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<td>PARTS OF THE AXLE HOUSING</td>
<td>20 241</td>
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<td>REMOVING AND REINSTALLING AND REPAIRING THE TIE-ROD, ADJUSTING THE TOE-IN AND THE WHEEL TURN ANGLES</td>
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</tr>
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<td>REMOVING AND REINSTALLING THE STEERING KNUCKLES, REMOVING AND REINSTALLING THE DOUBLE JOINTS, ASSEMBLING THE BRAKE SUPPORT AND THE SPINDLE</td>
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</tr>
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<td>ASSEMBLING THE KNUCKLE PIN BEARING BUSHES AND THE SEALING RINGS ON THE STEERING KNUCKLE</td>
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</tr>
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<td>ASSEMBLING THE STEERING AND TIE-ROD ARMS</td>
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<td>ASSEMBLING THE DOUBLE JOINT (AXLE SHAFT REPLACEMENT)</td>
<td>25 246</td>
<td></td>
</tr>
<tr>
<td>REMOVING AND REINSTALLING THE INNER BEARING AND SEALS OF THE SPINDLE</td>
<td>27 247</td>
<td></td>
</tr>
<tr>
<td>REMOVING AND REINSTALLING BEARING AND SEALS OF THE KNUCKLE CARRIER</td>
<td>28 248</td>
<td></td>
</tr>
<tr>
<td>DISK WHEEL BRAKE</td>
<td>28 270</td>
<td></td>
</tr>
<tr>
<td>DIFFERENTIAL</td>
<td>29 310</td>
<td></td>
</tr>
<tr>
<td>DIFFERENTIAL SECTIONAL VIEW</td>
<td>29 310</td>
<td></td>
</tr>
<tr>
<td>PARTS OF THE DIFFERENTIAL</td>
<td>29 311</td>
<td></td>
</tr>
<tr>
<td>REMOVING AND REINSTALLING THE DIFFERENTIAL</td>
<td>30 312</td>
<td></td>
</tr>
<tr>
<td>REMOVING AND REINSTALLING THE COMPANION FLANGE, REPLACING THE OIL SEAL</td>
<td>30 313</td>
<td></td>
</tr>
<tr>
<td>REMOVING AND REINSTALLING THE DIFFERENTIAL, ADJUSTING THE BACKLASH AND THE CONTACT PATTERN</td>
<td>31 314</td>
<td></td>
</tr>
<tr>
<td>DISASSEMBLING AND REASSEMBLING THE DIFFERENTIAL</td>
<td>33 315</td>
<td></td>
</tr>
<tr>
<td>REMOVING AND REINSTALLING THE BEARING CAGE, ADJUSTING THE AXIS DISTANCE</td>
<td>35 316</td>
<td></td>
</tr>
<tr>
<td>DISASSEMBLING AND REASSEMBLING THE BEARING CAGE</td>
<td>36 317</td>
<td></td>
</tr>
<tr>
<td>OIL FILL-UP, RUN, CHECK</td>
<td>41 395</td>
<td></td>
</tr>
</tbody>
</table>
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 re-assembly 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.

RIGHTS FOR ALTERATIONS RESERVED!
DRAWINGS OF THE AXLES

Example

Forward direction
Example

Forward direction
# SECTION 205

## TECHNICAL DATA

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>UNITS</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CT8</td>
</tr>
</tbody>
</table>

**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:**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Units</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel Track</td>
<td>mm</td>
<td>1990*</td>
</tr>
<tr>
<td>Rubber tire</td>
<td>mm</td>
<td>9x20**</td>
</tr>
<tr>
<td>Rolling radius</td>
<td>mm</td>
<td>482*</td>
</tr>
<tr>
<td>Sinking depth</td>
<td>mm</td>
<td>150.876*</td>
</tr>
<tr>
<td>Spring Center Distance</td>
<td>mm</td>
<td>431.8 + 508 = 939.8</td>
</tr>
<tr>
<td>Overall Width</td>
<td>mm</td>
<td>2400*</td>
</tr>
</tbody>
</table>

**RATIOS:**

<table>
<thead>
<tr>
<th>Ratio</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive gear/drive pinion tooth number</td>
<td>41/7 ... 41/11*</td>
</tr>
<tr>
<td>Ratio</td>
<td>5.857 ... 3.727*</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>UNITS</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL DATA:</td>
<td></td>
<td>CT8</td>
</tr>
<tr>
<td>Camber</td>
<td>1º</td>
<td></td>
</tr>
<tr>
<td>Knuckle pin angle</td>
<td>5º</td>
<td></td>
</tr>
<tr>
<td>Nominal axle load kg</td>
<td>kg</td>
<td>3628</td>
</tr>
<tr>
<td>Max. output torque Nm</td>
<td>Nm</td>
<td>10000 - 12300 *</td>
</tr>
<tr>
<td>Max. input speed RPM 1/sec</td>
<td>1/sec</td>
<td>50</td>
</tr>
<tr>
<td>Axle mass without oil fill kg</td>
<td>kg</td>
<td>~385 *</td>
</tr>
<tr>
<td>WHEEL HUB EXECUTION</td>
<td></td>
<td>“A”, “B”, “C” *</td>
</tr>
<tr>
<td>“A” Hub centering for installing wheel disc</td>
<td>mm</td>
<td>Flange diameter: Ø221</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wheel nut: to be installed by the orderer</td>
</tr>
<tr>
<td>“B” Hub centering for installing wheel disc</td>
<td>mm</td>
<td>Flange diameter: Ø220.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wheel nut: to be installed by the orderer</td>
</tr>
<tr>
<td>“C” Hub centering for installing wheel disc</td>
<td>mm</td>
<td>Flange diameter: Ø219.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wheel nut: to be installed by the orderer</td>
</tr>
<tr>
<td>Parts of ABS</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Impulse generating ring</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>WHEEL BRAKE:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel brake (to installed by the vehicle manufacturer)</td>
<td></td>
<td>Disk brake</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bendix 410864-L *</td>
</tr>
<tr>
<td></td>
<td></td>
<td>410865-R *</td>
</tr>
<tr>
<td>Max. operating pressure on brake caliper</td>
<td>bar</td>
<td>120</td>
</tr>
<tr>
<td>Brake disk torque Nm</td>
<td>Nm</td>
<td>8470</td>
</tr>
<tr>
<td>48.3 km/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DESIGNATION</td>
<td>UNITS</td>
<td>TYPE</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>ROLLING BEARINGS:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In wheel hub:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer: Taper roller bearing</td>
<td></td>
<td>32015 X MGM</td>
</tr>
<tr>
<td>Inner: Taper roller bearing</td>
<td></td>
<td>33116 A MGM</td>
</tr>
<tr>
<td>On drive pinion:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outer: Taper roller bearing</td>
<td></td>
<td>TIMKEN 44348/44143</td>
</tr>
<tr>
<td>Inner: Taper roller bearing</td>
<td></td>
<td>TIMKEN JW4510/JW4549</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assortment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UC1306 TAM-1-C3 KOYO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UC1306 TAM FAG</td>
</tr>
<tr>
<td></td>
<td></td>
<td>UC1306 TM FAG</td>
</tr>
<tr>
<td>On differential:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On flanged case half: taper roller bearing</td>
<td></td>
<td>Assortment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32212 A MGM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32212 SKF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32212 A FAG</td>
</tr>
<tr>
<td>On flanged case half: taper roller bearing</td>
<td></td>
<td>Assortment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30212 A MGM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30212 SKF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30212 A FAG</td>
</tr>
<tr>
<td><strong>OIL SEALS:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In wheel hub:</td>
<td></td>
<td>1HHI 110x140x17-NB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEFA-DENSO</td>
</tr>
<tr>
<td>In the steering knuckle:</td>
<td></td>
<td>ASL-50x65x8-NB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIMMERWERKE</td>
</tr>
<tr>
<td>In seal retainer:</td>
<td></td>
<td>Ø50x65x6 KV 3440</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIMMERWERKE</td>
</tr>
<tr>
<td>In knuckle carrier:</td>
<td></td>
<td>A 49.5x80x8-NB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIMMERWERKE</td>
</tr>
<tr>
<td>On knuckle pin:</td>
<td></td>
<td>006.10-3110-038</td>
</tr>
<tr>
<td>In differential:</td>
<td></td>
<td>A-1205-S-1527 (53.975x92.202x11.5)</td>
</tr>
</tbody>
</table>
### TORQUE RATINGS

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>SECTION/FIGURE ITEM No.</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
<td>004</td>
</tr>
</tbody>
</table>

**NOTE:** The serial numbers are the item numbers of the figures in the REPAIR INSTRUCTIONS

**NOTE:** Nm to ftlb = Nm \( \div 1.3558 \) (Ex. 600 Nm \( \div 1.3558 \) = 443 ftlb)

<table>
<thead>
<tr>
<th>WHEEL HUB</th>
<th>210/1</th>
<th>Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel nuts</td>
<td>20</td>
<td>As specified by the orderer</td>
</tr>
</tbody>
</table>
| 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) (Per Section 223) | 26 | 588 - 637 |
| Spindle nut (inner) | 28 | 196 |

<table>
<thead>
<tr>
<th>AXLE HOUSING</th>
<th>240/1</th>
<th>Nm</th>
</tr>
</thead>
</table>
| Brake support and spindle to steering knuckle 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 |
# TORQUE RATINGS

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

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>UNITS</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHEEL HUB, STEERING KNUCKLE:</td>
<td></td>
<td>CT8</td>
</tr>
<tr>
<td>Axial play of wheel hub bearings</td>
<td>mm</td>
<td>0.01 - 0.04</td>
</tr>
<tr>
<td>(adjustment by shims)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial play of steering knuckle</td>
<td>mm</td>
<td>0.0 - 0.3</td>
</tr>
<tr>
<td>Shim thicknesses</td>
<td>mm</td>
<td>0.4; 0.6; 1.0; 1.2; 1.4</td>
</tr>
<tr>
<td>Toe-in</td>
<td>mm</td>
<td>0 ... 2.5</td>
</tr>
<tr>
<td>Max. inner wheel turn angle</td>
<td></td>
<td>40°</td>
</tr>
<tr>
<td>DIFFERENTIAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive pinion to drive gear</td>
<td>mm</td>
<td>0.2 - 0.28 *</td>
</tr>
<tr>
<td>backlash:</td>
<td></td>
<td>0.18 - 0.25 *</td>
</tr>
<tr>
<td>Drive pinion rolling torque.</td>
<td>Nm</td>
<td>1.0 - 5.0</td>
</tr>
<tr>
<td>after preloading the bearings (the oil seal is</td>
<td></td>
<td></td>
</tr>
<tr>
<td>not installed), adjustment by the distance rings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of distance ring</td>
<td>mm</td>
<td>Spacers from 8.755 to 9.530 mm</td>
</tr>
<tr>
<td>in 0.025 mm steps. totally 32 off.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Theoretical distance between the drive pinion</td>
<td>mm</td>
<td>77.44</td>
</tr>
<tr>
<td>face and the drive gear centerline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot;AXIS DISTANCE&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shim thicknesses</td>
<td>mm</td>
<td>0.10; 0.12; 0.25</td>
</tr>
</tbody>
</table>
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 tapered 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).*
Fig. 1.: SECTIONAL VIEW OF WHEEL HUB
SECTION 211

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
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.

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 safely.

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
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. 35° - 45°. 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.

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.).

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

**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

---

**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!**
FRONT AXLE HOUSING
SECTION 240
SECTIONAL VIEW OF AXLE HOUSING

Fig. 1.: SECTIONAL VIEW OF AXLE HOUSING
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

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
Measure the dimension “A” and mark the measurement place, then turn the wheel over by 180° 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 ± 45° from the vertical plane. If required remove one ball joint head, turn off the tie-rod by 180° and turn off the ball joint head by 360° 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

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

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).
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.

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.
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.).

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

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

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

Fig. 3.: PRESSING IN THE KNUCKLE PIN BUSHINGS

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.
ASSEMBLING THE DOUBLE JOINT (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

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. 1.: PULLING OUT THE BEARING BUSHINGS

Fig. 2.: DRIVING OUT THE KNUCKLE PINS
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.
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.

REINSTALLING THE INNER BEARING AND THE SEALS TO THE STEERING KNUCKLE

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

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. 1.: PULLING OUT THE BUSHING

Fig. 2.: PRESSING IN THE BUSHING

Fig. 3.: DRIVING IN THE SEALING RING
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.

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.
DIFFERENTIAL

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
5 — Bearing cage
6 — Taper roller bearing
7 — Distance ring
8 — Taper roller bearing
9 — Shims
10 — Hex. flanged bolts
11 — Differential carrier
12 — Drive pinion
13 — Oiler scoop
14 — Drive gear
15 — Taper roller bearing
16 — Bearing adjuster
17 — Cotter pin
18 — Differential case half
19 — Clam bolt
20 — Differential side washer
21 — Differential pinion
22 — Spider
23 — Differential pinion washer
24 — Taper roller bearing
25 — Differential case half (flanged)
26 — Taper roller bearing
27 — Drive gear
28 — Self-lock nut
29 — Hex. bolt
30 — Bearing shackle
31 — Hex. bolt
32 — Washer
33 — Lock washer
34 — Cylindric roller bearing
35 — Snap ring for shaft
36 — Lock washer
37 — Hex. bolt
38 — Lock washer
39 — Hex. bolt
40 — Oil baffle plate
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).

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.

Fig. 1.: MOUNTING THE SELF-LOCK NUT

Fig. 2.: REMOVING THE COMPANION FLANGE
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.).

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.

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.).

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.
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.).

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 90° 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

In case of GLEASON- toothed 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.
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.).

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.

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.
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.

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

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

When reassembling the bearing cage determine the thickness of the spacer ring (10) to be installed 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.).
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).
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.)

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.).

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.
SECTION 395

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. $60^\circ C$ at the wheel hub and approx. $80^\circ C$ at the input section.