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**REPAIR MANUAL
DRIVEN FRONT AXLE
MT22/MT23 SERIES**

MARMON-HERRINGTON ALL-WHEEL DRIVE

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PREFACE

The present document gives directions to the trained personnel to repair the

MARMON-HERRINGTON (M-H)-Axle MT22

Customary tools and devices, which are workshop standard, are supposed to be available.

Disassembly and assembly of one version only is explained in this document. Differing working sequences of other possible versions can easily be recognized by the skilled professional. For such jobs see enclosed sectional and perspective views.

The repair of the component may require changed working sequences or/and differing adjustment or checking data, according to the technical development of the product over the years.

Therefore, we recommend rendering your M-H Product only to the hands of periodically trained personnel.

Damages caused by improperly or unprofessionally executed repair work through untrained personnel and the resulting consequences are excluded from any contractual liability.

This also applies when NON-ORIGINAL-PARTS are being used.



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The company repairing M-H Components is in any case responsible for all aspects of safety.

The valid safety regulations and legal directives have to be obeyed to avoid injury of persons and damage of the product during maintenance and repair.

The proper repair of the M-H Product requires adequately trained personnel. To undergo training is the obligation of the repairer.

Always assure professional and clean working conditions. Components shall always be cleaned before disassembly.

The use of indicated tools is a precondition.

After disassembly, all parts have to be cleaned. This applies in particular to corners, nooks and oil catchers in housings and covers.

Carefully remove old sealing compound.
Clean surfaces thoroughly before sealing.

Lubrications bores, grooves and pipes are to be checked to be free from obstructions. They must be free from deposits, contamination and preservatives. The latter applies particularly for new parts.

Parts that are being damaged during disassembly are to be replaced by new ones.
E.g.: radial oil seals, o-rings, groove-rings, seal cups, protection caps a. s. o.

Parts as bearings, thrust washers, synchromesh parts etc., which are liable to normal wear have to be checked by the skilled professional. He judges if a part can be reused or not.

Parts, which have a shrink fit, must be driven to their end position after cooling down to assure perfect seating. Before pressing-in parts like shafts, bearings etc. both contact surfaces must be oiled.

On the assembly all given adjustment tolerances, check data and tightening torques have to be observed. M-H Components are to be filled with lubricant after the repair. Observe filling instructions and lubrication chart. After filling, the oil drain and oil level plugs must be tightened to correct torque.

Use Original M-H Parts only!

FOREWORD

This publication “GENERAL REPAIR INSTRUCTIONS” was prepared for workshops and contains all the necessary assembly instructions as well as data to be checked and adjusted during repair of the

MARMON-HERRINGTON

(M-H) MT22 type driven front axles.

For technical data on the specific type versions of the **M-H MT22** type driven front axles refer to the publication “**TECHNICAL DATA**”, while for the spare parts of that “**PARTS CATALOG**” grouped according to the Type.

The “**GENERAL REPAIR INSTRUCTIONS**” contain sections divided into 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.

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.

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 M-H MT22 made products.**

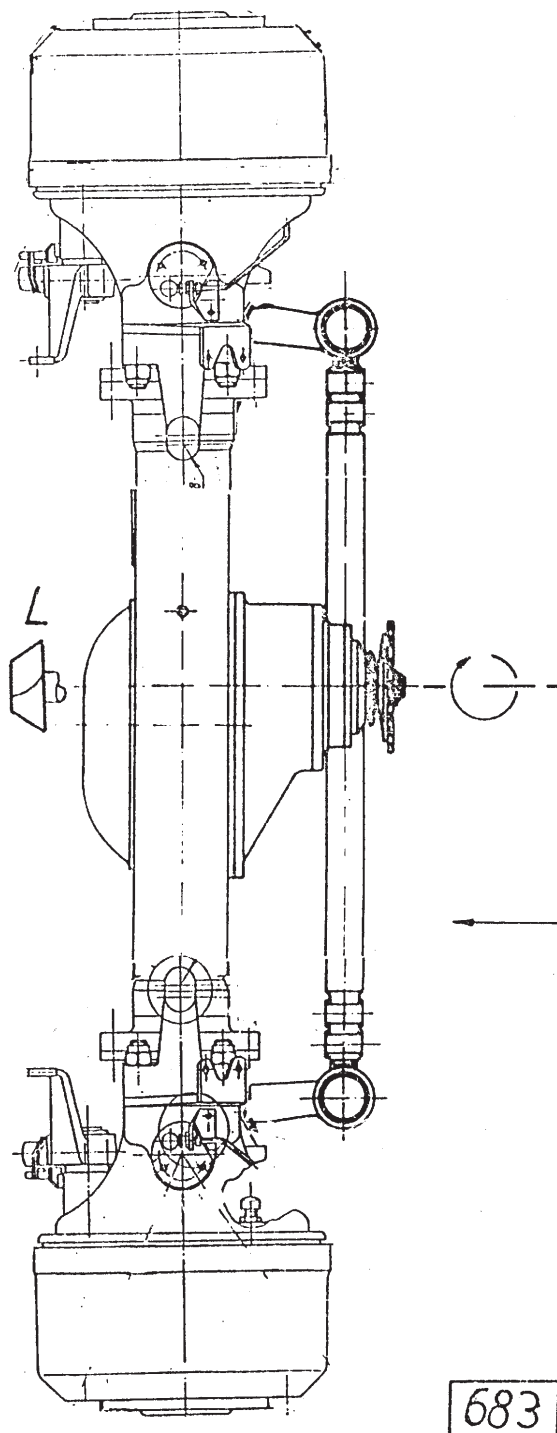
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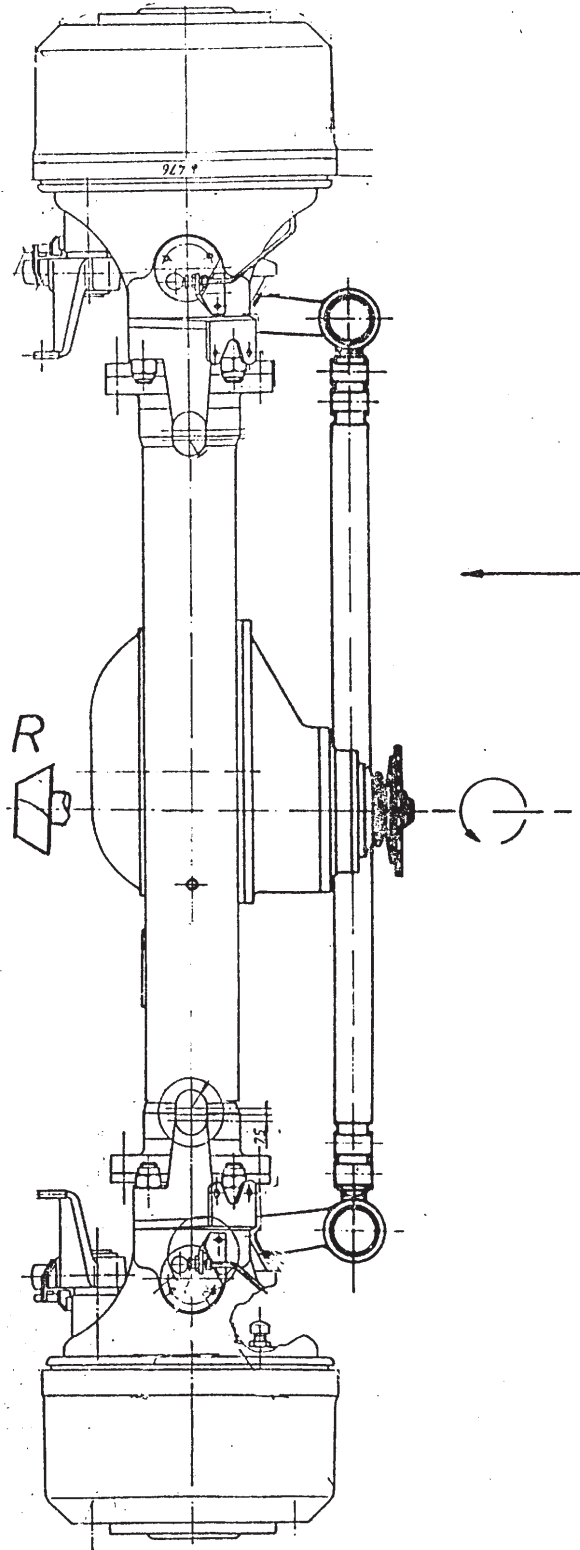
SECTION 204

DRAWINGS OF TYPE M-H MT22 DRIVEN FRONT AXLES



DRIVE PINIONS HAND OF SPIRAL

MT23



DRIVE PINIONS HAND OF SPIRAL

MT22

SECTION 205

TECHNICAL DATA

DESCRIPTION	UNITS	TYPE
		MT22/MT23
SYSTEM:		
The reduction of the driven and steered front axle is of two-stage design. The reduction is accomplished by a pinion and ring gear pair in the carrier and by spur planetary gearing in the wheel hub.		
DIMENSIONS:		
WHEEL TRACK	mm	1964 - 2072*
a./ Rubber tire		14x20” - 24x22.5”*
b./ Rolling radius	mm	542 - 590*
c./ Sinking depth	mm	145 - 180*
Max. Width	mm	max. 2500*
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.		

TECHNICAL DATA

DESCRIPTION RATIOS:	UNITS	TYPE
		MT22/MT23
Ring gear/pinion		27/22 - 32/13*
Planetary gear		64/26 + 1 = 3.461
Total ratio		4.248 - 8.521*
GENERAL DATA:		
Camber		0.5°
Knuckle pin inclination		5.5°
Inner wheel turn angle		max. 35°
Rated axle load	kg	10000*
Max. Input torque	Nm	7370 - 3470*
Max. Input speed	1/sec r.p.s.	50
Mass of axle without oil fill	kg	~830*
WHEEL HUB CONSTRUCTION:*		
C = Suitable for installing bore piloted wheel disk	mm	Flange: -0.32 Wheel nut hex. Distance: 32
C/1 = Suitable for installing bore piloted wheel disk	mm	Flange: -0.32
WHEEL BRAKE		
System		Simplex system internally acting drum brake
Brake drum dia.	mm/inch	420/16 1/2**
Max. Trued-up brake drum dia.	mm/mm	424/423*
Brake lining width	mm/inch	180/7**
Min. Brake lining thickness measured at brake shoe center (marked by upper edge of recess on side of brake lining)	mm/mm	7.0
SLACK ADJUSTER		Automatic slack adjuster
Slack adjuster installation radius, "C"	mm	165*
Distance between the bore center of the brake lever bush and the seating plane of the chamber holder, "A"	mm	318; 334*
ANTI-FRICTION BEARINGS		



TECHNICAL DATA

205

DESCRIPTION	UNITS	TYPE
		MT22/MT23
IN THE WHEEL HUB Outer: Taper roller bearing Inner: Taper roller bearing IN THE PLANETARY DRIVE Cylindric roller bearing IN THE AXLE HOUSING In the steering knuckle: Cylindric roller bearing In the knuckle carrier: Cylindric roller bearing IN THE DIFFERENTIAL CARRIER ASSEMBLY On the drive pinion: Outer: Taper roller bearing Inner: Taper roller bearing On the differential: On case half: Taper roller bearing On flanged case half: Taper roller bearing SEALS In the wheel hub: Sealing ring On the double joint: Oil seal Oil seal Sealing ring Metal clad sealing ring On the knuckle pin: O-ring		TIMKEN JM 822010 cone TIMKEN 48320 cone K30x42x30 MGM RNU 2208 EC RNU 310 EC 32312 B X7JU MGM 32314 B X7JU MGM 30215 A MGM 32215 A MGM 1HH1 178x205x17 NB STEFA DENSO A49, 5x80x8 NB SIMMERWERKE ø50x65x6 KV 3440 SIMMERWERKE (in dust protection case) 11 CCI65x85x10 NB STEF A vagy SIMMERWERKE ø 65x80x8 KV 3826 SIMMERWERKE OR 65x3 Mat. Pa 169

TECHNICAL DATA

205

DESCRIPTION	UNITS	TYPE
		MT22/MT23
Sealing ring		583.30-3110-038
In the differential:		
Oil seals		AS 75x95x10 NB SIMMERWERKE
In the brake spanner bearing:		
Oil seals		A 42x55x8 NB DIN 3760
NOTE: Nm to ftlb = $\text{Nm} \div 1.3558$ (Ex. $600 \text{ Nm} \div 1.3558 = 443 \text{ ftlb}$)		
WHEEL DRIVE, WHEEL HUB,	210/1	Nm



SECTION 206
TORQUE RATINGS

DESIGNATION	SECTION/FIGURE	TYPE
		MT22/MT23
AXLE HOUSING		
Wheel nut C	4	As specified by the orderer 540-670 Nm
End-cover to pinion carrier mounting bolts	12	39 - 49 Nm Installed with thread locker
Pinion carrier to wheel hub mounting bolts	33	39 - 49 Nm
Outer shaft-end nut	34	450 - 490 Nm
Inner shaft-end nut (Per Section 223)	36	196 Nm
Knuckle pin cover mounting bolts	52	30 - 40 Nm
Brake drum mounting hex. bolts	39	39 - 49 Nm
Tie-rod arm and pilot arm fixing castle nuts	61	540 - 590 Nm
Tie-rod arm and pilot arm fixing bolts	63	40 - 50 Nm Installed with thread adhesive
Lock wedge fixing hex. flanged nuts	69	50 - 70 Nm
Knuckle carrier to axle housing hex. Bolts	70	360 - 380 Nm Installed with thread locker
Dust protection plate mounting hex. Bolts	85	6 - 8 Nm
Pipeline support mounting hex. bolts	97	39 - 49 Nm
Low nut fixing the elbow to the support	99	30 - 40 Nm
Tie-rod clamp self lock nuts	-	75 - 90 Nm
Tie-rod to tie-rod arm castle nut	-	300 - 400 Nm
WHEEL BRAKE	260/1	Nm
Brake spanner support mounting hex. flanged bolts	5	130 - 140 Nm Installed with thread locker
Brake cover plate mounting hex. bolts	21	10 - 12 Nm
Brake support mounting hex. Bolts	24	350 - 400 Nm Installed with thread locker
DIFFERENTIAL CARRIER ASSEMBLY	310/1	Nm
Differential carrier to axle	-	88 - 98 Nm

TORQUE RATINGS

206

DESIGNATION	SECTION/FIGURE	TYPE
		MT22/MT23
housing hex. flanged bolts		Installed with thread locker
Drive pinion self-lock nut	1	540 - 590 Nm
Differential carrier cover mounting hex. bolts	6	20 - 30 Nm
Bearing cage to differential carrier mounting hex. flanged bolts	14	88 - 98 Nm Installed with thread locker
Hex. bolts attaching the tab lock plates fixing the differential case bearing adjusters	22	15 - 20 Nm
Differential case halves clamp bolts	25	49 - 59 Nm
Drive gear to differential case hex. bolts	39	98 -118 Nm Installed with thread locker
NOTE: mm to inch = mm ÷ 25.4 (Ex. 0.15 mm ÷ 25.4 = .006 inch)		
WHEEL HUB		



SECTION 207

ADJUSTMENT DATA

DESIGNATION	UNITS	TYPE
		MT22/MT23
Axial play of wheel hub bearings (adjusted by the spindle nuts)	mm	0.01 - 0.04
Axial play of the double joint (adjusted by shim on the sun gear side)	mm	0.4 – 1.6
Shim thicknesses	mm	0.25; 0.5; 2.0
STEERING KNUCKLE		
Axial play of the steering knuckle	mm	0.0 - 0.3
Shim thicknesses	mm	0.4; 0.6; 1.0; 1.2; 1.4
TOE-IN	mm	1.5 ± 1.5
WHEEL BRAKE		
Shoe clearance (during adjustment)	mm	0.3 - 0.6
Axial play of the brake spanner	mm	0.1 - 0.5
DIFFERENTIAL CARRIER ASSEMBLY		
Drive gear to pinion backlash	mm	0.15 - 0.25
Rolling torque after preloading the drive pinion bearings (during check the oil seal is not installed)	Nm	1.0 - 1.7
Adjustment by the distance rings. Distance ring dimensions	mm	- 34 spacers of 13.89 to 14.715 mm in 0.025 mm thickness steps
Theoretical distance between the drive pinion face and the drive gear centerline (“Axis distance”)	mm	88
Adjustment by shims under the bearing cage. Shim thicknesses:	mm	0.2; 0.25; 0.3; 0.5; 1.0

GENERAL 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 DRIVE, WHEEL HUB

After tightening the shaft-end nuts obtain **0.01 - 0.04 mm** axial play at the wheel bearings.

For adjustment refer to the Section **223**.

Install **ONLY** identical code, same tolerance class bearings supplied in one package to one wheel hub planetary gear.

Adjust the axial play of the twin-swivels to **0.4 – 1.6 mm** as measured between the bull gear and the friction disk. For adjustment shims of **0.25, 0.5 and 2.0 mm** thickness are available.

The adjustment is described in the Section **220**.

WHEEL BRAKE

If the brake linings are worn to the permitted limit (**as indicated by the upper edge of the recess on side of the brake lining**) replace the linings according to the instructions.

Check the brake shoe surface in contact with the shoe anchor pin and the shoe rollers.

Adjust the specified shoe clearance (**0.3 - 0.6 mm**) by means of the brake lever.

After adjustment the brake lining may not interfere with the brake drum.

From the sealing rings of the brake spanner only that at the brake spanner head may not pass over the surplus lubricant during greasing. The sealing ring at the brake spanner head protects the brake drum against the grease. **Make sure to install the sealing ring in proper position.**

True up the brake drum **ONLY** to the permitted maximum diameter.

DIFFERENTIAL CARRIER ASSEMBLY

Install the taper roller bearings of the drive pinion with preload. Assure such a preload the bearings shall roll on torque of **1 - 1.7 Nm**. During check the sealing rings (**4 in Fig. 1 of Section 310**) with the cover (**5**) not installed.

For adjustment refer to the Section **317**.

The differential gears should be rotatable without jam-

ming.

Install the taper roller bearings of the differential without clearance.

For adjustment of the proper contact pattern and the specified **0.15 - 0.25 mm** backlash refer to the Section **314**.

GENERAL INSTRUCTIONS

For purpose of 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 burrs and knock-outs. Before installation wipe the mating surfaces of the parts clean and apply thin coat of oil.

For assembly operations use **ONLY** plastic or lead-insert hammer.

Before installing the oil seals make sure to check if the sealing lip is sound and apply specified grease 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 material are used in the axle, e.g.:

Thread adhesive	LOCTITE 277
Thread locker	LOCTITE 243 LOCTITE 273
Surface Sealant	LOCTITE 515

Before installation apply the LOCTITE and Omni FIT concentrically to approx. 4-5 threads on the threaded surface of the bolt.

Clean and degrease the surfaces before applying the air-curing sealant type LOCTITE 515. 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 material other equivalent grade ones may also be used.



WHEEL DRIVE, WHEEL HUB

WHEEL DRIVE, WHEEL HUB SECTIONAL VIEW

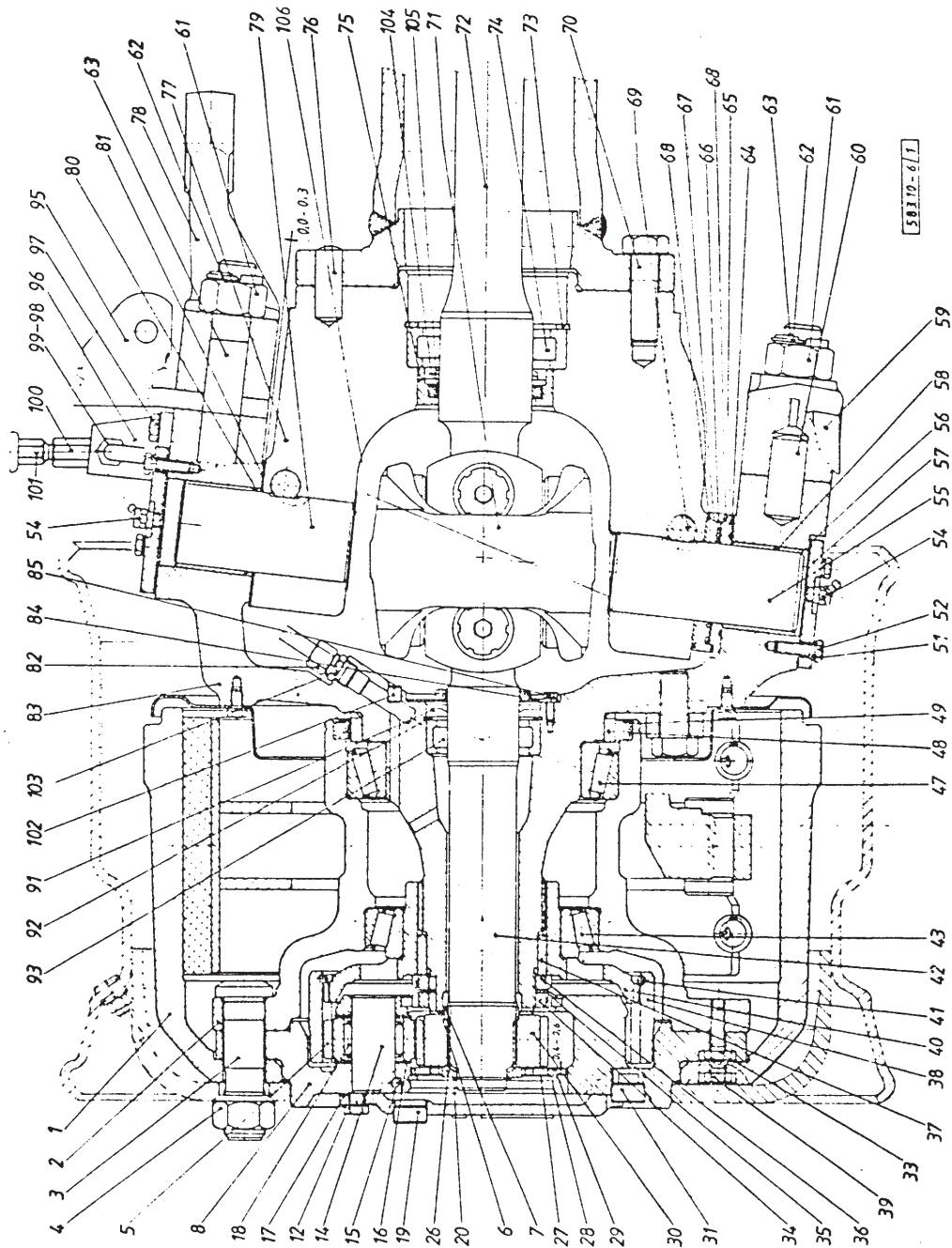


Fig. 1.: WHEEL DRIVE, WHEEL HUB SECTIONAL VIEW

SECTION 211

PARTS OF THE WHEEL DRIVE, WHEEL HUB

- | | |
|---|--|
| 1 — Brake drum | 56 — Gasket |
| 2 — Wheel hub | 57 — Cover |
| 3 — Wheel bolt | 58 — Knuckle pin, bushing |
| 4 — Wheel nut | 59 — Tie-rod arm |
| 5 — Idler pinion | 60 — Dowel pin |
| 6 — Friction disk | 61 — Castle nut |
| 7 — Distance ring | 62 — Securing wire |
| 8 — Pinion carrier | 63 — Stud bolt |
| — | 64 — O-ring (ø65x3) |
| 12 — Hex. bolt | 65 — Bearing case, lower |
| — | 66 — Thrust disk with plastic coating |
| 14 — Pinion pin | 67 — Bearing case, upper |
| 15 — Steel ball | 68 — O-ring (ø85x3) |
| 16 — Distance plate | 69 — Lock wedge with hex. flanged nut |
| 17 — End-cover | 70 — Hex. bolt |
| 18 — Cylindric roller bearing | 71 — Double-joint head |
| 19 — Oil filler bore screw plug | 72 — Inner axle shaft |
| 20 — Snap ring | 73 — Snap ring |
| — | 74 — Cylindric roller bearing |
| 26 — Distance ring | 75 — Seal retainer |
| 27 — Shims | 76 — Dowel pin |
| 28 — Snap ring | 77 — Knuckle carrier |
| 29 — Friction disk | 78 — Pilot arm |
| 30 — Sun gear | 79 — Knuckle pin, upper |
| 31 — Oil drain bore screw plug with magnetic insert | 80 — Sealing ring |
| — | 81 — Shims |
| 33 — Hex. bolt | 82 — Connecting pipeline |
| 34 — Outer shaft-end nut | 83 — Steering knuckle |
| 35 — Lock plate | 84 — Dust protection plate with gasket |
| 36 — Inner shaft-end nut | 85 — Hex. bolt with lock washer |
| 37 — Centering ring | — |
| 38 — Gear rim | 91 — Sealing ring |
| 39 — Hex. bolt | 92 — Snap ring |
| 40 — Rim hub | 93 — Cylindric roller bearing |
| 41 — Circlip | — |
| 42 — Outer axle-shaft | 95 — Diaphragm holder |
| 43 — Taper roller bearing | 96 — Holder |
| — | 97 — Hex. bolt with lock washer |
| 47 — Taper roller bearing | 98 — Elbow |
| 48 — Shoulder ring | 99 — Low nut |
| — | 100 — Reducing fitting |
| 49 — Sealing ring | 101 — Vent valve |
| 51 — Lock washer | 102 — Grub screw |
| 52 — Hex. bolt | 103 — Pipe fitting |
| — | 104 — Sealing ring |
| 54 — Ball lube fitting | 105 — Dust protection gasket |
| 55 — Knuckle pin, lower | 106 — Anti-corrosion point |



SECTION 212

REMOVING AND REINSTALLING THE WHEEL DISK

REMOVING THE WHEEL DISK

With wheels in loaded condition loosen the wheel nuts (4), then jack up the axle, back out the wheel nuts and remove the wheels.

REINSTALLING THE WHEEL DISK

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

SECTION 213

REMOVING AND REINSTALLING THE BRAKE DRUM

REMOVING THE BRAKE DRUM

After removing the wheel disk back out the 2 hex. bolts attaching the brake drum to the wheel hub, then by 2 M12 bolts of at least 40 mm thread length driven into the threaded bores for this purpose in the brake drum flange pull out the brake drum and remove.

REINSTALLING THE BRAKE DRUM

Aligning the bores position the brake drum to the wheel hub. Install the hex. bolts attaching the brake drum and tighten to 39 - 49 Nm torque.

SECTION 214

REMOVING AND REINSTALLING THE END-COVER

REMOVING THE END-COVER

Drain the oil.

Remove the hex. bolt (12) attaching the end-cover (17) to the pinion carrier and separate the end-cover.

REINSTALLING THE END-COVER

As described in the “GENERAL SERVICE INSTRUCTIONS” apply oil-proof sealant to the seating flange of the end-cover (avoiding the bores from inside).

Aligning the bores and the oil drain bore position the end-cover to the pinion carrier and secure by means of the hex. bolts coated with thread locker and tightened to 39 - 49 Nm torque.

SECTION 220

REMOVING AND REINSTALLING THE PINION CARRIER, ADJUSTING THE AXLE-SHAFT CLEARANCE

REMOVING THE PINION CARRIER

After removing the end-cover (17) by means of snap ring pliers remove the snap ring (28), then the shims (27) and the friction disk (29) from the pinion carrier.

Following this remove the hex. bolts (33) from the flange of the pinion carrier (8), then by means of M8 bolts of at least 35 mm thread length driven into the two threaded bores for this purpose in the pinion carrier flange pull the pinion carrier out of the wheel hub.

REINSTALLING THE PINION CARRIER

As described in the “GENERAL SERVICE INSTRUCTIONS” apply oil-proof sealant to seating flange of the pinion carrier (avoiding the bores from inside).

Position the pinion carrier into the wheel hub aligning the bores and the gear teeth. Secure by means of hex. bolts tightened to 39 - 49 Nm torque.

ADJUSTING THE AXLE-SHAFT CLEARANCE

Insert the friction disk (29) into the installed pinion carrier and secure by the snap ring (28). Push the friction disk to bottom out against the bull gear (30) and by means of feeler gage measure the clearance between the friction disk and the snap ring.

From the shims (27) select such a pack the thickness of which is 0.4 – 1.6 mm less than the measured value.

By means of snap ring pliers remove the snap ring (28) again, then insert the selected shim pack and finally install the snap ring.

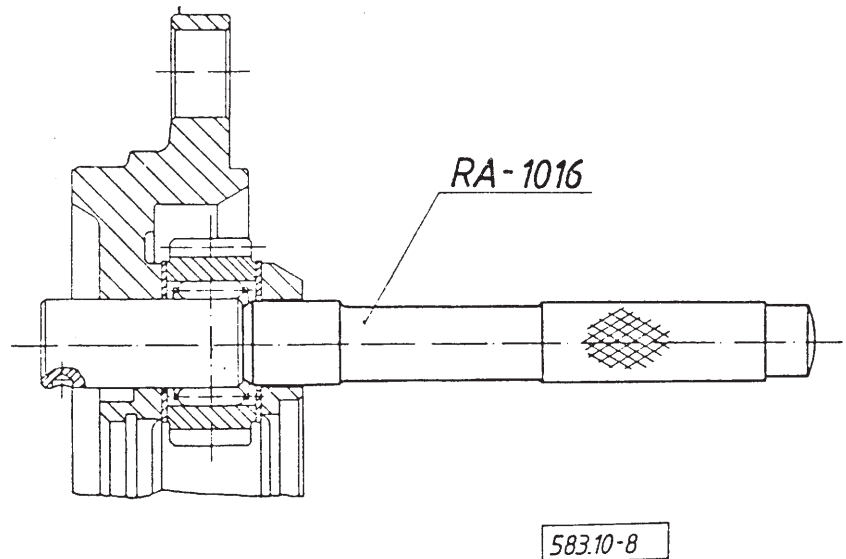
SECTION 221



DISASSEMBLING AND REASSEMBLING THE PLANETARY GEAR

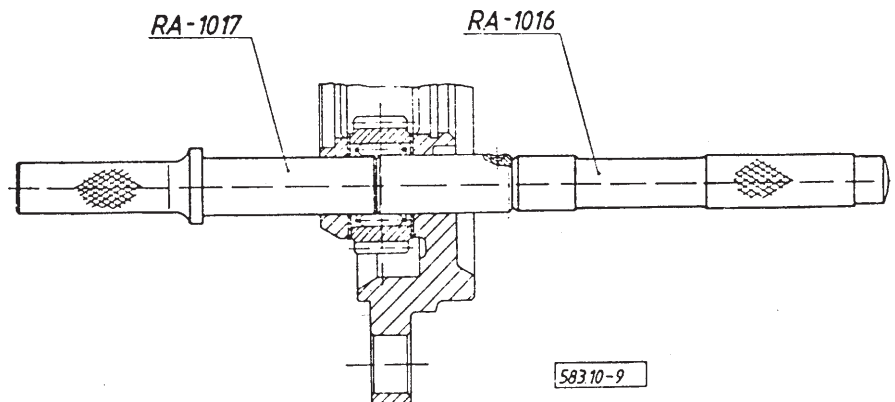
By means of the mandrel shown in **Fig. 1**, drive the pinion pins out toward direction the steel ball (15).

One by one stack the sound or replaced parts to the pilot mandrel positioned thru the pinion carrier bore as shown in **Fig. 2**.



Drive in the pinion pins by means of the shown service mandrels (see **Fig. 1**).

When driving in the pinion pins (14) make sure to align the groove machined for the steel ball in the pinion carrier (8) and the seat in the pinion pin to be able to insert the steel ball before completely driving in the pinion pin.



When replacing the pinion pins (14) make sure to install ONLY identical code, same tolerance class bearings supplied in one package to one planetary gear.

Reinstall the sun gear in reverse order of removal. Make sure to check if the friction disk (6) is on the distance ring (7), as well as the chamfered side of the distance ring (26) faces inward.

SECTION 222

REMOVING AND REINSTALLING THE SUN GEAR

REMOVING THE SUN GEAR

After removing the pinion carrier remove the snap ring (20) and the distance ring (26).

Following this pull the sun gear (30) from the axle-shaft together with the distance ring (7) and remove the friction disk (6).

REINSTALLING THE SUN GEAR

SECTION 223

REMOVING AND REINSTALLING THE WHEEL HUB

After removing the pinion carrier and the sun gear unse-



cure the shaft-end nuts (**34** and **36**).

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 (**2**) safely.

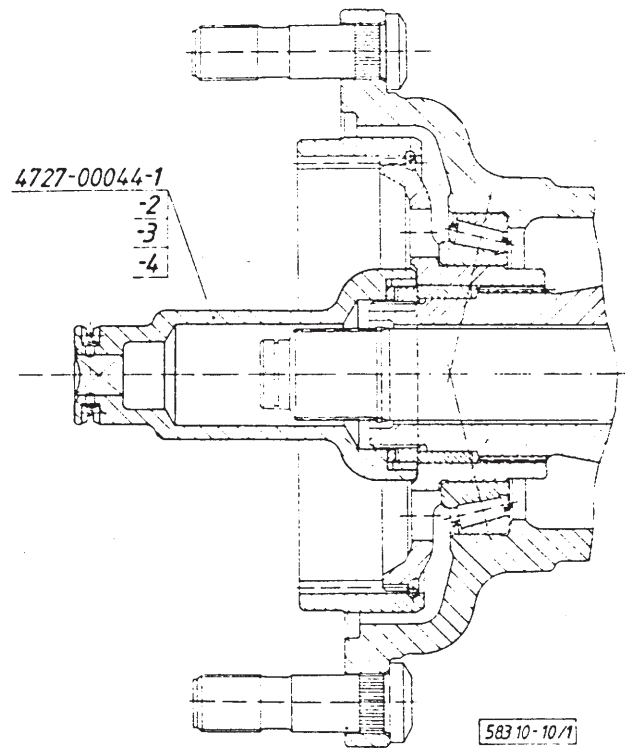
After removing the shaft-end nuts the rim hub (**40**) can be removed or by means of **M12** bolts of 50 mm length

off the rim hub.

Following this remove the suspended wheel hub from the steering knuckle.

By means of the tools shown pull off the taper roller bearing cone (see **Fig. 2**).

If the shoulder ring is to be replaced pull it off by means of the puller shown in **Fig. 3**



driven into the two threaded holes in the rim hub it can be pulled out of the taper roller bearing cone can be pushed

Fig. 1: ASSEMBLING THE SHAFT-END NUTS

REINSTALLING THE WHEEL HUB

For reinstalling the wheel hub first heat up the shoulder ring (**48**) and the inner

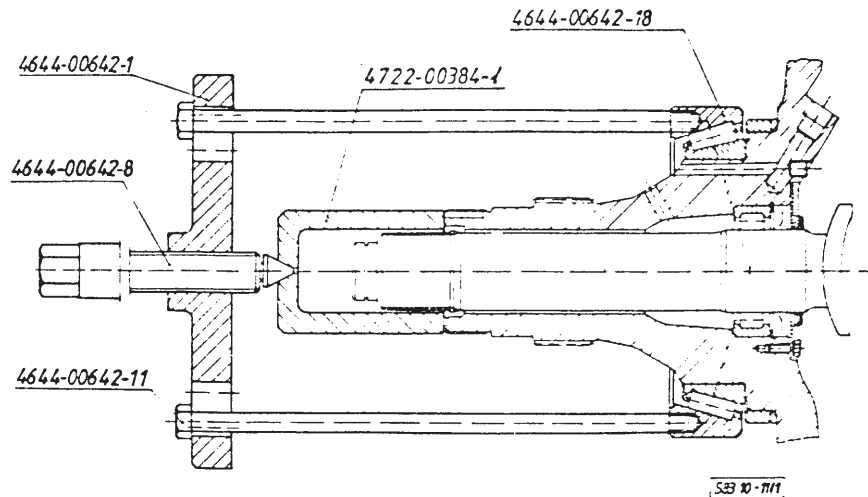
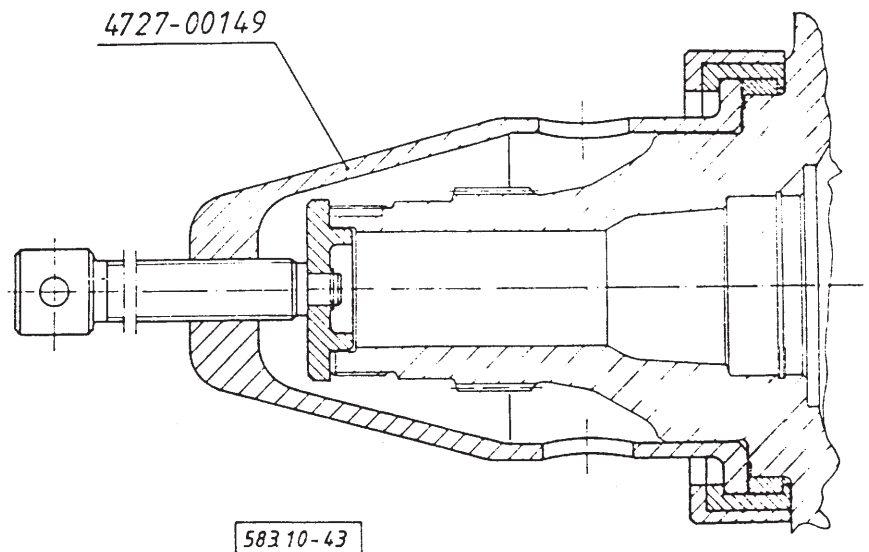


Fig. 2: PULLING OFF THE INNER TAPER ROLLER BEARING

taper roller bearing cone in furnace to 60 - 80° C.

As described in the “**GENERAL SERVICE INSTRUCTIONS**” apply oil-proof

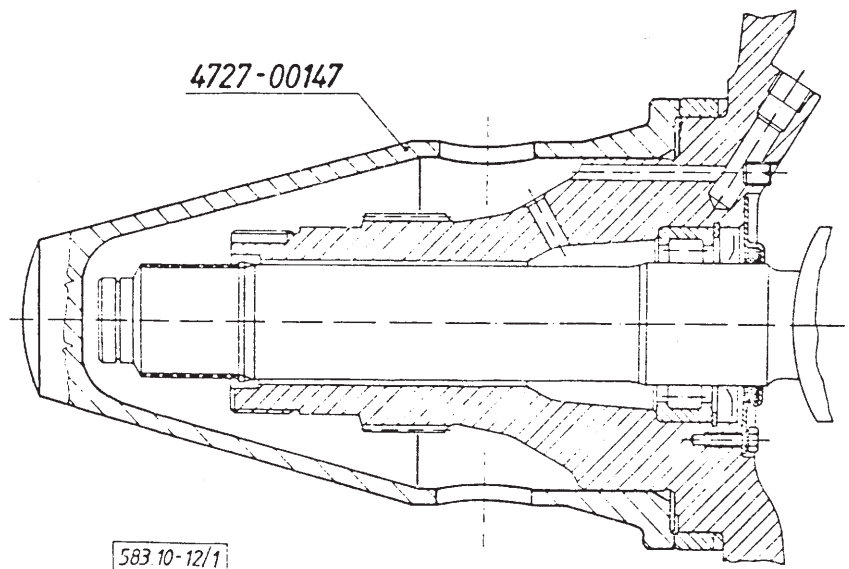


sealant to place of the shoulder ring on the steering knuckle.

As shown in the figure drive on the shoulder ring to bottom out (see Fig. 4)

After driving on the shoulder ring drive on the inner taper roller bearing cone to bottom out against the shoulder of the steering knuckle (see Fig. 5).

Safely suspended to hoist position the wheel hub subassembled with sealing ring (49) and cups of the taper roller bearings (43 and 47) to the steering



knuckle and push it down on the shoulder ring. Do not damage the

Position the rim hub (40) subassembled with the outer taper roller bearing cone and with gear rim (38) into the wheel hub and aligning the splines drive on to bottom out, making sure the taper roller bearing seats properly.

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

By means of the wrench tighten the inner shaft-end nut (36) — while continually rotating and axially moving

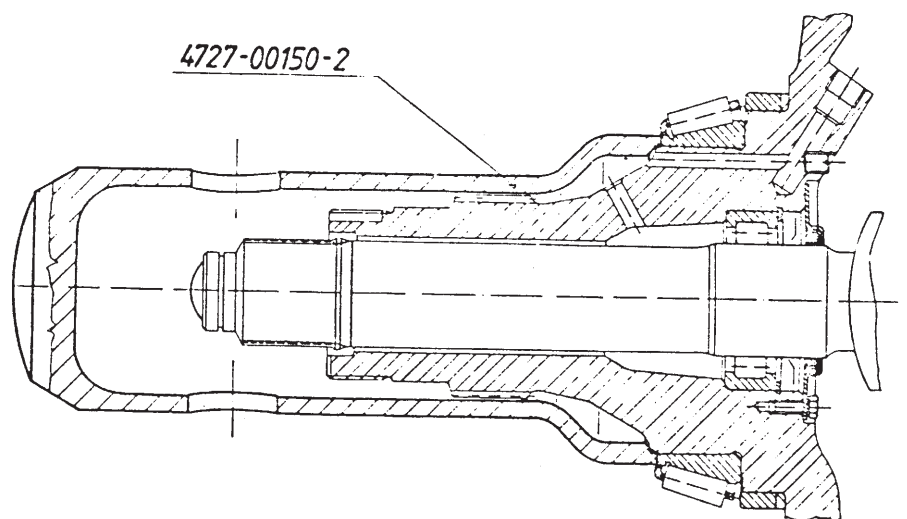


Fig. 5.: DRIVING ON THE INNER TAPER ROLLER BEARING CONE



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. **35° - 45°**.

Position the lock plate, install the outer shaft-end nut and tighten to **450 — 490 Nm torque**.

By means of dial indicator check if the specified **0.01 - 0.04 mm** axial play is obtained.

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 (35).

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 (49) from the removed wheel hub.

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

REASSEMBLING THE WHEEL HUB

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

Turn the wheel hub over and also drive in the cup of the inner taper roller bearing (see Fig. 3).

Drive the sealing ring into the seat until the tool bottoms out (see Fig. 4).

Fill **AMBLYGONTA 15/2** grease to between the sealing lip and the dust protection edge.

WARNING!

On axles mountable with ABS, toothed surface of

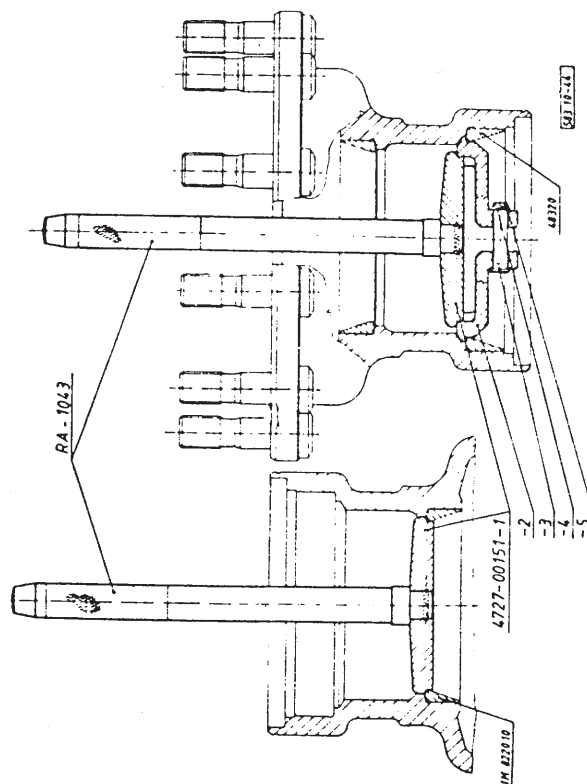


Fig. 1.: DRIVING OUT THE TAPER ROLLER BEARING CUPS

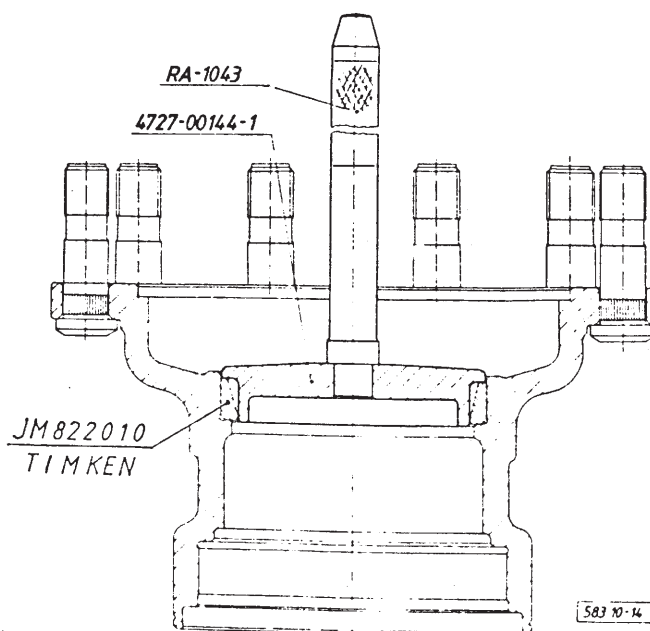
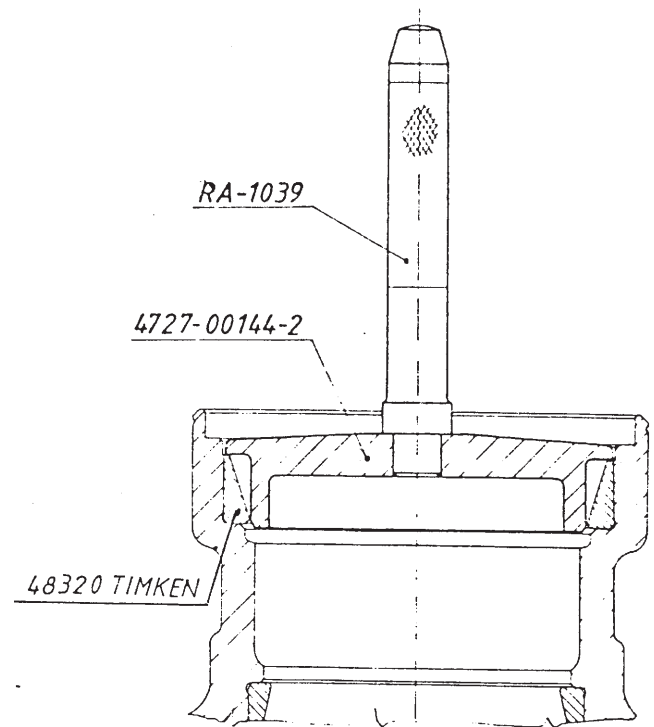


Fig. 2.: DRIVING IN THE OUTER TAPER ROLLER BEARING CUP

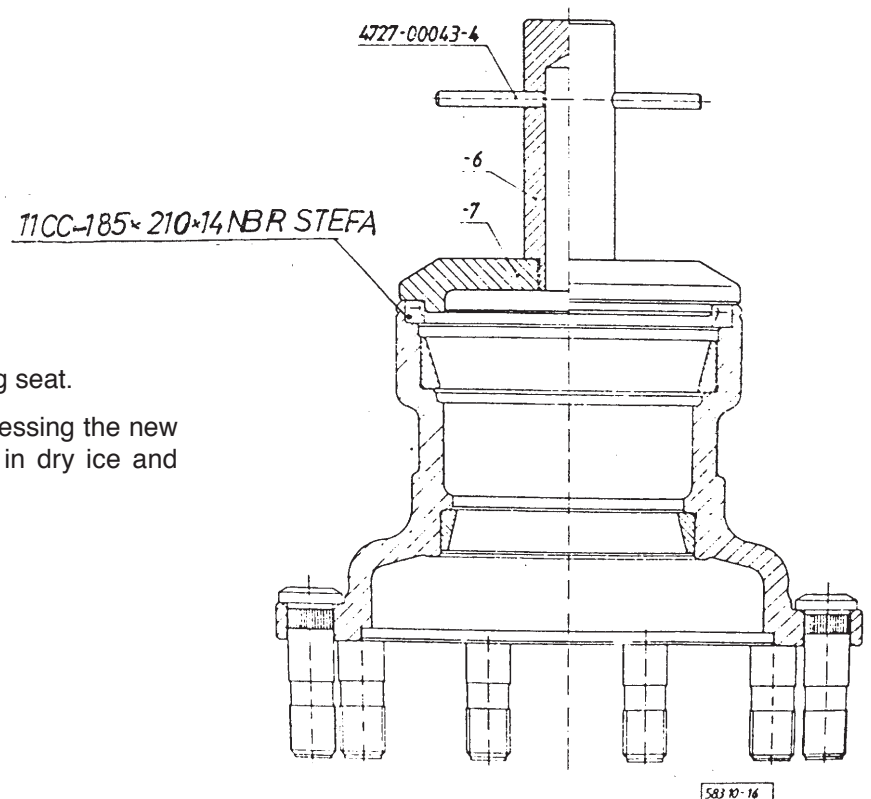
impulse ring shall be protected from shocking during installation of seal support and seal ring!

According to “**GENERAL SERVICE INSTRUCTIONS**”



583.10-15

Fig. 3.: DRIVING IN THE INNER TAPER ROLLER BEARING CUP



apply oil-proof sealant to the impulse ring seat.

If the impulse ring is changed, before pressing the new impulse ring is to be cooled uniformly in dry ice and pushed in to stop on the wheel hub.

Fig. 4.: DRIVING IN THE SEALING RING

TOOTHING CAN NOT GET DAMAGED!

Seating of seal ring is to be lubricated with oil-proof surface sealing material per “**GENERAL SERVICE INSTRUCTIONS**” and the seal ring, size 1HHI 178x205x17 STEFA shall be punched with disc, No.: 4727-00043-4,-6,-9 till stop, **Fig. 5**.

SECTION 225

DISASSEMBLING AND REASSEMBLING THE RIM HUB

DISASSEMBLING THE RIM HUB

After removing the circlip (41) pull the gear rim (38) off the rim hub (40).

DO NOT remove the centering ring (37) from the rim hub, these may be replaced only together.

REASSEMBLING THE RIM HUB

As shown in the figure drive the cone of the taper roller bearing to the rim hub supplied together with centering ring (37). **See Fig. 1**.

Aligning the rim hub and the gear rim (38) tooting push them completely together and install the circlip (41) into its groove.

SECTION 241

FRONT AXLE HOUSING

REMOVING AND REINSTALLING 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**).

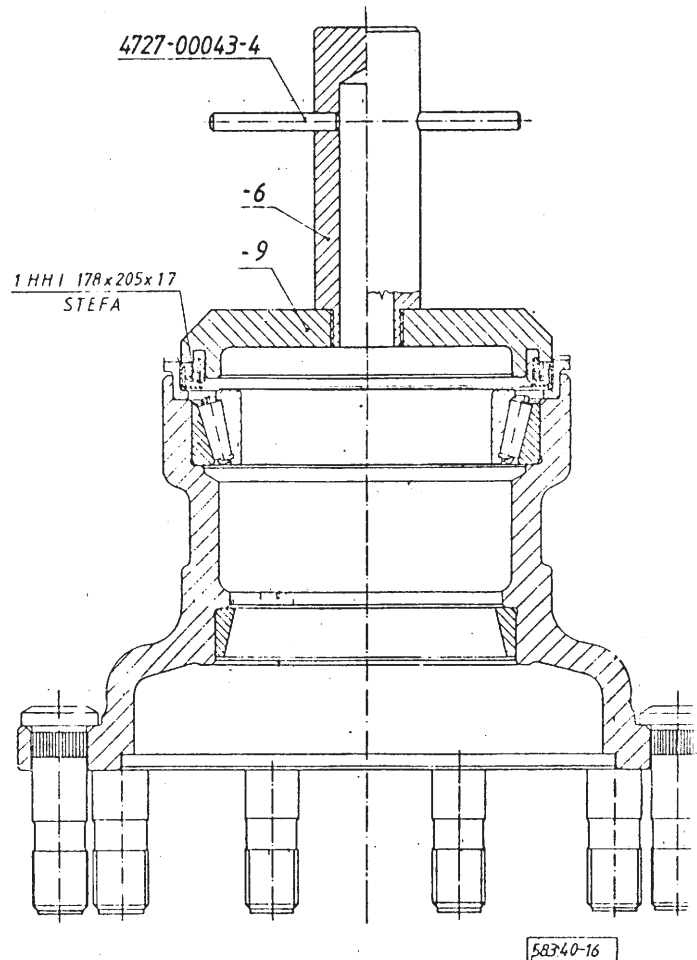


Fig. 5.: DRIVING IN THE SEALING RING

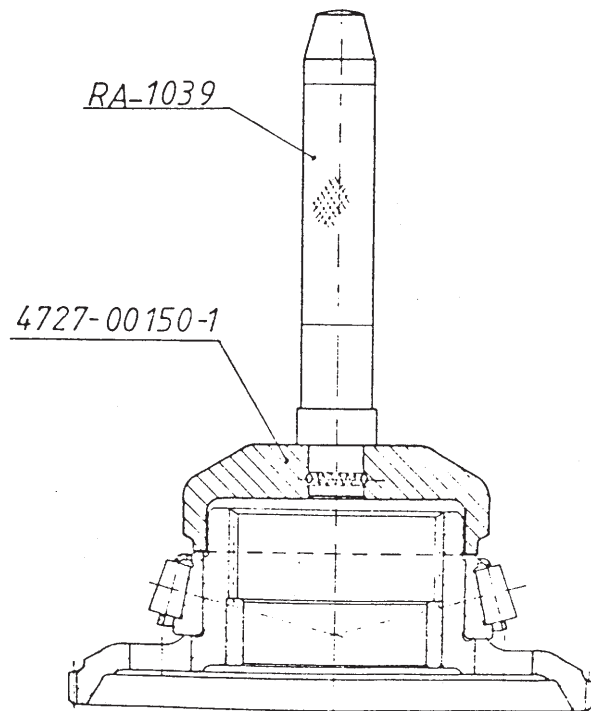


Fig. 1.: DRIVING THE TAPER ROLLER BEARING CONE TO THE RIM HUB

REINSTALLING THE TIE-ROD

Reinstall the tie-rod in reverse order of removal.

After reinstalling the tie-rod adjust the steering geometry of the axle.

1. ADJUSTING TOE-IN

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

$$\text{TOE-IN} = A - B = 1.5 \pm 1.5 \text{ mm.}$$

ATTENTION!

Measure toe-in with axle installed to the vehicle and in condition not hoisted up!

Perform adjustment of toe-in after loosening the tie-rod clamp self lock nuts by turning the tie-rod to proper direction.

After proper adjustment tighten the castle nuts of the ball studs to **300 - 400 Nm** and the tie-rod clamps castle nuts to the **75 - 90 Nm** torque, then cotter secure the self lock nuts and check the toe-in again.

2. ADJUSTING MAX. INNER WHEEL TURN ANGLE

- 1 — Stopbolt
- 2 — Jamnut
- a — 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.**).

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

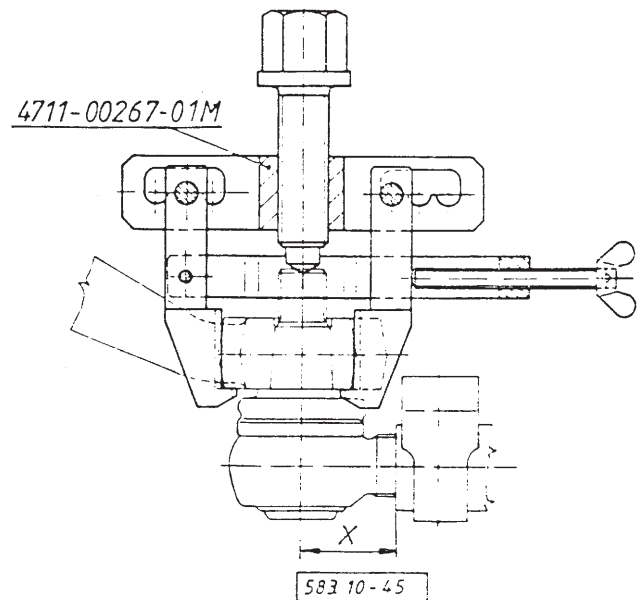


FIG. 1.: PRESSING OUT THE BALL STUDS

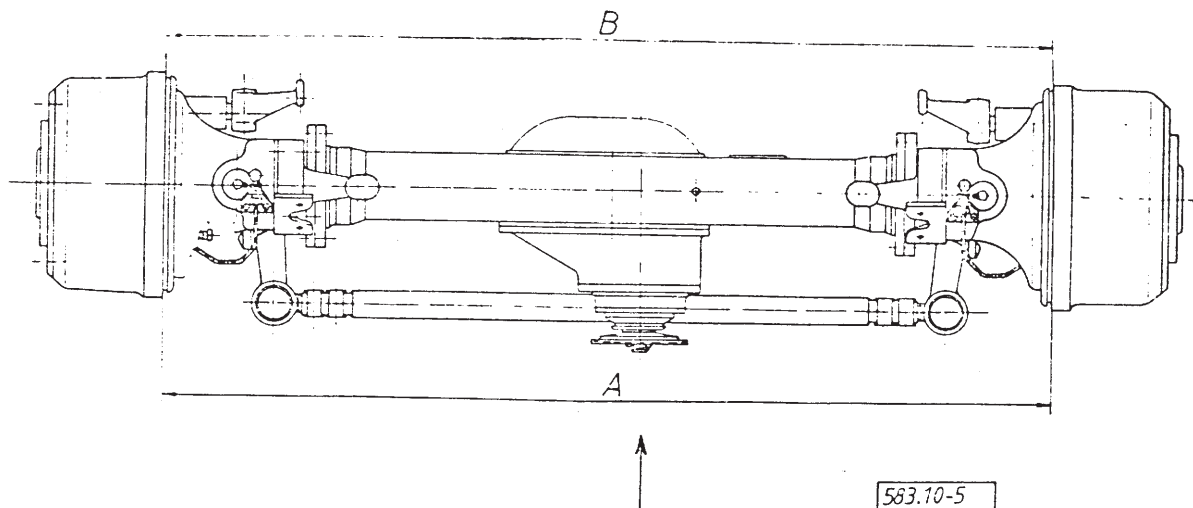


Fig. 2.: TOE-IN



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.

SECTION 242

DISASSEMBLING AND REASSEMBLING THE TIE-ROD

DISASSEMBLING THE TIE-ROD

Remove the cotters and back out the castle nuts, then remove the clamp bolts.

Unscrew the ball joint head from the tie-rod ends.

The ball joint head may be replaced **ONLY** as a unit.

REASSEMBLING THE TIE-ROD

Screw the ball joint head into the tie-rod so, after adjusting the proper length the ball joint head at the both ends of the linkage shall be screwed in nearly to identical length (**Fig. 1. of Section 241: "x"**).

Install the clamp bolts to the shackles and screw on the castle nuts.

After installing the tie-rod to the tie-rod arms and adjusting the specified toe-in tighten the castle nuts of the shackles to **55- 69 Nm** torque and cotter secure.

SECTION 243

REMOVING AND REINSTALLING THE STEERING KNUCKLE AND THE DOUBLE JOINTS

REMOVING THE STEERING KNUCKLE

After removing of the wheel hub detach the vent tube connection, then remove the cover (**57**) of the knuckle pins (**55 and 79**).

Remove the hex. flanged nuts (**69**) from the draw keys and drive out the keys.

By means of tool shown in **Fig. 1.** pull the knuckle pins out of the steering knuckle.

Following this safely pull the steering knuckle (**83**) off the knuckle carrier (**77**) and the outer axle-shaft, then remove the shims (**81**).

Until the steering knuckle is pulled off secure the thrust

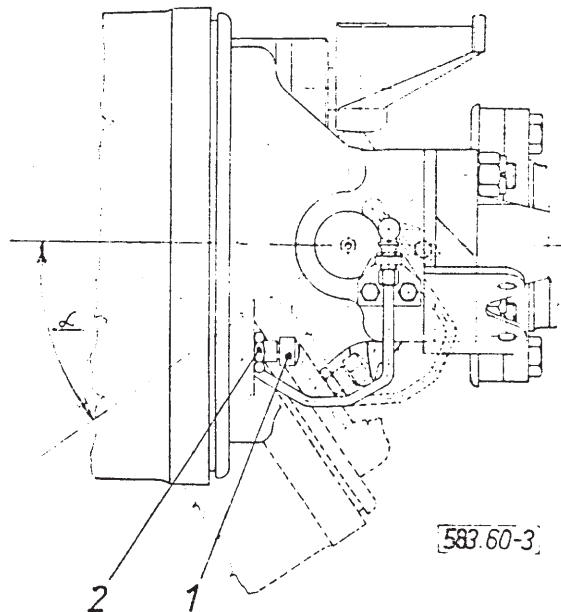


FIG. 3.: ADJUSTING THE MAX. INNER WHEEL TURN ANGLE

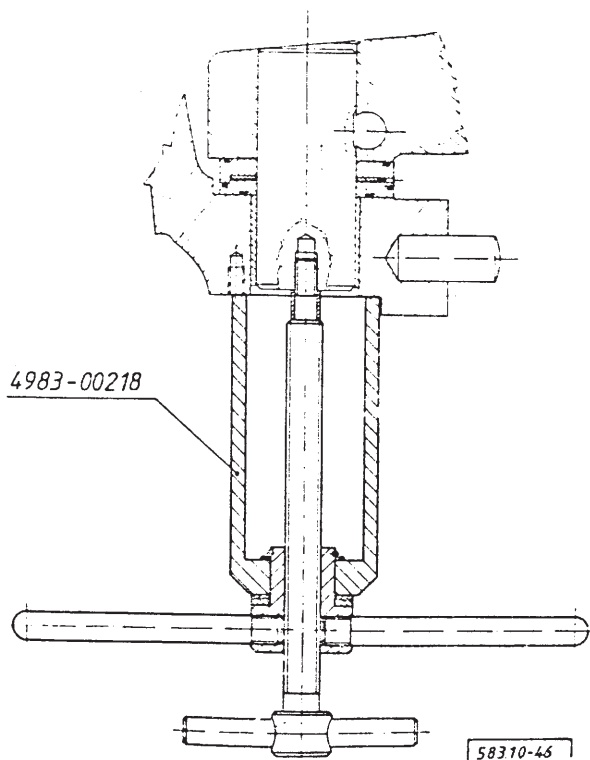


FIG. 1.: PULLING OUT THE KNUCKLE PINS

bearing, then after removing the steering knuckle remove these parts also from the knuckle carrier (**77**). **See Fig. 2.**

REMOVING THE DOUBLE-JOINT

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

REINSTALLING THE DOUBLE-JOINT AND THE STEERING KNUCKLE

Carefully push the inner longer axle-shaft (72) of the double joint thru the sealing ring of the knuckle carrier and the bore of its cylindric roller bearing (74), then aligning the splines with those of the differential gear push the axle-shaft further to bottom out against the differential, making sure not to damage the sealing ring (104 and 105).

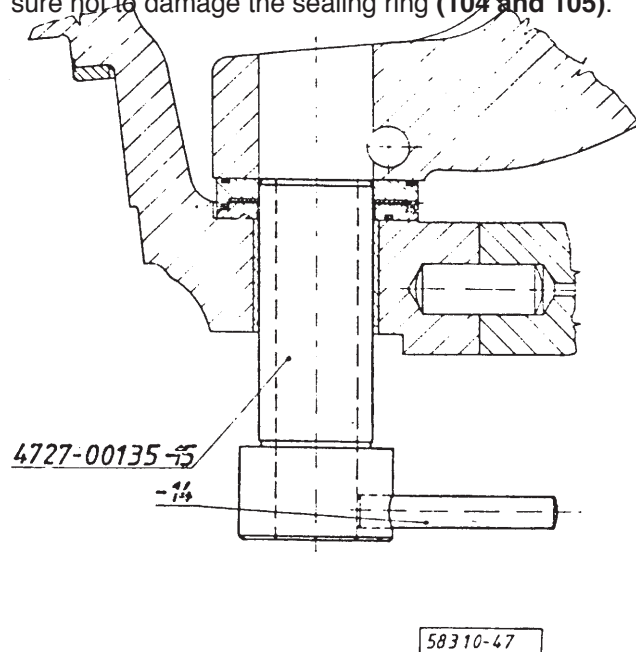


Fig. 2.: ASSEMBLING THE AXIAL BEARING OF THE LOWER KNUCKLE PIN

For installing the inner seals of the steering knuckle over the spines of the outer axle-shaft pull the service sleeve over the end of the outer axle-shaft (42).

Carefully push the relevant steering knuckle (83) sub-assembled 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.

Apply specified grease to the complete inner surface of the knuckle pin bushings.

Align the bore in the upper swivel pin of the steering swivel with that in the lock wedge of the knuckle carrier.

Pilot the bores by means of the service mandrel shown (see Fig. 3.).

By means of the lower knuckle pin position the thrust bearing, the o-rings (64 and 68), the bearing case, lower (65), the thrust disk (66), the bearing case, upper (67) to place then push in the knuckle pin to bottom out (Fig. 2).

Make sure the plastic coating on the thrust disk (66) shall face downward.

Push up the steering knuckle to bottom out so, the

o-rings (64 and 68) of the thrust bearing shall be compressed and the thrust bearing parts shall be in metal-to-metal contact. Perform clearance adjustment in this state, as follows:

By means of feeler gage measure the distance between the plane of the knuckle carrier (77) and the steering knuckle (83) then from the shims (81) select a pack of thickness 0.0 - 0.3 mm less than the measured value.

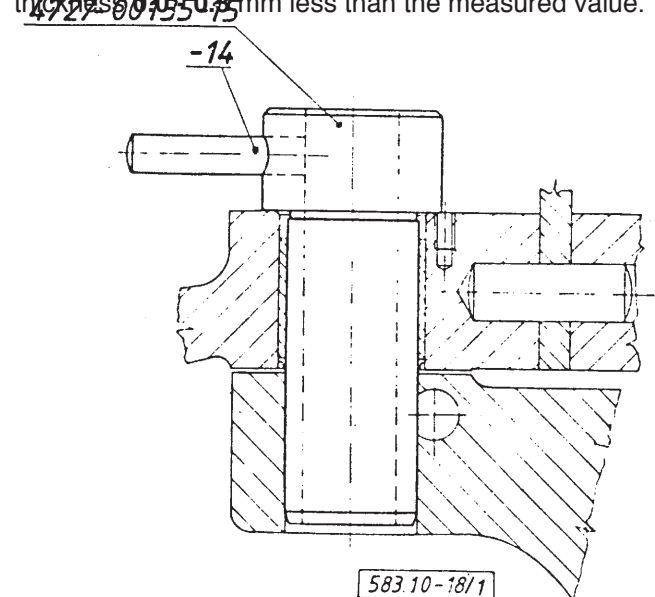


FIG. 3.: PILOTING THE BORE IN THE UPPER KNUCKLE PIN

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

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 (55 and 79) and secure by lock wedges (69). Screw the hex. flanged nuts to the lock wedges and tighten to 50 - 70 Nm.

Position the covers (57) together with gasket (56) over the knuckle pins and secure by lock washers and hex. bolts. Tighten the bolts to 30 - 40 Nm.

Screw one grease fitting (54) into each cover and lubricate the knuckle pin bushings with grease.

Apply properly adhering anti-corrosion chassis paint (106) coat to inner end of the knuckle pins and to mating surface of the steering knuckle.

SECTION 244

ASSEMBLING THE KNUCKLE PIN



BEARING BUSHINGS AND THE SEALINGS RING ON THE STEERING KNUCKLE

REMOVING THE KNUCKLE PIN BUSHINGS

Remove the sealing rings (80) by means of a simple pry.

By means of puller arranged from items shown pull out the knuckle pin bushes (58) on both sides (see Fig. 1.).

REINSTALLING 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 upper and lower bushings. Apply grease to outer surface of the bushings and to bore in the steering knuckle.

A = The slot in the upper and lower bushings should face toward the indicated area (Fig. 2.).

By means of the device arranged from the items shown press in the bushing to both the upper and lower side (Fig. 3.).

When installing the lower bushing, before completely pressing in, remove the insert ring item 7 of the device so, to be able to press the bush into depth shown in Fig. 2.

By means of the tools shown in Fig. 4. drive in the sealing ring flush to the bushing. Make sure to install the sealing ring as shown in detail drawing of Fig. 2.

The sealing ring many not extend from plane of the steering knuckle.

Apply specified grease to the complete inner surface of

the knuckle pin bushings.

SECTION 245

REMOVING AND REINSTALLING THE

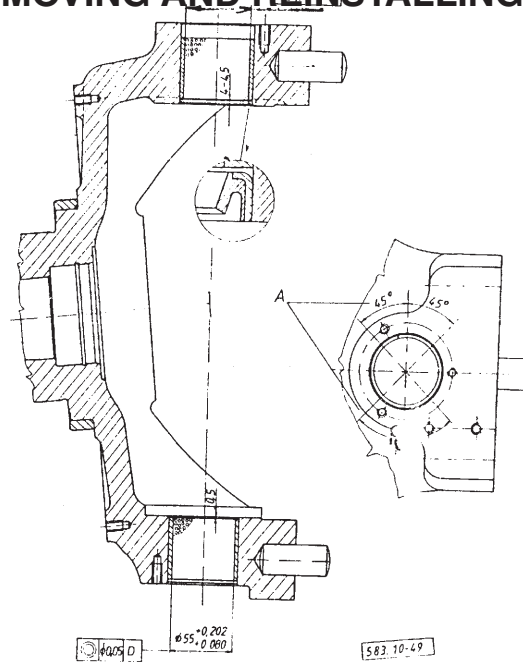
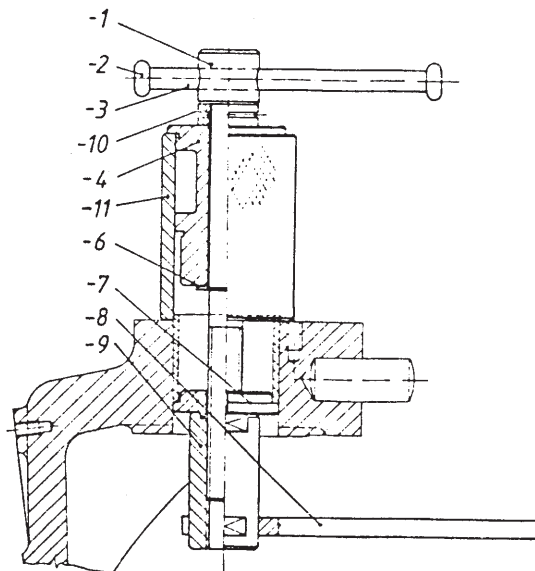


Fig. 2.: POSITION OF THE KNUCKLE PIN BUSHINGS AND THE SEALING RINGS

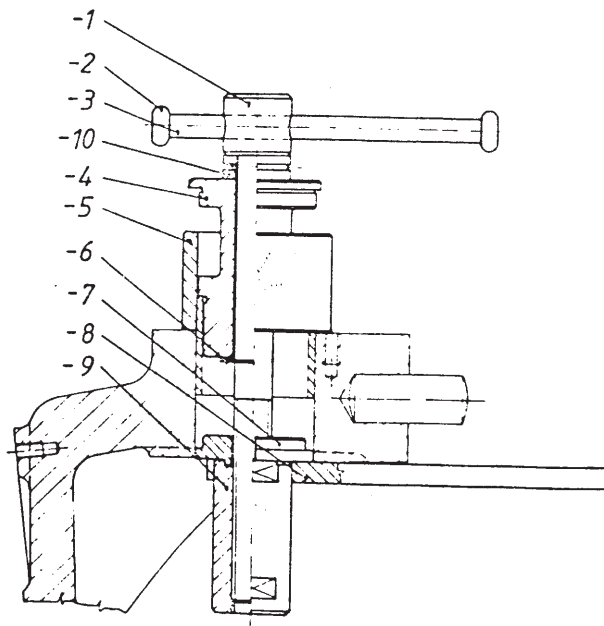
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Fig. 1.: PULLING OUT THE KNUCKLE PIN BUSHINGS



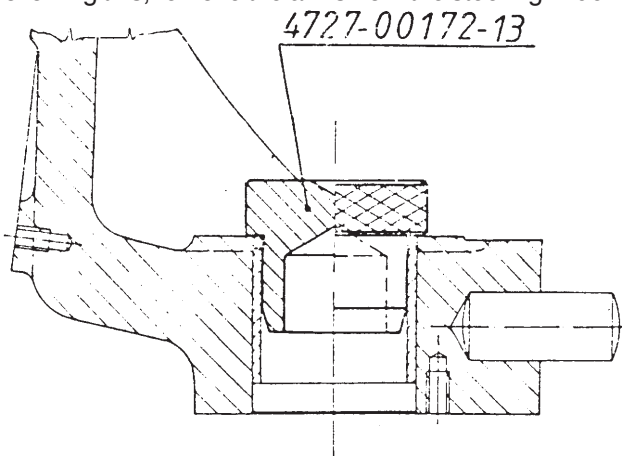
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Fig. 3.: PRESSING IN THE KNUCKLE PIN BUSHINGS

PILOT ARMS, THE BRAKE CANISTER HOLDER AND THE TIE-ROD ARMS

For removing the castle nuts cut their securing wire (62) and back off the castle nuts (61).

Following this, remove the arms from the steering knuckle.



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Fig. 4.: DRIVING IN THE SEALING RING

The dowel pins (60) remain in the steering knuckle. After removing the pilot arms the brake canister holder can also be removed from the steering knuckle from the stud bolts.

Using the stud bolt driver install the new stud bolts. Apply thread adhesive to 4-5 threads — a torque of 40 - 50 Nm.

Install the relevant brake canister holder, tie-rod arm to the steering knuckle and secure with castle nuts.

Tighten the castle nuts to 540 - 590 Nm.

Secure the castle nuts by securing wire through the bolt bore.

SECTION 246

ASSEMBLING THE DOUBLE-JOINT (REPLACING THE AXLE-SHAFT)

REMOVING THE AXLE-SHAFTS FROM THE DOUBLE-JOINT

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

By means of the puller shown remove the bearing caps from the carrying ring on both the 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. Caps are different sizes.

After removing the bearing caps remove the axle-shaft

together with outer spider from the carrying ring.

Remove the bearing caps off of the outer spider in the same way like from the inner carrying ring shown in Fig. 1., then remove the set screws.

- | | |
|-------------------|---------------|
| 1 — Bearing cup | 4 — Set screw |
| 2 — Carrying ring | 5 — Spider |
| 3 — Screw plug | 6 — Pivot pin |

By means of the tools shown press the pivot pins out of the outer spider and the axle-shaft (see Fig. 2.), then by a mandrel of dia. smaller than $\varnothing 30$ mm drive out.

REASSEMBLING THE TWIN-SWIVEL

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

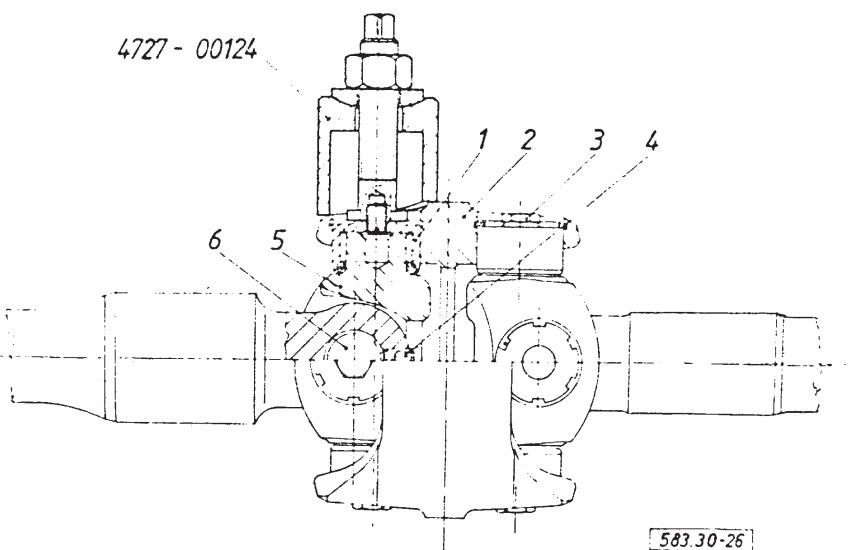


Fig. 1.: PULLING OUT THE BEARING BUSHINGS from the center position is ± 0.05 mm (see Fig. 3.).

After adjusting the center position secure the pivot pin with set screw. Install the set screw with **LOCTITE** thread locker.

On both sides press in the bearing caps (see Fig. 4.).

Before the bearing bushings insert the proper snap rings



to the seats.

WARNING!

Thickness of the snap rings is different, so make sure to install them to the original place according to the match-mark.

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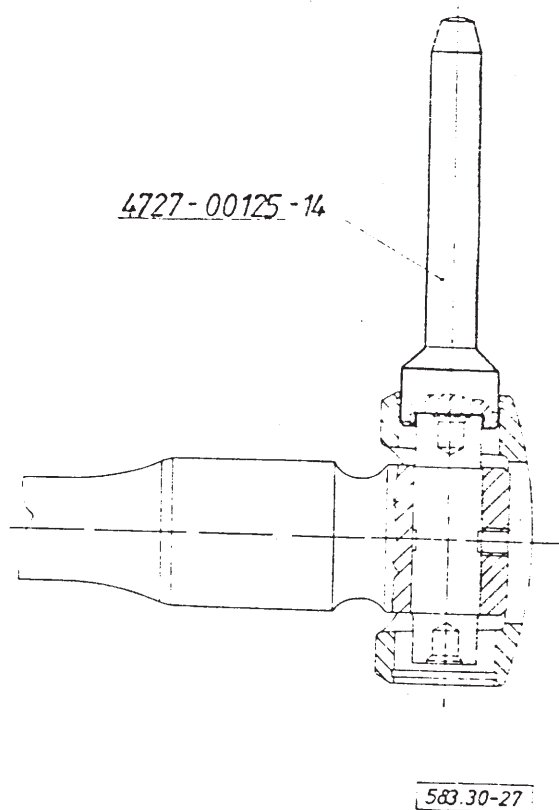


Fig. 2.: DRIVING OUT THE PIVOT PINS

Position the outer spider subassembled with axle-shaft into the carrying ring, then reinstall the removed sealing rings, bearing caps and snap rings to the original place.

Fill up the bores in the end of the pivot and the spider, as well as the space between the rollers with LZS-2 EP grease. Install the screw plugs.

Check the assembled twin-swivel. The permitted devia-

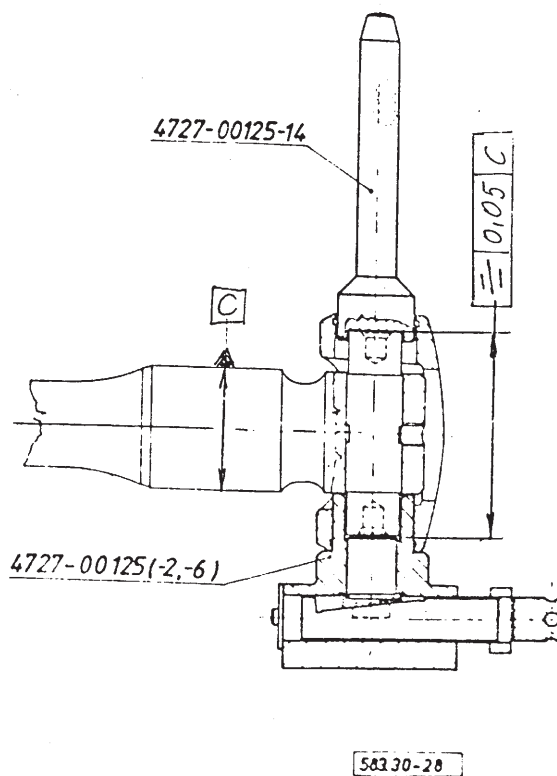


Fig. 3.: PRESSING IN THE PIVOT PINS

tion from the center position is ± 0.05 mm during turning.

SECTION 247

REMOVING AND REINSTALLING THE INNER BEARING AND SEALS OF THE STEERING KNUCKLE

REMOVAL

DOUBLE JOINT SERVICE (84)

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.

After driving in the bearing install the snap ring (92) to its seat by means of the snap ring pliers. By means of the tool used for the cylindric roller bearing drive the sealing ring (91) to bore the snap ring.

By means of lock washers (85) and hex. bolts install the dust protection plate (84) supplied with pressed in gasket and tighten the bolts to **6 - 8 Nm** torque.

Fill up the space between the dust protection plate (84) and the sealing ring, as well as between the sealing lip and dust protection edge of the sealing ring with specified grease.

After removing the dust protection plate by means of pry remove the sealing ring (91).

Remove the snap ring (92) in front of the cylindric roller bearing (93), then using the puller pull out the bearing (Fig. 1.).

REINSTALLING THE INNER BEARING AND THE SEALS TO THE STEERING KNUCKLE

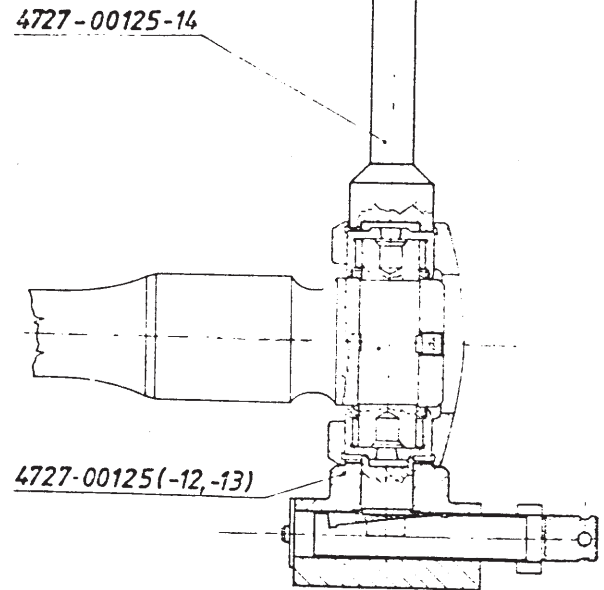


Fig. 4.: PRESSING IN THE BEARING BUSHINGS

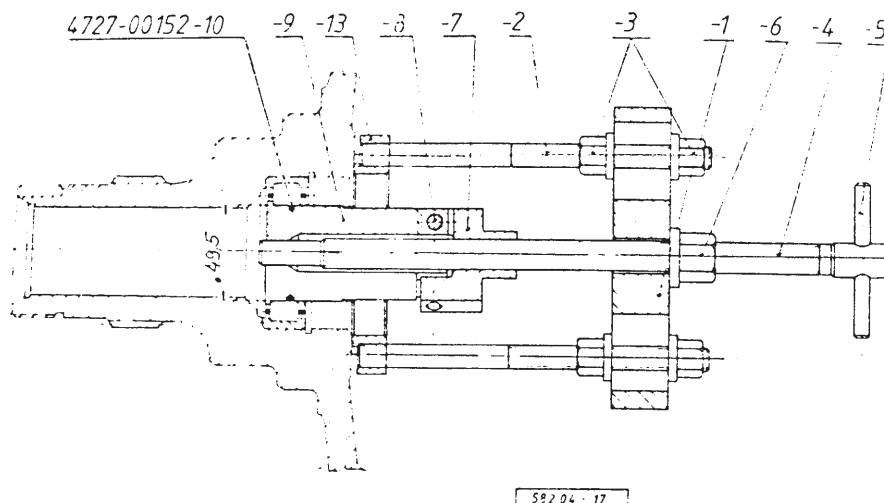


Fig. 1.: PULLING OUT THE CYLINDRIC ROLLER BEARING



REMOVING AND REINS THE BEARING AND THE THE KNUCKLE CARRIER

After removing the double-joint remove **REMOVAL** bolts (70) from the axle housing flange, then separate the knuckle carrier (77) from the axle housing, by 2 M12 bolts of at least 40 mm thread length driven into the axle housing flange. By means of snap ring pliers remove the snap ring (73).

Drive out the cylindric roller bearing (74) and the seal retainer (75). See Fig. 1.

INSTALLING THE CYLINDRIC ROLLER BEARING AND THE SEALS INTO THE KNUCKLE CARRIER

By means of the tool shown drive the dust protection seal (105) into the seal retainer (Fig. 2.).

By means of the tool shown drive the

new sealing ring (104) into the seal retainer (see Fig. 3.).

Apply oil-proof surface sealant to mantle of the seal retainer.

For installation turn the knuckle carrier over and first drive in the seal retainer subassembled with sealing ring until the tool bottoms out (see Fig. 4.).

After pressing in fill up the gap between the sealing lip and the dust protection edge of the sealing ring with specified grease.

Drive in the cylindric roller bearing to bottom out against the seat (see Fig. 5.).

Secure the cylindric roller bearing by means of snap ring (73).

Apply oil-proof surface sealant to seating flange of the knuckle carrier as described in the "GENERAL SERVICE

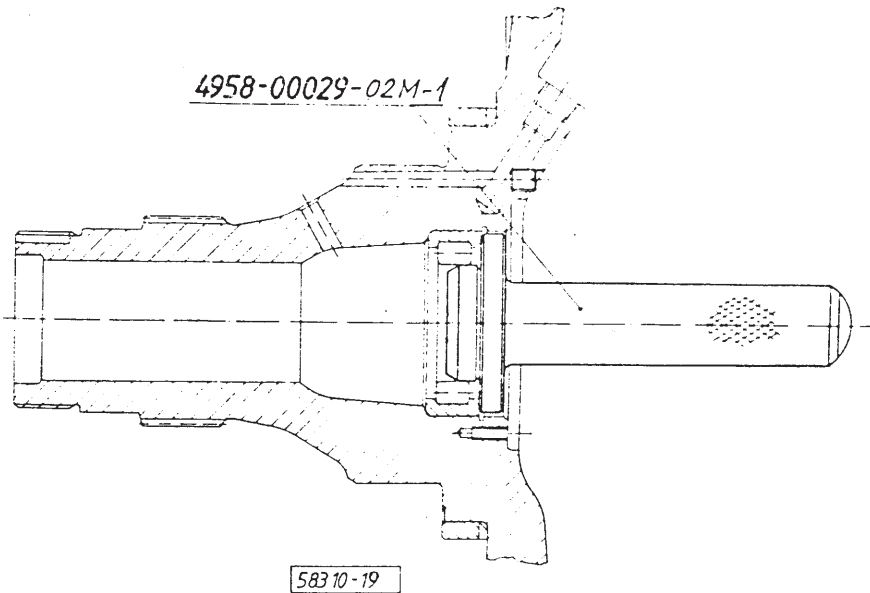


Fig. 2.: DRIVING IN THE CYLINDRIC ROLLER BEARING

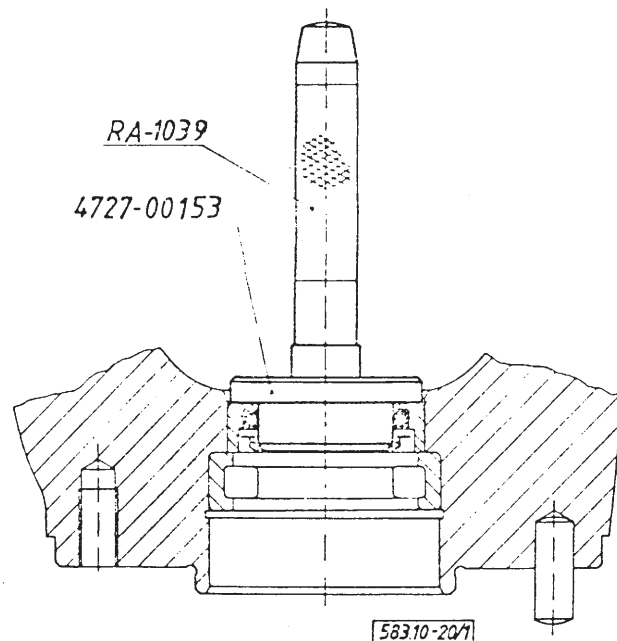


Fig. 1.: REMOVING THE SEAL RETAINER AND THE CYLINDRIC ROLLER BEARING

INSTRUCTIONS", then connect the knuckle carrier to the axle housing and attach by means of hex. bolts (70) coated with thread locker and tightened to **360 - 380 Nm** torque.

SECTION 249

ASSEMBLING THE VENT TUBE LINE

REMOVING THE VENT TUBE LINE

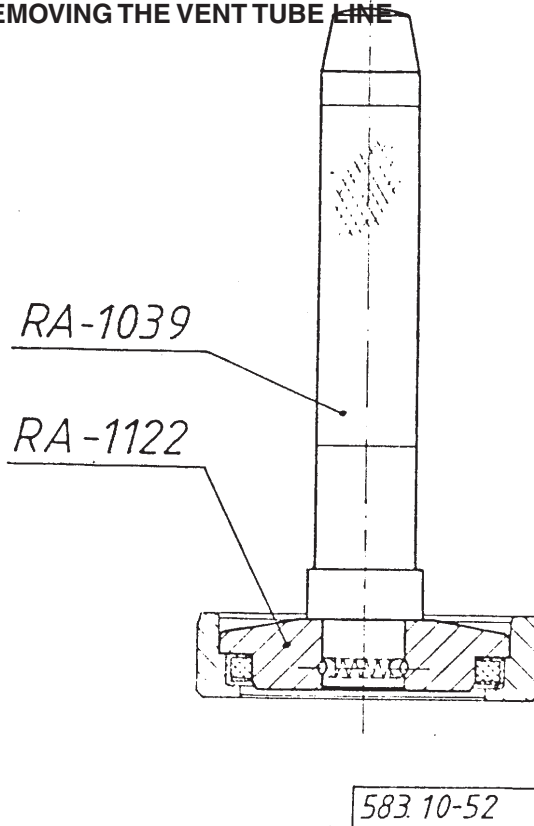


Fig. 2.: INSTALLING THE METAL CLAD SEALING RING INTO THE SEAL RETAINER

Detach the vent tube line at the pipe fitting (103) of the steering knuckle and at the elbow (98) on the holder (96) mounted to the steering knuckle. Remove the pipes and unscrew the fitting from the steering knuckle as well as the elbow (98) from the holder (96) after removing the lower nut (99).

REINSTALLING THE PIPES

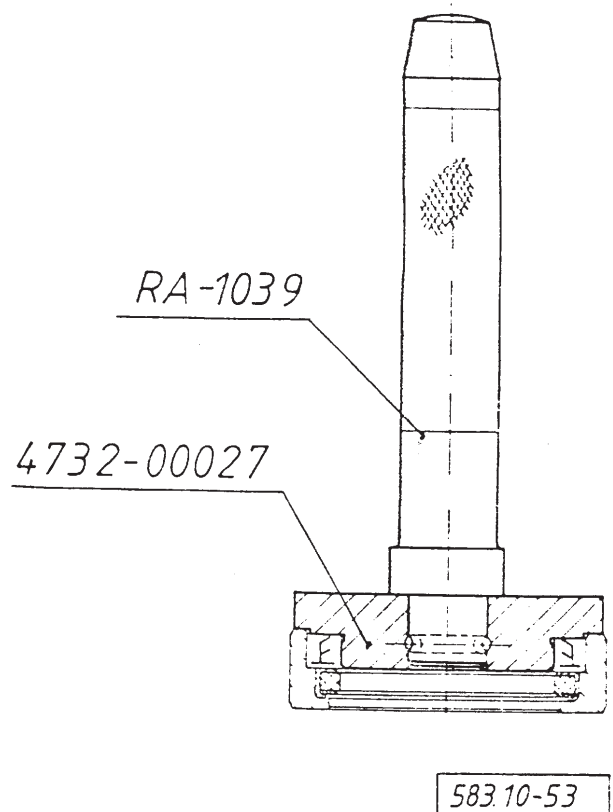


Fig. 3.: DRIVING THE NEW SEALING RING INTO THE SEAL RETAINER

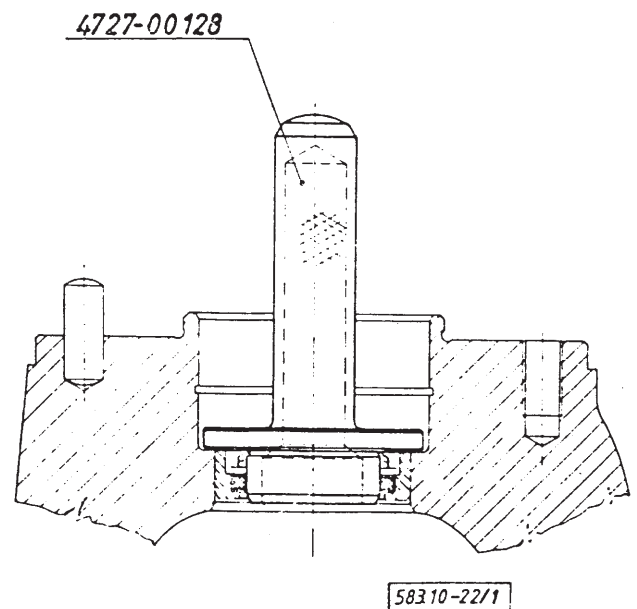


Fig. 4.: DRIVING IN THE SEAL RETAINER



The holder on the steering knuckle is attached by means of 2 hex. bolts (97) and lock washers.

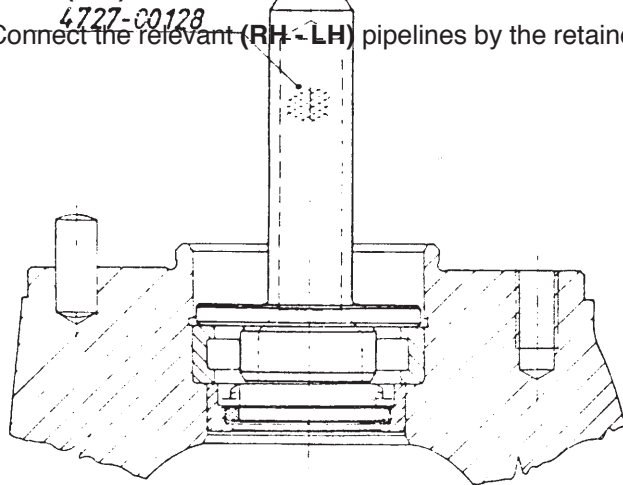
Tightening torque of the bolts is **39 - 49 Nm**. Screw the elbow into the threaded bores of the holder and secure by tightening lower nut to **30 - 40 Nm** torque after the vent valve is installed.

Install the pipe fitting coated with thread locker into the threaded bores of the steering swivel.

Close the bore of the steering knuckle by means of grub screw (102) coated with thread locker.

Connect the relevant (RH - LH) pipelines by the retainer

- 8 – Sealing ring
- 9 – Bearing bush
- 10 – Spacer washer
- 11 – Camshaft
- 12 – Roller
- 13 – Roller locking spring
- 14 – Brake shoe return spring, long
- 15 – Spring support pin
- 16 – Bushing
- 17 – Brake Bracket (steering knuckle housing)
- 18 – Brake shoe anchor pin



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Fig. 5.: DRIVING IN THE CYLINDRIC ROLLER BEARING

ring and the union nut to the pipe fitting and the elbow, then tighten to be leak-tight. Screw the reducing fitting and the vent valve to the elbow so, the vent valve shall be vertical.

Install the threaded extension of the vent valve to the axle housing so, the vent valve shall be vertical.

SECTION 260

FRONT WHEEL BRAKE

DRAWING OF THE FRONT WHEEL BRAKE

SECTION 261

PARTS OF THE FRONT WHEEL BRAKE

- 1 – Snap ring
- 2 – Spacer
- 3 – Brake lever
- 4 – Wear indicator disk
- 6 – Shims
- 7 – Spacer



- 19 – Brake shoes
- 20 – Brake shoe return spring, short
- 23 – Dustshield
- 28 – Stop
- 29 – Hex bolt Flat lock washer

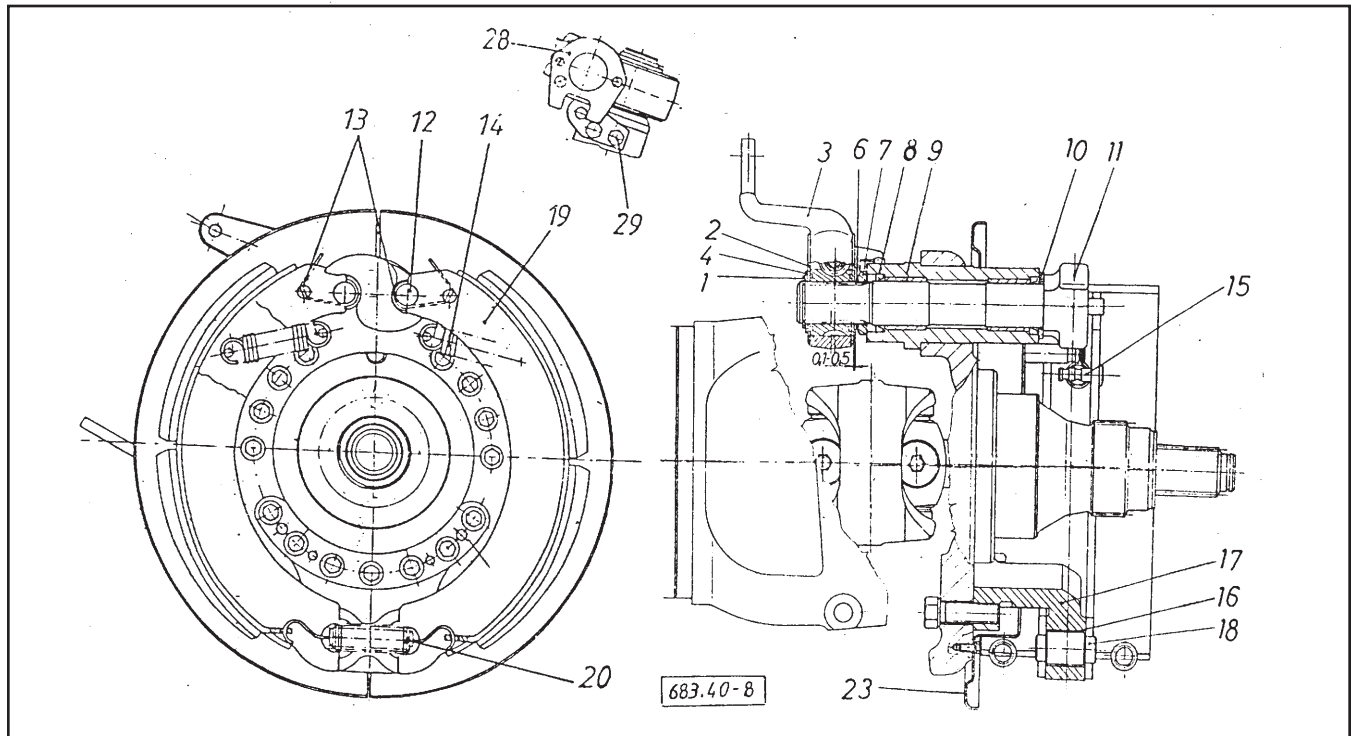


Fig. 1.: DRAWING OF THE WHEEL BRAKE

SECTION 262

REMOVING AND REINSTALLING THE BRAKE SHOES

REMOVING THE BRAKE SHOES

Remove the brake drum (54 in Fig. 1. of Section 210).

Pry the brake shoes (19) away. Remove the rollers (12) together with the lock springs (13).

Unhook the shoe return springs by means of a spring hooking device, then remove the brake shoes.

REINSTALLING THE BRAKE SHOES

Position the brake shoes to the placed in shoe anchor

pin (18) and the brake camshaft head. Hook the return springs (14 and 20) to the brake shoes. Use the spring hooking device.

Place the roller (12) into the roller locking spring (13) pry the brake shoes away, then insert the rollers together with the lock spring so, they shall seat both in the brake shoe rib and in the brake spanner involute profile.

SECTION 263

REPAIRING THE BRAKE SHOES

AND THE BRAKE DRUM

DO NOT operate the axle with brake drum trued-up exceeding the permitted max. diameter and brake lining worn below the permitted limit. Exceeding the permitted limits the brake camshaft may turn over making the brake application impossible.

The permitted minimum brake lining thickness is indicated by the upper edge of the recess in the brake lining side. (This value is $v_{min} = 7 \text{ mm}$ as measured at center of the brake shoe)

In case of damage or wear to the permitted limit replace

the brake linings.

Replacement of the brake lining or true-up of the brake shoe may be performed only in brake shoe pairs.

The brake shoes equipped with new linings should be in compliance with the dimension specifications and technical requirements shown in Fig. 1.

- 1 – Max. Zed-area
- 3 – Dimension data
- 4 – Check dimension



For riveting use ONLY the rivets corresponding to **Fig. 2**

TECHNICAL REQUIREMENTS:

2 – Upper plate C10MSZ 31

3 – Tolerance of the untolerated dimensions is ± 0.254

4 – Tolerance of the untolerated angles is $\pm 1^\circ$

For riveting use the device equipped with tool developed according to **Fig. 3**.

1 – Rivet set, upper

2 – Rivet set, lower

3 –

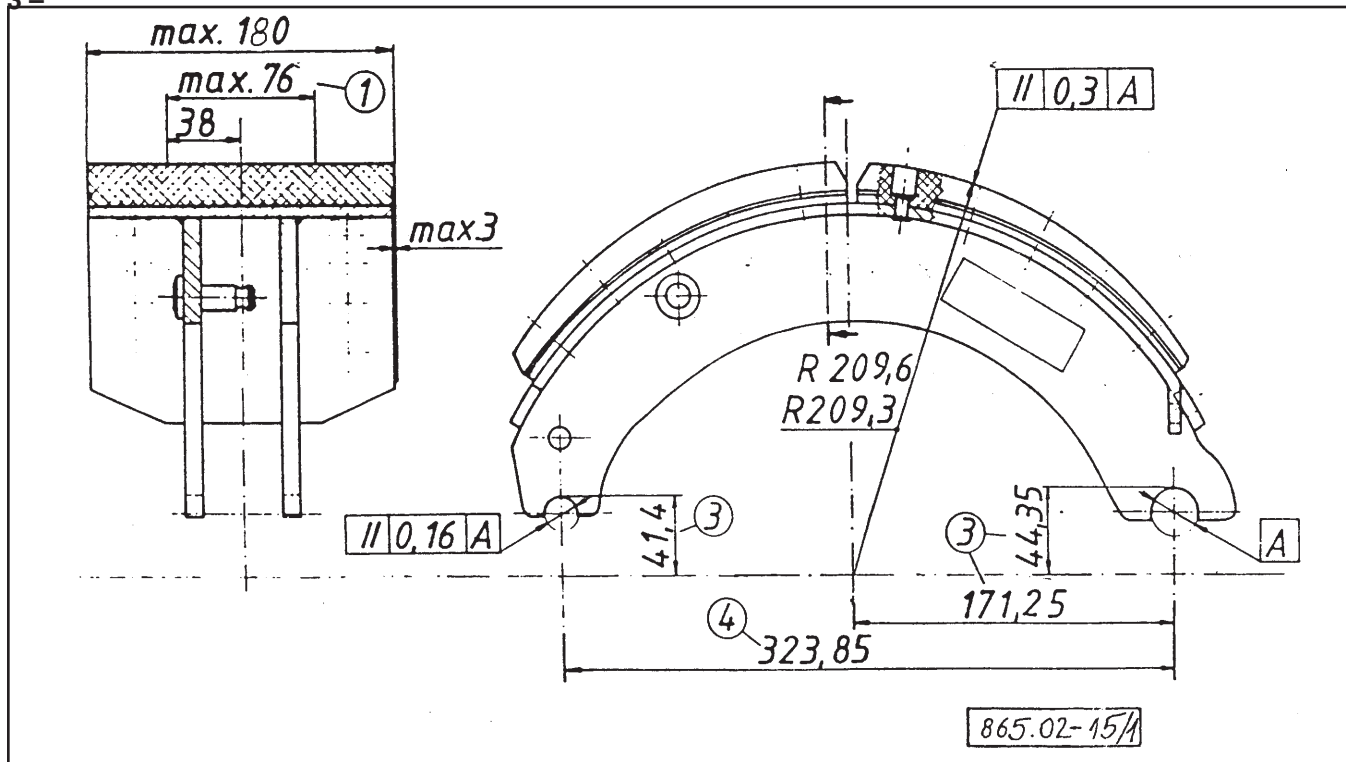
Perform riveting in sequence shown in **Fig. 4**.

1 – Center of the brake shoe

2 – Brake camshaft end of the brake shoe

The brake lining should seat so, the feeler gage of thickness **0.15 mm** could not be inserted to between the lining and the brake shoe along the full length except the **Zed-area** (see **Fig. 1**).

At the both ribs check the brake lining surface for paral-



That to the dimension "A" so, the dimension "A" must be 22.5 mm pin be positioned as shown (see **Fig. 1**). **Fig. 1.: DATA FOR TRUEING UP THE BRAKE SHOES WITH NEW LININGS.**

During checking the 32 rivets should ensure the 5340

N test load, applied to bottom of the $\varnothing 3.784$ mm bore, without loosening.

On each lining 2 rivet flanges may crack in Vee-shape, provided the test load was endured.

CHECKING THE BRAKE DRUM

Check the inside surface of the brake drum.

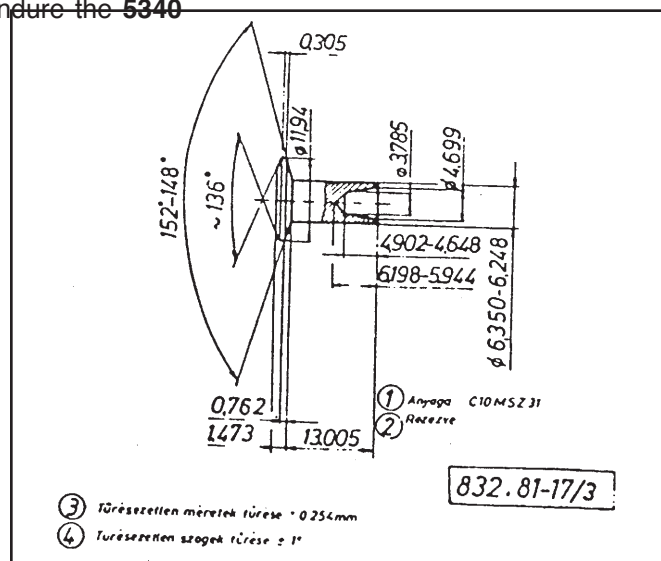


Fig. 2.: DIMENSIONS OF THE RIVETS

If depth of the hair-cracks experienced on the brake drum surface does not exceed **1 mm** the brake drum can be repaired by true-up.

The maximum of the brake drum diameter after true-up **ø 423 mm**

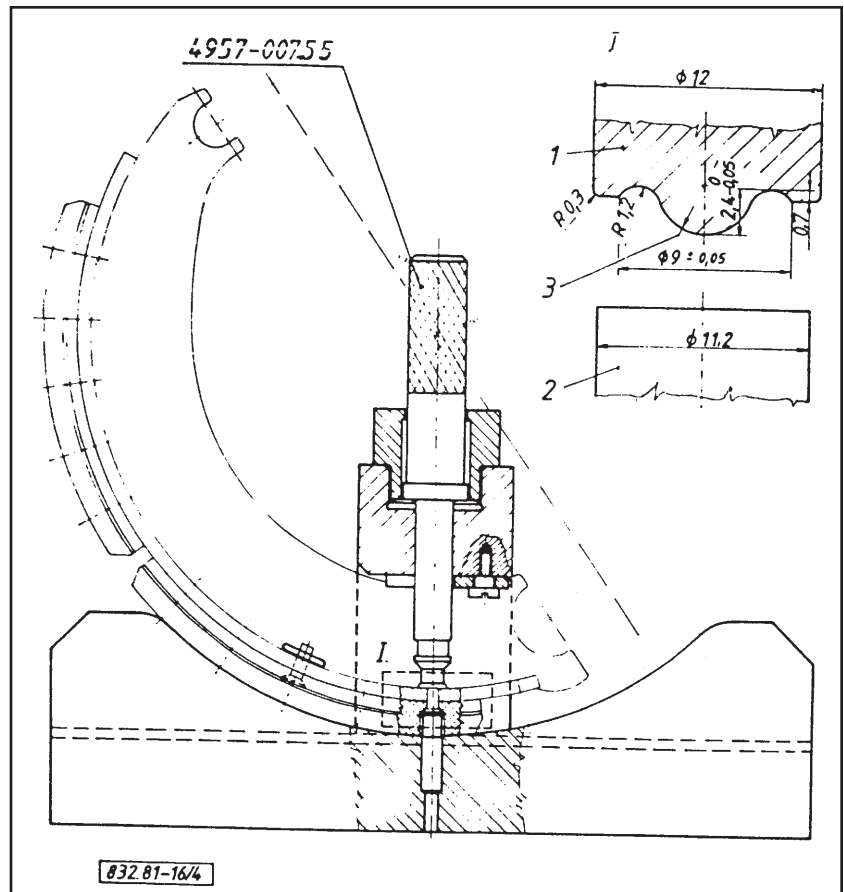


Fig. 3.: RIVETING TOOLS

Out of this diameter the brake drum should be replaced.

When trueing up the brake drum the brake shoes should be trued up taking the brake drum diameter into account.

E.g.: If diameter of the trued up brake drum is **422 mm**, true up the brake shoe to **R210.6 - R210.3 mm** as shown in Fig. 1.

SECTION 264

REMOVING AND REINSTALLING THE BRAKE SUPPORT AND THE CAM-SHAFT SUPPORT, ASSEMBLING THE SPRING SUPPORTING PIN

In case of damage to the brake support the steering swivel assembly machined together with the brake support should be replaced as described in the Section 243.

ASSEMBLING THE SPRING SUPPORTING PINS

Install the spring supporting pins (15) with thread adhesive.

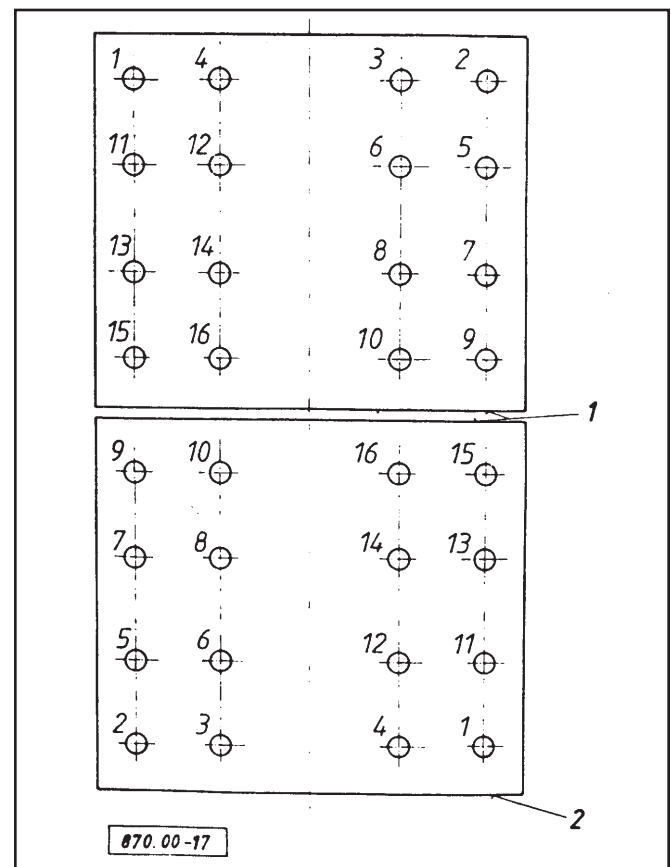


Fig. 4.: RIVETING SEQUENCE



REMOVING THE CAMSHAFT SUPPORT

After removing the hex. flanged bolts (5) the camshaft support can be pulled out of the steering swivel.

REINSTALLING THE CAMSHAFT SUPPORT

The relevant (RH - LH) camshaft support should be positioned into bore of the steering knuckle and secured by hex. flanged bolts coated with thread locker. Tighten the bolts to **130 - 140 Nm** torque.

If the anchor pin bushing (16) are to be replaced, use the tool shown. **Fig. 1.**

SECTION 265

REMOVING AND REINSTALLING THE BRAKE LEVER AND THE CAM-SHAFT

REMOVING THE CAMSHAFT

Removal of the camshaft can be performed after removing the brake shoes.

Remove the snap ring (1), the spacer (2a) and the wear indicator disk (2).

Pull the brake lever (3), the shims (6) and the spacer (7) off the brake spanner (11) end.

Pull the brake spanner out of the brake spanner support (4) and remove the distance washer (10) below the brake spanner head.

REINSTALLING THE BRAKE SPANNER

Position the distance washer (10) to the relevant brake spanner (RH - LH) to bottom out against the brake spanner head.

Apply grease to the brake spanner bushings and push the brake spanner subassembled with distance washer into the bushings (9) of the brake spanner support.

REINSTALLING AND ADJUSTING THE BRAKE LEVER

Stack the spacer (7), the required number shims (6) and the relevant brake lever (RH - LH) to the brake spanner. Position the wear indicator disk (2), the spacer (2a) and the snap ring (1) to be end of the brake spanner.

Install the brake lever to the brake spanner so, the bore center of the brake lever bush shall be in distance "A" specified in the "TECHNICAL DATA" from the upper plane of the brake canister holder.

After adjusting the above "A" dimension and the **0.1 - 0.6 mm** shoe clearance adjust the wear indicator disk so, the cut-out marked "0" on the disk and the recess on the lever shall be in the nearest position to each other.

In case of new lining the brake lever recess and "0" mark of the wear indicator disk will nearly align (**max. deviation is 9°**).

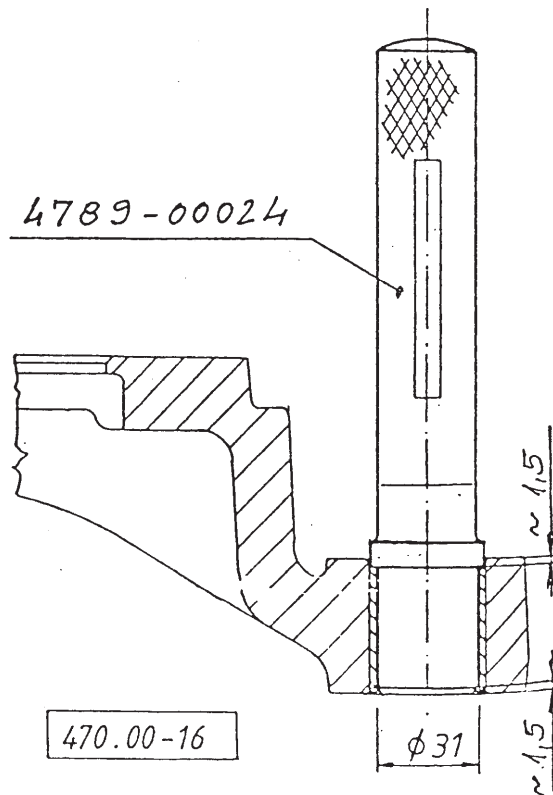


Fig. 1.: PRESSING THE BUSHINGS IN AND OUT

With wear of the brake lining the brake canister stroke length increases, which is automatically readjusted before exceeding the limit permitted by the brake canister.

In case of new brake drum of $\varnothing 420$ mm the mark "420" while at brake drum trued-up to a $\varnothing 424$ mm the mark "424" of the disk may reach the recess on the brake lever. This indicates that the brake lining is worn to the permitted limit. In such a case replace the brake linings.

SECTION 266

REPAIRING THE CAMSHAFT BEARING SUPPORT

REMOVING THE BEARING BUSHINGS AND THE SEALING RINGS

By means of the tool shown pull the bearing bushings (9) out of the camshaft support (4). **See Fig. 1.**

The bushings will push out the sealing rings (8) ahead.

REINSTALLING THE BEARING BUSHINGS

By means of the tools shown drive in the new bearing bushings until the tool bottoms out (**Fig. 2.**).

REINSTALLING THE SEALING RINGS

When reinstalling the sealing rings make sure to check if the sealing lips of the rings both near the brake spanner head and on the brake lever side face toward the axle housing center and the brake lever.



By this means leak-tightness at the brake spanner head is assured.

During lubrication with grease the sealing ring near the

brake lever should pass the surplus lubricant toward the brake lever.

By means of the tools shown drive the sealing rings before the bushings (see Fig. 3.).

SECTION 268

AUTOMATIC SLACK AD- JUSTER

The slack adjuster requires no maintenance, since it is automatically readjusted according to the brake lining wear.

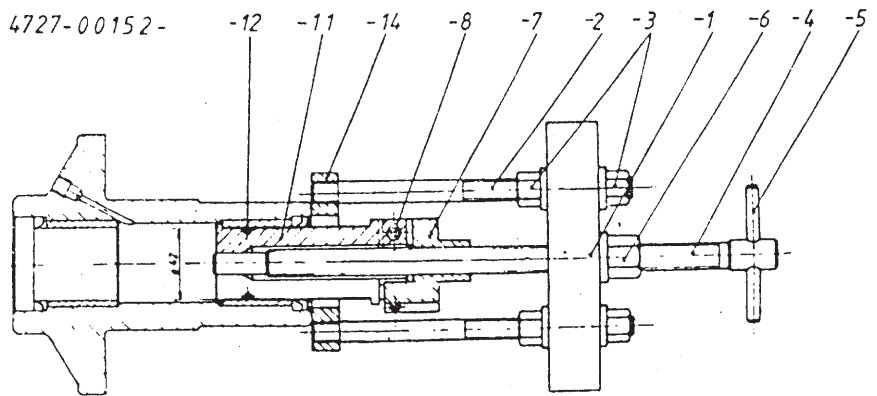


Fig. 1.: PULLING OUT THE BEARING BUSHINGS

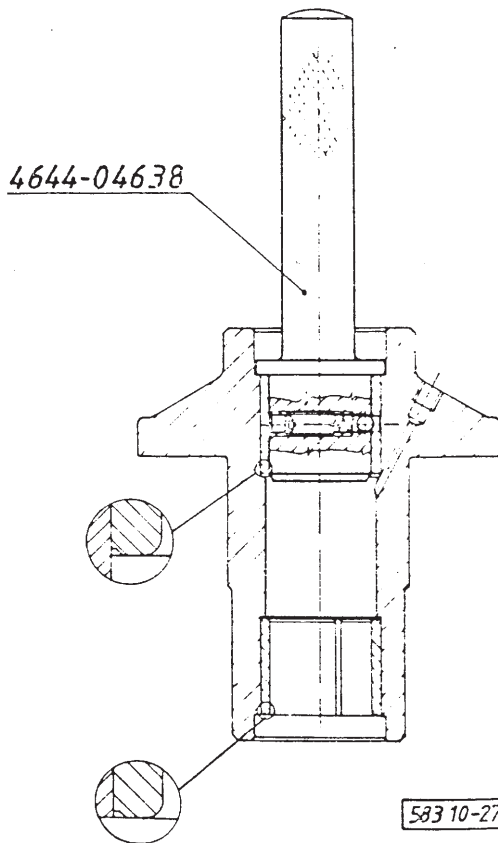


Fig. 2.: DRIVING IN THE BEARING BUSHINGS

In case of replacing the brake linings of after repairing the axle perform adjustment of the shoe clearance and the automatic slack adjuster as follows:

ITEMS:

- 1 – Adjusting plate
- 2 – Setscrew (hex. distance 13)
- 3 – Setscrew (hex. distance 10)
- 4 – Protection cup
- 5 – Hex. adjusting ring (hex. distance 32)
- 6 – Stop pin
- 7 – Plastic thread protector

ADJUSTMENT DATA:

- A = Distance between the chamber holder plane and the brake lever bore
- B = - " -
- C = Brake lever installation radius
- D = - " -

For dimensions A - C and B - D refer to "TECHNICAL DATA".

A/ ADJUSTING POSITION

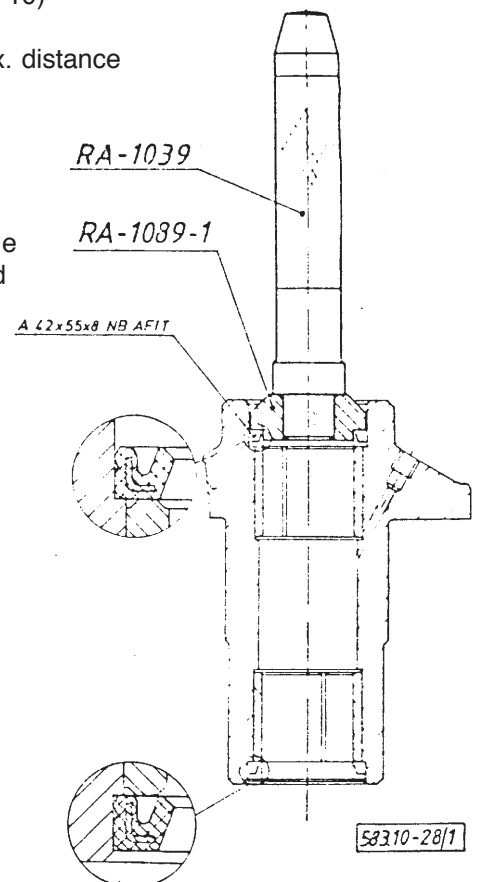
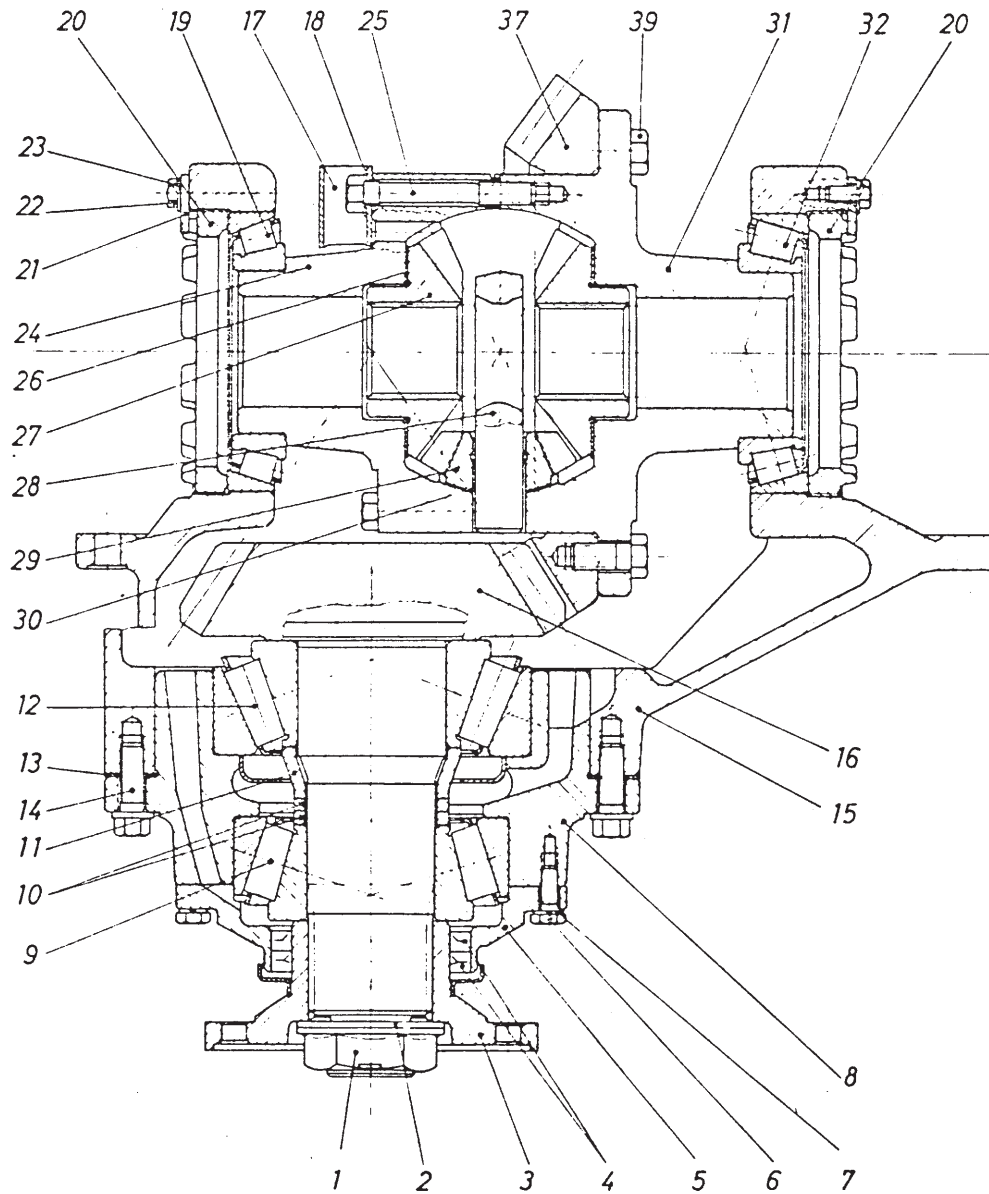


Fig. 3.: PRESSING IN THE SEALING RING



- 19 – Taper roller bearing
(30215 A MGM)
- 20 – Bearing adjuster
- 21 – Tab lock plate
- 22 – Hex. bolt
- 23 – Lock plate



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Fig. 1.: DIFFERENTIAL CARRIER ASSEMBLY SECTIONAL VIEW



LIMITED SLIP DIFFERENTIAL CARRIER ASSEMBLY SECTIONAL VIEW

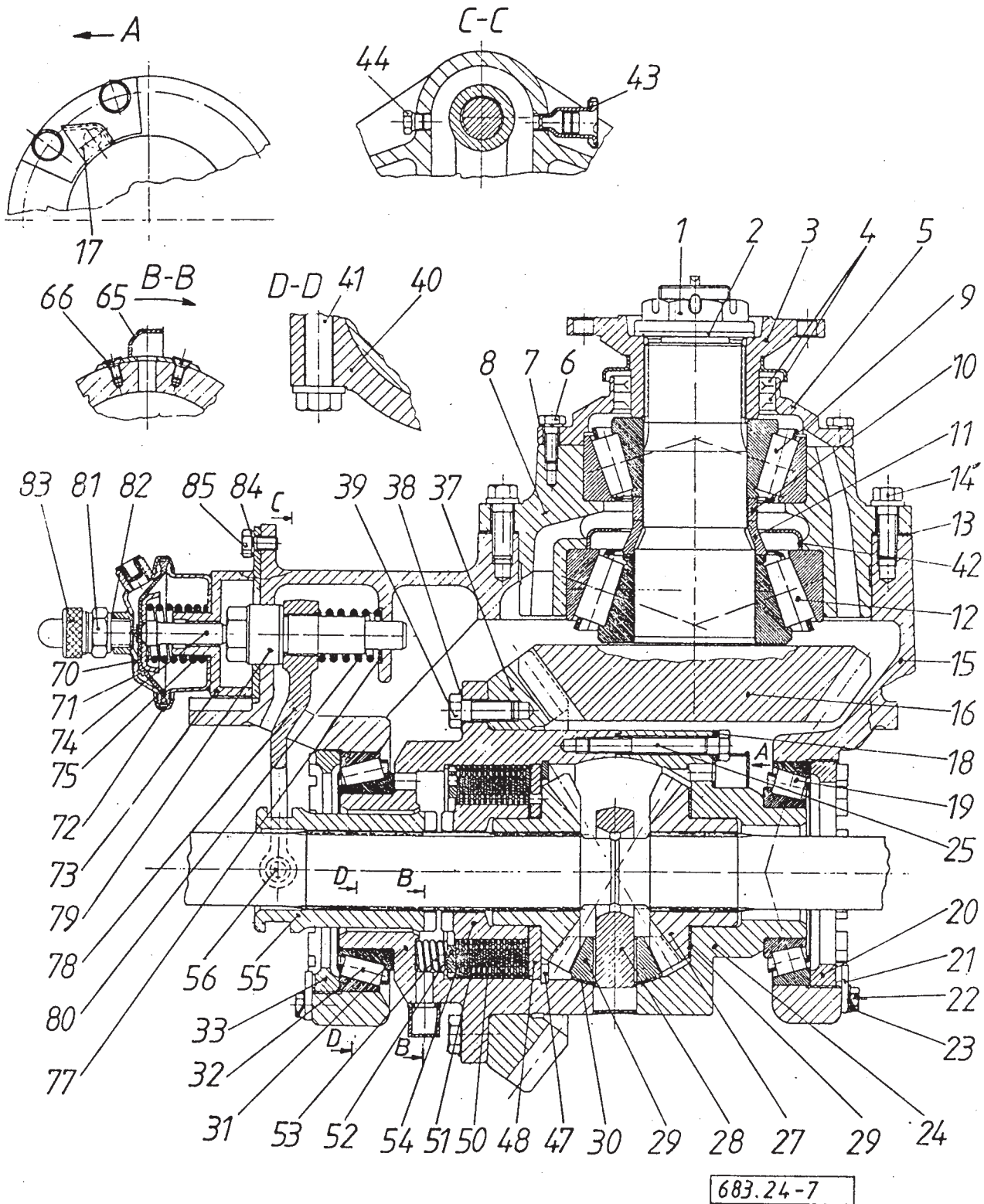


Fig. 2.: LIMITED SLIP DIFFERENTIAL CARRIER ASSEMBLY SECTIONAL VIEW

24 – Differential case half

25 – Clamp bolt

26 – Spacer

27 – Differential gear

28 – Spider

29 – Differential pinion

30 – Shim

31 – Differential case half (flanged)

32 – Taper roller bearing (32215 A or 32018 X MGM)

33 – Bearing adjuster

–

37 – Drive gear

38 – Lock plate

39 – Hex. bolt

40 – Bearing cage

41 – Hex. flanged bolt

42 – Oil baffle plate

43 – Vent valve

44 – Screw plug

–

47 – Snap ring

48 – Insert disk

–

50 – Inner disks

51 – Outer disks

52 – Backing disk

53 – Thrust springs

54 – Toothed hub

55 – Clutch sleeve

56 – Thrust pad

65 – Oil scoop

66 – Sunk head screw

–

70 – Pneumatic chamber cover

71 – Diaphragm

72 – Clamp

73 – Pneumatic chamberhousing

74 – Spring retainer

75 – Spring

–

77 – Stop insert

78 – Shift yoke

79 – Shift bar

80 – Spring

81 – Reporting switch

82 – Washer

83 – Connecting

84 – Lock washer

85 – Hex. bolt

SECTION 312

REMOVING AND REINSTALLING THE DIFFERENTIAL CARRIER ASSEMBLY

ing the differential carrier assembly to the axle housing and lift out the

REINSTALLING THE DIFFERENTIAL CARRIER ASSEMBLY

CARRIER ASSEMBLY

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

Install one **M12** stud bolt to two opposite bores in the axle body, then fit the differential carrier into the axle housing and secure by hex. flanged bolts coated with thread locker.

Tighten the bolts diagonally to **88 - 98 Nm** torque.

Install the double joints as described in Section 243.

SECTION 313

REMOVING AND REINSTALLING

ranged from the shown parts (Fig. 2.).

REPLACING THE SEALING RINGS IN THE COVER

Back out the hex. bolts (6) and remove the cover (5).

By means of the tools shown remove the used sealing rings (4) from the cover (see Fig. 3.).

Drive in the inner sealing ring (see Fig. 4.).

Drive in the outer sealing ring, as well, by

DIFFERENTIAL CARRIER ASSEMBLY

Before removing the differential carrier assembly from the axle drain the oil.

For removing the differential carrier pull the inner axle-shafts of the double-joint out of the differential. This can be performed in two ways:

1./ After removing the wheel hub and the steering knuckle, remove the double joints as described in Section 243.

2./ Assembly can be performed in case of removing the knuckle carrier, as well. Perform removal and reinstallation of the knuckle carrier as described in Section 248.

Remove the hex. flanged bolts attach-

carrier.

THE COMPANION FLANGE AND THE COVER, REPLACING THE SEALS IN THE COVER

REMOVING THE COMPANION FLANGE

For assembling the self-lock nut (1) use the tools shown (Fig. 1.).

For the pitch diameter **184.15 mm** companion flanges use the shown counter-support No. **4644-00651-2, -5** while for those of pitch diameter **155.5 mm** the counter-support No. **4644-00651-4, -5**.

For pulling off the companion flange use the device or-

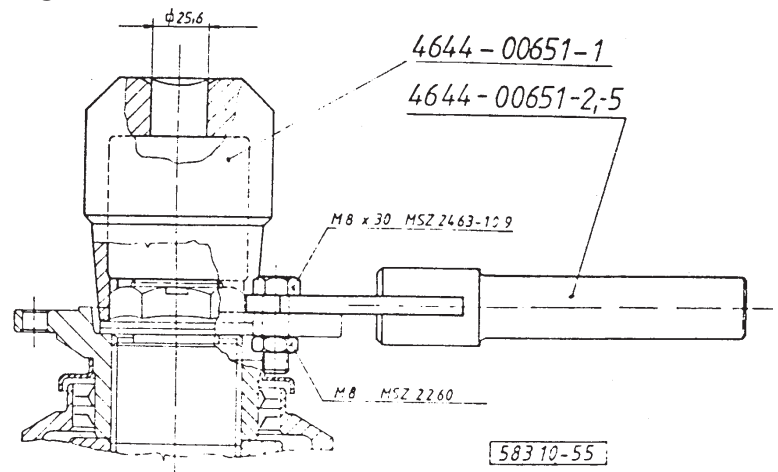


Fig. 1.: ASSEMBLING THE SELF-LOCK NUT



means of the tool shown (see Fig. 5.)

Apply specified grease between the sealing lip and the dust protection edge of the outer sealing ring and apply thin coat grease to the inner one.

REINSTALLING THE COVER

As described in the "GENERAL SERVICE INSTRUCTIONS"

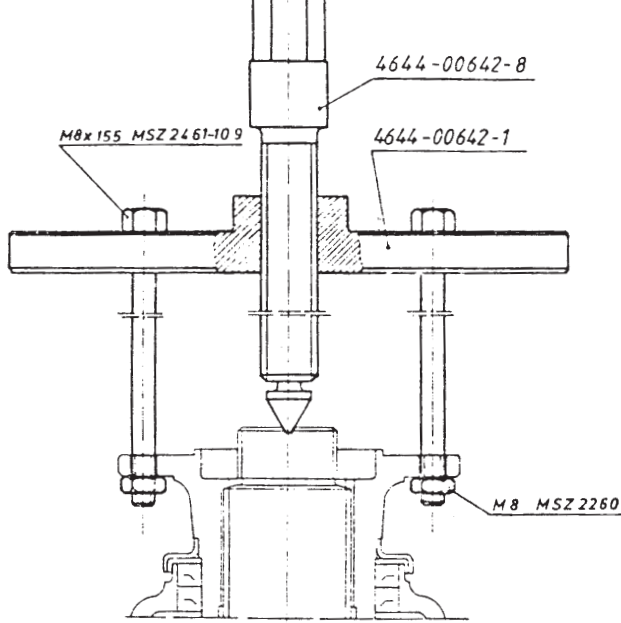


Fig. 2.: PULLING OF THE COMPANION FLANGE

By means of the tool shown press the companion flange (3) to the drive pinion splines to bottom out (Fig. 6.).

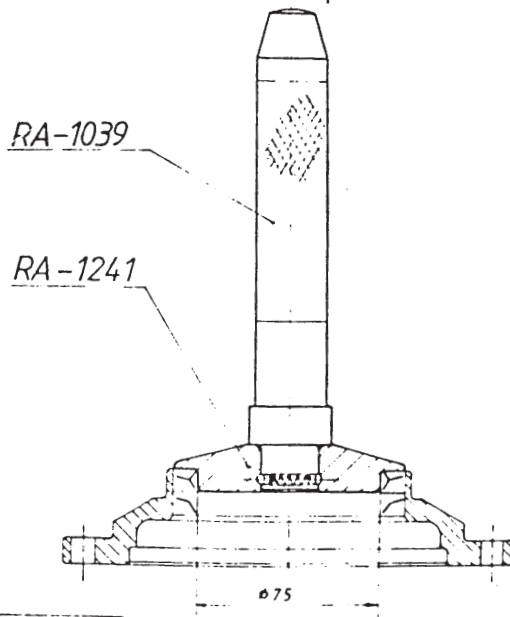


Fig. 3.: DRIVING OUT THE SEALING RINGS

REINSTALLING THE COMPANION FLANGE

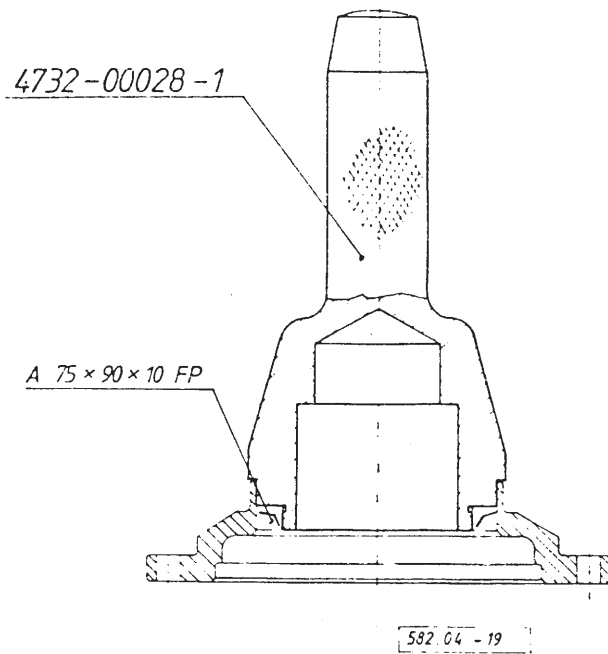


Fig. 4.: DRIVING IN THE INNER SEALING RING

By means of the tool shown press the companion flange (3) to the drive pinion splines to bottom out (Fig. 6.).

Install the washer (2), screw on the self lock nut (1) and

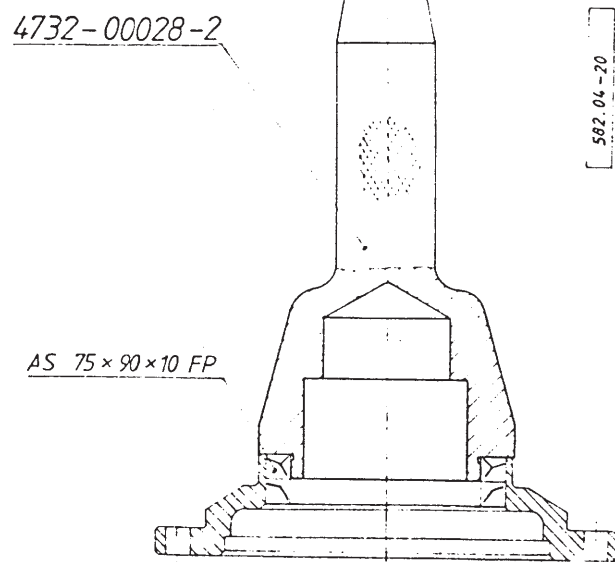


Fig. 5.: DRIVING IN THE OUTER SEALING RING

tighten to 540 - 590 Nm torque.

SECTION 314

REMOVING AND REINSTALLING



THE DIFFERENTIAL, AD- JUSTING THE BACKLASH AND THE CONTACT PAT- TERN

Back out the hex. bolts (22) and remove the lock plates (23) and the tab lock plates (21).

By means of the tool 4642-00817-01M

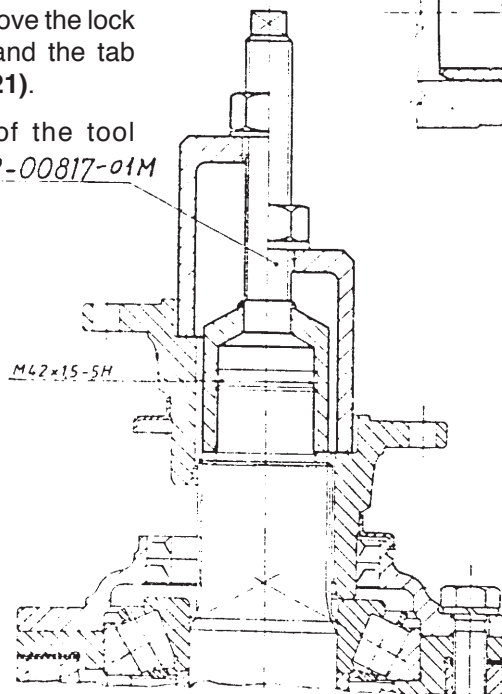


Fig. 6.: PRESSING ON THE COMPANION FLANGE

shown remove the bearing adjusters (20) from both sides (see Fig. 1.).

By means of the tool shown in Fig. 2. tap the differential toward the flanged differential case half (31) so, the outer race of the taper roller bearing (19) shall fall out.

Due to the taper roller bearing cones the differential can be removed only if disassembled.

Back out the differential case halves clamp bolts (25), then remove the separated case halves and the other parts from the carrier.

Drive the outer race of the other taper roller bearing out of the leg bore in the differential carrier by means of the tool shown in Fig. 3.

REINSTALLING THE DIFFERENTIAL

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

Position the assembled differential into the differential

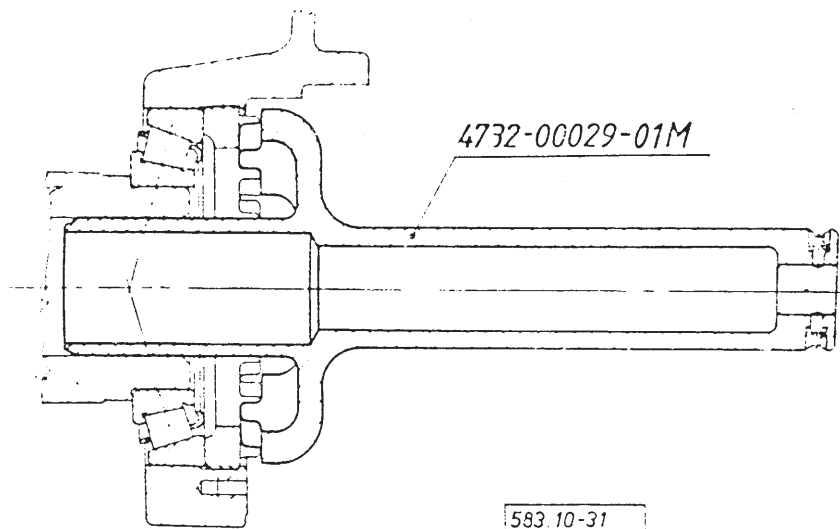


Fig. 1.: ASSEMBLING THE BEARING ADJUSTERS

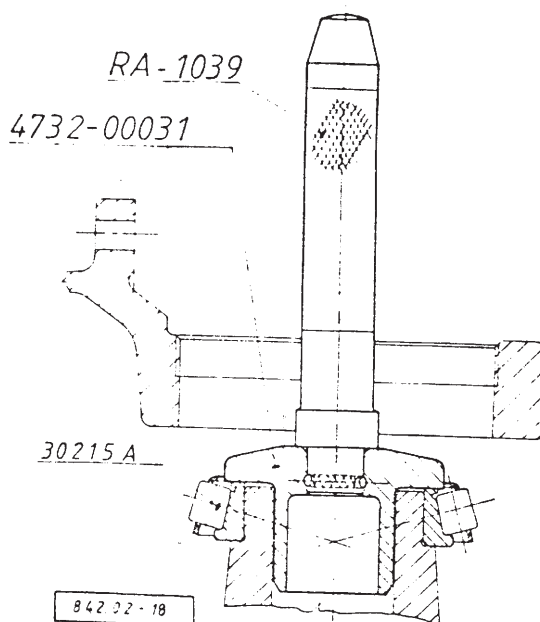


Fig. 2.: DRIVING ON THE TAPER ROLLER BEARING CONE

carrier. Turn the differential carrier over so, the differential shall be supported by its flanged case half.

Position the cone of the taper roller bearing (19) to the differential case half (24) and by means of the tool shown drive on to bottom out (see Fig. 2.).

Position the taper roller bearing outer race into the bear-



ing bore in the differential carrier and drive in by means of the tool shown (see Fig. 3.).

Screw in the bearing adjusters (20).

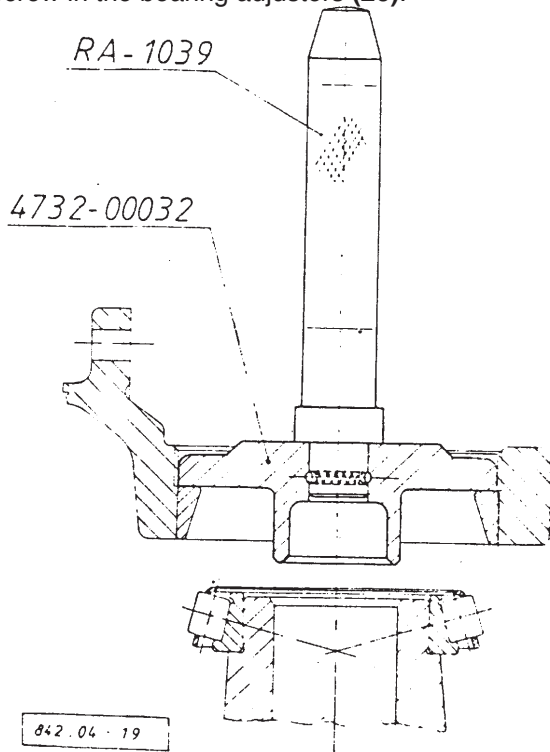


Fig. 3.: DRIVING IN THE TAPER ROLLER BEARING CUP

Turn the differential carrier over and drive the taper roller bearing cone to the flanged case half (31), then by the same tool as at the other side the bearing cup. Screw in the bearing adjusters (20).

ADJUSTING THE BACKLASH AND THE BEARING PRELOAD

By means of the bearing adjusters adjust the drive pinion to gear backlash (at KLINGELNBERG toothing) to 0.15 - 0.25 mm.

Locking the drive pinion measure the backlash by dial indicator at four places diagonally on the drive gear toothing, perpendicularly to the tooth surface by the dial indicator (Fig. 4.).

Maintaining the backlash install the differential taper roller bearing (19 and 32) with no clearance. Tighten the bearing adjusters (20) so, to obtain 0.000 mm axial play of the drive gear.

After adjusting the backlash and the 0.000 mm bearing clearance check the contact pattern as follows.

ADJUSTING THE CONTACT PATTERN

Apply indicator paint to 3 opposite teeth pairs of the drive gear.

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. 5. is obtained, the drive gear-pinion pair is installed properly.

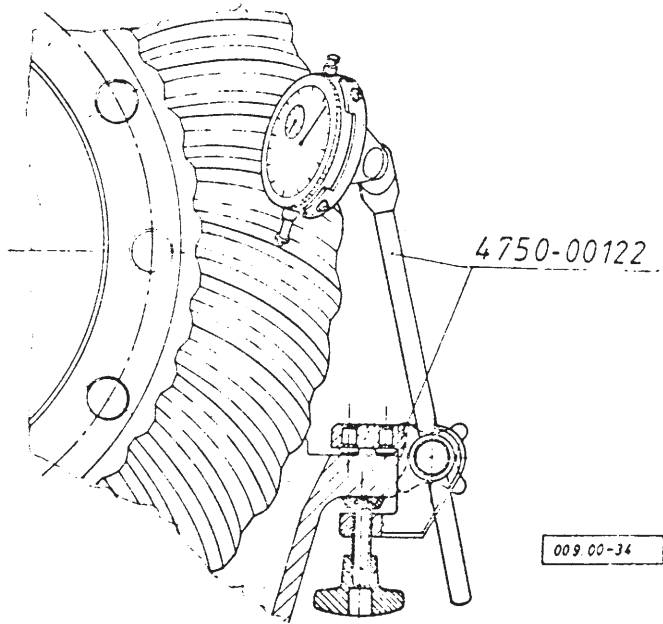


Fig. 4.: CHECKING THE BACKLASH

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

In case of GLEASON toothing the contact pattern along the tooth is shifted toward the small diameter of the drive gear.

TOO DEEP CONTACT

If the contact pattern is shifted to the dedendum as shown in detail 2 of Fig. 5., 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. 5.

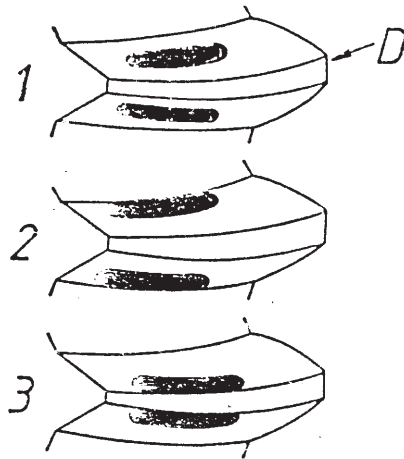
TOO HIGH CONTACT

If the contact pattern is shifted to the addendum as shown in detail 3 of Fig. 5., 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. 5.

After each contact pattern adjustment measure the backlash and check if the bearing clearance is 0.00 mm.

After adjusting the proper contact pattern and bearing clearance tighten the bearing adjusters on both sides by **0.75 - 1.25 pitch (approx. 7.5° - 15°)** to be able to secure them by one of the tab lock plates (21).

Secure the tab lock plates on both sides by means of the hex. bolts (22). Tighten the bolts to **15 - 20 Nm** and secure by folding the corners of the lock plates (23) to



118.00-20

Fig. 5.: THE CONTACT PATTERN

flats of the bolts.

When the adjustment and the operation is proper, remove bearing cage assembled with drive pinion and according to the **"GENERAL SERVICE INSTRUCTIONS"** apply oil-proof surface sealant to the inner flange, then fit back the bearing cage and secure by hex. flanged bolts (14) coated with thread locker. Diagonally tighten the bolts to **88 - 98 Nm** torque.

SECTION 315

DISASSEMBLING AND REASSEMBLING THE DIFFERENTIAL

Pull the inner race of the taper roller bearings (19 and 32) from the removed differential (see Fig. 1.).

For disassembling the differential case remove the hex. bolts (25) clamping the case halves (24 and 31) together and separate the case halves.

Remove the spider (28) together with the differential pinions (29) and shims (30) as well as the differential gears (27) and the spacers (26).

Replace the drive gear ONLY together with the matched drive pinion.

The match-marks are stamped to one 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, + 0.04.**

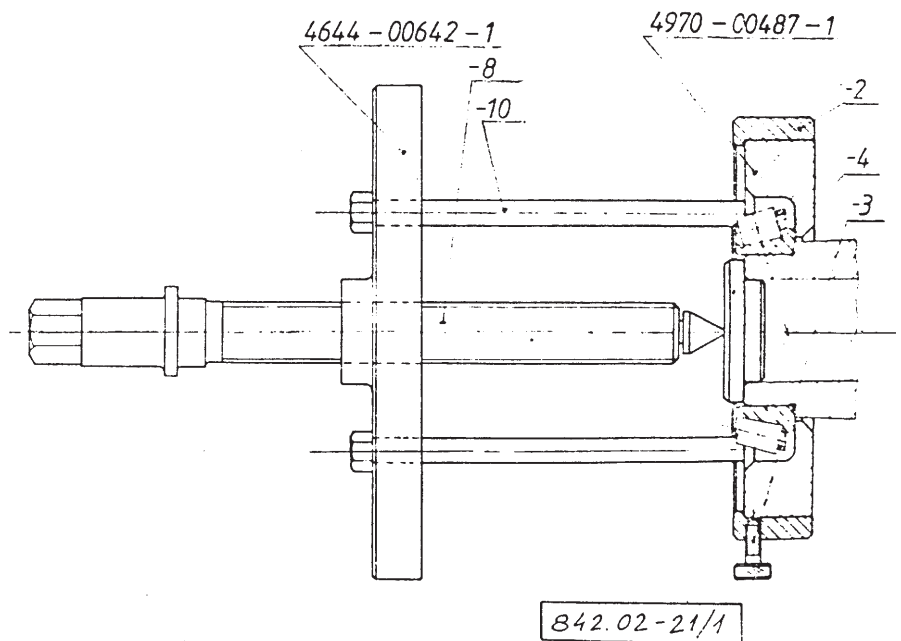


Fig. 1.: PULLING OFF THE TAPER ROLLER BEARING CONES

The differential case halves are match pairs, thus assemble only match-marked case halves according to the mark.

Pull the flanged differential case half (31) over the lower service mandrel (see Fig. 2.). Insert the spacer (26) and the differential gear (27) as well as the spider (28) subassembled with shims (30) and differential pinions (29). Following this insert the other differential gear and the spacer.

According to the match-marks and aligning the bores fit the differential case halves together, then install the clamp bolts (25). By means of the upper service mandrel lock the differential and tighten the clamp bolts to **49 - 59 Nm**. Remove the upper service mandrel and rotate the differential on the lower mandrel.

The differential should roll evenly and smoothly without jamming and jerks.

Apply thin coat of oil to the mating surface of the drive gear. Aligning the bores position the drive gear to the flanged differential case half. Thru the flange bore drive 4 hex. bolts with completely screwed on nut into the drive

gear and gradually tightening the nuts pull the drive on to bottom out (**Fig. 3.**).

Secure the drive gear by means of bolts (even at the place of the puller bolts) applied with thread locker. Tighten the bolts to 98 - 118 Nm torque.

REASSEMBLING AND DISASSEMBLING THE

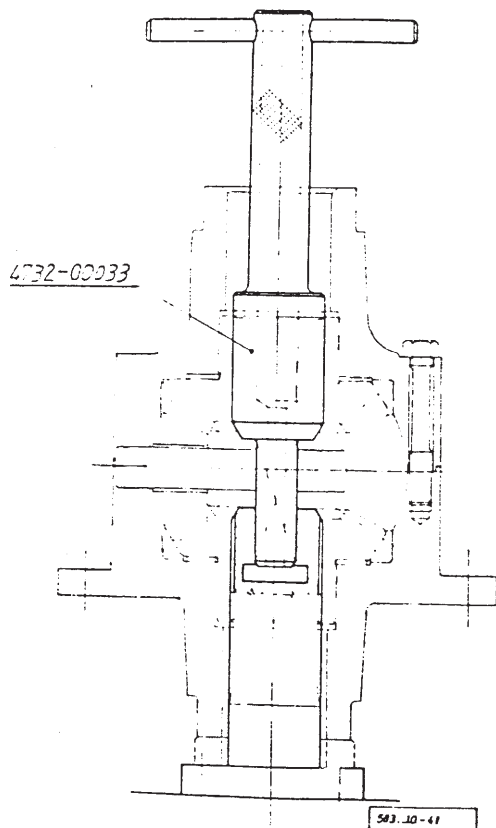


Fig. 2.: ASSEMBLING AND CHECKING THE DIFFERENTIAL

LIMITED SLIP MECHANISM

CAUTION!

The springs in the limited slip mechanism are under tension.

By means of the device shown, pull the disks together to bottom out securing the spring force and remove the snap ring (**47**). (**Fig. 1.**).

After removing the locking tool, remove the thrust disk (**48**), the inner and the outer disk (**50 and 51**), the backing disk (**52**), the toothed hub (**54**) and the thrust springs (**53**).

After removing the parts of the limited slip mechanism tap the inner race of the taper roller bearing (**32**) off the differential case thru the 4 Ø10 mm bores in the empty differential case half (**31**).

Spaced 4x3 position the 12 thrust springs (**53**) into the

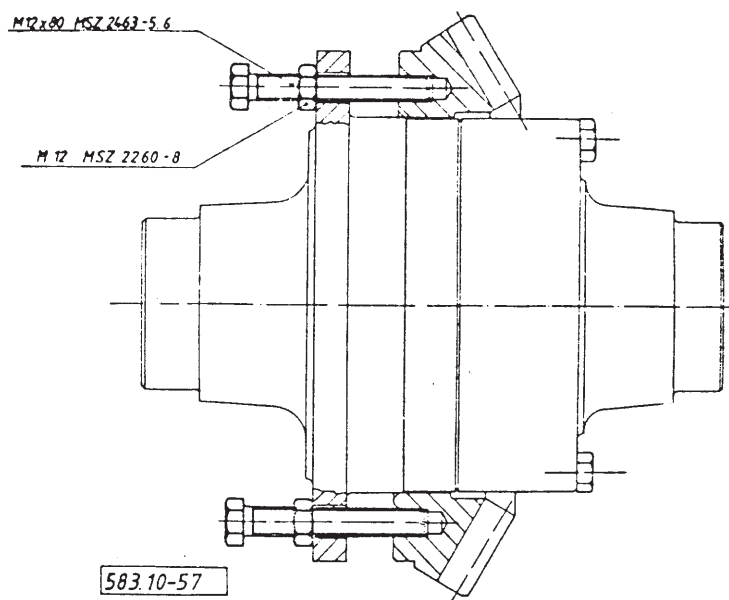


Fig. 3.: PULLING ON THE DRIVE GEAR

flanged differential case half (**31**) so that no spring flush with the 4 bores of 10 mm.

Above the springs position the backing disk (**52**) and pull the thrust disk off by means of the device shown in Fig. 3.

Following this insert the proper quantity of inner and the outer disks (**50 and 51**) alternately.

For the axles of 6,500 kg axle load install 8 outer and inner disks. For the axles of 10,000 kg axle load install

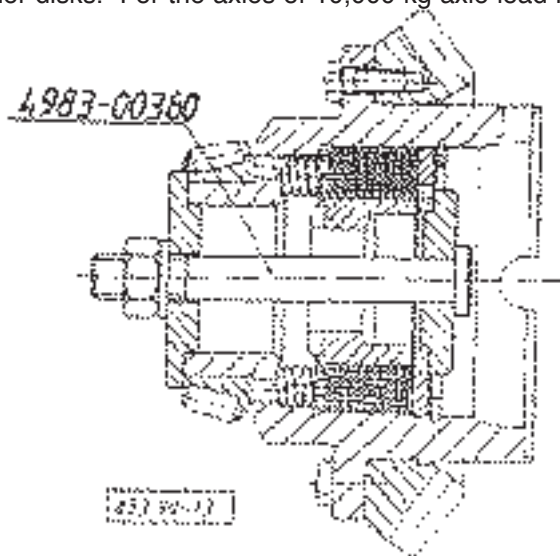


Fig. 1.:

13 outer and inner disks.

After positioning the disks install the toothed hub (**54**) by means of the tool shown in Fig. 3.

After installing the toothed hub insert thrust disk (**48**) and

finally secure by snap ring (47).

Following this remove the device installed for securing the springs.

SECTION 316

DISASSEMBLING AND REASSEMBLING THE BEARING CAGE ADJUSTING THE AXIS DISTANCE

Remove the hex. flanged bolts (14) attaching the bearing cage to the differential carrier.

By means of **M12** bolts of at least **65 mm** thread length driven into the two threaded bores in flange of the bearing cage (8), pull the bearing cage out of the differential carrier and remove the shims from flange of the differential carrier.

REINSTALLING THE BEARING CAGE TO THE DIFFERENTIAL CARRIER

After reassembling the bearing cage and adjusting the specified bearing preload adjust the axis distance (**with differential removed from the carrier**).

ADJUSTING THE AXIS DISTANCE

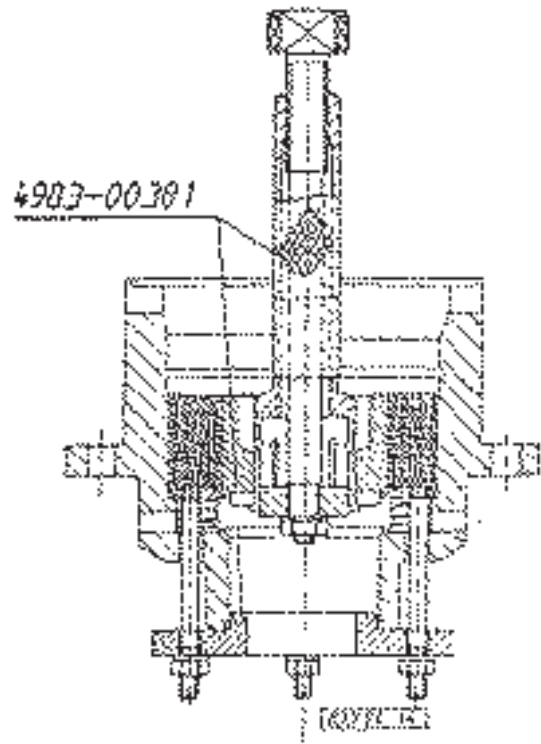


Fig. 3.:

For purpose of piloting, screw one **M12** stud bolts to two opposite bores in the differential carrier, position the shims (13) necessary for adjusting the drive pinion and gear contact pattern over these studs so, the extreme ones shall be the thicker. Aligning the bores push the bearing cage subassembled with drive pinion into the differential carrier (15) and provisionally secure by hex. flanged bolts (14) driven into two opposite bores and tightened to **88 - 98 Nm** torque.

On the relevant measuring pin of the accessory “A” belonging to the measuring device shown in Fig. 1. adjust the theoretical “**AXIS DISTANCE**” **B = 88.00 mm**, by setting the dial indicator to zero.

Insert the measuring device to **B = 88.00 mm** to the differential carrier as shown in Fig. 1. and measure the “**AXIS DISTANCE**” deviation. **Check if the reading is identical to the “AXIS DISTANCE” deviation stated on end of the drive pinion.**

In case of identity the adjustment is proper, otherwise obtain the specified value by selecting the proper shim pack (13). The permitted deviation is ± 0.025 mm.

E.g.: If the axis distance deviation stated on the drive pinion is + 0.04, the value “B” to be adjusted is 88.04 ± 0.025 mm.

Following this reinstall the differential into the differential carrier and adjust the contact pattern as described in the Section 314.

REINSTALLING THE BEARING CASE

In case of proper contact pattern adjustment and operation remove the bearing cage subassembled with drive pinion and according to the “**GENERAL SERVICE INSTRUCTIONS**” apply oil-proof surface sealant to the



inner flange, then reinstall the bearing cage by means of hex. flanged bolts **(14)** coated with thread locker. Diagonally tighten the bolts to **88 - 98 Nm** torque.

SECTION 317

DISASSEMBLING AND REASSEMBLING THE BEARING CAGE

By means of the device arranged from parts shown in the figure press the drive pinion (**16**) out of the removed bearing cage (**8**) (**see Fig. 1.**).

The drive pinion can also be removed by means of press, provided the flange of the bearing cage is properly backed up.

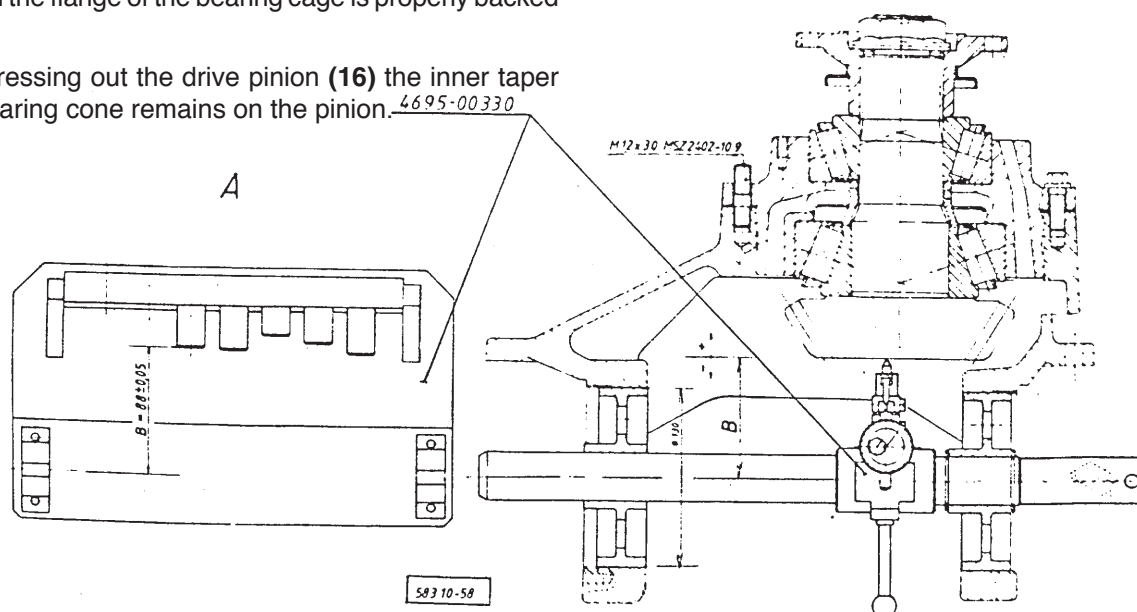
When pressing out the drive pinion **(16)** the inner taper roller bearing cone remains on the pinion. 4695-00330

Pull off the cone of the taper roller bearing by means of the device shown (**see Fig. 2**).

Drive the cup of the inner taper roller bearing out of the bearing cage by means of the device shown (**see Fig. 3.**) and properly backing the bearing cage.

Turn the bearing cage over and by means of tools shown drive out the cup of the outer taper roller bearing (**see Fig. 4.**).

Position the inner taper roller bearing cup **(12)** into the bearing cage, then by the tools shown drive in to bottom out **(Fig. 5.)**.



19. THE CHALLENGING THE DISCOVERY

Turn the bearing cage over and by means of the tools shown drive in the cup of the outer taper roller bearing to bottom out (**see Fig. 6.**).

After subassembling the bearing cage with taper roller bearing cups adjust the bearing preload (**see Fig. 7.**).

The distance between the outer taper roller bearing cone and the distance sleeve may vary between **13.96 and 15 mm**. This distance should be determined by measurement for selecting the proper distance ring pair **(10)**.

Stack the inner taper roller bearing cone, the distance sleeve **(11)** and distance ring pair for filling the gap determined by measurement, then the subassembled bearing cage and the outer taper

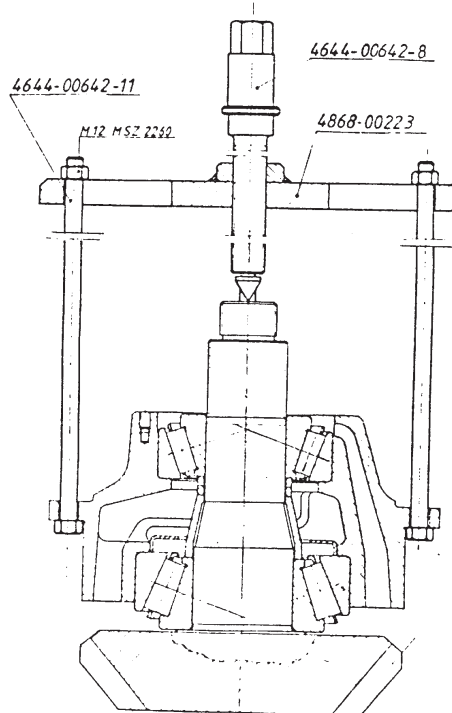


Fig. 1.: PRESSING OUT THE DRIVE PINION

roller bearing cone to the shown master shaft.

Position the washer belonging to the master shaft to the bearing

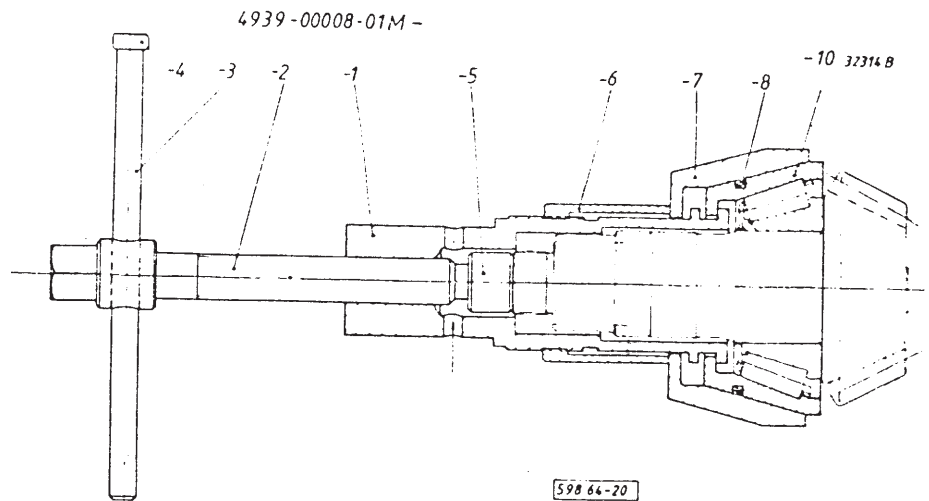


Fig. 2.: PULLING OFF THE INNER RACE OF THE TAPER ROLLER BEARING

cone, screw on the flanged nut of the device and tighten to **540 - 590 Nm** torque.

Attach **approx. 2 mtrs** long cord to one bore in the bearing cage flange and wind the cord around the bearing cage.

Attach fish-scale to other end of the cord and measure the rolling torque.

In case of new bearings installed the force obtained from

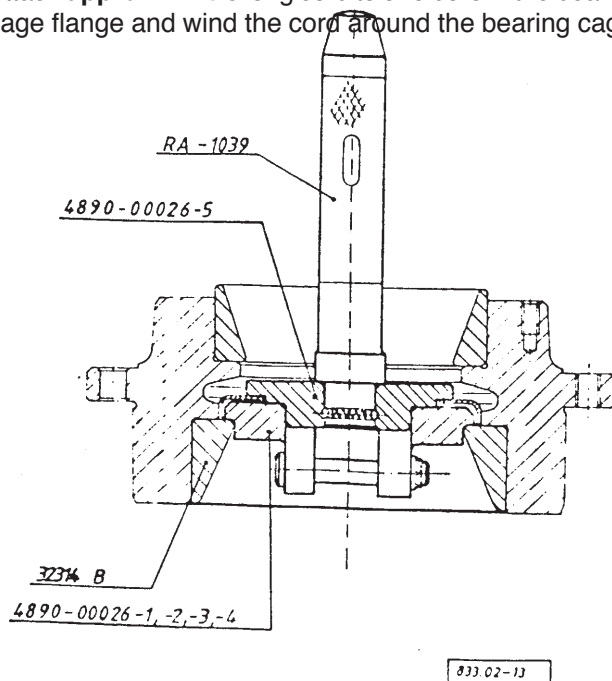


Fig. 3.: DRIVING OUT THE CUP OF THE INNER TAPER ROLLER BEARING

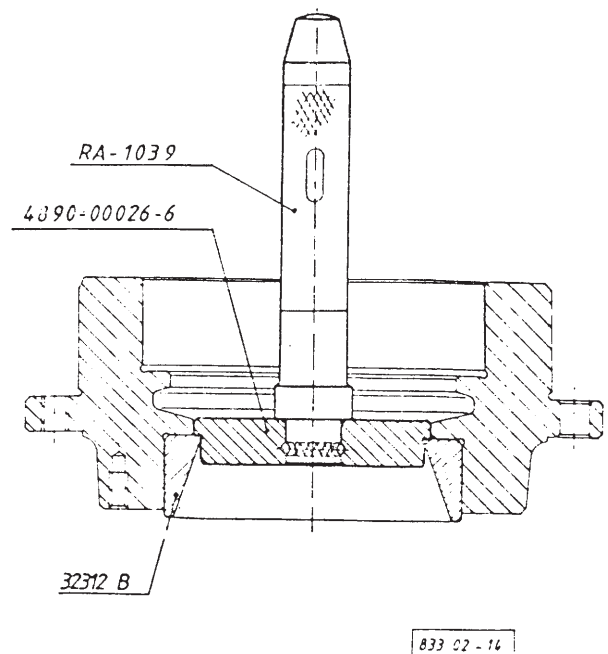


Fig. 4.: DRIVING OUT THE OUTER TAPER ROLLER BEARING CUP

the fish-scale at **approx. 50 rpm** should be **9.6 - 16.2 N**, which corresponds to the specified **1.0 - 1.7 Nm** rolling torque.

In case of reused bearings adjust the rolling torque to **0.5**

- **0.85 Nm** (to half of the rolling torque at new bearings).

In case of deviation perform correction by replacing the distance ring. With higher rolling torque use higher distance ring, while at lower torque use lower one.

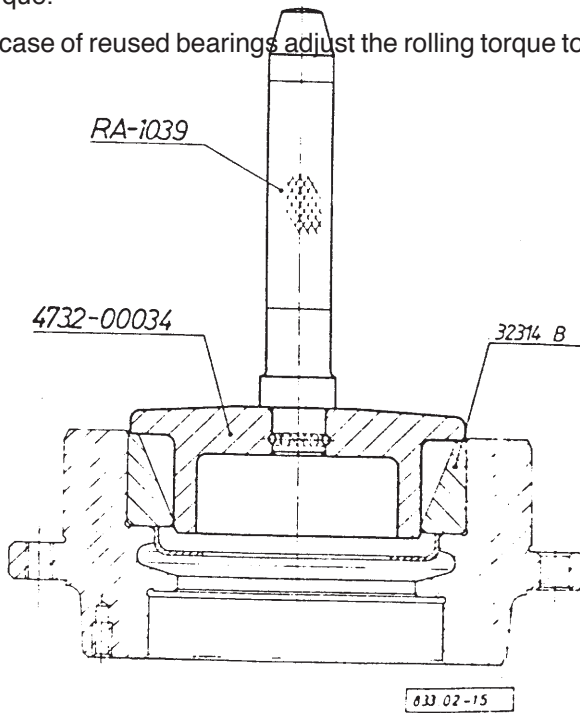


Fig. 5.: DRIVING IN THE CUP OF INNER TAPER ROLLER BEARING

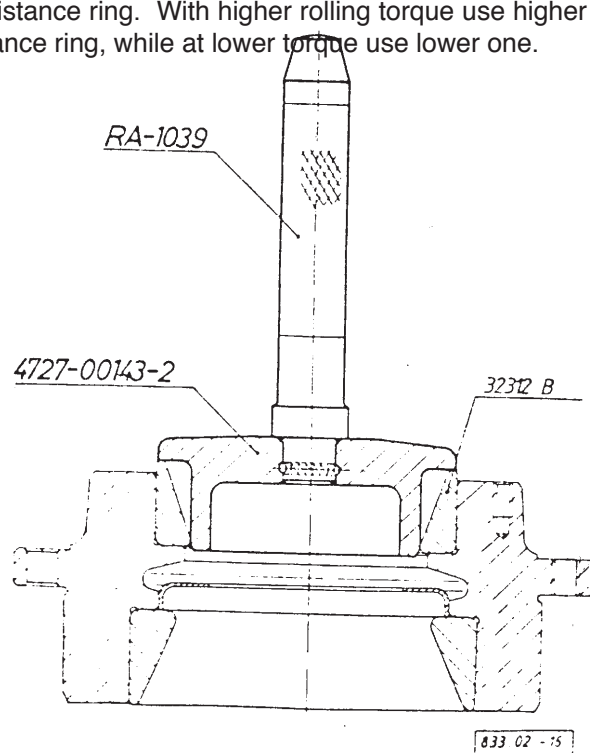


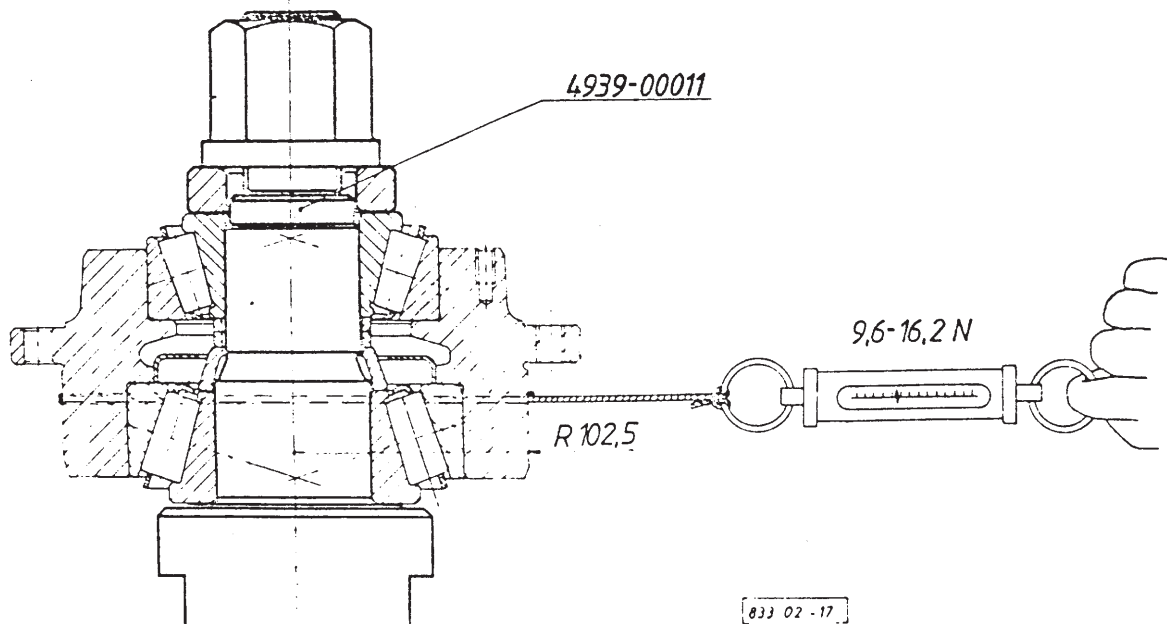
Fig. 6.: DRIVING IN THE CUP OF OUTER TAPER ROLLER BEARING

In case of proper adjustment relocate the parts from the master shaft to the drive pinion. **Make sure to install ONLY the parts used for the previous adjustment.**

By means of the tools shown drive the inner race of the

inner taper roller bearing (12) onto the drive pinion (Fig. 8.).

Position the distance sleeve (11), the previously selected distance ring (10) and the bearing cage subassembled means



of press sleeve drive on the outer taper roller bearing cone to bottom out while assuring proper connection of the bearings.

By the tool shown in **Fig. 6. of Section 313** press the companion flange **(3)** to the drive pinion. Screw on the flanged castle nut **(1)** and tighten to **540 - 590 Nm** torque.

Check the rolling torque as described earlier. If deviation is experienced repeat the adjustment until obtaining the specified value.

The oil seals **(4)** with the cover **(5)** are not installed during check.

unusual noise is permitted at the rotary mechanism in the differential and the wheel hubs. The meshing gears should roll on one another smoothly without unusual noise.

The brake for operation: In initial position no friction is permitted between the brake shoes and the brake drum. During brake application the brake spanner may not jam in the brake spanner bearing and upon termination of the braking force it should return to initial position.

The axle for warming: At the end of running the maximum temperature of the wheel hub may be approx. **60° C**, while at the input section approx. **80° C**.

SECTION 395

OIL FILL-UP, RUN, CHECK

Thru the oil filler bores on the end-cover of the wheel hubs and on the axle housing fill up the finish assembled axle with oil of grade specified in the Operators Manual.

Fill ONLY completely clean oil to the axle.

After oil fill-up install the fill plug to be leak-tight. Following this run the axle to both directions at varying speed.

DURING RUN CHECK THE FOLLOWING:

The axle for leaks: No leaks are permitted.

The axle for operation: No excessive sound of friction or

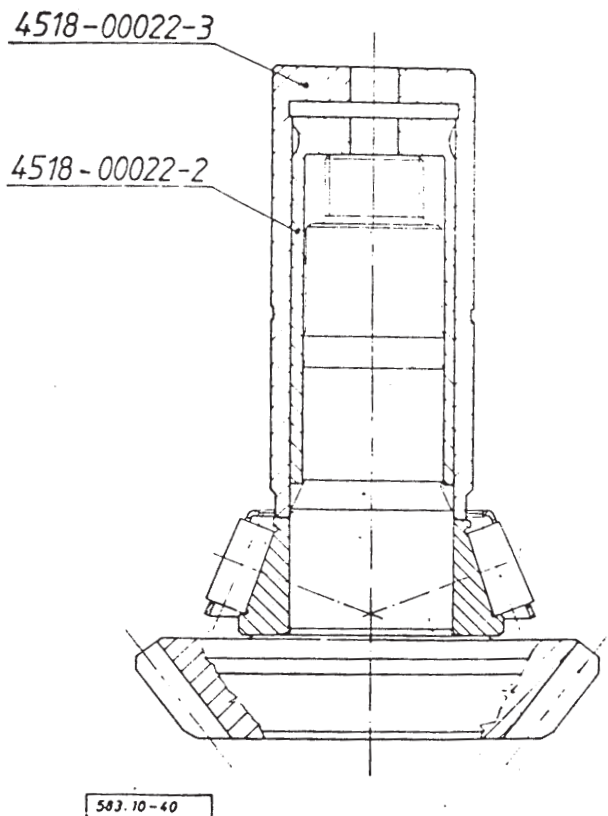


Fig. 8.: DRIVING ON THE INNER TAPER ROLLER BEARING CONE





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