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General Principles

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General Principles

This manual mainly states maintenance and service methods of DFA1101GZ5AD6J-907 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.

Dong Feng 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>
<tr>
<td>Check acceleration capability and decelerability</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check exhaust status</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the leakage of engine lubricant</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the cleanliness and reserves of lubricant</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the leakage of fuel</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the leakage in cooling system</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the damage of fan belt</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Remove the deposit in fuel prefilter</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check and clean air filter element</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Replace engine lubricant</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Replace oil filter</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check and adjust valve clearance</td>
<td>☆ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Replace fuel filter and oil &amp; water separator</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Replace air filter element</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the compression pressure in cylinder</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the injection pressure of injector</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check injection timing</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the injection volume of injection pump</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the working conditions of delivery pump</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the working conditions of thermostat</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the working conditions of radiator</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Clean the cooling system of engine</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Check the working conditions of supercharger, replace while necessary</td>
<td>★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★</td>
</tr>
</tbody>
</table>
### General Principles

#### Clutch

<table>
<thead>
<tr>
<th>Maintenance Item</th>
<th>Maintenance Mileage Interval $\times 1,000 \text{km}$</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 $\times 1,000 \text{km}$</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 $\times 1,000 \text{km}$</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 $\times 1,000 \text{km}$</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>

GL-4
## 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>
<tr>
<td>Clean axles and wheels</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the oil leakage of final drive</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the fastening conditions of important bolts</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the pressure in tyres</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the abnormal wearing of wheels</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check lubricant reserves of final drive, clean vent plug</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Clean and adjust hub bearings</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Replace the lubricant of final drive</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Wheel changing</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the working conditions of final drive and the bearings</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Disassemble and check final drive and adjust it</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Make magnetic examination for axle shaft tube</td>
<td>★★★★★★★★★★★★</td>
</tr>
</tbody>
</table>

### Steering System

<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>Check the oil leakage of steering gear</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Clean steering gear</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check free travel and working conditions of hand wheel</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the fastening conditions of the ball heads of steering cross rod and tie rod</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check fastening conditions of steering mechanism and its brackets</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check fastening conditions of steering arm and steering knuckle arm</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check and adjust front wheel toe-in</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check front wheel alignment</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check and adjust steering gear</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Disassemble and check the connectors of steering cross rod and tie rod</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Make magnetic examinations for steering knuckle</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Replace the ball head pins in steering system</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check power steering oil reserves, add while necessary</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Replace power steering transmission oil</td>
<td>★★★★★★★★★★★★</td>
</tr>
</tbody>
</table>

### Braking System

<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>Check the free travel of brake pedal</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check parking brake and its efficiency</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check the air leakage of braking pipeline</td>
<td>★★★★★★★★★★★★</td>
</tr>
<tr>
<td>Check and adjust the clearance between brake drum and friction disc</td>
<td>★★★★★★★★★★★★</td>
</tr>
</tbody>
</table>
Recommended Fuel and Lubricant

The quality of fuel and lubricant can affect 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.

Dong Feng 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 accordance 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 Dong Feng 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>102</td>
</tr>
<tr>
<td>Engine lubrication system</td>
<td>9</td>
</tr>
<tr>
<td>Engine cooling system</td>
<td>14.5</td>
</tr>
<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 &quot;MAX&quot; of clutch oil reservoir</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.

<table>
<thead>
<tr>
<th>Part</th>
<th>Volume (L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power steering gear</td>
<td>Add between the upper and lower scale of oil tank</td>
</tr>
</tbody>
</table>

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.
General Principles

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 affect 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 can not start → Listen to the sound 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 troubled
    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
  - Steering system troubled
  - Incorrect front wheel alignment
  - Front axle troubles
  - Over low pressure of front wheel
- Turning wheels not return
  - Steering system troubled
  - Incorrect front wheel alignment
  - Front axle troubles
- Insufficient steering angle
  - Steering system trouble
  - Front axle troubles

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

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

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### Main Parameter

<table>
<thead>
<tr>
<th>Bolt install hole size</th>
<th>Distributing diameter (mm)</th>
<th>Φ 368.3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Aperture (mm)</td>
<td>Φ 10.3 (+0.25)</td>
</tr>
<tr>
<td></td>
<td>Number of holes</td>
<td>8 (4 pairs)</td>
</tr>
<tr>
<td>Positioning pin hole size</td>
<td>Distributing diameter (mm)</td>
<td>Φ 363.53</td>
</tr>
<tr>
<td></td>
<td>Aperture (mm)</td>
<td>Φ 7.92 (0.03)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Φ 9.52 (+0.03)</td>
</tr>
<tr>
<td></td>
<td>Number of holes</td>
<td>2</td>
</tr>
<tr>
<td>Angle between positioning hole and installing bolt hole</td>
<td></td>
<td>15°</td>
</tr>
<tr>
<td>Friction lining size</td>
<td>D×d</td>
<td>Φ 325× Φ 200</td>
</tr>
<tr>
<td>Working pressure force</td>
<td></td>
<td>10250</td>
</tr>
<tr>
<td>Release bearing stroke (mm)</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Pressure plate lift range (mm)</td>
<td></td>
<td>≥ 1.4</td>
</tr>
<tr>
<td>Height of release finger (mm)</td>
<td></td>
<td>56±1</td>
</tr>
<tr>
<td>Unbalance static of the cover assembly (g.cm)</td>
<td></td>
<td>≤ 50</td>
</tr>
<tr>
<td>Unbalance static of the driven disc assembly (g.cm)</td>
<td></td>
<td>≤ 25</td>
</tr>
<tr>
<td>Torque (N.m)</td>
<td>Max=770</td>
<td></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

### Trouble Analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch disengaged incompletely or vehicle started unstably</td>
<td>Clutch pressure plate or driven disc lining distorted or cracked&lt;br&gt;Release lever improper adjusted&lt;br&gt;Air in clutch hydraulic pressure controlling system pipe&lt;br&gt;Too large clutch pedal free travel&lt;br&gt;Clutch master cylinder or booster worked abnormally</td>
<td>Change the pressure plate or driven disc lining&lt;br&gt;Disassemble and repair&lt;br&gt;Exhaust the air in the pipe&lt;br&gt;Readjust accord to the standard&lt;br&gt;Disassemble and repair</td>
</tr>
<tr>
<td>Clutch slipped</td>
<td>Clutch driven disc friction lining or pressure plate worn&lt;br&gt;Oil stain on clutch driven disc or pressure plate&lt;br&gt;Too small clutch pedal free travel&lt;br&gt;Clutch booster push rod has no free stroke.&lt;br&gt;Clutch booster push rod can't return.&lt;br&gt;Clutch pressure plate spring failed&lt;br&gt;Clutch release bearing worn&lt;br&gt;Clutch booster push rod adjusted improperly</td>
<td>Replace clutch driven disc friction lining or pressure plate&lt;br&gt;Clean driven disc friction lining and pressure plate&lt;br&gt;Disassemble and repair&lt;br&gt;Readjust accord to the standard&lt;br&gt;Check master cylinder push rod and booster oil seal&lt;br&gt;Change the pressure platespring&lt;br&gt;Replace the release bearing&lt;br&gt;Disassemble and repair</td>
</tr>
<tr>
<td>Abnormal sound of clutch</td>
<td>Clutch release bearing worn or improper lubricated&lt;br&gt;Clutch pressure plate or driven disc distorted&lt;br&gt;Transmission input shaft or driven disc spline worn&lt;br&gt;Clutch pedal shaft bush worn</td>
<td>Replace the release bearing release bearing&lt;br&gt;Change the pressure plate or driven disc&lt;br&gt;Replace input shaft or driven disc&lt;br&gt;Replace the bushing</td>
</tr>
<tr>
<td>Clutch pedal can't be stepped down</td>
<td>Clutch out of control&lt;br&gt;Cylinder of clutch hydraulic pressure system blocked&lt;br&gt;Release lever worn</td>
<td>Adjust&lt;br&gt;Adjust&lt;br&gt;Replace</td>
</tr>
<tr>
<td>Changes in clutch pedal</td>
<td>Air in hydraulic pressure pipeline&lt;br&gt;Master cylinder oil pipeline blocked</td>
<td>Exhaust air in the pipe&lt;br&gt;Clean or replace</td>
</tr>
<tr>
<td>Too large clutch pedal force</td>
<td>Clutch booster troubled&lt;br&gt;Release shaft bushing blocked or improper lubricated&lt;br&gt;Release bearing flange blocked&lt;br&gt;Release lever bush improper lubricated</td>
<td>Disassemble, repair and clean&lt;br&gt;Replace bush or lubricate&lt;br&gt;Correct or replace the bearing flange&lt;br&gt;Lubricate</td>
</tr>
</tbody>
</table>
Clutch Mechanical System

1. Clutch pedal bracket assy
2. Lower fixed plate--pedal bracket
3. Hose assy--oil reservoir to master cylinder
4. Clutch pedal welding assy
5. Pedal sleeve
6. Clutch pedal shaft
7. Clutch pedal return spring
8. Bush--pedal assy
9. Pin
10. Clutch master cylinder assy
11. Oil reservoir assy

12. Front oil pipe assy
13. Free flowing coupling
14. Front hose assy--clutch
15. Rear oil pipe assy--clutch master cylinder to booster
16. Clutch rear oil pipe bracket
17. Rear hose assy
18. Booster assy
19. Nylon pipe assy (air pipe to four-way protective valve)
20. Bracket set--clutch booster
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. Friction lining rivet
2. Friction lining
3. Wave spacer
4. Front damping disc
5. Wave spacer rivet
6. Damping spring
7. Damping spacer
8. Disc hub
9. Damping impact spacer
10. Damping spring spacer
11. Limiting pin
12. Rear damping disc
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.
Overmuch 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
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 acrossed sequence, following two steps.
1. Driving blade  
2. Rivet--pressure plate  
3. Rivet--cover  
4. Rivet--supporting ring  
5. Supporting ring  
6. Diaphragm spring  
7. Pressure plate  
8. Clutch cover  
9. Balancing rivet
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

Usage and Maintenance

The diaphragm clutch which has two positioning holes and been connected by 8 M10 bolts, is made up by cover assy and driven disc assy.

The drive blade is used to transmit the engine torque between the pressure plate and clutch cover. Two ends of the drive blade are riveted to the clutch cover and the pressure plate. When disengaged, the drive blade may have the axial deformation, and there is no friction between clutch cover and pressure plate. Therefore, the clutch will has a higher drive efficiency, lower noise, and stable engage.

The working pressure force is caused by the diaphragm. The original height of the clutch release finger is 56±1mm. During the usage, it will be higher because of wearing. The wear limit of the two pieces of the friction lining is 2×1.8mm. During the wearing time, the distance between the toppest point of the release finger and the release bearing end has to be adjusted to 3~4mm, and the largest release stroke of the release finger is 10mm.

The outside diameter of the driven disc friction lining is Φ325mm. Its material may adopt to asbestos or non-asbestos according to the need of the customer. The original thickness of the driven disc working surface is 9.7±0.3mm. The assembly is equipped with big and small shock-absorber spring and damping spacer which is good to absorb the impact and vibration from the chassis.

The involute spline is used to connect the driven disc and transmission.

The working surface of the driven disc can't be stained with oil soil during the assembling and storage.

When the friction lining is in trouble, such as the rivet loose or come out or cracked, the driven disc must be replaced immediately.

During the assembling and instorage, the working surface of the clutch cover assembly must haven't any scuffing and rust. If the release finger is broken or the pressure plate reached to its wear limit and the diaphragm is broken, you must replace the assembly immediately.
Clutch
Transmission

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### Transmission 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>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearance between gear shift lever and select lever</td>
<td>Gear shift lever</td>
<td>—</td>
<td>0.1–0.4</td>
<td>—</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>Gear select lever</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Radial clearance between gear shift lever and its spline</td>
<td></td>
<td>—</td>
<td>0.05–0.11</td>
<td>—</td>
<td>0.5</td>
</tr>
<tr>
<td>Clearance between gear shift lever and guide block</td>
<td>Gear shift lever</td>
<td>—</td>
<td>0.1–0.4</td>
<td>—</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Each guide block</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Clearance between gear shift fork and slide sleeve</td>
<td>Free length</td>
<td>—</td>
<td>34.0–36.0</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Pressure force</td>
<td>—</td>
<td>140–190 N</td>
<td>—</td>
<td>110N When press to 25mm</td>
</tr>
<tr>
<td>Backlash between mainshaft and countershaft</td>
<td>—</td>
<td>0.15–0.25</td>
<td>—</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Axial clearance of the 2nd gear</td>
<td>—</td>
<td>0.3–0.5</td>
<td>—</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Axial clearance of the reverse gear</td>
<td>—</td>
<td>0.3–0.6</td>
<td>—</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Radial clearance between mainshaft spline hub and mainshaft</td>
<td>—</td>
<td>0.2–0.3</td>
<td>—</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Radial clearance between slide sleeve and coupling gear</td>
<td>—</td>
<td>0.45–0.55</td>
<td>—</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Axial clearance of ball bearing</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Lockpin type</td>
<td>Pretravel of synchronizer conical ring and conical disc</td>
<td>—</td>
<td>0–0.5</td>
<td>—</td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>Clearance between baulk ring and synchronizer conical ring</td>
<td>—</td>
<td>1.5–2.5</td>
<td>—</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Radial clearance between baulk ring and fixed tooth seat</td>
<td>—</td>
<td>5.3–5.7</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Synchronizer Slide block type</td>
<td>Axial clearance between fixed seat and synchronizer closing ring</td>
<td>—</td>
<td>&gt; 0.5</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Axial clearance between fixed seat and synchronizer backing block</td>
<td>—</td>
<td>0.05–0.35</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Free length of the backing block spring</td>
<td>15</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Packing force of the backing block spring</td>
<td>—</td>
<td>6–10N</td>
<td>—</td>
<td>4N When press to 12.5mm</td>
</tr>
</tbody>
</table>
Transmission

Tightening Torque

<table>
<thead>
<tr>
<th>Item</th>
<th>Tightening Torque (N.m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clutch housing connecting bolt</td>
<td>142~186</td>
</tr>
<tr>
<td>fasten nut of propeller shaft connecting flange</td>
<td>333~549</td>
</tr>
<tr>
<td>Transmission upper cover fixed bolt and nut</td>
<td>32~42</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>Power take-off housing connecting bolt</td>
<td>Standard</td>
</tr>
<tr>
<td>Countershaft rear bearing cover fixed bolt</td>
<td>47~63</td>
</tr>
<tr>
<td>Fixed bolt of mainshaft rear bearing seat M12</td>
<td>59~79</td>
</tr>
<tr>
<td>Fixed bolt of drive gear shaft bearing cover M14</td>
<td>93~124</td>
</tr>
<tr>
<td>Reverse gear shaft locking plate bolt</td>
<td>33~44</td>
</tr>
<tr>
<td>Mainshaft front locking nut</td>
<td>20~26</td>
</tr>
<tr>
<td>Oil drain screw plug and filler port screw plug</td>
<td>300</td>
</tr>
<tr>
<td>Gear shift guide bolt</td>
<td>120~140</td>
</tr>
<tr>
<td>Countershaft rear locking nut</td>
<td>40</td>
</tr>
<tr>
<td>Gear shift guide bolt</td>
<td>300</td>
</tr>
</tbody>
</table>

Transmission Dismount

Before disassemble the assembly, switch the ignition key to OFF, and wedge up the front and rear wheel to ensure the safety.

1. Screw off the drain plug screw, drain off the lubricant oil from the underpart of the transmission;
2. Disassemble the driving shaft assembly and central support bearing;
3. Remove the speedometer flexible shaft;
4. Disassemble transmission control system
5. Remove the return spring and dowel pin of the clutch slave cylinder then safely put the clutch slave cylinder assembly onto the frame;
6. Remove wire and tube.
7. Disassemble the transmission with transmission jack and steel wire.
Transmission Disassembly

Transmission housing and drive gear shaft

Set the transmission on the working table carefully. If there is not a working table, make use of a simple table to support the transmission housing first, and then carefully do the disassembly.
Disassembly of transmission accessories

1. Remove the clutch housing assembly;

2. Remove the transmission upper cover assembly and spacer;

3. Dismantle the power take-off cover and spacer;

4. Measure the backlash of every pair of gear and take the records;
   Note: Take three points of every pair of gear to measure.
5. Measure the axial clearance of every gear and take the records.

Check point

1. Clearance between 6th speed gear and 6th speed gear thrust ring;
2. Clearance between 4th speed gear and 6th speed gear thrust ring;
3. Clearance between 3rd speed gear and 3rd and 4th speed gear fixed seat;
4. Clearance between reverse gear and reverse gear fixed seat;
5. Clearance between 2nd speed gear and 3rd speed gear thrust ring;
6. Clearance between 1st speed gear and reverse gear seat.

Transmission body

1. Remove the rear bearing cover of the mainshaft;
2. Remove the speedometer drive gear and spacer;
3. Remove the driven gear, flexible joint and bushing of the speedometer;

4. Remove the countershaft rear bearing cover and gasket;

5. Remove the drive gear shaft bearing cover and gasket;

6. Remove the oil seal from the bearing cover (if necessary);

7. Take out the drive gear shaft assembly;
8. Remove the elastic collar and remove the ball bearing (only if it is necessary to replace the bearing);

9. Remove the mainshaft rear ball bearing elastic ring, set the extractor in the slot of the elastic ring, then take down the bearing;

10. Take down the synchronizer baulk ring of the 5th and 6th speed gear;
    Note: Make marks on the baulk ring in order to distinguish.

11. Make use of a crane or hoist to lift the mainshaft out from the transmission housing and make the front end of the mainshaft uptilted;
12. Make use of the extractor to pull the reverse gear shaft;

13. Disassemble the reverse gear assembly;

14. Remove the countershaft rear locking nut;

15. Remove the elastic ring of the countershaft rear ball bearing, then set the extractor in the retainer ring slot, and pull the bearing out;
16. Lift the countershaft out by using crane or hoist.

Transmission mainshaft
Transmission

1. Take down the following parts in sequence: the thrust washer, reverse gear, needle bearing and bearing base ring, reverse gear seat, reverse gear sleeve;

2. Set the front end of the mainshaft up and place it on the working table, remove the elastic ring and square the locking spacer, then loose the locking nut by a spanner.
   Note: Make sure the nut is totally loose.
3. Pull out the bearing by the extractor, then remove the locking nut, locking spacer and the spacer sleeve in sequence;

4. Take down the 5th and 6th speed gear synchronizer assembly and the 6th gear;

5. Dismantle the 5th and 6th speed gear synchronizer assembly;
   Note: Be careful when dismantle the slide gear sleeve, take care of the fixed gear seat, lockpin and spring of the slide sleeve, and other parts. Do not miss any of them.

6. Pull the reverse gear with an extractor to loose the shaft bush and every gear needle bearing seat ring;
7. Take down 6th speed gear needle bearing and the bearing seat ring;

8. Remove the thrust spacer, 4th gear, needle bearing and 4th speed gear bearing seat ring;

9. Take down 3rd and 4th speed gear fixed gear seat;

10. Take down 3rd and 4th speed gear synchronizer;
11. Take down 3rd and 4th speed gear;

12. Remove the needle bearing, spacer sleeve;

13. Take down 2nd speed gear and needle bearing;

14. Take down the 1st and 2nd speed gear synchronizer assembly;

15. Remove the 1st speed gear and needle bearing.
Transmission countershaft, reverse gear shaft

Usually, the countershaft need not to be disassembled, unless the gear worn or damaged and it is necessary to replace, then you need to do the disassembly.
1. Take down the elastic ring and spacer sleeve;

2. Remove the roller bearing;

3. Make use of the oil pressure machine to press out the gear which fixed by keys, and remove the spacer sleeve at the same.
   
   Note:
   
   When pressing the countershaft, don't let it fall down.
Transmission

Transmission cover

1. Controlling shaft
2. Oil seal
3. Top cover
4. Plain washer
5. Spring washer
6. Hex bolt
7. Vent plug assy
8. Snap ring for shaft
9. Washer
10. Cup spacer
11. Pin
12. O-ring
13. Gear select rocker arm assy
14. Gear shift lever
15. Balancing spring -- gear select
16. Steel ball
17. Damping spring -- reverse gear
18. Lock shim -- spring seat
19. Damping spring seat -- reverse gear
20. Top cover spacer
21. Lock transmission fork shaft spring
22. Steel ball
23. Limiting stop pilot bolt
24. Spring washer
25. Switch assy
26. Spacer
27. Steel ball
28. Reverse shift fork
29. Reverse gear guide block
30. Steel wire rope
31. Reverse gear fork shaft
32. Steel wire rope
33. 1st, 2nd gear fork
34. Gear fork catch bolt
35. 1st, 2nd gear fork shaft
36. 1st, 2nd gear guide block
37. 3rd, 4th gear fork shaft
38. Interlock pin
39. Steel ball
40. 3rd, 4th gear fork
41. 5th, 6th gear fork
42. 5th, 6th gear fork shaft
43. 5th, 6th gear guide block
44. Cotter pin
45. Safety stop pin spring
46. Safety stop pin spring
47. Spacer -- transmission upper cover
48. Transmission upper cover
49. Spring washer
50. Hex bolt
51. Cup spacer
Transmission

Gear shift shaft and fork could be moved in any sequence. But however, the interlocked pin and steel ball are related to the transmission top cover. Therefore, if the interlocked pin is not set on the neutral position, you can't pull down the gear shift fork shaft.

1. Take down the top cover assembly and gasket;

2. Take out the self-locked spring and steel ball;
   Note:
   Look out the self-locked spring and steel ball, don't miss any of them.

3. Take down the reverse lamp switch and neutral switch, steel ball;

4. Take down the guide bolt of the limit block;
5. Make use of tools to take out the gear shift fork of the reverse gear, 5th and 6th speed gear, and the spring pin of every guide block;

6. Knock down the 5th and 6th speed or reverse gear shift shaft, and then take down the interlocked pin, reverse gear or 5th and 6th speed gear shift fork and steel ball;

7. Knock out the 1st and 2nd gear shift fork spring pin, and then the 1st and 2nd gear shift fork and 3rd and 4th speed gear guide block shaft.

Transmission top cover

1. Take down the elastic ring, and then remove the select rocker arm and O-ring;
2. Loose the screw and remove the locking spacer, then take out the spring and steel ball from the gear shift lever;

3. Make marks on the same place of the gear shift lever and gear shift shaft spline;

4. Knock out the straight pin by a hammer and then pull the gear shift shaft.
Transmission

Cleaning

Cleaning is compulsive because parts and components are often covered up with dirty oil and slurry. Applicable washing methods include vapor wash, Light oil wash, acid wash or alkaline wash, neutral agent wash, trichloroethylene wash, Magnus solution wash, etc. Some damages may be exposed during washing, so keep an eye on the parts and components during washing.

Metal parts
Light oil

Unlike other solutions, light oil is not able to osmose into and solute slurry. So except for the finish surface, clear the slurry with metal brush or other tools, and then wash twice as specified above.

Alkaline solution

Don't wash with alkaline solution if the part or component is of alloyed metal, alkaline solution is an ideal washing agent for steel or cast iron.

Note:
If wash with alkaline solution, prepare some neutralizing agent such as boric acid solution. In case alkaline solution splash into eyes or onto skin, wash it off with neutralizing solution.

Rubber parts

Don't wash with mineral oil. Get rid of slurry or filth with alcohol or clean cloth.

Oil channel

Let a wire go through the oil passage to unclog the passage, then wash the passage by injecting washing solution into it with pressurized nozzle.

Anticorrosion

After getting rid of the dirty oil on the component, apply a layer of clean grease to prevent corrosion.

Check

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 so worn 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 reaching service limit.

Carefully inspect the surface of components by eye looking 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),
- bent,
loose,
abnormal noise (bearing),
discolored,
eroded,
deteriorate (friction lining), etc.
All the rubber pieces, such as O-rings, oil seals, washers, cannot be further used after disassembled.

Transmission top cover

1. Measure the clearance between gear shift lever and gear select rocker arm;
   Repair standard: 0.1~0.4mm
   Wear limit: 0.8mm

2. Measure the clearance between gear shift shaft and gear shift lever spline;
   Repair standard: 0.05~0.11mm
   Wear limit: 0.5mm

3. Measure the clearance between gear shift lever and every guide block.
   Repair standard: 0.1~0.4mm
   Wear limit: 1.0mm
Transmission upper cover

1. Measure the clearance between gear shift fork and gear slide sleeve slot;
   - Note: Measure the gear slide sleeve slot, it has to be above than 3 points or 5 points.
   - Repair standard: 0.10~0.18mm
   - Wear limit: 1.0mm

2. Measure the free length and stiffness of the gear shift fork shaft self-locked spring.
   - Free length: 35mm
   - When press to 25mm:
     - Repair standard: 140~190N
     - Repair limit: 110N

Gear

1. If the measured backlash is over the wear limit value, check gear impression and working condition of the bearing;
   - Repair standard: 0.15~0.25mm
   - Wear limit: 0.5mm

2. Measure the clearance between fixed gear seat and gear slide sleeve engaged tooth (including mainshaft);
   - Repair standard: 0.2~0.3mm
   - Wear limit: 0.5mm

3. Measure the radial clearance between slide sleeve and the upper engaged tooth of the gear.
   - Repair standard: 0.45~0.55mm
   - Wear limit: 1.0mm

Ball bearing

- Measure the axial clearance of the ball bearing.
  - Wear limit: 0.5mm
Transmission

Synchronizer
Lockpin type

Check the pretravel between synchronizer conical ring and cone disc. (A)

Note:
- Measure the average value between two points by 180°.
- Repair standard: 0~0.5mm
- Wear limit: 2.0mm

Slide block type

1. Measure clearance between baulk ring and synchronizer conical ring;
   - Repair standard: 1.5~2.5mm
   - Wear limit: 0mm

2. Measure clearance between baulk ring and gear fixed seat (C);
   - Repair standard: 5.3~5.7mm

3. Measure axial clearance between baulk ring and backing block (D);
   - Repair standard: > 0.5mm
4. Measure radial clearance between fixed gear seat and synchronizer backing block (E);
   Repair standard: 0.05~0.35mm

5. Measure the free length and stiffness of the synchronizer spring.
   Free length: 15mm
   When press to 12.5mm:
   Stiffness repair standard: 0.6~1.0kg
   Wear limit: 0.4kg

Reassembly

When assembling the parts, please make sure that the installing direction of the gear thrust washer needle bearing and spacer sleeve.

All the surface of the turning part should be smeared with clean gear oil.

According to the requirement, all the self-locked nut, oil seal and O-ring should be replaced.

Mainshaft

1. Install the needle bearing and 2nd speed gear;
   Note:
   Install the 2nd speed gear in the correct direction.

2. Install the thrust spacer, and let the gap align to the dowel;

3. Assemble the 3rd speed gear needle bearing;

4. Assemble the 3rd speed gear;
5. Assemble the 3rd and 4th speed fixed gear seat and synchronizer assembly;

6. Press the needle bearing seat ring of the 4th speed gear, then install the needle bearing and 4th speed gear;

7. Install the thrust spacer;

8. Install the 6th speed gear needle bearing seat ring and needle bearing;

9. Install the 5th and 6th speed fixed gear seat;
10. Install the synchronizer backing block, spring seat, spring and lockpin in sequence;

11. Install the synchronizer lockpin assembly into the slot of the fixed gear seat;
    Note:
    Be sure to make the wide face of the synchronizer accord to the turning direction of the fixed gear seat.

12. Install the 5th and 6th speed gear slide sleeve;
    Note:
    The height of the synchronizer lockpin lower than the lockpin assembly is not allowed.

13. Install the 5th and 6th speed gear synchronizer;

14. Install the spacer sleeve and lock shim, then tighten the locking nut with a special spanner;
    Tightening torque: 300N.m
    Note:
    Bend the relative edge of the locking shim and nut.
15. Install the mainshaft front bearing;

16. Set the elastic ring in the slot of the mainshaft end to block off the bearing;

17. Set the front end of the mainshaft downward, and install the 1st and 2nd speed synchronizer assembly, needle bearing, 1st speed gear, reverse gear seat and reverse gear sleeve;

18. Press in the reverse gear bearing seat ring, and install the needle bearing and reverse gear and thrust spacer;

19. Measure clearance between every gear of mainshaft;
   Repair standard: 0.3~0.5mm
   Wear limit: 0.7mm
   Note:
   Make use of the transmission housing and mainshaft assembly to measure the end clearance of the 1st speed gear.
Countershaft

1. Install the 3rd speed gear woodruff key;
2. Install the 3rd speed gear;
3. Install the spacer sleeve;
4. Install the flat key of 4th and 5th speed gear;
5. Install the 4th and 6th speed gear of the countershaft;
6. Install the spacer sleeve;
7. Install the constant engaged gear flat key of the cou-
tershaft;

Note: When installing the key, pay attention that the face with a bigger chamfer should be set on the gear.
Transmission

8. Install the constant engaged gear of the countershaft;

9. Use a thickness gauge to measure, and make sure the clearance between spacer sleeve and gear is smaller than 0.05mm;

10. Install the roller bearing;

11. Install the elastic ring to the countershaft;

**Transmission upper cover**

1. Press to install the gear shift fork shaft by the upper cover hole, and then install the 3rd, 4th and reverse gear shift fork. Remember to assemble the spring pin into the spring pin hole of the gear shift fork;
2. Install the interlocked pin on the 5th and 6th speed gear shift fork shaft, and then press to install the 5th and 6th speed shift fork shaft by the upper cover hole, then assemble the gear shift fork and guide block;

3. Install the interlock steel ball;

4. Install the interlocked pin to the 1st and 2nd speed gear shift fork shaft, press to assemble the 1st and 2nd gear shift shaft by the transmission upper cover hole, and then install the 1st and 2nd guide block and transmission fork;

5. Install the steel ball;
6. After install the interlocked pin to the reverse gear fork shaft, press to assemble the reverse gear fork shaft through the hole of the transmission upper cover, then install the reverse gear guide block and gear shift fork;

7. Install the guide bolt;
   Tightening torque: 40N.m

8. Assemble the plug and spacer on the two ends;

9. Install the spring pin on every shaft;
   Note:
   When installing the spring pin to the gear shift fork shaft and the guide block shaft, the gap of the spring pin has to align with the direction of the shaft.
10. Install the reverse lamp switch and neutral switch.
   - Tightening torque: 20N.m

Transmission top cover
1. Install the spacer sleeve and O-ring on the gear shift shaft;

2. Assemble the gear shift block on the gear shift shaft, and pay attention that you should align with the marks which made when disassembling;

3. Make use of a hammer to knock the pin into the housing;

4. Install the steel ball and spring into the gear shift block, and make the screw plug on the gear shift block by a locking shim;
   - Note:
     Bend the locking shim to lock the screw plug.
5. Install the O-ring into the slot of the gear select rocker arm, smear a layer of grease on the surface and then install it on the transmission top cover;

6. Install plain washer and elastic ring;

7. Install the steel ball and self-locked spring into the hole, and then assemble the top cover on the transmission upper cover;

   Tightening torque: 20–26N.m

---

Transmission assembly

Before installing, smear some gear oil on the surface of bearing, O-ring, oil seal and the fitted bolt.

1. Install the countershaft assembly;

2. Install the front bearing then the elastic ring;
3. Install the reverse gear shaft assembly, and then install the locking spacer on the shaft;
   Tightening torque: 20~26N.m

4. Measure the end clearance and backlash of the reverse gear, and you should assure the observed value among the repair standard;
   End clearance: repair standard: 0.3~0.6mm
   Backlash: repair standard: 0.15~0.25mm

5. Install the mainshaft assembly;

6. Install the countershaft rear bearing cover and gasket;
   Tightening torque: 59~79N.m

7. Install the flexible joint, oil seal and the driven gear of the speedometer;
8. Install the ball bearing, spacer sleeve, speedometer drive gear, gasket and bearing seat in sequence;
   Tightening torque:
   M12  59~79N.m
   M14  93~124N.m

9. Install the 5th and 6th speed gear synchronizer baulk ring;

10. Press to install the ball bearing onto the drive gear shaft, and then assemble the elastic ring;

11. Assemble the drive gear shaft assembly;
12. Assemble the bearing cover assembly;
   Tightening torque: 33~44N.m
   Note:
   You must assure the oil hole of the bearing cover align to the hole of the transmission housing.

13. Measure the end clearance of the 1st speed gear (clearance between 1st speed gear and its thrust spacer) and make it among the repair standard;
   Repair standard: 0.3~0.5mm

14. Measure the backlash of every gear.
   Repair standard: 0.15~0.25mm

**Transmission accessories**

1. Install the propeller shaft connecting flange;
   Tightening torque: 340~560N.m
   Note:
   When tightening the locking nut, first engaged the gear; after tightening, set to the neutral position.

2. Install the power take-off hole cover and sealing shim;
   Tightening torque: 47~63N.m

3. Install the sealing shim and the transmission upper cover assembly;
   Tightening torque: 33~44N.m

4. Install the clutch housing assembly.
   Tightening torque: 145~190N.m
Transmission

Transmission Mount

Before assemble gearbox 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 drive gear shaft spline align to the 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 lever.

4. Install propeller shaft and center bearing.

   Propeller shaft tightening torque  215~245N • m
   Center bearing tightening torque  160~220N • m

5. Connect all the lines and tubes;

6. Made sure that drain plug screw is tightened, and add some gear oil, then tighten plug screw of oil filler.

   Tightening torque: 120~140N.m
Propeller Shaft

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</table>
## Propeller Shaft

### Technical Parameter

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open type, tubular propeller shaft, two segments. The front segment is midship shaft with bearing, the rear is double universal joints with flange inner slide</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Universal joint type</th>
<th>Spider type</th>
</tr>
</thead>
<tbody>
<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>901~100</td>
</tr>
</tbody>
</table>

### Trouble Analysis

<table>
<thead>
<tr>
<th>Trouble</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 Propeller shaft tube is bent Renewed major components without dynamic balance Center bearing rubber washer slacken or failed</td>
<td>Reassemble it in accordance with the mark Check or renew Dynamic balance correct</td>
</tr>
<tr>
<td>Universal joint or slip yoke worn out early</td>
<td>Oil seal failed Not fill grease regularly or not fill enough oil</td>
<td>Replace Fill with enough lubricating grease periodically</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

Intermediate Propeller and Center Bearing

Structure

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 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. Loosen 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.

\[
\text{Free travel} \leq 35\text{mm}
\]

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 \( 29.5^\circ \)
1. Steering wheel assy
2. Washer--steering wheel
3. Adjuster bolt
4. Steering column bracket welding assy
5. Plate, sliding
6. Taper washer, spring
7. Compaction nut
8. Spanner assy, adjuster
9. Washer--tighten immobility spanner
10. Bolt--tighten immobility spanner
11. Restoration spring
12. Limiting bush
13. Steering column welding assy
14. Bush--Steering column
15. Steering column
16. Bearing
17. Fork, universal joint
18. Fitting, grease
19. Spider
20. Needle bearing assy
21. Steering universal joint fork--slide fork
22. Oil seal--slide fork
23. Oil seal cover--slide fork
24. Grease fitting distance limited piece
25. Fitting, grease
26. Joint with spline shaft assy
27. Spider
28. Needle bearing assembly
29. Steering universal joint fork
30. Bolt
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  ± 6°
Up, down      L3: ± 15mm

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>13</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.
# Steering System

## Trouble Analysis

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bothway heavy steering</td>
<td>Oil level in steering gear is not sufficient</td>
<td>Add oil to the upper mark</td>
</tr>
<tr>
<td></td>
<td>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>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>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>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>Rotary valve blocked</td>
<td>Repair the steering gear</td>
</tr>
<tr>
<td></td>
<td>Improper oil pressure in the oil pump</td>
<td>Replace oil pump</td>
</tr>
<tr>
<td></td>
<td>Vehicle overload too much</td>
<td>Reduce load</td>
</tr>
<tr>
<td>One-way heavy steering</td>
<td>Tire pressure of one side isn't enough.</td>
<td>Inflating</td>
</tr>
<tr>
<td></td>
<td>Only one direction of the steering gear leak out too much.</td>
<td>Repair the steering gear</td>
</tr>
<tr>
<td></td>
<td>The rotary valve isn't in the neutral position.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The fixed pressure of left or right can't be set up.</td>
<td>Replace sealing part</td>
</tr>
<tr>
<td>Heavy steering when quickly turning bothway</td>
<td>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></td>
<td>Too small flow capacity of the steering oil pump</td>
<td>Replace the steering oil pump</td>
</tr>
<tr>
<td>Too large free travel of the steering wheel</td>
<td>Steering wheel and steering shaft fit is loose</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>Connecting part of the steering drive device loosed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fixed bolt of the steering gear and its bracket loosed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Too big clearance between steering screw arbor and nut</td>
<td>Repair the steering gear</td>
</tr>
<tr>
<td></td>
<td>Leaf spring bolt loosed</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>Steering universal joint locking bolt loosed</td>
<td>Tighten</td>
</tr>
<tr>
<td></td>
<td>Improper adjustment of the steering gear</td>
<td>Adjust side cover adjusting bolt</td>
</tr>
</tbody>
</table>
# Steering System

<table>
<thead>
<tr>
<th>Steering system issue</th>
<th>Solution</th>
</tr>
</thead>
</table>
| Steering gear overheat (its temperature is over 65°C of the environment temperature) | 1. Too much flow of the oil pump - Replace the oil pump  
2. The bending radius of the oil pipe is too small or the inner part is blocked and cause oil flowing difficult and heated - Replace the oil pump  
3. Steering to the limit position need more than 5 seconds. - Avoid to turn to the limited position |
| Steering control is not flexible | 1. Parts of steering system loose or wear - Tighten or replace  
2. Steering gear is loose - Tighten  
3. Improper adjusting of the steering gear - Adjust the side cover bolt  
4. Oil level of the oil reservoir is lower than the lowest mark - Add oil  
5. Front axle leaf spring fixed bolt loosed - Tighten  
6. Steering universal joint locking bolt loosed - Tighten |
| Steering wheel return failed | 1. Insufficient tyre pressure - Inflating  
2. Too tight fit of the front axle parts - Adjust  
3. Improper alignment of the front wheel |
| Steering wheel return too quick | 1. Insufficient oil in the steering oil reservoir - Add oil  
2. Air in the steering oil pipe - Exhaust  
3. Clearance between steering drive shaft and the steering universal joint - Replace the steering universal joint  
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. - Adjust clearance |
Front Axle

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Trouble Analysis..........................................................................................FA-5
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Appendix 2 Tighten Torque of the Bolts and Nuts.........................................FA-7
Appendix 3 Main Adjusting Data and Maintaining Standard .......................FA-8
Front Axle

Front Axle Structure

Front axle, steering knuckle

1. Upper cover--steering knuckle
2. Spacer--steering knuckle upper cover
3. Steering knuckle pin
4. Upper bushing
5. Left steering knuckle
6. Knuckle pin plug assy
7. Bolt--knuckle pin plug
8. Grease elbow
9. Adjusting spacer--steering knuckle
10. Left steering knuckle arm
11. Double head bolt--upper steering arm
12. Upper steering arm--left steering knuckle
13. Wedge cotter pin--steering knuckle pin
14. Front axle knuckle
15. Thrust bearing
16. Right steering knuckle
17. Right steering knuckle arm
18. Steering limiting bolt

FA-1
Front Axle

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

FA-2
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></td>
<td>First maintain</td>
</tr>
<tr>
<td>Clean the axle assy</td>
<td></td>
</tr>
<tr>
<td>Check the important nut for its tightness</td>
<td></td>
</tr>
<tr>
<td>Clean and adjust wheel hub bearing</td>
<td></td>
</tr>
<tr>
<td>Check service brake and park brake efficiency</td>
<td></td>
</tr>
<tr>
<td>Check the brake bottom plate for tightness</td>
<td></td>
</tr>
<tr>
<td>Clean the brake air chamber</td>
<td></td>
</tr>
<tr>
<td>Check brake pipeline for leakage</td>
<td></td>
</tr>
</tbody>
</table>
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 lose 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 adding the grease, measure both left and right of the starting force at cotter pin of steering knuckle journal, and the starting force should be ≤ 10N.

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 20~50N.

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 no 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 \( \leq 0.1 \text{mm} \).

## 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 deterioriation</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>Steering wheel heavily manipulated</td>
<td>Improper adjustment of the wheel alignment (too big caster)</td>
<td>Check and adjust</td>
</tr>
<tr>
<td></td>
<td>Too big clearance between kingpin and bush</td>
<td>Check and adjust the clearance</td>
</tr>
<tr>
<td></td>
<td>Thrust bearing installed on the contrary</td>
<td>Correct the installation</td>
</tr>
<tr>
<td></td>
<td>Front axle lacks of lubricating</td>
<td>Add some grease</td>
</tr>
<tr>
<td></td>
<td>Ball connecting overtighten or too loose</td>
<td>Check and lubricate ball head pin</td>
</tr>
<tr>
<td>Condition</td>
<td>Action</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>---------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Front wheel hub bearing worn</td>
<td>Replace wheel hub bearing</td>
<td></td>
</tr>
<tr>
<td>Kingpin and bush overworn</td>
<td>Correct or replace troubled parts</td>
<td></td>
</tr>
<tr>
<td>Steering knuckle distortion</td>
<td>Replace</td>
<td></td>
</tr>
<tr>
<td>Improper wheel alignment</td>
<td>Check and adjust</td>
<td></td>
</tr>
<tr>
<td>Pulling to one side</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improper wheel alignment</td>
<td>Check and adjust</td>
<td></td>
</tr>
<tr>
<td>Front axle bent</td>
<td>Correct or replace</td>
<td></td>
</tr>
<tr>
<td>Brake unsmooth</td>
<td>See the relative brake items</td>
<td></td>
</tr>
<tr>
<td>Front wheel hub bearing nut loosed</td>
<td>Tighten accord to the required torque</td>
<td></td>
</tr>
<tr>
<td>Tire unevenly worn or earlier worn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improper wheel alignment</td>
<td>Check and adjust</td>
<td></td>
</tr>
<tr>
<td>Wheel hub bearing worn or damaged</td>
<td>Replace wheel hub bearing</td>
<td></td>
</tr>
<tr>
<td>Bearing nut loosed</td>
<td>Tighten accord to the required torque</td>
<td></td>
</tr>
<tr>
<td>Ball pin, kingpin and bush overtightened or slackened</td>
<td>Correct or replace the troubled parts</td>
<td></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 4 8 12 16 20 24 28 32 36 40 44 48</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>
Appendix 3  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>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 fist surface and the steering knuckle</td>
<td>≤ 0.1mm</td>
</tr>
<tr>
<td>Clearance between front fiction plate and brake drum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Shoe shaft end 0.25~0.45mm</td>
</tr>
<tr>
<td></td>
<td>Cam shaft end 0.40~0.70mm</td>
</tr>
<tr>
<td></td>
<td>Clearance difference between two shoes of the same side is &lt; 0.1mm</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>≤ 0.05mm</td>
<td>0.15 spacer adjustment</td>
<td></td>
</tr>
<tr>
<td>Starting force of steering knuckle</td>
<td>≤ 10N</td>
<td>Measure at cotter pin of shaft head</td>
<td></td>
</tr>
<tr>
<td>Starting force of front wheel hub</td>
<td>20~50N</td>
<td>Measure at the bolt of wheel</td>
<td></td>
</tr>
</tbody>
</table>
Rear Axle

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Tightening Torque of Important Bolts and Nuts.............................................RA-7
Main Adjusting Data and Maintaining Standard ..........................................RA-8
Rear Axle

Rear Axle Structure

Rear axle housing and half axle

1. Vent plug
2. Screw plug--oil level hole
3. Gasket--axle housing rear cover
4. Rear axle housing cover assy
5. Bolt--fix the rear axle housing cover
6. Rear axle housing
7. Set pin
8. Square slotted conical screw plug with glue
9. Gasket
10. Bolt--fix the differential
11. Heavy spring washer
12. Half-axle bushing
13. Rear axle half-axle gasket
14. Half-axle oil seal assy
15. Rear axle half-axle
16. Rear axle half-axle bolt
17. Bracket--sensitive valve
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 4 8 12 16 20 24 28 32 36 40 44 48 80</td>
</tr>
</tbody>
</table>
| Clean the axle assy                        | ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
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 damage 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 to pay attention to the tightening torque of the thread connecting parts and the adjustment of the bearing pretightening force.

Assembly of the main reductor 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 reductor assembly
   1. After assembled the bearing outer ring of the differential, install it onto the main reductor housing;
   2. Install the adjusting nut and the bearing cover, then fasten with bolts;
   3. Equally 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
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>Gear contact zone</th>
<th>Adjusting method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Proper contact zone</td>
<td>No need to adjust</td>
</tr>
<tr>
<td>2 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 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 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 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 effect 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.
Rear Axle

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 1/8~1/6 circle;
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>
### Rear Axle

#### Abnormal noise while driving

<table>
<thead>
<tr>
<th>Condition</th>
<th>Solution</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>Solution</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>Solution</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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First maintain 4 8 12 16 20 24 28 32 36 40 44 48</td>
</tr>
<tr>
<td>Reductor assy</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>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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## 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</td>
<td>U-bolt and nut loosed</td>
<td>Replace spring leaf</td>
</tr>
<tr>
<td>center hole</td>
<td></td>
<td></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
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 soring 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;
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

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

Wear limit

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

SP-7
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 32~42N • 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: 300~350N • 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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# 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>Φ 310 × 120mm</td>
</tr>
<tr>
<td>Rear</td>
<td>Φ 310 × 150mm</td>
</tr>
<tr>
<td>Brake cam type</td>
<td>Front 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 Cause</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>The rivet or bolt protrude due to the wear of the brake lining</td>
<td>Replace brake lining</td>
</tr>
<tr>
<td>The brake lining surface is harden</td>
<td>Replace brake lining</td>
</tr>
<tr>
<td>The brake lining surface deteriorated</td>
<td>Replace brake lining</td>
</tr>
<tr>
<td>Bad contact of brake shoe and brake lining</td>
<td>Rivet up the rivet or screw up the bolt</td>
</tr>
<tr>
<td>Uneven wear of brake drum inner surface or incorrect installation</td>
<td>Adjust a screw up brake drum</td>
</tr>
<tr>
<td>Brake shoe supporting pin loosed</td>
<td>Adjust the clearance and tighten the lock nut</td>
</tr>
<tr>
<td>The wheel hub bearing worn out</td>
<td>Replace the wheel hub bearing</td>
</tr>
<tr>
<td>The brake drum deformed</td>
<td>Adjust or replace the brake drum</td>
</tr>
</tbody>
</table>

Unsteady brake

<table>
<thead>
<tr>
<th>Trouble Cause</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<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>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>Incorrect joint of brake lining</td>
<td>Adjust the joint of brake lining</td>
</tr>
<tr>
<td>Incorrect adjustment of left or right brake</td>
<td>Adjust</td>
</tr>
<tr>
<td>The brake lining deteriorate</td>
<td>Replace brake lining</td>
</tr>
<tr>
<td>The brake lining have oil</td>
<td>Clean with petrol, eliminate the oil leakage of wheel hub</td>
</tr>
<tr>
<td>The brake bottom plate is damaged</td>
<td>Replace brake bottom plate</td>
</tr>
<tr>
<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</th>
<th>Cause</th>
<th>Repair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient brake under any conditions</td>
<td>Normal air pressure</td>
<td>Check and replace the brake valve if necessary</td>
</tr>
<tr>
<td></td>
<td>Brake valve travel is too short</td>
<td>Check and replace cam shaft if necessary</td>
</tr>
<tr>
<td></td>
<td>Cam shaft doesn't run (bush lacks lubricant)</td>
<td>Adjust the travel</td>
</tr>
<tr>
<td></td>
<td>Improper push rod travel of the brake air chamber</td>
<td>Disassemble and repair</td>
</tr>
<tr>
<td></td>
<td>Bad contact of relay valve</td>
<td>Replace friction lining</td>
</tr>
<tr>
<td></td>
<td>Brake shoe lining is overheat or deteriorate</td>
<td>Correct the engaging position</td>
</tr>
<tr>
<td></td>
<td>Incorrect engaging of brake shoe lining</td>
<td>Clean with proper cleanser or replace the friction lining</td>
</tr>
<tr>
<td></td>
<td>There is lubricant on brake shoe lining or brake drum</td>
<td></td>
</tr>
<tr>
<td>Abnormal air pressure</td>
<td></td>
<td>Repair</td>
</tr>
<tr>
<td></td>
<td>Air pipes leak air</td>
<td>Disassemble and repair the air compressor</td>
</tr>
<tr>
<td></td>
<td>Air compressor doesn't work</td>
<td>Adjust or clean</td>
</tr>
<tr>
<td></td>
<td>Improper adjustment of the unloader valve or it failed because of impurities</td>
<td>Disassemble and repair the brake valve</td>
</tr>
<tr>
<td></td>
<td>Brake valve leaks air</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>
1. Pin, cotter
2. Front brake adjust arm assembly
3. Pin, cotter
4. Washer
5. Pin shaft--chamber push rod
6. Hex bolt
7. Washer, spring
8. Washer, spring
9. Bolt
10. Front brake bracket assembly L. H.
11. Shim, adjusting
12. Front brake chamber assembly L. H.
13. Hex bolt-to fix dust shield
14. Washer, spring
15. Plug-rear dust shield
16. Front dust shield
17. Front brake plate L. H.
18. Screw
19. Wire, lock
20. Anchor pin-front brake
21. Rivet
22. Bushing-brake shoe
23. Front brake shoe
24. Return spring-rear brake shoe
25. Washer, spring
26. Hex bolt
27. Roller shoe-brake shoe
28. Roller
29. Lock ring--brake shoe roller shaft
30. Pin shaft-Washer, spring
31. Front dust shield
32. Fitting, grease
33. Bush-brake plate
34. Seal washer,O type
35. Camshaft-front brake L. H.
36. Brake lining
37. Washer--brake cam
38.
Brake System

Rear brake

1. Pin, cotter
2. Brake adjust arm
3. Pin, cotter
4. Washer
5. Fork, cotter
6. Pin, crew cut
7. Hex bolt
8. Rear spring accumulator chamber L. H.
9. Rear brake bracket assembly L. H.
10. Washer-camshaft
11. Hex bolt
12. Washer, spring
13. Rubber plug
14. Rear dustproof tray--rear brake
15. Rear brake plate
16. Screw--to fix brake shoe
17. Wire, lock
18. Shaft-shoe
19. Rivet
20. Bush--rear brake shoe
21. Rear brake shoe
22. Return spring--rear brake shoe
23. Pin, return spring
24. Washer, spring
25. Screw--to fix brake plate
26. Roller shaft--rear brake shoe
27. Roller--rear brake shoe
28. Lock ring--brake shoe roller shaft
29. Rear dustproof tray--rear brake
30. Fitting, grease
31. Bush--brake plate
32. Seal washer, O type
33. Cam--rear brake L. H.
34. Brake lining--rear brake shoe
35. Washer--brake cam
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
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
1. Elbow fitting
2. Exhaust brake valve assembly
3. Air line assembly--electromagnetic valve to exhaust brake valve
4. Fitting, tube
5. Three way fitting
6. Nylon pipe assembly
7. Nylon pipe assembly
8. Nylon pipe assembly
9. Nylon pipe assembly
10. Three way fitting
11. Nylon pipe assembly
12. Loading sensing valve assembly
13. Air line assembly
14. Fitting
15. Air line assembly
16. Nylon pipe assembly
17. Nylon pipe assembly
18. Quick release valve subassembly
19. Nylon pipe assembly
20. Hose assembly
21. Hose assembly
22. Hose bracket
23. Hose assembly
24. Fitting, elbow
25. Hose assembly
26. Nylon pipe assembly
27. Hose assembly
28. Air line assembly--desiccator to damp Air tank assembly
29. Air desiccator and unloader valve subassembly
30. Double direction valve and Quick release valve subassembly
31. Hose assembly
32. Nylon pipe assembly
33. Hose assembly
34. Fitting, elbow
35. Hose assembly
36. Nylon pipe assembly
37. Nylon pipe assembly
38. Nylon pipe assembly
39. Nylon pipe assembly
40. Nylon pipe assembly
41. Hose assembly
42. Air line assembly
Brake System

Cab Brake Pipeline

1. Brake valve assembly
2. Hose bracket
3. Bracket, upper
4. Nylon pipe assembly--Brake valve 21 connect hole to hose bracket
5. Nylon pipe assembly--Brake valve 22 connect hole to hose bracket
6. Nylon pipe assembly--Brake valve 12 connect hole to hose bracket
7. Nylon pipe assembly--Brake valve 11 connect hole to hose bracket
8. Jacket
9. Transition tie-in
1. Air line assembly -- hose bracket to hand control valve 1 connect hole
2. Air line -- hose bracket to hand control valve 1 connect hole
3. Air line assembly -- hose bracket to hand control valve 2 connect hole
4. Air line -- hose bracket to hand control valve 2 connect hole
5. Hand control valve assembly
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 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 is 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.
Disassemble the roof lamp ass'y.
Disassemble the handrail.
Disassemble the seats.
Disassemble the safely belt.
Disassemble the door guardrail.
Disassemble the rear window glass.

Door trims
Disassembly of the door trims:
Disassemble lock knob.
Disassemble inside seal.
Disassemble inside handle escutcheon rear door.
Disassemble pull handle.
Pull out regulator handle.
Cab

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

Headlining

Headlining adhesive

Single seater cab

Cab External Trims

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
Cab

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 Mounting

Cab front mounting

1. Torsion bar arm assy
2. Tilting bracket assy
3. Torsion bar

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

Main electric system and wire harness.

Sparate 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

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
Exhaust the refrigerant of the air-conditioner

Note:

Don't exhaust the refrigerant directly, otherwise it will destroy the ozonosphere. Please take use of the reclaim device of the refrigerant when exhausting.

Do remember wear the blinkers.

Avoid to touch the refrigerant directly.

Keep the refrigerant container under 40 °C and avoid to drop from high.

Work in a drafty environment, because the vaporizing of the refrigerant will consume a lot oxygen and cause dyspnea.

The refrigerant should avoid the fire, because its combustion will produce toxic gas.

The temperature can't be higher than 40 °C too much when fill the refrigerant.

Don't warm the refrigerant container with the fire, because it may cause the container exploded.

Note:

Don't wash the surface of the condensor and evaporator with vapor. Please use the cold water or compressed air.

Don't wash the contaminative air-conditioning pipe with compressed air. If the pipe has too much water or dirt, change it. Don't use your mouth to blow the pipe with refrigerant.

Don't use the compound gauge with biggish error.

Don't screw down the filler bonnet too much.

Use the refrigerant reclaim device according to the instructions of the factory.
Air-conditioner and Heater

Remove and Install the Air-conditioner

Note:
Make sure that the pressure of the air-conditioning system is lower than the air pressure, then gradually loosen the exhaust pipe and remove it.

Change and clean the component of the air-conditioner

1. Don't put the compressor sideward or convert it for more than 10 minutes, otherwise, the oil of the compressor will flow into the low-pressure chamber.

2. Use a torque spanner and an engineer's spanner at the same time when connect the pipe.

3. Plug the hole after remove the pipe to avoid the dust and moisture come into.

4. Install the pipe according to the requestment. The sealing plug of the pipe and other component could be removed when need.

5. Before installing the component in the cold place to the vehicle under the sunshine, please first put the component under the sunshine to warm it up. It is necessary for avoiding the moisture emerge on the inner wall of the component.

6. Get rid of the moisture before filling the refrigerant.

7. The O-sealing ring should be changed.

8. Lubricating as the figure showed when install the pipe, and don't put the lubricating oil on the screw thread.

9. The O-ring should be put about on the seat of the pipe.

10. Insert the guide pipe into the screw pipe fitting, then screw down follow the required torque.

11. After connecting the pipe, make sure there is not any leakage. If there is, dismantle the leaky part of the pipe, and change the O-sealing ring, then screw down.

The Maintenance of the Compressor

Note:

1. Plug the inlet and outlet of the compressor to avoid the leakage and dirt.

2. Don't put the compressor sideward or revert it for more than 10 minutes.

3. Do remember to discharge the oil of the compressor and check its capacity when change or maintain the compressor.

4. When change the compressor, first take out the oil of the old compressor, then fill the new compressor according to the required capacity or the capacity of the old compressor.

5. After the maintenance of the compressor, take the shaft of the compressor with your hand to turn for 5 times to make the oil in the compressor well-distributed, then run the compressor under the condition that the engine is idling for 1 hour.

6. When change the electromagnetical clutch, please check if it is working normally under the power supplied.
The Using of the Air-conditioner and Heater

Control panel

Fan switch:
It is used to control the on-off and rotate speed of the bloer.

Operating-mode chosen switch:
It is used to control the directions of the airflow.

Temperature slide switch:
It is used to adjust the temperature of the outlet.

Ventilating slide switch:

- It is used to introduce the external air.

- It is used to circulate the internal air.

Air-conditioner switch:
Start the engine, put the fan switch at your wanted place, then press the air-conditioner switch. The indicator light will go on when the air-conditioner is working. Press again the air-conditioner switch to stop it.

The air-conditioning system only works under the condition of the running of the engine.
Construction of the Heater

1. Left air pipe
2. Wind channel ass'y
3. Middle air pipe
4. Right air pipe ass'y
5. Left door defroster hose ass'y
6. Defroster nozzle ass'y
7. Right door defroster hose ass'y
8. Wind inlet channel ass'y
9. Plastic nut ass'y
10. Heater ass'y
11. Air blower ass'y
12. Heater control ass'y
13. Water inlet tube
Air-conditioner and Heater

Air Flowing Direction

- ventilating mode
- circulating air (inner)
- circulating door
- ventilating defrost door
- door of feet blown
- evaporator core
- air combined door
- ventilating door
- heater core
- mode of ventilating and blow feet
- blow your feet
- warm air
- combined air
- cold air

Note: The specific operate method refer to its maintenance tool manual.
Check the Leakage of the Refrigerant

Operational procedure
In order to be convenient for checking the leakage of the refrigerator, please follow the method below:

1. Start the engine;
2. Start the air-conditioner;
3. Adjust the fan switch to the "4" position;
4. Set the temperature to the lowest;
5. Then operate the refrigerating system for more than 5 minutes.

The checking of the refrigerant leakage should be after the stop of the engine immediately. Begin from the high-pressure pipe. That is because after the stop of the circulation, the pressure of the high-pressure pipe will be down, and the pressure of the low-pressure pipe will be up, but it is easier to check the leakage at the high pressure condition.

Check

Clean the checking part with a piece of cloth before checking the fitting of the pipe carefully.
Compressor: check the shaft seal, the hole of the bolt, and the around of the electromagnetic clutch.
Oil storage container: check the pressure-protecting switch, fuse plug and fuse pin.
Check the around of the maintenance valve, make sure the valve core is tightening, the maintenance bonnet must be connected on the valve (avoid leakage), and check if there is anything in the bonnet.
Evaporator: after the stop of the engine, put the device into the outlet pipe immediately, staying for more than 10 seconds.

BF-20
Air-conditioner and Heater

Make sure the quantity of the filled refrigerant

As for the quantity of the filled refrigerant, you can measure by inspecting the flow of the refrigerant from the window, and read the pressure gauge of the high and low pressure pipe.

Procedure

- Engine revolution: 1500rpm
- After warm the engine, adjust the suction temperature to 30–50°C until the high pressure reached 14.7 bar, 15kg/cm²
- Check the window of the refrigeration system, feel the temperature of the high and low pressure pipe by hand
- Check the refrigerant for any cloud or bubble
  - Correct
  - If there is cloud or bubble
    - Incorrect
    - Reclaim refrigeration from the A/C system and refill with required quantity by an accurate weighing machine
- Add enough refrigerant
1. Evaporator assy
2. Evaporator lower bracket
3. Evaporator exhaust pipe
4. Bracket assy--evaporator inlet and outlet pipe
5. Pipe assy--connecting evaporator and condenser
6. Pipe assy--connecting evaporator and compressor
7. Pipe assy--connecting compressor and condenser
8. Compressor assy--with clutch
9. Condenser assy--with drier and bracket
Air-conditioner and Heater

Oil of the Compressor

Keep enough oil in the compressor.

The lubricating oil and the refrigerant circulate in the inner system, when change the component or the oil leaks a lot, please add the oil to the requirement capacity. If the oil capacity is not proper, the compressor will be in abnormal condition.

Short of oil: the cylinder of the compressor may be nicked by the piston or the compressor may be locked-up

Excessive oil: the effect of the refrigeration may go down

Capacity of the adding oil

<table>
<thead>
<tr>
<th>substitute part</th>
<th>capacity (mm)</th>
<th>ratio (%)</th>
<th>shortfall cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>evaporator</td>
<td>45~75</td>
<td>30</td>
<td>—</td>
</tr>
<tr>
<td>condenser</td>
<td>30~50</td>
<td>20</td>
<td>—</td>
</tr>
<tr>
<td>oil storage container</td>
<td>15~25</td>
<td>10</td>
<td>compressor, no change</td>
</tr>
<tr>
<td>others</td>
<td>30~50</td>
<td>—</td>
<td>leak a great deal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>leak a little bit</td>
</tr>
</tbody>
</table>

Check the operational function

Its purpose is to check if the system worked under the requirements. These parts need to check: blower(fan), circulation of the operational-mode( outlet), inlet, temperature lower, and upper, and the A/C switch.

Checking condition:

The engine is running and the temperature is in normal condition.

Approach:

1. Check the blower(fan)

Move the fun switch to the "1" position, the fan should be in the speed of "1";

Then move to the "2" position;

Check the other speed of the fan;

2. Check the ventilation

Move the switch to the position, check if the air is blown to your face;

Move the switch to the position, check if the air is blown to your face and feet;

Move the switch to the position, check if the air is blown to your feet;

Move the switch to the position, check if the air is blown to your feet and defrost;

Move the switch to the position, check if the air is vented from the defroster.
3. Check the inlet

Move the switch to the position, the inner air of the cab will be used in the circulation.

Move the switch to the position, the external fresh air will be blown into the cab by the blower.

4. Temperature lower checking

Move the switch to the lowest position;
Check the cold air from the vent.

5. Temperature upper checking

Move the switch to the highest position;
Check the warm air from the vent.

6. Check the A/C switch

Move the fan switch to the position of 1~4, and press the air-conditioner switch, the indicator will go on.
# Electric and Instrument

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## Electric and Instrument Specification

<table>
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<tr>
<th>Vehicle Model</th>
<th>DFA1101GZ5AD6J-907</th>
</tr>
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<td>Wire system</td>
<td>24V, Single lead type, negative earth</td>
</tr>
<tr>
<td><strong>Starter</strong></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><strong>Alternator</strong></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>
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></td>
</tr>
<tr>
<td></td>
<td>Starter damages</td>
<td>Repair or replace</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 and Instrument

### 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 restring then the joint, Replace bulb, Repair or replace switch, 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 loose or wears Electric brush contacts not well Horn relay damages Horn damages</td>
<td>Replace Connect or strap up Adjust brush's height 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 and Instrument

#### 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

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position light doesn't go no 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>
<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 over-powering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(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>
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:

<table>
<thead>
<tr>
<th></th>
<th>Radiator relay</th>
<th>Heater relay</th>
<th>Ignition relay</th>
<th>A/C relay</th>
<th>Horn relay</th>
<th>Flasher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15A</td>
<td>15A</td>
<td>25A</td>
<td>5A</td>
<td>5A</td>
<td>N/</td>
</tr>
<tr>
<td>2</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>5A</td>
<td>15A</td>
<td>N/</td>
</tr>
<tr>
<td>3</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>4</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>5</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>6</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>7</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>8</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>9</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>10</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>11</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>12</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>13</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>14</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>15</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>16</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>17</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>18</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>19</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>20</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>21</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
<tr>
<td>22</td>
<td>15A</td>
<td>5A</td>
<td>10A</td>
<td>10A</td>
<td>10A</td>
<td>N/</td>
</tr>
</tbody>
</table>

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: 1.26~1.285g/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
Alternator operation principle diagram

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

Specification

<table>
<thead>
<tr>
<th>Vehicle model</th>
<th>DFA1101GZ5AD6J-907</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.
**Trouble analysis**

<table>
<thead>
<tr>
<th>Trouble</th>
<th>Cause</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging indicator does not /\ 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>Charging indicator does not /\ small, the battery is insufficient. No charging at low speed.</td>
<td>Diode is partly damaged</td>
<td></td>
</tr>
<tr>
<td>Charging indicator does not /\ small, the battery is insufficient. No charging at low speed.</td>
<td>The rotor winding has 1 phase or 3 phases bad contact</td>
<td></td>
</tr>
<tr>
<td>Charging indicator does not /\ small, the battery is insufficient. No charging at low speed.</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>The instrument indicator sometimes charges and sometimes not</td>
<td>Built-in regulator works abnormally</td>
<td></td>
</tr>
<tr>
<td>The instrument indicator sometimes charges and sometimes not</td>
<td>The contact from engine fire wire connector to battery connector is loose</td>
<td></td>
</tr>
<tr>
<td>The instrument indicator sometimes charges and sometimes not</td>
<td>Alternator interior connection is loose.</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>Engine has abnormal noise during running.</td>
<td>Bearing damaged or too large clearance</td>
<td></td>
</tr>
<tr>
<td>Engine has abnormal noise during running.</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.
Starter

<table>
<thead>
<tr>
<th>Vehicle model</th>
<th>DFA1101GZ5AD6J-907</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>

EL-9
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.
Wiper motor

<table>
<thead>
<tr>
<th>Power</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revolution</td>
<td></td>
</tr>
<tr>
<td>Low speed</td>
<td>$40^2$</td>
</tr>
<tr>
<td>High speed</td>
<td>$60 \pm 6$</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 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 and Instrument

Instruments

Structure

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

Name of the indicators and warning lights

- Taillight 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
Instrument Panel

Technical parameter and function

Technical parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speedometer (km/h)</td>
<td>0–140</td>
</tr>
<tr>
<td>Tachometer (r/min)</td>
<td>0–5000</td>
</tr>
<tr>
<td>Fuel meter</td>
<td>0–1/2–1</td>
</tr>
<tr>
<td>Water temperature meter (℃)</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
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 holder</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>
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 0.1 km.

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>Total 99999</td>
</tr>
<tr>
<td></td>
<td>Sum 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>$2.6C_{11}^{+0.12} \times 2.6C_{11}^{+0.06}$</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.


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 and Instrument

**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(1/min)</td>
<td>0~5000</td>
</tr>
<tr>
<td>Deflecting angle(°)</td>
<td>245</td>
</tr>
<tr>
<td>Min. graduation (1/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</td>
</tr>
<tr>
<td></td>
<td>Sensor damaged</td>
<td>socket's contact</td>
</tr>
<tr>
<td></td>
<td>Instrument burnt out</td>
<td>Replace sensor</td>
</tr>
<tr>
<td></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 shakes abnormally</td>
<td>There's foreign objects in the core</td>
<td>Remove foreign objects</td>
</tr>
<tr>
<td>Needle clicked</td>
<td>Needle slacked</td>
<td>Press the needle firmly and turn to zero</td>
</tr>
<tr>
<td>Needle doesn't return to zero</td>
<td>Core is clicked by foreign objects</td>
<td>Remove foreign objects</td>
</tr>
</tbody>
</table>
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></td>
<td>40 ~ 80 ~ 100 ~ 120</td>
</tr>
<tr>
<td>Meter seat connection</td>
<td></td>
<td>3-M3-6g screw</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></td>
<td>0 ~ 1/2 ~ 1</td>
</tr>
<tr>
<td>Meter seat connection</td>
<td></td>
<td>3-M3-6g</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>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>