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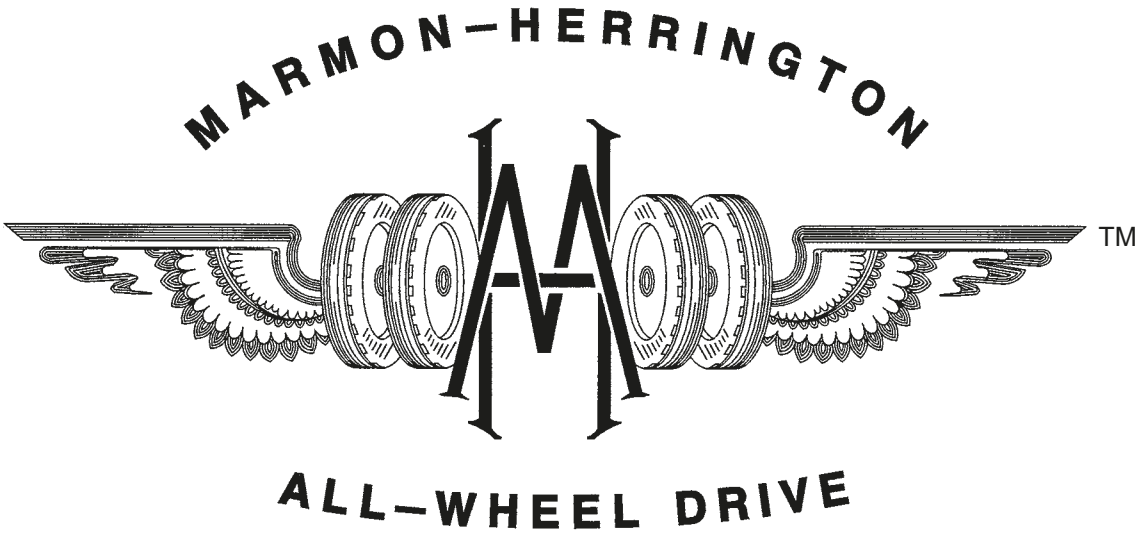

WORKSHOP MANUAL
DRIVEN FRONT AXLE
CT8 SERIES

MARMON-HERRINGTON ALL-WHEEL DRIVE
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FOREWORD

This production "GENERAL WORKSHOP MANUAL" was prepared for workshops and contains all the necessary assembly instructions as well as data to be checked and adjusted during repair, with the knowledge of which repair and adjustment of the

CT8

type driven front axles can properly be performed.

For technical data on the specific type versions of the **CT8** type driven front axles refer to the publication **"TECHNICAL DATA"**, while for the spare parts of that **"PARTS CATALOG"** grouped according to the Orderers.

The **"GENERAL WORKSHOP MANUAL"** contain divided into sections the technical data and the service instructions of the axle. The sections of the service instructions contain the disassembly and reassembly operations of the individual assembly unit, stating the special tools to be used.

The serial numbers of the figures are started from the beginning in each section. The item numbers of the figures for an assembly unit are referred to in each section dealing with the assembly procedures.

For service operations it is recommended to use the tools shown in the figures in order to assure proper assembly of the individual units. The figures show each essential service operation stating the designation of the tool and its service position. The tools are partly available from commerce and partly can be fabricated in the workshop according to the tool blueprint ordered on basis of tool list supplemented to the **"GENERAL WORKSHOP MANUAL"**.

The manufacturer shall not be liable for warranty claims on damages resulting from negligence of the general service practice required for normal service operations but not contained in this Manual.

For replacing assembly units or individual parts use ONLY **genuine MARMON-HERRINGTON made products.**

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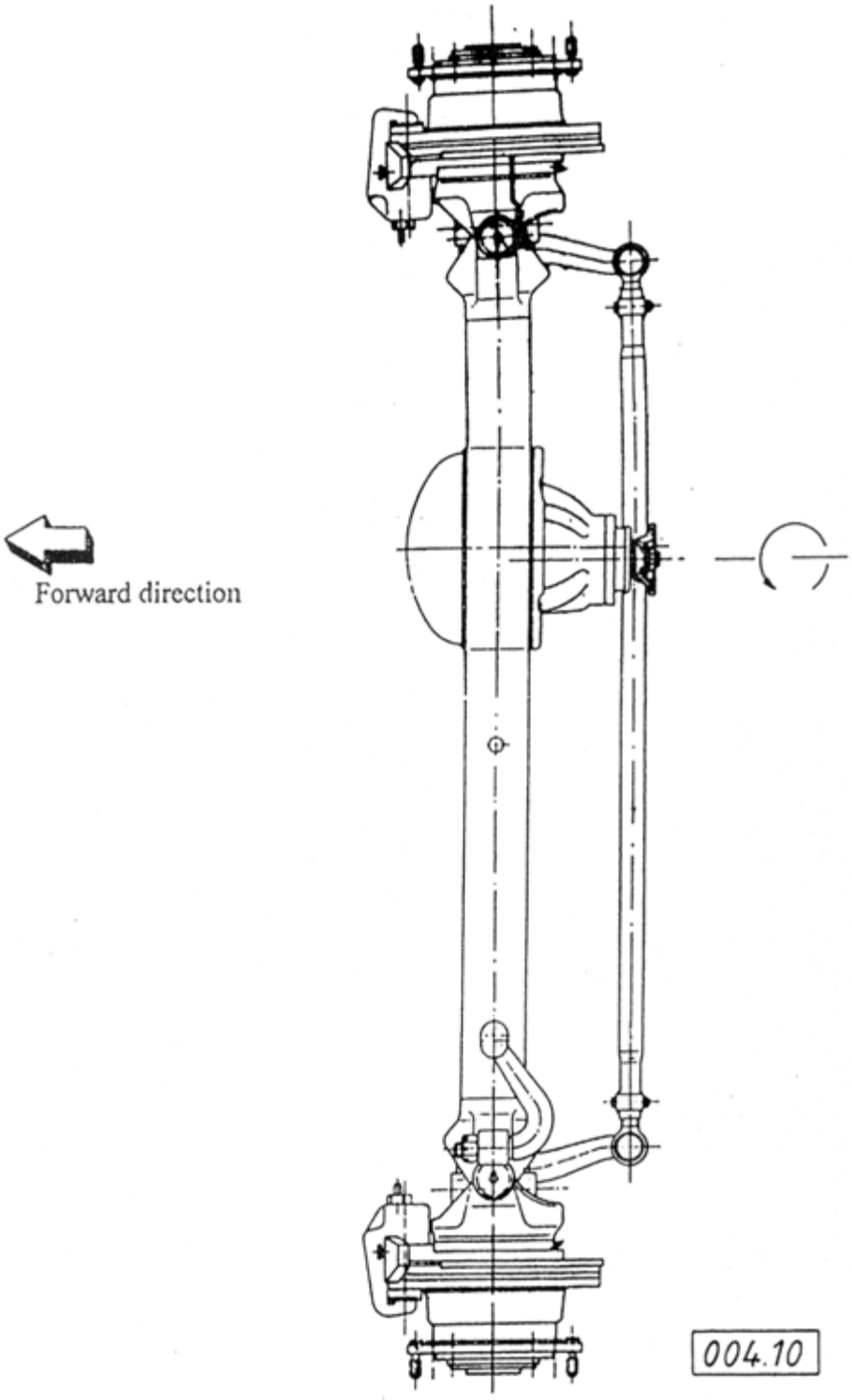
DRAWINGS OF THE AXLES

Example



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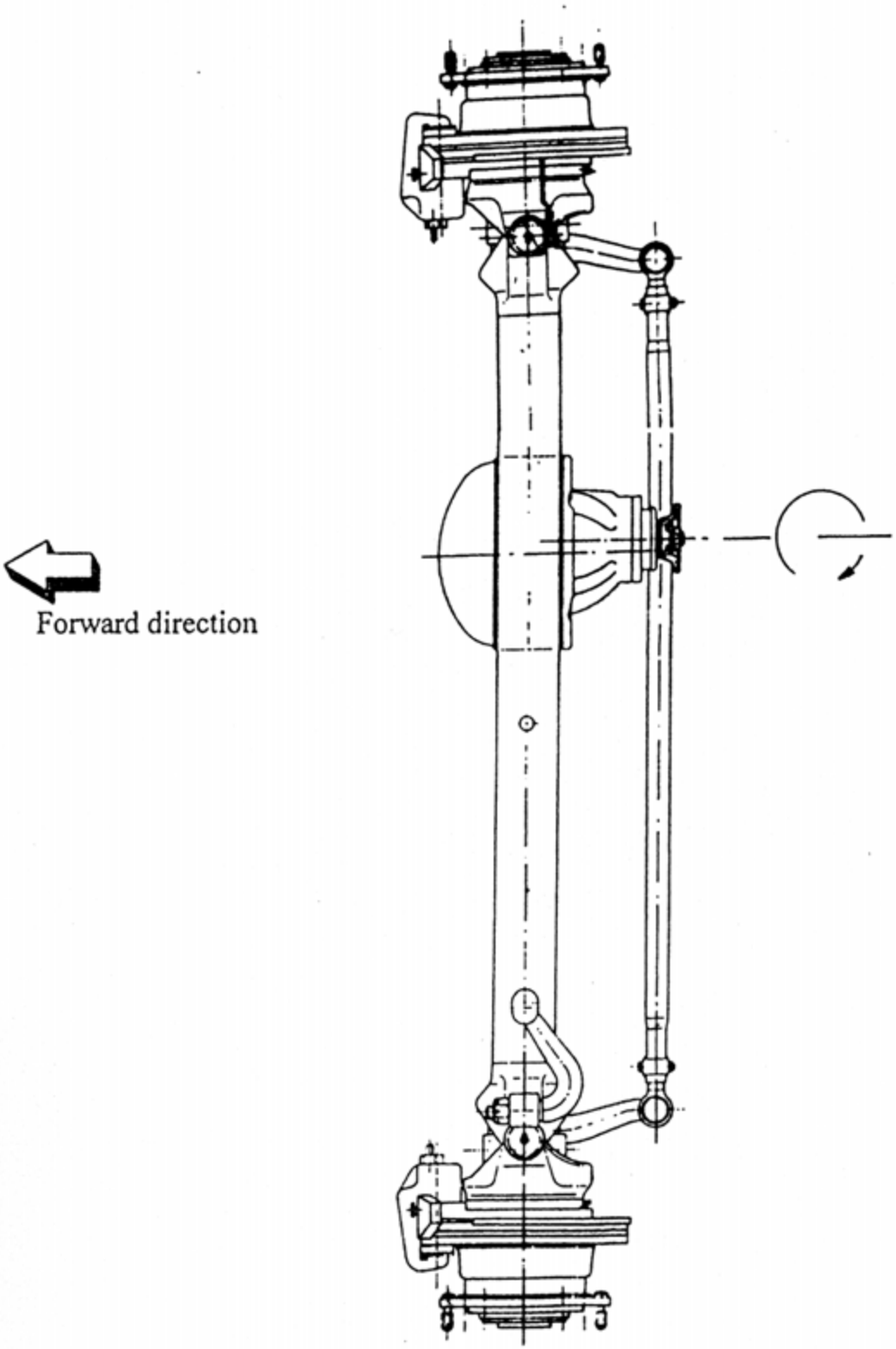
DRAWINGS OF THE AXLES

Example



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TECHNICAL DATA

DESIGNATION	UNITS	TYPE
		CT8
SYSTEM OF THE DRIVEN FRONT AXLES:		
Single reduction driven front axle with axle housing of welded steel plate and hypoid toothing drive pinion gear pair in the differential.		
DIMENSIONS:		
Wheel Track	mm	1990*
Rubber tire		9x20"*
Rolling radius	mm	482*
Sinking depth	mm	150.876*
Spring Center Distance	mm	431.8 + 508 = 939.8
Overall Width	mm	2400*
RATIOS:		
Drive gear/drive pinion tooth number		41/7 ... 41/11*
Ratio		5.857 ... 3.727*

For detailed technical data marked by asterisk (*) at the type versions required by one orderer refer to publication **"TECHNICAL DATA"** related to the type versions.

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TECHNICAL DATA

DESIGNATION	UNITS	TYPE CT8
GENERAL DATA:		
Camber		1º
Knuckle pin angle		5º
Nominal axle load	kg	3628
Max. output torque	Nm	10000 - 12300 *
Max. input speed RPM	1/sec	50
Axle mass without oil fill	kg	~385 *
WHEEL HUB EXECUTION		**“A”, “B”, “C” ***
“A” Hub centering for installing wheel disc	mm	Flange diameter: Ø221 Wheel nut: to be installed by the orderer
“B” Hub centering for installing wheel disc	mm	Flange diameter: Ø220.8 Wheel nut: to be installed by the orderer
“C” Hub centering for installing wheel disc	mm	Flange diameter: Ø219.8 Wheel nut: to be installed by the orderer
Parts of ABS		*
Impulse generating ring		*
WHEEL BRAKE:		
Wheel brake (to installed by the vehicle manufacturer)		Disk brake Bendix 410864-L * 410865-R *
Max. operating pressure on brake caliper	bar	120
Brake disk torque	Nm	8470
48.3 km/h		

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TECHNICAL DATA

DESIGNATION	UNITS	TYPE
		CT8
ROLLING BEARINGS:		
In wheel hub: Outer: Taper roller bearing Inner: Taper roller bearing		 32015 X MGM 33116 A MGM
On drive pinion: Outer: Taper roller bearing Inner: Taper roller bearing Cylindric roller bearing		 TIMKEN 44348/44143 TIMKEN JW4510/JW4549 Assortment UC1306 TAM-1-C3 KOYO UC1306 TAM FAG UC1306 TM FAG
On differential: On flanged case half: taper roller bearing		 Assortment 32212 A MGM 32212 SKF 32212 A FAG
On flanged case half: taper roller bearing		Assortment 30212 A MGM 30212 SKF 30212 A FAG
OIL SEALS:		
In wheel hub:		1HHI 110x140x17-NB STEFA-DENSO
In the steering knuckle:		ASL-50x65x8-NB SIMMERWERKE
In seal retainer:		Ø50x65x6 KV 3440 SIMMERWERKE
In knuckle carrier:		A 49.5x80x8-NB SIMMERWERKE
On knuckle pin:		006.10-3110-038
In differential:		A-1205-S-1527 (53.975x92.202x11.5)

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TORQUE RATINGS

DESIGNATION	SECTION/FIGURE ITEM No.	TYPE
		004
NOTE: The serial numbers are the item numbers of the figures in the REPAIR INSTRUCTIONS **NOTE:** Nm to ftlb = Nm ÷ 1.3558 (Ex. 600 Nm ÷ 1.3558 = 443 ftlb)		
WHEEL HUB	210/1	Nm
Wheel nuts	20	As specified by the orderer
Cover to toothed hub hex. bolts	1	19.6 - 24.5 Mount with thread locker
Brake disk to wheel hub hex. bolts	12	205 - 225 Mount with thread adhesive
Sensor holder mounting bolts	16	10 - 15
Toothed hub to wheel hub hex. bolts	21	129 - 156 Mount with thread locker
Spindle nut (outer)	26	588 - 637
Spindle nut (inner) (Per Section 223)	28	196
AXLE HOUSING	240/1	Nm
Brake support and spindle to steeringknuckle hex. flanged bolts	31	205 - 225 Installed with thread adhesive
Dust shield to steering knuckle hex. bolts	35	6 - 8
Oil filling and level plugs	-	34
Brake cover plate to brake support hex. bolts	42	30 - 40
Cover to steering knuckle hex. bolts	47	30 - 40
Knuckle pin lock wedge flanged nut	56	40 - 60
Steering arms and tie-rod arms mounting castle nuts	68	650 - 850
Stop bolts jamnut	-	60 -80
Tie-rod ball joint heads castle nuts	-	200 - 250
Tie-rod clamps self lock nuts	-	70 - 80

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TORQUE RATINGS

DESIGNATION	SECTION/FIGURE ITEM No.	TYPE
		CT8
DIFFERENTIAL:	310/1	Nm
Differential carrier housing to axle housing mounting bolts	-	88 - 98 Mount with thread locker
Drive pinion self-lock nut	1	410 - 540
Bearing cage to differential carrier housing mounting hex. flanged bolts	14	40.7 - 67.8 Mount with thread adhesive
Differential case halves clamp bolts	25	81.4 - 101.7 Mount with thread adhesive
Drive pinion mounting Self-lock nuts	38	160 - 170
Bearing shackles to differential carrier housing mounting hex. bolts	41	149 - 196.6 Mount with thread adhesive
Oil baffle plate and oiler scoop mounting bolts (M6)	73	8 * Mount with thread adhesive
Oiler scoop mounting bolts (M10)	75	20 * Mount with thread adhesive

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ADJUSTMENT DATA

DESIGNATION	UNITS	TYPE
		CT8
WHEEL HUB, STEERING KNUCKLE:		
Axial play of wheel hub bearings (adjustment by shims)	mm	0.01 - 0.04
Axial play of steering knuckle	mm	0.0 - 0.3
Shim thicknesses	mm	0.4; 0.6; 1.0; 1.2; 1.4
Toe-in	mm	0 … 2.5
Max. inner wheel turn angle		40º
DIFFERENTIAL		
Drive pinion to drive gear backlash:	mm	0.2 - 0.28 * 0.18 - 0.25 *
Drive pinion rolling torque. after preloading the bearings (the oil seal is not installed), adjustment by the distance rings	Nm	1.0 - 5.0
Size of distance ring	mm	Spacers from 8.755 to 9.530 mm in 0.025 mm steps. totally 32 off.
Theoretical distance between the drive pinion face and the drive gear centerline “AXIS DISTANCE”	mm	77.44
Shim thicknesses	mm	0.10; 0.12; 0.25

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GENERAL SERVICE INSTRUCTIONS

This section summarizes the service operations and adjustment data considered by us to be most important and which should thoroughly be observed and followed during assembling the axle.

WHEEL HUB

Assure **0.01 - 0.04 mm** axial play for the wheel hub bearings after securing the spindle nut. For adjustment refer to Section **223.**

Fill up the wheel hub with LZS-2 EP grease as described in the Section **223.**

AXLE HOUSING

For axial bearing play assure **0.0 - 0.3 mm** clearance between the knuckle carrier mounted in the steering knuckle and the steering knuckle. For adjustment refer to Section **243.**

For adjustment of the **0 … 2.5 mm** toe-in and the max. inner wheel lock-out angles refer to Section **241.**

DIFFERENTIAL

Install the taper roller bearings of the drive pinion with preload. Assure such a preload the bearings shall roll on torque of **1.0 - 5.0 Nm.** During check the sealing ring **(4)** is not equipped. for adjustment refer to Section **317.**

The differential gears should be rotatable without jamming.

Install the taper roller bearings supporting the differential without clearance.

Adjust clearance as described in “Technical data” and check the contact pattern. After checking adjust the bearing preload. The bearing preload must be $Ø300^{+0.35}_{+0.25}$ **mm** on the plane of the bearings.

For check and adjustment refer to Section **314.**

GENERAL INSTRUCTIONS

For purposes of labor safety during service operations performed on the axle removing the individual assembly units make sure to assure safe backing, fixing or suspension.

Install only clean and sound parts free of burr and knockouts. Before installation wipe the mating surfaces of the parts clean and apply thin coat of oil.

For assembly operations use ONLY plastic or copper-insert hammer.

Before installing the oil seals make sure to check if the sealing lip is sound and apply specified grease to between the sealing lip and the dust protection edge. Install the o-rings also with grease.

When installing the taper roller bearings take care of the pairing according to the original packing or to the manufacturer’s specification.

The following thread cementing, locking and surface sealing materials are used at the axle, e.g.:

Thread adhesive:	LOCTITE 277
High-strength	Omni FIT 1550 HENKEL
Thread locker:	LOCTITE 243
Medium-strength	Omni FIT 230 M HENKEL
Surface sealant:	LOCTITE 518
	Omni FIT 58 H HENKEL

Clean and degrease the surfaces before applying the thread adhesive and thread locker.

Clean and degrease the surfaces before applying the air-curing sealant. Apply a continuous strip of min. **3 mm** diameter to the specified surface. The time between applying the sealant and assembling the parts together may not exceed **10 min.**

Instead of the above cementing, fixing and sealing materials other equivalent grade ones may also be used.

APPLICATION OF “LOCTITE” BOLT

LOCKING MATERIALS

The LOCTITE 277 thread adhesive material needs min. 3-4 hrs. on 22º C temperature, the LOCTITE 243 thread locking needs 1-2 hrs in the same conditions - to 75% solidification - based on the LOCTITE catalogue. The proper bonding strength does not develop on greasy, oily surfaces even after a longer period. Oil must not reach the surface even after the application of the LOCTITE 277 and 243 bolt locking materials and after the bolts are driven in, within the curing time.

REPAIR OF THE PARTS ASSEMBLED WITH LOCTITE THREAD ADHESIVE AND THREAD LOCKING MATERIALS:

In case of a defect during the operation and during a general overhaul, after the assembly unit had been previously washed, the first thing to do is to dismount the bonded joints. Clean carefully the matching surfaces and the threaded bores of the dismounted units from the dirt and the remains of the adhesive. The remains of the adhesive shall be removed both by mechanical cleaning and with LOCTITE 806 solvent. The threaded bores can be considered to be cleaned, when the bolts can easily be driven up to the total thread length.

Prior to assembly, degrease carefully the bores of the parts to be assembled and the bolts. If oil/dirt is detected in the bores of the washed parts, drop the oil from bores then spray with LOCTITE 7061 cleaning spray then dry it in free air. *(Blowing is permitted only with oil-free compressed air!)* Spray the bores and the bolts with LOCTITE 7649 activator, then let them dry at least for 10 minutes.

Before driving in, apply LOCTITE on the bolts around 4-5 threads from the end of the shank. (If steel is to be bonded to steel, the curing time is 1-3 hrs for achieving 50-80% strength which provides the loadability).

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WHEEL HUB

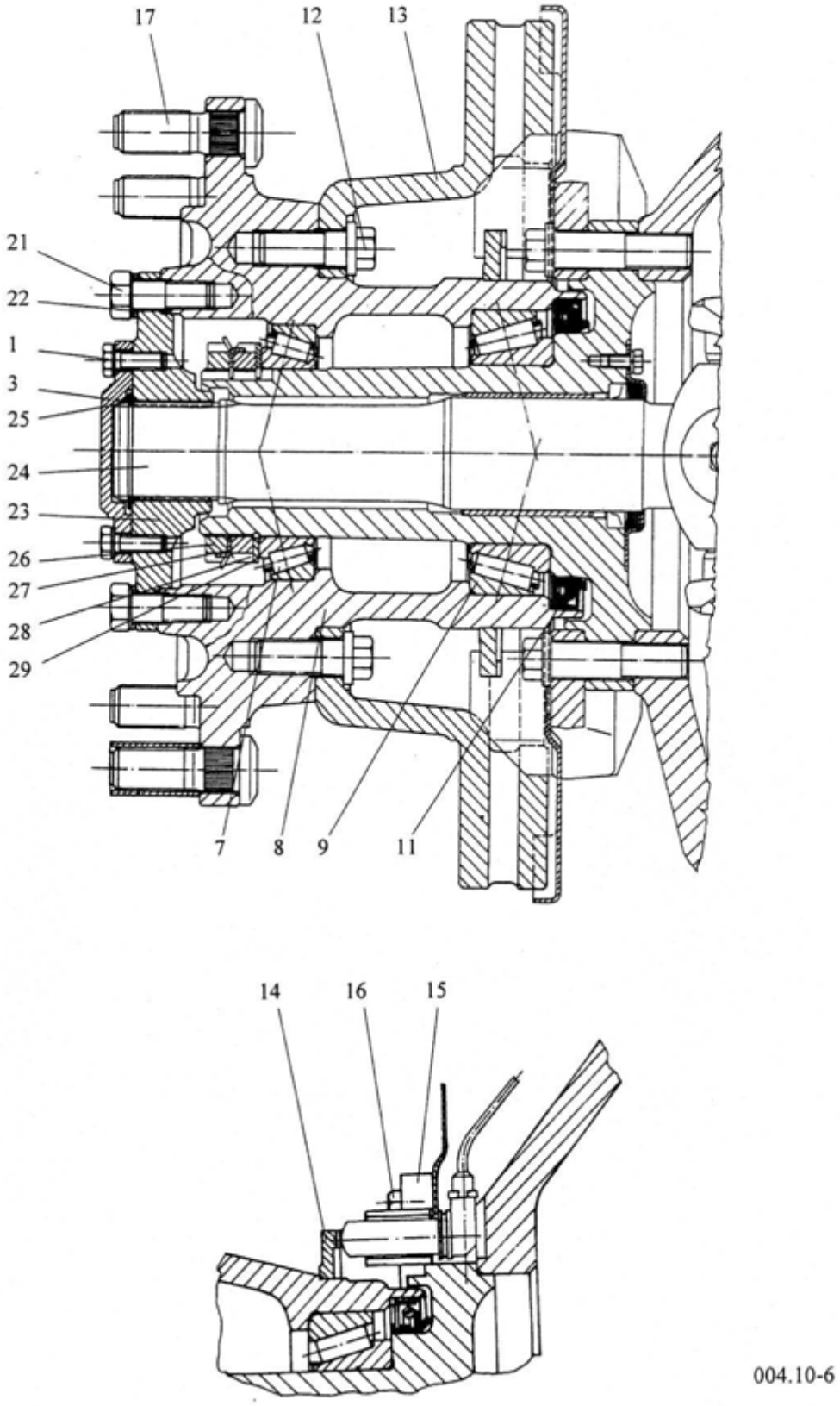

Fig. 1.: SECTIONAL VIEW OF WHEEL HUB

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PARTS OF THE WHEEL HUB

1 - Hex. bolt

—

3 - Cover

—

7 - Taper roller bearing

8 - Wheel hub

9 - Taper roller bearing

—

11 - Sealing ring

12 - Hex. flanged bolt

13 - Brake disk

14 - Impulse generating ring

15 - Sensor holder

16 - Hex. bolt

17 - Wheel bolt

—

21 - Hex. bolt

22 - Washer

23 - Toothed hub

24 - Outer axle shaft

25 - Snap ring

26 - Outer shaft-end nut

27 - Lock plate

28 - Inner shaft-end nut

29 - Bearing retainer

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SECTION 212

REMOVING AND REINSTALLING THE WHEEL DISK

REMOVING THE WHEEL DISK

With wheels in loaded condition loosen the wheel nuts then jack up the axle, back out the wheel nuts and remove and the wheels.

REINSTALLING THE WHEEL DISKS

After positioning the wheel disk diagonally tighten the wheel nuts as specified.

SECTION 214

REMOVING AND REINSTALLING THE COVER AND THE TOOTHED HUB

Remove the hex. bolts **(1)** and separate the cover **(3)** by driving an **M8** bolt into bore the cover.

Remove the snap ring **(25)** and unscrew the hex. bolts **(21).**

By means of the bolts shown **(Fig. 1.)** pull off the toothed hub **(23).**

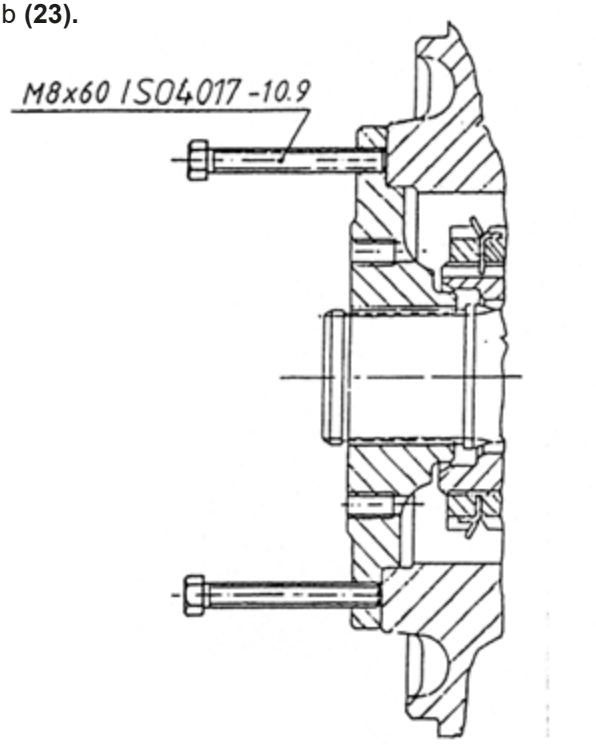

Fig. 1.: PULLING OFF THE TOOTHED HUB

When reinstalling the toothed hub apply oil-proof surface sealant to the inner seating flange — behind bores — as described in the **"GENERAL SERVICE INSTRUCTIONS".**

Push the toothed hub over the splines of the outer axle shaft **(24)** to bottom out.

Secure the toothed hub to the wheel hub by means of hex. bolts **(21)** with washer **(22).** Apply thread locker sealant to the bolts and tighten to **129 - 156 Nm** torque.

Pull the outer axle shaft forward and secure with snap ring **(25).**

As described in the **"GENERAL SERVICE INSTRUCTIONS"** apply oil proof surface sealant to the seating flange of the cover — behind the bores — and secure by hex. bolts applied with thread locker and tightened to **19.6 - 24.5 Nm.**

SECTION 223

REMOVING AND REINSTALLING THE WHEEL HUB

Remove the disk brake.

After removing the cover **(3)** and the toothed hub **(23)** unsecure the shaft-end nuts **(26** and **28).**

The shaft-end nuts can be removed by means of the tools shown (see **Fig. 1.**).

Before removing the shaft-end nuts MAKE SURE to suspend the wheel hub safelv.

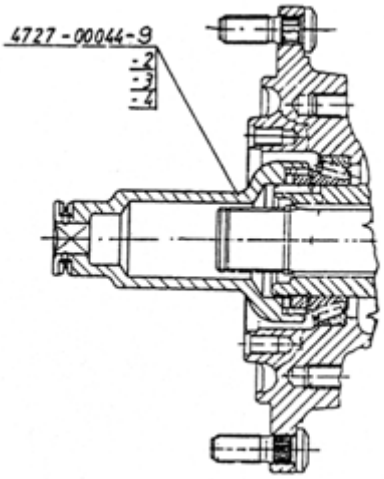

Fig. 1.: ASSEMBLING THE SHAFT-END NUTS

Following this remove suspended wheel hub from the steering knuckle.

Fill up the wheel hub subassembled according to **Section 224** with grease specified in the **"OPERATOR'S MANUAL"**, as shown in **Fig. 2.**

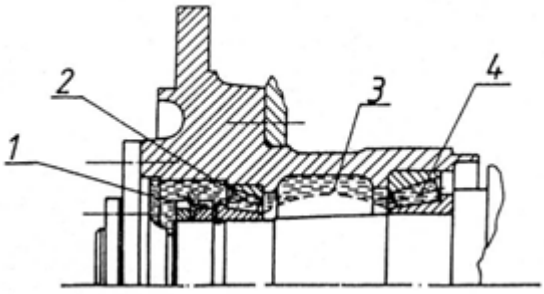

Fig. 2.: GREASE CAPACITY OF THE WHEEL HUB

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Grease capacity of the space indicated:

1 = 0.16 kg
2 = 0.022 kg
3 = 0.45 kg
4 = 0.060 kg

(Apply grease to the space marked **1** after adjusting the axial clearance of the wheel hub.)

Concentrically pull the wheel hub filled with grease over the spindle coated with grease the bearing journals, making sure not to damage the oil seal.

Install the cone of the outer taper roller bearing **(7)** and screw on the inner shaft-end nut **(28).**

Adjust axial play of the wheel hub to 0.01 - 0.04 mm.

By means of the wrench shown in **Fig. 1.** tighten the inner shaft-end nut **(28)** — while continually rotating and axially moving the wheel hub — so, the wheel hub shall turn hard. By this means proper connection of the bearings is assured.

Back out the shaft-end nut and tighten again to **196 Nm** torque, then turn back by approx. **35º - 45º.** Position the lock plate, install the outer shaft-end nut and tighten to **588 - 637 Nm** torque.

By means of dial indicator as shown in **Fig. 3** check the specified **0.01 - 0.04 mm** axial play.

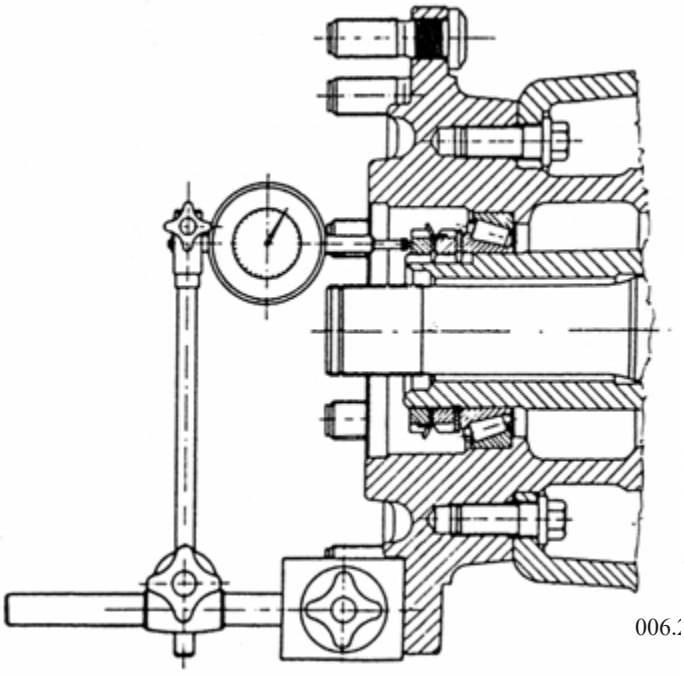

Fig. 3.: MEASURING THE WHEEL HUB BEARING CLEARANCE

In case of improper bearing clearance repeat the adjustment by properly turning back the shaft-end nut and check procedures.

If the **0.01 - 0.04 mm** axial play is adjusted secure the shaft-end nuts by the lock plate **(27).**

SECTION 224

DISASSEMBLING AND REASSEMBLING THE WHEEL HUB

(Replacing the bearing cups and the sealing ring.)

By means of a simple pry remove the sealing ring **(11)** from the removed wheel hub and remove the inner taper roller bearing cone.

By means of the tools shown drive out the cups of the taper roller bearings (see **Fig. 1.**).

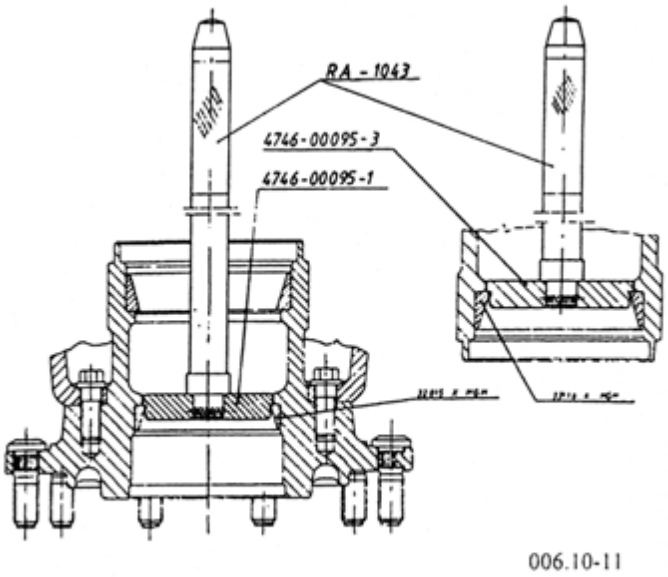

Fig. 1.: DRIVING OUT THE BEARING CUPS

REASSEMBLING THE WHEEL HUB

First drive in the cups of the outer taper roller bearings by means of the tool shown **(Fig. 2.).**

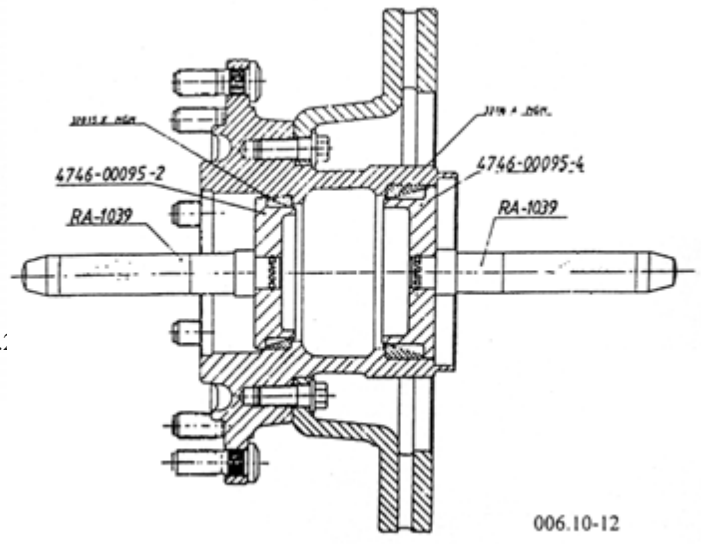

Fig. 2.: DRIVING IN THE OUTER TAPER ROLLER BEARING CUPS

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Inset the cone of the inner taper roller bearing **(9)** into bore of the installed cup.

As described in the “GENERAL SERVICE INSTRUCTION” apply thin coat of oil-proof sealant to seat of the oil seal.

Drive the sealing ring into the seat until the tool bottoms out (see **Fig. 3.**).

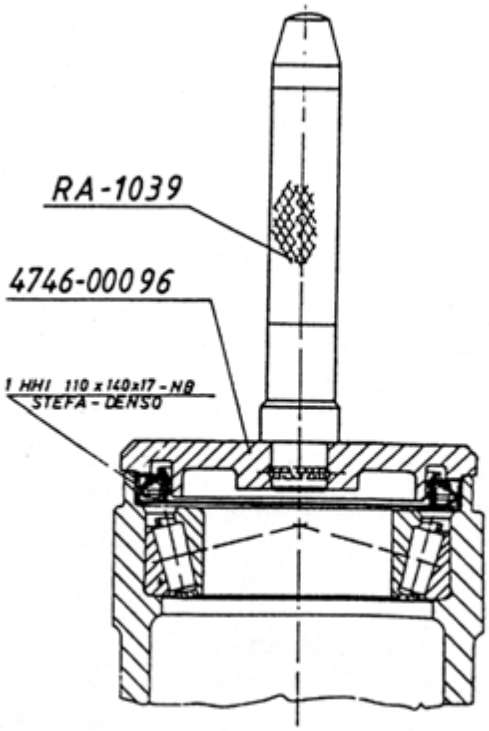

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Fig. 3.: DRIVING IN THE SEALING RING

SECTION 227

REMOVING AND REINSTALLING THE BRAKE DISC

When the brake disc **(13)** is to be replaced remove the hex. flanged bolts **(12)** installed with thread locker and pull the brake disc off the wheel hub.

During reinstalling the new brake disc tighten the hex. flanged bolts applied with thread locker to **205 - 225 Nm** torque.

SECTION 229

INSTALLATION INSTRUCTIONS FOR PARTS OF ANTILOCKING SYSTEM

The models given in “TECHNICAL DATA” contain the items **(A, C),** necessary at the installation of the anti-block and anti-skid systems **(1)**.

1. Installed elements of the anti-lock and Anti-Skid Systems

1.1 Revolution sensor:
WABCO 441 032 808 0

1.1. Clamp sleeve:
WABCO 899 759 815 4

Note: The revolution sensor and the spring bushing must be of the same make.

“A” Toothed pulse generating ring

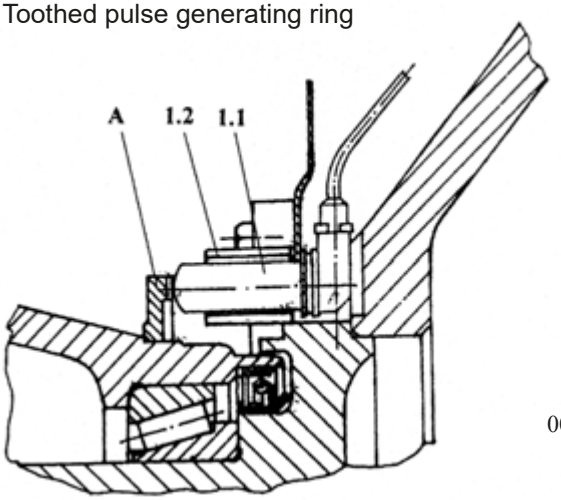

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Fig. 1.: INSTALLING THE ANTILOCKING SYSTEM

2. Installation instruction

Before installing the spring bushing coat the bore of the revolution sensor holder with copper paste or silicone grease **(e.g. Molykote FP 186, Unirew N3)** in order to prevent corrosion.

Insert the clamp sleeve from the middle of the axle into the bore until stop **(1.2).**

Put the revolution sensor **(1.1)** into the clamp sleeve and push it until it reaches the generator ring on the wheel hub. This setting has to be performed every time the hub will be disassembled.

During operation maximum clearance between the revolution sensor and the generator ring may be **0.8 mm.**

When leading the wire of the revolution sensor out of the axle brake mechanism be sure not to bend it with a radius less than **R50 mm.** Fasten the wire at distances of **50 mm** exposed to heat load inside the brake mechanism.

Check the run out of the toothed pulse generating ring on the wheel hub. Maximum permissible run out of toothing in direction of revolution sensor shaft is **0.2 mm.**

Note: Tachometer to be built in only with spring bushing of the same manufacturing. Besides ordered tachometer, a tachometer of other production, interchangeable with the above is allowed to be built in. If the impulse ring is changed before pressing the new impulse ring is to be heated uniformly to **150º C** and pushed up to stop on the wheel hub.

TOOTHING CAN NOT GET DAMAGED!

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FRONT AXLE HOUSING

SECTION 240

SECTIONAL VIEW OF AXLE HOUSING

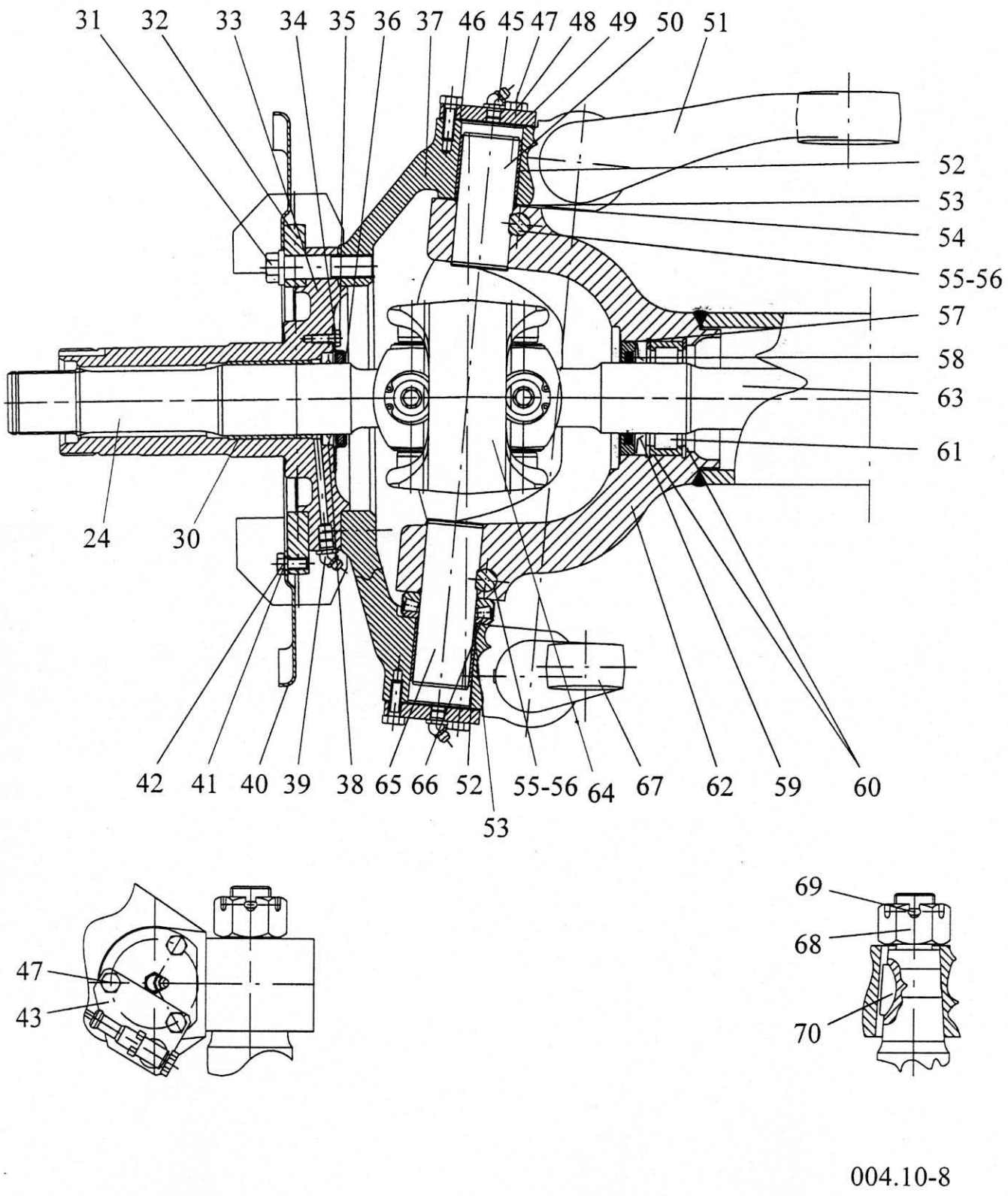

Fig. 1.: SECTIONAL VIEW OF AXLE HOUSING

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SECTION 241

PARTS OF THE AXLE HOUSING

24 – Outer axle shaft
30 – Bush
31 – Hex. flanged bolt
32 – Brake support
33 – Spindle
34 – Lock washer
35 – Hex. bolt
36 – Dust shield with sealing ring
37 – Steering knuckle
38 – Sealing ring
39 – Grease fitting
40 – Brake cover plate
41 – Lock washer
42 – Hex. bolt
43 – Holder of the tachometer's wire
—
45 – Gasket
46 – Ball grease fitting
47 – Hex. bolt
48 – Lock washer
49 – Cover
50 – Knuckle pin, upper
51 – Steering arm
52 – Knuckle pin bush
53 – Sealing ring
54 – Shim
55 – Lock wedge
56 – Flanged nut
57 – Seal retainer
58 – Sealing ring
59 – Oil seal
60 – Snap ring
61 – Cylindric roller bearing
62 – Knuckle carrier
63 – Inner axle shaft
64 – Double joint head
65 – Knuckle pin, lower
66 – Axial bearing
67 – Tie-rod arm
68 – Castle nut
69 – Cotter
70 – Woodruff key

SECTION 242

REMOVING AND REINSTALLING AND REPAIRING THE TIE-ROD, ADJUSTING THE TOE-IN AND THE WHEEL TURN ANGLES

REMOVING THE TIE-ROD

Remove the cotters and back out the castle nuts, then remove the linkages from the taper bore of the tie-rod arms by pressing out the ball stud with the tool shown **(Fig.1.).**

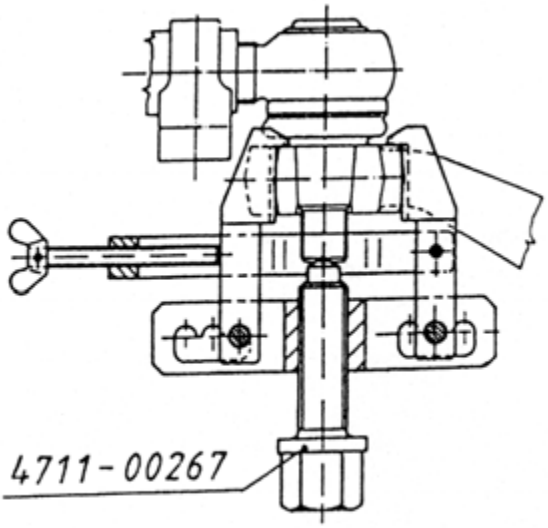

Fig. 1.: PRESSING OUT THE BALL STUDS

006.10-46/1

REINSTALLING THE TIE-ROD

Reinstall the tie-rod in reverse order of removal.

After performing the proper adjustments tighten the castle nuts of the ball pins to **200-250 Nm** torque.

When installing the tie-rods adjust the toe-in, as well.

ADJUSTING THE STEERING GEOMETRY OF THE AXLES (Fig. 2. and 3.)

1. MEASURING, ADJUSTING TOE-IN

Toe-in **(Fig. 2)** means the difference between the dimensions **"A"** and **"B"** as measured at the height of the wheel center in front and rear on the brake disc flange. The value **"B"** measured at the front is smaller.

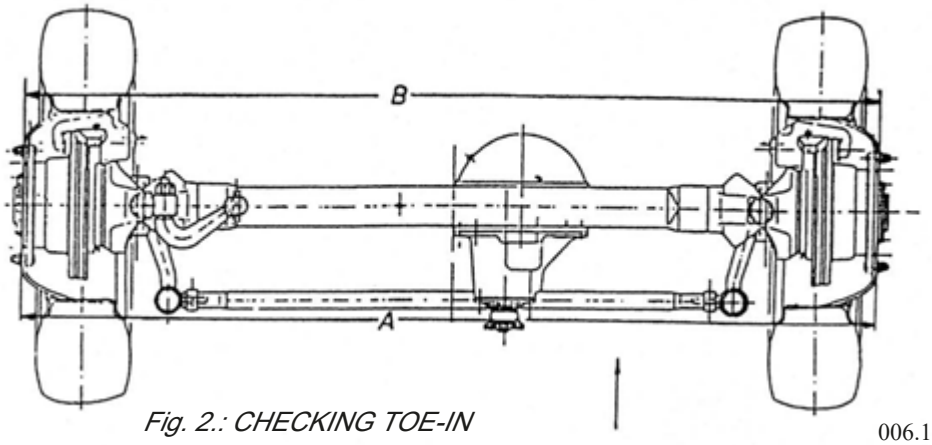

Fig. 2.: CHECKING TOE-IN

006.10-3/1

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Measure the dimension **"A"** and mark the measurement place, then turn the wheel over by **180º** and measure the dimension **"B"** at the marked place.

TOE-IN = A – B = 0.0 … 2.5 mm

Warning!

Perform toe-in measurement with axle installed to the vehicle and not jacked up.

After loosening the tie-rod clamp nuts adjust the toe-in by turning the tie-rod to required direction.

After adjustment the tie-rod tube slit and the stem of the tie-rod clamps should face downward, under angle of **± 45º** from the vertical plane. If required remove one ball joint head, turn off the tie-rod by **180º** and turn off the ball joint head by **360º** to proper direction to assure the slit shall be in lower position.

After proper adjustment tighten the self-lock nuts of the ball studs to **200-250 Nm** and the tie-rod clamps to **70 - 80 Nm** torque. After this check the toe-in again.

2. ADJUSTING MAX. INNER WHEEL TURN ANGLE

Upon reaching the max. inner wheel turn angle **(a)** specified in the "TECHNICAL DATA", adjust the stop bolt so, to bottom out against the axle body **(Fig. 3.).**

1 – Stop bolt

2 – Jamnut

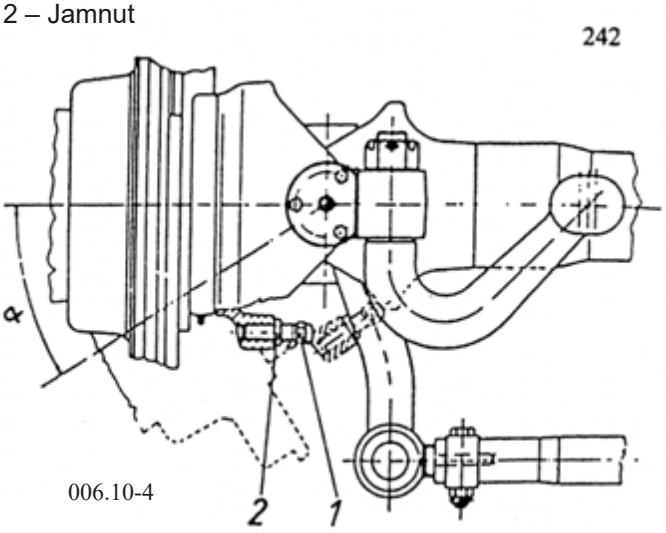

Fig. 3.: ADJUSTING THE INNER MAX. WHEEL TURN ANGLE

Warning!

By means of the pressure relief valve adjust the power steering gear so the servo effect shall terminate 2.0 - 3.0 mm before the stop bolts bottom out against the axle body.

Secure the stop bolt by tightening the hex. jamnut to **60 - 80 Nm** torque.

Perform adjustment of the max. inner wheel turn angle on the both sides.

When adjusting the inner wheel turn angles the double joint may not interfere with the knuckle carrier and the steering knuckle.

The outer wheel turn angle is a resultant value.

THE TIE-ROD AND ITS REPAIR

THE TIE-ROD

1 – Tie-rod
2 – Ball joint head
3 – Hex. bolt
4 – Self-lock nut

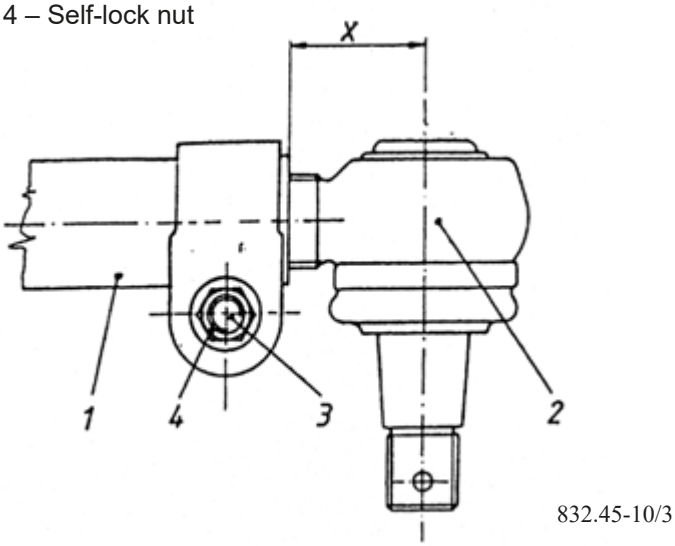

Fig. 1.: THE TIE-ROD

REPAIRING THE TIE-ROD

Loosen the self lock nut **(4).** Screw the ball joint head out of the tie-rod end.

The ball joint head can be replaced as a unit, only.

When reassembling the tie-rod make sure to check if the distance (X) between the tie-rod end and the ball stud centerline is nearly identical on both sides.

After installing the tie-rod to the tie-rod arms and adjusting the specified toe-in tighten the self-lock nuts of the shackles to **70 - 80 Nm** torque.

SECTION 243

REMOVING AND REINSTALLING THE STEERING KNUCKLES, REMOVING AND REINSTALLING THE DOUBLE JOINTS, ASSEMBLING THE BRAKE SUPPORT AND THE SPINDLE

REMOVING THE STEERING KNUCKLES

After removing the wheel hub, remove the cover **(49)** of the knuckles pins (**50** and **65**).

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Remove the hex. flanged nuts **(56)** from the lock wedges **(55)** and drive out the wedges.

Properly backing up the steering knuckle drive out the knuckle pins by the driver shown **(Fig. 1.).**

If required start moving the knuckle pin first by driving inward.

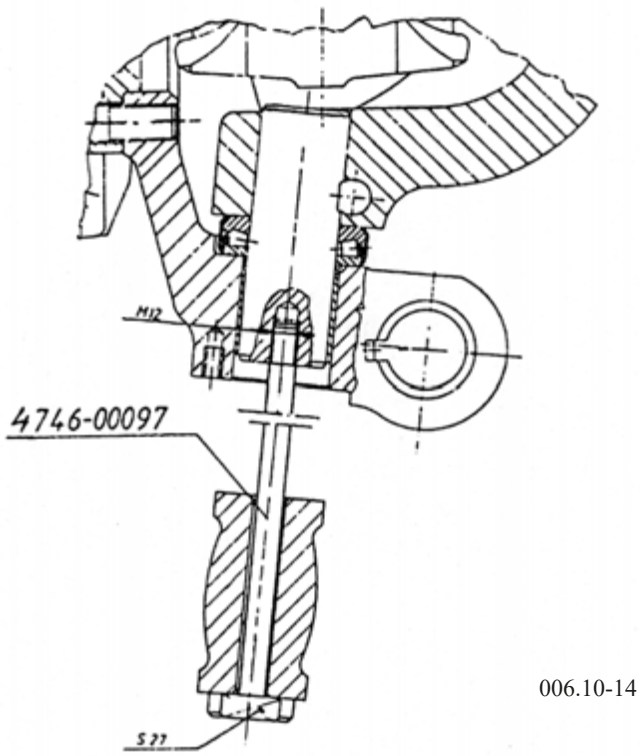

Fig. 1.: DRIVING OUT THE KNUCKLE PINS

By means of the mandrel shown secure the axial bearing **(66)** until pulling off the steering knuckle **(Fig. 2.).**

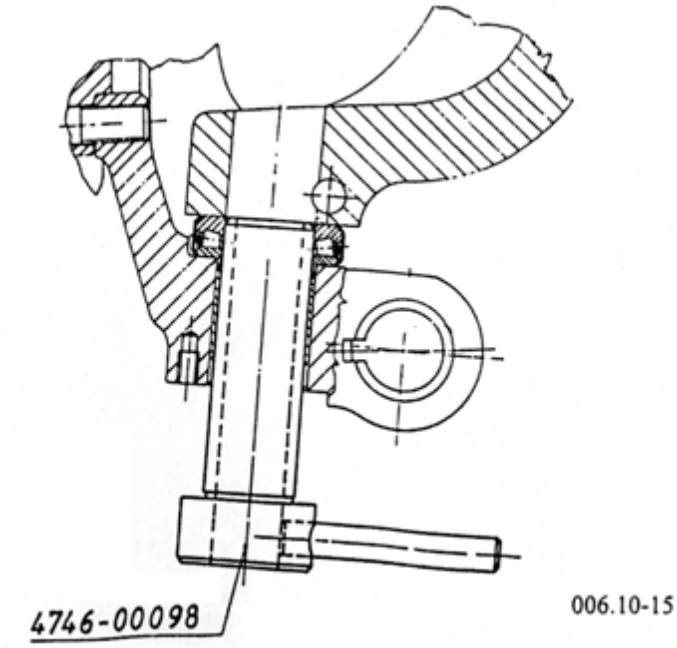

Fig. 2.: ASSEMBLING THE AXIAL BEARING OF THE LOWER KNUCKLE PIN

Following this catching safely pull the steering knuckle **(37)** off the knuckle carrier **(62)** and the outer axle-shaft, then remove the shims **(54).**

REMOVING THE DOUBLE JOINT

After removing the steering knuckle carefully pull the double joint out of the differential gear splines and pinion carrier seals.

ASSEMBLING THE BRAKE SUPPORT AND THE SPINDLE

After dismounting wheel hub **(Section 223),** unscrew the hexagonal flanged bolts **(31)** and detach the spindle **(33)** and the brake support **(32)** from steering knuckle **(37).**

Install the proper (RH-LH) spindle and the brake support to the steering knuckle by applying thread locker to the hex. flanged bolts. Tighten the bolts to **205 - 225 Nm** torque.

Tighten the hex. bolts **(42)** attaching the brake cover plate **(40) to 30 - 40 Nm** torque.

REINSTALLING THE DOUBLE JOINT AND THE STEERING KNUCKLE

Carefully push the inner longer axle-shaft **(63)** of the double joint thru the sealing ring of the knuckle carrier **(62)** and the bore of its cylindric roller bearing **(61)**, then aligning the splines with those of the differential gear push the axle-shaft further bottom out against the differential, making sure not to damage the gasket **(58)** and the sealing ring **(59).**

Pull the service sleeve shown over the outer axle shaft **(24)** for playing the inner seals of the spindle past over the outer axle shaft splines **(Fig. 3.).**

Carefully push the relevant steering knuckle subassembled with inner seals over the service sleeve on the outer axle-shaft, taking care not to damage the sealing rings, then pull the service sleeve off the axle-shaft end.

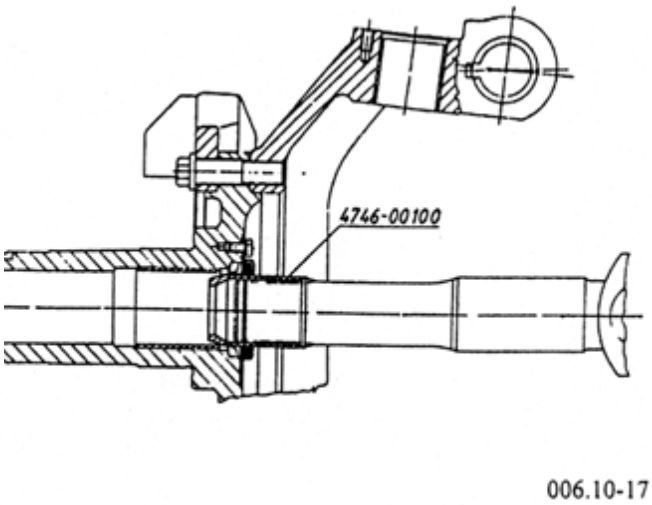

Fig. 3.: REINSTALLING THE STEERING KNUCKLE

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Align the bore in the upper knuckle pin of the steering knuckle with that in the lock wedge of the knuckle carrier. Pilot the bores by means of the service mandrel shown (see **Fig. 4.**).

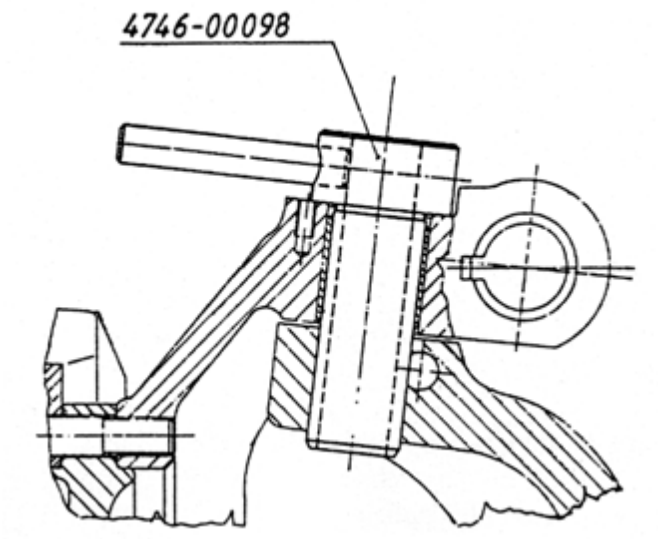

Fig. 4.: PILOTING THE BORE IN THE UPPER KNUCKLE PIN

Fill up the inter-roller space of the axial bearing with specified grease before assembling.

By means of the lower service mandrel fit the axial bearing **(66)** to place shown in **Fig. 2.**, then push the service mandrel in to bottom out.

Push up the steering swivel to bottom out so, not to turn off. By means of feeler gage measure the distance between the plane of the knuckle carrier **(62)** and the steering knuckle **(37)** then from the shims **(54)** select a pack of thickness **0.1 - 0.3 mm** less than the measured value.

Pull out the upper service mandrel so, to be able to insert the selected shim pack, then aligning the bores push back the service mandrel.

Lower the steering knuckle to normal position and install the magnetic pedestal dial indicator. Moving the steering knuckle up and down check if the clearance is **0.0 - 0.3 mm.**

For accuracy perform the measurement several times.

In case of proper clearance install the relevant knuckle pins **(50 - 65)** in place the service mandrels and secure by lock wedge **(55)**. Screw the hex. flanged nuts to the lock wedges and tighten to **40 - 60 Nm**.

Install the covers **(49)** together with gasket **(45)** and the holder **(43)** of the tachometer's wire over the knuckle pins. Tighten the hex. bolts with lock washers to **30 - 40 Nm** torque.

Screw on ball grease fitting **(46)** into each cover and fill up the knuckle pin bearing with grease. Grease has to appear at the sealing ring of knuckle pin.

Apply properly adhering chassis protection paint to the inner end of the knuckle and the inner surface of the connecting knuckle carrier!

SECTION 244

ASSEMBLING THE KNUCKLE PIN BEARING BUSHINGS AND THE SEALING RINGS ON THE STEERING KNUCKLE

REMOVING THE KNUCKLE PIN BUSHINGS

Remove the sealing rings **(53)** by means of a simple pry.

By means of the device arranged from the parts shown pull out the knuckle pin bushings **(52)** on both sides **(Fig. 1.).**

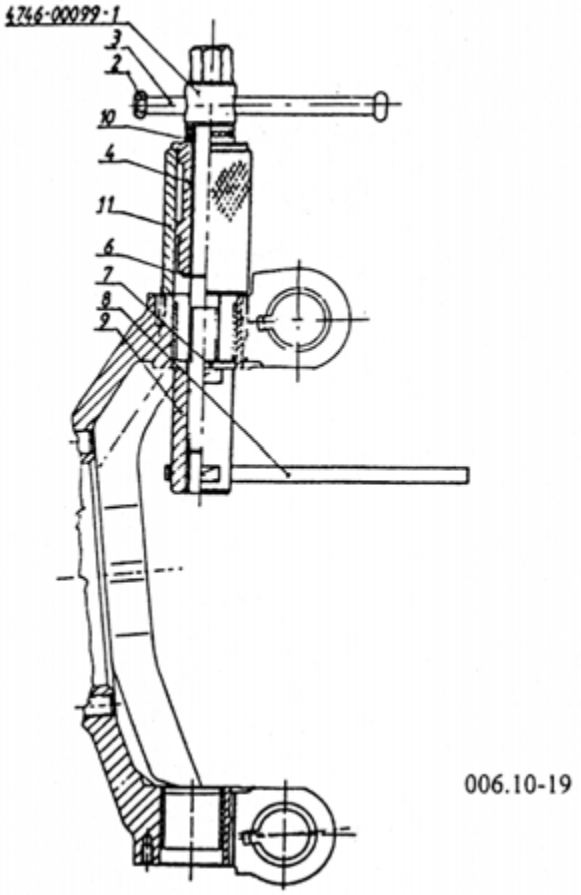

Fig. 1.: PULLING OUT THE KNUCKLE PIN BUSHINGS

INSTALLING THE KNUCKLE PIN BUSHINGS AND THE SEALING RINGS

When pressing in the knuckle pin bushings make sure to check if the slot of the bushings faces toward the area indicated in **Fig. 2.**, both at the lower and upper bushing. Apply grease to out surface of the bushings.

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1 = The slot in the upper and lower bushing should face toward the indicated area **(Fig. 2.)**.

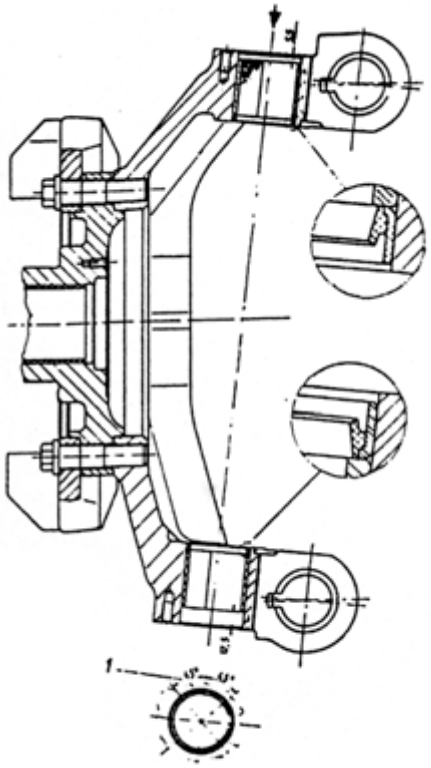

Fig. 2.: POSITION OF THE KNUCKLE PIN BUSHINGS AND THE SEALING RINGS

By means of the device arranged from the parts shown press in the bushings to the upper and lower side, as well **(Fig. 3.)**.

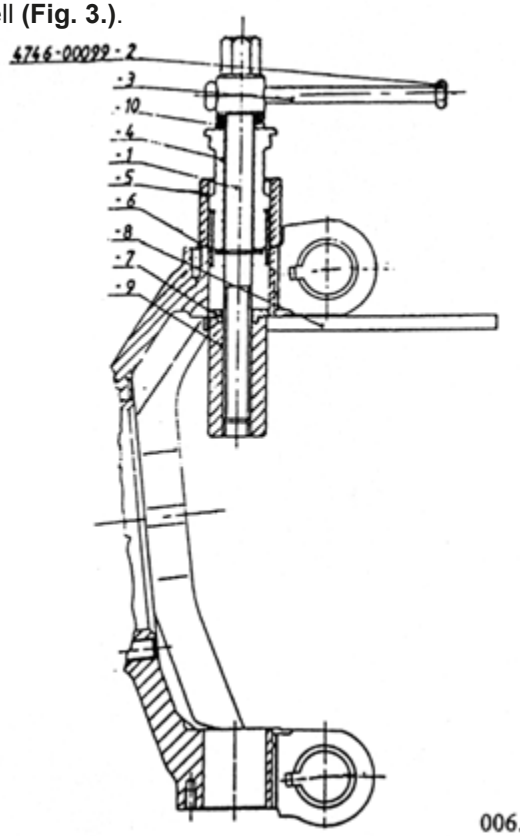

Fig. 3.: PRESSING IN THE KNUCKLE PIN BUSHINGS

Drive in the specified sealing rings beside the bushings by means of the tools shown in **Fig. 4.** Make sure to install the sealing rings as shown in detail drawing of **Fig. 2.** The sealing rings may not extend from plane of the steering swivel.

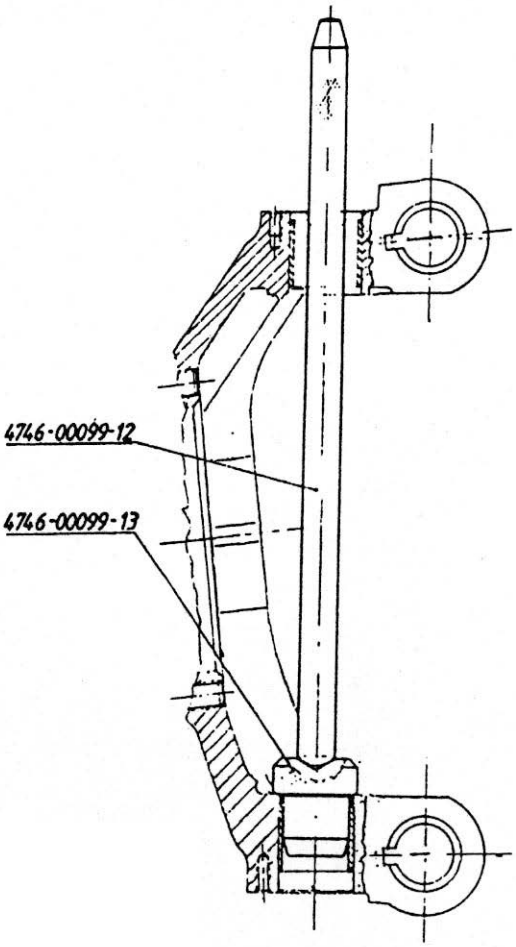

Fig. 4.: DRIVING IN THE SEALING RINGS

SECTION 245

ASSEMBLING THE STEERING AND TIE-ROD ARMS

REMOVING THE ARMS

For removing the pilot and tie-rod arms remove the cotters **(69)** and unscrew the castle nut. Drive the arms out of the steering knuckle.

REINSTALLING THE ARMS

Position the relevant tie-rod arm (RH-LH) and the pilot arm into the seat in the steering knuckle taper bore, then drive in together with the Woodruff key **(70)**. Tighten the castle nut **(68)** to **650 - 850 Nm** torque and cotter secure.

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ASSEMBLING THE DOUBLE JOIN (AXLE SHAFT REPLACEMENT)

REMOVING THE AXLE SHAFTS FROM THE DOUBLE JOINT

Remove the screw plug from the bearing bushing and remove the snap ring before the bearing bushing.

1 – Bearing bushing

2 – Carrying ring

3 – Screw plug

4 – Snap ring

5 – Spider

6 – Pivot pin

7 – Threaded dowel

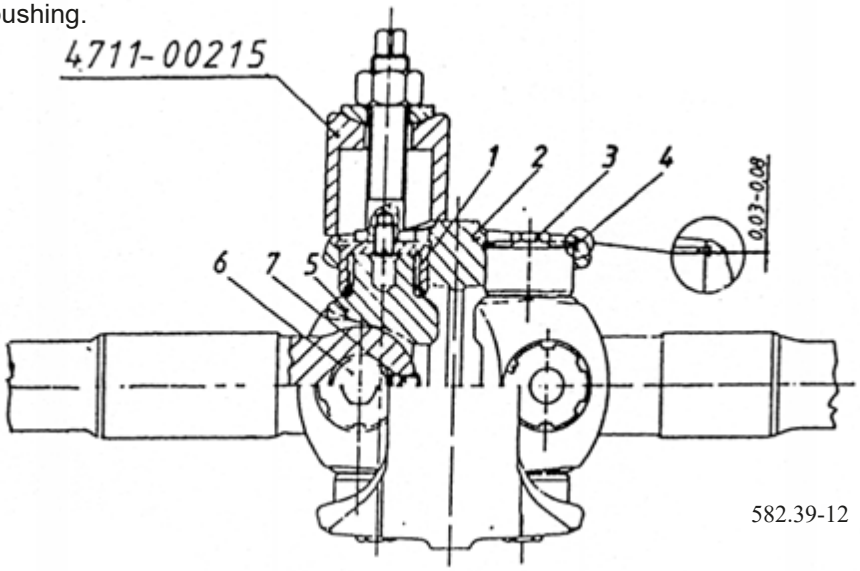

Fig. 1.: PULLING OUT THE BEARING BUSHINGS

By means of the puller shown remove the bearing bushings from the carrying ring on the both sides, by screwing the bolt of the puller to place of the screw plug (see **Fig. 1.**).

Mark the removed parts to assure reinstallation to their original place.

After removing the bearing bushings remove the axle-shaft together with outer spider from carrying ring.

Pull the bearing bushing out of the spider by proper adapter of the puller, then unscrew the dowel pins, from the spider.

Properly backing up the axle-shaft, start the knuckle pin out of the axle-shaft by means of the thrust pin of the tool shown in **Fig. 3.**, then drive out by a mandrel of diameter less than **30 mm (Fig. 2.).**

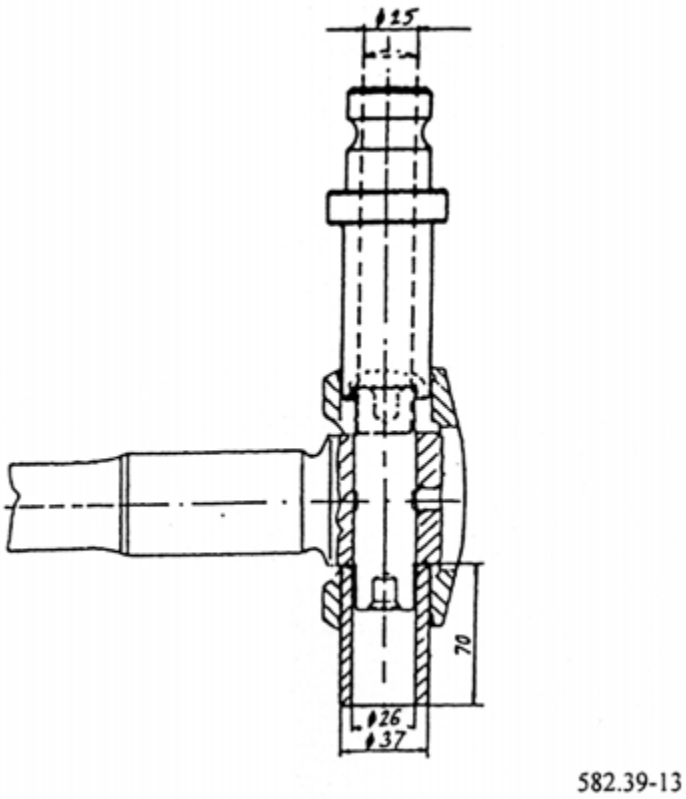

Fig. 2.: DRIVING OUT THE KNUCKLE PINS

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REASSEMBLING THE DOUBLE JOINT

Reassemble the new axle-shaft in reverse order of removal.

Install the proper axle-shaft into the spider and press in the knuckle pin to center position as shown by **"A"** in **Fig. 3.**

WARNING!

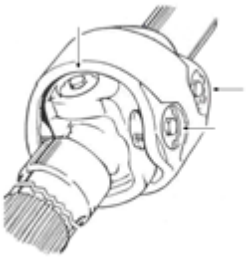
The symmetry tolerance of the knuckle pin face pressed into the axle-shaft relative to the ground bearing place of the axle-shaft is ***± 0.05 mm.*** *Perform check between centers by dial indicator.*

Adjustment of the mean position can be performed by rotating the adjusting spindle of the device and by adjusting the moveable wedge or its support pin **(Fig. 3.).**

After adjusting the knuckle pin to mean position, secure by threaded dowel **(7).** Apply LOCTITE thread locker to the dowel.

DOUBLE-JOINT SERVICE

The Cardan-Joint caps are fitted with plugged threaded ports that are used for disassembly/assembly. While these ports will accept a standard zerk fitting, we recommend that only a needle attachment be used to flow lube into these joints. Adding lube under pressure may result in the failure of the cup seal.



Fill up the roller spaces of the bearing bushings equipped with oil seal, as well as the bores of the knuckle pins and the end of the spider with specified grease.

Adjust the axial play of the knuckle pin and the spider to **0.03 - 0.08 mm,** by installing identical thickness snap rings or using ones different with one size step.

According to detail **"A"** of **Fig. 3**. use proper backing and press the bearing bushing assembly to one side, then install the "standard" **2.075 mm** thickness blue colored snap ring into the groove. By backing up as shown in detail **"B"** of **Fig. 3.,** press the bearing bushing assembly to the other side and here also install the "standard" **2.075 mm** thickness blue colored snap ring into the groove.

If the joint assembly can be turned off easily, the axial play is excessive, so first install the next higher thickness step snap ring instead of the "standard" thickness one. If the joint in spite of this still can be rotated easily, replace the snap ring on the other side also to the higher thickness step one.

When the joint assembly can be turned excessive hard, the axial play is too low, so replace the "standard" thickness snap rings to a lower thickness step one, as described above.

Insert the spider subassembled with axle-shaft into the carrying ring and backing up properly press in the bearing bushings assembled with oil seal and packed with grease using the thrust pin of the press set **No. 4711-00217.** Install the snap rings as above.

Install the screw plugs into the bearing bushings filled with grease.

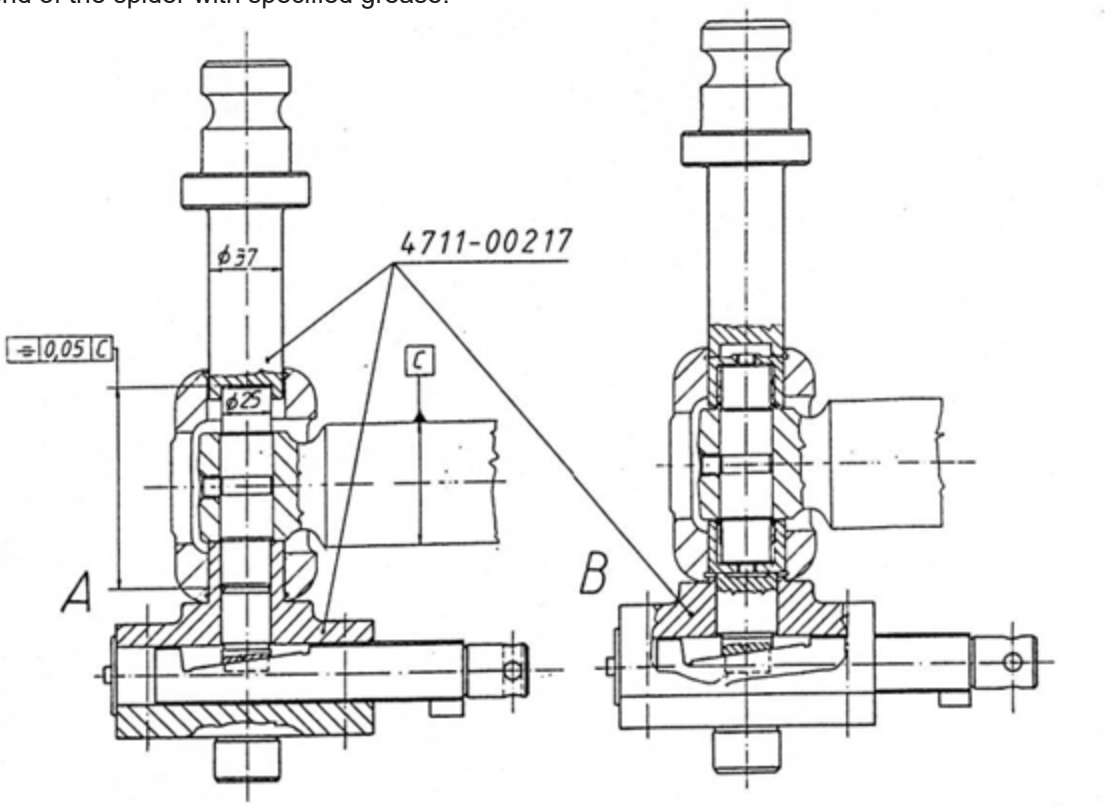


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Fig. 3.: INSTALLING THE KNUCKLE PINS AND THE BEARING BUSHINGS

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SECTION 247

REMOVING AND REINSTALLING THE INNER BEARING SEALS OF THE SPINDLE

REMOVAL

Remove the dust protection plate **(36).**

After removing the dust protection plate by means of pry remove the sealing ring **(38)**.

By means of the device shown **(Fig. 1.)** pull the bushing **(30)** out.

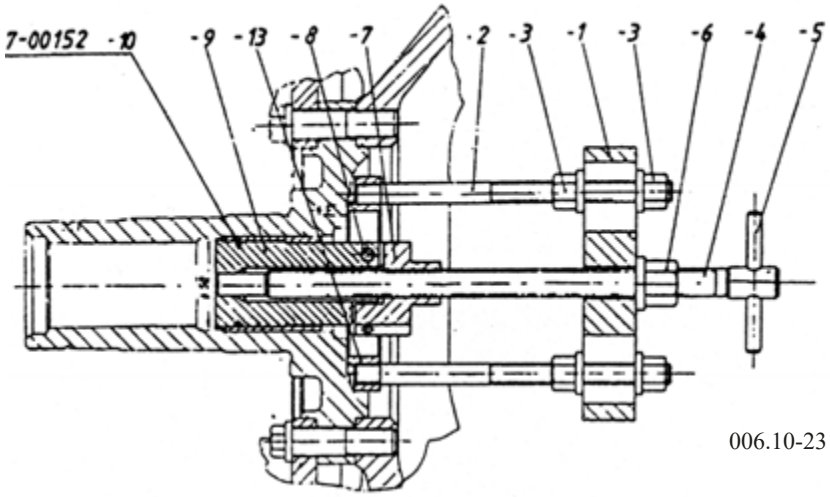

Fig. 1.: PULLING OUT THE BUSHING

REINSTALLING THE INNER BEARING AND THE SEALS TO THE STEERING KNUCKLE

First press the bushing into its seat to bottom out (see **Fig. 2.).**

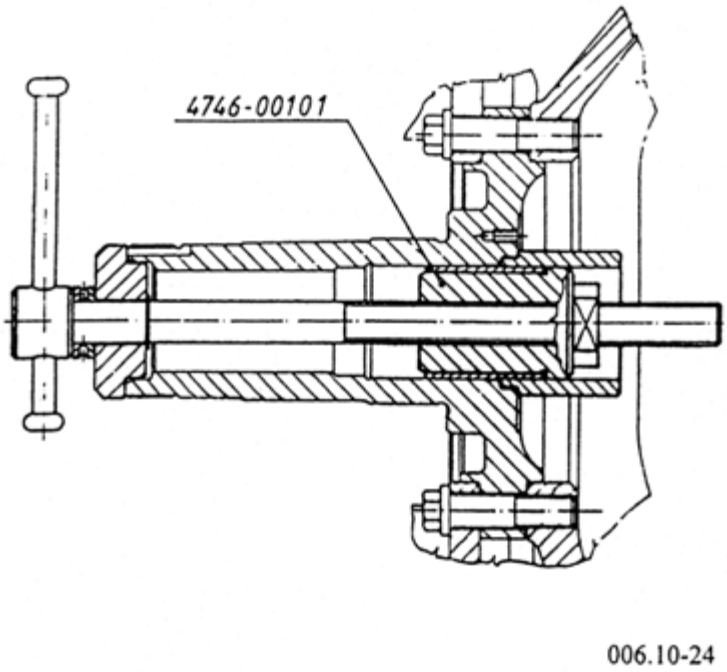

Fig. 2.: PRESSING IN THE BUSHING

By means of the tool shown drive the new sealing ring into its seat **(Fig. 3.).**

By means of lock washer **(34)** and hex. bolts **(35)** install the dust protection plate **(36)** supplied with pressed in sealing ring and tighten the bolts to **6 - 8 Nm** torque.

Fill up the space between the dust protection plate **(36)** and the sealing ring, as well as and the tips of the sealing rings with grease.

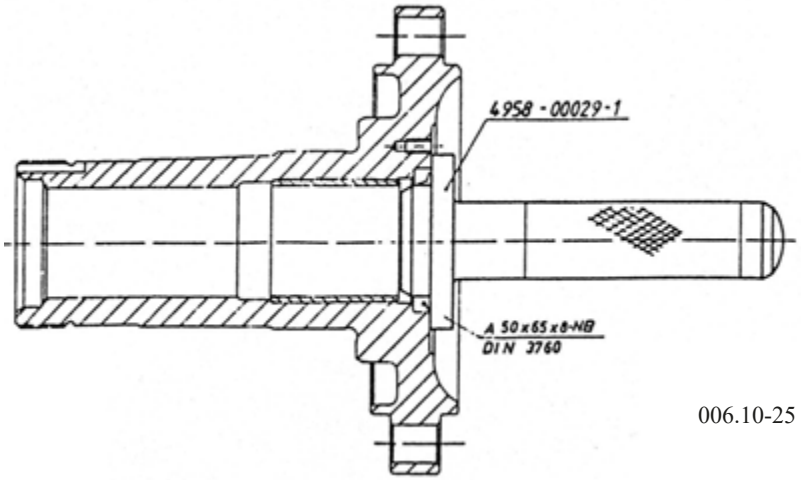

Fig. 3.: DRIVING IN THE SEALING RING

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SECTION 248

REMOVING AND REINSTALLING THE BEARING AND SEALS OF THE KNUCKLE CARRIER

REMOVAL

By means of the puller 4727-00152 pull out the seal retainer **(57)** with the sealing ring **(58)** and then the inner oil seal **(59),** as well. (See in **Fig. 1. Section 247**).

Remove the snap ring **(60)** in front of the cylindric roller bearing **(61)** and also pull out the cylindric roller bearing by means of the above puller.

REINSTALLATION

Install the inner snap ring **(60).**

Drive in the cylindric roller bearing by means of the tool shown **(Fig. 1.).**

Install the outer snap ring before the cylindric roller bearing and drive in the oil seal **(59)** by means of the same tool, then drive in the seal retainer **(57)** with the sealing ring **(58)** so, the sealing ring shall be inside.

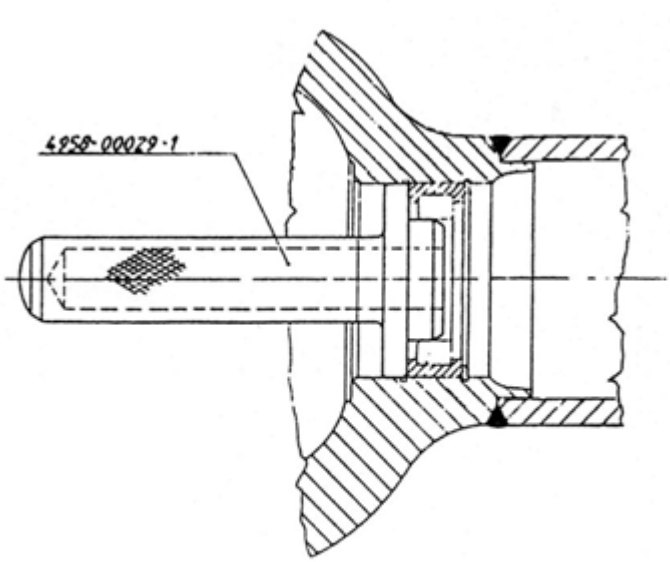

Fig. 1.: DRIVING IN THE CYLINDRIC ROLLER BEARING

SECTION 270

THE DISC WHEEL BRAKE

Repair, removing and reinstalling the BENDIX 410864–L, 410865–R disk brake as given in specifications of installer and BENDIX.

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SECTION 310

DIFFERENTIAL SECTIONAL VIEW

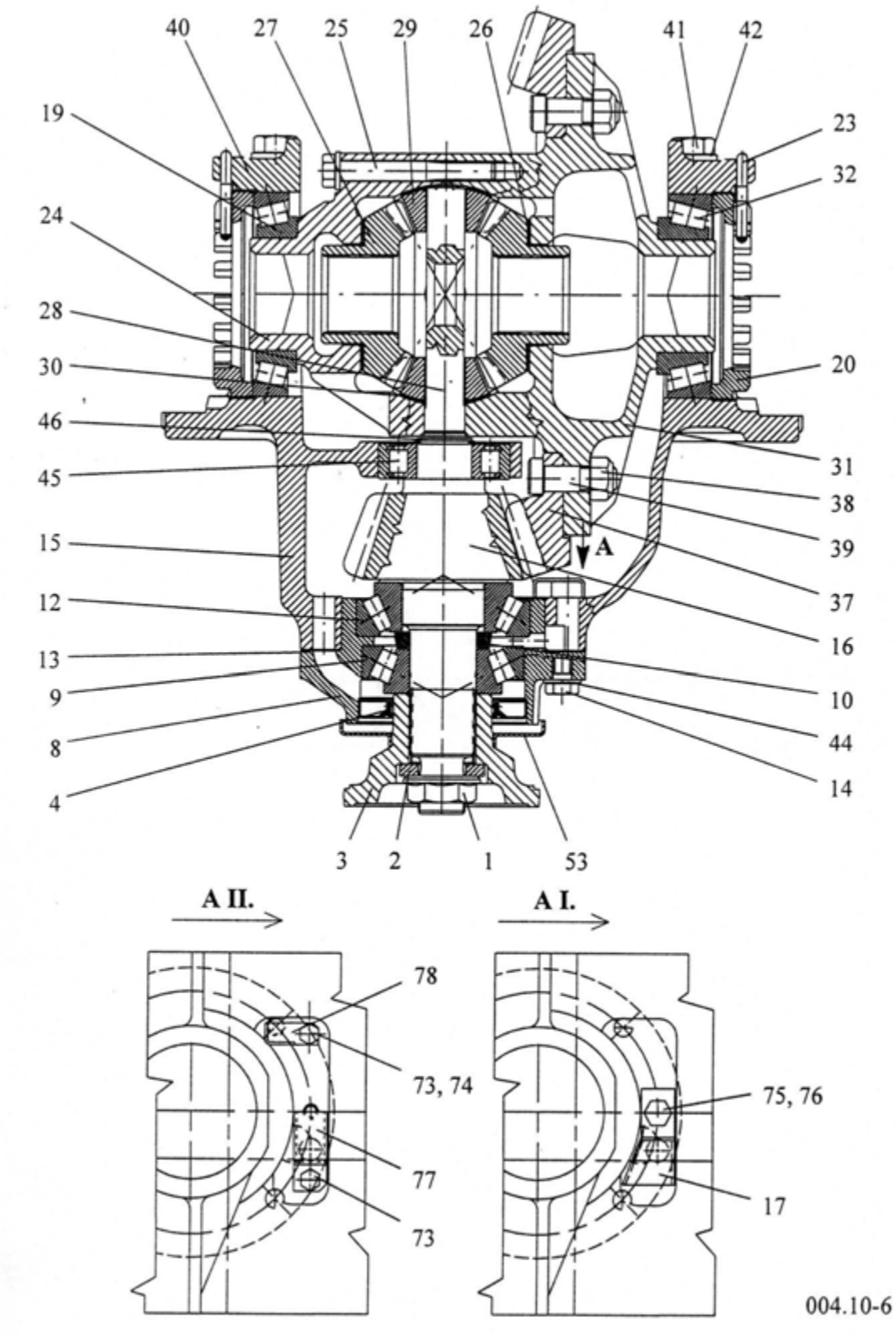

Fig. 1.: DIFFERENTIAL SECTIONAL VIEW

SECTION 311

PARTS OF THE DIFFERENTIAL

1 — Self-lock nut
2 — Washer
3 — Companion flange
4 — Sealing ring
—
8 — Bearing cage
9 — Taper roller bearing
10 — Distance ring
—
12 — Taper roller bearing
13 — Shims
14 — Hex. flanged bolts
15 — Differential carrier
16 — Drive pinion
17 — Oiler scoop
—
19 — Taper roller bearing
20 — Bearing adjuster
—
23 — Cotter pin
24 — Differential case half
25 — Clamp bolt
26 — Differential side washer
27 — Differential gear
28 — Spider
29 — Differential pinion
30 — Differential pinion washer
31 — Differential case half (flanged)
32 — Taper roller bearing
—
37 — Drive gear
38 — Self-lock nut
39 — Hex. bolt
40 — Bearing shackle
41 — Hex. bolt
42 — Washer
—
44 — Lock washer
45 — Cylindric roller bearing
46 — Snap ring for shaft
—
53 — Flat lock washer
—
73 — Hex. bolt
74 — Lock washer
75 — Hex. bolt
76 — Lock washer
77 — Oiler scoop
78 — Oil baffle plate

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SECTION 312

REMOVING AND REINSTALLING THE DIFFERENTIAL

REMOVING THE DIFFERENTIAL

Drain the oil from the axle.

Remove the axle shafts with double joint as described in **Section 246.**

Remove the hex. flanged bolts attaching the differential carrier assembly to the axle housing.

Pull the differential out from axle housing by companion flange.

REINSTALLING THE DIFFERENTIAL

As described in the “GENERAL SERVICE INSTRUCTIONS” apply oil-proof surface sealant to flange of the axle.

Put the differential into the axle housing and screw the bolts with thread locker. Tighten the bolts to **88 - 98 Nm** torque.

SECTION 313

REMOVING AND REINSTALLING THE COMPANION FLANGE AND THE COVER, REPLACING THE OIL SEAL

By means of the tools shown **(Fig. 1.)** remove the self-lock nut **(1)**.

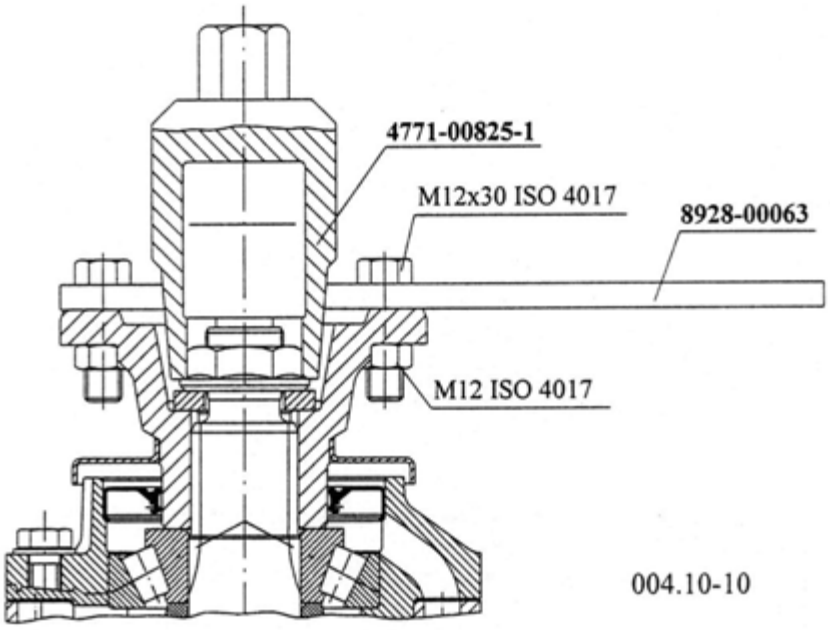

Fig. 1.: MOUNTING THE SELF-LOCK NUT

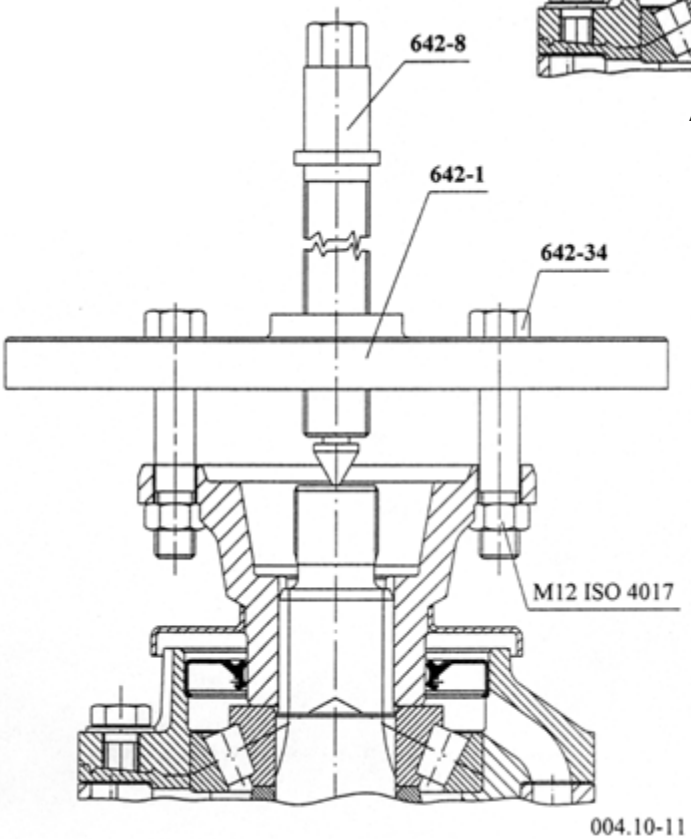

Fig. 2.: REMOVING THE COMPANION FLANGE

Pull the companion flange **(3)** by means of the tools shown in **Fig. 2.**

By means of pry remove the old oil seal **(4)** from the companion flange.

In case of distortion, the dust plate **(53)** too, should be replaced. Drive it off, after cutting the weld seams. Secure the new dust plate in position by three weld seams **1.5x5 mm.**

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Pull the old oil seal **(4)** out from the bearing cage.

Coat the surface of the bearing cage contacting the oil seal with grease LZS2 and drive in the oil seal to the bearing cage by means of tool shown **(Fig. 4.).**

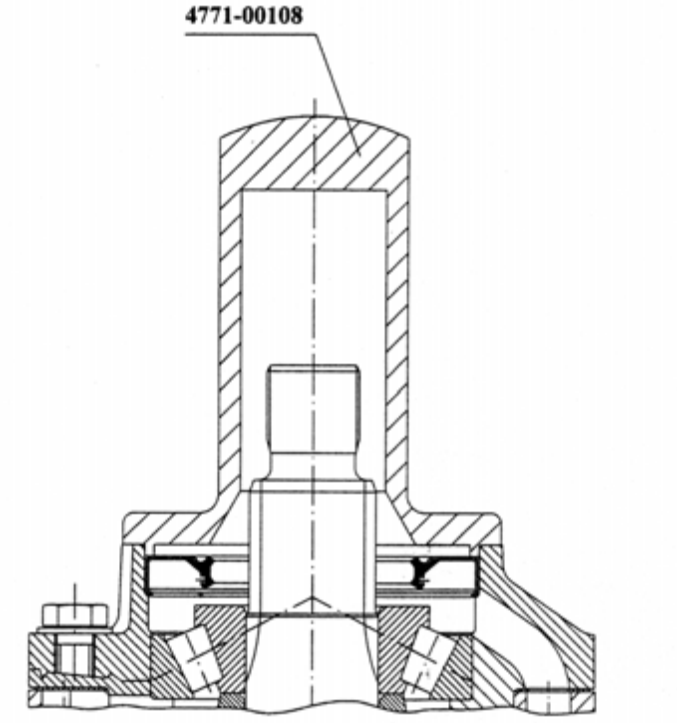

Fig. 4.: HAMMERING SEAL RING IN

By means of the tool shown press the companion flange **(3)** to the drive pinion splines to bottom out **(Fig. 5.).**

Install the washer **(2),** screw on self-lock nut **(1)** and tighten to **410 - 540 Nm** torque.

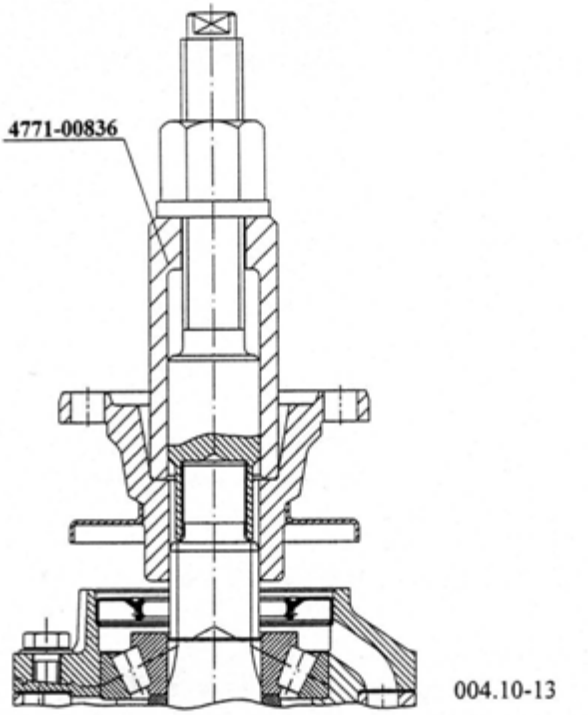

Fig. 5.: PRESSING ON THE COMPANION FLANGE

REMOVING AND REINSTALLING THE DIFFERENTIAL, ADJUSTING THE BACKLASH AND THE CONTACT PATTERN

REMOVING THE DIFFERENTIAL

Remove the cotter pin **(23)** from both of sides.

Back out the hex. bolts **(41)** and remove the bearing shackles **(40)**. Following this remove the differential from the differential carrier and remove the outer race of the taper roller bearing **(19, 32)** and the bearing adjusters **(20).**

REINSTALLING THE DIFFERENTIAL

Reinstall the differential only after installing the bearing cage and adjusting the axis distance (see **Section 316)**!

Assemble the bearing adjusters by means of the tool shown **(Fig. 1.).**

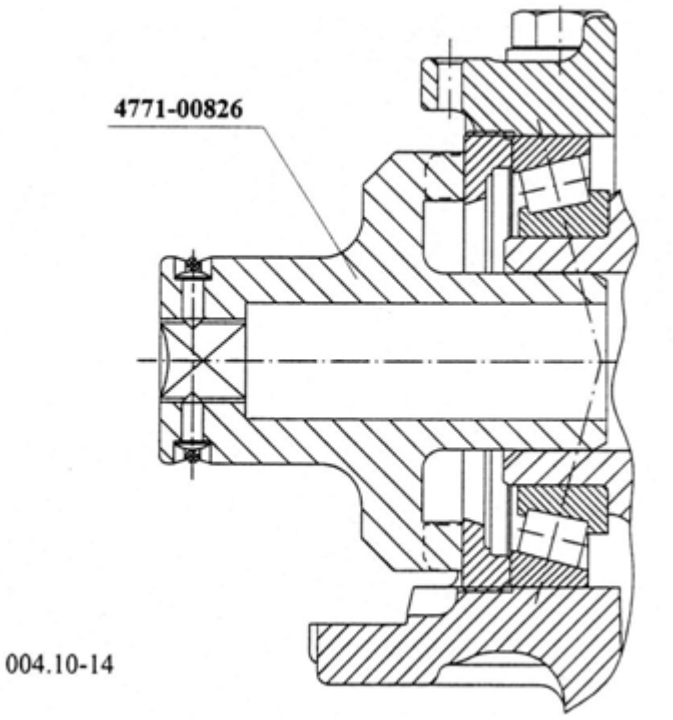

Fig. 1.: ASSEMBLING THE BEARING ADJUSTERS

Fit the assembled differential together with cups of the taper roller bearings **(19, 32)** into the differential carrier, then screw on the bearing shackles to the original place, adjust on the bearing adjusters and secure by hex. bolts applied with thread adhesive and washers **(42).**

Tighten the hex. bolts **(41)** applied with thread adhesive to **149 - 196.6 Nm** torque.

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ADJUSTING THE BACKLASH AND THE BEARING PRELOAD

By means of the bearing adjusters adjust the drive pinion to gear backlash as described in “TECHNICAL DATA” (GLEASON toothing).

Measure the backlash at the drive gear diagonally at four places, by means of dial indicator with stand and perpendicularly to the tooth surface, while the drive pinion is locked **(Fig. 2.)**.

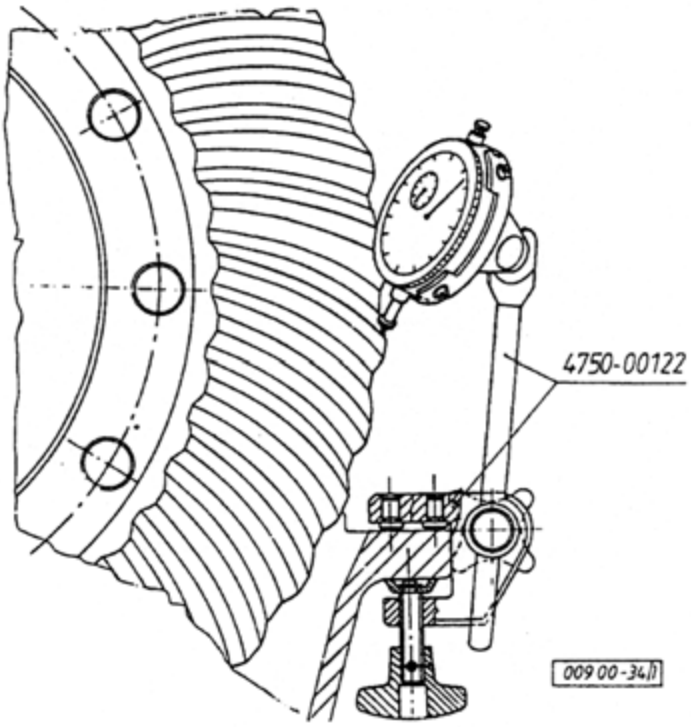

Fig. 2.: CHECKING THE BACKLASH

Maintaining the backlash install the differential taper roller bearings **(19 and 32)** with no clearance.

IT IS IMPORTANT that while the bearing is adjusted, the ring gear has to be kept revolving, this will assure seating of the taper rollers in the bearings. If setting is made in stationary position, the bearings can get stressed or the rolling bodies can get jammed. The bearings set in this way release during revolution.

After adjusting the backlash and the bearing preload check the contact pattern as follows.

ADJUSTING THE CONTACT PATTERN

Apply indicator paint to 2 opposite teeth pairs of the drive gear at four places of **90º** pitch and one tooth of the drive pinion.

Rotate the drive pinion to both directions for approx. **15 sec.** while braking the drive gear by a piece of wood.

PROPER CONTACT PATTERN

If a contact pattern shown in detail **1 of Fig. 3** is obtained, the drive gear-pinion pair is installed properly.

Practically the perfect contact pattern shown in the figure cannot be obtained, but it is important that the pattern shall nowhere reach the edge of the tooth surface.

D = Large diameter
1 = Proper contact pattern
2 = Too deep contact
3 = Too high contact

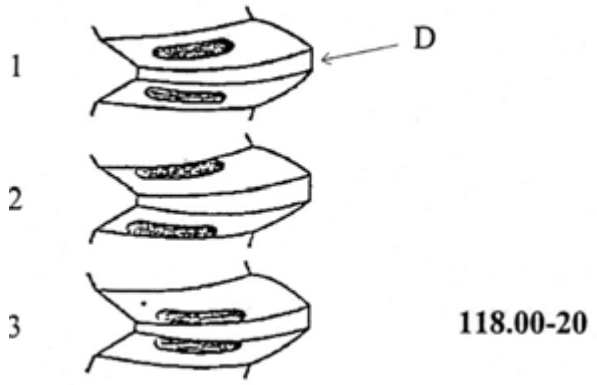

Fig. 3.: THE CONTACT PATTERN

In case of GLEASON- toothing the contact pattern moving to the direction of the crown gear small diameter.

TOO DEEP CONTACT

If the contact pattern is shifted to the dedendum as shown in detail **2** of **Fig. 3** increase the “AXIS DISTANCE” by increasing the thickness of the shim pack **(13)** and simultaneously reduce the increased backlash by shifting the drive gear so, to obtain the contact pattern shown in detail **1** of **Fig. 3.**

TOO HIGH CONTACT

If the contact pattern is shifted to the addendum as shown in detail **3** of **Fig. 3** reduce the “AXIS DISTANCE” by reducing the thickness of the shim pack **(13)** and simultaneously increase the reduced backlash by shifting the drive gear so, to obtain the contact pattern shown in detail **1** of **Fig. 3.**

During drive the rotation should be smooth and noiseless.

After each contact pattern adjustment measure the backlash, readjust the bearing preload and check the dimension **Ø300 +0.35 +0.25 mm** on the supporting flange. Perform assembly by the check ring No. 4771-00106.

The checking ring of “GO SIDE” are placed on the bearing cap legs, then both bearing adjusters are tightened by equal angular displacement until the check ring fits the bearing cap legs free of clearance.

If the bearing adjusters can not be locked, they must be kept revolving until all of them can be locked.

Before locking the bearing adjusters you must make sure that the backlash has remained within the specified range.

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Size of the diagonal legs of the bearing cap must be checked separately with the “NO GO SIDE” of the check ring.

Maintaining the previously adjusted **Ø300 +0.35 +0.25 mm** leg dimension secure the bearing adjuster **(20)** by cotter pin **(23).**

After the above operations finish installation of the bearing cage as described in **Section 316.**

SECTION 315

DISASSEMBLING AND REASSEMBLING THE DIFFERENTIAL

DISASSEMBLING THE DIFFERENTIAL

Pull the cones of the taper roller bearing **(19 and 32)** from the removed differential **(Fig. 1.).**

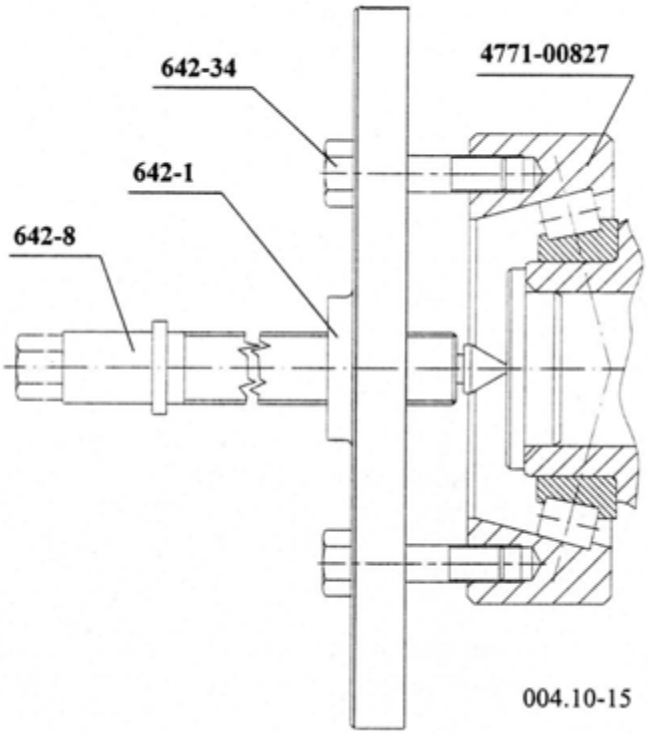

Fig. 1.: PULLING OFF THE INNER RACE OF THE TAPER ROLLER BEARINGS

Match mark the differential unit case half parts. Loosen and remove hexagonal bolts **(25)** fastening differential unit case parts **(24 and 31)** and divide the differential unit case in half.

Remove the spider **(28)** together with the differential pinions **(29)** and differential pinion washers **(30)** as well as the differential gears **(27)** and the differential side washers **(26).**

REASSEMBLING THE DIFFERENTIAL

Replace the drive gear only together with the matched drive pinion!

The match-marks are stamped to one tooth end of the drive pinion and to one tooth end on the outer taper surface of the drive gear.

The match-marks indicate the identification number of the matched drive gear-pinion pair and the deviation - true to sense- from the theoretical “AXIS DISTANCE” measured between the drive pinion face and the drive gear centerline. (For example: **1250; +4**).

Place the flanged differential half case **(31)** into the assemble mandrel **(Fig. 2.).** Position the differential side washer **(26)** and differential gear **(27)** and differential pinion washers **(30)** with the differential pinion **(29)** and cross shaft **(28).** Position the other differential gear and the spacer disc.

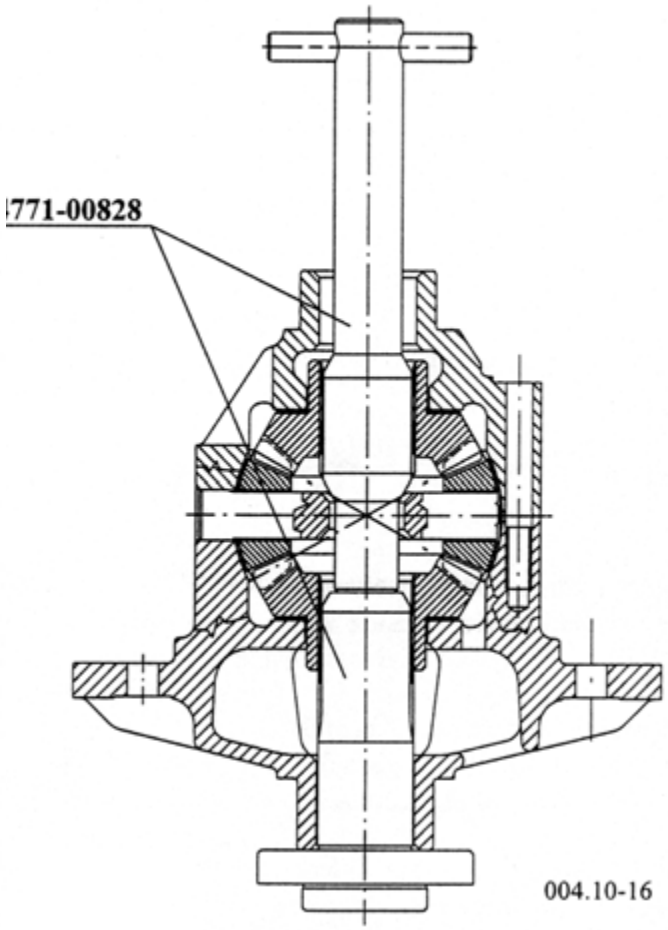

Fig. 2.: MOUNTING AND CHECKING THE DIFFERENTIAL

Assemble the differential box half cases checking the bores as match marked at factory and fix with the fastener bolts **(25).** Close the differential box with the upper assembly mandrel and tighten the fastening bolts with **81.4 - 101.7 Nm** torque. Remove the upper assembly mandrel and rotate the differential box on the lower assembly mandrel.

Sticking or tight spots are not permitted, must roll smoothly and without incident.

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Position and match the drive gear to the preassembled differential and pull it at the same until stop by using **4 M14** small-head bolts of min. **90 mm** length, as well as washers and nuts **(Fig. 3.).**

Insert the hex. bolts **(39)** and the self-lock nuts **(38)** attaching the drive gear to the differential case and tighten them to **160 - 170 Nm** torque.

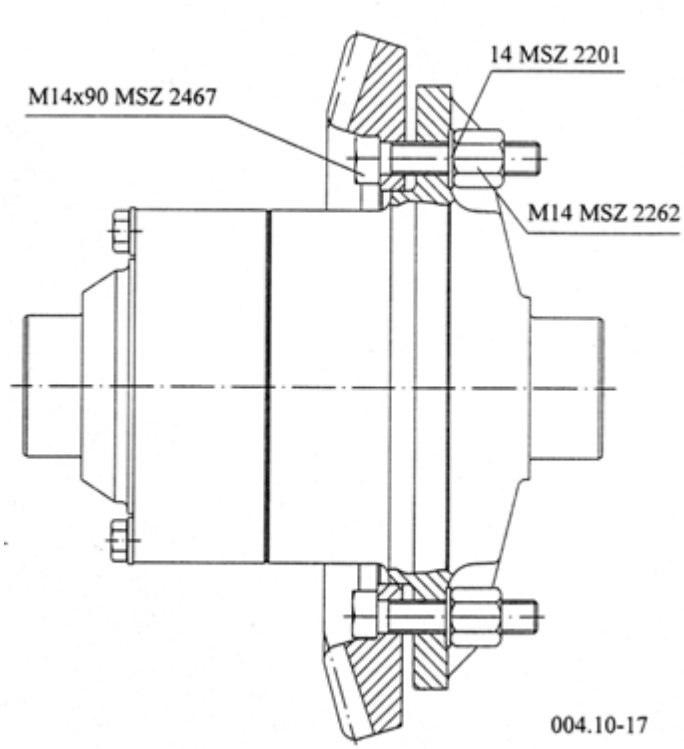

Fig. 3.: PULLING UP DRIVE GEAR

Driving in outer side of taper roller bearing up with tool as shown in figure **(Fig. 4.).**

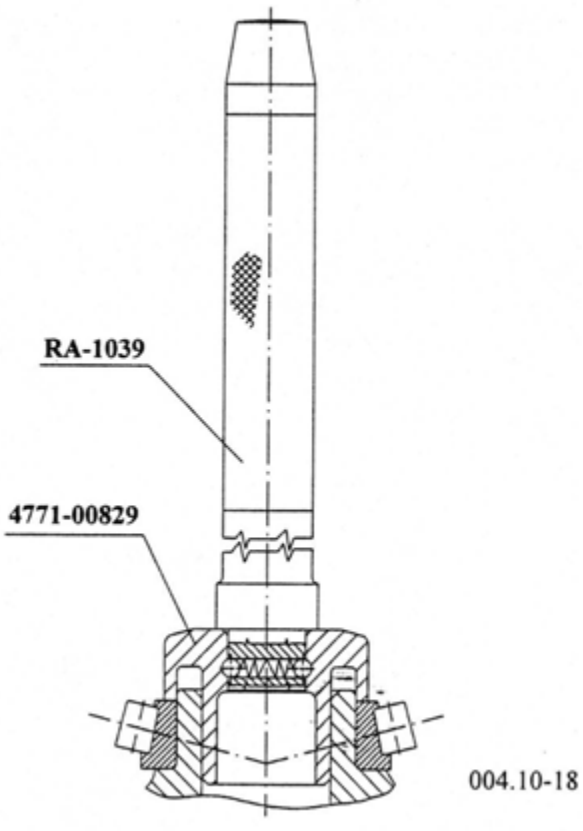

Fig. 4.: DRIVING ON INNER RACE OF TAPER ROLLER BEARING

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REMOVING AND REINSTALLING THE BEARING CAGE, ADJUSTING THE AXIS DISTANCE

REMOVING THE BEARING CAGE

The bearing cage can be removed after removal of the differential (see **Section 314**).

Remove the hex. bolts **(14)** attaching the bearing cage to the differential carrier. Pull out bearing tube from the differential carrier housing with the aid of shift hub.

Remove the shim **(13)** from the flange of bearing cage.

REINSTALLING THE BEARING CAGE

Prior to mounting the bearing tube, be sure the prescribed rolling torque (bearing prestress) **(Section 317)**, the axis distance and the contact pattern **(Section 314)** were adjusted!

I. * After reinstalling the bearing cage install the oiler scoop **(17)** by the bolts **(75)** with lock washers **(76).** Tighten the bolts to **20 Nm** torque.

II. * After reinstalling the bearing cage install the oil baffle plate **(78)** and the oiler scoop **(77)** by the bolts **(73)** with lock washers **(74).** Tighten the bolts to 8 Nm torque.

ADJUSTING THE AXIS DISTANCE

After assembling the bearing cage and adjusting the bearing preload **(Section 317),** screw **M10** pilot stud bolts into two opposite bores of the differential carrier housing for piloting purposes. Stack the shim pack necessary for adjusting the “AXIS DISTANCE” and the contact pattern over these studs so, the two extreme ones shall be thicker. Make sure to align the oil pass bores in the differential carrier housing and the bearing cage.

It is advisable to start assembling with approx. **1.4 mm** shim pack thickness.

Push the bearing cage subassembled with drive pinion into the differential carrier housing. then provisionally secure it by **2** off hex. bolts **(14)** and lock washers **(44)** in opposite bores. Tighten the bolts to **40.7 - 67.8 Nm** torque.

On the suitable master pin of accessory **“A”** of the measuring device shown in **Fig. 1** adjust the theoretical “AXIS DISTANCE” **B = 77.44 mm - 10 mm** (measuring plate thickness) = **67.44 mm** by setting the dial indicator to zero.

The measuring plate has to be fastened to the drive pinion face by means of the pressure plate attached to the flange of the differential carrier housing.

As shown in **Fig. 1** insert the device set to **67.44 mm** into the differential carrier housing.

and measure the “AXIS DISTANCE” deviation. Check if the measured value is identical to that stamped in the end of the drive pinion.

In case of identical values the adjustment is proper. otherwise correct the “AXIS DISTANCE” deviation by changing the thickness of the shim pack **(13)**. The adjustment accuracy is **± 0.025**.

For example: If the axis distance deviation stamped in the drive pinion is **+3** the value to be set is **77.44 +0.03 = 77.47 ± 0.025.**

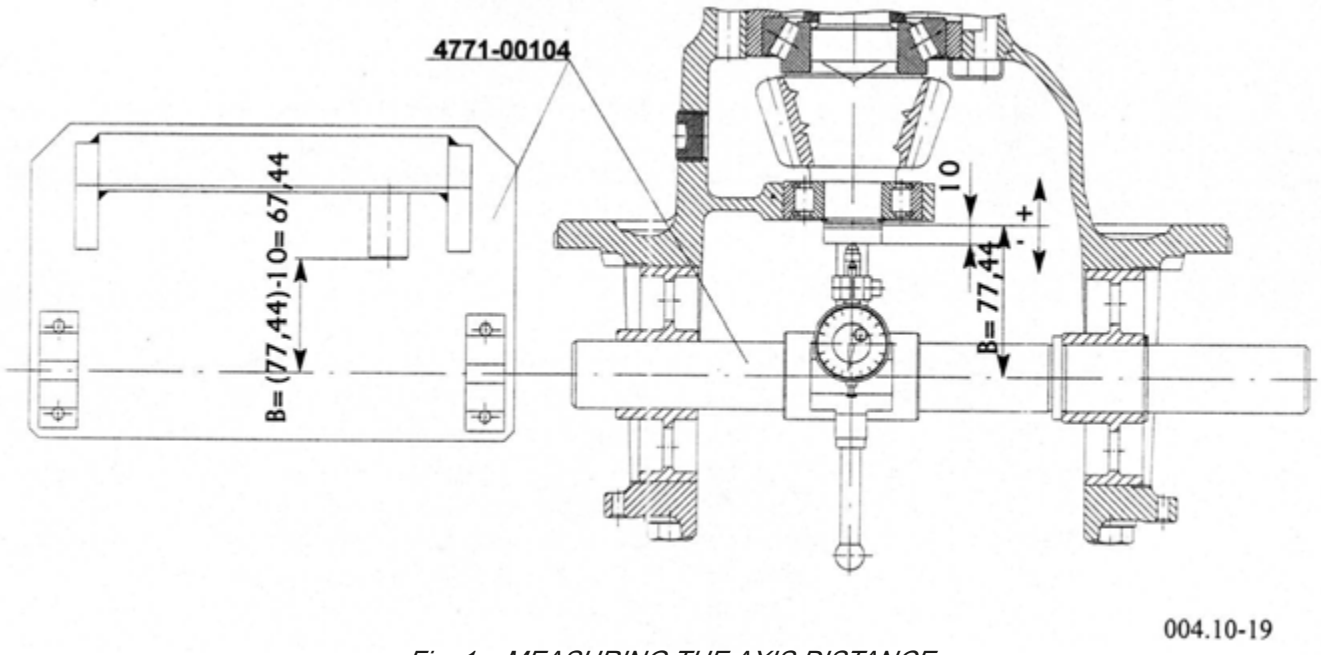

Fig. 1.: MEASURING THE AXIS DISTANCE

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INSTALLING THE BEARING CAGE FINALLY

If contact pattern adjustment **(Section 314)** and operation are proper, lift the bearing cage assembled with the drive pinion and as described in the “GENERAL SERVICE INSTRUCTIONS” apply some sealant to the inner flange.

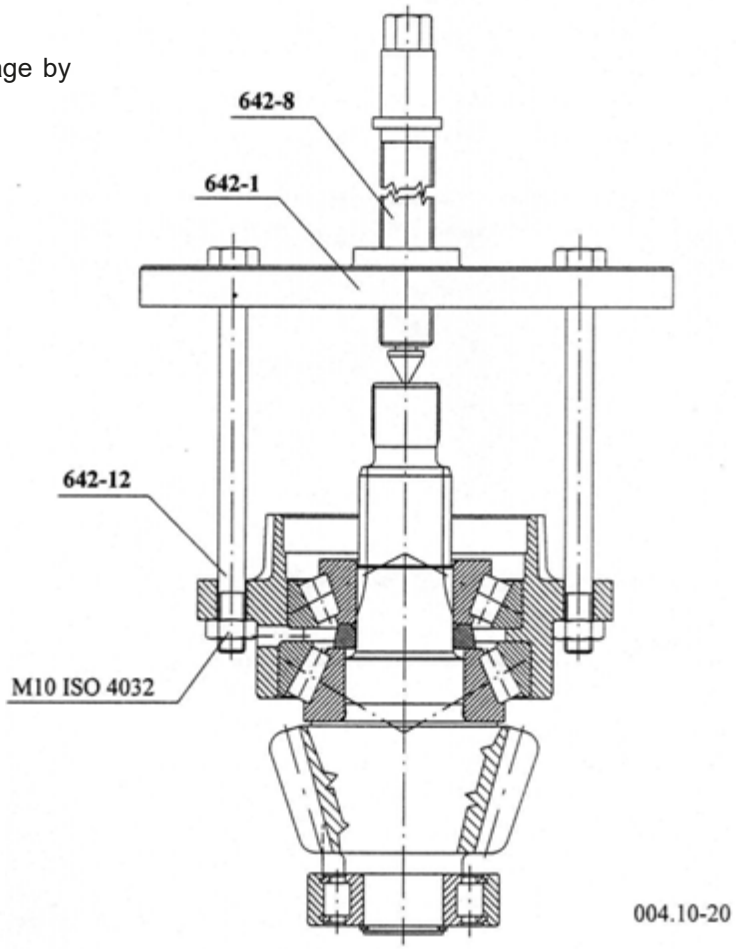
Fit back the bearing cage, making sure that the oil pass bores are aligned then secure the cage by hex. bolts **(14)** and lock washers **(44)** coated with thread adhesive. Tighten the hex. bolts to **40.7 - 67.8 Nm** torque.

SECTION 317

DISASSEMBLING AND REASSEMBLING THE BEARING CAGE

DISASSEMBLING THE BEARING CAGE

Press the drive pinion **(16)** out of the bearing cage by means of the device shown in **Fig. 1.**



By means of the device shown **(Fig.2.)** pull the inner race of the inner taper roller bearing **(12)** from the drive pinion.

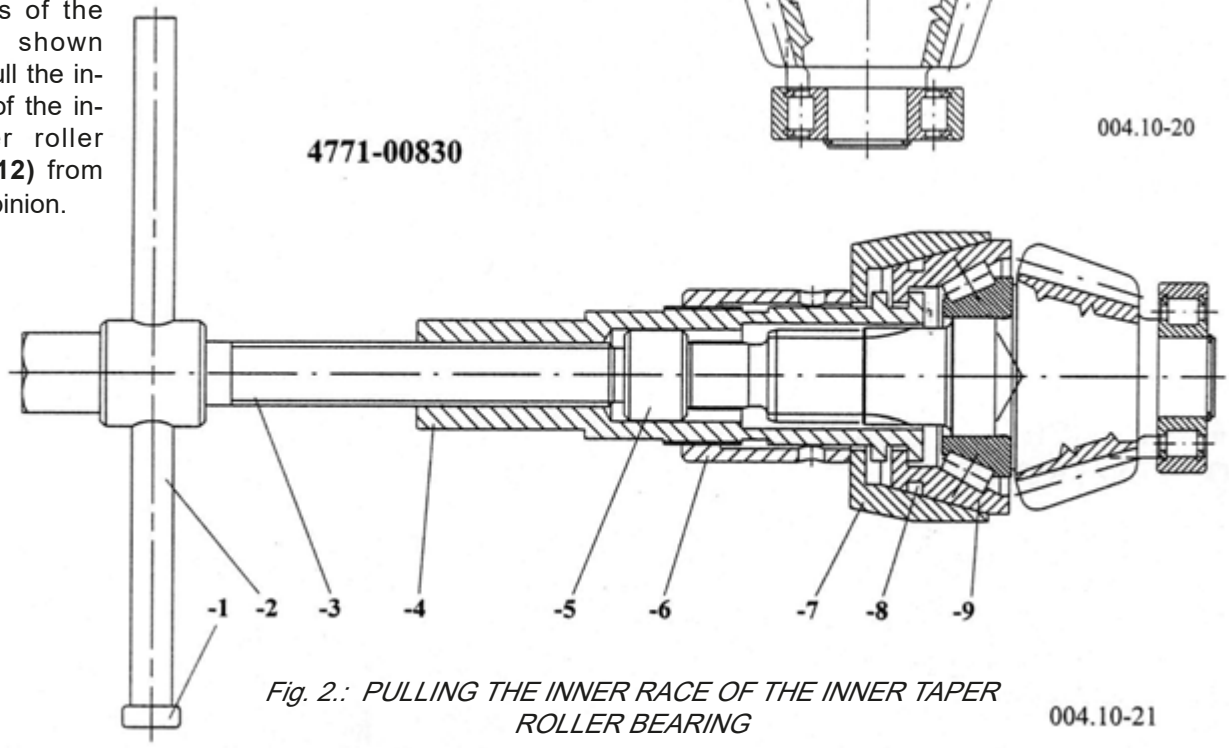


Fig. 2.: PULLING THE INNER RACE OF THE INNER TAPER ROLLER BEARING

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Remove the snap ring **(46)** from the end of the drive pinion and by means of the device shown and pull the cylindric roller bearing **(45) (Fig. 3.).**

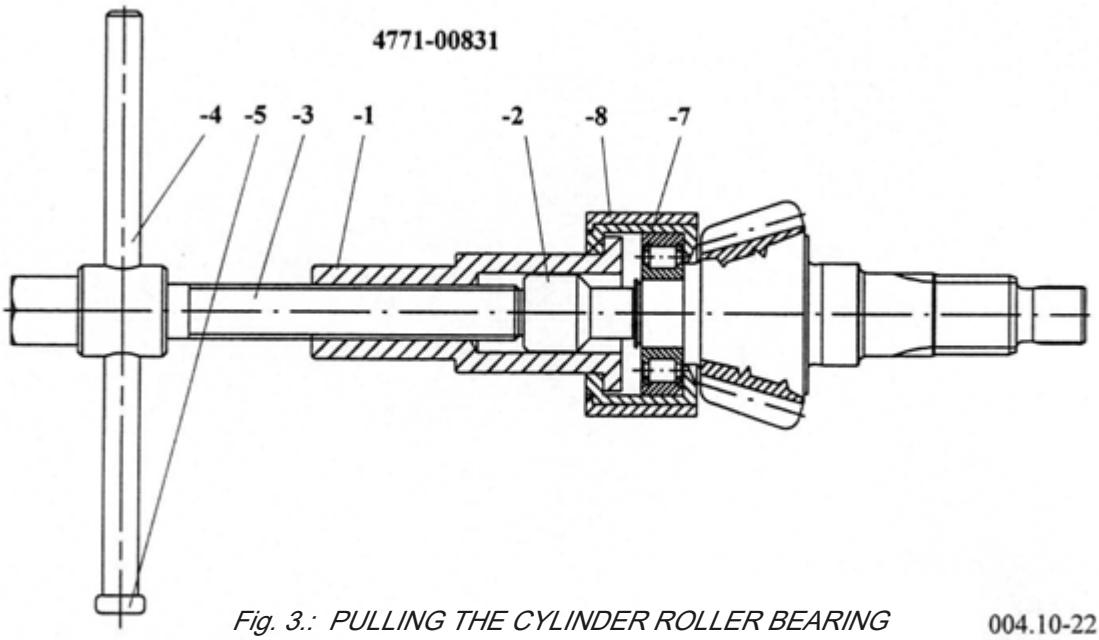

Fig. 3.: PULLING THE CYLINDER ROLLER BEARING

REASSEMBLING THE BEARING CAGE

In case of replacing the bearing cage **(8)** the new bearing cage is delivered with pressed in outer races of taper roller bearings **(9,12)** and with complete bearings.

If only the taper roller bearings are to be replaced, install the taper roller bearing outer races according to the **Fig. 4, 5, 6, 7.**

The taper roller bearings should be replaced according to the factory pairing together with the inner and outer races!

Drive out the outer taper roller bearing outer race **(9)** from the bearing cage by means of the tools shown **(Fig. 4.)**

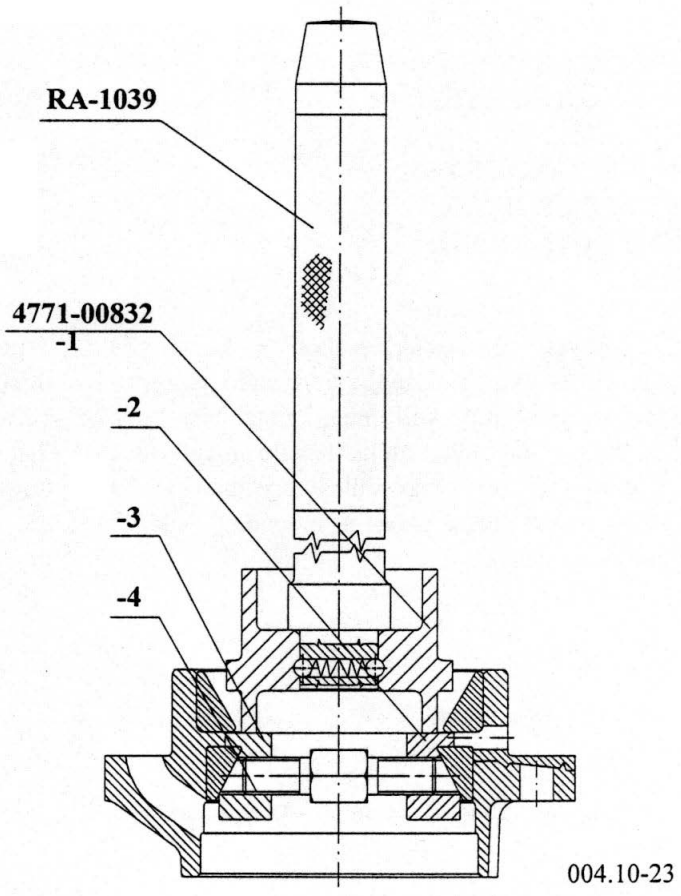

Fig. 4.: DRIVING OUT THE TAPER ROLLER BEARING OUTER RACE

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Turn the bearing cage and drive out the inner taper roller bearing outer race **(12)** by means of the tools shown **(Fig. 5.).**

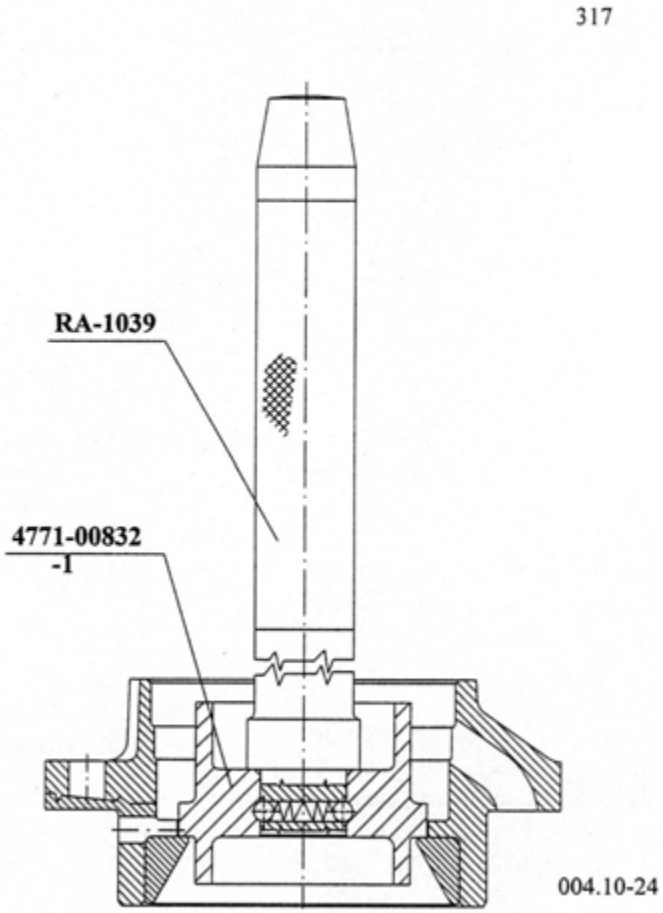

Fig. 5.: DRIVING OUT THE INNER TAPER ROLLER BEARING OUTER RACE

When reassembling the bearing cage determine the thickness of the spacer ring **(10)** to be installed to between the inner races of the taper roller bearings so, that after tightening the flanged nut to the specified torque the rolling torque of the bearing cage (without the oil seal installed) shall be within the specified limits.

Drive in the outer race of the outer taper roller bearing **(9)** by means of the tools shown **(Fig. 6.).**

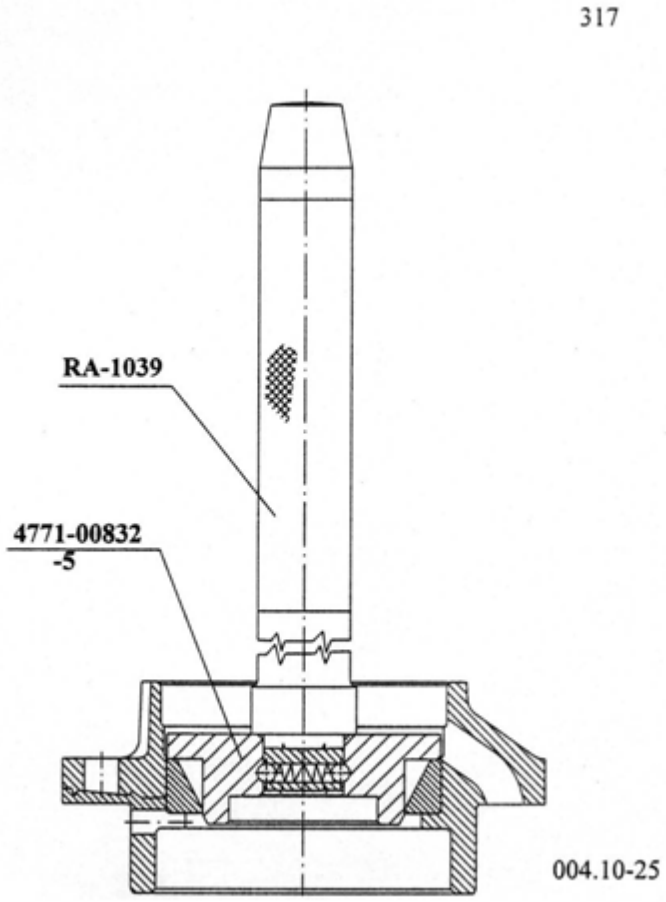

Fig. 6.: DRIVING IN THE OUTER RACE OF THE OUTER TAPER ROLLER BEARING

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Drive in the outer race of the inner taper roller bearing by means of the tools shown **(Fig. 7.).**

WARNING!

*Seating check on the whole periphery after drive in of the bearing cups. The **0.025 mm** backlash gauge not push between the bearing cups and the face surfaces of the cage.*

Before pressing it onto the drive pinion subassemble the bearing cage as shown in **Fig. 5** on the loose-fit master shaft in order to determine the thickness of the spacer to be installed, while tightening the flanged nut to the specified torque.

Install the parts onto the master shaft and tighten the flanged nut of the device to **410 - 540 Nm** torque.

Measure the rolling torque by means of a dynamometer and a cord attached to the mantle of the bearing cage.

When new bearings are installed the dynamometer should read **1.81 - 9.0** at approx. **50 r.p.m.** This corresponds to the **1.0 - 5.0 Nm** rolling torque.

When installing used bearings, set the rolling torque **0.5 - 2.5 Nm** (i.e. to half the rolling torque of new bearings).

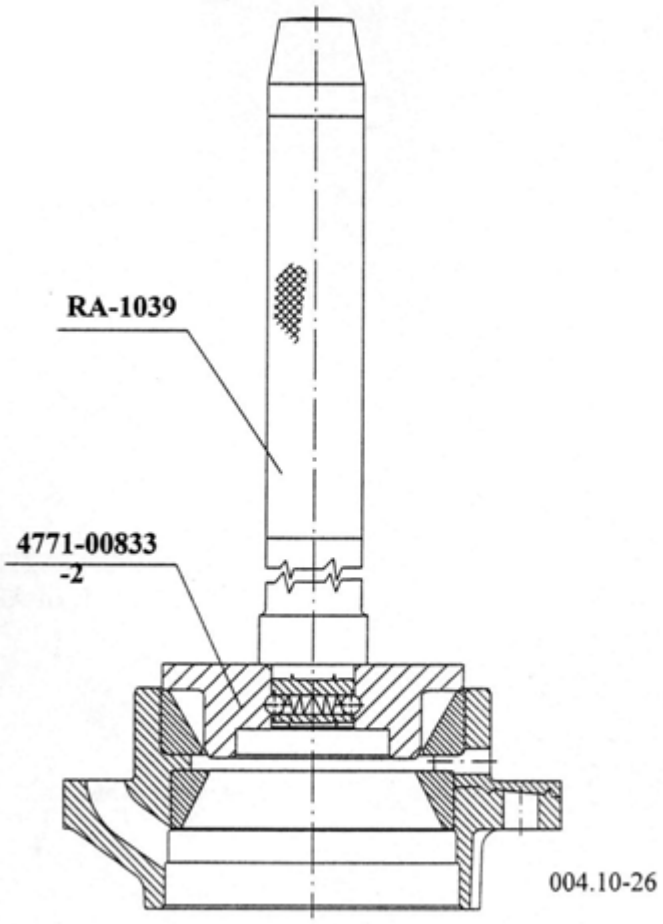

Fig. 7.: DRIVING IN THE OUTER RACE OF THE INNER TAPER ROLLER BEARING.

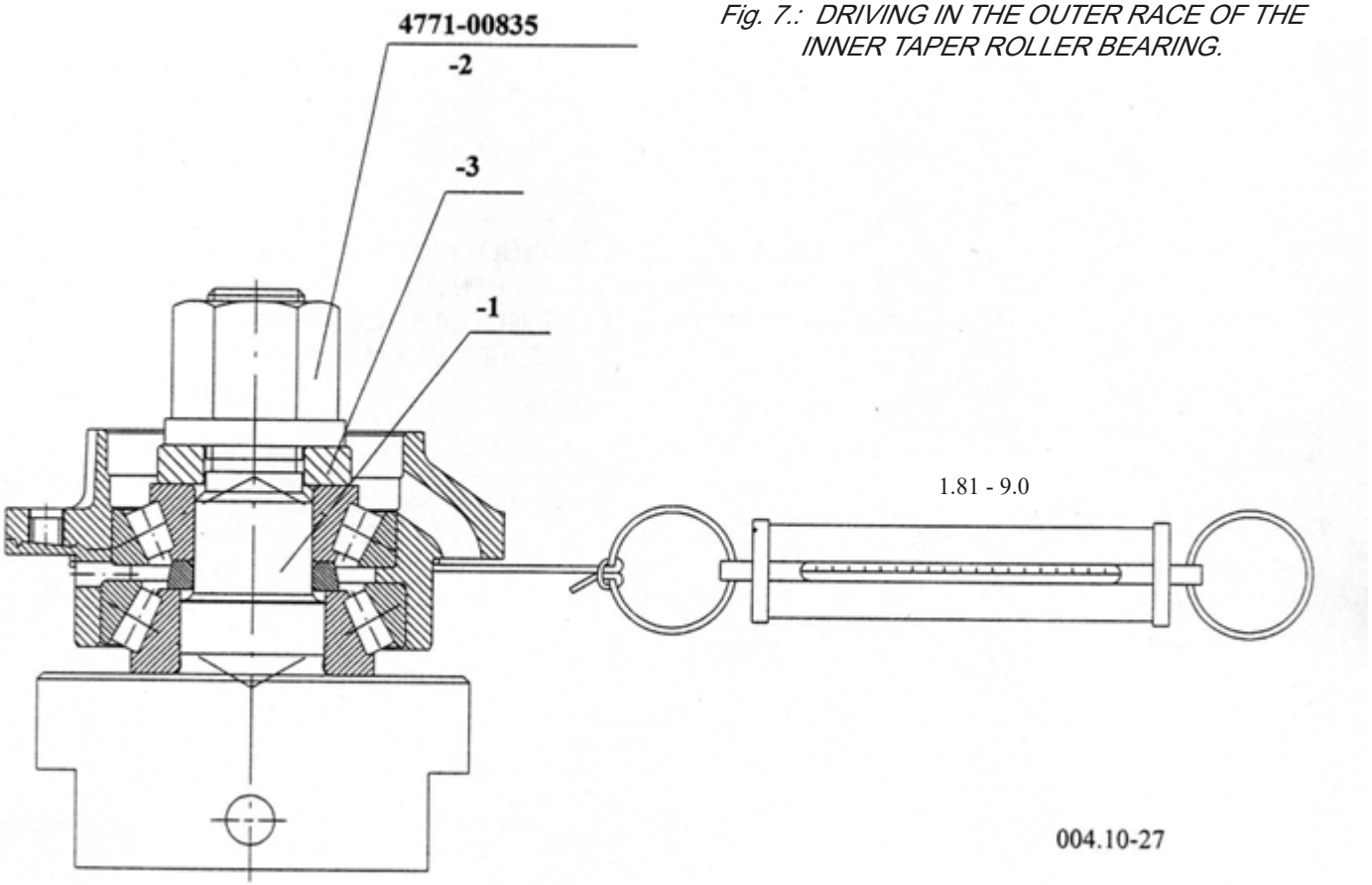

Fig. 8.: ADJUSTING THE BEARING PRELOAD

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In case of deviation perform correction by replacing the spacer ring **(10).** With rolling torque higher than specified use a thicker spacer and at lower torque a thinner one.

In case of proper adjustment transfer the parts from the master shaft to the drive pinion. (Do not install the oil seal yet.)

Make sure the install only the parts used for the previous adjustment onto the drive pinion.

Drive on the cylindric roller bearing **(45)** by means of the pressing head **(Fig. 9.)**

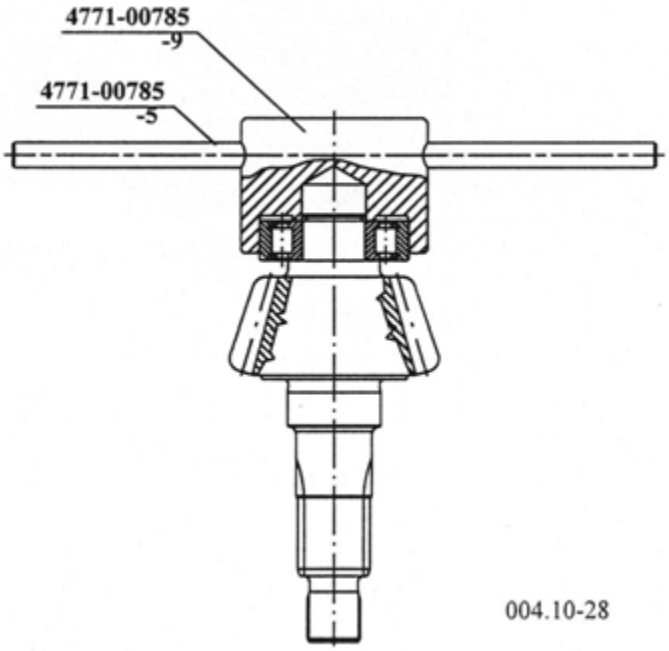

Fig. 9.: DRIVING ON THE CYLINDRIC ROLLER BEARING

Drive the lock ring **(46)** to the end of the drive pinion by means of tools **No. a 4771-00785-10** and **4771-00785-11**

Drive on the inner race of the inner taper roller bearing by means of tools shown **(Fig. 10.).**

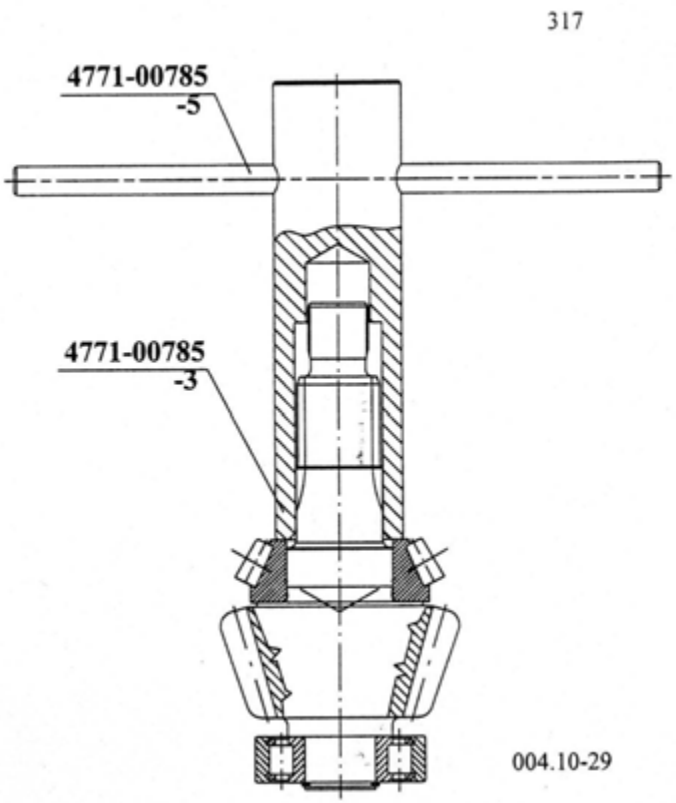

Fig. 10.: DRIVING ON THE INNER RACE OF THE INNER TAPER ROLLER BEARING

Position the previously selected spacer ring **(10),** the bearing cage subassembled with the bearing outer races and the outer taper roller bearing inner race. Then by means of the press sleeve **No. 4771-00835-5** press on the parts to bottom out, while taking care of the proper connection of the bearings.

Press the companion flange **(3)** without the oil seal **(4)** to the drive pinion, position the washer **(2),** screw on the flanged nut of the adjusting device and tighten it to **410 - 540 Nm** torque.

Check the rolling torque as described earlier and in case of deviation repeat the adjustment until the specified torque is obtained.

After adjusting the proper rolling torque remove the companion flange.

Install the companion flange with the oil seals as described in **Section 313.**

Tighten the self-lock nut **(1)** to **410 - 540 Nm** torque.

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OIL FILL-UP, RUN, CHECK

Fill up the finish-assembled axle with oil of grade and quantity as specified in the “OPERATING AND MAINTENANCE INSTRUCTIONS”.

Fill only perfectly clean oil into the axle.

After fill-up install the screw plugs to be leak-tight and tighten. Following this run the axle with varying speed to both directions.

DURING RUNNING CHECK THE FOLLOWING:

THE AXLE FOR LEAKS:

No oil leaks are permitted.

THE AXLE FOR OPERATION:

At the rotated mechanisms, in the differential and the wheel hub — no excessive noise or sound of friction is permitted. The meshing gears should roll on one another smoothly, without noise.

THE BRAKE FOR OPERATION:

As described in documentation of BENDIX.

THE AXLE FOR WARMING:

At the end of the run temperature may not exceed approx. **60º C** at the wheel hub and approx. **80º C** at the input section.

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