Calculating speed "V"

V	=	**n : iovxUA x 0.06**	
n	=	Engine speed (rpm)	
iov	=	Overall ratio	
UA	=	Dynamic rolling circumference of tyres (m)	
V	=	Road speed (km/h)	

Example:

V = 1000 : 3.000 x 1.93 x 0.06 = 39 km/h

The road speed at an engine speed of 1000 rpm in 6th gear is 39 km/h.

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 34-29 or Page 39-69.
- Capacities and specifications => from Page 00-3 or Page 00-7.

Nuts, bolts

- ♦ Loosen nuts or bolts, opposite to tightening sequence.
- ♦ Nuts and bolts which secure covers and housings should be slackened and tightened crosswise in stages if no tightening sequence is specified.
- ♦ The tightening torques stated apply to non-oiled nuts and bolts.
- ♦ Always renew self-locking nuts and bolts.
- ♦ 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.
- ♦ Mark needle bearings of 1st to 6th speed sliding gears when removing, this ensures that when installing, the same installation position can be guaranteed.
- ▸ 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 orinner 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.

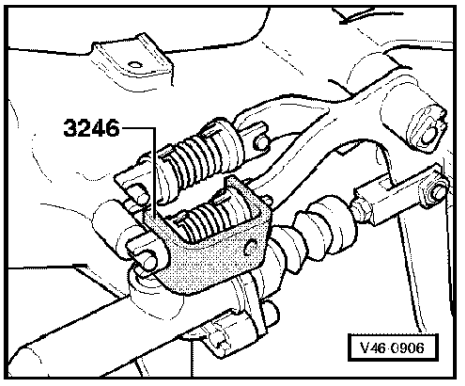


Fig.2 Removing and installing over-centre spring

- Remove left-hand storage compartment

=> General body repairs; Repair group 70; Dash panel; Removing driver's side storage compartment =>

- Take securing clip off pivot pin.
- Slide installation clamp 3246 onto over-centre spring from the side.
- Depress clutch pedal and remove over-centre spring together with installation clamp.

Notes:

- Installation clamp 3246 is shown in the illustration with the pedal bracket removed.
- Before assembling, lubricate moving parts with G 052 142 A2 polycarbamide grease.

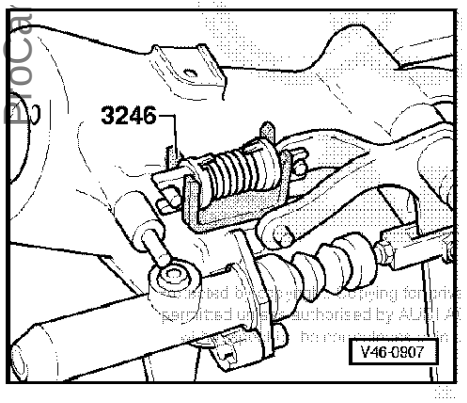


Fig.3 Removing and installing assister spring

- Remove over-centre spring => Fig. 2.
- Take securing clip off pivot pin.
- With clutch pedal slightly depressed, slide installation clamp 3246 onto assister spring from below.
- Depress clutch pedal and remove assister spring together with installation clamp.

Notes:

- Installation clamp 3246 is shown in the illustration with the pedal bracket removed.
- Before assembling, lubricate moving parts with G 052 142 A2 polycarbamide grease.

– Hold gear stick in this position and tighten ball housing bolts.
– Install gear stick cover and knob.
– Alignexhaust system free of stress

=> Avant RS2; Repair group 26; Aligning exhaust system free of stress =>

Removing and installing gearbox

Special tools, testers and auxiliary items required:

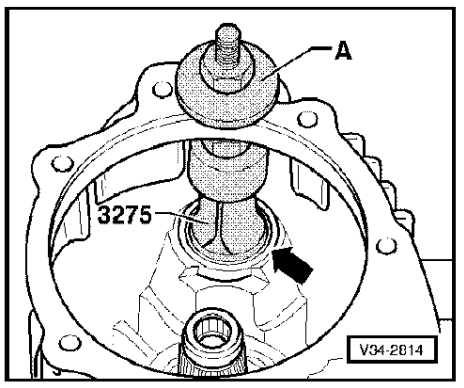
♦ Engine support bracket 10-222 A
♦ Gearbox support 3282
♦ Adjustment plate 3282/12
♦ Gearbox jack V.A.G 1383 A

Removing

Note:

Obtain anti-theft code for radio before disconnecting the battery.

– Remove battery cover.
– Disconnect battery earth strap.
– Remove air cleaner housing cover with air mass meter.
– Detach lower section of air cleaner housing.
– Remove noise insulation below engine compartment and unbolt noise insulation bracket.



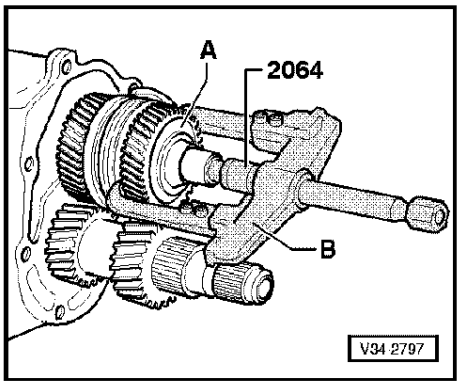
- Pull 2nd inner race for ball bearing for input shaft from input shaft.

_ A - Washer

Note:

The internal extractor 3275 grips the circumferential groove of the inner race -arrow- during the pulling operation.

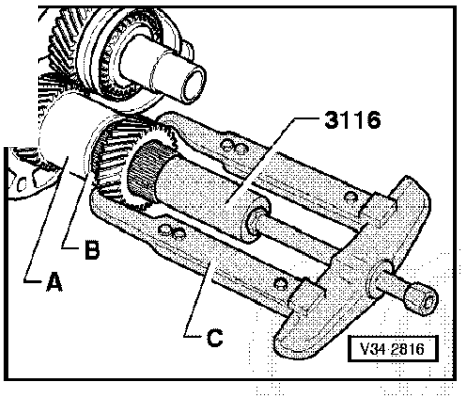
- Take off end cover together with end cover/bearing plate gasket.
- Pull dowel sleeves out of bearing plate.



- Pull off 5th speed sliding gear with spring together with 1st inner race -A- for ball bearing for input shaft.

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

- Take off 5th gear synchro-ring.
- Take off circlip for 5th speed gear.



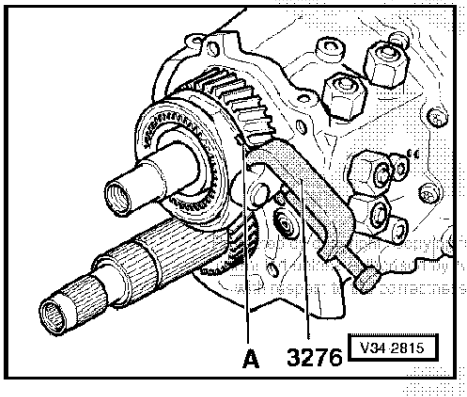
- Pull off 5th speed gear, to do this, block hollow shaft by engaging 2 gears =>Page 34-49.

Note:

Use only hexagon bolt of tensioning sleeve 3116, length 50 mm.

_ C - Two arm puller, e.g. Kukko 20/10 with 200 mm long puller arms

- Remove shim -B- for 5th speed gear, note thickness and redetermine if necessary =>Page 34-68.
- Take off spacer sleeve -A-.



- Press out roll pin -A- for selector fork for 5th and 6th gear.

Note:

Do not drive out roll pin, otherwise selector rod bearing will be damaged.

- Pull selector rod on follower together with selector fork for 5th and 6th gear and locking collar as far as possible away from bearing plate (until stop is felt).

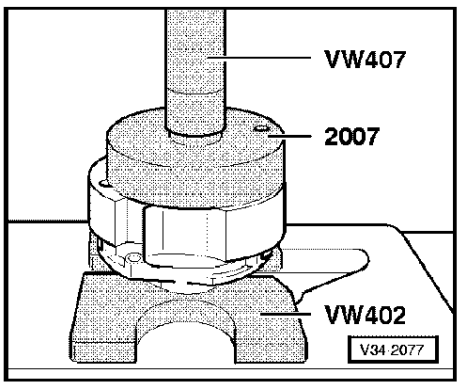


Fig.4 Pressing on balance weight

Note:

Note position of holes.

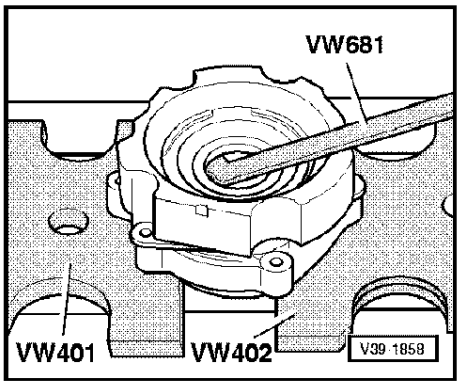


Fig.5 Pulling out seal

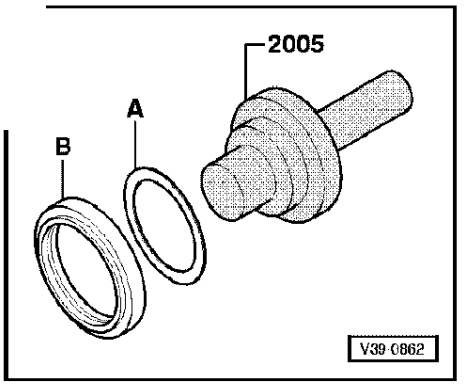


Fig.6 Preparing seal for installation

- A - Shim Part No. 016 311 391 B (1.7 mm thick)
- B - Seal
- Fill space between sealing and dust lips with multipurpose grease.
- Fit shim and seal onto tool one after the other.
  - Installation position: open side of seal towards bearing housing

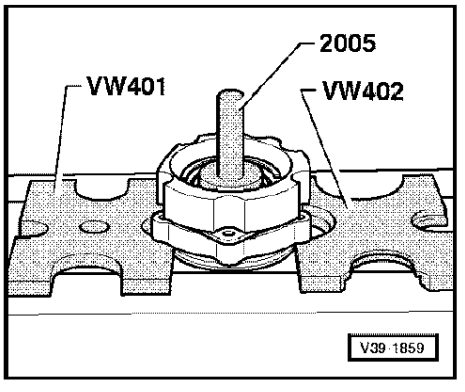
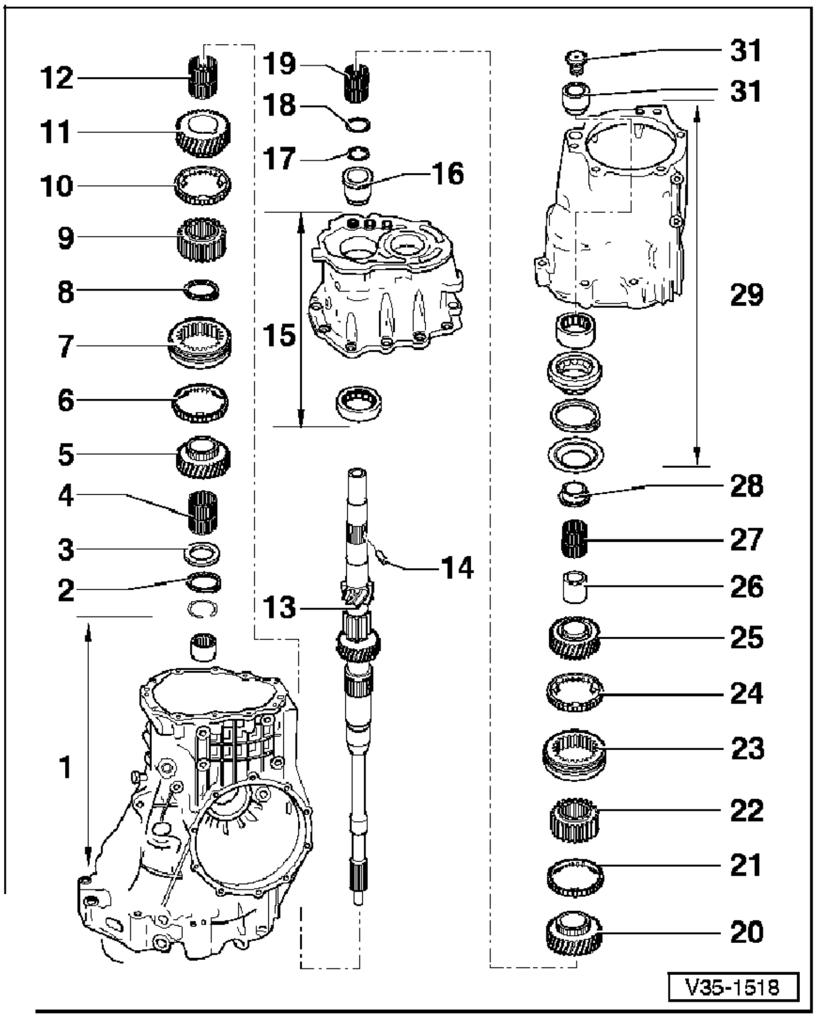


Fig.7 Driving in seal

- Remove shim.

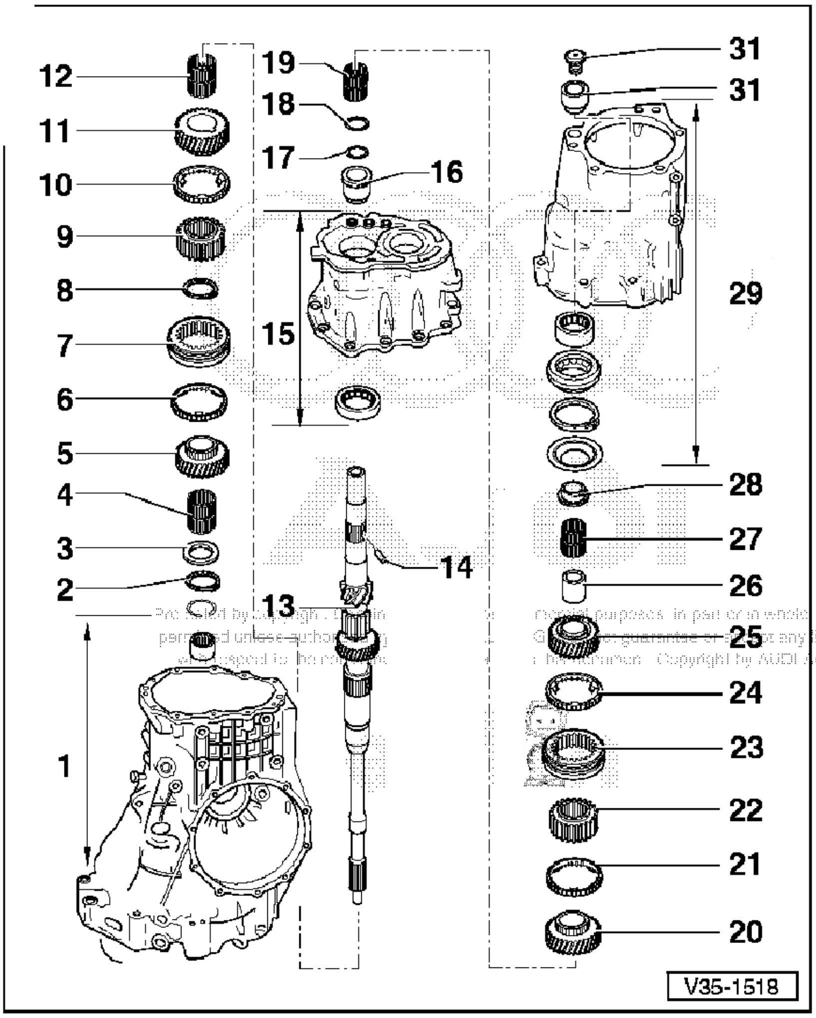


Dismantling and assembling input shaft

Notes:

- ♦ When installing new gears, refer to => Technical data, Page 00-3.
- ♦ In gearboxes with code letters CGR from serial No.77644onwardsand in gearboxes with code letters CRB a wider 1st speed gear (on input shaft -Item 13-) and a wider 1st speed sliding gear are fitted. At the same time the bearing plate -Item 15– was modified and the width of the cylinder roller bearing inner race -Item 16– was reduced.
- ♦ Mixed installation of components belonging to old and new versions is not permissible.

1 – **Gearbox housing**
- ♦ Servicing => Page 34-114



2 – **Circlip**

3 – **Thrust washer**

4 – **Needle bearing for 4th gear**
- ♦ Mark before removing
- ♦ Do not interchange with needle bearing for 3rd gear
- ♦ Oil with gear oil before installing

5 – **4th speed sliding gear**
- ♦ Before installing, insert spring => Fig. 1
- ♦ After installing, check axial clearance with a feeler gauge (0.15 ... 0.35 mm)

6 – **Synchro-ring for 4th gear**
- ♦ Checking for wear => Fig. 2

Renewing seal for flange shaft

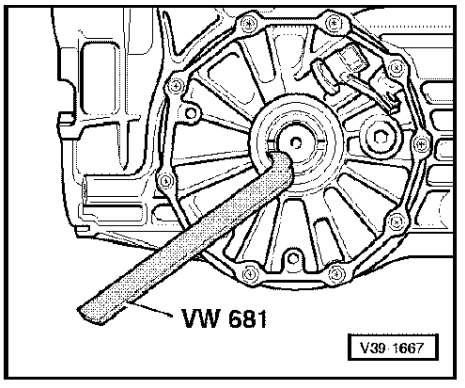
- Gearbox installed

Notes:

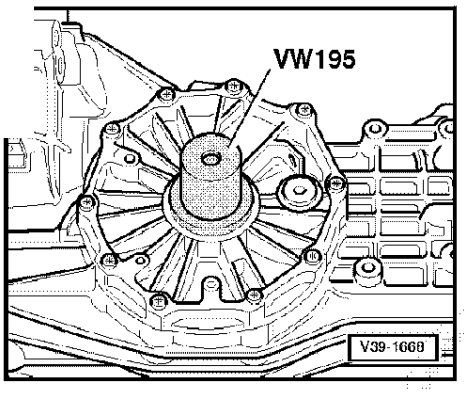
- Illustrated, removing and installing oil seal on left-hand side.
- Procedure for removing oil seal on left and right-hand sides is identical.

Removing

- Remove heat shield.
- Disconnect drive shaft.
- Place a drip tray underneath.



- Remove flange shaft, secure with a drift to prevent it turning.
- Pull seal out with lever VW 681.



Installing

- Fill space between sealing and dust lips with multipurpose grease.
- Lightly oil outer circumference of seal.
- Drive in seal for flange shaft.
  - Insertion depth: 6.5 mm
- Install flange shaft and drive shaft.

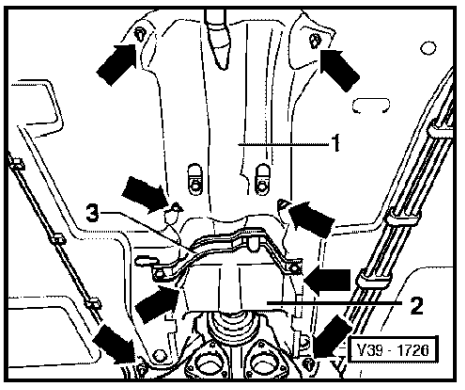
Tightening torques

Component	Nm
Flange shaft to gearbox	10 + 90°[1])
Drive shaft to flange shaft	80

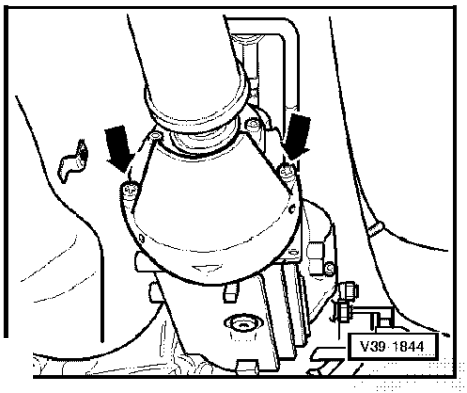
[1]) 90° = 1/4turn

Removing and installing propshaft

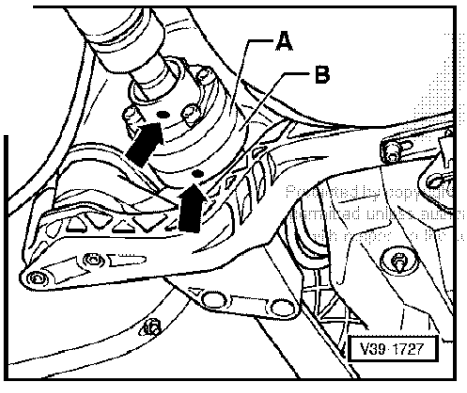
Removing



- Observe notes => Page 39-57.
- Remove parts of exhaust system behind catalytic converters => Avant RS2; Repair group 26; Removing and installing parts of exhaust system =>
- Remove head shields -1- and -2- -arrows-.
- Unbolt cross member -3- below propshaft.



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

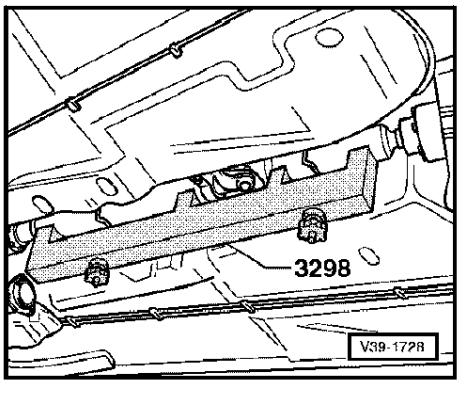


- Check whether there is a factory marking (paint spots -arrows-) on the propshaft flange and the flange on the rear final drive. If not, mark the position of the propshaft flange -A- in relation to the rear final drive -arrow B- with paint.

Note:

Only mark if the same propshaft is to be reinstalled.

- Slacken securing bolts on both propshaft flanges.

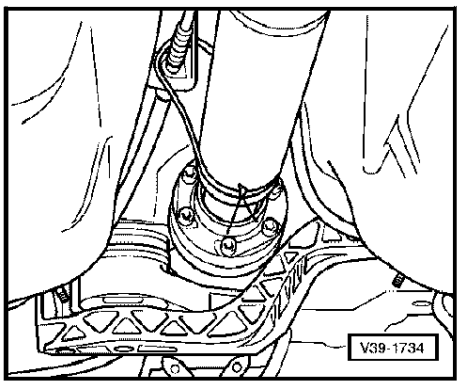


- Attach assembly tool 3298 and tighten plastic nuts.

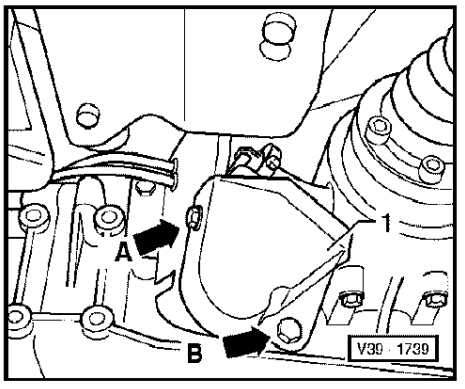
Note:

Never fit assembly tool onto balance plates.

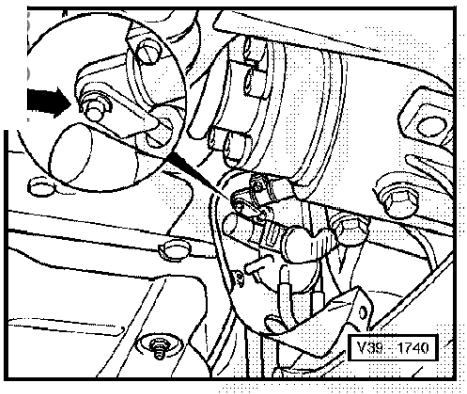
- Loosen bolts securing centre propshaft mounting to body.
- Remove securing bolts and shims from centre mounting.
- Slide propshaft together towards rear final drive. The constant velocity joints move along their axes.



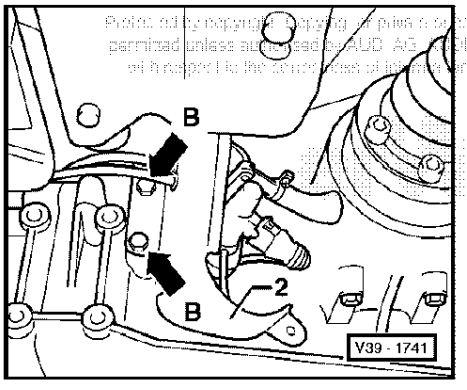
- Tie up propshaft to handbrake cable bracket with wire.



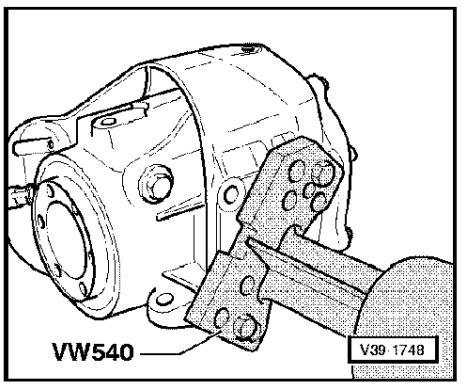
- Unbolt heat shield -1- for differential lock actuator -arrows A and B-.



- Using a screwdriver, prise off circlip -arrow- on connection between differential lock actuator and differential lock.
- Take out connecting pin from above.



- Unclip electrical wiring and hoses for differential lock actuator.
- Unbolt bracket -2- for vacuum unit and switch for differential lock on rear final drive -arrow B-.
- Move bracket clear to the side with wiring and hoses connected, and tie up with wire.



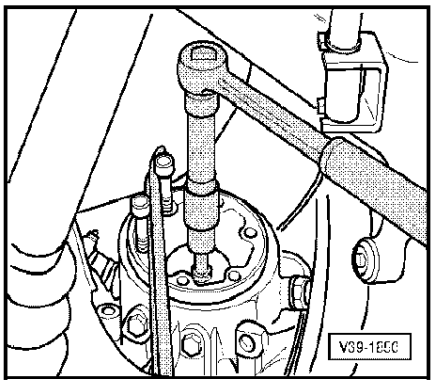
Removing

- Rear final drive removed

– Secure complete rear final drive on a repair stand with bracket VW 540.

– Place drip tray underneath to collect oil.

– Drain gear 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 (left and right) and pull out.

– Remove clutch body for differential lock => Page 39-136. Selector fork and locking collar remain in final drive.

– Unscrew securing bolts from cover for final drive.

– Take cover for final drive off axle housing and remove differential.

Installing

Install in reverse order.

– Insert differential.

– Clean sealing surface and coat with sealing paste AMV 188 200 03.

– Fit final drive cover on axle housing and tighten bolts in diagonal sequence.

– Install clutch body for differential lock with correct shim => from Page 39-136.

– Fill space between sealing and dust lips with multipurpose grease.

– Fit flange shafts and tighten

Note:

A shim is fitted between differential and right flange shaft.

– Top-up gear oil in rear final drive and check oil level => Page 39-69.

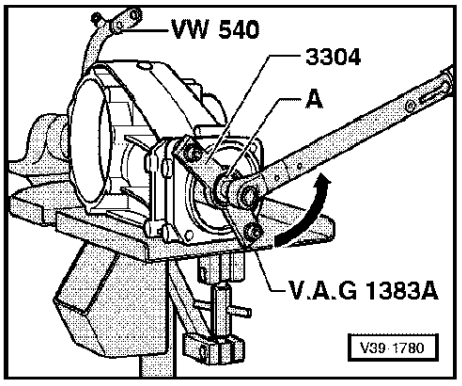


Fig.11 Tightening drive pinion nut and setting frictional torque

Notes:

- ♦ Only increase tightening torque slowly and read-off frictional torque frequently. If the specified frictional torque is exceeded, the spacer sleeve must be replaced and the adjustment repeated. It is not possible to reuse a spacer sleeve that has been excessively compressed.
- ♦ The final drive must be supported (e.g. with V.A.G 1383 A) when tightening the drive pinion nut, otherwise the threaded holes in the housing will be damaged.

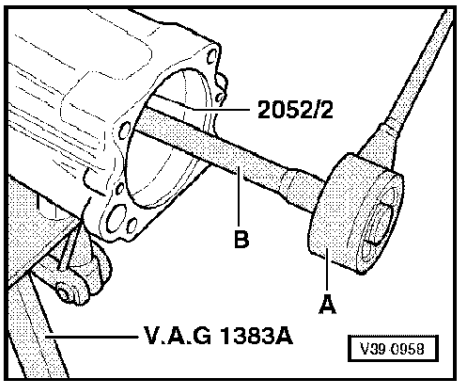


Fig.12 Measuring frictional torque

- _ A - Torque gauge, commercially available, 0 ... 600 Ncm
- _ B - Socket (32 mm)
- – The following frictional torques should be set:

New bearings	Used bearings
250 ... 300 Ncm	30 ... 60 Ncm

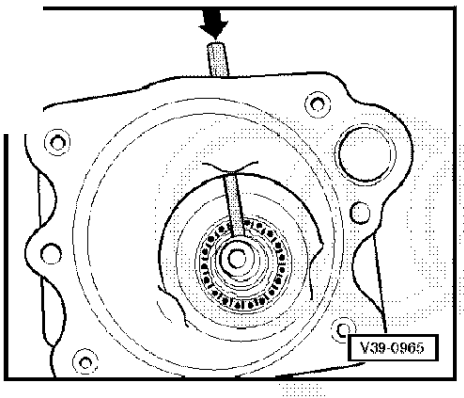


Fig.13 Locking drive pinion nut

– Peen drive pinion nut with punch.

Adjustment overview

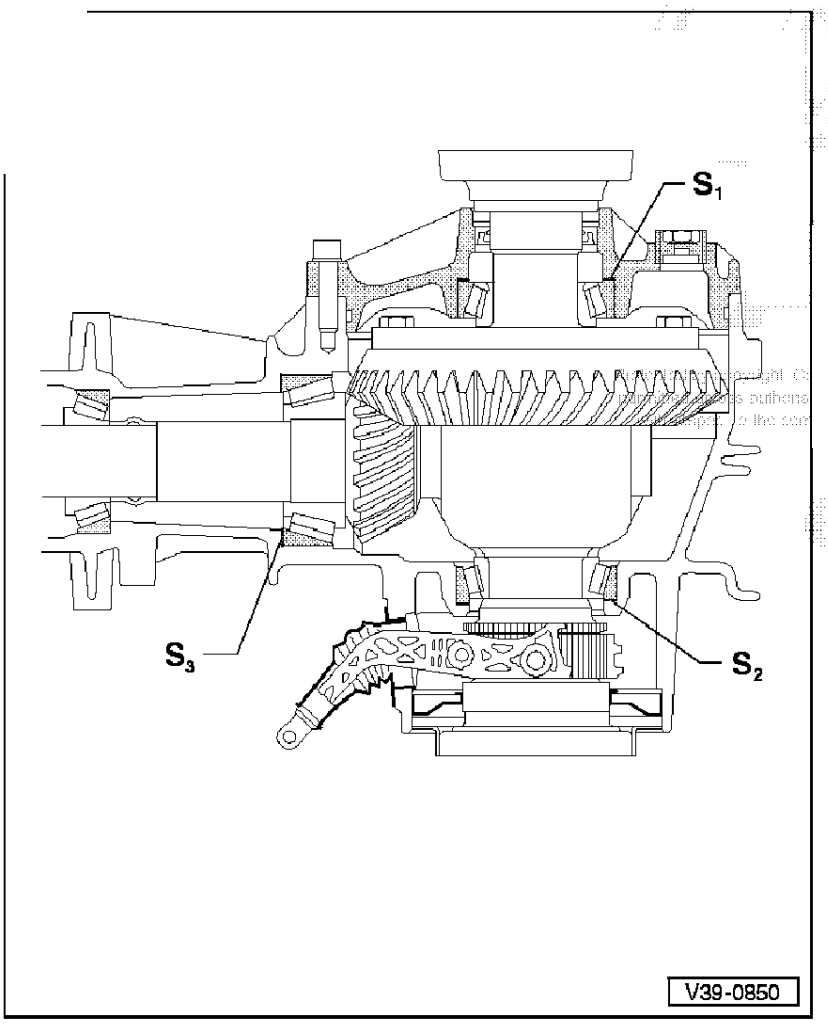
Note:

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 39-162	Drive pinion "S3" [1] via deviation "r" => Page 39-151	Backlash 0.12 ... 0.22 mm => Page 39-167	Left flange shaft => Page 39-143
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 39-150.

[2] Drive pinion and crown wheel; only renew together.



Position of shims

Note:

Adjustment overview when renewing individual components of final drive => Page 39-149.

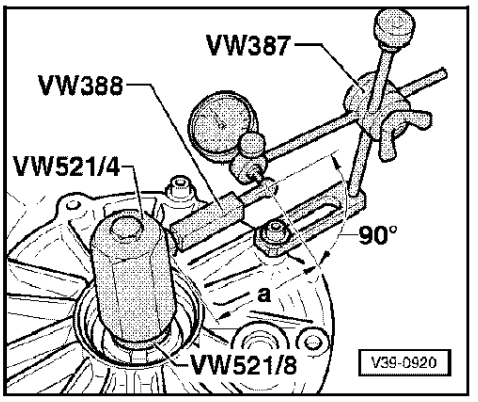
- **S1 - Adjustment shim for crown wheel in cover for final drive**
- **S2 - Adjustment shim for crown wheel in final drive housing**
- **S3 - Adjustment shim for drive pinion in final drive housing**

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

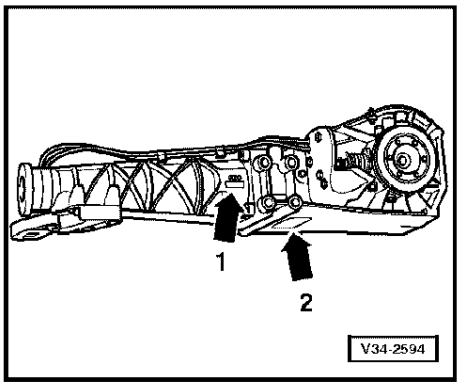
Example:		
	1st measurement	0.28 mm
+	2nd measurement	0.30 mm
+	3rd measurement	0.30 mm
+	4th measurement	0.28 mm
=	Sum of measured values	1.16 mm

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

Identification of rear final drive

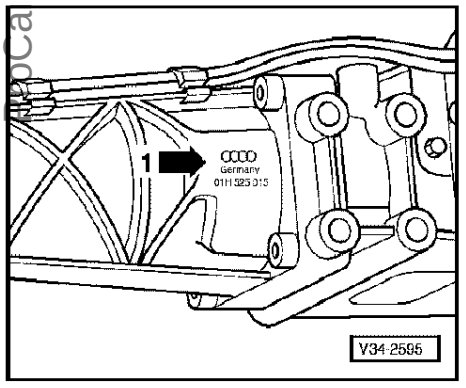
Final drive 01H is fitted in conjunction with manual gearbox 01E (four-wheel drive).

Allocation = >Page 00-7, Technical data.

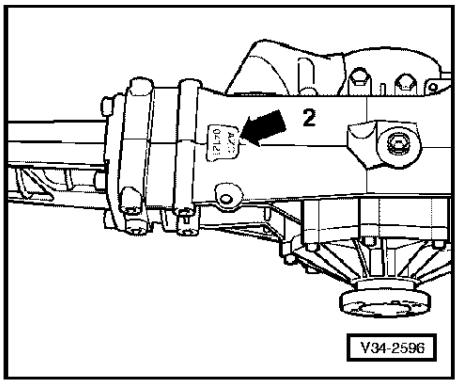


Location on final drive

- ♦ Final drive 01H -arrow 1-
- ♦ Code letters and date of manufacture -arrow 2-



Final drive 01H -arrow 1-



Code letters and date of manufacture of rear final drive -arrow 2-

Example:	AZC	04	12	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.