Drive pinion, adjusting

(Adjusting drive pinion and hollow shaft)

Repairs after which the drive pinion must be adjusted ⇒ Page 39-37 , table

Special tools, testers and auxiliary items

- Universal mandrel VW 385/1
- Centering disc VW 385/2
- Centering disc VW 385/3
- Measuring plunger VW 385/14
- Measuring plate VW 385/17
- Master gauge VW 385/30
- Universal dial gauge bracket VW 387
- Press tool VW 407
- Multi-purpose tool VW 771/15

- Thrust pad 3062
- Pin 3114/2

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- Clamping sleeve 3116
- Bolt 3116/1
- Torque gauge 0-600 Ncm
- Dial gauge
- Dial gauge extension 6.5 mm
- Dial gauge extension 30 mm

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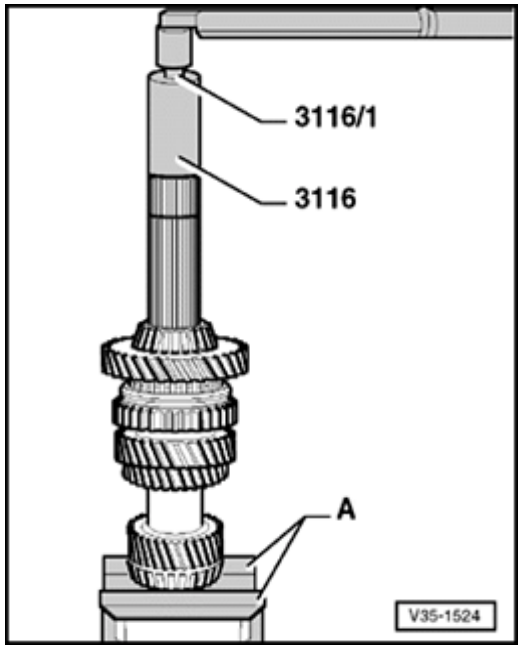
Determining total shim thickness "S_{total}" for shims "S3" + "S4"

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

- Differential removed



- Clamp drive pinion in a vice using clamps -A-.
- Insert tapered rollers with grease, assemble drive pinion and hollow shaft.
- Turn hollow shaft against drive pinion five turns in both directions so that tapered roller bearings settle.
- Preload drive pinion/hollow shaft to 10 Nm, hold hollow shaft when doing this.
- Insert outer race for tapered roller bearing for drive pinion into transmission housing without shims ⇒ *Fig. 2* , ⇒ Page 35-22 and ⇒ *Fig. 3* , ⇒ Page 35-23 .

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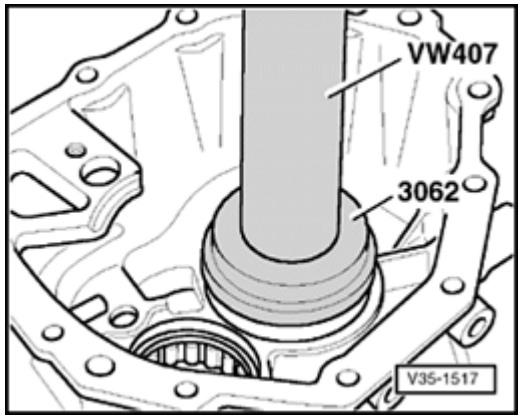
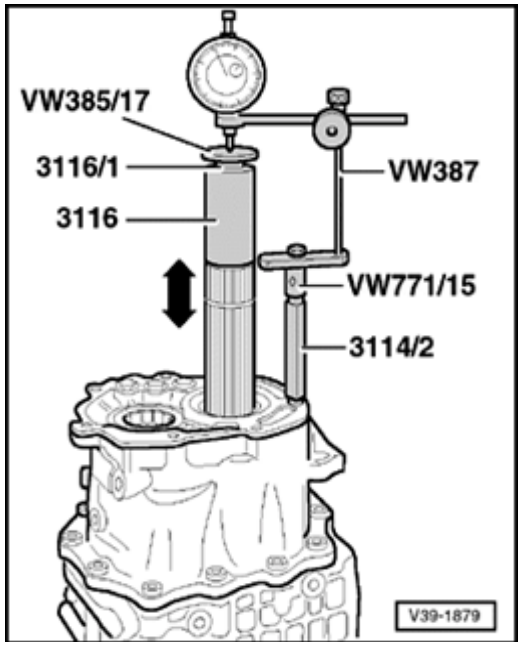


- Insert outer race for tapered roller bearing for drive pinion with shim "S4*" (1.0 mm thick) into bearing plate.

Note:

For measurement purposes a shim "S4" of 1.0 mm is initially inserted which is designated "S4" After determining measurement "e" "S4*" will be replaced by the correct shim "S4."*

- Insert completely assembled drive pinion in transmission housing.
- Fit bearing plate with dowel sleeves and tighten to 25 Nm.
- Turn drive pinion with hollow shaft five turns in both directions so that tapered roller bearings settle.



- Assemble measuring equipment, use a 30 mm dial gauge extension.
- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.

Note:

The tip of the dial gauge must be positioned on center of drive pinion.

- Lift drive pinion, without turning, and read off play on dial gauge.

  Measurement in example: 0.90 mm

Note:

If the measurement has to be repeated, the drive pinion with hollow shaft must be turned 5 turns in each direction to settle the tapered roller bearings. Set dial gauge again to "0" with 2 mm preload.

Formula:

"S_{total}" = "S4*" + measurement + bearing preload

Example:

	Inserted shim "S4*"	1.00 mm
+	Measured value (example)	0.90 mm
+	Bearing preload (constant)	0.15 mm
=	Total shim thickness "S_{total}" for "S3" + "S4"	2.05 mm

Determining thickness of shim "S3*"

Formula:

"S3*" = "S_{total}" - "S4*"

Example:

	Total shim thickness "S_{total}" for "S3" + "S4"	2.05 mm
-	Inserted shim "S4*"	1.00 mm
=	Thickness of shim "S3*"	1.05 mm

Remove outer race for tapered roller bearing, insert shim "S3*" into transmission housing and install outer race again

⇒ *Fig. 2* , ⇒ Page 35-22 and

⇒ *Fig. 3* , ⇒ Page 35-23 .

- Insert completely assembled drive pinion into transmission housing again.

- Fit bearing plate with dowel sleeves and tighten securing bolts to 25 Nm.

- Turn drive pinion with hollow shaft five turns in both directions to settle the tapered roller bearing.

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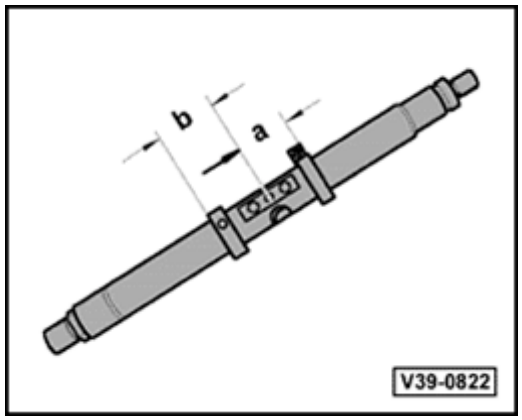
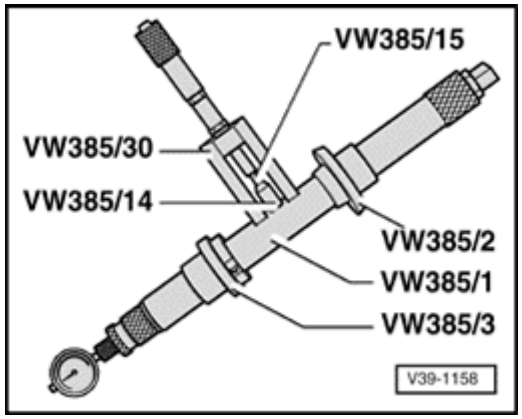
Determining measurement "e"

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:
  - Dimension a = 65 mm
  - Dimension b = 55 mm



- Assemble universal mandrel VW 385/1 as illustrated:
  - Dial gauge extension VW 385/15, 9.3 mm long
  - Master gauge VW 385/30
- Set master gauge VW 385/30 to Ro = 59.65 mm and fit onto mandrel.
- Set dial gauge (3 mm measuring range) to "0" with 2 mm preload.

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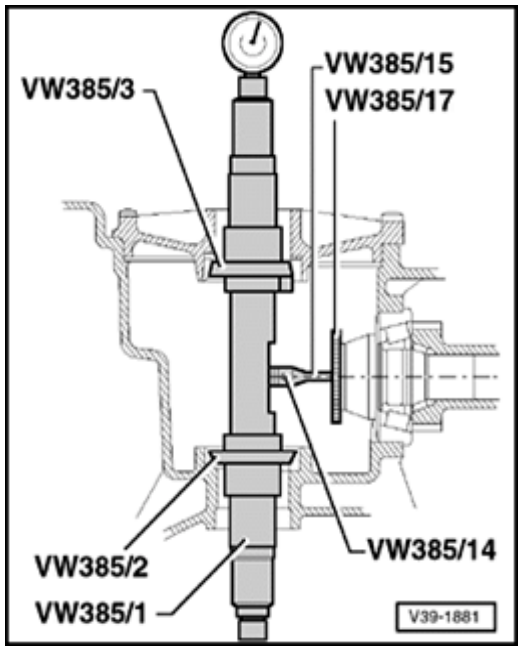
Note:

The gauge VW 385/27 can also be used in place of the master gauge VW 385/30 (Ro = 59.65 mm).



Arrangement of measuring equipment when determining dimension "e"

- Place end measuring plate VW 385/17 onto drive pinion head.

Note:

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

- Take master gauge off mandrel.
- Insert mandrel into transmission housing.
  - ♦ The centering disc 385/3 faces toward cover for final drive
- Fit cover for final drive and tighten 4 bolts to 25 Nm.
- Using adjustable ring, pull 2nd centering disc VW 385/2 out as far as possible so that mandrel can still just be turned by hand.

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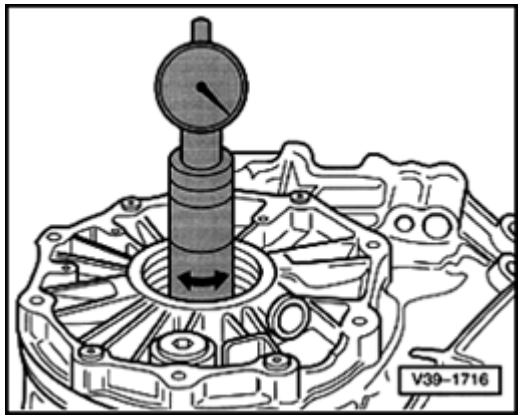

- Turn mandrel until dial gauge plunger tip touches end measuring plate on drive pinion head, then measure maximum deflection (return point).
  - Measurement in following example: "e" = 0.16 mm (in red scale)

Determining thickness of shim "S3"

Formula:

"S3" = "S3*" + "r" + "e"

("e" in black scale)

or

"S3" = "S3*" + "r" - "e"

("e" in red scale)

Note:

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

Example:

	Inserted shim "S3*"	1.05 mm
+	Deviation "r"	0.38 mm
-	Determined "e" (in red scale)	
		0.16 mm
=	Thickness of shim "S3"	1.27 mm

- Determine shim(s) from table.

⇒ *Parts catalog*

The following shims are available for "S3"

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

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

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Determining thickness of shim "S4"

Formula:

"S4" = "S_{total}" - "S3"

Example:

	Total shim thickness "S_{total}" for "S3" + "S4"	2.05 mm
-	Thickness of shim "S3"	1.27 mm
=	Thickness of shim "S4"	0.78 mm

- Determine shim(s) from table.

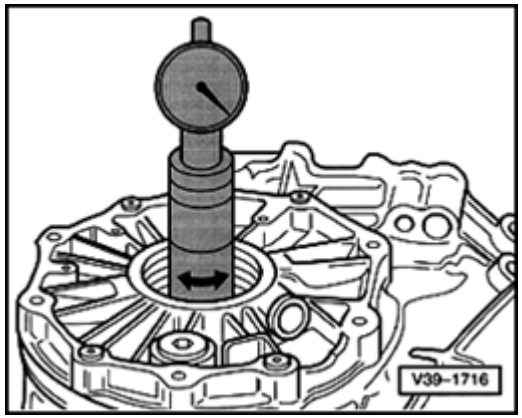
⇒ *Parts catalog*

The following shims are available 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.

39-50



Performing check measurement

Checking dimension "r"

- Install drive pinion with determined shims "S3" and "S4" and turn 5 turns in both directions.

- Insert universal mandrel, ⇒ Page 39-45 , "determining measurement 'e'" 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 ring gear) must be shown - within a tolerance of ± 0.04 mm

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.

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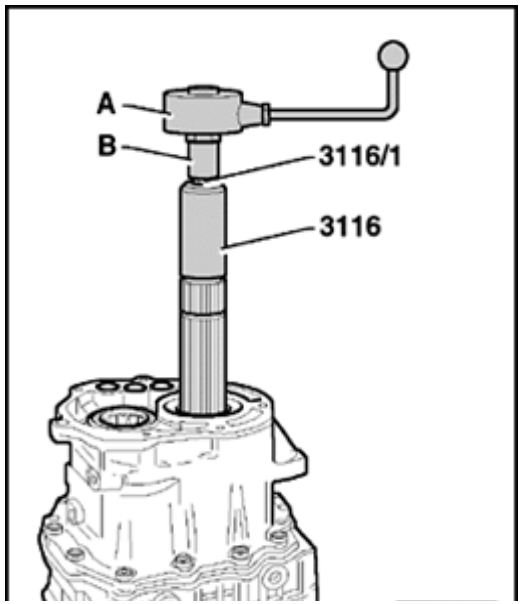
Measuring friction torque (check)

Note:

- *Drive pinion/hollow shaft tapered roller bearings are low friction bearings. Therefore the frictional torque has only a limited use as a check. Correct adjustment is only possible by determining the total shim thickness "S_{total}."*

- *Do not additionally oil new tapered roller bearing to perform the frictional torque measurement. These bearings have already been treated with a special oil by the manufacturer.*



- Fit torque gauge 0-600 Ncm -A- onto drive pinion.

B - Socket

- Insert tensioning sleeve 3116.

Frictional torque specification:

New bearings	Used bearings
80-150 Ncm	30-60 Ncm