Worksheet for adjustment of axle drive

Axle model **737.0/1/41** and **747.0/1/41**

Customer	Vehicle Ident. No.	Date	Order No.
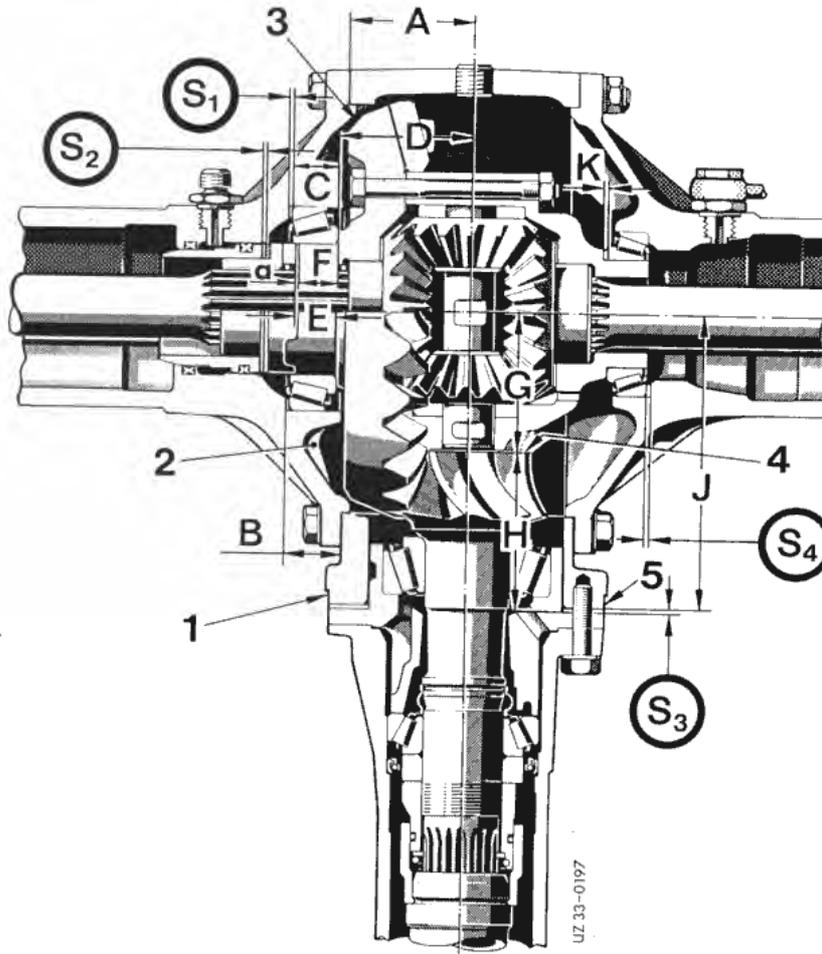
UZ 33-0197

Adjustment, brake-away moment for tapered roller bearing of drive pinion

- Clean tapered roller bearing and install with transmission oil SAE 90.
- Use always a new collapsable sleeve, remove preservation coating.
- When tightening the nut turn the flange.
- Find out the correct break-away moment.

  Do not hammer on the flange since this would influence the reading.

Type	Width of center axle housing	Tapered roller bearing for drive pinion	Brake-away moment **Nm**
411, 421	130 mm	001 981 37 05 (large) 001 981 44 05 (small)	**2,0 to 2,2** to vehicle ident. no. 011 819 (08.77)
421* 407	130 mm	001 981 46 05 (large) 001 981 44 05 (small)	**2,5 to 3,0** *from vehicle ident. no. 011 820 (09.77)
403, 406 413, 416	130 mm	001 981 46 05 (large) 001 981 44 05 (small)	**2,5 to 3,0** to vehicle ident. no. 028 562 (05.71)
403*, 406*, 413*, 416*, 417, 424, 427, 435, 437	140 mm	003 981 92 05 (large) 004 981 28 05 (small)	**3,0 to 3,5** *from vehicle ident. no. 028 563 (05.71)

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1. 51/51

489

Determine shim thickness S₁ up to S₄

1. Shim thickness S₁ (large bearing)

$$S_1 = (A + B) - (C + D)$$

A =	C =	(A + B)=
+ B =	+ D =	− (C + D)=
(A + B) =	(C + D) =	S₁ =

A Measurement „1" is stamped on center axle housing.

   Note: In front of the stamped number i. e. *88* the number *64* must be inserted on axle housing *130 mm*, respectively *74* on axle housing *140 mm*. The numbers are stamped in 2 digits after the comma.

B Measurement „2" stamped in axle tube, differential lock side.

C Total hight of large tapered roller bearing.

D Measurement „3" written on ring gear.

2. Shim thickness S₂ (shifting claw clearance)

$$S_2 = E - (F + a)$$

F =	E =
+ a =	− (F + a) =
(F + a) =	S₂ =

F Measurement from top ring gear differential claw to base of large tapered roller bearing.

a Shifting claw clearance of disengaged differential lock.   **Clearance =**

E Measurement from large tapered roller bearing inner race to top of shifting claw.

   ● install piston, shifting claw and thrust washer (without shim) and shims S₁ together with outer race of bearing into the axle tube.

   ● insert large tapered roller bearing and measure with depth gauge from top of inner race to shifting claw.

3. Shim thickness S₃ (pinion flange)

$$S_3 = (G + H) - J$$

G =	(G + H) =
+ H =	− J =
(G + H) =	S₃ =

G Measurement „4", from surface of drive pinion to center of differential, written on top of drive pinion.

H Measurement from surface of drive pinion up to pinion flange, measured with depth gauge.

J Measurement „5", from center of differential to flange, stamped into **upper side** on axle center housing.

   Note: In front of i.e. *6,77* the number   *17* has to be inserted,
   in front of i.e.   *77* the number *176* has to be inserted,
   in front of i.e.   *00* the number *177* has to be inserted.
   Now, only the number after the comma are stamped in 2 digits.

4. Shim thickness S₄ (small bearing)

$$S_4 = K$$

Measurement example at housing width	
130 mm	**140 mm**
64,88	74,88
20,60	33,10
26,50	29,00
56,90	76,90
38,00	33,30
0,5 ± 0,2 mm	
39,30	34,80
85,80	86,15
91,40	92,05
176,77	176,77
176,77	176,77
177,00	177,00
1,0 − 2,0	1,0 − 2,0

● Install outer bearing race into axle tube **without** compensating shims.

● Install bearing **approx. 2/3 rd.** with inner race to the differential housing.

● Position axle center housing with 2 screws to the axle tube, differential lock side.

● Install return spring and differential into center housing.

● Position long axle tube to center housing, tighten **6 bolts** crosswise while rotating continuously.

● Remove long axle tube and pull-out bearing outer race again.

● Measure gap K with feeler gauge, insert determindes shims S₄ under outer bearing race and force in bearing race. **Remark:** If NILOSRING was installed **do not install** again. Select compensating shims that clearance of **0 ± 0,05 mm** achieved.

● Press tapered roller bearing inner race on differential housing.

● Assemble axle.

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1.5/2

490

Worksheet for adjustment of axle drive
Axle model **737.2/42** and **747.2/42**

Customer	Vehicle Ident. No.	Date	Order No.
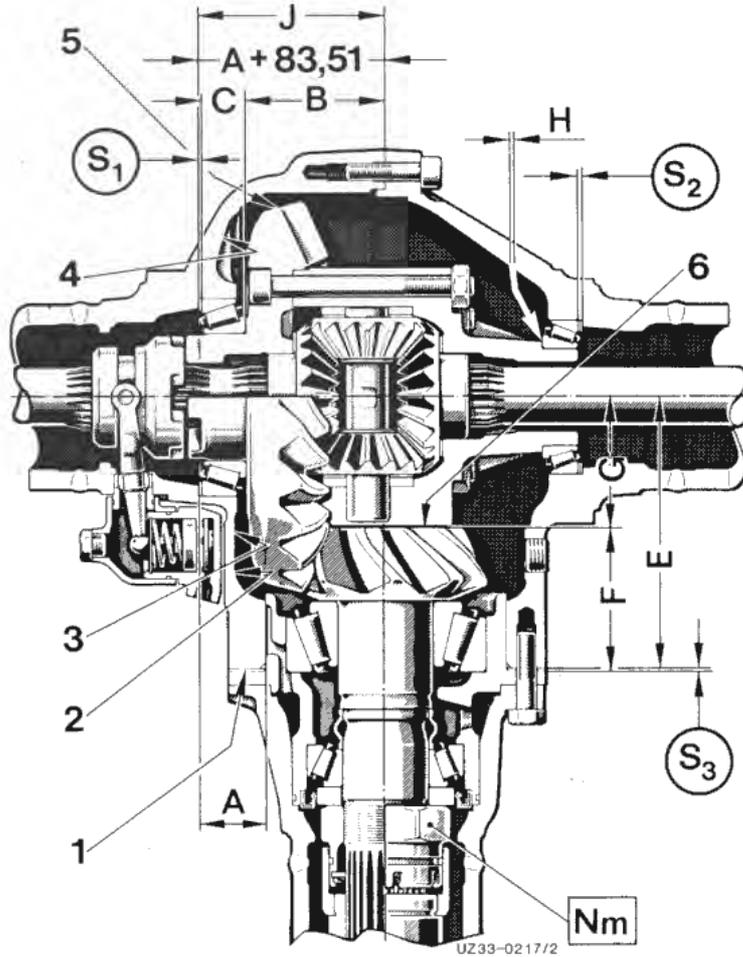
UZ33–0217/2

Adjustment, brake-away moment for tapered roller bearing of drive pinion

- Clean tapered roller bearing and install with transmission oil SAE 90.
- Use always an new collapsable sleeve, remove preservation coating.
- When tightening the nut turn the flange.
- Find out the correct break-away moment.

Type	Axle model	Tapered roller bearing for drive pinion	Brake-away moment **Nm**
425, 435, 437	737.2 747.2	005 981 05 05 (large) 004 981 97 05 (small)	6,0 to 6,5
424, 427	737.42 747.42	006 981 71 05 (large) 003 981 92 05 (small)	6,5 to 7,0

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1.5 15/3

491

Determine shim thickness S_1 up to S_3

1. Shim thickness S_1 (large bearing)

$S_1 = J - (B + C)$

	Measurement example at axle type	
	737.2 747.2	**737.42 747.42**

Constante = 83,51	B =	J =
+ A =	+ C =	− (B + C) =
J =	(B + C) =	S_1 =

A Measurement „2" stamped in axle housing, differential lock side.

B Measurement „5" written on ring gear.

C Total hight of large tapered roller bearing.

J Measurement „4" was stamped in axle housing, differential lock side, **only up to axle number 500.**

	737.2 747.2	737.42 747.42
A	46,04	28,70
B	95,95	80,85
C	32,00	29,00
J	129,36	–

2. Shim thickness S_2 (small bearing)

$S_2 = H + I$

H =
+ I =
S_2 =

H Measurement from bearing inner race to bearing seat on differential housing.

I Preload   **Clearance =**

	737.2 747.2	737.42 747.42
H	1,0 – 2,0	1,0 – 2,0
Clearance	0,20	0,10

- Install outer bearing race into axle tube **without compensating shims.**
- Install bearing **approx. 2/3 rd.** with inner race to the differential housing.
- Install differential into the axle housing, differential lock side.
- Position long axle housing, tighten **6 bolts** crosswise while rotating continuously.
- Remove long axle housing and pull-out bearing outer race again.
- Measure gap H with feeler gauge and add the preload I to the achieved value.
- Insert shims S_2 in the achieved measurement into the axle housing and install the bearing outer race.
- Press tapered roller bearing inner race on differential housing.

3. Shim thickness S_3 (pinion flange)

$S_3 = (F + G) - E$

F =	(F + G) =
+ G =	− E =
(F + G) =	S_3 =

F Measurement from surface of drive pinion up to pinion flange, measured with depth gauge.

G Measurement „6" written on top of drive pinion.

E Measurement „3" was stamped in axle housing, differential lock side, **only up to axle number 149.**

    Measurement „1" written on top of axle housing, differential lock side, **from axle number 150.**

	737.2 747.2	737.42 747.42
F	101,60	99,60
G	93,20	86,10
E	193,00	184,90

- Assemble axle.

Worksheet for adjustment of axle drive

Axle model **737.50/53/55/56** and **747.50/53/55/56**

Customer	Vehicle Ident. No.	Date	Order No.
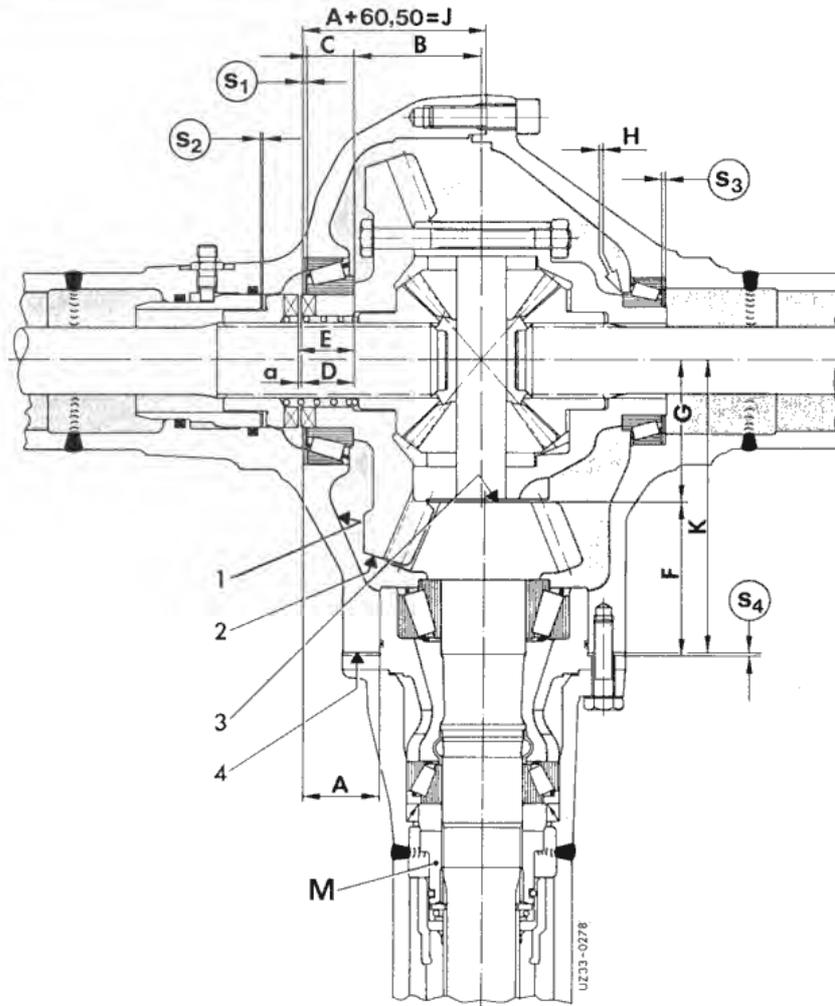
Adjustment, brake-away moment for tapered roller bearing of drive pinion

- Clean tapered roller bearing and install with transmission oil SAE 90.
- Use always a new collapsable sleeve, remove preservation coating.
- When tightening the nut (M) turn the flange.
- Find out the correct break-away moment.
  Do not hammer on the flange since this would influence the reading.

Type	Axle model	Tapered roller bearing for drive pinion	Brake-away moment **Nm** (Specified value)
408, 418	737.50/53/55/56 747.50/53/55/56	003 981 92 05 (large) 004 981 28 05 (small)	**3,0 to 3,5**

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1.5/5

493

Determine shim thickness S_1 up to S_4

1. Shim thickness S_1 (large bearing)

$S_1 = J - (B + C)$

Constant = 60,50	B =	J =
+ A =	+ C =	– (B + C)=
J =	(B + C) =	S_1 =

	Guide dimensions in mm
A Dimension "1" is engraved or written on the axle tube on the lock side.	47,60
B Dimension "2" is written on the circumference of the ring gear.	72,26
C Measure overall height of the large tapered roller bearing with outer race from the differential.	29,00

2. Shim thickness S_2 (shifting claw clearance)

$S_2 = E - (D + a)$

D =	E =
+ a =	– (D + a) =
(D + a) =	S_2 =

D Measurement from top ring gear differential claw to base of large tapered roller bearing.	33,05
a Shifting claw clearance of disengaged differential lock. **Clearance =**	0,5 ± 0,2
E Measurement from large tapered roller bearing inner race to top of shifting claw.	34,15

● Install piston, shifting claw and thrust washer (without shim) and shims S_1 together with outer race of bearing into the axle tube.
● Insert large tapered roller bearing and measure with depth gauge from top of inner race to shifting claw.

3. Shim thickness S_3 (small bearing)

$S_3 = H + I$

H =
+ I =
S_3 =

H Dimension from bearing inner race to contact surface of bearing on differential housing	
I Preload **Clearance =**	0,10

● Install bearing outer race in axle tube without shims.
● Install bearing approx. 2/3 rd. with inner race to the differential housing.
● Insert differential in axle tube on lock side.
● Mount long axle tube and tighten crosswise with 6 bolts while continuously turning the ring gear.
● Remove long axle tube and pull-out bearing outer race again.
● Measure gap H with feeler gauge and to determined dimension add the preload I.
● Insert determined dimension as shims S_3 in the bearing seat, axle tube and install bearing outer race.
● Press tapered roller bearing inner race on differential housing.

4. Shim thickness S_4 (pinion flange)

$S_4 = (F + G) - K$

F =	(F + G) =
+ G =	– K =
(F + G) =	S_4 =

F Measure dimension from end face of drive pinion up to contact surface of pinion flange with depth gauge.	91,80
G Dimension "3" is written on the end face of the drive pinion.	85,96
K Dimension "4" is written on the end face of the axle tube on the lock side.	176,73
● Assemble axle.	

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494