DONGFENG DFA1063DJ10(14)-301/303

SERVICE MANUAL

DONGFENG AUTOMOBILE CO., LTD.

September. 2006
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General Principles

This manual mainly states maintenance and service methods of DONGFENG DFA1063DJ10(14)-301/303 light commercial truck.

To use vehicles safely and efficiently, you need to read the manual thoroughly and make sure that you are familiar with the items that mark "Note". This is very important.

Due to continuous improvements on our vehicles, maybe there are some instructions in the manual that do not accord with the actual vehicles.

Maintenance method varies with different skill level, methods, tools and available parts that serviceman adopts. Any serviceman should firstly take into consideration no harm personal safety and vehicle safety when working.

As for the maintenance of engine, please refer to service documents offered by Dongfeng Cummins Engine Co., Ltd.


**Operational Instruction**

You can neglect the structural differences between the part in the manual and the corresponding one of your vehicle, because the manual is just teaching you principles for your operation.

**Standard Terms**

**Vehicle direction**

Vehicle direction referred in the manual is marked as the right picture.

**Maintenance standard**

The matching clearance or standard performance parameter of components while assembled.

**Reparation limit**

It means that the component size or component clearance after repairing must satisfy the specified repair limit;

**Wear limit**

It means that if a component is overworn or exceeds its wear limit, it must be replaced;

**Unit**

Legal measure units are used in this manual.

**Standard Tightening Torque**

To assure the safety and reliability of key vehicle parts, this manual makes specific prescriptions to the tightening torque of the bolts and other fasteners on those parts. As for the bolts and other fasteners not mentioned, the structures and the sizes of them have been standardized and they should be fastened with screwing torques prescribed in the following table.

<table>
<thead>
<tr>
<th></th>
<th>M6</th>
<th>M8</th>
<th>M10</th>
<th>M12</th>
<th>M14</th>
<th>M16</th>
<th>M18</th>
<th>M20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordinary carbon steel</td>
<td>5~8</td>
<td>16~23</td>
<td>29~42</td>
<td>50~70</td>
<td>80~110</td>
<td>130~170</td>
<td>160~200</td>
<td>260~320</td>
</tr>
<tr>
<td>High-strength alloy steel</td>
<td>9~12</td>
<td>18~26</td>
<td>34~48</td>
<td>67~95</td>
<td>120~170</td>
<td>165~220</td>
<td>200~250</td>
<td>320~400</td>
</tr>
</tbody>
</table>
General Principles

Maintenance Rule

Maintenance Schedule

It's necessary for periodical inspection and maintenance of truck to prolong its service life, improve its power performance and fuel economy, so periodical inspection and maintenance should be carefully carried out according to the following items. Then it will achieve the max economic and social benefits.

The following schedule is not only for maintenance items of 80,000km, but also for normal maintenance items after 80,000Km.

△—maintenance mileage at running-in period (1,500~2,500km)

☆—maintenance items at running-in period

★—maintenance items at regular driving period

Note:
Customers should carry out the inspection and maintenance intervals according to the different area condition. Properly shorten the maintenance intervals can ensure the truck to get the reasonable maintenance and move reliability. Never prolong the intervals.

Dongfeng Cummins Diesel Engine

<table>
<thead>
<tr>
<th>Maintenance Item</th>
<th>Maintenance Mileage Interval (× 1,000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4  8  12  16  20  24  28  32  36  40  44  48  80</td>
</tr>
<tr>
<td>Clean engine assembly</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
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</table>
### Clutch

<table>
<thead>
<tr>
<th>Maintenance Item</th>
<th>Maintenance Mileage Interval (× 1,000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the working conditions of clutch</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the free travel of clutch pedal</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the leakage of the hydraulic pipeline and clutch pump</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the air leakage of clutch booster</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the reserve of braking fluid in oil reservoir</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Replace clutch braking fluid</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
</tbody>
</table>

### Propeller Shaft

<table>
<thead>
<tr>
<th>Maintenance Item</th>
<th>Maintenance Mileage Interval (× 1,000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the looseness of the linking parts of propeller shaft</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the looseness of spider bearing</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the looseness of middle bearing</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the wearing conditions of spline</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
</tbody>
</table>

### Gearbox

<table>
<thead>
<tr>
<th>Maintenance Item</th>
<th>Maintenance Mileage Interval (× 1,000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean gearbox and vent plug</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the oil reserves in gearbox</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check oil leakage of gearbox</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Replace gearbox lubricant</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the looseness of the linking parts of the control mechanism</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the working conditions of the bearings in gearbox</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Disassemble and check gearbox</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
</tbody>
</table>

### Suspension System

<table>
<thead>
<tr>
<th>Maintenance Item</th>
<th>Maintenance Mileage Interval (× 1,000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check the leakage of shock absorber and fasten the bolts of brackets</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Clean front and rear leaf spring and shock absorber</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Fasten U bolt of leaf spring when fully loaded</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the damage and looseness of shock absorber</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the wearing of pin sleeve of rear leaf spring, replace while necessary</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check if shock absorber is out of service</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Disassemble leaf spring, replace spring pin and pin sleeve</td>
<td>★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★</td>
</tr>
</tbody>
</table>
### General Principles

#### Axle and Wheel

<table>
<thead>
<tr>
<th>Maintenance Item</th>
<th>Maintenance Mileage Interval (× 1,000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>△ 4 8 12 16 20 24 28 32 36 40 44 48 80</td>
</tr>
</tbody>
</table>
| Clean axle and wheels | ★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★★
General Principles

Recommended Fuel and Lubricant

The quality of fuel and lubricant can effect the performances, quality and even life of vehicles. Therefore, to ensure normal operations of vehicles, suitable oil products should be used according to relative prescriptions.

DongFeng Automobile Co., Ltd. prescribes the most suitable fuel and lubricants for its products. The following are the fuel and lubricants that should be used in our products.

Fuel

Qualified light diesel in accord with GB252—87 Standard should be used. Users can choose specific class of light diesel according to the specific temperature in his region.

Recommended temperature scope:

<table>
<thead>
<tr>
<th>Class</th>
<th>Recommended Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>0# light diesel</td>
<td>above 4 °C</td>
</tr>
<tr>
<td>10# light diesel</td>
<td>above -5 °C</td>
</tr>
<tr>
<td>20# light diesel</td>
<td>between -5 °C ~ -14 °C</td>
</tr>
<tr>
<td>35# light diesel</td>
<td>between -14 °C ~ -29 °C</td>
</tr>
<tr>
<td>50# light diesel</td>
<td>between -29 °C ~ -44 °C</td>
</tr>
</tbody>
</table>

Engine lubricant

High-quality lubricant meeting following standards must be used for Dongfeng Cummins engines:

Lowest standard: CF-4/SG 15W-40
Recommended Standard: CG-4/SH 15W-40
Ideal standard: CH-4/SJ 15W-40
Note:
Engine damages for using lubricants below CD15W-40 or CE15W-40 or even lower are not in our warranty scope.

Suitable temperature scope:
For 15W-40: -10 °C ~ -15 °C; For 10W: -5 °C ~ -20 °C; For 5W-30: below -25 °C

Lubricant for gears in driving axle
Recommend to use sulfur-phosphor API GL-5 gear lubricant for heavy duty vehicle. Applicable environment temperatures for different classes are as follow:

![Temperature Chart]

Gearbox oil
Recommend to use sulfur-phosphor 85W/90 GL-4 gear lubricant for middle duty vehicle.

Lubricating grease
Recommend to use generally-used lithium grease for the lubricating points on hubs and chassis frame.

Shock absorber oil
Recommend to use specially-used shock absorber oil.

Clutch boosting liquid
Recommend to use DOT 4 compounded braking liquid. Different classes of braking liquid can not be used together.
Note:
Braking liquid made by different manufacturers can not be used together.

Engine antifreeze liquid (coolant)
Recommend to use long-term antirust & antifreeze liquid. The freeze point of the antifreeze liquid used should be 8 °C lower than the minimum local temperature. Different classes of antifreeze liquid can not be used together.

Volume Data

<table>
<thead>
<tr>
<th>Part</th>
<th>Volume (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel tank</td>
<td>120</td>
</tr>
<tr>
<td>Engine lubrication system</td>
<td>9</td>
</tr>
<tr>
<td>Engine cooling system</td>
<td>14.5</td>
</tr>
</tbody>
</table>
Volume Data

<table>
<thead>
<tr>
<th>Part</th>
<th>Volume (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gearbox</td>
<td>4.2</td>
</tr>
<tr>
<td>Rear axle</td>
<td>Add till the oil overflow from the inspection hole</td>
</tr>
<tr>
<td>Clutch</td>
<td>Add to the scale of “MAX” of clutch oil reservoir</td>
</tr>
<tr>
<td>Power steering gear</td>
<td>Add between the upper and lower scale of oil tank</td>
</tr>
</tbody>
</table>

Protective Measures while Repairing

To assure safety in repairing, the following protective measures should be taken all the way:

1) Before reparation, you should ensure that the wheels can not turn. The measure to lock wheels is as the sketch map.

2) Ensure that the gearbox is at neutral position.

3) Ensure that the ignition switch is at "off" position.

4) When repairing electric circuit, the negative pole should be disconnected.

5) The jacks and brackets used should be strong enough for the load acting on them.

Method of mounting brackets is as the sketch map.

The supporting points of front axle for mounting jacks is as the sketch map.

The supporting points of rear axle for mounting jacks is as the sketch map.
General Principles

6) When disassemble or assemble the assemblies that have been taken down, you should ensure that they are on a solid worktable to avoid they would drop or turn over.

Cleaning

Because the parts may be covered by dirty oil and mud, cleaning is compulsive.

Applicable cleaning methods include steam cleaning, pressure cleaning, light oil cleaning, acid or alkali cleaning, neutral medium cleaning, trichlorethylene steam cleaning, Magnus solution cleaning, etc. Part damages may be revealed during the cleaning, so great attention should be paid while cleaning.

Metal parts

Light oil: in contrast with other solutions, light oil can't penetrate or dissolve mud. Therefore, except for finished surface, mud should be removed by wire brush or other tools and should be cleaned in this way for two times.

Alkali solution: if the parts are made of alloy, don't use alkali solutions for the cleaning. Instead, alkali solutions are very effective for the cleaning of steel and cast iron.

Note:
If alkali solutions are being used, you should make some correctives such as boric acid solution. Once your eyes or skin touch the alkali solution, you should use the corrective to clean.

Rubber parts

Don't use mineral oil for the cleaning. Use alcohol or clean cloth to remove the mud.

Oil duct

Make a metal wire to get through the oil duct to ensure it is not jammed. Wash the oil duct with cleaning solution with high-pressure nozzle.

Antirust

After removing the oil grease on the parts, clean grease should be applied to prevent the rusting of the parts.

General Inspection

Check parts and components with special gauges or tools. Decide whether a component can continue to serve according to specified maintenance standards. Damaged components should be repaired or replaced as required. If one of a pair of components fitted together is worn so much that the fit clearance exceeds the specified range, replace the pair of components together.

Out of consideration of preventive maintenance, some components should be replaced before them reaching service limit.

Carefully inspect the surface of components by outlook or red check method. Repair or replace the component if its surface has the following abnormal signs: uneven wear, biased wear, scratch, crack, distortion, malfunction or becoming weak (spring), bended, loose, abnormal noise (bearing), distortion, malfunction or becoming weak (spring), bended, loose, abnormal noise (bearing), discolored, seized, eroded, deteriorate (friction lining), etc.

All the rubber pieces, such as O-rings, oil seals and washers cannot be further used after disassembled.
General Principles

Trouble Analysis

In a vehicle, a part is made up of many components. Some parts like clutch, transmission and rear axle are interactive functioning. Therefore, in order to find and examine trouble exactly, it is necessary to know the structure of each part as well as the functional connection between various parts.

To resolve a problem of the vehicle, you must first know the nature of the trouble. To achieve this, you must get some exact knowledge of the trouble from the customer, including the parts that effect using conditions and the date of the happening of the trouble.

A trouble may be caused by one or many reasons in most cases. Therefore, to examine and repair requires the ability of systematic thinking and resolving problems step by step. For example, when the steering wheel turns unstable, you should first examine the connection mechanism of the pitman arm instead of disassembling the steering gear rashly, then decide whether the trouble belongs to the steering gear or to the connection mechanism.

When disassembling the part to find the cause of the trouble, proceed systematically and start from easy problem.

It is a very important way to find out the cause of the trouble according to the manifestation of the trouble such as abnormal noise, vibration and failure. Listed below are some common trouble signs and their reasons. As for the detailed trouble analysis, please refer to chapter of each assembly.

1. During starting of the engine (neutral position)

   Engine cannot start → Listen to the sound of the gear of the gear of the starter → Folo-tru drive
   - No sound → Trouble in starting system
   - Having sound → Engine troubled

2. After engine started

   Abnormal sound → Engage a gear → Sound does not stop
   - Clutch cover troubled
   - Engine troubled
   - Exhaust system troubled

   Sound stops
   - Clutch driven disc troubled
   - Transmission troubled

3. During starting of vehicle

   Abnormal sound → Clutch troubled
   - Transmission troubled
   - Propeller shaft troubled
   - Rear axle troubled
   - Engine drive belt slipped
4. During vehicle running

- Unstable running of vehicle
  - Engine troubled
  - Incomplete release of parking brake
  - Incomplete release of brake
  - Bumpy running of vehicle
    - Clutch troubled
    - Overload of propeller shaft
    - Engine rubber mounting failed

- Poor acceleration
  - Clutch slipped
  - Incomplete release of brake
  - Incomplete release of parking brake
  - Engine fuel system troubled

- Abnormal noise
  - Continuous noise
    - Transmission troubled (oil insufficient or deteriorate)
    - Reductor gear troubled (oil insufficient or deteriorate)
    - Wheel hub bearing troubled (grease insufficient or improper)
    - Over-low tyre pressure
  - Noise
    - Transmission troubles
    - Reductor gear troubled
    - Propeller troubled
  - Noise when run on road bend
    - Differential gear troubled
  - Noise when brake
    - Brake troubled

- Too heavy vibration
  - Front and rear leaf spring troubled
  - Shock absorber troubled
  - Propeller shaft troubled
  - Engine troubled
  - Uneven wear of tyre or imbalance of tyres
  - Engine mounting troubled
  - Cab mounting troubled

- Unstable running (straight)
  - Incorrect front wheel alignment
  - Front axle troubled
  - Suspension spring troubled
  - Steering system troubled
  - Incomplete release of brake
  - Uneven tyre pressure
General Principles

Abnormal steering operation
- Heavy steering
- Incorrect front wheel alignment
- Front axle troubled
- Over low pressure of front wheel
- Turning wheels not return
- Steering system troubled
- Incorrect front wheel alignment
- Front axle troubled
- Insufficient steering angle
- Steering system troubled
- Front axle troubled

Abnormal gear shift
- Difficult gear shift
- Abnormal clutch disengagement
- Transmission troubled
- Transmission handling mechanism troubled
- Gear disengaged
- Transmission troubled
- Transmission handling mechanism troubled

Abnormal braking operation
- Weak braking
- Brake system troubled
- Overwear of tyres
- Hub bearing clearance too large
- Brake can't be released completely
- Brake system troubled
- Hub bearing clearance too large
Clutch

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Adjustment of Clutch Pedal ............................................... CL-3
Clutch Cover and Flywheel ............................................... CL-6
## Clutch

### Clutch

#### Main Parameter

<table>
<thead>
<tr>
<th>Bolt install hole size</th>
<th>Distributing diameter (mm)</th>
<th>Φ 379</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture (mm)</td>
<td>Φ 10.5 (+0.27)</td>
<td></td>
</tr>
<tr>
<td>Number of holes</td>
<td>8 (4 pairs)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Positioning pin hole size</th>
<th>Distributing diameter (mm)</th>
<th>Φ 384</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture (mm)</td>
<td>Φ 9.5 (+0.061, +0.025)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Φ 7.9 (+0.061, +0.025)</td>
<td></td>
</tr>
<tr>
<td>Number of holes</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Angle between positioning hole and installing bolt hole</th>
<th>10°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friction lining size D×d</td>
<td>Φ 325× Φ 200</td>
</tr>
<tr>
<td>Working pressure force</td>
<td>11300±13500</td>
</tr>
<tr>
<td>Release bearing stroke (mm)</td>
<td>10~11.5</td>
</tr>
<tr>
<td>Pressure plate lift range (mm)</td>
<td>≥ 1.5</td>
</tr>
<tr>
<td>Height of release finger (mm)</td>
<td>56±1.6</td>
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<tr>
<td>Unbalance static of the cover assembly (g.cm)</td>
<td>≤ 70</td>
</tr>
<tr>
<td>Unbalance static of the driven disc assembly (g.cm)</td>
<td>≤ 35</td>
</tr>
<tr>
<td>Torque (N.m)</td>
<td>Mmax=1087</td>
</tr>
</tbody>
</table>

**Note:**
- The DOT4 compound brake fluid is recommended to the clutch.
- Unclean or dirty brake fluid is forbidden to use.
- Do not splash the brake fluid down to the paint. (It may erode the paint.)
- You must make use of the tools to disassemble and assemble the clutch pipeline system.
- Make use of the clean brake fluid to clean the master cylinder, booster and the fluid reservoir.
- The mining oil such as gasoline, kerosene, etc., it will erode the rubber parts in the hydraulic pressure system.

After clean the clutch pressure plate, dry it with the suction cleaner, not the compression air.
Clutch

Clutch Mechanical System

Clutch Control Mechanism

1. Clutch pedal bracket assy
2. Lower fixed plate--pedal bracket
3. Clutch pedal welding assy
4. Protective sheath--pedal
5. Clutch pedal shaft
6. Return spring--clutch pedal
7. Bush--pedal assy
8. Pin
9. Clutch master pump assy
Clutch

Clutch Control Pipeline

1. Clutch master pump assy
2. Front oil pipe assy--clutch master pump to slave pump
3. Straight joint
4. 2nd front oil pipe assy--clutch master pump to booster
5. Hose bracket
6. Front hose assy--clutch
7. Rear oil pipe assy--clutch master pump to booster
8. Clutch rear oil pipe bracket
9. Rear hose assy--clutch
10. Booster assy
11. Nylon hose assy
12. Oil reservoir assy

Adjustment of Clutch Pedal

1. Adjust the height of the clutch pedal by adjusting the pedal setting bolt. The height of clutch pedal is about 160~170mm.

2. Adjust the free stroke of the clutch pedal.

Release bearing

Check the release bearing for any crack or wear. The release bearing must be smooth and turn without noise. Replace it if necessary.

Check the release sleeve and release fork for wear, damage or erode, and replace if necessary.

Bearing lubricating

Make use of the recommended lubricant for the connecting surface and the attrition surface of bearing and fork.

Note:
Overmuch lubricant may cause clutch driven disc damaged.
Clutch driven disc and pressure plate

Clutch driven disc

1. Rivet--friction disc
2. Rivet--catch plate
3. Front damping disc
4. Friction disc
5. Damping fin
6. Driven disc clamping plate
7. Driven disc
8. Driven disc rivet
9. Wave spacer
10. Wave spacer rivet
11. Disc hub set
12. Spline disc
13. Damping spring 1
14. Damping spring 2
15. Rear damping disc
16. Half ring pressure board
17. Catch plate
18. Damping spring--idle speed
19. Spring spacer
20. Guard shield
Check

Check the degree of wear of the driven disc surface.

Wear limit: (from friction surface to the rivet head) 0.3mm.

Check the spline tooth clearance and the run out tolerance of driven disc.

Check the driven disc for ablation, color changed, or contaminated by oil or grease. Replace if necessary.

Installation

Smear some grease on the connecting surface and the spring.

Over much grease may damage the surface of the driven disc.

Clutch pressure plate

Check and adjust

Check the height and plainness of the diaphragm.

When checking the height of the diaphragm, set a clearance gauge (T=0.2mm) on the distance bushing.

Height of the diaphragm: 41~43mm (base disc to the top of the diaphragm)

If the height is not in the range of the specific range, you need to replace the pressure plate.

Shake the pressure plate gently, listening and check the wear or damage of the diaphragm supporting ring. Or you can knock the rivet head gently to find if there is cracks. Replace the pressure plate if necessary.

Check the surface of the pressure plate for any ablation or dirt, make use of the corundum paper to get rid of them if necessary.

Check the connecting side of the pressure plate and the driven disc for any distortion or damage, and replace them if necessary.

Adjust the plainness of the diaphragm by tools.

Plainness: <0.7mm

Flywheel check

Check the working face of the flywheel for ablation or color changed, make use of the corundum paper to get rid of them if necessary.

Check the plainness of the flywheel surface: <0.1mm
1. Drive spacer
2. Rivet--cover
3. Spacer sleeve
4. Rivet--diaphragm spring
5. Supporting disc
6. Diaphragm spring
7. Clutch pressure plate
8. Cover
9. Balance rivet
10. Rivet
11. Stop spacer
12. Spring washer
When install the clutch pressure plate and driven disc, insert the special tool into the clutch driven disc spline (used to align and orient).

Screw down the fixing bolt of the clutch cover.

Screw down the bolt in an crossed sequence, following two steps.

1. Installation and adjustment

   Check the type of the clutch to make sure if it is accord to the vehicle model before installation, then find out if the size of installation screw hole, locating pin hole or locating exicircle match the flywheel. The thickness of the driven disc also has to accord the requirements.

   During the installation, first insert the locating mandrel into the spline hole of the driven disc and set it on the flywheel end. Then install the cover assembly to the flywheel and tighten the 8 installation bolts equably. When tightening the bolts, do remember to make the locating pin into the locating hole correctly.

   When adjust the control mechanism, you have to make sure that the travel of the release bearing is 2~3mm, and the efficient travel of the release bearing should be not less than 10mm.

2. Notice

   Pay attention to match the proper torque of the engine during using, which is to assure the certain repertory coefficient.

   The friction plate mustn't be contaminated with oil stain during using.

   The vehicle should not be over loaded during using to avoid skid and cause wear.

   Never make the driven disc in a half engaging situation during using to avoid too much wear earlier.

3. Maintenance

   If the driven disc has been a little bit worn, you must adjust the control mechanism periodically to assure the proper free travel.

   When the friction plate is worn too much like the distance between its surface to the rivet head is not more than 0.5mm, you have to change a new one.

   When maintaining the engine, you must clean up the surrounding place of the inner support disc and ring of the cover assembly.

   If you need to disassemble the pressure plate to do the clean, do remember to assemble it to its original place to assure its balance.
Transmission

MT

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## Technical Parameter

<table>
<thead>
<tr>
<th>Assembly Name</th>
<th>DONGFENG 17G1A2-DJ10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission Model</td>
<td>A121J</td>
</tr>
<tr>
<td>Transmission Type</td>
<td>Mechanical type, 5 forward gears, 1 reverse gear; 2nd−5th gear with synchrinizer</td>
</tr>
<tr>
<td>Control System</td>
<td>Double flexible shaft cable, remote control</td>
</tr>
<tr>
<td>Center Distance (mm)</td>
<td>121.125</td>
</tr>
<tr>
<td>Output Torque (N.m)</td>
<td>1820</td>
</tr>
<tr>
<td>Gear Type</td>
<td>1st, reverse gear, Straight tooth</td>
</tr>
<tr>
<td></td>
<td>2nd−5th gear, Skewed tooth</td>
</tr>
<tr>
<td>Speed Ratio</td>
<td>1st gear 4.763</td>
</tr>
<tr>
<td></td>
<td>2nd gear 2.808</td>
</tr>
<tr>
<td></td>
<td>3rd gear 1.594</td>
</tr>
<tr>
<td></td>
<td>4th gear 1.00</td>
</tr>
<tr>
<td></td>
<td>5th gear 0.756</td>
</tr>
<tr>
<td></td>
<td>Reverse gear 4.99</td>
</tr>
<tr>
<td>Capacity of lubricant (L)</td>
<td>5.5</td>
</tr>
<tr>
<td>Lubricant type</td>
<td>Sulfur-phosphor middle loaded 85W/90 API GL-4 gear oil</td>
</tr>
</tbody>
</table>

## Maintenance Standard

<table>
<thead>
<tr>
<th>Item</th>
<th>Nominal Dimension (mm)</th>
<th>Service Standard (mm)</th>
<th>Repair Limit (mm)</th>
<th>Wear Limit (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission top cover</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearance between gear select rocker block and gear shift lever block slot</td>
<td>0.1−0.4</td>
<td>--</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>Tooth space between control shaft and gear shift lever spline</td>
<td>0.05−0.11</td>
<td>--</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Transmission upper cover</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clearance between transmission fork shaft and transmission fork hole</td>
<td>0.140−0.101</td>
<td>--</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Clearance between end face of the reverse gear fork and ring groove</td>
<td>0.5−0.8</td>
<td>--</td>
<td>Not drop</td>
<td></td>
</tr>
<tr>
<td>Clearance between end faces of other gears and ring groove</td>
<td>0.2−0.5</td>
<td>--</td>
<td>Not drop</td>
<td></td>
</tr>
<tr>
<td>Transmission body</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axial clearance of output shaft 2nd gear</td>
<td>0.1−0.37</td>
<td>--</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Axial clearance of output shaft 4th gear</td>
<td>0.1−0.35</td>
<td>--</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Side play between output shaft and 1st, reverse gear soline</td>
<td>0.055−0.175</td>
<td>--</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Meshing play of running gear</td>
<td>0.15−0.26</td>
<td>--</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Synchromizer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. turning quantity of balking ring end face</td>
<td>--</td>
<td>--</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Max. wearing of balking ring bevel</td>
<td>--</td>
<td>--</td>
<td>0.1 Bevel groove</td>
<td></td>
</tr>
<tr>
<td>Clearance between balking ring end face and cone disc end face</td>
<td>3</td>
<td>--</td>
<td>Single side</td>
<td></td>
</tr>
</tbody>
</table>
Transmission

Tightening Torque

<table>
<thead>
<tr>
<th>Item</th>
<th>Tightening Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch housing connecting bolt</td>
<td>137~167</td>
</tr>
<tr>
<td>Fasten nut of propeller shaft connecting flange</td>
<td>200~220</td>
</tr>
<tr>
<td>Transmission upper cover fixed bolt and nut</td>
<td>33~44</td>
</tr>
<tr>
<td>Transmission cover fasten bolt</td>
<td>20~26</td>
</tr>
<tr>
<td>Reversing lamp switch and neutral position switch</td>
<td>20</td>
</tr>
<tr>
<td>Countershaft rear bearing locking nut</td>
<td>200~300</td>
</tr>
<tr>
<td>Reverse gear shaft locking plate bolt</td>
<td>20~26</td>
</tr>
<tr>
<td>Oil drain screw and filler port screw</td>
<td>120~140</td>
</tr>
<tr>
<td>Propeller shaft connecting bolt and nut</td>
<td>215~245</td>
</tr>
<tr>
<td>Midship mounting bolt and nut</td>
<td>160~220</td>
</tr>
</tbody>
</table>

Trouble Shooting

Abnormal noise
Check the abnormal noise from transmission to determine if it happens during driving or gear shifting, which is one of the factor to the trouble shooting. Also, find out this abnormal noise comes from gear or bearing.

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal sound or noise</td>
<td>· Viscosity of lubricating oil too low</td>
<td>· Use suitable lubricating oil</td>
</tr>
<tr>
<td></td>
<td>· Lubricating oil insufficient</td>
<td>· Add it to required level</td>
</tr>
<tr>
<td></td>
<td>· Gear teeth cracked or worn out (clearance too large)</td>
<td>· Repair or replace the part</td>
</tr>
<tr>
<td></td>
<td>· Bearing worn out or broken</td>
<td>· Replace the bearing</td>
</tr>
<tr>
<td></td>
<td>· Engaging position of shift fork and gear incorrect</td>
<td>· Check shift fork, replace it if its twist</td>
</tr>
<tr>
<td></td>
<td>· Synchronizer worn out or damaged</td>
<td>· Replace</td>
</tr>
<tr>
<td></td>
<td>· Some gears broken</td>
<td>· Clean, replace</td>
</tr>
</tbody>
</table>

Gear engagement is difficult
When gears of transmission are difficult or tend to disengaged, you must consider that is failure of control system that the transmission inside mechanism is isolated from the gear shift lever to gear shift fork.

When there is failure of transmission engagement, the problem maybe caused by malfunctioning synchronizer and this kind of problems normally occur at the certain speed, as 2nd speed or 3rd speed.

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty in shifting</td>
<td>Control system</td>
<td>· Adjust operating level</td>
</tr>
<tr>
<td></td>
<td>· Operating level deformed</td>
<td>· Adjust flexible shaft length</td>
</tr>
<tr>
<td></td>
<td>· Gear select or shift flexible shaft length incorrect</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transmission</td>
<td></td>
</tr>
<tr>
<td></td>
<td>· Bearing worn out or damaged</td>
<td>· Replace bearing</td>
</tr>
<tr>
<td></td>
<td>· Malfunctioning of synchronizer</td>
<td>· Replace synchronizer</td>
</tr>
<tr>
<td></td>
<td>· Gear select and shift rocker welding point loosened</td>
<td>· Weld, repair</td>
</tr>
<tr>
<td></td>
<td>· Fork deformed or damaged</td>
<td>· Check, adjust or replace</td>
</tr>
<tr>
<td></td>
<td>· Shift lever come out from groove</td>
<td>· Assemble or replace parts</td>
</tr>
<tr>
<td></td>
<td>· Malfunctioning of gear shift rocker bolt</td>
<td>· Replace bolt</td>
</tr>
<tr>
<td></td>
<td>· Fork stopping screw loosened</td>
<td>· Tighten, lock</td>
</tr>
</tbody>
</table>
## Transmission

### Difficulty in shifting

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Correction</th>
</tr>
</thead>
</table>
| Gear throw out of mesh in operation | Transmission gear jump automatically | Control system  
   · Incorrect adjustment of control system  
   · Mobile shift lever moved caused by the vibration of truck  
   · Gear shift fork deformed or worn out  
   · Self lock ball or ball groove of gear shift fork shaft worn out  
   · Self lock spring broken or fatigue  
   · The clearance of gear too large  
   · Connecting teeth or sleeve back taper failure  
   · Sliding part or end face of sliding sleeve worn  
   · Bearing worn cause the axial running  
   · Flange locking nut loosened | Check and correct the control hinge  
   · Check the engine and cab rubber mount for damage, replace faulty parts  
   · Check and adjust or replace it if it is twist  
   · Disassemble and replace worn parts  
   · Replace  
   · Adjust the clearance or replace gear  
   · Check, replace  
   · Replace shaft sleeve  
   · Replace bearing  
   · Tighten the nut as required |
| Shift disorder | Inter lock steel ball or inter lock pin worn out or forgotten assemble | Disassemble to check or assemble |

### Oil leak

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Correction</th>
</tr>
</thead>
</table>
| Oil leak | Excessive lubrication oil  
   · Sealing element worn out or failed  
   · Fastening part loosened  
   · Vent plug plugged  
   · Forget to spread on bolt sealing glue | Drain some lubricating oil  
   · Replace  
   · Tighten  
   · Unplug  
   · Spread on sealing glue and assemble |
|          |       |            |
Transmission

Construction

Transmission housing and input shaft

1. Front bearing--input shaft
2. Bearing cover--input shaft
3. Oil seal--transmission input shaft
4. Gasket spacer--input shaft bearing cover
5. Circlip for shaft
6. Steel snap ring for shaft
7. Rear ball bearing--input shaft
8. Transmission input shaft
9. Transmission input shaft and ball bearing assy
10. Front bearing cover--intermediate shaft
11. Sealing ring--intermediate shaft front bearing cover
12. Cover board--power take-off hole
13. Cover board gasket spacer--power take-off hole
14. Square end conical screw plug
15. Transmission housing
16. Rear bearing cover gasket spacer--output shaft
17. Rear bearing cover--output shaft
18. Oil sealing--odometer driven gear
19. Flexible shaft joint--odometer
20. O-sealing ring--flexible shaft joint
21. Gasket spacer--intermediate shaft rear bearing
22. Rear bearing cover--intermediate shaft
23. Gasket spacer--reverse gear checking hole cap
24. Cap--reverse gear checking hole
Transmission output shaft and gear

1. Conical disc--4th, 5th gear synchronizer
2. Balking ring assy--4th, 5th gear synchronizer
3. Balking ring--4th, 5th gear synchronizer
4. Lockpin--4th, 5th gear synchronizer
5. Locating pin--synchronizer
6. Steel ball
7. Lockpin spring
8. Slide gear sleeve--4th, 5th gear
9. Fixed toothholder lock ring
10. Fixed toothholder thrust ring
11. Fixed toothholder--4th, 5th gear
12. Needle bearing
13. 4th gear
14. 4th gear shaft sleeve
15. 4th gear thrust ring
16. 3rd gear
17. 3rd gear needle bearing
18. Conical disc--3rd gear synchronizer
19. Balking ring assy--2nd, 3rd gear synchronizer
20. Balking ring--2nd, 3rd gear synchronizer
21. Lockpin--2nd, 3rd gear synchronizer
22. Slide gear sleeve--2nd, 3rd gear
23. Transmission output shaft
24. 2nd gear
25. Needle bearing--2nd gear
26. Thrust clip--1st gear
27. Thimble
28. 1st gear
29. Needle bearing--1st, reverse gear
30. Slide gear sleeve--1st, reverse gear
31. Fixed tooth holder--1st, reverse gear
32. Reverse gear shaft bush
33. Driven gear--reverse gear
34. Thrust ring--output shaft rear bearing
35. Rear roller bearing--output shaft
36. Driven gear--odometer
37. Steel snap ring for shaft
38. Drive gear--odometer
39. Spacer sleeve--output shaft rear bearing
40. Saucer spring
41. Lock nut--transmission flange
42. Circlip for shaft
43. Spacer
Transmission intermediate shaft, reverse shaft and gear

1. Front roller bearing--intermediate shaft
2. Circlip for shaft
3. Constant mesh gear--intermediate shaft
4. 4th gear spacer sleeve--intermediate shaft
5. 4th gear lock ring--intermediate shaft
6. 4th gear--intermediate shaft
7. 3rd gear--intermediate shaft
8. 2nd gear--intermediate shaft
9. Half-round key
10. Transmission intermediate shaft
11. Vehicle bearing
12. Snap ring
13. Nut lockpin
14. Round nut
15. Outside thrust shim--reverse gear
16. Inside thrust shim--reverse gear
17. Vehicle bearing
18. Needle bearing spacer sleeve--reverse gear
19. Reverse gear
20. Reverse gear shaft
21. Reverse gear shaft lock shim
22. Sealing ring--reverse gear shaft
Transmission

Transmission cover

1. Cover
2. Straight pin
3. Bell cap
4. Balancing spring--selecting shaft
5. Circlip for shaft
6. Oil seal--transmission cover
7. Control shaft and gear shift arm assy
8. Transmission shift lever
9. Steel ball
10. Damping spring--reverse gear
11. Lock shim--spring seat
12. Damping spring seat--reverse gear
13. Washer
14. O-ring
15. Gear selecting rotating arm assy
16. Switch assy
17. Sealing ring
18. Steel ball
19. Gasket spacer--cover
20. Transmission upper cover
21. Gasket spacer--upper cover
22. Spacer
23. Vent plug assy
24. Guide block--1st, reverse gear
25. Locking gear shift fork shaft spring
26. Steel ball
27. Gear shift fork shaft --1st, reverse gear
28. Gear shift fork --1st, reverse gear
29. Straight pin--interlock
30. Gear shift fork shaft--2nd, 3rd gear
31. Gear shift fork--2nd, 3rd gear
32. Gear shift fork--4th, 5th gear
33. Locking bolt--gear shift fork
34. Gear shift fork shaft--4th, 5th gear
Transmission

Transmission Disassembly

Disassembly procedure

Before disassemble assembly, park the truck on the flat ground, shift the transmission in neutral position, switch off the power and wedge up the front and rear wheel to ensure the safety.

1. Tilt the cab.
2. Screw off the drain plug screw, drain off the lubricant oil from transmission when the vehicle is warm.
3. Disassemble the propeller shaft assembly and intermediate support bearing.
4. Screw off four tightening bolts of transmission and clutch housing.
5. Remove speedometer flexible shaft, reverse speed switch, and separate the parking brake steel wire and rocker.
6. Disassemble transmission control system.
7. Remove the return spring and dowel pin of the clutch's slave cylinder then put the clutch's slave cylinder assembly onto frame safety.
8. Remove wire and tube.
9. Disassemble transmission with transmission jack and steel wire.

Disassembly

1. Remove transmission upper cover assembly, gasket, power-take-off hole cover, reverse gear inspect hole cover and output shaft rear bearing cover.

2. Disassemble input shaft bearing cover and gasket from front end of transmission, tap input shaft slightly from right to left with copper bar, take out the input shaft with bearing from front end.

   Take out main shaft front bearing and input shaft rear bearing.
Transmission

3. Take off speedometer drive gear and spacer, hold up and sway up and down the front end of mainshaft with hands, tap the rear end of mainshaft from right to left with copper bar to move it backward out of the rear. Take off mainshaft rear bearing snap ring, remove the rear bearing from mainshaft with puller.

4. Slope the front end of mainshaft assembly upward to take out the mainshaft assembly from transmission casing.

Take out the 4th and 5th speed synchronizer assembly locating tooth seat lock loop and thrust ring. Take off the 2nd and 3rd speed synchronizer assembly and all the parts in front of synchronizer in turn from mainshaft.

Take off 1st and reverse speed gear from rear end of mainshaft, depress the thrust ring locking pin with screwdriver, turn the thrust ring and remove it.

Note: When removing the thrust ring avoid the rebound of the locking pin by the spring.

5. Remove reverse speed gear shaft lock plate, pull out the reverse speed gear shaft with extractor, and take out the reverse speed gear, bearing and spacer through inspection hole of reverse speed.

6. Take off the countershaft front and rear bearing cover, countershaft lock plate and nut, put the copper rod against the front end of the countershaft and knock the copper rod to move out the countershaft assembly a little, remove the rear bearing from countershaft with extractor.
Transmission

7. Slope the front end of countershaft assembly upward to take out the countershaft assembly from transmission casing.

   Put a copper rod against the countershaft front bearing outer ring and then tap the copper rod to take out the bearing outer ring. Remove the bearing inner ring and nap ring from countershaft, press the engagement gear out with press machine, then take off another snap ring, press the other gears and spacers out with press machine in turn.

Check

1. Check the backlash of each pair of gears.
   - Standard dimension: 0.15~0.26mm
   - Service limit: 0.50mm

2. Check the axial clearance of each gear.
   - The axial clearance of mainshaft 2nd speed gear:
     - Standard dimension: 0.05~0.37mm
     - Service limit: 0.40mm
   - The axial clearance of mainshaft 4th speed gear:
     - Standard dimension: 0.10~0.35mm
     - Service limit: 0.40mm
   - The axial clearance of mainshaft and input shaft gears:
     - Standard dimension: <0.30mm
Transmission

Assembly Point

Countershaft assembly

Press on gear and spacer according to the counter procedure of disassembly, assemble snap ring with simple taper tool.

Note: Before press on gear, the gear key groove must align with key on the shaft to avoid damaging. Make sure that the axial clearances of each gear correspond to standard axial clearance.

(1) Upper taper sleeve
(2) Snap ring
(3) Down taper sleeve

Mainshaft assembly

Assemble each gear synchronizer from front and rear end according to the counter procedure of disassembly.

Note: when assemble 2nd and 3rd synchronizer; make sure that the bulging part of sliding sleeve face forward.

Make sure that the axial clearances of each gear correspond to standard axial clearance.

Sub assembly assemble

1. Mount the countershaft assembly into countershaft hole of transmission assembly in correct direction.

2. Align the countershaft at countershaft front bearing hole of front end of casing, cover the front bearing, tap the bearing outer ring regularly with copper rod until the bearing get close to axle journal pedestal sit, cover the rear bearing from body rear end, tap the bearing outer ring regularly with copper rod until the bearing get close to axle journal pedestal sit, cover the lock plate, tighten the locking nut with the tightening torque of 146Nm, turn over the lock plate to lock the nut, put on the snap ring at the bearing outer ring.
3. Put the needle bearing and spacer into reverse speed gear inner hole, put the reverse speed gear through the reverse speed gear inspecting hole, insert the reverse speed gear shaft from the transmission casing rear end, seize the lock plate with the bolt to fix it.

4. Put the main shaft into casing, cover the rear bearing from mainshaft rear end, tap the bearing with copper rod to make the bearing get close the shoulder of main-shaft spline, cover the drive gear of speedometer and spacer, then put the snap ring at bearing outer ring.

5. Press the rear bearing into input shaft, assemble the snap ring and the steel ring of bearing outer ring, put the mainshaft front bearing into inner hole.

6. Put the input shaft into casing front end bearing hole, align the mainshaft front end axle journal with the front bearing hole, tap the input shaft rear bearing slightly with copper rod, rotate the input shaft with had, put the bearing into casing seating hole smoothly.
7. Put the sealing gasket with sealing glue form input shaft front end to the positing place of bearing cover, cover the bearing cap and tighten it with bolt.
   Note: Install the clutch release sleeve return spring bracket at the upper left bolt or the bearing cap.

8. Install each sealing gasket with sealing glue onto countershaft front and rear bearing cap, power-take-off cover, reverse speed inspecting hole cover and main-shaft rear bearing cap, tighten them with bolts.
   Note: Spread or sealing glue at the thread of bolt.

9. Install oil ring, fix the parking brake assembly onto mainshaft rear bearing cap, then cover the parking brake flange onto mainshaft, install disk like washer, tighten the locking nut.
   Tightening torque 196~245Nm

Assemble of the assembly

Before assemble transmission onto truck, make sure that the corresponding parts is tightened.

1. Install transmission and bracket as a assembly into truck with transmission jack and steel wire, make sure that input key into clutch driven disc hub spline.

2. Install clutch booster or clutch slave cylinder, return spring and dowel pin. Adjust free running for clutch outer pull rod.
   Free running for clutch outer pull rod 2~3mm

3. Install transmission operating tie rod.

4. Install propeller shaft and central supporter.
   Propeller shaft tightening torque 215~245Nm
   Central supporter tightening torque 160~220Nm

5. Connect all the circuits and pipe lines.

6. Make sure that drain plug screw is tightened, and gear oil, then tighten plug screw of oil filler.
   Tightening torque 120~140Nm
Transmission

Transmission Control System

General Construction
Transmission control mechanism

1. Gear shift knob assy
2. Shift lever assy
3. Shift rocker shaft
4. Selector rocker shaft
5. Bushing
6. Selector rocker and shift sleeve sets
7. Sheathing
8. Selector return spring
9. Buffer shell
10. Flexible shaft and rocker shaft bracket sets
11. Shift and selector flexible shaft with ball joint assy
12. Flexible shaft clip board
13. Upper bracket, double hose clip
14. Shift, selector flexible shaft clip board
15. Flexible shaft bracket assy
16. Pin
17. Selector rocker
18. Pin needle, bushing
Check and Adjustment

Note for installation of flexible shaft

1. Ensure the adjustment for flexible shaft is making in clear environment. If the dirt goes into the tie rod, it will goes into the flexible shaft interior when tie rod move, and cause the damage for flexible shaft core.

2. When adjusting the flexible shaft, do not hold dirt boot by hand to avoid the damage for interior parts. Do not tap the dirt boot with tool.

3. Do not damage the exteriors of flexible shaft and any sealing parts.

Adjustment of selective shift flexible shaft

1. Fit the ball joint assembly at the connecting end of selective shift flexible shaft and gear shift, then push the flexible shaft to the bottom to adjust the ball joint and big nut, the dimension of A should meet the requirement.

   A = 185±1mm

   (1) Ball joint
   (2) Adjusting nut
   (3) Locking nut

2. Install the rubber, push the rear end of flexible shaft to the bottom to adjust the adjusting nut the length of B should be 205mm. Ensure the relative angle of flexible shaft clip and rubber connector is 90 degree.

   (1) Flexible shaft clip
   (2) Adjusting nut
   (3) Rubber connector
Adjustment of selective shift flexible shaft

1. Fit the ball joint assembly at the connecting end of selective shift flexible shaft and gear shift, then push the flexible shaft to the bottom to adjust the boll joint and big nut, the dimension of A should meet the requirement.

   \[ A = 193 \pm 1 \text{mm} \]

   (1) Ball joint
   (2) Adjusting nut
   (3) Locking nut

2. Push the rear end of flexible shift to the bottom, screw the adjusting nut to made the length of C is 214±1mm, and ensure the angle relation ship of two ball joint and the angle relationship of ball joints and flexible shaft clip.

   After finished the adjustment, tighten the adjusting nut.

   (1) Ball joint
   (2) Adjusting nut

Installation of flexible shaft

The selective shift flexible shaft assembly adjusted according to the above way can be assembled on the truck.

1. Loosen the big nut of front end, let the flexible shaft go through the bracket and the dirt boot plate, and then tighten the big nut.

2. Connect the ball joint assembly with selective arm together with self-locked nut. The flexible shaft dirt boot must be fitted on the fixed plate.

   1. Adjusting nut  2. Supporter
   3. Ball joint      4. Locking nut
   5. Selective arm  6. Operating shift
   7. Floating supporter  8. Fixed plate
   9. Dirt boot

3. Fit the front end of flexible shaft, then fit the rear end, connect it with the transmission assembly, first fit the
flexible shaft clip on the bracket, then connect the flexible shaft with shift rock arm, the transmission should be in neutral position.

When assembling, the flexible shaft core must not be twisted. When connecting the flexible shaft with gearbox, the end section of flexible shaft should be about 100mm line, then it can be bent, the bending radius is not less than 200mm.

When connecting the flexible shaft two end with other parts, pay attention to assemble direction, it should not be crooked.

Lubrication normally

Lubricating grease need not be used in flexible shaft control system. If the noise is found in operating the flexible shaft control system or it is difficult to operate the control system, it is necessary to turn over the cab to check whether the lubricating grease is sufficient in dirt boot of shift level support ball knob and in dirt boot of flexible shaft ball joint assembly. If necessary, add the No.2 industrial Li base lubricating grease.
Propeller Shaft

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# Propeller Shaft

## Technical Parameter

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Universal joint type</td>
<td>Spider type</td>
</tr>
<tr>
<td>Center bearing</td>
<td>Slide a little along lengthways in the center bearing seat</td>
</tr>
<tr>
<td>Universal joint max oscillatory angle</td>
<td>± 20°</td>
</tr>
<tr>
<td>Max spline slippage (mm)</td>
<td>54</td>
</tr>
</tbody>
</table>

## Maintenance Standard

Unit: mm

<table>
<thead>
<tr>
<th>Item</th>
<th>Standard dimension</th>
<th>Service limit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radial motion of propeller shaft</td>
<td>0~0.75</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>Slip spline backlash</td>
<td>0.025~0.115</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Clearance of universal joint and needle bearing</td>
<td>-</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Axial clearance of center bearing</td>
<td>-</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Center bearing bearing seat inside hole surface worn</td>
<td>-</td>
<td>0.05</td>
<td></td>
</tr>
</tbody>
</table>

## Tightening Torque

Unit: N.m

<table>
<thead>
<tr>
<th>Item</th>
<th>Tightening Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propeller shaft flange fork connecting nut</td>
<td>90~110</td>
</tr>
<tr>
<td>Center bearing locking bolt and nut</td>
<td>901~10</td>
</tr>
</tbody>
</table>

## Trouble Analysis

<table>
<thead>
<tr>
<th>Trouble (Running)</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal vibration in the running</td>
<td>Connecting bolts on the propeller shaft loosely</td>
<td>Tighten bolts or nuts</td>
</tr>
<tr>
<td>Propeller shaft vibration</td>
<td>Propeller shaft has not been reassembled in accordance with the mark on it</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Propeller shaft tube is bent</td>
<td>Reassemble it in accordance with the mark</td>
</tr>
<tr>
<td></td>
<td>Renewed major components without dynamic balance</td>
<td>Check or renew</td>
</tr>
<tr>
<td></td>
<td>Center bearing rubber washer slacken or failed</td>
<td>Dynamic balance correct</td>
</tr>
<tr>
<td>Universal joint or slip yoke worn out early</td>
<td>Oil seal failed</td>
<td>Tighten or replace</td>
</tr>
<tr>
<td></td>
<td>Not fill grease regularly or not fill enough oil</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fill with enough lubricating grease periodic</td>
</tr>
</tbody>
</table>
Propeller Shaft

Structure

1. Flange fork
2. Bolt
3. Cross shaft needle bearing assy
4. Dust collar
5. Cross shaft
6. Grease nipple
7. Snap ring for holes
8. Slip york assy
9. Grease fitting
10. Slip york oil seal
11. Oil seal spacer
12. Oil seal cover
13. Propeller shaft assy
Propeller Shaft Maintenance

Propeller shaft vibration

If the propeller shaft vibrates during high speed, please first check its radial runout.

1. Support the rear axle up.

2. Turn the propeller shaft, and check one point of the propeller shaft for its radial runout.
Propeller Shaft

Measure point of the propeller shaft (mm):
A=155
B=165
C=185

3. If the radial runout is above the limit value, remove the connecting flange of one end of the rear axle, and turn it for 180° then install the propeller shaft.

4. Check the radial runout again, if it still beyond the limit value, replace the propeller shaft.

5. Road tests.

Appearance check

Check the surface of the propeller shaft for any cracks or pit. If there were, replace the propeller shaft.

Disassembly and assembly

Make marks on the flange disc and remove the propeller shaft from the end of the rear axle.

Pull the propeller shaft out from the power train, and plug the protruded part of the power train with plug.
Check

Check the radial runout of the propeller shaft, and if it is beyond the limit value, replace the propeller shaft.

Check the axial freedom of the spider shaft

If the axial freedom of the spider shaft is beyond the limit value, you have to replace the spider shaft assembly.

Disassembly

Disassemble the spider shaft.

1. Make marks on the propeller shaft and flange fork.

2. Remove the snap ring.
3. Knock the flange fork with a hammer, and don't damage the holes of the spider shaft and flange fork when disassembling the spider shaft.

4. Disassemble the spider shaft bearing of the other end in the same way. Make marks on the dismantled parts, and you may not change their original position when reassembling.

Assembly

Spider shaft

1. Install the spider shaft bearing, apply some grease on the surface of the bearing inside face.

   Never miss the needle of the needle bearing when assembling.

2. Select a snap ring to make the spider shaft among the required axial clearance and install it. The thickness of the selected snap ring should be below 0.06mm.
3. Eliminate the clearance between bearing and snap ring by knocking flange fork.

4. Check the flexibility and axial freedom of the spider shaft.

### Maintain

**Replace of the front oil seal**

Note:

The adjusted spacer is used for the driveline. After the disassembly of the flange, it is necessary to adjust the pretightening force of the bearing, so the main retarder needs to be repaired.

1. Remove the propeller shaft.
2. Loose the end face nut.
3. Remove the connecting flange.
4. Remove the front oil seal.
5. Apply some grease on the lip cavity of the oil seal and then press it into the oil seal seat.

6. Assemble the flange disc and drive gear nut.

7. Assembly the propeller shaft.

Disassembly and Assembly

Disassemble
  Remove the propeller shaft.
  After removing the propeller shaft, plug the output port of the transmission by plug.
  Remove the axle housing half axle.

Note:
  Don't damage the spline, sleeve flange fork and front oil seal when removing the propeller shaft.

Assemble
  Fill with recommended gear lubricant.
Steering System

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Steering System

Note:
Before disassembly, carefully clean the surface of the parts.
Please do the disassembly in a cleaning environment to avoid dust or any other filth enter the parts.
Put the removed parts in order and it may be convenient to reassemble.
Clean the parts with nylon or soft paper.
Before checking or assembling, clean all the parts with liquid carefully.
You'd better apply a layer of transmission lubricant on the surface of the parts before assembly. Apply a layer of vaseline on the surface of hydraulic pressure parts and O-type oil seal.
Replace all of the oil seal, spacer and O-ring. Avoid using the used spacer, oil seal and O-ring when assembling. After assembly, you must have a test run.

Check

Check the free travel of the steering wheel

Measure the free travel of the steering wheel when it is set on the center.

Free travel \( \leq 35\text{mm} \)

If the measured value isn't in this range, check the steering gear clearance and the ball pin.

Check the center position of the steering wheel

Correct the center position of the steering wheel before dismantling.

Check

When the vehicle is running straight, check to see if the steering wheel is in the center position.

If not, disassemble the steering wheel and reassemble it.

Check the turning angle of the front wheel

Turn the steering wheel left and right to measure its maximum turning angle.

Inner wheel \( 38.5^\circ \pm 30' \)
Outer wheel \( 29.5^\circ \)
Steering System

Steering Wheel and Steering Column

1. Steering wheel assy
2. Annular ball bearing with doubled sided sealing ring
3. Steering column welding assy
4. Adjusting screw
5. Steering column bracket welding assy
6. Guiding fin
7. Saucer spring washer
8. Pressed nut
9. Adjustor wrench assy
10. Washer--fix wrench
11. Bolt--fix wrench

12. Return spring
13. Distance limit spacer sleeve
14. Steering shaft
15. Steering universal joint fork
16. Spider
17. Spider needle bearing assy
18. Steering universal joint fork with spline shaft
19. Oil sealing--sliding fork
20. Oil sealing cap--sliding fork
21. Steering sliding fork assy
22. Grease nipple shim--straight
23. Grease nipple--straight
Steering System

Steering column

When assembling the steering column, tighten the bolt and clip of the lower supporter by hand first. Then tighten the steering column under the condition that the steering column is out of force.

When assemble the steering cross shaft, you must check if the locking bolt and the sunk part is aligned.

Disassembly and Assembly

When do the disassembly and assembly, you have to unlock the steering lock by key.

Assure the surface of the spring lock ring is under the shaft.

Before insert the shaft into the sleeve, first install the spring lock ring.

Assemble the spring lock ring on the upper half shaft by special tool.
Steering System

Turning lock

Remove the fixed bolt of the clip.

Tighten the fixed bolt.

Note:
Take a look if the installing position of the steering lock is correct.

Adjusting mechanism

After assembling the steering shaft adjusting mechanism, check its moving condition.

Front, rear  \[\pm 6^\circ\]
Up, down  \[L3: \pm 15\text{mm}\]

Check

If the steering wheel can't be turned flexibly, please check the steering column by the following steps and replace the corresponding wearing parts.

Check the steering column bearing for any damage or weariness, and lubricate the bearing with proper grease. Replace the total steering column if necessary.

Check the steering column sleeve for distortion or damage, and replace it if necessary.
1. Power steering gear assembly
2. Elbow assembly, inlet oil
3. Upper bracket
4. Elbow assembly, outlet oil,
5. Bracket
6. Clip
7. Clip
8. Oil pump
9. Bolt--joint of the oil pump
10. Joint--inlet oil tubing
11. Jacket
12. High pressure hose assembly
13. Hose
14. Hose--steering gear to oil reservoir
15. Oil reservoir assembly, steering
Steering System

Steering Gear

Basic parameter

<table>
<thead>
<tr>
<th>Basic parameter</th>
<th>M11-3411010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate maximum load of front axle (kg)</td>
<td>3500</td>
</tr>
<tr>
<td>Max. output torque (N.m)</td>
<td>2150</td>
</tr>
<tr>
<td>Max. oil pressure (MPa)</td>
<td>13</td>
</tr>
<tr>
<td>Recommended oil pump flow (L/min)</td>
<td>10</td>
</tr>
<tr>
<td>Drive ratio</td>
<td>18:1</td>
</tr>
<tr>
<td>Number of total turns</td>
<td>4.78</td>
</tr>
<tr>
<td>Pitman arm shaft turning angle</td>
<td>± 45°</td>
</tr>
<tr>
<td>Temperature range (°C)</td>
<td>-40~120</td>
</tr>
<tr>
<td>Diameter of the piston (mm)</td>
<td>80</td>
</tr>
</tbody>
</table>

Maintenance

1. After 2,500km, the new power steering gear need to replace its hydraulic pressure oil, and wash the filter in the oil reservoir. Replace the hydraulic pressure oil and wash the filter ever 50,000km or every year after that.

2. Check the oil quantity every month to see whether it reduced, deteriorated or too much impurities. If there is any badness, you have to refill or replace the oil immediately.

3. Check and keep the tire pressure accord with the requirement.

4. Procedure of replace or fill oil

   (1) Support the front axle.

   (2) Open the oil reservoir, screw down the oil outer bolt of the steering gear, drain off the remain oil in the oil pump and the oil reservoir (idle the engine), and turn the steering wheel left and right to the limit for several times, till there is not oil flowing out.

   (3) Tighten the oil outer bolt (keep it clean and avoid dirt entered)

   (4) Fill with new hydraulic pressure oil.

   (5) Idle the engine, turn the steering wheel left and right to its limit for several times until there is no bubbles appeared in the oil reservoir and the oil level stop dropping.

   (6) Refill the oil reservoir to its maximum.

   (7) Tighten the upper cover of the oil reservoir.
## Trouble Analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bothway heavy steering</strong></td>
<td>1. Oil level in steering gear is not sufficient</td>
<td>Add oil to the upper mark</td>
</tr>
<tr>
<td></td>
<td>2. The connecting part between the oil outlet and the engine, and between the oil inlet of the steering oil pump and the engine, and between the oil pump and the engine sucked air.</td>
<td>Tighten oil pipe fitting or replace the sealing part</td>
</tr>
<tr>
<td></td>
<td>3. Too small flow of the steering oil pump (flow control valve blocked)</td>
<td>Disassemble and wash the flow control valve</td>
</tr>
<tr>
<td></td>
<td>4. Strainer screen of the oil reservoir damaged or blocked</td>
<td>Replace the filter cartridge and wash the oil suction pipeline between oil reservoir and oil pump</td>
</tr>
<tr>
<td></td>
<td>5. The movement between steering drive shaft and universal joint connecting with the steering gear is not flexible.</td>
<td>Move repeatedly until it becomes flexible, otherwise you have to replace the universal joint</td>
</tr>
<tr>
<td></td>
<td>6. Rotary valve blocked</td>
<td>Repair the steering gear</td>
</tr>
<tr>
<td></td>
<td>7. Improper oil pressure in the oil pump</td>
<td>Replace oil pump</td>
</tr>
<tr>
<td></td>
<td>8. Vehicle overload too much</td>
<td>Reduce load</td>
</tr>
<tr>
<td><strong>One-way heavy steering</strong></td>
<td>1. Tire pressure of one side isn’t enough.</td>
<td>Inflating</td>
</tr>
<tr>
<td></td>
<td>2. Only one direction of the steering gear leak out too much.</td>
<td>Repair the steering gear</td>
</tr>
<tr>
<td></td>
<td>3. The rotary valve isn’t in the neutral position.</td>
<td>Replace sealing part</td>
</tr>
<tr>
<td><strong>Heavy steering when quickly turning bothway</strong></td>
<td>1. The connecting part between the oil outlet of the steering oil reservoir and the engine, and between the oil inlet of the steering oil pump and the engine sucked air.</td>
<td></td>
</tr>
<tr>
<td><strong>Too large free travel of the steering wheel</strong></td>
<td>2. Too small flow capacity of the steering oil pump</td>
<td>Replace the steering oil pump</td>
</tr>
<tr>
<td></td>
<td>1. Steering wheel and steering shaft fit is loose</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>2. Connecting part of the steering drive device loosed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Fixed bolt of the steering gear and its bracket loosed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. Too big clearance between steering screw arbor and nut</td>
<td>Repair the steering gear</td>
</tr>
<tr>
<td></td>
<td>5. Leaf spring bolt loosed</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>6. Steering universal joint locking bolt loosed</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>7. Improper adjustment of the steering gear</td>
<td>Adjust side cover adjusting bolt</td>
</tr>
</tbody>
</table>
### Steering System

<table>
<thead>
<tr>
<th>Steering gear overheat (its temperature is over 65° C of the environment temperature)</th>
<th>1. Too much flow of the oil pump</th>
<th>Replace the oil pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The bending radius of the oil pipe is too small or the inner part is blocked and cause oil flowing difficult and heated</td>
<td>Replace the oil pump</td>
<td></td>
</tr>
<tr>
<td>3. Steering to the limit position need more than 5 seconds.</td>
<td>Avoid to turn to the limited position</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steering control is not flexible</th>
<th>1. Parts of steering system loose or wear</th>
<th>Tighten or replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Steering gear is loose</td>
<td>Tighten</td>
<td></td>
</tr>
<tr>
<td>3. Improper adjusting of the steering gear</td>
<td>Adjust the side cover bolt</td>
<td></td>
</tr>
<tr>
<td>4. Oil level of the oil reservoir is lower than the lowest mark</td>
<td>Add oil</td>
<td></td>
</tr>
<tr>
<td>5. Front axle leaf spring fixed bolt loosed</td>
<td>Tighten</td>
<td></td>
</tr>
<tr>
<td>6. Steering universal joint locking bolt loosed</td>
<td>Tighten</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steering wheel return failed</th>
<th>1. Insufficient tyre pressure</th>
<th>Inflating</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Too tight fit of the front axle parts</td>
<td>Adjust</td>
<td></td>
</tr>
<tr>
<td>3. Improper alignment of the front wheel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steering wheel return too quick</th>
<th>1. Insufficient oil in the steering oil reservoir</th>
<th>Add oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Air in the steering oil pipe</td>
<td>Exhaust</td>
<td></td>
</tr>
<tr>
<td>3. Clearance between steering drive shaft and the steering universal joint</td>
<td>Replace the steering universal joint</td>
<td></td>
</tr>
<tr>
<td>4. The input torque of the steering gear when idling is smaller than 40–60N.cm that the mesh of the nut and arm shaft loosed.</td>
<td>Adjust clearance</td>
<td></td>
</tr>
</tbody>
</table>
Front Axle

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Front Axle

Front Axle

Construction

Front axle, steering knuckle

1. Upper cover--steering knuckle
2. Gasket--steering knuckle upper cover
3. King pin--steering knuckle
4. Upper bush
5. Left steering knuckle
6. Lower bush
7. King pin blanking cover assy
8. Washer
9. Screw--king pin blanking cover
10. Grease nipple--neck
11. Double head bolt--steering knuckle arm
12. Upper arm--left steering knuckle
13. Left steering knuckle arm
14. Steering limit bolt
15. Dovetail form lockpin--king pin
16. Front axle
17. Adjusting spacer (2.1mm~2.8mm)
18. Thrust bearing assy
19. Right steering knuckle arm
20. Right steering knuckle
Disassembly of the Front Brake

1. Front dustproof shield
2. Rubber plug
3. Column pin--air chamber push-rod
4. Front brake bracket assy
5. Front brake air chamber assy
6. O-ring
7. Front brake cam
8. Bush--air chamber bracket
9. O-ring
10. Adjusting spacer
11. Front brake adjusting arm assy
12. Washer--brake cam
13. Adjusting washer
14. Front brake bottom plate assy
15. Shaft--brake shoe
16. Bush
17. Screw
18. Pin
19. Rivet
20. Brake friction plate
21. Front brake shoe
22. Return spring
Front Axle

Maintenance

Before using new axle, apply enough 2# lithium grease into every grease fitting.

First maintain

To assure the safe running of your vehicle and obtain a long service life, you have to do the first maintain after the first 1,500~2,500km after leaving factory. Please note the following items:

1. Dismantle and check the wheel hub for any abnormal wear (please go to the Assembly and Adjustment to see the reference)
2. Check the fastening piece.

Periodical maintain

Do the periodical maintain for the vehicle is a good way to prolong the service life and assure the safe running of the vehicle. If you follow the maintenance schedule to do the maintain, your vehicle may obtain the best economic benefit.

The items of the periodical maintain are as following:

1. Add some grease to the grease nipple
2. Avoid important nut loosed
3. Adjust wheel hub bearing pretightening force and toe-in
4. Adjust the brake clearance

Periodical Maintain Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Maintenance Interval Mileage (× 1000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean the axle assy</td>
<td>● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●</td>
</tr>
</tbody>
</table>
Front Axle

Assembly and Adjustment

Disassemble and assemble of the assembly
Front wheel hub brake drum assembly
1. Fixed the front axle and remove the wheel hub end cover;
2. Take off the cotter pin, adjusting nut and spacer;
3. Turn the wheel hub brake drum a little and pull it, gently knock at the brake drum at the same time to loose the inner ring of the outer bearing, then take down the wheel hub brake drum, but you need to pay attention that the assembly is so heavy that may be fallen down or hurt someone, and the inner ring of the outer bearing need to care at the same time, don't fall it.

The assembling sequence of the front wheel hub brake drum assembly is opposite to the above sequence, and you must to pay attention to the tightening torque of the thread connecting parts and the adjustment of the bearing pretightening force.

Adjustment of axle
Adjustment of axial clearance between front axle and steering knuckle
1. Install the steering knuckle and thrust bearing on the front axle, select the proper adjusting spacer (Note: only use one) to adjust the clearance and assure the clearance is ≤ 0.1mm;
2. Apply a layer of grease on the surface of the kingpin, align the lock pin slot of the kingpin to the lock pin hole of the front axle, then insert the kingpin and tighten the lock pin;
3. Before add the grease, measure both left and right of the starting force at cotter pin of steering knuckle journal, and the starting force should be ≤ 10 N.

Adjustment of front wheel hub pretightening force
1. Apply some 2# lithium grease on the thread of the steering knuckle shaft end and the wearproof spacer;
2. Tighten the locking nut by a torque of 120~150N.m;
3. Turn the wheel hub for 2~3 circles to correct the alignment of the bearing;
4. Tighten the locking nut by a torque of 120~150N.m;
5. Unscrew the locking nut for 1/3 circle, install the locking washer and limit spacer, and make the limit spacer align to the steering knuckle key slot and the adjusting nut limit pin;
6. Install the outer nut, tighten it with a torque of 120~150N.m;
7. Make sure if the pretightening force is correct. First, turn the wheel hub for 2~3 circles, then confirm the tangential force of the wheel hub bolt;
   The tangential force of the wheel hub is 20~50 N.

Adjustment of the toe-in
1. First, loose the locking bolt of the tie rod;
2. Turn the tie rod and make the toe-in is 0~4mm at the external diameter of the tire;
3. Tighten the fixed nut of the tie rod, and make the angle between left and right joint is not larger than 4°, and the angle of oscillation of the tie rod joint during the largest turning angle must have some over measure.

Adjustment of the steering angle
1. Adjust the limit screw of the turning angle, and make the max. turning angle of the inner wheel is 40°;
2. After adjusting the limit screw, tighten the locking nut.
Adjustment of the brake clearance

Turn the worm shaft and shoe shaft of the brake adjusting arm, made the surface of the brake shoe totally connected with the inner face of the brake drum, then loose 3–4 circles of the worm shaft, and adjust the clearance between brake drum inner face and brake shoe:

Shoe shaft end: 0.25–0.45mm;

Cam shaft end: 0.40–0.70mm, the clearance should be corresponding and the clearance difference between the upper and lower shoe is \( \leq 0.1 \)mm.

Trouble Analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel hub bearing is stugnant</td>
<td>Big pretightening force of the wheel hub bearing</td>
<td>Adjust pretightening force</td>
</tr>
<tr>
<td></td>
<td>Bearing lack of lubricating or improper grease</td>
<td>Add or replace the grease</td>
</tr>
<tr>
<td></td>
<td>Dust on the bearing</td>
<td>Clean and add some grease</td>
</tr>
<tr>
<td>Insufficient brake force</td>
<td>Cam shaft turns inflexibly</td>
<td>Check the cam for its working condition</td>
</tr>
<tr>
<td></td>
<td>Improper adjustment of the brake air chamber push rod travel</td>
<td>Adjust travel</td>
</tr>
<tr>
<td></td>
<td>Friction plate overheated or deterioration</td>
<td>Replace friction plate</td>
</tr>
<tr>
<td></td>
<td>Improper connecting condition of the friction plate</td>
<td>Correct the joint position of friction plate</td>
</tr>
<tr>
<td></td>
<td>Water entered the brake drum</td>
<td>Press down the brake pedal during running to exhaust the water</td>
</tr>
<tr>
<td></td>
<td>Grease on the connecting face of the friction plate or the brake drum</td>
<td>Cleanup the grease or replace friction plate</td>
</tr>
<tr>
<td>Abnormal noise while braking</td>
<td>Friction plate worn and rivet appeared</td>
<td>Replace friction plate</td>
</tr>
<tr>
<td></td>
<td>Friction plate surface hardening or deterioration</td>
<td>Replace friction plate</td>
</tr>
<tr>
<td></td>
<td>Brake drum uneven worn or loose installed</td>
<td>Correct brake drum or tighten the bolt</td>
</tr>
<tr>
<td></td>
<td>Brake shoe and friction plate connected loosely</td>
<td>Replace rivet</td>
</tr>
<tr>
<td></td>
<td>Brake shoe fixed pin loosed</td>
<td>Tighten fixed pin locking screw</td>
</tr>
<tr>
<td></td>
<td>Wheel hub bearing worn</td>
<td>Replace wheel hub bearing</td>
</tr>
<tr>
<td></td>
<td>Brake drum distortion</td>
<td>Replace brake drum</td>
</tr>
<tr>
<td>Wheel unsmooth</td>
<td>Cam shaft lack of lubricating or adjusting arm doesn't return</td>
<td>Add grease or correct troubled parts</td>
</tr>
<tr>
<td></td>
<td>Return spring of the brake shoe or air chamber broken or fatigue</td>
<td>Replace troubled parts</td>
</tr>
<tr>
<td>Front Axle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Steering wheel heavily manipulated</strong></td>
<td><strong>Improper adjustment of the wheel alignment</strong></td>
<td>(too big caster) Check and adjust</td>
</tr>
<tr>
<td></td>
<td><strong>Too big clearance between kingpin and bush</strong></td>
<td>Check and adjust the clearance</td>
</tr>
<tr>
<td></td>
<td><strong>Thrust bearing installed on the contrary</strong></td>
<td>Correct the installation</td>
</tr>
<tr>
<td></td>
<td><strong>Front axle lacks of lubricating</strong></td>
<td>Add some grease</td>
</tr>
<tr>
<td></td>
<td><strong>Ball connecting overtighten or too loose</strong></td>
<td>Check and lubricate ball head pin</td>
</tr>
<tr>
<td><strong>Pendulate</strong></td>
<td><strong>Front wheel hub bearing worn</strong></td>
<td>Replace wheel hub bearing</td>
</tr>
<tr>
<td></td>
<td><strong>Kingpin and bush overworn</strong></td>
<td>Correct or replace troubled parts</td>
</tr>
<tr>
<td></td>
<td><strong>Steering knuckle distortion</strong></td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td><strong>Improper wheel alignment</strong></td>
<td>Check and adjust</td>
</tr>
<tr>
<td><strong>Pulling to one side</strong></td>
<td><strong>Improper wheel alignment</strong></td>
<td>Check and adjust</td>
</tr>
<tr>
<td></td>
<td><strong>Front axle bent</strong></td>
<td>Correct or replace</td>
</tr>
<tr>
<td></td>
<td><strong>Brake unsmooth</strong></td>
<td>See the relative brake items</td>
</tr>
<tr>
<td></td>
<td><strong>Front wheel hub bearing nut loosed</strong></td>
<td>Tighten accord to the required torque</td>
</tr>
<tr>
<td><strong>Tire unevenly worn or earlier worn</strong></td>
<td><strong>Improper wheel alignment</strong></td>
<td>Check and adjust</td>
</tr>
<tr>
<td></td>
<td><strong>Wheel hub bearing worn or damaged</strong></td>
<td>Replace wheel hub bearing</td>
</tr>
<tr>
<td></td>
<td><strong>Bearing nut loosed</strong></td>
<td>Tighten accord to the required torque</td>
</tr>
<tr>
<td></td>
<td><strong>Ball pin, kingpin and bush overtightened or slackened</strong></td>
<td>Correct or replace the troubled parts</td>
</tr>
</tbody>
</table>
Appendix 1  Lubricating Parts and Lubricant

Lubricating parts

<table>
<thead>
<tr>
<th>Item</th>
<th>Maintenance Interval Mileage (× 1000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First maintain</td>
</tr>
<tr>
<td>Steering knuckle kingpin</td>
<td>●</td>
</tr>
<tr>
<td>Tie rod ball pin</td>
<td>●</td>
</tr>
<tr>
<td>Wheel hub bearing</td>
<td>●</td>
</tr>
<tr>
<td>Adjusting arm</td>
<td>●</td>
</tr>
<tr>
<td>Cam bracket</td>
<td>●</td>
</tr>
</tbody>
</table>

Lubricant

<table>
<thead>
<tr>
<th>Part</th>
<th>Lubricant</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering knuckle kingpin</td>
<td>lithium grease</td>
<td>2#</td>
</tr>
<tr>
<td>Tie rod ball pin</td>
<td>lithium grease</td>
<td>2#</td>
</tr>
<tr>
<td>Wheel hub bearing</td>
<td>lithium grease</td>
<td>2#</td>
</tr>
<tr>
<td>Adjusting arm</td>
<td>lithium grease</td>
<td>2#</td>
</tr>
<tr>
<td>Cam bracket</td>
<td>lithium grease</td>
<td>2#</td>
</tr>
</tbody>
</table>

Appendix 2  Tightening Torque of the Bolts and Nuts

<table>
<thead>
<tr>
<th>Part</th>
<th>Tighten Torque (N.m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steering draglink arm nut</td>
<td>120–140</td>
</tr>
<tr>
<td>Nut of the left and right steering knuckle arm</td>
<td>120–140</td>
</tr>
<tr>
<td>Front brake bottom plate bolt</td>
<td>140–170</td>
</tr>
<tr>
<td>Air chamber bracket fixed bolt</td>
<td>55–70</td>
</tr>
<tr>
<td>Air chamber fixed bolt</td>
<td>55–70</td>
</tr>
<tr>
<td>Pin lock nut</td>
<td>55–70</td>
</tr>
<tr>
<td>Steering limit bolt locking nut</td>
<td>80–100</td>
</tr>
<tr>
<td>Steering ball pin nut</td>
<td>130–160</td>
</tr>
<tr>
<td>Tie rod clamp nut</td>
<td>40–60</td>
</tr>
<tr>
<td>Front adjusting nut</td>
<td>120–150</td>
</tr>
<tr>
<td>Kingpin plug cover screw</td>
<td>40–60</td>
</tr>
</tbody>
</table>
## Main Adjusting Data

### Adjusting Item

<table>
<thead>
<tr>
<th>Item</th>
<th>Adjusting Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toe-in</td>
<td>0~4mm</td>
</tr>
<tr>
<td>Turning angle of the inside wheel</td>
<td>40°</td>
</tr>
<tr>
<td>Clearance between front axle first surface and the steering knuckle</td>
<td>( \leq 0.1 \text{mm} )</td>
</tr>
<tr>
<td>Clearance between front fiction plate and brake drum</td>
<td>Shoe shaft end, 0.25<del>0.45mm; Cam shaft end, 0.40</del>0.70mm; Clearance difference between two shoes of the same side is (&lt; 0.1 \text{mm} )</td>
</tr>
</tbody>
</table>

## Maintaining Standard

<table>
<thead>
<tr>
<th>Item</th>
<th>Maintaining Standard</th>
<th>Wear Limit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside diameter of kingpin</td>
<td>31.9~32mm</td>
<td>31.9mm</td>
<td></td>
</tr>
<tr>
<td>Clearance between kingpin and steering knuckle bush</td>
<td>0.025~0.077mm</td>
<td>0.20mm</td>
<td></td>
</tr>
<tr>
<td>Clearance between kingpin and front axle hole</td>
<td>0.01~0.052mm</td>
<td>0.10mm</td>
<td></td>
</tr>
<tr>
<td>Clearance between steering knuckle and front axle</td>
<td>( \leq 0.05 \text{mm} )</td>
<td>0.15 spacer adjustment</td>
<td></td>
</tr>
<tr>
<td>Starting force of steering knuckle</td>
<td>( \leq 10 \text{N} )</td>
<td></td>
<td>Measure at cotter pin of shaft head</td>
</tr>
<tr>
<td>Starting force of front wheel hub</td>
<td>20~50N</td>
<td></td>
<td>Measure at the bolt of wheel</td>
</tr>
</tbody>
</table>
# Rear Axle

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<table>
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<th>Section</th>
<th>Page</th>
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<td>Maintenance</td>
<td>RA-3</td>
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<tr>
<td>Assembly and Adjustment</td>
<td>RA-4</td>
</tr>
<tr>
<td>Trouble Analysis</td>
<td>RA-8</td>
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<tr>
<td>Lubricating Parts and Lubricant</td>
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<tr>
<td>Tightening Torque of Important Bolts and Nuts</td>
<td>RA-7</td>
</tr>
<tr>
<td>Main Adjusting Data and Maintaining Standard</td>
<td>RA-8</td>
</tr>
</tbody>
</table>
Rear Axle

Rear Axle

Structure

Rear axle housing and half axle

1. Conical bush--axle shaft bolt
2. Axle shaft--rear axle
3. Gasket-axle shaft
4. Double head bolt (small teeth)
5. Inner oil seal support ring--rear axle
6. Housing assembly--rear axle (include NO.5)
7. Ventilate plug assembly
8. Oil filling plug
9. Oil level indicating plug
10. Oil drain plug assembly

RA-1
Disassembly of the brake

1. Cotter pin
2. Brake adjusting arm
3. Cotter pin
4. Plain washer
5. U-fork
6. Flat pin
7. Locking nut
8. Spring air chamber
9. Air chamber bracket
10. Cam ring cage ring
11. Bolt
12. Spring washer
13. Rubber plug
14. Dustproof shield
15. Brake bottom plate
16. Set screw
17. Steel lock wire
18. Supporting pin
19. Rivet
20. Brake bush
21. Brake shoe
22. Return spring
23. Return spring pin
24. Spring washer
25. Screw
26. Roller pin shaft
27. Roller
28. Clamp ring
29. Dustproof shield
30. Grease nipple
31. Bush
32. Oil seal
33. Cam shaft
34. Brake friction plate
Rear Axle

Maintenance

Before using new axle, apply enough 2# lithium grease into every grease fitting.

First maintain

To assure the safe running of your vehicle and obtain a long service life, you have to do the first maintain after the first 1,500~2,500km after leaving factory. Please note the following items:

1. Add or replace the gear oil for the reductor;
2. Dismantle and check the wheel hub brake drum assembly for any abnormal wear (please go to the Assembly and Adjustment to see the reference)
3. Check the fastening piece.

Periodical maintain

Do the periodical maintain for the vehicle is a good way to prolong the service life and assure the safe running of the vehicle. If you follow the maintenance schedule to do the maintain, your vehicle may obtain the best economic benefit.

The items of the periodical maintain are as following:

1. Add some grease to the grease nipple
2. Avoid important nut loosed
3. Adjust wheel hub bearing pretightening force and brake clearance
4. Add and replace the gear oil for the reductor

Periodical Maintain Schedule

<table>
<thead>
<tr>
<th>Item</th>
<th>Maintenance Interval Mileage ( × 1000km)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First maintain</td>
</tr>
<tr>
<td>Clean the axle assy</td>
<td></td>
</tr>
<tr>
<td>Check main reductor for leakage</td>
<td>●</td>
</tr>
<tr>
<td>Replace grease of main reductor</td>
<td>●</td>
</tr>
<tr>
<td>Check lubricant level of the main reductor and clean the vent plug</td>
<td>●</td>
</tr>
<tr>
<td>Check tightness of the important bolts</td>
<td>●</td>
</tr>
<tr>
<td>Clean and adjust wheel hub bearing</td>
<td>●</td>
</tr>
<tr>
<td>Do the magnetic particle test to half axle sleeve</td>
<td>●</td>
</tr>
<tr>
<td>Check service brake and parking brake efficiency</td>
<td>●</td>
</tr>
<tr>
<td>Check the tightness of the brake bottom plate</td>
<td>●</td>
</tr>
<tr>
<td>Clean brake air chamber</td>
<td>●</td>
</tr>
<tr>
<td>Check brake pipeline for leakage</td>
<td>●</td>
</tr>
</tbody>
</table>
Assembly and Adjustment

Disassemble and assemble of the assembly

**Rear wheel hub brake drum assembly**
1. Fix the rear axle and remove the half axle bolt by a spanner;
2. Pull out the half axle gently and when the spline passing the oil seal, turn the half axle slowly to avoid damaging the half axle oil seal;
3. Take down three screws of the stop spacer by a screwdriver, then remove the stop spacer and dismantle the adjusting nut by a spanner;
4. Turn the wheel hub brake drum a little and pull it, gently knock at the brake drum at the same time to loose the inner ring of the outer bearing, then take down the wheel hub brake drum, but you need to pay attention that the assembly is so heavy that may be fallen down or hurt someone, and the inner ring of the outer bearing need to care at the same time, don't fall it.

The assembling sequence of the rear wheel hub brake drum assembly is opposite to the above sequence, and you must pay attention to the tightening torque of the thread connecting parts and the adjustment of the bearing pretightening force.

Assembly of the main reducer assembly
1) Assembly of the drive gear
   1. Press the outer ring of the front inner and outer bearing into the bearing seat;
   2. Press the oil seal on the oil seal seat;
   3. Press the inner ring of the front inner bearing onto the drive gear, and install the spacer sleeve, adjusting spacer, bearing seat assembly and front outer bearing inner ring in sequence at the spline end of the gear;
   4. Measure the pretightening load of the drive gear bearing: install the oil seal assembly, thrust washer, flange fork and washer, then tighten the castle nut with a torque 350~500N.m and measure the pretightening force at this time, the starting force of pulling the flange hole of the bearing seat should be 12~30N;
   5. If the pretightening force is disqualified, you need to replace the adjusting spacer, reassemble to qualified;
   6. Make use of a cotter pin to lock the castle nut.

2) Assembly of the differential
   1. Install the bearing to the left and right differential housing;
   2. Install planet gear, half axle gear, cross shaft, planet gear supporting washer, and half axle gear supporting washer;
   3. Measure the tooth space of the planet gear of the differential, check the clearance between half axle gear supporting end face and the supporting washer with a clearance gauge, it should be \(\leq 0.8\) mm;
   4. Align the marks of left and right differential housing and then assemble.

   **Tightening torque:** 140~160N.m

3) Assembly of the main reducer assembly
   1. After assembled the bearing outer ring of the differential, install it onto the main reducer housing;
   2. Install the adjusting nut and the bearing cover, then fasten with bolts;
   3. Equably tighten the adjusting nut to pretighten the load until the pretightening load is between 16.4~24.3N;
   4. Install the adjusting spacer of main cone to the bearing seat and assemble the drive conical gear assembly;
   5. Adjust the gear tooth space to 0.20~0.40mm:
      The change value of the tooth space \(\leq 0.15\) mm
Rear Axle

6. Paint two or three engaged teeth of driven gear red to check the contact zone, if the contact area is improper, increase or reduce the thickness of the adjusting spacer until it is proper;

Sketch map of the contact zone is as follows:

<table>
<thead>
<tr>
<th></th>
<th>Gear contact zone</th>
<th>Adjusting method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Proper contact zone</td>
<td>No need to adjust</td>
</tr>
<tr>
<td>2</td>
<td>The drive gear &amp; the driven gear is too far</td>
<td>The drive gear and the driven gear is too far (reduce the thickness of the spacer)</td>
</tr>
<tr>
<td>3</td>
<td>The drive gear &amp; the driven gear is too near</td>
<td>The drive gear and the driven gear is too near (increase the thickness of the spacer)</td>
</tr>
<tr>
<td>4</td>
<td>The contacting area of the driven tapered gear is too low</td>
<td>The drive gear and the driven gear is too near (increase the thickness of the spacer)</td>
</tr>
<tr>
<td>5</td>
<td>The contacting area of the driven tapered gear is too high</td>
<td>The drive gear and the driven gear is too far (reduce the thickness of the spacer)</td>
</tr>
</tbody>
</table>

7. Tighten the bearing cover fixed bolt, reassemble the stop spacer.

Adjustment of the axle

Adjustment of the brake clearance

No matter if the brake clearance is too big or too small, it will affect the brake efficiency of the vehicle. Please adjust the worm shaft hex-head of the adjusting arm by a spanner. Firstly, turn it with the clockwise until you can't turn to make the clearance become zero, then turn with the counter clockwise until you hear two sounds of steel ball, and the middle part clearance of the brake friction plate is 0.4~0.7mm.
Adjustment of the rear wheel bearing pretightening force

1. Remove the stop spacer first;

2. Tighten the adjusting nut by a special spanner with a torque of 150~180N.m;

3. Turn the wheel hub 2~3 circles, and make the bearing aligned correctly;

4. Fasten the adjusting nut with a tightening torque of 150~180N.m;

5. Reverse the adjusting nut for 1/8~1/6circle;

6. Make sure if the pretightening force is correct. First, turn the wheel hub for 2~3 circles, then confirm the tangential force of the wheel hub bolt;

   The tangential force of the wheel hub bolt is 30~60 N.

### Trouble Analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel hub bearing is stugnant</td>
<td>Big pretightening force of the wheel hub bearing</td>
<td>Adjust pretightening force</td>
</tr>
<tr>
<td></td>
<td>Bearing lack of lubricating or improper grease</td>
<td>Add or replace the grease</td>
</tr>
<tr>
<td></td>
<td>Dust on the bearing</td>
<td>Clean and add some grease</td>
</tr>
<tr>
<td>Insufficient brake force</td>
<td>Cam shaft turns inflexibly</td>
<td>Check the cam for its working condition</td>
</tr>
<tr>
<td></td>
<td>Improper adjustment of the brake air chamber push rod travel</td>
<td>Adjust travel</td>
</tr>
<tr>
<td></td>
<td>Friction plate overheated or deterioration</td>
<td>Replace friction plate</td>
</tr>
<tr>
<td></td>
<td>Improper connecting condition of the friction plate</td>
<td>Correct the joint position of friction plate</td>
</tr>
<tr>
<td></td>
<td>Water entered the brake drum</td>
<td>Press down the brake pedal during running to exhaust the water</td>
</tr>
<tr>
<td></td>
<td>Grease on the connecting face of the friction plate or the brake drum</td>
<td>Cleanup the grease or replace friction plate</td>
</tr>
<tr>
<td>Abnormal noise while braking</td>
<td>Friction plate worn and rivet appeared</td>
<td>Replace friction plate</td>
</tr>
<tr>
<td></td>
<td>Friction plate surface hardening or deterioration</td>
<td>Replace friction plate</td>
</tr>
<tr>
<td></td>
<td>Brake drum uneven worn or loose installed</td>
<td>Correct brake drum or tighten the bolt</td>
</tr>
<tr>
<td></td>
<td>Brake shoe and friction plate connected loosely</td>
<td>Replace rivet</td>
</tr>
<tr>
<td></td>
<td>Brake shoe fixed pin loosed</td>
<td>Tighten fixed pin locking screw</td>
</tr>
<tr>
<td></td>
<td>Wheel hub bearing worn</td>
<td>Replace wheel hub bearing</td>
</tr>
<tr>
<td></td>
<td>Brake drum distortion</td>
<td>Replace brake drum</td>
</tr>
<tr>
<td>Wheel unsmooth</td>
<td>Cam shaft lack of lubricating or adjusting arm doesn't return</td>
<td>Add grease or correct troubled parts</td>
</tr>
<tr>
<td></td>
<td>Return spring of the brake shoe or air chamber broken or fatigue</td>
<td>Replace troubled parts</td>
</tr>
</tbody>
</table>
### Abnormal noise while driving

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper gear space of the differential</td>
<td>Replace spacer or gear</td>
</tr>
<tr>
<td>Too big clearance between drive gear and driven gear</td>
<td>Replace spacer or gear</td>
</tr>
<tr>
<td>Drive gear bearing pretightening force too small</td>
<td>Adjust pretightening force</td>
</tr>
<tr>
<td>Half axle gear, planet gear, and cross shaft worn or damaged</td>
<td>Correct or replace troubled parts</td>
</tr>
<tr>
<td>Oil level too low</td>
<td>Add enough lubricant</td>
</tr>
</tbody>
</table>

### Lubricant leaks

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil seal worn, loosed or damaged</td>
<td>Replace oil seal</td>
</tr>
<tr>
<td>Fasten bolt loosed or sealant failed</td>
<td>Tighten bolt or smear the sealant again</td>
</tr>
<tr>
<td>Bearing seat fasten bolt loosed</td>
<td>Tighten bolt by the required torque</td>
</tr>
<tr>
<td>Oil drain screw plug loosed or the gasket is damaged</td>
<td>Tighten screw plug or replace gasket</td>
</tr>
<tr>
<td>Axle housing distorted because of overload</td>
<td>Correct or replace axle housing</td>
</tr>
<tr>
<td>Vent is blocked or damaged</td>
<td>Clean or replace vent plug</td>
</tr>
</tbody>
</table>

### Brake unstably

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improper installation of the brake shoe or return spring is broken</td>
<td>Tighten fixed pin lock screw or replace return spring</td>
</tr>
<tr>
<td>Oil on brake friction plate or deterioration</td>
<td>Clean or replace friction plate</td>
</tr>
<tr>
<td>Brake bottom damaged</td>
<td>Replace brake bottom plate</td>
</tr>
</tbody>
</table>

### Lubricating Parts and Lubricant

#### Lubricating parts

<table>
<thead>
<tr>
<th>Item</th>
<th>Maintenance Interval Mileage (× 1000km)</th>
<th>First maintain</th>
<th>4</th>
<th>8</th>
<th>12</th>
<th>16</th>
<th>20</th>
<th>24</th>
<th>28</th>
<th>32</th>
<th>36</th>
<th>40</th>
<th>44</th>
<th>48</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reductor assy</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Wheel hub bearing</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Adjusting arm</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Cam bracket</td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

#### Lubricant

<table>
<thead>
<tr>
<th>Part</th>
<th>Lubricant</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reductor assy</td>
<td>gear oil</td>
<td>GL-5 double curve gear oil</td>
</tr>
<tr>
<td>Wheel hub bearing</td>
<td>lithium grease</td>
<td>2#</td>
</tr>
<tr>
<td>Adjusting arm</td>
<td>lithium grease</td>
<td>2#</td>
</tr>
<tr>
<td>Cam bracket</td>
<td>lithium grease</td>
<td>2#</td>
</tr>
</tbody>
</table>
### Rear Axle

#### Tightening Torque of Important Bolts and Nuts

<table>
<thead>
<tr>
<th>Part</th>
<th>Tighten Torque (N.m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil drain screw plug</td>
<td>130 ~ 150</td>
</tr>
<tr>
<td>Big nut of the drive gear</td>
<td>350 ~ 500</td>
</tr>
<tr>
<td>Rear brake bottom plate bolt</td>
<td>156 ~ 206</td>
</tr>
<tr>
<td>Air chamber bracket fixed bolt</td>
<td>55 ~ 70</td>
</tr>
<tr>
<td>Air chamber fixed bolt</td>
<td>50 ~ 75</td>
</tr>
<tr>
<td>Bearing seat bolt</td>
<td>50 ~ 70</td>
</tr>
<tr>
<td>Driven gear bolt</td>
<td>140 ~ 160</td>
</tr>
<tr>
<td>Differential housing bolt</td>
<td>140 ~ 160</td>
</tr>
<tr>
<td>Half axle nut</td>
<td>70 ~ 95</td>
</tr>
<tr>
<td>Rear adjusting nut</td>
<td>150 ~ 180</td>
</tr>
<tr>
<td>Reductor housing and axle housing connecting bolt</td>
<td>140 ~ 170</td>
</tr>
<tr>
<td>Axle housing rear cover and axle housing connecting bolt</td>
<td>90 ~ 120</td>
</tr>
</tbody>
</table>

#### Main Adjusting Data and Maintaining Standard

**Main adjusting data**

<table>
<thead>
<tr>
<th>Adjusting Item</th>
<th>Adjusting Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tooth space</td>
<td>0.2~0.4mm</td>
</tr>
<tr>
<td>Clearance between rear fiction plate and brake drum</td>
<td>0.4~0.7mm</td>
</tr>
</tbody>
</table>

**Maintaining Standard**

<table>
<thead>
<tr>
<th>Item</th>
<th>Maintaining Standard</th>
<th>Wear Limit</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feedhole of the rear axle leaf spring worn</td>
<td>Φ 27mm</td>
<td>Φ 28mm</td>
<td></td>
</tr>
<tr>
<td>Radial runout of left and right half axle sleeve outer bearing journal</td>
<td>0.03mm</td>
<td>0.1mm</td>
<td></td>
</tr>
<tr>
<td>Radial runout of the middle part rough surface of half axle</td>
<td>1mm</td>
<td>1.5mm</td>
<td>Repair limit: 1.5mm</td>
</tr>
<tr>
<td>Face runout of the wheel hub and half axle flange connecting face</td>
<td>0.1mm</td>
<td>0.15mm</td>
<td></td>
</tr>
</tbody>
</table>
Suspension System

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Assembly ..................................................................................................................... FA-8
# Suspension

## Trouble Analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bumpy ride</td>
<td>Spring leaf damaged</td>
<td>Replace the spring leaf</td>
</tr>
<tr>
<td></td>
<td>Overload</td>
<td>Load as required</td>
</tr>
<tr>
<td>Vehicle rocked severely</td>
<td>Damper failed</td>
<td>Replace the damper</td>
</tr>
<tr>
<td>Spring leaf center bolt is broken</td>
<td>U-bolt and nut loosed</td>
<td>Replace center bolt</td>
</tr>
<tr>
<td>Spring leaf is broken at the center hole</td>
<td>U-bolt and nut loosed</td>
<td>Replace spring leaf</td>
</tr>
</tbody>
</table>
Front leaf spring

1. Front spring leaf assy
2. Inclined underplate with set sleeve assy
3. Center bolt
4. Bush
5. Fixed end bracket
6. Spring pin set bolt
7. Spring leaf pin--front suspension
8. U-bolt
9. U-bolt
10. Cover board--front suspension
11. Limit block--front suspension
12. Lifting eye bracket
13. Front lifting eye
14. Lifting eye oin set
Suspension

Rear leaf spring

1. Fixed end bracket
2. Wedge lock pin
3. Leaf spring pin
4. Limit block assy
5. Sub-leaf spring bracket
6. Bracket--lifting eye end
7. Lifting eye with bush assy
8. Leaf spring pin
9. Cover board
10. U-bolt
11. Sub-leaf spring assy
12. Sub-leaf spring underplate
13. Rear leaf spring assy
14. Set pin sleeve
15. U-bolt underplate
Disassembly

Clean the suspension system before disassembling. Set the truck in brake state, and block up the front and rear wheel with wooden stand.

Dismounting of front suspension

1. Wedge the rear wheel, lift the front axle and front part of the frame with a jack and the safety support, then take down the front wheel;

2. Unscrew the set nut from the lower end of the front damper, dismantle the front damper lower end, and take off the related parts.

3. Loosen the set nut from the upper end of the damper, dismantle the front damper upper end, and take off the front damper.

4. After loose U-bolts and nuts, remove the U-bolt, cover board and limit block;

5. Down the front axle by loose the jack and then the leaf spring is in a free condition;

6. Remove the spring rear end, loose the lifting pin fasten nut at the lower end, take down the lifting pin and the leaf spring rear end can be removed;
Suspension

7. Remove the fixed bolt of the leaf spring front end spring pin, then take down the leaf spring pin and let down the jack and take out the leaf spring;

8. Loose the lifting eye locking nut, and take down the lifting eye pin and you can remove the lifting eye.

Disassembly of the rear suspension

1. Wedge the front wheel, lift the rear axle and rear part of the frame with a jack and the safety support, then take down the rear wheel;

2. Unscrew the set nut from the lower end of the damper, and take off the related parts;

3. Loosen the set nut of the damper pin from the upper end of the damper, remove the related parts, and take down the damper;

4. Loose the U-bolts and nuts, remove U-bolt underplate, U-bolt and cover board;
5. Slowly down the jack to fall the rear axle to the ground, and remove the sub leaf spring assembly and sub-leaf spring underplate;

6. Disassemble the rear end of the leaf spring. Remove the fasten bolt of the leaf spring pin and pull the spring pin out then you can disassemble the rear end of the leaf spring rear end;

   Note: When pulling the spring pin, you must use the threaded sleeve of the spring pin. Before remove the lock bolt of the leaf spring pin, screw the threaded sleeve off a little then pull, or you can use the pin puller with thread.

7. Remove the cotter pin used to fix the front pin of the rear leaf spring, then take down the front pin of the rear leaf spring, down the jack then remove the rear leaf spring finally;

8. Take down the cotter pin of the lifting eye pin, and make use of an iron rod (diameter=15mm) went through the special hole used to remove the lifting eye pin, then push the pin out to take down the lifting eye.

Disassembly of the front and rear leaf spring

1. Take down the clamp;
2. Clamp the center part of the leaf spring by a C-shape clip;
3. Take down the center bolt;
4. Loose the C-shape clip slowly and detach the spring leaf.
Suspension

Check

1. Measure the outer diameter of the spring pin and lifting eye pin

<table>
<thead>
<tr>
<th>Wear limit</th>
<th>Front suspension</th>
<th>17.5mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rear suspension</td>
<td>29.5mm</td>
</tr>
</tbody>
</table>

2. Inner diameter of the spring bush and lifting eye bush

<table>
<thead>
<tr>
<th>Wear limit</th>
<th>Front suspension</th>
<th>19mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rear suspension</td>
<td>31mm</td>
</tr>
</tbody>
</table>

3. Clearance between spring pin, lifting pin and bush:

Spring pin and bush:
- Repair standard: 0~0.302mm
- Wear limit: 1.0mm

Lifting pin and bush:
- Repair standard: 0.08~0.252mm
- Wear limit: 1.0mm

4. Check the spring leaf for any cracks or wear condition;

5. Measure the wear condition of the spring leaf, if the wear value is over 15% of the standard thickness, please replace the spring leaf.

- Standard thickness of the front leaf spring is 9mm, wear limit is 7.65mm;
- Standard thickness of the rear leaf spring is 10mm, wear limit is 8.5mm;
- Standard thickness of the sub-leaf spring is 8mm, wear limit is 6.8mm.

Note: If one of the leaf spring is broken, you'd better replace the whole leaf spring assembly. Only replace the broken one may cause others damaged very soon.

Wear limit

Front suspension 17.5mm
Rear suspension 29.5mm
Front suspension 19mm
Rear suspension 31mm
Standard thickness of the front leaf spring is 9mm, wear limit is 7.65mm;
Standard thickness of the rear leaf spring is 10mm, wear limit is 8.5mm;
Standard thickness of the sub-leaf spring is 8mm, wear limit is 6.8mm.

Note: If one of the leaf spring is broken, you'd better replace the whole leaf spring assembly. Only replace the broken one may cause others damaged very soon.
Suspension

Assembly

Assembly of the sub-assembly

Assemble the leaf spring by center bolt accord the sequence of the spring leaf;
   Note: Smear some black lead lime grease on the relative friction surface of the spring leaf.
Clamp the leaf spring by a C-shape clip, and tighten the center bolt and nut;
Take down the C-shape clip from the leaf spring;
After tightening the center bolt, rivet the connecting thread of the bolt and nut to lock;
Install sleeve and bolt on the clamp and tighten the nut;
After tightening the clamp bolt, rivet the connecting thread of the bolt and nut to lock.

Assembly of the front suspension

1. Smear a layer of grease on the spring bush and lifting eye bush before assembling;
2. Install the lifting eye to its bracket and insert the pin, then tighten the locking nut;
3. Install the front leaf spring assembly, cover board, limit block to the front axle and lift the front axle with a jack;
4. Align the bracket hole of the fixed end to the spring eye, then insert the spring pin;
   Note: Make the spring pin slot align to the set bolt.
5. Install the set bolt;
6. Install the rear end of the spring, align the lifting eye and spring eye, then insert the lifting eye pin;
7. Assemble the U-bolt;

8. Lift the front axle by the jack, and then take down the support of the frame then own the jack;

9. Tighten the U-bolts and nuts;
   
   Tightening torque 200–250N • m

10. Install the damper to the bracket, then the plain washer, spring washer and nut, then tighten them;
   
   Tightening torque 140–170N • m

11. Add grease to the leaf spring pin and lifting eye pin as required;

Assembly of the rear suspension

1. Smear a layer of grease on the spring bush and lifting eye bush, and install the lifting eye to its bracket, then insert lifting eye pin, then the cotter pin and tighten its lock nut;
   
   Tightening torque 90–110N • m

   Note: When inserting the cotter pin, make the inclined face contact to the face of lifting eye pin.

2. Set the rear spring to the rear axle, and lift the rear axle by the jack;

3. Align the fixed end bracket hole to the spring eye, insert the spring pin, then the cotter pin and tighten the nut;
   
   Tightening torque 32–42N • m

   Note: When inserting the cotter pin, make the inclined face contact to the face of lifting eye pin.
4. Install the rear end of the spring, align the lifting eye hole to the spring eye, insert the spring pin, then install the lock nut;

   Tightening torque  32–42 N • m

   Note: When inserting the cotter pin, make the inclined face contact to the face of lifting eye pin.

5. Install the underplate, sub-spring and cover board to the upper of the rear spring, then install the U-bolt;

6. Lift the rear end of the vehicle by a jack, take down the support under the frame then down the jack;

7. Install the U-bolt underplate and damper lower bracket;

8. Install the U-bolts and nuts and tighten;

   Tightening torque: 300–350 N • m

9. Add grease to the leaf spring pin and lifting eye pin;

10. Install the rear damper by referring to the assembling method of the front damper.
Brake System

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- Rear Brake ........................................................................ BR-8
- Frame Brake Pipeline .......................................................... BR-9
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# Brake System

## Brake System

### Technical Parameter

<table>
<thead>
<tr>
<th>Structure type</th>
<th>Air-pressure, with shoe, drum type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake type</td>
<td>S type cam roller type</td>
</tr>
<tr>
<td>Brake bottom plate</td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>Pressing bottom plate</td>
</tr>
<tr>
<td>Rear</td>
<td>Foundry bottom plate</td>
</tr>
<tr>
<td>Brake specification</td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>$\phi 310 \times 120\text{mm}$</td>
</tr>
<tr>
<td>Rear</td>
<td>$\phi 310 \times 150\text{mm}$</td>
</tr>
<tr>
<td>Brake cam type</td>
<td></td>
</tr>
<tr>
<td>Front</td>
<td>Rectangle cam</td>
</tr>
<tr>
<td>Rear</td>
<td>S type cam (involute)</td>
</tr>
</tbody>
</table>

### Tightening Torque

<table>
<thead>
<tr>
<th>Item</th>
<th>Tightening Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasten bolt of the front brake air chamber and its bracket</td>
<td>55~70</td>
</tr>
<tr>
<td>Fasten bolt and nut of the front air chamber and brake bottom plate</td>
<td>55~70</td>
</tr>
<tr>
<td>Fasten bolt of front brake bottom plate and steering knuckle</td>
<td>160~220</td>
</tr>
<tr>
<td>Lock nut of front brake anchor pin with conical sleeve</td>
<td>128~167</td>
</tr>
<tr>
<td>Fasten bolt of the rear brake air chamber and its bracket</td>
<td>55~70</td>
</tr>
<tr>
<td>Fasten bolt and nut of the rear air chamber and brake bottom plate</td>
<td>80~110</td>
</tr>
<tr>
<td>Flange bolt of rear brake bottom plate and two end of rear axle housing</td>
<td>130~160</td>
</tr>
<tr>
<td>Fasten nut of brake air chamber clamp</td>
<td>15~20</td>
</tr>
</tbody>
</table>
Brake System

Trouble Analysis of Wheel Brake

The trouble of brake system including insufficient braking effectiveness, brake being seized, or only one brake shoe expanded, and having abnormal sounding. The worn-out brake shoe lining and the overlarge clearance between the lining and brake drum cause the insufficient braking effectiveness. If you cannot find any causes in the whole brake system, you should consider the brake's condition.

When the brake is seized, it is necessary to check and make sure whether one brake is seized or all the brakes are seized. If only one brake is seized, it may this brake down; if all the brakes are seized, the problem may be in the control mechanism.

In case of only one brake shoe expands the condition of tires and brake unit should be considered.

The abnormal sounding of brake is caused by the worn out brake shoe lining.

Abnormal sound

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal sound when press down the brake pedal</td>
<td>The rivet or bolt protrude due to the wear of the brake lining</td>
<td>Replace brake lining</td>
</tr>
<tr>
<td></td>
<td>The brake lining surface is harden</td>
<td>Replace brake lining</td>
</tr>
<tr>
<td></td>
<td>The brake lining surface deteriorated</td>
<td>Replace brake lining</td>
</tr>
<tr>
<td></td>
<td>Bad contact of brake shoe and brake lining</td>
<td>Rivet up the rivet or screw up the bolt</td>
</tr>
<tr>
<td></td>
<td>Uneven wear of brake drum inner surface or incorrect installation</td>
<td>Adjust a screw up brake drum</td>
</tr>
<tr>
<td></td>
<td>Brake shoe supporting pin loosed</td>
<td>Adjust the clearance and tighten the lock nut</td>
</tr>
<tr>
<td></td>
<td>The wheel hub bearing worn out</td>
<td>Replace the wheel hub bearing</td>
</tr>
<tr>
<td></td>
<td>The brake drum deformed</td>
<td>Adjust or replace the brake drum</td>
</tr>
</tbody>
</table>

Unsteady brake

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsteady brake</td>
<td>The pressure in the tires are uneven or the dimension of tires are not the same</td>
<td>See regulations</td>
</tr>
<tr>
<td></td>
<td>Improper installation of the brake shoe or return spring damaged</td>
<td>Tighten the lock nut and replace the return spring</td>
</tr>
<tr>
<td></td>
<td>Incorrect joint of brake lining</td>
<td>Adjust the joint of brake lining</td>
</tr>
<tr>
<td></td>
<td>Incorrect adjustment of left or right brake</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>The brake lining deteriorate</td>
<td>Replace brake lining</td>
</tr>
<tr>
<td></td>
<td>The brake lining have oil</td>
<td>Clean with petrol, eliminate the oil leakage of wheel hub</td>
</tr>
<tr>
<td></td>
<td>The brake bottom plate is damaged</td>
<td>Replace brake bottom plate</td>
</tr>
<tr>
<td></td>
<td>The U bolt of the spring is loosen</td>
<td>Screw up U bolt</td>
</tr>
</tbody>
</table>
Brake System

Insufficient brake

<table>
<thead>
<tr>
<th>Trouble under any conditions</th>
<th>Cause</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal air pressure</td>
<td>Brake valve travel is too short</td>
<td>Check and replace the brake valve if necessary</td>
</tr>
<tr>
<td>Cam shaft doesn't run (bush lacks lubricant)</td>
<td></td>
<td>Check and replace cam shaft if necessary</td>
</tr>
<tr>
<td>Improper push rod travel of the brake air chamber</td>
<td></td>
<td>Adjust the travel</td>
</tr>
<tr>
<td>Bad contact of relay valve</td>
<td></td>
<td>Disassemble and repair</td>
</tr>
<tr>
<td>Brake shoe lining is overheat or deteriorate</td>
<td></td>
<td>Replace friction lining</td>
</tr>
<tr>
<td>Incorrect engaging of brake shoe lining</td>
<td></td>
<td>Correct the engaging position</td>
</tr>
<tr>
<td>There is lubricant on brake shoe lining or brake drum</td>
<td></td>
<td>Clean with proper cleanser or replace the friction lining</td>
</tr>
<tr>
<td>Abnormal air pressure</td>
<td></td>
<td>Repair</td>
</tr>
<tr>
<td>Air pipes leak air</td>
<td></td>
<td>Disassemble and repair the air compressor</td>
</tr>
<tr>
<td>Air compressor doesn't work</td>
<td></td>
<td>Adjust or clean</td>
</tr>
<tr>
<td>Improper adjustment of the unloader valve or it failed because of impurities</td>
<td></td>
<td>Disassemble and repair the brake valve</td>
</tr>
<tr>
<td>Brake valve leaks air</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All the wheel is seized

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheel seized</td>
<td>Air in brake air chamber</td>
<td>Check and correct the exhaust valve of relay valve and quick-release valve</td>
</tr>
<tr>
<td></td>
<td>Improper lubricant of cam shaft or adjusting arm return incorrect</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Return spring of brake shoe or air chamber is broken or fatigue</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Spring brake is in use</td>
<td>Release the spring brake and eliminate the question</td>
</tr>
<tr>
<td></td>
<td>Vent of relay valve or quick-release valve blocked</td>
<td>Disassemble and clean troubled parts</td>
</tr>
<tr>
<td></td>
<td>Primary or secondary piston of brake valve return failed</td>
<td>Disassemble and clean brake valve, replace troubled parts if necessary</td>
</tr>
</tbody>
</table>

BR-3
Brake System

Structure

Front wheel brake

1. Rear dust cap
2. Rubber plug
3. Axis pin
4. Left bracket--front brake chamber
5. Front brake chamber
6. Supporting washer--front brake shoe
7. Front brake cam, left
8. Bush--front bracket
9. O-sealing ring
10. Adjusting spacer
11. Front adjusting arm assy
12. Adjusting spacer
13. Adjusting spacer
14. Front brake bottom plate
15. Shoe plate shaft--front brake
16. Bush--front brake shoe plate shaft
17. Screw--fix shoe plate
18. Spring--axis pin
19. Rivet
20. Brake friction wafer
21. Brake shoe
22. Return spring
Rear wheel brake

1. Front dust boot
2. Rubber plug
3. Axis pin
4. Front brake air chamber bracket (left)
5. Front left brake chamber assy
6. Spring air chamber bracket spacer (thickness=0.05)
7. Front left brake cam
8. Bush--rear bracket
9. O--sealing ring
10. Adjusting washer
11. Front adjusting arm assy
12. Adjusting washer
13. Adjusting washer
14. Bush--front bracket
15. Rear brake bottom plate
16. Supporting washer--front brake shoe
17. Nut
18. Sprung axis pin
19. Rivet
20. Brake friction plate
21. Brake shoe
22. Return spring
23. Screw--fix shoe plate shaft
24. Bush--front brake shoe plate shaft
25. Brake shoe plate--front brake
Brake System

Front Brake

Disassembly

Remove the brake drum and wheel hub assembly, take down the return spring, brake shoe, brake cam, air chamber bracket and brake bottom plate in sequence.

Check

1. Make sure whether the brake drum is damaged or distorted, replace in necessary.
2. When the brake drum is worn out and becomes out of round, it is allowed to bore, but the accumulative machining quantity should not exceed 4mm for the diameter direction.
3. When the brake drum assembly has been bored:
   - The run-out of the drum inside surface to the bearing axis (mm) <0.25
   - The difference of the inside diameters of left and right drums on one vehicle (mm) <1mm
4. The wear allowance of the lining thickness is 7mm. The distance from the lining surface to the rivet head should not be less than 1mm. The lining surface should not be cracked and broken away. Otherwise, it should be replaced.
5. The wear allowance of the shoe flat face at one end should not exceed 0.30mm.
6. Check carefully. There should not be any crack (especially at the two end hooks).
7. The diaphragm of the brake chamber should be in good condition. It should not have any ageing crazing or crack. It is not allowed to use the same size diaphragms of different hardness on one truck.
8. Check clearance of all fitting surface.

Assembly

1. Install the assembled brake backing plate assembly on the front axle steering knuckle.
   - Tighten bolts with the specified torque  160~220N • m
2. Put the tightening bolts with the locking wires into the holes around the brake camshaft seat from the inside. Install anchor pin into its seating holes and make two eccentric journals of the anchor pins opposite each other.
3. Assemble brake chamber brackets (with brake chamber assembly) in turn and tighten them. Put in the brake camshaft and the adjusting washer. Then assemble the front brake slack adjuster on the brake camshaft and lock it with the cotter pin. The brake air chamber push rod will be connected with the brake adjust arm by a pin.
4. Fit the brake shoes inside the brake backing plate. At anchor pin ends lock brake shoes with lock plate and cotter pins.
5. The return spring is hooked between two brake shoes.
Brake System

Adjust

After the brake linings have been replaced, the brake bottom plates have been dismounted, causing the positions of the anchor pins and the camshaft changed, the normal contact of the brake linings and the brake drum is destroyed; adjust the brake entirely as follows:

1. Take off the cover of the inspection hole on the drum. Loosen the securing nuts of the anchor pins and the nuts of the securing nuts for the air chamber bracket.

2. Turn the anchor pins to make the marks at their ends opposite each other inwardly.

3. Turn the anchor pins and the worm shaft of the slack adjuster again and again to keep the linings fitted to the drum fully. At the adjusted position, tighten the nuts of the air chamber bracket and the nuts of the anchor pins. (Be careful to keep the positions of the anchor pin and the air chamber bracket fixed.)

4. Loosen the worm shaft 1/2~2/3 turn. The drum should rotate freely, but not touch the linings or any other parts. The clearances between the brake linings and the drum should be:
   - Near the anchor pins: 0.25~0.40mm
   - Near the camshaft: 0.40~0.55mm

   The difference of clearance at the same end of the two shoes $\leq 0.1\text{mm}$

When braking linings worn out and the push rod stroke of the chamber exceeds 40mm, partial adjustment should be done immediately to reduce the clearance between the linings and the drum. (Never turn the anchor pins to destroy the good match of linings and drum.) When adjusting, face the worm shaft of slack adjusters, turn the worm shaft clockwise, clearance decreased, and turn anticlockwise, clearance increased. It is wrong to adjust clearance by tightening the push rod clevis for changing the stroke of push rod.

Note:
During adjusting the brake clearance, clean up dirt and filth on the head of the adjusting arm worm shaft. Make use of a double offset ring spanner, cover it onto the worm shaft head, press the lock bush to release the worm shaft and then turn the worm shaft. If the lock bush can't be pressed down, knock it with a hammer gently and then press. After adjusting, cover with a rubber dust shield.

Lubricate

1. The brake cam surface
2. Camshaft journal
3. The anchor pins and the holes
4. Brake slack adjust arm assembly
5. Bearing holes of the camshafts on the brake chamber bracket
Brake System

Rear Brake

Disassembly

After remove the rear axle half axle, take down the brake drum and wheel hub assembly, then dismount rear brake adjust arm, brake cam, air chamber bracket, brake shoe with bottom plate assembly, and dust shield in sequence.

Check

1. Make sure whether the brake drum is damaged or distorted, replace if necessary.
2. Make sure whether the brake shoe with linings is cracked, replace if necessary.
3. Check the roller surface for any cracks and damages, replace if necessary.
4. Check the return springs.
   
   Note:
   After replace the friction plate, the excircle of the friction plate needs to be wholly machined. That is to install the brake shoe and brake bottom plate together, and make use of the bottom plate to position to machine the excircle of the friction plate.

Assembly

1. Install the brake to the bottom plate, screw on the screw and fasten with steel wire, then machine the excircle of the brake shoe friction plate.
2. Install the brake shoe and brake bottom plate to the two ends of the rear axle housing, the tightening torque of the bolt is 130~160N.m, and then install the pressing dust shield.
3. Install the air chamber bracket and fasten, then set to the brake cam and assemble the adjusting spacer. After that, install the brake adjust arm to the brake cam and lock with a clamp ring, connecting the air chamber push rod to the brake adjust arm with flat pin.
4. The return spring is hooked between two brake shoes.

Adjust

Disassemble the rubber dust shield of the inspection hole and the adjust arm. Make use of a double offset ring spanner to press the lock bush of the worn shaft head, turn the worm shaft to let the friction plate surface and inner surface of brake drum contact, then turn worm shaft loose for 1/2~2/3 circle. At this time, the clearance between center of two brake shoe friction wafers and brake drum is about 0.7mm, and the brake drum can turn freely without interfere with other parts.

After air entered the chamber, the push rod must be out immediately, and after exhaust, it can return without block. The travel of the air chamber push rod is between 25 ± 5mm.

Lubricate

1. Brake shoe roller shaft
2. Roller hole
3. Roller surface
4. Other parts refer to the front brake
Brake System

Frame Brake Pipeline

1. Pipe joint
2. Lock washer with inner tooth
3. Quick release valve set
4. Spring washer
5. Nylon pipe assy
6. Nylon pipe assy
7. Nylon pipe assy
8. Nylon pipe assy
9. Nylon pipe assy
10. Relay valve assembly technique sets
11. Lock washer with inner tooth
12. Pipe joint
13. Nylon pipe assy--four circuit protective valve
14. All metal lock nut
15. Lock washer with inner tooth
16. Brake hose assy
17. Air pipe assy--three way tube joint to right brake air chamber
18. Tube joint--straight
19. 2nd air pipe assy--air compressor to unloader valve
20. Nylon pipe assy
21. Brake hose assy
22. Air pipe assy--unloader valve to wet air tank
1. Brake Valve Assy
2. Hose Bracket
3. Upper bracket--4 pipes bracket
4. Nylon pipe assy--brake valve 21 to hose bracket
5. Nylon pipe assy--brake valve 22 to hose bracket
6. Nylon pipe assy--brake valve 12 to hose bracket
7. Nylon pipe assy--brake valve 11 to hose bracket
8. Jacket sleeve
9. Transition joint
Brake System

Parking Brake Control Mechanism

1. Parking brake control device assy
2. Adjusting nut seat--wiredrawing
3. Spring washer
4. Bracket
5. Parking brake steel wire assy
6. Clip--single tube
7. Clamping piece
8. Upper bracket--single tube clip
9. Lower bracket--single tube clip
10. Axis pin
11. Rocker and bush assy
12. Axis pin
13. Cotter pin
14. Shackle
15. Axis pin--parking brake rocker
16. Return spring
17. Bracket--spring
18. Bracket
19. Spherical washer
20. Release pull rod spring--clutch
21. Parking brake puller lever assy
Cab

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Precautions
When removing or installing various parts, place a cloth or padding onto the vehicle body to prevent scratches.
Disassemble or assemble the handle device, molding parts, instrument, inner trims and so on carefully not to soil or damage them.
Apply seal glue on necessary place when assembling.
Be careful not let the glue flow out of the parts when applying.
When replacing the metal parts external plate of the body, be sure to take rust prevention measures.

Clip and Fastener
The following code and pictures and symbols are subject of the clip and fastener in the BF section.
The clip and fastener must be replaced if damaged during assembling or disassembling.
Disassembling the front bumper ass'y:

1. Release off the six fixed nuts from the front bumper (each three on left and right side).
2. Release off the bumper ass'y.
3. Disassemble the connection device for right and left fog light.
4. Disassemble the clip and bolt.
5. Disassemble reinforcement, seal washer and installation board for the lights.
Front Door

When disassembling the front door, it is better to disassemble the cover at the front side first. After adjusting the door or door lock, check the door lock open and lock condition.
Caution:
Before disassembling the instrument panel, switch off the power-supply.
Be careful not to scratch pad and other parts.
These parts are made of plastic. Excessive force will damage them.
The structure of the instrument panel in shown as below:

1. Instrument frame welding ass'y.
2. Oil can cap
3. Instrument frame welding ass'y.
4. Instrument panel upper cover ass'y.
5. Ashtray ass'y.
6. Block cover, Small glove box ass'y.
7. Block cover, warm air control
8. Lower trim grille ass'y.
9. Glove box cover
10. Glove box ass'y.

Cab Internal Trims and External Trims

Internal trims
Side ard floor trims-Passenger area

Caution:
Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes.
Disassembly of the side inner trims:

① Disassemble the sun visor.
② Disassemble the rearview mirror.
③ Disassemble the roof lamp ass'y.
④ Disassemble the handrail.
⑤ Disassemble the seats.
⑥ Disassemble the safely belt.
⑦ Disassemble the door guardrail.
⑧ Disassemble the rear window glass.

Door trims

Disassembly of the door trims:
① Disassemble lock knob.
② Disassemble inside seal.
③ Disassemble inside handle escutcheon rear door).
④ Disassemble pull handle.
⑤ Pull out regulator handle.
6. Disassemble inner guard board of door (front door).
7. Disassemble inner guard board of door (rear door).

---

Roof trims

Disassembly of the roof trims

Single seater cab

1. Remove part of headlining from corner and gradually peel headlining off.

Double seater cab

1. Disassemble the screw and roof bow.

2. Remove headlining by peeling it off, starting with middle portion
Cab External Trims

Single seater cab

Single seat cab
① Front upper cover
② Front lower cover and lower cover board
③ Side external cover board
④ Front and rear windows
⑤ Cab door seal strips
⑥ Door and window seal strips
⑦ Front pedal cover and pedal mat (option).

Front upper finisher, Front grille, Front corner panel
Cab

Front and rear window

Cab door seal strip
Door outside molding

Foot step shield and mat
Cab

Seat

When assemble or disassemble the seat, it should be maintained clean and well.

Front seat

Cab Safety Belt

Notes:
If the vehicle in severely dashed in an accident, whatever the nature of the accident is, the belt assembly must be replaced.
If any part of the belt has quality problems, it must be replaced instead of repairing it.
If there is any cut, looseness or damage on the texture, etc., replace the assembly.
Wine, oil or other material should not be sprayed into the buckle hole lock, so does not the huckle and the knob.
Cab

Cab Mounting

Cab front mounting

1. Torsion bar arm assy
2. Tilting bracket assy
3. Torsion bar
4. Left bracket--front mounting
5. Retainer lower assy

Cab rear mounting

1. Left connecting bracket assy--rear mounting
2. Upper cushion assy
3. U-suppot welding assy
4. Rear mounting lower cushion assy
5. Right connecting bracket assy--rear mounting
Cab and Cargo Body

Cab

The following parts at least should be disassembled in the area of cab engine:

Main electric system and wire harness.
Separate the engine part from steering transmission device, brake system and clutch operation system.

The following parts at least should be disassembled in the area of cab:

1. Transmission system and steering control system.
2. Hand brake operation and brake drag wire.
3. Electric system, wire harness and tube

Cargo Body

First disassemble the following part:

Rear combination light system and license lamp
Cab body mounting

Note:
Different model has different shape of cargo body.
1. Front cross member assy
2. 2nd cross member
3. Right bracket of rear mounting
4. Left side member
5. 4th cross member
6. Lower angle iron for fixing chassis frame
7. Propeller midship mounting cross member
8. Damper cross member
9. Lifting eye end bracket
10. Rear leaf spring cross member
11. Hook bracket
12. Right side member
13. Fixed end bracket
14. Lifting eye end bracket
15. Engine rear mounting cross member
16. Rear leaf spring cross member
17. Fixed end bracket
18. Sub-spring bracket
19. Stiffening plate--rear bracket of rear spring
20. Stiffening plate--rear bracket of front spring
21. Bolt
22. Rear hook set
23. Rear cross member
Construction of the Heater

1. Left air pipe
2. Wind channel assy
3. Middle air pipe
4. Right air pipe assy
5. Left door defroster hose assy
6. Defroster nozzle assy
7. Right door defroster hose assy
8. Wind inlet channel assy
9. Plastic nut assy
10. Heater assy
11. Air blower assy
12. Heater control mechanism assy
13. Water inlet tube--heater
Electric System

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Electric System

Electric System

Specification

<table>
<thead>
<tr>
<th>Vehicle Model</th>
<th>DFA1064DH01-985</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire system</td>
<td>24V, Single lead type, negative earth</td>
</tr>
<tr>
<td>Starter</td>
<td></td>
</tr>
<tr>
<td>Nominal Voltage (V)</td>
<td>24</td>
</tr>
<tr>
<td>Nominal Power (kW)</td>
<td>3.7</td>
</tr>
<tr>
<td>Alternator</td>
<td></td>
</tr>
<tr>
<td>Specified voltage (V)</td>
<td>28</td>
</tr>
<tr>
<td>Specified current (A)</td>
<td>45</td>
</tr>
<tr>
<td>Battery (A • h)</td>
<td>90</td>
</tr>
</tbody>
</table>

Bulb Type

<table>
<thead>
<tr>
<th>Light name</th>
<th>Bulb specification</th>
<th>Bulb type</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front headlamp</td>
<td>H4 75/70P</td>
<td>P43t-38</td>
<td></td>
</tr>
<tr>
<td>Fog light</td>
<td>H3 70</td>
<td>PK22s</td>
<td></td>
</tr>
<tr>
<td>Front combination light</td>
<td>PY21W</td>
<td>BA15s</td>
<td>Turning light</td>
</tr>
<tr>
<td></td>
<td>R10W</td>
<td>BA15s(BA15d)</td>
<td>Front light</td>
</tr>
<tr>
<td>Side turning light</td>
<td>R10</td>
<td>BA15s(BA15d)</td>
<td></td>
</tr>
<tr>
<td>Doom light</td>
<td>QT24-5SV</td>
<td>SV8.5</td>
<td></td>
</tr>
<tr>
<td>Inspection light</td>
<td>QT24-21</td>
<td>BA15s/19</td>
<td></td>
</tr>
<tr>
<td>Rear combination light</td>
<td>P21W</td>
<td>BA15s(BA15d)</td>
<td>Reverse light</td>
</tr>
<tr>
<td></td>
<td>PY21W</td>
<td>BAU15s</td>
<td>Turning light</td>
</tr>
<tr>
<td></td>
<td>P21/5W</td>
<td>BAY15d</td>
<td>Brake light, rear light</td>
</tr>
<tr>
<td>License plate light</td>
<td>R10W</td>
<td>BA15s(BA15d)</td>
<td></td>
</tr>
</tbody>
</table>
Electric System

Trouble Analysis

The trouble in the electric system is divided into line trouble, which caused by wire crack or circuit short, and parts trouble, which caused by parts wear or fire. On the other hand, according to the service and maintenance, the system that approaches the final life car easily has trouble.

When check the circuit, first check the harness for wearing earth or cracking if exist please wrap up or connect and continue to check.

If the circuit has no problems, check the parts associated with the system to find out causes.

If the fuse burns out frequently during the operation, please check the harness for wearing earth and the output voltage of generator to see if over loaded.

### No electricity

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>No electricity</td>
<td>Battery capacity insufficient</td>
<td>Recharge or replace</td>
</tr>
<tr>
<td></td>
<td>Earth line contact not good</td>
<td>Make earth line steady</td>
</tr>
<tr>
<td></td>
<td>Main supply switch failed</td>
<td>Make line steady</td>
</tr>
<tr>
<td></td>
<td>One-position failed</td>
<td>Replace one-position switch</td>
</tr>
<tr>
<td></td>
<td>Fusible wire and fuse burnt</td>
<td>Replace fusible wire</td>
</tr>
<tr>
<td></td>
<td>When turn on the one-position switch the</td>
<td>Replace or repair main supply</td>
</tr>
<tr>
<td></td>
<td>switch has not good contact</td>
<td>switch</td>
</tr>
</tbody>
</table>

### Engine cannot start

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine can not start and starter</td>
<td>Fuel cutoff solenoid fuse burnt</td>
<td>Replace fuse</td>
</tr>
<tr>
<td>runs abnormally</td>
<td>Fuel cutoff solenoid failed</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Fuel lacks or fuel line jammed</td>
<td>Add fuel or clear the line</td>
</tr>
<tr>
<td></td>
<td>Battery capacity insufficient or contact</td>
<td>Replace battery or tighten</td>
</tr>
<tr>
<td></td>
<td>abnormally</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Starter damages</td>
<td></td>
</tr>
<tr>
<td>Engine can not start and starter</td>
<td>Starter one-way ditch damages</td>
<td>Repair or replace</td>
</tr>
<tr>
<td>car run</td>
<td>Fork and starter driving have trouble</td>
<td>Repair or replace</td>
</tr>
<tr>
<td>Starter can't run</td>
<td>Starter relay has not good contact</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Breaker damages</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Ignition lock damages</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Starter solenoid switch hasn't good contact</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Solenoid switch damages</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Starter relay damages</td>
<td>Repair or replace</td>
</tr>
</tbody>
</table>
## Electric System

### Front headlamp

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The headlamp doesn't light when turn on the switch</td>
<td>Fuse burnt, Circuit breaks, Earth line hasn't good contact, Lamp wire burnt, Lamp switch has trouble, Dimmer switch has trouble</td>
<td>Check cause and replace, Check and repair, Get off rust and restrin the joint, Replace bulb, Repair or replace switch</td>
</tr>
</tbody>
</table>

### Turning signal light

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>When turning the switch, the turning signal light doesn't run</td>
<td>When turning &quot;left&quot; or &quot;right&quot;, turn on signal light, light goes on, Flasher has trouble</td>
<td>Replace flasher</td>
</tr>
<tr>
<td></td>
<td>When turning &quot;left&quot; or &quot;right&quot;, turn on signal light, light goes on, Fuse burnt, Flasher joint or others are not good, circuit breaks</td>
<td>Find out cause to solve and replace fuse, Check and repair</td>
</tr>
<tr>
<td>Right (left) turning signal light goes on, but left (right) turning signal light doesn't go on</td>
<td>Left turning light (right turning light)'s joint doesn't contact well</td>
<td>Check the circuit, from turning signal light switch to lamp</td>
</tr>
<tr>
<td>When turn on the switch, the light continues to go on, but does not flash</td>
<td>Flasher failed (contact maintains engage), Front/rear bulb failed</td>
<td>Replace flasher, Replace bulb</td>
</tr>
<tr>
<td>Turning signal light flashes too quickly</td>
<td>Flasher failed, Reduce overall kW to specified value, Check and repair</td>
<td>Replace flasher, Replace bulb's overall kW exceeds the specified value, Contact or joint has not good contact</td>
</tr>
<tr>
<td>Turning signal light flashes too slowly</td>
<td>Flasher failed, Bulb's power is over low</td>
<td>Replace flasher, Check bulb's power according to specified value</td>
</tr>
</tbody>
</table>

### Horn doesn't sound

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horn doesn't sound</td>
<td>Brake light doesn't go on, fuse burnt, Harness looses or wears, Electric brush contacts not well, Horn relay damages, Horn damages</td>
<td>Replace, Connect or strap up, Adjust brush's height, Replace, Replace</td>
</tr>
</tbody>
</table>

### Brake light doesn't go on

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brake light doesn't go on</td>
<td>Horn doesn't sound, fuse burnt, Brake light bulb burns out</td>
<td>Replace, Replace</td>
</tr>
</tbody>
</table>
### Electric System

#### Fog light doesn't go on

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fog light doesn't go on</td>
<td>Fuse burnt</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Earth line contacts not well</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>Bulb burns out</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Fog light switch damages</td>
<td>Replace</td>
</tr>
</tbody>
</table>

#### Position light doesn't go on when turn on the fog light

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position light doesn't go on when turn on the fog light</td>
<td>Fog light switch damages</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Bulb burns out</td>
<td>Replace</td>
</tr>
</tbody>
</table>

#### Position light doesn't go on when turn on the signal light

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position light doesn't go on when turn on the signal light</td>
<td>Harness connecting is not firm</td>
<td>Check the connection</td>
</tr>
<tr>
<td></td>
<td>Combination switch circuit contacts not well</td>
<td>Connect</td>
</tr>
<tr>
<td></td>
<td>Combination switch damages</td>
<td>Repair or replace</td>
</tr>
</tbody>
</table>

#### Windshield and wiper

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiper doesn't operate</td>
<td>Fuse burnt</td>
<td>Find out cause and replace fuse</td>
</tr>
<tr>
<td></td>
<td>Circuit breaks or contacts not well</td>
<td>Check and repair</td>
</tr>
<tr>
<td></td>
<td>Wiper switch failed or contacts not well</td>
<td>Replace wiper switch</td>
</tr>
<tr>
<td></td>
<td>Synchronous connecting board breaks away</td>
<td>Check and repair</td>
</tr>
<tr>
<td></td>
<td>Wiper arm's tightening bolt loosens</td>
<td>Tighten bolt</td>
</tr>
<tr>
<td></td>
<td>Wiper motor assembly failed</td>
<td>Check and repair wiper motor assembly if necessary replace parts</td>
</tr>
<tr>
<td></td>
<td>1. Internal coil burns out</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Wiper motor overload because of current overpowering (The rectifier is polluted, carbon, rotary bearing is seized, wiper arm connect not well, motor wears, constant speed gear fails)</td>
<td></td>
</tr>
<tr>
<td>Motor creaks</td>
<td>The lube grease in the gearbox qualitative change</td>
<td>Replace lube grease</td>
</tr>
<tr>
<td>Wiping picture is not correct</td>
<td>Wiper arm spring fatigue (pull force descends)</td>
<td>Replace wiper arm</td>
</tr>
<tr>
<td></td>
<td>Wiper blade rubber damages</td>
<td>Replace blade</td>
</tr>
<tr>
<td>The wiper can't return to its original position when turn off the switch</td>
<td>Main guideline and contactor</td>
<td>Repair</td>
</tr>
<tr>
<td></td>
<td>Wilding is not good</td>
<td>Repair</td>
</tr>
<tr>
<td></td>
<td>The contactor has not good contact</td>
<td></td>
</tr>
<tr>
<td>Cam switch</td>
<td>The joint is not good</td>
<td>Repair or replace switch</td>
</tr>
<tr>
<td>Wiper doesn't stop</td>
<td>The contact is not good</td>
<td>Repair or replace switch</td>
</tr>
</tbody>
</table>
Electric System

General Instruction

Constitution

- Power supply division: Alternator, battery
- Starting system
- Power supply warning system
- Instrument indicator system
- Lighting system
- Others: Wiper, horn, cigar lighter, radio cassette player

Features

- Using integrated alternator
- Using electromagnetic main power switch
- Two fusible wires at starter
- 22-way fuse box

The complete truck wiring

The wires of 22-way fuse box of the complete truck are connected as follow

| 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Radiator relay | Heater relay | Ignition relay | A/C relay | Horn relay | Flasher |
| 15A | 15A | 25A | 5A | 10A | 5A | 5A | 15A | 10A | 10A | 10A | 10A | 15A | 15A | 10A |

In the normal conditions, the output of alternator reaches ignition switch, lighting and instruments by the way of two fusible wires. If the alternator fusible wires are burnt, the above systems will continue to operate using the battery power. But if the engine stops at the time, the systems can't start until replace the fusible wires. The fusible wire must be replaced immediately to prevent the battery from over discharging.

Besides the safety control described above, there are another 6 small relays: start relay, ignition relay, heater relay, A/C relay, radiator relay, and horn relay.
Battery Specifications

<table>
<thead>
<tr>
<th>Battery</th>
<th>Two batteries 6-QW-90DF are in series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Less maintenance</td>
</tr>
<tr>
<td>Nominal voltage (V)</td>
<td>12</td>
</tr>
<tr>
<td>Nominal capacity (A · h)</td>
<td>165</td>
</tr>
</tbody>
</table>

Check

1. Electrolyte density when fully charged: 1.26~1.285 g/cm³
   ① Density meter
   ② Floater

2. Fill distilled water in time if the electrolyte is found insufficient. Charging for over half an hour after filling in order to let the filled distilled water fully fix with the former electrolyte.
   Electrolyte level (above the top of the battery plate)
   15~20mm
   ① Battery plate    ② Electrolyte
Electric System

Alternator

Alternator operation principle diagram

![Alternator Diagram]

1. Battery  
2. Electric using equipment  
3. Charging indicator  
4. Regulator

Specification

<table>
<thead>
<tr>
<th>Vehicle model</th>
<th>EQ1074T/G5AD-666</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (V)</td>
<td>28</td>
</tr>
<tr>
<td>Adjusting voltage (V)</td>
<td>28 ± 0.3</td>
</tr>
<tr>
<td>Nominal current (A)</td>
<td>45</td>
</tr>
<tr>
<td>Nominal revolution (r/min)</td>
<td>6000</td>
</tr>
<tr>
<td>Starting revolution (r/min)</td>
<td>&lt; 1150</td>
</tr>
<tr>
<td>Output current (A)</td>
<td>18-20</td>
</tr>
</tbody>
</table>

Construction Principle

Features

- Improve the magnetic circuit and use 8-diode rectifier to increase the output power.
- Construction without brush to make it simplified, and ease of servicing
- Use the alternator with built-in rectifier and electric regulator.

Operation principle

- The alternator produces self-excitation field and operates normally when the charging indicator lamp is extinguished.
## Electric System

### Trouble analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging indicator does not extinguish and the truck starts difficultly during operation</td>
<td>Short circuit or too large contact resistance</td>
<td>Check the circuit and repair or replace the damaged parts</td>
</tr>
<tr>
<td></td>
<td>Short circuit between the 3 phases and rotor winding and casing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diode damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Regulator failed</td>
<td></td>
</tr>
<tr>
<td>Charging current is too small, the battery is insufficient. No charging at low speed.</td>
<td>Output voltage is over low.</td>
<td>Exclude the trouble and replace the damaged parts</td>
</tr>
<tr>
<td></td>
<td>Diode is partly damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The rotor winding has 1 phase or 3 phases bad contact</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Slipping belt</td>
<td></td>
</tr>
<tr>
<td>The instrument indicator sometimes charges and sometimes not</td>
<td>Belt is too loose and slippery.</td>
<td>Tighten the contactors, and replace the instrument if it is damaged.</td>
</tr>
<tr>
<td></td>
<td>Built-in regulator works abnormally</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The contact from engine fire wire connector to battery connector is loose</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alternator interior connection is loose.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Instrument failed</td>
<td></td>
</tr>
<tr>
<td>Engine has abnormal noise during running.</td>
<td>Belt is loose or worn, shaken during running</td>
<td>Adjust the belt, replacebearing</td>
</tr>
<tr>
<td></td>
<td>Bearing damaged or too large clearance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Too large clearance of bearing caused interference</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
The self-excitation speed is very low (about 1000r/min) with battery operation. So be sure to see if the charging indicator is perfect or not during the operation.

Alternator negative earthing.
Be sure to use the original factory's parts as possible if it has to replace the diode.

During the alternator operation, if the temperature of the casing reaches to 105 °C + ambient temperature, and the output of the alternator is normal, the alternator is not burnt down.
Electric System

Starting Division

Starter

<table>
<thead>
<tr>
<th>Vehicle model</th>
<th>DFA1064DH01-985</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (V)</td>
<td>24</td>
</tr>
<tr>
<td>Nominal power (kW)</td>
<td>3.7</td>
</tr>
<tr>
<td>Pinion teeth</td>
<td>10</td>
</tr>
<tr>
<td>Pinion module</td>
<td>2.54/2.1167</td>
</tr>
<tr>
<td>Brake torque (N · m)</td>
<td>40</td>
</tr>
<tr>
<td>Brake current (A)</td>
<td>800</td>
</tr>
<tr>
<td>Brake voltage (V)</td>
<td>12</td>
</tr>
</tbody>
</table>

Starting relay

<table>
<thead>
<tr>
<th>Operating voltage (V)</th>
<th>18~32</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating current (A)</td>
<td>50</td>
</tr>
<tr>
<td>Pull-in voltage (V)</td>
<td>9~17</td>
</tr>
<tr>
<td>Drop-off voltage (V)</td>
<td>1~8</td>
</tr>
</tbody>
</table>

Assistant start button

The assistant start button is located at the right side of cab rear support. When the engine need to be repaired under the truck, put the ignition switch to "ON" position and make the ignition relay's contactor pull-in. Let the transmission in idle position and join up the idle switch. Press the sub-starting button under the truck to start the starter.

Electromagnetic Main Power Switch

Operation principle

When this switch is turned on, the current passes through the coil and the contactor closed to connect the battery cathode and chassis frame.

As soon as fuse is burnt the electromagnetic main supply switch will automatically cut off the battery negative earthed circuit. So there will be no electricity in the complete truck.

Specification

<table>
<thead>
<tr>
<th>Mode</th>
<th>Nominal voltage</th>
<th>Operating voltage</th>
<th>Operating current</th>
<th>Main contacts current in operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DK238</td>
<td>24V</td>
<td>20~30V</td>
<td>≤ 0.5A</td>
<td>300A</td>
</tr>
</tbody>
</table>

Trouble analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamming</td>
<td>The electromagnetic main supply switch is jammed</td>
<td>Slap the housing gently or repair</td>
</tr>
<tr>
<td>Not working</td>
<td>The electromagnetic main supply switch's interior trouble</td>
<td>Repair or replace</td>
</tr>
</tbody>
</table>
Exhaust Brake System

The exhaust brake is operative when the foot is removed from both the clutch pedal and the accelerator pedal; and the exhaust brake switch, clutch switch, accelerator switch and electromagnetic solenoid are all on. But the exhaust brake will be released when either the clutch pedal or the accelerator pedal is depressed.

Note:
The exhaust brake indicator lamp comes on, which only indicates the exhaust brake switch is ready for operation, not indicates the exhaust brake is operative.
Hazard Warning System

When the hazard warning switch is in the alarm position, the left and right turning signal lamps will flash simultaneously.
Electric System

Accessories

Wiper motor

<table>
<thead>
<tr>
<th></th>
<th>Power</th>
<th>Revolution</th>
<th>Low speed</th>
<th>High speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
<td>Low speed</td>
<td>40 ± 2</td>
<td>60 ± 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High speed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Horn

Press the horn button, the normal-open contact of the horn relay is connected and make the electric horn work.

Horn relay

Decrease the current flowing through horn button via an iron core with high resistance so as to prevent the horn button from burning out.

1. To horn
2. To power supply
3. To horn button
Electric System

Electric wiring diagram
Fog Lamps

Double rocker switch in parallel is used as a fog switch. That is because when the front lamps go on, the tail lamps, license lamp, instrument and quartz clock illuminators should be all lighted simultaneously, while the foglamp is not included, but when the foglamp goes on, the front lamps, tail lamps, license lamp, instrument and quartz clock illuminator should be all lighted.
Electric System

Instruments

Structure

This part consists of air pressure meter, fuel meter, water temperature meter, tachometer and speedometer.

Name of the indicators and warning lights

- Tailight warning indicator
- Exhaust brake indicator
- High beam indicator
- Charge warning light
- Fuel–water separator warning light
- Parking brake warning light
- Safety belt indicator light
- Fuel level warning light
- Rear fog indicator
- Water temperature warning light
- Oil pressure warning light
- Brake–down warning light
- Air–filter block warning light
- Direction signal indicator

EL-16
Instrument Panel

Technical parameter and function

Technical parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speedometer (km/h)</td>
<td>0–140</td>
</tr>
<tr>
<td>Tachometer (rpm)</td>
<td>0–5000</td>
</tr>
<tr>
<td>Fuel meter</td>
<td>0–1/2–1</td>
</tr>
<tr>
<td>Water temperature meter (°C)</td>
<td>40–80–100–120</td>
</tr>
<tr>
<td>Nominal voltage (V)</td>
<td>24</td>
</tr>
</tbody>
</table>

Constitution and function

The instrument panel assembly is consisted by speedometer, tachometer, water temperature meter, fuel meter, warning system (14 warning indicator), and matched with the sensor and warner.

Disassembly

1. Panel assembly
2. Speedometer
3. Washer
4. Self-tapping screw
5. Warning lamp pattern piece
6. Big case
7. Soft printed circuit board
8. Nylon rivet
9. Speedometer lighting bulb holder
10. Small warning signal lamp bulb holder assembly
11. Big warning signal lamp holder
12. Oil pressure gauge assembly
13. Fuel level gauge
14. Water temperature gauge
15. Small gauge transition connector
16. Electronic tachometer
17. Washer
18. Self-tapping screw
19. Spring washer
20. Screw
21. Spring washer
22. Screw
23. Small gauge voltage drop resistor
Electric System

Disassembly

Pull out connectors and the flexible shaft, and then detach wires connected with the electronic tachometer before removing the instrument panel assembly.

1. Remove the speedometer after detaching 3 tapping screw.

2. Pull out bulb when turning the bulb holder counter clockwise to make it aligned with the notch.

3. The voltage drop resistors of small meters are also tightened by tapping screws so that they can be removed.

4. The wire connectors of the speedometer are connected to the big case by the tapping screws and they can be pulled out after removing the bulb holder and loosening screws. When assembling, fit lamps by passing through the circuit board or by removing all the warning lamps first, connect wires and fit the lamps.

5. The circuit board is riveted to the case, so pull it out by force when detaching.

6. After removing the big case, the pattern pieces can be removed because they are stuck with glue which will not dry. But they should be put in appropriate positions when assembling.

7. Remove meters after loosening screws at the back of the big case. Fit it carefully when assembling to avoid the bad fit between transition connecting parts and the big case.

8. Take out the circuit board only after all the bulbs and screws are removed.

Instruments replacing

The speedometer and tachometer can be replaced directly after disassembling according to the above method. The three small meters can be replaced after the transition connecting parts have been removed which should be fit and tightened after the meters are replaced.

Reassembly and check

Reassemble the removed parts in the reverse order of removal and tighten screws when reassembling. Check if there is any part assembled wrongly or any scratches, damages and so on. Then attach the connectors, the tachometer wires and the flexible shaft of the speedometer. Assemble the instrument panel assembly and operate it for a while to see if the meters work normally.

Notice

Attach connectors A and B appropriately and note if the voltage of the electric system is connected.

Stop the vehicle to check immediately if the warning indicator illuminated and something troubled happened.

The light spring washer and washer of the small meters should be copper plated or galvanized.

Meters on the instrument panel should be matched with appropriately specified sensors.

The speedometer assembly and the big case are connected with panel by tapping screws, so please be careful when assembling and disassembling in order to avoid damages of the tapping thread and result in loose connecting.

Trouble analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning lamps does not go on</td>
<td>Bulb holder slackened</td>
<td>Tighten the holder</td>
</tr>
<tr>
<td></td>
<td>Bulb damaged</td>
<td>Replace bulb</td>
</tr>
<tr>
<td></td>
<td>Wire slackened</td>
<td>Connect wire or tighten</td>
</tr>
<tr>
<td></td>
<td>Warning sensor damaged</td>
<td>Replace</td>
</tr>
<tr>
<td>Illuminator does not go on or in bad condition</td>
<td>Power of the bulb is over sufficient, insufficient or the bulb is aging.</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Holder is not tightened or bulb is damaged.</td>
<td>Tighten or replace</td>
</tr>
<tr>
<td></td>
<td>Wire slackened or broken</td>
<td>Tighten, connect</td>
</tr>
</tbody>
</table>
Dial description

The speedometer needle indicates the vehicle speed in kilometers per hour. The odometer indicates the accumulated driving distance in kilometers.

The trip odometer indicates the distance driven per day or driving distance between specified regions. Firmly press the reset knob to reset the meter indicator to zero and then release it before using this speedometer. The red figure at the far right with the white background indicates readings in units of 0.1km.

Note:
Do not press the reset button during the driving period.
Do not pull or turn the reset button when press it.

Technical parameter

<table>
<thead>
<tr>
<th>Type</th>
<th>Magnetic inductive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed indicator range (km/h)</td>
<td>0~140</td>
</tr>
<tr>
<td>Mileage counting figures (km)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99999</td>
</tr>
<tr>
<td>Sum</td>
<td>999.9</td>
</tr>
<tr>
<td>Speed ratio</td>
<td>1: 625</td>
</tr>
<tr>
<td>Connector thread</td>
<td>M18 × 1.5</td>
</tr>
<tr>
<td>The inner square hole of drive (mm)</td>
<td>(2.6C_{11 +0.06} \times 2.6C_{11 +0.06})</td>
</tr>
</tbody>
</table>
Structure

The speedometer is used to indicate the vehicle driving speed and the accumulated driving distance. It comprises a speed and a mileage unit which records vehicle driving mileage. These two units are integrated into one body and driven by the flexible shaft which is connected with transmission output shaft.

The mileage unit records the driven mileage of the vehicle in order to do necessary maintenance on mileage. The counter is divided into an accumulated counter and a day counter. The speed unit indicates the transient speed of the vehicle. It is convenient to control the vehicle speed so as to obtain safety, economy and high efficiency.

1. Flexible shaft  2. Drive shaft  3. Worm and lateral shaft  
4. Worm and vertical shaft  5. Worm wheel  6. Digital wheel  
7. Magnetic ring  8. Temperature compensated ring  
9. Inductive aluminum cover  10. Needle shaft  
11. Hairspring  12. Needle

Working principle

Drive of speedometer

The flexible shaft (driven by transmission main shaft) mounted on the back of the transmission is driven by pulling the square connector into the square hole at the outside of the speedometer turning shaft which drives the digital wheel through three sets of worm wheel and worm.

Indication of odometer

When the flexible shaft drives the speedometer turning shaft to rotate, the magnetic steel on the drive shaft rotates simultaneously, causing the eddy current within the inductive cover, which also produce magnetic field. Both fields interact on each other to produce deflecting torque. The higher the vehicle speed is, the larger the deflecting torque is, which can be indicated by the needle deflection. When the needle deflecting torque of the hairspring, the needle will stay at the appropriate speed value. The needle deflecting angle is proportional to the speed of the speedometer turning shaft, that is, the vehicle speed, causing the needle to indicate various speed.
## Trouble analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both the speed division and the distance counting division of the speedometer do not work</td>
<td>Flexible shaft core broken</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Odometer rotating shaft seized</td>
<td>Replace the odometer</td>
</tr>
<tr>
<td></td>
<td>Square connector nut slackened</td>
<td>Tighten again</td>
</tr>
<tr>
<td>Only the speed division of the speedometer does not work</td>
<td>Needle deformed and seized with dial or glass</td>
<td>Correct</td>
</tr>
<tr>
<td></td>
<td>Drive worm wheel and worm, and inductive plate seized, broken, or dirtied</td>
<td>Replace or clean</td>
</tr>
<tr>
<td>The needle and the accumulated machine do not run simultaneously</td>
<td>Drive gear or driven gear of the speedometer damaged</td>
<td>Replace meter</td>
</tr>
<tr>
<td></td>
<td>Meter failed</td>
<td>Replace meter</td>
</tr>
<tr>
<td>The deflection indication of the needle is too high.</td>
<td>Speedometer flexible shaft deformed or radius area bent</td>
<td>Correct the flexible shaft</td>
</tr>
<tr>
<td></td>
<td>Input shaft or gear worn</td>
<td>Replace meter</td>
</tr>
<tr>
<td>The speedometer indication is on the low side</td>
<td>Transmission output shaft slipped</td>
<td>Tighten the flange fork under the recommended torque</td>
</tr>
<tr>
<td></td>
<td>The magnetic effect of the magnetic steel reduced</td>
<td>Replace</td>
</tr>
<tr>
<td>Needle indication error</td>
<td>Hairspring deformed or deviate from the original position</td>
<td>Move the hairspring to one side to adjust the indication of the needle</td>
</tr>
<tr>
<td></td>
<td>Magnetic body cracked</td>
<td>Replace meter</td>
</tr>
<tr>
<td></td>
<td>Dimension of tyre is wrong</td>
<td>Replace and use the recommended tyre</td>
</tr>
<tr>
<td></td>
<td>Speed gear worn or damaged</td>
<td>Replace meter</td>
</tr>
<tr>
<td>The needle deflection exceeds the dial</td>
<td>Grease on the magnet</td>
<td>Clean out the grease</td>
</tr>
<tr>
<td>The speed needle of the speedometer works unsteadily</td>
<td>Hairspring broken</td>
<td>Replace meter</td>
</tr>
<tr>
<td></td>
<td>At the constance velocity of the vehicle when the speed needle's indication unsteadily reaches to 3km/h, it is in trouble. Check the curvature of the flexible shaft to see if it is too small.</td>
<td>Adjust</td>
</tr>
<tr>
<td></td>
<td>Flexible shaft core seized</td>
<td>Clean and lubricate</td>
</tr>
<tr>
<td>Speedometer needle oscillates severely</td>
<td>The axial clearance of the flexible shaft is too big causes the flexible shaft and speedometer's rotating shaft sometimes engaged, sometimes separated.</td>
<td>Replace shaft core</td>
</tr>
</tbody>
</table>
Electric System

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>The needle seized or failed that can not return to zero</td>
<td>Grease on the magnet</td>
<td>Clean out the grease</td>
</tr>
<tr>
<td></td>
<td>Hairspring deformed</td>
<td>Replace meter</td>
</tr>
<tr>
<td></td>
<td>Wrong assembling of the needle (needle slackened)</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>There are impurities absorbed on the magnet of the indication board.</td>
<td>Clean</td>
</tr>
<tr>
<td>The day distance counter does not work or can not return to zero</td>
<td>Odometer drive pinion damaged</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Return zero button damaged</td>
<td>Repair or replace</td>
</tr>
<tr>
<td>Speedometer noise</td>
<td>Speedometer bearing worn and damaged</td>
<td>Replace meter</td>
</tr>
<tr>
<td></td>
<td>Speedometer gear lacks of lubricating and causing worn</td>
<td>Fill with grease</td>
</tr>
<tr>
<td></td>
<td>Speedometer flexible shaft lacks of lubricating and causing worn</td>
<td>Fill with grease</td>
</tr>
</tbody>
</table>

Tachometer

Dial description

The needle of the electronic tachometer indicates the engine speed in revolutions per minute. The red zone indicates the range of the critical engine speed. Strictly be sure to always keep the indicator below this critical zone. The green zone indicates the most economical engine operation. Driving within this green zone will save fuel and extend the engine life.

Technical specification

<table>
<thead>
<tr>
<th>Type</th>
<th>Moving coil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range (r/min)</td>
<td>0~5000</td>
</tr>
<tr>
<td>Deflecting angle(°)</td>
<td>245</td>
</tr>
<tr>
<td>Min. graduation (r/min)</td>
<td>100</td>
</tr>
<tr>
<td>Accuracy level</td>
<td>1.5</td>
</tr>
<tr>
<td>Connector</td>
<td>DJ7043-6.3-20 type, 4-cable combined socket</td>
</tr>
</tbody>
</table>

Constructional description

The electronic tachometer construction including:

The indication division: comprise of needle, dial and so on.

The signal processing division: comprise of printed-circuit plate and electronic parts.

The measuring mechanism: comprise of magnetic steel, pole plate, pole ring, and needle shaft coil assembly, bracket assembly, upper and lower bearing and so on.

Auxiliary part: Base, housing, screws and electrical connectors.
Instrument assembly and disassembly

Before disassembling the instrument, pull out needle 1, and then loosen two screws 2.

When disassembling the printed-circuit board; pull it out directly after welding off two wires 9 (the printed board and blade connector are directly connected together through a spring blade socket on the board).

Generally, do not disassemble the unit core. If it has to be disassembled, weld off both the upper and the lower hairsprings, and the conductive blade at first so as not to damage the hairsprings. In addition, do not break the coil output wire.


Trouble analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Case</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>The instrument doesn't work</td>
<td>Circuit broke</td>
<td>Check wire connection and connector with socket's contact</td>
</tr>
<tr>
<td></td>
<td>Sensor damaged</td>
<td>Replace sensor</td>
</tr>
<tr>
<td></td>
<td>Instrument burnt out</td>
<td>Replace instrument</td>
</tr>
<tr>
<td>Needle shakes abnormally</td>
<td>Wire connection is not good</td>
<td>Check wire connection</td>
</tr>
<tr>
<td></td>
<td>Integrated body damaged</td>
<td>Replace integrated body</td>
</tr>
<tr>
<td>Needle clicked</td>
<td>There's foreign objects in the core</td>
<td>Remove foreign objects</td>
</tr>
<tr>
<td>Needle doesn't return to zero</td>
<td>Needle slacked</td>
<td>Press the needle firmly and turn to zero</td>
</tr>
<tr>
<td></td>
<td>Core is clicked by foreign objects</td>
<td>Remove foreign objects</td>
</tr>
</tbody>
</table>
Water Temperature Meter and Fuel Meter

Dial description

Water temperature meter

The water temperature meter is used to indicate the temperature of the engine coolant. The temperature of the coolant will change because of the temperature of the atmosphere and vehicle running condition. If the indication of the meter is over its normal range, stop the vehicle as soon as possible. Under the condition of too hot engine, continuously drive the vehicle will cause the damages of the engine.

Fuel meter

The fuel meter is used to indicate the fuel level in the tank. The indication may change slightly because of braking, turning, or accelerating of the vehicle. Please fill the fuel tank in time before the fuel is used up.

Technical parameter

<table>
<thead>
<tr>
<th>Water temperature meter</th>
<th>Type</th>
<th>Moving magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicating range (℃)</td>
<td>40 ~ 80 ~ 100 ~ 120</td>
<td></td>
</tr>
<tr>
<td>Meter seat connection</td>
<td>3-M3-6g screw</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fuel meter</th>
<th>Type</th>
<th>Moving magnet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicating range</td>
<td>0 ~ 1/2 ~ 1</td>
<td></td>
</tr>
<tr>
<td>Meter seat connection</td>
<td>3-M3-6g</td>
<td></td>
</tr>
</tbody>
</table>

Trouble analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel meter does not work</td>
<td>Open circuit of the sensor resistance wire</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Open circuit of the sensor and meter electric wire</td>
<td>Connect</td>
</tr>
<tr>
<td>Wrong indication of the fuel meter</td>
<td>Sensor floater cracked and does not float</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Wrong connection between meter and sensor</td>
<td>Check and connect</td>
</tr>
<tr>
<td></td>
<td>Floater lever deformed or seized</td>
<td>Repair or replace</td>
</tr>
<tr>
<td></td>
<td>Sensor does not match with fuel meter</td>
<td>Replace</td>
</tr>
<tr>
<td>Water temperature meter does not work</td>
<td>Instrument power supply opened</td>
<td>Check and connect</td>
</tr>
<tr>
<td></td>
<td>Open circuit of the sensor</td>
<td>Replace</td>
</tr>
<tr>
<td></td>
<td>Open circuit of the water temperature meter</td>
<td>Repair or replace</td>
</tr>
<tr>
<td>Water temperature meter indication stays at 40 ℃</td>
<td>Sensor damaged</td>
<td>Replace</td>
</tr>
<tr>
<td>Water temperature meter indication increase to 120 ℃ suddenly</td>
<td>Short circuit of the circuit or induced plug</td>
<td>Check or replace</td>
</tr>
</tbody>
</table>