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<td>Removing and Reinstalling the Differential, Adjusting the Backlash and the Contact Pattern</td>
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<td>Disassembling and Reassembling the Bearing Cage</td>
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</table>

Marmon-Herrington
The present document gives directions to the trained personnel to repair the

**RF17/R17 Rear Axles**

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

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

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

Use only Marmon-Herrington parts. Seal and bearings are proprietary throughout.
GENERAL WORKING DIRECTIONS

Individuals repairing Marmon-Herrington equipment are responsible for all aspects of safety.

All safety regulations must be observed to avoid personal injury or property damage.

Proper mechanical training is required, and is the responsibility of the repair person or facility. Marmon-Herrington shall not be liable for personal injury or property damage resultant of inadequately trained personnel.

Always ensure a clean working environment. Parts and components must always be cleaned before assembly.

Always ensure that proper tools and equipment are available. Common hand and air tools are referred to throughout this manual. Most special tools can be fabricated in the shop environment.

The condition of all parts must be checked prior to final assembly. This includes wear items such as seals, bearings, o-rings, etc.

Observe all adjustment tolerances and torque requirements. Ensure that proper lubes and capacities are checked before operation.

Use original Marmon-Herrington parts only.
This manual has been prepared for owners and operators of vehicles equipped with Marmon-Herrington All-Wheel-Drive systems and components. For additional technical assistance, contact Marmon-Herrington Customer Service.

Please observe and follow all procedural and maintenance guidelines to ensure reliable operation and optimum service life. The Marmon-Herrington basic service schedule will integrate seamlessly with most preventative maintenance programs.

Marmon-Herrington shall not be liable for component failures or damages caused by operational abuse or neglect. Please review the Warranty Statement for a detailed explanation of coverage and claim reporting procedures.

We thank you for your investment in Marmon-Herrington equipment, and look forward to serving your needs in the tradition of engineering excellence.

GENERAL OPERATION STATEMENT

As close as engineers try to match gear ratios and tires for a given application, the reality is that there will always be some degree of ratio mis-match between front and rear axles. When a vehicle is operated on a hard, dry surface with the front axle engaged (AWD, 4X4, 6X6 modes), the tires are not able to slip and relieve the torsional forces being generated.

As such, Marmon-Herrington equipped vehicles are designed for “as needed” AWD operation only, in “off-road” or poor traction conditions. They are not intended to be driven in AWD mode on hard, dry surfaces.

Note: Seek expert advice when considering tire size or gear ratios changes.

SH IFTING OF AXLE OR TRANSFER CASE

Marmon-Herrington Axles and Transfer Cases use no clutching or synchronization devices, and therefore should only be shifted when the vehicle is at a complete stop. This applies to front axle engagement, high and low ranges, and locking differentials. The only exceptions are those vehicles equipped with Marmon-Herrington’s Safety-Shift system, which are calibrated to shift up to 5 mph.

“Shifting on the fly” generally results in two types of damage. The first is degradation of the engagement teeth due to relative rotation of the drive gears and shift collars. This type of damage can prevent the case from shifting normally, as the teeth become burred and cannot mesh.

The second condition occurs when a shift is actually completed at excessive speed. This results in extreme torque loading that is transmitted through the transfer case, drive shafts, and axles. The extent of possible damage increases proportionately with the vehicle speed.

SUMMARY

Before retreating from the subject of shifting, it must be reemphasized that no transfer case, PTO, axle differential, or power divider should ever be shifted while the vehicle is in motion. The engagement of these components is intended for off-road only, in poor traction conditions.

TORQUE

“Torque Shock” or “Torque Loading” is a damaging mode of failure that is easily avoidable. It generally occurs in situations wherein a vehicle is operating in an area of low traction at high RPM with the wheels spinning. When the tires make abrupt contact with a tractable surface, a violent shock-load is transmitted through the drive train. This can result in damages to axles, drive shafts, transfer cases and transmissions.

Simply engaging the front axle and operating in low range at lower speeds will allow the vehicle to proceed without imparting undue stress to the drive train.
### Drawing of the Axle

#### Forward direction

<table>
<thead>
<tr>
<th>Drawing number tandem axles</th>
<th>Type</th>
<th>Total ratio</th>
<th>Drive pinion hand of spiral</th>
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<tbody>
<tr>
<td>RF17</td>
<td>RF17</td>
<td>5.283</td>
<td>jobb / rechts / right</td>
</tr>
<tr>
<td>R17</td>
<td>R17</td>
<td>5.283</td>
<td>bal / links / left</td>
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**RF17/R17**
## SECTION 205.  
### TECHNICAL DATA

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<tbody>
<tr>
<td></td>
<td></td>
<td>RF17</td>
</tr>
</tbody>
</table>

## SYSTEM OF AXLE:

The reduction of the axle is of a two-stage design. The reduction is accomplished by a pinion and drive gear in the carrier and by spur planetary gearing in the wheel hub.

### DIMENSIONS

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<th></th>
<th>mm</th>
<th>inches</th>
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<tr>
<td>Wheel track</td>
<td>2059</td>
<td>81.06</td>
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<tr>
<td>Overall width</td>
<td>2492</td>
<td>98.11</td>
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### RATIOS

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<tbody>
<tr>
<td>Drive gear- / drive pinion tooth number</td>
<td>29/19</td>
<td></td>
</tr>
<tr>
<td>Spur gear/Driven gear</td>
<td>23/23</td>
<td></td>
</tr>
<tr>
<td>Planetary gear</td>
<td>64 / 26 +1 = 3,461</td>
<td></td>
</tr>
<tr>
<td>Total ratio</td>
<td>5.283</td>
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Marmon-Herrington
<table>
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<tr>
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<td></td>
<td>RF17</td>
</tr>
<tr>
<td>GENERAL DATA</td>
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<td></td>
</tr>
<tr>
<td>Nominal axle load</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max G.V.W.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permitted total rolling masse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On highway operation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permitted input torque</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. output torque</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. output speed revolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. engine performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axle mass without oil fill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential lock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inter axle differential lock</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parts of the ABS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impulse generating ring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Nm</th>
<th>SAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal axle load</td>
<td>7700</td>
<td>16,975</td>
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<tr>
<td>Max G.V.W.</td>
<td>22600</td>
<td>49,824</td>
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<tr>
<td>Permitted total rolling masse</td>
<td>46000</td>
<td>101,412</td>
</tr>
<tr>
<td>On highway operation</td>
<td>15320</td>
<td>11,300</td>
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<tr>
<td>Permitted input torque</td>
<td>30000</td>
<td>22,126</td>
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<tr>
<td>Max. output torque</td>
<td>500</td>
<td>500</td>
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<tr>
<td>Max. output speed revolution</td>
<td>280</td>
<td>375</td>
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<tr>
<td>Axle mass without oil fill</td>
<td>720</td>
<td>628</td>
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<td>Differential lock</td>
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<td>Yes</td>
</tr>
<tr>
<td>Inter axle differential lock</td>
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<td>Yes</td>
</tr>
<tr>
<td>Parts of the ABS</td>
<td></td>
<td>Can be installed</td>
</tr>
<tr>
<td>Impulse generating ring</td>
<td></td>
<td>Can be installed</td>
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<table>
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<tr>
<th>WHEEL HUB EXECUTION</th>
<th>mm</th>
<th>in</th>
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</thead>
<tbody>
<tr>
<td>Flange diameter</td>
<td>219.8</td>
<td>8.65</td>
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</table>

<table>
<thead>
<tr>
<th>WHEEL BRAKE</th>
<th>Metric</th>
<th>SAE</th>
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<tbody>
<tr>
<td>System: The wheel brake is of simplex system internally acting drum brake.</td>
<td></td>
<td></td>
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<tr>
<td>Brake drum diameter</td>
<td>420</td>
<td>16.535</td>
</tr>
<tr>
<td>Max. trued-up brake drum diameter</td>
<td>424</td>
<td>16.693</td>
</tr>
<tr>
<td>Brake lining width</td>
<td>180</td>
<td>7.09</td>
</tr>
<tr>
<td>Brake shoe clearance (at adjustment)</td>
<td>0.3 - 0.6</td>
<td>0.011-0.24</td>
</tr>
<tr>
<td>Max. radial play of the camshaft (camshaft bushing wearing)</td>
<td>0.4</td>
<td>0.015</td>
</tr>
<tr>
<td>Min. brake lining thickness measured at brake shoe center (marked by upper edge of recess on side of brake lining)</td>
<td>7</td>
<td>0.27</td>
</tr>
<tr>
<td>Max. camshaft torque/brake drum torque</td>
<td>Nm</td>
<td>lbs</td>
</tr>
<tr>
<td></td>
<td>1760/17072</td>
<td>1298/12591</td>
</tr>
<tr>
<td>DESIGNATION</td>
<td>UNITS</td>
<td>TYPE</td>
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<td>------------------------</td>
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<tr>
<td>SLACK ADJUSTER</td>
<td>mm</td>
<td>RF17/R17</td>
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<tr>
<td>Slack adjuster installation radius “C”</td>
<td></td>
<td>175</td>
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<tr>
<td>Distance of slack adjuster bushing bore center from seating plane of the chamber bracket “A”</td>
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<td>83</td>
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**ANTIFRICTION BEARINGS**

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<th>In Wheel Hub</th>
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<tbody>
<tr>
<td>Outer : taper roller bearing</td>
<td></td>
<td>30218 A MGM</td>
</tr>
<tr>
<td>Inner : taper roller bearing</td>
<td></td>
<td>32218 A MGM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>In Wheel Hub planetary gear</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Cylindric roller bearing</td>
<td></td>
<td>K 30x42x30 MGM</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On drive pinion</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outer : taper roller bearing</td>
<td></td>
<td>32312 B J2Q LC7</td>
</tr>
<tr>
<td>Inner : taper roller bearing</td>
<td></td>
<td>32314 B J2Q LC7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32312 CJR KOYO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32314 CJR KOYO</td>
</tr>
<tr>
<td>DESIGNATION</td>
<td>UNITS</td>
<td>TYPE</td>
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<tr>
<td>-------------------</td>
<td>-------</td>
<td>-----------------</td>
</tr>
<tr>
<td>ANTIFRICTION BEARINGS</td>
<td>RF17</td>
<td>R17</td>
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</table>

**On differential**

<table>
<thead>
<tr>
<th>On flanged case half: taper roller bearing</th>
<th>32215 SKF; 32215 JR KOYO</th>
</tr>
</thead>
<tbody>
<tr>
<td>On half case: taper roller bearing</td>
<td>30215 SKF; 30215 JR KOYO</td>
</tr>
</tbody>
</table>

**On input shaft**

<table>
<thead>
<tr>
<th>Outer: Taper roller bearing</th>
<th>32212 SKF 32212 CR KOYO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inner: Taper roller bearing</td>
<td>30214 X SKF 32012 JR KOYO</td>
</tr>
</tbody>
</table>

**On thru-drive shaft**

<p>| Deep-groove ball bearing                  | 6210 RC3 KOYO             |</p>
<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>UNITS</th>
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<tbody>
<tr>
<td>SEALS</td>
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<td>RF17</td>
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<tr>
<td>In the wheel hub</td>
<td></td>
<td>R17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1HH 145x175x17.54-NB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEFA DENSO</td>
</tr>
<tr>
<td>In camshaft bushing bracket</td>
<td></td>
<td>42x55x8 NB SEMPERFORM</td>
</tr>
<tr>
<td>In differential</td>
<td></td>
<td>AS 75x95x10 NB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIMMERWERKE;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A 75x95x10 NB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIMMERWERKE</td>
</tr>
<tr>
<td>In main differential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input shaft</td>
<td></td>
<td>A 75x95x10 NB</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SIMMERWERKE;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AS 75x95x10 NB</td>
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<td>SIMMERWERKE</td>
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<tr>
<td>Through shaft</td>
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<td>SIMMERWERKE</td>
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<td></td>
<td>ASL 65x90x10/12 NB;</td>
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<td>SIMMERWERKE</td>
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<tr>
<td></td>
<td></td>
<td>A 65x90x10 NB</td>
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</table>
## SECTION 206.

**TORQUE RATINGS**

The serial numbers are the item numbers of the figures in the “REPAIR INSTRUCTION”.

<table>
<thead>
<tr>
<th>DESIGNATION</th>
<th>SECTION/FIG. ITEM No.</th>
<th>TYPE RF17/R17</th>
<th>Nm</th>
<th>in</th>
<th>lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHEEL HUB</td>
<td></td>
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<tr>
<td>Wheel nuts</td>
<td>210/1</td>
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<tr>
<td>Wheel hub cover bolts</td>
<td>6</td>
<td>20 - 25</td>
<td>15 - 18</td>
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<td>Brake drum mounting bolts</td>
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<td>39 - 49</td>
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<td>Planetary carrier mounting bolts</td>
<td>26</td>
<td>39 - 49</td>
<td>28 - 36</td>
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<td>Spindle nut (inner) Per section 223</td>
<td>36</td>
<td>196</td>
<td>145</td>
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<td>Spindle nut (outer)</td>
<td>34</td>
<td>450 - 490</td>
<td>330 - 360</td>
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<td>Spindle to axle housing mounting bolts</td>
<td>41</td>
<td>360 - 380 Mounted with thread locker</td>
<td>265 - 280</td>
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<td>Oil filling and level plugs</td>
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<td>55 - 85</td>
<td>40 - 60</td>
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<td>WHEEL HUB</td>
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<td>Chamber bracket mounting hex. bolts</td>
<td>16</td>
<td>130 - 140 Mounted with thread locker</td>
<td>95 - 103</td>
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<td>Dust shield mounting bolts</td>
<td>21</td>
<td>10 - 12</td>
<td>7 - 8.5</td>
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<td>---------------------------------------------------------------------------</td>
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<td></td>
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<td><strong>WHEEL HUB</strong></td>
<td>310/1</td>
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<td></td>
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</tr>
<tr>
<td>Differential carrier housing to axle causing mounting bolts</td>
<td>44</td>
<td>88 - 98 lbs</td>
<td>65 - 72 lbs</td>
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<td></td>
<td></td>
<td>Mount with thread locker</td>
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<td></td>
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<tr>
<td>Flanged castle nuts of companion flanges</td>
<td>1</td>
<td>850 - 1050 lbs</td>
<td>625 - 775 lbs</td>
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<tr>
<td>Drive gear to drive pinion castle nut</td>
<td>52</td>
<td>850 - 1050 lbs</td>
<td>625 - 775 lbs</td>
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<td></td>
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<tr>
<td>Cover mounting bolts</td>
<td>6</td>
<td>59 - 78 lbs</td>
<td>43 - 57 lbs</td>
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<tr>
<td>Differential carrier housing II...III clamp bolts</td>
<td>14</td>
<td>88.3 - 98 lbs</td>
<td>65 - 72 lbs</td>
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<td></td>
<td>Mount with thread locker</td>
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<tr>
<td>Differential carrier housing II...III clamp bolts</td>
<td>52</td>
<td>160 - 180 lbs</td>
<td>118 - 130 lbs</td>
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<tr>
<td>Toothed disc lock nut</td>
<td>57</td>
<td>37 lbs</td>
<td>27 lbs</td>
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<td></td>
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<td>Secured with thread</td>
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<td>Oil pump cover I. mounting bolt</td>
<td>54</td>
<td>13 lbs</td>
<td>9.5 lbs</td>
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<td>Clamp bolt of intermediate differential case halves</td>
<td>93</td>
<td>25 - 30 lbs</td>
<td>18 - 22 lbs</td>
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<td></td>
<td>Mount with thread locker</td>
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<tr>
<td>Thru-drive shaft bearing cage castle nut</td>
<td>93</td>
<td>39 - 49 lbs</td>
<td>28 - 36 lbs</td>
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<td></td>
<td></td>
<td>Mount with thread locker</td>
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</tr>
<tr>
<td>DESIGNATION</td>
<td>SECTION/FIG. ITEM No.</td>
<td>TYPE</td>
<td>Nm</td>
<td>lbs</td>
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<td><strong>MAIN DIFFERENTIAL CARRIER HEAD</strong></td>
<td>310/1</td>
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<tr>
<td>Oil pump mounting bolts</td>
<td>66</td>
<td>58.8-78.6</td>
<td>43 - 57</td>
<td></td>
<td></td>
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<tr>
<td>Input shaft cover mounting bolts bearing cage</td>
<td>6</td>
<td>58.8-78.6</td>
<td>43 - 57</td>
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<td>Adjuster lock plate mounting bolts</td>
<td>22</td>
<td>15 - 20</td>
<td>11 - 15</td>
<td></td>
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</tr>
<tr>
<td>Differential case halves clamp bolts</td>
<td>25</td>
<td>49 - 59</td>
<td>36 - 43</td>
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<td>Driven pinion mounting bolts</td>
<td>39</td>
<td>120 - 135</td>
<td>88 - 99</td>
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</tr>
<tr>
<td><strong>DIFFERENTIAL LOCK</strong></td>
<td>310/1</td>
<td></td>
<td></td>
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<tr>
<td>Actuating air chamber lock nut</td>
<td>16</td>
<td>29 - 39</td>
<td>21 - 28</td>
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<td>Air chamber half nuts</td>
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<tr>
<td>DESIGNATION</td>
<td>SECTION/FIG. ITEM No.</td>
<td>TYPE</td>
<td>Nm</td>
<td>lbs</td>
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<td>-------------------------------------------------</td>
<td>----------------------</td>
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</tr>
<tr>
<td>DIFFERENTIAL CARRIER HEAD</td>
<td>310/1</td>
<td>R17</td>
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</tr>
<tr>
<td>Differential carrier housing to axle housing</td>
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<td>88-98</td>
<td>65-72</td>
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</tr>
<tr>
<td>mounting bolts</td>
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<td>Mount with thread locker</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Drive pinion castle nut</td>
<td>1</td>
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<td>650-700</td>
<td>480-512</td>
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<tr>
<td>Differential carrier cover mounting bolts</td>
<td>6</td>
<td></td>
<td>20-30</td>
<td>65-72</td>
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<td>Bearing cage mounting bolts</td>
<td>14</td>
<td></td>
<td>88-98</td>
<td>15-22</td>
<td></td>
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<tr>
<td>Mount with thread locker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjuster lock plate mounting bolts</td>
<td>22</td>
<td></td>
<td>15-20</td>
<td>11-15</td>
<td></td>
</tr>
<tr>
<td>Differential case halves clamp bolts</td>
<td>25</td>
<td></td>
<td>49-59</td>
<td>36-43</td>
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</tr>
<tr>
<td>Ring gear mounting bolt</td>
<td>39</td>
<td></td>
<td>120-135</td>
<td>88-99</td>
<td></td>
</tr>
<tr>
<td>Bolts mounting the actuating air chamber lock</td>
<td></td>
<td></td>
<td>29-39</td>
<td>21-28</td>
<td></td>
</tr>
<tr>
<td>Nuts of clamps for diff. lock actuating air chamber</td>
<td></td>
<td></td>
<td>2.5</td>
<td>2</td>
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</tr>
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</table>
### Section 207: Adjustment Data

#### Designation | Units | Type
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>WHEEL HUB</td>
<td>mm</td>
<td>SAE</td>
</tr>
<tr>
<td>Axial play of the wheel hub bearings: (adjusted by the spindle nuts)</td>
<td>0.01 - 0.04</td>
<td>0.0004 - 0.0016</td>
</tr>
<tr>
<td>WHEEL BRAKE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoe clearance (during adjustment)</td>
<td>0.3 - 0.6</td>
<td>0.012 - 0.024</td>
</tr>
<tr>
<td>Axial play of camshaft</td>
<td>0.1 - 0.5</td>
<td>0.0004 - 0.0017</td>
</tr>
<tr>
<td>DIFFERENTIAL CARRIER HEADS</td>
<td></td>
<td></td>
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<tr>
<td>Drive pinion to drive gear backlash GLEASON-toothing (ground)</td>
<td>0.25 - 0.33</td>
<td>0.010 - 0.013</td>
</tr>
<tr>
<td>Drive pinion rolling torque, after pre-loading the Bearings (the seal is not installed, adjustment by the distance rings)</td>
<td>2.5 - 3.5</td>
<td>2.2 - 2.7</td>
</tr>
<tr>
<td>Size of distance rings</td>
<td>- 34 distance rings from 13.89 to 14.715 mm in 0.025 mm steps.</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>Theoretical distance between the drive pinion face and the drive gear centerline (“AXIS DISTANCE”)</td>
<td>mm</td>
<td>88</td>
</tr>
<tr>
<td>Shim thickness</td>
<td>mm</td>
<td>2.0; 0.25; 0.3; 0.5; 1.0</td>
</tr>
<tr>
<td>Axial play of input shaft</td>
<td></td>
<td>0.1 - 0.15</td>
</tr>
<tr>
<td>Shim thickness</td>
<td></td>
<td>2.0; 0.25; 0.3; 0.5; 1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5; 2.0</td>
</tr>
<tr>
<td>DIFFERENTIAL LOCK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearance between clutch gear and toothed hub (as engaged)</td>
<td>mm</td>
<td>0.5 - 2.0</td>
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</tbody>
</table>
## PULLER AND PILOT BOLTS

<table>
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<tr>
<th>SECTION</th>
<th>Stock No.:</th>
<th>Draw. NO.</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>213, 313</td>
<td>902390</td>
<td>M12X40</td>
<td>Hex. full thrd. bolt, (4 off)</td>
<td>For brake drum</td>
</tr>
<tr>
<td>220</td>
<td>910186</td>
<td>M8X25</td>
<td>Hex. full thrd. bolt, (2 off)</td>
<td>For planet carrier and flanged castle nut</td>
</tr>
<tr>
<td>282, 289, 312, 316</td>
<td>923737</td>
<td>M12X30 MSZ 2402-10.9</td>
<td>Std bolt, (2 off)</td>
<td>For installing differential carrier</td>
</tr>
<tr>
<td>283</td>
<td>987548</td>
<td>M8-10 ISO 4032</td>
<td>Hex. nut, (4 off)</td>
<td>For companion flange</td>
</tr>
<tr>
<td>288, 315</td>
<td>939037</td>
<td>M12 MSZ 2201</td>
<td>Washer, (4 off)</td>
<td>For pulling on the driver gear</td>
</tr>
<tr>
<td></td>
<td>365244</td>
<td>M12X1.5 ISO 8673-8</td>
<td>Hex. nut, (4 off)</td>
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<tr>
<td>316</td>
<td>910339</td>
<td>M12X65 ISO 4017-10.9</td>
<td>Hex. full thrd. bolt, (2 off)</td>
<td>For removing the bearing cage</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 DRIVE AND THE 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.

Install ONLY identical code, same tolerance class bearings supplied in one package to one wheel hub planetary gear. Adjust the axial play of the axle-shaft t0.4 - 1.6 mm as measured between the sun 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 219.

**WHEEL BRAKE**

If the brake linings are worn to the permitted limit (max. 7.0 mm as indicated by upper edge of recess on side of the linings) replace the brake linings as specified.

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

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

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

From among the sealing rings of the brake spanners that at the brake spanner head may not pass the surplus lubricant during greasing. The sealing ring at the brake spanner head protects the brake drum against the grease. Make sure to check if the sealing rings are pressed in proper position.

True up the brake drum ONLY to the permitted max. 424 mm diameter.

**DIFFERENTIALS (MAIN DIFFERENTIAL - FORWARD-REAR AND DIFFERENTIAL CARRIER ASSEMBLY - REAR-REAR)**

Install the taper roller bearings of the drive pinion with preload. Preload should provide that the bearings roll at the torque of 2.5 – 3.5 Nm at forward-rear carrier and at the torque of 2.2 – 2.7 Nm at rear-rear carrier. During inspection the seal ring (4 in figure 1 of Section 310) with the cover (5) are not installed in rear-rear carrier. For adjustment refer to Sections 290 and 317.

The gears of the cross differentials should be rotatable without jamming.

Install the taper roller bearings of the differentials free of clearance. After adjusting the proper contact pattern and the specified 0.25-0.33 mm backlash, tighten the bearing adjusters on both sides so that they could be fixed by one of the tab lock plates (21). For inspection and adjustment refer to Section 287.

At the differential carrier assembly install the taper roller bearings 32212 and 32014 so, to obtain 0.1 to 0.15 mm axial play at the input shaft /68/. For adjustment refer to Section 293.

For adjustment of the inter-axle diff. lock actuating pneumatic chamber at the differential carrier assembly refer to Section 294.

For adjustment of the cross differential locks refer to the Section 318.

**GENERAL INSTRUCTIONS**

For purpose 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 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 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 material are used at the axle, e.g.:

- **Thread adhesive:** LOCTITE 277
  Omni FIT 1550 HENKEL

- **Thread locker:** LOCTITE 243
  Medium-strenght Omni FIT 230 M HENKEL

- **Surface sealant:** LOCTITE 515
Fig. 1.: WHEEL DRIVE, WHEEL HUB SECTIONAL VIEW
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Brake drum</td>
</tr>
<tr>
<td>2</td>
<td>Wheel hub</td>
</tr>
<tr>
<td>3</td>
<td>Wheel bolt</td>
</tr>
<tr>
<td>4</td>
<td>Pinion carrier</td>
</tr>
<tr>
<td>5</td>
<td>Idler pinion</td>
</tr>
<tr>
<td>6</td>
<td>Hex. bolt with lock washer</td>
</tr>
<tr>
<td>7</td>
<td>End-cover</td>
</tr>
<tr>
<td>8</td>
<td>Pinion pin</td>
</tr>
<tr>
<td>9</td>
<td>Steel ball</td>
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<td>10</td>
<td>Cylindric roller bearing</td>
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<td>11</td>
<td>Distance plate</td>
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<tr>
<td>12</td>
<td>Friction disk</td>
</tr>
<tr>
<td>13</td>
<td>Distance ring</td>
</tr>
<tr>
<td>14</td>
<td>Snap ring</td>
</tr>
<tr>
<td>15</td>
<td>Distance ring</td>
</tr>
<tr>
<td>16</td>
<td>Oil filler bore screw plug</td>
</tr>
<tr>
<td>17</td>
<td>Friction disk</td>
</tr>
<tr>
<td>18</td>
<td>Shims</td>
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<td>19</td>
<td>Snap ring</td>
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<td>20</td>
<td>Sun gear</td>
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<td>21</td>
<td>Sealing ring</td>
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<td>22</td>
<td>Oil drain bore screw plug with magnetic insert</td>
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<td>23</td>
<td>Threaded stub</td>
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<td>Hex. bolt</td>
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<tr>
<td>26</td>
<td>Hex. bolt</td>
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<td>27</td>
<td>Gear rim</td>
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<td>Rim hub</td>
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<tr>
<td>29</td>
<td>Circlip</td>
</tr>
<tr>
<td>30</td>
<td>Taper roller bearing</td>
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<tr>
<td>31</td>
<td>Spacer sleeve (toothed)</td>
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<tr>
<td>32</td>
<td>Axle shaft</td>
</tr>
<tr>
<td>33</td>
<td>Spindle</td>
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<tr>
<td>34</td>
<td>Outer shaft-end nut</td>
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<tr>
<td>35</td>
<td>Lock plate</td>
</tr>
<tr>
<td>36</td>
<td>Inner shaft-end nut</td>
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<td>37</td>
<td>Taper roller bearing</td>
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<td>Impulsering</td>
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<td>Shoulder ring</td>
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<td>41</td>
<td>Hex. bolt</td>
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<td>42</td>
<td>Axle housing</td>
</tr>
<tr>
<td>43</td>
<td>Plastic Plug</td>
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</tbody>
</table>

**SECTION 211.**

**PARTS OF THE WHEEL DRIVE AND WHEEL HUB**
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 DISK
After positioning the wheel disk diagonally tighten to the specified torque.

SECTION 213.
REMOVING AND REINSTALLING THE BRAKE DRUM

REMOVING THE BRAKE DRUM
After removing the wheel disk back out the 4 off hex. bolts attaching the brake drum to the wheel hub, then by 2 off M12 bolts of at least 40 mm thread length driven into the threaded bores prepared for this purpose in the brake drum flange pull off and remove the brake drum.

REINSTALLING THE BRAKE DRUM
Position the brake drum on the wheel hub. Install the hex. bolts attaching the brake drum and tighten to the specified 39 - 49 Nm torque.

SECTION 214.
REMOVING AND REINSTALLING THE END-COVER

REMOVING THE END-COVER
Drain the oil.
Remove the hex. bolts (6) attaching the end-cover (7) to the pinion carrier and separate the end-cover.

REINSTALLING THE END-COVER
As a described in the “GENERAL SERVICE INSTRUCTIONS” apply oil-proof surface 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 the secure by means of the hex. bolts with lock washer and tightened to 20 - 25 Nm torque.

SECTION 219.
REMOVING AND REINSTALLING THE AXLE SHAFT AND THE SUN GEAR, ADJUSTING THE AXLE SHAFT CLEARANCE

After removing the end-cover (7) by means of snap ring pliers remove the snap ring (19), then the shims (18) and the friction disk (17) from the pinion carrier.
By means of the tool Drw. No. 4927-00002 access behind the sun gear and pull out the axle shaft.
The sun gear (20) can be pulled from the axle-shaft (32) together with the distance and the friction disk (12) ring (13) after removing the snap ring (14) and the distance ring (15).
Reinstalling the sun gear in reverse order of removal. Make sure to check if the friction disk (12) is on the distance ring (13), as well as the chamfered side of outer distance ring (15) faces inward.
The axle shaft subassembled with sun gear can be reinstalled without aid.
After aligning the toothing of the planetary gears and the sun gear, as well as the splines of the differential gear, push the axle shaft subassembled with sun gear into the axle housing and the differential.

ADJUSTING THE AXLE SHAFT CLEARANCE
Insert the friction disk (17) into the installed planetary gear, then insert the snap ring (19). Pressing the friction disk to bottom out against the sun gear by means of feeler gage measure the distance between the friction disk and the snap ring.
From among the shims (18) select an amount of thickness less by 0.4 – 1.6 mm than the measured value.
By means of snap ring pliers remove the snap ring (19) again, then insert the selected shim pack and finally install the snap ring.
SECTION 220.
REMOVING AND REINSTALLING THE PLANET CARRIER,
ADJUSTING THE AXLE SHAFT CLEARANCE

REMOVING THE PLANET CARRIER
Remove the hex. bolt (26) from flange of the pinion carrier (4). Following this for pulling the pinion carrier out of the wheel hub drive 2 off M8 bolts of at least 25 mm thread length into the threaded bore prepared for this purpose in the pinion carrier flange and pull the carrier out of the wheel hub.

REINSTALLING THE PLANET CARRIER
According to the “GENERAL SERVICE INSTRUCTIONS” apply oil-proof surface sealant to seating flange of the pinion carrier avoiding the bore from inside.
Aligning the bores and the gear teeth insert the planetary gear into the wheel hub, making sure the matchmarks on the wheel hub and the pinion carrier align (oil drain).
Secure the pinion carrier by means of hex. flanged bolts coated with thread locker and tightened to 39 - 49 Nm torque.

SECTION 221.
DISASSEMBLING AND REASSEMBLING THE PLANETARY GEAR

By means of the mandrel shows in the figure drive out the pinion pin toward direction of the detent ball (see Fig. 1.).

When driving in the pinion pins (8) make sure the seat machined for the detent ball in the pinion pin and the groove in the pinion carrier (4) align, to be able to insert the detent ball into the seat before completely driving in the pinion pin.

Stack the sound or replaced parts one by one over the guide mandrel positioned thru the pinion carrier bore as shown in Fig. 2.

In case of replacing the cylindric roller bearings (10), make sure to install only identical tolerance class bearings supplied in one package and marked by the same color code into one wheel hub planetary gear.

Fig. 1.: DRIVING OUT THE PINION PINS

Fig. 2.: DRIVING OUT THE PINION PINS
SECTION 223.
REMOVING AND REINSTALLING
THE WHEEL HUB

REMOVING THE WHEEL HUB

Before removing the spindle-end nuts safely suspend the wheel hub (2). Due to the thread-lock design of the spindle nuts, and the high torque value at which they are set, an impact wrench should be used to loosen the outer nut.

After removing the pinion carrier and the sun gear unsecure the shaft-end nuts.

With the clamping elements shown, clamp the wheel hub elements together and the shaft-end nuts can be removed by means of the tools shown (see Fig. 1.).

Pull the wheel hub off steering knuckle. The wheel hub parts (inner part of the inner taper roller bearing (37) and toothed spacer sleeve (31) clamped together with the locking elements are removed from the knuckle by the seal ring (39) struck with surface sealant.

Application of the locking elements assures central positioning of the seal ring pressed in the wheel hub, when removing and reinstalling the assembled wheel hub.

INSTALLING THE WHEEL HUB

Reinstall the wheel hub preassembled and clamped together by means of the clamping elements, on the spindle according to section 224.

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

By means of the wrench Drw. No. 4983-00155 tighten the inner shaft-end nut (36) - 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 and one of the slots of the shaft-end nut adjust to any tab of the lock plate, but do not secure yet. Install the outer shaft-end nut (34) up while rotating the wheel hub tighten to 450-490 Nm torque. This is a "wet" torque spec with lube applied to the thread.

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 (33).
SECTION 224.
DISASSEMBLING AND REASSEMBLING THE WHEEL HUB

Attention!
At mounting of wheel hub the energizer ring is not replaced. At replacement of bearings and sealing rings take care to preserve the toothing of energizer ring in good state to a greater extent.

By means of a simple pry remove the sealing ring (39) from the removed wheel.
By means of the tools shown drive out the cups of the taper roller bearings (see Fig. 1.).

REASSEMBLING THE WHEEL HUB

Drive in the cups of the outer taper roller bearings by means of the tool shown (Fig. 2.).
Seating of seal ring is to be lubricated with oil proof surface sealing material per “GENERAL SERVICE INSTRUCTIONS” and the seal ring.

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

**WARNING!**

*On the axles mountable with ABS toothed surfaces of the impulse ring shall be protected from shocking during installation of seal support and seal ring!*

---

**THE WHEEL HUB PREASSEMBLED**

Preassembling is made on the master shaft shown in Fig. 4. Place on the master shaft the wheel hub assembled with taper roller bearing cups, the inner taper roller bearing cup and the sealing ring. Place in the engaged spacer sleeve (31).

Position on it the ring gear support (28) assembled with the taper roller bearing cup and ring gear, take care of bearing parts.

Clamp the installed parts together with the clamping elements shown in Fig. 1 of section 223.
SECTION 225.
DISASSEMBLING AND REASSEMBLING THE RIM HUB

DISASSEMBLING THE RIM HUB
After removing the circlip (29) pull the gear rim (27) off the rim hub (28).

By 2 off M8 bolts of at least 40 mm thread length driven into the thru bore in the ring gear support flange press off the taper roller bearing cup (Fig. 1.).

REASSEMBLING THE RIM HUB
As shown in the figure drive the cone of the taper roller bearing to the rim hub (Fig. 2.).

Aligning the rim hub and the gear rim toothing push them completely together and install the circlip into its groove.
REMOVING THE SPINDLE AND THE BRAKE SUPPORT ASSY.

After removing the wheel hub back out the hax. bolts (41) attaching the spindle (33) to flange of the axle housing (42) and pull the spindle out of the axle housing bore.

REINSTALLING THE SPINDLE AND THE BRAKE SUPPORT ASSY.

Aligning the bores push the spindle supplied together with the brake support into the axle housing bore. Secure the spindle by hex. bolts applied with thread locker and tighten the bolts to 360 - 380 Nm torque.

SECTION 229.

INSTALLATION INSTRUCTIONS FOR MOUNTING THE PARTS OF THE ANTIBLOCKING SYSTEM

This description contains the constructional elements of the antiblocking and anti-skid systems (ABS and ASR), that can be installed by the customer into the axle as well as the installation instructions. In the „TECHNICAL DATA“ manual items identified as (A, C) are necessary to mount the ABS and ASR items (1).

1. INSTALLABLE ELEMENTS OF THE ANTI-BLOCK AND ANTI-SKID SYSTEMS

1.1 Revolution sensor:
- Robert Bosch GmbH A 335 545 231 or
- KNORR-BREMSE ZB 9010-1/83315 or
- WABCO 441 032 001 0 or
- WABCO 441 032 808 0 or
- WABCO 441 032 578 0

1.2 Spring bushing:
- Robert Bosch GmbH C 335 002 431 A or
- KNORR-BREMSE 4B 69698 or
- WABCO 899 760 510 4 or
- WABCO 899 759 815 4

NOTE: Install speed sensor with the same type of springed bush only.

A - Toothed impulse ring.

2. MOUNTING INSTRUCTIONS

Apply copper paste or silicon grease (e.g. Molykote FP186, NBU 30 PTM Uniview N3) to the Ø18H11 bore of the speed sensor holder before installation of the springed bush, to prevent corrosion.

Push the springed bush into the Ø18H11 bore from the middle of axle to mate (12).

Insert speed sensor (1.1) into the spring bush, and push towards the inductor ring on the wheel hub. After dismounting wheel hub this adjustment must be made every time.

During operation the distance between the speed sensor and the inductor ring should be 0,8 mm max. Lead the wire of speed sensor from the axle brake system in such a way that the radius of the blended wire never less than a minimum of R50 mm and fix the wire at 50 mm intervals while inside the hot brake system.

Check the runout of toothed impulse inducing ring. Allowable runout of the ring teeth in the direction of the speed sensor is 0,2 mm max.

Note: Tachometer to be built in only with spring bushing of the same manufacturing. Besides BOSCH, KNORR and WABCO 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 150°C and pushed up to stop on the wheel hub.
WHEEL BRAKE
DRAWING OF THE FRONT WHEEL

Fig. 1.: DRAWING OF THE FRONT WHEEL BRAKE
SECTION 261.

PARTS OF THE WHEEL BRAKE

1 – Snap ring
2 – Spacer
3 – Brake lever
4 – Wear indicator disk
5 – Chamber bracket
6 – Shims
7 – Spacer
8 – Sealing ring
9 – Bearing bush
10 – Distance washer
11 – Brake spanner
12 – Brake shoe roller
13 –
14 – Brake shoe return spring, long
15 – Spring support pin
16 – Hex. bolt
17 – Spindle with brake support
18 – Brake shoe anchor pin
19 – Brake shoes
20 – Brake shoe return spring, short
21 – Hex. bolt
22 – Lock washer
23 – Brake cover plate
–
25 – Bushing
–
28 – Stop
29 – Hex. bolt with lock washer
SECTION 262.

REMOVING AND REINSTALLING
THE BRAKE SHOES REMOVING
THE BRAKE SHOES

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

Pry the brake shoes (19) away. Remove the brake shoe rollers (12).

Unhook the shoe return springs by means of the spring hooking device 4957-00489, then remove the brake shoes.

BRAKE SHOE ROLLER AND ITS ASSEMBLING

At specified intervals described in the OPERATING AND MAINTENANCE INSTRUCTIONS drive out the brake shoe roller. Apply thin coat of the operating surface of the brake shoe roller and refill the groove with AGIP AUTOL TOP 2000 grease.

When the oil seal is to be replaced, after driving out the roller pin remove the worn oil seal.

By means of the tool shown drive in the new oil seal to bottom out (Fig. 2.).

Fill up the hole between the sealing lip of the oil seal and the spacer with the above mentioned grease, too.

Drive on the spacer with the spacer driver mandrel of the No. 8928-00058 set.

REINSTALLING THE BRAKE SHOES

Position the brake shoes to the placed in shoe anchor pin (18) an the brake camshaft head. Hook the return springs (14 and 20) to the brake shoes. For hooking use the springs hooking device Drw. No. 4957-00489.

Pull the rollers (12) over then pry the brake shoes away, then insert the roller pins so, they shall seat both in the brake shoe rib and in the brake spanner involute profile.
Operate the axle with brake drum trued-up ONLY to the permitted max. diameter and brake linings worn to the permitted limit. Exceeding the above limits the brake spanner may turn over making the brake application impossible.

The permitted minimum thickness of the brake linings is indicated by upper edge of the recess in side of the linings. (As measured at the center of the brake shoe \( V_{\text{min.}} = 7.0 \text{ mm} \)).

Replace the brake linings if damaged or worn below the permitted limit. Replace the brake linings and true up the brake shoes only in pairs.

The working off is implemented with equipment drawing number 4399-03234. The device shall be mounted on the wheel hub. The fitting of the device on the guiding flange (\( \Phi 282E8 \)) after the clamping shall be checked then the device shall tightened by the wheel bolts.

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

The depth of cut can be adjusted base on the scale on the bolt of tool adjuster (1 pitch: 0.05 mm in radial direction). Every time, the device is permitted to be operated only by the crank rod. It is prohibited to turn on the drive!

CHECKING THE BRAKE DRUM
Check the inside surface of the brake drum. 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 maximal brake drum diameter after true-up may be \( \Phi 424 \text{ mm} \). Out of this diameter the brake drum should be replaced.

WARNING!
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 \( R 210.6 - R 210.3 \) mm as shown in Fig. 1.
SECTION 264.
REMOVING AND REINSTALLING
THE ANCHOR BUSHING AND THE
CHAMBER BRACKET, ASSEMBLING
THE SPRING SUPPORT

REMOVING AND REINSTALLING THE
ANCHOR BUSHING

If the anchor pin bushing (25) are to be replaced, drive out by means of No. 8839-00371 driver and drive in the tool shown (Figure 1.).

Note!
The bushing slots have to be located in the specified 90° zone.

In case of damage to the brake support the spindle assembly machined together with the brake support should be replaced as described in the Section 226.

ASSEMBLING THE SPRING SUPPORTING PINS

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

REMOVING AND REINSTALLING THE
CHAMBER BRACKET

After removing the hex. bolts (16) pull the chamber bracket out of the brake support.

The relevant (RH-LH) camshaft support should be positioned into bore of the brake support and secure by hex flanged bolts coated with thread locker. Tighten the bolts (16) to 130-140 Nm torque.
REMOVING THE BRAKE SPANNER

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

Remove the snap ring (1), the spacer (2) and the wear indicator disk (4).

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 chamber bracket (5) 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 bushes and push the brake spanner subassembled with distance washer into the bushes (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.

Install the brake lever to the brake spanner so, the bore centre of the brake lever bush shall be in distance “A” in the “TECHNICAL DATA” from the upper plane of the diaphragm holder.

Position the spacer (2) and the wear indicator disk (4) to the end of the brake spanner.

After adjusting the above “A” dimension and the 0.1-0.5 mm shoe clearance adjust the wear indicator disk so, the cut-out marked “O” on the disk and the recess on the lever shall be in the nearest position to each other (see I. in Fig. 1. in section 268).

Position the snap ring (1) to the end of the brake spanner.

Check the axial clearance of the camshaft to be between 0.1 - 0.5 mm. If required perform readjustment by means of shims (6).

WARNING!
After installing the camshaft make sure it is installed properly (RH, LH). Actuating the slack adjuster brake shoe should open!

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

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

In case of new brake drum of Ø420 mm the mark “424” while at brake drum true-up to Ø424 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 (see II. in Fig. 1. in section 268).

Attach the relevant brake lever stop (28) (RH-LH) to the diaphragm holder by 2 off M8x14 hex. bolts (29) with lock washer (30) for each. Tighten the hex. bolts to 20 - 25 Nm torque.
SECTION 266.
REPAIRING THE BRAKE SPANNER
BEARING SUPPORT

REMOVING THE BEARING BUSHES AND THE SEALING RINGS

By means of the tool shown pull the bearing bushes (9) out of the chamber bracket (5) See Fig. 1.

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

REINSTALLING THE BEARING BUSHES

By means of the tools shown drive in the new bearing bushes until the tool bottoms out (Fig. 2.).
REINSTALLING THE BEARING BUSHES

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 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 press the sealing rings before the bushes (Fig. 3.).

Fig. 3.: DRIVING IN THE SEALING RING
SECTION 268.

AUTOMATIC SLACK ADJUSTER

The slack adjuster is automatically readjusted according to the brake lining wear.

In case of replacing the brake linings or 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
5. Hex. adjusting ring (Hex. distance 32)
6. Stop pin
7. Plastic thread protector
8. Toothed disk

I. Position of wear indicator disk a new brake lining.
II. Position of wear indicator disk at worn brake lining. Brake drum diameter: 420 mm.

**Adjustment data:**

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

For dimension A - C refer to “TECHNICAL DATA”.

**Adjusting position of the brake lever and the shoe clearance:**
- Remove setscrew (2, 3).
- Take care of the plastic thread protector (7).
- Remove the adjusting plate (1) and the plastic protection cap (4).
- By turning the hex. adjusting ring (5) to proper direction adjust the specified distance between the seating surface and the brake lever bore. (Start adjustment from a distance higher than specified. If required, also adjust the push rod clevis.)
- After the above operation adjust the shoe clearance to 0.3 - 0.6 mm.

**Adjusting and fixing the adjusting plate:**
Secure the fork “E” of the adjusting plate (1) in bottom position relative to stop pin (6) as shown in Fig. 1.

Complete adjustment by reinstalling the plastic protection cap (4) and the adjusting plate (1) as well as installing and securing the setscrew (2, 3) and screwing on the plastic thread protector.

During fixing plane of the adjusting plate should be perpendicular to the stop pin (6).

Before installation apply graphitic grease to serration of the brake lever.

Fig. 1.: AUTOMATIC SLACK ADJUSTER
Main Differential (RF17)
Fig. 1.: MAIN DIFFERENTIAL SECTIONAL VIEW

Fig. 1/a.: SECTIONAL VIEW OF THE CROSS DIFFERENTIAL IN THE MAIN DIFFERENTIAL

1 - Flanged castle nut
2 - Washer
3 - Companion flange I.
4 - Sealing rings
5 - Cover
6 - Hex. bolt
7 - Lock washer
9 - Taper roller bearing (32312)
10 - Distance ring
11 - Distance sleeve
12 - Taper roller bearing (32314)
13 - Shims
14 - Hex. flanged bolts
15 - Differential carrier I.
Fig. 1/A.: SECTIONAL VIEW OF THE CROSS DIFFERENTIAL IN THE MAIN DIFFERENTIAL

SECTION 281

PARTS OF THE DIFFERENTIAL

1 - Flanged castle nut  
2 - Washer  
3 - Companion flange I.  
4 - Sealing rings  
5 - Cover  
6 - Hex. bolt  
7 - Lock washer  
9 - Taper roller bearing (32312)  
10 - Distance ring  
11 - Distance sleeve  
12 - Taper roller bearing (32314)  
13 - Shims  
14 - Hex. flanged bolts  
15 - Differential carrier I.  
16 - Drive pinion  
17 - Oil baffle plate  
18 - Washer  
19 - Taper roller bearing (30215)  
20 - Bearing adjuster  
21 - Tab lock plate  
22 - Hex. bolt  
23 - Lock plate  
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)
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SECTION 282.
REMOVING AND REINSTALLING THE MAIN DIFFERENTIAL

It is recommended to remove and reinstall the axle shaft with the differential lock in engaged position.

Before removing the main differential from the axle drain the oil.

Remove the hex. flanged bolts (44) attaching the differential carrier assembly to the axle housing and by 2 off M12 bolts driven into the two threaded bores in the flange of the differential carrier pull the differential carrier assembly out of the axle housing.

REINSTALLING THE MAIN DIFFERENTIAL
At described in the “GENERAL INSTRUCTIONS” ap-
ply oil-proof surface sealant (LOCTITE 515) to flange of the axle body and to connecting flange of the differential carrier I.

Install one M12 stud bolt to two opposite bores in the axle body, then fit the differential assembly into the axle housing and secure by hex. bolts (44) coated with thread locker.

Tighten the bolts diagonally to 100 - 110 Nm torque.

Install the axle-shafts.

SECTION 283.
REMOVING AND REINSTALLING THE COMPANION FLANGES AND THE COVER, REPLACING THE OIL SEALS IN THE COVER

REMOVING THE COMPANION FLANGE
By means of the tools shown (Fig. 1.) remove the flanged castle nut (1).

Pull off the companion flange by means of the device assembled from the shown parts (Fig. 2.).
#### REPLACING THE SEALING RINGS IN THE COVER

Back out the hex. bolts (6) and remove the cover (5) and the shims (67).

Remove the used sealing rings (4) from the cover, No. RA-0039 and RA-1241 of the tools.

Drive in the new sealing rings (see Fig. 3. and 4.).

Apply specified grease to between the sealing lip and the dust protection edge of the outer sealing ring, while thin coat of grease (AMBLYGON TA 15/2) to the inner one.

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#### INSTALLING THE COVER

When installing the cover (5) adjust the axial play of the input shaft as described in the Section 293., then as described in the “GENERAL INSTRUCTIONS” apply oil-proof (LOCTITE 515) surface sealant to the protruding corner surface of the outer taper roller bearing on the input shaft.

Aligning the bores install the necessary shim pack (67) and the cover subassembled with sealing rings, Attach to the differential carrier III. by means of lock washer (7) and hex. bolts (6). Tighten the bolts to 59 - 78 Nm torque.
**REINSTALLING THE COMPANION FLANGE**

Fitting to splines of the input shaft drive (68) on the companion flange I. (3) until bottoms out, making sure not to damage the sealing rings. (Fig. 5.).

Install the washer (2) and the flanged castle nut (1). By means of tools shown in Fig. 1. tighten the nut to 850 - 1050 Nm torque and secure with cotter (107).

Following this moving the input shaft (68) to axial direction measure the axial play by means of dial indicator equipped with magnetic stand. Turning the companion flange by pry perform measurement at three places in even pitch.

The axial play should be between 0.1-0.15 mm. Adjust this value, if required, by selecting the proper thickness shim pack (67).

Check the runout of the companion flange. Allowable runout of the companion flange in radial and axial direction is 0.08 mm (Fig. 1. in section 280). When the adjustment is improper, then pull off the companion flange, turn it by 15° and press on and check the runout again. Repeat the adjustment until obtaining the specified value.

After adjusting the proper axial play no jamming or uneven rotation is permitted.
SECTION 284.
REMOVING AND REINSTALLING THE THRU-DRIVE SHAFT

REMOVING THE THRU-DRIVE SHAFT
As described in the Section 283, remove the flanged castle nut (1) and the companion flange II. (105) the thru-drive shaft (94).

By means of a simple pry remove the sealing ring (4) and the distance ring (99).

Remove the inner sealing ring and the snap ring (100).

By means of the device shown remove the thru-drive shaft together with the deep-groove ball bearing (98). Secure the device to the thru-drive shaft by means of the flanged castle nut (1) as shown in Fig. 1.

If replacement of the deep-groove ball bearing (98) is required, pull off it with general puller.

As described in the “GENERAL INSTRUCTIONS” apply oil-proof (LOCTITE 515) surface sealant to the bearing cage face inside the bolt bores.

When reinstalling the bearing cage make sure to check if the oil baffle plate flange faces downward. Secure the bearing cage by the hex. bolts applied with thread locker and tighten the bolts to 59 - 78 Nm torque.

REMOVING AND REINSTALLING THE BEARING CAGE
After the hexagon head bolts (109) are backed out, remove the bearing cage (108) out of the axle housing.

Clean the connecting surfaces of the axle housing to the bearing cage.
**REINSTALLING THE THRU-DRIVE SHAFT**

Heat up the deep-groove ball bearing to 80-100°C and by means of tool shown in Fig. 2. install to the thru-drive shaft to bottom out against the shoulder ring. Wait for the bearing cool down.

Position the subassembled thru-drive shaft to the axle housing, the aligning its splines to those of the differential gear I. (91) drive the deep-groove ball bearing together with the shaft to place until the bearing bottoms out against its seat. For driving in use the same tool as above (see Fig. 2.).

Position the snap ring (100). By the above tool drive in the inner sealing ring, position the distance ring (99) and also drive in the outer sealing ring by the drive sleeve shown in Fig. 2. to flush with outer edge of the bearing cage.

Apply specified grease to between the sealing lip and the dust protection edge of the outer sealing rings, and thin coat of grease the inner one. (AMBLYGON TA 15/2)

As described in the Section 283. install the companion flange II. (105) to the shaft end, position washer (2) and flanged castle nut tightened to 850 - 1050 Nm torque and secure with cotter. Rotate the thru-drive shaft and check for even run, free of jamming and jerks.

**SECTION 285.**

**REMOVING THE INPUT SHAFT AND DIFFERENTIAL CARRIER III.**

After removing the companion flange I. (3) and the cover (5) remove the hex. flanged bolts (14) from the outer flange of the differential carrier III. (45). Drive out the dowel pins and separate the differential carrier III. from the differential carrier II.

Match-mark the differential carriers II. and III. since they are matched parts. Withdraw the differential carrier III. (45) together with the input shaft (68) and the toothed hub (69).

Remove the differential side gear I. (91) assembled with the 32014 taper roller bearing (92) cone, then the differential (89) and remove the differential side gear II (85) mounted with the drive gear (82).

After backing out the 2 off M8x15 bolts remove the inter-axle differential lock actuating pneumatic chamber and unscrew the shift bar (79) from threaded bore of the shift yoke (78).

Pull the toothed hub (69) together with shift yoke (78) from the input shaft (68) and also remove the spring (80) set free.
Back out the hex. bolts (22) and remove the lock plates (23) and the tap lock plates (21).

By means of the tool shown remove the bearing adjusters (20) from the 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 cup 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 bolts (25) clamping the differential case halves, 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 differential carrier II. and adjusting the axis distance (see Section 289.)!

Position the assembled differential into the differential 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 cup into the bearing bore in the differential carrier and drive in by means of the tool shown (see Fig. 3.).

Screw in the bearing adjuster (20).

Turn the differential carrier over and drive the taper roller bearing cone and, then drive on the bearing cup by the same tool (Fig. 4.).

Screw in the bearing adjuster (20).
ADJUSTING THE BACKLASH AND THE BEARING PRELOAD

By means of the bearing adjuster adjust the drive pinion to gear backlash to 0.15-0.20 mm.

Locking the drive pinion measure the backlash at four places diagonally on the drive gear teeth, perpendicularly to the teeth surface by means of the backlash checking device No. 4750-00122 (Fig. 5.).

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

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.

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

During drive the rotation should be smooth and noiseless.

PROPER CONTACT PATTERN

If a contact pattern shown in detail 1 of Fig. 6. 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 toothing the contact pattern along the tooth is shifted toward the small diameter of the drive gear.

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. 6. increase the “AXIS DISTANCE” by reducing 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. 6.

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 further the bearing adjuster on both sides by 7.5°-15° to be able to secure them by one of the tap lock plates (21).

Secure the tap 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 flats of the bolts.

When the adjustment and the operation is proper, remove the differential carrier II. assembled with drive pinion and according to the “GENERAL INSTRUCTIONS” apply oil-proof surface sealant (LOCTITE 515) to the inner flange, then fit back the differential carrier II. and secure by hex. flanged bolts (14) coated with thread locker. By means of wrench extension 4905-00022 diagonally tighten the bolts to 49-59 Nm torque.

**TOO HIGH CONTACT**

If the contact pattern is shifted to the addendum as shown in detail 3 of Fig. 6. 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. 6.

**SECTION 288.**

**DISASSEMBLING AND REASSEMBLING THE DIFFERENTIAL**

Pull the inner 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 spacer (26).

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

The match-marks are stamped to one face 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.

The differential case halves are matched pairs, thus install only match-marks differential case halves, according to the marks.
REASSEMBLING THE DIFFERENTIAL

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. Fix the oil baffle plate (17) by washer (18) to the differential. Remove the upper service mandrel and rotate the differential on the lower mandrel.

The differential roll evenly and smoothly without jamming and jerks.

Apply thin coat of 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 off hex. bolts with completely screwed on nut into the drive gear and gradually screwing the nuts completely pull on the drive gear to bottom out (Fig. 3.).

Secure the drive gear by hex. flanged self-lock bolts (at place of the puller bolts, as well) and tighten the bolts to 120 - 135 Nm torque.
If the drive pinion (16) or its bearings are to be re-
placed remove the differential carrier II. (45) from the
differential carrier I. (15).

By means of the wrench extension 4905-00022 re-
move the hex. flanged bolts (14) from the inner flange.

Following this separate the differential carrier II. from
the differential carrier I. and lift out together with the
drive pinion and the driven gear (50). Remove the
shims (13).

**REINSTALLING THE DIFFERENTIAL CARRIER II. TO THE DIFFERENTIAL CARRIER I.**

After reassembling the differential carrier II. and ad-
justing the specified bearing preload adjust the axis
distance (after removing the differential).

**ADJUSTING THE AXIS DISTANCE, REINS-
STALLING THE DIFFERENTIAL CARRIER II.**

For purpose of piloting screw M12 stud bolts to two
opposite bores in flange of the differential carrier I
(15). Position the shims (13) necessary for adjusting
the drive gear - pinion contact pattern over these stud
bolts so, the extreme two ones shall be thicker. Use
maximum 4 pcs from the shims.

Fit the differential carrier II. assembled with drive
pinion into the Ø180 bore of the differential carrier I.,
then at two opposite bores provisionally secure by
hex. flanged bolts tightened to 88-108 Nm torque.

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

Insert the measuring device set 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 odentity the adjustment is proper, other-
wise obtain the specified value by selecting the prop-
er shim pack (13). The permitted deviation is ±0.025
mm. E.g.: If axis distance 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 differen-
tial carrier and adjust the contact pattern as described
in the Section 287.

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**Fig. 1.: CALIBRATING THE AXIS DISTANCE**
SECTION 290.
DISASSEMBLING AND REINSTALLING
THE DIFFERENTIAL CARRIER II.

DISASSEMBLING THE DIFFERENTIAL CARRIER II.

By means of the device shown drive the drive pinion out of the removed differential carrier II. (Fig. 1.).

When driving out the drive pinion the inner taper roller bearing cone remains on the pinion spindle.

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

Fig. 1.: DRIVING OUT THE DRIVE PINION
From the differential carrier II. press out the taper roller bearing cups 32312 (see Fig. 3.).

Turn the differential carrier II. over and press out the cup of the inner taper roller bearing 32314, too (see Fig. 4.).
REASSEMBLING THE DIFFERENTIAL CARRIER II.

Before reassembling carefully check the removal parts and replace if required.

Drive in the taper roller bearing (9, 12 cups) by means of the tools shown, bottom out (see Fig. 5.).

After subassembled the differential carrier II. with the taper roller bearing cups adjust the specified bearing preload.

The distance between the outer taper roller bearing cone and the distance sleeve may vary from 13.96 to 15.00 mm. For selecting the proper distance ring (10) this distance should be determined by measurement (X in Fig. 6.).
Position the inner taper roller bearing cone, the distance sleeve (11) and the distance ring (10) for filling the gap determined by measurement to the shown master shaft, then the subassembled differential carrier II., the outer taper roller bearing cone and the driven gear (50). Screw on the flanged castle nut (1) (Fig. 5.).

Tighten the nut to 850 - 1050 Nm torque. Position the subassembled unit to the shown stand (Fig. 6.) and measure the rolling torque by means of fish-scale attached with cord to mantle of the driven gear (50).

In case of new bearings installed the rolling torque at approx. 5 rpm should be 30.3 - 42.4 N with Ø165.5 mm driven gear which corresponds to 2.5 - 3.5 Nm rolling torque.

In case of reused bearings adjust the rolling to 1.25 - 1.75 Nm (i.e. to half to the rolling torque at new bearings).

In case of deviation from this value perform correction by changing the distance ring. If the rolling torque is higher than specified use higher distance ring pair, while at lower torque use lower one.

When the adjustment is proper relocate the parts from the adjusting device to the drive pinion. Make sure to install only the parts used for adjustment over to the drive pinion.

Fig. 6.: ADJUSTING THE BEARING PRELOAD
REINSTALLING THE DRIVE PINION

By means of the tools shown drive the cone of the inner taper roller bearing (12) onto the drive pinion (Fig. 7.).

Position the distance sleeve (11), the previously selected distance ring (10), the differential carrier II. subassembled with bearing outer races, them by means of drive sleeve 4518-00022-4 drive on the cone of outer taper roller bearing to bottom out, taking care of proper connection of the taper roller bearings.

Drive on the driven gear (50), position the washer, screw on the flanged castle nut (1) and secure by cotter (2).

Position the drive pinion subassembled in this way to stand of the adjusting device Drw. No. 4970-00489, secure the driven gear by lock of the device as shown in Fig. 6. and tighten the flanged castle nut to 850 - 1050 Nm torque.

Check the rolling torque as described earlier. If deviation is experienced repeat the adjustment until obtaining the specified value.
SECTION 292.
REINSTALLING THE INPUT SHAFT AND
THE DIFFERENTIAL CARRIER III.

By means of the tools shown drive the taper roller bearing cup into its seat to bottom out (see Fig. 1.).

Fig. 1.: DRIVING IN THE TAPER ROLLER BEARING CUP

By means of the tool shown drive the cone of taper roller bearing 32014 onto the differential gear l. (91) to bottom out (see Fig. 2.).

Fig. 2.: DRIVING ON THE TAPER ROLLER BEARING CONE
By means of the tool shown drive the sealing plate to bottom out (see Fig. 3.).

By means of the press head shown drive the pinion drive spur gear onto the differential gear II. (85) to bottom out (see Fig. 4.).

Secure the pinion drive spur gear in place by installing the snap ring (81) to its groove.
SUBASSEMBLED THE INTER-AXLE DIFFERENTIAL CASE

Install the 4 off grub screw (111) with thread locker in the bore of the spider. Position the differential pinions (87) and the shims (86) to the spider (88) and insert this subassembled unit into the previously separated differential case (89).

Aligning the factory match-marks clamp the differential case halves together by means of hex. bolt (93) coated with thread locker. Diagonally tighten the clamp bolts to 25 - 30 Nm torque and rotating the drive pinion check if the assembly improper. During rotation on jamming may occur.

SUBASSEMBLING THE DIFFERENTIAL CARRIER III.

Fit the toothed hub (69) to splines of the input shaft (68). The toothed hub should slides freely when moving axially.

Put the input shaft together with toothed hub (69) sat to shift yoke (78) of the differential lock into the carrier bore so, the threaded bore of the shift yoke shall align with actuating bore of the differential lock.

Put the spring (80) near the shift yoke and thru the carrier bore screw the shift bar (79) into threaded bore in the shift yoke to bottom out secure the spring.

REINSTALLING THE OIL PUMP

Position the O-ring (114) into its seat. As described in the “GENERAL INSTRUCTIONS” apply oil-proof surface sealant (LOCTITE 515) to seating surface of the oil pump cover I. (65) and to outer mantle of the cover II. (64). Fit the oil pump assembly into its bore and secure by means of hex. bolts with lock washer (66). Tighten the bolts to 59 - 78 Nm torque.

Install the toothed disk (53) with woodruff key (60) to input shaft of the oil pump and screw on the hex. nut with lock plate (57). Tighten the hex. nut to 37 Nm torque and secure by the tab lock plate.

REINSTALLING THE DIFFERENTIAL CARRIER III.

Secure the differential carrier so, the outer flange of the differential carrier II. shall face upward.

Install the differential gear (91) subassembled with bearing cone (as shown in Fig. 2.), the subassembled differential (89) to cup of the previously pressed in taper roller bearing 32014 (92), then the pinion drive spur gear subassembled as per Fig. 5.

As described in the “GENERAL INSTRUCTIONS” apply oil-proof surface sealant (LOCTITE 515) to flange of the differential carrier.

After aligning the bores fit the subassembled carrier III. together with the input shaft (68) by means of dowel pin to the differential carrier II. and the connected parts and clamp the carrier halves together by means of hex. flanged bolts (14) coated with thread locker and tightened to 88,3-108 Nm torque.
INSTALLING THE OUTER TAPER ROLLING BEARING TO THE INPUT SHAFT

Heat up the cone of the outer taper roller bearing (51) to 80-100°C, then by means of tools shown drive onto the input shaft to bottom out against the shaft shoulder (see Fig. 5.).

Fit the outer race of the previous bearing into the differential carrier III. and drive in by means of the same tool so, to fit to without jamming or excessive play when rotating (see Fig. 6.).

Following this, by moving in horizontal direction, check the differential lock shift bar (79) and shift yoke (78) for operating properly without jamming. If trouble is experienced eliminate before going on without assembly operations.
Fit the outer race of the taper roller bearing 32212 to the inner race, then rotating the input shaft check for running free of jamming.

Measure the height of the bearing outer race section protruding from the differential carrier III. and note the measured value.

Measure the height of the inner bearing seat in the cover (5) subassembled with sealing ring (4) and also note the result.

According to the measurement result select from the 7 different thickness shims (67) such an amount - but maximum 5 off - which assure 0.1-0.15 mm axial play.

As described in the “GENERAL INSTRUCTIONS” apply oil-proof surface sealant to corner surface of the protruding bearing section, then install the previously selected shim pack and the cover (5) subassembled with sealing ring. Aligning the bores attach to the differential carrier III. (45) by means of lock washer (7) and hex. bolts (6). Tighten the bolts to 59 - 78 Nm torque diagonally.

CHECKING THE AXIAL PLAY

After installing the companion flange (see Section 283.) check the adjusted axial play by means of magnetic stand dial indicator while moving the input shaft to axial direction.

Perform measurement at three even pitch places by turning the companion flange with pry.

During check and axial play of 0.1-0.15 mm should be obtained. In case of deviation adjust the required value by means of shims (67).
SECTION 294.
REPAIRING, REINSTALLING AND ADJUSTING THE INTER-AXLE DIFFERENTIAL LOCK

Remove the differential lock mechanism as described in the Section 285.

REPAIRING THE PNEUMATIC CHAMBER
Remove the clamp (72) the housing (73) and the cover (70), then lift off the cover and the diaphragm plate (71), as well. Pull the push rod - spring retainer (74) unit out of the housing, thus setting free the spring (75). Using sound or replaced parts perform reassembly in reverse order of disassembly.

70 - Chamber cover
71 - Diaphragm
72 - Clamp
73 - Pneumatic chamber housing
74 - Spring retainer
75 – Spring

ASSEMBLING INSTRUCTION FOR THE CLAMP
- The pneumatic chamber housing (73), the diaphragm (71) and the cover (70), to be axially compressed in a device. A=7.2-7.5 mm
- The clamp (72) halves to be radially compressed in a device so as both halves totally fit on the cover and housing. B=3.6-4.4mm.
- Nuts for the clamping bolts be tightened to 2.5 Nm torque the distance between the clamp ends-at both ends-be equal.

When checked with 10 bar (10 kp/cm²) trial pressure, no air leakage is permitted.

REINSTALLING THE ACTUATING PNEUMATIC CHAMBER
As described in the “GENERAL INSTRUCTIONS” apply oil-proof surface sealant to seating flange of the pneumatic chamber, then fit to the shift bar (79) and attach by 2 off M8x16 hex. bolts and lock washers. Tighten the bolts to 29-39 Nm torque.

Turn in the reporting switch (122) with the washer (121) and tighten it 50 - 80 Nm torque. Connect the air pipe and electrical connection.

Screw the lock nut (83) to the stop bolt (84) coated with thread locker to bottom out against the threaded end, then screw the stop bolt hand-tight into the housing bore.

ADJUSTING THE DIFFERENTIAL LOCK
Connect the air line and the electric wire.

Actuate the pneumatic chamber by means of 5 kp/cm² (49 N/cm²) pressure air, after then turn the input (68) and thru-drive (94) shafts so, the clutch claws slide into one another. Following this carefully screw the stop bolt (84) coated with thread locker until bottoms out against the shift (79), then turn further by half turn and secure by lock nut (83) in this position.

After adjusting the stop bolt check the differential lock and the electric indicator for proper operation, by engaging and disengaging several times. Eliminate the trouble if experienced.
DISASSEMBLING THE OIL PUMP

Remove the hex. bolts with lock washer (54) clamping the oil pump covers (64 and 65) and the oil pump case (55), then remove the pump covers from the pump case.

After removing the cover pull the drive (61) and driven gears out of the oil pump case.

Tap or pull the used bushes (58) out of the covers.

After backing out the flanged screw plug (56) the oil pressure control spring (59) and the steel ball (62) can be removed from the pump cover II.

REASSEMBLING THE OIL PUMP

Press the bushes into the covers the flush with the sides surface.

Tap the lock pin into both sides of the pump case. Insert the gear into relevant bores pump case, then fitting the covers to the gears and the lock pins attach them to both sides of the pump case.

For reassembling the case and the cover use the matching sleeve Drw. No. 4905-00025.

Make sure the gears are installed to the relevant bores.

From the oil pump cover I. side screw the hex. bolts with lock washer (54) thru the oil pump case (55) and tighten to 13 Nm torque.

Punch secure the lock pin on the oil pump cover I. (65) side against loosening.

Insert the steel ball (62) into the seat, position the oil pressure control spring (59) and secure by flanged screw plug with sealing ring (56).

Install the other flanged screw plug with sealing ring (63), as well.
SECTION 310.
DIFFERENTIAL CARRIER ASSEMBLY
DIFFERENTIAL CARRIER ASSEMBLY SECTIONAL VIEW

Fig. 1.: DIFFERENTIAL CARRIER ASSEMBLY
SECTIONAL VIEW

784.74-7/1

Marmon-Herrington
PARTS THE DIFFERENTIAL CARRIER ASSEMBLY

1 – Flanged castle nut with cotter pin
2 – Washer
3 – Companion flange
4 – Sealing rings
5 – Cover
6 – Hex. bolt
7 – Lock washer
8 – Bearing cage
9 – Taper roller bearing
10 – Distance ring
11 – Distance sleeve
12 – Taper roller bearing
13 – Shims
14 – Hex. flanged bolts
15 – Differential carrier
16 – Drive pinion
17 – Oil baffle plate
18 – Washer
19 – Taper roller bearing
20 – Bearing adjuster
21 – Tab lock plate
22 – Hex. bolt
23 – Lock plate
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
33 – Toothed hub
34 – Differential lock clutch gear
35 – Backing ring
36 – Snap ring
37 – Drive gear
39 – Hex. bolt
42 – Vent valve
43 – Oil baffle plate
70 – Pneumatic chamber cover
71 – Diaphragm
72 – Clamp
73 – Pneumatic chamber housing
74 – Spring retainer
75 – Spring
76 – Pilot pin
77 – Washer
78 – Shift yoke
79 – Shift bar
80 – Spring
119 – Shackle
120 – Hex. bolt
121 – Washer
122 – Reporting switch
123 – Connecting
SECTION 312.
REMOVING AND REINSTALLING THE DIFFERENTIAL CARRIER ASSEMBLY

Drain the oil from the axle before removing the differential carrier assembly.

Remove the axle shaft as described in Section 219.

Remove the hex. flanged bolts attaching the differential carrier assembly to the axle and lift out the carrier.

REINSTALLING THE DIFFERENTIAL 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 assembly into the axle housing and secure by hex. flanged bolts coated with thread locker.

Tighten the bolts diagonally to 88 - 98 Nm torque.

Reinstall the axle-shafts according to Section 219.

SECTION 313.
REMOVING AND REINSTALLING THE COMPANION FLANGE AND THE COVER, REPLACING THE OIL SEAL

REMOVING THE COMPANION FLANGE

After removing the cotter pin (Fig. 1.) remove the flanged castle nut (1).

Pull off the companion flange by means of the device assembled from the shown parts (Fig. 2.).
REPLACING THE OIL SEAL

Remove the cover (5).

Drive out the used sealing ring by means of the tools shown (Fig. 3.).

Drive in the inner sealing ring (Fig. 4.).
REINSTALLING THE COVER

As described in the “GENERAL SERVICE INSTRUCTIONS” apply oil-proof surface sealant to inner flange of the cover (5) subassembled with sealing rings (4), then aligning the bores attach the cover to the bearing cage by means of the lock washer (7) and hex. bolts (6). Diagonally tighten the bolts to 20 - 30 Nm torque.

REINSTALLING THE COMPANION FLANGE

Press the companion flange (3) to the drive pinon splines to bottom out (Fig. 5.).

Install the washer (2), screw on flanged castle nut (1) and tighten to 650 - 700 Nm torque and secure with cotter pin.

Check the runout of the companion flange. Allowable runout of the companion flange in radial direction is 0,08 mm (Fig. 1. in section 310). When the adjustment is improper, then pull off the companion flange, turn it by 15° and press on and check the run-out again. Repeat the adjustment until obtaining the specified value.

Drive in the outer sealing ring, as well, by means of the tool shown (Fig. 5.)

Apply specified grease to between the sealing lip and the dust protection edge of the outer sealing ring and apply thin coat grease to the inner one.
As described in the Section 318, remove the shift yoke (78) and the toothed hub (33).

Remove the snap ring (36) and the backing ring (35) and pull off the clutch gear (34).

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

By means of the tool shown remove the bearing adjusters (20) from the both sides (see Fig. 1.).

By means of the tool shown in Fig. 3. tap the differential toward the flanged differential case half (31) so, the cup of the taper roller bearing (19) shall fall out.

The differential can be removed only if disassembled.

Back out the bolts (25) clamping the differential case halves, 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 with tool No.4732-00032 (see 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 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 cup into the bearing bore in the differential carrier and drive in by means of the tool shown (see Fig. 3.).

Screw in the bearing adjuster (20).

Turn the differential carrier over and drive the taper roller bearing cone and to the splinted shaft-end, then drive on the bearing cup by the same tool (Fig. 4.).

Screw in the bearing adjuster (20).

Install the oil baffle plate (17) and the washer (18) to side the differential case (24) half.
ADJUSTING THE BACKLASH AND THE BEARING PRELOAD

By means of the bearing adjuster adjust the drive pinion to gear backlash at GLEASON toothing to 0.15 - 0.20 mm.

Locking the drive pinion measure the backlash at four places diagonally on the drive gear toothing, perpendicularly to the tooth surface by means of the backlash checking device (Fig. 5.).

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

Important: While setting the backlash of 0.000 mm, rotate the ring gear, hereby you can assure that taper rollers seat in the bearing. In stationary position some of the rollers may slightly diagonally wedge in. A bearing set this way will get loose during rotation.

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 opposite teeth pairs of the drive gear, at 4 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. 6. 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 toothing the contact pattern along the tooth is shifted toward the small diameter of the drive gear.

Fig. 4: DRIVING ON THE TAPER ROLLER BEARING INNER RÉZÉNEK FELÜTÉSE

Fig. 5: BACKLASH CHECKING DEVICE

Fig. 6: THE CONTACT PATTERN
TOO DEEP CONTACT

If the contact pattern is shifted to the dedendum as shown in detail 2 of Fig. 6, 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. 6.

TOO HIGH CONTACT

If the contact pattern is shifted to the addendum as shown in detail 3 of Fig. 6, 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. 6.

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 further the bearing adjuster on both sides by 0.75 - 1.25 pitch (approx. 23°-37°) 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 flats of the bolts.

When the adjustment and the operation is proper, remove the 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.

Fit the differential lock clutch gear (34) to splines of the differential case, install the backing ring (35) and secure by snap ring (36).
DISASSEMBLING AND REASSEMBLING THE DIFFERENTIAL

Pull the inner 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 spacer (26).

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

The match-marks are stamped to one face 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: 1235, +0.04.

The differential case halves are matched pairs, thus install only match-marks differential case halves, according to the marks.

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 roll evenly and smoothly without jamming and jerks.
Apply thin coat of 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 off hex. bolts with completely screwed on nut into the drive gear and gradually screwing the nuts completely pull on the drive gear to bottom out (Fig. 3.).

Secure the drive gear by flanged self-lock bolts and tighten the bolts to 120 - 135 Nm torque.

**Fig. 3.: PULLING ON THE DRIVE GEARS**

SECTION 316.

REMOVING AND REINSTALLING 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 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

For purpose of piloting screw M12 guide 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 set 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. Eg.: If axis distance 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 CAGE

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 tools shown in the figure press the drive pinion (16) out of the bearing cage (8) (Fig. 1.).

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

Fig. 1.: PRESSING OUT THE DRIVE PINION

Fig. 2.: PRESSING OFF THE INNER TAPER ROLLER BEARING CONE
Properly backing the bearing cage drive the cup of the taper roller bearing and the oil baffle plate (43) out of the bearing cage (Fig. 3.).

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

Turn the bearing cage over and drive out the cup of the outer taper roller bearing (Fig. 4.).

Fig. 4.: DRIVING OUT THE OUTER TAPER ROLLER BEARING CUP
Position the oil baffle plate (43) and the cup of the inner taper roller bearing (12) and by means of the tools shown drive into the bearing cage (Fig. 5.).

By means of the tools shown drive in the cup of the outer taper roller bearing bottom out (see Fig. 6.).

After subassembling the bearing cage with taper roller bearing cups adjust the bearing preload.

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

Fig. 6.: DRIVING IN THE CUP OF THE OUTER TAPER ROLLER BEARING
The distance between the outer taper roller bearing cone and the distance sleeve may vary between 13.89 and 14.715 mm. This distance should be determined by measurement for selecting the proper distance ring (10).

Stack the inner taper roller bearing cone, the distance sleeve (11) and the distance ring for filling the gap determined by measurement, then the subassembled bearing cage and the outer taper roller bearing cone on the shown master shaft.

Position the washer belonging to the master shaft to the bearing inner race, screw on the flanged nut of the device and tighten to 650 - 700 Nm torque.

Attach approx. 2mtrs 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.

With new bearing installed the force obtained from the fish-scale at approx. 5 rpm should be 21.46 - 26.34 N, which corresponds to 2.2 - 2.7 Nm torque.

Installing reused bearings adjust the rolling torque to 1.1 - 1.35 Nm (approx. half to the new bearing).

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. 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 cone 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 with bearing cups to the drive pinion stem, them by means of press sleeve 4518-00022-4 drive on the outer taper roller bearing cone to bottom out while assuring proper connection of the bearings.

By means of tool according to Fig. 2. of Section 313, press the companion flange (3) to the drive pinion. Screw on the flanged castle nut (1) and tighten to 650 - 700 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.

**REPAIRING THE PNEUMATIC CHAMBER**

Remove the clamp (72) clamping the housing (73) and the cover (70), then lift off the cover and the diaphragm plate (71), as well. Pull the push rod - spring retainer unit out of the housing, thus setting free the spring (75).

Using sound or replaced parts perform reassembly in reverse order of disassembly.

**REMOVING THE DIFFERENTIAL LOCK**

After detaching the pressure air connection and the electric wire remove the differential lock actuating pneumatic chamber by backing out the 2 off M8x16 bolts and unscrew the shift bar (79) from threaded bore of the shift yoke (78).

Pull the pilot pin (76) out of the differential carrier and remove the shift yoke (78) together with the toothed hub (33). Remove the spring (80) and stop washer (77), as well.

**REPAIRING THE PNEUMATIC CHAMBER**

Remove the clamp (72) clamping the housing (73) and the cover (70), then lift off the cover and the diaphragm plate (71), as well. Pull the push rod - spring retainer unit out of the housing, thus setting free the spring (75).

Using sound or replaced parts perform reassembly in reverse order of disassembly.

**SECTION 318.**

**REPAIRING, REINSTALLING, ADJUSTING THE DIFFERENTIAL LOCK**

**ASSEMBLING INSTRUCTION FOR THE CLAMP**

- The pneumatic chamber housing (73), the diaphragm (71) and the cover (70), to be axially compressed in a device. A=7.2-7.5 mm

- The clamp (72) halves to be radially compressed in a device so as both halves totally fit on the cover and housing. B=3.6-4.4 mm

- Nuts for the clamping bolts be tightened to 2.5 Nm torque the distance between the clamp ends-at both ends-be equal.

When checked with 10 bar (10 kp/cm²) trial pressure, no air leakage is permitted.
REASSEMBLING THE DIFFERENTIAL LOCK

When reassembling the differential lock adjust the clearance between the clutch gear (34) and the toothed hub so, to obtain 0.5 - 2.00 mm clearance at engaged differential lock.

Section 310, Fig. 1. install the toothed hub with the shackle (119) and hex. bolts (120) to the shift yoke. Insert the shift yoke with the washers (77) without spring (80) into the differential carrier and screw in the shift bar (79).

Drive in the pilot pin (76). Push the shift bar in to bottom out and measure the clearance between the clutch gear (34) and the toothed hub (33). In case of 0.5 - 2.0 mm clearance the number of the stop insert (77) is sufficient, otherwise adjust the required clearance by selecting the proper number stop inserts.

In case of proper clearance remove the shift yoke, then reinstall with the selected number stop inserts and the spring.

REINSTALLING THE PNEUMATIC CHAMBER

Install the actuating pneumatic chamber after assembling the differential carrier into the axle housing. As described in the “GENERAL SERVICE INSTRUCTIONS” apply oil-proof surface sealant to seating flange of the pneumatic chamber, the fit to the shift bar (79) and attach to the housing by 2 off M8x16 bolts and lock washers. Tighten the bolts to 29 - 39 Nm torque.
According to the Operators Manual fill up the finish assembled axle with oil to lower edge of the filler bores in the end-cover of the wheel hubs, in the axle housing and the differentials.

**Fill only completely clean oil fill-up into the axle.**

After oil fill-up install the screw plugs and tighten to be leak-tight. Following this it is recommended to run the axle to both directions at varying speeds between 0 and 2200 rpm.

**DURING RUNNING CHECK THE FOLLOWING:**

**THE AXLE FOR LEAKS:**
No leaks are permitted.

**THE AXLE FOR OPERATION:**
No unusual noise or excessive friction may be experienced at the rotary mechanisms in the differentials and the wheel hubs. The meshing gears should roll on one freely without unusual noise.

**THE BRAKE FOR OPERATION:**
In normal position no friction may occur between the brake shoes and the brake drum, during brake application the brake spanner may not jam in the spanner bearing and upon releasing the brake the spanner should return to initial position.

**THE AXLE FOR WARMING:**
At the end of running the temperature of the wheel hub parts may not exceed approx. 60°C and at the input section approx. 80°C

**THE DIFFERENTIAL LOCK FOR OPERATION:**
During run check by engaging and disengaging the differential lock, braking the wheel on one side and monitoring the pilot lamp.
MARMON-HERRINGTON WARRANTY

This is to certify that we, Marmon-Herrington Company, Louisville, Kentucky, warrant each new chassis remanufactured, or assembly or part furnished for the remanufacture of a truck chassis against defects in material and workmanship under normal use and service. Marmon-Herrington’s obligation under this warranty is limited to replacement of, at our factory, any part or parts thereof which shall, within one (1) year after delivery of such vehicle to the final user after installation of the all-wheel drive conversion kit, be returned to us with transportation charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective.

Marmon-Herrington will warrant covered components against defects in material and workmanship under normal use and service for the specified period. This warranty includes all internal components with the following exceptions: Exceptions include, but are not limited to wear items such as brake linings and drums, oil seals and bearings, which will be covered for a period of 12 months or 12,000 miles, whichever occurs first.

Failure to follow designated maintenance procedures and schedules, maintain required lubrication levels, or any form of operational abuse or misuse will void all warranty coverage expressed or implied.

Failure reporting and claims submission procedures are to be followed as outlines in the standard warranty guidelines.

Service parts are manufactured to the same standards as production installed parts. However, since the installation thereof, as well as the age and condition of the receiving vehicle are beyond the control of Marmon-Herrington, Service Parts are warranted for a period of ninety (90) days or five thousand (5,000) miles whichever first occurs. All other regular warranty conditions apply.

On vehicles operating OVERSEAS, the determination of defects will be made at Marmon-Herrington Company, Louisville, Kentucky, from complete information supplied in writing by overseas distributors or recognized acting distributors. Complete information is defined to mean: vehicle serial number, user’s name, date of delivery, mileage at time of breakage, date of breakage, type of service, nature of break or fault, distributor’s recommendation (for guidance only), and any other pertinent information. After determination of our obligation, any parts to be replaced will be shipped to distributor or acting distributor in accordance with his instructions.

The warranty is in lieu of all other warranties expressed or implied and of all other obligations or liabilities incurred by Marmon-Herrington. Marmon-Herrington neither assumes nor authorizes any other person to assume any other liability in connection with this sale, including but not limited to indirect or consequential damages.

This warranty shall not apply to any vehicle which shall have been repaired or altered in any way so as in our judgement, to affect its stability or reliability, nor which has been subjected to misuse, negligence, or accident, nor which shall have been operated at a speed exceeding the factory rated speed or loaded beyond the factory rated load capacity or operated in violation of Marmon-Herrington’s instructions.

Marmon-Herrington makes no warranty whatever on components of the original manufacturer’s chassis not related to the modification work. Also, no warranty is made on tires, rims, ignitions, or other parts usually warranted separately by their respective manufacturers.

The manufacturers reserve the right to make changes in design, and changes or improvements upon their product, without notice, and without incurring any obligation to install such changes or improvements upon their products theretofore, manufactured. This warranty shall become effective only when the Warranty Certificate has been returned to Marmon-Herrington and validated by the same.

In the case of vehicles operating in extreme conditions such as corrosive material mines, deep-water zones or areas of hostile aggression, the following warranty limitations apply:

Marmon-Herrington shall not be responsible for damage caused by chemical corrosion, internal water damage due to total immersion, or explosive impact. These constitute severe duty and are not covered by Marmon-Herrington standard warranty.
WARRANTY REPAIR AND CLAIM PROCEDURE

Initial Failure Reporting
1. Operator must call Marmon-Herrington Customer Service prior to performing any repairs and receive a Work Authorization Number to be eligible for reimbursement. The work authorization number does not guarantee payment but is an acknowledgement that the vehicle is within the warranty period in terms of date and mileage, and that a claim has been activated. It will be the responsibility of the operator to ensure that the repair facility is aware of and complies with the guidelines of this policy.
2. To expedite the authorization process, you will need the Sales Order Number or “S” number found on the front of this certificate. You will also need the Vehicle Identification Number or the last six digits of the “VIN”, the date the vehicle was placed in service, and the current mileage. Please note the following:
   • This Warranty Registration should have been submitted at the time of delivery. If our records do not include a warranty registration, you must complete one before any authorization for repair can be issued. We will make them available by mail or fax upon request.
3. Marmon-Herrington will pre-approve .5 hours diagnosis/inspection time prior to your call for repair authorization. If the diagnosis/inspection complaint does not reveal a warrantable failure, or result in a warrantable repair, the customer will be responsible for all charges including diagnosis/inspection time.
4. The Operation Manual contains information covering proper equipment use and maintenance schedules. Operators must adhere to these guidelines to be eligible for reimbursement, and service records must be provided upon request.

Pre-Repair Requirements
1. Authorization for repairs will require a written estimate/repair order of costs after determination that a warrantable condition is found to exist.
2. Estimates must contain the following information:
   • A list of all parts necessary to the specific job and if applicable, all parts that will be invoiced back to Marmon-Herrington.
   • The cost of disassembly, inspection and diagnosis of any portion of the vehicle to determine extent of repairs needed.
   • Current labor costs, reflecting both hourly rate and number of hours to effect repairs must be listed.
   • Miscellaneous charges such as “shop supplies” must be defined. Actual dollar amounts must be listed, as percentages will not be accepted.
   • Sublet repairs must also be defined and included in the estimate at their actual dollar amount.
   • NOTE: If it becomes necessary to exceed the original estimate in terms of parts or labor, the repair facility must call Marmon-Herrington Customer Service for additional authorization.
3. Only the use of Marmon-Herrington supplied parts will constitute reimbursement unless prior approval has been obtained.

Parts Ordering
1. While Marmon-Herrington operates a full service Parts Department, replacement parts needed to effect Warranty repairs must be acquired through Customer Service to be eligible for reimbursement.

Post Repair requirements
1. The final invoice or work order must include the following:
   • Customer’s name, address, and phone number.
   • The Vehicle Identification number.
   • The Sales Order Number or “S” number, which the customer can provide or can be located on the ID tag, fixed to the transfer case or axle.
   • The Axle or Transfer case Model and Serial Number, also located in the ID tag.
   • Mileage IN / Mileage OUT
   • The Cause and Correction of the repair including detailed description of repairs and parts replaced.
   • The date the repair order was open and the date the repairs were completed.
   • The Work Authorization Number obtained from Customer Service.

Notes to Repair Facilities
1. Miscellaneous charges such as “shop supplies” must be listed as separate line items and shown on the final invoice as stated in “Pre-Repair Requirements”. Invoice for sublet repairs must be made available upon request.
2. All repairs must comply with any or all state and DOT requirements.
3. Downtime of vehicle and incurred costs associated due to the delay of parts shipments or any other condition beyond our control is not reimbursable and should not be listed on the invoice.
4. All failed parts that are required to be returned to Marmon-Herrington must be received before payment will be made. The Return Authorization will be sent with the replacement parts when shipped from Marmon-Herrington.
5. All claims must be submitted within 60 days of completion of repairs to be eligible for reimbursement.

For Work Authorization call: 800.227.0727 ext. 282
To Submit Claims by Fax: 502.253.0317
Submit Claims by Mail to: Marmon-Herrington Company
Customer Service Department
13001 Magisterial Drive
Louisville, KY 40223