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SANYI

SRT95C
Off-Highway Truck

Service Manual

⚠ WARNING

Read and follow the safety precautions and instructions in this manual and on the machine decals. Failure to do can cause serious injury, death or property damage. Keep this manual with the machine for reading and future reference.

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PREFACE

Dear users:

Thank you very much for purchasing mining dump truck which is famous product of SANY Mining Equipment co. , ltd ! We will be providing you ' first class products, first class quality and first class service' .

All of parts of machine are easily worn, loosened and damaged if machine has been used for a long time, so the regular inspection, maintenance and servicing for machine that are very important and useful way to your machine for exert its performance and working with stable, safety extending its service life. We provided this manual book for you and it's makes easily to inspection, maintenance and servicing for machine.

The manual book has contained particular specification and illumination to inspection, maintenance, repairing of all parts of the SRT95C and introducing some diagnosis and resolving ways to regular malfunction. There are methods and steps for repairing and servicing are recommended and provided in manual book. There are also provided some special tools are designed for repairing or some especial place of the machine.

Please read this manual book carefully, included all of cautions and notes to minimize the human injuries and deaths or machine damages duo to the incorrect operation methods. The operator has to know that there are not illuminate all of danger situation with cautions and notes which happened during the servicing when you uses some tools are not recommended, everybody has to ensure of self-safety and machine safety first before repairing.

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Caution

The contents in the Maintenance Manual are subject to change without notice. Please contact the agent of SANY Mining Equipment Co., Ltd. for the latest information.

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OVERVIEW

Important safety notes

Does the maintenance and servicing in correctly for the machine safe and reliable are very important. There are description and all recommends are useful for the maintenance and servicing. In addition, there some special tools are designed for maintenance and operation, they are recommended when the maintenance and servicing.

In order to minimize the possibility of human injuries and casualties or damage of equipment due to improper maintaining method, this Manual and the important notes and various warnings in it should be read through carefully! It is also required to learn the potential dangers of each method that the details are not provided in these warnings and notes, that are hard to foresee and that come to mind during the process of maintenance. Therefore, when adopting a maintenance procedure or tool that is not recommended, all operators must ensure that the maintaining method can ensure the safety of their own and the truck.

Safety warning sign

1.  Following the safety information indicated on the sign may help avoid possible human injuries or death.
2. The sign is only used for warning you the potential danger of human injuries.

Danger rating

A multi-level danger rating system is often used to indicate potential dangers of human injuries. The following symbols and notes are used together for expresses the level of dangerous, symbols and notes are used independent for expresses the loss and protection of properties. The symbols of the manual has the same effect with the symbols,

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notes, cautions and labels of the agreement of the machine.

 **Danger** It indicates an emergent and dangerous situation, which may lead to deaths or serious injuries if it is not avoided.

 **Warning** It indicates a potentially dangerous situation, which may lead to deaths or serious injuries if it is not avoided.

 **Caution** It indicates a dangerous situation, which may lead to minor or moderate injuries if it is not avoided.

The caution is used independent for indicated potential dangerous situation without the symbols, it could be makes the properties loss if is not avoided.

General

Incorrect operation is very dangerous, so be sure to read the Manual carefully before any maintenance operation.

1. Before filling grease or repairing, read all notes about the truck.

2. Safety boots and helmets must be worn during operation. Do not wear unfitted work clothes, and button up the clothes.

• Wear safety goggles while striking with a hammer.

• Wear safety goggles when smashing stones with a stone crasher.

3. When it is required to perform welding operation, the operator must be an experienced ones who has received training. During the operation, the operator must wear or use welding gloves, baffle, goggles, working cap, and work clothes which things suitable for the welding operation.

4. When the two operators are worked together, they are has to follow the operation procedures such as : informed the guy who working together on site and has to hang the label up which wrote the' repairing ' on it at

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obviously place.
5. Storing all of tools properly and know that how to use them.
6. Get a proper place in the workshop that used to store tools and parts when they are removed out of the machine. The store has to keeping clean, oil-free and no smoking in there.

⚠ warning

During the operation, the old parts, repaired parts which performance has been weakened that are prohibited to using again, they will be effected the performance of the machine seriously, and even lead to severe damage to equipment or human injury.

Preparation for operation

7. When the refilling and repairing the machine, the truck must be parked on a solid and horizontal ground. Place chocks for the wheels to prevent the truck motion.
8. Before operation, it is required to drop to the ground those parts and components that are possible to slide down. If it is impossible, such as : suspension cylinders and body etc that are has to block by chocks to prevent them drop out form the machine, in addition, shutdown of the power, locked all of lever and hanged the caution up at obviously place.
9. Before the disassembling or assembling operation, chocks, jacks or other things to support the truck.
10. Cleaning all of dirt things around of the whole truck and uses armrest, ladder or stair to mounting or dismounting truck. If no armrest or ladder can be used, a jack horse with safe base may be used.

Notes during operation

11. When the disassembling the feeding cover,

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discharge cover and liquidometer, the operator has to wear safety goggles and sideways body to avoid liquid spray out during the cover opening. Caution : discharge the pressure from the hydraulic, water and air-compress system before to disassembling them.

12. The water and oil system are very hot when the engine shutdown. Pay attention ! Do not touch them with hands.

Before any operation in the oil or water system, wait for oil or water system cooled off before start the operation.

13. Before operation, cut off electricity and remove the battery wires. Removing the wires from the cathode joints of the battery first.

14. A hoisting machine or crane may be used to lift a cumbersome component.

Check the wire rope, chain and hoist hook to prevent dangers.

It is required to use a hoisting device with sufficient hoist power.

• Erect the hoisting device at the correct place. The hoisting machine or crane should be operated slowly to prevent its components getting collided with other parts. It is prohibited to stand under the lifting machine when the hoisting machine or crane are working.

15. When removing the cover which with internal pressure or spring inside, it has to unscrew the bolts at two opposite directions to release the pressure gradually. Then unscrew all of bolts slowly and remove the cover out of machine.

16. Be slowly when disassembling the structure parts from the machine, do not make mistake of operated to cut or damaged the wires, because the damaged wires may cause fire.

17. When operator to disassembling the piping system, operator has to avoid fuel or grease get out of the machine, if fuel or grease dropped on the ground, rub if off immediately because that would makes worker slid or fire.

18. Do not use gasoline to clean any parts.

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This is a general rules. Pay greater attention when cleaning an electric parts.

19. Pay attention to reinstall all parts into their original positions.

When using a new part to replace a damaged one, put the new and old ones separately to avoid mis-installation because they are mixed.

When installing of hoses and wires, it is required to ensure that all hoses and wires will be not damaged due to contact and wear with other parts during the operation of the truck.

20. When installing of a high-pressure hose, it is required to make sure that the hose does not get twisted. It is very dangerous to damage pipes, so be careful to install a high-pressure pipe. It is also required to check whether the connecting parts are installed in a correct way.

21. Tighten up a part to the given torque when assembling or installing it. Pay great attention to install a protective piece like baffle and a party involving intense vibration and high-speed revolution, and check whether they are installed in a correct way.

22. When the two components needs to align with two holes, do not put hand or finger into any hole so as to avoid dangers.

23. Before checking the oil pressure, check whether the measuring instrument is installed correctly.

24. Cracking or disintegration of both tyres and rim or either of them may result to serious injuries or casualties. Abide by the suggestions in instruction manual provided by manufacturers or read the specification provided by tyre supplier for reference strictly.

Storing of truck

In order to avoid damaging any parts of the truck, pay great attention to keeping truck for a short period or non-temporarily. On the period of the storing the truck, if there are no necessary ways to protecting all components that will wastes more money for maintenance of machine and delay the truck returned to

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work.

Temporary storing

The company requires taking the following preventive measures when the storing period of the truck is within 30 days:

1. Fully inspection, checking of the vehicle and make some necessary maintenances and modifications for preparing to use vehicle when the expired of storing date has been arrived.
2. Lubrication – Lubricate the truck thoroughly according to the requirements specified in Chapter 'CENTRALIZED LUBRICATION SYSTEM' of the Manual.
3. Parking – After cleaning the truck thoroughly, park it on a level ground which is solid and dry, and then apply parking brake. Remember that there should not be any grease or oil on the ground because such substance will make all tyres to expired.
4. Battery – If the local temperature is moderate, the battery may be keep in the truck, and it may be recharged for using it again if it is not used after 30 days. If possible, send the battery to a workshop for inspection and recharging, and ensure that it can be fully charged by way of micro-current charging. Keep the battery at a place free of encroaching severe temperature under the cold or torrid climate.
5. Rust protection – Clear off all rust over the truck, and additionally, cover the exposed metal surface of the truck with quality rust inhibitor.
6. Oil tank – Fill the fuel tank and hydraulic oil tank to prevent moisture inside the oil tank from getting condensed.
7. Tyre – Inflate all tyres to the correct pressure. During the period of storing, inspect the pressure about once each two weeks.
8. Engine – Refer to the maintenance manual of engine to learn the complete procedure for storing the engine less than 30 days.

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9. Transmission – Feed oil into the oil sump of the transmission to the correct level.

Long-term storing within six months

When the truck is kept for over 30 days but less than six months, the following steps must be followed:

1. Inspection and maintenance – Follow the procedures for temporary storing.
2. Lubrication – Follow Step 2 for temporary storing.
3. Parking – Follow Step 3 for temporary storing, and chock up the truck with sleepers to keep the tyres off the ground.
4. Battery – Remove the battery from the truck, keep it at an appropriate place, and check it at least each 30 days (charge it once or connect it to a micro-current charger upon each inspection).
5. Rust protection – Follow Step 5 for temporary storing.
6. Oil tank – Follow Step 6 for temporary storing.
7. Tyre – Deflate the tyres to 0.7 bar (10 pound per square inch) after chock up the truck as required in Step 3, clear all grease on the tyres, and use suitable outer covers to protect the tyres and keep them away from direct sunshine and water erosion.
8. Transmission – Refer to the maintenance manual of transmission to learn the complete procedure for keeping it over 30 days.
9. Engine – Refer to the maintenance manual of engine to learn the complete procedure for storing it over 30 days.
10. Ventilator and respirator – remove all ventilating holes and respirators and block off all openings with covers; use waterproof rubberized fabric to cover the ventilation holes and respirators even if it is impossible.

Storing for over six months

When the truck is kept for over six months, the following steps must be followed:

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Others – storing of truck

Note: In addition to the steps for the keeping period less than six months, follow the following additional requirements:

1. Lubrication – Lubricate the truck thoroughly according to the instructions in Chapter 'CENTRALIZED LUBRICATION SYSTEM' of the Manual.
2. Wheel bearing – remove, clean, inspect and re-assemble all wheel bearings.

Caution: Repeat the above steps once each six months during the storing period.

Release of storing

1. Lubrication – Lubricate the truck thoroughly according to the instructions in Chapter 'CENTRALIZED LUBRICATION SYSTEM' of the Manual.
2. Battery – Install the battery and check whether it is charged full. If it is not full, recharge it as required.
3. Tyre – In reference to Chapter 'FRONT WHEEL ASSEMBLY' of the Manual, inflate the tyres to the normal pressure.
4. Fuel and hydraulic oil tank – Discharge the oil left inside the oil tank, feed oil into it to the correct level, take off the blanking cover of the respirator, and install the respirator that has been cleaned thoroughly.
5. Draining valve and respirator – Remove all seals and screw cover at the joining part of respirators, and then install all respirators and draining valves.
6. Engine – Refer to the maintenance manual of engine and release engine keeping as provided.
7. Painting – Check whether the truck get rusted or not and spray paint storing.
8. Transmission – Refer to the maintenance manual of transmission and release transmission storing as provided.

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Reading Guide

Arrangement of chapters

The manual book which used to guide how to does maintenance and fix the damaged truck. there some contents is different, so please in accordance with type of the truck to read it.

This Manual consists of the following chapters: 38 chapters in total, including: Front Wheel Assembly, front axle assembly, Rear Axle Assembly and Installation, Rear Wheel Assembly, Installation of Engine, Transmission and Mounting, Fender and platform mounting, Cab and Mounting, Hydraulic Steering Pipeline of Operator's Cab, Operator's Cab Brake Pipeline and Joint, Air Conditioning Pipeline Installation, Fuel Tank and Mounting, steering Pipeline and Joint, Hosit Pipeline and Joint, Hydraulic Oil Tank Assembly, Brake Pipeline and Joint, Transmission retarder control, Frame and Installation, Driveline Installation, Air Cleaner and Mounting, xhaust System Assembly, Rear Suspension System, radiator Guard, Body and Mounting, Illumination Lamp and Installation, Power Module, Hoist Cylinder and Installation, Arrangement Plan of SRT95C, Centralized Lubrication System, Transmission Oil Filter Assembly, Disc Brake Cooling System Pipeline and Joint, Brake Oil Cooler and Installation, Oil Cooler Assembly, Radiator and Mounting, Water Tank Mounting and lines, Battery and Installation, Cables and Harnesses, etc.

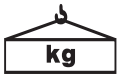
Distribution and Timely Revision

If there is any supplement or change to the Manual, the relevant contents will be sent to SANY Mining Equipment Co., Ltd. so that the latest information may be got before operation.

Signs

In order to bring into full play the Manual, the following signs are used regarding important safety and quality requirements.

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Sign	Item	Description
	Safety	Pay special attention to safety during operation
★	Caution	During operation, pay special attention to the technical requirements and other notes to ensure that the operation quality may reach the standard.
	Weight	It is required to pay attention to the weight of system components in selecting the wire rope and operation posture.
	Tightening torque	Upon assembly, pay special attention to the tightening torque of components.
	Coating	Parts required to coat binding agent and lubricating grease
	Oil and water	The parts for feeding engine oil, water and fuel.
	Discharge	The parts for discharging oil or water and discharging volume.

Notes on hoist

If a component cannot be move off the truck with a hoist machine, the following inspection must be carried out:

1) Check whether all tightening bolts at the component to be moved off has been unscrewed.

2) Check whether there are any other components hindering the removal of the part.

Wire rope

1) Choose wire ropes according to the weight of the part on the hoist machine and in reference to the table below:

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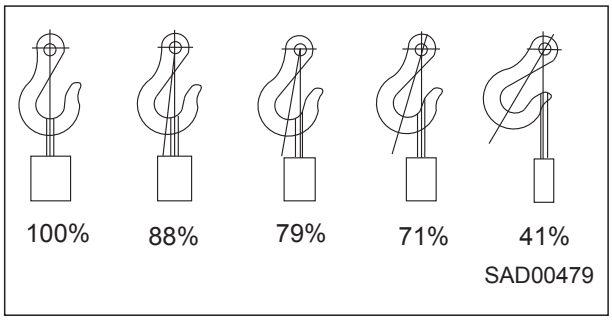
Wire rope		
Rope diameter	Permitted load	
mm	kN	tons
10	9.8	1
11.5	13.7	1.4
12.5	15.7	1.6
14	21.6	2.2
16	27.5	2.8
18	35.3	3.6
20	43.1	4.4
22.4	54.9	5.6
30	98.1	10
40	176.5	18
50	274.6	28
60	392.2	40

The permitted load value is 1/6 or 1/7 of the rupture strength of wire rope.

⚠ warning

The cumbersome components (above 25kg) that must be lifted with a hoisting machine like crane is described in the section 'Disassembly and Assembly'. All parts over 25kg should be marked with signs.

2) The wire rope must be hung between the hooks.
If the wire rope is hung at an end of the hook, it may escape from the hook, thus resulting in serious accidents.
The middle part of the hook has the greatest strength.
3) It is prohibited to use only a wire rope, and it is required to use at least two ropes to wind around the heavy for hoisting.



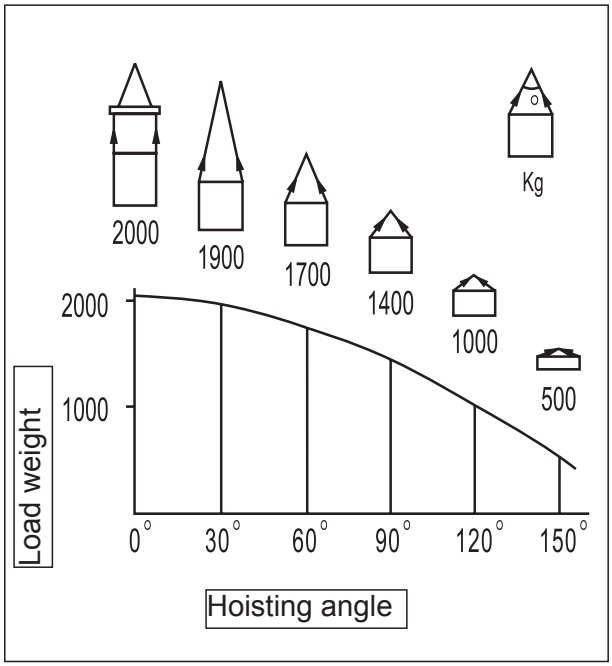
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⚠ warning

Only a rope is used, it may cause the heavy to revolve during the process of hoisting, and the wire rope get loosened or the heavy slide away from original binding position, hence causing dangerous accident.

4) When hoisting a heavy heavy, the hoisting angle of the wire rope and hook should not be too large. When two or more wire ropes are used to hoist an heavy, the stress borne by each wire rope will increase with the increasing hoisting angle. The table below shows the changes in the permitted load value at different angles when two wire ropes, each of which may hoist 1000kg to the maximum, are used to lift a heavy object.

When the two ropes are hoisted vertically, they may lift 2000kg in total; when the hoisting angle reaches 120°, the loading weight can only reach 1000kg. On the other hand, at the hoisting angle of 150°, when the two wire ropes hoist 2000kg load, the stress they bear will reach 4000kg.



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Conversion Table

Method to use the conversion table

The conversion table in section may provide simple number conversion. See the following example for the detailed method to use the conversion table.

Example: Method to use the conversion table from mm to in.

1. Convert 55mm into in.

(1) At the No. 50 position in the left vertical column, select (A) for instance, and then draw a horizontal line from (A).

(2) At the No. 5 position in the top transverse row, select (B) for instance, and then draw a vertical line from (B).

(3) The crossing point of the two lines, (C) for instance, is the converted value from mm to in. So, 55mm=2.165in.

2. Convert 550mm into in.

(1) There is no 550 in the table, divide it by 10 (move the decimal point one digit to the left) to convert it into 55mm.

(2) Repeat the above procedure to convert 55mm into 2.165in.

(3) Because the original value (550mm) is divided by 10, 2.165in should be multiplied by 10 (move the decimal point one digit to the right) to return to the original value. Hence, 550mm=21.65in

Convert （mm）into （in）　　（B）　　1mm=0.03937in

（A）

	0	1	2	3	4	5	6	7	8	9
0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
						（C）				
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

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convert mm into in

1mm=0.03937in

	0	1	2	3	4	5	6	7	8	9
0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

convert kg into lb

1kg=2.2046lb

	0	1	2	3	4	5	6	7	8	9
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.53	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

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convert L into U. S. Gal

1L=0.2642 U. S. Gal

	0	1	2	3	4	5	6	7	8	9
0	0	0.264	0.528	0.793	1.057	1.321	1.585	1.849	2.113	2.378
10	2.642	2.906	3.170	3.434	3.698	3.963	4.227	4.491	4.755	5.019
20	5.283	5.548	5.812	6.076	6.340	6.604	6.869	7.133	7.397	7.661
30	7.925	8.189	8.454	8.718	8.982	9.246	9.510	9.774	10.039	10.303
40	10.567	10.831	11.095	11.359	11.624	11.888	12.152	12.416	12.680	12.944
50	13.209	13.473	13.737	14.001	14.265	14.529	14.795	15.058	15.322	15.586
60	15.850	16.115	16.379	16.643	16.907	17.171	17.435	17.700	17.964	18.228
70	18.492	18.756	19.020	19.285	19.549	19.813	20.077	20.341	20.605	20.870
80	21.134	21.398	21.662	21.926	22.190	22.455	22.719	22.983	23.247	23.511
90	23.775	24.040	24.304	24.568	24.832	25.096	25.361	25.625	25.889	26.153

convert L into U.K. Gal

1L=0.21997 U.K. Gal

	0	1	2	3	4	5	6	7	8	9
0	0	0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.950	4.179
20	4.399	4.619	4.839	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.969	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.778
50	10.998	11.281	11.438	11.658	11.878	12.098	12.318	12.528	12.758	12.978
60	13.198	13.418	13.638	13.858	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.037	18.257	18.477	18.697	18.917	19.137	19.357	19.577
90	19.797	20.017	20.237	20.457	20.677	20.897	21.117	21.337	21.557	21.777

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convert kg•m into ft•lb

1kg•m =7.233 ft•lb

	0	1	2	3	4	5	6	7	8	9
0	0	7.2	14.50	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	296.6	303.8	311.0	318.3	325.5	332.7	340.0	347.2	354.4
50	361.7	368.9	376.1	383.4	390.6	397.8	405.1	412.3	419.5	426.8
60	434.0	441.2	448.5	455.7	462.9	470.2	477.4	484.6	491.8	499.1
70	506.3	513.5	520.8	528.0	535.2	542.5	549.7	556.9	564.2	571.4
80	578.6	585.9	593.1	600.3	607.6	614.8	622.0	629.3	636.5	643.7
90	651.0	658.2	665.4	672.7	679.9	687.1	694.4	701.6	708.8	716.1
100	723.3	730.5	737.8	745.0	752.2	759.5	766.7	773.9	781.2	788.4
110	795.6	802.9	810.1	817.3	824.6	831.8	839.0	846.3	853.5	860.7
120	868.0	875.2	882.4	889.7	896.9	904.1	911.4	918.6	925.8	933.1
130	940.3	947.5	954.8	962.0	969.2	976.5	983.7	990.9	998.2	1005.4
140	1012.6	1019.9	1027.1	1034.3	1041.5	1048.8	1056.0	1063.2	1070.5	1077.7
150	1084.9	1092.2	1099.4	1106.6	1113.9	1121.1	1128.3	1135.6	1142.8	1150.0
160	1157.3	1164.5	1171.7	1179.0	1186.2	1193.4	1200.7	1207.9	1215.1	1222.4
170	1129.6	1236.8	1244.1	1251.3	1258.5	1265.8	1273.0	1280.1	1287.5	1294.7
180	1301.9	1309.2	1316.4	1323.6	1330.9	1338.1	1345.3	1352.6	1359.8	1367.0
190	1374.3	1381.5	1388.7	1396.0	1403.2	1410.4	1417.7	1424.9	1432.1	1439.4

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convert kg/cm^2 into lb/in^2 $1kg/cm^2=14.2233lb/in^2$

	0	1	2	3	4	5	6	7	8	9
0	0	14.2	28.4	42.7	56.9	71.1	85.3	99.6	113.8	128.0
10	142.2	156.5	170.7	184.9	199.1	213.4	227.6	241.8	256.0	270.2
20	284.5	298.7	312.9	327.1	341.4	355.6	369.8	384.0	398.3	412.5
30	426.7	440.9	455.1	469.4	483.6	497.8	512.0	526.3	540.5	554.7
40	568.9	583.2	597.4	611.6	625.8	640.1	654.3	668.5	682.7	696.9
50	711.2	725.4	739.6	753.8	768.1	782.3	796.5	810.7	825.0	839.2
60	853.4	867.6	881.8	896.1	910.3	924.5	938.7	953.0	967.2	981.4
70	995.6	1010	1024	1038	1053	1067	1081	1095	1109	1124
80	1138	1152	1166	1181	1195	1209	1223	1237	1252	1266
90	1280	1294	1309	1323	1337	1351	1365	1380	1394	1408
100	1422	1437	1451	1465	1479	1493	1508	1522	1536	1550
110	1565	1579	1593	1607	1621	1636	1650	1664	1678	1693
120	1707	1721	1735	1749	1764	1778	1792	1806	1821	1835
130	1849	1863	1877	1892	1906	1920	1934	1949	1963	1977
140	1991	2005	2020	2034	2048	2062	2077	2091	2105	2119
150	2134	2148	2162	2176	2190	2205	2219	2233	2247	2262
160	2276	2290	2304	2318	2333	2347	2361	2375	2389	2404
170	2418	2432	2446	2460	2475	2489	2503	2518	2532	2546
180	2560	2574	2589	2603	2617	2631	2646	2660	2674	2688
190	2702	2717	2731	2745	2759	2773	2788	2802	2816	2830
200	2845	2859	2873	2887	2901	2916	2930	2944	2958	2973
210	2987	3001	3015	3030	3044	3058	3072	3086	3101	3115
220	3129	3143	3158	3172	3186	3200	3214	3229	3243	3257
230	3271	3286	3300	3314	3328	3343	3357	3371	3385	3399
240	3414	3428	3442	3456	3470	3485	3499	3513	3527	3542

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Measurement units

In this Manual, all measurement units are metric units.

Relevant regular weight unit system is indicated in braces { }.

Example:

kg { N }
kgm { N·m }
kg/cm^2 { MPa }
mmHg { kPa }
mmH_2O { kpa }
HP/r/min { kw/r/min }
g/HPh { g/kwh }

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1 FRONT WHEEL ASSEMBLY

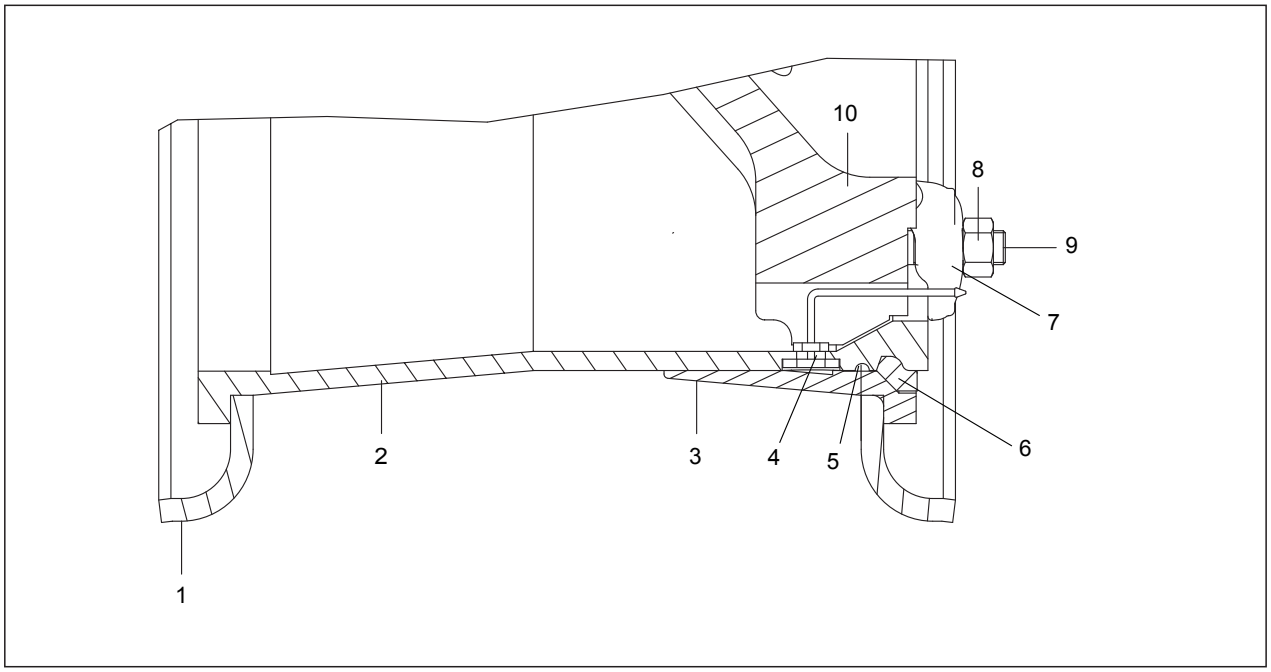


Fig.1 Sectional view of wheel rim assembly

1. Flange
2. Rim
3. Bead seat band
4. Valve stem assembly
5. 'O' Ring
6. Lock ring
7. Clamp
8. Nut
9. Stud
10. Wheel

Description

The front wheel assembly consists of tyre and rim assembly, rim clamp and nut.

The tyre and rim assembly is designed to be replaced with a pre-assembled tyre and rim.

Preparation for servicing

⚠ warning

Before loosening rim clamps or performing any service on the tyre or rim components, to prevent personal injury and property damage, completely deflate tyre by removing the valve cap and core. Insert a thin wire through the valve to be sure

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the valve is not plugged. Even a flat tyre, in some cases, will retain sufficient air pressure to blow off a rim component with enough force to cause injury or death.

⚠ warning

Gases that build up inside an air inflated tyre mounted on a rim during welding or heating of rim components can ignite, causing an explosion of the tyre and rim components. This warning also applies to Nitrogen gas inflated tyres. Ignition will not occur in a Nitrogen gas atmosphere; but the pressure build up from the applied heat may be sufficient to cause a blowout severe enough to injure or kill. Never weld or otherwise apply heat on rim components with the tyre mounted on the rim, whether the tyre is inflated or deflated, to prevent injury or property damage from the potential tyre explosion! Do not attempt to repair rims or rim components by welding or heating, even if the tyre is not mounted on the rim. It is recommended to scrap questionable rim parts unless specific permission and repair procedures are obtained in writing either from the company or the rim manufacturer.

Removing Tyre and Rim Assembly

Numbers in parentheses refer to Fig.1.

If the tyre and rim assembly is to be replaced with a pre-assembled tyre and rim assembly, it is not necessary to remove the tyre from the rim on the truck. The tyre and rim may be removed from the truck as an assembly, and transported to a more desirable location for removing the tyre from the rim.

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⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of sufficient capacity to do the job safely.

1. Place the truck in a flat area, apply parking brake and shut down the engine.
2. The steering wheel turns for several circles in the two directions to relieve the pressure in steering system. Block all wheels, except the one to be raised. Use wooden blocks 100 mm x 100 mm (4 in x 4 in) or larger.
3. Support the truck with jack for removal of tyre, but do not jack up the truck.
4. Completely deflate tyre by removing valve cap and core. Check valve stem by running a piece of wire through the stem to make sure it is not plugged. See warning under 'Preparation for servicing' .
5. Loosen the nut (8) on the wheel hub. But do not remove from the stud (9).
6. Jack the truck up only as high as necessary to remove wheel from truck, and place safety blocks under the frame.
7. Support the tyre with a chain or rope of sufficient strength attached to a suitable lifting device. Remove the nut(8) and clamp(7) from the wheel stud (9). Lift tyre and rim assembly clear.

Dismounting Tyre from Rim

Numbers in parentheses refer to Fig.2, unless otherwise specified.

Note: The following instructions are applicable to use of hand tools. For procedures and tooling required to dismount the tyre from the rim, using hydraulic tools, contact the tyre manufacturer.

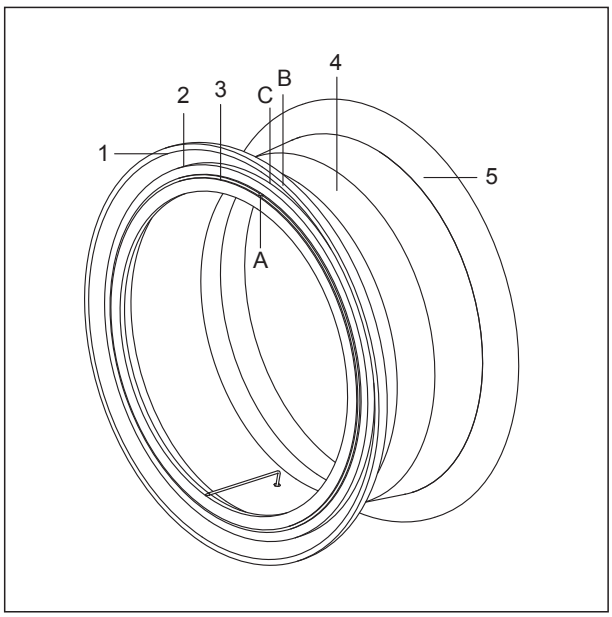


Fig.2 Rim assembly

1. Outer fange
2. Bead seat band
3. Lock ring
4. Rim
5. Inner flange

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⚠ warning

When lifting tyre from rim, be sure the device is of sufficient capacity and properly secured to do the job safely.

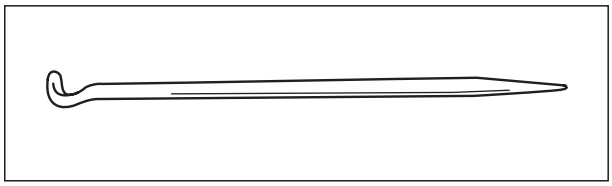


Fig.3 Pry Bar

1. Completely deflate tyre if not done previously. See warning under 'Preparation for servicing' . Tape valve threads to protect from damage, leaving valve end open to avoid any possibility of trapping air inside the tyre.
2. As shown in Fig.3, break outer tyre bead loose by placing the flat hooked end of a pry bar, into one of the breaking slots (C) between the bead seat band (2) and outer flange (1). A length of pipe slipped over straight end of bar will increase leverage. Twist straight end of bar around toward tyre to break this portion of bead. Another person may now insert another pry bar of the same type into the slot between the bead seat band (2) and outer flange (1), and with the same twisting action, hold the space gained with the first pry bar. Move first pry bar all the way around the wheel, twisting and following up with second pry bar, until inner tyre bead is loose.
3. Start bead seat band (2) in away from lock ring (3) by placing hooked end of pry bar in groove of rim (4), between ends of lock ring, and prying up with bar. Using two tools, as in Step 2, work completely around wheel.
4. Pry lock ring (3) out in same manner by starting at prying notch (B) in wheel, and work all the way around wheel with the two pry bars.
5. Remove and discard the O-ring (5, see Fig.1).
6. After removing lock ring (3), pry out and remove bead seat band (2). Outer flange (1) can be removed now.
7. Similar breaking slots are provided on the inside of rims. The inner bead on the back

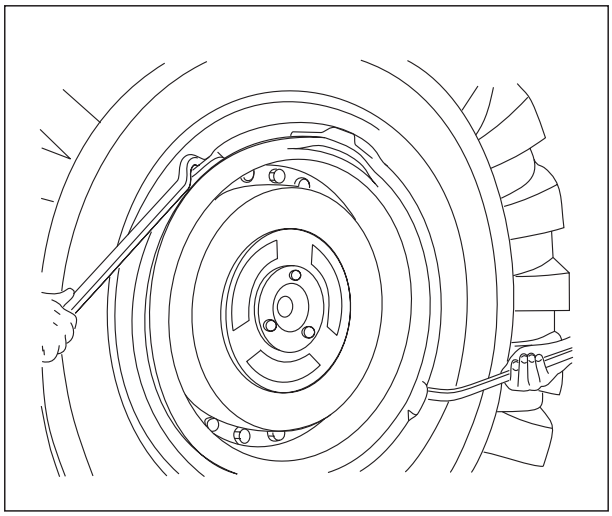


Fig.4 Breaking Typical Tyre Bead Loose

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side of the tyre may be broken by using the same method as in Step 2, for the outer bead. If the wheel assembly is still on the truck, another method which can be used is to place a small jack between the inner flange and some solid part of the frame. By extending the jack, pressure is exerted, which forces the tyre bead off the rim seat. Work around the wheel until the bead is broken at all points.

8. Use a proper lifting device to lift tyre away from rim. The dismantling of tyre is completed in such a way.

Note: If tyre and rim is on truck, and no lifting device is available, the tyre can be separated off the rim as follows: force bottom of tyre outward as far as possible; lower jack enough to allow weight of tyre to rest on ground; force top of tyre out as far as possible; raise jack to original height and repeat the above until tyre is off rim.

Inspection

Tyre

Check interior surface of the tyre to determine its condition. Inspect for cuts or fabric breaks that have penetrated the tyre body. Inspect closely for any sharp, pointed objects that may have penetrated the tyre body but is invisible from the outside. All dust, dirt, water or other foreign matter should be cleaned from the inside of the tyre.

Replace valve core assembly if condition is questionable.

Rim assembly

Overload, improper tyre inflation, rough terrain, high speed, accidents, dirt accumulation and corrosion will reduce service life of rims and rim components. It is recommended that rims be inspected, as below, not less than at every tyre change and, as the warranty limit approaches, consideration be given to rim replacement.

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⚠ warning

Never mix components of one manufacturer's rims with those of another. Using the rim base of one manufacturer with the lock ring of another or vice versa is dangerous. The lock ring of one may not fully engage with the lock ring groove of the other. Always consult the rim manufacturer for proper matching and assembly instructions.
Also, use of damaged, worn out, or improperly rim assemblies is a very dangerous practice. Failure to comply with the above warnings could result in explosions from tyre pressure causing serious personal injury and property damage.

1. Clean all rust and dirt from rim parts.
2. Coat parts with primer paint, allow thorough drying before assembling.
3. Inspect rim assemblies (Fig.2) for bent, cracked, distorted, battered, and rusted parts which may have resulted from abusive practices outlined above. Replace any damaged parts with new parts.
4. Discard 'O' ring and replace with a new one.

Note: Handle 'O' rings carefully, as damage will prevent an airtight seal for tyre inflation.

Mounting Tyre on Rim

Numbers in parentheses refer to Fig.2, unless otherwise specified.

⚠ warning

When lifting tyre onto rim, be sure the device is of sufficient capacity and properly secured to do the job safely.

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1. If tubeless tyre valve assembly was removed from rim, install this assembly in the rim valve hole and tighten securely.
2. Whether the rim (4) is on or off the truck, tyre installations are performed in basically the same manner. For off-truck installations, lay the rim on blocks with 'O' ring groove up. The rim should be just off the floor enough so the tyre rests on the rim and does not touch the floor. The blocks should not extend more than 13 mm (0.5 in) beyond the rim base, so they won't interfere with inner flange (5).
3. Install the inner flange (5) onto the rim (4).
4. Before assembly of tyre to rim, lubricate both tyre beads and new 'O' ring (5, Fig.1) with a thin solution of vegetable base soap and water. Make sure tyre valve assembly is securely in place. Lower the tyre onto the rim, seating tyre firmly against inner flange (5).
5. Install outer flange (1) on rim (4).
6. Install bead seat band (2) on rim (4).
7. Install lock ring (3) in groove of rim (4). Use pry bar for this operation, as illustrated in Fig.5.
8. Force bead seat band (2) past 'O' ring groove in rim (4) by prying, or with lift truck forks. Use blocking between the forks and tyre to prevent tyre damage. Lubricate area of rim adjacent to 'O' ring groove with a thin solution of soap and water or another approved lubricant which is not harmful to rubber. Avoid using an excessive amount of lubricant. Insert a new 'O' ring (5, Fig.1) in the groove of the rim behind the lock ring.
9. Lift tyre upwards to effect a seal between bead seat band (2) and 'O' ring (5, Fig.1). In some cases the tyre will automatically spring out, if this step is neglected,

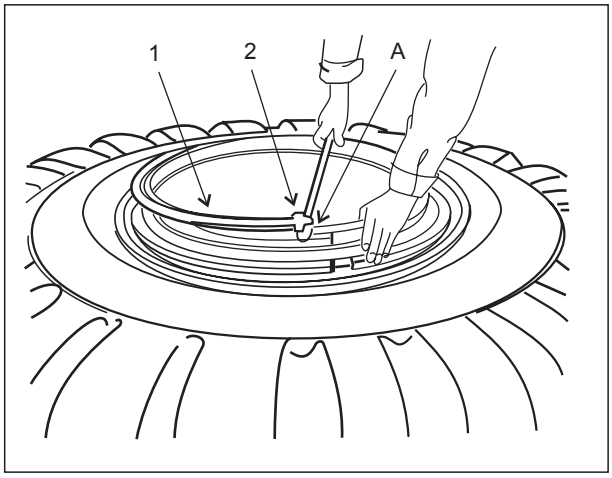


Fig.5 Installation of Lock Ring

Mounting tyre and rim assembly on wheel

Numbers in parentheses refer to Fig.1.

1. Support tyre and rim assembly with a chain or rope sling attached to an overhead lifting device and slide onto wheel (10) of the truck.

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Side with lock ring (6) and bead seat band (3) should be facing outward.
2. Install clamps (7) and nuts (8) on studs (9). Gradually tighten wheel nuts opposite each other, until all nuts are snug, torque tighten wheel nuts (8) to 1000 N. M-1300 N. M.
Re-tighten nuts after a few hours operation.
Note: The fastener torque should be checked regularly, particularly on new truck or newly-installed wheels, to maintain the required wheel rim-clamp load. A newly installed wheel or a new truck should be checked at 30 day intervals until rim fasteners show no significant torque loss from the previous check. After that, a 90 day torque check interval should be adequate.

⚠ warning

Be sure lifting equipment is of sufficient capacity and properly secured to do the job safely.

Tyre Inflation

⚠ warning

To prevent personal injury and property damage, the tyre and rim assembly should be placed in a safety cage before inflating. If no safety cage is available or tyre is on the truck, the tyre and rim assembly should be wrapped with safety chains or with cables before inflating.
Even with these precautions remember that air-blast is a potential hazard. Tyre inflation should be carried out away from busy working areas.
To prevent personal injury and property damage, never stand or sit in front of a mounted tyre during tyre inflation. Use a clip-on air chuck with a long hose and stand to one side while the tyre is being

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inflated.

To prevent personal injury and property damage, always prevent flammable vapours that could produce tyre explosions, from being pumped into tyres during inflation, by observing the following precautions:

1. Use an air compressor and reservoir located inside a heated building, when available, so that alcohol, methanol, or other flammable antifreeze liquids are not needed in the air tanks to prevent moisture freezing in the tank and lines in subfreezing temperatures.

2. Make sure that paints, lacquers, paint thinners, or similar materials that produce volatile, flammable vapours are not used or stored near the air intake of the compressor that supplies the air for inflating tyres. The compressor should be isolated from all such sources of flammable vapours.

3. Be sure to thoroughly flush and blow off all flammable solvents used for cleaning the air compressor inlet screen before using the compressor for tyre inflation, or any other purpose.

4. Do not charge batteries, near the air inlet of a compressor used for inflating tyres. Charging batteries produces highly explosive hydrogen gas which can be readily drawn into a nearby compressor inlet and pumped into the tyre.

5. Never exceed the specified concentration of alcohol when adjusting the alcohol vaporiser, or adding alcohol to the auxiliary air tank, used on machine air systems to prevent freezing or moisture condensate in below-freezing temperatures. Excessive alcohol, added to the air tanks can produce flammable vapours that will be pumped into a tyre when this air supply is used for tyre inflation if the tyre inflation kit is not equipped with a moisture filter.

6. Another source of hazardous flammable vapours in tyres is the tyre bead lubricant.

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Always use bead lubricants that do not introduce flammable vapours into the tyre.

Inflation

Note: To prevent moisture corrosion of internal rim parts, use tyre inflation equipment with an air filter that removes moisture from the air supply.

1. If the tyre is off the truck, it should be placed in a safety cage before inflating. See Fig.6.
2. Inflate all tyres with ratings of 16-ply and above to 0.52 Mpa to seat beads and seal 'O' ring, then adjust to the recommended pressure.
3. For recommended operating air pressure, refer to the chart 'Tyre Inflation Pressures'.

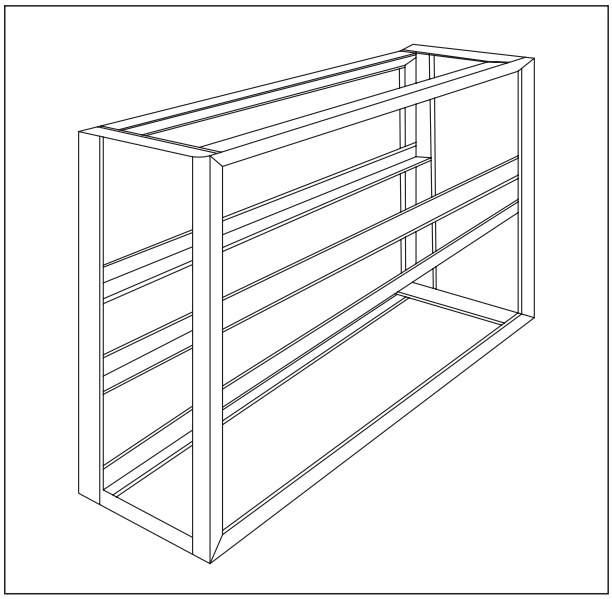


Fig.6 Tyre Inflation Safety Cage

Nitrogen tyre inflation

Note: All Warnings and procedures under 'Tyre Inflation' will apply, except for differences covered by this passage.

In certain enviroN·ments it is recommended that tyres be inflated with dry nitrogen gas, and that the resulting oxygen content of the inflation does not exceed 5%. All machines whose tyres are factory inflated with dry nitrogen gas will be identified by a decal on the body or frame.

Nitrogen gas improves tyre pressure retention, increases tyre life by reducing carcass oxidation from within, minimizes rim rust and has no detrimental effects on the tyre. It also reduces the potential of a tyre explosion because it is an inert gas and will not support combustion inside the tyre.

The same tyre inflation pressure used for air inflation should be used for nitrogen inflation. Tyre valves formerly used with air inflation are entirely satisfactory for use with nitrogen gas.

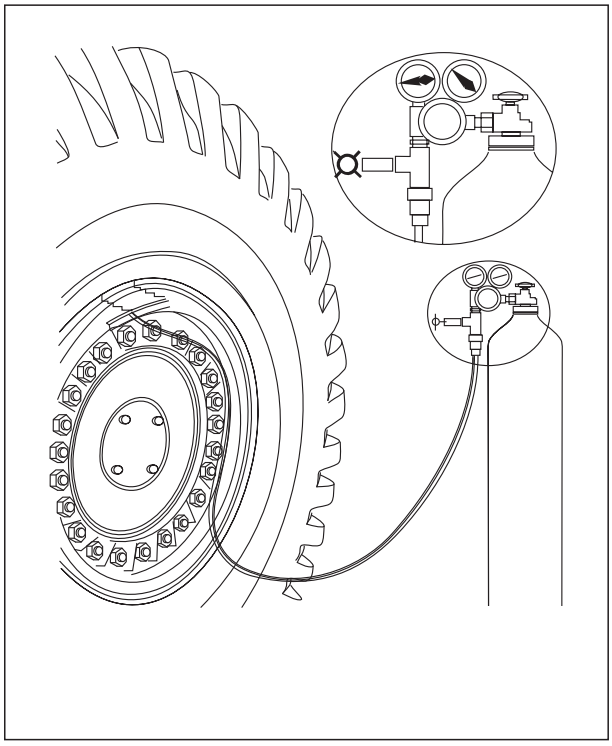


Fig.7 Nitrogen Tyre Inflation Kit

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Nitrogen tyre inflation kit

⚠ warning

DO not use charging assembly for tyre inflation because this assembly does not include a pressure regulator, safety relief valve, and adequate pressure gauging which is mandatory for tyre inflation. Tyre volume is as much as 90 times greater than the average accumulator volume and it takes very much longer to inflate a tyre - up to 40 minutes or more for very large tyres. Nitrogen gas cylinders used to inflate tyres are generally charged to approximately 15.2Mpa. A tyre blowout or rim failure could occur if inflation equipment is not properly used. Proper nitrogen charging equipment and personnel training can avoid over inflation.

1. A nitrogen tyre inflation kit is available from your dealer and consists of the following. Refer to Fig.7.
a. Pressure regulator, 0 – 1.3 Mpa, with two dual pressure gauges.
b. Safety relief valve, 0.86 Mpa, that will assure an upper limit to the pressure available for tyre inflation.
c. A 15 length of flexible hose with interconnecting fittings. On the tyre end of the hose is a large bore quick connect.
2. The pressure regulator is connected to a nitrogen compressed gas cylinder available from local suppliers.
3. The usual procedure for using this type of equipment is as follows:
a. Connect nitrogen tyre inflation kit to nitrogen compressed gas supply. DO not connect quick connect to the tyre valve at this time.
b. Open valve on nitrogen supply.
c. With flexible hose and quick connect connected to nitrogen tyre inflation kit

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assembly but not connected to the tyre, adjust pressure regulator so that its output pressure is not more than 0.14Mpa higher than the desired tyre inflation pressure.
d. Connect quick connect to the tyre valve. The tyre will now inflate. Tyre pressure can be monitored by observing the gauge at the pressure regulator.
e. When desired inflation pressure has been achieved, back off the regulator or close the valve on the compressed gas cylinder.
f. Remove the quick connect and adjust the tyre pressure with the tyre gauge in the usual manner.

Re-inflation of a mounted tyre

To re-inflate a tyre with dry nitrogen gas which is now inflated with air, proceed as follows:
1. Deflate the tyre until the air in tyre reaches the atmospheric pressure.
2. Re-inflate the tyre using only dry nitrogen gas to 0.41Mpa gauge as a minimum, or to bead-seating pressure as a maximum.
3. Adjust to the service inflation pressure required:
a. If the required service inflation pressure is less than 0.41Mpa remove the quick connect and adjust the pressure with the tyre gauge in the usual manner.
b. If the required service inflation pressure is greater than 0.41Mpa, continue inflating with dry nitrogen gas only, to the pressure level required. Then remove the quick connect and adjust the pressure with the tyre gauge in the usual manner.

New tyre mounts and remounts

To newly mount or remount a tyre to rim, use only dry nitrogen gas; this includes the pressure required to seat the beads. After seating the tyre beads, remove the quick connect and adjust the pressure with the tyre gauge in the usual manner.
Note: Although a little more nitrogen gas is

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used to seat beads than that used for re-inflation of a mounted tyre, its cost is generally negligible in comparison to the time and labour saving and, longer tyre life achievable with the reduced oxygen content which results.

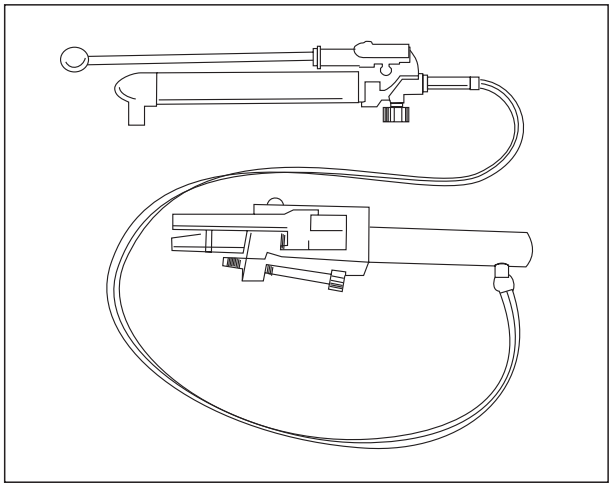


Fig.8 Typical Hydraulic Bead Breaking Tool

Hydraulic bead breaking tool

The hydraulic bead breaking tool illustrated in Fig.8 is specifically designed to break tyre beads on rusted rims, and is available from your dealer. Refer to Special Tools. It can be used on rims having pry bar slots. The recommended procedure for using this tool is described below.

1. Prepare for dismantling tyres according to the necessary steps in the ‘Preparation for servicing’ and ‘Dismantling tyre from Rim’.
2. Completely deflate tyre if not done previously. See warning under 'Preparation for servicing'. Tape valve threads to protect from damage, leaving valve end open to avoid the possibility of trapping air inside the tyre.
3. Place the lip of the hydraulic tool in one of four breaking slots between the flange and the bead seat band.
4. Adjust locking screw to a position which will hold the tool in a line perpendicular to the face of the rim.
5. Close valve on the hydraulic pump and apply pressure to take up the slack in the tool and rim parts. This will cause the tool to tilt slightly downward. Release pressure and adjust the screw again so that the tool will be perpendicular to the rim when under pressure.
6. Apply enough pressure to move the flange back approximately 13 mm (0.5 in) and hold this distance by dropping a nut, or similar object, in the space between the flange and the bead seat band.
7. Release pressure and move the tool around the rim in either direction. Insert lip of tool between bead seat band and flange. Repeat cycle until 3/4 of the rim circumference has

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been covered. Apply pressure at this point until bead breaks loose.

8. Remove lock ring, bead seat band and flange as described under 'Dismounting tyre from rim'.

9. After lock ring, bead seat band and rim flange have been removed, inner bead must be broken loose according to Steps 3-7 for breaking outer bead.

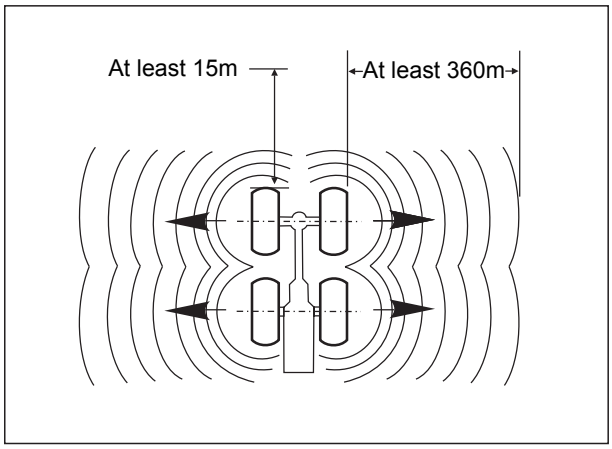


Fig.9 Do Not Approach Tyre in Shaded Area

⚠ warning

Whenever a tyre is exposed to excessive heat such as a truck fire or overheated brakes the hazard of a subsequent violent tyre explosion must be recognized. All persons must avoid approaching the truck so as not to be physically endangered in the event of an explosion of the tyre and rim parts. The truck should be moved to a remote area, but only when this can be done with complete safety to the operator operating or towing the truck. All other persons should stay clear of the truck. The fire or overheated brakes, wheel, etc. should be extinguished or cooled from a safe distance. Do not attempt to extinguish the fire or cool the machine by use of hand-held fire extinguishers.

If it is absolutely necessary to approach a truck with a suspect tyre, approach only from the front or the back. Stay at least 15 m (50 ft) from the tread area. Keep observers out of the area and at least 460 m (1 500 ft) from the tyre sidewall. Refer to Fig.9. The tyre should be allowed at least 8 hours cooling time after the machine is shut down or the fire extinguished before approaching closer.

There is always a possibility of a tyre explosion whenever the smell of burning rubber or excessively hot brakes is detected. The danger is also present when a fire on the truck reaches the tyre and

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wheel area. Under such conditions, all personnel must avoid approaching the truck in a manner that could result in injury should an explosion actually occur. Move the truck to a remote area only if it can be done without endangering the operator or other personnel in the area.
DO not weld on or heat rim components. For several years the company and tyre and rim manufacturers have warned users never to weld rim components with the tyre mounted on the rim. The gases that build up inside the tyre during arc welding or heating on rim components can ignite, resulting in one of these explosive-like failures of the tyre and rim. It is recommended to scrap the part if heat is necessary to repair any rim component.

Tyre maintenance

Tyre repairs
Prompt repair of tyre injuries will prevent small injuries from enlarging and causing tyre failure. Use the best tyre repair facilities available. If good repair facilities are not available, have the nearest dealer make the necessary repairs.
Minor cuts, snags, or punctures should be repaired upon discovery. Skive with a sharp pointed knife around any cut in the tyre tread area that is of sufficient depth or shape to hold pebbles or dirt. The angle of the skive should be no more than sufficient to expel all foreign material and should extend no deeper than the breaker. The skive should go to the bottom of the hole. Tyres with shallow cuts, if treated promptly, may be allowed to continue in service. If the cut extends deeper into the tyre carcass, the tyre should be removed for repair. Ordinary tubeless tyre punctures can be repaired without removing the tyre from the rim. Use tyre repair plugs and follow the

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directions given by the manufacturer.
The tyre must be removed from the rim to repair larger punctures or cuts. Irregular shaped punctures or cuts less than 13 mm in size can be repaired with a plug and hot patch. Insert a repair plug into the hole to keep out moisture and to back up the hot patch. Trim the plug off flush with the inside of the casing, buff, and apply the hot patch according to the instructions supplied with the hot-patch equipment.
Punctures 13 mm or larger, large cuts, or bruise breaks require sectional or reinforced vulcanized repair. Cover the repair patch with a layer of cushion gum after application to the tubeless tyre to ensure an airtight repair. Any cords of the inside ply that are exposed in bugging and are not covered with repair patch must be coated with cushion gum to prevent air leakage into the carcass plies on tubeless tyres.

Recapping and retreading
There are two general methods employed in restoring the tread surface of off-the-highway tyres: recapping and retreading.
A recapped tyre has a new tread cured right over the old tread surface.
A retreaded tyre has the old tread removed entirely and a new tread cured directly onto the body of the tyre. A tyre can be recapped or retreaded if the cord body is free of cuts, bruises and separation, and is thoroughly sound, including previous repairs.

Tyre care
To obtain maximum service from off-the-highway tyres, a few common-sense precautions should be followed.

Maintain correct inflation
Most tyre damage are caused by improper inflation. Both over-inflation and under-inflation are detrimental to tyre life. Tyre pressure

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should be checked daily, preferably before the truck is placed in operation, see the instructions in 'Tyre Inflation Pressures'.
The valve cores should be checked for leaks. Keep in mind that valve cores are delicate mechanisms that wear out in service; therefore, they should be replaced when they become worn. Each tyre should be equipped with a valve cap to prevent dirt from damaging the valve core and causing air leakage.

Maintain good haul roads
Because haul roads are considered temporary roads, they are frequently neglected. The better the haul road, the longer the tyre and machine life of off-the-highway equipment.
Note: Although it takes time and effort to maintain good haul roads, delay and cost of tyre and machine breakdowns caused by poor haul roads is many times greater.

Inspect tyres regularly
A systematic plan for tyre inspection will more than pay for itself in lowered tyre costs per hour of operation. All tyres should be checked regularly for cuts, bruises, fabric breaks, excessive or uneven wear, embedded foreign matter, and any other damage which can be repaired. A considerable increase in tyre service can be realized if tyre injuries are repaired before they have progressed to the irreparable stage. The rim mounting nuts should be checked periodically and tightened to the recommended torque.

Prevent overloading
Off-the-highway trucks are designed to carry a maximum allowable payload.
Note: Excessive loading will overstress both the machine and tyres and shorten the life of both.

Prevent tyre contact with oil
Prevent tyre contact with petroleum products.

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Rubber that is exposed to oil, petrol, or grease becomes soft and spongy and deteriorates rapidly. Always avoid driving truck equipped with rubber tyres through a puddle of petrol, fuel oil, lubricating oil, or grease. Never let a tyre stand in oil or grease spot overnight.

Store tyres properly

The best of care given to tyres in service by operators and maintenance personnel can be completely nullified by careless storage. Time is not the only contributing factor to the deterioration of rubber products. Therefore, tyres that are to be stored must be protected from light, heat, oils, dirt, moisture and ozone. Stored tyres should be carefully covered with a tarpaulin or some other suitable material, such as opaque plastic sheets, to prevent contact with the contaminants listed.

Proper handling of tubeless tyres and rims

Tubeless tyres should be stored vertically. Horizontal stacking may compress the tyre walls making inflation difficult. If tyres are stored in racks, the lower supporting members should provide as broad a surface as possible to the tyre tread to avoid a concentration of load.

The beads of tubeless tyres must be protected from damage or a faulty air seal will result. Do not use hooks, cables, or chains in contact with the tyre beads when lifting these tyres. If forklift trucks are used for handling, they should be equipped with broad, well rounded arms to distribute the load and prevent damage to the tyre bead. When handle tyres with the fork truck, do not scrape the fork across the bead.

Tubeless tyre rims perform an important function as part of the assembly air seal. Proper care therefore must be taken not to distort or mutilate the rim parts, because they must mate properly to form part of the basic air chamber. Since the rim base, bead seat band,

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and flange are endless, distortion may prevent easy assembly as well as possibly resulting in no seal.
Never drop, tumble, or roll rim parts.
If rim parts are stored outdoors they should be given a protective coat of a good commercial primer.
Similar parts should be stacked neatly to prevent distortion.
Babbitt or lead hammers, not sledge hammers, should be used in assembling rims.
'O' rings are seals and should be carefully stored in a cool, dry place where they will not be damaged.
Valve cores also should be stored in a cool, dry and clean place.

Special tools
Refer to Section 38.3, SERVICE TOOLS, for part numbers of special tools outlined in this section and general service tools required. These tools are available from your dealer.

Tyre inflation pressures
E3 tyres may be so roaded up to 48 km/h (30 mile/h), maximum, with a 30 minute cooling stop after each 80 km (50 miles) or 2 hours sustained operation - whichever occurs first - and a 60 minute cooling stop after each aggregate of 4 hours of operation.
E4 tyres may be so roaded up to 32 km/h (20 mile/h), maximum, with a 30 minute cooling stop after each 32 km (20 miles) or 1 hour of sustained operation - whichever occurs first - and a 60 minute cooling stop after each aggregate of 4 hours of operation.
Normal inflation pressure of bias tyres (27.00-49 48PR) is 0.575 Mpa. Specific job conditions, terrain, haul road maintenance and length, maximum and workday average speed, job t-km/h (ton-mile/h) required and tyre t-km/h (ton-mile/h) capacity, etc., may require an increase in inflation pressure. It is recommended that for tyres both listed and

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unlisted the user consult the tyre manufacturer and evaluate all job conditions in order to make the proper selection.

Technical conditions of special torque				
Fig. NO.	Item NO.	Item Name	Torque	
			N•m	lbf•ft
1	8	Nut	1000-1300	510

Tubeless Tyre Leak Diagnosis	
Occasionally a tubeless off highway tyre/rim assembly may leak in field service. To determine cause of leakage, the entire assembly including valve hardware, multi-piece rim assembly, 'O' ring and tyre should be checked using a soap solution. This table lists various causes of air loss and possible remedy.	
Causes	Remedy
Defective valve	Tighten and replace suspicious parts and use valve core cap.
Cracked rim or weld	Replace defective parts. Warning Do not repair rim parts (including welding and etc.).
Twisted or damaged 'O' ring	Replace O-ring (Perform lubrication).
Tyre cuts and snags	Repair damaged tyre.
Bead area awl holes	Repair internal lining (It should be performed in priority).
Leakage between tyre bead trim	With tyre removed from rim: Clean tyre beads in rim contact area Clean rim with wire brush Inspect 5°tapered bead seat band and the rim base in the bead seating area to determine if the transverse weld trims are flat or concave. Replace defective part. Weld trim should follow rim contour.
	Mount tyre using a lubricant such as Murphy's Tyre and tube Mounting Compound, or equivalent, on tyre beads and rim bead seat area.

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2 FRONT AXLE ASSEMBLY

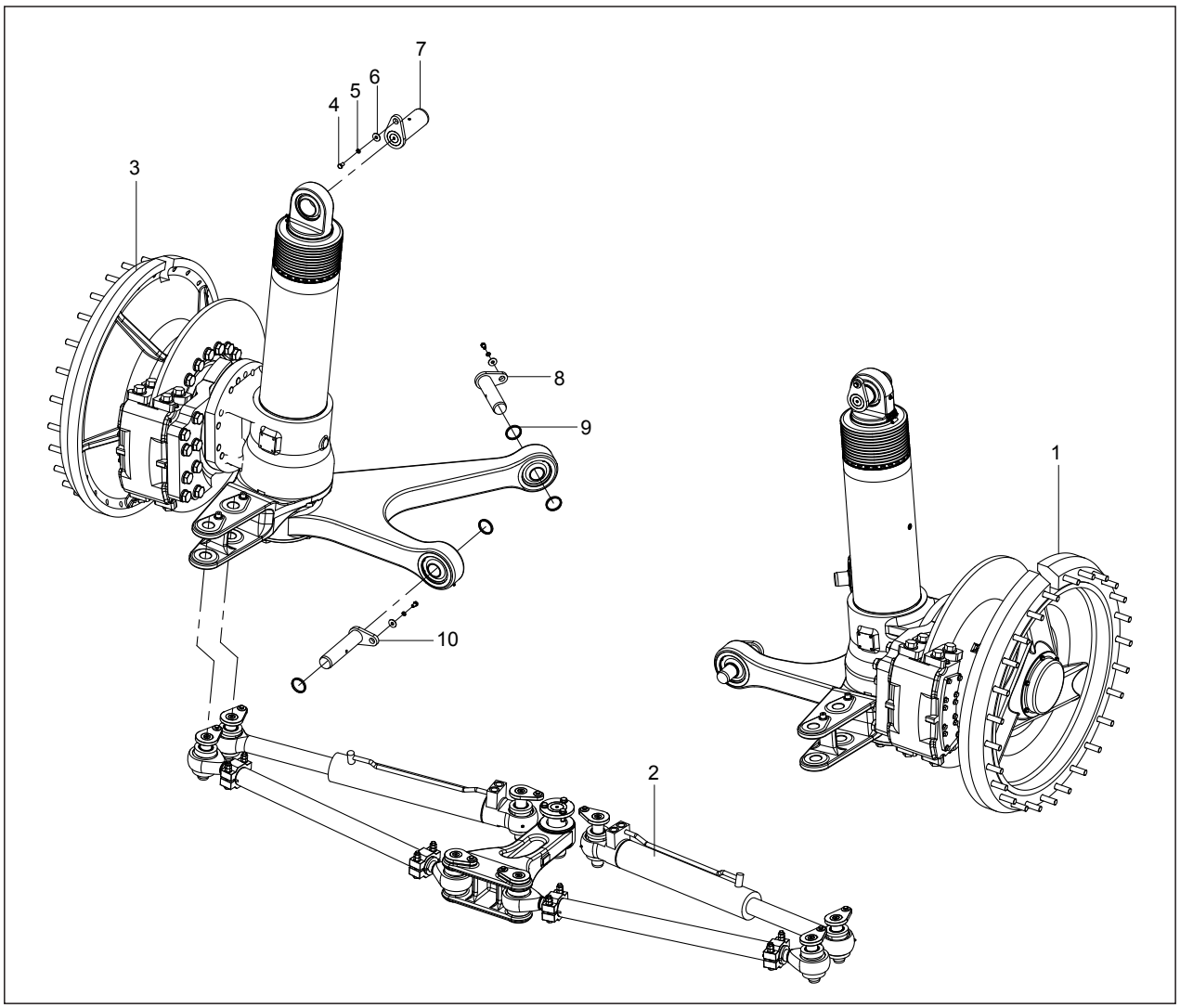


Fig.1

1. Right front axle assembly
2. Steering mechanism
3. Left front axle assembly
4. Bolt
5. Washer
6. Washer
7. Brace piece axial pin
8. Brace piece axial pin
9. Separating sleeve
10. Brace piece axial pin

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Overview and operating principle

The front axle that it is very important part for vehicle which used to carrying, it connecting with frame via the front suspension cylinders, A-shape arm and steering crank. Its major task is to transmit all the forces and moments acting between the wheels and the frame, alleviate the shock load transferred form road surface to the frame,attenuate consequent vibration of the carrying system and ensure the running smoothness of the truck.It ensures the ideal motion characteristics of wheels in case of rough road surface and variable load,and ensures the manipulation stability of the truck. At the same time, it can utilize the steering mechanism to deflect the wheels to a certain angle so as to realize turning.

⚠ warning

The cylinder has fully pressure inside. Before valve or joint is opened, pressure should be released according to the instructions in the section of 'Releasing Suspension Cylinder Pressure'. If it is released suddenly, it will lead to personal injuries and equipment damages.

Disassembly

See Fig.1 for the numbers in brackets.

1. Place the truck in a level work area. The wheels must be chocked to ensure that the truck will not slide. If it cannot,keep the truck in the parking situation and shut down the engine.
2. The steering wheel turns for several circles in the two directions to release the steering system pressure. Chock the wheels and set the main switch of battery into the "OFF" position.
3. Refer to the part of "Releasing the Pressure of Suspension Cylinder"in this chapter,and

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release nitrogen pressure in the suspension cylinders of the left and right front axle(1)(3).
4. Remove the connneting pin between the steering mechanism(2)and the left/right fornt axle(1)(3) to separate the steering mechanism from the left and right front axles.
5. Remove the brace piece axial pin(7)(8)(10) for the left and right front axles. As the same time remove the separating sleeve(9).Use a fork truck or crane to move them away.

⚠ warning

To prevent personal injury and property loss,ensure that wheel chocks and hoist device have sufficient capability and are correctly fixed to ensure safe work.

Inspection

1. Clean all connecting parts and holes with a proper solvent and dry them with air-compress. Check whether the articulating hole bearing rotates normally and whether the spacer ring and pin spindle are worn. If they are worn, replace them with new ones.

Installation

1. Removes all of dirt things from the frame and connecting holes of the frame and makes them clean.
2.Lift and insert the left and right front axles in position.Use the pin(7)to install the upper articulating points for the front suspension of the left and right front axles into the mounting hole of ring beam.Install the A-arm articulating hole onto the beam lower articulating point and the front longitudinal beam articulating point of frame via pin(8)(10)and the sleeve(9).
3. Connect the steering cylinder and steering tie rod of steering mechanism(2)to the steering arm assembly of left and right front axles(1)(3) through pin.
4. According to the requirements for front

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suspension in this chapter to filling gas or oil in to the suspension cylinder.

5.According to the requirements for the adjustment of steering tie rod in this chapter,adjust the toe-in of front axle.

⚠ warning

To prevent personal injury and property loss, ensure that wheel chocks and hoist device have sufficient capability and are correctly fixed to ensure safe work.

Maintenance

According to the requirements in the maintenance manual, lubricate all articulating points of the front axle on a regular basis.

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2.1. Front Axle Assembly

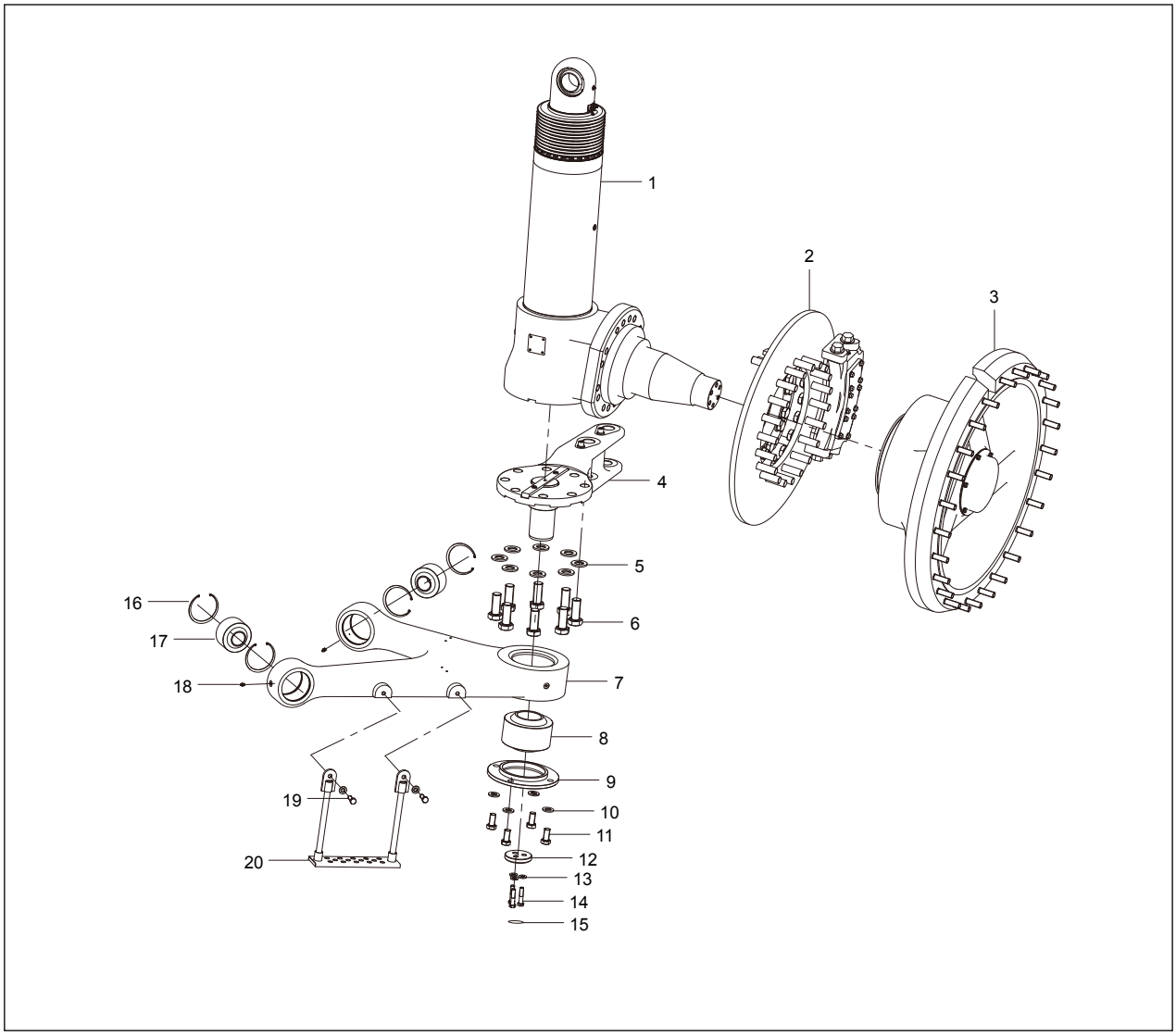


Fig.2

1. Front suspension cylinder
2. Front brake and installation
3. Installation of front hub
4. Steering arm assembly
5. Washer
6. Bolt
7. Left A-arm
8. Bearing
9. A-arm baffle
10. Washer
11. Bolt
12. Steering arm baffle
13. Washer
14. Bolt
15. Steel wire
16. Retainer ring
17. Bearing
18. Oil fitting
19. Bolt
20. Step assembly

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Overview and operating principle

See Fig.2 for the numbers in brackets.

The left front axle (also applicable to the right front axle) is a critical component of front axle, bearing the shock transmitted from the frame to the left part of front axle and attenuating the vibration.It provides braking force to the front axle. The left front axle can be divided into left suspension cylinder, left steering arm, front brake, hub and left/right A-arm for installation.

Disassembly

See Fig.2 for the numbers in brackets.

1.Place the left front axle levelly,remove the anti-loosening steel wire（15）、Bolt（14）and washer（13）.Remove Steering arm baffle（12）.Disengage left A-shape arm（7）form the lower shaft of steering arm assembly（4）.

2. After removed Bolt（11）、washer（10）, demolition A-shape arm baffle（9）, knock out bearing（8）of left A-shape arm（7）.After removed retainer ring（16）with pliers,knock out bearing（17）of left A-shape arm（7）.

3.Open the cover of the front hub,remove pressure plate form front axle of front suspension cylinder（1）, pull down front hub（3）.

4.Removed the screws of front brake and pull down the fornt brake(2).

5.Removed the screws of bolt（6）、washers（5）and separate steering arm assembly（4）from the front suspension cylinder（1）.

Inspection

1.According to Section 2.1.1"FORNT WHEEL AND INSTALLATION",check the parts and components in the front hub and its installation for damages.

2.According to Section 2.1.2"FRONT BRAKE ASSEMBLY AND INSTALLATION",check the parts and components in the front brake and its installation for damages.

3. According to Section 2.1.4 'FRONT

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SUSPENSION CYLINDER', check the half shaft surface and internal parts and components of left suspension cylinder for damages.
4. Check the lower shaft of steering arm assembly(4)and the mounting holes of steering cylinder and tie rod for wearing.If damaged,repair or replacement is required.
5. Check each bearing of A-arm(7) for wearing and looseness.

Installation
1. According to Section 2.1.4"FRONT SUSPENSION CYLINDER",restore the left suspension cylinder assembly.
2. Fix steering arm(4)in the lower end of suspension cylinder(1)and tighten it up.
3. Press the bearing(8)into the large-end bearing hole of left A-arm(7)and use the A-arm baffle(9)、bolt（11）and washer（10）to press it tightly.Press the bearing（17）into the small-end hole of left A-shape arm（7）and clamped tightly by retainer ring（16）.
4. Insert the lower shaft of left steering arm assembly（4）into the bearing（8）and left A-shape arm（7）.Use the steering arm baffle （12）、bolt（14）and washer（13）to press it tightly.thread the locking steel wire（15） and tighten it up.Retain the hex head side of bolt（14）.
5. According to Section2.1.2"FRONT BRAKE ASSEMBLY AND INSTALLATION",restore the left front brake system and brake clearance adjustment.
6.According to Section2.1.1"FRONT WHEEL AND INSTALLATION",restore the front hub and bearing clearance adjustment.
7.It is also allowed to complete Step 5 and 6 after the front suspension cylinder is installed onto the ring beam.The sepuence depends on specific situation.

Maintenance
According to the requirements in the

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preventative maintenance manual, lubricate all articulating points of the front axle on a regular basis.

2.1.1 Front wheel and installation

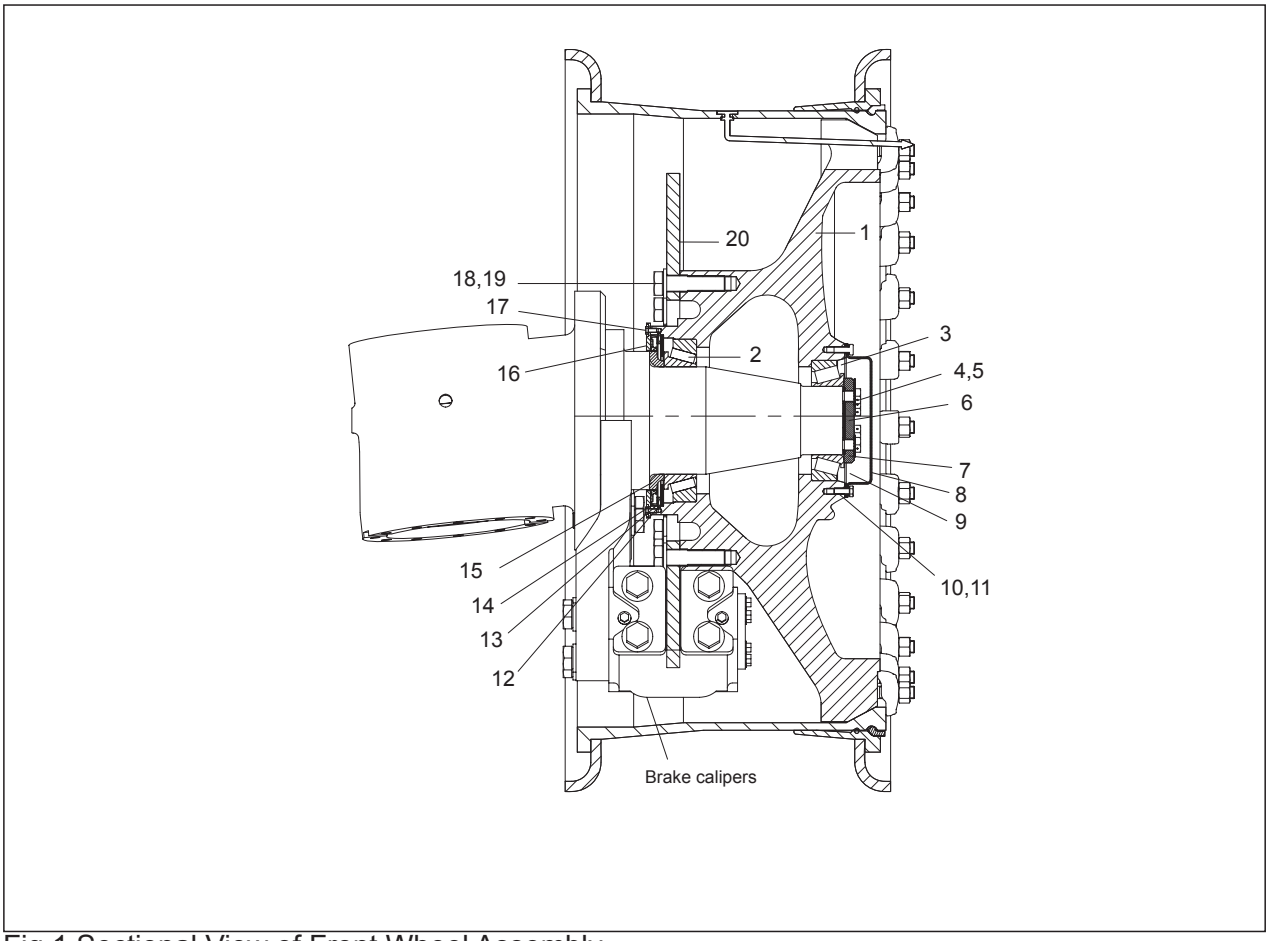


Fig.1 Sectional View of Front Wheel Assembly

1. Front wheel
2. Bearing
3. Bearing
4. Bolt
5. Lockwire
6. Plate
7. Shim pack
8. Cover
9. Gasket
10. Bolt
11. Washer
12. Snap ring
13. Washer
14. Oil seal
15. Bushing
16. Plate
17. Bolt
18. Bolt
19. Washer
20. Brake disc

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Overview

The wheel is mounted on the axle spindle with two tapered roller bearings mounted in the hub. The brake disc is bolted to the wheel. The tyre and rim assembly is mounted on the wheel with clamps and nuts.

The wheel itself is a large cylindrical casting with the bearing bores and other finished surfaces machined after the wheel is cast.

Removal and Disassembly

Numbers in parentheses refer to Fig.1.

⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting device are properly secured and of sufficient capacity to do the job safely.

⚠ warning

To prevent personal injury and property damage, completely deflate tyre by removing the valve cap and core. Insert a thin wire through the valve to be sure the valve is not plugged. Even a flat tyre, in some cases, will retain sufficient air pressure to blow off a rim component with enough force to cause injury or death.

1. Block the front and rear of all wheels, except the one to be raised. Jack up or lift machine so its weight is no longer on that wheel.
2. Deflate tyre completely, and remove the tyre and rim assembly from the wheel. Follow instructions under 'Removing Tyre and Rim Assembly'. Refer to Section 1, Front Wheel Assembly.
3. Relieve the pressure in the braking system.

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Refer to Section 2.1.2, FRONT BRAKE ASSEMBLY AND INSTALLATION. Disconnect brake hydraulic line at brake caliper.

4. Remove brake caliper. Refer to Section 2.1.2, FRONT BRAKE ASSEMBLY AND INSTALLATION.

5. Remove bolts (10) and washers (11) which secure cover (8) to wheel (1). Remove cover (8) and gasket (9).

6. Remove lockwire (5), bolts (4), plate (6) and shim pack (7) from spindle. Retain shim pack (7).

7. With suitable lifting equipment, pull wheel (1) off of spindle, being careful that outer bearing cone (3) does not fall.

8. If required, remove bolts (18) and washers (19) securing brake disc (20) to wheel (1), and remove brake disc.

9. Remove the bolts (17) which secure the plate (16) to wheel, remove the plate(16).

10. Remove oil seal (14), using hammer and soft drift.

11. Remove snap ring (12). Tap out washer (13) and remove inner bearing (2) cone from wheel.

Note: Bearing cups and cones must always be replaced as a matched set, never separately.

12. If required, remove bearing (2 & 3) cups from wheel (1), by driving out with a soft drift.

⚠ warning

Be sure to use a soft drift and take care when driving in bearing cups with a drift, to avoid personal injury from chips or fragments.

13. During operation, oil seal (14) rides on bushing (15) which is shrunk on spindle to provide a smooth contact surface for the seal. If the bushing is found to be rough or worn, remove bushing (15).

Inspection

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1. Thoroughly clean all metal components, except bearing cones, in a suitable solvent. Dry with compressed air and coat all threaded components with light oil to facilitate assembly.
2. Clean bearings in volatile mineral spirits and wipe dry with a lint free cloth. Lubricate lightly with light oil and spin by hand, to check for wear and roughness. Replace with new bearings if excessively worn, or if operation is rough or noisy.
3. Inspect all machined surfaces of all parts for scoring, pitting, corrosion and burring. Resurface or replace with new parts as necessary.
4. Inspect all threaded components, and repair or replace as necessary.

Assembly and installation

Numbers in parentheses refer to Fig.1.

⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting device are properly secured and of sufficient capacity to do the job safely.

1. If removed, heat bushing (15) to 170 - 205° C to expand it for installation. If heating equipment is not available, heat the bushing evenly to 205° C (400° F). This takes about 1 minute, using a torch with a heating tip. Use a Tempilstik or other temperature gauge to make sure the bushing is hot enough. Slide heated bushing (15) on spindle and tap lightly with a hammer to seat it.

Note: Do not apply flame directly to bushing. Place bushing on steel plate and apply flame to centre of plate, to evenly distribute heat.

2. If removed, install bearing (2 & 3) cups in their respective wheel (1) bearing bores with care to avoid damaging their raceways.

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Installation by press fit at ambient temperature is best. Note that the cups must seat fully against the shoulders of the cup bores in the wheel hub to assure retention of bearing adjustment. If carbon dioxide, or dry ice, freezing of the cup is used, remember to permit the cup and hub to warm to ambient temperature after insertion and then to tap them with a soft steel drift and hammer to seat.

3. Lubricate the bearings with lubricant specified in Section 36.1, 'LUBRICATION AND MAINTENANCE '. Do not pack bearings solidly with lubricant, as too much is harmful. Fill wheel cavity not less than one-third to not more than one-half full with lubricant.

4. If removed, install brake disc (20) on wheel (1) and secure with bolts (18) and washers (19). Tighten bolts (18) to a torque of 1850-1900 N·m.

5. Install inner bearing (2) cone, washer (13), snap ring (12) and oil seal (14) in wheel end facing spindle. Seal lip must be facing out.

6. Install the plate (16) and secure with the bolts (17).

7. With suitable lifting equipment slide wheel (1) assembly onto spindle.

8. Install outer bearing (3) cone on spindle and seat in outer bearing (3) cup.

Note: Ensure all dirt, grease, and oil is completely removed from plate (6), shims (7) and end of spindle to allow accurate setting of the bearing pre-load.

9. Install plate (6), without shims (7) on end of spindle, and secure with six bolts (4). Tighten bolts (4) evenly in equal increments to 'initial seating bolt torque' as specified in 'Bearing Adjustment Table', while rotating and bumping the wheel (1) assembly.

10. Remove bolts (4) and tap wheel (1) assembly to free bearings.

11. Reassemble plate (6) without shims (7) and using only two bolts (4) located 180°apart, adjacent to the gauging holes in plate (6).

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Tighten bolts (4) evenly in equal increments to 'Gauging Bolt Torque', as specified in 'Bearing Adjustment Table', while rotating and bumping wheel (1) assembly.

12. Determine gap between plate (6) and end of spindle at both gauging holes. To determine gap, use a depth micrometer in both gauging holes to measure distance from outer face of plate (6) to end of spindle. Measure thickness of plate (6) with a micrometer. Subtract plate thickness reading from depth gauge readings.

13. Average the two readings, obtained at Step 12, in increments of 0.025 mm (0.001 in) and round off to the next higher 0.025 mm (0.001 in). This is the average gap. The required shim pack (7) thickness is equal to the average gap plus the tabulated constant as shown in the 'Bearing Adjustment Table'.

14. Install the required shim pack (7), plate (6) and bolts (4) on the end of spindle. Tighten bolts (4) evenly in equal increments to 'Final Bolt Torque', as specified in 'Bearing Adjustment Table', while rotating and bumping the wheel (1) assembly. Secure bolts (4) with lockwire (5).

15. Install gasket (9) and cover (8) and secure to wheel (1) with bolts (10) and washers (11).

16. Install brake caliper, connect brake hydraulic line and bleed braking system. Refer to Section 2.1.2, 'FRONT BRAKE ASSEMBLY AND INSTALLATION'.

17. Install tyre and rim assembly as described under 'Mounting Tyre and Rim Assembly on Wheel'.

Table of special torque

Initial seating bolt torque		Gauging bolt		Shim pack thickness		Final bolt torque	
No. of Bolts	N· M	No. of Bolts	N· M	mm	in	No. of Bolts	N· M
6	135	2	135	Ave. Gap +0.203	Ave. Gap +0.008	6	390

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2.1.2 Front brake assembly and installation

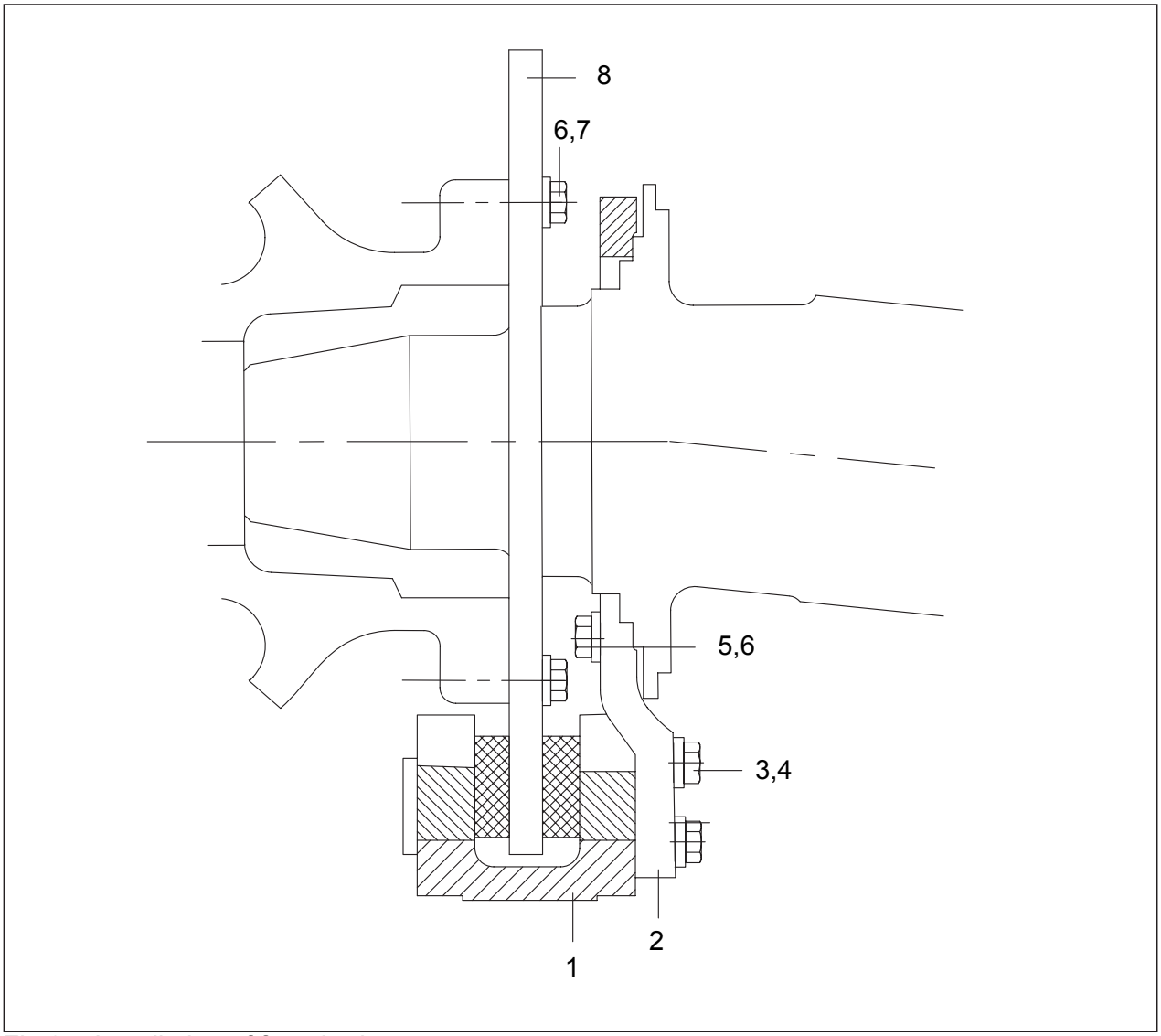


Fig.2-4 Installation of front brake

1. Brake head
2. Mounting plate
3. Bolt
4. Washer
5. Bolt
6. Washer
7. Bolt
8. Brake disc

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Operation overview

This service brake is of dry disc and caliper type. The caliper is designed for use with hydraulic oil meeting the specification Section 36.1 ‘LUBRICATION AND MAINTENANCE’.

Warning: It is not allowed to use synthetic brake fluid.

Break head is bolted to a mounting plate on the spindle. Brake disc is bolted to the wheel. There are one set of brake head and one brake disc at each wheel.

Each caliper brake head assembly consists of one torque plate, two brake pads(one on each side of the disc) and six brake pistons(three on each side of the disc).

The brake is driven by the hydraulic oil entering the internal oil supplying passage of brake head. The piston bores on each side of the torque plate are interconnected through internal passages.

When braking is applied, oil pressure forces the pistons against the brake pads which are synchronously forced against each side of the brake disc, slowing or stopping the disc and wheel rotation.

Routine inspection

1.Inspect the brake pads for wear.If the thickness of the friction material on the brake pad is worn down to 3mm, the brake pad must be replaced.

2.Inspect the brake disc for wear. Measure the thickness of the brake disc at three points which are in the annular area contacted with the brake pad friction material, then determine the average disc thickness.

If the average disc thickness is 22 mm or less, the disc must be replaced. Refer to Chapter 1, 'FRONT WHEEL ASSEMBLY', for the break disc replacement instructions.

Deflection of brake disc

The maximum allowable defection of brake

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disc is 0.76mm when disc speed is below 100 rpm. If defection exceeds this value, replace the brake disc or repair hub referring to Chapter 1'FRONT WHEEL ASSEMBLY '.

⚠ warning

Continually using the break pads that should have been repleaced when worn to limits, will result in loss of braking and possible catastrophic failure.

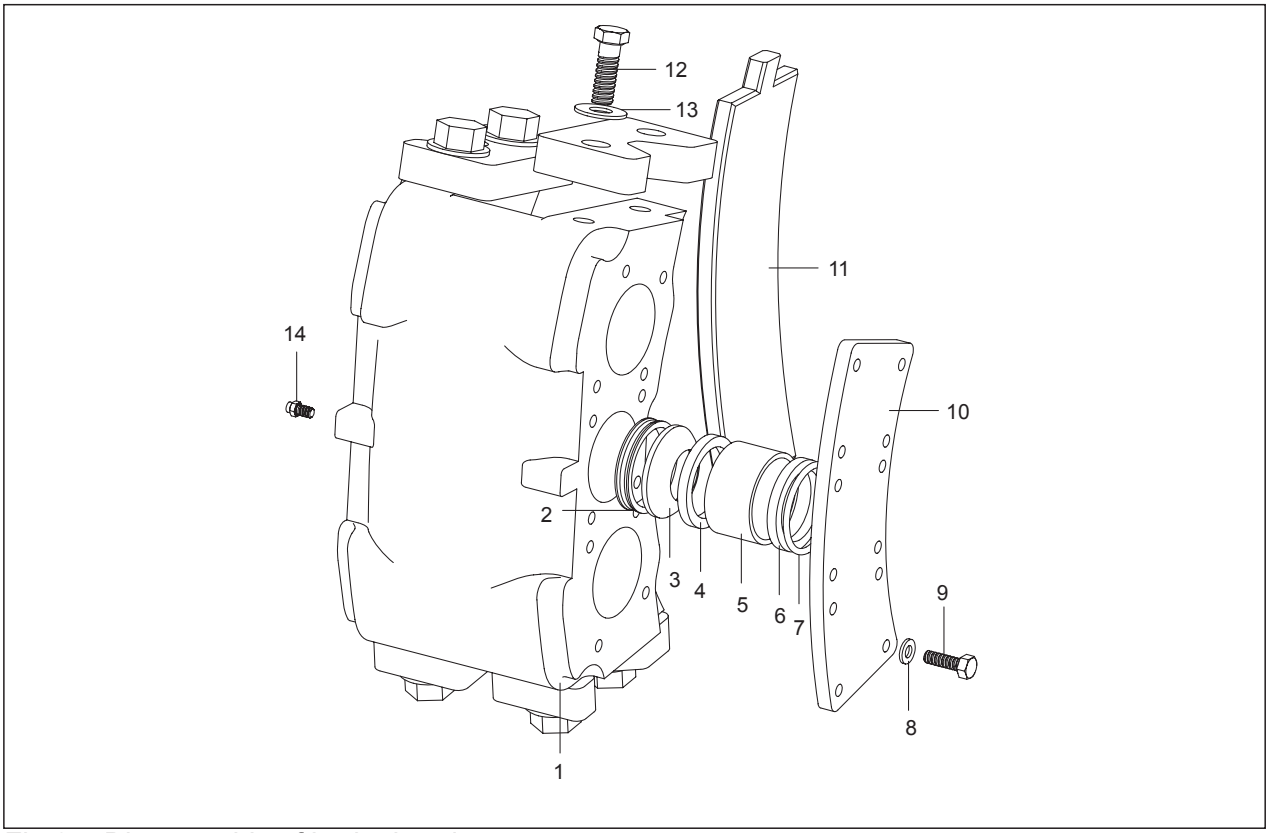


Fig.2-5 Disassembly of brake head

1. Housing
2. Dust boot
3. Backup ring
4. Seal ring
5. Piston
6. Seal ring
7. Backup ring
8. Washer
9. Bolt
10. Cover plate
11. Brake pad
12. Bolt
13. Washer
14. Bleeder valve

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Remove and installation of brake pad

Refer to Fig.2-5 for numbers in brackets.

1. Place the truck in a flat work area, apply parking brake and shut down engine and rotate steering wheel towards both directions for several times to release the pressure of steering system.
2. Chock wheels for safety. Set the main switch of accumulator into the 'OFF' position, and remove the type and rim referring to Section 1.1 'Front Wheel Assembly'.
3. Remove the check plate through loosing the bolt (12) and washer (13) from one end of brake head (the left and right positions of check plate are not interchangeable).
4. Attach a bleeder line and open bleeder valve(14).Insert screwoperator or crowbar between brake pads and brake disc to press the pistons (5) into piston bores in the housing as far as possible. Then close the bleeder valve.
5. Rotate the brake pads (11) out of the open end of brake head.
6. Inspect the position of piston (5) for oil leakage, and the dust boot (2) for damage.
7. Install new brake pad(11) with friction material to press brake disc tightly, and rotate it into brake head.
8. Install the check plate in the position where it was removed. Ensure that the flat tail seat in grooves of the check plate, then use bolt(12) and washer(13)to fasten the check plate. Tighten bolts(12)to a torque of 1000N·m.
9. Press down brake pedal until the brake pads(5) presses brake disc tightly.
10. After new brake pads are installed on the truck, the following operations should be performed to achieve optimal brake performance:

a. Drive the truck at the speed of 8~15 km/h and apply braking. Increase pressure until the truck produces dragging noise. In this process, any occurrence of smoke or odor from the

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brake pads is nomal.

Caution: After stopping, measure the temperature of brake disc with infrared electronic thermometer.

b. Continuously cycle this process until the temperature of brake disc reaches 315-370°C.

c. Repeat Steps a and b when the temperature of brake disc is lower than 95°C.

d. When brake disc is cooled to less than 10°C above the ambient temperature, repeat Steps a and b until the brake pads achieve the brake performance according with applicable goverment regulations.

⚠ warning

To prevent personal injury and accident occuring, ensure that position the truck firmly and lifting equipment is of sufficient capacity before removing the brake pads.

Use extreme caution to prevent personal injury when removing wheels. The procedure must be adhered to as described in Chapter 1'Front Wheel Assembly'.

Hands or fingers should be kept away from the clearance between brake disc and brake head piston to prevent personal injury.

⚠ warning

Proper oil level should be maintained in the hydraulic oil tank for steering and brake control. Refer to Chapter 15 'Hydraulic Oil Tank Assembly'.

Disassembly and assembly of brake

Refer to Fig.2-5 for numbers in brackets, unless otherwise specified.

1. Position the truck in a level work area, apply parking brake and shut down the engine.

2. Turn steering wheel in both directions

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for several times to release steering system pressure. Press down brake pedal continuously to release the pressure in brake accumulators. Chock the truck for safety. Remove tyres according to the requirements in Chapter 1'Front Wheel Assembly'.

3. Carefully loosen brake pipes at base of both accumulators to check that pressure has released. Then retighten brake pipes.

4. Remove hydraulic oil inlet line at brake head assembly. Plug the line and brake head to prevent entry of dirt.

5. Remove the bolt (3, Fig.1) and the washer (4, Fig.1). Then, remove the brake head assembly onto a workbench.

6. Disassemble the brake head assembly in order of serial numbers. If necessary, maintain and service the seal rings (4 and 6), backup rings (3 and 7) and the dust boot (2). The parts (12, 13 and 14) can be left in the housing (1).

7. New dust boot (2), seal rings (4 and 6) and backup rings (3 and 7) are contained in the repair kit. Their quantity is enough to reassemble a caliper brake head. All parts in repair kit are utilized to replace damaged parts every time the brake head is reassembled.

8. Inspect the brake pad (1) according to the requirements of Step 1 in ‘Routine inspection’.

9. Clean the housing (1) and ensured that no solvent remains in the oil passages or grooves. Inspect the dust boot, seal grooves and the step areas between grooves for damage or cracks. Small cracks or scratches can be blended with crocus cloth. If the housing (1) is excessively corroded or the dust boot and seal grooves are damaged, it should be replaced. It is prohibited to repair the brake head.

10. Inspect the piston (5) for small scratches and cracks, and blend them with crocus cloth. If severe cracks or scratches occur to the piston or its chrome plate is worn off, the piston should be replaced.

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⚠ warning

To ensure the personal and property safety, ensure that the truck is parked stably and the anti-moving facilities are safe and reliable so as to guarantee the operation safety. At the same time, ensure that the hoist device has sufficient hoist capacity.
Use extreme caution to prevent personal injury when removing wheels. The procedure must be adhered to as described in Chapter 1'Front Wheel Assembly'.
To prevent unnecessary personal injuries, release brake system pressure according to operating procedure. In this operating process, great care should be taken.

Assembly

Refer to Fig.2-5 for numbers in brackets, unless otherwise specified.

Caution: Refer to the specifications in Section 38.2 'Technical Conditions for Tightening Moments of Standard Bolts and Nuts' for the tightening torque of the fasteners which are not especially specified.

⚠ warning

It is prohibited to use brake fluid.

1. Use petroleum base lubricating oil or vaseline to lubricate the seal rings (4 and 6) and the piston (5).
2. Install the seal ring (4), dust boot (2) and backup ring (3) into the piston bore of housing (1), and lubricate them according to Step 1.
3.Install the piston (5) into the housing (1) in the following method. Install the lubricated piston (5) in the specified position at a small angle into the backup ring (3) and the piston bore. Spread out the backup ring to make its bore larger than external circumference of

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the piston so that the piston can be rotated. Inspect the forward extension between the piston and the backup ring along external circumference. Ensure that external circumference lip of the packing retainer remains in the groove in the piston bore.

4. After the piston (5) is inserted into the backup ring (3), the piston can be aligned by feel over the seal ring (6) and one rotating thrust force can be applied by hands to install the piston into seal ring.

5. When assured pistons (5) are through seal ring(3), pressure, other than hand pressure, may be used to press pistons (5) the remainder of the way into the piston bores. Snap open end of dust boot (2) into groove of piston.

6. Install the seal ring (6) and backup ring (7) on the open end of piston bore in the housing(1).

7. Subsequently, install the cover plate (10) onto the housing with bolt (9) and washer (8). Tighten the bolt (9) to a torque of 380 N•m.

8. If the brake disc (8, Fig.1) is excessively worn, it should be replaced according to the requirements in ‘Routine inspection’ in this section. Refer to Chapter 1 'Front Wheel Assembly' for the relevant replacement instructions.

Installation

Refer to Fig.2-4 for numbers in brackets, unless otherwise specified.

Caution: Refer to the Section 36.2 'TECHNICAL CONDITIONS FOR BOLTS AND NUTS ' for the tightening torque of the fasteners which are not especially specified.

⚠ warning

To prevent personal injury and property loss, ensure that the truck is chocked and reliably stopped to ensure safe work. Ensure that hoist device has sufficient

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hoist capacity.
Use extreme caution to prevent personal injury when removing wheels. The procedure must be adhered to as described in Chapter 1'Front Wheel Assembly'.

1. Install the washer (6) onto the bolt (5).
2. Position the brake head assembly over brake disc to align with connecting hole on brake mounting plate. Then screw the assembled bolt (5) and washer (6) into housing through the mounting plate. Tighten the bolt (5) to a torque of 610 N•m.
3. Remove plugs from brake head and hydraulic oil inlet passages and reconnect hydraulic oil circuit at the brake head.
4. Bleed the brake system according to the requirements below the heading 'Bleeding' in this section.
5. Install types and rims, referring to Chapter 1'Front Wheel Assembly'.

Bleeding
Refer to Fig.2-5 for numbers in brackets

⚠ warning

To prevent personal injury and property loss, ensure that the truck is chocked and reliably stopped to ensure safe work.

To achieve satisfactory braking, all the air in brake hydraulic lines should be eliminated according to the following requirements:
1. Refer to the requirements in Chapter 15 'Hydraulic Oil Tank Assembly', and check the oil level in the oil tank as required. If the oil level is low, add oil. The oil selected should meet the specifications recommended in Section 36.1 'LUBRICATION AND MAINTENANCE'.
2. Connect a clean bleeder hose to bleeder

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valve and put open end of the hose into a clean container.

3. Press down the brake pedal, and gradually unscrew the bleeder valve (14), which should be kept open until the oil exhausting from the bleeder valve is free from bubbles. Then screw the bleeder valve, release the brake pedal and remove the bleeder hose.

Caution: This system is equipped with the accumulator which can still maintain system pressure even when engine is shut down. If system pressure is zero, it will be required to start the engine before bleeding to pressurize the system. Engine should be shut down before bleeding procedure is performed.

⚠ warning

This brake system operates at high pressure. The bleeder valve should be loosened carefully.

4. Repeat Steps 1 - 3 on each brake head assembly.

Maintenance
Every 10 hours of operation(Daily)

Inspect the brake assembly, ensure that all connecting bolts are tightened and there is no leakage. Inspect the boot for demage.

Refer to Chapter 15 'Hydraulic Oil Tank Assembly', and check the oil level. If the oil level is low, then add oil. The oil selected should meet the specifications recommended in Section 36.1 ‘LUBRICATION AND MAINTENANCE’.

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Special tools

Refer to Section 38.3'Service Tools'.

Special torque specifications			
Fig. No.	No.	Description	Torque
			N·m
2-4	3	Bolt	1500~1550
2-4	5	Bolt	2250~2300
2-4	7	Bolt	1300~1360
2-5	9	Bolt	180~200
2-5	12	Bolt	1000~1050

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2.1.3 Steering arm assembly

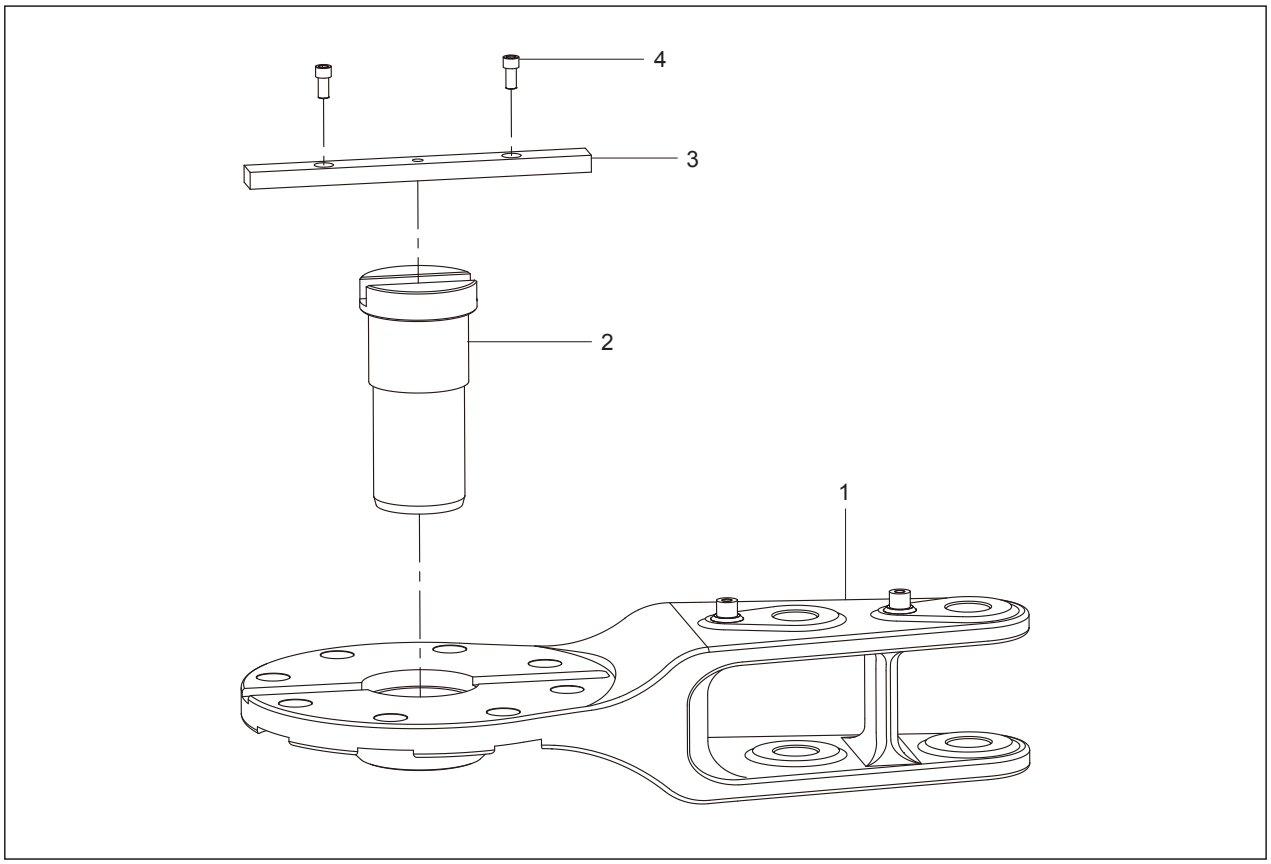


Fig.2-6 Left steering arm assembly

1. Steering arm welding body 2.Lower end pin 3. Key 4. Screw

Disassembly

Numbers in parentheses refer to Fig.2-6.

1. Remove screw (4).
2. Remove key (3) from keyway of steering arm welding body (1).
3. Check wear condition of lower end pin(2), if change needed, partly heating steering arm welding body (1), remove lower end pin (2).
4. Place disassembled parts in a clean work for assembly.

Assembly

Numbers in parentheses refer to Fig.2-6.

1. If change needed, partly heating steering arm, assembly lower end pin (2), keeping keyway aligned of lower end pin (2) with that of steering arm.

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2. Place key (3) into keyway of steering arm welding body (1), keeping mounting holes of key aligned with those of keyway.
3. Fasten key (3) with screw (4) , complete assembly of steering arm assembly.

2.1.4 Front suspension cylinder

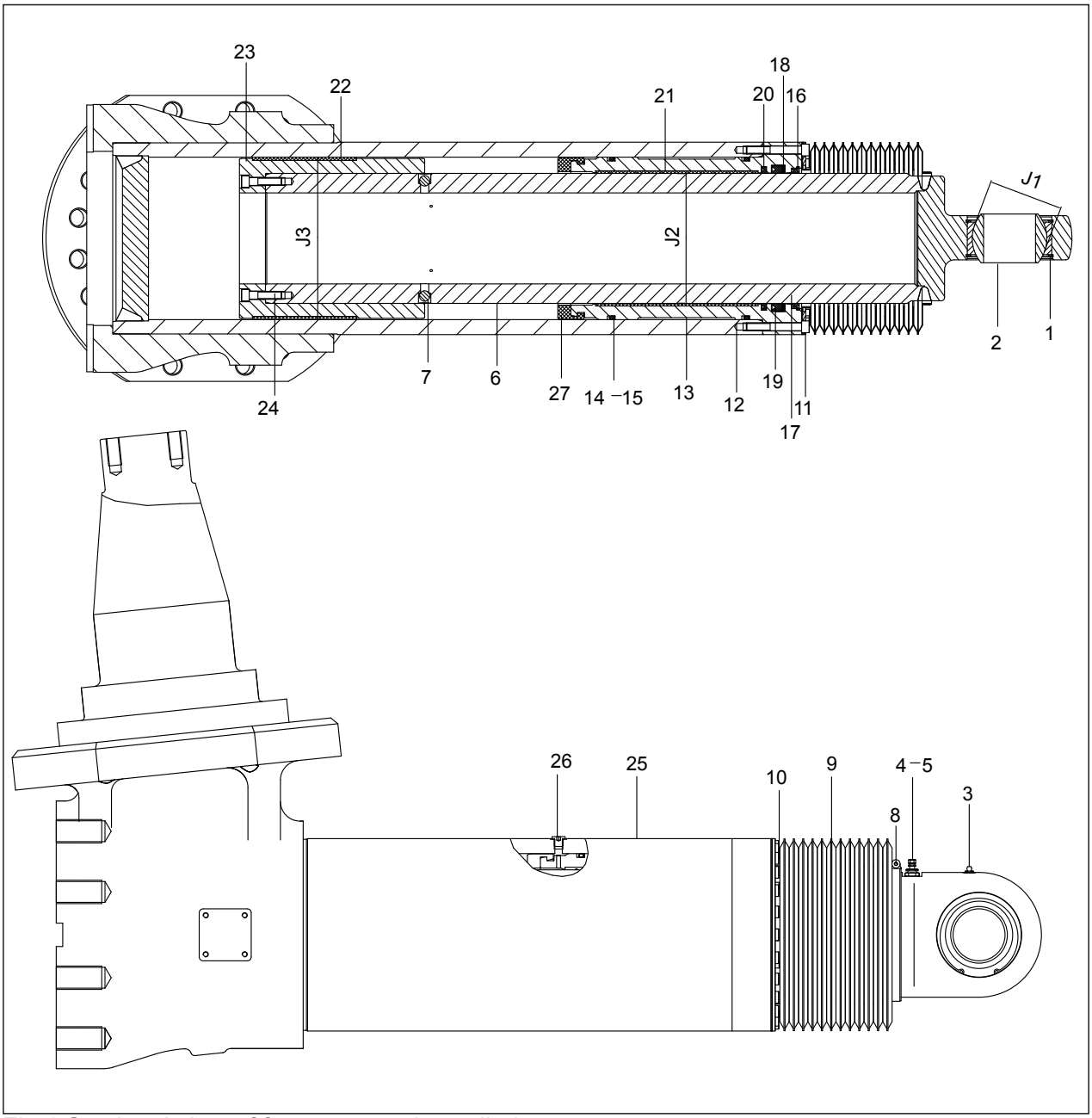


Fig.1 Sectional view of front suspension cylinder

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1.Snap ring
2.Bearing
3.Oil fitting
4.Plug
5.Charge valve
6.Piston rod
7.Ball
8.Clamp
9.Dust boot
10.Bolt
11.Plate
12.Bolt
13.Guide sleeve
14.Retainer ring
15.O-ring
16.Retainer ring
17.Seal-wiper
18.Backup ring
19.Seal
20.Buffer seal
21.Wear ring
22.Wear ring
23.Piston
24.Bolt
25.Cylinder tube assy.
26.Plug
27.Buffer stopper

Front suspension system – Front suspension cylinder

overview

Numbers in parentheses refer to Fig.1.

The front suspension cylinder is mounted on frame to support the front wheel and absorbs road shock as the wheel travels over rough and uneven surfaces. Oil and compressed nitrogen fill the inside of cylinder tube.

The cylinder contains piston rod (6), guide sleeve(13),cylinder tube(25) and piston (23). Oil and compressed nitrogen fill the inside of the cylinder. When the wheel hits a bump on the ground, piston rod(6) is forced inward in the cylinder. The pressurized nitrogen compresses against the oil inside the cylinder. As the nitrogen pressure builds up in the cylinder, piston rod (6) slows down until it stops. Nitrogen pressure causes piston rod (6) to extend back to its original position. As piston rod (6) is compressing, ball (7) is forced off its seat, allowing the increased pressure to fill the cavity between tube cylinder tube(25) and piston rod (6) faster. As piston rod (6) returns to the normal position, the pressure in the cavity forces ball (7) against its seat. Pressure in the cavity is forced to return only through passage in the piston rod thereby slowing and smoothing the return travel of the piston rod(6).

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⚠ warning

Pressurized cylinders. Release pressure as described under 'Relieving Cylinder Pressure'before removing valves or fittings. Accidental release of pressure will result in personal injury and property damage.

To prevent personal injuries and property losses, be sure that the air pressure in the cylinder is completely released before the suspension is dismantled. In addition, be sure blocking and lifting equipment is of sufficient capacity and properly secured to do the job safely.

Removal

Numbers in parentheses refer to Fig.2&3&4.

1.Position the truck in a level work area, apply the parking brake and switch off the engine.

2.Turn the steering wheel in both directions several times to relieve pressure in the steering system. Block all road wheels.

3.Relieve nitrogen pressure from both front suspension cylinders. Refer to “Relieving Cylinder Pressure”, in this section.

4.Jack frame up at “horse collar” until front suspension cylinder is fully extended.

5.Jack up front suspension cylinder until tyre is off ground and block steering arm in position.

6.Remove front tyre and rim. Refer to Chapter1 'FRONT WHEEL ASSEMBLY'.

7. Remove pins attaching tie rod and steering cylinder to steering arm.Secure both tie rod and steering cylinder away from the work area. Refer to Section 2.2, "STEERING MECHANISM".

8.Position lift truck forks under front suspension cylinder and block up front suspension cylinder as shown in Fig.3.

9.Remove pin assembly (1, 2, 4,Fig.2) which securing front suspension cylinder.

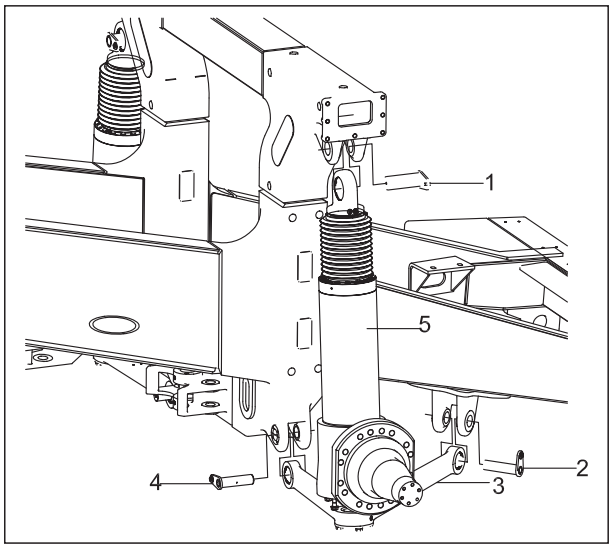


Fig.2 Front suspension cylinder mounting

1. Pin
2. pin
3. A-arm
4. Pin
5. Front suspension cylinder

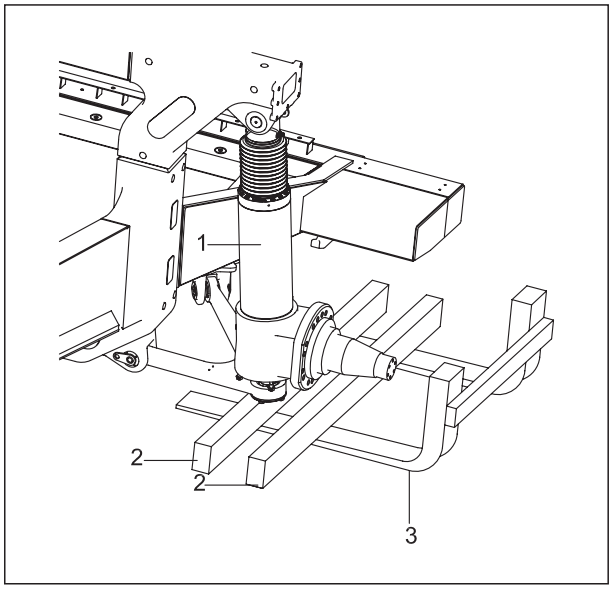


Fig.3 Disassembly and installation of front suspension

1. Front suspension cylinder
2. Wooden blocking
3. Lift truck forks

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10.Carefully remove the front suspension cylinder(5, Fig.2), A arm(3, Fig.2),and steering arm(8, Fig.4)to a suitable work area for further disassembly.
11. Follow procedures in Steps 4 through 10 above if the other front suspension cylinder is to be removed.

Disassembly
Numbers in parentheses refer to Fig.4.

⚠ warning

To prevent personal injury and property loss, be sure blocking and lifting equipment is of sufficient capacity and properly secured to do the job safely

1. Remove A-arm.
a. Remove the bolt (1, Fig.4) and plate (2, Fig.4).
b. Remove the A-arm (6, Fig.4).
c. Remove the bolt (3, Fig.4) and plate (4, Fig.4) to separate the A-arm(6, Fig.4) and bearing(5, Fig.4).
2. Remove steering arm.
After the A-arm is removed, remove eight bolts(7, Fig.4) to separate the steering arm (8, Fig.4) from suspension cylinder (9, Fig.4). Remove flat key in keyway of the steering arm.
3. Remove front wheel
Refer to Chapter 1 “FRONT WHEEL ASSEMBLY” for the removal of front wheels.
4 Remove the front suspension cylinder
Numbers in parentheses refer to Fig.5.
a.Remove clamp(8),bolts(10) and plate(11) securing dust boot(9) to piston rod (6) and guide sleeve(13), then remove dust boot(9).
b.Remove charge valve (5) and plug(4) from piston rod(6). Drain oil from suspension cylinder into a suitable container. Remove

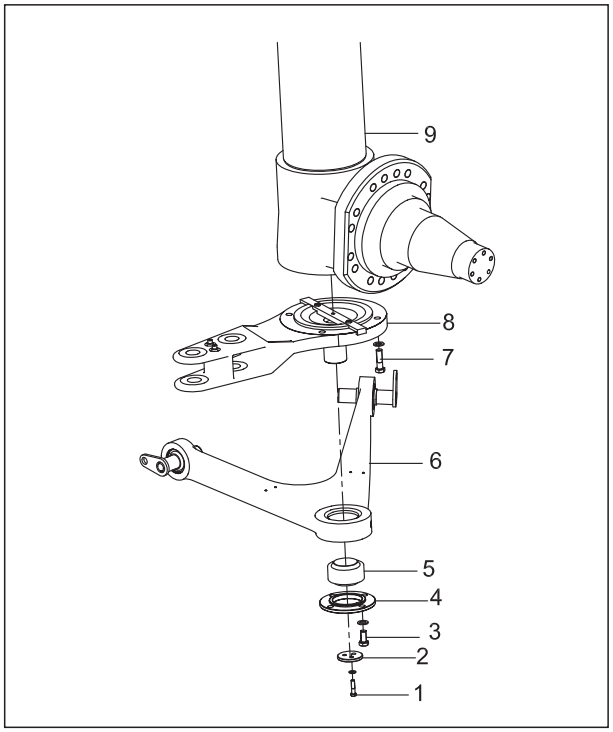


Fig.4 Remove A-arm and steering arm

1. Bolt
2. plate
3. Bolt
4. plate
5. Bearing
6. A-arm
7. Bolt
8. Steering arm assembly
9. Front suspension cylinder

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bolts (12) securing guide sleeve (13) on cylinder tube (25).

c.Securing the suspension cylinder in a proper position for disassembly.

d.Install a lifting eye in the top of piston rod (6) and attach to an adequate lifting device. Slide piston rod (6), piston (23) and guide sleeve(13) as an assembly out from top of cylinder tube (25). Be careful not to damage the surface of any component.

e.Remove bolts (24) securing piston (23) to piston rod (6). Knock on the piston (23) assembly with a soft hammer to remove it from the end of piston rod (6).Remove wear ring (22) from the piston (13).

f.Take out the ball (7) from the hole of piston rod (6).

g.**Note**: Take care not to misplace ball (7).

h.Carefully fix piston rod on the base of press machine and make the hole in the rod end downwards. Separate piston rod (6) from the guide sleeve (13). Be careful not to damage the surface of components.

i.Remove and discard retainer rings(14) and O-rings(15) from the outer groove of guide sleeve(13). Then remove and discard snap ring(15), seal-wiper (17),backup ring (18), seal(19) ,buffer seal(20) and wear ring(21) from the inner groove of guide sleeve (13).

j.Remove buffer stopper (27) from the guide sleeve(13).

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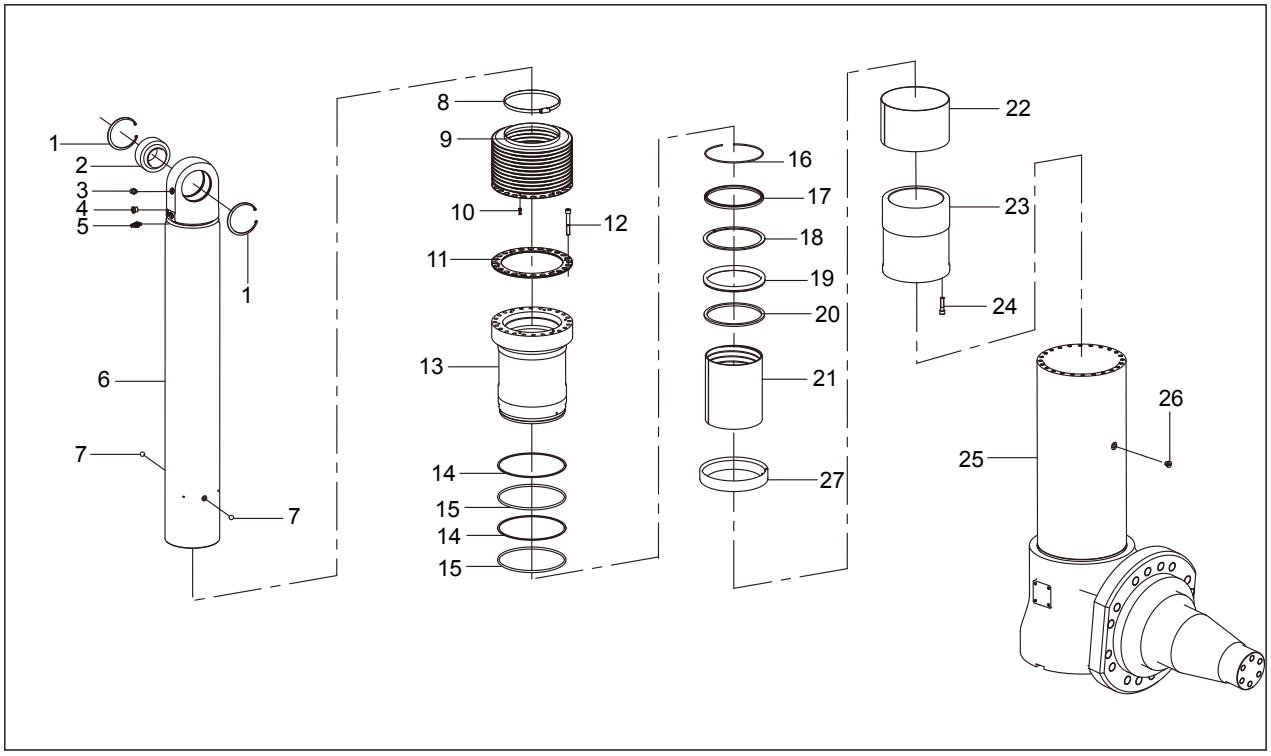


Fig.5 Disassembly and assembly drawing of front suspension cylinder

1.Snap ring	10.Bolt	19.Seal
2.Bearing	11.Plate	20.Buffer seal
3.Oil fitting	12.Bolt	21.Wear ring
4.Plug	13.Guide sleeve	22.Wear ring
5.Charge valve	14.Retainer ring	23.Piston
6.Piston rod	15.O-ring	24.Bolt
7.Ball	16.Retainer ring	25.Cylinder tube assy.
8.Clamp	17.Seal-wiper	26.Plug
9.Dust boot	18.Backup ring	27.Buffer stopper

Inspection and maintenance

Numbers in parentheses refer to Fig.5.

1.Wash all parts thoroughly in a suitable solvent. Dry all parts with compressed air. Check all inner and outer grooves in guide sleeve(13) and piston(23) for cleanliness.

2.Inspect cylinder tube (25), piston rod (6) , piston (23) and guide sleeve(13) for scores, scuffing or small ridges in the walls. Use a fine stone to smooth out any defective areas. If damage is too extensive, replace with a new

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part.

3.Inspect all cylinder assembly components for signs of unusual distortion or excessive wear. Replace defective components.

4.Inspect plug (4，26), Charge valve (5). If the seal or part is damaged, replace with a new part. Inspect steel ball(7). If they are damaged, replace them in time.

5.Check the seating positions in piston rod(6) and cylinder tube (25). If threads in any of these parts are damaged, restore the threads. Replace defective parts if necessary.

6.Inspect the holes of frame for abnormal distortion or damage. They must be repaired before the pin are installed.

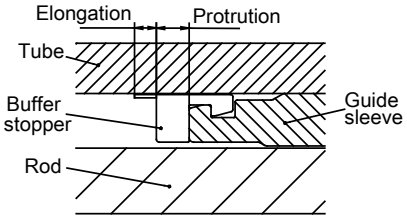
7.Inspect wear ring (21，22) and bearing for excessive wear or damage. Replace them if is damaged.

Note: The maintenance standard of bearing (2), wear ring (21,22), buffer stopper(27) refer to Fig. 1. and Tab.1.

Tab.1 Maintenance standard

No.	Check item	Criteria					Remedy
J1	Clearance between race and ball of bearing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace wear ring
			Shaft	Hole			
		115			0.085- 0.165	0.69	
J2	Clearance between piston rod and wear ring	200	-0.043 -0.106	+0.272 0	0.043-0.368	0.4	
J3	Clearance between cylinder and wear ring	250	-0.05 -0.296	+0.072 +0	0.05-0.368	0.8	Replace wear ring

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J4	Deformation of buffer stopper	Measuring method: Measure protrusion and elongation of stopper.  	Elongation : Max.5mm Protrusion: Min.15mm No cracks	Replace

Assembly

Numbers in parentheses refer to Fig.5.

Note:Apply a light coating of clean hydraulic oil to all components as they are assembled. This facilitates the assembly procedure. Make sure that all work is done in a clean area so that no contaminants can get into the oil.

1.Install new snap ring (16), seal-wiper(17), backup ring(18),seal (19) ,buffer seal(20)and wear ring (21) into the corresponding groove in the inner bore of guide sleeve (13). Before seal-wiper is installed, waterproof glue should be applied onto the external surface of frame.

2.Install new retainer rings (14)， O-rings (15) and buffer stopper(27) into the corresponding groove on the external surface of guide sleeve (13).

3.Use a proper seal ring expander or similar tool to prevent the seal ring from damage. Carefully install the guide sleeve (13) into the piston rod (6). The large end should be installed at first and sufficient space should be provided to install the piston (23) into the piston rod. Be careful not to damage seal. Then install balls (7) into the corresponding hole of piston rod (6).

Note: Fix these balls temporarily with a little clean grease in the rest assembly procedure.

4.Install new wear ring (22) into the corresponding hole of piston (23). Install piston assembly to piston rod (6). Slide piston assembly up piston rod (6) enough. Secure piston (23) assembly to piston rod (6) with

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bolts (24). Tighten bolts to torque of 136 N•m.

5.Install a lifting eye in the top of piston rod (6) and attach to an adequate lifting device. Insert piston rod (6) , piston (23) and guide sleeve(13) as an assembly (refer Fig.6) through the top of cylinder tube assy.(25). Pushing piston rod in until piston (23) bottoms inside the cylinder tube. Be careful not to damage the surface of any component.

Note: Because of close tolerances, care will have to be taken when assembling piston rod (6) and piston(23) assembly into cylinder tube (25).

6.Secure guide sleeve (13) to cylinder tube assy.(25) with bolts (12). Tighten bolts to torque of 136 N•m.

7.Install dust boot(9) with clamp(8) , bolts(10) and plate(11) to secure it to piston rod (6) and guide sleeve(13).

8.Install charge valve (5) and plug(4,26) on suspension cylinder. The tighten torque of charge valve is 50Nm. The tighten torque of inflation valve core is 0.35~0.45N•m, the tighten torque of inflation valve protecting cover is 4.5 ~5.5N•m. Before installation, inspect the seal rings of inflation valve and plug for signs of damage, replace them in time if they are damaged.

9.Install bearing(2) and snap rings (1) to the hole of piston rod(6).

Note:the piston rod and piston assembly should be installed into the cylinder tube assembly with great care because the tolerance is small.

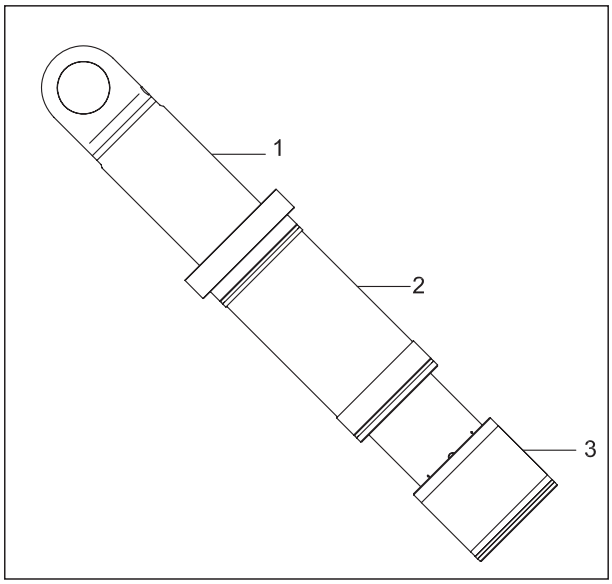


Fig.6 Piston rod component

1. Piston rod
2. Guide sleeve
3. Piston

Installation

Numbers in parentheses refer to Fig.2.

1.Clean all parts surface of suspension cylinder and frame to make them smooth.

2.Place cushion block on the fork of fork truck as shown in Fig.3. Then locate the front suspension cylinder assembly in the installation position on frame. The weight of suspension cylinder is over 765kg. If it

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is charged with oil or fluid in advance, the volume of oil or fluid will be 23L.
3.Secure front suspension cylinder (5,Fig2) to frame with pin assembly(1,2,3, Fig3).After pins are installed, use bolts and washers to lock them.
4.Move away the installation equipment.
5.Connect brake hydraulic pipeline to brake calipers and exhaust the brake system. Refer to Section 2.1.2 ‘FRONT BRAKE ASSEMBLY AND INSTALLATION’.
6.Install front tyre and rim assembly as described in Chapter 1 'FRONT WHEEL ASSEMBLY'.
7.Repeat Steps 1-6 to install the suspension cylinder if the suspension cylinder on the other side is removed.
8.Charge the suspension cylinder according to the 'charging instructions'.

⚠ warning

To prevent personal injury and property loss, be sure blocking and lifting equipment is of sufficient capacity and properly secured to do the job safely.

Maintenance and adjustment
Periodic maintenance includes the following steps:
1.Clean the device. Check the signs of wear, damage or oil-gas leakage. Pay special attention to the exposed part of piston rod and inflation valve. Repair or replace them as required.
Note:The dust boot is equipped with zipper which can be replaced without remove suspension cylinder or pin.
2.Check all parts for signs of wear or looseness. In case of any looseness, repair or replace them if necessary.
3. Inspect the exterior of suspension cylinder for signs of oil leakage. Repair or replace

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according to the requirements and add oil again according to the method described in the instructions.

Note: Refer to following procedure in this part for detailed instructions of oil level inspections.

4. Check the relevant operating conditions of suspension cylinder according to the following method:

1)Run the truck and make that two suspension cylinder can achieve a balance at the normal operating temperature.

2) Position the empty truck on a flat ground. Measure the distance A between the center of pin and the end cap of guide sleeve as shown in Fig.8. The value obtained should be approximately 410mm(with the error not exceeding 10mm; refer to Fig. 8). If the distance is not in this range, check and adjust the nitrogen pressure according to the procedure below this part. The following signs indicate that it is necessary to maintain the interior of suspension:

a.There is sign of oil leakage in the surrounding of suspension cylinder.

b. The gas column height changes frequently. It is required to charge nitrogen.

Note 1: The reduction in the gas column height is usually accompanied by the loss of gas.

Note 2: At the circumstance of normal gas column height, the offset of gas height indicates that the oil is losing.

Note 3: The traveling or excessive elasticity of gas will lead to repeated operation of suspension cylinder.

3) After the suspension cylinder is inflated to the correct height, apply the rated load, park the truck on a flat ground, the distance A between the center of pin and the end cap of guide sleeve should be equal to 320mm or higher. (If A is less than 320mm, check the truck is overloaded or not. If not, deflate and add oil, inflate gas again).

Note 4: The unsmooth traveling or excessive

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elasticity of gas column will lead to repeated operation of suspension at its travel terminal.

Charging front suspension cylinder

⚠ warning

To prevent personal injuries and property losses, ensure that the air pressure in the cylinder is completely released before the suspension is dismantled. In addition, be sure blocking and lifting equipment is of sufficient capacity and properly secured to do the job safely.

Relieving Cylinder Pressure

⚠ warning

Pressurized cylinders. Release pressure as described under 'Relieving Cylinder Pressure' before removing valves or fittings. Accidental release of pressure will result in personal injury and property damage.

Note:Truck must be unload and on a level surface prior to relieving suspension cylinder pressure.

1. Support the frame near the suspension cylinder with blocking and/or a hydraulic jack with adequate capacity.
2. Remove the cap from nitrogen charging valve at the top of the cylinder. Turn the hex nut on the valve 1/4 to 1/2 turn counter-clockwise and depress the valve core. If no gas escapes, continue to turn the hex nut in 1/4 turn increments until the nitrogen releases as the valve core is depressed.
3.Remove blocking or release pressure on the hydraulic jack and allow the truck's weight to fully retract the suspension cylinder rod.
4.Depress nitrogen charging valve core again

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to be sure all pressure has been relieved.

Note:Nitrogen leaving the cylinder will often carry oil with it. This results form foaming of the oil in the cylinder. The foaming takes place as nitrogen which was dissolved in the oil at high pressure expands at atmospheric pressure. The oil lost in this operation must be replaced in the charging operation. The longer the oil is allowed to stand at atmospheric pressure after discharging cylinder, the easier it will be to purge cylinder of bubbles in the oil when recharging.

⚠ warning

Pressurized cylinders. Keep valve core depressed until all gas is bled from cylinder. Failure to release all pressure may result in personal injury or property damage.

Charging Instructions

Note1: This procedure should be performed after the suspension cylinder is installed on mining truck. If it is not installed, the suspension cylinder should be placed with a proper supporting form and fastness before this procedure is operated.

Note2: To ensure that both suspension cylinders will be equally charged to the required height specifications and equal pressures, both cylinders should be charged simultaneously. Also when front suspension cylinders are being charged, both rear suspension cylinders should be extended equally. This can be accomplished by placing equal thickness blocks between axle and frame at the bump stops. It may be necessary to raise frame slightly to install spacers. Be sure to remove spacers when charging is complete.

Note3: The pressure of a confined gas varies directly with its temperature. Hence, extreme

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changes in suspension cylinder ambient temperature will change its nitrogen charge volume and,consequently, its operating height. It might be necessary, therefore, to add or remove nitrogen to maintain proper cylinder height as ambient temperature changes.

Filling oil (Cylinder filled with oil initially, or refilled with oil during maintenance)

Note: This method is recommended to fill oil when the loss of oil in the suspension cylinder is caused by some other reasons but surface leakage. If surface leakage occurs, the cylinder should be removed and replaced. Return the suspension cylinder to factory for repair. Unauthorized repair may influence its quality.

Oil level of the suspension cylinder mounted on mining truck can be checked and adjusted according to the following steps:

Note 1: During the operation of mining truck, the charged nitrogen in the cylinder tends to be mixed with oil. When the nitrogen pressure is released, oil will be released from the suspension cylinder in the form of foams.

Note 2: To detect oil level correctly, nitrogen must be completely discharged from the cylinder body. This operation can be completed by evacuating gas or by sustaining frame properly with cushion block to keep cylinder. in the open state for more than 24 hours.This operation is required only when surface leakage or deviation excessive.

Note 3: This procedure should be performed after the suspension cylinder is installed on mining truck. If it is not installed, the suspension cylinder should be placed with a proper supporting form and fastness before this procedure is operated.

1. Position the truck in a level work area. The truck must be parked stably without applying friction brake system.
2. Jack frame up until front suspension cylinder is fully extended. The dimension

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“A”(See Fig.8,distance between the center of pin and end cap of guide sleeve) is equal to 525mm when the cylinder is fully extended. Secure front suspension cylinder in this position.

3. Remove the cap from nitrogen charging valve at the top of the cylinder. Turn the hex out on the valve 1/4 to 1/2 turn counter-clockwise and depress the valve core to release the nitrogen .

4. Connect a vacuum pump to the charge valve to perform the vacuum pumping.

5. Start vacuum pumping and monitor this process until all gas is pumped out. When the color of oil in the suspension cylinder is darkened homogeneity, it indicates that it is pumped out.

Note: It is not allowed to pump the oil from the suspension cylinder.

6. Stop vacuum pumping.

7. Slowly lower down the frame to make the dimension “A”(the distance between the center of pin and end cap of guide sleeve ,See Fig.8) equal to 205mm.

8. Release all residual gas pressure in the suspension cylinder as step 3.

9. With cylinder rod in its right position (“A” = 205mm), open plugand pay attention to oil flows or not. If no oil flows, fill oil according to the following requirements when oil level is lower.

10. Remove the plug and charge valve from the piston rod. Attach hose from a pressure pump filled with hydraulic oil specified in chapter36.1“LUBRICATION AND MAINTENANCE” to oil fill port.The approximate volume required for initial oil charging of each front suspension cylinder is about 23L.

Note: In a cold region, a synthetic hydraulic fluid(Conoco/Philips synthetic R&O or similar products) is recommended as a substitute product. This fluid should have the following characteristic:

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ISO viscosity grade: 46; solidification temperature: -70°C (-55°C); PAO synthetic agent, allowing to use normal insulation device.

11. Fill the cylinder until oil flows free of air bubbles from charging valve port. It may be necessary to wait 30 or more minutes after nitrogen pressure has been released to clear the foam which has formed inside the cylinder.

12.Remove oil fill equipment, reinstall plug and nitrogen charging valve in the ports .

Note: If vacuum pumping have not be done before oil filling, oil fill should accord to the following procedure in order to exhaust the air of cylinder:

a. Remove the plug in piston rod and plug in the cylinder tube assy. meanwhile the charge valve should not be removed.

b. Attach oil fill equipment to the plug port and fill the cylinder until oil flows free of air bubbles from plug port. Reinstall plug in the port of cylinder tube assy. and remove nitrogen charging valve in the ports .

c. Go on filling the cylinder with the plug port. Stop oil filling until the oil flows free of air bubbles from charge valve port, and remove oil fill equipment. Reinstall plug and nitrogen charging valve in the ports .

13. Charging suspension cylinder with the nitrogen according to the following procedure.

Charging nitrogen

⚠ warning

Use dry nitrogen to charge cylinder. Do not use a gas such as oxygen which ,if used by mistake for pressurizing, will explode violently when coming into contact with oil or grease, possibly causing personal injury and property damage.

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Numbers in parentheses refer to Fig.8, unless otherwise specified.
To charge both cylinders simultaneously with nitrogen, use the charging assembly which including a tee fitting（4，Fig.7）, line (8，Fig.7）, Cut-off valve (5, Fig.7) and Nitrogen charging joint (9, Fig.7) . Refer to Fig.7 'nitrogen charging tool.

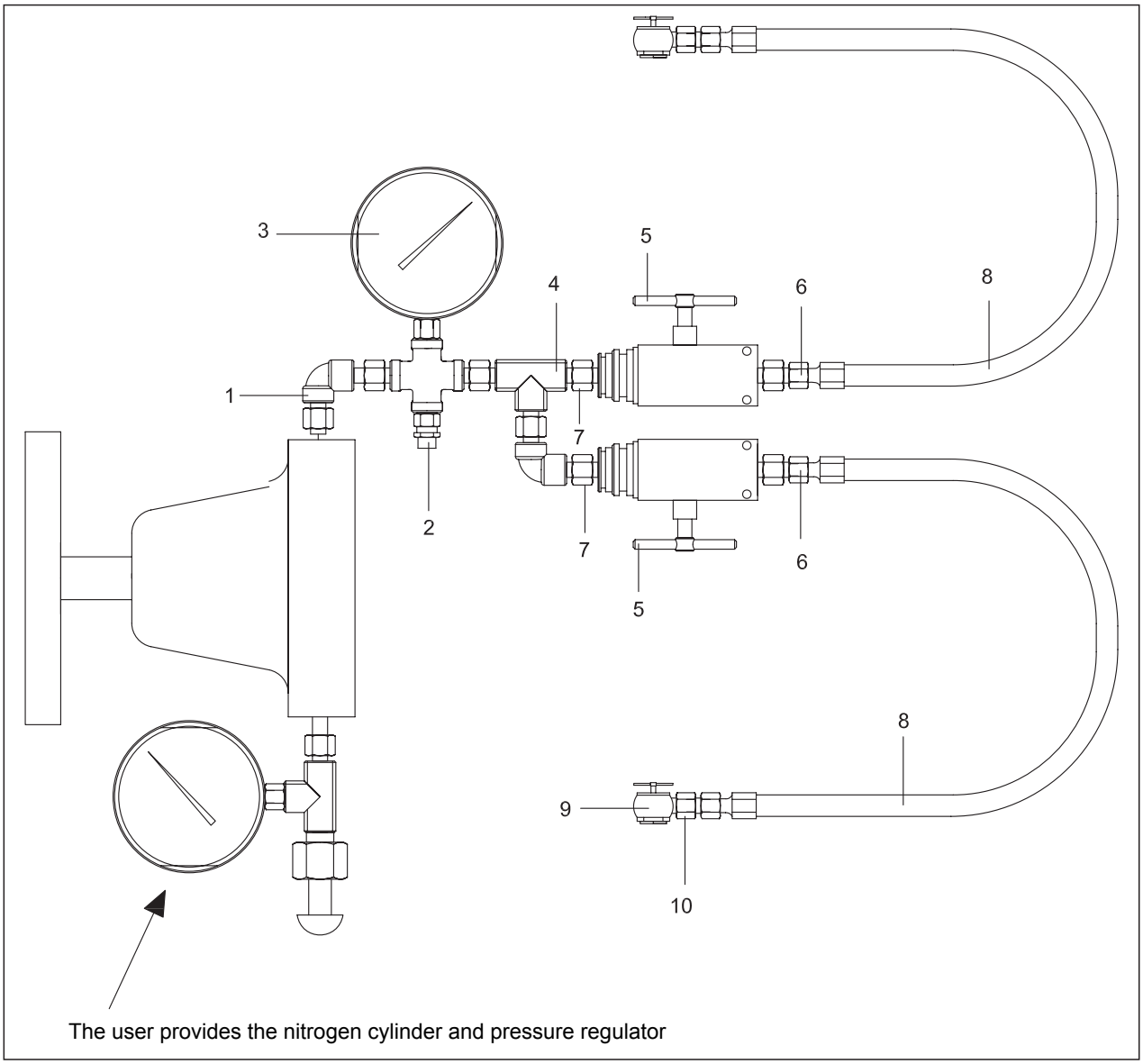


Fig.7 Nitrogen charging assembly

1. Elbow
2. Bleeder valve
3. Pressure gauge
4. Tee piece
5. Cut-off valve
6. Pipe joint
7. Pipe joint
8. Line
9. Nitrogen charging joint
10. Pipe joint

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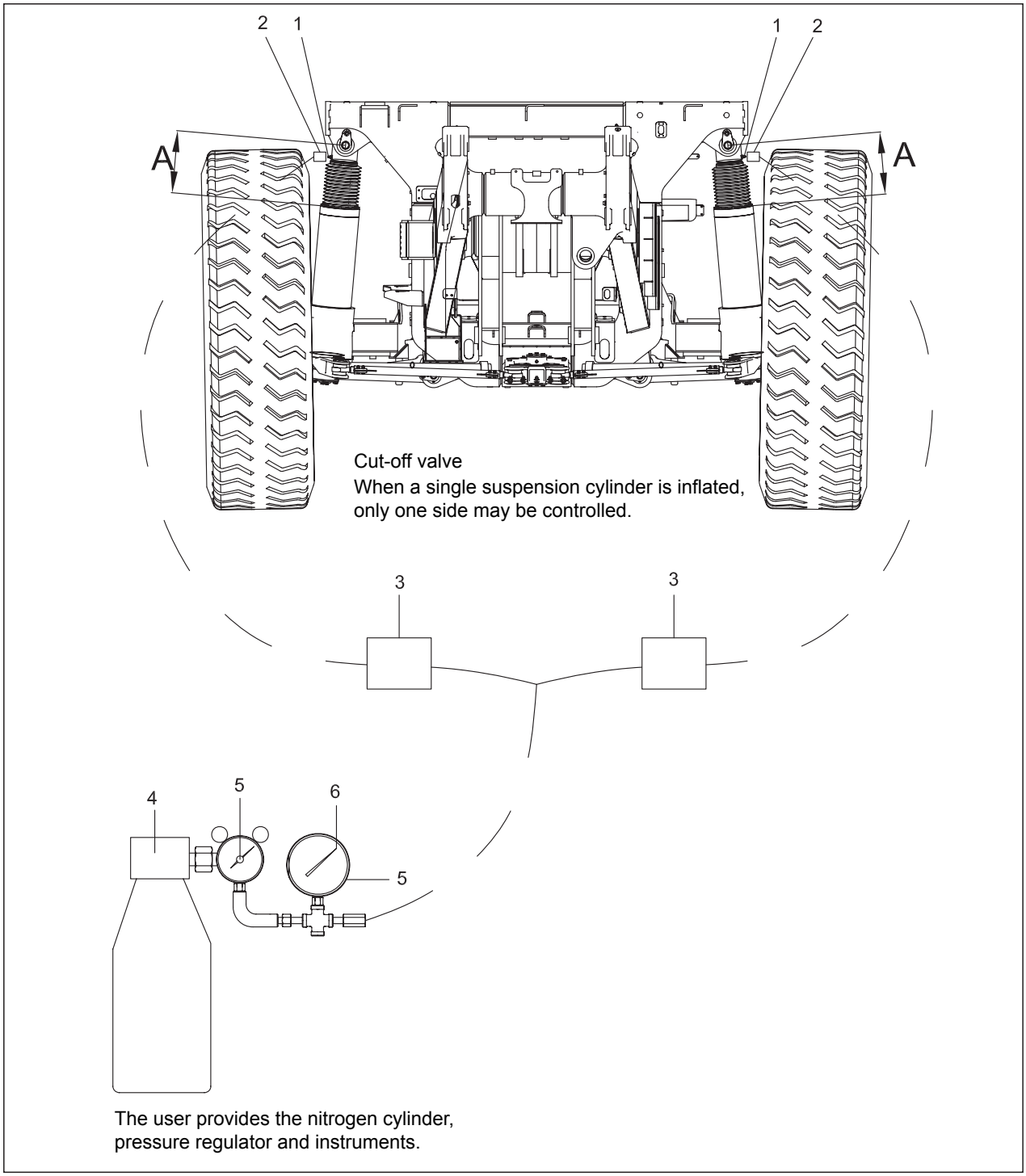


Fig.8 Charge of Front Suspension Cylinder

1. Charge valve	3. Cut-off valve	5. Pressure regulator
2. charge joint	4. Nitrogen cylinder	6. Pressure gauge

A: The distance between center of pin and end cap of guide sleeve

Position for oil filling: A=205mm Empty : A=410mm Loaded: A=320mm

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⚠ warning

Use dry nitrogen to charge cylinder. Do not use a gas such as oxygen which ,if used by mistake for pressurizing, will explode violently when coming into contact with oil or grease, possibly causing personal injury and property damage.

Note: Use the gas pressure regulator installed on the nitrogen cylinder to protect the pressure gauge (The nitrogen cylinder is not supplied with the nitrogen charging assembly). An accurate and reliable pressure gauge is very critical to the correct adjustment of suspension.

Note: When the charge valve protecting cover is removed, no residual gas pressure is allowed. If any, the protecting cover can be removed after the pressure is completely discharged.

1. Position the truck at a safe and flat road surface. The truck must be parked stably without applying friction brake system of mining truck.
2. Remove cover of the charge valve carefully because residual gas pressure may exist.
3. Connect the charge component (closing the cut-off valve) to charge valve(1,Fig.8) on suspension cylinder and the gas pressure regulator on the nitrogen cylinder.

1) Connect the hoses of two ends installed with the Nitrogen charging joint(2,Fig.8) to the charge valves(1,Fig.1)of front suspension cylinder respectively.

2) Connect the other end to the nitrogen cylinder.

4. Adjust the gas pressure regulator to about 2000kpa.

Note: Protect the pressure gauge carefully to avoid excessive pressure. The pressure is easy to exceed 7000kpa.

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5. Charge the suspension cylinders according to the following steps:

a. Rotate the small hex nut on the charge valve (1, Fig.8) of suspension cylinder counterclockwise for two or three turns to make the internal valve move away from the seat.

b. Rotate the “T” handle of nitrogen charge joint (2, Fig.7) clockwise until it cannot be turned any more. Open the check valve of inflation joint.

c. Open the cut-off valve (3, Fig.8), and inflate the suspension cylinders at both sides with the same pressure. During the inflation, open slowing and intermittently close the cut-off valve (3, Fig.8) until the distance A between the center of pin and end cap of guide sleeve is equal to 395mm (the allowable range of error is 10mm).

d. When the height ‘A’ is reached (Fig.8), turn off the pressure regulator (5, Fig.8) on the nitrogen cylinder, close the cut-off valve(3, Fig.8), rotate the hex nut on the charge valve (1, Fig.8) of suspension cylinder clockwise and close the internal valve. Rotate the T-shape handle of nitrogen charge joint (2, fig.8) counterclockwise until it cannot be turned any more.

Note 1: In the charging process, the gas should be slowly added and the flow of gas should be periodically stopped to allow the suspension cylinders in the left and right sides to reach balance. The correct process will vary with the equipment, materials and operators.

No excessive inflation is allowed; otherwise, it will lead to the excessive extension of cylinder body and damage of fixing bolts on the piston.

Note 2: To check the pressure of nitrogen cylinder (4, Fig.8), close the cut-off valve (3, Fig.8), turn on the gas pressure regulator (5, Fig.8)slowly on the gas cylinder and observe the reading of the pressure gauge (6, Fig.8). The pressure in the gas cylinder must be higher than 7000kpa.

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Note 3: To check the pressure in the cylinder, turn off the gas pressure regulator on the gas cylinder, open the cut-off valve (3, Fig.8) and observe the reading of the pressure gauge (6, fig.8).

Note 4: If height of unload isn't correct, repeat the previous procedure to add or reduce charging pressure by the increment of 150kpa. The increment is a critical parameter for suspension cylinder charging to get a correct height of no-load state.

Note 5: If the mining truck operated in the colder environment, it is recommended to raise the height of unload state by 10~20mm to compensate for the effect of temperature reduction.

6. Close the cut-off valve and turn off the gas pressure regulator.

7. Remove the charge device and check nitrogen charge valves (1) for leakage with soapy water.

Note: In case of any leakage in the spool of charge valve:

1) Check the torque of spool. The torque should be 0.35 - 0.45N•m.

2) If the leakage cannot be stopped, check the spool for damage or contamination. Replace it if necessary. All suspension cylinder pressure should be released before the spool is removed with oil charging assembly.

8. Install the cover of charge valve. The torque is 4.5 - 5.5N•m.

9. Run the mining truck about 24 hours, perform the procedure of inspect un-load height again, and make adjustment if necessary.

Note: On new or rebuilt cylinders, the seals and wipers may grip the piston rods tighter and make it difficult to obtain the correct height shown in Fig.8. If this happens, the cylinders should be charged as accurately as possible. In addition, the height of suspension cylinder should be checked again according to the following table after the truck runs for

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several days. The cylinder pressure shown in table.2 is guide only. Cylinders should be charged according to the height 'A' specified in the Fig.8 and NOT solely on the basis of monitoring cylinder pressure.

Tab.2 Front Cylinder charging height and pressure		
	Cylinder height 'A'	Cylinder pressure
Truck at Empty	A=410mm	3.8MPa
Loaded	A=320mm	7MPa

Maintenance

Visually check suspension cylinder heights daily（Fig8&Tab.2）. Lubricate the suspension cylinders at service intervals and with lubricant specified in Chapter 36.1 “LUBRICATION AND MAINTENANCE”.

Tab.3 Special torque specifications			
Fig. No.	Item No.	Name	Torque (N•m)
1&5	12	Bolt	136
1&5	24	Bolt	136
1&6	4	Plug	65
1&6	5	Plug	50
1&6	25	Charge valve	50

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2.2 Steering Mechanism

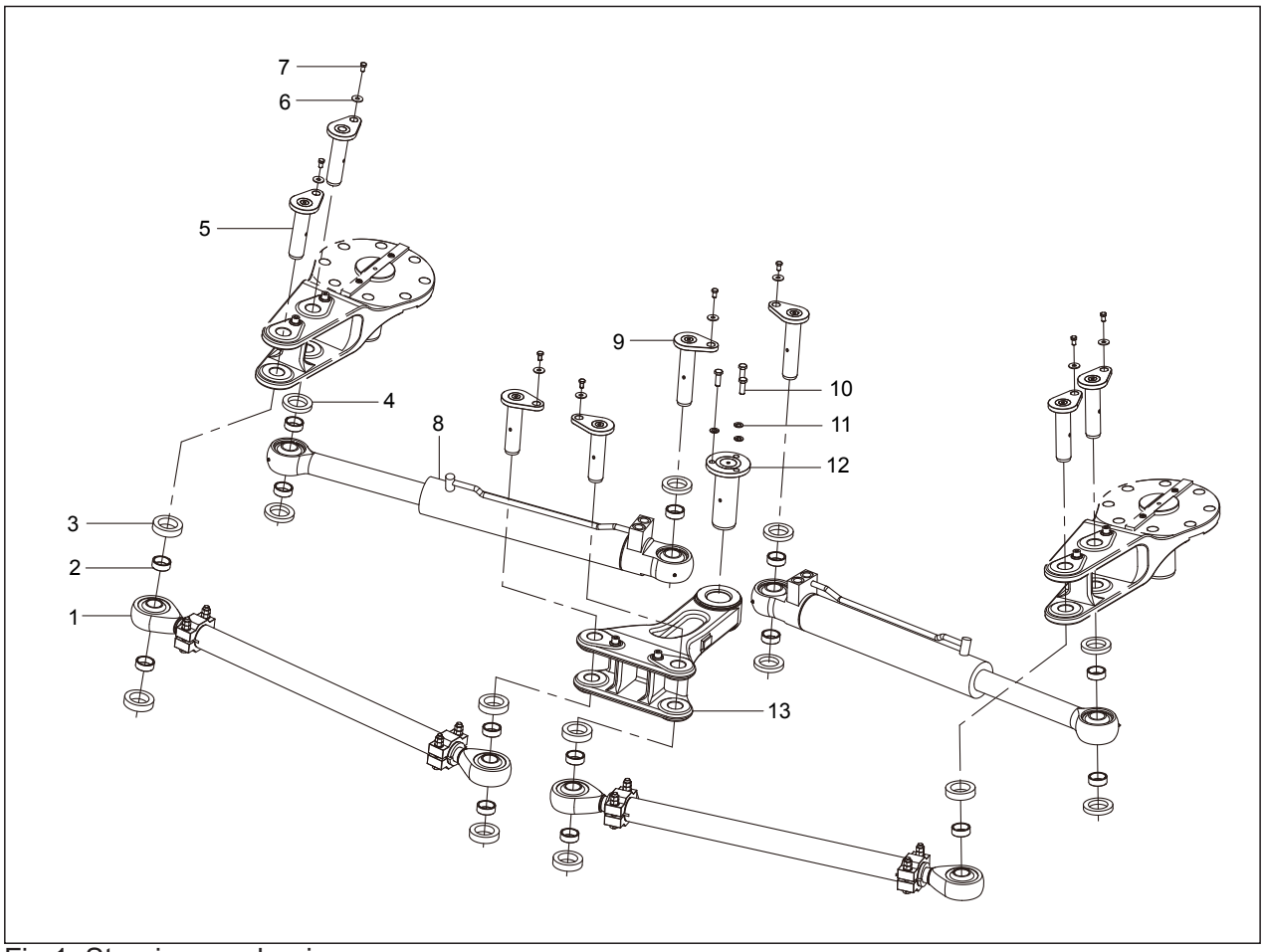


Fig.1 Steering mechanism

1. Tie rod assembly
2. Pin spacer
3. Dust cover
4. Dust cover
5. Tie rod pin assembly
6. Washer
7. Bolt
8. Steering cylinder
9. Cylinder pin assembly
10. Bolt
11. Washer
12. Crank pin assembly
13. Crank assembly

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Description

Layout of steering mechanism refer to Fig.1.
There are two single stage, double acting steering cylinders (8) installed on the truck. These exert the necessary hydraulic force on the steering arm assemblies (A) to pivot the front wheels. Single stage, double acting means that the piston rod can have oil applied to either side, extending or retracting the piston rod.
Steering cylinder (8) piston rod end is connected to steering arm assembly (A), positioned by pin spacer (2) , fixed to steering arm assembly by tie rod pin assembly (5), bolt (7) and washer (6).
Steering cylinder (8) base end is connected to frame, positioned by pin spacer (2), fixed to frame by cylinder pin assembly (9), bolt (7) and washer (6).
Steering tie rod assembly (1) is positioned by pin spacer (2), connected to steering arm assembly (A) and crank pin assembly (13) respectively through tie rod pin assembly (5), bolt (7) and washer (6).

Removal

Numbers in parentheses refer to Fig.1.
1. Position the truck in a level work area, be sure the body is completely lowered, apply the parking brake and switch off the engine.
2. Turn steering wheel in both directions several times to relieve pressure in accumulator and steering system.
3. Block all wheels properly.
4. Switch the battery to the 'OFF' position.

Steering tie rod assembly

1. Support tie rod assembly (1) with suitable lifting device.
2. Remove bolt(7) and washer (6). Remove tie rod pin assembly (5) at one end of tie rod (1) from left side steering arm assembly (A). At

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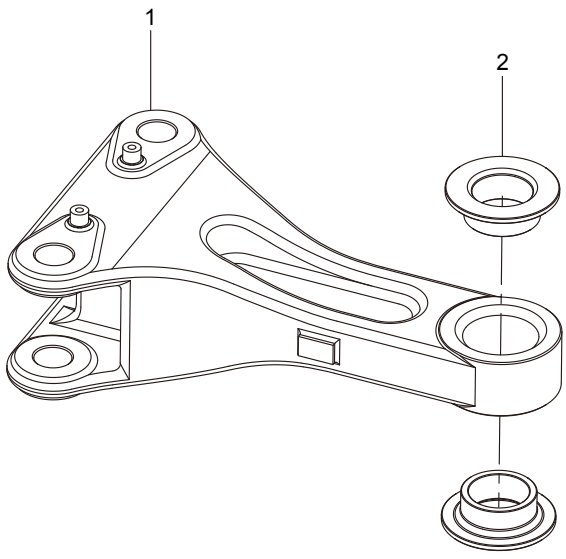
the same time, remove pin spacer (2) and dust cover(3).
3. Remove bolt(7) and washer (6). Remove tie rod pin assembly (5) at another end of tie rod (1) from crank assembly (13). At the same time, remove pin spacer (2) and dust cover(3). Complete the disassembly of left side steering tie rod assembly (1).
4. Repeat Steps 1~3 to remove right side steering tie rod assembly (1). Place the disassembled parts in a clean work for assembly.

Steering cylinder
5. Support steering cylinder (8) with suitable lifting device.
6. Remove bolt(7) and washer (6). Remove tie rod pin assembly (5) at the piston rod end of steering cylinder (8) from left side steering arm assembly (A). At the same time, remove pin spacer (2) and dust cover(4).
7. Remove bolt(7) and washer (6). Remove cylinder pin assembly (9) at the base end of steering cylinder (8) from frame. At the same time, remove pin spacer (2) and dust cover(4). Remove left side steering cylinder (8).
8. Repeat Steps 5~7 to remove the right side steering cylinder (8). Place the disassembled parts in a clean work for assembly.

Steering crank assembly
9. Support crank assembly (13) with suitable lifting device.
10. Remove bolt (10) and washer (11),using a mild steel drift ,drive crank pin assembly(12) out from crank housing of frame.
11. Remove crank assembly (13), Place the disassembled parts in a clean work for assembly.

Disassembly

Crank assembly
Disassembly of crank assembly refer to Fig.2



1.Crank welding body
2.Crank inner spacer

Fig.2 Crank assembly

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Crank assembly comprises of crank welding body(1) and crank inner spacer (2), crank assembly swing around crank pin assembly after assembled. Check wear condition of crank inner spacer (2), if bad condition, change is needed.

1. Heating crank assembly partly.
2. Drive crank inner spacer (2) out from inner bore of crank assembly, using tools such as brass rod.

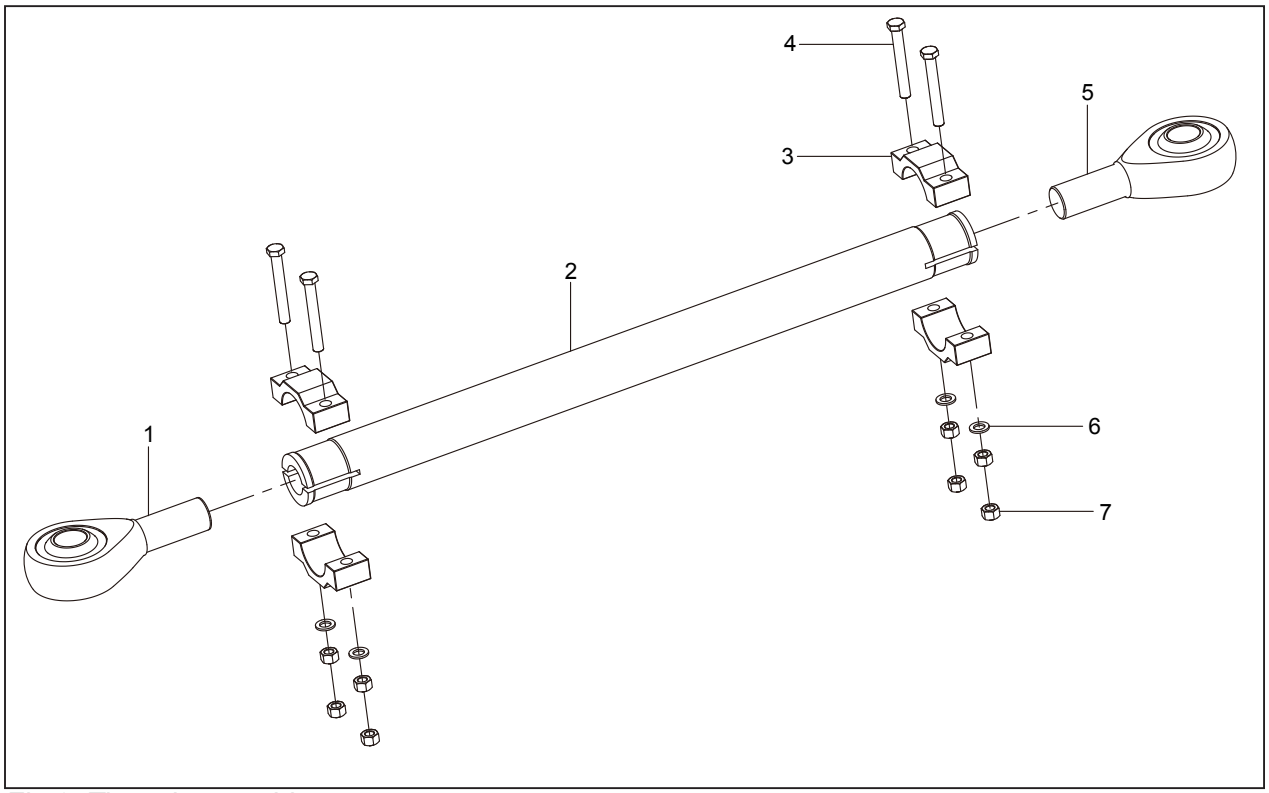


Fig.3 Tie rod assembly

1. Rod end bearing(Left-hand)
2. Tie rod
3. Tie rod clip
4. Bolt
5. Rod end bearing(Right-hand)
6. Washer
7. Nut

Steering tie rod assembly

Disassembly of tie rod assembly refer to Fig.3

Tie rod assembly comprises of tie rod (2), left rod end bearing (1), right rod end bearing (5), tie rod clips(3) and fasteners, which can keep alignment of front wheels with this adjustable

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structure. With rod end bearing (1and 5) screwed in, tie rod (2) is clamped by up and down tie rod clips (3) and fixed by bolt (4), nut (7), and washer (6).
1. Record the assembling length before disassembly.
2. Remove tie rd clips (3) ,bolt (4), nut (7)and washer (6) , take down rod end bearing (1and 5).
3. Place disassembled parts in a clean work for assembly.

Assembly

Crank assembly
Disassembly of crank assembly refer to Fig.2
1. Heating crank assembly (1) partly.
2. Drive crank inner spacer (2) into inner bore of crank assembly, using tools such as brass rod.

Steering tie rod assembly
Numbers in parentheses refer to Fig.3.
1. Place tie rod (2) in a vice. Screw rod end bearings (1 and 5) into tie rod (2) until assembled length recorded is obtained.
2. After installation is completed, and front end alignment is checked and corrected, assembly up and down tie rod clips (3) and tighten nut (7) , bolt(4) and washers (6).

Installation

Caution: Tighten all fasteners without special torques specified to standard torques listed in Section 36.2 ‘Technical Conditions for Tightening Torque of Standard Bolts and Nuts'.
Crank assembly
Numbers in parentheses refer to Fig.1.
1. Supported with suitable lifting device, assembly crank assembly (13) into crank housing of frame.
2. Drive crank pin assembly (12) into crank assembly (13) and crank housing of frame,

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fixed onto frame by washer (11) and bolt(10).

Steering cylinder

3. Support steering cylinder (8) with suitable lifting device.
4. Assembly base end of steering cylinder (8) into frame, with pin spacer (2) and dust cover(4) assembled ,insert cylinder pin assembly (9),and fixed into frame by bolt(7) and washer(6).
5. Assembly piston rod end of steering cylinder (8) into left side steering arm (A), with pin spacer (2), dust cover (4) assembled ,insert tie rod pin assembly (5) ,and fixed into left side steering arm (A) by bolt(7) and washer(6).
6. Repeat steps 3~5 to assembly right side steering cylinder (8).

Steering tie rod assembly

7. Support tie rod assembly (1) with suitable lifting device, assembly into space between crank assembly (13) and left side steering arm assembly (A), keeping mounting hole aligned.
8. Assembly pin spacer (2) and dust cover (3),insert tie rod pin assembly (5), fixed into crank assembly (13) and steering arm assembly (A) with bolt (7) and washer (6).
9. Repeat steps 7~8 to assembly right side steering tie rod assembly (1).

Alignment

Numbers in parentheses refer to Fig.3.
Correct front end alignment is dependent on three basic fundamentals.
a. Caster-Forward and rearward tilt of the axle assembly.
b. Camber-Outward tilt of the top of the front wheels.
c. Toe-in - Inward turning of the front wheels.
Note: Caster and camber are built into the truck and are not adjustable.
1. Check for toe-in only when the truck is empty and crank is centered. Use a slide bar attached to the wheel rim edge to make this

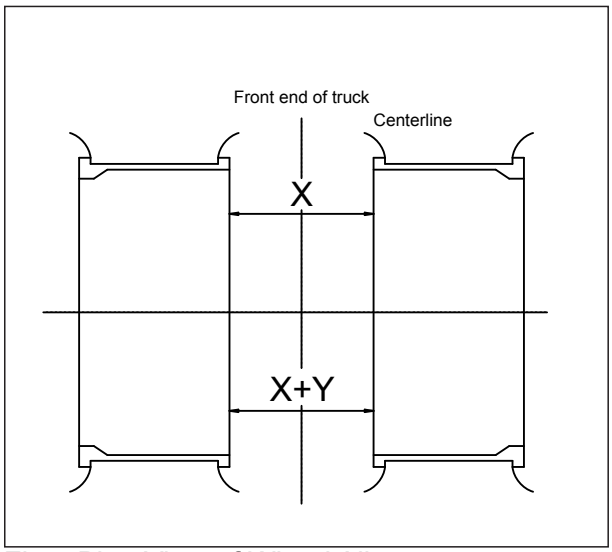


Fig.4 Plan View of Wheel Alignment
Wheel (toe-in) adjustment dimension:
Y=8~12mm

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check, required toe-in refer to Fig. 4.
2. Loosen nut (7) and bolt (4) at each end of tie rod assembly. Turn tie rod (2) with a pipe pliers until correct toe-in dimension obtained, refer to Fig.4.
3. When tie rod assembly lengths have been established, fixed rod end bearings (1 and5) into tie rod (2) with nut (7), bolt (4) and washers(6).

Maintenance

Every 50 Hours - Lubricate pin assemblies with grease specified in Section 36.1 ‘LUBRICATION AND MAINTENANCE’.

Special tools

There are no special tools required for procedures outlined in this section. Refer to Section 36.3 ‘MAINTENANCE TOOLS’ for part numbers of general servicetools required.

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3 REAR AXLE ASSEMBLY AND INSTALLATION

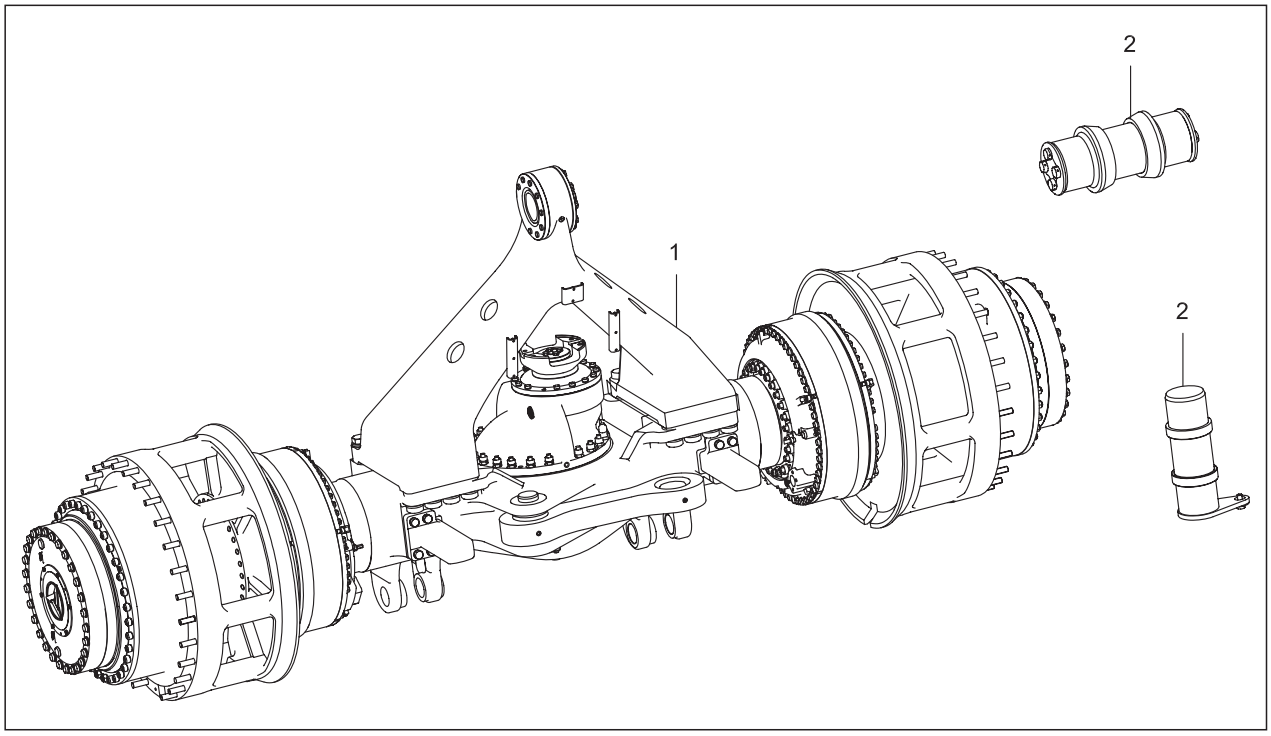


Fig.3-1 Rear axle assembly and installation

1. Rear axle assembly
2. Rear axle mounting part

Overview of operating principle

See Fig.3-1 for the numbers in the brackets.

The rear axle assembly and installation consist of the rear axle assembly (1) and rear axle mounting part (2). The rear axle assembly also connects the rear wheels to the chassis through A-frame, Link, and the rear ride cylinders. The rear axle assembly is centrally mounted on the rear frame crossmember with a tapered pin and component parts, which allows the axle to oscillate as the truck moves over uneven terrain.

Removal

See Fig.3-1 for the numbers in the brackets.

1. Position the vehicle in a level work area, apply the parking brake and switch off the engine.

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2. Turn the steering wheel in both directions several times to relieve pressure in the steering system. Operate the treadle valve continuously to relieve pressure in the braking system. Block all road wheels.
3. Disconnect brake, cooling, breather and lubrication lines. Drain all the lubricant from the axle, brake assemblies and planetary assemblies into suitable containers. See Section 3.1.3 'MAIN REDUCER AND DIFFERENTIAL ASSEMBLY' and Section 3.1.5 'REAR BRAKE AND INSTALLATION', cap all open lines and fittings to prevent entry of dirt.
Note: Avoid spilling lubricant on tyres, as it will deteriorate the rubber.
4. Jack up or lift up the truck so that its weight is not supported by the tyres any more. Securely support the truck at this position.
5. Remove four bolts from the driveline flange and swing-driveline away from the main reducer and differential assembly. Punch mark both flanges to facilitate installation. (See chapter 19 'Installation of Transmission Shaft'.
6. If necessary, remove the tyre and rim assembly according to the method in Chapter 4 'REAR WHEEL ASSEMBLY'.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

7. Position a hydraulic jack under the axle at the differential housing, being sure jack is of suitable capacity and proportions to lift and balance the axle assembly. Place wheeled dollies at both ends of the axle for wheels to rest on when the axle is lowered. Raise axle just enough to take weight off centre tapered pin.
8. Remove lower ends of rear ride cylinders.

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Refer to Section 22, Rear suspension cylinder.
9. Dismantle the bolt, elastic washer, flat washer and articulated shaft used for installing Link on the frame, and remove the spacer ring.
10. Remove the bolts and other parts for connecting A-frame to the rear axle mounting part on the frame assembly.
11. Drive tapered pin out of the chassis using a soft drift. As tapered pin moves out, remove spacers. Lower the axle assembly onto the wheeled dollies and roll out from beneath the vehicle.
12. Use the hoist device to lift the rear axle assembly and place it onto the rear axle assembly fixture.

Inspection
1. Clean all metal parts in a suitable solvent, using a brush to clean bearings. Dry all parts on a clean surface and allow bearings to dry naturally. Make sure parts are free from dirt.
2. Check all inner and outer grooves for cleanliness. Check components for cracks, scores, blemishes or burrs. Use a fine stone to smooth out defective areas. Replace any parts that show excessive wear.
3. Inspect fittings, plugs, studs and their seating positions for thread wear. If threads in any of these parts are damaged, replace parts.
4. Check bushings, bearings and snap rings for wear or warped condition. Replace defective parts.
5. Replace the used washer and damaged O-ring.

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⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

Assembly

See Fig.3-1 for the numbers in the brackets.

Note: Tighten all fasteners without special torques specified to standard torques listed in Section38.2 Standard bolt and nut torque specifications. Tighten the connecting joint of hydraulic pipeline and replace all 'O'rings.

1. After the rear axle assembly is completely reassembled, use a proper hoist device to lift it up and place it under the truck and align under the chassis.
2. Using a hydraulic jack of suitable capacity and proportions to lift and balance the axle assembly, raise the axle assembly into position in the chassis. Insert spacers and, using a soft drift, drive in tapered pin.
3. Install rear ride cylinders to the chassis and axle assembly as outlined in Section 22 'Rear suspension cylinder'.
4. With the axle group securely fastened to the rear ride cylinders and the two sections of the chassis at Link and A-frame, release and remove thehydraulic jack.
5. Align the punch marks, as marked during removal, on the driveline and differential flanges, and secure with four bolts. Refer to Chapter 19 ‘Installation of Transmission Shaft’.
6. If removed, replace tyre and rim assemblies as outlined in Section 4'REAR WHEEL ASSEMBLY'.
7. Remove blanking caps and reconnect all brake, cooling, breather and lubrication lines. Refer to Section 3.1.5 'rear brake assembly' and Section 3.1.3,'Main reduxer and differential.
8. According to the contents specified

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in Section 36.1 ‘LUBRICATION AND MAINTENANCE’, add lubricating oil into the rear axle housing, planetary assembly and rear brake assembly.

9. Lubricate the rear axle assembly through lube fittings with lubricant specified in Section 36.1'LUBRICATION AND MAINTENANCE' .

10. Refer to Section 3.1.5 ‘REAR BRAKE AND INSTALLATION’ for exhaust of the brake system.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

Maintenance

Correct lubrication is critical to routine maintenance of planetary and axle shaft and main reducer and differential assembly. Refer to the lubrication interval and proper lubricant specified in Section 36.1 ‘LUBRICATION AND MAINTENANCE’.

Axle diagnosis

Noises originating in the tyres, transmission or driveline might be attributed by mistake to the axle. Therefore, all possible sources of noise should be investigated before deciding the axle is at fault. true axle noises may be located by lifting or jacking the truck until all driving wheels are clear of the floor or ground. Securely block the truck in this position. Run power train at moderate speed. Be certain all tyres are off the ground and, to prevent damage to the differential, see that neither rear brake drags.

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3.1 Rear Axle Assembly

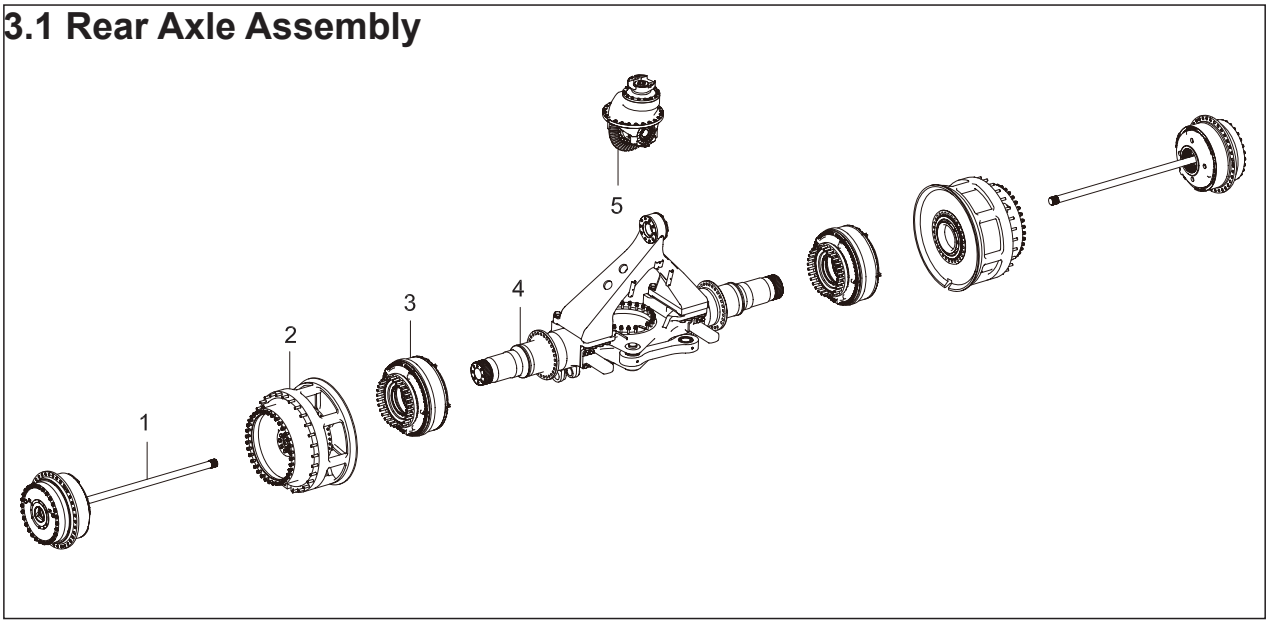


Fig.3-2 Rear axle assembly

1. planetary assembly and axle shaft
2. Rear hub assembly
3. Rear brake assembly
4. Rear axle housing assembly
5. Main reducer and differential assembly

Overview of operating principle

See Fig.3-2 for the numbers in the brackets.

The rear axle assembly consists of the planetary assembly and rear half shaft (1), rear hub assembly (2), rear brake assembly (3), rear axle housing assembly (4) and main reducer and differential assembly (5). The rear axle also connects the rear wheels to the chassis through A-frame, link and the rear ride cylinders. The rear axle assembly is centrally mounted on the rear frame crossmember with a tapered pin and component parts, which allows the axle to oscillate as the truck moves over uneven terrain.

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Disassembly

See Fig.3-2 for the numbers in the brackets.

1. Position the vehicle in a level work area, apply the parking brake and switch off the engine.

2. Turn the steering wheel in both directions several times to relieve pressure in the steering system. Operate the treadle valve continuously to relieve pressure in the braking system. Block all road wheels.

3. Disconnect brake, cooling, breather and lubrication lines. Drain all the lubricant from the axle, brake assemblies and planetary assemblies into suitable containers.

See Section 3.1.3 ‘Main reducing device and differential assembly’ and Section 3.1.5 ‘REAR BRAKE AND INSTALLATION’, Cap all open lines and fittings to prevent entry of dirt.

Note: Avoid spilling lubricant on tyres, as it will deteriorate the rubber.

4. Jack up or lift up the truck so that its weight is not supported by the tyres any more. Securely support the truck at this position.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

5. Remove four bolts from the driveline flange and swing-driveline away from the differential. Punch mark both flanges to facilitate installation. (See chapter 19 ‘Installation of Transmission Shaft’.)

6. If necessary, remove the tyre and rim assembly according to the method in Chapter 4 ‘REAR WHEEL ASSEMBLY’.

7. Position a hydraulic jack under the axle at the differential housing, being sure jack is of suitable capacity and proportions to lift and balance the axle assembly. Place wheeled

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dollies at both ends of the axle for wheels to rest on when the axle is lowered. Raise axle just enough to take weight off centre tapered pin.

8. Remove lower ends of rear ride cylinders. Refer to Section 22, Rear suspension cylinder.

9. Dismantle the bolt, elastic washer, flat washer and articulated shaft used for installing link on the frame, and remove the spacer ring.

10. Remove nut, pin and washer used for connecting A-frame to the frame assembly, and remove the split bush from the tapered pin.

11. Drive tapered pin out of the chassis using a soft drift. As tapered pin moves out, remove spacers. Lower the axle assembly onto the wheeled dollies and roll out from beneath the vehicle.

12. Use a hoist device to lift up the rear axle assembly and place it on the rear axle assembly placement fixture.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

Disassembly

See Fig.3-2 for the numbers in the brackets.

1. If the gear oil is not discharged, remove the oil filling screw cover and the oil discharge screw cover from the rear axle and the planetary gear carrier first. Drain the gear oil inside the rear axle assembly into a clean and proper container.

2. Remove the thrust cover in the planetary assembly and axle shaft (1), take down the retainer ring, sun gear and axle shaft.

3. Remove the nut connecting the planetary assembly and rear hub assembly (2). Then remove the planetary assembly and discard the O-ring installed on planetary gear carrier.

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At the same time, use a proper hoist device to lift the planetary assembly and place it on a clean work bench.

4. Remove the rear hub assembly (2), use a proper hoist device to lift up the rear hub assembly (2) and place it on a clean workbench.

5. Remove the nut connecting rear hub assembly (2) and rear axle housing assembly (4), then use a proper hoist device to lift the rear brake assembly (3). Then remove the rear brake assembly (3) and place it on a clean workbench and discard the damaged O-ring.

6. Remove the nut for connecting the main reducer and differential assembly (5) and the rear axle housing assembly (4). At the same time, use the proper hoist device to lift up the main reducer and differential assembly (5) and place it on a clean workbench.

7. If necessary, the A-frame can be dismantled.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

Inspection

1. Clean all metal parts in a suitable solvent, using a brush to clean bearings. Dry all parts on a clean surface and allow bearings to dry naturally. Make sure parts are free from dirt.

2. Check all inner and outer grooves for cleanliness. Check components for cracks, scores, blemishes or burrs. Use a fine stone to smooth out defective areas. Replace any parts that show excessive wear.

3. Inspect fittings, plugs, studs and their seating positions for thread wear. If threads in any of these parts are damaged, replace parts.

4. Check the bush, bearing and snap ring for wearing or deformation. Replace the defective

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parts and components.
5. Replace the used washer and the damaged O-ring.

Assembly

See Fig.3-2 for the numbers in brackets.

Note: Tighten all fasteners without special torques specified to standard torques listed in Section38.2 Standard bolt and nut torque specifications.

1. If the oil filling screw cover and oil drainage screw cover are removed, then they should be installed onto the axle housing.
2. Install the main reducer and differential assembly (5) onto the axle housing. Use the nut to fix and tighten it to the tightening torque of 541N•m. Refer to Section 3.1.3 'MAIN REDUCER AND DIFFERENTIAL ASSEMBLY'. If the A-frame is removed, then install it onto the axle housing. To assemble the main reducer and differential assembly and A-frame, select and use a proper hoist device to lift them up.
3. Install the rear brake assembly (3) onto the rear axle housing assembly (4). In addition, use the nut to fix it and tighten it to the tightening torque of 1166N•m - 1193N•m. To assemble the rear brake assembly, select and use a proper hoist device to lift them up.
4. Use a proper hoist device to lift up the rear hub assembly (2), and install it onto the rear axle housing assembly (4).
5. Use a proper hoist device to lift up the planetary assembly and install it onto the rear hub assembly (2). Use the nut to fix it and tighten it. The tightening torque is 650N•m.
6. Install the axle shaft into the rear axle housing assembly (4) and insert the external spline without circlip groove at its end into the internal spline of differential axle shaft bevel gear in the main reducer and differential assembly (5). Then install the sun gear and the retainer ring; finally install the thrust cover and tighten up the bolts according to the specified moment.

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⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

Installation

See Fig.3-2 for the numbers in the brackets.

Note: Tighten all fasteners without special torques specified to standard torques listed in Section38.2 Standard bolt and nut torque specifications. Tighten the connecting joint of hydraulic pipeline and replace all 'O'rings.

1. After the rear axle assembly is completely reassembled, use a proper hoist device to lift it up and place it under the truck. Then align it with the frame.
2. Using a hydraulic jack of suitable capacity and proportions to lift and balance the axle assembly, raise the axle assembly into position in the chassis. Insert spacers and, using a soft drift, drive in tapered pin.
3. Install the rear suspension cylinder onto the frame and rear axle assembly. Refer to Chapter 22 ‘REAR SUSPENSION SYSTEM’.
4. With the axle group securely fastened to the rear ride cylinders and the two sections of the chassis at Link and A-frame, release and remove thehydraulic jack.
5. Align the punch marks, as marked during removal, on the driveline and differential flanges, and secure with four bolts. Refer to Chapter 19 ‘Installation of Transmission Shaft’.
6. If removed, replace tyre and rim assemblies as outlined in Section 4'REAR WHEEL ASSEMBLY'.
7. Remove blanking caps and reconnect all brake, cooling, breather and lubrication lines. Refer to Section 3.1.5 'REAR BRAKE AND INSTALLATION' and Section 3.1.3,'MAIN REDUCER AND DIFFERENTIAL ASSEMBLY'.
8. According to the contents specified

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in Section 36.1 ‘LUBRICATION AND MAINTENANCE’, add lubricating oil into the rear axle housing, planetary assembly and rear brake assembly.

9. Lubricate the rear axle assembly through lube fittings with lubricant specified in Section 36.1'LUBRICATION AND MAINTENANCE' .

10. See Section 3.1.5 ‘REAR BRAKE AND INSTALLATION’ for exhaust of the brake system.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

Maintenance

Correct lubrication is critical to routine maintenance of planetary assembly and axle shaft and main reducer and differential assembly. Refer to the lubrication interval and proper lubricant specified in Section 36.1 ‘LUBRICATION AND MAINTENANCE’.

Axle diagnosis

Noises originating in the tyres, transmission or driveline might be attributed by mistake to the axle. Therefore, all possible sources of noise should be investigated before deciding the axle is at fault. true axle noises may be located by lifting or jacking the truck until all driving wheels are clear of the floor or ground. Securely block the truck in this position. Run power train at moderate speed. Be certain all tyres are off the ground and, to prevent damage to the differential, see that neither rear brake drags.

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Fault diagnosis system		
Faults	Cause	Elimination
Noise	Lubrication is insufficient or incorrect.	Check oil level and add the lubricating oil of the right type.
	Wheel bearing is scratched or roughened.	Replace the bearing.
	Gear teeth in planetary chipped	Replace the gear.
Loss of lubri-cating oil	Oil level of lubricating oil is too high.	Drain exce-ssive oil.
	Lubricating oil contains too many foams.	Add correct lubricating oil.
	Oil seal is worn or damaged.	Replace the oil seal.
	Breather is clogged.	Clean the breather.
	Nut or bolt is loose.	Tighten the nut or bolt.
Increase of lubricating oil	The differential housing brea-ther is clogged.	Clean the breather.
High temp-erature of planetary mechanism	Lubricating oil is insufficient or incorrect.	Check oil level and repl-ace it with the lubricating oil of the right type.
	Pinion bearings seized	Replace the bearing.

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3.1.1 Two stage planetary assembly and axle half

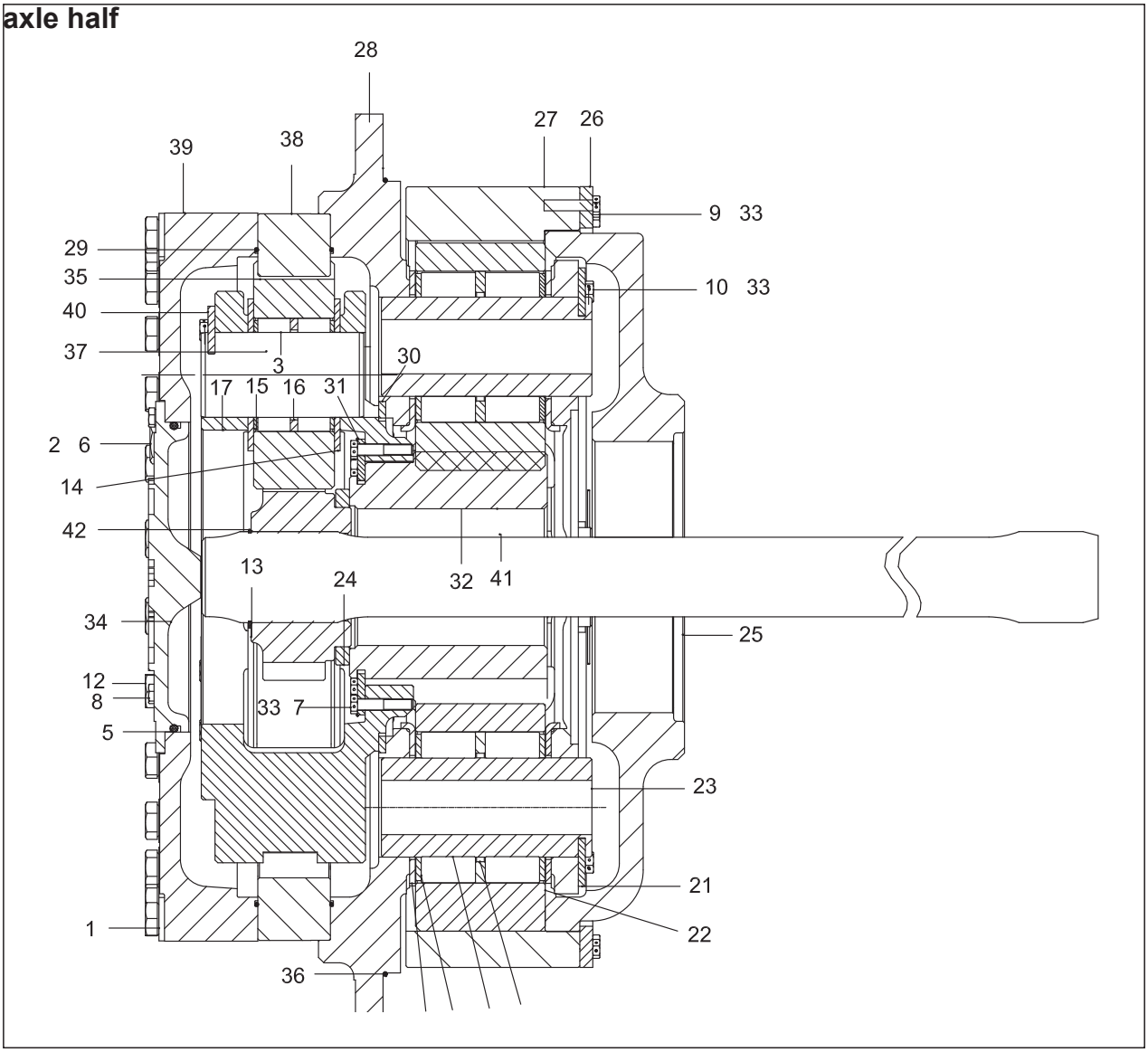


Fig.1 Sectional View of Two Stage Planetary Assembly

1. Hardened washer
2. Washer
3. Roller
4. Roller
5. O-ring
6. cover
7. Bolt
16. Roller spacer
17. Planetary carrier
18. Thrust plate
19. Thrust spacer
20. Roller spacer
21. Pin retainer
22. Planetary pinion
31. Sun gear retainer
32. Sun gear
33. Lockwire
34. Cover
35. Planetary pinion
36. O-ring
37. Primary planetary gear shaft

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8. Bolt
9. Bolt
10. Bolt
11. Screw
12. Bolt
13. Sun gear
14. Thrust plate
15. Thrust spacer
23. Pinion pin
24. Thrust washer
25. Ring gear carrier
26. Ring gear retainer
27. Ring gear
28. Planetary carrier
29. O-ring
30. Thrust washer
38. Ring gear
39. Carrier cover
40. Pin retainer
41. Axle half
42. Snap ring
43. Screw

Plenetary assembly and axle shaft

Description and operation

Numbers in parentheses refer to Fig.1.

The planetary gearing shown is a two -stage planetary gear assembly. This assembly contains two sun gears(13&32), two planetary carriers (17&28) with planet pinions (22&35) and two ring gears (27&38), to provide compound gear ratio to the drive wheels. Axle shaft (41) is driven by the differential and turns the first sun gear (13) to which it is splined. The sun gear (13) meshes with and rotates the first stage planetary pinions (35)which turn first stage planetary carrier(17) . First stage planetary carrier(17)meshes with secondstage sun gear(32) and planet pinions (22) mesh with ring gear (27). The interaction of the first stage sun gear (13), planet pinions (35) and ring gear (38) causes first stage planetary carrier (17) to rotate which, in turn, drives the second stage sun gear (32). Second stage sun gear (32) meshes with and rotates second stage planetary pinions (22) which, in turn, are meshed with ring gear (38). Since second stage ring gear (38) is splined to the wheel spindle it can not turn and forces the second stage planetary carrier (28) to rotate. Hence, two sets of planetary pinions (22&35) with two different gear ratios interact with their respective meshed parts resulting in planetary carrier(28) being the output to the drive wheels. These combined planetary sets, therefore, provide a compound gear ratio to

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multiply the torque applied to the drive wheel by the axle shaft (41).

Planetary Gearing-Towing
Numbers in parentheses refer to Fig.1

⚠ warning

Be sure adequate steering and braking pressure are available before towing to prevent injury or damage enroute.

If the truck is to be towed, as in the case of a breakdown, the axle shaft (41) and sun gear (13)should be removed from the planetary assemblies. The removal will prevent possible damage to the power train components during towing. The axle shaft(41) and sun gear(13) can be removed easily by taking off the cover (34) and simply sliding the axlf shaft(41), together with sun gear(13), out of each planetary assembly by hand. Be certain the driving cover (34) are installed to protect the planetary assemblies from road dust and dirt while towing is in progress.

Removal and Disassembly
Numbers in parentheses refer to Fig.2.
Note: The planetary assembly can be removed from the wheel without removing the tyre and rim assembly.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

1. Position the vehicle in a level work area with plug (6) at its lowest point. Apply the parking brake and switch off the engine.

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2. Turn the steering wheel in both directions several times to relieve pressure in the steering system. Block all road wheels.
3. With a suitable container in position, remove plug (6) and drain all lubricant from the planetary assembly.
4. Remove bolts (8), cover (34) from carrier cover(39). Remove and discard 'O' ring (5). Planetary assembly.
5. Pull out sun gear(13), snap ring (42) and axle shaft(41) assembly from planetary housing. Remove snap ring (42) from axle shaft (41) and remove sun gear(13) from the axle shaft (41).
Thrust washer (24) is a press fit on the shoulder of sun gear (13) and should be removed only if worn or damaged.
6. Support the planetary assembly with suitable lifting equipment and remove planetary assembly mounting nuts from the wheel studs. The planetary assembly can now be removed from the wheel by threading three set screws into the puller holes in planetary carrier (28) to force the planetary assembly outward. Set the planetary assembly on a clean work surface with planetary carrier (28) downward.
7. Remove and discard 'O' ring (36). Remove ring gear assembly (26, 27, 9, & 25) from the wheel spindle by removing lockwire, bolts, and retainer plate attaching ring gear carrier (25) to the spindle.
8. Match mark cover (39), ring gear (38), and planetary carrier (28) to aid assembly. Remove bolts (12) and hardened washers(1) and lift carrier cover (39) and ring gear (38) from planetary carrier (28). Remove and discard 'O' rings (29) from carrier cover (39) and planetary carrier (28).9. Lift up the component of primary planetary gear carrier (17) from the secondary planetary gear carrier (28).
9. Lift assembled first stage planetary carrier (17) from planetary carrier (28).
10. Remove lockwire (33) from bolts (7).

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Remove bolts (7) and Sun Gear Retainer (31) from sun gear (32). Lift first stage planetary carrier (17) from sun gear (32).
11. Remove lockwire (33), bolts (7) and pin retainer (31) from planet pinion pins (37) in planetary carrier (17) assembly. Remove planet pins (37) from planetary carrier (17) assembly.
12. Slide planet pinions (35), thrust plates (14), thrust spacers (15), roller (3) and roller spacers (16) from planetary carrier (17) assembly. Use care to avoid dropping and/or damaging rollers (3).
13. Turn planetary carrier (17) assembly over and remove thrust washer (30).
14. Turn planetary carrier(28) over. Remove lockwire (33), bolts (10) and pin retainer (21) from pinion pins (23). Remove pinion pins (23) from planetary carrier (28).
15. Slide planet pinions (22), thrust plates (18), thrust spacers (19), rollers (4) and rollers spacers (20) from planetary carrier (28).
16. If necessary, remove lockwire (33), bolts (9) and Ring Gear Retainer (26) and separate ring gear (27) and ring gear carrier (25).

Inspection

Numbers in parentheses refer to Fig.2.
1. Clean all parts thoroughly in suitable solvent and dry with moisture-free compressed air or a clean, lint-free cloth. Allow rollers to air dry and dip in clean planetary lubricant.
2. Inspect all parts for damage. Repair or replace as necessary.
3. Inspect all pinions, gears and splines for excessive wear, cracked or broken teeth and pitted or scored surfaces. If replacing planet pinions or sun gear, be sure the new pinions or gear have the same number of teeth as the old ones so torque multiplication will remain the same.
4. Inspect roller for damage or excessive wear. In addition, check for free fit in planet pinions and on the planet pins. Replace any parts

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which are in questionable condition.

5. Inspect for pitted, scored or worn thrust surfaces and burrs on the two planetary gear carriers (17&28) .

6. Inspect ring gear (27&38) and planetary carrier (17&28) for cracks and wear.

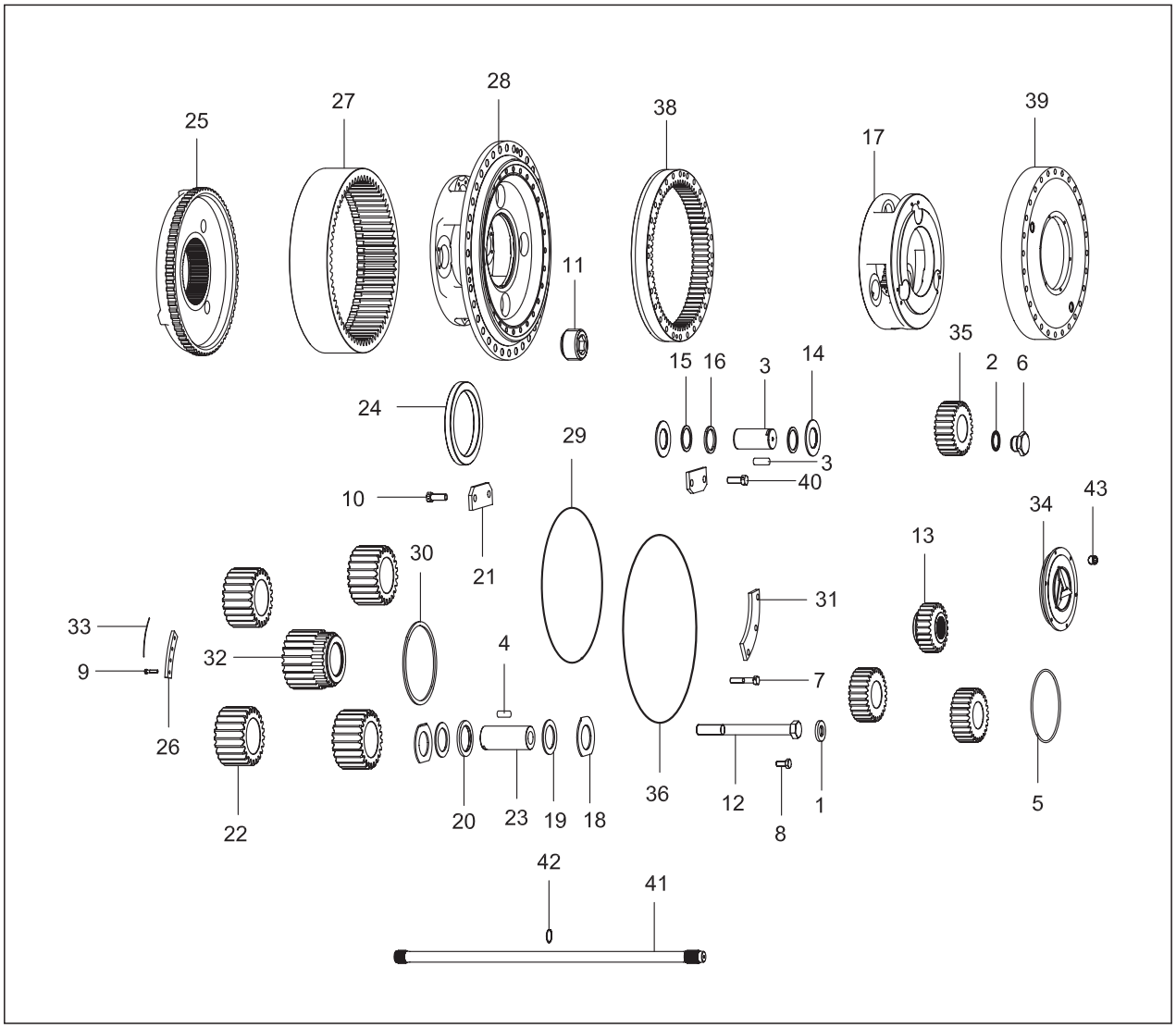


Fig.2 Exploded View of Two-Stage Planetary Assembly

1. Hardened washer
2. Washer
3. Roller
4. Roller
5. O-ring
16. Roller spacer
17. Planetary carrier
18. Thrust plate
19. Thrust spacer
20. Roller spacer
31. Sun gear retainer
32. Sun gear
33. Lockwire
34. Cover
35. planetary gear

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6. Plug
7. Bolt
8. Bolt
9. Bolt
10. Bolt
11. Screw
12. Bolt
13. Sun gear
14. Thrust plate
15. Thrust spacer
21. Pin retainer
22. Planetary pinion
23. Pinion pin
24. Thrust washer
25. Ring gear carrier
26. Ring gear retainer
27. Ring gear
28. Planetary carrier
29. O-ring
30. Thrust washe
36. O-ring
37. Pinion pin
38. Ring gear
39. Carrier cover
39. Baffle
41. Axle half
42. Snap ring
43. Screw

Assembling and installing

Numbers in parentheses refer to Fig.1and Fig.2.

Note: Tighten all fasteners to standard torques listed below.

Table of bolt torque (Unit: N•m)				
Specifications Grade	5.8	8.8	10.9	12.9
M6	6.1	9.8	14.7	17
M8	15	24	33	40
M10	29	47	65	79
M12	51	81	114	136
M14	80	128	181	217
M16	123	197	277	333
M18	172	275	386	463
M20	240	385	541	649
M22	324	518	728	874
M24	416	665	935	1120
M27	600	961	1350	1620
M30	819	1310	1840	2210

Note: If Ring Gear Carrier (25) is replaced, the wheel bearing adjustment must be checked and corrected as required, as described in 3.1.2 rear hub assembly.

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⚠ warning

To prevent personal injuries and property losses, the chocking material and the hoist device should be firm and reliable and the hoist device should have the sufficient hoist capacity to prevent the component assembly from falling down or the hoist device from tipping over for safe operation.

1. If disassembled, attach ring gear (27) securely to ring gear carrier (25) with retainers (26), bolts (9) and lockwire (33). Install ring gear and ring gear carrier assembly on the wheel spindle and attach securely with its etainer plate, bolts and lockwire. See Fig.1.
2. Install planet pinions (35) in planetary carrier (17) as follows (See Figs 1 & 3):Place thrust plates (14) on a flat surface, then place planet pinion (35) on top of thrust plate (14). See Fig.3. Insert thrust spacer (15) inside planet pinion (35) then insert 22 rollers (3) as a group in a circlerollers inside planet pinion (35) and over roller spacer (16). Make certain thrust spacer (15) is centred to the cage of rollers (3)in a circlerollers. Then insert rollers spacer (12), 22 roller (3) and thrust spacer (15) to complete planet/roller assembly as shown in Fig.3. Install the assembled planet pinion with thrust plates (14) into planetary carrier (17). Insert pinion pin (37) through planetary carrier (17) and secure with pin retainer (40), bolts (10) and lockwire (33).
3. According to Step 2, the rest two planetary pinion (35) are assembled. Repeat Step 2 to assemble and install remaining two planet pinions (35) in planetary carrier (17).
4. Install planet pinions (22) in planetary carrier (28) as follows (See Figs. 1 & 4): Place thrust plates (18) on a flat surface, then place planet pinion (22) on top of thrust plate (18). See Fig.4. Insert thrust spacer (19) inside

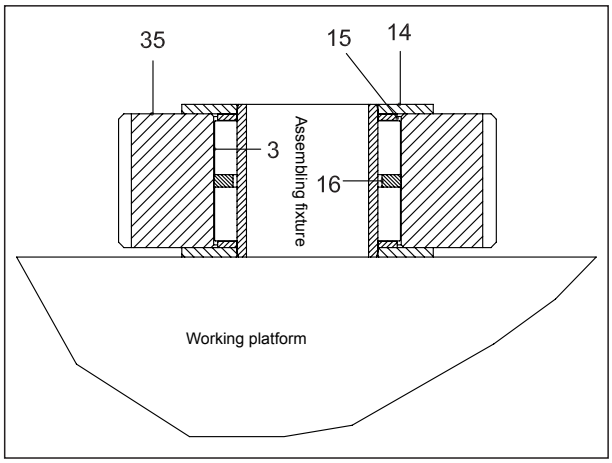


Fig.3 First Stage Planet/Rollers Assembly

3. Roller
14. Thrust Plate
15. Thrust Spacer
16. Roller spacer
35. Planetary Pinion

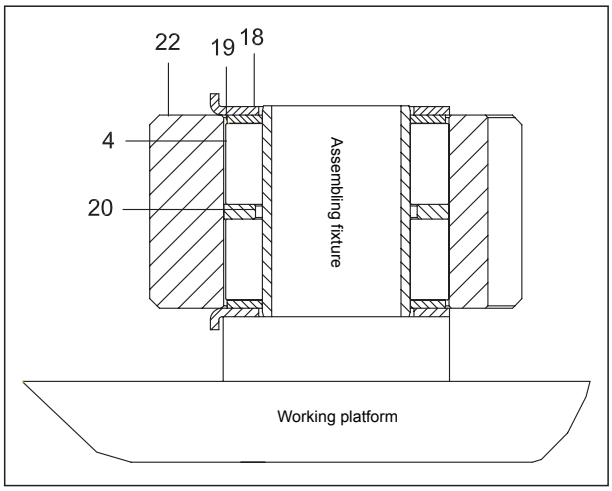


Fig.4 Second Stage Planet/Rollers Assembly

4. Roller
18. Thrust Plate
19. Thrust Spacer
20. Rollers Spacer
35. Plandtary Pinion

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planet pinion (22) then insert 15 rollers (4) as a group in a circlerollers inside planet pinion (22) and over roller spacer (20). Make certain thrust spacer (18) is centred to the cage of rollers (4)in a circlerollers. Then insert rollers spacer (20), 22 roller (3) and thrust spacer (19) to complete planet/roller assembly as shown in Fig.4. Install the assembled planet pinion with thrust plates (18) into planetary carrier (28). Insert pinion pin (23) through planetary carrier (28) and secure with pin retainer (21), bolts (10) and lockwire (33).

5. Assemble and install the remaining three planet pinions (22) in planetary carrier (28) as described in Step 4.

6. Position planetary carrier (28) on a clean, level surface with its bolts circle upward.

7. Insert thrust washer (30) in planetary carrier (28).

8. Install sun gear (32) in planetary carrier (28) assembly so that its undercut teeth mesh with the planetary carrier (17) internal teeth. Attach sun gear (32) to planetary carrier (17) securely with sun gear retainer (31), bolts (7) and lockwire (33).

9. Install new 'O' ring (29) in planetary carrier (28) groove and install ring gear (38) on planetary carrier (28) as match marked at 'Disassembly'.

10. Install assembled planetary carrier (17) and sun gear (32) in planetary carrier (28) carefully meshing sun gear (32) and planet pinion(22) teeth, and ring gear (38) and planet pinion (35).

11. Insert new 'O' ring (29) in carrier cover (39) and install carrier cover (39) on ring gear (38) as match marked at 'Disassembly'.

12. Align bolt holes in planetary carrier (28) ring gear (38) and carrier cover (39). Install bolts (12) and hardened washers (1) and tighten securely, using torque wrench.

13. Install a new 'O' ring (36) on planetary carrier (28).

14. Attach suitable lift-eyes, sling, cables,

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and/or other lifting equipment to the planetary assembly and raise it into position for installation on the wheel.

15. Align the teeth of the four planetary pinions (22) with their mating teeth in ring gear (27) and carefully insert the planetary assembly to the wheel so that planetary carrier (28) mates with the wheel, as match marked at 'Disassembly'. Use care to prevent damage to 'O' ring(36).

16. Install nuts on wheel studs and tighten securely.

Note: If removed from sun gear (13), thrust washer (24) must be pressed onto the sun gear shoulder until completely bottomed on the gear.

17. If removed, install sun gear (13) on axle shaft (41) and secure with snap ring (42). Insert shaft and sun gear assembly into the spindle, carefully mating the teeth of sun gear (13) and planet pinions (35), and, axle shaft (41) teeth with the differential side gears.

18. Push axle shaft (41) and sun gear (13) inward as far as they will go. With a steel rule and straight edge, measure from cover mounting surface on carrier cover (39) to the end of axle shaft (41). Note as dimension 'A'. See Fig.5.

19. Next, lay cover (34) on flat surface and again use a straight edge and steel rule to measure the height of the inside raised surface of cover (34). Note as dimension 'B'. See Fig.6.

20. Subtract dimension 'B' from dimension 'A' and the clearance should be within 2 - 11 mm.

Note: If the end play is too small, the axlf shaft(41) is not pushed completely into the differential side gear. If the end play is greater than the allowable maximum, either the axlf shaft(41) end or the cover, or both are excessively worn. To correct this, replace cover (34) first. If the end play is still too great, a new axlf shaft must be installed.

21. Install new 'O' ring (5) on cover (34) and

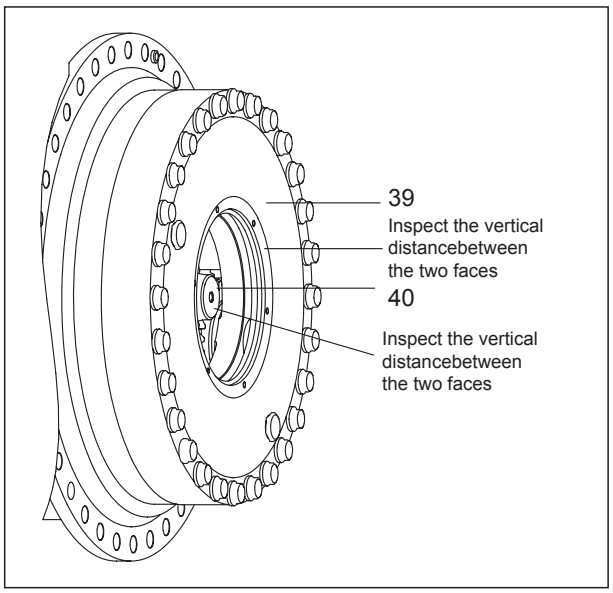


Fig.5 Measuring dimension ‘A’

39. Cover Carrier 41. Axle Half

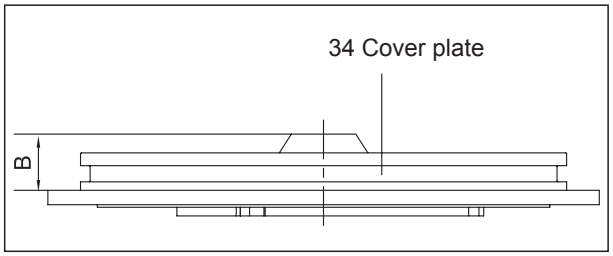


Fig.6 Measuring dimension ‘B’

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attach cover securely to carrier cover (39) with bolts (8). Then install the screw (43).

22. Rotate the wheel until the 'oil-level' markings on the planetary cover are horizontal. Fill the planetary to plug (6) level, with lubricant Install plug (6)and washer(2) and screw (11) and tighten securely.

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3.1.2 Rear wheel and installation

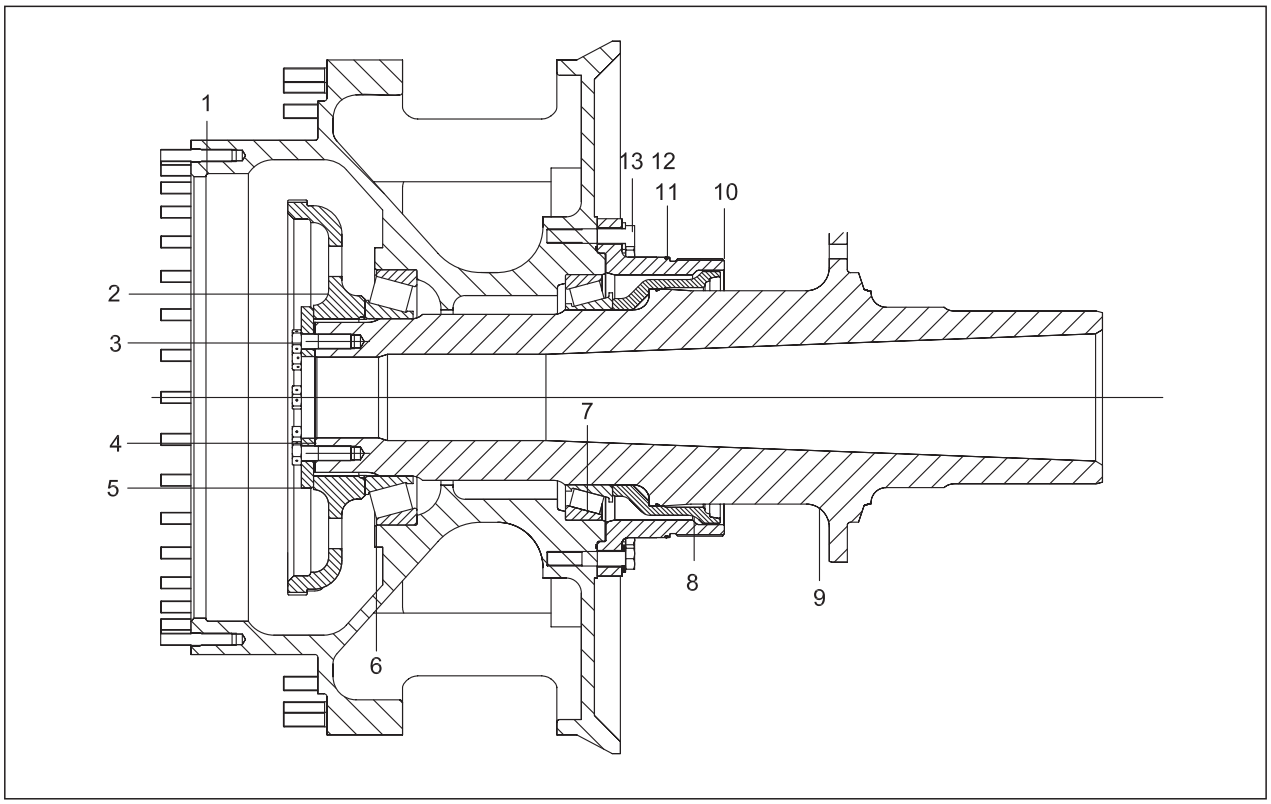


Fig.1 Sectional View of Drive Wheel Assembly

1. Rear wheel
2. Ring gear carrier
3. Bolt
4. Shim pack
5. Plate
6. Bearing
7. Bearing
8. Inner seal housing
9. Spindle
10. Wheel driver
11. ‘O’ Ring
12. Bolt
13. Washer

Description

Each drive wheel is mounted on its spindle with two tapered roller bearings. All the weight of the truck resting on the drive axle is supported by the wheels and bearings; none of the weight is supported by, or transmitted through, the axle shafts. This type of construction is known as 'Full Floating'.

The wheel itself is a large cylindrical casting with the bearing bores and other finished

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surfaces machined after the wheel is cast.

Removal and disassembly
Numbers in parentheses refer to Fig.1

⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting device are properly secured and of sufficient capacity to do the job safely.

1. Place the truck in a flat area, apply parking brake and shut down the engine.
2. The steering wheel turns for several circles in the two directions to relieve the pressure in steering system. Block all wheels, except the one to be raised. Lift up the truck so that its weight isn't sustained by axle. Main switch of battery is in the 'OFF' position.
3. Release parking brake.
4. Deflate both tyres completely, and remove the tyre and rim assembly from the wheel. Follow instructions under 'Removing Tyre and Rim Assembly'. Refer to Section 4.1 'REAR WHEEL ASSEMBLY'.
5. Drain differential and planetary gear lubricant and remove planetary gear assembly from the wheel. Refer to Section 3.1.1, 'TWO STAGE PLANETARY ASSEMBLY AND AXLE HALF'.

⚠ warning

To prevent personal injury and property damage, completely deflate tyre by removing the valve cap and core. Insert a thin wire through the valve to be sure the valve is not plugged. Even a flat tyre, in some cases, will retain sufficient air pressure to blow off a rim component with enough force to cause injury or death.

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6. Remove lockwire, bolts (3), plate (5) and shim pack (4) from spindle (9). Retain shim pack (4).
7. Pull ring gear carrier (2) from end of spindle (9).
8. With suitable lifting device, pull wheel (1) off of spindle (9), being careful that outer bearing (6) cone does not fall.
9. Remove and discard 'O' ring (11) from wheel operator (10).
Note: The wheel operator (10) portion of the disc brake assembly is bolted to inner face of wheel (1), when the wheel is removed, the attached disc brake wheel operator (10) will also be removed. Refer to Section 3.1.3, Rear Brake Assembly and Installation, if necessary to remove wheel operator.
Note: Bearing cups and cones must always be replaced as a matched set, never separately.
10. Remove inner bearing (7) cone from spindle (9).
11. If required, remove bearing (6 & 7) cups from wheel (1).

Inspection
1. Thoroughly clean all metal components, except bearing cones, in a suitable solvent. Dry with compressed air and coat all threaded components with light oil to facilitate assembly.
2. Clean bearings in volatile mineral spirits and wipe dry with a lint free cloth. Lubricate lightly with light oil and spin by hand, to check for wear and roughness. Replace with new bearings if excessively worn, or if operation is rough or noisy.
3. Inspect all machined surfaces of all parts for scoring, pitting, corrosion and burring. Resurface or replace with new parts as necessary.
4. Inspect all threaded components, and repair or replace as necessary.
Assembly and installation
Numbers in parentheses refer to Fig.1.

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⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting device are properly secured and of sufficient capacity to do the job safely.

1. If removed, install bearing (6 & 7) cups in their respective wheel (1) bearing bores with care to avoid damaging their raceways. Installation by press fit at ambient temperature is best. Note that cups must seat fully against shoulders of cup bores in the wheel hub to assure retention of bearing adjustment. If carbon dioxide, or dry ice, freezing of the cup is used, remember to permit the cup and hub to warm to ambient temperature after insertion and then to tap them with a soft steel drift and hammer to seat.
2. Lubricate inner bearing (7) cone with lubricant specified in Section 38.1, LUBRICATION SYSTEM. Install inner bearing (7) cone onto spindle (9).
3. If removed, install wheel operator (10) on wheel (1). Refer to Section 3.1.3, Rear Brake Assembly and Installation.
4. Install new 'O' ring (11) on wheel operator (10). Refer to Section 3.1.3, Rear Brake Assembly and Installation.
5. With suitable lifting device slide wheel (1) assembly onto spindle (9), carefully mating splines of wheel operator (10) with splines of disc brake disc operator. Refer to Section 3.1.3, Rear Brake Assembly and Installation.
6. Lubricate outer bearing (6) cone with lubricant specified in Section 38.1, LUBRICATION SYSTEM. Install outer bearing (6) cone on spindle (9) and seat in outer bearing cup (8).
7. Install ring gear carrier (2) on end of spindle

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(9).

Note: Ensure all dirt, grease and oil is completely removed from plate (5), shim pack (4) and end of spindle (9) to allow accurate setting of the bearing pre-load.

8. Install plate (5), without shim pack (4) on end of spindle (9), and secure with eight bolts (3). Tighten bolts (3) evenly in equal increments to 'Gauging Bolt Torque', as specified in 'Bearing Adjustment Table', while rotating and bumping wheel (1) assembly.

9. Remove bolts (3) and tap the wheel (1) assembly to free bearings.

10. Reassemble plate (5) without shim pack (4) and using only two bolts (3) located 180° apart, adjacent to gauging holes in plate (5). Tighten bolts (3) evenly in equal increments to 'Gauging Bolt Torque' (ref. 'Bearing Adjustment Table'), while rotating and bumping wheel (1) assembly.

11. Determine gap between plate (5) and end of spindle (9) at both gauging holes. To determine gap, use a depth micrometer in both gauging holes to measure distance from outer face of plate (5) to end of spindle (9). Measure thickness of plate (5) with a micrometer. Subtract plate thickness reading from depth gauge readings.

12. Average the two readings, obtained at Step 11, in increments of 0.03 mm (0.001 in) and round off to the next higher 0.03 mm (0.001 in). This is the average gap. The required shim pack (4) thickness is equal to the average gap plus the tabulated constant as shown in the 'Bearing Adjustment Table'.

13. Install required shim pack (4), plate (5) and bolts (3) on end of spindle (9). Tighten bolts (3) evenly in equal increments to 'Final Bolt Torque' (ref. 'Bearing Adjustment Table'), while rotating and bumping wheel (1) assembly. Secure bolts (3) with lockwire.

14. Install planetary gear assembly and fill planetary and differential assemblies with lubricant specified in Section 38.1,

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LUBRICATION SYSTEM. Install tyre and rim assembly as described under 'Mounting Tyre and Rim Assembly on Wheel'.

Table of special torque							
Initial seating bolt torque		Gauging bolt		Shim pack thickness		Final bolt torque	
No. of Bolts	N· M	No. of Bolts	N· M	mm	in	No. of Bolts	N· M
8	200	2	200	Ave. Gap +0.18	Ave. Gap +0.007	8	940

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3.1.3 Main reducer and differential assembly

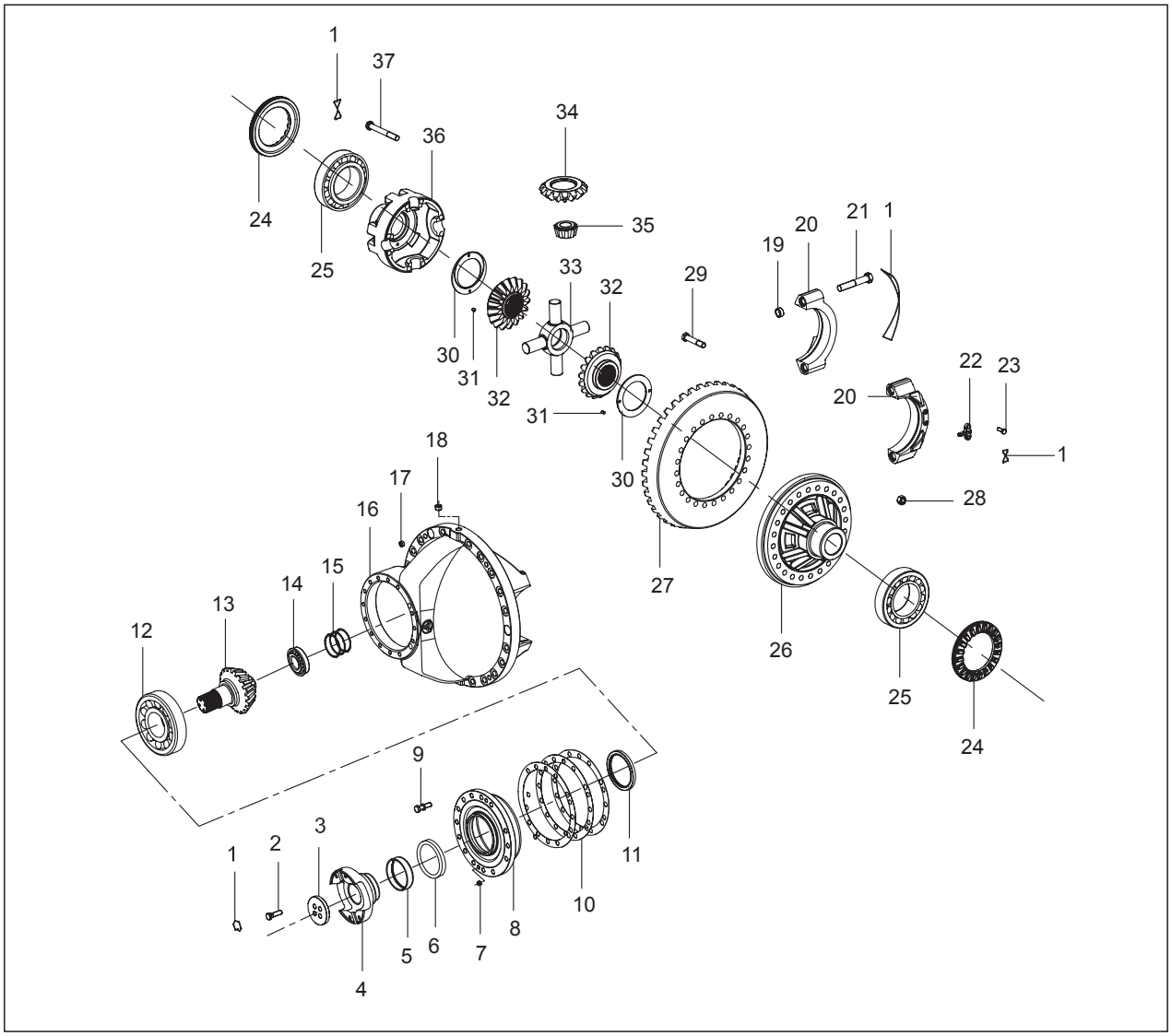


Fig.1 Main reducer and differential assembly

1. Lockwire
2. Bolt
3. Plate
4. Yoke
5. Sleeve
6. Dust shelter
7. Screw
8. Bearing seat
9. Bolt
14. Bearing
15. Shim
16. Main reducer housing
17. Screw
18. Screw
19. Bushing
20. Bearing cap
21. Bolt
22. Lock
27. Driven spiral bevel gear
28. Nut
29. Bolt
30. Thrust washer
31. Dowel pin
32. Axle shaft bevel gear
33. Spider
34. Planetary bevel gear
35. Bearing

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10. Shim
11. Oil seal
12. Bearing
13. Drive spiral bevel gear
23. Bolt
24. Bearing Adjuster
25. Bearing
26. Right differential housing
36. Left differential housing
37. Bolt

Shim thickness: 0.10, 0.15 and 0.50mm

Overview and operation

Numbers in parentheses refer to Fig.1.

The main reducer and differential have three functions:

1. It multiplies torque delivered by the driveline and change the torque direction;
2. It transmits this torque to the axle shafts;
3. It allows the drive wheels to rotate at different speeds. When the truck is making a turn, one drive wheel must travel a greater distance than the other. If the wheels were connected by a single axle shaft, the wheel turning the larger radius of the turn circle would have to override the wheel making the shorter turn. Thus, one wheel would have to skip or hop causing tire scuffing and strain on the power train.

The Main reducer and differential assembly eliminates wheel skip by allowing separate axle shafts inserted into axle shaft gears (32) to rotate at different speeds as the drive wheels rotate. spider (33) and planetary bevel gears (34) are meshed with axle shaft bevel gears (32), as shown in Fig.2&3. This assembly is enclosed in Left differential housing (36) and Right differential housing (26)which are bolted to driven spiral bevel gear(27). Thus, Driven spiral bevel gear(27), Left differential housing (36) and Right differential housing (26) rotate as an assembly when driven by input drive spiral bevel gear (13). However, axle shaft bevel gears (32), into which each axle shaft is inserted, are free to rotate independently about planetary bevel gears (34) with which they are meshed. Therefore, as each drive wheel travels through a different arc as the truck makes a turn, axle

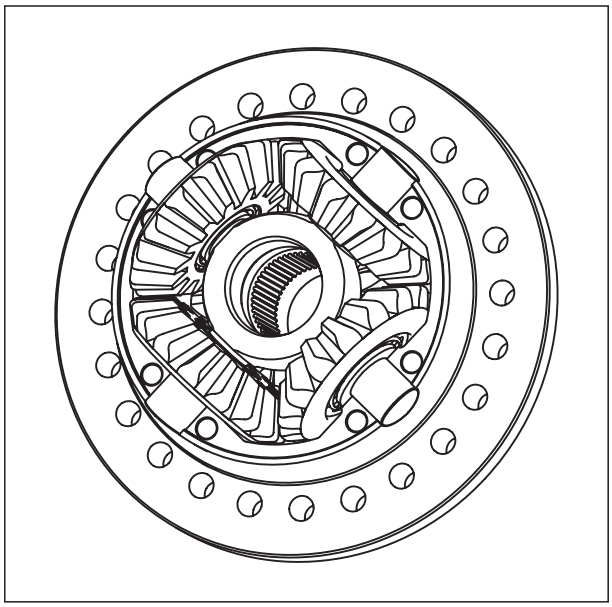


Fig.2 Differential

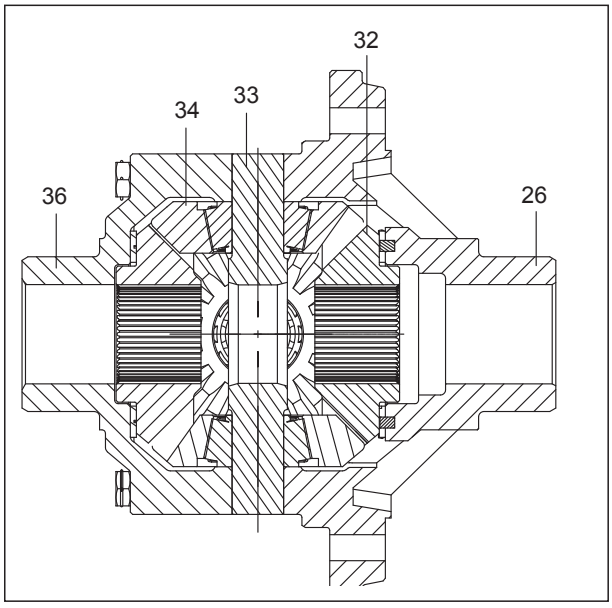


Fig.3 Differential assembly

Note: See Fig.1 for the serial numbers in brackets.

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shaft bevel gears (32) rotate about planetary bevel gears (34) to provide the required differential action.

Removal

1. Position the vehicle in a level work area, raise the body and install the body prop pins. Refer to Section 23 'BODY AND MOUNTING'.

⚠ warning

To prevent personal injury and property damage, be sure wheel chocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely. A come-a-long or chain fall with a minimum capacity of one ton is required for removal and installation of a main reducer and differential assembly.

2. Apply the parking brake and switch off the engine. Turn the steering wheel in both directions several times to relieve pressure in the steering system. Block all road wheels.
3. Ensure the battery switch turned to the 'OFF' position.
4. With suitable containers in position, drain the
lubricant from the banjo housing and wheel planetary assemblies.
5. Remove the driving flange cover from each wheel and pull the axle shaft and sun pinion gear assembly of each driving wheel at least 150 mm (6 in) out of the wheel housing to disengage the inner axle shaft splines from the splines of axle shaft bevel gears (32).
6.Identify the relationship of yoke (4) flange with that of the driveline companion flange using punch marks. Remove rear driveline connecting Main reducer an differential assembly and transmission. Refer to Section 19. Rear driveline.
7. Remove set screw (18) from main reducer

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housing(16) housing and replace it with a lifting eye.
8.Install chain fall or come-a-long to the loop placed on the body just behind the hoist brackets. Attach the other end of the lifting device to eye previously installed in the main reducer housing.
9. Support the weight of the main reducer and differential assembly with the lifting device.
10. Remove the self locking nuts which secure the main reducer and differential assembly to the axle banjo housing. These nuts can be used for several times.
11. Turn the four screws(17) in to break the seal between the main reducer housing(16) and banjo housing. If this does not move the main reducer and differential assembly out enough, either remove the screws(17) and insert longer bolts in the four holes, or use a suitable bar to pry the differential assembly away from the banjo housing and studs. If a bar is used, caution should be exercised to prevent damaging the mounting surfaces.
12. Pull the main reducer and differential assembly away from the banjo until it clears the studs of the axle banjo housing, then carefully lower the differential assembly.
13. Move main reducer and differential assembly to a clean work area for disassembly.

Disassembly
Numbers in parentheses refer to Fig.1.

Driven spiral bevel gear component
Before the disassembly, make marks between the joint surfaces of some assembly parts to facilitate reinstallation:
Make identifying punch marks on both the bearing caps (20) and main reducer housing (16), so that the bearing caps can be returned to their original position in assembly.
Scribe an identifying line on bearing adjusters (24) and main reducer housing (16) bores which these adjusters screw into. If the

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main reducer and differential assembly is disassembled for inspection purposes only, this line will be of assistance when readjusting the preload on the side bearing(25) cups and cones. If the main reducer and differential assembly is disassembled and parts replaced, do not rely on this line for determining the preload on the side bearings.

Scribe an identifying line on the right differential housing (26) and left differential housing (36) and the end of spider (33) to show their relationship for assembly purposes.

1. Cut and remove lockwires (1), then remove bolts (23) and locks (22).

2. Use a proper tool to clamp securely the driven spiral bevel gear (27) to prevent the driven spiral bevel gear (27) from rotating. Then loosen the nut (28) on the bolt (29), but do not remove them.

3. Cut and remove lockwires (1), loosen and remove the bolt(21). Then remove bearing caps (20) from main reducer housing (16). Salvage dowel bushings (19) that are seated in the bolt holes between the bearing caps and the main reducer housing. The bushing can be reused.

4. Unscrew and remove bearing adjusters (24).

5. Lift the differential assembly from main reducer housing (16) and Position it on a clean workbench or a spacial support.

6.Inspect whether the bearing(25) cups and cones on both sides of differential assembly are damaged, remove cones of bearing (25) from differential assembly just only if they are damaged and have to be replaced. Bearing assembly is replaceable as an assembly only. If any component is defective, the complete assembly must be replaced. When bearing need not be replaced, wire the bearing(25) cup and parts which removed from the same side (include busing and Bearing Cap, etc.) for mating in assembly and marks should be made to prevent the parts from being mixed during reassembly.

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Note:If the cone of bearing(25) should be removed, in conjunction with the bearing puller, use a round steel disc, approximately 95 mm (3.75 in) diameter and 10 mm (0.38 in) thick. This will serve as a centre for the puller screw to push against. Puller arms must not exert a force on the bearing roller separator cage.

7. Loosen and remove the bolts (29) and nuts(28) holding the driven spiral bevel gear(27) and the right differential housing(26) together. Position the differential assembly vertically on a bench(could be lifted) with the driven spiral bevel gear's tooth(27) facing downwards. Place thick wood bar under the gear(27) and then separate driven spiral bevel gear(27) from right differential housing(26) by tapping the edge of the gear(27) with a soft-faced hammer or a copper stick.

8. Loosen bolts (37) right differential housing(26) and left differential housing(36) together. Then lift right differential housing(26) off left differential housing(36).

9. Remove one thrust washer (30) and axle shaft bevel gear (32), then lift spider (33) and planetary bevel gears (34) out of right differential housing(26).

10.Inspect whether it is necessary to replace the spider (33), bearing (35) and four planetary bevel gears (34). Do further disassembling only when the gear or bearing has been excessively worn or damaged and replacement is required.

11. Remove the axle shaft bevel gear (32) and thrust washer (30) from the right differential housing (26). Remove the dowel pin (31) from the left differential housing (36) and right differential housing (26) only when it is necessary to replace the damaged parts in them.

Drive spiral bevel gear component

1. Remove bolts (2) and plate (3). Pull yoke (4) assembly from drive spiral bevel gear (13)

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shaft with care so as not to damage or distort the yoke flange or sleeve surface.

2. Unscrew bolts (9) attaching bearing seat (8) and shims (10) to the main reducer housing (16).
3. Remove set screws (7) and screw in two bolts(M16-80) in the tapped holes of bearing seat (8) , using these bolts as pullers to remove bearing seat (8) assembly.
Note: If the above bearing seat assembly removal procedure is not feasible, the following method may be used: Invert main reducer housing (16), as shown in Fig.4, then use a copper bar to knock on the drive spiral bevel gear(13) shaft to drive bearing seat (8) out of the housing. During this operation, be careful not to obliterate the etched dimension on the bottom of drive spiral bevel gear(13) shaft.
4. Remove shims (10) and wire them together to aid in assembly.
5. Remove the oil seal (11) from bearing seat assembly and discard it.
6.Inspect the cups and cones of bearing(12,14) matched with the drive spiral bevel gear(13) damaged or not. If yes, using a bearing puller remove cone of bearing(12,14) from drive spiral gear (13) shaft. Remove the cups of bearing(12,14) and shim pack(15) from the bearing seat(8) and main reducer housing(16) just when the bearing(12,14) damaged and need to be replaced.
Note: If the bearing seat are still serviceable, wire the cups and corresponding cones together for mating in assembly. Bearing (12 , 14) is replaceable as an assembly only. If any component is defective, the complete assembly must be replaced.

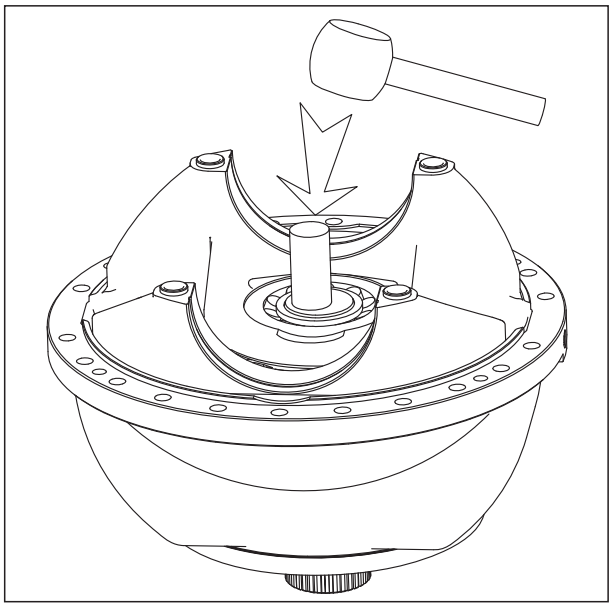


Fig.4 Driving Out bearing seat assembly

Inspection
Numbers in parentheses refer to Fig.1.
The importance of careful and thorough inspection cannot be over stressed. Thorough

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inspection and necessary replacement of parts now, may eliminate costly and avoidable trouble later.

1. Clean all parts in a suitable solvent.
2. Immediately after cleaning, dry all parts, except bearings, with compressed air, or lint-free cloth. Bearings are better left to air dry, then inspected and oiled thoroughly with gear lubricant for protection from corrosion.
3. With the parts cleaned, coat parts immediately with light oil to prevent corrosion. If parts are not to be assembled immediately, treat them with a good rust preventative and wrap them with treated paper or other suitable material designed to prevent corrosion.
4. Replace all gaskets, 'O' rings and seals with new parts.
5. Before installing the main reducer and differential assembly to the banjo, clean the inside and outside of the banjo housing to remove any foreign material.
6. Oil seal (11) rides on a special sleeve (5), which is on yoke (4) to provide a smooth contact surface. If the sleeve is rough or worn, pull it from the yoke and install a new one. Heat the new sleeve to 177 - 205o C (350 - 400° F) in oil to expand it for installation. If oil heating equipment is not available, heat the bushing evenly to 205o C (400o F). This takes about 1 minute using a torch with a heating tip. Use a Tempilstik or other temperature gauge to make sure sleeve (5) is hot enough. Slide heated sleeve on the yoke and tap lightly with a hammer to seat it. When install the sleeve, make sure the chamfer outwards, which is specially used for oil seal's installation.
7. Examine bearing cap bushings (19) for wear or damage. Replace as necessary.
8. Inspect all gears and splines for cracked or broken teeth, excessive wear, and pitted or scored surfaces. Repair or replace as necessary.

Note: If either driven spiral bevel gear (27) or drive spiral bevel gear (13) is defective,

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both gears must be replaced, because they are serviced only as a matched set. This set is identified by a serial number on the OD of driven spiral bevel gear (27) and outer face of drive spiral bevel gear (13). It is also advisable to replace axle shaft bevel gears (32) or planetary bevel gears (34) in matched sets only, because a newer gear installed to operate in conjunction with an older, worn gear tends to carry an uneven portion of the load. This creates an excessive amount of stress on the new gear.

Check for pitted, scored or worn thrust surfaces of differential housing halves, spider trunnions and thrust washers. It is also advisable to replace thrust washers(30) in sets, as the use of a combination of old and new washers may cause premature failure.

9. Inspect main reducer housing (16), driven spiral bevel gear (27), right differential housing(26) and bearing seat(8) for bore damage, cracks and wear. Replace as necessary.

10. Check the amount of run-out on the machined surfaces of bearing seat (8). The outer machined surface matched with the main reducer housing(16) on the hub of the bearing cage must be concentric with the bearing cup bore within 0.05 mm (0.002 in) total indicator reading (T.I. R.).

11. The outer machined surface (OD) on bearing seat (8) must be concentric within 0.05 mm (0.002 in) T.I. R. with the surface into which oil seal (11) fits.

12. The threads and bores of bearing caps (20) and main reducer housing (16) must be concentric within 0.27 mm (0.005 in) T.I. R. and must be square with the drive spiral bevel gear bore within 0.08 mm (0.003 in) when checked at points 254 mm (10 in) from the centre line of the drive spiral bevel gear bore.

Note: Bearing caps (20) and main reducer housing (16) can only be replaced as an assembly.

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13. The machined mating surfaces of right differential housing (26) and left differential housing (36) must be square with the axis of the housing within 0.075 mm (0.003 in) T.I. R.. The mating diameters of the cases must also be concentric within 0.075 mm (0.003 in) T.I. R..

Assembly

Numbers in parentheses refer to Fig.1.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is properly secured and of adequate capacity to do the job safely.

Drive spiral bevel gear component

Note: During assembly and installation, make sure that mated, punch-marked or otherwise identified parts are returned to their original positions, if still serviceable.

1. Determine the required shim pack (15) thickness so as to give the proper gauging distance within 0.075 mm (0.003 in) etched on drive spiral bevel gear (13) tail shaft (see Fig.5 and Fig.6) as follows:

Note: The OD of a bearing(14) cup can be ground to 189.5- 190mm to provide a slip fit special tool as an aid in determining the required thickness of shims (15).

a. Install a shim pack (15) of approximately 1.5 mm(0.060 in), measure and record the actual thickness as Dimension 'X', and the loosely fitting bearing cup (14) (see previous note) in the drive spiral bevel gear shaft bore of main reducer housing (16).

b. Install bearing(12) cone and bearing(14) cone on drive spiral bevel gear (13). Install bearing(12) cup into bearing seat (8) until it bottoms against the bearing seat shoulder. Install drive spiral bevel gear assembly (12, 13

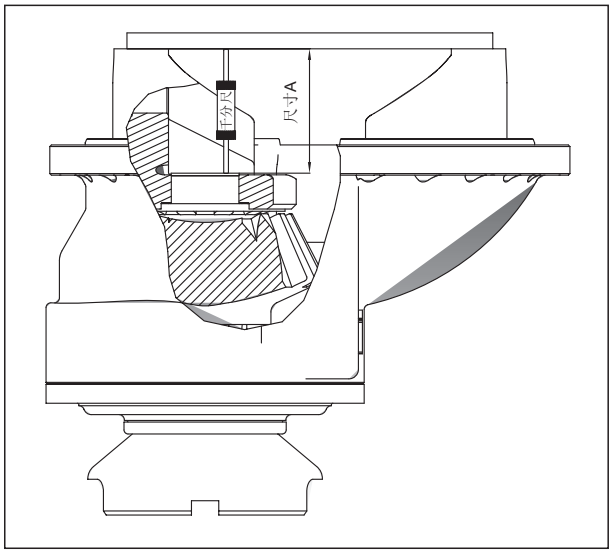


Fig.5 Measuring dimension A

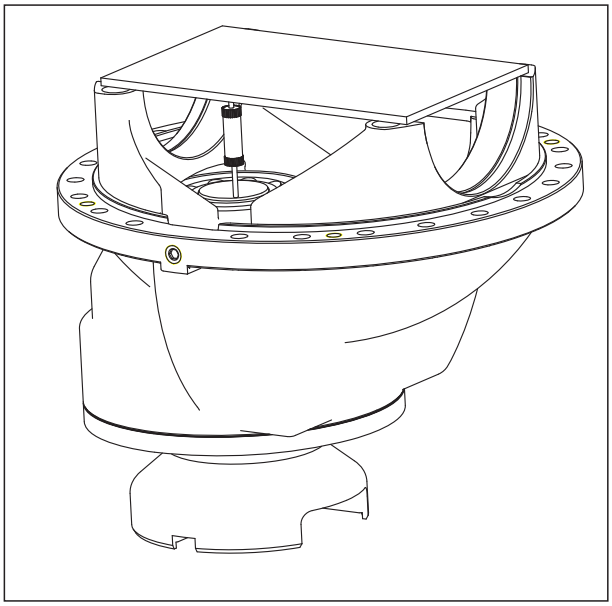


Fig.6 Method for measuring the dimension A

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& 14) and bearing seat (8) into main reducer housing (16). Secure bearing seat (8) with eight bolts (9) equally spaced.
c. Rotate the drive spiral bevel gear (13) and tighten bolts (9) until the gear(13) cannot be rotated by hand to seat the bearing rollers firmly.
d. Place a flat plate approximately 450 mm long and 300mm wide across the two bearing cap (20) mounting surfaces in main reducer housing (16) as shown in Fig.5. The plate must lie perfectly flat between the bearing cap mounting surfaces and must be clean and free of burrs.
e. Measure the distance from the end of drive spiral bevel gear (13) shaft to the plate (axle centre line). See Fig.6.
Record this distance as Dimension 'A'.
f. Record the dimension etched on the end of drive spiral bevel gear (13) as Dimension 'B'.
g. The correct thickness of shims (15) to be used is: Dimension 'X' + Dimension 'B' - Dimension 'A'.
2. Determine shim pack (10) thickness so as to allow the pair of bearing(12,14) on the drive spiral bevel gear (13) 0.02 - 0.05mm (0.0007 - 0.002 in) axial end play as follows:
a. With drive spiral bevel gear (13) installed as previously described in Steps 1-a through 1-f, rotate drive spiral bevel gear (13) and tighten the eight bolts (9) evenly spaced, to 110 N•m (80 lbf•ft) torque to seat the bearing rollers firmly.
b. Remove bolts (9) and reinstall two of them 180° apart. Tighten the two bolts alternately in 30 N•m (20 lbf•ft) increments to a final torque of 275 N•m(200 lbf•ft).
c. Measure the gap between bearing seat (8) and main reducer housing (16) adjacent to the two installed bolts and record the average measurement as Dimension 'C'.
d. The correct thickness of shim pack (10) is: Dimension 'C'(Step 2-c) +Dimension 'B' (Step 1f) - Dimension 'A' (Step 1-c)-0.04mm. This

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shim pack thickness should provide 0.02mm-0.05 mm (0.007-0.002 in) axial end play of bearing(12,14)on the drive spiral bevel gear (13).

3. Remove bolts (9) and remove bearing seat (8) from main reducer housing (16). Adjust shim pack (15) to the required thickness as calculated in Step 1-g and replace the ground bearing(14) cup with bearing cup to be installed permanently.

4. Install drive spiral bevel gear assembly (12, 13 & 14) in main reducer housing (16) as previously described in Steps1 and 2.

Note: Due to reasons such as measurement error, incompletely compacted shims during the measurement, the thickness of shim pack(15) and shim pack (10) measured and determined in the above-mentioned steps cannot be used as the final assembling thickness. It just provides a good starting point or reference to determine the final thickness. The final determining for the thickness of shim pack(15) is that make sure the value deviation is less than 0.075 mm (0.003 in) (see Fig.7), which between the actual adjustment distance measured as the bearing(14) pressed tightly with the clearance disappears and the dimension etched on the end of drive spiral bevel gear (13) .

The final judgment for determining the thickness of shims (10) is that position a dial indicator on the surface of bearing seat(8). the dial indicator should vertically to the bolt (2) head. With the bearing seat as the pivot, use a crowbar to act on the plate. The runout should be in range of 0.02 - 0.05 mm.

5. Install oil seal (11) into bearing seat (8) flush with the bearing seat shoulder at the seal bore.

6. Install measured shim pack (10) as calculated in Step 2-d on bearing seat (8) and install the assembly on main reducer housing (16). Align slot in bearing seat (8) with the lubrication holes in shims (10) and main

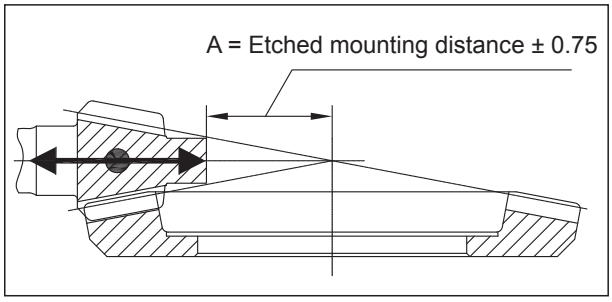


Fig.7 Allowable offset distance for initial adjustment of drive bevel gear

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reducer housing(16) and install bearing seat assembly in main reducer housing.
7. Install bolts (9) connecting bearing seat (8) to main reducer housing (16) and tighten to a torque of 270 N•m(198 lbf•ft). Install set screws (7) in bearing seat (8).
8. Lubricate the lip of sleeve (5) and spline of drive spiral bevel gear (13) with grease Lubricant.
9. Install yoke (4) assembly to operator spiral bevel gear (13) spline until it contacts bearing cone (12).
Note:DO not pound on yoke flange.
10. Install plate (3) and secure to drive spiral bevel gear (13) with bolts (2). Tighten bolts (2) to a torque of 270 N•m (198 lbf•ft) and secure with lockwire (1).

Driven spiral bevel gear assembly
1. Press thrust washer dowel pins (31) into holes in left differential housing(36) and left differential housing(38), if removed.
2. Install bolts (29) and nuts (28) and tighten to a torque of 900 N•m (663 lbf•ft).

Spider and component parts assembly
1. If the dowel pin (31) of half shaft bevel gear gasket (30) is removed, press it into the locating holes of left differential housing (36) and right differential housing (26).
2. Lubricate inner walls of left differential housing (36) and right differential housing (26) and all component parts with gear lubricant.
3. Position one thrust washer (30), grooved side facing towards axle shaft bevel gear in bore of right differential housing (26).
4. Install the first axle shaft bevel gear (32) machined surface against thrust washer (30) in right differential housing (26).
5. Install bearings (35) in planetary bevel gears (34) and install bearings and planetary bevel gears assembly on spider(35), if removed. Control the dimensions A and B as shown in Fig.8.

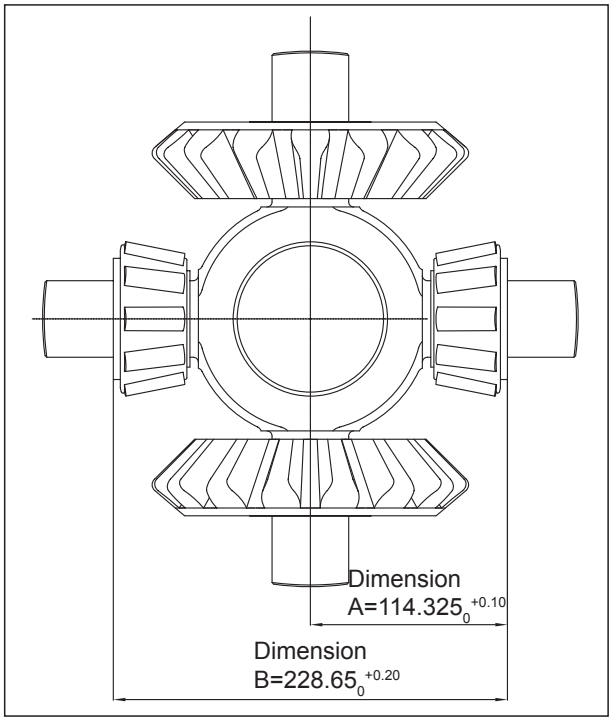


Fig.8 Installation of spider, bearing and planetary gear

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6. Lay complete spider assembly in planetary bevel gear grooves in face of right differential housing (26).
7. Install other axle shaft bevel gear (32) and thrust washer (30), with grooved side of washer mating with machined surface of axle shaft bevel gear, in left differential housing (36).
8. Assemble left differential housing (36) to the driven spiral bevel gear (27) and right differential housing (26) assembly, making certain that thrust washers (30) do not slip off dowel pins (31). Turn left differential housing (36) until the mating mark made during disassembly lines up with the mark made on right differential housing (26).
9. Apply retaining compound to bolts (37) and install four bolts (37) equally spaced. Tighten bolts (37) to a torque of 580 N•m (428 lbf•ft).
10. Check assembly for free gear rotation and correct if necessary. Install remaining bolts (37) and tighten to a torque of 580 N•m (428 lbf•ft).
11. Press side bearing (25) cones squarely and firmly over machined cylinders of left differential housing (36) and right differential housing (38).

Driven spiral bevel gear component assembly to main reducer housing

Bearing adjusters(24) have two basic functions:

Pre-loading cups and cones of bearing(25); and positioning driven spiral bevel gear(27) to obtain the correct backlash between the driven spiral bevel gear(27) and drive spiral bevel gear(13). The bearing adjuster (24) located on the same side of drive spiral bevel gear (13) as driven spiral bevel gear(27), pushes the driven spiral bevel gear toward the drive spiral bevel gear. Bearing adjuster (24), located on the opposite side of drive spiral bevel gear (13) than the driven spiral bevel gear, pushes the driven spiral bevel gear away from the drive spiral bevel gear. The driven spiral bevel gear assembly must be installed onto main

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reducer housing(16) so that cups and cones of bearing(25)are properly pre-loaded; correct backlash exists between driven spiral bevel gear (27) and drive spiral bevel gear (13), and satisfactory tooth pattern is established between driven spiral bevel gear (27) and drive spiral bevel gear (13).

These conditions can be obtained by using the following procedures:

1. Mount driven spiral bevel gear (27) and differential assembly on main reducer housing (16). Make sure that side bearing(25) cups are properly positioned on side bearing(25) cones. Install bearing caps (20) over cups and cones of bearing(25), then secure bearing caps to the main reducer housing with four dowel bushings (19) and bolts (21). Secure bolts snugly, but do not tighten them to torque specifications at this time.

Note: Each bearing cap (20) is mated to main reducer housing (16), therefore, they must be returned to their original positions by aligning the identification marks made during disassembly.

2. Install a dial indicator to check the back side of driven spiral bevel gear (27) for true running. Rotate the assembly with an easy motion and note the back face run-out. The run-out is not to exceed ±0.075 mm (0.003 in) with the dial indicator position as shown in Fig.9.

3. Using a micrometer, take a measurement diagonally across bearing cap (20) lock pads and record it for reference later.

4. Install bearing adjusters (24) in their respective bearing caps (20).

5. Place a dial indicator in the position shown in Fig.10, to check driven spiral bevel gear backlash. The dial indicator pointer must be perpendicular to the tooth surface. Tighten bearing adjuster (24) on the driven spiral bevel gear side until the backlash between driven spiral bevel gear (27) and drive spiral bevel gear (13) reads 0.41mm-0.56mm (0.016-0.022

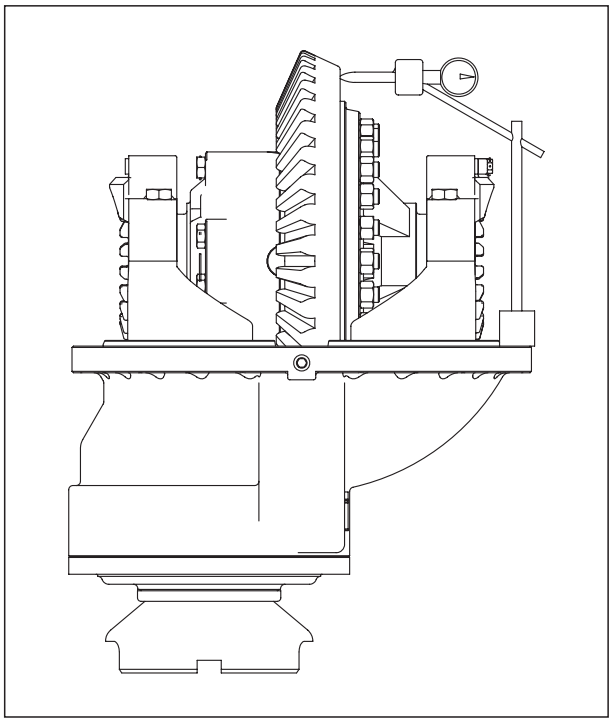


Fig.9 Checking Driven spiral bevel Gear Runout

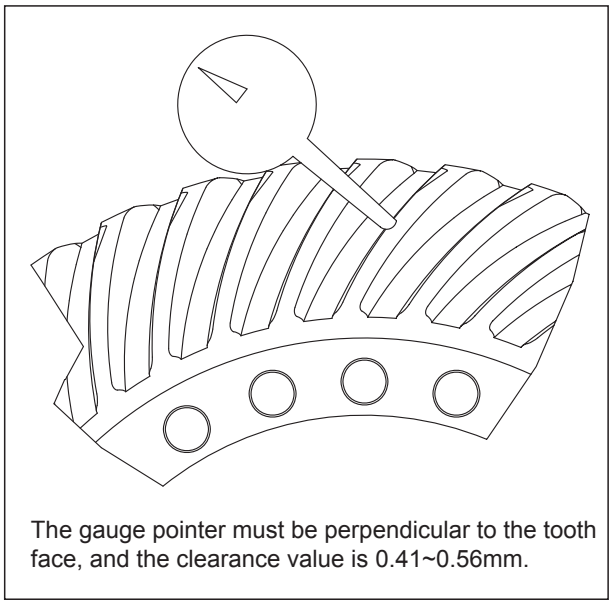


Fig.10 Checking Driven Spiral Bevel Gear Backlash

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in) on the dial indicator.
6. Tighten the opposite bearing adjuster (24) until another measurement across bearing cap (22) lock pads indicates a 0.05 - 0.13 mm (0.002 - 0.005 in) expansion when compared to the measurement recorded in Step 3. At the same time, rotate the driven spiral bevel gear(27) until the rotate torque is 9.5N•m-19N•m. Then the corresponding preload of the pair of bearing(25) is correct. This preload can be measured with a spring scale by pulling the bolt(29) in the tangential direction making the driven spiral bevel gear just rotating as the force is 53N-104N.
7. Recheck the backlash tolerance between driven spiral bevel gear (27) and drive spiral bevel gear (13) which should be 0.41 - 0.56 mm(0.016-0.022 in). If this tolerance has not been obtained at this point, it can be accomplished without changing the bearing preload by backing off one adjuster a certain number of notches and tightening up the opposite adjuster an equal number of notches.
8. When a satisfactory backlash tolerance has been established, check the gear tooth pattern as described under the heading 'Adjustments'.
9. If gear tooth pattern is not correct, some correction can be made by systematically loosening and tightening the bearing adjusters (24), as previously described, but in every instance re-check the backlash tolerance. If a favourable gear tooth pattern cannot be established within the backlash tolerance, it will be necessary to alter, add or remove, shims(15) between bearing(14) cup and main reducer housing(16) and alter shims (10) by the same amount.
10. When altering these shims as described in ' drive Spiral Bevel Gear Group ', disregard all procedures given for comparing the micrometer (measured) dimension and etched dimension on drive Spiral Bevel Gear (13) tail shaft end.
11. The procedures for keeping differential

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side bearing preload, backlash and favourable gear tooth pattern within specifications is strictly a ' try, check, and try again ' method.
12. After a satisfactory preload, backlash and gear tooth pattern is obtained, make certain that the bolts (9) are tightened to a torque of 270N•m (198 lbf•ft). Again check backlash tolerance and gear tooth pattern.
13. Tighten bearing cap bolts (21) to a torque of 900 N•m (663 lbf•ft) and tie with lockwire (1). The lockwire passes over the top of bearing cap (20) and through the heads of the respective bolts. The same procedure is to be followed for both bearing caps.
14. A final measurement across bearing cap (20) pilot pads must indicate a 0.05 mm (0.002 in) to 0.13 mm(0.005 in) expansion, after ten driven spiral bevel gear revolutions under a light load, when compared to the original measurement recorded in Step 3. This ensures that the side bearings have the proper preload.
15. Install adjuster locks (22) and secure with bolts (23). Tighten bolts (23) to a torque of 74 N•m (54 lbf•ft) and tie with lockwire (1).

Adjustment

When adjusting a noisy main reducer and differential assembly that has been in service for some time, more harm than good can result. Changes in adjustment will frequently concentrate the bearing area on a small portion of the teeth which often results in failure. Therefore, it is advisable to know exactly what the end result will be before adjustments are made in an old differential.
Note: A rebuilt main reducer and differential assembly or one that has not worn excessively may be adjusted as previously described.
The following suggestions are offered to make gear tooth pattern analysis and identification easier.
1. Paint twelve teeth of driven spiral bevel gear with Prussian Blue, oiled red lead, or

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some other easily removed paint or dye. When the drive spiral bevel gear is rotated, the paint is squeezed away by the contact of the teeth, leaving bare areas the exact size, shape and location of the contacts.

2. Make this check by rotating the driven spiral bevel gear at least ten revolutions under light drive load. Another method for checking contact pattern is to turn the driven spiral bevel gear clockwise and anticlockwise several times. For sharper impressions apply a drag on the driven spiral bevel gear by forcing a wooden block against the edge of the driven spiral bevel gear gear while it is being turned.

3. Gear tooth patterns can be interpreted by referring to Figs. 11- 16.

a. If a contact pattern similar to that shown in Fig.11 is obtained, the adjustment is correct.

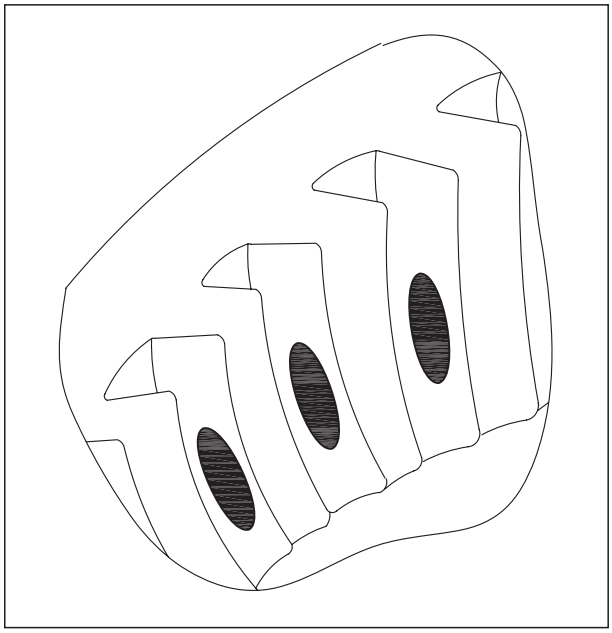


Fig.11 Proper Tooth Contact

b. If the contact area is on the inner side of the driven spiral bevel gear(27) teeth, see Fig.12, move driven spiral bevel(27) away from drive spiral bevel gear(13) by turning bearing adjusters equal amounts until the proper bearing pattern is obtained.

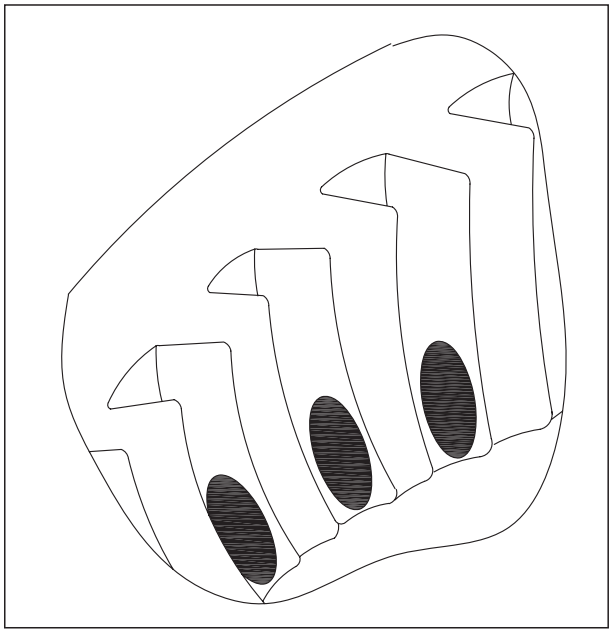


Fig.12 Insufficient Backlash

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c. If the contact area is on the outer part of the driven spiral bevel gear teeth, see Fig.13, move driven spiral bevel gear toward pinion by turning bearing adjuster.

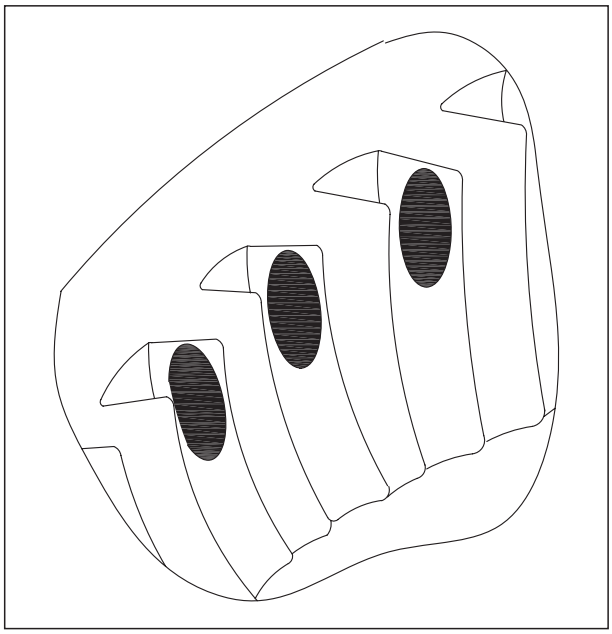


Fig.13 Excessive Backlash

d. If the contact area is along the root of the driven spiral bevel gear teeth, see Fig.14, move the drive spiral bevel gear out by adding shims.

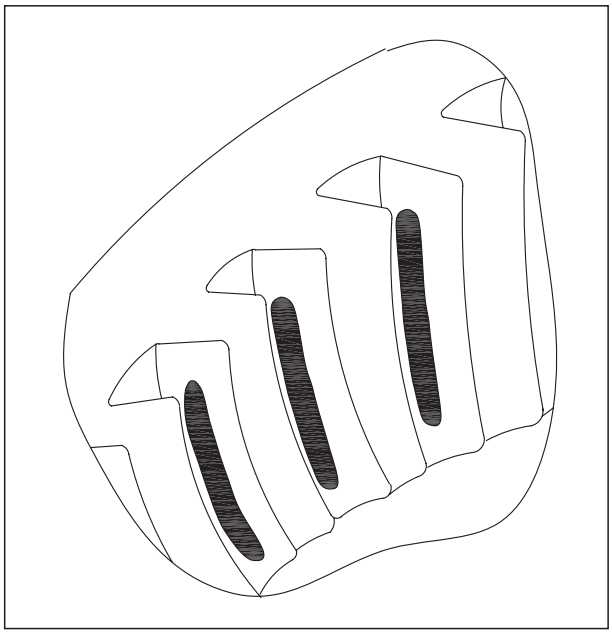


Fig.14 Drive spiral bevel gear in Too Far - Add Shims

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e. If the contact area is along the top edge of the driven spiral bevel gear teeth, see Fig.15, move the drive spiral bevel gear in by removing shims.

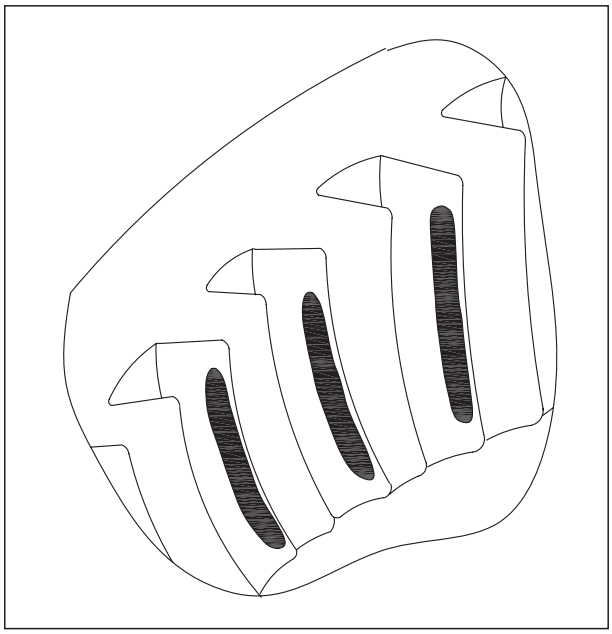


Fig.15 Drive spiral bevel gears out Too Far - Remove Shims

Installation

Numbers in parentheses refer to Fig.1.

1. Be sure truck wheels are chocked securely.
2. If the body is not already raised, raise body and install body prop pins. Refer to Section 23, BODY AND MOUNTING.
3. Clean mating surfaces of the banjo and main reducer and differential assembly with a hydrocarbon solvent to remove dirt, oil, grease, or other foreign matter. Wipe cleaned surfaces dry. Apply the sealant cord as follows: The adhesive side of the cord is applied to the banjo face, starting at the top, looping once around the first stud, then to the second stud, etc., ensuring not to overstretch the cord and that the loop between the studs will be on the inside of any of the main reducer and differential assembly extraction holes. Working all the way round finishing with an overlap at the top.
4. Set screw (18) should already have been removed from the top of the differential housing and replaced with a lifting eye during removal. If not, remove set screw (18) from main reducer housing and replace it with a lifting eye.
5. Position the main reducer and differential assembly under the truck in front of the banjo housing.
6. Install chain fall or come-a-long to the loop on the body just behind the hoist brackets. Attach the other end of the lifting device to the eye previously installed in the main reducer and differential assembly.
7. Lift the main reducer and differential assembly and carefully position it on the studs of the banjo housing.
8. Secure the main reducer and differential assembly to the banjo with the self locking

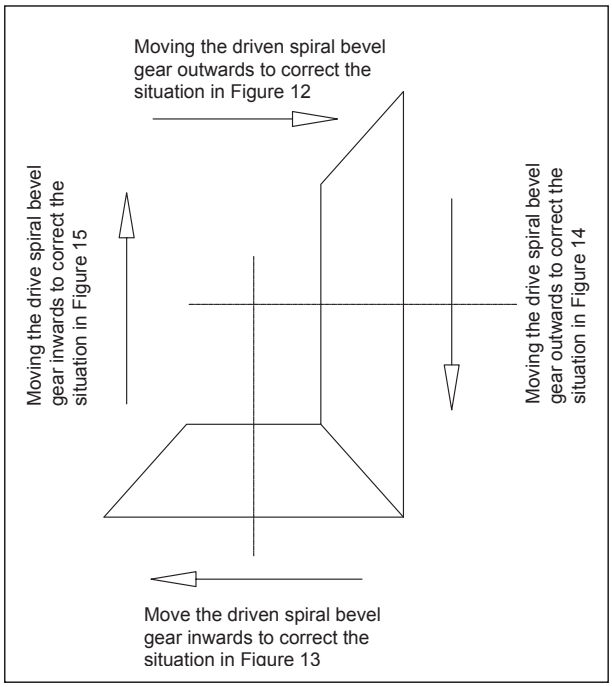


Fig.16 Correct movement for adjustment

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nuts removed at removal. Tighten the nuts evenly in increments of 90 N•m (66 lbf•ft) to a final torque of 541 N•m (399 lbf•ft).
9. Replace the rear driveline, aligning marks made during disassembly. Refer to Section 19, Rear driveline.
10. Install the axle shafts, then replace and secure the driving flange cover to the wheels. Refer to Section 3.1, Planetary assembly.
11. Fill the drive axle, planetary reservoirs and main reducer anddifferential assembly with the proper grade and quantity of lubricant specified in Section 38.1, lubrication system.

Maintenance

Periodic inspection
Inspect regularly the flange yoke mounting bolts, drive spiral bevel gear shaft nut, bearing seat and bearing seat bolts and main reducer and differential assembly stud nuts for tightness. Tighten the stud nuts and flange bolts weekly until they 'set' or show that they no longer need tightening. Keep the nuts tight to reduce the possibility of main reducer and differential assembly or driveline failure due to excessive vibration or wear. Replace any mounting studs which have become stripped or broken.
Jack up the drive axle to 'test run' the main reducer and differential assembly and listen for noises which may indicate the need for adjustment or replacement of worn parts.
When doing this, lift BOTH wheels off the ground. Both wheel brakes should be free to allow both wheels to rotate at approximately the same speed.
Note: Do not operate with only one wheel jacked up. Excessive operation in this manner will overheat the differential spider and cause galling or shearing of the spider trunnions and bearings.
If the main reducer and differential assembly is excessively noisy, it should be removed from

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the banjo and disassembled for inspection.

Lubrication

The main reducer and differential assembly is splash lubricated with an extreme pressure lubricant. The fill level plug is located in the centre rear of the banjo housing.

The main reducer and differential assembly should be checked and periodically drained and filled to the bottom of the fill-level hole, or to no more than 13 mm (0.5 in) below the fill level, with new lubricant as recommended. Refer to Section 38.1, lubrication system. When the lubricant is drained, remove any chips of steel particles that may be attached to the magnetic drain plug located in the bottom of the banjo housing. After draining and refilling an axle, the planetary gearing should be checked after 10 hours of operation.

1. Check the level in planetaries at oil level plug. If the oil level is low, add oil. This check point is a minimum check point only. If the oil level is above the check point, do not drain off oil.

2. Add oil if needed. The oil level is correct when oil flows from the lube level check plug in the banjo. These checks should be made every 10 hours until oil level in the differential is maintained.

SPECIAL TORQUE SPECIFICATIONS				
FIG. NO.	ITEM NO.	ITEM NAME	Torque	
			N•m	lbf·ft
1	2	Bolt	270	198
1	9	Bolt	270	198
1	21	Bolt	900	663
1	23	Bolt	74	54
1	28	Nut	900	663
1	29	Bolt	900	663
1	37	Bolt	580	428

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Table of fault diagnosis		
Condition	Reason	Remedy
Vibration	Broken gear teeth.	Replace the damaged gear.
	The drive spiral bevel gear or bearing seat are excessively worn.	Disassemble, correct or replace faulty part.
Continuous noise	Bearing worn.	Replace worn parts.
	Gears damaged or worn.	Replace gears.
Noise on drive.	The drive and driven gears adjustment tight.	Adjust.
Noise on coast.	Bearing damaged.	Replace the bearing.
	Loose the drive and driven spiral bevel gear adjustment.	Readjust it.
	Excessive drive spiral bevel gear end play.	Readjust it.
Noise on turns.	Worn axle shaft bevel gears or planetary bevel gears.	Replace the gear.
	Worn or damaged spider bushings.	Replace the bearing.
Loss of lubricant.	Oil seals worn.	Replace seal.
	Loose nuts.	Tighten nuts to correct torque.
	Cracked housing.	Repair or replace housing.

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3.1.4 Rear axle housing assembly

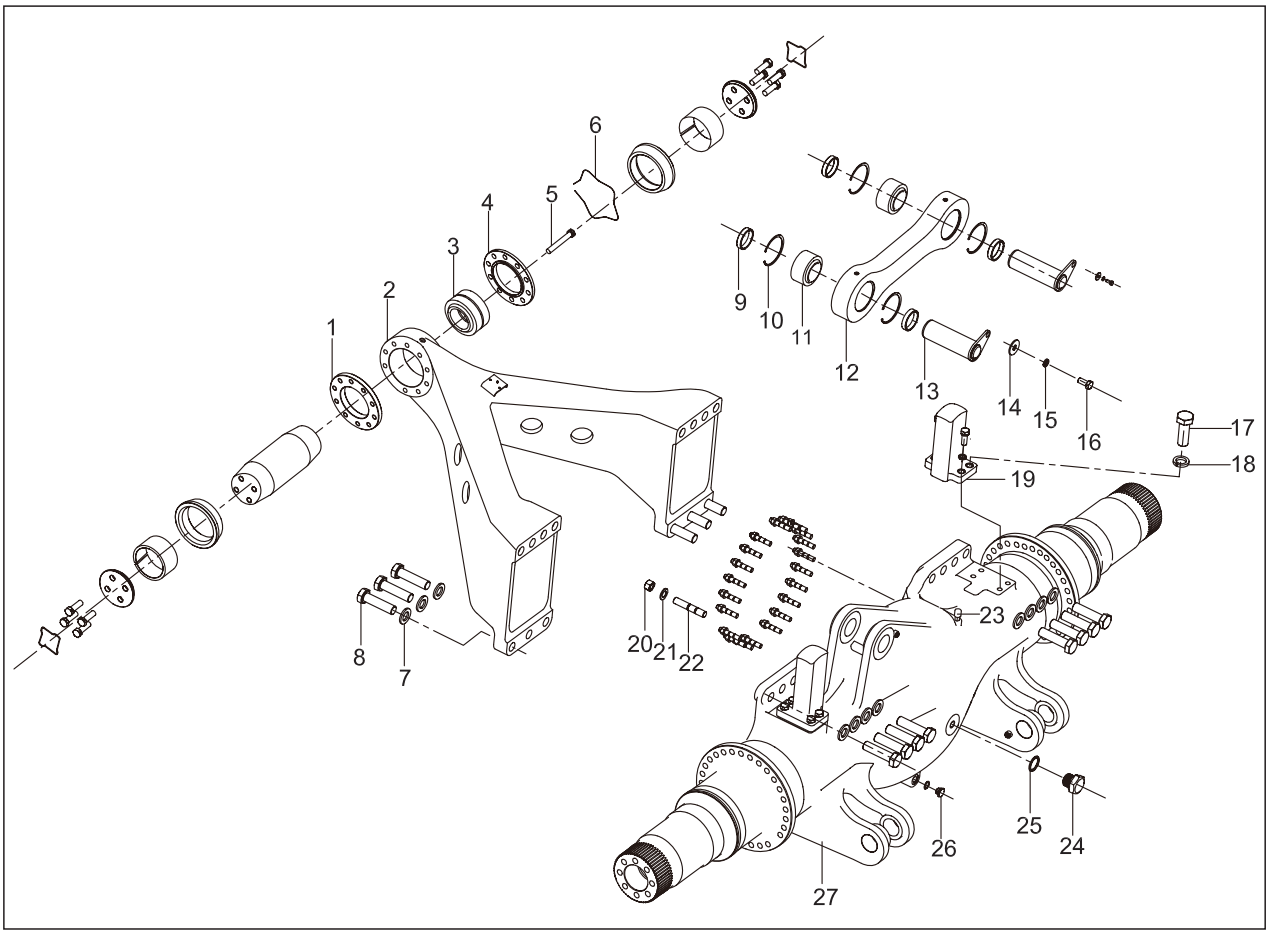


Fig.1 Rear axle housing assembly

1. Thread gasket
2. A-frame assembly
3. Bearing
4. Gasket
5. Bolt
6. Steel wire
7. Washer
8. Bolt
9. Spacer
10. Snap ring
11. Bearing
12. Link
13. Shaft
14. Washer
15. Washer
16. Bolt
17. Bolt
18. Washer
19. oscillation Stop
20. Link nut
21. Washer
22. stud
23. Breather
24. Screw plug
25. Washer
26. Screw plug
27. Axle housing component

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Description and operation

The rear axle assembly consists of axle housing assembly(27) , A-frame (2) and Link(12). The axle housing assembly provides the housing for the differential and axle shafts which drive the wheels, and spindles to which the wheels are mounted. The axle housing assembly also connects the rear wheels to the chassis through A-frame (2), Link(12), and the rear ride cylinders.

Removal and disassembly

See Fig.1 for the numbers in the brackets.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of dequate capacity and properly secured to dothe job safely.

1. Remove the bolt (5) from A-frame assembly (2), take down the gasket (4) and thread gasket (1). Then remove the bearing (3). If necessary, the grease fitting can be removed from the A-frame assembly (2).
2. Remove the A-frame assembly (2) from the axle housing assembly (27) by Disassembly bolt (8) and washer (7). Before Disassembly, use the proper hoist device to lift up A-frame.
3. Remove the bolt (17), Washer (18) and take down the oscillation stop (19).
4. Remove the bolt(16), washer(15), (14) and shaft(13). Take down the spacer (9) and link(12).
5. Remove the Snap ring (10) and bearing (11) from the link (12).
6. Remove the breather (23) from the axle housing assembly (27).

Inspection

1. Clean all metal parts in a suitable solvent, using a brush to clean bearings. Dry all parts

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on a clean surface and allow bearings to dry naturally. Make sure parts are free from dirt.
2. Check all inner and outer grooves for cleanliness. Check components for cracks, scores, blemishes or burrs. Use a fine stone to smooth out defective areas. Replace any parts that show excessive wear.
3. Inspect fittings, plugs, studs and their seating positions for thread wear. If threads in any of these parts are damaged, replace parts.
4. Check the bush, bearing and snap ring for wearing or deformation. Replace the defective parts and components.
5. Replace the used gasket.

Assembly and installation

See Fig.1 for the numbers in brackets.

Note: Tighten all fasteners without special torques specified to standard torques listed in Section 38.2 'Standard bolt and nut torque specifications', unless it is otherwise noted.

Note: If heating of axle housing is required to assemble spindles and axle housing, axle housing interference areas must cool to 66° C (150° F) maximum before welding. For welding spindles to axle housing preheat spindles and axle housing to 150° C (300° F) minimum in weld area and maintain during welding.

1. Install the washer (25), Screw plug (24) and Screw plug (26) onto the axle housing assembly (27).
2. Install the breather (23) onto the axle housing assembly (27).
3. Install the bearing (11) onto the link (12) and use the Snap ring (10) for fixing. Then, install the assembled link components onto the axle housing component (27) and install the spacer (9) and the articulated shaft (13). Then use the washer (14) , (15) and bolt (16) to fix the link (12) onto the axle housing components (27).
4. Use the bolt (17) and washer (18) to fix the oscillation Stop (19) onto the axle housing component (27).

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5. Install the bearing (11) onto the A-frame assembly (2), and install the thread gasket (1) and gasket (4). Use the bolt (5) to fix them onto the A-frame assembly (2) and use steel wire (6) to lock the bolt (5).
6. Use a proper hoist device to install the A-frame assembly (2) onto the axle housing components (27) and use the bolt (8) and washer (7) for fixation. The tightening moment of bolt (8) is 3640 N•m.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

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3.1.5 Rear brake and installation

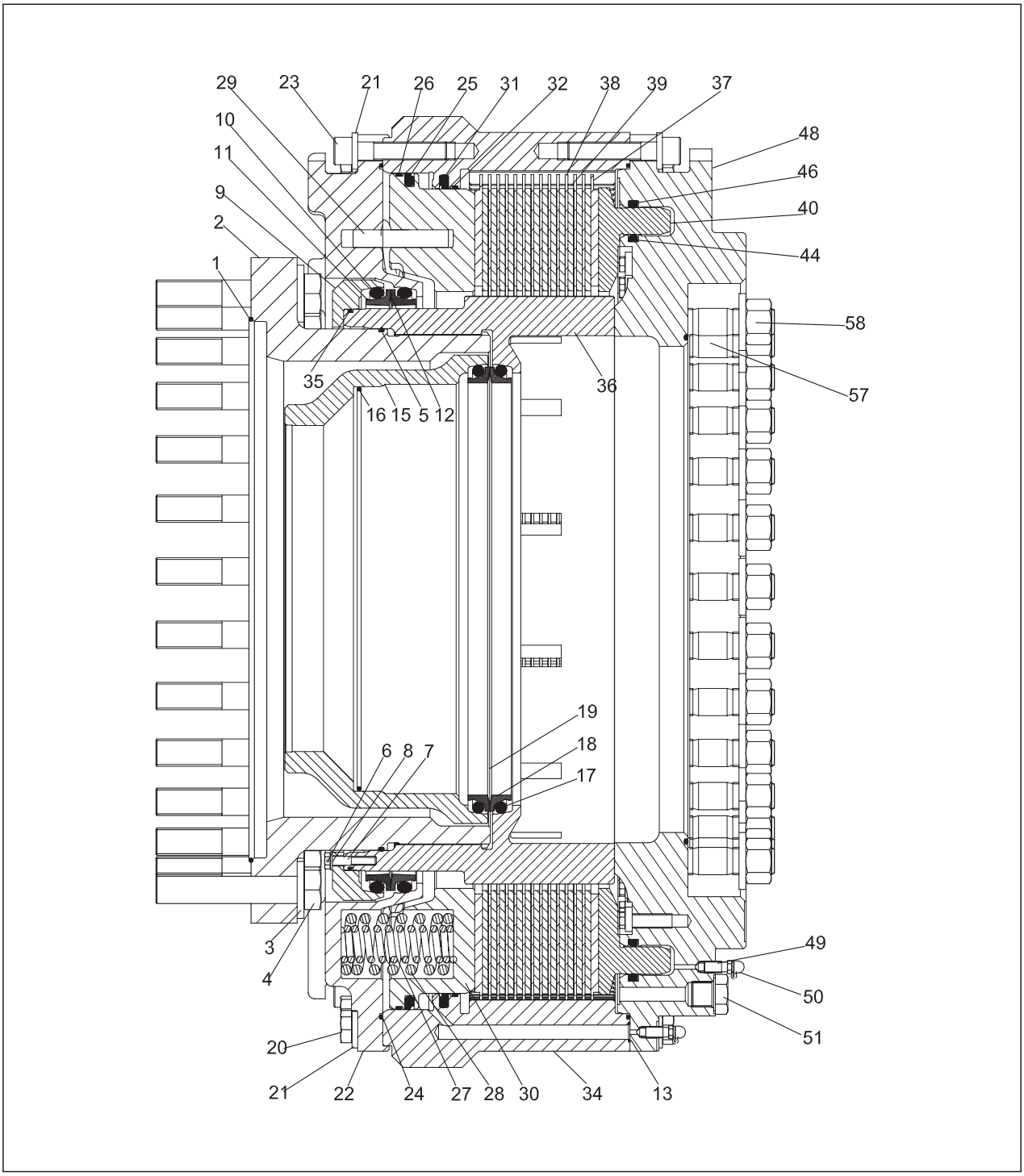


Fig.1 General view of brake

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1. O-ring
2. Driving wheel
3. Hardened washer
4. Bolt
5. O-ring
6. Lockwire
7. Bolt
8. washer
9. Outer seal housing
10. O-ring
11. Seal ring
12. Dynamic seal assembly
13. O-ring
15. Inner seal housing
16. O-ring
17. O-ring
18. Seal ring
19. Dynamic seal assembly
20. Bolt
21. washer
22. Spring housing
23. Socket head screw
24. O-ring
25. OG seal ring
26. Guiding belt
27. Spring
28. Spring
29. Pin
30. Parking brake piston
31. OD seal ring
32. Guiding belt
33. Pin
34. Housing
35. O-ring
36. Driving disc
37. damper plate
38. Friction disc
39. Friction plate
40. Service brake piston
41. Bolt
42. Mounting plate
43. Spring
44. Pin
45. Return pin
46. D-ring
47. D-ring
48. Service brake piston housing
49. Bleeder screw
50. Dust boot
51. Plug
53. Stud
54. Locknut

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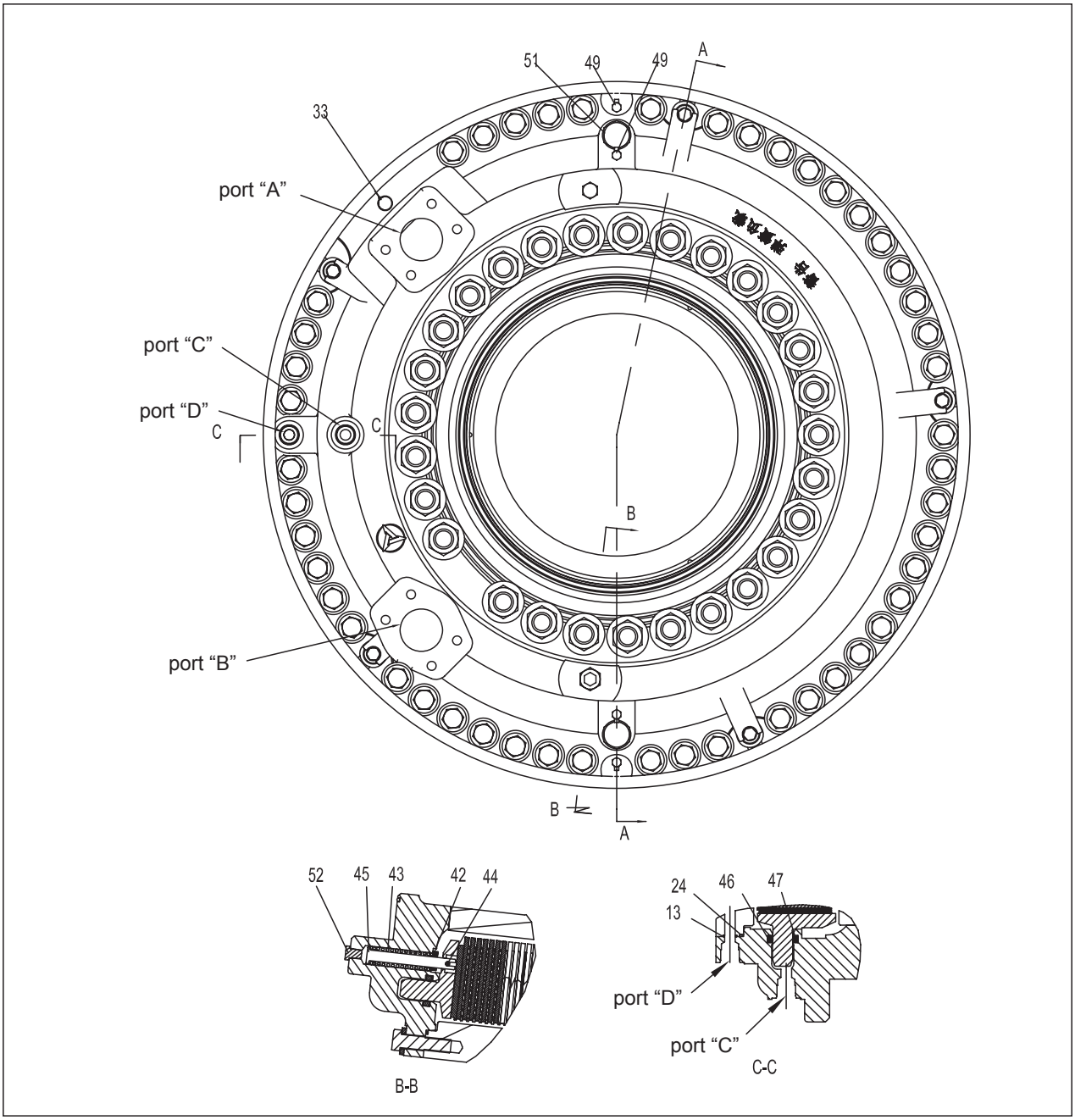


Fig.2 Structure of brake

13. O-ring
24. O-ring
33. Pin
42. Mounting plate
43. Spring
44. Pin
45. Return pin
46. D-ring
47. D-ring
49. Bleeder screw
51. Plug
52. Plug

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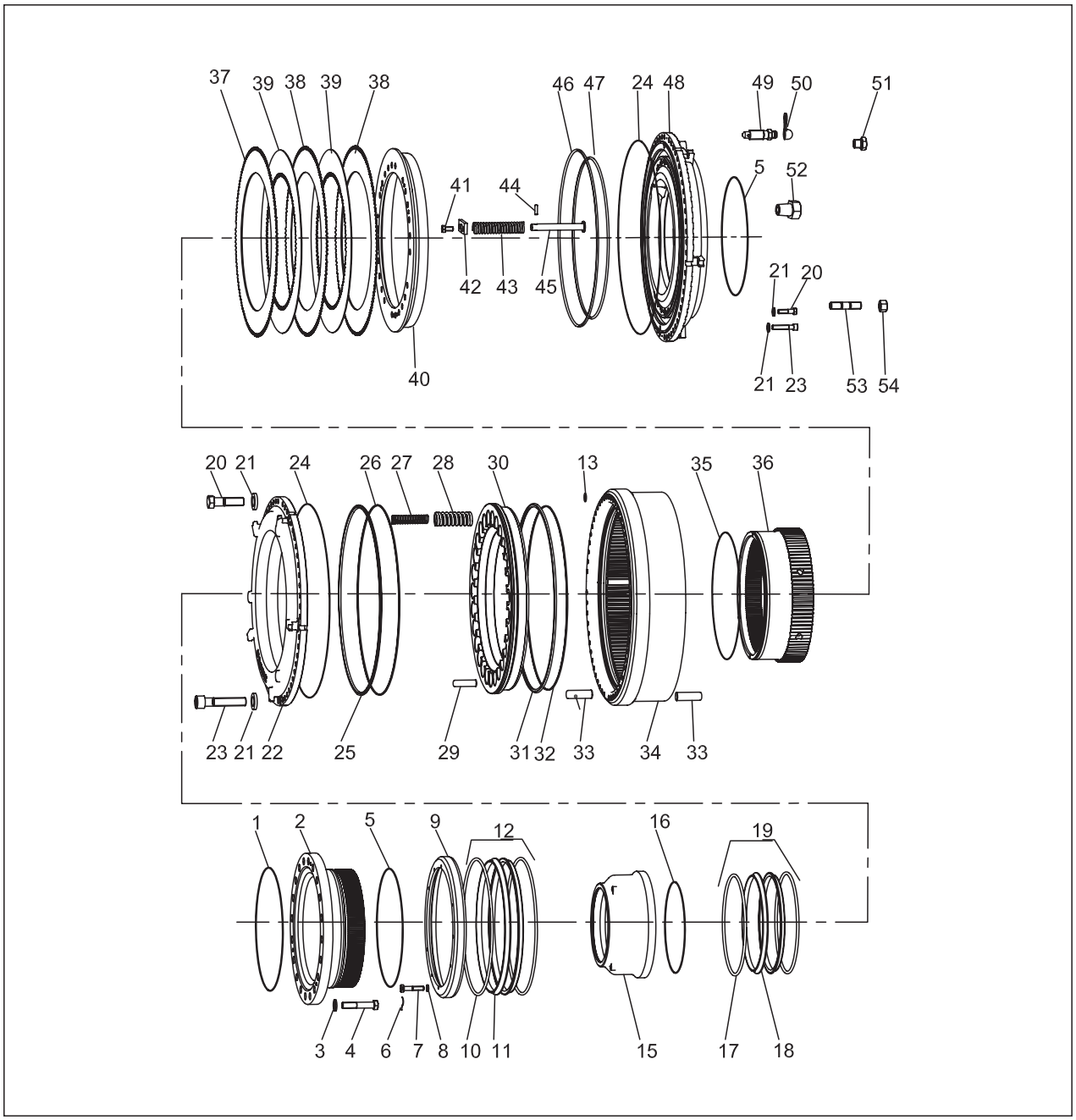


Fig.3 Exploded view of brake assembly(Refer to Fig.1 and Fig.2 for the part names corresponding to the numbers)

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Operation overview

Refer to Fig.1 and Fig.2 for numbers in brackets.

Service brake

Note: The service brakes are of 'Upright Design', i. E. requiring pressure to hold the brakes on.

The rear service brake utilizes hydraulic force to slow or stop the driving wheel. When the pedal of foot brake in the cab is pressed down or the retarder control lever on the central operating console is operated and the retarder selector switch (if equipped) is turned into the position of rear disc brake, the hydraulic oil will be transmitted to the port ‘C’ on the rear disc brake, referring to Fig.2. The hydraulic oil entering into the port ‘C’ forces the service brake piston (40) against the brake disc pack consisting of the damper plate (37), friction disc (38) and friction plate (39).

The friction plate is clamped between the friction disc (38) and it is driven by the wheel via the driving wheel (2) and driving disc (36). To decelerate or stop the driving wheel, pressing force applied onto the brake disc component directly depends on the pressed level of brake pedal.

When the service brake pedal or retarder control lever is released, the pressure asainst the service brake piston (40) is immediately relieved. The force of brake return spring (43) tightly against the head of the return pin (45) makes the return pin pull the piston (40) back to the original position, and consequently the pressure against the brake disc pack is released.

Parking brake

Note: The parking brake is of 'Inverted Design', i. E. requiring pressure to hold the brakes off.

This brake is operated with the parking/ emergency brake control button mounted on

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the instrument panel. It is applied with spring force and released with hydraulic force. When the control button is released, the hydraulic oil enters into the port ‘D’, referring to Fig.2. And it flows into the oil passage in front of the parking brake piston (30) via the guide groove inside the brake disc housing (34). At the moment, the hydraulic oil will push the piston (30) to overcome the tension of springs (27 and 28) and to remove pressure on the baffle (37). Consequently, the release of the brake disc component is maintained. If the control button is pressed, the oil pressure at the port ‘D’ and that tightly against the parking piston (30) will be immediately released. The tention of springs (27, 28) recovers and forces against the damper plate (37) and disc pack consisting of friction disc(38)and friction plate(39). At the moment, the rotating friction plates clamped between friction discs are immediately pressed tightly, thus keeping the wheels from rotating.

Removal

Refer to Fig.1 and Fig.2 for numbers in brackets.

Note: Before the disc brake assembly is removed and disassembled, the wear extent of friction plates and baffles should be recorded referring to the specifications on measuring procedure and maximum allowed wear limit described in the 'Measuring procedure for disc brake assembly wear' under 'Inspection' in this section.

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⚠ warning

To prevent personal injury and equipment loss, it should be ensured that the hoist equipment has sufficient carrying capacity and the wheels are reliably fixed and chocked to enable safe operation.
After the engine is shut down, the hydraulic oil still remains in the brake system. Before the brake system is operated, the pedal valve should be continuously operated until the pressure is completely released, so that severe personal injuries can be avoided.
Use extreme caution when removing wheels. Specific operation procedure must be complied with as describedi in 'tyre and rim assembly'.

1. Place the truck in a flat place, apply parking brake, turn off the engine, turn the steering wheel in the two directions for several times, and release the pressure of the steering system.
2. Continuously press down the brake pedal to release the brake system pressure. Chock the wheels and set the main switch of battery into the ‘OFF’ position.
3. Remove the plug (51). Drain the cooling oil inside the disc brake assembly into a clean container and then reinstall the plug.
4. Remove the bleeder screw (49) at the bottom. Drain the brake hydraulic oil into a clean container. Then reinstall the bleeder screw.

Note: To reduce the loss of hydraulic oil during removing of oil pipe from the brake assembly, the air breather on steering and brake control oil tank can be removed in advance and the port can be connected to the vacuum pump to evacuate the air in the tank to vacuum of 0.5 - 0.7 bar.

5. Remove the brake cooling pipe from the

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ports 'A' and 'B' of the service brake piston housing (48) and marks properly, referring to Fig.2. Plug the pipes and ports to prevent contamination and keep oil in the pipes and housing.

6. Remove the service brake pipe from the port 'C'of the service brake piston housing (48) and mark properly, referring to Fig.2. Plug the pipes and ports to prevent contamination and keep oil in the pipes.

7. Remove the parking brake pipe from the port 'D' of the service brake piston housing (48) and mark properly, referring to Fig.2. Plug the pipes and ports to prevent contamination and keep oil in the pipes.

8. Remove the wheel assembly from the truck as described in Chapter 4 'REAR WHEEL ASSEMBLY'.

9. Orient the driving wheel (2) upwards and place the wheel assembly in a horizontal position. Remove and discard the O-ring (5) from the outer diameter of driving wheel (2).

10. Remove the bolt (4) and hardened washer (3) securing the driving wheel (2) to the wheel and use a proper lifting device to remove the driving wheel from wheel.

11. Remove the O-ring (1) from the wheel and discard it.

12. Remove the inner seal housing (15). Remove and discard the O-ring (16).

13. Remove the dynamic seal assembly (19) from the inner seal housing (15) and driving disc (36), and discard the 'O'rings. The reserved metal seal elements are put aside for inspection.

14. Remove one bolt (20) and hardened washer (21) from the spring housing (22) and the service brake piston housing (48) respectively. The two bolts removed should be located as close to 12 o'clock as possible. Then intall a lifting eye in each bolt hole.

15. Connect a proper lifting device to the lifting eyes installed on the disc brake assembly in Step 14 and tension it upwards. Then remove

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the nut (54). Use lifting device to carefully remove the disc brake assembly from the spindle. Place it in a clean flat area with the spring housing (22) oriented upwards.
16. Repeat Steps 3-15 to remove the opposite disc brake assembly.

Disassembly
Refer to Fig.3 for numbers in the brackets.

⚠ warning

To prevent personal injury and equipment loss, it should be ensured that the hoist equipment has sufficient carrying capacity and the wheels are reliably fixed and chocked to enable safe operation.

1. Remove the lockwire (6) on the bolt (7), and remove the bolt (7) and washer (8) securing the outer seal housing (9) to the driving disc (36). Then remove the outer seal housing.
2. Remove and discard the O-ring (35) from the outer diameter of driving disc (36).
3. Remove the dynamic seal assembly (12) from the driving disc (36) and discard its O-ring. The reserved metal elements should have no scratch or damage.
4. Use a proper lifting device to carefully lift the driving disc (36) out of the disc brake assembly. Use a lifting device to turn over the disc brake assembly to orient the service brake piston housing (48) upwards.
5. Remove and discard the O-ring (5) from the service brake piston housing (48). If necessary, the bleeder screw (49) can be removed from the service brake piston housing.
6. Remove the plug (51) and the O-ring (5) on the service brake piston housing (48) and discard the O-ring.
7. If necessary, remove the stud (53) from the service brake piston housing (48).
8. Remove the bolt (20) and washer (21) from

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the service brake piston housing (48).

9. Remove the socket head screw (23) and hardened washer (21) with great care. Alternately unscrew each screw by one turn every time to prevent the service brake piston housing (48) pressed by the springs (27 and 28) from being ejected.

⚠ warning

To prevent personal injury and equipment damage, take great care to remove the socket head bolt (23) and hardened washer (21) , for the spring housing (22) is under the pressure from the springs (27, 28).

10. Use a proper lifting device to remove the service brake piston housing (48) from the brake housing(34) , and place it in a flat area with service brake piston (40) side oriented upwards.

11. Remove and discard the 'O'rings (24 and 13) from the service brake piston housing(48).

12. Use the tool shown in Fig.4 (**Note**: The tool can be fabricated as shown in Fig.20). Screw the T handle of the tool into the threaded hole in the end of a return pin (45). Place the base of this tool on the flat surface of service brake piston (40). Press down the handle of the tool to raise the return pin (45) and compression spring (36) until the pin (44) is pulled out of the return pin. Then remove the tool. Refer to Fig.5.

13. Repeat Step 12 to remove the pin (44) on each return pin (45).

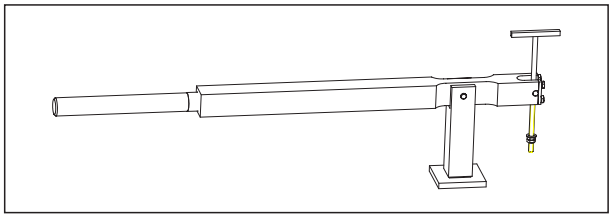


Fig.4 Spring compression tool

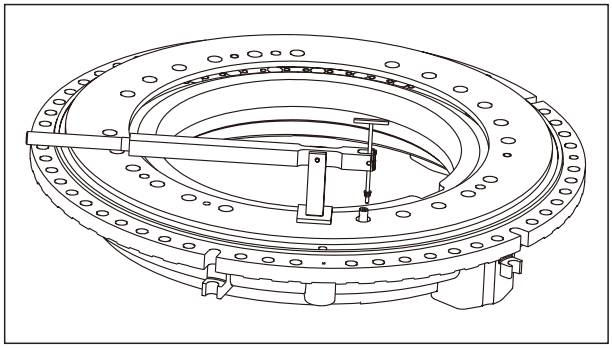


Fig.5 Schematic diagram for operation of spring compression tool

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14. Install three M12 bolts in three threaded holes on the service brake piston (40) for pulling. Alternately screw in the bolts to gradually pull the service brake piston (40) out of the service brake piston housing (48). Then remove the three pulling bolts and remove the service brake piston. Refer to Fig.6.
15. Remove and discard D-rings (46, 47) from the service brake piston housing (48).

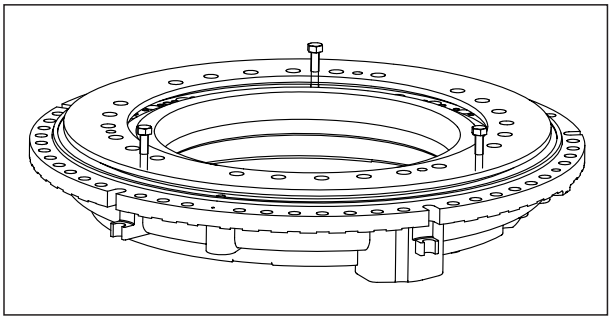


Fig.6 Schematic diagram for service piston removing

16. As the spring (43) is under the mounting plate (42), the mounting plate (42) and bolt (41) for fixing the spring (43) should be removed from the service brake piston housing (48) with great care. Refer to Fig.7.
17. Remove the return pin (45) and return spring (43) from the service brake piston housing (48). Refer to Fig.7.

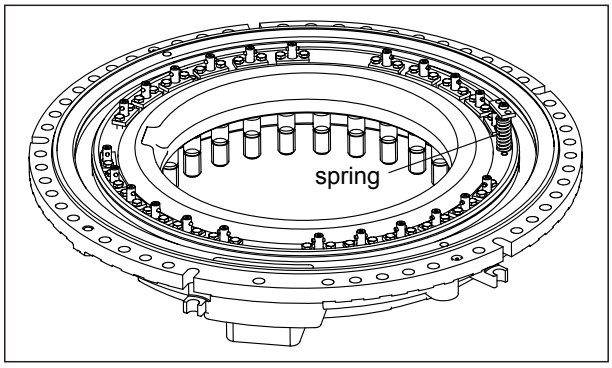


Fig.7 Schematic diagram for returen pin and spring removing

18. Remove the damper plate (37) in one side of the brake disc housing (34). Subsequently, remove all friction plates (39) and friction discs (38) alternately until the baffle (28) in the other side is removed. Refer to Fig.8.
19. If necessary, remove the pin (33) from the brake disc housing (34).
20. Use a lifting device to turn over the brake disc housing (34) to orient the spring housing (22) side upwards. Remove the bolt (20) and hardened washer (21) from the spring housing (22).

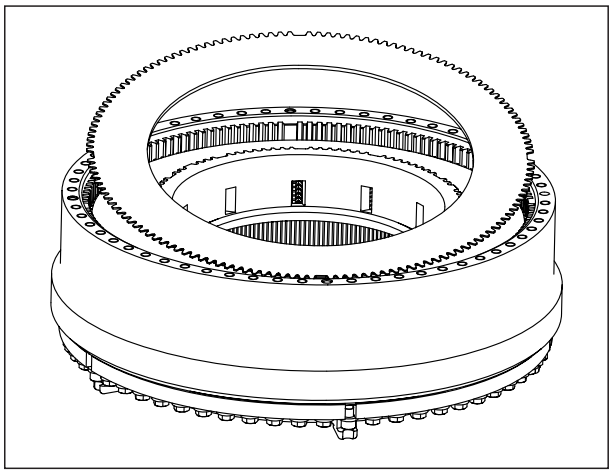


Fig.8 Schematic diagram for friction pack removing

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⚠ warning

For the spring housing is under the pressure from spring (27, 28), to prevent personal injury and equipment damage, take great care to remove the socket head bolt (23) and hardened washer (21) from the spring housing (22).

21. Alternately unscrew socket head screws (23) by one turn every time, and remove them along with the hardened washers (21). Then use a lifting device to remove the spring housing (22) from the brake disc housing (34). Refer to Fig.9.
22. Remove and discard the O-ring (24) from the spring housing (22). Remove the springs (27, 28) from the parking piston (30).
23. Use the lifting tool shown in Fig.10 to lift and remove the parking piston (30), and the lifting tool can be fabricated according to Fig.23. Place legs of the tool on the edge of brake disc housing to make the tool over parking piston. Align the three holes of the tool with three threaded holes in the parking piston. Then insert three M12 bolts through the three holes into the three threaded holes in the parking piston. When screw the bolts downwards, the parking piston will move upwards until out of the brake disc housing due to the support of lifting tool. Then lift out the parking piston. Refer to Fig.11.
24. Remove and discard the OG seal ring (25) and Guiding belt (26) from the parking piston (30).
25. If necessary, the pin (29) can be removed from the parking piston (30).
26. Remove and discard the OD seal ring (31) on the brake disc housing (34). Then remove the Guiding belt (32).
27. If necessary, remove the pin (33) from the brake disc housing (34).

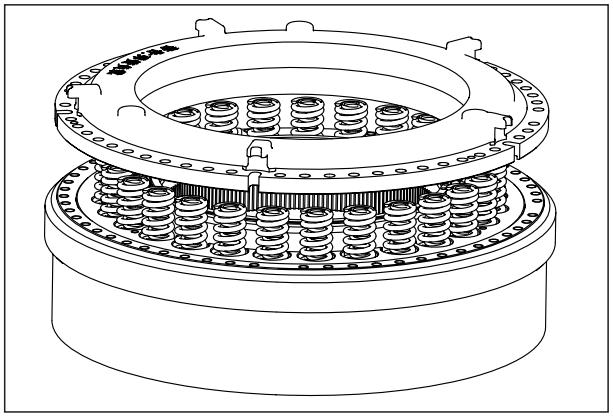


Fig.9 Schematic diagram for spring housing removing

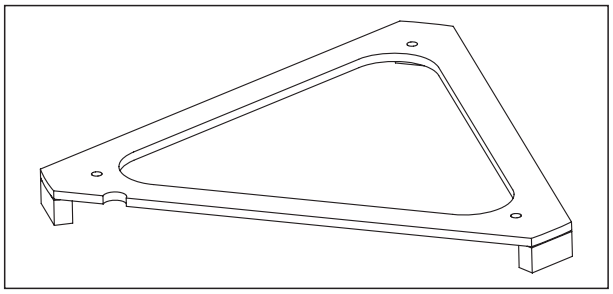


Fig.10 Hoist tool

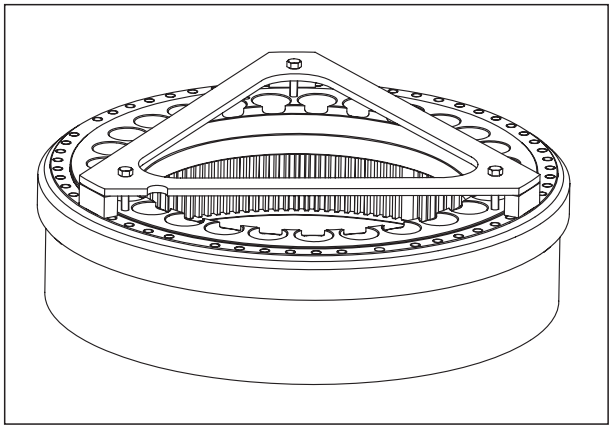


Fig.11 Schematic diagram for parking piston removing

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Inspection

Detection procedure for the wearing of brake disc assembly

Note: This detection should be performed before the removing and disassembling of disc brake assembly so that the wearing extent of brake disc components can be determined.

1. Pull out the parking/emergency brake control button. Pressure should be generated in the parking brake cavity and the parking brake springs (27, 28; Fig.1) should be compressed.
2. Press down the service brake pedal or turn the retarder selection mode switch (if equipped) to the disc brake position, and place the retarder control lever in the applied position. Pressure should be generated in the service brake piston cavity.
3. Carefully remove the plug (52) from the service brake piston housing (48).
4. Insert a depth micrometer into the plug hole and measure distance from end of return pin (45) to machined surface on the service brake piston housing (48). This is dimension 'A'. Record this dimension.
5. Record the dimension that is stamped on the service brake piston housing (48). Subtract the stamped dimension from dimension 'A' (referring to Step 4). The difference is the amount of brake wear. Refer to 'Wear limit of disc brake' table for allowable wear limits.

Wear limits for new and worn brake disc

Thickness of friction plate:

New plate:·····5.08±0.13 mm (0.200±0.005 in)

Minimum allowable dimension of worn plate:·····4.57 mm (0.180 in)

Thickness of friction disc:

New disc:·····2.413±0.064 mm (0.095±0.0025 in)

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Minimum allowable dimension of worn disc:……2.29 mm (0.090 in)

Thickness of damper plate:

New plate:……6.9±0.051 mm (0.270±0.020 in)

Compression state after use:……5.84 mm (0.230 in)

Wear limit of disc brake			
	Quantity	Thickness (mm)	
		New	Old
Friction plate	13	66.04	59.41
Friction disc	12	28.96	27.48
damper plate	2	13.8	11.68
Stack thickness		108.8	98.57
Maximum allowed limit	10.23		

Disassembled parts

Refer to Fig.3 for the numbers in the brackets.

1. Use a proper solvent to clean all parts.
2. After cleaning, immediately dry all parts with compressed air.
3. After cleaning and drying, coat all parts with light oil to prevent corrosion.
4. The sealing face of dynamic seal assemblies (3 and 11) metal rings must be carefully inspected to determine if reuse is possible. The sealing band, which is a highly polished surface on the sealing face of each metallic ring, must be within the outer half of the total seal area, be concentric with the seal face diameters, of uniform width and free from wear marking. Refer to Fig.12.

Note: The metal sealing elements between brake assemblies are not allowed to be interchanged. Otherwise, poor assembling will be caused in the seal housing (9) and correct sealing contact between metals will be

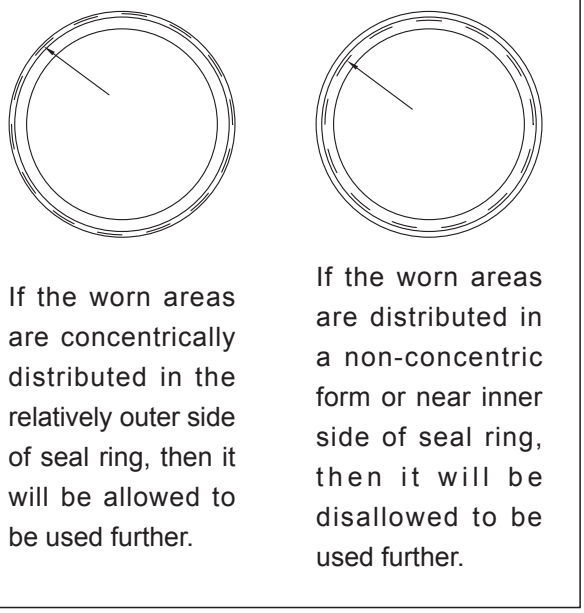


Fig.12 Schematic diagram for the wearing inspection of dynamic seal

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influenced.

Note: When the metal ring which has already conformed to inspection requirements is used for assembling, a slight 'overlap' condition, related to the original orientation of the seal faces, could occur and cause initial light leakage which will stop immediately when the assembly starts.

5. Before installing the disc brake assembly, clean all exterior surfaces to remove any foreign material.

6. Inspect all splines for cracked or broken teeth, excessive wear and pitted or scored surfaces. Repair or replace as requirements.

7. Check for pitted, scored or worn mating surfaces of housings.

8. Check all threaded holes and threaded parts for dirt or damaged threads. Repair or replace as requirement.

9. Check seal surfaces of service brake piston (40) for pitting, scoring or wear. Repair or replace as requriements.

10. Check springs (27, 28 , 43) for cracks or other damage and for spring tension.

11. Check all friction plates (38) and friction discs (39) contact surfaces for nicks, pits or corrosion. Check teeth of friction plates and friction discs for wear and damage.

12. Check finished surfaces of all other parts for scored or worn surfaces. Repair or replace if necessary.

Assembly

Refer to Fig.3 for the numbers in the brackets.

⚠ warning

To prevent personal injury and equipment damage, it must be ensured that the hoist equipment is reliably connected and has sufficient carrying capacity for safe operation.

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Note: All 'O'rings, seal rings and contacting surfaces must be clean and lubricated at assembling.

1. Use a lifting device to place the brake disc housing (34) in a clean level place with the side installed with the spring housing (22) oriented upwards.
2. Install the removed pin (33) into the brake disc housing (34).
3. Stretch new seal ring (31) slightly. Lubricate seal groove in disc housing (34) and seal ring (31) with 'Wynns S. T. P.' to aid seal ring installation. Install seal ring (24).
4. Lubricate guiding belt (32) with 'Wynns S. T. P' and install in disc housing (25) as shown in Fig.13.
5. Install the pin (29) on the parking piston (30).
6. Use 'Wynns S. T. P.' special grease to lubricate the new seal ring (25) and the groove in the outer diameter of parking piston (30). Then install the seal ring (25).
7. Use 'Wynns S. T. P.' special grease to lubricate the guiding belt (26) and its surrounding area, and then install it into the parking piston (30) as shown in Fig.13.
8. Use 'Wvnns S. T. P.' to lubricate the seal ring (31) and its surrounding area, and then install the parking piston (30) into the brake housing (34).
9. Place the spring housing (22) on the parking piston (30) to align with the pin (29). Rotate the spring housing (22) to align the pin (33) in the brake disc housing (34) with the hole in it so that it can be positioned. Then use six bolts (20) to seat the parking piston (30) into the brake disc housing (25). During the operation, take care to avoid damage to the seal rings (25, 31). Then remove the bolt (20) and spring housing (22).
10. Install the springs (27, 28) in bores in parking piston (30), as is shown in Fig.9. Install new O-ring (24) in the groove of the spring housing (22).
11. Use a lifting device to carefully place the

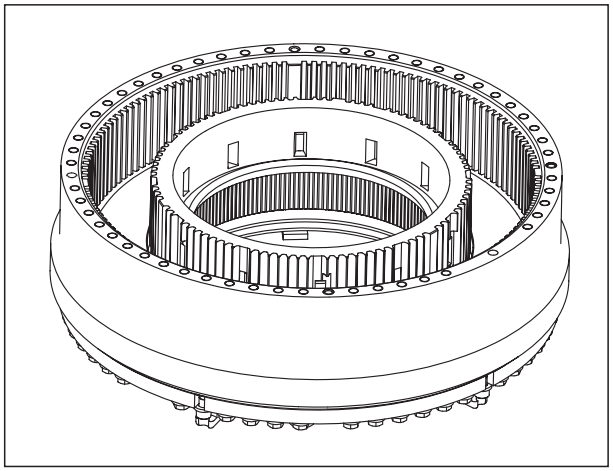


Fig.13 Schematic diagram for the installation of driving disc

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spring housing (22) over the springs (27, 28) in the brake disc housing (25). Then align the springs with the spring bores in the spring housing and align the pins (29) with dowel holes in the spring housing to facilitate installation.

12. Install five socket head bolts (23) and hardened washers (21) into the holes under protruding ears on the spring housing (22). Alternately tighten the socket head bolts (23) by one turn every time. Haul the spring housing (22) to overcome the resilience of springs (27, 28) and press down to the brake disc housing (34). Then tighten the socket head screws (23) to the torque of 260~280N•m (190~210 lbf•ft) torque.

13. Install the bolts (20) and hardened washers (21) in the remaining connecting holes of spring housing (22) and brake disc housing (34), and tighten the bolts to the torque of 260~280N•m (190~210 lbf•ft).

14. Use a lifting device to turn over the brake disc housing (34) and place it on a clean flat surface with the side equiped with the spring housing (22) oriented downwards, as is shown in Fig.14. Install the removed pin (33) in the brake disc housing (34).

15. Use a lifting device to install the driving disc (36) with its large end oriented upwards in the brake disc housing (34), and use the 50x100mm (2x4in) blocks to block it up. Refer to Fig.13.

16. Align the teeth on the damper plate (37) with the inner teeth of brake disc housing (34). Ensure that the outer end face is oriented downwards to the parking piston (30).

Note: Before the friction disc (38) is installed, the friction plate should be coated with the same type oil used in the system.

17. Align the inner teeth of friction plate (39) with the spline groove on the driving disc (36) and thread and mount it onto the driving disc.

18. Install the friction disc (38) onto the friction plate (39). Alternately install both of them until

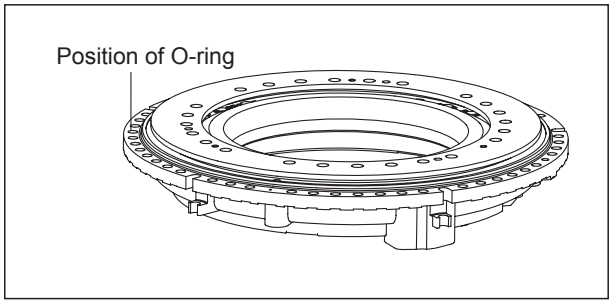


Fig.14 Schematic diagram for installation of O-ring

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it is completed.

19. Install the other damper plate (37) onto the last piece of friction plate (39). During assembling, it should be noticed to orient the cork side of the baffle upwards, and toward the service brake piston (40).

20. Install three new 'O'rings(13) into the counterbore in three holes in mounting face of the brake disc housing(34).

21. Install the removed stud (53) in the service brake piston housing (48).

22. Use a lifting device to place the service brake piston housing (48) on a clean flat surface with its inner face oriented upwards. Install the return pin (45) and spring (43) into the corresponding hole of service brake piston housing (48).

23. Install the mounting plate (42) over the return pins (45) and springs (43) and fix it with the bolts (41). Slightly stretch a new D seal ring (46) and install it along with the new D seal ring (47) in the inner and outer grooves in service brake piston housing (48) respectively.

Caution: Ensure that the D seal rings are installed in position. Their twisting and inclination will lead to oil leakage of the service brake cavity.

24. Install the service brake piston (40) with its flat surface oriented upwards in the service brake piston housing (48). Ensured that three 13 mm holes in the service brake piston are aligned with three M12 threaded holes in the piston housing. During assembling, take care to prevent the two D seal rings in the piston housing assembly from being damaged. Then, insert three M12 bolts with flat washers through the service brake piston and screw them in the piston housing. Alternately screw the bolts by one turn every time to haul the piston downwards in positon.

25. Use the spring compression tool which is shown in Fig.4 and can be fabricated according to Fig.20. As is shown in Fig.5, screw the threaded end of T handle on the tool

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into the threaded hole of a return pin (45).
26. Then, place the base of the tool on the flat surface of service brake piston (40) and press down the handle of tool to pull the return pin (45) up far enough to insert the pin (44) into the hole in the end of return pin (45), as is shown in Fig.5. Release pressure on tool handle, making sure pin (44) is inserted far enough into return pin (45) to clear both sides of return pin hole in service piston (31). Remove the spring compression tool.
27. Repeat Step 26 and install the pin (44) in each return pin (45).
28. Remove three M12 bolts and flat washers.
29. Install the new O-ring (24) on the service brake piston housing (48) as shown in Fig.15.
30. Use a lifting device to turn over the service brake piston housing (48) with service brake piston (40) downwards.
31. Install the bleeder screw (49) in the service brake piston housing (48).
32. Replace the O-ring in the plug (51) with new one. Then install them together in the service brake piston housing (48).
33. Using a proper lifting device to hang the service brake piston housing (48) on the brake disc housing (34), making sure the pin holes in housing are aligned with pins (33) on disc housing. Gradually lower piston housing onto disc housing.
34. Install five socket head screws (23), with hardened washers (21), in the holes under protruding ears on service brake piston housing (48). Tighten socket head screws (45) alternately, one turn at a time, to draw piston housing assembly down on disc housing (34). Tighten socket head screws (23) to a torque of 260 - 280 N•m (190 - 210 lbf•ft).
35. Install the bolt (20) and hardened washer (21) in the service brake piston housing(48). Tighten the bolt (20) to a torque of 260-280 N•m.

Note: The disc brake assembly should be turned over with care to prevent the driving

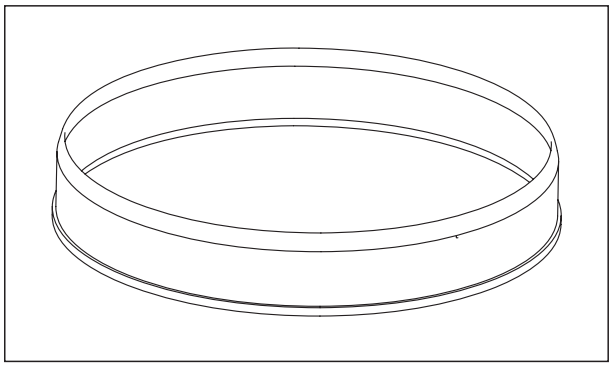


Fig.15 Dynamic seal installation tool– seal sleeve

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disc (36) from sliding out of the brake disc housing (25).

36. Place the brake assembly in a vertical position and keep the bleeder screw (49) located at the 12 o'clock position, referring to Fig.2. Connect a portable hand pump to the port 'C' and inject clean brake hydraulic oil into the port to pressurize service brake piston cavity to 52 bars. While injecting oil to the port 'C' to pressurize, slightly open the bleeder screw (49, Fig.2) to release the residual air in the cavity until clean oil flows from bleeder screw. Then close the bleeder screw and pressurize the piston cavity to 52 bars. Repeat applying and releasing pressure for 10 times. After the piston seal ring is set in position, shut down the hand oil pump and maintain the 52 bar pressure. After it is maintained for 15 minutes, if the pressure drop in the service brake piston cavity does not exceed 3.5 bars, this service brake piston assembly is acceptable.

37. Disconnect the pump hose from the port 'C', and connect it to the port 'D' (Fig.2) to set the parking piston seal ring in position and carry out pressure test. Start to pressurize the parking brake piston cavity, and open the bleeder screw (49, Fig.2) slightly until all residual air in the cavity is released and clean oil flows out, then close the bleeder screw and pressurize to 83 bars. Repeat applying and releasing pressure for 10 times. After the parking piston seal ring is set in position, shut down the hand oil pump and maintain the 83 bar pressure in the piston cavity. If the pressure drop in the parking brake piston cavity does not exceed 7 bars after the pressure is maintained for 15 minutes, this parking brake piston assembly is acceptable.

Installation

Refer to Fig.1 and Fig.2 for numbers in brackets.

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⚠ warning

To prevent personal injury and equipment loss, it should be ensured that the hoist equipment has sufficient carrying capacity and the wheels are reliably fixed and chocked to enable safe operation.

1. Install new O-ring (5) in the counterbore on the mounting surface of the service brake piston housing (48).
2. Remove one bolt (20) and hardened washer (21) from the spring housing (22) and service brake piston seat ring (48) respectively. In addition, the two bolts removed should be located as close to 12 o'clock as possible. Then install a lifting eyes in each bolt hole.
3. Connect a lifting device to the lifting eyes on the disc brake assembly. Then lift the brake assembly on the spindle.

Caution: When installing the right brake assembly, its 'INLET' port is located on the top. When installing the left brake assembly, its 'INLET' port is located at the bottom. Align and install the studs (57) on the brake assembly with the holes in the spindle flange. During installation, it should be ensured that the O ring (5) is maintained in the counterbore on the piston housing assembly.

4. Install the locknuts (58) on the studs (57) and tighten to a torque of 1166 -1193 N•m.

Note: Prior to installing the dynamic seal assembly (12), clean O ring and metal ring in the trichloroethane liquid.

Note: The seal installation tool (refer to the special tools) consists of seal sleeve, seal driver and a spring.

5. Insert the seal sleeve tool shown in Fig.15, into the spring housing until it is in as far as it can go.
6. Insert seal installation kit spring on one metal seal ring of dynamic seal assembly (12). The spring prevents the metal ring from riding

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up the ramp of the groove hence leading to easier installation.

7. Install one half of dynamic seal assembly with O-ring and spring fitted into the spring housing (22) through the bore of the seal sleeve. It should be ensured that a clearance from the rope connected to the spring is present so that the spring can be easily pulled out after the installation of dynamic seal assembly.

8. Use the seal driver as shown in Fig.16 to press the dynamic seal assembly (12) in position until the inside face of seal driver is flush with the outside face of seal sleeve. Refer to Fig.17.

9. Remove the seal driver, and slowly remove the seal sleeve out of the spring housing (22). Subsequently, pull out the spring from the dynamic seal assembly (12). Then apply a thin film of lubricating oil to the metal contacting surface of dynamic seal assembly.

10. Install the O ring on the other half dynamic seal assembly (12) and install in the seal housing (9) with the O ring side oriented downwards. Press the seal assembly into the housing.

11. Coat the O-ring (35) with grease and install it in the driving disc (36). In addition, apply a thin film of lubricating oil on the metal contacting face of dynamic seal assembly (12). Install the seal housing (9) with half seal assembly on the driving disc (36) and use the bolt (7) and washer (8) for fixing. Then use the lockwire (6) to lock the bolt (7).

Note: Ensured that the lockwire (6) will not interfere with the O ring (8) on the driving wheel when driving wheel is installed on the disc brake assembly.

Note: Prior to installing the dynamic seal assembly (3), clean the dynamic seal assembly (3) in trichlorethane liquid. Apply a thin film of oil to the metal contacting surfaces of the dynamic seal assembly.

12. Use the installation tool to install half of the

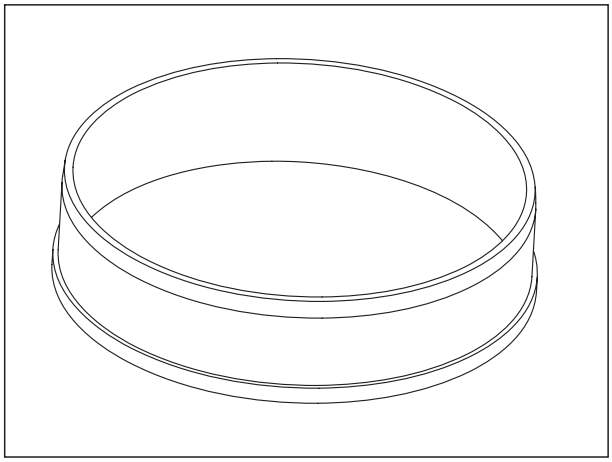


Fig.16 Dynamic seal installation tool- seal driver

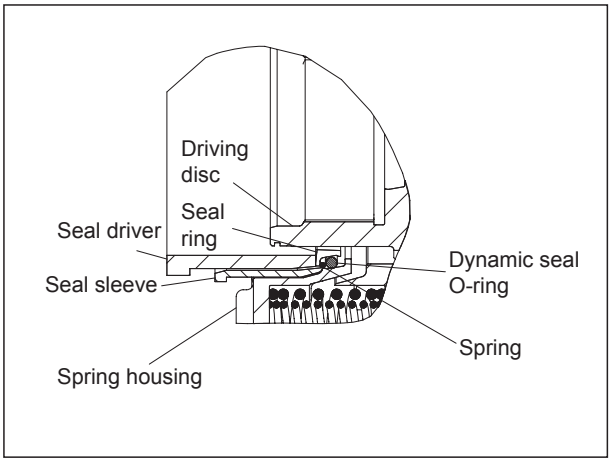


Fig.17 Schematic diagram for installation of dynamic seal assembly

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new dynamic seal assembly (19) with the O ring side oriented inwards over spindle. Using seal installation tool, press dynamic seal assembly into disc driver (27) by tapping the tool with a soft hammer. Then remove the tool.

13. Use the tool to press and install the other half of new dynamic seal assembly (19) with its O ring side oriented inwards into the inner seal seat ring (15). Then remove the tool.

14. Coat the O ring (16) with grease and install it in the seal groove. Install the other half dynamic seal assembly (19) in the inner seal housing (15). Then install the inner housing (15) in the brake assembly.

15. Install new O ring (1) in groove on the groove.

16. Install the driving wheel (2) on the wheel and use the bolt (4) and hardened washer (3) for fixing. During installation, ensured that the O ring stays in the groove on the wheel. Then tighten the bolt (4) to a torque of 1166 -1193 N•m.

17. Install new O ring (5) on the driving wheel (2).

18. Refer to the requirements described in Chapter 1 'Tyre and Rim Assembly' and install the wheel on the spindle. When the driving wheel (2) is inserted into the driving disc (36), the splines on the driving wheel (2) and driving disc (36) should be aligned carefully, and it should be noticed not to damage the O-ring (5).

19. Add 11 litres (3 US gallons) clean hydraulic oil of the same type used in the brake cooling circuit into the service brake pack. Block the port ‘A’ (outlet) on the brake assembly on the opposite and pressurize the brake assembly with 2 bar air pressure through the port ‘B’ (inlet). Refer to Fig.2.

Note: Refer to Fig.18. For brake pressure testing, the flange plates for port ‘A’ and ‘B’ can be fabricated according to Fig.20 and Fig.21.

While rotating the wheel, observe for air pressure loss on the air supply hose gauge.

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Less than 0.14 bar (2 lbf/in2) air pressure loss in 15 minutes is satisfactory. If the air pressure loss is greater than 0.14 bar (2 lbf/in2) in 15 minutes, rotate the wheel additionally to reseat all seals and pressurise the brake assembly to 2 bar (30 lbf/in2). If the brake assembly again leaks more than 0.14 bar (2 lbf/in2) air pressure in 15 minutes, loosen the wheel retainer bolts, rotate the wheel to reseat the seals, and tighten the bolts. Repeat the air pressure test to be sure the seals are properly seated, to prevent oil leaks.

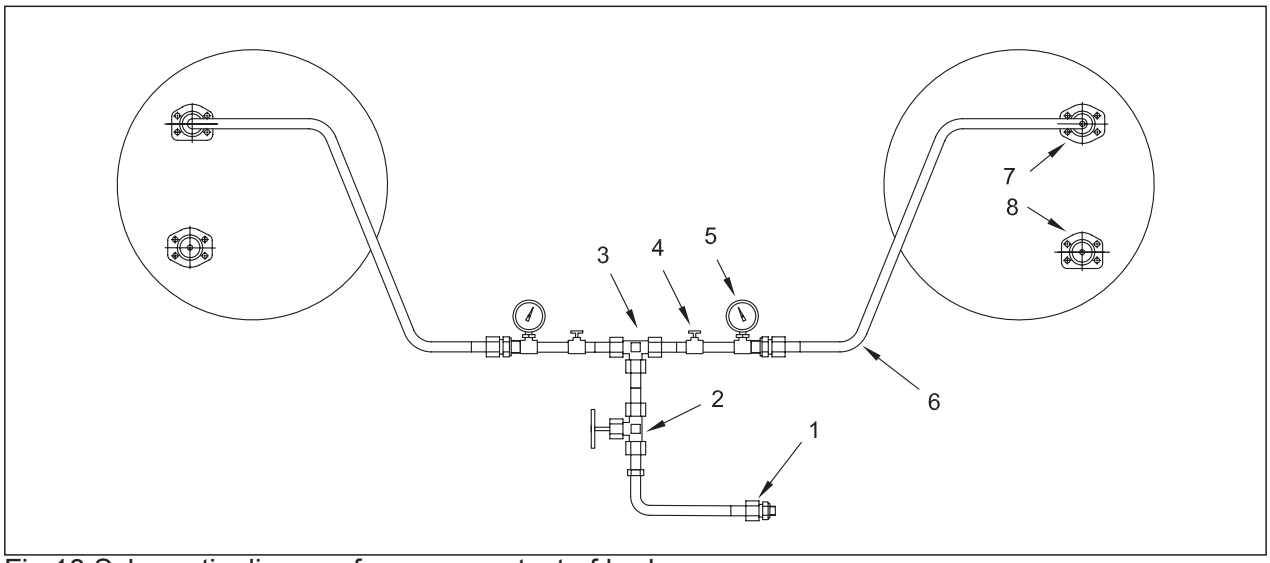


Fig.18 Schematic diagram for pressure test of brake

1. Adaptor
2. Pressure regulator
3. Tee piece
4. Switch valve
5. Pressure gauge
6. Hose assembly
7. Flange plate (For 'B')
8. Flange plate (For 'A')

Note: Be sure to open and install only one hydraulic line at a time to prevent loss of oil from brake hydraulic oil tank. The vacuum pump, installed during removal, cannot retain oil in tank if more than one line is uncapped at a time.

20. Remove the plugs and connect the hydraulic pipe of service brake to the port 'C' according to the mark made during removing. Refer to Fig.2.

21. Similarly, connect the pipeline of parking

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brake to the port ‘D’. See Fig.2.
22. Similarly, connect cooling pipe to the ports ‘A’ and ‘B’. Refer to Fig.2.
23. Remove the vacuum pump required to be installed on the hydraulic oil tank for removing the pipes. Then reinstall the ari breather into the breathing port of oil tank.
24. Refer to the requirements in the section of ‘LUBRICATION AND MAINTENANCE’ , and fill the steering and brake control oil tank.
Note: If brake discs, service and/or parking pistons, piston housing, or the complete brake assembly have been replaced, a new brake disc stack height measurement should be taken as described under 'Disc Assembly Wear Measurement Procedure', under 'Inspection' in this section. This dimension ‘H' should be measured for future reference.

Bleeding
Refer to Fig.1 for numbers in brackets.
To achieve satisfactory braking, the service brake and parking brake hydraulic system must be bled to elimite any air in hydraulic pipes and system.
1. Ensure that the steering and brake control tank is filled with oil specified in the section of lubrication and maintenance.
2. Start engine, build up oil pressure in accumulators until accumulator pressure warning lights are extinguished, then shut down engine.
3. Chock all road wheels. Pull out parking/ emergency brake control to release the brakes.
4. Securely connect a clean bleeder hose to upper bleeder screw (49) and place loose end of hose in a clean container.
5. Press down the service brake pedal and gradually open bleeder screw (49). Bleeder screw should remain open until oil that flows out is free of air bubbles. Close bleeder screw and release brake pedal.
Note: Pressurize the system again when

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necessary by repeating Step 2.
6. Repeat the above full process on the brake assembly in the opposite side.
Note: A correct oil level in the steering and brake control oil tank must be always maintained and the selected oil should conform to the specifications recommended in the section of lubrication and maintenance. For the correct oil level, refer to the section of hydraulic oil tank assembly.
Note: The full bleeding procedure should be repeated on the brake assembly after repair and maintenance to ensure that all air in the brake assembly is completely eliminated.

Special tools
The hoist tool for parking piston can be manufactured according to the structure and dimensions shown in Fig.22.

Technical conditions of special torque			
No.	Description	Torque	
			lbf·ft
4	Bolt	1166~1193	860~880
20	Bolt	260~280	260~280
23	Screw	260~280	260~280
53	Nut	1166~1193	860~880

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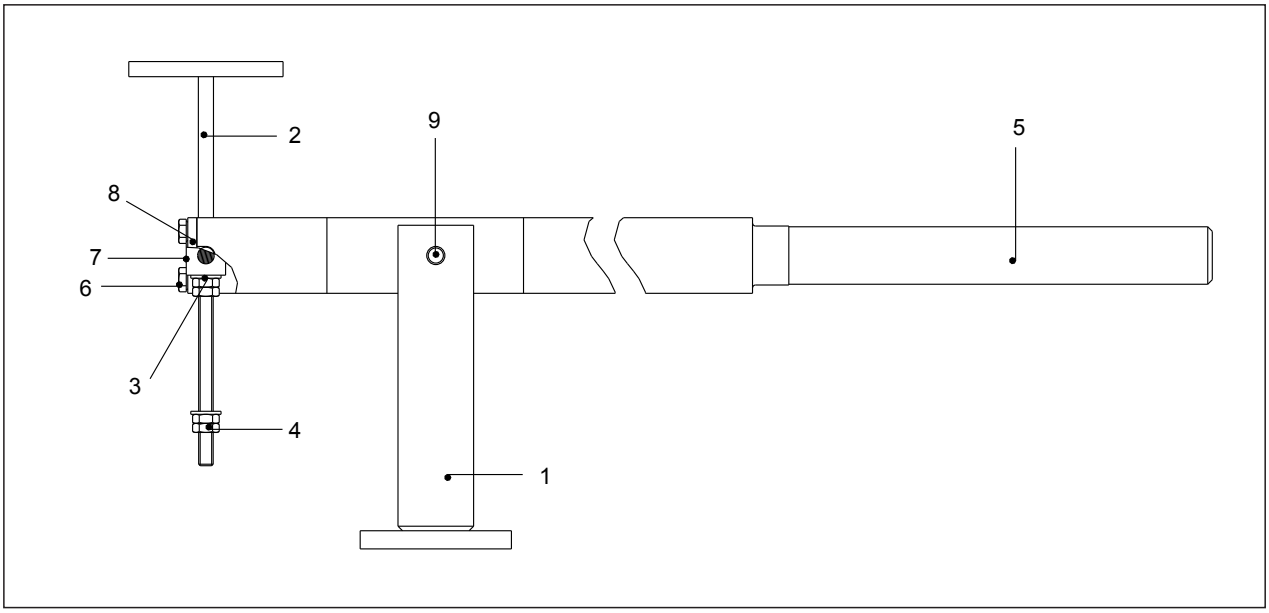


Fig.19 -1 Fabrication of spring compression tool

1. Welding base
2. T handle
3. Washer
4. Nut
5. Handle
6. Bolt
7. Rotating shaft
8. Damper
9. Shaft

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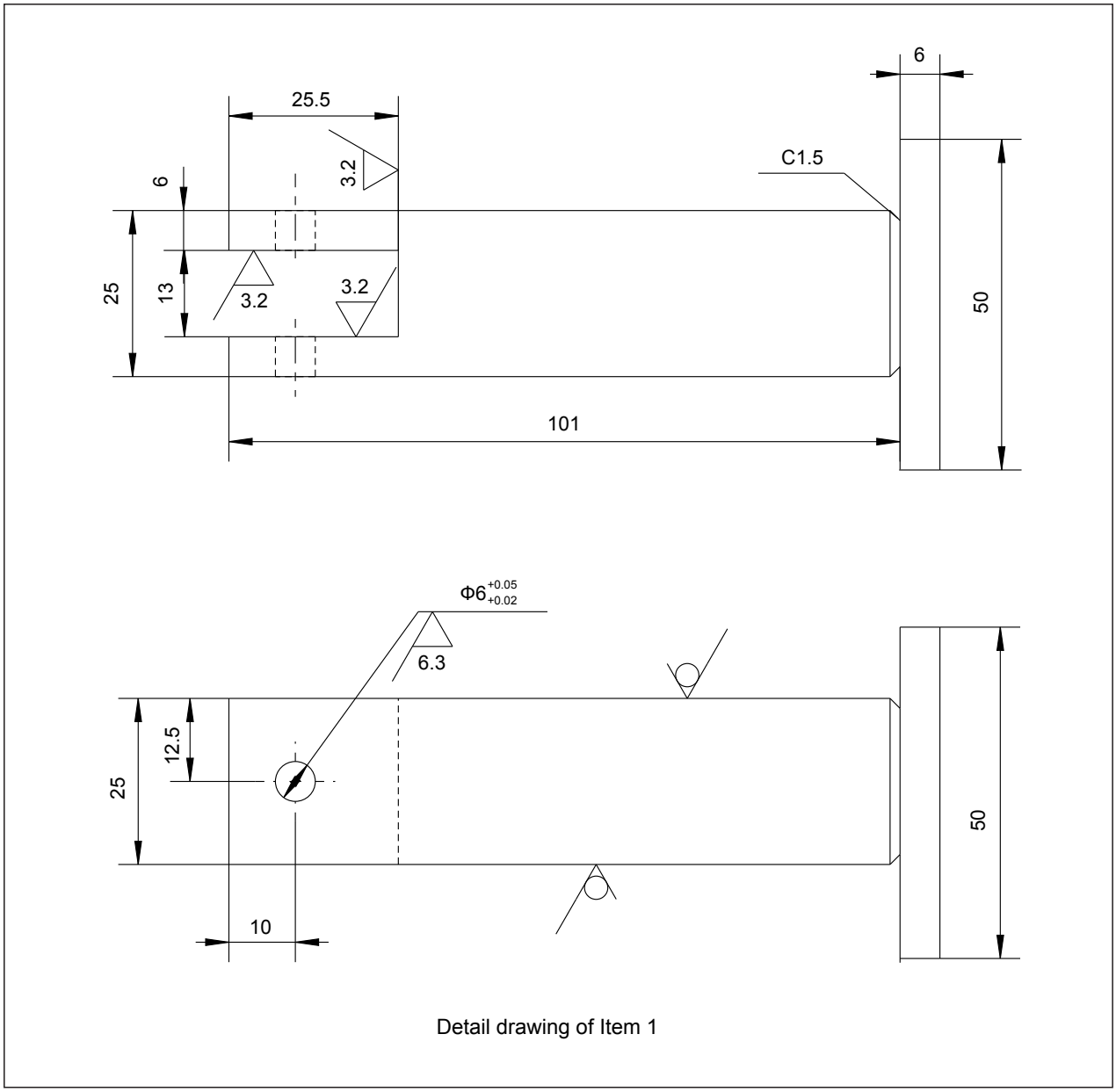


Fig.19 -2 Fabrication of spring compression tool

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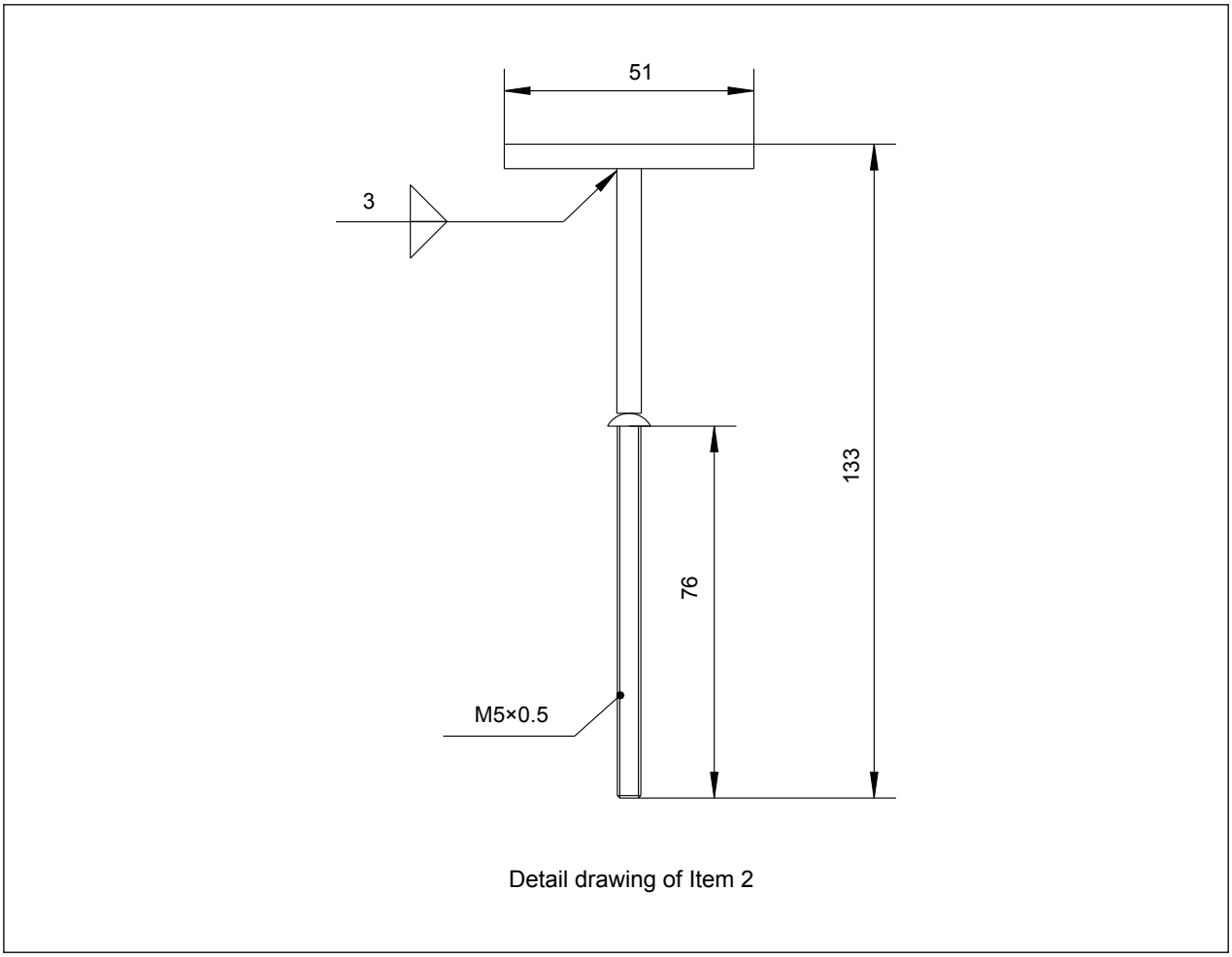


Fig.19 -3 Fabrication of spring compression tool

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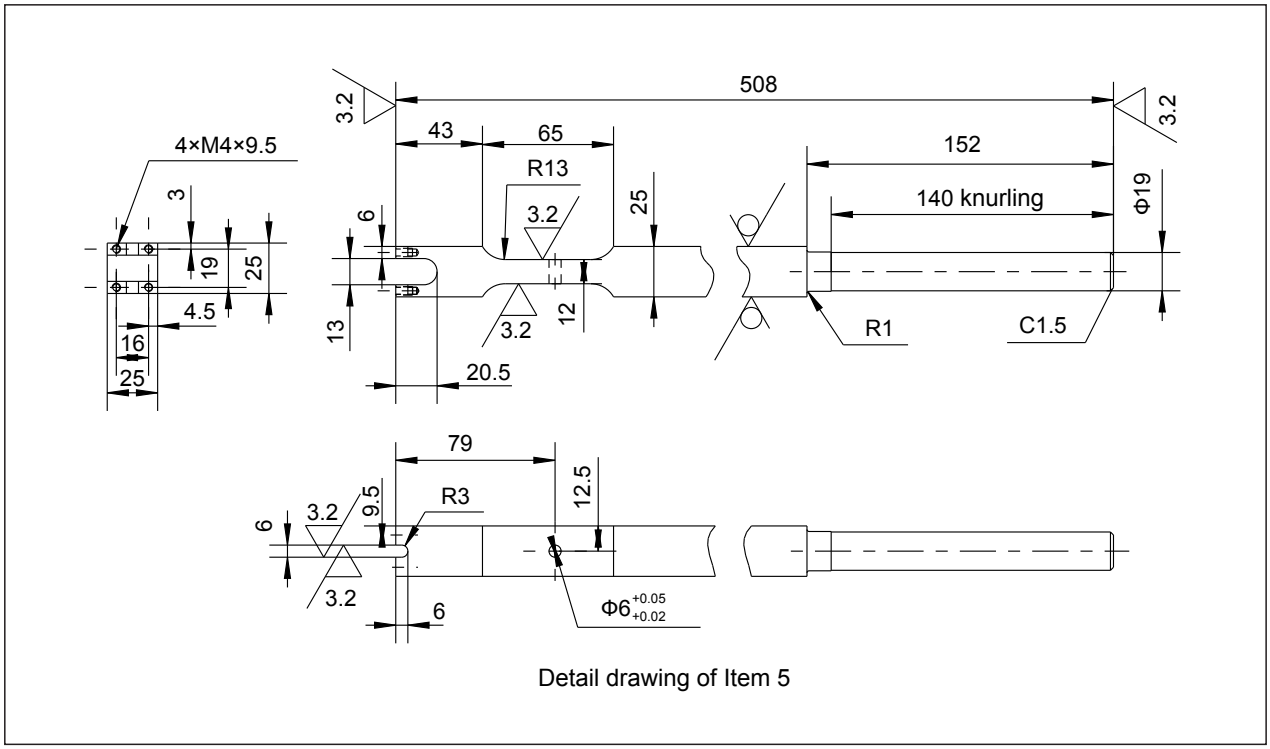


Fig.19 -4 Fabrication of spring compression tool

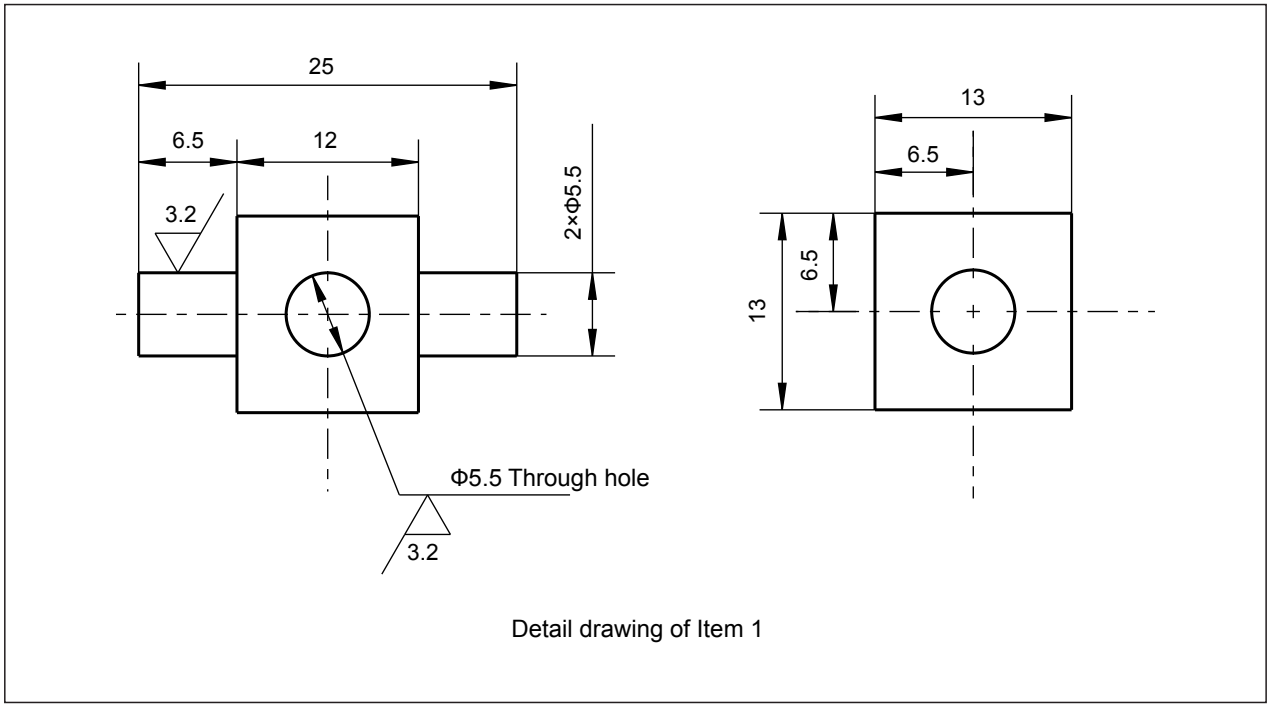


Fig.19 -5 Fabrication of spring compression tool

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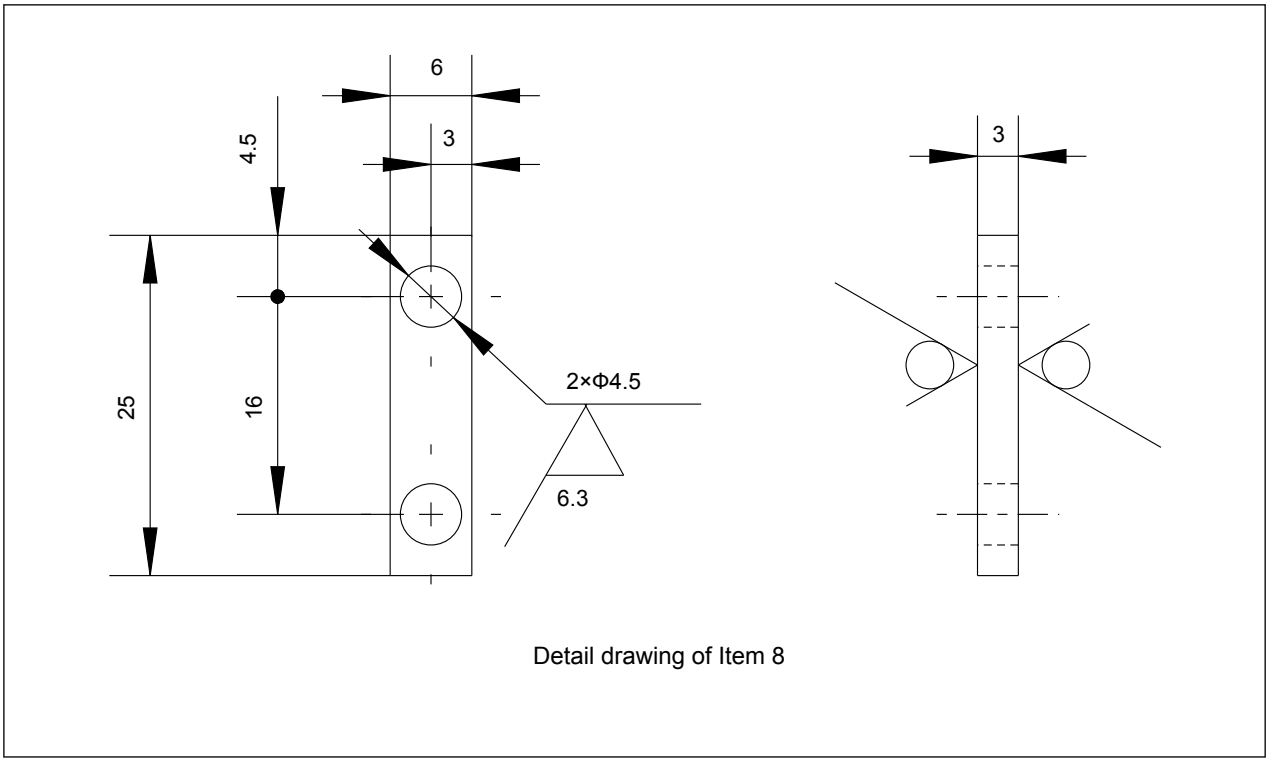


Fig.19 -6 Fabrication of spring compression tool

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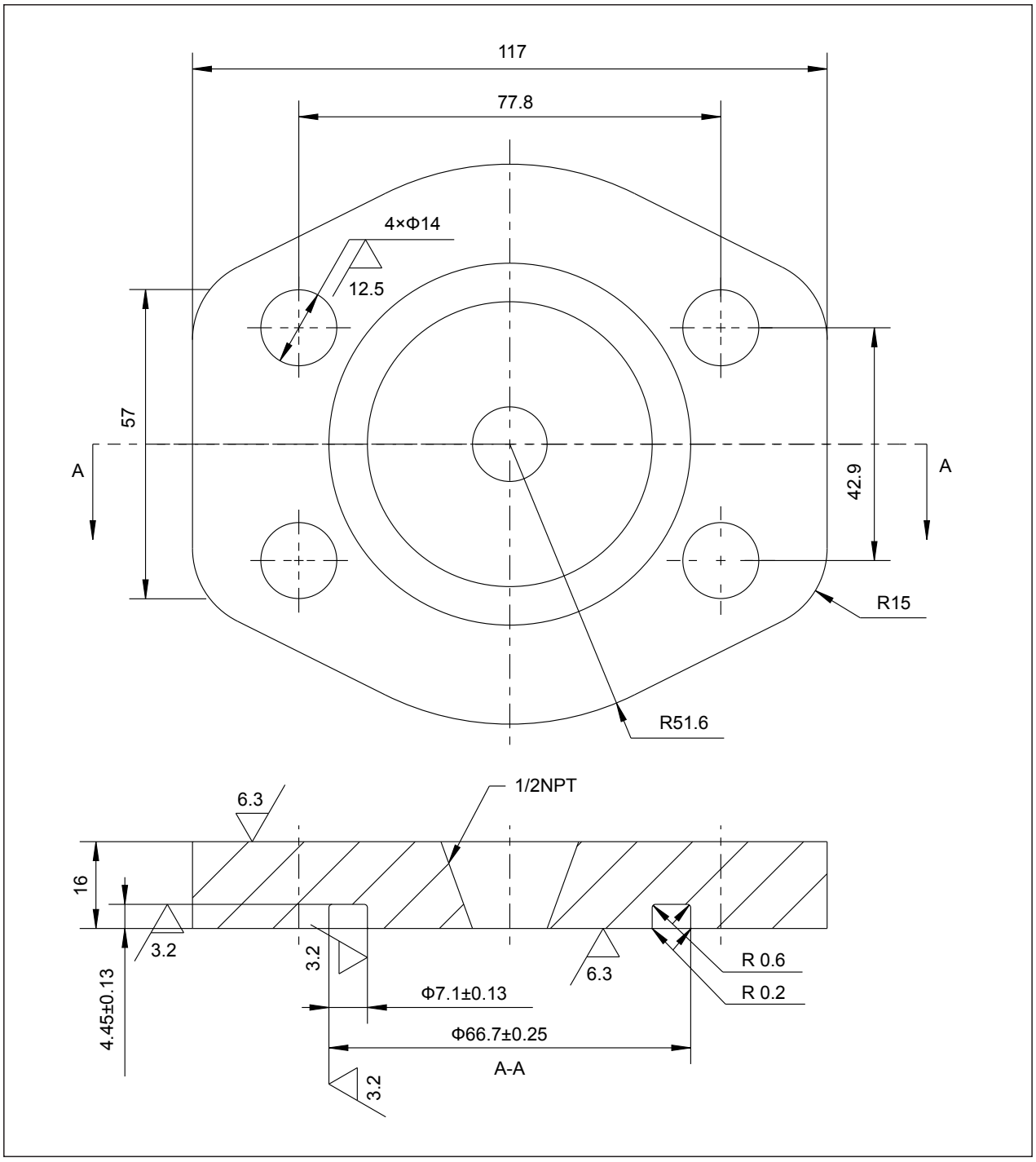


Fig.20 Fabrication for flange plate of port A

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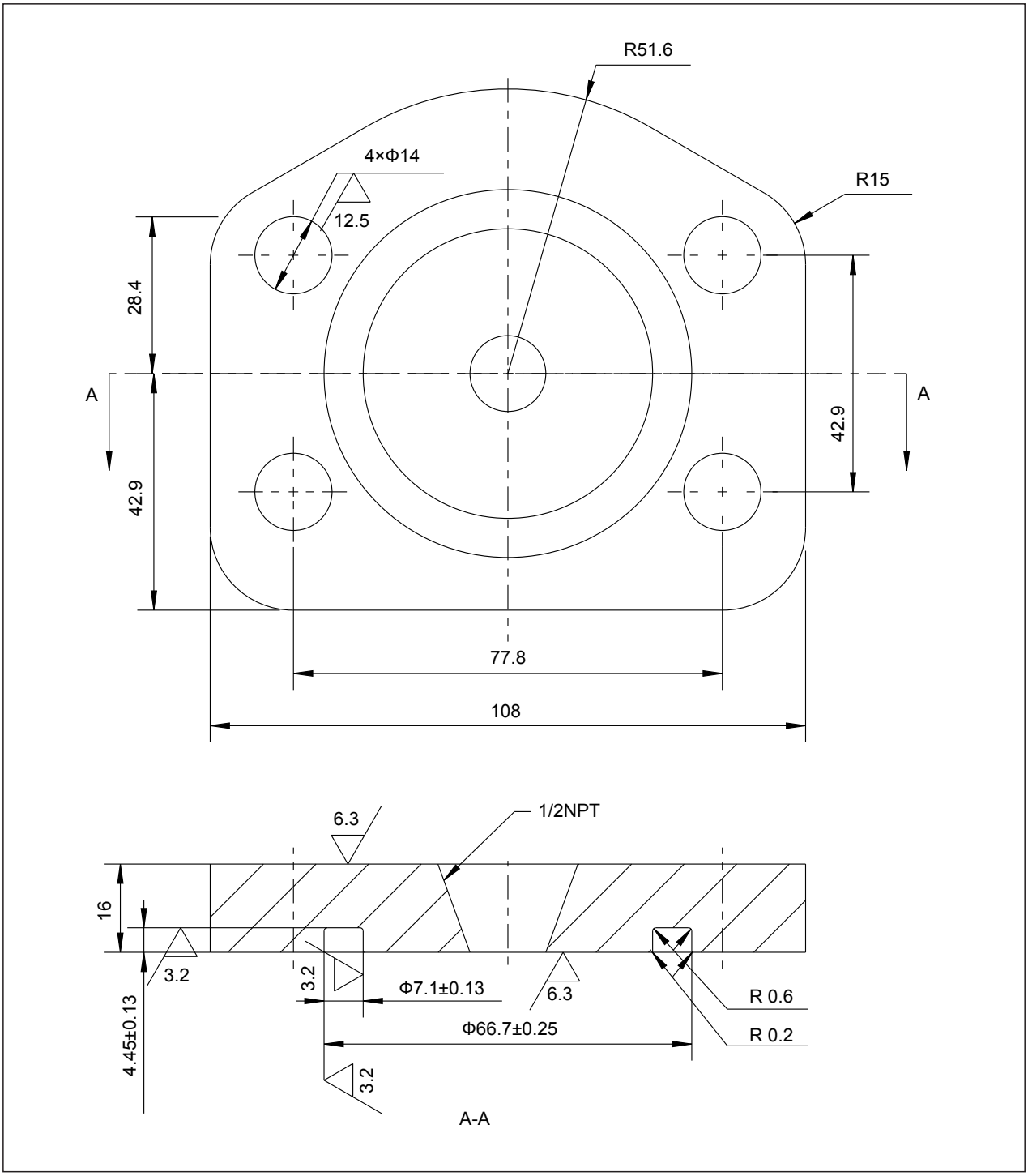


Fig.21 Fabrication for flange plate of port B

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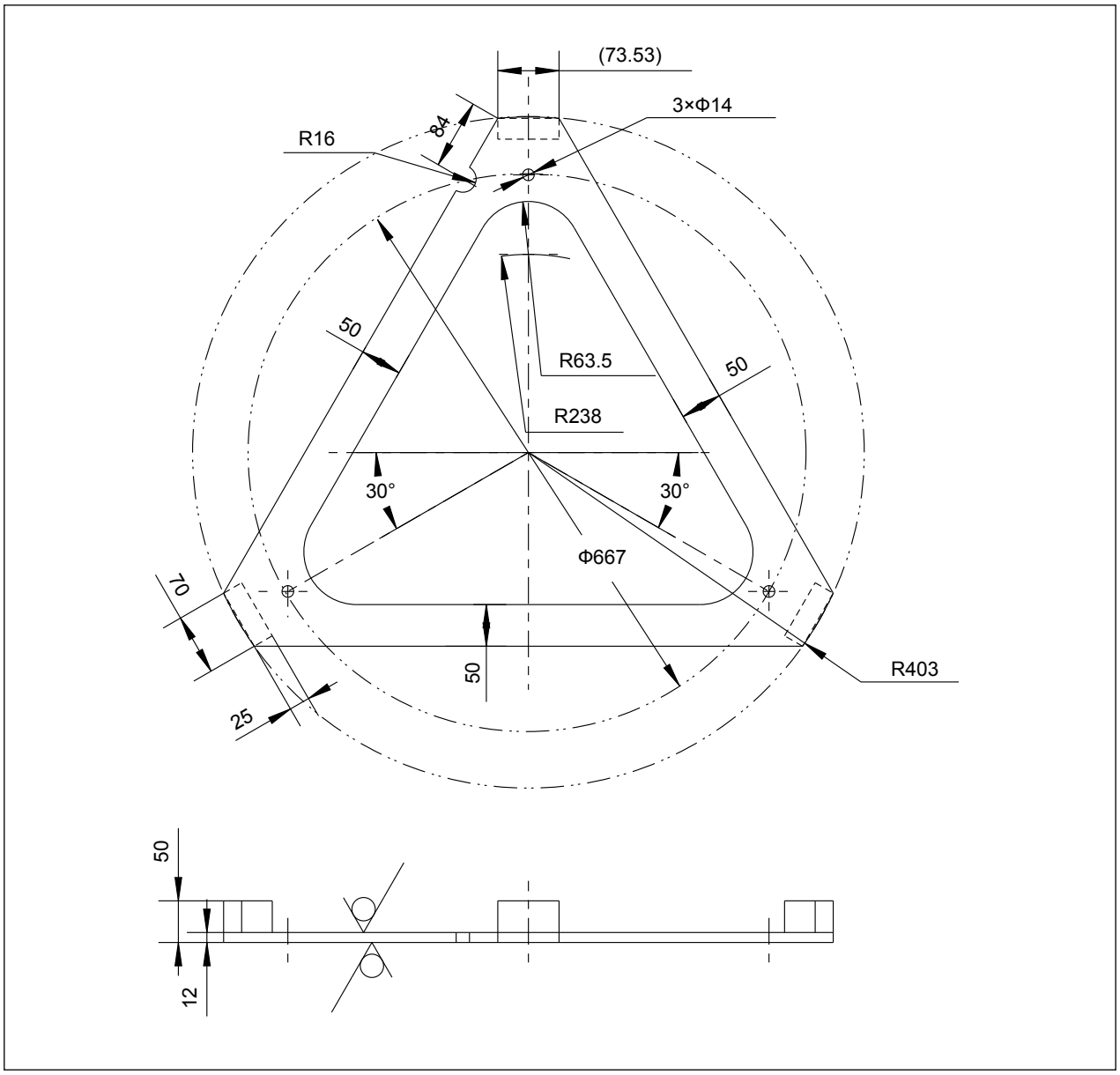


Fig.22 Fabrication for parking brake piston lifting tool

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3.2 Rear Axle Mounting Part

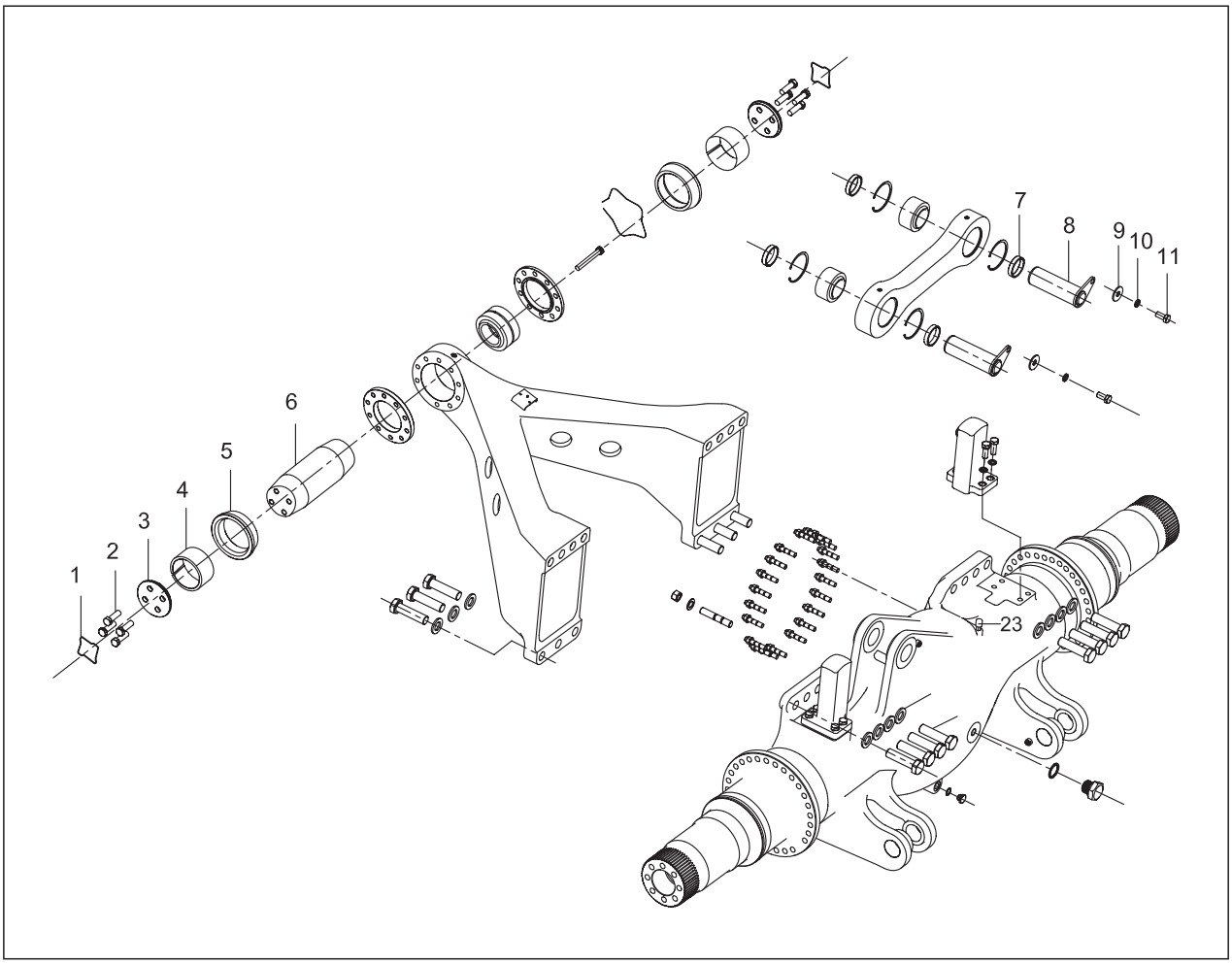


Fig.1 Rear axle mounting part

1. Steel wire
2. Bolt
3. Plate
4. Bush
5. Spacer
6. Tapered pin
7. Spacer
8. Shaft
9. Washer
10. Washer
11. Bolt

Overview of operating principle

See Fig.1 for the numbers in the brackets.

The rear axle mounting part consists of the tapered pin (6), Spacer (5), bush (4), plate (3), bolt (2), steel wire (1), spacer (7), shaft (8), washers (9) and bolt (11). The rear axle mounting parts are the assembly to connect

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rear axle assembly to frame via A-frame and link.

Remove and disassembly

See Fig.1 for the numbers in the brackets.

⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

1. Use the hoist equipment to lift up the rear axle assembly. Remove the bolt (11) and washers (10) and (9). Then take down the shaft (8) and spacer (7) in turn.
2. Remove the steel wire (1) and bolt (2). Then take down the pressure plate (3), bush (4), Spacer (5) and tapered pin (6) from the hole of A-frame in turn.

Inspection

1. Clean all metal parts in a suitable solvent, using a brush to clean bearings. Dry all parts on a clean surface and allow bearings to dry naturally. Make sure parts are free from dirt.
2. Check all inner and outer grooves for cleanliness. Check components for cracks, scores, blemishes or burrs. Use a fine stone to smooth out defective areas. Replace any parts that show excessive wear.
3. Inspect fittings, plugs, studs and their seating positions for thread wear. If threads in any of these parts are damaged, replace parts.
4. Check the bush and spacer ring for wearing or deformation. Replace the defective parts and components.
5. Replace the old washers with new ones.

Assembly and installation

See Fig.1 for the numbers in brackets.

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⚠ warning

To prevent personal injury and property damage, be sure lifting equipment is of adequate capacity and properly secured to do the job safely.

Note: Tighten all fasteners without special torques specified to standard torques listed in Section38.2
Standard bolt and nut torque specifications.

1. Use the hoist equipment to lift up the rear axle assembly. Place this assembly under the truck and align it with the frame. Use a hydraulic jack with proper carrying capacity to slowly lift up the axle body assembly to the installation position on the truck.
2. Install the tapered pin (6), Spacer (5), bush (4) and plate (3) in turn. Then tighten the bolt (2) at the specified moment and use the steel wire (1) to lock it.
3. Install the shaft (8) and spacer (7) in turn onto the link; apply the mucilage onto the bolt (11). Then install the washers (9) and (10) and bolt (11) in turn. Finally, tighten the bolt (11) at the specified moment.

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4 REAR WHEEL ASSEMBLY

4.1 Rear Wheel Assembly

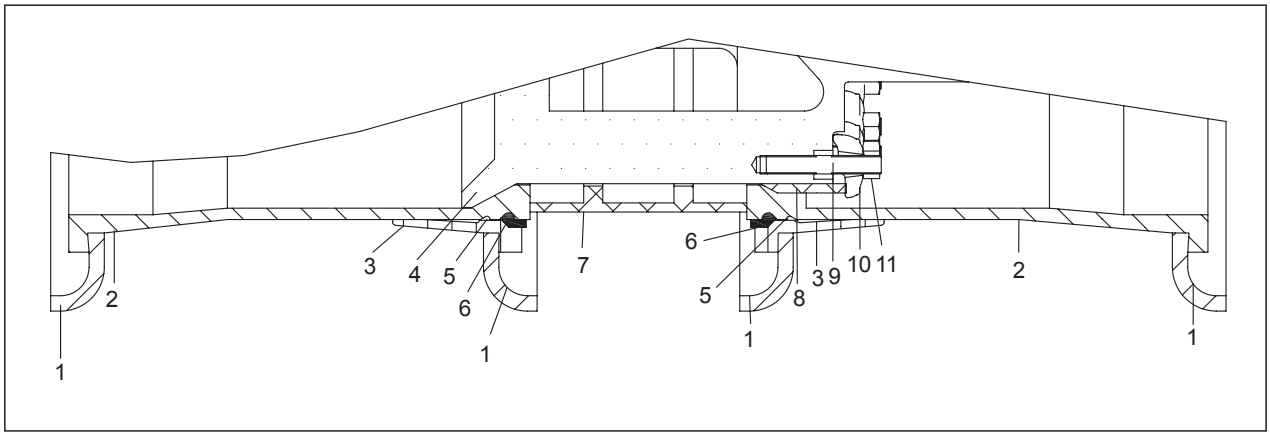


Fig.1 Sectional View of Dual Wheel Rim Assembly

1. Flange
2. Rim
3. Bead seat band
4. Wheel
5. 'O' Ring
6. Lock Ring
7. Spacer sand
8. Wedge band
9. Stud
10. Clamp
11. Nut

Overview

The rear wheel assembly consists of two tyre and rim assemblies, spacer band, wedge band, rim clamp and nut.

The tyre and rim assembly is designed to be replaced with a pre-assembled tyre and rim.

Preparation for Servicing

⚠ warning

Before loosening rim clamps or performing any service on the tyre or rim components, to prevent personal injury and property damage, completely deflate tyre by removing the valve cap and core. Insert a thin wire through the valve to be sure the valve is not plugged. Even a flat tyre,

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in some cases, will retain sufficient air pressure to blow off a rim component with enough force to cause injury or death.

⚠ warning

Gases that build up inside an air inflated tyre mounted on a rim during welding or heating of rim components can ignite, causing an explosion of the tyre and rim components. This warning also applies to Nitrogen gas inflated tyres. Ignition will not occur in a Nitrogen gas atmosphere; but the pressure build up from the applied heat may be sufficient to cause a blowout severe enough to injure or kill. Never weld or otherwise apply heat on rim components with the tyre mounted on the rim, whether the tyre is inflated or deflated, to prevent injury or property damage from the potential tyre explosion! Do not attempt to repair rims or rim components by welding or heating, even if the tyre is not mounted on the rim. It is recommended to scrap questionable rim parts unless specific permission and repair procedures are obtained in writing either from the company or the rim manufacturer.

Removing Tyre and Rim Assembly

Numbers in parentheses refer to Fig.1.

If the tyre and rim assembly is to be replaced with a pre-assembled tyre and rim assembly, it is not necessary to remove the tyre from the rim on the truck. The tyre and rim may be removed from the truck as an assembly, and transported to a more desirable location for removing the tyre from the rim.

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⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of sufficient capacity to do the job safely.

1. Place the truck in a flat area, apply parking brake and shut down the engine.
2. The steering wheel turns for several circles in the two directions to relieve the pressure in steering system. Block all wheels, except the one to be raised. Use wooden blocks 100 mm x 100 mm (4 in x 4 in) or larger.
3. Support the truck with jack for removal of tyre, but do not jack up the truck.
4. Completely deflate tyre by removing valve cap and core. Check valve stem by running a piece of wire through the stem to make sure it is not plugged. See warning under 'Preparation for servicing' .
5. Loosen the nut (11) on the wheel hub. But do not remove from the stud (9).
6. Jack the truck up only as high as necessary to remove wheel from truck, and place safety blocks under the frame.
7. Support the tyre with a chain or rope of sufficient strength attached to a suitable lifting device. Remove the nut(11) and clamp(10) from the wheel stud (9). Remove wedge band (8) and lift tyre and rim assembly clear.
8. If inner tyre and rim assembly is being removed, remove spacer band (7), attach a lifting device to tyre and rim assembly, and remove from truck.

Dismounting tyre from rim

Numbers in parentheses refer to Fig.2, unless otherwise specified.

Note: The following instructions are applicable to use of hand tools. For procedures and tooling required to dismount the tyre from the

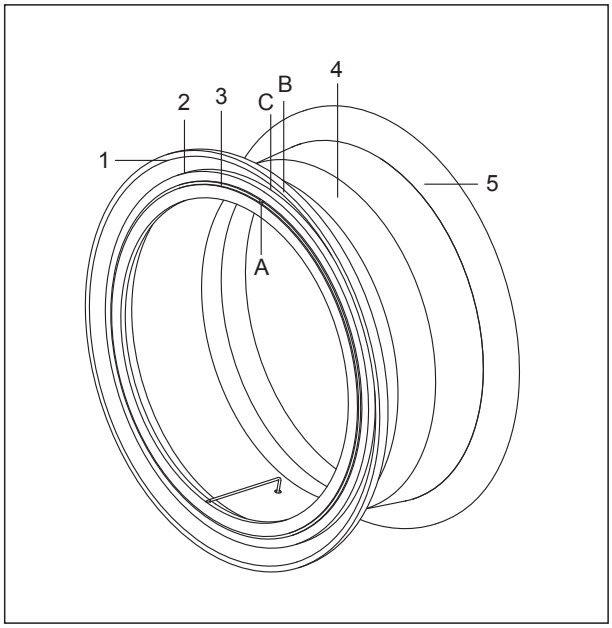


Fig.2 Rim assembly

1. Outer flange
2. Bead Seat Band
3. Lock ring
4. Rim
5. Inner flange

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rim, using hydraulic tools, contact the tyre manufacturer.

⚠ warning

When lifting tyre from rim, be sure the device is of sufficient capacity and properly secured to do the job safely.

1. Completely deflate tyre if not done previously. See warning under 'Preparation for servicing' . Tape valve threads to protect from damage, leaving valve end open to avoid any possibility of trapping air inside the tyre.
2. As shown in Fig.3, break outer tyre bead loose by placing the flat hooked end of a pry bar, into one of the breaking slots (C) between the bead seat band (2) and outer flange (1). A length of pipe slipped over straight end of bar will increase leverage. Twist straight end of bar around toward tyre to break this portion of bead. Another person may now insert another pry bar of the same type into the slot between the bead seat band (2) and outer flange (1), and with the same twisting action, hold the space gained with the first pry bar. Move first pry bar all the way around the wheel, twisting and following up with second pry bar, until inner tyre bead is loose.
3. Start bead seat band (2) in away from lock ring (3) by placing hooked end of pry bar in groove of rim (4), between ends of lock ring, and prying up with bar. Using two tools, as in Step 2, work completely around wheel.
4. Pry lock ring (3) out in same manner by starting at prying notch (B) in wheel, and work all the way around wheel with the two pry bars.
5. Remove and discard the O-ring (5, see Fig.1).
6. After removing lock ring (3), pry out and remove bead seat band (2). Outer flange (1) can be removed now.

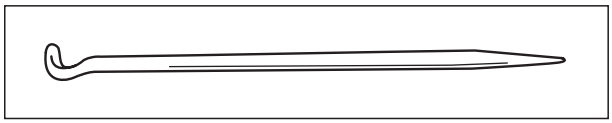


Fig.3 Pry Bar

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7. Similar breaking slots are provided on the inside of rims. The inner bead on the back side of the tyre may be broken by using the same method as in Step 2, for the outer bead. If the wheel assembly is still on the truck, another method which can be used is to place a small jack between the inner flange and some solid part of the frame. By extending the jack, pressure is exerted, which forces the tyre bead off the rim seat. Work around the wheel until the bead is broken at all points.
8. Use a proper lifting device to lift tyre away from rim. The dismantling of tyre is completed in such a way.
Note: If tyre and rim is on truck, and no lifting device is available, the tyre can be separated off the rim as follows: force bottom of tyre outward as far as possible; lower jack enough to allow weight of tyre to rest on ground; force top of tyre out as far as possible; raise jack to original height and repeat the above until tyre is off rim.

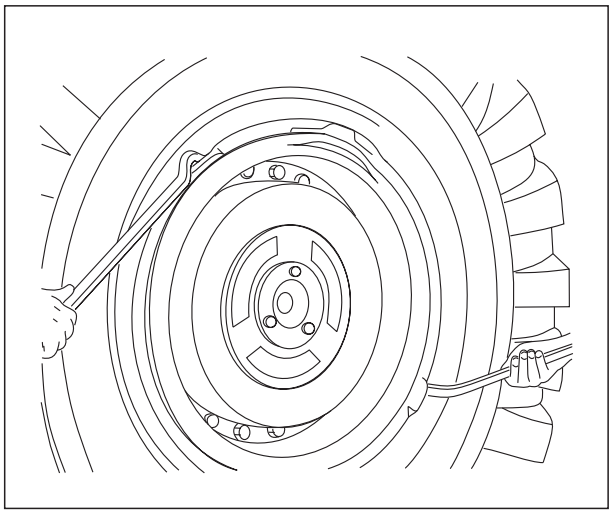


Fig.4 Breaking Typical Tyre Bead Loose

Inspection

Tyre

Check interior surface of the tyre to determine its condition. Inspect for cuts or fabric breaks that have penetrated the tyre body. Inspect closely for any sharp, pointed objects that may have penetrated the tyre body but is invisible from the outside. All dust, dirt, water or other foreign matter should be cleaned from the inside of the tyre.
Replace valve core assembly if condition is questionable.

Rim assembly

Overload, improper tyre inflation, rough terrain, high speed, accidents, dirt accumulation and corrosion will reduce service life of rims and rim components. It is recommended that rims be inspected, as below, not less than at every tyre change and, as the warranty limit approaches, consideration be given to rim

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replacement.

⚠ warning

Never mix components of one manufacturer's rims with those of another. Using the rim base of one manufacturer with the lock ring of another or vice versa is dangerous. The lock ring of one may not fully engage with the lock ring groove of the other. Always consult the rim manufacturer for proper matching and assembly instructions.
Also, use of damaged, worn out, or improperly rim assemblies is a very dangerous practice. Failure to comply with the above warnings could result in explosions from tyre pressure causing serious personal injury and property damage.

1. Clean all rust and dirt from rim parts.
2. Coat parts with primer paint, allow thorough drying before assembling.
3. Inspect rim assemblies (Fig.2) for bent, cracked, distorted, battered, and rusted parts which may have resulted from abusive practices outlined above. Replace any damaged parts with new parts.
4. Discard 'O' ring and replace with a new one.

Note: Handle 'O' rings carefully, as damage will prevent an airtight seal for tyre inflation.

Mounting tyre on rim

Numbers in parentheses refer to Fig.2, unless otherwise specified.

⚠ warning

When lifting tyre onto rim, be sure the device is of sufficient capacity and properly secured to do the job safely.

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1. If tubeless tyre valve assembly was removed from rim, install this assembly in the rim valve hole and tighten securely.
2. Whether the rim (4) is on or off the truck, tyre installations are performed in basically the same manner. For off-truck installations, lay the rim on blocks with 'O' ring groove up. The rim should be just off the floor enough so the tyre rests on the rim and does not touch the floor. The blocks should not extend more than 13 mm (0.5 in) beyond the rim base, so they won't interfere with inner flange (5).
3. Install the inner flange (5) onto the rim (4).
4. Before assembly of tyre to rim, lubricate both tyre beads and new 'O' ring (5, Fig.1) with a thin solution of vegetable base soap and water. Make sure tyre valve assembly is securely in place. Lower the tyre onto the rim, seating tyre firmly against inner flange (5).
5. Install outer flange (1) on rim (4).
6. Install bead seat band (2) on rim (4).
7. Install lock ring (3) in groove of rim (4). Use pry bar for this operation, as illustrated in Fig.5.
8. Force bead seat band (2) past 'O' ring groove in rim (4) by prying, or with lift truck forks. Use blocking between the forks and tyre to prevent tyre damage. Lubricate area of rim adjacent to 'O' ring groove with a thin solution of soap and water or another approved lubricant which is not harmful to rubber. Avoid using an excessive amount of lubricant. Insert a new 'O' ring (5, Fig.1) in the groove of the rim behind the lock ring.
9. Lift tyre upwards to effect a seal between bead seat band (2) and 'O' ring (5, Fig.1). In some cases the tyre will automatically spring out, if this step is neglected,

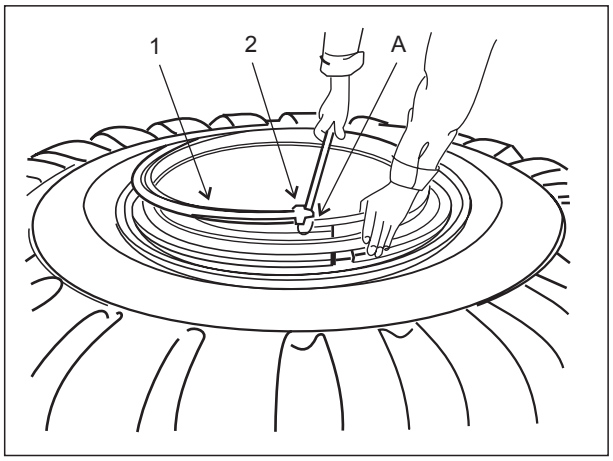


Fig.5 Installation of Lock Ring

Mounting tyre and rim assembly on wheel
Numbers in parentheses refer to Fig.1.

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⚠ warning

Be sure lifting equipment is of sufficient capacity and properly secured to do the job safely.

1. Support inner tyre and rim assembly with a chain or rope sling attached to an overhead lifting device and slide onto wheel (4) of the truck. Side with lock ring (6) and bead seat band (3) should be facing outward.
2. Install outer tyre and rim assembly in the same manner, except with bead seat band (3) and lock ring (6) facing inward, toward spacer band (7). Install wedge band (8).
3. Install clamps (10) and nuts (11) on studs (9). Gradually tighten wheel nuts opposite each other, until all nuts are snug, torque tighten wheel nuts (11) to 1000 N. M-1300 N. M.

Re-tighten nuts after a few hours operation.

Note: The fastener torque should be checked regularly, particularly on new truck or newly-installed wheels, to maintain the required wheel rim-clamp load. A newly installed wheel or a new truck should be checked at 30 day intervals until rim fasteners show no significant torque loss from the previous check. After that, a 90 day torque check interval should be adequate.

Tyre inflation

⚠ warning

To prevent personal injury and property damage, the tyre and rim assembly should be placed in a safety cage before inflating. If no safety cage is available or tyre is on the truck, the tyre and rim assembly should be wrapped with safety chains or with cables before inflating.

Even with these precautions remember that air-blast is a potential hazard. Tyre

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inflation should be carried out away from busy working areas.

To prevent personal injury and property damage, never stand or sit in front of a mounted tyre during tyre inflation. Use a clip-on air chuck with a long hose and stand to one side while the tyre is being inflated.

To prevent personal injury and property damage, always prevent flammable vapours that could produce tyre explosions, from being pumped into tyres during inflation, by observing the following precautions:

1. Use an air compressor and reservoir located inside a heated building, when available, so that alcohol, methanol, or other flammable antifreeze liquids are not needed in the air tanks to prevent moisture freezing in the tank and lines in subfreezing temperatures.

2. Make sure that paints, lacquers, paint thinners, or similar materials that produce volatile, flammable vapours are not used or stored near the air intake of the compressor that supplies the air for inflating tyres. The compressor should be isolated from all such sources of flammable vapours.

3. Be sure to thoroughly flush and blow off all flammable solvents used for cleaning the air compressor inlet screen before using the compressor for tyre inflation, or any other purpose.

4. Do not charge batteries, near the air inlet of a compressor used for inflating tyres. Charging batteries produces highly explosive hydrogen gas which can be readily drawn into a nearby compressor inlet and pumped into the tyre.

5. Never exceed the specified concentration of alcohol when adjusting the alcohol vaporiser, or adding alcohol to the auxiliary air tank, used on machine air systems to prevent freezing or moisture condensate in below-freezing temperatures. Excessive

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alcohol, added to the air tanks can produce flammable vapours that will be pumped into a tyre when this air supply is used for tyre inflation if the tyre inflation kit is not equipped with a moisture filter.
6. Another source of hazardous flammable vapours in tyres is the tyre bead lubricant. Always use bead lubricants that do not introduce flammable vapours into the tyre.

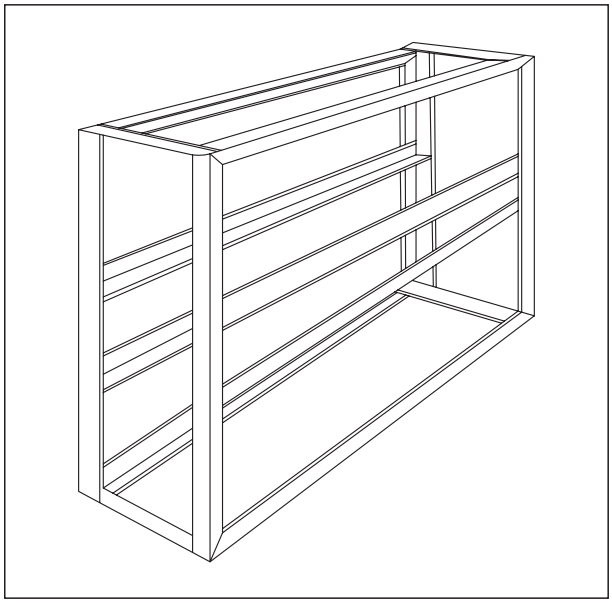


Fig.6 Tyre Inflation Safety Cage

Inflation

Note: To prevent moisture corrosion of internal rim parts, use tyre inflation equipment with an air filter that removes moisture from the air supply, when available,

1. If the tyre is off the truck, it should be placed in a safety cage before inflating. See Fig.6.
2. Inflate all tyres with ratings of 16-ply and above to 0.52 Mpa to seat beads and seal 'O' ring, then adjust to the recommended pressure.
3. For recommended operating air pressure, refer to the chart 'Tyre Inflation Pressures'.

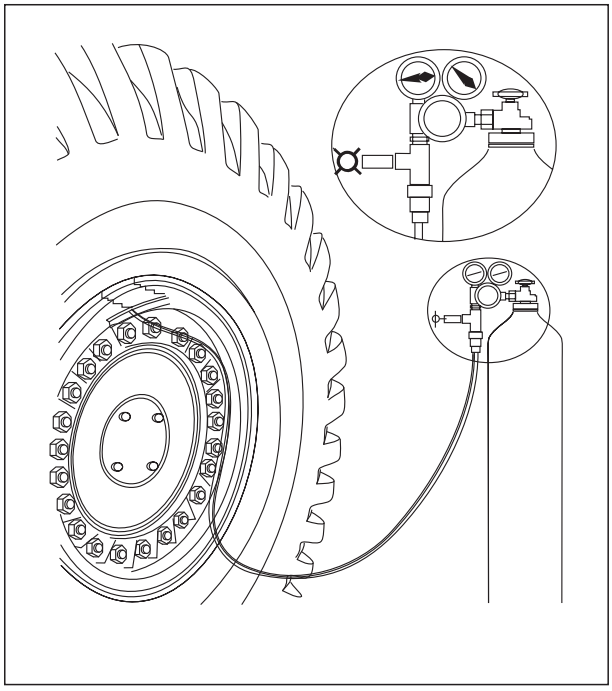


Fig.7 Nitrogen Tyre Inflation Kit

Nitrogen tyre inflation

Note: All Warnings and procedures under 'Tyre Inflation' will apply, except for differences covered by this passage.

In certain environments it is recommended that tyres be inflated with dry nitrogen gas, and that the resulting oxygen content of the inflation does not exceed 5%. All machines whose tyres are factory inflated with dry nitrogen gas will be identified by a decal on the body or frame.

Nitrogen gas improves tyre pressure retention, increases tyre life by reducing carcass oxidation from within, minimizes rim rust and has no detrimental effects on the tyre. It also reduces the potential of a tyre explosion because it is an inert gas and will not support combustion inside the tyre.

The same tyre inflation pressure used for air

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inflation should be used for nitrogen inflation. Tyre valves formerly used with air inflation are entirely satisfactory for use with nitrogen gas.

Nitrogen tyre inflation kit

⚠ warning

DO not use charging assembly for tyre inflation because this assembly does not include a pressure regulator, safety relief valve, and adequate pressure gauging which is mandatory for tyre inflation. Tyre volume is as much as 90 times greater than the average accumulator volume and it takes very much longer to inflate a tyre - up to 40 minutes or more for very large tyres. Nitrogen gas cylinders used to inflate tyres are generally charged to approximately 15.2Mpa. A tyre blowout or rim failure could occur if inflation equipment is not properly used. Proper nitrogen charging equipment and personnel training can avoid over inflation.

1. A nitrogen tyre inflation kit is available from your dealer and consists of the following. Refer to Fig.7.
a. Pressure regulator, 0 – 1.3 Mpa, with two dual pressure gauges.
b. Safety relief valve, 0.86 Mpa, that will assure an upper limit to the pressure available for tyre inflation.
c. A 15 length of flexible hose with interconnecting fittings. On the tyre end of the hose is a large bore quick connect.
2. The pressure regulator is connected to a nitrogen compressed gas cylinder available from local suppliers.
3. The usual procedure for using this type of equipment is as follows:
a. Connect nitrogen tyre inflation kit to nitrogen compressed gas supply. DO not connect quick

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connect to the tyre valve at this time.
b. Open valve on nitrogen supply.
c. With flexible hose and quick connect connected to nitrogen tyre inflation kit assembly but not connected to the tyre, adjust pressure regulator so that its output pressure is not more than 0.14Mpa higher than the desired tyre inflation pressure.
d. Connect quick connect to the tyre valve. The tyre will now inflate. Tyre pressure can be monitored by observing the gauge at the pressure regulator.
e. When desired inflation pressure has been achieved, back off the regulator or close the valve on the compressed gas cylinder.
f. Remove the quick connect and adjust the tyre pressure with the tyre gauge in the usual manner.

Re-inflation of a mounted tyre

To re-inflate a tyre with dry nitrogen gas which is now inflated with air, proceed as follows:
1. Deflate the tyre until the air in tyre reaches the atmospheric pressure.
2. Re-inflate the tyre using only dry nitrogen gas to 0.41Mpa gauge as a minimum, or to bead-seating pressure as a maximum.
3. Adjust to the service inflation pressure required:
a. If the required service inflation pressure is less than 0.41Mpa remove the quick connect and adjust the pressure with the tyre gauge in the usual manner.
b. If the required service inflation pressure is greater than 0.41Mpa, continue inflating with dry nitrogen gas only, to the pressure level required. Then remove the quick connect and adjust the pressure with the tyre gauge in the usual manner.

New tyre mounts and remounts

To newly mount or remount a tyre to rim, use only dry nitrogen gas; this includes the pressure required to seat the beads. After

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seating the tyre beads, remove the quick connect and adjust the pressure with the tyre gauge in the usual manner.

Note: Although a little more nitrogen gas is used to seat beads than that used for reinflation of a mounted tyre, its cost is generally negligible in comparison to the time and labour saving and, longer tyre life achievable with the reduced oxygen content which results.

Hydraulic bead breaking tool

The hydraulic bead breaking tool illustrated in Fig.8 is specifically designed to break tyre beads on rusted rims, and is available from your dealer. Refer to Special Tools. It can be used on rims having pry bar slots. The recommended procedure for using this tool is described below.

1. Prepare for dismantling tyres according to the necessary steps in the ‘Preparation for servicing’ and ‘Dismantling tyre from Rim’.
2. Completely deflate tyre if not done previously. See warning under 'Preparation for servicing'. Tape valve threads to protect from damage, leaving valve end open to avoid the possibility of trapping air inside the tyre.
3. Place the lip of the hydraulic tool in one of four breaking slots between the flange and the bead seat band.
4. Adjust locking screw to a position which will hold the tool in a line perpendicular to the face of the rim.
5. Close valve on the hydraulic pump and apply pressure to take up the slack in the tool and rim parts. This will cause the tool to tilt slightly downward. Release pressure and adjust the screw again so that the tool will be perpendicular to the rim when under pressure.
6. Apply enough pressure to move the flange back approximately 13 mm (0.5 in) and hold this distance by dropping a nut, or similar object, in the space between the flange and the bead seat band.

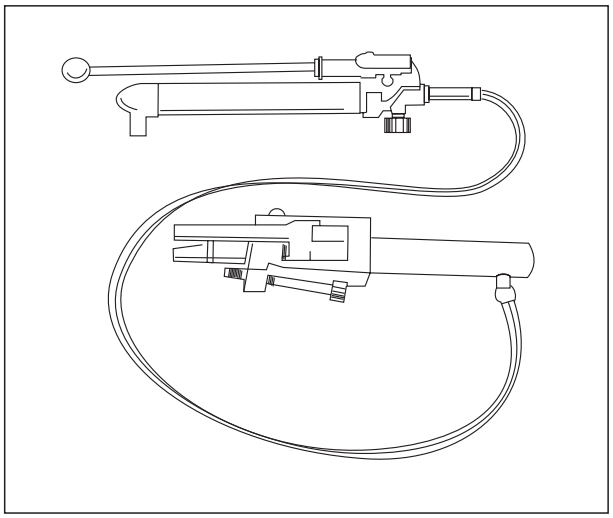


Fig.8 Typical Hydraulic Bead Breaking Tool

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7. Release pressure and move the tool around the rim in either direction. Insert lip of tool between bead seat band and flange. Repeat cycle until 3/4 of the rim circumference has been covered. Apply pressure at this point until bead breaks loose.
8. Remove lock ring, bead seat band and flange as described under 'Dismounting tyre from rim'.
9. After lock ring, bead seat band and rim flange have been removed, inner bead must be broken loose according to Steps 3-7 for breaking outer bead.

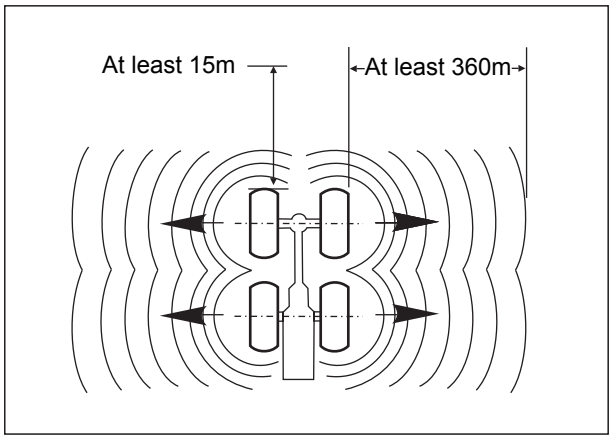


Fig.9 Do Not Approach Tyre in Shaded Area

⚠ warning

Whenever a tyre is exposed to excessive heat such as a truck fire or overheated brakes the hazard of a subsequent violent tyre explosion must be recognized. All persons must avoid approaching the truck so as not to be physically endangered in the event of an explosion of the tyre and rim parts. The truck should be moved to a remote area, but only when this can be done with complete safety to the operator operating or towing the truck. All other persons should stay clear of the truck. The fire or overheated brakes, wheel, etc. should be extinguished or cooled from a safe distance. Do not attempt to extinguish the fire or cool the machine by use of hand-held fire extinguishers.
If it is absolutely necessary to approach a truck with a suspect tyre, approach only from the front or the back. Stay at least 15 m (50 ft) from the tread area. Keep observers out of the area and at least 460 m (1 500 ft) from the tyre sidewall. Refer to Fig.9. The tyre should be allowed at least 8 hours cooling time after the machine is shut down or the fire extinguished before approaching closer.
There is always a possibility of a tyre

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explosion whenever the smell of burning rubber or excessively hot brakes is detected. The danger is also present when a fire on the truck reaches the tyre and wheel area. Under such conditions, all personnel must avoid approaching the truck in a manner that could result in injury should an explosion actually occur. Move the truck to a remote area only if it can be done without endangering the operator or other personnel in the area.

DO not weld on or heat rim components. For several years the company and tyre and rim manufacturers have warned users never to weld rim components with the tyre mounted on the rim. The gases that build up inside the tyre during arc welding or heating on rim components can ignite, resulting in one of these explosive-like failures of the tyre and rim. It is recommended to scrap the part if heat is necessary to repair any rim component.

Tyre maintenance

Tyre repairs

Prompt repair of tyre injuries will prevent small injuries from enlarging and causing tyre failure. Use the best tyre repair facilities available. If good repair facilities are not available, have the nearest dealer make the necessary repairs.

Minor cuts, snags, or punctures should be repaired upon discovery. Skive with a sharp pointed knife around any cut in the tyre tread area that is of sufficient depth or shape to hold pebbles or dirt. The angle of the skive should be no more than sufficient to expel all foreign material and should extend no deeper than the breaker. The skive should go to the bottom of the hole. Tyres with shallow cuts, if treated promptly, may be allowed to continue in service. If the cut extends deeper into the tyre carcass, the tyre should be removed for

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repair. Ordinary tubeless tyre punctures can be repaired without removing the tyre from the rim. Use tyre repair plugs and follow the directions given by the manufacturer.

The tyre must be removed from the rim to repair larger punctures or cuts. Irregular shaped punctures or cuts less than 13 mm in size can be repaired with a plug and hot patch. Insert a repair plug into the hole to keep out moisture and to back up the hot patch. Trim the plug off flush with the inside of the casing, buff, and apply the hot patch according to the instructions supplied with the hot-patch equipment.

Punctures 13 mm or larger, large cuts, or bruise breaks require sectional or reinforced vulcanized repair. Cover the repair patch with a layer of cushion gum after application to the tubeless tyre to ensure an airtight repair. Any cords of the inside ply that are exposed in bugging and are not covered with repair patch must be coated with cushion gum to prevent air leakage into the carcass plies on tubeless tyres.

Recapping and retreading

There are two general methods employed in restoring the tread surface of off-the-highway tyres: recapping and retreading.

A recapped tyre has a new tread cured right over the old tread surface.

A retreaded tyre has the old tread removed entirely and a new tread cured directly onto the body of the tyre. A tyre can be recapped or retreaded if the cord body is free of cuts, bruises and separation, and is thoroughly sound, including previous repairs.

Tyre Care

To obtain maximum service from off-the-highway tyres, a few common-sense precautions should be followed.

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Maintain correct inflation

Most tyre damage are caused by improper inflation. Both over-inflation and under-inflation are detrimental to tyre life. Tyre pressure should be checked daily, preferably before the truck is placed in operation, see the instructions in 'Tyre Inflation Pressures'.

The valve cores should be checked for leaks. Keep in mind that valve cores are delicate mechanisms that wear out in service; therefore, they should be replaced when they become worn. Each tyre should be equipped with a valve cap to prevent dirt from damaging the valve core and causing air leakage.

Maintain good haul roads

Because haul roads are considered temporary roads, they are frequently neglected. The better the haul road, the longer the tyre and machine life of off-the-highway equipment.

Note: Although it takes time and effort to maintain good haul roads, delay and cost of tyre and machine breakdowns caused by poor haul roads is many times greater.

Inspect tyres regularly

A systematic plan for tyre inspection will more than pay for itself in lowered tyre costs per hour of operation. All tyres should be checked regularly for cuts, bruises, fabric breaks, excessive or uneven wear, embedded foreign matter, and any other damage which can be repaired. A considerable increase in tyre service can be realized if tyre injuries are repaired before they have progressed to the irreparable stage. The rim mounting nuts should be checked periodically and tightened to the recommended torque.

Prevent overloading

Mining dump trucks are designed to carry a maximum allowable payload.

Note: Excessive loading will overstress both the machine and tyres and shorten the life of

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both.

Prevent tyre contact with oil

Prevent tyre contact with petroleum products. Rubber that is exposed to oil, petrol, or grease becomes soft and spongy and deteriorates rapidly. Always avoid driving truck equipped with rubber tyres through a puddle of petrol, fuel oil, lubricating oil, or grease. Never let a tyre stand in an oil or grease spot overnight.

Store tyres properly

The best of care given to tyres in service by operators and maintenance personnel can be completely nullified by careless storage. Time is not the only contributing factor to the deterioration of rubber products. Therefore, tyres that are to be stored must be protected from light, heat, oils, dirt, moisture and ozone. Stored tyres should be carefully covered with a tarpaulin or some other suitable material, such as opaque plastic sheets, to prevent contact with the contaminants listed.

Proper handling of tubeless tyres and rims

Tubeless tyres should be stored vertically. Horizontal stacking may compress the tyre walls making inflation difficult. If tyres are stored in racks, the lower supporting members should provide as broad a surface as possible to the tyre tread to avoid a concentration of load.

The beads of tubeless tyres must be protected from damage or a faulty air seal will result. Do not use hooks, cables, or chains in contact with the tyre beads when lifting these tyres. If forklift trucks are used for handling, they should be equipped with broad, well rounded arms to distribute the load and prevent damage to the tyre bead. When handle tyres with the fork truck, do not scrape the fork across the bead.

Tubeless tyre rims perform an important function as part of the assembly air seal.

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Proper care therefore must be taken not to distort or mutilate the rim parts, because they must mate properly to form part of the basic air chamber. Since the rim base, bead seat band, and flange are endless, distortion may prevent easy assembly as well as possibly resulting in no seal.
Never drop, tumble, or roll rim parts.
If rim parts are stored outdoors they should be given a protective coat of a good commercial primer.
Similar parts should be stacked neatly to prevent distortion.
Babbitt or lead hammers, not sledge hammers, should be used in assembling rims.
'O' rings are seals and should be carefully stored in a cool, dry place where they will not be damaged.
Valve cores also should be stored in a cool, dry and clean place.

Special Tools
Refer to Section 38.3, SERVICE TOOLS, for part numbers of special tools outlined in this section and general service tools required. These tools are available from your dealer.

Tyre Inflation Pressures
E3 tyres may be so roaded up to 48 km/h (30 mile/h), maximum, with a 30 minute cooling stop after each 80 km (50 miles) or 2 hours sustained operation - whichever occurs first - and a 60 minute cooling stop after each aggregate of 4 hours of operation.
E4 tyres may be so roaded up to 32 km/h (20 mile/h), maximum, with a 30 minute cooling stop after each 32 km (20 miles) or 1 hour of sustained operation - whichever occurs first - and a 60 minute cooling stop after each aggregate of 4 hours of operation.
Normal inflation pressure of bias tyres (27.00-49 48PR) is 0.575 Mpa. Specific job conditions, terrain, haul road maintenance and length, maximum and workday average

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speed, job t-km/h (ton-mile/h) required and tyre t-km/h (ton-mile/h) capacity, etc., may require an increase in inflation pressure. It is recommended that for tyres both listed and unlisted the user consult the tyre manufacturer and evaluate all job conditions in order to make the proper selection.

Technical conditions of special torque				
Fig. NO.	Item No.	Item Name	Torque	
			N•m	lbf•ft
1	11	Nut	1000~1300	740~960

Tubeless Tyre Leak Diagnosis	
Occasionally a tubeless off highway tyre/rim assembly may leak in field service. To determine cause of leakage, the entire assembly including valve hardware, multi-piece rim assembly, 'O' ring and tyre should be checked using a soap solution. This table lists various causes of air loss and possible remedy.	
Causes	Remedy
Defective valve	Tighten parts. Replace defective parts. Use valve caps.
Cracked rim or weld	Replace defective parts ⚠ Warning Do not attempt repair of wheel components.
Twisted or damaged 'O' ring	Replace 'O' ring (lubricate)
Tyre cuts and snags	Repair tyre damage
Bead area awl holes	Repair inner liner (preferred)

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Leakage between tyre bead trim	With tyre removed from rim: Clean tyre beads in rim contact area Clean rim with wire brush Inspect 5° tapered bead seat band and the rim base in the bead seating area to determine if the transverse weld trims are flat or concave. Replace defective part. Weld trim should follow rim contour.
	Mount tyre using a lubricant such as Murphy's Tyre and tube Mounting Compound, or equivalent, on tyre beads and rim bead seat area.

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5 INSTALLATION OF ENGINE

5.1 Engine and Mounting

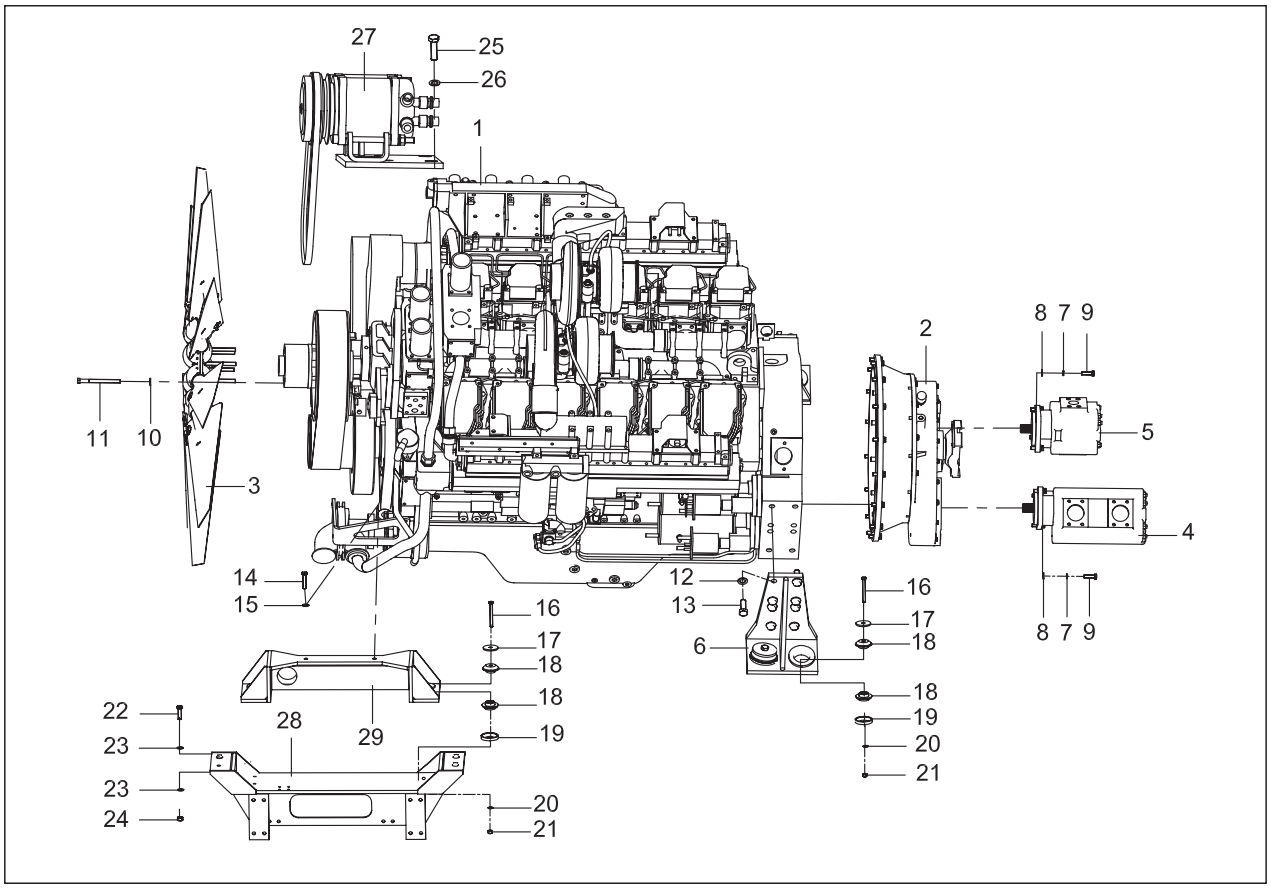


Fig.1 Engine and Mounting

1. Engine	11. Bolt	21. Nut
2. Engine - power takeoff	12. Washer	22. Bolt
3. Fan	13. Bolt	23. Washer
4. Double-gear pump	14. Bolt	24. Nut
5. Gear pump	15. Washer	25. Bolt
6. Rear mount	16. Bolt	26. Washer
7. Washer	17. Snubbing washer	27. Compressor
8. Washer	18. Shock mount	28. Crossmember
9. Bolt	19. Snubbing washer	29. Front support
10. Washer	20. Washer	

Overview

Numbers in parentheses refer to Fig.1.

For engine make, model and specification,

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refer to Section 36.4, 'Specifications of SRT95C Mining Truck'. For engine servicing and repair data refer to the engine manufacturers service manual. The engine is mounted to the frame at three points by a mounting assembly (28 and 29) at the front of engine (1) and two rear mounts (6). Rubber Shock Mount (18) through engine mounts provide sufficient flexibility to absorb varying engine vibration and torsional loads. There are four full-flow oil filters, two fuel filters and two coolant filters mounted on the engine (1). There are a alternator at the front right hand side of engine, and two starting motors at the rear left hand side of engine.

Removal

Numbers in parentheses refer to Fig.1.

⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely. High electrical current can cause sparks and personal injury from burns. Turn ignition key switch to the 'Off' position before removing any components. Remove battery ground cable first, and reconnect last, to avoid damaging electrical components.

Note: Tag all cables, harnesses, lines and pipes disconnected during removal to aid in installation.

1. Position the vehicle in a level work area, ensure the body is fully lowered, apply the parking brake and switch off the engine.
2. Turn steering wheel several times to relieve pressure in the steering circuit. Block all road wheels.
3. Disconnect battery cables from battery

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terminal ports before starting removal procedures. Disconnect ground cable first.
The connectors of electric components should be disconnected in the following order:
a. Disconnect the ground cable of battery compensator
b. Disconnect battery cables from battery terminal ports (Disconnect ground cable first)
c. Disconnect the positive cable of battery compensator
d. Disconnect the connector of ECU
4. Remove mounting hardware securing the hood on the vehicle. Remove hood assembly from the vehicle.
5. Disconnect electrical connections from the radiator guard and remove mounting hardware securing the radiator guard on the vehicle. Remove radiator guard from the vehicle.
6. Place a suitable container under the engine drain port, remove drain plug and drain the oil. After draining, reinstall drain plug in the engine sump and tighten securely.

⚠ warning

Harmful gas. Before disconnecting any air conditioner lines refer to Refrigerant will rapidly freeze all objects with which it comes into contact, and it can cause serious damage to the skin and eyes.

7. If the truck is equipped with an air conditioning system, evacuate refrigerant from the system and disconnect lines at the compressor. Refer to Section 5.2, 'Compressor Installation'.
8. With suitable containers in position, open drain cocks and drain coolant from the radiator and engine (1) assembly. Close all drain cocks after draining.
9. Identify cooling lines for ease of installation and with suitable containers in position, disconnect cooling lines from engine (1). Cap

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open line ends and fittings.
10. Using suitable lifting equipment, carefully remove the radiator assembly from the vehicle. Refer to Chapter 32, ‘RADIATOR AND MOUNTING’.
11. Disconnect and remove air cleaner intake pipe from the engine turbocharger and air cleaner.
12. Disconnect and remove exhaust tube from the engine turbocharger.
13. Disconnect the throttle cable from the engine (1).
14. Identify heater lines for ease of installation and, with a suitable container in position, disconnect heater lines from engine (1). Cap open line ends and fittings.
15. Close fuel shutoff valve at filter head, identify fuel lines for ease of installation and, with a suitable container in position, disconnect fuel lines from engine (1). Cap open line ends and fittings.

⚠ warning

Heavy assembly. To prevent personal injury and property damage, be sure lifting device is of adequate capacity and properly secured to do the job safely.

16.Identify all electrical harnesses and cables attached to engine (1) for ease of installation and disconnect from engine (1).
17. Disconnect driveline from engine coupling and secure clear of engine (1). Refer to Chapter 19, ‘Transmission Shaft Installation’.
18. Remove the bolts (9) and the washers (7 and 8). Remove the double-gear pump (4) and gear pump (5) from the engine power takeoff (2) .
Note: The hydraulic lines can be left attached to the double-gear pump (4) and gear pump (5).
19. Remove bolts (16), Snubbing washers

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(17,19), Shock Mounts(18), washers (20) and nuts(21) securing Crossmember (28) to front mounting (29). Remove bolts (16), Snubbing Washers(17,19), Shock Mounts (18), washers (20) and nuts(21) securing rear mounting brackets (6) to the frame.
20. Remove the disc brake oil cooler and gearbox oil cooler from the Crossmember (28).
21. After the oil coolers are removed, remove the bolt (22), washer (23) and nut (24). Remove the Crossmember (28) from the frame.
22. Identify all electrical harnesses and cables attached to engine (1) for ease of installation and disconnect from engine (1).
23. Check to make certain that all necessary line and electrical disconnections have been made before lifting engine (1).
24. Carefully lift engine (1) assembly clear of the frame and move to a clean work area. Securely mount engine (1) assembly to a work stand.

Disassembly

Numbers in parentheses refer to Fig.1.
1. If required, remove bolts (14) and washers (15) securing front mount (29) to engine (1). Remove front mount (29) .
2. If required, remove bolts (13) and washers (12) securing rear mounts (6) to engine (1). Remove rear mounts (6).
3. If required, remove bolts (25) and washers (26) fixing the compressor (27), loosen compressor drive belt, Remove the compressor (27) from the engine (1). Refer to Section 5.2, ‘Compressor Installation’.
4. Remove bolts (11) and washers (10) securing fan to engine (1) then remove fan.
5. Loosen the fan hub mounting bolts and turn the adjusting rod anticlockwise enough to allow slack in poly 'V' belts. Remove poly 'V' belts.
6. If necessary, the shaft coupling can be removed from the flywheel after the power takeoff assembly is removed. Refer to section

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5.1.1, ‘Engine POWER TAKEOFF AND INSTALLATION’.
7. Take down the bolt and washer from the removed PTO. Remove the shaft coupling from the engine (1).
8. When removing the filters, plug the ports to avoid grit and dust enter engine, as described under 'Maintenance'.
9. If necessary, Refer to the Engine Service Manual.

Inspection
See Fig.1 for the numbers in brackets.
1. Inspect shock mounts (18) for damage and replace if damaged.
2. Check all mounting components for cracks and excessive wear. Repair or replace as required.
3. Inspect shaft coupling, joint for wear or damage and replace if necessary.
4. Replace all filters. Check all drive belts for tension and wear, as described under 'Maintenance'.
5. Refer to the Engine Service Manual for additional engine disassembly/assembly, repair, adjustment and tune-up procedures.

Assembly
Numbers in parentheses refer to Fig.1.
Note: Tighten all fasteners without special torques specified to standard torques listed in Section 38.2, STANDARD BOLT AND NUT TORQUE SPECIFICATIONS.
1. Remove the caps and Position the new filters, as described under 'Maintenance'.
2. If the oil filling pipe has already been removed, Position the oil filling tube and filter assembly to the engine and fix them with the grip. And the secure the bolts, washers and nuts.
3. Position the shaft coupling and power take-off(2) to engine (1) , secure the bolts and washers.
4. Install 'V' belts in the grooves of alternator

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(56) and accessory drive pulley.
Note: Alternator belt tension adjustment is made after installation of engine (1) and the radiator assembly.
5.Install poly 'V' belts to the fan pulley and crankshaft pulley.
6.. Adjust poly 'V' belts by turning the adjusting screw clockwise until the correct tension is obtained. Refer to 'Drive Belt Adjustments'. When correct tension is obtained tighten fan hub mounting bolts to a torque of 101 - 126 N•m (75 - 93 lbf•ft).
7. Position fan to fan pulley on engine (1) and secure with bolts (11) and washers (10). Tighten bolts 11) in a star shaped pattern to a torque of 34 N•m (25 lbf•ft).
8. Position the compressor assembly (27) on the engine (1) and secure with bolts (25) and washers (26).
9. Position the front support (29) on the engine (1), and secure with bolts (14) and washers (15).
10. Position the rear mounts (6)) on the engine (1), and secure with bolts (13) and washers (12).

Installation
Numbers in parentheses refer to Fig.1.

⚠ warning

To prevent personal injury and property damage, be sure lifting device is properly secured and of adequate capacity to do the job safely.

Note: Tighten all fasteners without special torques specified to standard torques listed in Section 38.2, STANDARD BOLT AND NUT TORQUE SPECIFICATIONS.
1. Install the crossmember (28) on the chassis mounts and secure with bolts (10), washers (23) and nuts (23).

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2. Attach suitable lifting equipment to engine (1) lifting brackets and carefully position engine (1) assembly in the frame.
3. Secure crossmember (28) assembly and rear mounts (6) to engine (1) with bolts (16), Snubbing Washers (17), Shock Mounts (18), Snubbing Washers (19), washers (20) and nuts (21)). Install the disc brake oil cooler and gearbox oil cooler to the crossmember (28).
4. Connect driveline to the engine coupling. Refer to Chapter 19, FRONT DRIVELINES.
5. Install the double gear pump (4 and 5) to the engine power take-off (2).
6. Install tandem pump on power takeoff assembly and secure with mounting hardware. Refer to Chapter 32, 'RADIATOR AND MOUNTING'.
7. Remove caps from all cooling lines and connect lines to the radiator assembly and engine (1) assembly as identified at removal.
8. Install air cleaner intake pipe and exhaust piping to engine turbocharger. Tighten mounting clamps securely.
9. Remove caps from heater lines and fittings and connect heater lines to engine (1) as identified at removal.
10. Remove caps from fuel lines and fittings and connect fuel lines to engine (1) as identified at removal.
11. Connect all electrical harnesses and cables to engine (1) (with the exception of battery connections) as identified at removal.
12. If the vehicle is equipped with air conditioning, connect the lines at the compressor as identified at removal. On completion of engine installation the air conditioning system will require to be charged. Refer to Section 5.2, 'Compressor Installation'.
13. Connect all electrical harnesses and cables to engine (1) assembly as identified at removal. Do not connect battery and battery equalizer connections at this time.
14. Connect throttle control linkage to engine (1) assembly.

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15. Connect electrical connections as follows:
a. Connect electrical connections at the ECU.
b. Connect battery equalizer positive cables.
c. Connect battery cables to terminal posts (ground cables last).
d. Connect battery equalizer ground cables.
16. Check that all electrical connections and cables, all lines and components removed or disconnected at removal have been reinstalled correctly. Ensure all drain plugs and drain cocks are tightly secured.
17. Fill engine (1) with lube oil specified in Section Section 36.1, ‘LUBRICATION AND MAINTENANCE’. Check oil level as described under 'Maintenance
18. Start the engine and bring the engine oil to operating temperature. Check all lines and fittings for leaks and tighten as required. Switch off the engine.
19. Using suitable lifting equipment, install hood assembly into position on the vehicle. Secure hood assembly with mounting hardware removed at removal.
20. Install hood side assembly on the vehicle and secure with mounting hardware removed at removal.
21. Connect battery positive connections to battery terminal posts. Connect battery earth connections to battery terminal posts.
22. Ensure all lines, harnesses and cables are secured with clips and clamps as removed during removal. Ensure no lines are chaffing on sharp edges or resting against areas where heat will be evident. Ensure all drain plugs and cocks are secured tightly.
23. Fill the cooling system with coolant specified in Chapter 34, ‘Radiator Mounting’ Check the coolant level as described in Chapter 34, ‘Radiator Mounting’.
24. Fill the engine with lube oil specified in 'Maintenance'. Check oil level as described under 'Maintenance'.
25. Start up the engine and bring the engine oil to operating temperature. Check all lines

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and fittings for leaks and tighten as required.
26. Ensure parking brake is applied and remove wheel blocks from all road wheels.

Maintenance
Numbers in parentheses refer to Fig.1.

Every 10 Hours (Daily)
Engine (1): Visually check engine for damage, loose or frayed belts and listen for any unusual noises. Check the turbocharger for leaks.
Engine (1) Oil Level: Check engine oil level and add oil if low. To allow checking before starting as well as immediately after shutting down the engine, the dipstick is provided with two types of marks:
1. Dot Marks - Before starting up after a major shut down period the oil level should be up to the top dot mark (cold level).
2. **Dash Marks** - Upon shutting down the engine at low idling (wait 1 to 2 minutes) the oil level should be up to, but not over, the top dash mark (hot level).

Every 250 Hours
Engine (1): Drain engine oil and refill. Refer to Section 36.1, 'LUBRICATION AND MAINTENANCE'. **Engine Water Pump**: Inspect water pump drain hole and clean if required.
Engine Oil Filters : Replace oil filters as follows:
1. Using filter wrench, remove and discard both oil filters from engine (1). Inspect the sealing surface of the filter to ensure that the seal ring stayed with the filter. If not, remove it from the filter adaptor.
2. Clean the filter adaptor with a clean, lint free cloth.
3. Lightly coat new oil filter seal with clean engine oil Refer to Chapter 29, 'Lubrication System'.
4. Start a new oil filter on the filter adaptor and tighten it by hand until the seal touches the

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adaptor filter head. Tighten an additional 2/3 of a turn after contact.

Note: Mechanical tightening of oil filters is not necessary and will distort or crack the adaptor. Tighten oil filters by hand only.

5. Repeat steps 3 and 4 for second oil filter.

6. Start and run the engine for a short period and check for oil leaks. If any leaks are noted, have them corrected.

7. After the engine has been stopped long enough (approximately 20 minutes for the oil from various parts of engine (1) to drain back to the crankcase, check oil level and add oil to bring it to the proper level on the dipstick. Refer to Section 36.1, 'LUBRICATION AND MAINTENANCE'.

Fuel Filters: Replace primary and secondary fuel filters as follows:

Note: There is a fuel system shut off valve on the discharge side of secondary fuel filter. Closing this valve will prevent loss of fuel prime at time of filter replacement.

1. Close shut off valve at secondary fuel filter and, using filter wrench, remove and discard both fuel filters from engine (1).

2. Fill the replacement filters and coat the gaskets slightly with clean fuel oil as specified in Section 36.1, 'LUBRICATION AND MAINTENANCE'.

3. Start a new fuel filter on the filter adaptor and tighten it by hand until the gasket contacts the adaptor fully with no side movement of the filter evident. Tighten an additional 1/2 of a turn.

Note: Mechanical tightening of fuel filters is not recommended, and may result in seal and/or cartridge damage. Tighten fuel filters by hand only.

4. Repeat step 3 for second fuel filter.

5. Start the engine and check for leaks. If any leaks are noted, have them corrected.

Coolant Filter: Check condition of coolant inhibitor as described in Chapter 32, 'RADIATOR AND MOUNTING'.

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Note: There is a shut off valve at the coolant inlet and outlet lines of coolant filter. Closing these valves will enable coolant filter to be replaced without an excessive loss of coolant.

1. Close shut off valves at coolant filter inlet and outlet lines and, using filter wrench, remove and discard coolant filter from engine (1).
2. Clean the filter adaptor with a clean, lint free cloth.
3. Lightly coat new coolant filter seal with clean engine oil as specified in Section 36.1, 'LUBRICATION AND MAINTENANCE'.
4. Start coolant filter on the filter adaptor and tighten it by hand until the seal touches the adaptor filter head. Tighten an additional 2/3 of a turn after contact.

Note: Mechanical tightening of coolant filter is not necessary and will distort or crack the adaptor. Tighten oil filters by hand only.

5. Open shut off valves at coolant filter inlet and outlet lines.
6. Start the engine and check for leaks. If any leaks are noted, have them corrected. Add coolant as required. Refer to Chapter 32, 'RADIATOR AND MOUNTING'.

Drive belt adjustments

Every 50 Hours: Check all drive belt tensions and adjust if required. If vehicle is equipped with air conditioning, compressor belts should be checked and adjusted as described in Section 5.2, 'Compressor Installation'.

Every 2000 Hours: Replace all drive belts.

Note: Replace all belts in a set when one is worn. Single belts of similar size should not be used as a substitute for a matched belt set as premature belt wear can result due to belt length variation. All belts in a matched belt set are within 0.81 mm (0.032 in) of their specified centre distances.

Using belt tension gauge, adjust the belt tension to the following values:

Fan - Poly 'V' Belt

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Belt Tension 'New' - 3 340 N (750 lbf)
Belt Tension 'Used' - 2 450 - 3 340 N (550 - 750 lbf)

Alternator - 'V' Belt

Belt Tension 'New' - 556 N (125 lbf)
Belt Tension 'Used' - 445 N (100 lbf)

Note: A belt is considered 'Used' if it has been in service for 10 minutes or longer. If the used belt tension is less than the minimum value, tighten the belt to the maximum value.

Belts should be neither too tight nor too loose. Belts that are too tight impose excess loads on the crankshaft, fan and alternator bearings, shortening both belt and bearing life. Excessively overtightened belts can result in crankshaft breakage. A loose belt will slip and may cause damage to accessory components.

Special tools

Refer to Section 36.3 'MAINTENANCE TOOLS', for part numbers of tools referenced in this section, general service tools required, and service tools which should be used in conjunction with procedures outlined in the engine manufacturers service manual. These tools are available from your dealer.

Special torque requirement				
			Torque	
Drawing No.	No.	Description	N·m	lbf·ft
1	7	Bolt	150	110
1	22	Bolt	34	25
1	50	Bolt	81-95	60-70
1	61	Bolt	81-95	60-70
		Fan mounting nut	101-126	75-93

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5.1.1 Engine - power takeoff

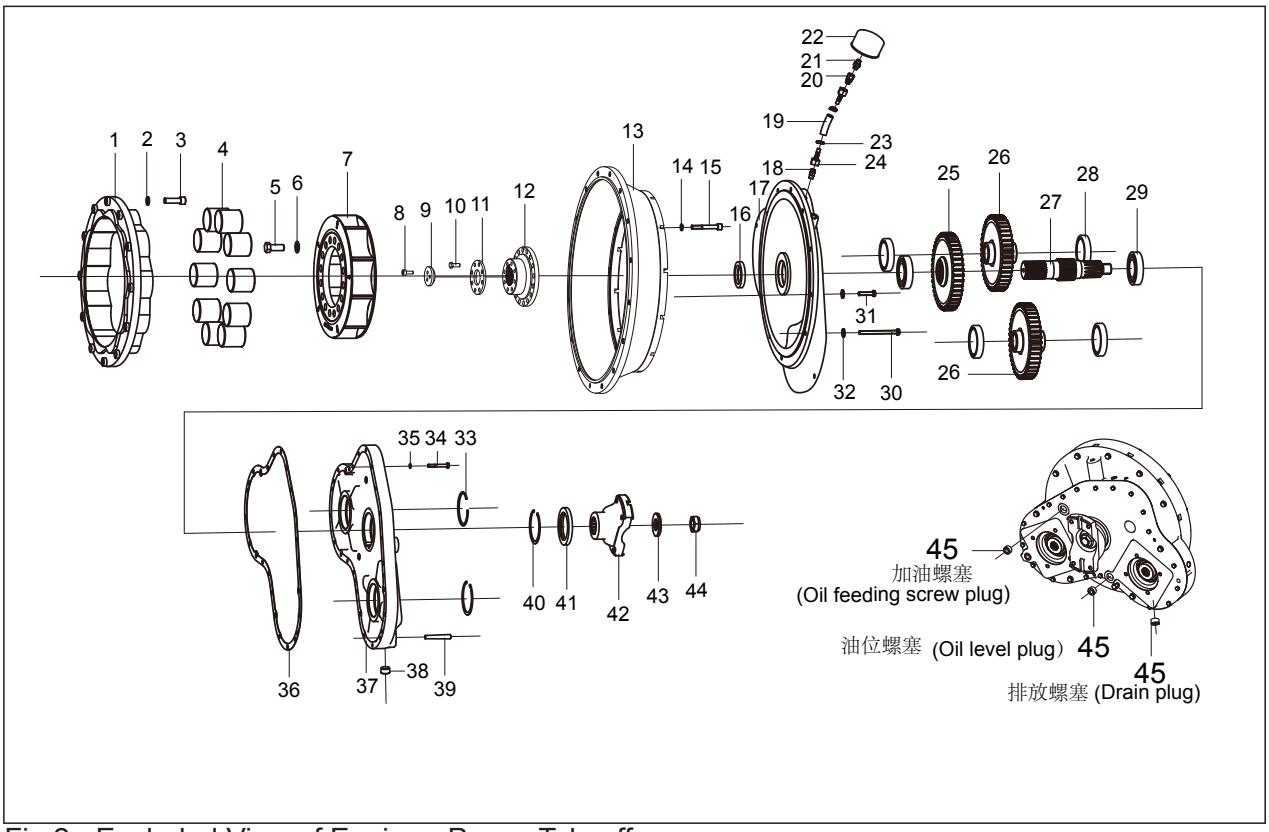


Fig.2 - Exploded View of Engine - Power Takeoff

1. Outer ring, aluminum
2. Washer
3. Screw
4. Elastic body
5. Bolt
6. Washer
7. Inner ring, aluminum
8. Screw
9. Pressure cover
10. Bolt
11. Pressure cover
12. Sleeve, shaft
13. Transitional disc
14. Washer
15. Bolt
16. Oil Seal
17. Shell seat
18. Rubber adaptor
19. Breathing tube
20. Pipe connector
21. Pipe connector
22. Breather
23. Throat collar
24. Pipe connector
25. Drive gear
26. Driven gear
27. Drive shaft
28. Bearing
29. Bearing
30. Bolt
31. Bolt
32. Washer
33. Ring, retainer
34. Bolt
35. Washer
36. Gasket
37. Shell cover
38. Plug
39. Pin
40. Ring, retainer
41. Oil Seal
42. Yoke
43. Washer
44. Nut
45. Plug

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Description operation

Numbers in parentheses refer to Fig.2.

The function of the power takeoff (PTO), as the name implies, is to provide the means of mounting and driving auxiliary components.

The hydraulic pump on the shell cover (37) and its input shaft is meshed with the internal spline in the hub of driven gear (26).

The major components of the PTO assembly are: Shell seat (17), shell cover (37), drive shaft (27), drive gear (24) and driven gear (26). As drive shaft (27) is driven by the engine crankcase, drive gear (25) turns to drive driven gears (26). The hydraulic pump drive shafts, meshed in the hub of driven gears (26), turn with driven gears (26) to operate the hydraulic pump which, in turn, supplies hydraulic oil to the body hoist system and steering system and disc brake assemblies.

Removal

Numbers in parentheses refer to Fig.2, unless otherwise specified.

⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

1. Position the vehicle in a level work area, apply the parking brake and switch off the engine.
2. Turn steering wheel in both directions several times to relieve pressure in accumulator and steering system. Block all road wheels.
3. Disconnect driveline from yoke (42) at PTO assembly.
4. Drain oil from power takeoff housing by removing drain plug (45) from shell seat (17).

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Reinstall drain plug (45) securely.
5. Match mark main hydraulic pump and combination gear pump mounting flange and shell cover (37) so that the pump can be installed in the same position at installation.
6. With suitable blocking or lifting equipment, support the hydraulic pump and combination gear pump before loosening attaching bolts. Remove Bolts and lock washers from main hydraulic pump and combination gear pump clear of PTO assembly.
7. Match mark engine flywheel housing and shell seat (17) so that PTO assembly can be installed in the same position at installation.
8. Attach a suitable lifting device to PTO assembly and remove bolts (30 & 31) and lock washers (32) securing PTO assembly to the engine flywheel housing. Remove the rubber adaptor (18). Carefully lower PTO assembly from the flywheel housing and move to a clean work area for disassembly.
9. Remove the bolt (15) and washer (14) from the engine flywheel. Carefully remove the transitional disc (13).
10. Remove the bolt (3) and washer (2) from the aluminum outer ring (1) of engine flywheel. Carefully remove the aluminum outer ring (1).

Disassembly

Numbers in parentheses refer to Fig.2, unless otherwise specified.
1. Remove the locknut (44) and washer (43) from drive shaft (27). Pull yoke (42) from drive shaft (27).
2. Remove the pins (39) from the shell cover (37).
3. Place shell cover (37) yoke side up on a work bench. Pry oil seal (41) from shell cover (37) and discard.
4. Turn over PTO assembly. Remove the bolts (5) and washers (6) from the aluminum Inner ring (7). Pull aluminum Inner ring (7) from shaft sleeve (12).
5. Remove the screw (8) from the drive shaft

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(27). Pull pressure cover (9) from drive shaft (27). Remove the bolt (10) from the shaft sleeve (12). Pull pressure cover (11) and shaft Sleeve (12) from drive shaft (27).
6. Remove the bolts (34) and washers (35) from the shell cover (37). Pull shell cover (37) and gasket (36) from the shell seat (17). Discard gasket (36).
7. Remove snap rings (33 & 40) from pump and drive shaft bores. Drive bearings (28 & 29) from shell cover (37) with a sleeve or soft steel drift. Drive on the outer race of bearings (28 &29) taking care not to damage the bearings.
8. Slide drive gear (25) from drive shaft (27), and pull driven gears (26) from shell seat (17).
9. Pull drive shaft (27) from shell seat (17). Pry oil seal (16) from shell seat (17) and discard.
10. Pull bearings (28 & 29) from shell seat (17) with a suitable bearing puller.

Inspection

Numbers in parentheses refer to Fig.2, unless otherwise specified.
1. Wash all parts thoroughly in a suitable solvent and dry all but bearings (28 & 29) with compressed air. Dry bearings (28 & 29) with a clean lint free cloth.
2. Check the condition of splines and teeth on gears (25 & 26), drive shaft (27) and yoke (42) for burrs or signs of wear.
3. Lubricate bearings (28 & 29) with oil and check operation by spinning bearings by hand. Do not spin bearings with compressed air. Inspect bearing bores for out of roundness. Replace bearings, if required.
4. Inspect shell seat (17) and shell cover (37) for cracks. If either shell seat (17) or shell cover (37) are damaged, both parts must be replaced as an assembly.
5. Visually check oil seal lip contact surfaces on drive shaft (27) and yoke (42) for nicks, dents, scratches, wear, or corrosion. Replace as necessary.
6. Inspect aluminum outer ring (1) and

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aluminum inner ring (7) and shaft sleeve (12) of shaft coupling for cracks. If either aluminum outer ring (1) or aluminum inner ring (7) or shaft sleeve (12) are damaged, the parts must be replaced as an assembly. At the same time, check the elastic body (4) and bolt (5 & 10) and screw (3 & 8) and pressure cover (9 & 11).

Assembly

Numbers in parentheses refer to Fig.2, unless otherwise specified.

Note: Prior to assembly, lubricate all seal lips and surfaces with lubricant specified in Section 36.1, LUBRICATION SYSTEM.

Note: Tighten all fasteners without special torques specified to standard torques listed, STANDARD BOLT AND NUT TORQUE SPECIFICATIONS.

⚠ warning

To prevent personal injury and property damage, be sure lifting device is properly secured and of adequate capacity to do the job safely.

1. Press bearings (28 & 29) into their bores in shell seat (17).
2. Install driven gears (26) and drive shaft (27) into shell seat (17). Slide drive gear (25) over drive shaft (27) to its proper location.
3. Install the new gasket (36) on the shell seat (17). Install the shell cover (37) onto the shell seat (17). Install the pins (39) into the shell cover (37) and the shell seat (17).
4. Press bearings (28 & 29) into their respective bores in shell cover (37). Install rings (33 & 40) into the shell cover (37).
5. Use the bolt (34) and washer (35) to fix the shell cover (37) onto the shell seat (17).
6. Install new oil seal (41) into centre bore in the shell cover (37) so that it is flush with shell

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cover (37) face.
7. Turn over PTO assembly. Install new oil seal (16) in the shell seat (17) so that it is flush with shell seat (17) face.
Note: When installing new oil seals, install them with the oil lip (larger of the two lips with the spring behind it) facing inward. Care should be taken to prevent damage to seal lips during assembly.
8. Install yoke (42) on drive shaft (27) end and secure with hardened washer (43) and locknut (44). Tighten locknut (44) to fasten it after the paste is applied to it. The torque is 850 - 1050 Nm.
9. Install the pressure cover (11) of shaft coupling onto the shaft sleeve (12). Use the bolt (10) to fasten it after the paste is applied to it. The torque of bolt (10) is 104Nm.Install the shaft sleeve (12) of shaft coupling onto the input end of drive shaft (27). Then install the pressure cover (9) onto the drive shaft (27). Use the set screw (8 to fasten it after the paste is applied to it. The torque of set screw (8) is 60Nm. Then install the aluminum inner ring (7) of shaft coupling onto the shaft sleeve (12). Use the bolt (5) and washer (6) to fasten it after the paste is applied to it. The torque of connecting bolt (5) is 350Nm.
10. Install the aluminum outer ring (1) of shaft coupling onto the flywheel disc and use the shaft coupling fastening screw (3) and washer (2) to fix it. The torque of connecting screw (3) for the aluminum outer ring (1) and flywheel disc of shaft coupling is 170Nm. The thread anti-loosing paste should be applied for tightening.
11. Install the elastic body (4) in aluminum inner ring (7). Attach a suitable rope to fix the elastic body (4).

Installation
Numbers in parentheses refer to Fig.2, unless otherwise specified.
Note:When reassembling PTO assembly.

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to the engine flywheel housing, and main hydraulic and tandem pumps to PTO assembly. be sure to align match marks inscribed during disassembly.

Note: Tighten all fasteners to standard torques listed, STANDARD BOLT AND NUT TORQUE SPECIFICATIONS.

1. Install the transitional disc (13) onto the flywheel housing and use the Bolt (15) and washer (14) to fix it. Use suitable lifting equipment, position Power take-off assembly into the aluminum outer ring (1) of shaft coupling. Remove the rope of elastic body (4). Secure PTO assembly to the transitional disc (13) with bolts (30 & 31) and washers (32).
2. Using suitable lifting equipment, position hydraulic pump over its mounting studs and secure with bolts removed during removal.
3. Reconnect driveline to yoke (42). Install rubber adaptor (18) into shell seat (17).
4. Remove oil level plug and drain plug (45) from the front shell cover (37) and the shell seat (17) respectively. Add the lubricating oil into the PTO assembly from the drain plug (45), until the oil reliefs from the opening of oil level plug (45). Then install and fasten the oil level plug and drain plug (45) respectively.
5. Start the engine and bring oil to correct operating temperature. Check for leaks and correct as necessary.
6. Remove wheel blocks from all road wheels.

Maintenance

Numbers in parentheses refer to Fig.2, unless otherwise specified.

Note: Refer to Section 36.1, LUBRICATION SYSTEM for recommended check and drain intervals and lubricant specifications.

Oil level check

Remove oil level plug (45) from front part of shell cover (37), if oil is not showing in oil level plug (45), add lubricant until oil is to oil level plug (45). Reinstall oil level plug (45) and tighten securely.

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Draining and refilling

To drain: Remove drain plug (45) from shell seat (17) and drain oil into a suitable container. Reinstall drain plug (45) securely when draining is complete.

To refill: Remove oil level plug (45) from the front of shell cover (37) and fill PTO assembly. until oil flows from the oil level port. Install oil level plug (44) in shell cover (36) and tighten securely.

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5.2 Installation of Compressor

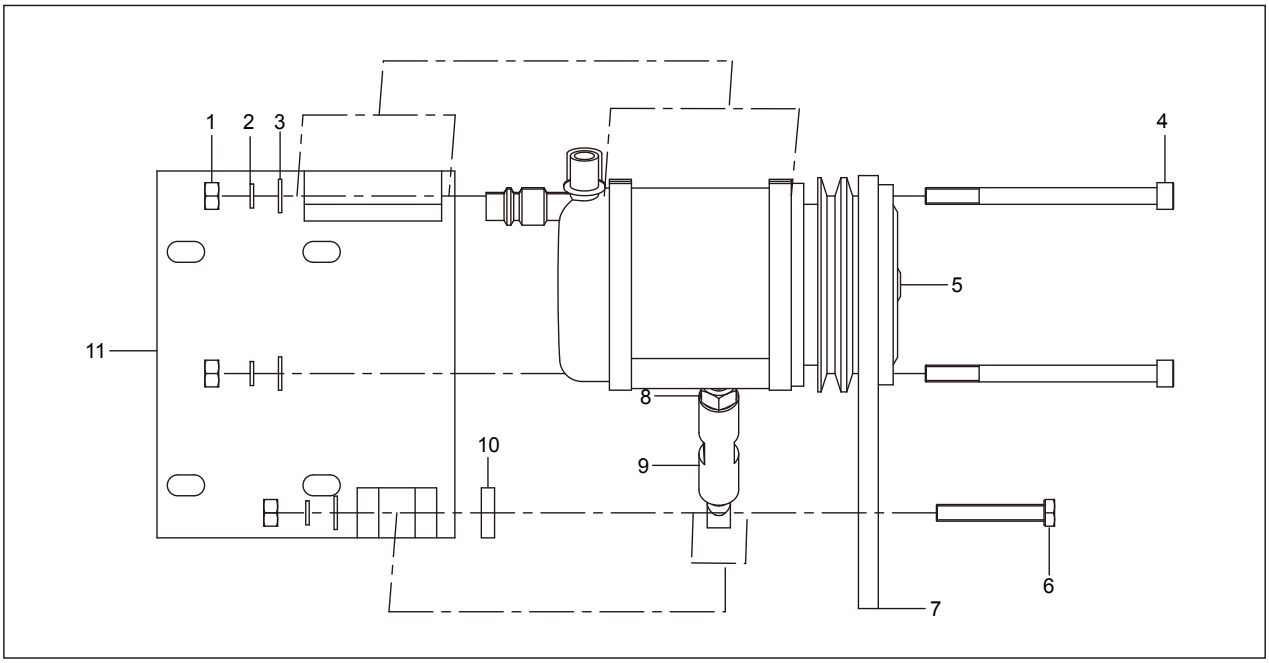


Fig.1 Assembly drawing of compressor

1. Nut
2. Washer
3. Washer
4. Screw
5. Compressor
6.Bolt
7. V-belt
8. Nut
9. Adjusting screw rod
10. Adjusting gasket
11. Compressor support

Disassembly of compressor

1. Disconnect the electrical connection from the clutch of compressor (5).
2. Loosen the nut and washer on the adjusting screw rod (9) and release the tension of V-belt (7).
3. Loosen the nut (1), bolt (6) and washers (2、3). Regulate the adjusting screw rod (9). The V-belt (7) should be able to freely slip from the groove of compressor (5).
4. Remove the nut (1), screw (4) and washers (2、3) from the compressor (5). Detach the adjusting screw rod (9) from the compressor.
5. Support the compressor (5). Remove the adjusting gasket (10), washers (2、3) and nut (1) fixing the compressor (5) onto

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the compressor support (11). Remove the compressor (5) from the compressor support (11).
6. Remove the compressor support (11) from the engine.
Note: If it isn't required to replace the V-belt (7), then it will be unnecessary to remove it from the engine.

Installation of compressor
1. Install the compressor support (11) onto the engine and use the removed fasteners to fix it properly.
2. Install the compressor (5) onto the compressor support (11) and use the removed fasteners to fasten it. They can't be completely tightened in this step.
3. Install the V-belt (7) onto the rear groove of engine fan pulley and then install it onto the rear groove of compressor (5).
4. Insert the upper part of adjusting screw rod (9) through the mounting hole of compressor (5). Insert the screw (4) through the mounting hole of compressor. Use the washers (2、3) and nut (1) to fasten the adjusting screw rod (9) and compressor (5). They can't be completely fastened in this step.
5. Insert the lower part of adjusting screw rod (9) through the mounting hole of base seat. Insert the Screw(4) through the mounting hole of compressor support (11). Use the washers (2、3) and nut (1) to fasten the adjusting screw rod (9) and compressor support (11). They can't be completely fastened in this step.
6. Fix the compressor (5). Fasten the washers (2、3) and nuts (1) in Step 4 and 5.
7. Adjust the V-belt (7) of compressor with the adjusting screw rod (9), until a deflection of about 10mm appears when the center part of V-belt (7) is pressed by thumb. Tighten all fasteners.
8. Connect the electric circuit of the clutch of compressor (5).

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6 TRANSMISSION AND MOUNTING

6.1 Transmission Mounting

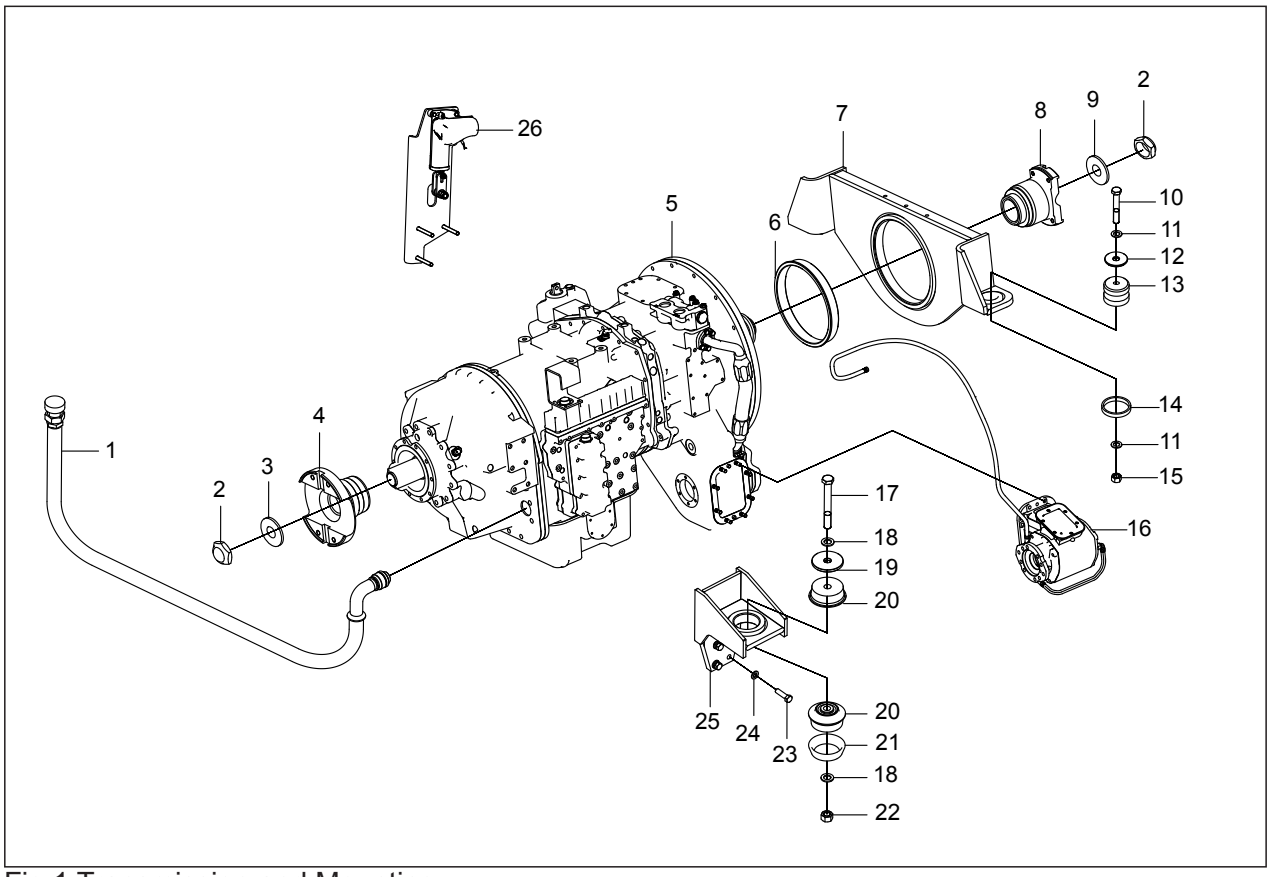


Fig.1 Transmission and Mounting

1. Filler hose
2. Flange nut
3. Retainer plate
4. Output flange
5. Transmission
6. Ring
7. Trunnion
8. Input flange
9. Retainer plate
10. Bolt
11. Washer
12. Plate
13. Shock mount
14. Ringer
15. Nut
16. Power take-off assembly
17. Bolt
18. Washer
19. Plate
20. Shock mount
21. Ringer
22. Nut
23. Bolt
24. Washer
25. Bracket
26. Transmission retarder control

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Description

Numbers in parentheses refer to Fig.1.

For transmission make, model and specification, refer to ‘GeneralL information’.

For transmission switches, sensors and instruments, refer to Section 8.1.7, 'Switches and sensors'.

For transmission servicing and repair data, refer to the transmission manufacturers service manual.

The transmission is remote mounted in the frame and is supported by trunnion (7) assembly at the front and two mounting brackets (25) at the rear.Integral with transmission (5) assembly are torque converter and planetary gearing. There are six forward gears and one reverse gear with automatic lockup in all speed ranges. Operation of the transmission is by the Commercial Electronic Control (CEC) Shift System. A brief description and operation of the main transmission components are as follows:

Torque converter

The torque converter consists of three elements -pump, turbine, and stator. The pump is the input element and is driven directly by the engine. The turbine is the output element and is hydraulically driven by the pump. The stator is the reaction (torque multiplying) element. When the pump turns faster than the turbine, the torque converter is multiplying torque. When the turbine approaches the speed of the pump the stator starts to rotate with the pump and turbine. When this occurs, torque multiplication stops and the torque converter functions as a fluid coupling.

Lockup clutch

The lockup clutch is located inside the torque converter and consists of three elements - piston, clutch plate, and backplate. The piston and backplate are driven by the engine and the clutch plate, located between the piston

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and backplate, is splined to the converter turbine. The lockup clutch is hydraulically engaged and released in response to electrical signals from the ECU. It engages when the vehicle reaches a predetermined speed. Engagement of the lockup clutch provides a direct drive from the engine to the transmission gearing. This eliminates converter slippage to provide maximum fuel economy. The lockup clutch releases at lower speeds (and momentarily during shifts). When the lockup clutch is released, drive from the engine is transmitted hydraulically through the converter to the transmission gearing. The lockup clutch also releases when the ECU detects certain undesirable conditions.

Planetary gears and clutches

A series of planetary gears and shafts provide the gear ratios and directions of travel for the vehicle. Power flow through the planetaries is controlled by multiple clutch packs. The clutches are applied and released hydraulically in response to electrical signals from the ECU.

Hydraulic retarder

A vaned rotor and two vaned stators are the basic components of the retarder. Application of the retarder control valve fills the cavity around the rotor with oil when the vehicle must be slowed on steep downgrades. When the cavity is emptied, the rotor is free of drag. Maximum retarder effect occurs in the lowest gear range with foot off of the accelerator pedal. Long continuous use of the retarder will raise transmission oil temperature. Short periods of full release, to interrupt continuous application, will help prevent overheating. During normal operation the dash mounted transmission oil temperature gauge should read in the green zone. However, during transmission retarder operation oil temperature can enter the yellow 'Retarder On' zone but should not enter the red zone.

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Transmission oil cooler

The transmission oil is cooled by a separate oil cooler mounted between the radiator and transmission to maintain transmission oil within its required operating temperature range. Refer to Section 33,'oil cooler assembly'.

Transmission oil filter

The transmission oil filter is mounted at the left hand side of the transmission. It is installed in the transmission oil lines to remove dirt and other contaminants from the transmission oil to minimise wear and provide maximum service life for the transmission. Refer to Section 30, 'transmission oil filter'.

Removal

Numbers in parentheses refer to Fig.1.

⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

High electrical current can cause sparks and personal injury from burns. Switch circuit breakers to the 'Off' position before removing any electrical components. Remove battery ground cable first, and reconnect last, to prevent damaging electrical components.

Any time the battery equalizer is disconnected from the batteries, remove ground cable first, and reconnect last, to prevent damaging the component.

1. Position the vehicle in a level work area, raise the body and secure in place with the body safety pins. Refer to Section 23,'Body and Installation'.
2. Apply the parking brake and switch off

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the engine. Turn steering wheel in both directions several times to relieve pressure in the steering system. Operate the treadle valve continuously to discharge the brake accumulators.

3. Block all road wheels.

Note: It is important that the electrical connections are removed in the order listed in step 4 to prevent damage to the electrical components.

4. Disconnect battery equalizer ground connection from the batteries. Disconnect battery cables from terminal posts (ground cable first). Disconnect battery equalizer positive connection. Disconnect electrical connections at the ECU.

5. Using suitable lifting equipment, support transmission guard and remove mounting hardware securing the guard to the frame. Remove transmission guard.

6. Disconnect driveline from input flange (8) at the front of transmission (5). Refer to Section 19, 'Driveline Installation'.

7. Disconnect driveline from output flange (4) at the rear of transmission (1). Refer to Section 19, 'Driveline Installation'.

8. Drain the oil from transmission (5).

9. Disconnect the transmission retarder cables at transmission (5).

10. Disconnect transmission oil cooler lines and oil filter lines from transmission (1). Cap all open lines and fittings to prevent entry of dirt.

11. Disconnect all remaining hydraulic lines attached to transmission (5). Cap all open lines and fittings to prevent entry of dirt.

12. Disconnect all electrical connections and cables attached to the transmission.

13. Disconnect filler hose(1) attached to the transmission(5).

14. Install suitable lifting eyes into the holes provided at the top of transmission (5) housing and secure a suitable lifting device to the eyes.

15. Remove bolts (10), washers(11),

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Plates(12)and nuts(15) securing trunnion (7) to the frame.
16. Remove bolts (17), washers(18), Plates(19)and nuts(22) securing brackets(25) to the frame.
17. Check to make certain that all hydraulic lines and electrical connections fitted to transmission (5) have been disconnected before moving transmission (5).
18. Carefully manoeuvre transmission (5) out of the frame mounting and lower onto a suitable dolly or pallet.
19. Move transmission (5) assembly to a suitable work area or onto a work stand for further disassembly, if necessary.

Disassembly
Numbers in parentheses refer to Fig.1.
Note: Refer to the transmission manufacturers Service Manual if transmission service or repair is required.
1. Remove flange nut (2) and retainer plate (9) securing input flange (8) on transmission (5). Pull input flange (8) from transmission (1).
2. Pull trunnion (7) from transmission (5) and remove ring (6) and shock mounts (13) from trunnion (7), if required.
3. Remove flange nut (2) and retainer plate (3) securing output flange (4) on transmission (5). Pull output flange (4) from transmission (5).
4. Remove bolts (23) and washers(24) securing brackets (25) on transmission (5) and remove brackets (25).
5. If required, remove shock mounts (20) from mounting brackets (25).

Assembly
Numbers in parentheses refer to Fig.1.
1.If removed, fit shock mounts(13) and ring (6) to trunnion (7). Install trunnion (7) to transmission (5).
2.If removed, fit shock mounts (20) to brackets (25). Install brackets (25) on transmission (5) and loosely secure with bolts (23) and

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washers (24).
3. Ensure transmission output shaft is in the most outward position and the bearing between the shaft shoulder and the flange is tight against the shaft shoulder.
4. Coat splines of input shaft with EP, NLGI molybdenum grease and fit input flange (33) on input shaft.
5. Install input flange (8) on transmission (1) securing with flange nut (2) and retainer plate(9). Tighten flange nut (2) to a torque of 1300 N•m.
6. Coat splines of output shaft with EP, NLGI molybdenum grease and fit output flange (4) on output shaft.
7. Install output flange (4) on transmission (5) securing with flange nut (2) and retainer plate(3). Tighten flange nut (2) to a torque of 1300 N•m.

Installation
Numbers in parentheses refer to Fig.1.

⚠ warning

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

1. Position transmission (5) assembly under the truck and attach a suitable lifting device to the eye bolts on top of transmission (5).
2. Carefully lift transmission (5) into its mounting position and secure trunnion (7) to the frame with bolts (10), washers(11), plates(12) and nuts (15). Tighten bolts (10) to a torque of 507 N•m-557N•m.
3. secure brackets (25) to the frame with bolts (17), washers(18), plates(19) and nuts (22). Tighten bolts (17) to a torque of 790N•m-860N•m.
4. Remove lifting device and lifting eye bolts

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from top of transmission (5).
5. Install filler hose (1) to transmission(5).
6. Connect all electrical connections and cables to transmission (1) as tagged at removal.
7. Connect transmission oil cooler lines to transmission (1) and oil filter lines to transmission oil filter as tagged at removal.
8. Connect any remaining hydraulic lines which were removed during removal. Ensure all hydraulic lines are securely tightened.
9. Connect transmission retarder cables at transmission (1).
10. Install rear driveline to output flange (4) at the rear of transmission (5) and secure with mounting hardware removed during removal. Refer to Section 19, 'Driveline Installation'.
11. Install front driveline to input flange (8) at the front of transmission (5) and secure with mounting hardware removed during removal. Refer to Section 19, 'Driveline Installation'.
12. Using suitable lifting equipment, support transmission guard and secure guard to the frame with mounting hardware removed during removal.
13. Fill transmission (5) with oil specified in Section 36.1,' LUBRICATION AND MAINTENANCE', and check the oil level as described under 'Oil Level Check'.
Note: It is important that the electrical connections are made in the order listed in step 14 to prevent damage to the electrical components.
14. Connect electrical connections at the ECU. Connect battery equalizer positive connection. Connect battery cables to battery terminal posts (ground cable last). Connect battery equalizer ground connection.
15. Start the engine and make an operational check of all lines and components disconnected during removal. Check all hydraulic lines and fittings for leaks and tighten as required.
16. Ensure parking brake is applied, remove

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the body safety pins and lower the body. Remove wheel blocks from all road wheels. Refer to Section 24,'Body and Installation'.

⚠ warning

When checking the oil level, be sure that the parking brake is applied and all road wheels are securely blocked.

Maintenance

Periodic inspections

For easier inspection, the transmission should be kept clean. Make periodic checks for loose bolts and leaking oil lines. Check the condition of electrical harnesses and connections regularly.

The transmission breather should be checked regularly and as frequently as necessary, depending on the operating conditions of the vehicle. A badly corroded or plugged breather restricts proper breathing and causes a buildup of condensation and subsequent oil deterioration.

Oil level check

Check the transmission oil level and add oil if low, every 10 hours/daily. Use only oil of the type specified in Section 36.1, 'LUBRICATION AND MAINTENANCE'. Because the transmission oil cools, lubricates and transmits hydraulic power it is important that the proper oil level be maintained at all times. If the oil level is too low, the converter and clutches will not receive an adequate supply of oil. If the oil level is too high, the oil will aerate and the transmission will overheat. It is absolutely necessary that the oil put into the transmission be clean. Oil must be handled in clean containers to prevent

foreign material from entering the system.

Note: Containers or fillers that have been

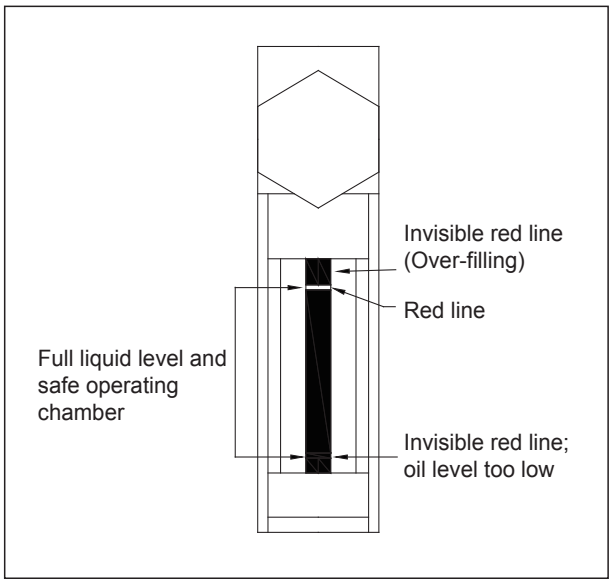


Fig.2 Visual Level Indicator

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used for antifreeze or engine coolant solution must not be used for transmission oil.

Visual level indicator

A visual level indicator is mounted on the lower left side of the transmission main housing and provides a method of checking the oil level. Refer to Fig.2.

Cold oil level check

Before starting the engine, check the visual level indicator or remove the ADD (lower) plug. If oil is present in the indicator or if oil flows from the plug opening, the transmission has sufficient oil to permit safe starting of the engine. If no oil is present, add sufficient oil to bring the level within the indicator or to cause a flow from the plug opening. Replace the plug.

Hot oil level check

Note: Observe the condition of the oil in the visual level indicator or the type of flow from the plug opening. Foaming or spurting may indicate a false level.

A hot oil level check is made to determine if there is sufficient oil for working operation of the transmission. Select neutral on the transmission range selector and start the engine. Operate the vehicle until the transmission reaches a normal operating temperature of 82° C - 103° C (180° F - 220° F). Idle the engine, apply the parking brake and block all road wheels. Check the visual level indicator or remove the FULL (upper) oil level check plug. The oil should be within the indicator limits shown in Fig.2 or at or near the level of the plug opening. Add or drain oil as necessary to bring the oil level within these limits.

Note: The transmission may be operated safely as long as the oil level is above the ADD (lower) plug.

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⚠ warning

Be sure to apply the parking brake, switch off the engine and block all road wheels before troubleshooting the vehicle. If it is necessary to run the engine, it is imperative that an operator be present in the cab at all times, even at idle.

Oil and filter change

After the first 200 hours of operating a new or rebuilt transmission, the transmission oil and filters should be changed. The transmission oil and filters should be changed at the intervals specified in Section 36.1, 'LUBRICATION AND MAINTENANCE', or sooner, depending on operating conditions. Also, the oil must be changed whenever there are traces of dirt or evidence of high temperature indicated by discoloration or strong odour. The screen and magnet assembly in the sump should be removed and cleaned with mineral spirits at each oil change. Metal particles in the oil (except for the minute particles normally trapped in the oil filters) indicate damage has occurred in the transmission. When these particles are found in the filters, the cause must be established and rectified immediately to prevent damage to the transmission. At each oil change, examine the used oil for evidence of dirt or water. A normal amount of condensation will emulsify in the oil during operation of the transmission. However, if there is evidence of water or engine coolant in the oil, the cause must be established and rectified immediately to prevent damage to the transmission.

Welding on vehicles equipped with CEC

When frame or other welding is required, the following precautions are to be taken to protect

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the electrical components.
a. Disconnect battery equalizer ground connection from the batteries. Disconnect battery cables from terminal posts (ground cable first). Disconnect battery equalizer positive connection. Disconnect electrical connections at the ECU.

⚠ warning

The ECU can be damaged by improper welding procedures. Any time the battery equalizer is disconnected from the batteries, remove ground cable first, and reconnect last, to prevent damaging the component.

b. If additional system ground wires are connected to the frame, they must be disconnected also.
c. Cover electrical components and wiring to protect from damage.
d. Do not connect welding cables to electrical components. Do not weld on electrical components. If welding is to be done close to electrical components, the components should be removed prior to the welding process.
e. On completion of all welding reconnect electrical connections in the reverse order to step a.

Troubleshooting
Converter stall test
A stall test should be conducted when the power package (engine and transmission) is not performing satisfactorily. The purpose of the test is to determine the engine power output and establish if the transmission is the malfunctioning component.

⚠ warning

When conducting a stall test, the vehicle

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must be positively prevented from moving. The parking brake must be applied and the vehicle should be blocked to prevent movement forward or reverse. Keep people safely away from the vehicle path. Do not maintain the stalled condition longer than 30 seconds due to rapid heating of the transmission oil. With the transmission in neutral, run the engine at 1200 - 1500 r/min for two minutes to cool the oil between tests. Do not allow the converter-out temperature to exceed 135° C (275° F). Keep a close check to prevent overheating of the engine cooling system.

1. Position the vehicle on a level area with room for movement all round.
2. Apply the parking brake and block all road wheels. Turn the manual mode key switch to the 'On' position and the mode selection switch to the 'Power' mode.
3. Apply the service brake, release the parking brake and select fifth gear on the transmission shift selector. The transmission will shift to fifth gear and deactivate the lockup clutch. Apply the parking brake and release the foot pedal.
4. Accelerate the engine to full throttle and, using a tachometer of known accuracy, note the maximum rev/min the engine will attain. Converter-out pressure should be 2 bar (30 lbf/in²).

Note: The stall speed of each vehicle is noted on the final inspection records prior to the vehicle leaving the factory. This can be used as a guide when checking the stall speed. It is recommended to keep a record of the stall speed after each major service and use the previous recorded value as a guide.

5. When the stall check is complete, return the accelerator to the idle position and move the shift selector to the neutral position.

Note: Engine power will decrease with an increase in elevation (altitude), becoming more

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pronounced at greater elevation. This will result in a lower engine speed under converter stall conditions.
6. During the stall check the transmission oil temperature should rise while the engine is under load and drop when the transmission is returned to neutral. Should the temperature fail to drop it indicates that there is a problem with the converter.
7. After making allowances for elevation, a low engine speed may indicate the engine is not delivering full power. Refer to engine service manual for engine repair information.

Electrical troubleshooting
Refer to troubleshooting manual TS3353 for commercial electronic controls 2(CEC2) of Allison transmission.

Mechanical troubleshooting
It is recommended to follow the procedures laid down for mechanical troubleshooting, as outlined in the 'Mechanical Trouble Shooting' charts.

Special tools
There are no special tools required for the procedures outlined in this section. Refer to Section 38.3, 'Service tools' for part numbers of service tools which should be used in conjunction with procedures outlined in the transmission manufacturers service manual, and, general service tools and adhesives required.

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Problem	Cause	Remedy
A - Transmission overheats	High or low oil level	Restore proper oil level
	Aerated (foaming) oil	Refer to condition 'B'
	Truck overloaded	Reduce load
	Engine coolant overheated	Correct engine overheating
	Transmission oil cooler or	Clean or replace oil cooler or lines
	Low coolant level	Add coolant, check for leaks
	Oil leaking	Check transmission and lines for leaks
	Low main pressure	Refer to condition 'V'
	Low converter-out pressure	Refer to condition 'U'
	Truck brakes dragging	Check parking and service brakes
	Torque converter stator locked	Check for low top speed of vehicle. Check torque converter components.
	Clutch slipping	Overhaul transmission. Replace worn piston seal rings or clutch plates.
B - Oil is aerated (foaming)	Incorrect type of oil used	Change oil. Use only oil specified in Section 36.1, 'Lubrication and Maintenance'.
	High or low oil level	Restore proper oil level
	Air entering suction side of oil pump	Check oil pump bolts and gasket
	Water in oil	Check for source, clean system
C - Heavy metal debris found in oil	Transmission internal failure	Completely disassemble, clean and repair in oil transmission. Replace filters and clean lines and oil cooler.
D - Coolant found in oil	Transmission oil cooler leaking	Completely disassemble and thoroughly clean transmission. Replace all friction faced clutch plates. Repair or replace oil cooler. Replace filters and clean external lines.
E - Transmission will not operate in any range regardless of selector position	Loss of electrical power	Refer to Electrical Troubleshooting
	Internal mechanical failure	Overhaul transmission
	Driveline failure	Check transmission input and output
	Low oil level	Restore proper oil level
	Low main pressure	Refer to condition 'V'

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F - Transmission continues in the same forward gear regardless of selector position	Loss of electrical power	Refer to Electrical Troubleshooting
G - Shifting is erratic		Refer to Electrical Troubleshooting
H - Transmission operates only in first, neutral and reverse		Refer to Electrical Troubleshooting
II - Transmission shifts to neutral during reverse operation, but will operate normally in all other ranges		Refer to Electrical Troubleshooting
J - Vehicle operates in reverse and moves backwards in neutral when engine is accelerated, but stalls in all other gears when engine is accelerated - Electrical Troubleshooting OK	Reverse clutch has failed (won't release)	J - Vehicle operates in reverse and moves backwards in neutral when engine is accelerated, but stalls in all other gears when engine is accelerated - Electrical Troubleshooting OK
K - Vehicle operates in first and second gears and moves forward in neutral when engine is accelerated, but stalls in all other gears when engine is accelerated - Electrical Troubleshooting OK	First and second gear clutch failed (won't release)	Overhaul transmission

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L - Vehicle operates in third and fourth gears and moves forward in neutral when engine is accelerated, but stalls in all other gears when engine is accelerated - Electrical Troubleshooting OK	Third and fourth gear clutch failed (won't release)	Overhaul transmission
M - Vehicle operates in fifth and sixth gears and moves forward in neutral when engine is accelerated, but stalls in all other gears when engine is accelerated - Electrical Troubleshooting OK	Fifth and sixth gear clutch failed (won't release)	Overhaul transmission
N - No power is transmitted in any one range - Electrical Troubleshooting OK	Range clutch failed (won't apply, slipping)	Overhaul transmission. Check for worn piston seals, broken piston housing, or worn clutch plates in that range.
O - Vehicle will operate in second, fourth, sixth and reverse gears but will not operate in all other gears -Electrical Troubleshooting OK	Splitter-overdrive clutch won't release or splitter-direct clutch won't apply, slipping	Overhaul transmission. Check splitter clutches for worn components.
P - Vehicle will operate in first, third and fifth gears but will not operate in all other gears -Electrical Troubleshooting OK	Splitter-direct clutch won't release or splitter-overdrive clutch won't apply, slipping	Overhaul transmission. Check splitter clutches for worn components.
Q - Slow clutch engagement	Low oil level	Add oil to proper level
	Foaming oil	Refer to condition 'B'
	Worn piston seals	Overhaul transmission
	Low main pressure	Refer to condition 'V'

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R - Vehicle lacks power and acceleration	Engine malfunction	Check engine. Refer to engine service manual.
	Aerated oil	Refer to condition 'B'
	Low engine speed at converter stall	Refer to condition 'T'
	High engine speed at converter stall	Refer to condition 'S'
	Hydraulic retarder partially applied	Check retarder linkage
	Truck brakes dragging	Check parking and service brakes
	Stator freewheel clutch failed	Overhaul transmission
S - High engine speed at converter stall	Low oil level	Add oil to proper level
	Low converter-out pressure	Refer to condition 'U'
	High oil temperature (above 135° C; 275° F)	Refer to condition 'A'
	Clutch slipping, main pressure normal	Overhaul transmission. Replace clutch piston seal rings or clutch plates.
	Foaming oil	Refer to condition 'B'
T - Low engine speed at converter stall	Low engine output torque	Tune engine and check output
	Converter element interference	Check for noise at stall; overhaul converter if necessary
	Transmission oil not up to operating temperature	Warm up transmission to 82° C - 103° C (180° F - 220° F)
U - Low converter-out pressure	Low oil level	Add oil to proper level
	Oil line leakage (oil cooler or filter)	Check for leaks, correct as required
	Plugged oil strainer	Clean oil strainer
	Defective oil pump	Rebuild/replace oil pump assembly
	High oil temperature	Refer to condition 'A'
	Foaming oil	Refer to condition 'B'

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V - Low main pressure	Low oil level	Add oil to proper level
	Leaks in hydraulic system	Check all external points for leaks; check each range for localizing internal leaks
	Failure in pressure regulator	Overhaul valve assembly
	Worn input oil pump assembly	Rebuild/replace pump assembly
	Clogged oil strainer	Clean oil strainer
	Air leaks at suction side of input pump	Check input pump, correct as required
W - Downshift of transmission is permitted during lockup operation		Refer to Electrical Troubleshooting
X - Shift quadrant not illuminated	Failed light bulb	Replace the light bulb
Y - Reverse signal not energized		Refer to Electrical Troubleshooting

Special torque specifications for transmission and mounting

FIG. NO.	No.	Name	Torque	
				lb· Ft
1	10	Bolt	507~557	373~410
1	17	Bolt	790~860	582~633
1	23	Bolt	217~240	160~177
1	2	Flange Nut	1300	958

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6.2 Transmission retarder control

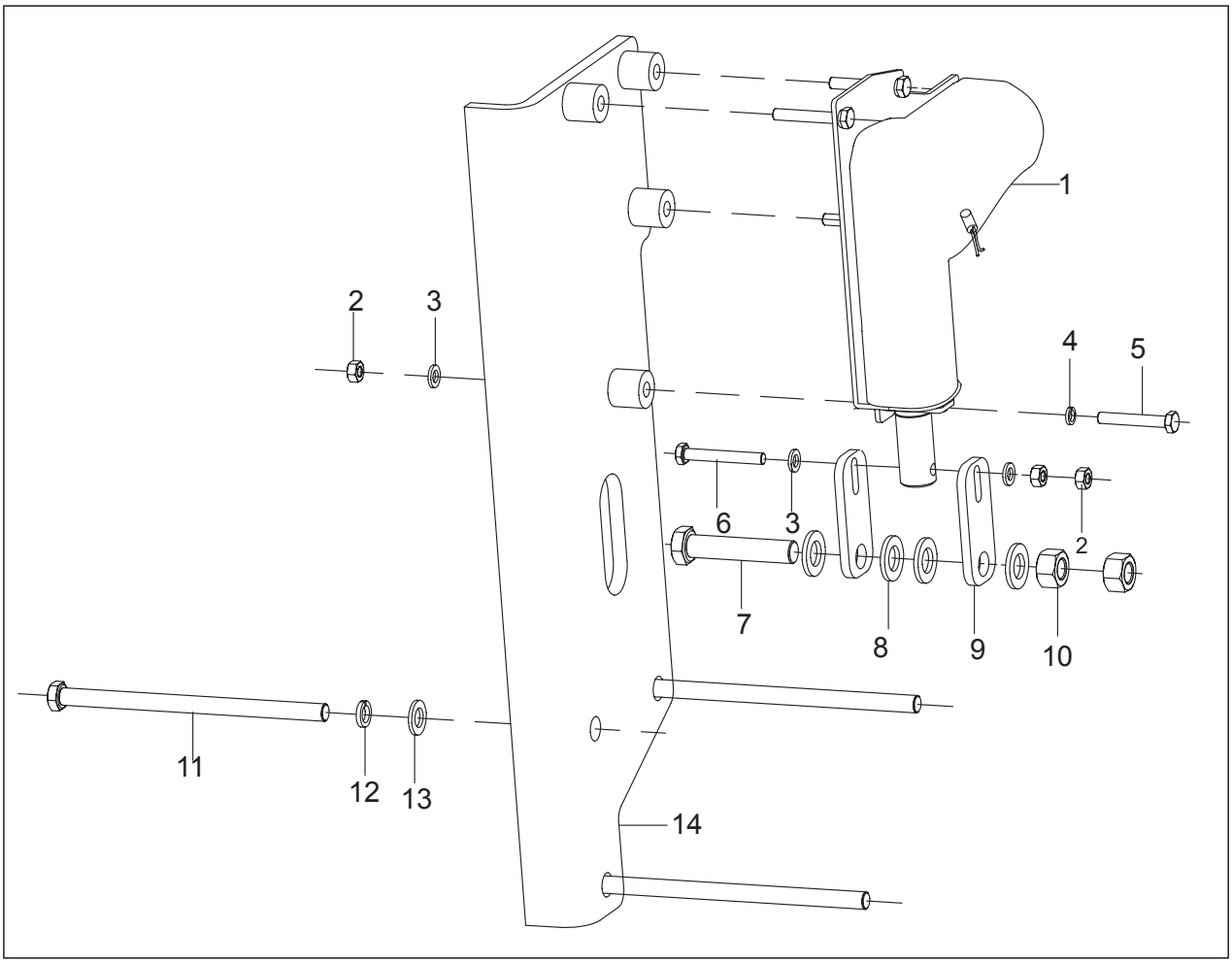


Fig.1 Transmission retarder control

1. Linear actuator
2. Nut
3. Washer
4. Washer
5. Bolt
6. Bolt
7. Bolt
8. Washer
9. Plate
10. Nut
11. Bolt
12. Washer
13. Washer
14. Fixed plate

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Overview

Numbers in parentheses refer to Fig.1.

Retarder control is the term used for applying a continuous braking force to hold the truck to a safe steady speed when descending grades. The truck fitted with disc brake and transmission retarders, introduce transmission retarder in this section.

Transmission retarder control is compose of linear actuator (1), fixed plate (14) and plate (9). Retarder control switch is installed on the centre console of the operator.

If operating retarder brake during truck operation, pushing the control switch. The linear actuator (1) will drive plate (9) and transmission retarder pole upwards, open transmission retarder for hydraulic retarder.

Removal

⚠ WARNING

The retarder may be used anytime to slow down. If additional braking is required apply the service brakes. The retarder is not meant for bringing the truck to a halt, or for sudden deceleration - the service brakes should be employed for this purpose. Retarder control can not last for more 3 minutes.

1. Position the vehicle in a level work area, apply the parking brake and switch off the engine.
2. Block all road wheels. Set the battery in the ' off ' position.
3. Disconnect wiring harness attached to linear actuator(1).
4. Remove bolt (6, 7), washer (3, 8), nut (2,10) and remove plate (9).
5. Remove bolt (5), washer (3, 4), nut (2) securing linear actuator (1) to fixed plate (14), remove linear actuator (1).

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6. Remove bolt (11) and washer (12,13) securing fixed plate (14) to transmission, remove fixed plate (14).

Installation

Note:Tighten all fasteners without special torques specified to standard torques.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks are properly secured and of adequate capacity to do the job safely.

1. Secure fixed plate (14) to transmission with bolts (11) and washers (12,13).
2. Secure linear actuator (1) to fixed plate (14) with bolts (5), washers (3,4) and nuts (2).
3. Secure plate (9) to fixed plate (14) and transmission retarder pole with bolts (6,7) , washers (3,8) and nuts (2,10).
4. Connect wiring harness attached to linear actuator(1).
5. Set the battery in the 'on' position. Start the engine and make an operational check of retarder.
6. Ensure parking brake is applied. Remove wheel blocks from all road wheels.

Special tools

There are no special tools required for procedures outlined in this section. Refer to Section 38.3, ' Service Tools '.

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7 FENDER AND PLATFORM MOUNTING

7.1 Installation of Fender And Platform

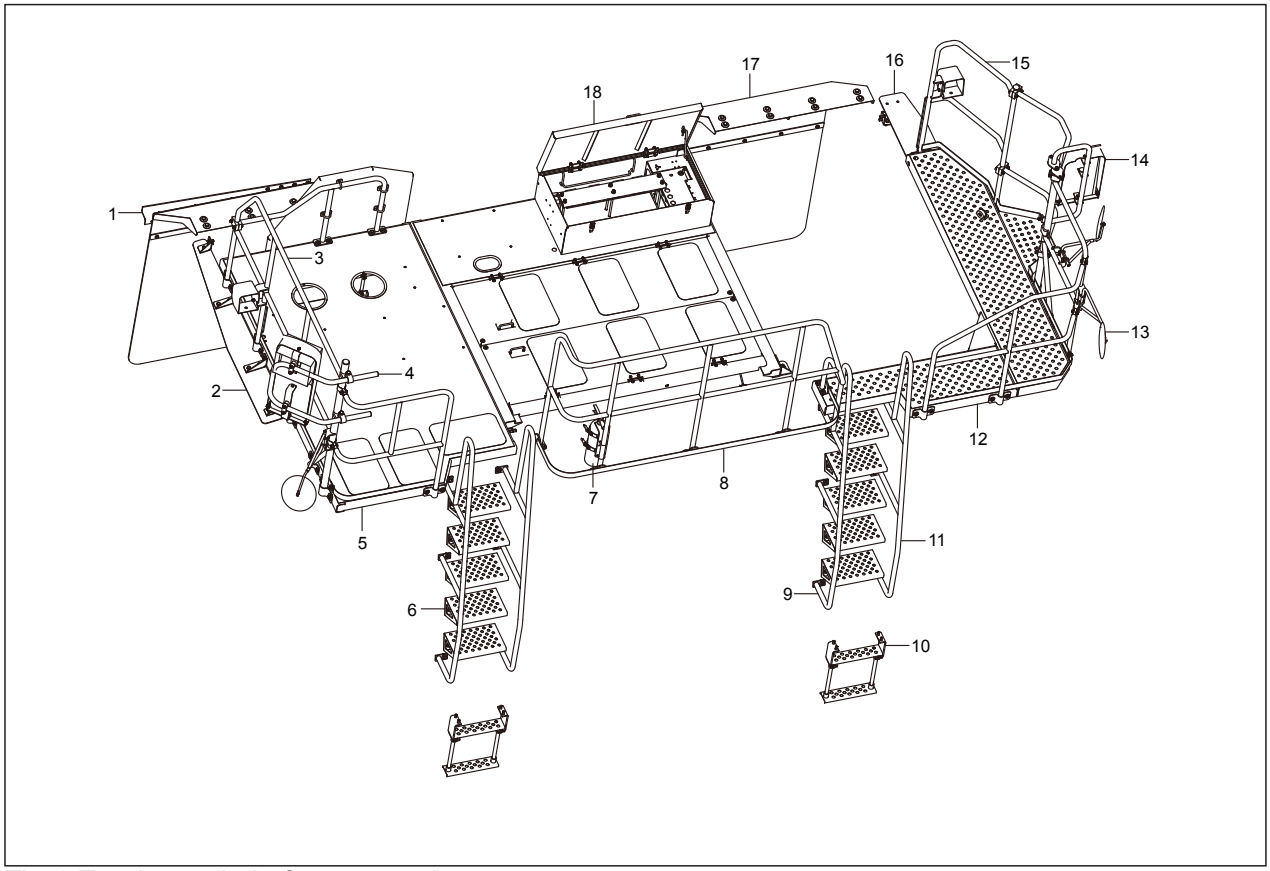


Fig.1 Fender and platform mounting

1.Right-hand mudguard assembly
2.Rubber plate
3.Right-hand handrail assembly
4.Rear view mirror and bracket
5.Platform assembly
6.Ladder assembly
7.Fire extinguisher and bracket
8.Front handrail assembly
9.Armrest assembly
10.Step assembly
11.Armrest assembly
12.Walkway assembly
13.Down tail mirror and bracket
14.Rear view mirror and bracket
15.Left-hand guardrail assembly
16.Rubber plate
17.Left-hand mudguard assembly
18.Battery box assembly

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Overview

The covering parts are installed on the left and right front support, bumper, ring beam and extension beam of frame. The cab is above them. Wherein, the platform is regarded as a component. It is the protective fence for individual components of hydraulic system and electrical system and protects the components from being contaminated and damaged during transportation. The platform and guardrails provide the passage and safety protection for the persons.

Removal

To remove any of the components shown in Fig.1&Fig.2 the following procedures should be carried out.

1. Position the vehicle in a level work area, apply the parking brake and switch off the engine.
2. Turn steering wheel in both directions several times to relieve pressure in the steering circuit.
3. Remove the body or lift up the body to the highest position and correctly fix it.
4. Attach a suitable lifting device to the component and remove mounting hardware. Remove the component from the vehicle.

⚠ warning

To prevent personal injury and property damage, be sure wheel chocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

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Installation

Using a suitable lifting device, align the component to be installed in position on the frame. Secure the component securely to the frame with mounting hardware removed during removal.

⚠ warning

To prevent personal injury and property damage, be sure wheel chocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

Inspection and maintenance

1. The vibration of mudguard support is relatively high. It requires frequent inspection. Observe the position of mounting hole for the cracks.
2. When the rear mirror and down view mirror are installed, the operator should sit inside the cab and command the installation persons to operate so that the correct mounting angle can be ensured. The components should be gently handled and placed to prevent the collision and breakage.
3. As the truck body has the relativy high width and height, the operator should observe the situations of rear mirror and down view mirror at first before driving the truck every time in order to prevent accidents.
4. The mounting bolts of handrail should be frequently inspected for their tightening to ensure personal safety.
5. Check all components for abrasion. If necessary, repair or replace them in time.

Installation instructions and notices for the gas spring in the platform assembly

1. The piston rod of gas spring must be installed in the downward position and no reverse installation is allowed, so that it can

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reduce the friction and ensure the optimal damping quality and buffering performance.
2. The gas spring should not be subject to the force in the lateral direction or be used as the armrest.
3. To ensure the reliability of seal, don't damage the surface of piston rod. It is prohibited to apply the paint, chemical substance and etc. onto the piston rod. It is prohibited to spray and apply the paint after the gas spring is installed in the desired position in advance.
4. The gas spring is a high-pressure product. It is prohibited to dissect, bake and knock it at random.
5. It is prohibited to turn the piston rod of gas spring to the left. If it is required to adjust the orientation of joint, it can be turned to the right only.
6. The junction point should allow the flexible rotation and have no seizure phenomenon.
7. The selected dimension should be reasonable. The value of force should be proper. The stroke dimension of piston rod should have the margin of 10mm.

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8. CAB ACCESSORIES

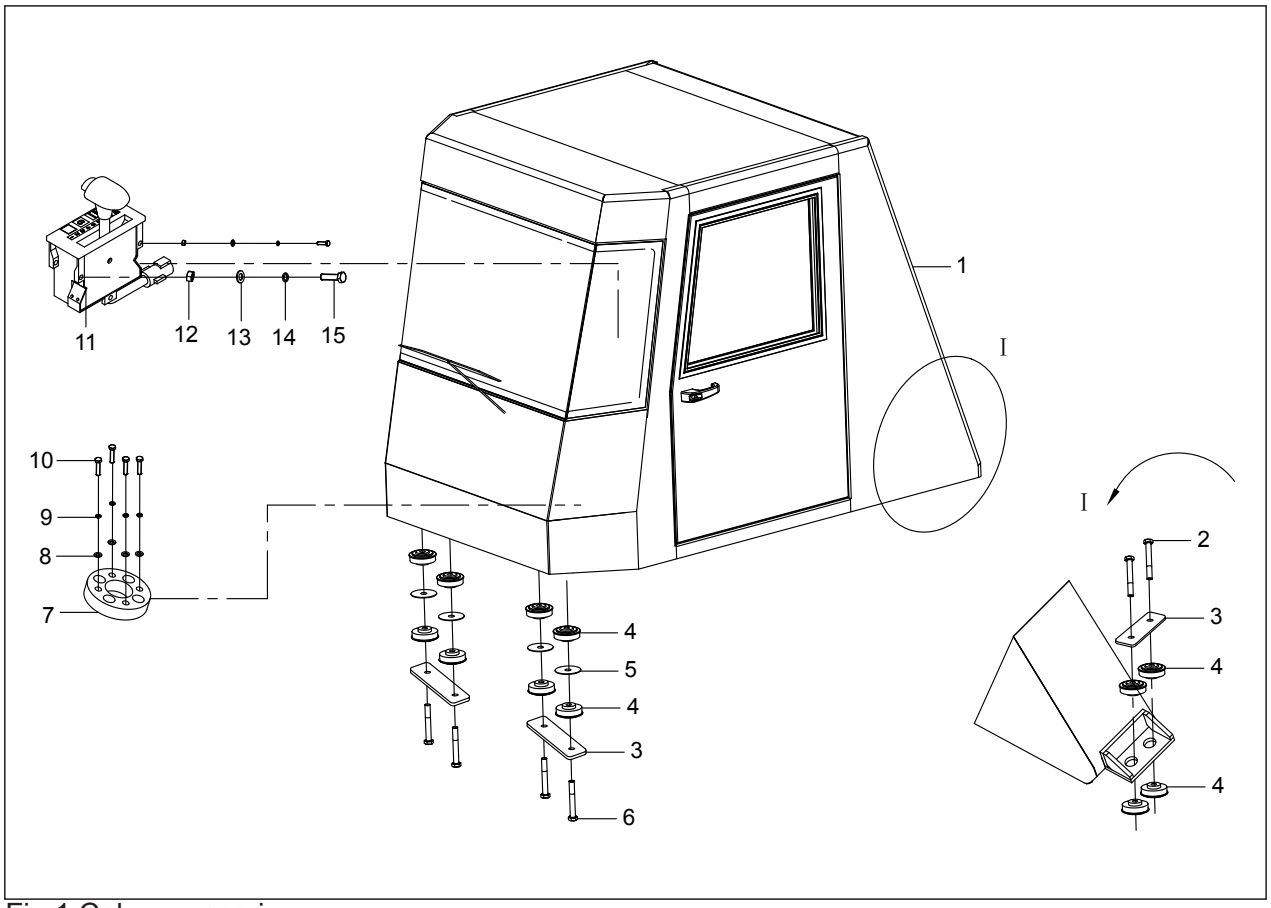


Fig.1 Cab accessories

1. Fixing of cab accessories	6. Bolt	11. Handle gear shifter
2. Bolt	7. Cushion	12. Nut
3.Cushion	8. Washer	13. Washer
4.Absorber	9. Washer	14. Washer
5. Washer	10. Bolt	15. Bolt

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Overview

Number in parentheses refer to Fig.1.

Install the damper on the fixed seat of driver's cab symmetrically from top to bottom; then fasten the absorber (4), fixing of cab accessories (1) and the fixed seat of driver's cab with high-strength bolts(6) into a whole.

Disassembly

See Fig1 for the numbers in brackets.

Note: Mark and identify all removed cables, wire harnesses, pipelines and tubes to facilitate the installation, adopt dustproof measure to protect tie-in.

1. Park the truck in a flat work area, lift up the body and install the body safety pin. See chapter 'Body and Installation'.
2. Apply parking braking and shut down engine.
3. Rotate steering wheel to the two directions for several turns and release steering system pressure. Press foot valve continuously to release pressure of brake accumulator. Continuously operate the lift control handle to release pressure of accumulator and chock wheels properly.
4. Disconnect electric cables in the following order so as to prevent electric components from being damaged.

a. Disconnect the grounding cable of battery compensator.

b. Disconnect battery cable from terminal posts (grounding cable firstly).

c. Disconnect anode battery cable compensator.

d. Disconnect electric contacts of ECU.

5. Disconnect the remaining electric contacts connected to driver's cab assembly.
6. Carefully loosen brake pipelines on two brake accumulator seats to check whether the brake pressure is released; re-tighten brake pipelines.
7. Make sure to mark all steering and brake pipelines connected to the driver's cab so as

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to facilitate installation; collect leaking oil with proper vessels, disconnect all pipelines and plug all opened pipelines and connectors.
8. If an air conditioner is equipped, evacuate the system before disconnecting air conditioning pipelines, and plug all opened pipelines and connectors. See Chapter 'AIR CONDITIONING PIPELINE INSTALLATION'.
9. Make sure to mark heater pipelines; collect leakage with proper vessels, disconnect heater pipelines and plug all opened pipelines and connectors.
10. Make sure to mark body lifting control handle so as to facilitate installation; collect leakage with proper vessels, disconnect hoses on the multi-way board of driver's cab bottom board and plug all opened pipelines and connectors.
11. Make sure that all the connectors connected to driver's cab assembly are removed before disassembly.
12. Suspend driver's cab assembly with proper lifting device and straighten loosened parts; remove absorber (4), cushion (3) washer (5) and bolt (2、6) of supporting beam of driver's cab assembly.
Note: For disassembly of driver's cab assembly, special lifting device and lever with pad should be used to prevent over-concentrated stress of hook, chain and wire rope at hook-on points of driver's cab.
13. Carefully lift driver's cab assembly to a proper working platform.
14. Loosen the bolt (10), washer (8、9), take off the cushion (7).
15. Loosen the bolt (15), washer (13、14) and nut (12), take off the handle gear shifter (11).

Installation

Note: Tighten all fasteners according to Section '**TECHNICAL CONDITIONS FOR TIGHTENING TORQUES OF STANDARD BOLTS AND NUTS**' in the manual.

Note: According to the descriptions of

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‘Schematic diagram of brake’ in the manual, tighten all of the hydraulic pipelines equipped with the O-ring end face seal port and replace the O-rings.

1. Install the handle gear shifter (11), tighten the bolt (15), washer (13、14) and nut (12).
2. Install the cushion (7), tighten the bolt (10), washer (8、9).
3. Check whether the rubber pad is damaged. If it is damaged, replace it. To install the new rubber pad, use the water or proper lubricant to lubricate it and then install it onto the driver's cab assembly. Use the screwdriver to get the rubber pad completely in position.
4. Use a proper hoisting device to place the driver's cab assembly onto the driver’s cab supporting beam. Care must be taken to prevent the pipelines and components from interfering with the lower side of driver's cab assembly.
5. Use absorber (4), cushion (3) washer (5) and bolt (2、6) to fix parts assembly of Cab(1) on the supporting beam of driver’s cab assembly.
6. Remove plug from lifting control handle pipeline; connect pipeline according to signs made upon removal and fix all pipelines properly.
7. Remove the plug from brake steering pipeline; connect pipeline according to signs made upon removal and fix all pipelines properly.
8. Except for battery cable, battery compensator cable and EUC connector, connect all electric connectors according to signs made upon removal.
9. Remove plug from heating pipeline and connector; connect pipeline according to signs made upon removal and tighten heating pipelines properly.
10. If an air conditioner is equipped on the truck, connect pipeline to evaporator and refill system.
11. Connect electric connectors in the

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following order:
a. Connect electric connectors removed from ECU.
b. Connect anode battery cable compensator.
c. Connect battery cable to the terminal posts (priority is given to anode cable).
d. Connect the grounding cable of battery compensator.
12. Check driver's cab assembly to ensure that all pipelines and cable harnesses have been reconnected after being removed.
13. Refill the two hydraulic oil tanks with oil according to stipulations in section 'LUBRICATION AND MAINTENANCE'. Check the coolant level in the overhead water tank of radiator. If it is low, then add the coolant. See section 'LUBRICATION AND MAINTENANCE'.
14. Start engine, check for leakage, tighten pipeline and joints according to the requirements, heat truck up to normal operation temperature and check all connections for leakage.
15. Check whether all instruments and control elements operate normally. Remove the body safety pin and lower down the body.

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8.1 Parts Assembly of Cab

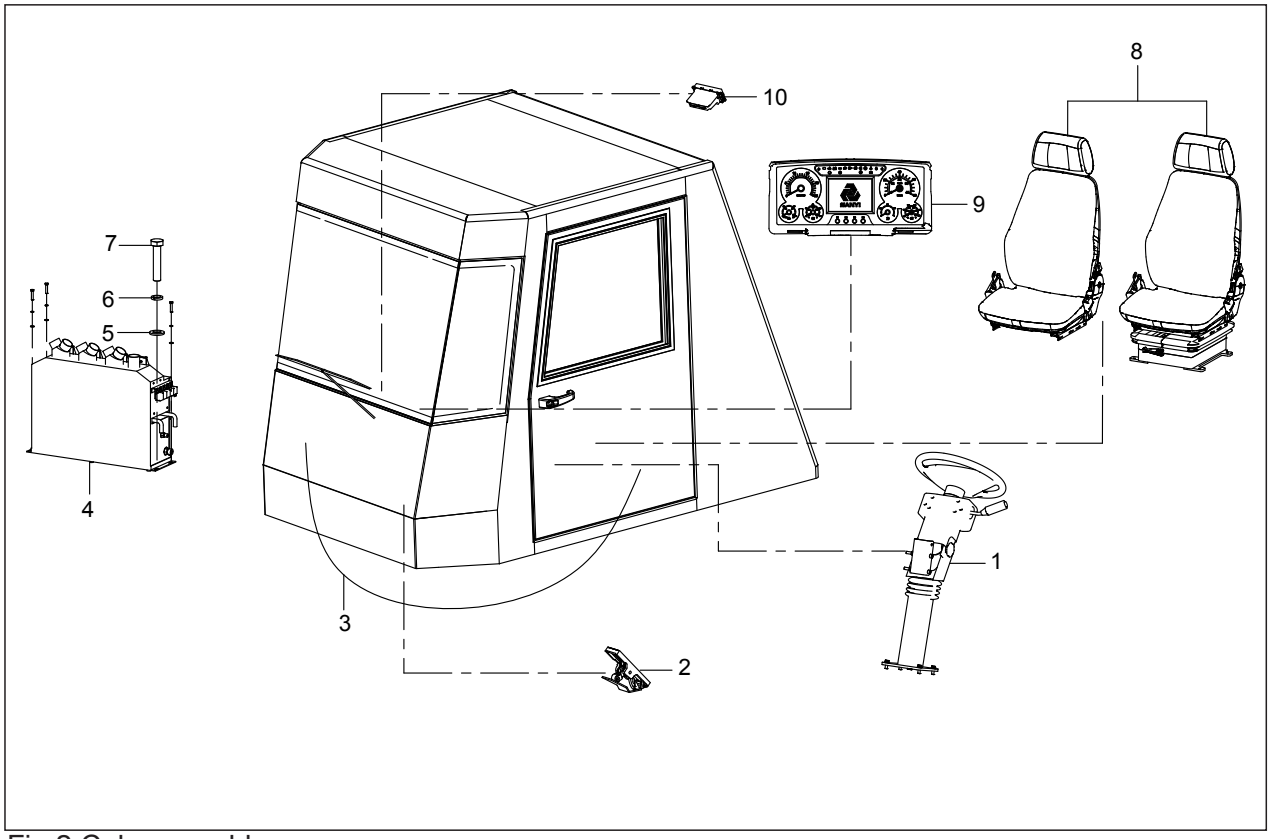


Fig.2 Cab assembly

1. Steering column mounting
2. Throttle controller assembly
3. Cab harness
4. Evaporator assembly
5. Washer
6. Washer
7. Bolt
8. Seat mounting assembly
9. Switch and meter
10. Control panel of air conditioning

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Overview

Numbers in parentheses refer to Fig.2.

Parts assembly of cab complies with safety rules as stipulated in ISO/SAE FOPS (falling object protective structure) and ROPS (rollover protective structures). Parts assembly of cab is accessible from two sides of the truck, with light-colored glass and a good view. The air conditioner is installed as standard on the driver's cab assembly. See Chapter 'AIR CONDITIONING PIPELINE INSTALLATION'.

Disassembly

Note: Mark and identify all removed cables, wire harnesses, pipelines and tubes to facilitate the installation.

1. Ensure parts assembly of cab is placed on a proper working platform which is stable and free of vibration.
2. Use a proper tool to dismantle the driver's seat and co-driver's seat as well as the base. See the installation of seat base.
3. Use the wrench to remove the flat washer (5), washer (6) and bolt (7) fixing the evaporator. Disconnect the cables and wire harnesses connected to the evaporator, and classify and place them into the storage box.
4. Disconnect the pipelines and pipes connected to the evaporator,
and synchronously make the marks properly. Plug all open pipelines and joints.
5. Place all removed objects in a visible place to facilitate the succeeding installation.

Installation

Note:Tighten all fasteners to standard torques listed in Section 36.2, TECHNICAL CONDITIONS FOR BOLTS AND NUTS.

1. Use a proper tool to install the driver's seat and co-driver's seat as well as the base. See the installation of seat base.
2. Use the wrench to tighten the flat washer (5), spring washer (6) and bolt (7) fixing the evaporator. Connect the cables and wire

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harnesses correctly according to the marks.
3. Connect all pipelines and tubes to evaporator in the order as marked.

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8.1.1 Body of cab

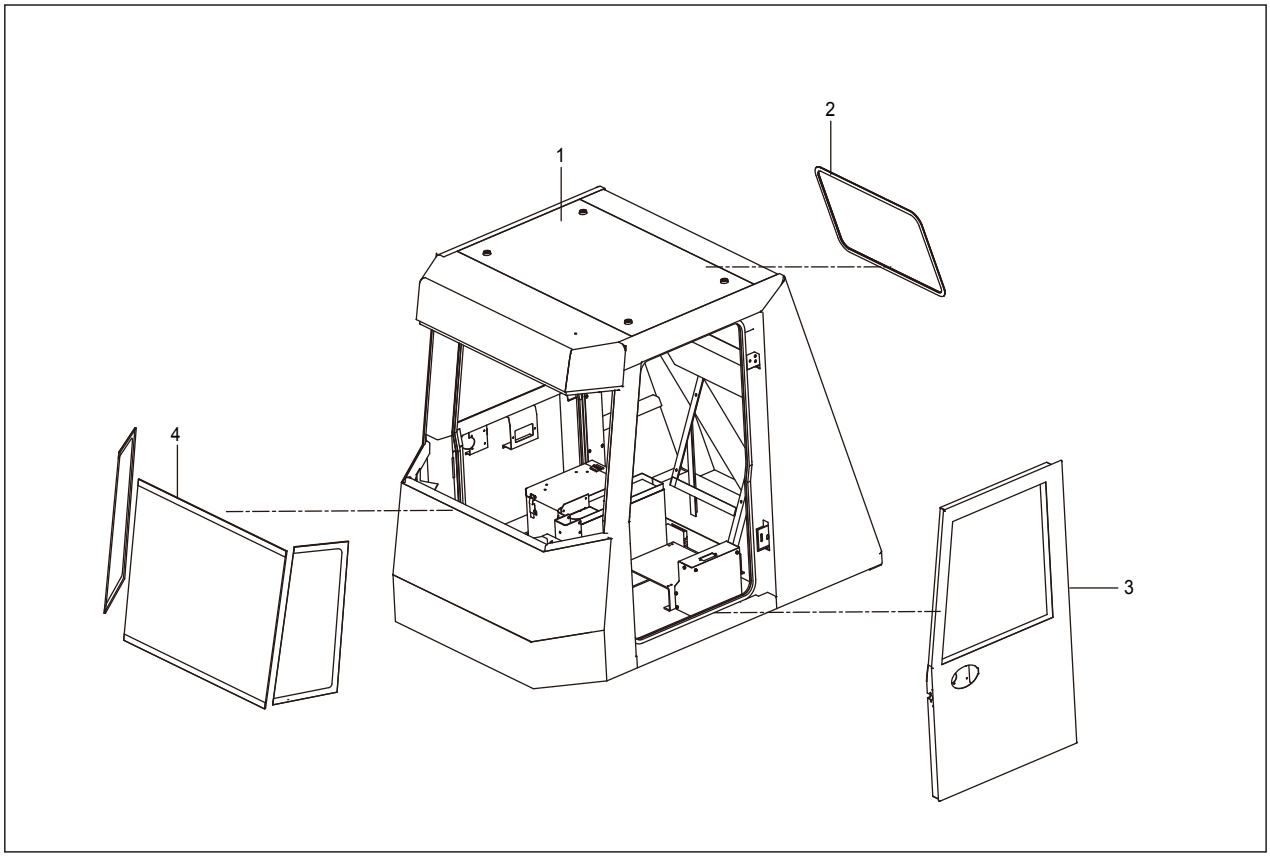


Fig.3 Body of cab

1. Body of cab welding
2. Rear window glass
3. Door assembly
4. Front windshield glass

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Door assembly

Descriptions

See Fig.3 for the numbers in the brackets.

The door assembly has the welded steel plate structure and the hinge connection in its rear part. The window glass is divided into the front and rear parts. Door limiter can prevent excessive swing of door. The door assembly can be removed as an assembly from inside the driver's cab. But the lock, handle, glass and etc. can be separately removed when the door is connected onto the cab.

Disassembly and installation

1. Open the door assembly and use a proper hoisting device to hoist it. Remove the cover and splint pin from the hinge. Use a proper screw driver to remove the pin from the hinge. Remove the door assembly from the driver's cab assembly.
2. Install the new plug-pin onto the hinge.
3. Use the proper hoisting device to hoist the door assembly. Align the door assembly with the hinge of driver's cab. To install the pin, perform the alignment with the hole and use the splint pin for the fixation.
4. Check whether the door assembly (3) is installed correctly and whether the lock function is normal.

Replace front windshield glass

See Fig.3 for the numbers in the brackets.

Attention：Before replacing the broken glass, must be sure the glass accord with rule of low, replace front windshield glass as following method.

Attention：Before eliminate glass glue, front windshield glass must be fixed.

1. Fixed front windshield glass with magnet, eliminate glass glue by cutter, disassemble front windshield glass.
2. Lay on the special glue on the edge of glass and window frame.

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3. Defend the edge of window frame by paper tape.
4. Lay on the glass glue on the window frame.
5. Adjust the clearance of glass and double side of window frame，fix up the glass.
6. Scrape glass glue between glass and frame averagely.
7. Fill in the clearance between glass and the double side of window frame with glass glue.
8. Eliminate the dirty glass glue.
Attention：The thickness of glass glue should exceed 8~10mm. In winter，the glass glue must be roasted to 35~40 ℃，which the time of calefaction is 6~8 hours, when replaced the glass, the car must be stayed over 24 hours.

Replace rear window glass
See Fig.3 for the numbers in the brackets.
Attention：Before replacing the broken glass, must be sure the glass accord with rule of low, replace rear window glass as following method.
Attention：Before eliminate glass glue, rear window glass must be fixed.
Attention：Before replacing the broken glass, must be sure the glass accord with rule of low, replace rear window glass as following method.
Attention：Before eliminate glass glue, rear window glass must be fixed.
1. Fixed rear window glass with magnet, eliminate glass glue by cutter, disassemble front windshield glass.
2. Lay on the special glue on the edge of glass and window frame.
3. Defend the edge of window frame by paper tape.
4. Lay on the glass glue on the window frame.
5. Adjust the clearance of glass and double side of window frame，fix up the glass.
6. Scrape glass glue between glass and frame averagely.
7. Fill in the clearance between glass and the double side of window frame with glass glue.

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8. Eliminate the dirty glass glue.

Detection of water leakage

It is required make detection over water leakage after glass is mounted. Spray water onto the sealing position from outside driver's cab. An assistant should mark where leakage occurs inside driver's cab. Apply sealant from outside and start from the leakage outwards. Spread sealant on the surrounding area of leakage.

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8.1.2 Seat mounting assembly

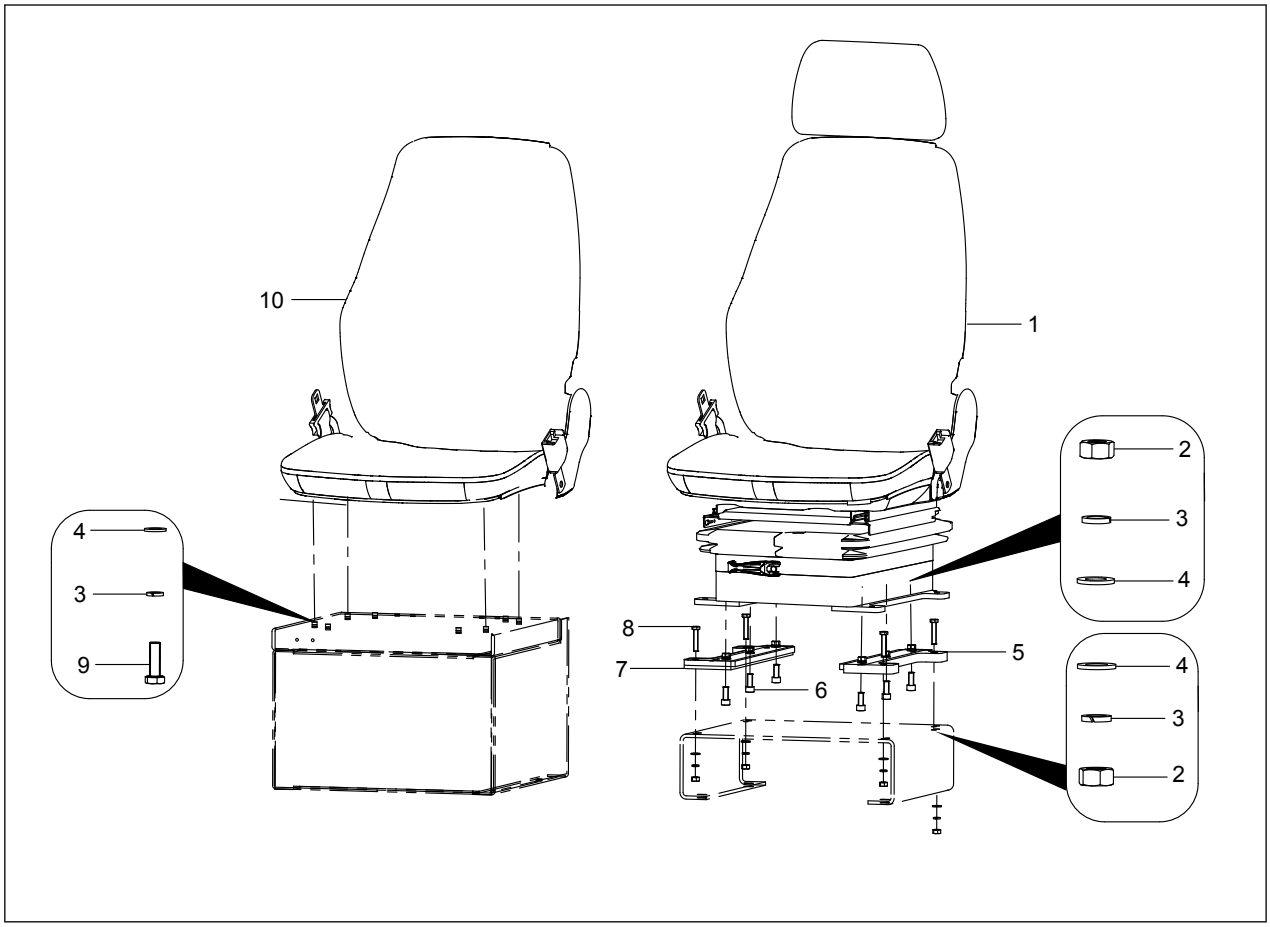


Fig.4 Seat Mounting Assembly

1. Mechanic suspension seat
2. Nut
3.Washer
4. Washer
5. Left connecting board
6. Bolt
7. Right connecting board
8. Bolt
9. Bolt
10. Passenger seat

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Overview

See Fig.4 for the numbers in brackets.

Fix driver's seat onto the cab's bottom board with bolt (8), washer (3、4) and nut (2). The seat assembly is mounted onto the seat support with a resilient cushion and back cushion; and the seat frame is mounted onto the bracket of driver's seat in an air-borne manner. One adjustable 2-point type safety belt is configured and it is fixed onto the seat assembly.

Caution: This seat can automatically adjust the rigidity of suspension mechanism in accordance with the weight of driver through the sensor on the seat so as to adapt seat to the weight of driver.

1. The caster angle of seat back is controlled through the backrest adjusting handle and can be adjusted at the driver's will.
2. The seat can be raised by 30mm when you hear a "click" sound, and another 30mm at the second "click". Move the backrest to an optimum position at where operation can be easily conducted, and release the handle.
3. Pull up the seat can adjust height, there are three levels(low、middle、high), when the seat is on high level, if pull up the seat, it will return low level.
4. To move the seat forwards and backwards, pull the front and back adjusting handles to move seat to the required position. The driver's seat is not equipped with a suspension mechanism, so its height cannot be adjusted. However, the front and back positions as well as the angle of backrest can be adjusted in the same way as driver's seat.

Removal and disassembly

1. Park the truck in a flat working area, apply parking brake and shut down the engine.
2. Rotate the steering wheel left and right for several turns respectively and release the pressure in the steering system. Chock all wheels properly.

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3. Use the proper lifting equipment. Properly tie the seat. Take down the flat washer (1), spring (2) and bolt (4) fixed on the driver's cab bottom board. Move the whole seat assembly out of the truck.
4. Loosen all bolts and locking gaskets with fixed safety belts and take off the safety belts.
5. If necessary, remove the rubber cover to expose the seat suspension frame assembly and height adjuster.

Inspection

Check all brackets and frame for cracks and/ or damage. Repair or replace as necessary.

Assembly and installation

Note:Tighten all fasteners without special torques specified to torques listed in Section 36.2, STANDARD BOLT AND NUT TORQUE SPECIFICATIONS.
1. In case the protective cover has been removed, first install it onto the bottom of seat so as to make it cover suspension frame assembly and height adjuster completely.
2. Connect the driver's seat, co-driver's seat and seat bracket with bolts and gaskets removed during disassembly.
3. Fasten the safety belt onto the seat with bolt and locking gasket in the same way as disassembly.
4. Place the seat on the floor of driver's cab with a proper lifting device and fixed it with bolt and gasket.

Maintenance

Add a bit lubricant onto such moving components as suspension frame assembly and height adjuster at regular intervals.
The driver should inspect the safety belt on schedule. If the mounting parts get worn or broken, belt get notched or abraded, lock fails, the connector gets loosened, or the safety belt gets aged, they should be replaced timely.

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Note: Due to aging, the safety belt should be replaced at least once three years regardless of external appearance.

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8.1.3 Steering column mounting assembly

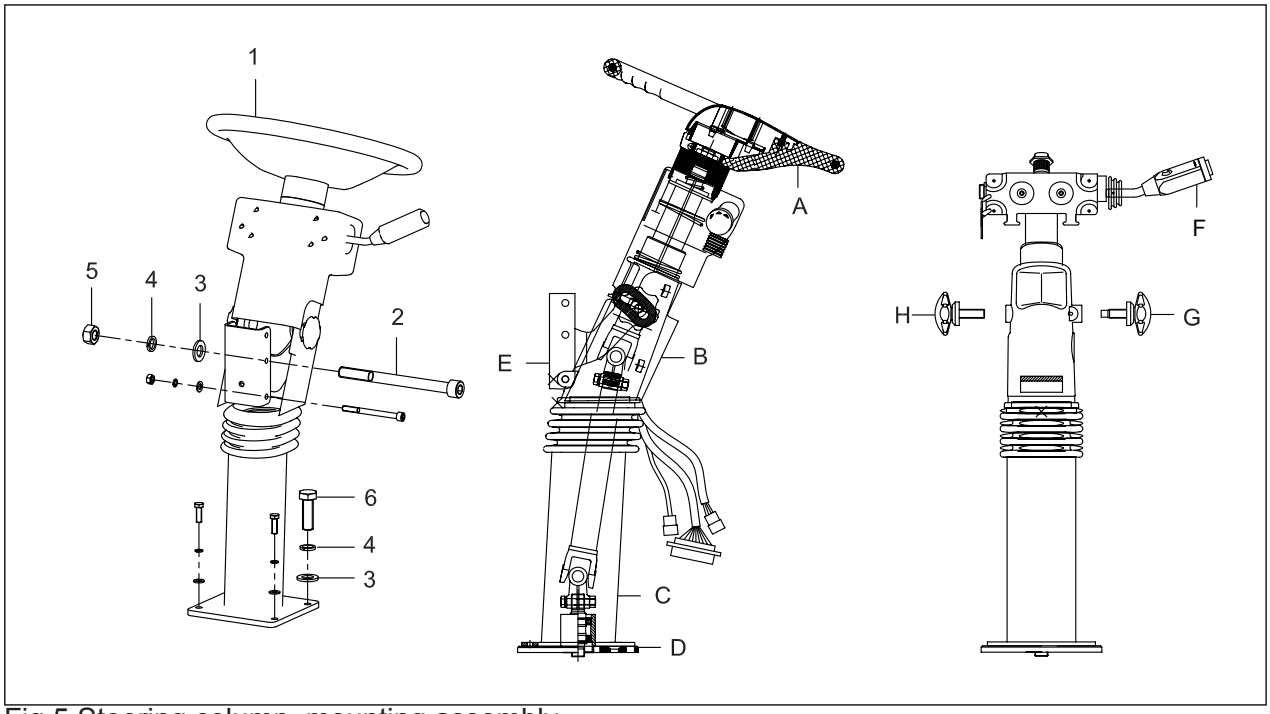


Fig.5 Steering column mounting assembly

1. Steering Gear
2. Screw
3. Washer
4. Washer
5. Nut
6. Bolt

A.Steering wheel

B. Steering column body
C. Lower rubber sheath
D. Steering spline shaft assembly
E. Mounting bracket
F. Combination switch
G. Height adjusting knob of Steering column
H. Tilt angle adjusting knob of Steering column

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Overview

Numbers in parentheses refer to Fig.5.

The steering column (1) is fixed onto the driver's cab bottom board by using the bolt (6), washer (3) and lockwasher(4). The steering column (1) consists of the steering wheel (A), steering column body (B), lower rubber sheath (C), steering spline shaft assembly (D), mounting support (E), combined switch (F), steering column height adjusting knob(G), steering column tilt angle adjusting knob (H) and the connecting pieces.

Caution: The driver can adjust height and tilt angle of the steering column by the two buttons.

1. The driver can adjust the height of steering column by 50mm via the height adjusting button of steering column.
2. With the steering column tilt angle adjusting button, the driver can perform the 14° tilting adjustment on the steering column.

Removal and disassembly

Numbers in parentheses refer to Fig.5.

1. Park the truck in a proper way.
2. Remove the bolt (6), washer (3) and lockwasher (4) fixing the steering column base seat.
3. Unscrew all of the bolt (6), washer (3), spring lockwasher (4) and nut (5) fixing the base seat.
4. Remove the line plug connectors of steering column, and remove the steering column assembly from the bottom board of driver's cab.
5. Loosen all fastening screws and gaskets of lower rubber sheath (C) and steering spline shaft assembly (D). Remove the clamping bolt inside lower rubber sheath connecting to the lower universal joint and steering spline shaft assembly. Take out the lower rubber sheath.
6. If necessary, the lower rubber sheath (C) can also be dismantled to expose the

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telescopic link of steering column so as to facilitate further disassembly.

Inspection

Check whether all connections are reliable and whether any damage occurs to lines, shell protective cover and lower rubber sheath. Repair or replace it timely if any.

Assembly and installation

Numbers in parentheses refer to Fig.5.

Caution: Tighten all fasteners to reach the standard torque according to section'Technical Conditions for Tightening Torques of Standard Bolts and Nuts' in the manual.

1. If the lower rubber sheath (C) has been removed, then install the lower rubber sheath onto the steering column body (B) at first.
2. Use the bolt and washer removed during the dismantling to properly connect the lower universal joint and the steering spline shaft assembly (D).
3. Properly connect the upper end of lower rubber sheath (C) and the steering column body (B). Then install all screws and washers for fixing the lower rubber sheath (C) and the steering spline shaft assembly (D). It is the same as the removing process.
4. Properly connect the steering spline shaft assembly and the steering column. Tighten the bolt (6), washer (2) and lockwasher (3) so that the steering gear is fixed inside the driver's cab.
5. Install and tighten the bolt (6), washer (3), lockwasher (4) and nut (5).

Maintenance

Add lubricant onto the butter mouth of universal joint at regular interval.

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8.1.4 Accelerograph controller mounting assembly

Overview

The accelerator pedal is secured to the cab floor with bolts(2), washers(3), lockwashers(4) and nuts (5). When the operator operates, the following points should be noticed:

1. Function of accelerograph: Changing both the rotational speed and the output power and torque of engine synchronously. Accelerator pedal is the operating device of the engine oil supply system. The rotational speed of the engine may be altered when the pedal is pressed down and released.

2. The SRT95C mining dump truck adopts the electronic accelerator control system which mostly consists of the accelerator pedal, pedal displacement sensor (sliding rheostat), ECM (electronic control module), data bus, servo motor and air throttle actuator. The displacement sensor is installed inside the accelerator pedal and it monitors the position of accelerator pedal at any time. When it is monitored that the height position of accelerator pedal is changed, this information will be transmitted instantaneously to ECM. ECM will perform the operation processing on this information and the data information transmitted from other systems and work out a control signal. This signal will be transmitted to the servo motor relay via the circuit. The servo motor will drive the air throttle actuator. The data bus is responsible for the communication between the system ECM and the other ECU (electronic control unit).

3. For the fuel addition, if it is felt that the accelerograph doesn't make a reaction as fast as its usual performance or that the engine lacks the power, check the spark cover, fuel injection nozzle and air throttle to see whether it is necessary to replace the spark cover or clean the air throttle and fuel injection nozzle.

4. In the case that the accelerograph doesn't

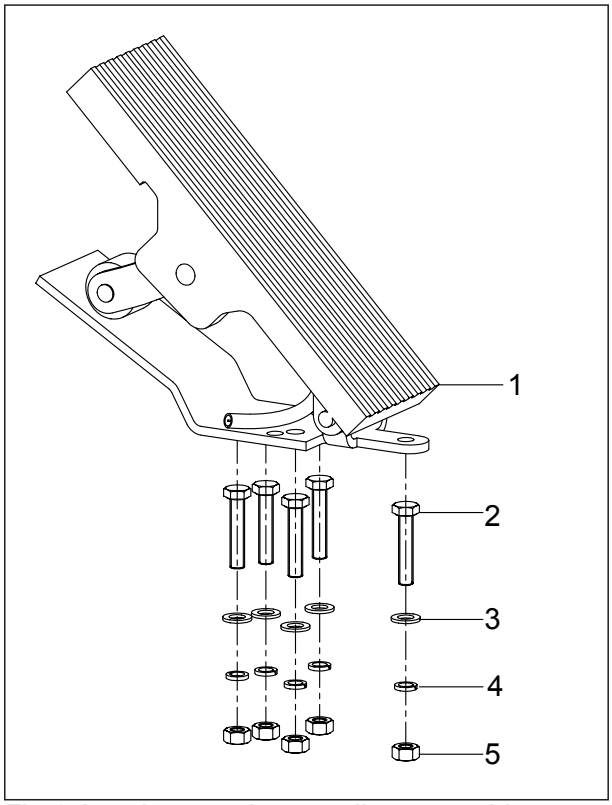


Fig.6 Accelerograph controller assembly

1. Accelerograph controller
2. Bolt
3. Washer
4. Lockwasher
5. Nut

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work when it is pressed down during the traveling, then it is normal all the time after the truck is stopped and filled with the fuel, and the above-mentioned fault occurs again after the truck runs for a period, the following points of fault causes may exist: the pressure of fuel pump is insufficient and the air lock occurs after the truck warms up, or the filter element is dirty and it leads to insufficient fuel supply; or the ignition energy is insufficient after the coil is heated; the measurement signal of valve sensor or air intake pressure sensor is incorrect and it leads to the abnormal fuel injection pulse; the fuel filter is dirty and it leads to insufficient fuel injection or no fuel injection during the fuel supply.

Removal and disassembly

Numbers in parentheses refer to Fig.6.

1. Position the vehicle in a level work area, ensure the body is fully lowered, apply the parking brake and switch off the engine.
2. Remove mounting bolts (2), washers(3), lockwashers(4) and nuts(5) securing accelerograph controller base.
3. Disconnect wiring harness from the accelerator pedal. Remove accelerator pedal from cab floor.

Inspection

Check all brackets and frame for cracks and/or damage. Repair or replace as necessary.

Assembly and installation

Numbers in parentheses refer to Fig.5.

Note:Tighten all fasteners without special torques specified to torques listed in Section 36.2, STANDARD BOLT AND NUT TORQUE SPECIFICATIONS.

1. Connect wiring harness.
2. Position pedal assembly on cab floor and secure with bolts (2), washers(3) lockwashers (4) and nuts(5).

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8.1.5 Evaporator assembly

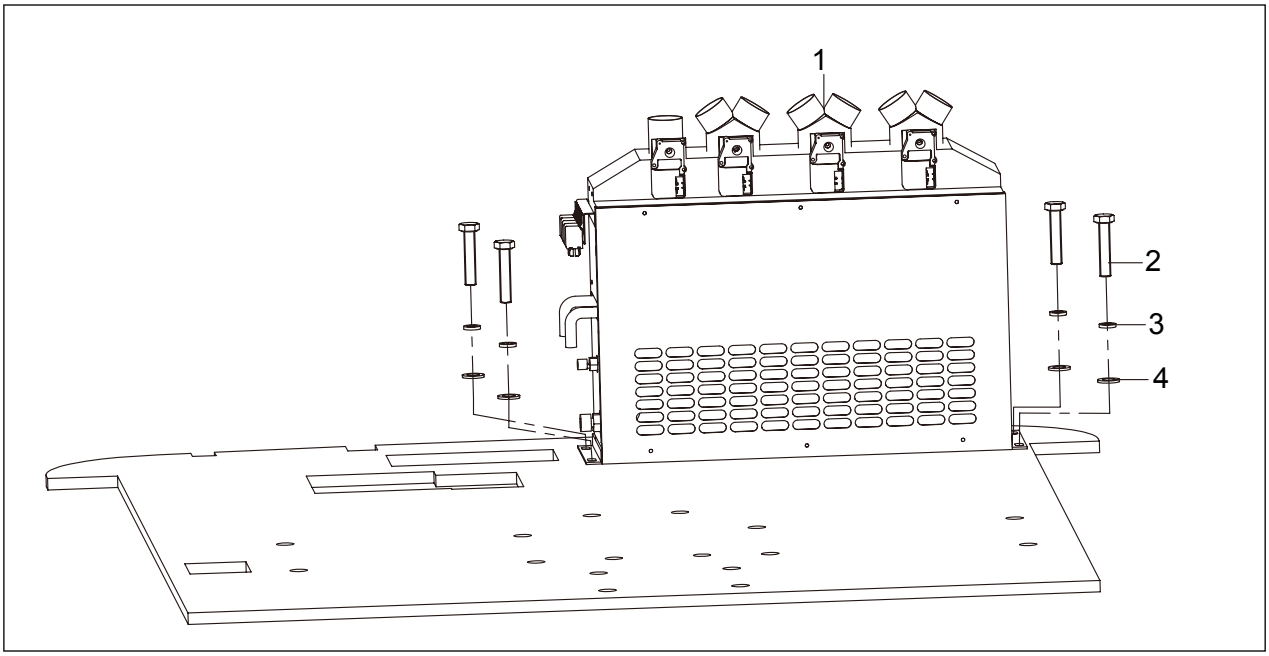


Fig.6 Evaporator assembly

1. Evaporator assembly
2. Bolt
3. Washer
4. Washer

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Overview

Evaporator serves to make gas-liquid two-phase coolant after reducing pressure by regulating flow evaporate and gasify into coolant vapor through absorbing the heat of air which flows over the surface of evaporator, so as to reduce the temperature of the air and thus realize the goal of cooling.

Caution:

1. After the evaporator assembly is installed, the barrier is present at the air intake and return ports, and the unsmooth air intake and return lead to the low air flow and insufficient refrigeration.
2. Evaporator assembly is not installed firmly and thus shakes in the later period, further leading to leakage of air and condensate water.
3. Evaporator assembly is not properly grounded and the system does not operate.
4. Twisting or blockage occurs to the blast pipeline connected to the air port of evaporator, and this results in low air volume and insufficient refrigeration.

Removal and disassembly

Numbers in parentheses refer to Fig.6.

Park the truck in a proper way.

Before dismantling evaporator assembly, make sure that the water valve at the water inlet tube of evaporator assembly is closed.

Remove all line plug connectors of evaporator assembly and mark them successively.

Remove the throat collars at all air outlets of evaporator assembly, and mark all removed air ducts. Remove the throat collars for two water pipes of evaporator assembly. After these two water pipes are marked respectively, separate these two water pipes from the evaporator assembly. Caution: a small amount of engine coolant will flow from the heating core of evaporator during this process.

Generally, it isn’t recommended to dismantle the storage-rubber pipe components and

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steam-pressure rubber pipe components connected to the evaporator assembly. Otherwise, cold coal inside air conditioning system will leak out. If storage-rubber pipe components and steam-pressure rubber pipe components need to be disassembled, they should be marked properly. Two rubber pipes should be plugged promptly with choke plug after dismantling so as to prevent air conditioning system from contamination.
Completely remove the bolt (2) and washers (3、4) fixing the evaporator assembly onto the driver's cab bottom. Meanwhile, remove two flow hoses on the bottom of evaporator assembly. If necessary, evaporator can be further disassembled.

Detection
Check whether all connections are reliable and whether any damage occurs to lines and pipelines. Repair or replace it timely if any.

Assembly and installation
Numbers in parentheses refer to Fig.6
Caution:Tighten all the fasteners to the standard torque according to section 'TECHNICAL CONDITIONS FOR TIGHTENING TORQUES OF STANDARD BOLTS AND NUTS' of the manual.
Install two removed flow hoses onto corresponding positions of evaporator assembly and fasten them with throat collar.
Fix the evaporator assembly onto the corresponding positions of the bottom of the driver's cab with bolt (2) and gaskets (3, 4).
Install and restore all line plug connectors disassembled to the designated positions according to signs made during disassembly.
Install the two disassembled water pipes to corresponding connectors according to signs and fasten them with throat collar.
Install all disassembled blast pipes to corresponding air port according to signs and fasten them with throat collar.

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In case the storage-rubber pipe components and steam-pressure rubber pipe components are both disassembled, install them to the corresponding connectors according to signs and fill cold coal according to stipulations after evaporator assembly is installed completely.

Maintenance

Harnesses of evaporator assembly, blast pipe throat collar, water intake tube and water return tube throat collar as well as mounting bolts of evaporator assembly should be checked for looseness at regular intervals.

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8.1.6 Harness of cab

Descriptions

The harness of cab refers to the wiring components of individual electrical components and control cabinets in the cab. It consists of the insulation shields, terminals, wire, and insulation wrapping material. To facilitate the installation and maintenance and ensure the operation of electrical equipments in the worst conditions, integrate the wire with different specifications and colors used by individual electrical equipments in the whole truck by properly arranging them, and use the insulation material to bundle the wire to the harness. In such a way, it achieves the integrity and reliability. The rear part of cab harness is connected to the control board via the 31-pin and 32-pin electrical connections and its front part is connected to various electrical components in the cab via various connectors.

Removal and Installation

The harness of cab is installed on the bottom of cab. It enters the cab via the front and rear wear wallboards. It is fixed and installed by using the wire clamps and cable ties. To dismantle the harness of cab, remove the 31-pin and 32-pin connectors connected to the control cabinet in the rear part of harness at first. Then remove the connectors connected to various electrical components in the front part. Subsequently, remove the front and rear wear wallboards, wire clamps and cable ties. Then, the harness of cab can be removed at the moment.

Installing new cab harness type should be consistent with the original model. The wire terminal and the wire should be reliably connected. Individual connectors and the can be gently pulled by hands to check them for looseness and disengaging. Compare the new harness with the original harness. For

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example, the dimension, connectors, wire marking and etc. of wire harnesses should be consistent. Any suspicious point can be tested with the multimeter. The replacement can be performed only after it is confirmed that the harness is intact. The connectors, covers and sockets of individual electrical equipments should correspond to the sockets and covers on the harness. After the individual wires are connected to the electrical components, a certain margin should be reserved, not tensioned or slackened.

For the inspection and connection test of circuits, after the harness is replaced completely, check whether the connectors and electrical components are connected correctly at first.

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8.1.7 Switches and instruments

Operating equipment and control panel

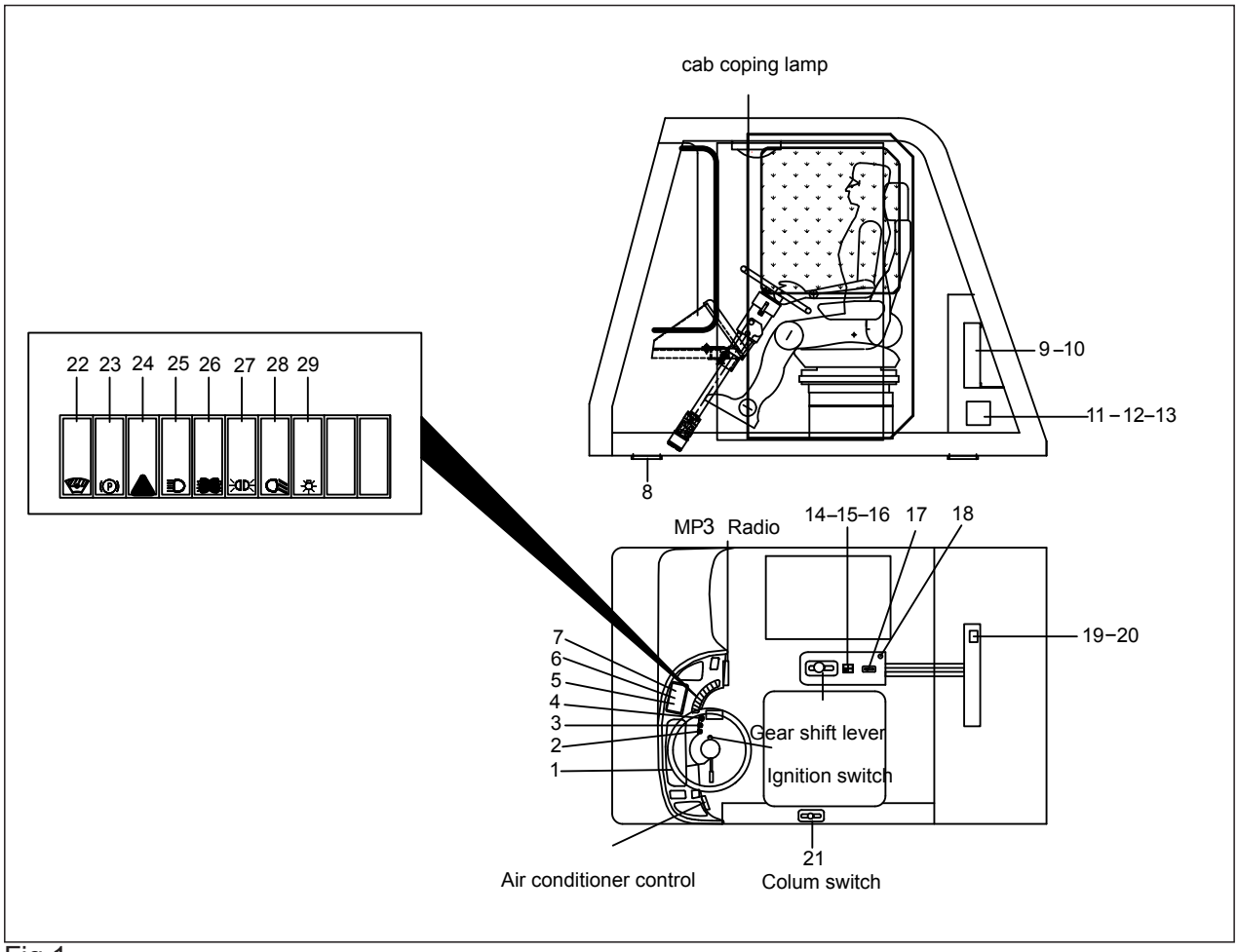


Fig.1

1. Combination instrument
2. Cigar lighter
3. Botton of solenoid valve for body stably control
4. Emergency stop switch
5. Monitor
6. Control box
7. 20-meter signal-line
8. Through-wallplate assembly
9. Control plate install
10. Central distribution case
11. GPS
12. Screw
13. Plug 35-core
14. Rocker switch frame
15. Rocker switch
16. Switch cover plate
17. Retarder lever
18. Buzzer
19. Nut
20. Nut
21. Body control lever
22. Rocker switch
23. Rocker switch
24. Rocker switch
25. Rocker switch
26. Rocker switch
27. Rocker switch
28. Rocker switch
29. Rocker switch middle frame

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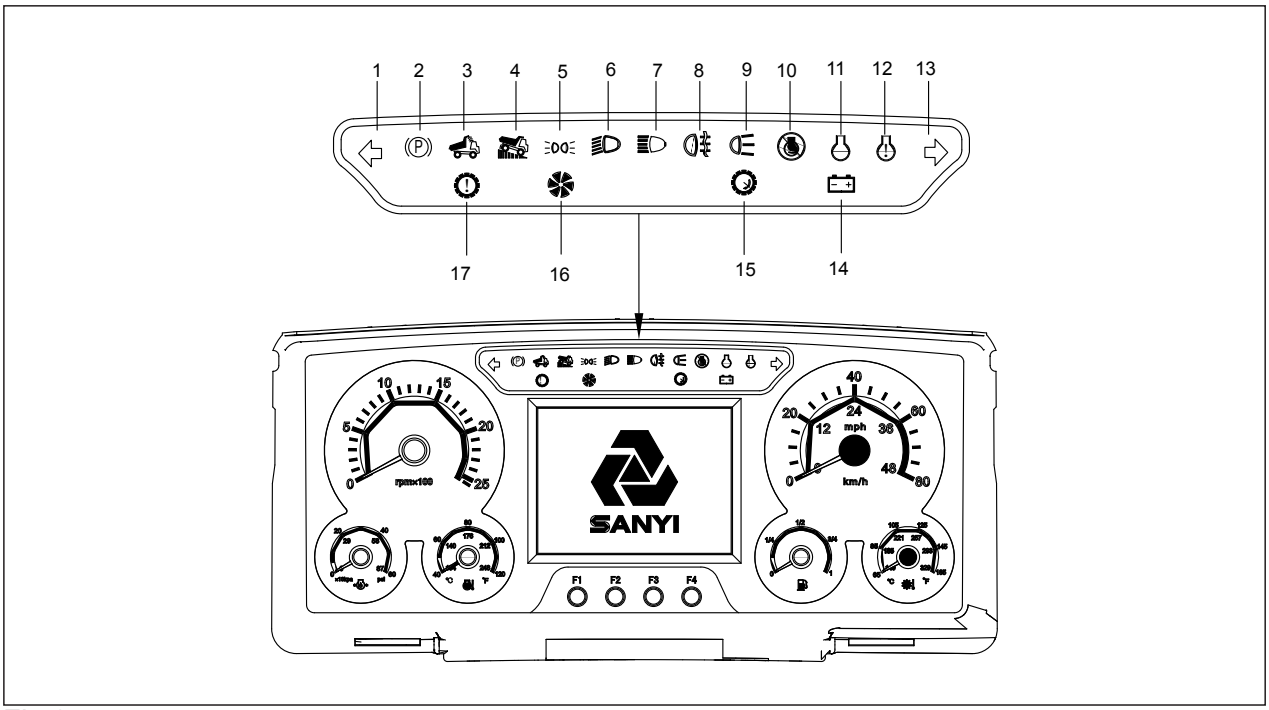


Fig.2

Indicator

1. Left steering Indicator (Green) - Flashes when the left indicator lights are operating.
2. Parking Brake (Red)-Illuminates when the parking brake is applied.
3. Body up (Yellow) - Illuminates to indicate that the body is NOT resting on the chassis. Never move the machine until this light goes OUT.
4. Retarder Indicator (Yellow) - Illuminates when the retarder is applied.
5. Side marker lamp (Yellow) - Such lamp will be on when side marker lamp starts to work.
6. Dipped beam Indicator (Green)-Illuminates when dipped beam head lamps start to work.
7 High beam Indicator (Blue)-Illuminates when high beam head lamps start to work.
8. Fog Indicator (Yellow) - Such lamp will be on when fog lamps start to work.
9.Rear Indicator (white)-
10. Engine Stop Indicator Red) - When the 'Stop' light comes on, the computer has detected a major malfunction in the engine

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that requires immediate attention.
Stop the machine when this light illuminates and do not operate until the fault is corrected.
11. Engine Maintenance Indicator (White) - Indicates that the engine needs to be maintained. See Cummins Manual for details about specific maintenance items.
12. Engine Warning Indicator (Yellow) - When the 'Warning' light comes on, the computer has detected a fault in the engine which may result in a power loss. The fault should be diagnosed and corrected at the earliest opportunity.
13. Right steering Indicator(Green) - Flashes when the right indicator lights are operating.
14. Alternator Charging (Red) - Illuminates to indicate when the alternator is not charging.
15. Transmission Over speed Indicator (red) - Illuminates when the transmission ECU senses transmission speed above 2350 rev/ min.
16. In-converter Indicator (Green)- Illuminates when the transmission is in Torque Converter drive. It goes OUT when Lockup is engaged.
17. Check Trans Indicator (Red) - Illuminates to alert of a fault in the transmission shift system or abnormal transmission temperature. The light will illuminate when the ignition key switch is turned to position '1' to provide a bulb and system check and should go off a few seconds after the engine is started.

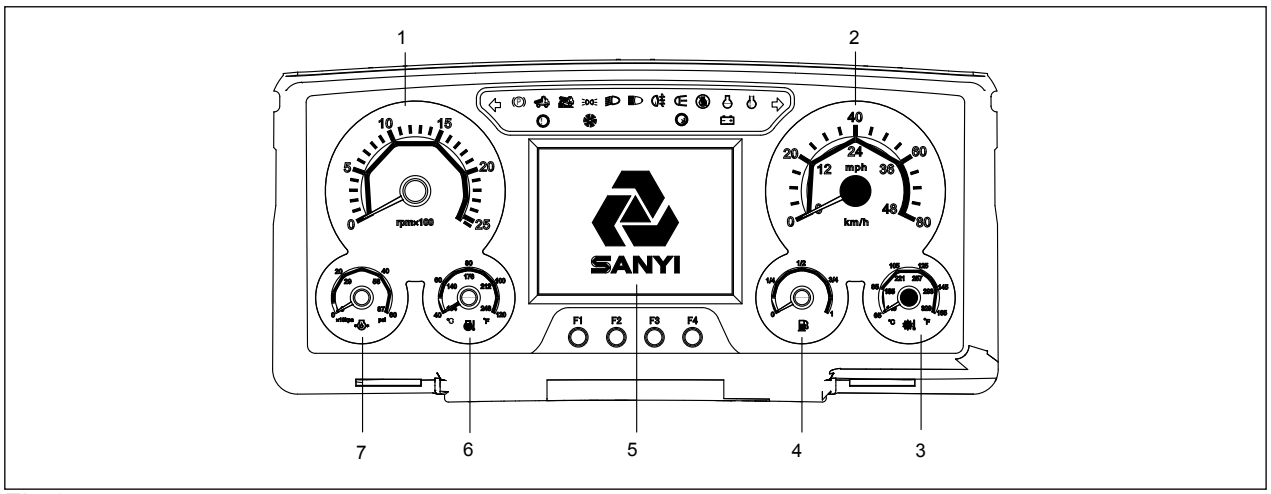


Fig.3

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Instrument

1. Tachometer

Driven by CAN bus; it indicates engine speed in revolutions per minute. When the pointer is located in white area said speed is normal, and once the pointer is located in red area that speed is too high, should reduce speed immediately.

2. Speedometer

Driven by CAN bus; it indicates vehicle running speed. When the pointer is located in white area said speed is normal, and once the pointer is located in red area that speed is too high, should reduce speed immediately.

3. Transmission Oil Temperature Gauge

The pointer indicates transmission oil temperature value. Such meter is directly connected to transmission temperature sensor. When the pointer is located in white area said transmission oil temperature is normal, and once the pointer is located in red area that transmission oil temperature is too high, movement, the buzzer for 10 seconds, then shut down automatically. In the electric power the same fault buzzer action only once.

4. Fuel level gauge

The pointer indicates percent of full tank a actual fuel level. Such meter is directly connected to fuel level sensor. When the pointer is located in white area said fuel level is normal, and once the pointer is located in red area that fuel level is too low, movement, the buzzer for 10 seconds, then shut down automatically. In the electric power the same fault buzzer action only once.

5. Display

1. Turn on power supply, start the key switch tol, the display shows 'sany' boot screen(see Fig.3-1), and all of the signal indicators are applied, 3 seconds after the display shows work interface, the lights go out at the same time.

2. Click F2 key to change from work interface to system function interface, and the work

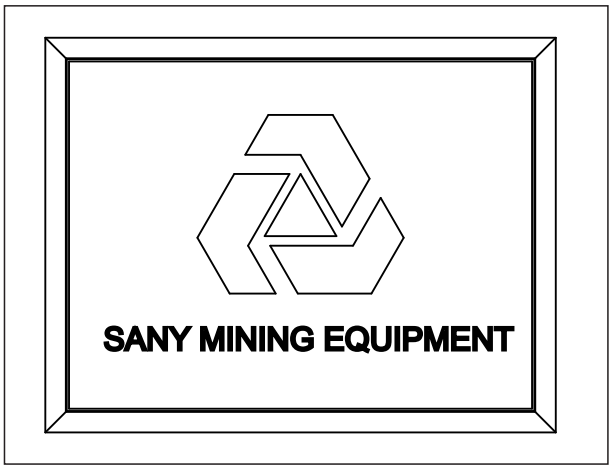


Fig.3-1

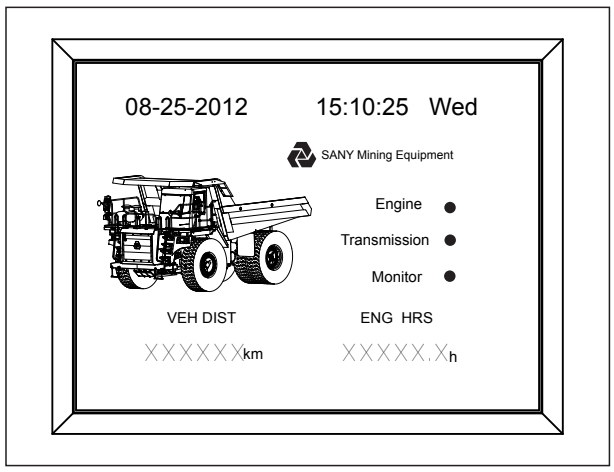


Fig.3-2

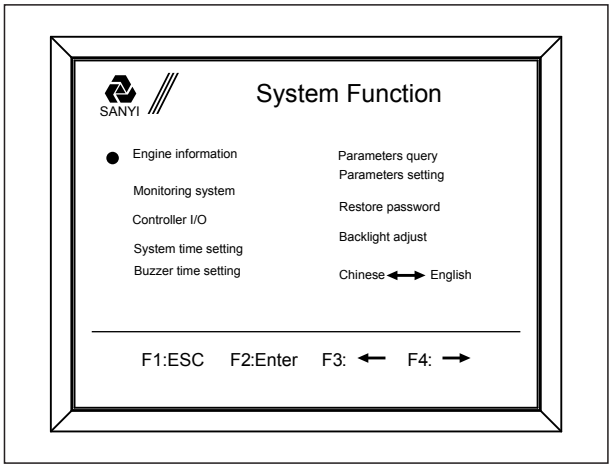


Fig.3-3

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interface is default (see Fig.3-2).
3. Enter the system function interface, F1 key to return, F2 key for confirmation key, the F3 key to move up, and F4 for down key(see Fig.3-3).
4. Under the system function interface, click the F3 key or F4 key to choose the function and click F2 key to confirm.
Take the case of setting system time to demonstrate operation method:
Under the system function interface:
a. Click F3 key or F4 key to choose the number of the time;
b. Click F2 key to confirm, then the cursor will automatically move to the next number(see Fig.3-4);
c. When the cursor to the last digit (the second single digits), click F2 key to confirm the current changes, and then click F2 key again to end the modify Settings until appear a square green claim(see Fig.3-5),
d. Click F1 key to return to the system function interface.
6. Engine Water Temperature Gauge
Driven by CAN bus; it indicates engine coolant temperature value. When the pointer is located in white area said engine coolant temperature is normal, and once the pointer is located in red area that engine coolant temperature is too high, movement, the buzzer for 10 seconds, then shut down automatically. In the electric power the same fault buzzer action only once.
7. Engine Oil Pressure Gauge
Driven by CAN bus; it indicates engine oil pressure value. When the pointer is located in white area said engine oil pressure is normal, and once the pointer is located in red area that engine oil pressure is too high, movement, the buzzer for 10 seconds, then shut down automatically. In the electric power the same fault buzzer action only once.

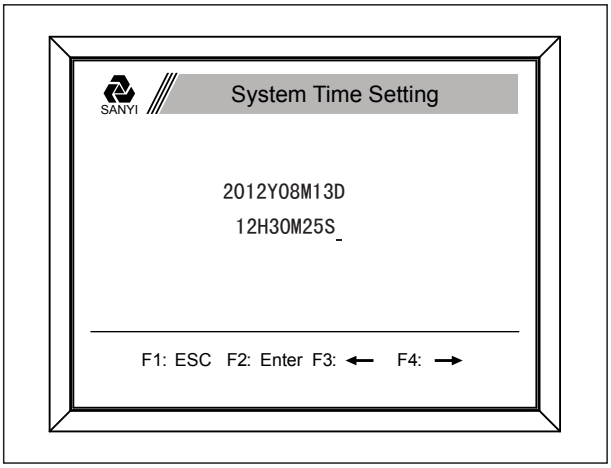


Fig.3-4

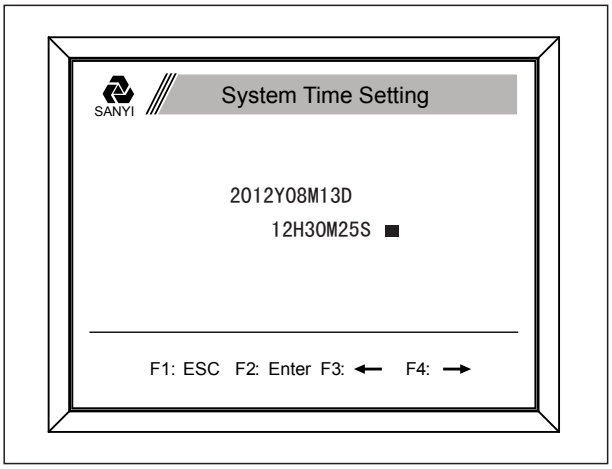


Fig.3-5

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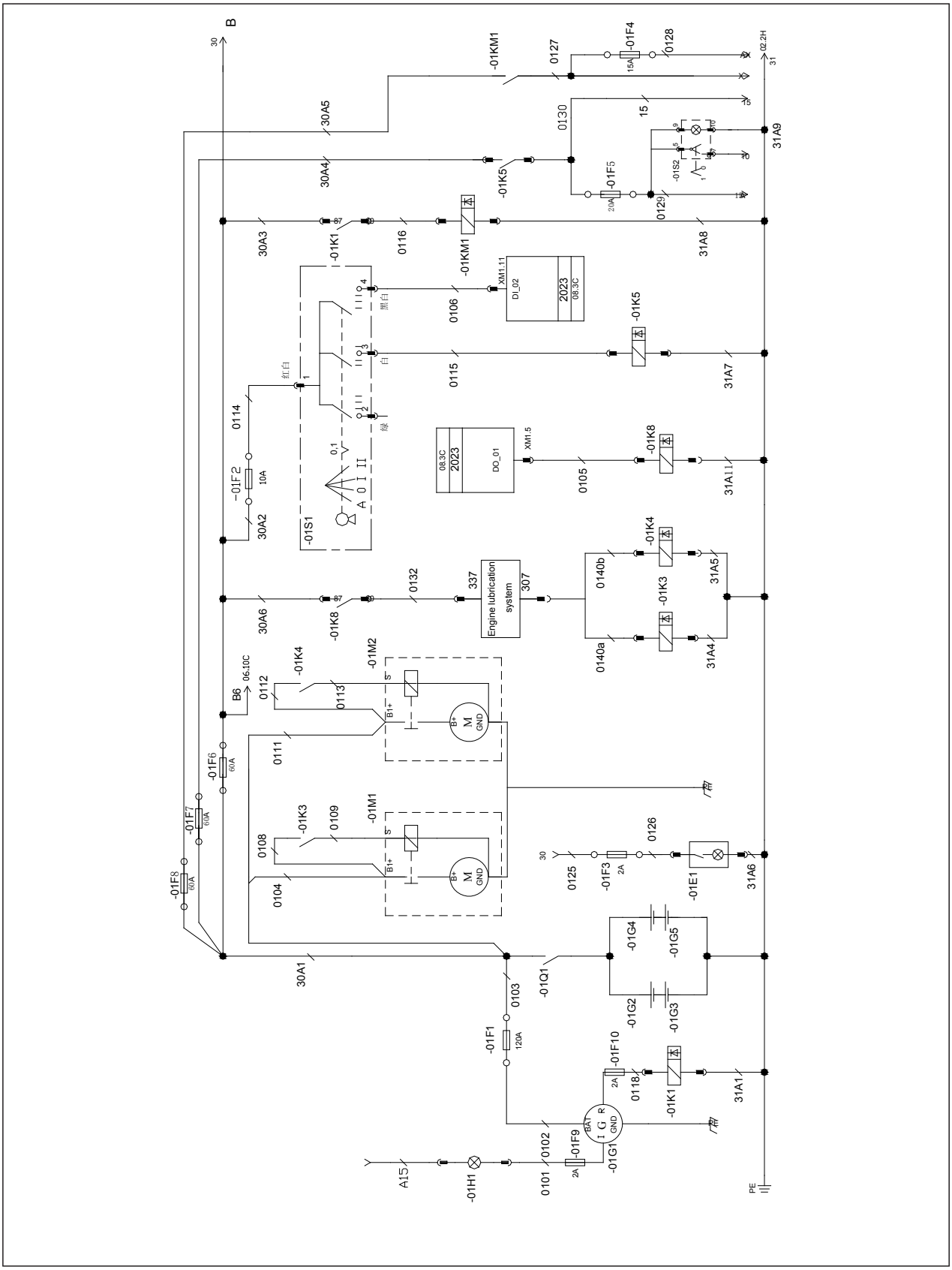


Fig.4 Switch and Meter

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01G1- AC generator	01K1- Generator relay	01KM1- X power contactor
01G2- Battery	01K8- Starter signal relay	01M1- Starter motor
01G3- Battery	01K3- Starter motor relay 1	01M2- Starter motor
01G4- Battery	01K4- Starter motor relay 2	01H1- Room lamp
01G5- Battery	01K5-Body power contactor	01S1- Ignition key switch
01S2- Small lamp switch		

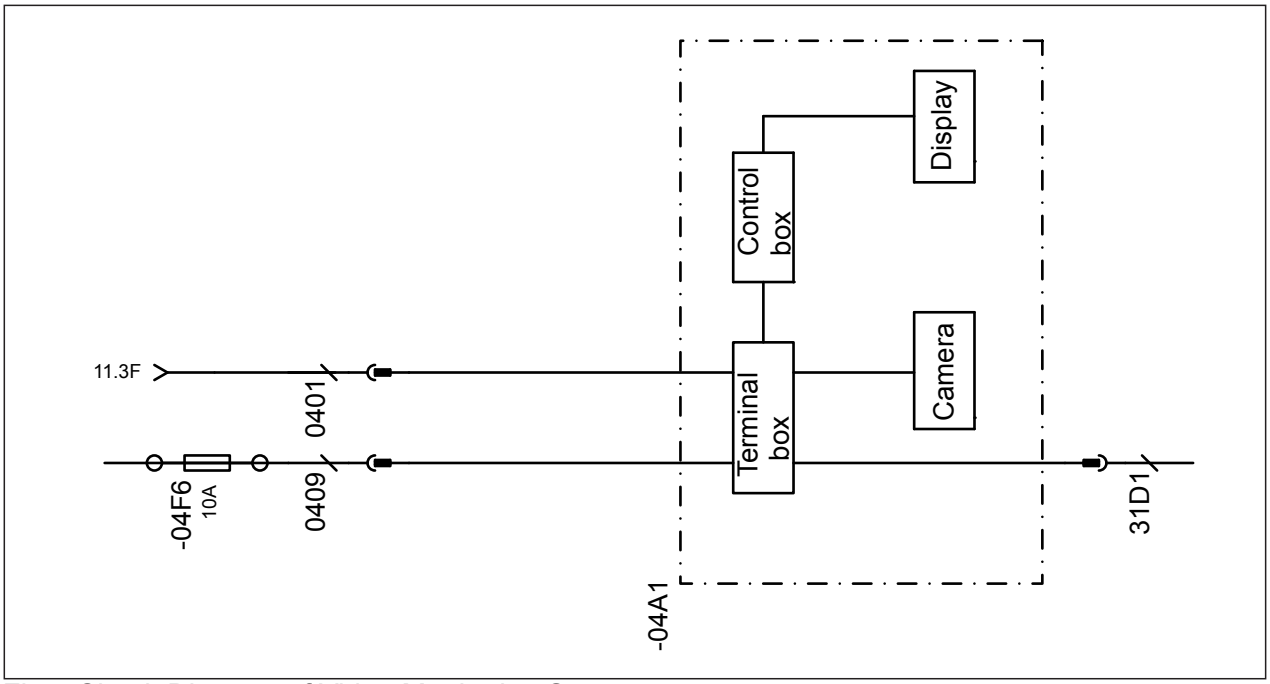


Fig.5 Circuit Diagram of Video Monitoring System

04A1—Vedio monitor system

04F6—Vedio monitor system fuse

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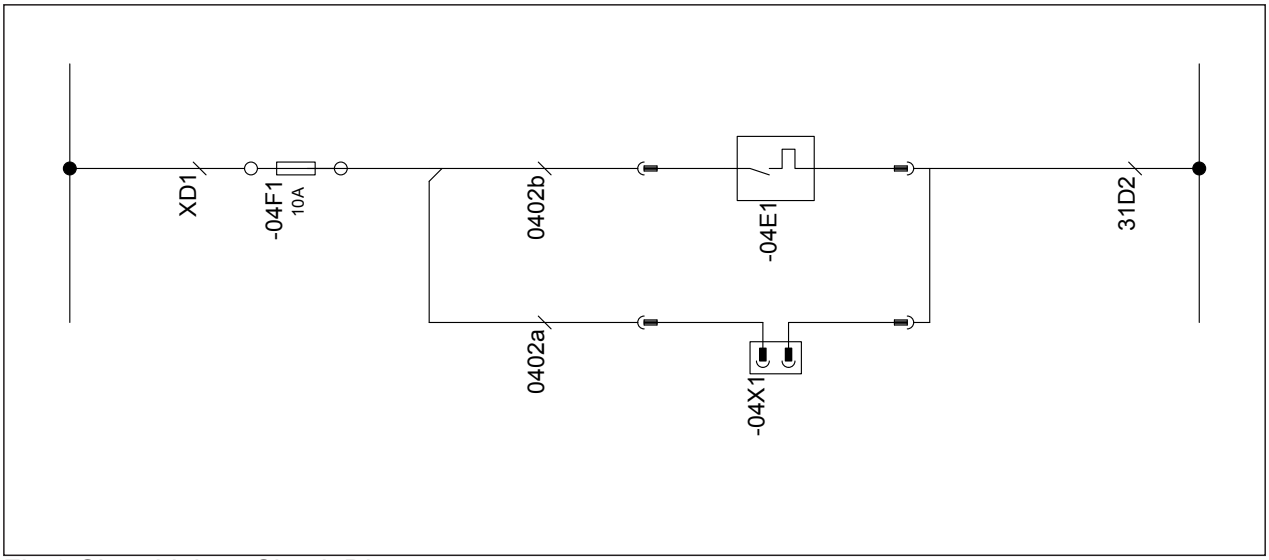


Fig.6 Cigar Lighter Circuit Diagram

04E1—Cigar lighter 04F1—Cigar lighter fuse 04X1—Socket

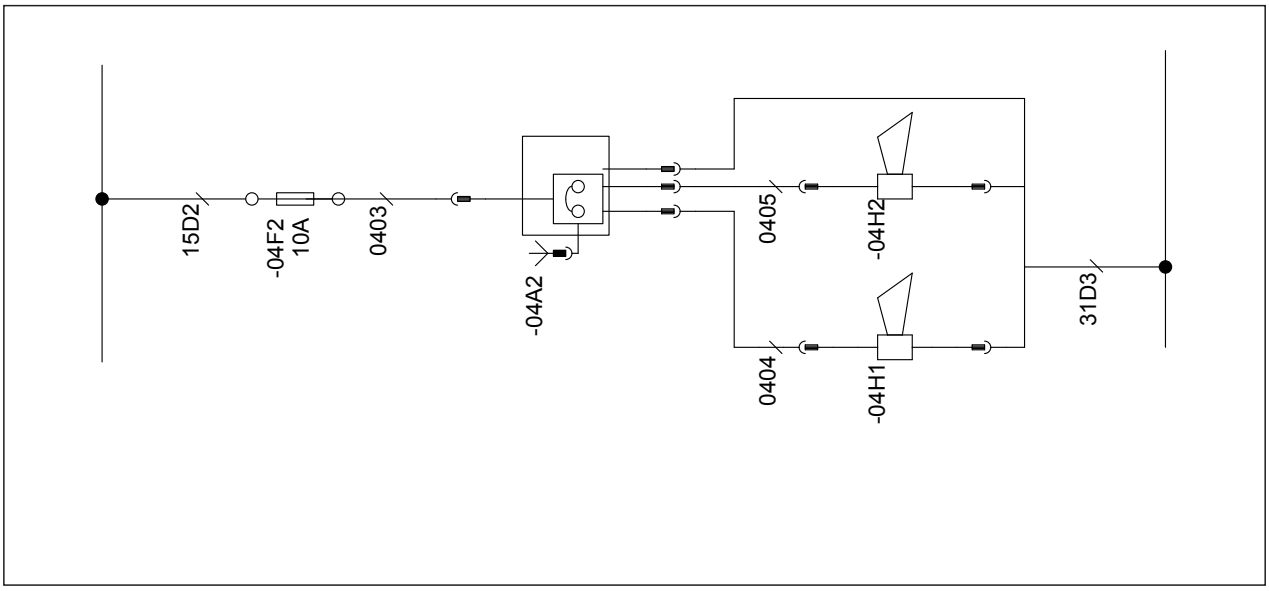


Fig.7 MP3 & Radio Circuit Diagram

04A2—MP3 & radio 04H1—Tweeter
04H2—Woofer 04F2—MP3 & radio fuse

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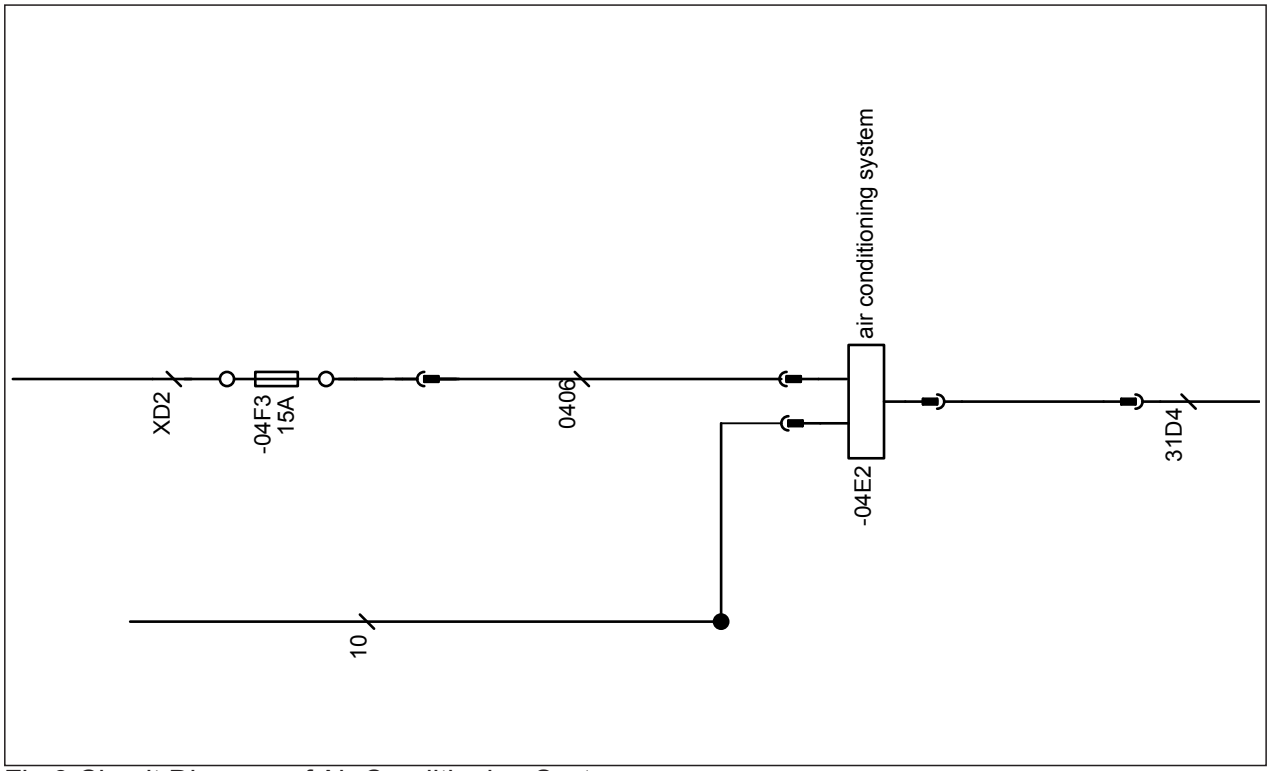
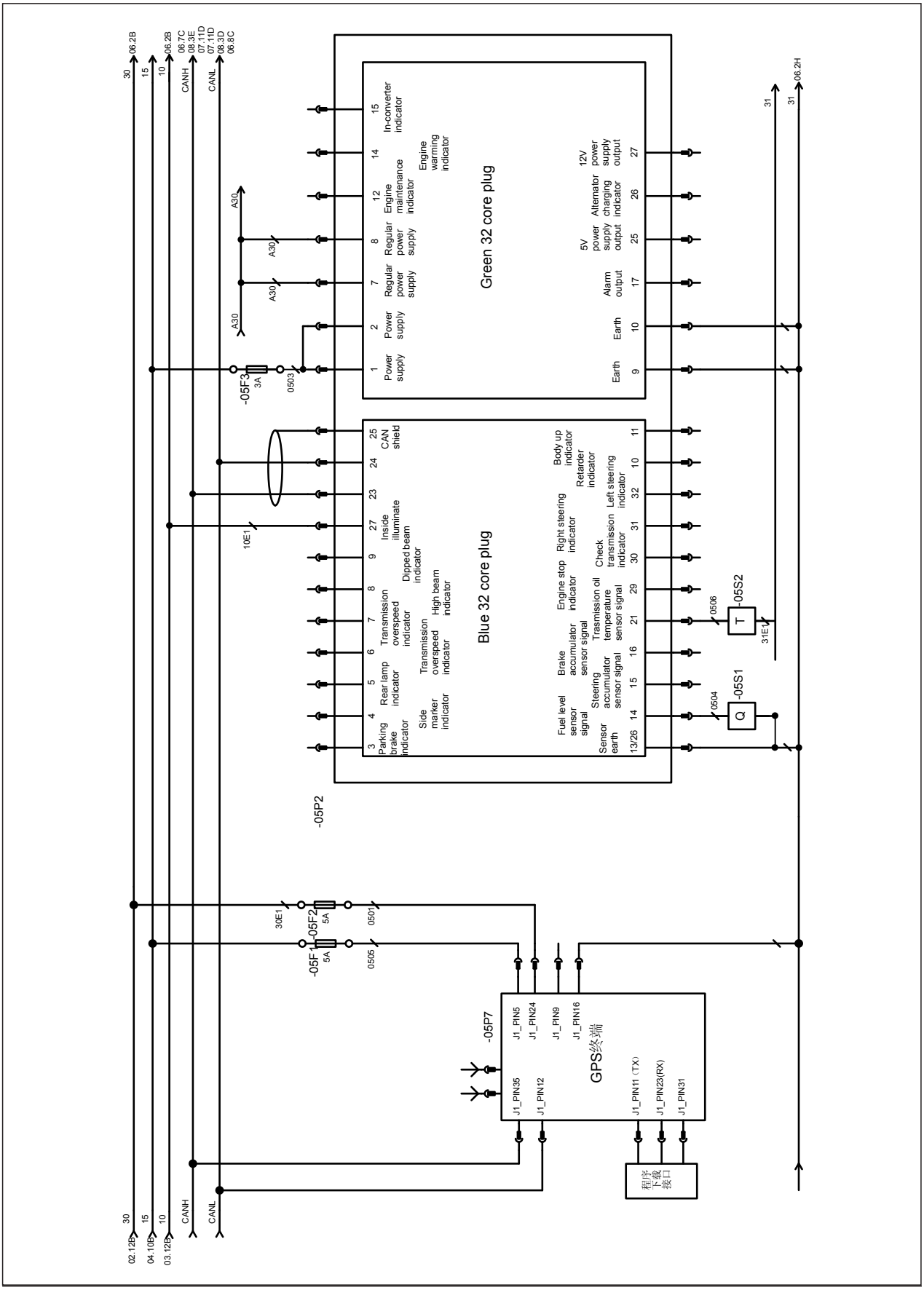


Fig.8 Circuit Diagram of Air Conditioning System

04F3——Fuse　　04E2——Air conditioner system

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Fig.9 GPS

05F1——GPS fuse
05F2——GPS fuse
05F3——Combination instrument fuse
05P7—— GPS
05P2——Combination instrument
05S1——Fuel level sensor
05S2——Transmission oil temperature sensor

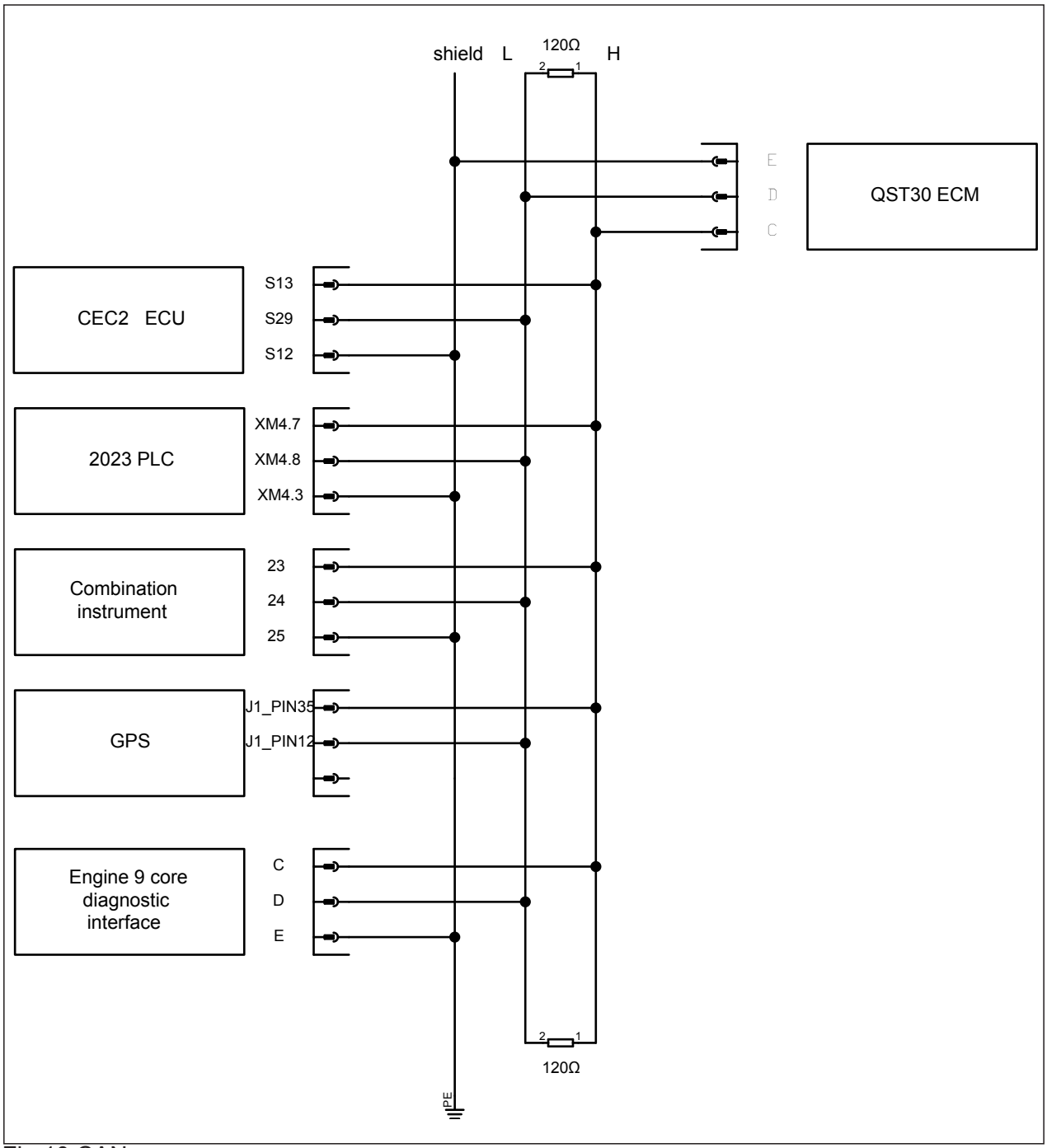


Fig.10 CAN

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List of Damageable Elements

Relay and type

1	60190151	DC relay JCC400/1C24 48A
2	60190150	DC relay JCC200/1C24 48A

Lights and Models

1	A241100000648	Headlight assembly A-1	Dipped beam lamp 90W,high beam lamp 100W
2	A241100000649	Combined front side marker & direction light assembly A-4- LED	5W
3	A241100000650	Combined night direction light assembly A-5- LED	5W
4	A241100000645	Reverse lamp assembly A-2	70W
5	A241100000647	Retarder light assembly A-6	21W
6	A241100000646	Fog light A-3	35W
7	60006212	Fog light WE-1	35W
5	A241100000647	Retarder light assembly A-6	21W
6	A241100000646	Fog light A-3	35W
7	60006212	Fog light WE-1	35W

Fuse and Models

Fuse	Name	Ampere (A)	Installation location	Names in central distribution box	Names in small central distribution box	Power supply terminal
01F1	Alternator fuse	120	Battery box			Battery anode switch
01F2	Ignition key switch fuse	10A	Central distribution box	F17		30
01F3	Room lamp fuse	2A	Central distribution box	F19		125
01F4	AX power supply fuse	15A	Small central distribution box		F19	X
01F5	A15 power supply fuse	20	Central distribution box	F24		15
01F6	30 power supply fuse	60	Battery box			Battery anode switch

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01F7	15 power supply fuse	60	Battery box			Battery anode switch
01F8	X power supply fuse	60	Battery box		F4	Battery anode switch
02F1	Wiper fuse	10	Central distribution box	F18		30
02F3	Dipped beam 1 fuse	20	Central distribution box	F12		X
02F4	High beam 1 fuse	20	Central distribution box	F14		X
02F5	Washer pump fuse	10	Central distribution box	F3		30
02F7	Horn fuse	10	Central distribution box	F13		30
02F6	Wiper reset fuse	10	Central distribution box	F18		30
03F1	Fog lamp fuse	15	Central distribution box	F6		X
03F2	Rear lamp fuse	15	Central distribution box	F4		X
04F6	Monitor fuse	10	Small central distribution box		F5	15
04F1	Cigar lighter fuse	10	Central distribution box	F10		X
04F2	MP3/radio fuse	10	Small central distribution box		F8	15
04F3	Air conditioner fuse	15	Small central distribution box		F20	X
04F4	Actuator	10	Small central distribution box		F8	15
05F1	GPS fuse	5	Small central distribution box		F6	15
05F2	GPS fuse	5	Central distribution box	F20		30
05F3	Combination instrument fuse	3	Central distribution box	F27		15
07F1	ECM power supply fuse	10	Central distribution box	F21		30

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08F2	5V power supply fuse	2	Central distribution box	F1		5
08F3	12V power supply fuse	2	Central distribution box	F28		12
09F1	17V power supply fuse	10	Small central distribution box		F9	15
11F1	ECM reverse and neutral position fuse	10	Small central distribution box		F5	15
14F1	Float solenoid valve fuse	5	Central distribution box	F16		X
14F2	Stop solenoid valve fuse	5	Small central distribution box		F14	X
14F3	Parking solenoid valve fuse	5	Small central distribution box		F13	X
15F1	Reverse lamp and buzzer fuse	10	Central distribution box	F8		15
15F2	Brake lamp fuse	10	Central distribution box	F9		15
15F3	Retarder linear actuator fuse	10	Central distribution box	F11		15
15F4	Retarder lamp fuse	5	Central distribution box	F5		15
09F2	Dipped beam 2 fuse	20	Central distribution box	F23		X
09F3	Dipped beam 3 fuse	20	Central distribution box	F25		X
09F4	High beam 2 fuse	20	Central distribution box	F15		X
09F5	High beam 3 fuse	20	Central distribution box	F26		X
14F4	Hoist proportional solenoid valve fuse	5	Small central distribution box		F1	2023
14F5	Drop proportional solenoid valve fuse	5	Small central distribution box		F2	2023
14F6	Retarder solenoid valve fuse	5	Small central distribution box		F3	2023

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Fuse and Models

F1	08F2	5V power supply fuse	2A
F3	02F5	Washer pump relay fuse	10A
F4	02F2	Front fog lamp relay fuse	15A
F5	15F4	Retarder lamp relay fuse	15A
F6	03F1	Back fog lamp relay	15A
F8	15F1	Reverse lamp fuse	10A
F10	04F1	Cigar lighter fuse	10A
F11	15F3	Retarder linear actuator fuse	10A
F12	02F3	Dipped beam 1 fuse	20A
F13	02F7	Horn fuse	10A
F14	02F4	High beam 1 fuse	20A
F15	09F1	High beam 2 fuse	20A
F16	14F1	Float solenoid valve fuse	10A
F17	01F2	Ignition key switch fuse	10A
F18	02F1	Wiper fuse	10A
F19	01F3	Room lamp fuse	10A
F20	05F1	GPS fuse	5A
F21	07F1	ECM power supply fuse	15A
F22	02F2	30 power supply fuse	20A
F24	01F5	15 power supply fuse	20A
F25	09F4	Dipped beam 3 fuse	20A
F27	05F2	Combination instrument fuse	3A
F28	08F3	12 power supply fuse	2A
F7	04F5	Rear lamp relay fuse	15A
F9	15F2	Brake lamp fuse	10A
F23	09F2	Dipped beam 2 fuse	20A
F26	09F5	High beam 3 fuse	20A

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9 HYDRAULIC STEERING PIPELINE OF OPERATOR'S CAB

9.1 Steering Control Unit

Overview

The steering control unit is connected to the the steering valve and it controls the hydraulic flow direction of steering system.

There are four ports on the unit:

'P' - In pressure form accumulator

'T' - Hydraulic oil that goes through this port back to tank

'R' - Hydraulic control oil that goes through this port to the cylinder which drives machine turn right

'L' - Hydraulic control oil that goes through this port to the cylinder which drives machine turn left

The action of steering wheel is transmitted to the bush and driving shaft via the steering shaft. In addition, the driving shaft is fixed and connected onto the bush by the mid-position pin. The rotation of driving shaft leads to the rotation of gear in the housing.

When the gear rotates, the oil is pressurized to flow to the port of steering cylinder via the spool and the bush.

There is a way to the bush from spool. It rotates inside the bush and provides the oil direction control.

The rated flow of steering control unit at 7MPa (1000psi) is 1.0L/S.

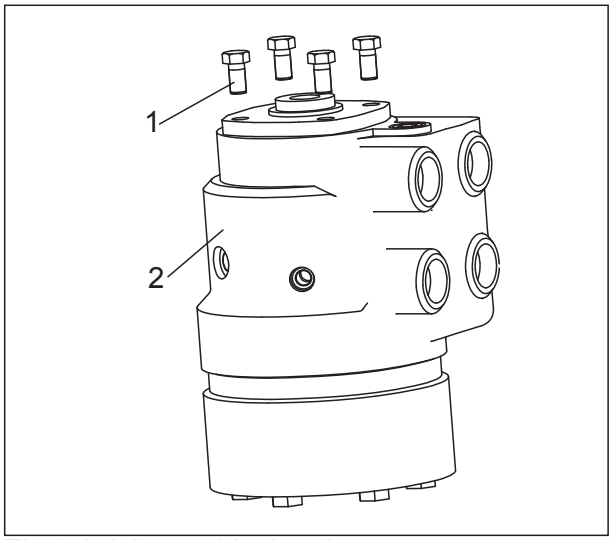


Fig.9.1-1 Assembly drawing

1. Screw 2. Steering control unit

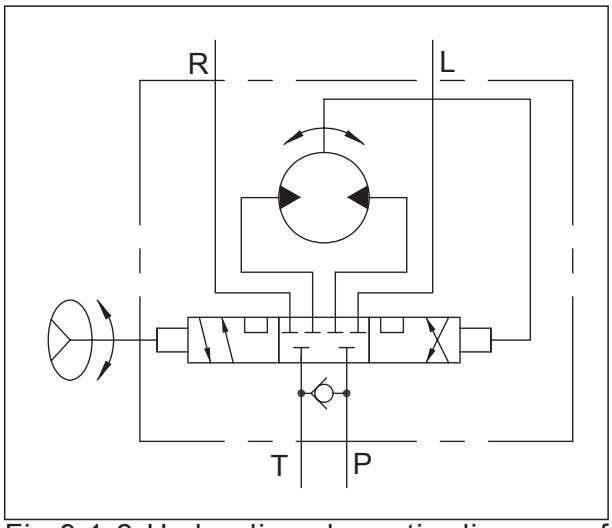


Fig.9.1-2 Hydraulic schematic diagram of Steering control unit

Operation

When the operator operates the steering wheel to left or right by a certain angle, the steering action is transmitted to the spool via the steering column. When it is rotated by the minimum angle of 2.5 degrees, the port of valve spool starts to be aligned with the port of bush. When the steering wheel is rotated by the maximum angle of 10 degrees, the ports are completely aligned to allow the maximum

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flow to pass. After the 10-degree rotation is performed in any direction, the valve spool and bush connected via the mid-position pin rotates as one assembly.

The pressure oil via P port to the bushing and spool to drives steering control unit works and provides pressure oil to the R port for makes truck turn right. If hydraulic oil through L port to the cylinder, then the truck will turn left. hydraulic oil will go back to tank via T port of the steering control unit when the cylinder moves.

The spool will goes back to the home position by tension of mid-spring after the steering force is released. In such a way, the oil port is disengaged from the original alignment state so that the oil liquid of pump doesn't flow into the steering cylinder any more. The truck won't make the steering any more and it will keep the current turning radius until the spool is rotated for its limit of minimum 2.5-degree angle.

For the left steering, as the steering column rotates, the oil flow from the accumulator save block (See the steering valve group in this chapter) is input into the steering control unit meter via the bushing and the valve spool and it enters into the piston cavity of right steering cylinder and the piston cavity of left steering cylinder from the port 'L' of Steering control unit. The discharged oil flows into the port 'R' of Steering control unit from the other end of steering cylinder and it is discharged into the oil tank from the port 'T'.

For the right steering: As the steering column rotates, the oil flow from the accumulator save block (See the steering valve group in this chapter) is input into the steering control unit meter via the bush and valve spool and it flows out of the port 'R' of Steering control unit and enters into the piston cavity of left steering cylinder and the piston cavity of right steering cylinder. The discharged oil flows out via the port 'L' of steering valve from the other end

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of steering cylinder and flows into the oil tank from the port 'T'.

During the manual steering operation, if the engine and the pump are faulty, the steering valve will be automatically switched over to the manual steering system. When the steering wheel is rotated, the oil liquid meter becomes the rotating manual pump and the pressure oil directly flows to the steering cylinder via the corresponding port.

In the case that the steering control unit is operated in the mid-position: In the mid-position or non-steering position, the valve spool and the bush are kept in a proper position due to the mid-position spring. The spring maintains the relatively small preload so that the valve is just kept in the mid-position and it can be within its limit and be released at any time. In such a way, when the truck temporarily stops with the power steering system in the loading state, the system can be protected against overheating.

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Disassemble

See Fig.9.1-1 for the numbers in brackets.

⚠ WARNING

To prevent personal injury and property loss, rotate the steering wheel in two directions for several turns and release the system pressure.

Prevent personal injury and property loss, and ensure that the wheels are chocked properly and the chock and the hoist device have sufficient capacity and work safely.

1. Place the truck in a flat working area, lower down the body completely, apply the parking brake and shut down the engine.
2. Rotate the steering wheel in two directions for several turns and release the pressure of accumulator and steering system. Chock the wheels, and set the main switch of battery into the 'OFF' position.
3. Before the steering control unit is removed, clean the valve block and cover pipeline in its surrounding to prevent ingress of dust.
4. Ensure that the hydraulic pipelines connected to the steering control unit are properly marked to facilitate the installation. Place a proper container in the position of oil liquid leakage. Disconnect the hydraulic pipelines and block all hydraulic pipelines to prevent ingress of dust.
5. Support the steering control unit (2) and remove the screw (1).
6. Carefully remove the steering control unit until the spline shaft is disengaged from the steering column and the cab firewall. Move the steering control unit to a clean working area to facilitate disassembly.

Installation

Note: Tighten all fasteners according to

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Section 36.2, 'Technical Conditions for Tightening Torques of Standard Bolts and Nuts'.

Note: Tighten all hydraulic pipelines with the O-ring end face seal and replace all 'O'rings.

⚠ WARNING

To prevent personal injuries and property loss, ensure that the wheels are chocked properly. The chock and hoisting device should have sufficient capacity and be well fixed to work safely.

1. Ensure the installation area is clean.
2. Carefully lift up the steering control unit until the spline shaft of steering column goes through the cab firewall and connects with the steering column.
3. Through the steering column, use the bolts to fix the steering control unit onto the cab firewall.
4. Remove all of covers from the valve ports of the steering control unit. Connect the pipelines to the steering control unit according to the signs made during disassembly.
5. Inspect hydraulic tank level which provides oil to steering or brake system.
6. Remove the chock under the wheels, set the main switch of battery into the 'ON' position, start up the engine, operate the steering system, check the hydraulic pipeline for leakage, and tighten the pipeline and joint if necessary.
7. Inspect hydraulic oil tank level again. Refill oil if necessary.

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Filling and draining the steering system

⚠ WARNING

Don' start up the truck. It can be started up only after the air in the oil is completely vented out.

1. Fill the steering and brake system oil tank to the maximum liquid level. Start up the engine and prepare to refill oil. The oil level isn't allowed to fall down to below the oil suction pipe of pump to prevent the air from entering the system.
2. Start up the engine at the idle speed. Fill oil to the tank of steering and brake system according to requirement immediately. If no more oil is required and the oil becomes clear, perform the operation according to the following steps:
a. Rotate the steering wheel to the left and the right to release the gas in the steering cylinder and pipeline.
Note: Rapidly move the valve spool, and refill oil to the steering and brake control oil tank to make up for the oil liquid circulating in the system.
b. If the oil in the oil tank becomes clear (without turbidity or emulsion), it will indicate that the air in the system is completed removed.
Note: The slight creeping movement or hysteresis of steering wheel is normal.
c. Fill the steering and brake system oil tank to the specified oil level.

Special tools

No requirement for special tools is present in the steps described in this chapter. These tools can be purchased from the agent.

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9.2 Steering Valve Group

Overview

The steering valve group consists of three valves as follows: a check valve, an accumulator save block and a system pressure protection valve.

The accumulator save block is installed in the middle part of valve block. The hydraulic pump keeps pressure of the accumulator normally, as shown in Fig.2; pressure oil will goes back to the tank of steering and brake control system via the block and the whole process about 3-5 minutes when the pump is turned off.

The safety valve is installed in the bottom of valve block. Its setting pressure is 21MPa (3050psi). If any fault occurs to the pressure-compensated valve of steering pump, this valve can be used as the auxiliary protection. If the pressure-compensated valve makes the steering system pressure exceed the setting pressure of safety valve, the safety valve will be opened to depressurize the oil liquid and allow it to flow back to the oil tank.

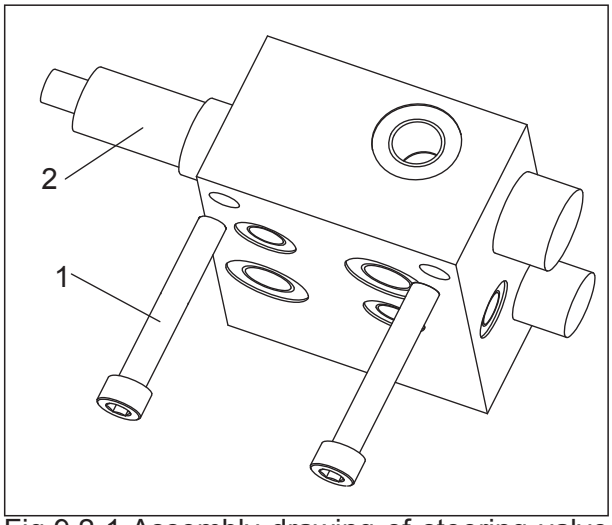


Fig.9.2-1 Assembly drawing of steering valve group

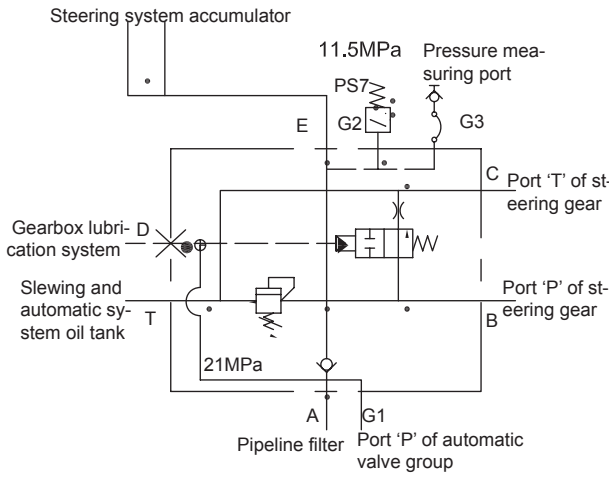
1. Screw	2. Steering valve group

Operating principle

The oil from the steering pump enters into the steering valve group from the port 'A' and the pressure is generated to open the check valve. The oil flows to the steering control unit via the port 'B' and then it is supplied to the accumulator via the port 'E'.

The pressure oil runs to the pressure switch via the port 'G2' and reaches the fault detection point via the tee fitting of port 'G2'. See Fig.2.

In the truck running process, the transmission pilot pressure runs through the hole 'D' and keeps the save block closed. Consequently, the oil leakage from the accumulator is cut off. The return oil of steering valve enters into the port 'C' and then flows into the oil tank via the port 'R'. The port 'G1' is blocked. If the



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pressure in the oil circuit exceeds the preset pressure in the safety valve, the valve will be opened to allow the oil to be discharged back to the oil tank via the port 'T'. After the engine stops, the pilot pressure of transmission disappears and the spring switches over the save block to the open position, so that the oil in the accumulator is allowed to flow into the internal passage via the port 'E' and then be discharged from the port 'T' to the steering and brake system oil tank via the piston.

Disassembly

⚠ WARNING

The pressure is dangerous. Before the operation, the steering wheel should be rotated back and forth for several times to release the pressure in the system. If the pressure isn't released, it will lead to personal injury and property loss.
Prevent personal injury and property loss, and ensure that the wheels are chocked properly and the chock and the hoist device have sufficient capacity and work safely.

1. Park the truck in a horizontal working area, and apply the parking brake. Shut down the engine.
2. Rotate the steering wheel in two directions for several times to release the pressure of steering system and accumulator. Chock all wheels and set the main switch of battery in the 'OFF' position.
3. Clean up the steering valve group and its surrounding area and make the corresponding marks on the hydraulic pipelines installed on individual ports of this valve.
4. Remove all hydraulic pipelines from the steering valve group and drain oil into a proper container. Cover all hydraulic pipelines and

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steering valve group port to prevent ingress of dust.
5. Remove the steering valve group from the truck. Use a proper solvent to clean the outer surface of multi-way safety valve assembly. Then move it to a clean area to facilitate disassembling.

Installation

Note: Perform the tightening according to the specified value in Section 38.2, 'Technical Conditions for Tightening Torques of Standard Bolts and Nuts'.

Note: Tighten the hydraulic pipeline equipped with the O-ring seal and replace the O-ring.

1. Install the steering valve group assembly onto its fixing support. Use the fasteners removed during disassembly to fix it.
2. According to the signs made during disassembly, connect all oil pipes to the steering valve group and fasten them.
3. According to the stipulations in Chapter 15, 'Hydraulic Oil Tank Assembly', check the oil level of oil tank. Add the oil to the proper oil level according to the stipulations.
4. Remove the chock, set the main switch of battery into the 'ON' position, start up the engine and operate the steering system. Check the steering system for leakage. If necessary, tighten the connecting piece and recheck the oil level.

Maintenance

The maintenance of steering valve group is limited to the replacement parts only.

Special tools

No requirement for special tools is present in the steps described in this chapter. These tools can be purchased from the agent.

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10 OPERATOR'S CAB BRAKE PIPELINE AND JOINT

10.1 Foot Valve

Overview

The foot valve is a mid-position cut-off valve. It controls the hydraulic oil pressure value of front and rear brakes as well as the maximum brake pressure applied into these pipelines. Such valve is controlled by the foot pedal inside cab. It operates along with the engine and the brake valve group can automatically apply brake.

The different maximum operation pressures required by the front and rear brakes can be provided by the foot valve. These pressures can be adjusted according to test and regulation. When being actuated by the foot valve, the pressure switch of stop light will send a signal to rear brake light to turn on the brake light.

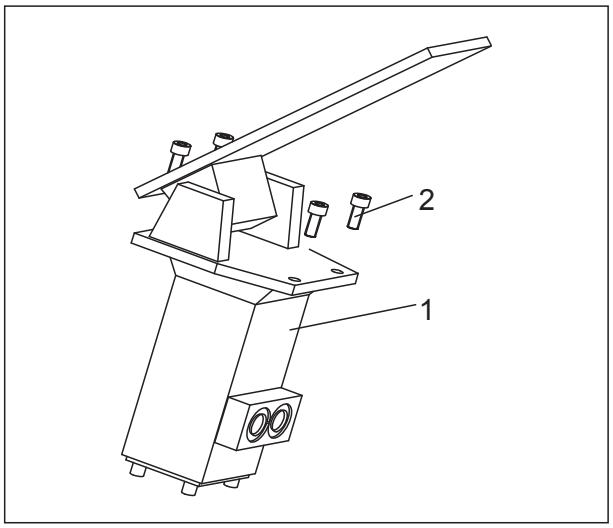


Fig.1 Assembly drawing of foot valve

1. Foot valve 2. Screw

Operation

Apply the traveling brake

See Fig.2.

When the foot valve is pressed down by the operator, the slide valve will move downward to push the regulating spring, which will then push the regulating spool downward. When the regulating spool moves downwards, the current limiting groove will move away the oil groove and shut down the exits of 'B1', 'B2' to port 'T'. The regulating spool will move downward continuously till the current limiting groove completely aligns with the pressure inlet. Such action opens ports 'P1', 'P2' and exits 'B1', 'B2'.

After the pressure of hydraulic oil in the brake is built up, the oil flow enters the cavity under the spool via the small orifice of adjusting spool. When the pressure in the brake rises up, the pressure in the cavity under the spool correspondingly increases to move the

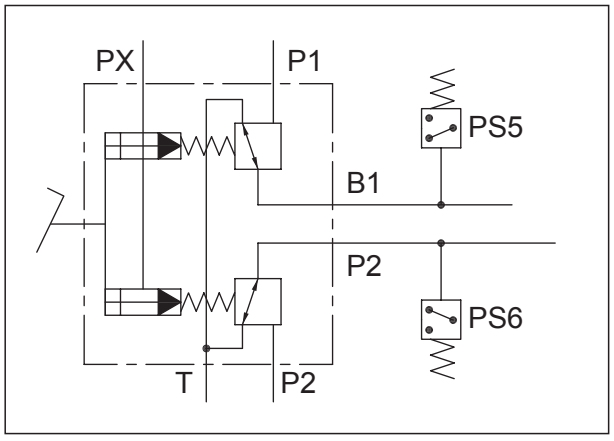


Fig.2 Hydraulic principle of foot valve

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adjusting spool upwards to close the outlet of interfaces 'B1' and 'B2'. The regulating spool keeps balance between brake pressure and regulating spring pressure. Such pressure is produced when the operator presses down the foot pedal. If the footplate is not pressed down, the adjusting valve will close the inlet, outlet and oil tank interface. The spool will be kept in this position. If the operator continues pressing down the footplate, the adjusting valve will move downwards to build up the higher pressure in the brake until it balances the action of footplate.

Releasing normal traveling brake

See Fig.2. When the operator releases the footplate, the adjusting spool loses the balance. It moves upwards, and the outlet of interfaces 'B1' and 'B2' connected to the interface 'T' of oil tank is opened. The oil in the pipeline of 'B1' and 'B2' is released into the oil tank via the interface 'T' of oil tank. The brake is released.

Applying/releasing emergency brake

See Fig.2. Press the emergency brake switch to de-energize the brake multi-way electromagnetic valve. It makes all pressure enter the interface 'PX' on the foot valve. It is equivalent to the complete and rapid pressing down of foot valve. For example, push the adjusting spool downwards and apply the maximum brake.

See Fig.2. Release the emergency brake to switch on the multi-way electromagnetic brake valve and enable the pressurized oil in 'PX' pipeline to return to the oil tank and the pressure will drop accordingly. Exits 'B1', 'B2' will be connected to oil tank port 'T' to return the oil in pipelines 'B1', 'B2' to the oil tank and release the brake.

Note: The output pressure generated at the outlet of 'B1' and 'B2' when the emergency brake is applied (in the pipeline of 'PX') is

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higher than the one generated when the footplate brake is applied by 5%.

Maintenance standard

Frequently check the valve for leakage or damage. Check whether the excessive cam swing occurs to the footplate. If necessary, replace the component.

If the following phenomena occur, the component should be repaired or replaced in time:

1. External leakage occurs.

Note: Check all hydraulic pipelines and joints and ensure no leakage.

2. The foot pedal can not restore to the original position.
3. The footplate is kept in the pressure state during the idle speed operation.
4. When the footplate is completely pressed down, the pressure output varies very quickly.
5. The output pressure of pipeline should be kept constant: ±0.52MPa (±75psi).

Disassembly

⚠ WARNING

To prevent personal injury and property damage, the wheels should be chocked properly and the hoist device should be fixed firmly and should have sufficient capacity for safe work. After the engine is shut down, the pressure of hydraulic oil will remain in the system. The operation can be performed on the brake system only after the foot brake is continuously pressed down until the pressure is released. Otherwise, it will result in severe personal injuries.

1. Park the truck in a horizontal working area, apply the emergency parking brake, shut

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down the engine, continuously operate the foot valve and release the pressure of brake accumulator.
2. Block the wheels. Turn the accumulator main switch to 'off' position.
3. Use proper solvent to clean the foot valve and the surrounding area. Dismantle all of the hydraulic pipelines connected to the foot valve and mark them to facilitate the installation. Use a proper container to catch the leakage oil, and cover all open pipelines and the foot valve interface to prevent contamination of dirt.
4. Remove and mark the electrical connector connected to the parking light pressure switch.
5. Remove the installation parts fastening the foot valve to cab floor. Move the foot valve assembly to a clean working area for performing the maintenance operations.

Installation

Note: Tighten all the fasteners according to 'Tightening Moment Technical Conditions of Standard Bolt and Nut' in 38.2.

Note: Tighten all the hydraulic pipelines equipped with the end face seal. Replace all 'O'rings.

1. Place the foot valve assembly onto the floor of cab. Use the installation parts to fix it. Remove the covers.
2. Remove the covers. Connect the hydraulic pipelines to the foot valve assembly according to the signs made during disassembly.
3. Connect the electrical connector to the parking light pressure switch according to the disassembly signs.
4. Check the oil level of steering and brake control oil tank. Refill oil conforming to the stipulations to reach the correct oil level specified in the 'Steering and brake control oil tank'.
5. Set the main switch of accumulator into the 'on' position, remove the chock, start up the engine and warm up the hydraulic oil to normal operating temperature.

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6. Apply the brake. Check for oil leakage. Tighten the pipelines and joints.
Note: To operate Step 7, ensure the applying and releasing of emergency brake.
7. Press down the footplate and the emergency brake system. Check the conditions of brake operation.

Parking light pressure switch
The parking light pressure switch is a normally open switch. When a testing instrument is connected to the terminal of parking light pressure switch, the system will be opened.
When the brake pressure is 0.27MPa or higher, the system will be closed to signal the brake indicator lamp to flash; when the pressure falls down to 0.27MPa, the system will be opened and the brake light will be off.

Maintenance
General maintenance
Check foot valve hydraulic pipelines and joints for oil leakage and damage, tighten or replace if necessary.

Every 1,000 hours
Check the front and rear brake pressure in the detection points. If the pressure is not in the specified range, inspect the valve and take the corresponding measures (adjusting the pressure; disassembly, repairing or replacing the valve).

Special tools
No special tool requirement is present in the steps described in this chapter.

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11 AIR CONDITIONING PIPELINE INSTALLATION

11.1 Air Conditioning Pipeline Installation

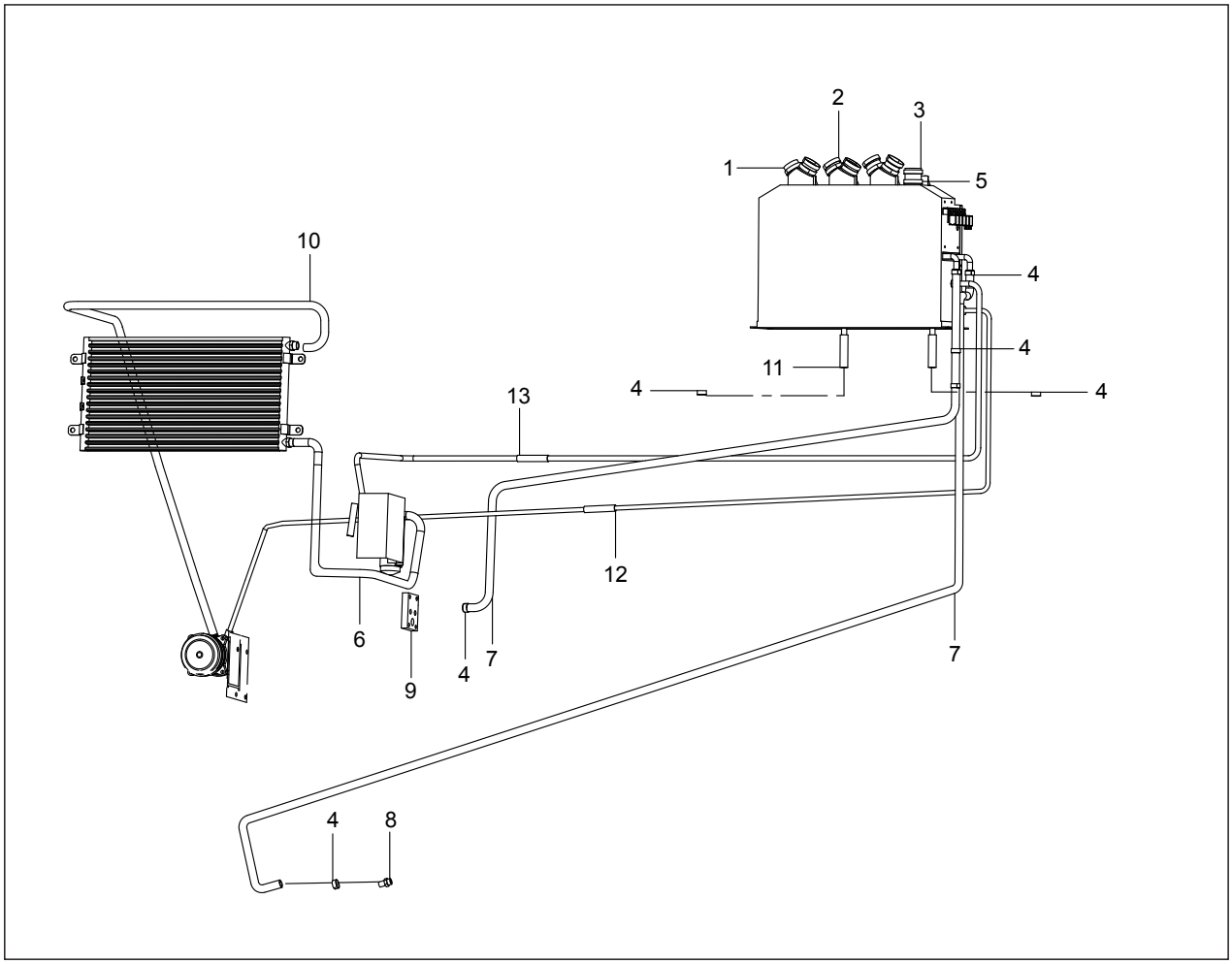


Fig.1 Air conditioning pipeline installation

1. Blast pipe	6. Condensation-storage rubber hose	11.Flow hose
2. Blast pipe	7. Warm water rubber hose	12.Stream-pressure rubber hose
3.Blast pipe	8.Hot water adaptor	13.Storage-steam rubber hose
4.Thimble	9.Hot water adaptor	
5. Thimble	10.Pressure-condensation rubber hose	

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Air conditioning system pipeline disassembly

See Fig1 for the number in the bracket.

1. Place the truck in a flat working area. Apply the parking brake. Shut down the engine. Turn the steering wheel for a few rounds to release the pressure of the steering system.
2. Chock the truck wheel. Put the main switch of the battery at the position of “close”.
3. If necessary, disassemble installation accessories on the protective cover of the truck.
4. After the system is completely discharged, respectively mark flow hose (11), defrosting blast pipe (1), blast pipe in front of driver’s seat for face blowing (2), blast pipe in front of co-driver’s seat for face blowing (3), warm water rubber hose (7), stream-pressure rubber hose component (12), condensation-storage rubber hose component (6), storage-steam rubber hose component (13), pressure-condensation rubber hose component (10) for the convenience of installation.
5. Carefully disassemble the marked flow hose (11), defrosting blast pipe (1), blast pipe in front of driver’s seat for face blowing (2), blast pipe in front of co-driver’s seat for face blowing (3), warm water rubber hose (7), stream-pressure rubber hose component (12), condensation-storage rubber hose component (6), storage-steam rubber hose component (13), pressure-condensation rubber hose component (10) respectively from corresponding systems, plug joint parts and corresponding pipe fittings to prevent the entry of foreign substances into the system.

Air conditioning system pipeline installation

Numbers in parentheses refer to Fig.11.1-1

Note: Tighten all the fasteners according to section 38.2 'technical conditions of tightening moment for standard bolts and nuts'.

1. Remove plugs from end of storage-steam

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rubber hose component (15) end, receiver drier (12) and evaporator (6) port; connect rubber hoses according to signs made at disassembly.

2. Remove plugs from end of condensation-storage rubber hose component (13), condenser assembly (11) and receiver drie (12) port; connect rubber hoses according to signs made at disassembly.

3. Remove plugs from end of stream-pressure rubber hose component (9) end, compressor (14) and evaporator (6) port; connect rubber hoses according to signs made at disassembly.

4. Remove plugs from end of pressure-condensation rubber hose component (10), compressor (14) and condenser (11) port; connect rubber hoses according to signs.

5. Remove plugs from end of warm water rubber hose (8), evaporator (6) and engine port, connect rubber hoses according to signs made at disassembly.

6. Remove plugs from end of flow hose (7), blast pipe for feet blowing (4), defrosting blast pipe (3), blast pipe in front of operator's seat for face blowing (2), blast pipe in front of co-operator's seat for face blowing (1), evaporator (6) and corresponding port in operator's cab, connect according to signs made at disassembly.

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12 FUEL TANK AND MOUNTING

12.1 Fuel Tank and Mounting

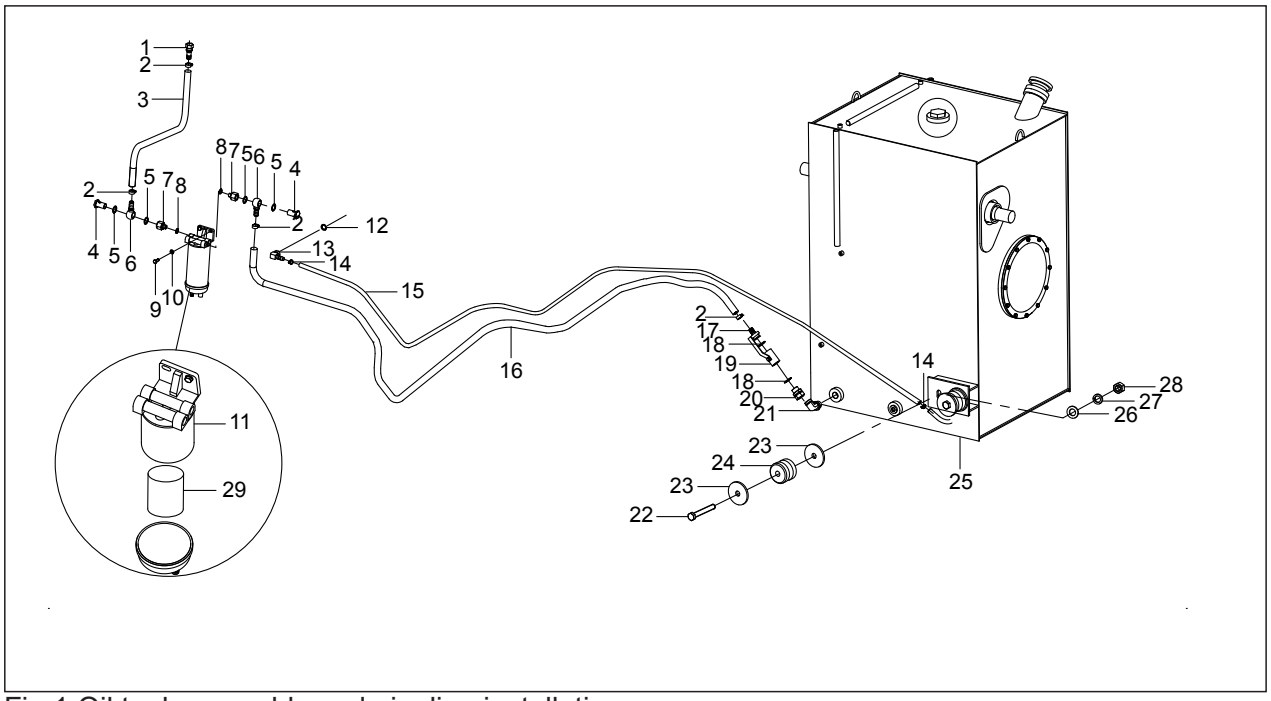


Fig.1 Oil tank assembly and pipeline installation

1.Connector
2.Clamp
3.Fuel supply line
4.Bolt
5.Washer
6.Articulating body
7.Connector
8.Washer
9.Bolt
10.Washer
11.Primary filter
12.Washer
13.Connector
14.Clamp
15.Fuel return line
16.Fuel supply line
17.Connector
18.Washer
19.Fuel control valve assembly
20.Connector
21.Connector
22.Bolt
23.Washer
24.Damper
25.Fuel tank
26.Washer
27.Washer
28.Nut
29.Core,filter,separator,oil-water

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Overview

See Fig.1 for the numbers in brackets, unless otherwise specified.

Note: fuel tank capacity and oil technical specifications are detailed in section 36.1 'LUBRICATION AND MAINTENANCE'.

Disassembly

See Fig.1 for the numbers in brackets, unless otherwise specified.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel chocks and lifting equipment are properly secured and of adequate capacity to do the job safely.

Remove the parts and components as following:

1. Position the vehicle in a level work area, raise the body and install the body safety pins.
2. Apply the parking brake and switch off the engine.
3. Turn the steering wheel in both directions several times to relieve any pressure in the steering system.

Block all road wheels.

4. Close fuel shut off valve at the fuel filters to prevent loss of fuel prime at the engine.
5. Disconnect fuel liquid level sensor joint.
6. With a suitable container in position, remove drain plug (12,Fig2) and drain fuel from fuel tank (25). Reinstall drain plug when fuel tank is completely drained.
7. Identify and tag fuel lines connected to fuel tank (25) and engine, with a suitable container available to catch leakage, loosen the clamp(2,14)disconnect fuel lines(3.15.16) from fuel tank (25) and engine. Cap open line ends to prevent entry of dirt.
8. Remove bolts (9) , washers (10) , bolt (4), Connector (7), washers (5,8) and articulating

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body (6), and remove Primary filter (11) from engine.

9. Using a suitable lifting device, support fuel tank (25)and take up any slack. Remove Bolts (22),washers(23),damper(24),washers(26、27) and nuts(28), Remove bolts and nuts, securing fuel tank (25) to chassis mounting brackets.Remove fuel tank (25).

Fuel tank assembly

Numbers in parentheses refer to Fig.2.

1.Remove the cover (15) and bolt securing air cleaner (2) to fuel tank. Check condition of gasket and replace if required.

2. Remove bolt securing level gauge (3) to fuel tank (14) and remove level gauge (3). Check condition of washer on level gauge (3) and replace if required.

3. Remove bolts (7), washers (6), cover plate(5) and O-ring (4) from fuel tank (14). Discard O-ring (4).

4. Remove bolts (11), washers (10), cover plate(9) and O-ring (8) from fuel tank (14), discard O-ring (8).

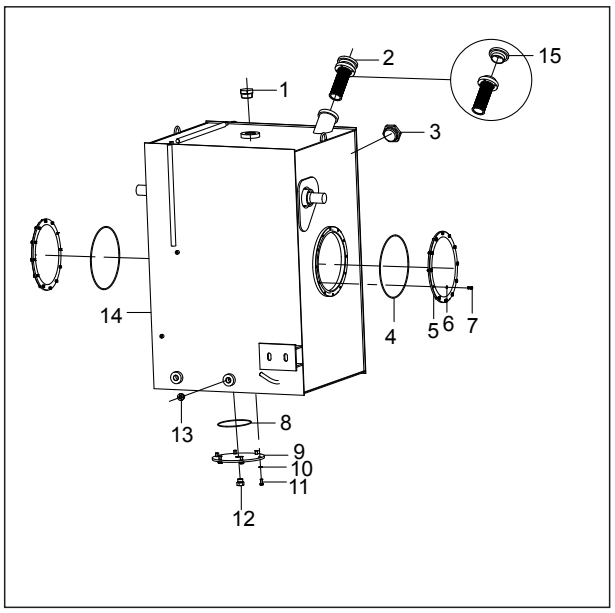


Fig.2 Fuel tank assembly disassembly

1.Plug	9.Cover plate
2.Air cleaner	10.Washer
3.Level gauge	11.Bolt
4.O-ring	12.Drain plug
5.Cover plate	13.Screw plug
6.Washer	14.Fuel tank
7.Bolt	welding assembly
8.O-ring	15.Cover

Cleaning

Numbers in parentheses refer to Fig.2.

1. Remove all dirt particles from fuel strainer and clean fuel strainer with clean diesel fuel.

2. Cover plate (9) port in fuel tank (14) can be used as an opening to remove dirt and sludge from the bottom of fuel tank (14) with a clean dry cloth. Remove drain plug (12) and fush fuel tank (14) with clean diesel fuel to remove any remaining dirt particles. Reinstall drain plug(12) and tighten securely.

Assembly

Numbers in parentheses refer to Fig.2

1. Install O-ring (4) in groove of fuel tank (14) boss and secure cover plate (5) with washers (6) and bolts (7).

2. Install O-ring (8) in groove of fuel tank (14) boss and secure cover plate (9) with washers

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(10) and bolts (11),and secure plug (12).
3. Ensure gasket is located on level gauge (3) and position level gauge (3) in fuel tank (14). Secure level gauge (3) with bolt.
4. Install fuel strainer in fuel tank (14). If removed install new gaskets in filter cap and install filter cap assembly loosely to prevent entry of dirt.
5. Ensure that drain plug and bolts are securely tightened in fuel tank.

Installation
See Fig.1 for the numbers in brackets, unless otherwise specified.

⚠ WARNING

To prevent personal injury and property damage, be sure lifting equipment is properly secured and of adequate capacity to do the job safely.

Note: Tighten all fasteners to standard torques listed in 'Tightening Moment Technical Conditions of Standard Bolt and Nut' in 36.2.
Numbers in parentheses refer to Fig.1, unless otherwise specified.
1.Using suitable lifting equipment, position fuel tank (25) on the chassis mounting brackets and Secure with damper (24), washers (23), nuts(28), washers (26、27) and bolts (22).
2. Install articulating bolt(4), connector(7), washers(5,8)and articulating body(6)to primary Filter (11). Secure Primary Filter (11) to frame with bolt(9)and washer(10).
3. Connect fuel supply lines(3)between articulating body (6) and Connector (1), secure with clamps(2).
4. Connect fuel supply lines (16) between articulating body (6) and Connector (17), secure with clamps (2).
5. Connect fuel return lines(15) between fuel tank (25) and Connector (13), secure with

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clamps(14).
6. Remove fller cap assembly from fller neck on fuel tank (25) and fill fuel tank (25) with fuel specified in Section 36.1, LUBRICATION SYSTEM. Ensure vent hole in fller cap is clear and install filler cap assembly on filler neck. Tighten fller cap securely.
7. Open fuel shut off valve at the fuel filters.
8. Start the engine and run for a few minutes to ensure fuel is being supplied to the engine. Check for leaks at fuel lines and tighten if required.
9. Remove body safety pins and lower the body. Remove wheel chocks from all road wheels.

Maintenance

Numbers in parentheses refer to Fig.1, unless otherwise specified.
Prior to starting the vehicle check the fuel level. Fuel tank should be filled at the end of each shift to prevent condensation from gathering in the tank.Ensure vent hole in fller cap is clear to prevent a vacuum from building up in fuel tank. Check condition of all fuel lines. When filling fuel tank check that there is no buildup of dirt and sludge at fuel strainer. Remove and clean fuel strainer and fller cap as required. From time to time make a visual check on the electrical connections at fuel level sender.The condition of fuel tank (25) mounting should be checked carefully. Check washers (23) and dampers (24) for any sign of wear or damage and repair or replace as required. Check that nut (28), washer(26、27) and bolt (22) are securely tightened and that no wear on mounting holes is evident. tighten nuts and bolts as required.

Primary filter separator maintenance

Daily maintenance: Loosen the drainage at the bottom of catchment cup, empty the collected water.
Maintain the primary Filter separator every

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19000km or 500 hours, or the engine power is insufficient.

1. Remove the strainer and catchment with special tools. Identify strainer and catchment gasket.
2. Remove all dirt particles from strainer. Replace the same model strainer if seriously blocked.
3. Clean catchment and gasket with clean diesel fuel. Check the gasket and replace if it is damage.
4. After cleaning, ensure gasket is located on catchment and position catchment in strainer.
5. Supply diesel fuel around the strainer except the hole in middle.
6. Clean strainer and gasket with clean diesel fuel. Check gasket and replace if required.
7. After cleaning, ensure gasket is located on strainer and position strainer with special tool.

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13 STEERING PIPELINE AND JOINT

13.1 Piston Pump

Overview

The steering pump is an axial piston variable-displacement (adjustable) pump with the high-pressure operating capability. It is installed on the power take-off (PTO) of engine. It supplies pressure oil for steering and brake system and it could control of the output in any given time for demand of system. The set value of pressure compensator is 18MPa.

The steering pump rotates counterclockwise in the view from the input shaft end of pump.

Caution: Do not drive the pump in the reverse direction. Otherwise, the pump will be seized.

The pump is mainly composed of: a pressure compensator valve, a pump housing, a driving shaft, a valve plate, a rotating assembly.

The variable-displacement unit includes the mechanism which can adjust the angle of swash plate. When the cylinder body assembly and the driving shaft rotate, the swash plate can control the stroke of each piston. The valve block is also used as the rear end cover of the whole component and includes the oil inlet and outlet; the bearing on the valve block and the one on the pump body are utilized to support the driving shaft.

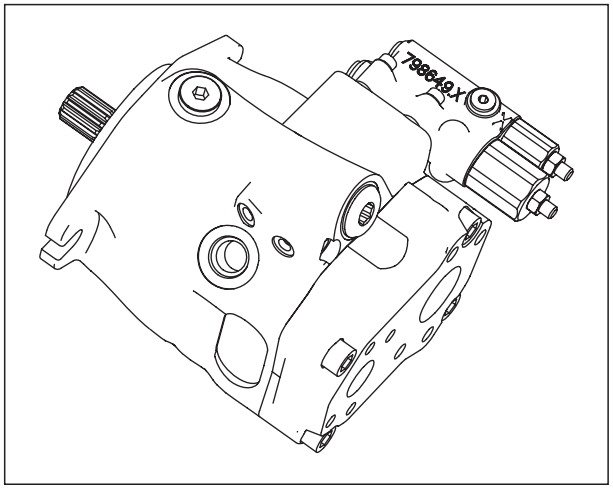


Fig.13.1-1 Piston pump

Operating principle

Fig.13.1-2 is the operating hydraulic schematic diagram of steering pump. The driving shaft of rotating pump can rotate the cylinder body, retainer plate and piston. The piston shoe abuts the swash plate through retainer plate. The angle of swash plate surface can cause the repeated movement of each piston in the cylinder body. The input and output ports are connected to the slotted hole of port plate. When the piston moves towards the outside of cylinder body, vacuum is generated. The oil is pressed into the cavity under the action

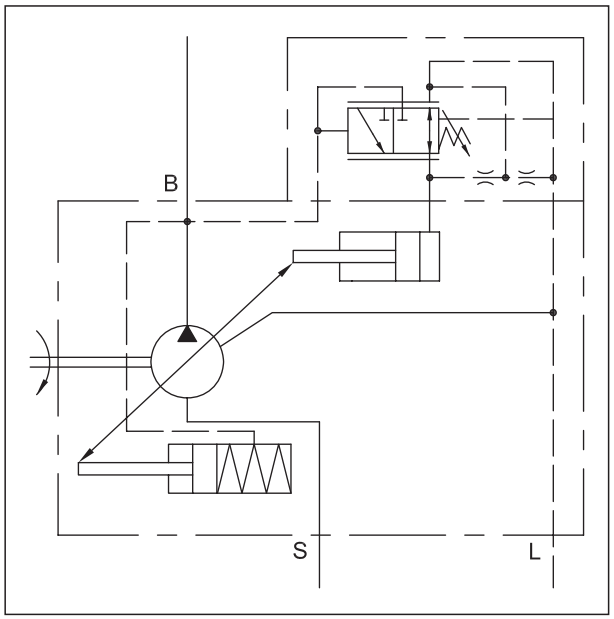


Fig.13.1-2 Operating schematic diagram of steering pump

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of atmospheric pressure. The oil flows in the cylinder body, passes through the oil inlet slotted hole of port plate and reaches the oil outlet slotted hole of port plate. When the piston moves in the reverse direction, oil is forced out of the cylinder body and enters into the oil discharge outlet.

The oil liquid flows from the oil discharge outlet to the steering valve group and provides the pressure to the steering oil circuit. The pressure oil is split to the brake valve group via the port 'G1' of steering valve group and provides the pressure to the brake control oil circuit.

The internal discharge of pump returns to the oil tank through the oil drainage pipe of steering pump.

Variable displacement

The displacement can be changed by changing the included angle between the return plate and the driving shaft. During the period when the operating load of pump or the pressure of system is continuously fed back to the slide valve cavity of differential piston and pressure-compensated valve, when the pressure of system reaches the spring setting value of pressure-compensated valve, the valve spool moves and the oil flow to the control slide valve is metered.

When the force generated by the control slide valve overcomes the spring force of differential piston, the angle of return plate will move to the minimum displacement position. The angular displacement of return plate (i. E. the change in the displacement) depends on the desired flow and pressure of system.

When the displacement meets the system requirement, the balance will be established again.

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13.2 Cushion Valve Block

Overview

Cushion valve block is installed to the fixing support under cab.

It is situated in the steering pipeline of Steering control unit and steering cylinder. There are four ports in total. Ports 'A', 'B' are connected to the steering control unit. Ports 'A1', 'B1' are connected to the cylinder.

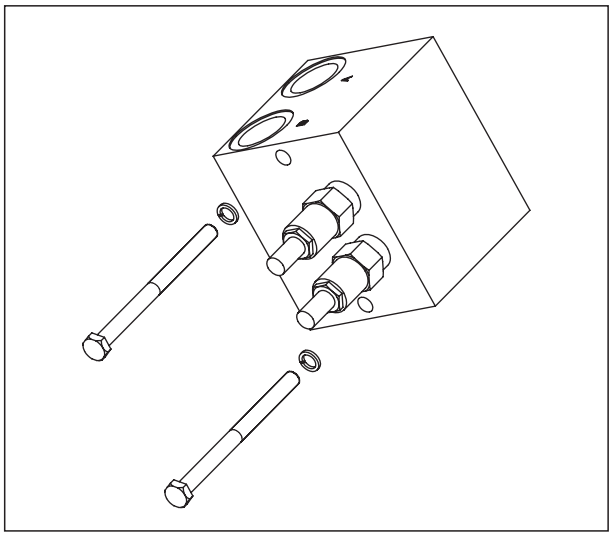


Fig.13.2-1 Cushion valve block

Operating principle

See Fig.13.2-2 for schematic diagram.

Port 'A' is connected to port 'A1'. When the pressure is larger than 20.7MPa (3000 psi), some hydraulic oil will flow back to the oil tank through relief valve or flow back to port 'B' and 'B1', so as to buffer the braking.

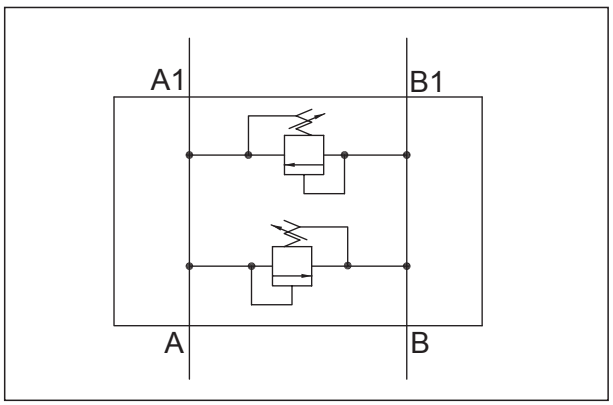


Fig.2 Hydraulic principle of cushion valve block

Disassembly

1. Park the truck at a horizontal working place and apply the parking brake. Shut down the engine.
2. Rotate the steering wheel in two directions for several times to release the pressure of steering system and accumulator. Chock all wheels and set the main switch of accumulator into the 'off' position.
3. Clean the cushion valve block and the surrounding area, mark the hydraulic pipeline mounted to each port of such valve.
4. Remove all the hydraulic pipelines from the cushion valve block, drain the oil into a proper vessel, cover all the hydraulic pipelines and cushion valve block ports to prevent the ingress of dust.
5. Remove the cushion valve block from truck, use proper solvent to clean the surface of cushion valve block, and then move to a clean area for disassembly.

Installation

Note: Tighten the hydraulic pipeline equipped with the O-ring end face seal and replace the 'O'ring.

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⚠ WARNING

The pressure is dangerous. Before the operation, the steering wheel should be rotated back and forth for several times to release the pressure in the system. If the pressure is not released, it will lead to personal injury and property loss.
To prevent personal injury and property loss, ensure that the wheels are chocked well and the chock and the hoist device have sufficient capability and can work safely.

1. Install the cushion valve block onto its fixing support. Use the fasteners removed during disassembly to fix it.
2. According to the signs made during disassembly, connect all oil pipes to the cushion valve block and fasten them.
3. According to the stipulations in the ‘Hydraulic Oil Tank Assembly’, check the oil level of oil tank. Refill oil to the proper oil level according to the stipulations.
4. Remove the chock, set the main switch of accumulator into the 'on' position, start up the engine and operate the steering system. Check the steering system for leakage. If necessary, tighten the connecting piece and recheck the oil level.

Maintenance
The maintenance of cushion valve block is only limited to the replaceable part.

Special tools
No special tool is required in steps described in this chapter. These tools can be purchased from the agents.

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13.3 Oil Filter

Overview

The oil filter is installed inside the left longitudinal beam and under the left and right longitudinal beams under the frame. It is located in the steering pipeline between the steering valve group and the steering pump and in the pipeline connecting the cooling system to the rear brake.

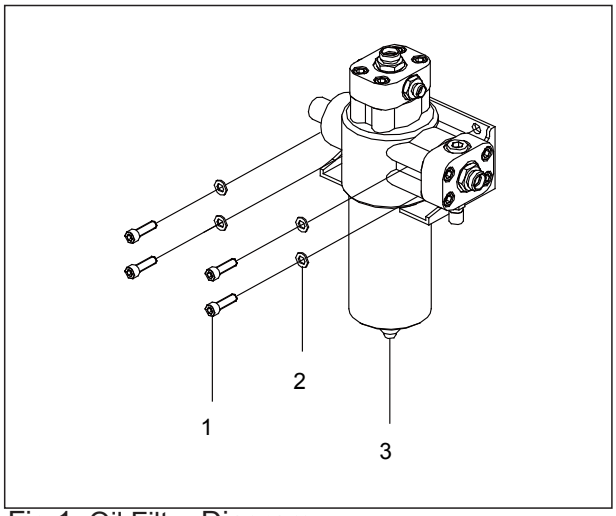


Fig.1 Oil Filter Diagram

1.Screw 2.washer 3.Pressure Oil Filter

Operation principle

The hydraulic oil from the piston pump enters to filter, flows into the annular region of filter bowl and reaches the exit through filter. The pressure of filter drops to the minimum during filter cleaning. When the hydraulic oil passes through the oil filter, the dirt in the oil is deposited on the filter. The more the dirt is, the higher the pressure drop of filter becomes, so must change filter at once..

Maintenance

Replace for every 1,000 hours of operation.

Replacing the filter

Note: Tighten all hydraulic pipelines equipped with the O-ring end face seal joint and replace the 'O'ring.

⚠ WARNING

Pressure is dangerous. Rotate the steering wheel in each direction and release the system pressure. If the pressure is not released according to the stipulation, it will lead to personal injury and property loss.
To prevent personal injury and property loss, ensure that the wheels are chocked well and the chock and the hoist device have sufficient capability and can work safely.

1. Place the truck in a flat working area, apply

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the parking brake and shut down the engine.
2. Rotate the steering wheel in two directions for several times, release the pressure in the accumulator and the steering system, and chock the wheels properly.
3. Remove the hydraulic pipelines of inlet and outlet and drain oil into a proper container.
4.Revolve the filter up-monoblock and make the down-monoblock separate oneself from up-monoblock.
5.Discharge the oil of the down-monoblock into a proper container.
6.Replace new O-ring for the oil filter.and tighten zhe up-monoblock.

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14 HOSIT PIPELINE AND JOINT

14.1 Hoist Pump

Overview

The hoist pump is a gear pump installed to engine PTO. It supplies oil to hoist system independently.

Operation

See Fig.14.1-2 for the principle of hoist pump. When the drive gear rotates, the driven gear rotates in the reverse direction. The tooth socket between the teeth of gear will bring the hydraulic oil from the gear pump case inlet to the outlet. When the teeth of gears are engaged again, the hydraulic is forced out of the outlet. The delivery capacity of hoist pump is determined by the width of its corresponding gear set and the rotating speed of drive gear.

The hoist pump delivers oil to hoist control valve. According to the movement of valve spool, the oil flows to body hoist circuit, or if the valve spool is at 'float' position, the oil flows through the confluence block behind the hoist control valve to supply the disc brake cooling system.

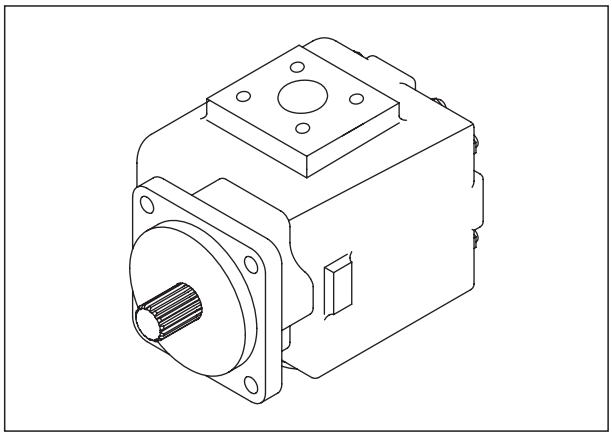


Fig.14.1-1 Hoist pump outside diagram

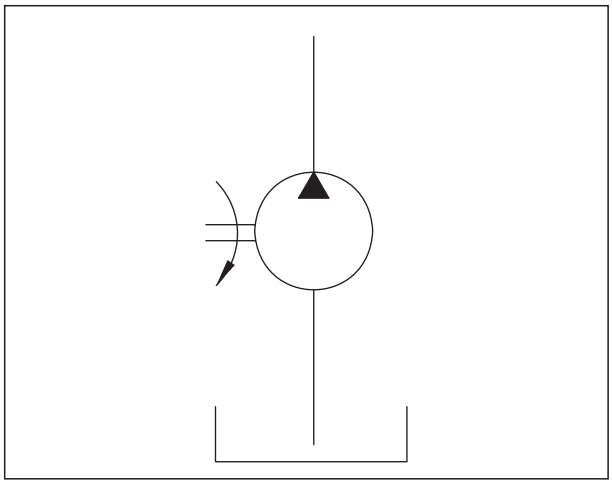


Fig.14.1-2 Hydraulic schematic diagram of hoist pump

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14.2 Hoist Valve

Overview

See Fig.14.2-1 for the numbers in brackets.

The hoist valve is installed inside the longitudinal beam of left frame. It is used to guide the hydraulic oil to the hoist cylinder for hoist or lowering the body. Depending on the position of valve spool, the oil for disc brake cooling system is supplied via the confluence block.

The hydraulic oil is pumped into hoist valve (1) by the double-gear pump installed to engine PTO. The hoist valve consists of one three-position valve spool and relief valve. It is fastened to the inside of left longitudinal beam by screw (2). The three positions of valve spool are: 'hoist', 'maintaining and floating' and 'lowering' (with power lowering). The valve spool kept at 'maintaining and floating' position will compress the internal and external springs, which will change the valve spool to 'maintaining' position from 'hoist' position. The action of valve spool is controlled by the pilot pressurized oil provided by the pilot oil source valve group. When the hoist handle valve on the control board on the right of seat is operated by the operator, the pilot oil source valve group will provide 3.5MPa (507psi) pressure to actuate the action of hoist valve spool.

The relief valve assembly is installed to port 'P/P1'. If the pressure exceeds 18MPa (2610psi), the relief valve will open to allow the oil to return to the tank. The relief pressure can be measured at the pressure check port 'G' behind the tank.

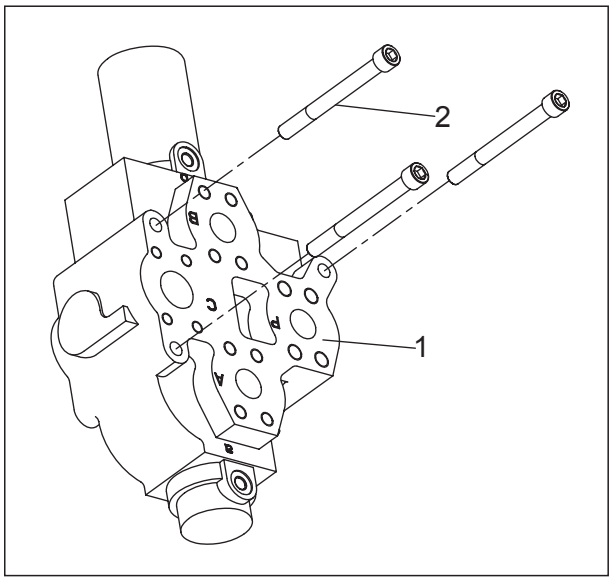


Fig.14.2-1 Assembly drawing of hoist valve

1. Hoist valve 2. Screw

Operation

Body at 'maintaining and floating' position

See Fig.14.2-2 for the hydraulic schematic diagram of hoist valve operating in the 'maintaining and floating' position.

When the hoist lever valve and valve spool

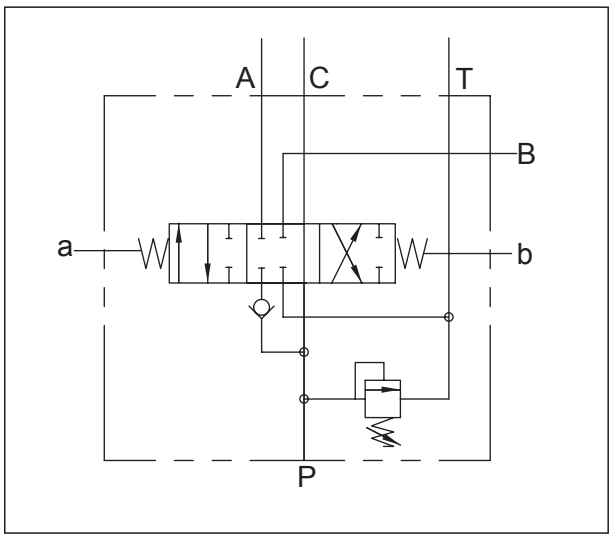


Fig.14.2-2 Hydraulic schematic diagram of hoist valve

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are kept at 'maintaining and floating' position, i. E., the valve spool is kept at the neutral position, the oil will enter port 'P/P1' of control valve block, flow through the valve and flow out of port 'T', enter the confluence block of disc brake cooling system and supply the disc brake cooling system. The valve spool obstructs oil from entering and leaving the body hoist cylinder and keeps the piston of cylinder body at the original position.

Body at the 'hoist' position

See Fig.14.2-2 for the hydraulic schematic diagram of hoist valve operating in the 'hoist' position.

When the hoist control handle is moved to 'hoist' position, i. E., the valve spool is at the hoist position, the hydraulic oil will enter port 'P/P1' of control valve block. The pilot oil pressure opens the valve spool for the oil to flow through the valve spool, port 'B', 'hoist port' and enter the hoist cylinder. The returned oil from the hoist cylinder returns to the hoist and disc brake cooling oil tank through port 'A' of balanced valve, port 'A' of hoist valve, valve spool passageway and port 'T1'.

Body at the 'lowering' (power lowering) position

See Fig.14.2-2 for the hydraulic schematic diagram of hoist valve operating in the 'lowering' position.

When moving the hoist control handle to the 'lowering' position, the valve spool in valve block will be located at the right position shown on Fig.2, through which the hydraulic oil can enter port 'P/P1' of control valve block. The pilot oil pressure opens the valve spool for oil to reach the balanced valve group through the open passageway of valve spool and port 'B'. The oil liquid flows through the balanced valve and reaches the 'forced landing port' of hoist cylinder. The returned oil from hoist cylinder of body enters port 'B' of control valve block,

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flows through the open passageway of valve spool, flows out of port 'T1' and returns to the tank of hoist and disc brake cooling system.

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14.3 Balanced Valve Group

Overview

The balanced valve group is installed on the support behind the transmission. The balanced valve group in the hydraulic hoist system can be used to prevent the formation of vacuum in the hoist cylinder due to the imbalanced body during unloading. In addition, it also used to leading oil back to the tank of hoist and brake system via the way of the hoist control valve.

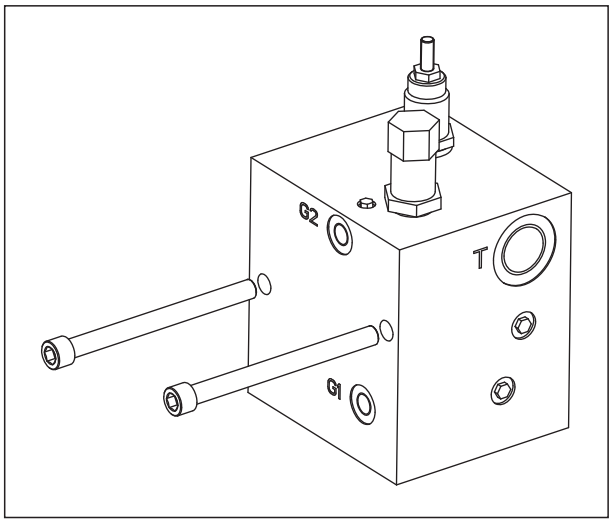


Fig.14.3-1 Assembly drawing of balanced valve group

Operation

See Fig.14.3-2. When hoist the body, the returned oil in the hoist cylinder enters the balanced valve group from ports 'A1', 'A2'. When lowering the body with control valve, the pressurized oil will be delivered to ports 'A1', 'A2' of the balanced valve. The spool will moves and pressure oil flow out of part A to lower the body down at the pressure is 17 Mpa (2465 psi). return oil goes through hoist valve back to thank of hoist, brake and cooling system.

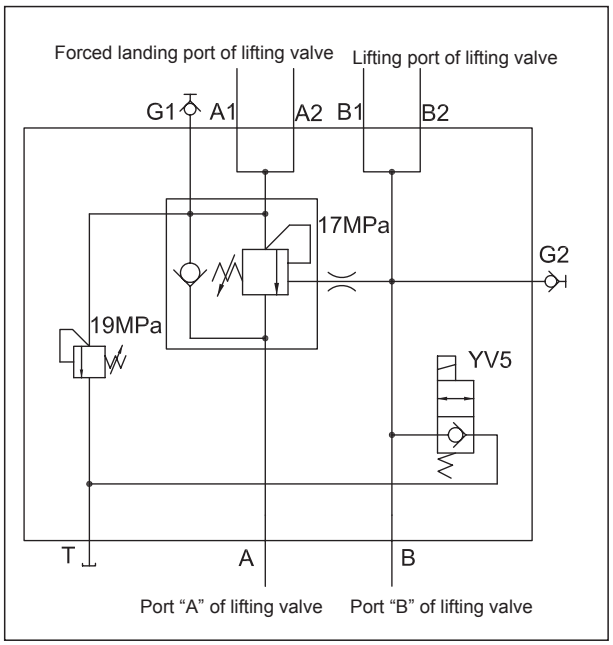


Fig.14.3-2 Schematic diagram of balanced valve

Disassembly

1. Ensure that the body is completely lowered, or fix the body with the safety pin when the body is in the hoist position. Apply the parking brake, shut down the engine and chock all wheels properly.
2. Use a proper solvent to clean the balanced valve group and make a sign on the hydraulic rubber hose to facilitate correct installation.
3. Remove the hydraulic pipe from the balanced valve and drain the oil into a proper container. To prevent ingress of dirt, cover all pipe openings and each port of the balanced valve group.
4. Remove the fasteners which fix the balanced valve onto the support. Take down the balanced valve and place it in a clean working area to facilitate disassembly.

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Installation

Note: Tighten all the fasteners according to section 38.2 'Technical Conditions for Tightening Moment of Standard Bolts and Nuts'.

Note: Tighten all hydraulic pipelines with the end face O-ring seal and replace all 'O'rings.

⚠ WARNING

Prevent personal injury and property loss and ensure that the wheels are chocked firmly. The chock and the hoist device should have sufficient capacity. They should be fixed firmly and can work safely.

1. The spacer (if used) should be placed together with the balanced valve group on the installation support and be fastened with fasteners.
2. Connect the hose according to the sign made during disassembly.
3. Lift up the body. Check the hose and balanced valve group for leakage.
4. Connect pressure gauge with check point 'G'. In case that the engine reaches the maximum rotating speed, the second stage of hoist cylinder is completed extended and the leading pipeline is removed, check whether the pressure of balanced valve is 17MPa (2465 psi).
5. Check the oil level according to chapter 15 'Hydraulic Oil Tank Assembly'. If the oil level is relatively low, then refill oil. . The oil used must conform to section 36.1 'LUBRICATION AND MAINTENANCE'.

Maintenance

Regularly check the balanced valve group for leakage and check the pressure according to above 'installation' requirements.

Special tools

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No requirement for specialized tools is present in this chapter. These tools can be purchased from the agent.

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14.4 Power Supply of Pilot Valve Group

Overview

The Power supply of pilot valve group is set on the support in the middle of the right longitudinal beam and on the hydraulic pipeline between the steering pump and the body hoist control handle. See Fig.2 for the schematic diagram.

The leading supply valve is a pressure control valve, which will reduce pressure for 21 Mpa (3045 psi) to 3.5 Mpa (500 psi) from steering system and it is erected with accumulator which pre-charged nitrogen pressure is 1.5 Mpa (217.5 psi).

Maintenance

The pilot valve is a non-maintenance valve. If it is damaged, it should be replaced as a whole. The steps are shown as follow (See Fig.1 for the number in brackets.):

Note: Tighten all the fasteners according to section 38.2 'Technical Conditions for Tightening Moment of Standard Bolts and Nuts'.

Note: Replace all 'O'rings and tighten the threads of all hydraulic pipelines.

⚠ WARNING

After the engine is shut down, the fluid pressure will still remain in the system. Operate the hoist control handle in the left and right directions for about 15 times. Any work can performed in the hoist control system only after it is ensured the pressure is discharged from the accumulator. Otherwise, it may result in severe injuries and deaths.

To prevent personal injury and property damage, ensure that the wheels are chocked properly and the hoist device has sufficient capacity and can work safely.

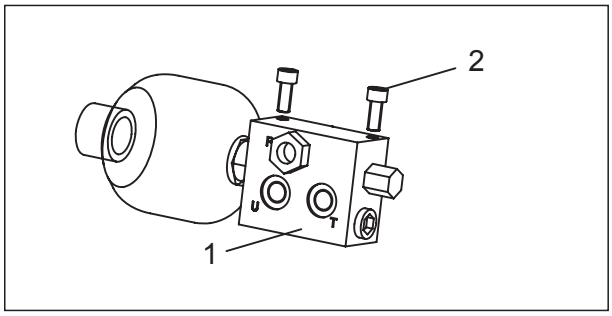


Fig.14.4-1 Assembly drawing of power supply of pilot valve group

1. Power supply of pilot valve group
2. Screw

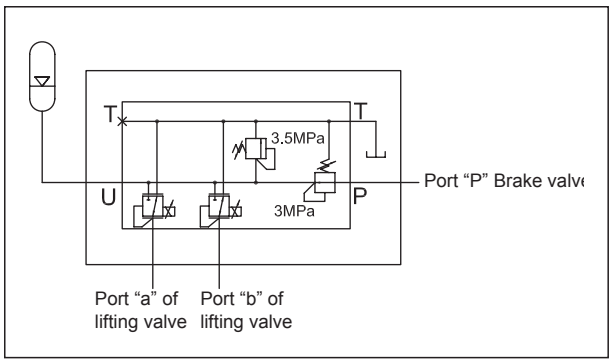


Fig.14.4-2 Schematic diagram of power supply of pilot valve group

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1. Park the truck in a horizontal working area, ensure that the body is completely lowered down, apply the parking brake and shut down the engine.
2. Continuously operate the hoist lever valve, release accumulator and chock all wheels properly.
3. Make the signs on all of the hydraulic pipelines connected to the power supply of pilot valve group (1) to facilitate the installation. Use a proper container to catch the leakage oil. Remove the hydraulic pipeline and cover all the ports of pipelines.
4. Remove the screw (2) and valve group (1) from the mounting support.
5. Mark the positions of joints installed to the valve, so that they can be used on the new valve after they are removed from valve group (1).
6. Install individual joints at the interfaces of new pilot valve group (1).
7. Use the screw (2) to fix the pilot valve group (1) onto the mounting support.
8. Remove the cover from the hydraulic pipeline, and install the pipeline onto the valve group (1) according to the signs made during disassembly.
9. Check the oil level of the tank of hoist and disc brake cooling system. If it is relatively low, it will require filling of oil.
10. Remove the wheel chocks, start up the engine .
11. Operate the valve control lever, check the hydraulic pipeline joint for leakage and tighten according to requirements.

Special tools

No requirement for specialized tools is described in this section. These tools can be purchased from the agent.

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14.5 Hoisting Cylinder and Installation

There are two hoisting cylinders between the longitudinal beams of frame. The cylinder through the bearing connected to the body. The piston rod via the bearing too connected to the frame. The hoisting cylinder is a two acting cylinder, the power which drives the body lower by the second acting of the cylinder.

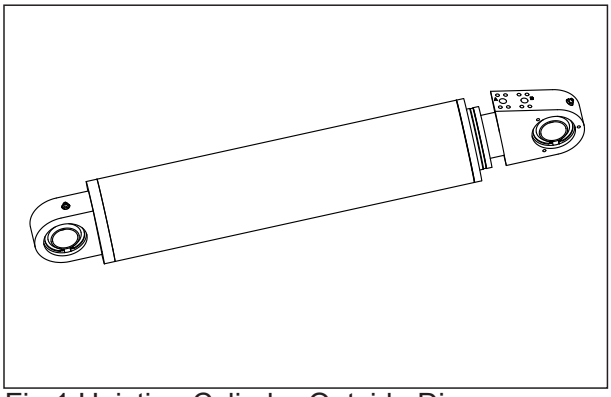


Fig.1 Hoisting Cylinder Outside Diagram

Removal

1. Park the truck in a horizontal area, raised body, install the safety pin in the rear part of truck, apply the parking brake, shut down the engine and chock individual wheels.
2. Use a proper lifting device to bind the oil cylinder firmly, and connect it to the lifting equipment.
3. Place a clean container under the cylinder. Set the hoisting lever moves on 'FLOAT' position. Disconnect the hydraulic pipeline and drain the oil. Makes the signs in the position of individual oil interfaces, and block them to prevent invasion of dirt.
4. Remove the screw, washer and upper pin shaft from the cylinder.
5. Compress the cylinder and use the steel wire to wrap it to prevent it from extending during the removal.
6. Move the cylinder to a clean site for disassembly.

Disassembly

1. Carefully disassemble for further inspects the internal component of the cylinder.

Inspection

1. Use a proper solvent to completely clean all parts and use dry soft linen to wipe them. Carefully clean all grooves so that all contaminants can be removed.
2. Use compressed air to blow and clean the

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oil passage of individual cylinder tubes and pistons to remove the contaminants.
3. Under good lighting condition, check individual cylinder bodies for the presence of the damages such as welding seam breakage or obvious scratch and etc.
4. Use a hone to smoothen pushing burr, gap and scratch. Replace all irreparable parts.
5. Check the threads of all screws and nuts for damages. If necessary, replace them with new parts.
6. Check whether all bushes and wearing rings are excessively worn. If necessary, replace them with new parts.
7. Replace all sealing elements, O-rings and dust rings.

Assembly

1. Carefully assemble the oil cylinder. During the assembly, be careful do not damage the sealing elements.

⚠ warning

Prevent personal injury and property loss and ensure that the wheels are chocked firmly. The chock and the hoist device should have sufficient capacity. They should be fixed firmly and can work safely.

Installation

1. Wrap the cylinder with a proper lifting device. Lift the cylinder onto the truck and ensure that the lubricating oil port on the piston rod support abutment of oil cylinder is oriented to the in front part of truck.
2. Install the upper pins shaft on the piston rod support abutment of oil cylinder at first, and use the washer and screw for fixation.
3. Remove the plug. Connect the hydraulic pipeline to the corresponding oil cylinder interface according to the signs made during disassembly.

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4. Start up the engine. Push out the cylinder tube until the mounting hole in its supper end is aligned with the hole on the body lifting support. Install the pin shaft, and use the washer and screw for fixation.
5. Check the oil level of tank according to the oil level requirement specified in Chapter 15, 'Hydraulic Tank Mounting'. Remove the body safety pin and operate the body. Check individual oil cylinder pipelines for the leakage. If necessary, tighten the joints to prevent leakage.

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15 HYDRAULIC OIL TANK ASSEMBLY

15.1 Hydraulic Oil Tank Assembly

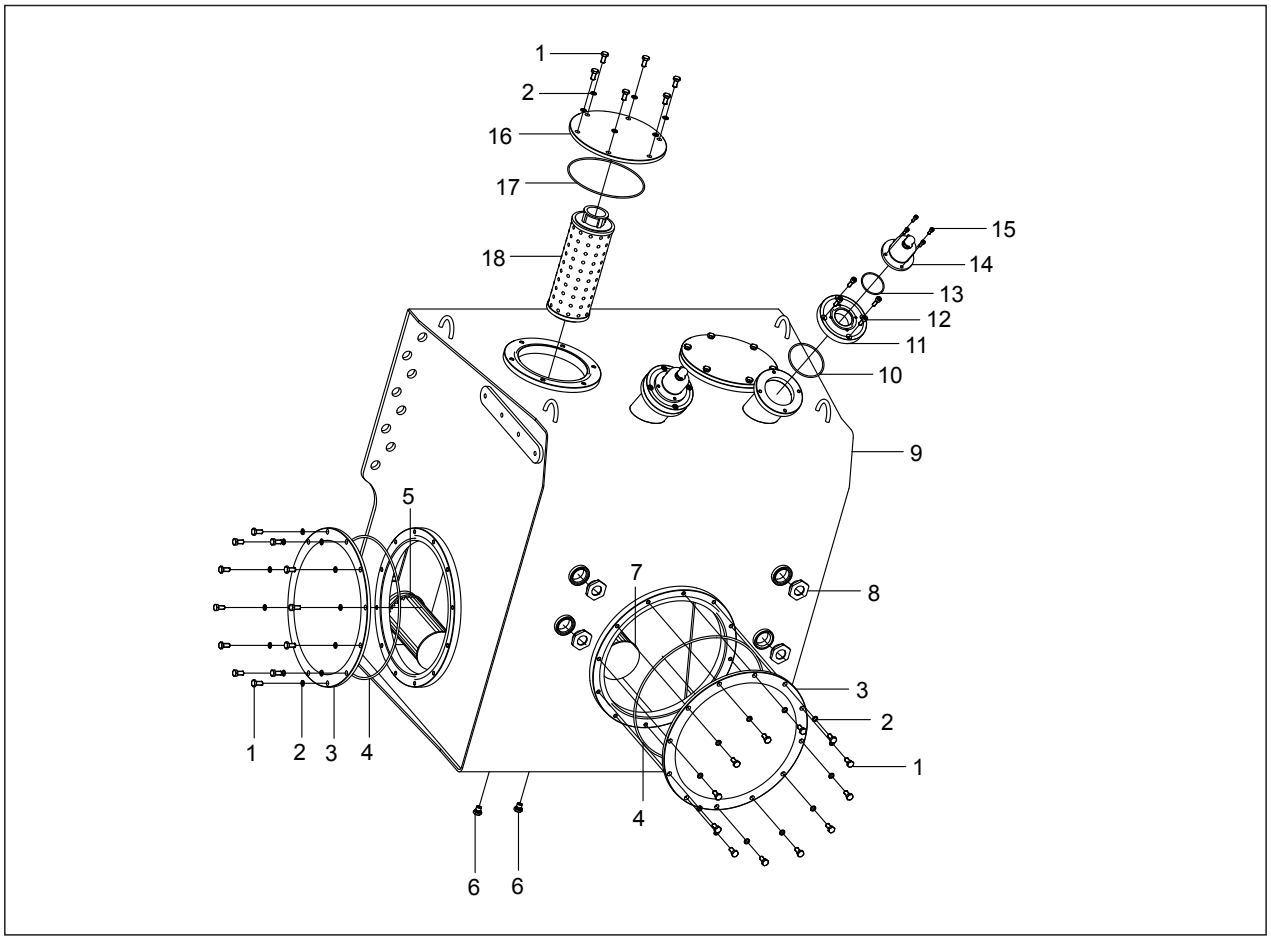


Fig.1 Hydraulic oil tank assembly

1.Bolt
2.Washer
3.Cover Plate
4.O-ring
5.Oil suction filter element
6.Plug
7.Oil suction filter element
8.Oil indicator
9.Box body welding assembly
10.O-ring
11.Spacer flange
12.Screw
13.O-ring
14.Breather valve
15.Screw
16.Cover plate
17.O-ring
18.Oil return filter element

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Overview

The hydraulic oil tank assembly is shown in Fig.1. The internal structure of hydraulic oil tank assembly is shown in Fig.2.

The hydraulic oil tank assembly is composed of cabinet welding assembly (9), oil suction filter (5 , 6), oil return filter (18), breather valve (14), oil sign (8), check valve (11), seal ring and fastener, two flanged cover plates (3).

The oil tank is internally isolated by three clapboards. Clapboard I divides the oil tank into two parts as are shown in Fig.2; the left side is steering and brake system oil tank and the right side is the tank of hoist and cooling system; clapboard II divides the oil suction area and oil return area of tank of steering and brake system; clapboard III divides the oil suction area and oil return area of the tank of hoist and cooling system.

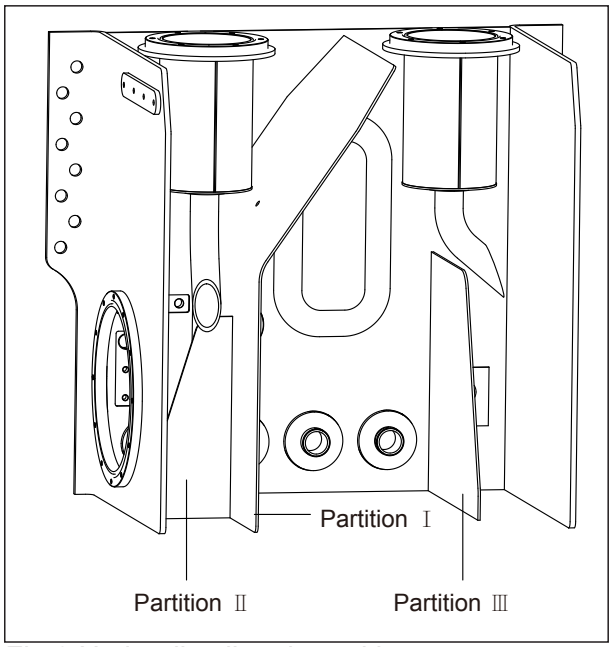


Fig.2 Hydraulic oil tank partition structure

Operating principle

The clapboard structure of hydraulic oil tank is seen in Fig.2. The operating principle of hydraulic oil tank is seen in Fig.3. The port position of hydraulic oil tank is seen in Fig.4; the digits in Fig.(1-4) are corresponding to letters.

The hydraulic oil tank assembly is divided into two parts by clapboard I in Fig.2 such as the steering and brake system oil tank and the hoist and cooling system oil tank.

The function of each port of the hydraulic oil tank:

Port A: Connect the breather valve of the hoist and cooling system tank

Port B: Connect the breather valve of the steering and brake system tank

Port C: Connect the port T of the steering valve group

Port D: Connect the prot T of the braking valve group

Port E: Connect the prot T1 of the braking valve group

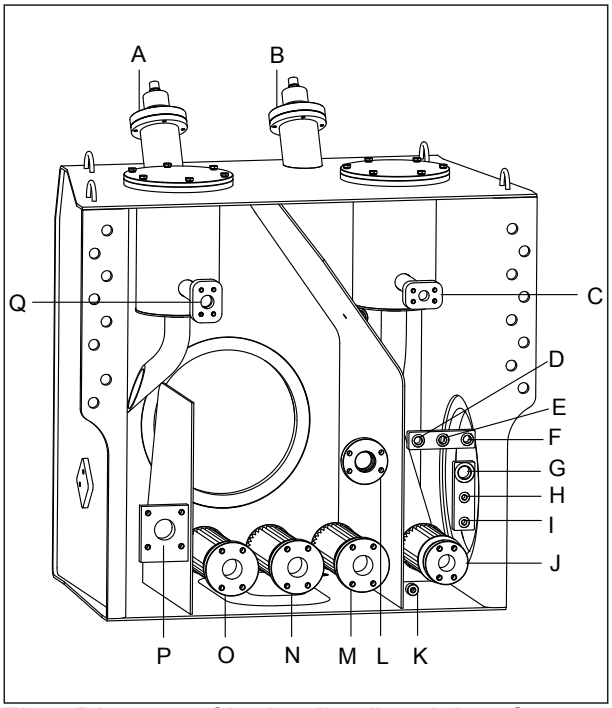


Fig.4 Diagram of hydraulic oil tank interface

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Port F: Connect the port T of the Leading oil sources valve group
Port G: Connect the prot T of the foot-operated valve
Port H: Connect the pressure switch
Port I: Connect the temperauture switch
Port J: Connect steering pump inlet
Port K: Connect steering pump outlet
Port L: Connect the cooling check valve
Port M:Connect cooling pump inlet
Port N: Connect cooling pump inlet
Port O: Connect hoist pump inlet
Port P: Connect cooling system confluence block return opening
Port Q: Connect hoist pump outlet
Port S: Connect the oil sign of the steering and brake system tank .
Port T: Connect the oil sign of the hoist and cooling system tank
The oil in the steering and brake system is pumped by the steering pump installed on transmission PTO through oil suction filter (5) port J; the oil is pumped into the steering valve group of steering system and the brake valve group of brake system. The internally leaked oil of pump returns to the steering and brake oil tank from the outlet of steering pump and through port K. The returned oil of the steering system returns to the steering and brake oil tank from the steering valve group port T and through port C indicated on Fig.3 and through oil return filter (18).
The oil hoist system is pumped by the gear pump installed to engine PTO through oil suction filter (7) and port O; the oil is pumped into the hoist valve of hoist system. If the valve spool of hoist valve is located at the hoist or forced landing position, the hydraulic oil will enter the hoist system. The returned oil will flow to the balanced valve group port T through the hoist valve port T and then flow to the tank of hoist and cooling system through port Q indicated on Fig.3 and oil return filter (18); when the hoist valve spool is located at

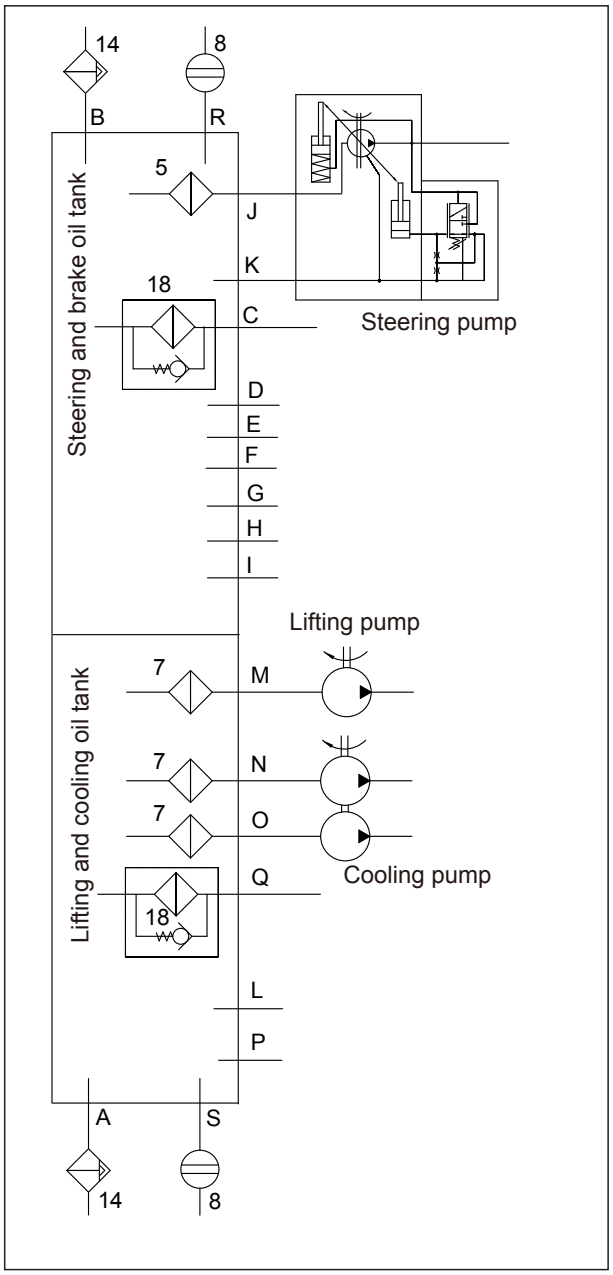


Fig.3 Functional diagram of hydraulic oil tank

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the neutral position, the hydraulic oil will enter the confluence block and disc brake cooling system; the other end of confluence block is installed with a check valve with settling pressure of 0.4MPa; when the cooling oil pressure is higher than the settling pressure, some oil will directly flow to the tank of hoist and cooling system through the confluence block, check valve 11 and port M indicated on Fig.3. Oil return filter (18) are installed with bypass valves, which will open when the oil pressure increases to 3.4 bar due to the blocking of filter. The oil will directly flow back to the oil tank through check valve.

The pressure oil of disc brake cooling system is pumped by the double-gear pump installed to engine PTO through oil suction filter (7), port M, N, and into the confluence block and the disc brake cooling system; the returned oil gathers at another confluence block and flows to the hoist and cooling oil tank through port Q. (14) indicates breathe valve respectively installed to port A, port B of two oil tanks; (8) indicates oil pointers respectively installed to port P, port Q of two oil tanks; liquid level sensors are respectively installed to port D, port A of two oil tanks; when the liquid level drops under a safe level, a signal will be sent to light the alarm indicator on the instrument panel. Meanwhile, the monitor will display different fault codes; in addition, the two oil tanks are installed with oil drainage cover (6) respectively for maintenance.

The flange at port H of the steering and brake oil tank is installed with an oil temperature switch and an oil pressure switch; if the oil temperature reaches 95°C or the oil pressure reaches 0.17MPa, the alarm indicator on the instrument panel in cab will light. Meanwhile, the monitor will display different fault codes.

Check the oil level

Cold check

Unless otherwise specified, the number in

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bracket is detailed in Fig.1.

The tank of steering and brake system: Stop the engine, turn the steering wheel left and right, release the steering accumulator pressure; continuously operate the foot valve to release brake accumulator pressure till the oil level reaches in the middle of oil indicator(8). Refuel the tank of steering and brake system as required with the hydraulic oil specified in section 36.1 'LUBRICATION AND MAINTENANCE' till the oil level reaches the middle of oil indicator(8), and then mounts the cover plate (5)back.

The tank of hoist and cooling system: Shut down the engine, completely lower down the body; the oil level should be kept in the middle of oil indicator (8). Refuel the hoist and cooling oil tank in accordance with the hydraulic oil specified in section 36.1 'LUBRICATION AND MAINTENANCE' till the oil level reaches the middle of oil indicator (8), mounts the cover plate (5)back.

Note:

1. Park the truck at a flat area when checking the oil level.
2. The normal oil level should be fully indicated by oil indicator (8) if the oil is at working temperature.

In order to prevent the blowby between the tank of steering and brake system and the tank of cooling system which results the leakage of oil from vent filter and hydraulic pump damage, a Ö10mm through-hole of 200mm away from the tank top is arranged on clapboard I between two oil tanks. The blowby usually happens under the following two conditions: 1) Hoist valve blowby: The hoist valve cavity oil with the pressure of 18MPa comes from tank of hoist and cooling system; the hoist valve control cavity oil with the pressure of 3MPa comes from the steering and brake oil tank; When the valve spool is working, the oil will leak from high pressure cavity to low pressure cavity, that is, the oil

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blows by from the tank of hoist and cooling system to the tank of steering and brake system; such blowby is usually regarded as rational leakage; 2) Brake blowby: The parking brake oil comes from the stank of steering and brake system with the pressure of 8.3MPa; the travelling brake oil comes from the tank of steering and brake system with the pressure of 5.3MPa; the brake cooling oil comes from the hoist and cooling oil tank with the pressure smaller than 0.4MPa; if the brake seal is damaged, the hydraulic oil will leak from high pressure cavity to low pressure cavity, that is, the oil blows by from the steering and brake oil tank to the tank of hoist and cooling system; in such case, the truck must be parked for repair.

Replacing the hydraulic oil

Unless otherwise specified, see Fig.1 for the number in bracket

Tank body welding assembly (9) should be emptied and cleaned before replacing the hydraulic oil. Refuel clean and specified hydraulic oil according to section 36.1 'LUBRICATION AND MAINTENANCE'.

Replacing the filter element

Unless otherwise specified, see Fig.1 for the number in bracket.

Replace oil suction filter element (5), (13), and oil return filter element (18) according to section 36.1 'LUBRICATION AND MAINTENANCE'.

⚠ WARNING

To prevent personal injury and property loss, ensure that wheel chocking material is fixed properly and it has sufficient capacity and works safely.

1. Place the truck in a flat working area, ensure that the body is completely lowered

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down, apply the parking brake and shut down the engine.
2. Rotate the steering wheel for several rounds to release steering accumulator pressure; continuously press the foot valve down to release brake accumulator pressure; chock the wheels, and set the accumulator main switch to 'off' position.
3. Place a proper container, remove the end cover from tank body welding assembly (4), discharge the hydraulic oil, reinstall the end cover and tighten again.
4. Remove bolt (1), washer (2) from tank body welding assembly (9) and take down oil tank cover plate(3).
5. Remove and discard oil suction filter element (5), (7) and oil return filter element (18) from tank body welding assembly (9).
6. Install new oil suction filter element (5), (7)and oil return filter element (18) to tank body welding assembly (5) and tighten with a special tool.
7. Replace O-ring (4), install cover plate (3), bolt (1), washer (2) again onto tank body welding assembly (9) and tighten bolts with a torque spanner.
8. Refuel the oil tank to correct liquid level according to section 36.1'LUBRICATION AND MAINTENANCE', then mounts the breath valve.
9. Remove wheel chocks, start the engine, fill the system pipeline and check the liquid level according to 'Oil Level Inspection'.

Oil tank assembly
Disassembly
Unless otherwise specified, see Fig.1 for the number in bracket.

⚠ WARNING

In order to prevent personal casualty and equipment damage, make sure the wheels

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are securely chocked and the hoist device is capable of working safely.

1. Place the truck in a horizontal working area, ensure that the body is completely lowered down, apply the parking brake and shut down the engine.
2. Chock all the wheels.
3. Remove two end covers (6) from the hydraulic oil tank assembly, discharge the hydraulic oil into a proper container, reinstall the end cover and tighten it.
4. Mark all the pipelines connected to the oil tank, use a proper container to collect the leaked oil, remove all the steep pipes and rubber hoses connected to the oil tank, and cover up the pipe ends with covers or end covers.
5. Lift the oil tank assembly with a proper hoist device.
6. Remove the bolts, nuts and washers on the two sides of oil tank assembly used for fastening.
7. Move the hydraulic oil tank assembly to a proper site for disassembly.

Disassembly

Unless otherwise specified, see Fig.1 for the number in bracket.

Remove all the parts from the hydraulic oil tank assembly.

⚠ WARNING

The oil tank is heavy. In order to prevent personal injury and equipment damage, make sure the hoist device has sufficient bearing capacity and is fastened correctly.

Inspection

Unless otherwise specified, see Fig.1 for the number in bracket.

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⚠ WARNING

Please wear appropriate protective cover when blowing the oil tank and part with compressed air, in order to prevent liquid splashing.

1. Clean the hydraulic oil tank assembly and its parts with kerosene and blow dry with compressed air.
2. Check the oil tank welding seam and internal welding pieces for crack and leakage.
3. Check oil suction filter element (5), (7) and oil return filter element (18) for damage, and if necessary, replace with new parts.
4. Check breath valve (14) for damage, and if necessary, replace with a new one.
5. Check 'O'ring (4) for damage, and if necessary, replace with a new one.

Assembly

Unless otherwise specified, see Fig.1 for the number in bracket.

Install all the parts of the hydraulic oil tank assembly indicated on diagram.

Installation

Unless otherwise specified, see Fig.1 for the number in bracket.

Note: Tighten all the hydraulic pipelines with O-ring end seal.

⚠ WARNING

In order to prevent personal injury and equipment damage, make sure the wheels are chocked, the chocking materials and hoist device have sufficient bearing capacity and are connected reliably.

1. Lift the hydraulic oil tank assembly to

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installation screw hole with an appropriate hoist device and fasten the hydraulic oil tank with bolts, washers and nuts.

2. Remove the end covers and install all the hydraulic pipelines to the oil tank assembly according to the signs made during disassembly.

3. Refuel hydraulic oil to the oil tank according to section 36.1'LUBRICATION AND MAINTENANCE' and mounts the cover plate (5)back..

4. Start the engine, fill the pipeline of hydraulic system with oil, stop the engine, and check the oil level of oil tank according to 'Oil Level Inspection'.

5. Check all the pipelines and joints for leakage, tighten according to requirements, and remove the materials for chocking wheels.

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16 BRAKE PIPELINE AND JOINT

16.1 Brake System Accumulator

Overview

Two accumulators are utilized in the brake system. They are used for the front and rear brake loops respectively. Wherein, the rear brake accumulator is additionally utilized to maintain the constant pressure in the parking brake loop to ensure that the parking brake is released during the running of truck.

The accumulator is of piston type with the pre-charged nitrogen pressure of 1.6 MPa (230 psi). It is composed of an inflation valve, end covers, a cylinder body and pistons. The inflation valve is provided with interlocking function. It can be opened by loosening the locking nut for the convenience of checking the pre-charged pressure or inflate the accumulator.

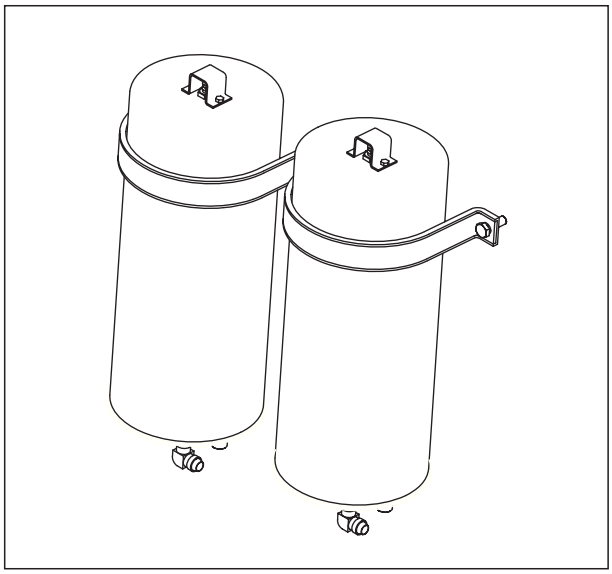


Fig.1Brake system accumulator

Operating principle

The piston is equivalent to a separator. It divides the interior of cylinder body into two mutually isolated parts. The part near the inflation valve side stores the pre-filling nitrogen; the other part can accommodate the pressure oil liquid which is supplied from the brake pump via the one way valve on the steering valve group . The pressure switch on brake valve group is used for monitoring the accumulator pressure.

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16.2 Brake Valve Group

Overview

See Fig.1. The brake valve group is installed in the hydraulic pipeline near the ring beam in the inner side of left longitudinal beam of frame. The major components are: Filter(1), Pressure reducing valve(2), Relief valve(3), Pilot to shift valve(4), Solenoid valve(5), Pressure reducing valve(6), Solenoid valve(7) and Proportional pressure reduce valve. The Brake valve group distributes hydraulic oil flow from the steering pump, to the pedal valve, front and rear brake circuit accumulators and parking brake at the rear wheels. The valve also provides appropriate returns to the steering and brake control tank for the hydraulic oil.

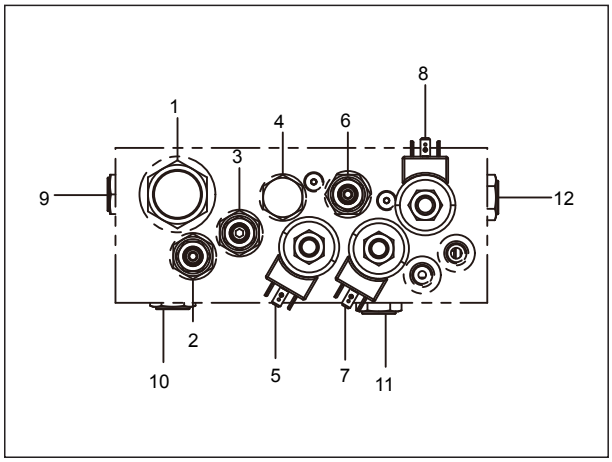


Fig.1

1. Filter
2. Pressure reducing valve
3. Relief valve
4. Pilot to shift valve
5. Solenoid valve
6. Pressure reducing valve
7. Solenoid valve
8. Proportional pressure reduce valve
9. Shuttle valve
10. Shuttle valve
11. Check valve
12. Check valve

Operating principle

See Fig.2.

The hydraulic oil enters the port 'P' of brake valve group from the steering pump. The oil pressure pushes the check valve and allow the oil flow to the front brake accumulator via the port 'ACC1' and to the rear brake accumulator via the port 'ACC2'.The hydraulic oil flows out of the brake valve group via the port 'B1' and flows to the port 'P1' of pedal valve. It flows to the port 'P2' of pedal valve via the port 'B2' of brake valve group.

Electromagnetic valve sleeve – turned off

When the emergency brake is applied, YV1 isn't energized. The oil flow runs out of the brake valve group via the port 'A' and goes to the port 'PX' of pedal valve and the emergency brake is applied.

Electromagnetic valve sleeve - turned on

When the emergency brake is applied, YV1 is energized. The oil flows out of the port 'RB1', The oil flow runs out via the pressure reducing valve and the parking brake is released.

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Pressure switch

The pressure switch in the position of port 'PS1' and 'PS2' signals the instrument alarm indicator, when the pressure drops below 13.1MPa. The instrument alarm indicator will flash.

Parking brake pressure switch 'PS3' sends a signal to illuminate the parking brake light. When the pressure in the parking brake circuit drops below 6.5MPa. The instrument alarm indicator will flash.

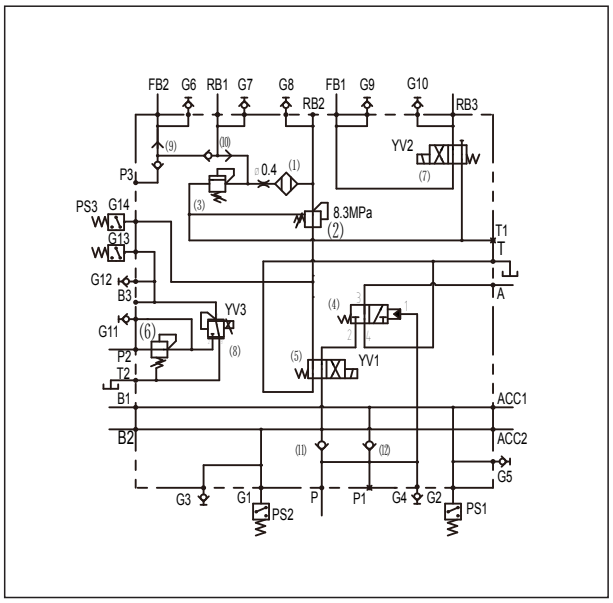


Fig.2

Disassembly

1. Park the truck in a horizontal working area, apply the parking brake, shut down the engine, continuously operate the pedal valve and release the pressure of brake power accumulator.
2. Chock the wheels and set the main switch of power accumulator into the 'OFF' position.
3. Remove and mark the electrical connectors of electromagnetic coil and pressure switch.

⚠ warning

After the engine is shut down, some pressure will still exist in the brake system. Continuously operate the pedal valve. Perform the work on the brake system only after the pressure is removed. Otherwise, it will result in personal injuries.

To prevent personal injury and property loss, ensure that wheels are chocked and fixed properly. The sufficient capability should be possessed and work should be performed safely.

4. Use a proper solvent to clean the multi-way valve assembly and surrounding area. Ensure that all of the hydraulic pipelines connected to the brake multi-way valve are properly marked to facilitate the installation. Use a proper container to receive the leakage oil, and plug

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all open pipelines.
5. Remove the fastening and installation parts fixing the brake multi-way valve onto the mounting cross beam of driver's cab. Remove the assembly from the truck.

Installation
Note: Tighten all fasteners according to Section 'Technical Conditions for Tightening Torque of Standard Bolts and Nuts'.
Note: Tighten the hydraulic pipelines equipped with the end face seal joint. Replace all O-rings.
1. Place the brake valve group assembly onto the front support of ring beam, and use the installation parts to fix it properly.
2. Remove the plug from the hydraulic pipeline. Connect it to the brake valve group according to the signs made during disassembly.
3. Connect the electrical connectors to the electromagnetic coil and the pressure switch.
4. Check the liquid level of steering and brake control oil tank according to the correct liquid level specified in the 'Steering and brake control oil tank' and the technical specifications for oil in the 'Lubrication system'. Refill oil if necessary.
5. Set the main switch of accumulator into the 'ON' position, remove the chocks, start up the engine and warm up the hydraulic oil to the operating temperature.
6. Check the brake valve group and hydraulic pipeline joints for the presence of leakage, and tighten them.
7. Shut down the engine, and apply the parking brake after it is ensured that the traveling brake is completely applied.
8. After the brake and engine shutdown are repeated for several times, check whether the same times of releasing are achieved.
9. Check all joints again for the leakage, and tighten them if necessary.
10. Remove the body safety pin shaft and

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lower down the port.

Maintenance

Frequently check the brake valve group for the presence of leakage or damage. Repair or replace it if necessary.

Note: The brake valve group allows only the replacement of components.

Specialized tools

No requirement for specialized tools is present in the steps described in this chapter. These tools and glue can be purchased from the agent.

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17 FRAME AND INSTALLATION

17.1 Frame and Installation

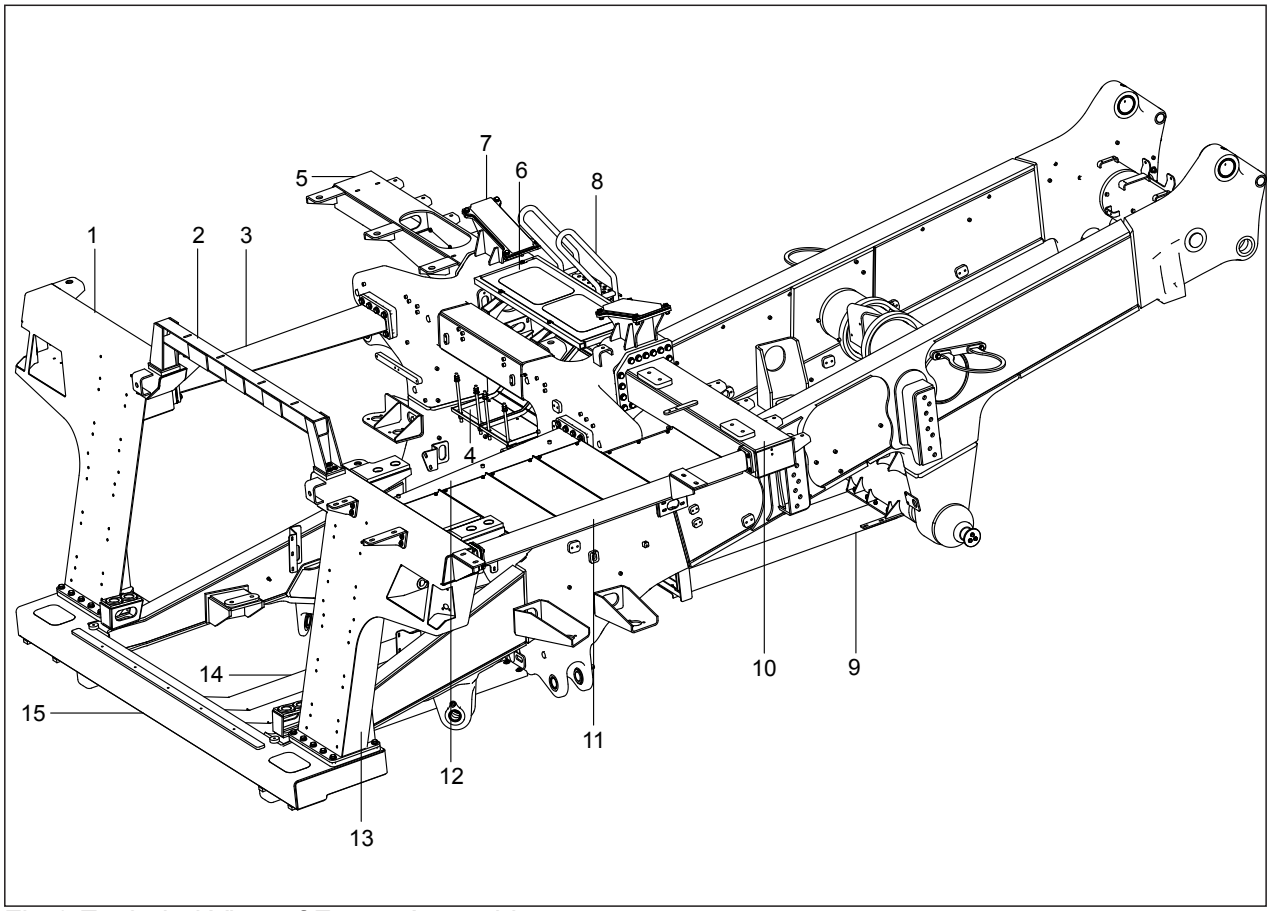


Fig.1-Exploded View of Frame Assembly

1.Right front support assembly
2.Tie rod units
3.Right-hand longitudinal pull rod
4.Lower guard
5.Right lengthening beam assembly
6.Rear platform
7.Damping pad
8.Ladder of platform
9.Gearbox lower guard
10.Left lengthening beam assembly
11.Outer longitudinal pull rod
12.Left-hand longitudinal pull rod
13.Left and front support assembly
14.Engine lower guard
15.Frame assembly

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Remove

The following steps provided should be followed for disassembly of the components as illustrated in the figure:

⚠ WARNING

To prevent personal injury and property damage, be sure wheel chocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

1. Position the vehicle in a level work area, apply the parking brake and switch off the engine.
2. Turn steering wheel in both directions several times to relieve pressure in the steering circuit. Block all road wheels.
3. Attach a suitable lifting device to the component and remove mounting hardware. Remove the component from the vehicle.

Installation

⚠ WARNING

To prevent personal injury and property damage, be sure wheel chocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

Caution: Tighten all the fasteners according to section 36.2 'TIGHTENING MOMENT TECHNICAL CONDITIONS OF STANDARD BOLT AND NUT'.

Using a suitable lifting device, align the component to be installed in position on the frame. Secure the component securely to the frame with mounting hardware removed during removal.

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Maintenance

Inspection

Inspect the frame and attached parts at intervals not exceeding 250 hours for cracked or broken welds and bending/twisting of the frame. Any defects found should be repaired before they progress into major failures. Contact your dealer for recommended weld and repair instructions.

Welding

Note: It is important that the electrical connections are disconnected in the following order to prevent damage to the electrical components:

⚠ WARNING

Welding and flame cutting cadmium plated metals produce odourless fumes which are toxic. Recommended industrial hygiene practice for protection of the welding operator from the cadmium fumes and metallic oxides requires enclosure ventilation specifically designed for the welding process.

1. Disconnect battery equalizer ground cables.
2. Disconnect battery cables from terminal posts (ground cable first).
3. Disconnect battery equalizer positive cables.
4. Disconnect electrical connections at the ECU.

After welding, reconnect all of the above in the reverse order.

Electric arc welding is recommended for all chassis welding. Since the nature and extent of damage to the frame cannot be predetermined, no definite repair procedure can be established. As a general rule however, if parts are twisted, bent or pulled apart, or a

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frame is bent or twisted, no welding should be done until the parts are straightened or realigned.

Successfully welded repairs will depend to a great extent upon the use of the proper equipment, materials and the ability of the welder. The Service Department can be consulted regarding the feasibility of welding repairs.

Caution: In principle, it is not allowed to weld anything to frame casually. Particularly, it is prohibited to weld anything on the upper and lower flanges of the front and rear longitudinal beams and it is strictly forbidden to splash any weld slag on them.

Painting

A check of the condition of the paint should be made approximately twice a year and chassis repainted if necessary.

If painting of the actual frame of the unit is required, thoroughly clean the areas to be painted. Apply a primer coat of red oxide and then a finish coat of polyurethane enamel.

To keep rust and corrosion to a minimum, periodic painting of abrasions and other exposed metal areas on the frame is highly recommended.

Special tools

No special tools are required for the operation steps illustrated in this chapter and refer to 36.3 'MAINTENANCE TOOLS' for the No. of general maintenance tools which are available from agents of manufacturers.

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18 DRIVELINE INSTALLATION

18.1 Front Driveline Assembly

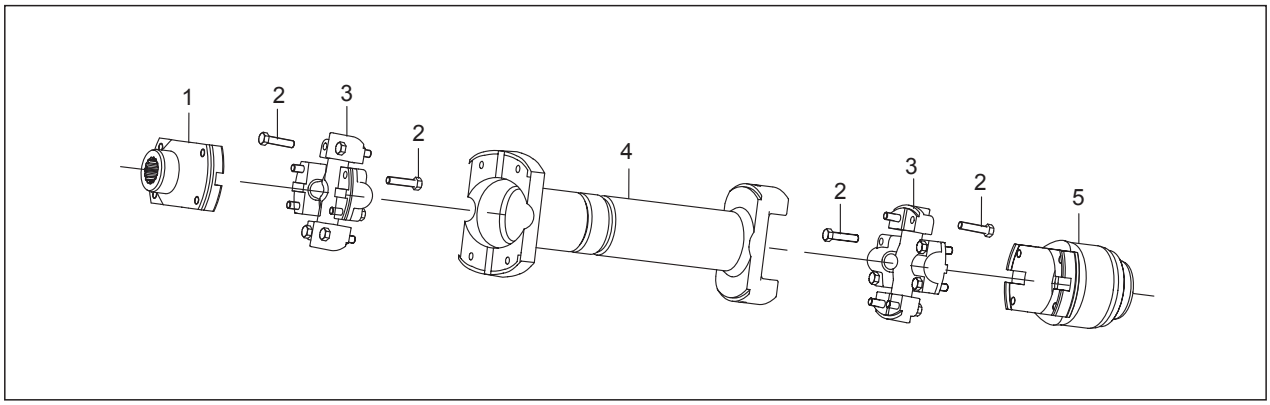


Fig.1 Front Driveline Installation

1. Output flange
2. Bolt
3. Universal joint
4. Driveline assembly
5. Input flange

Overview

The function of the driveline is to transmit rotating power from one point to another in a smooth and continuous action while allowing a degree of movement or misalignment of the components it connects.

The drivelines must operate through constantly changing relative angles between the components they are mounted to and must also be capable of changing length while transmitting torque.

A typical driveline consists of universal joints which allow some misalignment and permit the driveline to pivot in any direction, and, a light rigid hollow slip yoke and splined shaft assembly forming a slip joint.

The slip joint accommodates length variations generated during operation, preventing tension or compression loads from causing serious damage to the components.

Note: Extra care should be taken when handling the driveline since chips, dents, burrs or deformity on any rotating mass creates

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vibration and excessive wear during any operation.

Removal

Numbers in parentheses refer to Fig.1.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

Rotating shafts can be dangerous. You can snag clothes, skin, hair, hands, etc. This can cause serious injury or death. Do not go under a vehicle when the engine is running.

Note: Extra care should be taken when handling drivelines since carelessness can result in premature failure of the components. Chips, dents, burrs, or any other deformity of universal joints will prevent accurate mating. This will cause misalignment, which is accompanied by vibration and excessive wear.

1. Position the truck in a level work area, apply the parking brake and switch off the engine.
2. Turn steering wheel in both directions several times to relieve pressure in the steering circuit. Block all road wheels. Set the battery in the 'off' position.
3. Match mark universal joints (3) and their mating surfaces to ensure correct mating alignment when installing driveline assembly (4).
4. Support driveline assembly (4) with suitable lifting equipment and remove bolts (2) securing universal joints(3) to output flange(1).
5. Remove bolts (2) securing universal joints(3) to input flange(5).
6. Remove driveline assembly (4). If necessary tap driveline assembly (4) from its mating

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components with a soft faced hammer.
Note: Access to driveline assembly can be obtained from underneath the truck.

Disassembly

Numbers in parentheses refer to Fig.1.
1. Remove bolts (2) securing universal joints(3) to driveline assembly(4), remove universal joints(3).

Inspection

1. Clean all metal parts in a suitable solvent and dry all parts with compressed air.
2. Inspect universal joints for excessive wear. Replace if wear is excessive.
3. Inspect splines of shaft and yoke for nicks, burrs and excessive wear. Replace if wear is excessive or splines are nicked. Burrs may be removed with a fine file or medium India stone.
4. Check the surfaces of the components that universal joints mate against for parallelism. Refer to Fig.2.
5. Check the condition of mounting bolts and replace if required.

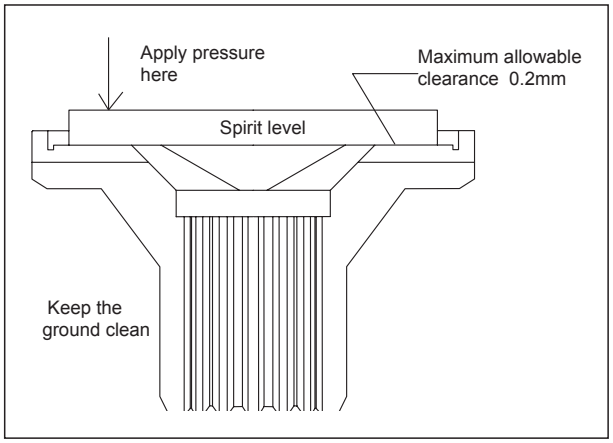


Fig.2 - Checking Parallelism

Assembly

Numbers in parentheses refer to Fig.1.

Universal Joint

1. Use bolts (2) securing universal joints(3) to driveline assembly(4). Tighten bolts (2) to a torque of 280N•m (207lb-ft).

Installation

Numbers in parentheses refer to Fig.1.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.
Rotating shafts can be dangerous. You can snag clothes, skin, hair, hands, etc.

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This can cause serious injury or death. Do not go under a vehicle when the engine is running.

Note: Extra care should be taken when handling drivelines since carelessness can result in premature failure of the components. Chips, dents, burrs, or any other deformity of universal joints and yoke will prevent accurate mating with the crosses and bearings. This will cause misalignment, which is accompanied by vibration and excessive wear.

1. Using suitable lifting equipment, position driveline assembly (4) on the truck and align match marks on universal joints (3) with those on its mating surfaces.
2. Apply Loctite 242 to the threads of bolts (2) and secure universal joints (3) to their mating surfaces with bolts (2). Tighten bolts (2) to a torque of 280N•m (207lb-ft).
3. Ensure the parking brake is applied and start the engine. Remove wheel blocks from all road wheels.

Maintenance

Lubrication

Lubricate driveline with either a hand-operated or a pressure grease gun. Refer to Section 38.1, 'Lubricate and maintenance', for recommended lubricant and service intervals.

Periodic inspection

Use a small pry bar to check companion flange yokes for looseness. If loose, drop one end of the driveline and twist the yoke to check backlash between splines and yokes. Replace any yoke that does not fit snugly. Using a small pry bar, check the universal joints for play. If loose, replace the universal joints. Check splines at slip joint, replace yoke if excessively worn.

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Special tools

There are no special tools required for procedures outlined in this section. Refer to Section 38.3, ' Service Tools '.

Special torque specification				
Fig. No.	No.	Name	Torque	
			N·m	lb·ft
1	2	Bolt	280	207

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18.2 Rear Driveline Assembly

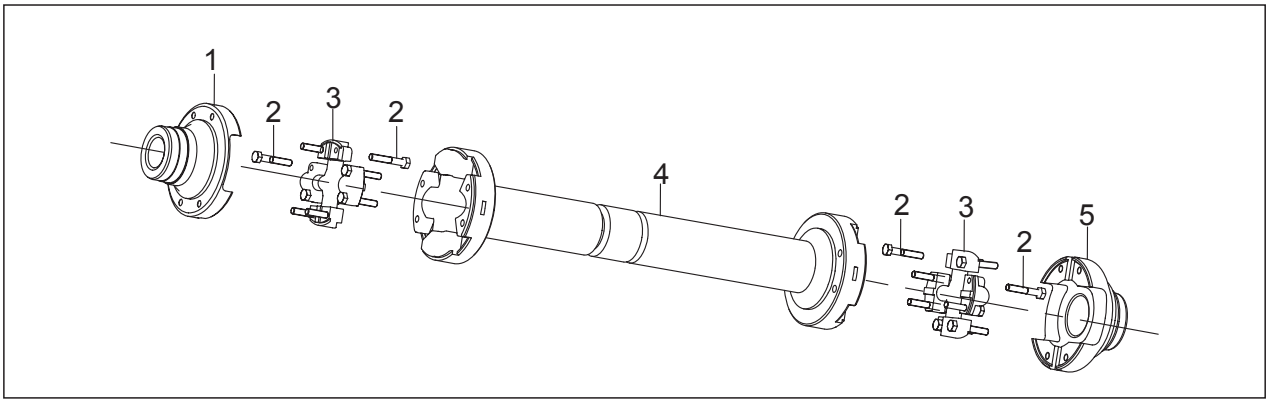


Fig.3 Rear Driveline Installation

1. Output flange
2. Bolt
3. Universal joint
4. Driveline Assembly
5. Input flange

Overview

The function of the driveline is to transmit rotating power from one point to another in a smooth and continuous action while allowing a degree of movement or misalignment of the components it connects.

The drivelines must operate through constantly changing relative angles between the components they are mounted to and must also be capable of changing length while transmitting torque.

A typical driveline consists of universal joints which allow some misalignment and permit the driveline to pivot in any direction, and, a light rigid hollow slip yoke and splined shaft assembly forming a slip joint. The slip joint accommodates length variations generated during operation, preventing tension or compression loads from causing serious damage to the components.

Note: Extra care should be taken when handling the driveline since chips, dents, burrs or deformity on any rotating mass creates vibration and excessive wear during any operation.

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Removal

Numbers in parentheses refer to Fig.3.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

Rotating shafts can be dangerous. You can snag clothes, skin, hair, hands, etc. This can cause serious injury or death. Do not go under a vehicle when the engine is running.

Note: Extra care should be taken when handling drivelines since carelessness can result in premature failure of the components. Chips, dents, burrs, or any other deformity of universal joints will prevent accurate mating. This will cause misalignment, which is accompanied by vibration and excessive wear.

1. Position the truck in a level work area, apply the parking brake and switch off the engine.
2. Turn steering wheel in both directions several times to relieve pressure in the steering circuit. Block all road wheels. Set the battery in the ' off ' position.
3. Match mark universal joints (3) and their mating surfaces to ensure correct mating alignment when installing driveline assembly (4).
4. Support driveline assembly (4) with suitable lifting equipment and remove bolts (2) securing universal joints(3) to output flange(1).
5. Remove bolts (2) securing universal joints(3) to input flange(5).
6. Remove driveline assembly (4). If necessary tap driveline assembly (4) from its mating components with a soft faced hammer.

Note: Access to driveline assembly can be obtained from underneath the truck.

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Disassembly

Numbers in parentheses refer to Fig.3.

1. Remove bolts (2) securing universal joints(3) to driveline assembly(4), remove universal joints(3).

Inspection

1. Clean all metal parts in a suitable solvent and dry all parts with compressed air.
2. Inspect universal joints for excessive wear. Replace if wear is excessive.
3. Inspect splines of shaft and yoke for nicks, burrs and excessive wear. Replace if wear is excessive or splines are nicked. Burrs may be removed with a fine file or medium India stone.
4. Check the surfaces of the components that universal joints mate against for parallelism. Refer to Fig.4.
5. Check the condition of mounting bolts and replace if required.

Universal joint

Numbers in parentheses refer to Fig.1.

Spider

1. Use bolts (2) securing universal joints(3) to driveline assembly(4). Tighten bolts (2) to a torque of 470N. M (348lb-ft).

Installation

Numbers in parentheses refer to Fig.1.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely. Rotating shafts can be dangerous. You can snag clothes, skin, hair, hands, etc. This can cause serious injury or death. Do not go under a vehicle when the engine is running.

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Note: Extra care should be taken when handling drivelines since carelessness can result in premature failure of the components. Chips, dents, burrs, or any other deformity of universal joints and yoke will prevent accurate mating with the crosses and bearings. This will cause misalignment, which is accompanied by vibration and excessive wear.

1. Using suitable lifting equipment, position driveline assembly (4) on the truck and align match marks on universal joints (3) with those on its mating surfaces.
2. Apply Loctite 242 to the threads of bolts (2) and secure universal joints (3) to their mating surfaces with bolts (2). Tighten bolts (2) to a torque of 470 N•m (348lb-ft).
3. Ensure the parking brake is applied and start the engine. Remove wheel blocks from all road wheels.

Maintenance

Lubrication

Lubricate driveline with either a hand-operated or a pressure grease gun. Refer to Section 36.1, ' Lubricate and maintenance ', for recommended lubricant and service intervals.

Periodic inspection

Use a small pry bar to check companion flange yokes for looseness. If loose, drop one end of the driveline and twist the yoke to check backlash between splines and yokes. Replace any yoke that does not fit snugly. Using a small pry bar, check the universal joints for play. If loose, replace the universal joints. Check splines at slip joint, replace yoke if excessively worn.

Special tools

There are no special tools required for procedures outlined in this section. Refer to Section 36.3, ' Service Tools '.

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Special torque specification				
Fig. No.	No.	Name	Torque	
			N·m	lb·ft
3	2	Bolt	470	348

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19 AIR CLEANER AND MOUNTING

19.1 Air Cleaner and Mounting

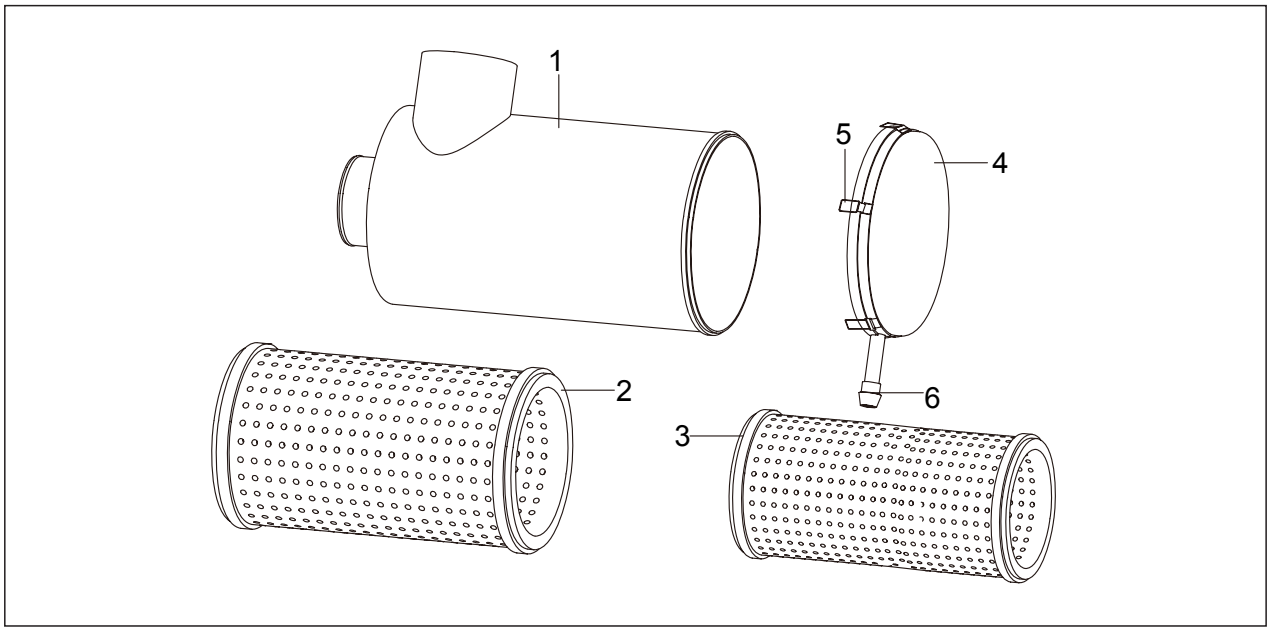


Fig.1 - Exploded View of Air Cleaner

1. Air cleaner body
2. Primary element
3. Safety element
4. Cover assembly
5. Latch
6. Vacuator valve

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Overviev

Numbers in parentheses refer to Fig.1, unless otherwise specified.

There are three, dual dry element type air cleaner assemblies mounted on the platform to the right hand side of the cab. Air cleaner assemblies prolong engine life by removing grit, dust and water from the air as it enters the engine. Grit and dust combined with engine oil, forms a highly abrasive compound which can destroy the engine in a comparatively short period of time.

A rubber vacuator valve (6) attached to cover assembly (4) in a downward position, ejects grit, dust and water while the engine is running. Vacuator valve (6) minimizes the need for daily servicing. Even though vacuator valve (6) is normally under a slight vacuum when the engine is running, pulsing of the vacuum opens and closes vacuator valve (6) expelling grit, dust and water as they collect. When the engine is stopped, vacuator valve (6) opens and expels any accumulated grit, dust or water.

An electrical air restriction gauge indicates when air restriction levels reach the maximum allowable limit. When air restriction levels are reached the circuit closes and a restriction indicator light located on the dash panel (Fig.2) illuminates. This light shows at a glance when the system air flow is being restricted indicating that primary element (2) should be serviced.

Air restriction gauge automatically resets after each air cleaner assembly is serviced. Safety element (3) is installed in each air cleaner assembly inside of primary element (2). This element increases the reliability of the air cleaner's protection of the engine from airborne dirt. It protects the engine from dirt admitted by a damaged primary element (2), or dirt that might be dropped into the air cleaner assembly while servicing primary element (2).

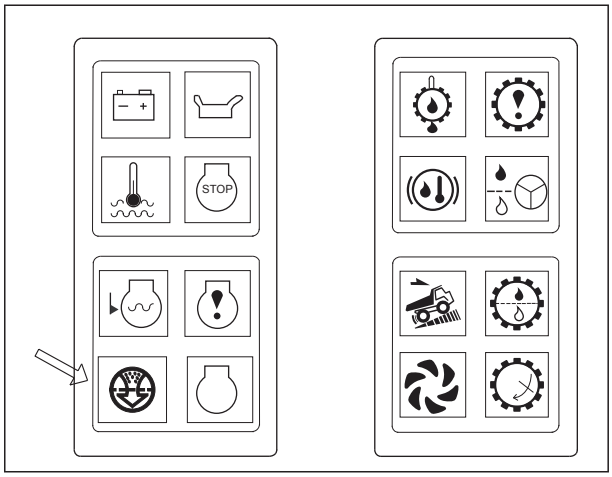


Fig.2 Air Cleaner Restriction Indicator Light

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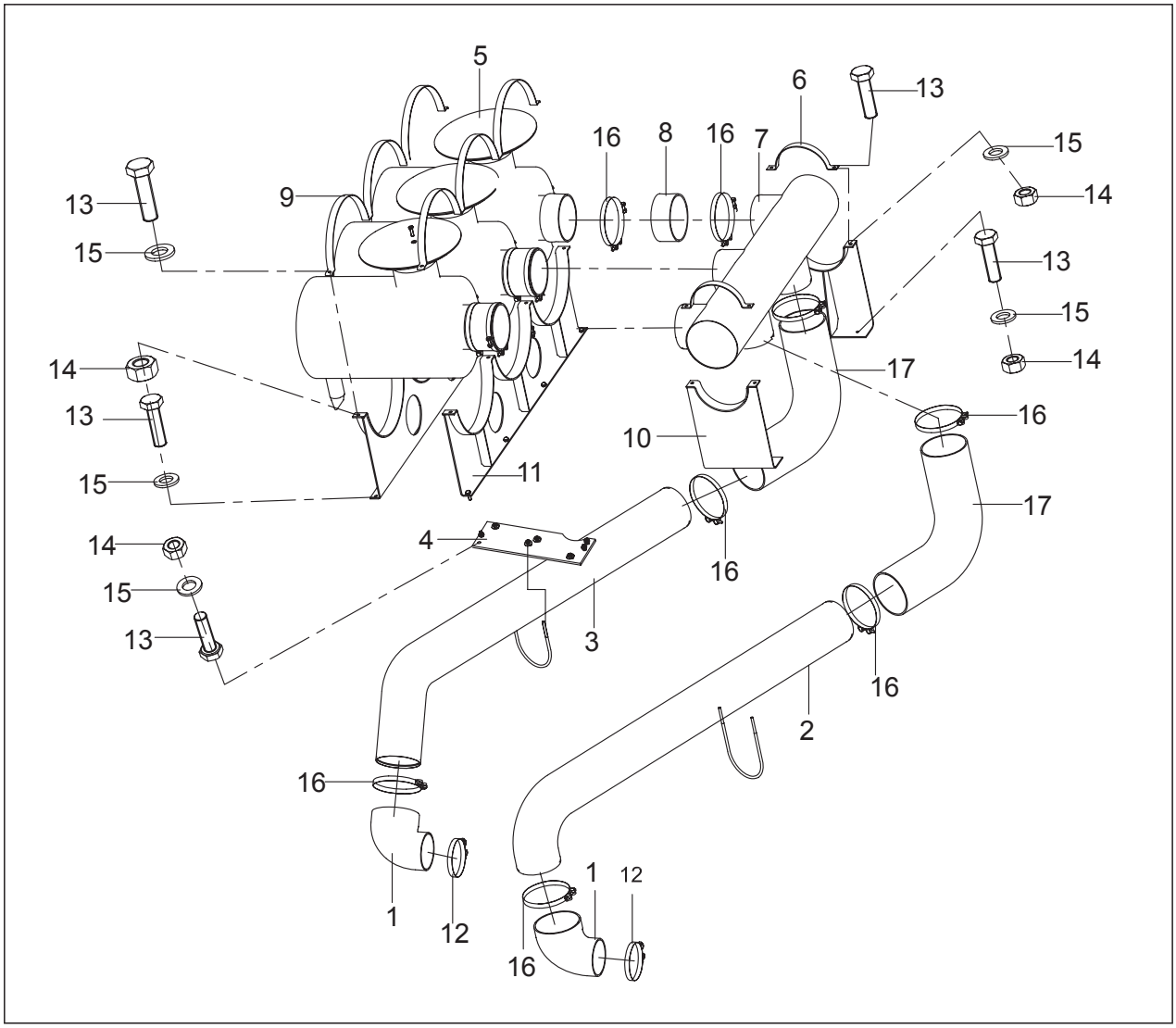


Fig.3- Exploded View of Air Cleaner Mounting

1. Elbow
2. Intake tube
3. Intake tube
4. Support assembly
5. Air cleaner
6. Mounting band
7. Plenum chamber
8. Tube
9. Mounting band
10. Bracket
11. Bracket
12. Clamp
13. Bolt
14. Nut
15. Washer
16. Clamp
17. Tube

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Maintenance

Numbers in parentheses refer to Fig.1, unless otherwise specified.

⚠ WARNING

Always shutdown the engine before servicing air cleaner.

The air cleaner elements should be serviced only when the maximum allowable restriction has been reached, as indicated by air cleaner restriction indicator light. The elements should not be serviced on the basis of visual observation as this would lead to over service. When restriction readings finally indicate a change, remove primary element (2) carefully and clean/replace as required. Refer to 'Primary Element'.

Never attempt to clean safety element (3). Change safety element (3) after every third primary element (2) service. Make sure vacuator valve (6) is not damaged or plugged and that the joint with cover assembly (4) is not broken. If vacuator valve (6) is lost or damaged, replace it to maintain pre-cleaner efficiency and normal filter element service life. Check condition of clamps (12, 11, Fig.3), mounting band (6, Fig.3), elbow (1, 17, Fig.3), tube (2, 3, 8, Fig.3), and plenum chamber (7, Fig.3). Tighten/replace as necessary.

Air Cleaner Assembly

Numbers in parentheses refer to Fig.1, unless otherwise specified.

Note: Air cleaner body (1) should be thoroughly cleaned twice a year. Do not apply heat in any form to air cleaner body (1).

1. Release latches (5) on cover assembly (4) and remove cover assembly from air cleaner body (1).
2. Remove primary element (2) and safety element (3) from air cleaner body (1).

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3. Slacken clamps (16, Fig.3).
4. Remove bolts (13, Fig.3) and washers (15, Fig.3) securing the air cleaner assembly to the platform. Disconnect tube (8, Fig.3) from air cleaner body (1).
5. Remove the air cleaner assembly from the platform for cleaning.
6. Open mounting bands (9) and remove from air cleaner body (1). Open clamp on cap assembly (6, Fig.3) and remove cap assembly from air cleaner body (1).
7. Blank off air cleaner body (1) outlets with tape or cardboard. Reach inside body with a compressed air nozzle or brush and remove dust from the body.
8. Remove all loose dust from air cleaner body (1) and remove tape or cardboard from body outlets.

Note: Assembly and installation of the air cleaner assembly is the reverse of disassembly and removal.

Primary Element

Numbers in parentheses refer to Fig.1.

Although a paper primary element (2) is used, it is possible to clean it so that it can be reused. The number of times one element can be reused depends on the type of dirt on the element and the care exercised in cleaning.

The life of a properly cleaned element will be approximately as long as that of a new element for the first one or two cleanings. After that, the life of the element will gradually decrease with each cleaning; however, it should perform satisfactorily through approximately six cleanings, providing it does not rupture. Visually determine the condition of primary element (2) and choose either the compressed air or washing method.

1. Release latches (5) on cover assembly (4) and remove cover assembly from air cleaner body (1).
2. Remove primary element (2) from air cleaner body (1).

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3. Using a damp cloth and a suitable solvent, wipe out all excess dust from air cleaner body (1) and allow to dry.
4. If the major contaminant on primary element (2) is light dust, direct a jet of compressed air, not exceeding 6.9 bar (100 lbf/in2), against the pleats of the element. The air jet should be directed in the opposite direction of normal operating air flow. Move the air jet up and down the pleats, holding the air nozzle 25 mm (1.0 in) away from the pleats, to prevent rupturing the element with either the nozzle or air jet.
5. In cases where the dust cake on primary element (2) contains oil or carbon, air will not clean effectively. Using manufacturers recommended solution and warm water, not exceeding 48° C (120° F), soak primary element (2) for fifteen minutes. Element should be gently agitated to assist cleaning process.
Note: It is possible to modify an old agitator type washing machine for primary element (2) cleaning. Do not soak or agitate primary element (2) in the solution for more than fifteen minutes. Prolonged exposure softens vertical seams in the element.
6. Rinse washed element thoroughly with a low pressure stream of water, not exceeding 0.7 bar (10 lbf/in2), opposite from the normal air flow, until rinse water runs clear.
7. Air dry primary element (2) thoroughly before returning it to service. Drying is a slow process which may be hastened by exposing element to slowly circulating heated air. Heated air temperature should not exceed 46o C (115o F). Drying time can be reduced to about three hours with heated air. Do not use a light bulb for drying. Do not use compressed air on a wet element.
Note: Replace paper elements after six cleanings or two years in service, whichever comes first. Mark each cleaned element to show total cleanings to date.
8. After primary element (2) is thoroughly dried,

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inspect for damage or ruptures, especially close to the end caps. To detect paper ruptures, place a bright light bulb inside the element and rotate element slowly. Inspection of element on the outside will disclose any holes where concentrated light shines through. Even the smallest hole will pass dust to the engine and may result in costly engine repairs.
9. Install primary element (2) in air cleaner body (1).
10. Install cover assembly (4) on air cleaner body (1) and secure with latches (5).

Secondary Element

Numbers in parentheses refer to Fig.1.
Since safety element (3) is protected from contamination by primary element (2), it needs no periodic cleaning and should be replaced only after every third primary element (2) service.
1. With primary element (2) removed from air cleaner body (1), remove safety element (3).
2. Remove any dust dislodged into air cleaner body (1) outlet and, using a damp cloth and a suitable solvent, wipe out all excess dust from air cleaner body (1) and allow to dry.
3. Install new safety element (3) followed by primary element (2) in air cleaner body (1).
4. Install cover assembly (4) on air cleaner body (1) and secure with latches (5).

Recommendations

Numbers in parentheses refer to Fig.3.
1. Under no condition should the vehicle be operated without both filter elements in each air cleaner assembly.
2. It is very important that tubes (2, 3, 8), tube assembly (12) and elbow (1, 17) from the air cleaner assembly to the engine be airtight or the purpose of the air cleaner will be completely defeated. All clamps (12, 16) and Mounting Band (6, 9) should be checked frequently and tightened to prevent leaks.
3. Keep new or cleaned filter elements on

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hand for replacement to prevent unnecessary downtime of the vehicle.

Measuring air restriction

Numbers in parentheses refer to Fig.3.

As a dry air cleaner element becomes loaded with dust, the vacuum on the engine side of the air cleaner (air cleaner outlet) increases. This vacuum is generally measured as 'restriction in mm (inches) of water'. The recommended maximum allowable intake restrictions at rated speed and load are as follows:

a. 380 mm-H2O (15 in-H2O) with clean filter elements.

b. 635 mm-H2O (25 in-H2O) with dirty filter elements. While the air restriction gauge sends a signal to indicate the need for servicing, it does not give as precise a measurement as a water manometer or vacuum gauge.

Water manometer

1. Remove protective cap and disconnect harness at air restriction gauge. Remove air restriction gauge from elbow.
2. Hold water manometer vertically and fill both legs approximately half full of water. Connect one of the upper ends to elbow by means of a flexible hose.
3. With the manometer held vertically and the engine drawing maximum air, the difference in height of the water columns in the two legs is measured as the air cleaner restriction.
4. If the restriction exceeds the levels indicated, engine performance will be affected. Primary filter element should be cleaned or replaced.

Vacuum gauge

a. Remove protective cap and disconnect harness at air restriction gauge. Remove air restriction gauge from elbow.

b. Connect the hose from the vacuum gauge to elbow and with the engine drawing maximum air, take a note of the reading on the gauge.

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c. If the restriction exceeds the levels indicated, engine performance will be affected. Primary filter element should be cleaned or replaced.

Special tools

Refer to Section 36.3 'MAINTENANCE TOOLS' for part numbers of service tools referenced in this section and general service tools required. These tools are available from your dealer.

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20 EXHAUST SYSTEM ASSEMBLY

20.1 Exhaust System Assembly

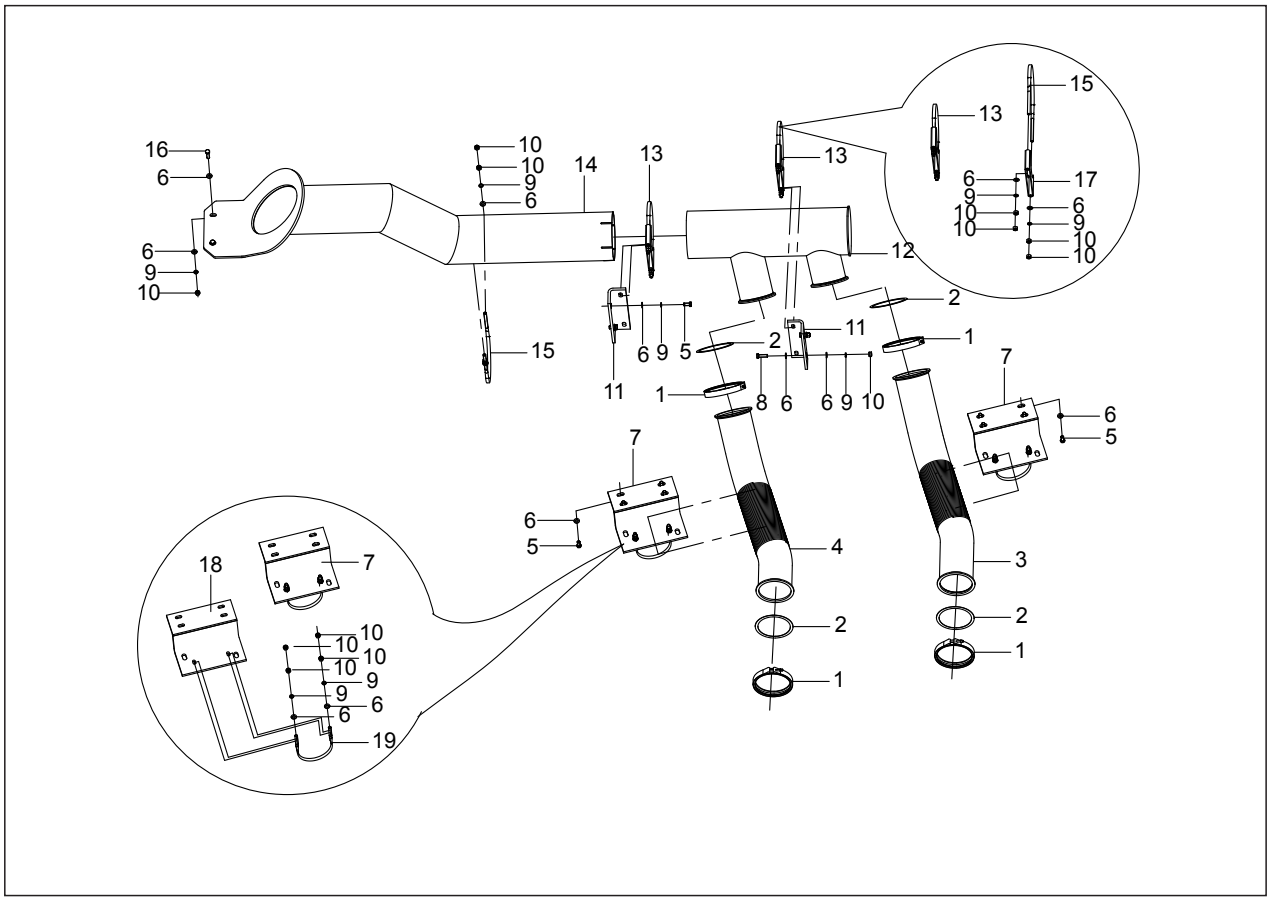


Fig.1 Exhaust System and Mounting

1.Connector
2.Gasket
3.Exhaust tube
4.Exhaust tube
5.Bolt
6.washer
7.Fixed clamp assembly
8.Bolt
9.Washer
10.Nut
11.Plate
12.Exhaust tube assembly
13.Fixed clamp
14.Exhaust tube
15.U-bolt
16.Bolt
17.Support assembly
18.Support
19.U-bolt

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Removal

Numbers in parentheses refer to Fig.1.

⚠ WARNING

To prevent personal injury and property loss, ensure that the wheels are chocked in a desired way and the chock and the hoist equipment have sufficient strength and hoist capacity and are fixed properly for ensuring work safety.

Remove the Exhaust system in the following order:

1. Position the vehicle in a level work area, apply the parking brake and shutdown the engine.
2. Turn the steering wheel in both directions several times to relieve pressure in the steering system. Block all road wheels.
3. Attach suitable lifting equipment to exhaust tube assembly (12) and remove connector(1)，gasket (2)securing exhaust tube (3) and exhaust tube assembly(4) to exhaust tube assembly (12).Remove Fixed clamp (13)，securing exhaust tube assemly (12) to Fixed clamp (13) and frame。remove exhaust tube assembly (12).
4. Attach suitable lifting equipment to exhaust tube (14) and remove bolt (16)，washer (6, 9),nut(10)and U-bolt(15) securing exhaust tube (14) to the platform.Remove exhaust tube (14) from the truck.
5. Attach suitable lifting equipment to exhaust tube（3) and remove washer (6, 9),nut(10) and U-bolt(19) securing exhaust tube(3) to support(18).Remove connector(1)，gasket (2)securing exhaust tube(3) to turbocharger,remove exhaust tube（3) from the truck.
6. Attach suitable lifting equipment to exhaust tube (4) and remove washer (6, 9),nut(10) and U-bolt(19) securing exhaust tube(4)

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to support(18).Remove connector(1), gasket(2)securing exhaust tube(4)to turbocharger,remove exhaust tube（4) from the truck.

7. Storage the pats removed from truck carefully.

Note:Please protect the outlet of turbocharger after removed the exhaust tube (3) and the exhaust tube (4).

Installation

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks, blocking materials and lifting equipment are properly secured and of adequate capacity to do the job safely.

1. Attach suitable lifting equipment to exhaust tube (4) and tighten connector (1)，gasket (2) securing exhaust tube (4) to the turbocharger. Tighten washer (6, 9),nut(10)and U-bolt (19) securing exhaust tube(4) to support (18).

2. Attach suitable lifting equipment to exhaust tube (3) and tighten connector (1)，gasket (2) securing exhaust tube (3) to the turbocharger. Tighten washer (6, 9),nut(10)and U-bolt (19) securing exhaust tube (3) to support (18).

3. Attach suitable lifting equipment to exhaust tube (14) and tighten bolt(16),washer (6, 9),nut (10)and U-bolt(15) securing exhaust tube(14) to the platform.

4. Attach suitable lifting equipment to exhaust tube assembly (12) and tighten connector(1)，gasket (2)securing exhaust tube assembly(12) to exhaust tube(3)and exhaust tube(4).Tighten Fixed clamp(13) securing exhaust tube assembly(12) and exhaust tube(14) to the frame.

5. Check and tighten all the fasteners if necessity.

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21 REAR SUSPENSION SYSTEM

21.1 Rear Suspension System

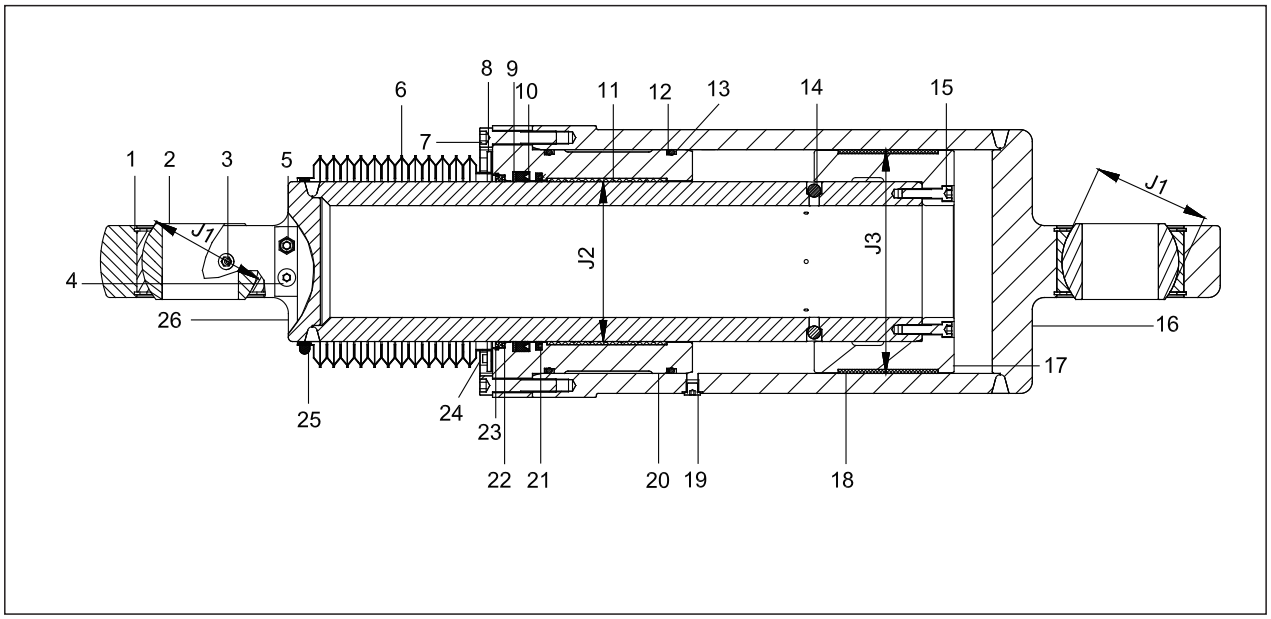


Fig.1 Cutaway View of Typical Rear Suspension Cylinder

1.Snap ring	10.Seal	19.plug
2.Bearing	11.Wear ring	20.Guide sleeve
3.Oil fitting	12.Retainer ring	21.Buffer seal
4.Plug	13.O ring	22.Seal-wiper
5.Charge valve	14.Ball	23.Retainer ring
6.Dust boot	15.Bolt	24.Bolt
7.Bolt	16.Cylinder tube assy.	25.Clamp
8.Plate	17.Piston	26.Piston rod
9.Retainer ring	18.Wear ring	

OVERVIEW

Numbers in parentheses refer to Fig.1.

Oil/gas (nitrogen) rear suspension cylinder is an elastic device suspending to the rear part of mining car. It is installed to the rear part of each longitudinal beam of frame, under the body and above rear drive axle. The rear suspension cylinders are used to absorb road shocks, when the truck hits a bump on the ground.

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OPEARATION

Numbers in parentheses refer toFig.1.

The rear suspension cylinder is composed of two assembly. Piston rod assembly (26) is installed to the frame through pin. Cylinder tube assembly (16) is connected to the rear axle. The cylinder is charged with oil and compressed nitrogen. The rear suspension cylinder works as the elastic elements and absorber. The piston rod performs advance and return movement in the cylinder tube to compress nitrogen and functions as a spring; the function of absorber can be realized through oil flow in internal and external oil chambers in control rear suspension cylinder. When the truck is kept static, the compressed nitrogen in internal cavity may produce sufficient force to support the truck. If the wheels suffer impact from the ground, the piston rod will be driven into the external cylinder barrel and thus to compress the nitrogen and absorb energy. Meanwhile, the oil will drive ball (14) to move and open check valve channel. The oil quickly flows into circular cavity (cyclic annular volume formed by piston rod external diameter and cylinder tube internal diameter) from the main oil chamber and through the hole on piston rod wall and valve hole. After the impact force is absorbed, the increased air pressure will drive piston rod (26) to move upward to return to the original position. Meanwhile, the oil in annular cavity will flow back to the main oil cavity. The oil pressure will force ball (14) to move and close check valve channel. The oil only flows back to the main oil cavity through hole, so as to restrict the flow in such direction, reduce the speed of piston rod in returning to the original position and conduct damp and spring back control based on flow feature difference of oil.

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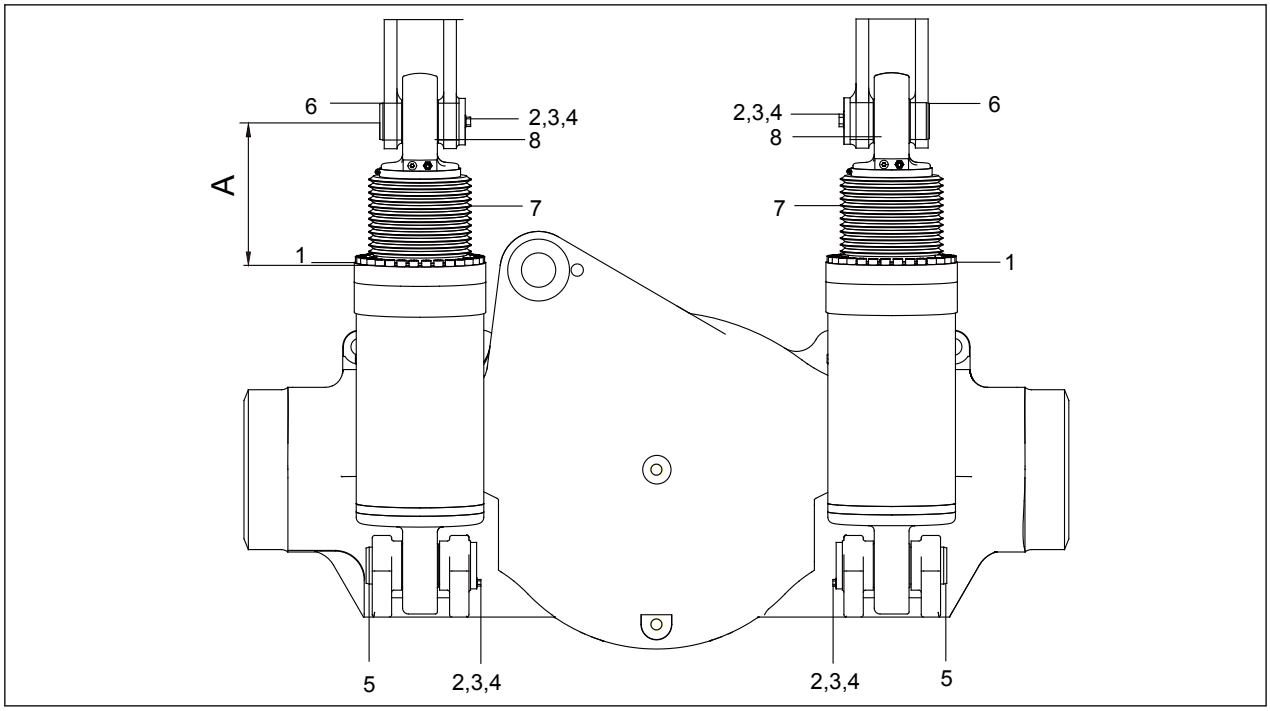


Fig.2 Removal and Installation of Suspension Ride Cylinder

1. Rear ride cylinder
2. Bolt
3. Lock washer
4. Washer
5. Pin Assembly
6. Pin Assembly
7. Dust boot
8. Oil fitting

REMOVAL

Numbers in parentheses refer to Fig.2.

⚠ WARNING

Pressurized cylinders. Release pressure as described under 'Relieving Cylinder Pressure' before removing valves or fittings. Accidental release of pressure will result in personal injury and property damage.

To prevent personal injuries and property losses, ensure that the air pressure in the cylinder is completely released before the suspension is dismantled. In addition, be sure blocking and lifting equipment is of sufficient capacity and properly secured to

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do the job safely.

1. Position the truck in a level work area, apply the parking brake and switch off the engine.
2. Turn the steering wheel in both directions several times to relieve pressure in the steering system. Block all road wheels.
3. Lift the rear end of the mining car, keep the distance A between the upper pin and end cap of guide sleeve is 517mm, and keep the tyres away from the ground. Fasten the rear axle assembly with proper cushion block at this position, then lower the truck slowly to remove the load of the suspension cylinder, and fix the frame with cushion block at this position.
4. Release the nitrogen pressure of rear suspension cylinders according to 'Release suspension cylinder pressure' in this section.
5. Support the suspension with sufficient force before remove the pin. single suspension cylinder weighs for more than 435kg; 19.5L oil will be charged.

Attach a suitable lifting device or 'come-along' to suspension cylinder (1). If a 'come-along' is used, place a bar or heavy pipe through both body prop pin holes in the frame. Attach the 'come-along' to the bar or pipe. Place a suitable strap or chain around suspension cylinder (1) and take up the slack.

Note: Lower end of suspension cylinder (1) must be disconnected before upper end.

6. Remove bolt (2), lock washer (3) and washer (4) used for fastening the suspension cylinder and rear axle housing, pull out pin assembly (5); the suspension cylinder may apply certain pressure to pin when removing the pin assembly.
7. Remove bolt (2), lock washer (3) and washer(4) used for fastening the upper end of suspension cylinder and frame, then pull out pin assembly (6).
8. Remove the rear suspension cylinder, move

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it to a clean working area for removal; repeat steps 5-8 to remove another suspension cylinder if necessary.

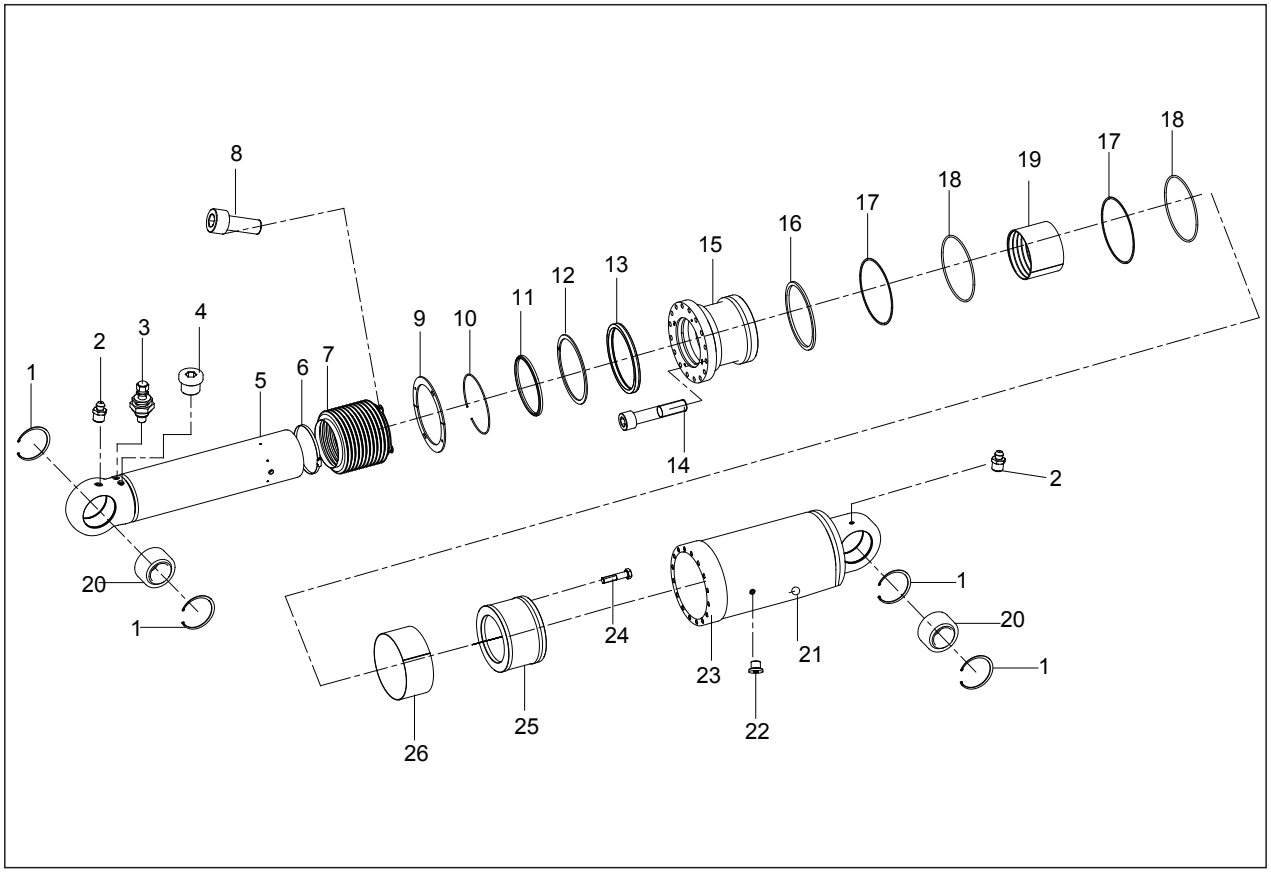


Fig.3 Exploded View of Rear Suspension Cylinder

1. Snap ring
2. Oil fitting
3. Charge valve
4. Plug
5. Piston rod
6. Clamp
7. Dust boot
8. Bolt
9. Plate
10. Retainer ring
11. Wiper-seal
12. Back-up seal
13. Seal
14. Bolt
15. Guide sleeve
16. Buffer seal
17. Retainer ring
18. O-ring
19. Wear ring
20. Bearing
21. Ball
22. Plug
23. Cylinder tube assy.
24. Bolt
25. Piston
26. Wear ring

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Disassembly

Numbers in parentheses refer to Fig. 3.

1. Remove clamp(6)used for securing dust boot (7) to piston rod (5), remove bolt (8)used for securing dust boot (7) to guide sleeve(15), then remove dust boot(7).

2. Remove charge valve (3) and plug(4,22) from cylinder. Drain oil from suspension cylinder into a suitable container. Do not disassemble charge valve (3) unless required.

3. Turn over the suspension with a crane and proper device and fasten cylinder tube assy. (23) to a proper position for disassembly. Remove bolts (14) securing guide sleeve (15) on cylinder tube assy. (23).

4. Install a lifting eye in the top of piston rod (5) and attach to an adequate lifting device. Slide piston rod (5) ,piston (25) and guide sleeve(15) as an assembly out from top of cylinder tube assy. (23). Be careful not to damage the surface of any component. Place these parts on a clean workbench for disassembly if necessary. Remove bolt (24) securing piston(25)to piston rod (5), knock piston (25) assembly away from the end of piston rod (5) with a soft hammer, remove wear ring(26) from piston (25).

⚠ WARNING

Flying metal chips. Use a soft drift and drive to remove piston (25). Flying chips from a hard metal drift can cause serious personal injury.

5. Take out the ball (6) from the hole of piston rod (5).

Note: Take care not to misplace ball (21).

6.Place piston rod (5) assembly securely into position in a press bed with piston rod eye down. Press piston rod (5) out of guide sleeve (15).Be careful not to damage the surface of parts.

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7.Inspect, remove and discard retainer ring(17) and O-ring (18) of guide sleeve(15) outer groove.
8.Inspect, remove and discard steel wire retainer ring (10), wiper-seal (11), seal(12) and wear ring(19) in the internal groove of guide sleeve(15).
9.Remove retainer ring(1) and push out bearing (20) from piston rod (5) and cylinder tube(23).

Inspection
Numbers in parentheses refer to Fig.3.
1.Wash all parts thoroughly in a suitable solvent. Dry all parts with compressed air. Check all inner and outer grooves in guide sleeve (15) for cleanliness.
2.Inspect cylinder tube assy. (23), piston rod (5) and piston (25) for scores, scuffing or small ridges in the walls. Use a fine stone to smooth out any defective areas. If damage is too extensive, replace with a new part.
3.Check all cylinder assembly components for signs of unusual distortion or excessive wear. Replace defective components.
4.Inspect all plugs (4) and charging valve (3). Check their seating positions in piston rod (5) and cylinder tube assy. (23). If threads in any of these parts are damaged, restore the threads. If threads are not repairable, the defective part must be replaced.
5.Inspect both cylinder eye surfaces for scratches or signs of excessive wear. Check bearings (20) and snap rings (1) for wear or warped condition. Replace defective parts.
6.Inspect wear ring (19,26) for excessive wear or damage. Replace if damaged.
Note: The maintenance standard of bearings (20) and wear ring (19,26) refer to Fig.1 and Tab.1.

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Tab.1 Maintenance standard

No.	Check item	Criteria					Remedy
J1	Clearance between race and ball of bearing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace bearing
			Shaft	Hole			
		146			0.13- 0.23	0.876	
J2	Clearance between piston rod and wear ring	200	-0.043 -0.096	+0.272 +0	0.043-0.368	0.4	Replace bearing
J3	Clearance between cylinder and wear ring	280	-0.05 -0.296	+0.072 0	0.05-0.368	0.8	Replace wear ring

Assembly

Numbers in parentheses refer to Fig.5.

1.Apply a light coating of clean hydraulic oil to all components to facilitate assembly procedure. Make certain that all work is carried out in a clean area so no dirt or other contaminants can get into the oil.

2.If removed, install snap ring (1) into cylinder tube assy.(23) eye. Use a hand press to position bearing (2)against snap ring (1) in eye of cylinder tube assy.(23). Retain bearing(2) with snap ring (1). Use similar procedure to install bearing(2) and snap rings (1) in piston rod (5) eye end.

3.Install new snap ring (1), seal-wiper (11), Back-up seal(12), seal(13) and wear ring(19) into the corresponding groove of guide sleeve (15). Before seal-wiper is installed, waterproof glue should be applied onto the external surface of frame.

4.Install new retainer ring (17) and O-ring (18) into the corresponding groove on the external surface of guide sleeve (15).

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5.Use a proper seal expander or similar tool to prevent the seal ring from damage. Install the guide sleeve (15) onto the piston rod (5) carefully.
6.Install ball (21) into the valve seat of cylinder piston rod(5).
Note: Fix these balls temporarily with a little clean grease in the rest assembly procedure.
7.Install wear ring (26) on piston (25) and press piston assembly into position on end of piston rod (5). Secure piston (25) assembly to piston rod (5) with bolts (24). Tighten bolts (24) evenly to a torque of 136 Nm.
8.Install a lifting eye in the top of piston rod (5) and attach to an adequate lifting device. Insert piston rod (5) ,piston (25) and guide sleeve(15) as an assembly through the top of cylinder tube assy.(23). Pushing piston rod in until piston (25) bottoms inside the cylinder tube. Be careful not to damage the surface of any component.
9.Use a seal shrinker or similar product to prevent the seal from damage. Align with each bolt holes and install the guide sleeve (15) into the cylinder tube assembly carefully.
Note: Because of close tolerances, care will have to be taken when assembling piston rod (5) and piston(25) assembly into cylinder tube (24).
10.Secure guide sleeve (15) to cylinder tube assy. (23) with bolts (24). Tighten bolts to torque of 333 N•m.
11.Install dust boot(7) on piston rod(4). Use clamp(6) , bolt(8) and plate(9) to secure it to piston rod (5) and guide sleeve (15).
12.Install charge valve (3) and plug(4) on piston rod. The tighten torque of charge valve is 50N•m, the tighten torque of charge valve core is 0.35 - 0.45N•m, the tighten torque of charge valve protecting cover is 4.5 - 5.5N•m. Before installation, inspect the seal of charge valve and plug for signs of damage, replace them in time if they are damaged.
13.Install suspension cylinder in operation

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position and charge oil and gas into suspension cylinder according to the requirements of the charging procedure.

Installation

Numbers in parentheses refer to Fig.3.

⚠ WARNING

To prevent personal injury and property damage, be sure blocking or lifting equipment

1.Clean all parts surface of suspension cylinder and frame to make them smooth.

2. Lift rear suspension cylinder with proper lifting equipment or chain and make sure the charge valve is outside the cylinder. The weight of cylinder is 435kg; the oil capacity is 19.5L.

Note: Lower end of suspension cylinder (1) must be attached first.

3. Apply anti-seeze lubricant to pin assembly (5).

4. Insert pin (5) through the rear axle housing and the pin hole of suspension cylinder, push it to specified position, and fasten it to the rear axle housing with washer (4), lock washer (3) and bolt (2).

5. Install upside of suspension cylinder to frame, insert pin (5) through the frame and the pin hole of suspension cylinder, push it to specified position, and fasten it to the frame housing with washer (4), lock washer (3) and bolt (2).

6. Remove the lifting equipment or chain from the rear suspension cylinder.

7.If the opposite suspension cylinder (1) was removed, follow Steps 1 through 6 to install the cylinder.

8. Charge the suspension cylinder according to charging procedure. Check the operation of suspension cylinder according to the contents

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indicated in maintenance and adjustment section.

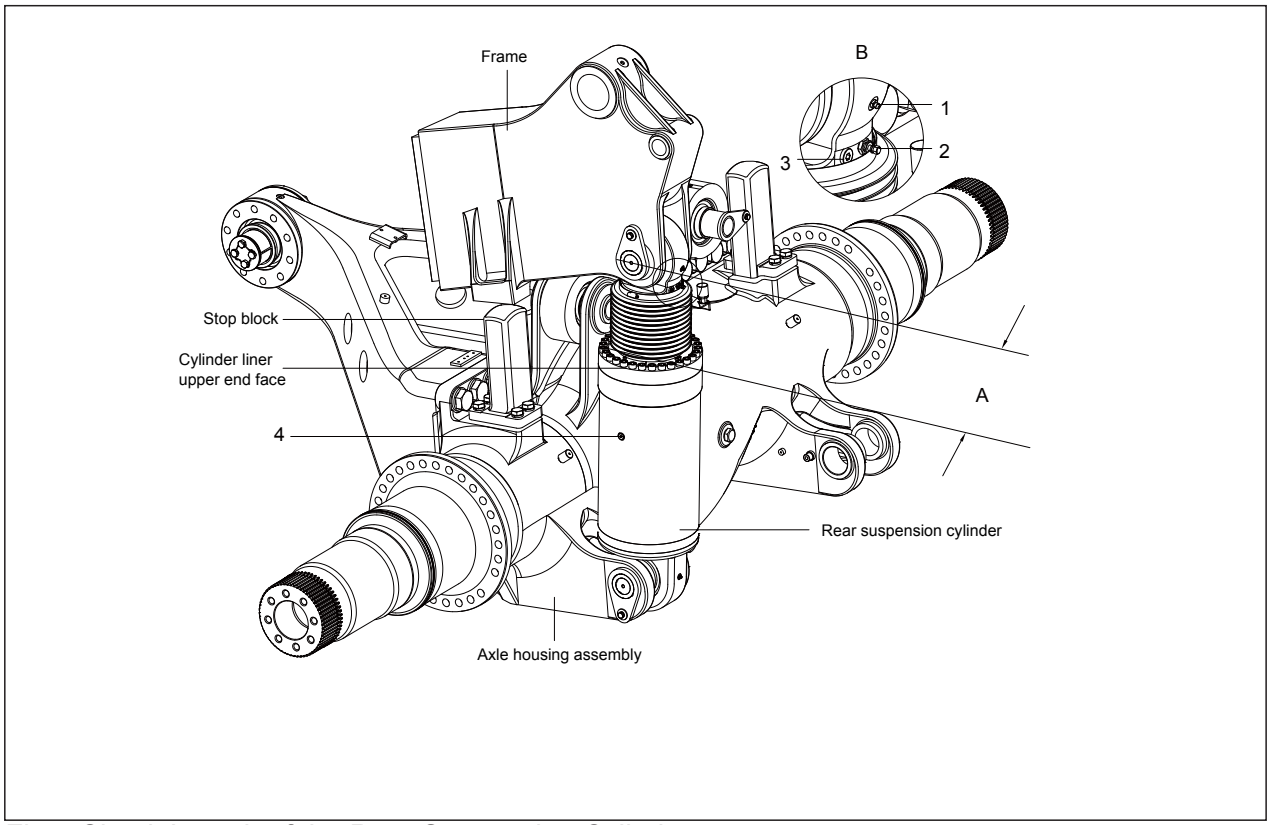


Fig.4 Check Length of the Rear Suspension Cylinder

A: Distance between centre of pin and the end cap of guide sleeve
Note: Dimension “A” =455mm with the truck empty
Dimension “A” =366mm with the truck loaded

1. Oil fitting
2. Nitrogen Charging Valve
3. Plug(oil fill port)
4. Plug(air exhaust port)

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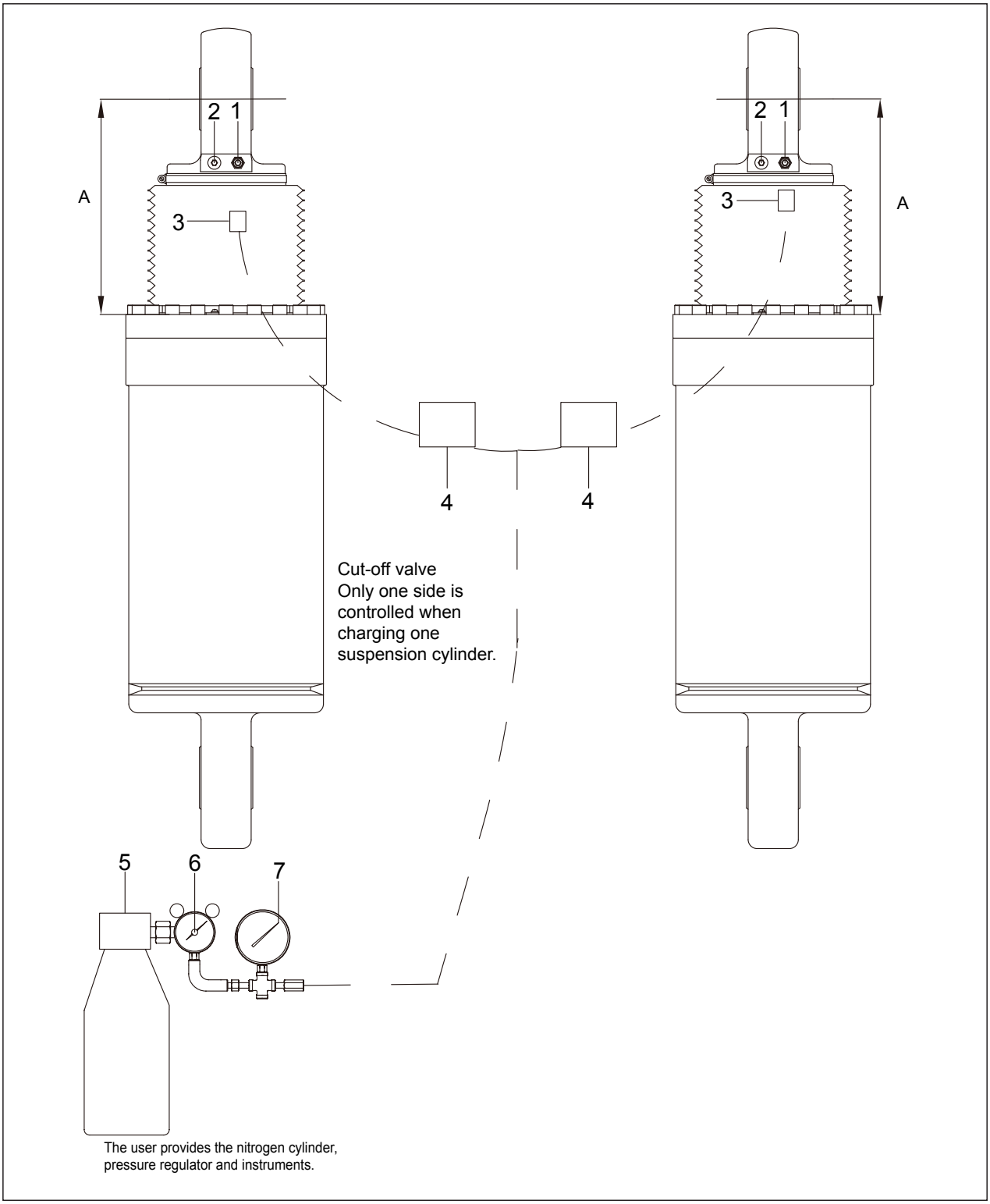


Fig.5 Nitrogen inflation drawing

A: Distance between the center of pin and cap of guide sleeve.

1. Charge valve
2. Plug
3. Nitrogen joint
4. Cut-off valve
5. Nitrogen cylinder
6. Pressure regulator
7. Pressure gauge

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Maintenance and adjustment

Periodic maintenance includes the following steps:

1. Clean the device. Check the signs of wear, damage or oil-gas leakage. Pay special attention to the exposed part of piston rod and inflation valve. Repair or replace them as required.

Note: The dust boot is equipped with zipper which can be replaced without remove suspension cylinder or pin.

2. Check all parts for signs of wear or looseness. In case of any looseness, repair or replace them if necessary.

3. Inspect the exterior of suspension cylinder for signs of oil leakage. Repair or replace according to the requirements and add oil again according to the method described in the instructions.

Note: Refer to following procedure in this part for detailed instructions of oil level inspections.

4. Check the relevant operating conditions of suspension cylinder according to the following method:

1)Run the truck and make that two suspension cylinder can achieve a balance at the normal operating temperature.

2) Position the empty truck on a flat ground. Measure the distance A between the center of pin and the end cap of guide sleeve as shown in Fig.8. The value obtained should be approximately 455mm (with the error not exceeding 10mm; refer to Fig. 8). If the distance is not in this range, check and adjust the nitrogen pressure according to the procedure below this part. The following signs indicate that it is necessary to maintain the interior of suspension:

a. There is sign of oil leakage in the surrounding of suspension cylinder.

b. The gas column height changes frequently. It is required to charge nitrogen.

Note 1: The reduction in the gas column

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height is usually accompanied by the loss of gas.

Note 2: At the circumstance of normal gas column height, the offset of gas height indicates that the oil is losing.

Note 3: The traveling or excessive elasticity of gas will lead to repeated operation of suspension cylinder.

3) After the suspension cylinder is inflated to the correct height, apply the rated load, park the truck on a flat ground, the distance A between the center of pin and the end cap of guide sleeve should be equal to 366mm or higher. (If A is less than 366mm, check the truck is overloaded or not. If not, deflate and add oil, inflate gas again).

Note 4: The unsmooth traveling or excessive elasticity of gas column will lead to repeated operation of suspension at its travel terminal.

Charging rear suspension cylinder

⚠ WARNING

Lifting heavy parts or machines. To prevent personal injury and property damage, be sure blocking or lifting equipment is of sufficient capacity and properly secured to do the job safely.

⚠ WARNING

Pressurized cylinders. Release pressure as described under 'Relieving Cylinder Pressure' before removing valves or fittings. Accidental release of pressure will result in personal injury and property damage.

To prevent personal injuries and property losses, ensure that the air pressure in the cylinder is completely released before the

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suspension is dismantled. In addition, be sure blocking and lifting equipment is of sufficient capacity and properly secured to do the job safely.

Relieving Cylinder Pressure

Note: Truck must be unload and on a level surface prior to relieving suspension cylinder pressure.

1.Support the frame near the suspension with blocking and/or a hydraulic jack with adequate capacity.

2.Place a 35mm cushion block between the frame and oscillation stopper to facilitate charging procedure.

3.Remove the cap from nitrogen charging valve at the top of the cylinder. Turn the hex out on the valve 1/4 to 1/2 turn counter-clockwise and depress the valve core. If no gas escapes, continue to turn the hex nut in 1/4 turn increments until the nitrogen releases as the valve core is depressed.

4.Remove blocking or release pressure on the hydraulic jack and allow the truck's weight to fully retract the suspension cylinder rod.

5.Depress nitrogen charging valve core again to be sure all pressure has been relieved.

Note:Nitrogen leaving the cylinder will often carry oil with it. This results form foaming of the oil in the cylinder. The foaming takes place as nitrogen which was dissolved in the oil at high pressure expands at atmospheric pressure. The oil lost in this operation must be replaced in the charging operation. The longer the oil is allowed to stand at atmospheric pressure after discharging cylinder, the easier it will be to purge cylinder of bubbles in the oil when recharging.

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⚠ WARNING

Pressurized cylinders. Keep valve core depressed until all gas is bled from cylinder. Failure to release air pressure may result in personal injury or property damage.

Charging Instructions

Note1: This procedure should be performed after the suspension cylinder is installed on mining truck. If it is not installed, the suspension cylinder should be placed with a proper supporting form and fastness before this procedure is operated.

Note2: To ensure that both suspension cylinders will be equally charged to the required height specifications and equal pressures, both cylinders should be charged simultaneously. Also when front suspension cylinders are being charged, both rear suspension cylinders should be extended equally. This can be accomplished by placing equal thickness blocks between axle and frame at the bump stops. It may be necessary to raise frame slightly to install spacers. Be sure to remove spacers when charging is complete.

Note3: The pressure of a confined gas varies directly with its temperature. Hence, extreme changes in suspension cylinder ambient temperature will change its nitrogen charge volume and,consequently, its operating height. It might be necessary, therefore, to add or remove nitrogen to maintain proper cylinder height as ambient temperature changes.

⚠ WARNING

Pressurized cylinders. Release pressure as described under 'Relieving Cylinder Pressure', before removing valves or

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fittings. Accidental release of pressure will result in personal injury and property damage.

A high pressure nitrogen pressure regulator must be used with the charging assembly. Failure to use a pressure regulator could cause property damage, personal injury, or death.

Filling oil (Cylinder filled with oil initially, or refilled with oil during maintenance)

Note: This method is recommended to fill oil when the loss of oil in the suspension cylinder is caused by some other reasons but surface leakage. If surface leakage occurs, the cylinder should be removed and replaced. Return the suspension cylinder to factory for repair. Unauthorized repair may influence its quality.

Oil level of the suspension cylinder mounted on mining truck can be checked and adjusted according to the following steps:

Note 1: During the operation of mining truck, the charged nitrogen in the cylinder tends to be mixed with oil. When the nitrogen pressure is released, oil will be released from the suspension cylinder in the form of foams.

Note 2: To detect oil level correctly, nitrogen must be completely discharged from the cylinder body. This operation can be completed by evacuating gas or by sustaining frame properly with cushion block to keep cylinder in the open state for more than 24 hours. This operation is required only when surface leakage or deviation excessive.

Note 3: This procedure should be performed after the suspension cylinder is installed on mining truck. If it is not installed, the suspension cylinder should be placed with a proper supporting form and fastness before this procedure is operated.

1. Position the truck in a level work area. The

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truck must be parked stably without applying friction brake system.

2. Lift up the truck until the suspension completely extends. Use jack or cushion blocks to fix mining truck. At the moment, the distance A between the center of pin and end cap of guide sleeve is equal to 517.5mm(See Fig.5).

3. Remove the cap from nitrogen charging valve (1, Fig.1) at the top of the cylinder. Turn the hex out on the valve 1/4 to 1/2 turn counter-clockwise and depress the valve core to release the nitrogen .

4. Connect a vacuum pump to the charge valve to perform the vacuum pumping.

5. Start vacuum pumping and monitor this process until all gas is pumped out. When the color of oil in the suspension cylinder is darkened homogeneity, it indicates that it is pumped out.

Note: It is not allowed to pump the oil from the suspension cylinder.

6. Stop vacuum pumping.

7. Slowly lower down the frame to make the dimension “A”(the distance between the center of pin and end cap of guide sleeve ,See Fig.5) equal to 348mm.

8. Release all residual gas pressure in the suspension cylinder as step 3.

9. With cylinder rod in its right position (“A” = 348mm), open plug(2, Fig.5) and pay attention to oil flows or not. If no oil flows, fill oil according to the following requirements when oil level is lower.

10. Remove the plug (2,Fig.5)and charge valve (1,Fig.5) from the piston rod. Attach hose from a pressure pump filled with hydraulic oil specified in chapter36.1“LUBRICATION AND MAINTENANCE” to oil fill port(2,Fig.5). The approximate volume required for initial oil charging of each front suspension cylinder is about 19.5L.

Note: In a cold region, a synthetic hydraulic

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fluid(Conoco/Philips synthetic R&O or similar products) is recommended as a substitute product. This fluid should have the following characteristic:
ISO viscosity grade: 46; solidification temperature: -70°C (-55°C); PAO synthetic agent, allowing to use normal insulation device.
12. Fill the cylinder until oil flows free of air bubbles from charging valve (1, Fig5) port. It may be necessary to wait 30 or more minutes after nitrogen pressure has been released to clear the foam which has formed inside the cylinder.
13. Remove oil fill equipment, reinstall plug (2, Fig5) and nitrogen charging valve (1, Fig5) in the ports .
14. Charging suspension cylinder with the nitrogen according to the following procedure.
Note:If vacuum pumping have not be done before oil filling, oil fill should accord to the following procedure in order to exhaust the air of cylinder:
a. Remove the plug in piston rod and plug in the cylinder tube assy. meanwhile the charge valve should not be removed.
b. Attach oil fill equipment to the plug port and fill the cylinder until oil flows free of air bubbles from plug port. Reinstall plug in the port of cylinder tube assy. and remove nitrogen charging valve in the ports .
c. Go on filling the cylinder with the plug port. Stop oil filling until the oil flows free of air bubbles from charge valve port, and remove oil fill equipment. Reinstall plug and nitrogen charging valve in the ports .
15. Charging suspension cylinder with the nitrogen according to the following procedure.

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Charging nitrogen

⚠ WARNING

Nitrogen can only be charged when the suspension cylinder is installed to the mining car.Use dry nitrogen to charge cylinder. Do not use a gas such as oxygen which , if used by mistake for pressurizing, will explode violently when coming into contact with oil or grease, possibly causing personal injury and property damage.

Numbers in parentheses refer to Fig.5, unless otherwise specified.

Please use the tool assembly including tee fitting(4, Fig.6), hose (8, Fig.6), cutoff valve (5, Fig.6) and charging joint(9, Fig.6) for charging the left and right suspension cylinder. Tool assembly is detailed in Fig.6 nitrogen charging tool.

Note: Use the gas pressure regulator installed on the nitrogen cylinder to protect the pressure gauge (The nitrogen cylinder is not supplied with the nitrogen charging assembly). An accurate and reliable pressure gauge is very critical to the correct adjustment of suspension.

Note: When the charge valve protecting cover is removed, no residual gas pressure is allowed. If any, the protecting cover can be removed after the pressure is completely discharged.

1. Position the truck at a safe and flat road surface. The truck must be parked stably without applying friction brake system of mining truck.
2. Remove cover of the charge valve carefully because residual gas pressure may exist.
3. Connect the charge component (closing the cut-off valve) to charge valve(1,Fig.5) on suspension cylinder and the gas pressure regulator on the nitrogen cylinder.

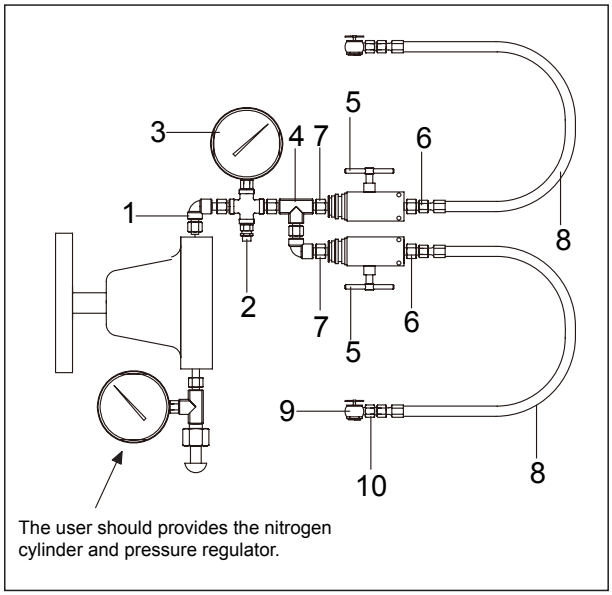


Fig.6 Nitrogen inflation tool

1. Elbow
2. Bleeder valve
3. Pressure gauge
4. Tee piece
5. Cut-off valve
6. Pipe joint
7. Pipe joint
8. Line
9. Nitrogen charging joint
10. Pipe joint

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1) Connect the hoses of two ends installed with the Nitrogen charging joint(3, Fig.5) to the charge valves(1,Fig.5)of rear suspension cylinder respectively.
2) Connect the other end to the nitrogen cylinder.
4. Adjust the gas pressure regulator to about 2000kpa.
Note: Protect the pressure gauge carefully to avoid excessive pressure. The pressure is easy to exceed 7000kpa.
5. Charge the suspension cylinders according to the following steps:
a. Rotate the small hex nut on the charge valve (1,Fig.5) of suspension cylinder counterclockwise for two or three turns to make the internal valve move away from the seat.
b. Rotate the “T” handle of nitrogen charge joint (3,Fig.5) clockwise until it cannot be turned any more. Open the check valve of inflation joint.
c. Open the cut-off valve (4,Fig.5), and inflate the suspension cylinders at both sides with the same pressure. During the inflation, open slowing and intermittently close the cut-off valve (4,Fig.5) until the distance A between the center of pin and end cap of guide sleeve is equal to 455mm (the allowable range of error is 10mm).
d. When the height ‘A’ is reached (Fig.5), turn off the pressure regulator (6, Fig.5) on the nitrogen cylinder, close the cut-off valve(4, Fig.5), rotate the hex nut on the charge valve (1, Fig.5) of suspension cylinder clockwise and close the internal valve. Rotate the “T” handle of nitrogen charge joint (3, Fig.5) counterclockwise until it cannot be turned any more.
Note 1: In the charging process, the gas should be slowly added and the flow of gas should be periodically stopped to allow the suspension cylinders in the left and right sides to reach balance. The correct process will vary

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with the equipment, materials and operators. No excessive inflation is allowed; otherwise, it will lead to the excessive extension of cylinder body and damage of fixing bolts on the piston.

Note 2: To check the pressure of nitrogen cylinder (5, Fig.5), close the cut-off valve (4, Fig.5), turn on the gas pressure regulator (6, Fig.5) slowly on the gas cylinder and observe the reading of the pressure gauge (7, Fig.5). The pressure in the gas cylinder must be higher than 7000kpa.

Note 3: To check the pressure in the cylinder, turn off the gas pressure regulator on the gas cylinder, open the cut-off valve (4, Fig.5) and observe the reading of the pressure gauge (7, Fig.5).

Note 4: If height of unload isn't correct, repeat the previous procedure to add or reduce charging pressure by the increment of 150kpa. The increment is a critical parameter for suspension cylinder charging to get a correct height of no-load state.

Note 5: If the mining truck operated in the colder environment, it is recommended to raise the height of unload state by 10~20mm to compensate for the effect of temperature reduction.

6. Close the cut-off valve and turn off the gas pressure regulator.

7. Remove the inflation device and check nitrogen charge valves (1) for leakage with soapy water.

Note: In case of any leakage in the spool of charge valve:

1) Check the torque of spool. The torque should be 0.35 - 0.45N•m.

2) If the leakage cannot be stopped, check the spool for damage or contamination. Replace it if necessary. All suspension cylinder pressure should be released before the spool is removed with oil charging assembly.

8. Install the cover of charge valve. The torque is 4.5 - 5.5N•m.

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9. Run the mining truck about 24 hours, perform the procedure of inspect unload height again, and make adjustment if necessary.

Note: On new or rebuilt cylinders, the seals and wipers may grip the piston rods tighter and make it difficult to obtain the correct height shown in Fig.4. If this happens, the cylinders should be charged as accurately as possible. In addition, the height of suspension cylinder should be checked again according to the following table after the truck runs for several days. The cylinder pressure shown in table.1 is guide only. Cylinders should be charged according to the height 'A' specified in the Fig.5 and NOT solely on the basis of monitoring cylinder pressure.

Tab.2 Rear Cylinder charging height and pressure

	Cylinder height 'A'	Cylinder pressure
Truck empty	A=455mm	1.5MPa
Truck loaded	A=366mm	10MPa

Maintenance

Visually check suspension cylinder heights daily(Fig.1-6&Tab.3). Lubricate the suspension cylinders at service intervals and with lubricant specified in Chapter 36.1 “LUBRICATION AND MAINTENANCE”.

Tab.3 Special torque specifications

Fig. No.	Item No.	Name	Torque (N•m)
3	14	Bolt	333
3	24	Bolt	136

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22 RADIATOR GUARD

22.1 Radiator Guard

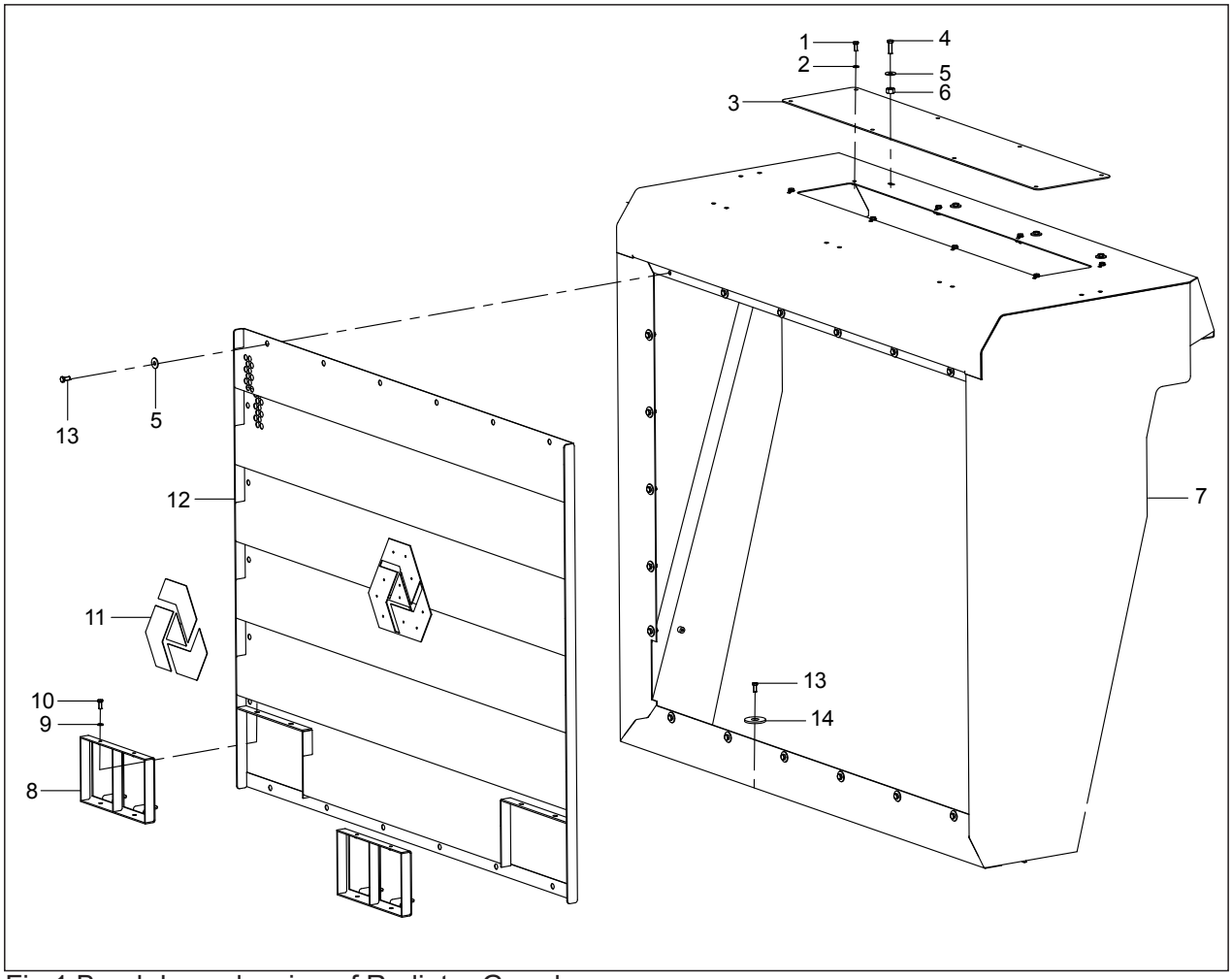


Fig.1 Breakdown drawing of Radiator Guard

1.Bolt	8.Fog lamp shield
2.Washer	9.Washer
3.Sealing plate	10.Bolt
4.Bolt	11.Company logosrt
5.Washer	12.Radiating net cover
6.Nut	13.Bolt
7.Hood frame	14.Washer

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Overview

Radiator guard provides necessary defence for the radiator front the truck, the serried mesh guarantees necessary airflow to the radiator fan.The removable upper cover plate provides convenience of maintenance and overhaul.

Removal

Numbers in parentheses refer to Fig.1, unless otherwise specified.

Note: Approximate weight of radiator guard assembly is 280Kg.

1.Position the truck in a level work area, apply the parking brake and block all wheels.
2.Remove bolts(13),washers(5), 22 in all.
3.Remove grid mesh(12).
4.Remove bolts(13),washers(14) that under the hood frame,7 in all.
5.Remove bolts(4),washers(5),nuts(6)the two sides of the hood frame,4 in all.
6.Remove hood frame(7).

Installation

Numbers in parentheses refer to Fig.1, unless otherwise specified.

Note:Tighten all fasteners to standard torques in 36.2, 'STANDARD BOLT AND NUT TORQUE
SPECIFICATIONS'.

Approximate weight of radiator guard assembly is 280Kg.

Using a suitable lifting device,align the component to be installed in position on the frame. Secure the component securely to the frame with mounting hardware removed during removal.

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23 BODY AND MOUNTING

23.1 Body and Mounting

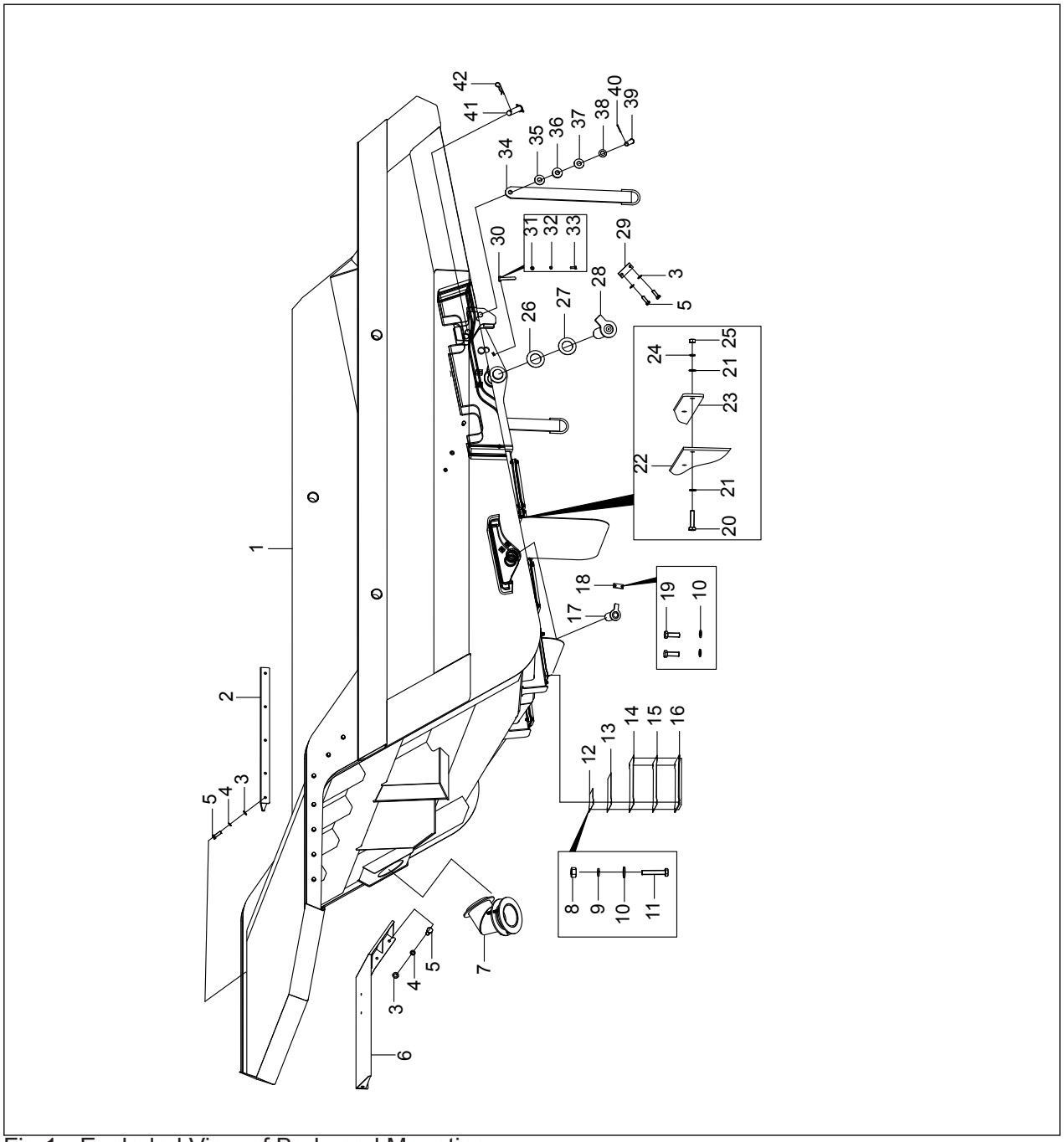


Fig.1 - Exploded View of Body and Mounting

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1.Body
2.Right front guard
3.Washer
4.Washer
5.Bolt
6.Left front guard
7.Exhaust device
8.Nut
9.Washer
10.Washer
11.Bolt
12.Shim
13.Shim
14.Shim
15.Shim
16.Damping pad
17.Brace piece axial pin
18.Plate
19.Bolt
20.Bolt
21.Washer
22.Rubber splashboard
23.Plate
24.Washer
25.Nut
26.Shim
27.Shim
28.Brace piece axial pin
29.Plate
30.Mounting plate
31.Washer
32.Washer
33.Bolt
34.Bar
35.Shim
36.Shim
37.Shim
38.Washer
39.Cotter pin
40.Pin
41.Safety pin
42.Inserted pin

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Overview

Numbers in parentheses refer to Fig.1.

Longitudinal 'V' floor which gives the body rigidity and a low centre of gravity.The body reinforced by wide channel-section stiffeners.

The body is pivoted at Brace piece axial pins (28) at the rear of the frame and is operated by two stage hoist cylinders mounted outside the frame rails. The hoist cylinders raise the body to a tipping angle of 60° in 16 seconds and power down the body in 15 seconds.

Operation

The body control joystick, mounted at the left hand side of the drivers' seat, provides electricity signal for operating body control valve which controls the way of entering oil and so make up shifts and downshifts of body.

The four operating positions of the body control joystick from front to rear are: Lower, Float, Hold and Raise.

Raising the Body

Before raising the body, allow the engine to slow to idle, make sure the rear wheels are on firm level ground, shift the transmission to Neutral and hold the truck stationary by Parking brake control.

Move the body control joystick back to the 'Raise' position and accelerate the engine. The body can be stopped at any point by moving the joystick to 'Hold'. Decelerate the engine as the last stages of the body hoists begin to extend to slow the raising speed as the hoists approach their maximum extensions. When the body has been raised to the desired height, move the control joystick to the 'Hold' position until the body is to be lowered.

Lowering the body

To lower the body, move the control joystick to the 'Float' position to allow the body's weight to lower it to the frame. Body descent can be stopped at any position by moving the joystick

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back to the 'Hold' position. If the body does not begin to lower by its own weight, such as after dumping downgrade, move the control joystick all the way forward to the 'Lower' position and power the body downward until it begins lowering by gravity. Then move the joystick to 'Float' to allow the body to lower the rest of the way to the chassis. Make sure that the body is completely lowered and the control lever is in 'Float' before releasing the brakes and moving the truck.

Removal

Numbers in parentheses refer to Fig.1.

Note: Approximate weight of body (1) is 13,631kg.

⚠ WARNING

To prevent personal injury and property loss, ensure that the wheels are chocked in a desired way and the chock and the hoist equipment have sufficient strength and hoist capacity and are fixed properly for ensuring work safety.

1. Position the truck in a level work area, apply the parking brake and block all wheels.
2. Raise body (1) and install body safety pins (41).
3. Remove bolts (19), washers (10) and plates(18) securing hoist cylinder mounting pins to body (1). Do not remove cylinder mounting pins (17) at this stage.
4. Remove body safety pins (41) and lower body (1) to rest on the frame rails.
5. Support body hoist cylinders from the rear of the truck to prevent them swinging back on removal of cylinder mounting pins. Remove cylinder mounting pins (17) and allow body hoist cylinders to rest against the chassis.
6. Remove plates(28),bolts (5) and washers (3) securing body brace piece axial pins(28).

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Remove body brace piece axial pins(28) and shims (26&27) from body (1) and pin mounting bores. Using suitable lifting equipment, sling body (1) and remove from the truck.

Note: Do not remove damping pads (16) and shims (14 & 15)unless damping pads (16) are being replaced.

7. If required, remove nuts (8) , washers (9 & 10) and bolts (11) securing damping pads (16) and shims (12、13、14 、15) to body (1). Remove and discard damping pads (16) and shims (12、13、14 、15).

Note: Do not remove damping pads (16) and shims (12、13、14、15) ，unless damping pads (16) are being replaced.

Installation

Numbers in parentheses refer to Fig.1.

⚠ WARNING

~~To prevent personal injury and property loss, ensure that the wheels are chocked in a desired way and the chock and the hoist equipment have sufficient strength and hoist capacity and are fixed properly for ensuring work safety.~~

Note: Tighten all fasteners to standard torques in 36.2, ~~STANDARD BOLT AND NUT TORQUE SPECIFICATIONS.~~

Note: Approximate weight of body (1) ~~134,631k~~.

1. Ensure body Brace piece axial pins (28) and bores in body (1) are thoroughly cleaned with a suitable solvent. Coat Brace piece axial pins (28) and bores in body (1) with a suitable anti-seize compound.
2. Using suitable lifting equipment, sling body (1) and centralize over the frame.
3. Align Brace piece axial pins (28) bores in body (1) with mounting bores in the frame. Install body Brace piece axial pins (28) and

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secure with plates (29),bolts (5) and washers (3).

4. Remove lifting equipment from rear lifting points on body (1) and raise the front end of body (1) to provide access to install body hoist cylinders. Position wooden blocks (or suitable stands) on the frame rails and lower body (1) to rest on the blocks. Remove lifting equipment from body (1).

Start the engine and using the body control lever, extend the body hoist cylinders until mounting holes are aligned with mounting bores on body (1).Secure both body hoist cylinders to body (1). Refer to chapter 14.5, 'LIFITING CYLINDER '.

5. Raise body (1), remove blocks and lower body (1).

6. Install the body damping pads (16) and shims (12、13、14 、15) as described under' BODY SHIMMING PROCEDURE'.

7. Ensure body (1) is centralized on the frame rails, remove body brace piece axial pins (28) .Adjust brace piece axial pins (28) with shims (26 & 27) as described described under 'BODY SHIMMING PROCEDURE'.

Check for correct clearance and secure body brace piece axial pins (28) with plates (29),bolts (5) and washers(3).

8. Install the damping pads (16) and shims (12、13、14、15) on the frame guides as described under 'BODY SHIMMING PROCEDURE'.

9. Raise and lower body (1) and check for correct clearance at body brace piece axial pins (28) and body guides.

10.Weld the exhaust device on the body, check the flue through lifting and dropping the body.

Body shimming procedure

Numbers in parentheses refer to Fig.1.

Note: Tighten all fasteners to standard torques in 36.2, STANDARD BOLT AND NUT TORQUE SPECIFICATIONS.

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Note: Damping pads (16) should be checked every 250 hours and should be adjusted if necessary.

Note: When it becomes necessary, damping pads (16) should be replaced as a set to maintain load distribution along the chassis. Existing body pads will have taken a compression 'set' and a new pad shimmed to match existing pads will not carry its share of the load, resulting in uneven load distribution along the chassis.

Note: The frame guides should also be inspected and rebuilt as necessary at this time.

1. Raise body (1) clear of the frame and position damping pads (16) roughly in position on the frame rails. Lower body (1) onto body damping pads (16).
2. Shim the two rear damping pads (16) with shims(12、13、14、15) until body brace piece axial pins (28) are just touching at the top of body (1) bores.
3. Shim remaining damping pads (16) with shims (12、13、14、15) to ensure body (1) is resting parallel on the frame. Ensure all residual damping pads(16) joint with frame.
4. Secure damping pads (16) and shims (12、13、14、15) to body (1) with bolts (11), washers (9&10), nuts (8).
5. Centralize body (1) on the frame rails, and measure the clearance between inside of the brace piece axial pin seat and flange end face of frame .Remove body brace piece axial pins(28), install shims of frame (26 , 27,or 26 & 27), ensure clearance of 0.5 -1.0mm between inside of the brace piece axial pin seat and flange end face of frame .Secure brace piece axial pins(28) with plates(29),bolts(5) and washers(3) .
6. Centralize body (1) on the frame rails, measure clearance between frame limiter and body limiter. Fix shim ,choose a suitable one from 12, 13, 14, 15 or combining each of them onto the body limiter with nuts (8),washers

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(9&10), and bolts (11).
7. Lift or lower body (1) to check correctness of brace piece axial pins(28) clearance.
Note: Operation should be performed according to steps specified in 'REMOVAL','INSTALLATION' as well as Chapter 14.5 'HOISTING CYLINDER'.

Cleaning heated body
Note: Optional exhaust heating of the body is available for dumping of sticky or frozen materials.
It is necessary to periodically clean out the carbon deposits in the body heating passages which restrict the flow of exhaust gases. This reduces the engine efficiency and prevents the body from being heated.
Occasionally the carbon deposits are ignited by spontaneous combustion or by heat from the exhaust gases. The resulting fire in the heating passages is helpful in that it burns away some of the carbon and helps keep the body passages open. However, the fire should be allowed to burn itself out and should not be encouraged by pouring fuel into the passages.
If excessive exhaust back pressure develops, another method of cleaning out the body passages is to remove the heat channel plates and scrape the carbon from the heating passages. To remove the heat channel plates, burn out the weld around them and lift out from the body assembly with suitable lifting equipment.
Note: Prior to welding on the truck, follow the procedures outlined for 'Welding' in Chapter 17, 'FRAME AND INSTALLATION'.
After the heating passages are thoroughly cleaned, replace the heat channel plates and weld to sides and bottom of the body assembly.

Maintenance
Lubricate body brace piece axial pins at the intervals stated and with lubricant specified

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in Section 36.1, 'LUBRICATION AND MAINTENANCE'.

Check the fasteners on plates of brace piece axial pin everyday to ensure no looseness and dropping.

Check the drainage holes of body to keep it unblocked.

After each 250 hours of operation, check whether damping pad can fit frame. Adjustment should be performed if necessary. Damping pad should be replaced in case of damage or wearing.

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24 ILLUMINATION LAMP AND INSTALLATION

24.1 Illumination Lamp and Installation

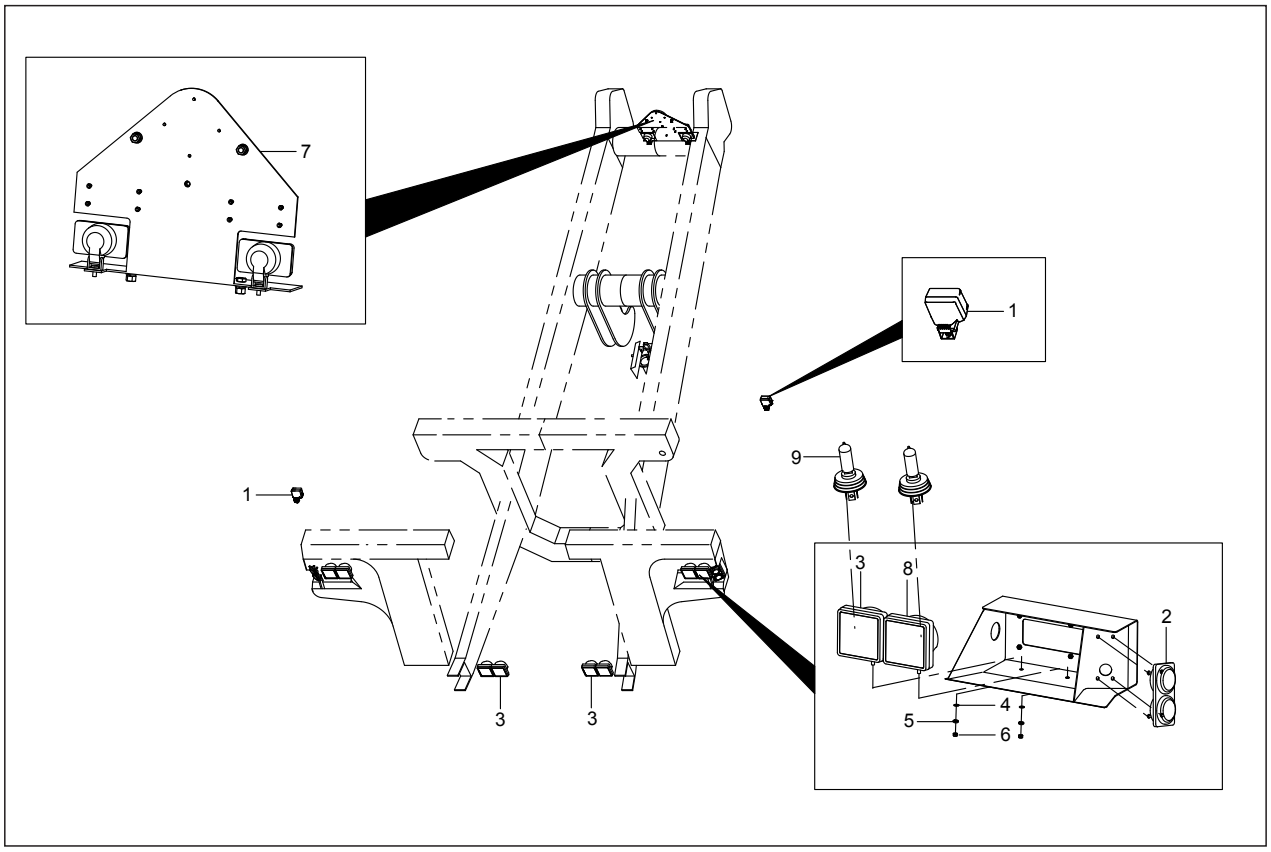


Fig.1 Front illumination lamp and installation

1. Work Lamp
2. Front combination signal lamp
3. Headlamp
4. Washer
5. Washer
6. Nut
7. Tail light system
8. Fog light
9. Bulb

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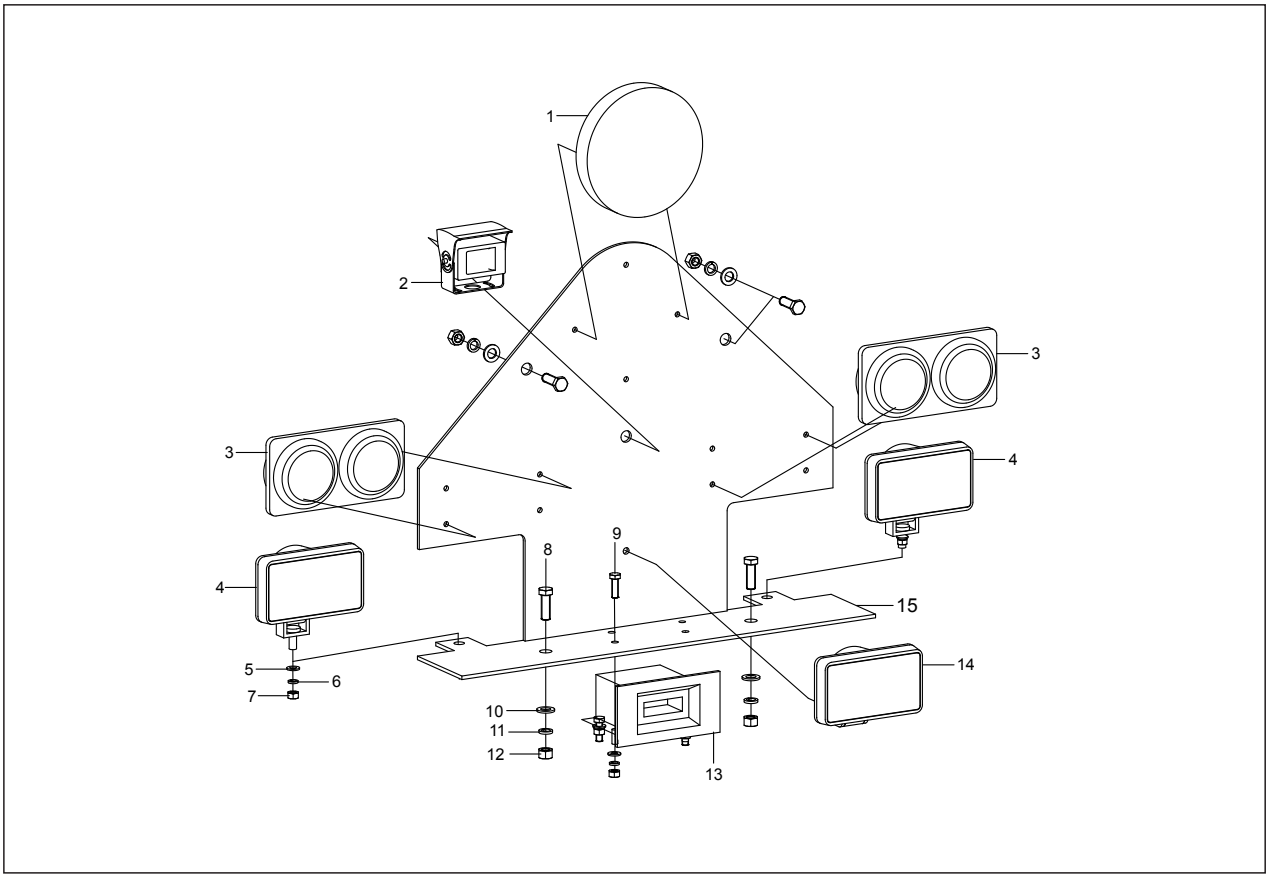


Fig.2 Tail Light System

1. Retarder lamp
2. Camera
3. Rear combination signal lamp
4. Fog lamp
5. Washer
6. Washer
7. Nut
8. Bolt
9. Bolt
10. Washer
11. Washer
12. Nut
13. Alarm
14. Reverse lamp
15. Frame

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Illumination system

The illumination system of SRT45 off high-way truck is divided into the headlamp system and the tail light system. The headlamp system includes: headlamp (high beam, dipped beam), side marker lamp F, L and R, steering lamp F, L and R; the tail lamp system includes: fog lamp B, L and R, side marker lamp B, L and R, brake lamp B, L and R, steering lamp B, L and R, retarder lamp, reverse lamp and alarm.

1. The side marker lamp is used to indicate the length and width of the truck in the night;
2. The fog lamp helps to improve visibility in foggy day The high beam is used while the truck is running normally. When the trucks is passing by, switch to dipped beam. When passing through a road junction or overtaking another truck, a prompt should be provided by switching between high and dipped beams.
4. The steering lamp is flashing intermittently when the truck is changing its direction.
5. The brake lamp is turned on when the operator is going to stop the truck.
6. The reverse lamp is turned on when the operator is going to reverse the truck.
7. The retarder lamp is turned on when the transmission retarder or disc retarder is acted.

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Maintenance

No.	Fault	Troubleshooting
1	No headlamp	① check the wiring whether loose; ② check X power supply whether exist; ③ check output signal from headlamp rocker switch whether exist; ④ check the bulb if one light fails，then check the fuse in central distribution box whether broke.
2	No steering lamp	① check the wiring whether loose; ② check flasher power supply and output in central distribution box whether exist; ③ check output signal from combination switch whether exist.
3	No side marker lamp	① check the wiring whether loose; ② check output signal from side marker lamp rocker switch whether exist.
4	No fog lamp	① check the wiring whether loose; ② check X power supply whether exist; ③ check output signal from fog lamp rocker switch whether exist; ④ check the fuse in central distribution box whether broke.
5	No brake lamp	① check the wiring whether loose; ② check output signal from 2023 whether exist; ③ check the fuse in central distribution box whether broke; ④ check output signal from brake press sensor whether exist.
6	Brake lamps can't be turned off	check output signal from brake press sensor whether continue exist, if yes to change the sensor.

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7	No retarder lamp	① check the wiring whether loose; ② check output signal from 2023 whether exist; ③ check input signal from retarder switch or linear actuator whether exist; ④ check output signal from transmission retarder rocker switch whether exist.
8	No reverse lamp or alarm	① check the wiring whether loose; ② check X power supply whether exist; ③ check the fuse in central distribution box whether broke; ④ check input and output signals from 2023 whether exist.

Cautions on use of lamps

1. Do not turn on/off frequently.
2. If there is any crack , the lamp is prohibited from being turned on and should be replaced timely. Cut off the power before replace the lamp or bulb.

Refer to the following circuit diagram for specific circuits and components.

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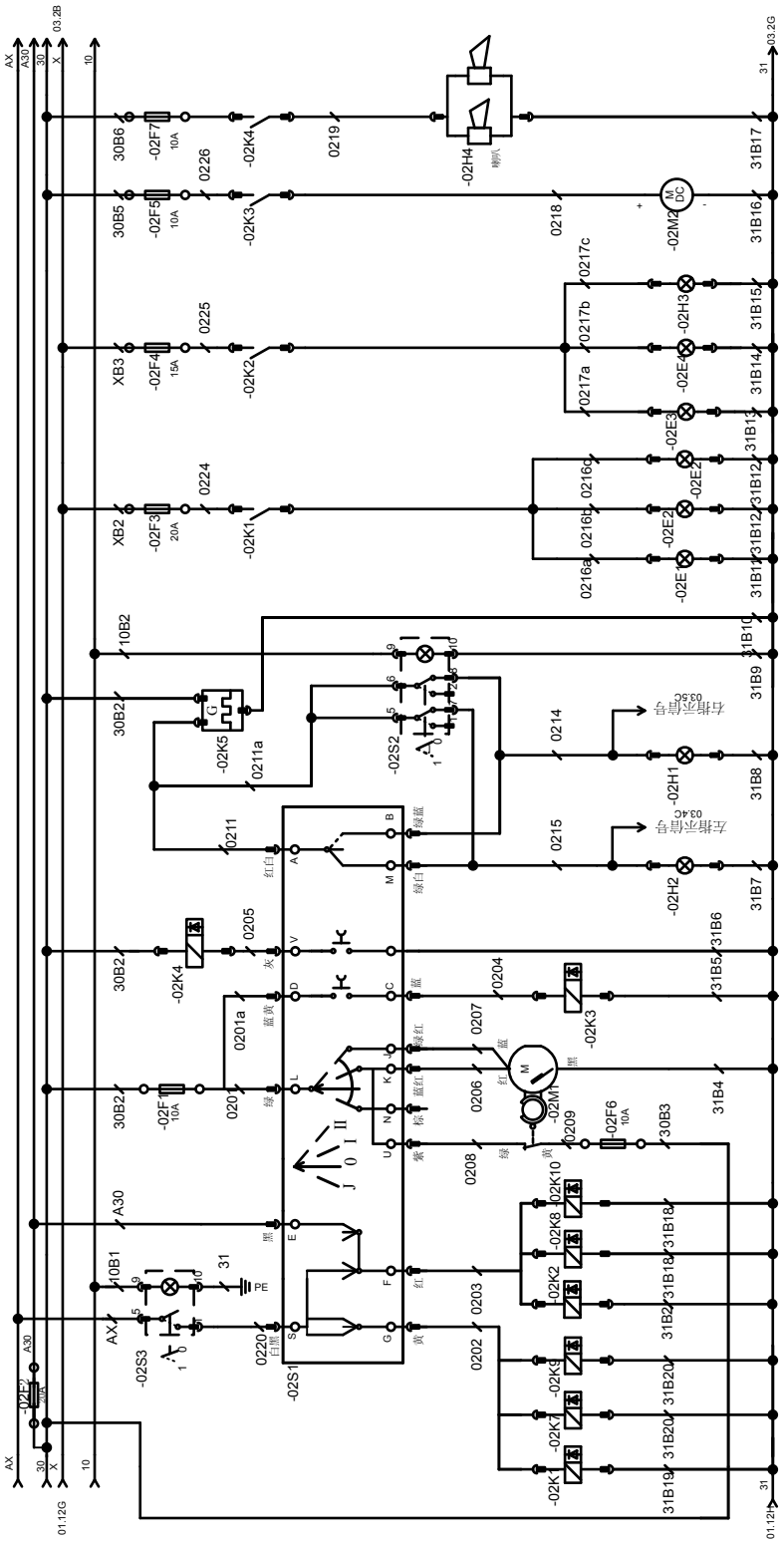


Fig.3 Circuit diagram of light illumination system (1)

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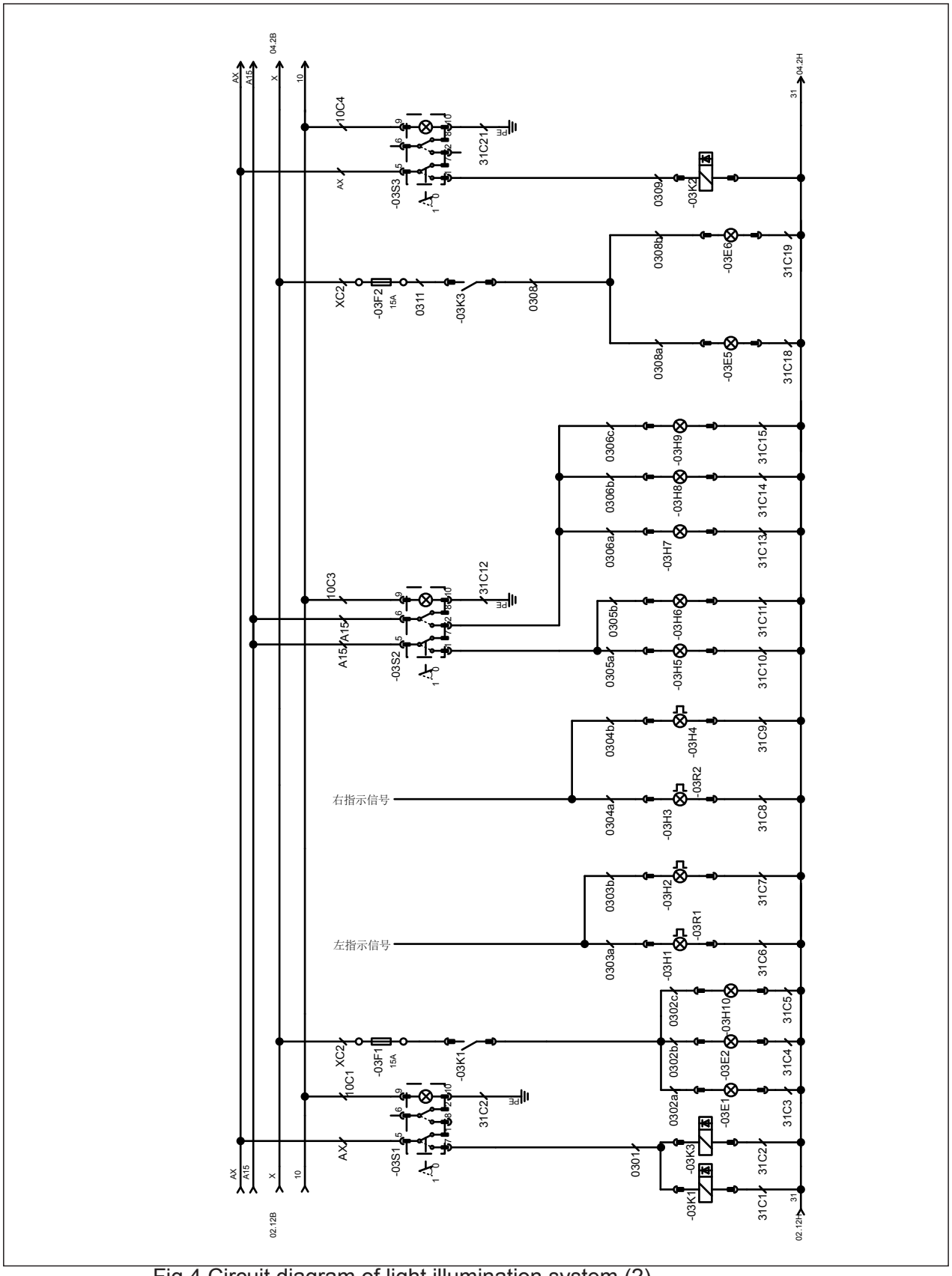


Fig.4 Circuit diagram of light illumination system (2)

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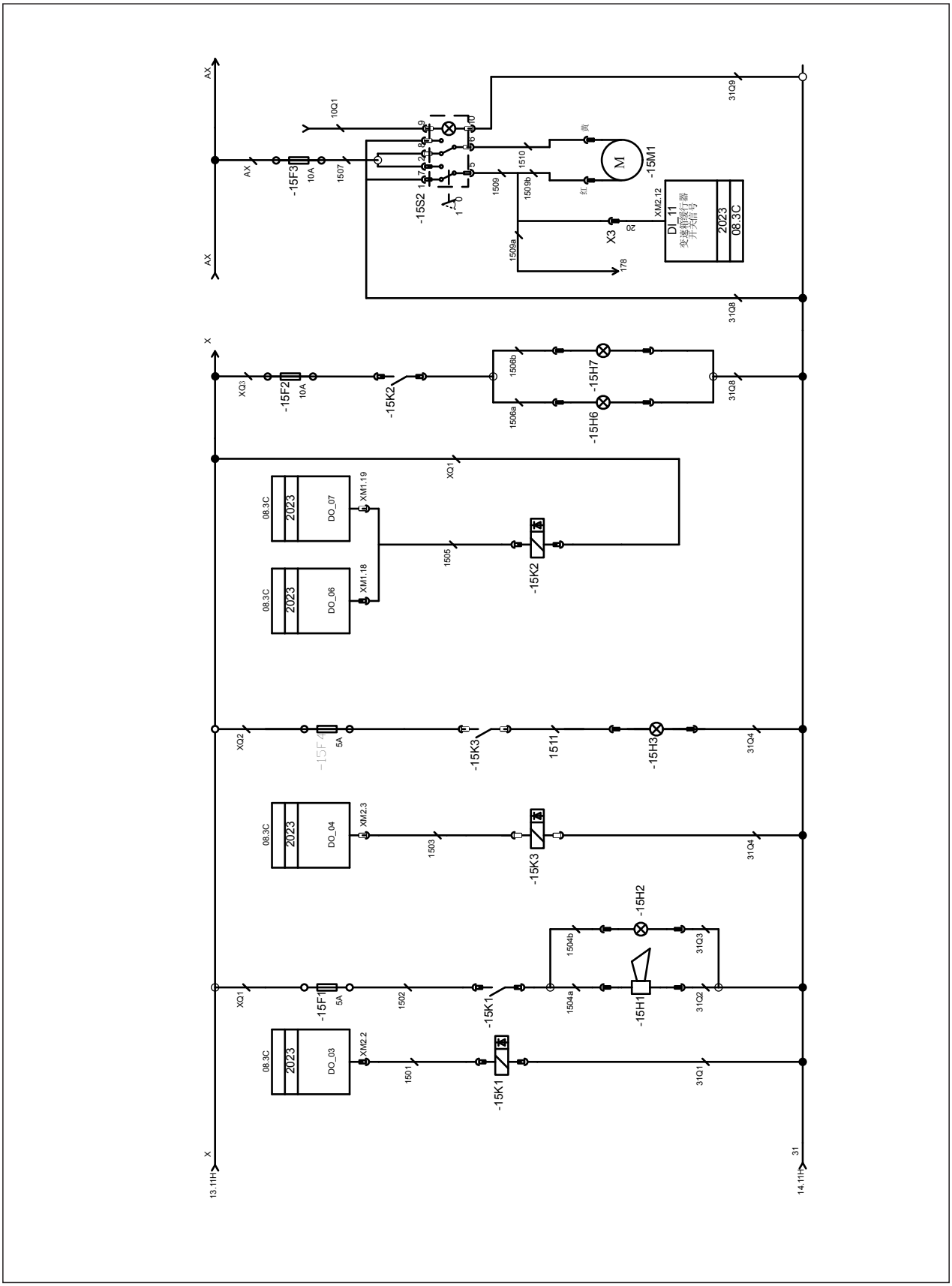


Fig.5 Circuit diagram of light illumination system (3)

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Names of standard components

02E1——Dipped beam lamp L1
02E2——Dipped beam lamp R1
02E3——High beam lamp L1
02E4——High beam lamp R1
02F1——Wiper fuse
02F3——Dipped beam lamp fuse
02F4——High beam lamp fuse
02F5——Washer pump fuse
02F6——Wiper fuse
02F7——Horn fuse
02H1——steering indicator R
02H2——steering indicator L
02H3——High beam indicator
02H4——Horn
02K1——Dipped beam lamp relay
02K2——High beam lamp relay
02K3——Washer pump relay
02K4——Horn relay
02K5——flasher
02M1——Wiper motor
02M2——Washer pump
02S1——Combination switch
02S2——Caution lamp switch
02S3——High/dipped beam lamp switch
03E1——Fog lamp B, L
03E2——Fog lamp B, R
03F1——Fog lamp B fuse
03H1——Steering lamp F, L
03H2——Steering lamp B, L
03H3——Steering lamp F, R
03H4——Steering lamp B, R
03H5——Side marker lamp F,L
03H6——Side marker lamp F,R
03H7——Side marker lamp B,L
03H8——Side marker lamp B,R
03H9——Side marker indicator
03F1——Fog lamp B fuse
03H1——Steering lamp F, L
03H10——Fog indicator
03K1——Fog lamp relay
03S1——Fog lamp switch
03S2——Side marker lamp switch
15F1——Reverse lamp and buzzer fuse
15F2——Brake lamp fuse
15H1——buzzer
15H2——Reverse signal lamp
15H3——Retarder lamp
15H6——Brake lamp
15H7——Brake lamp
15K1——Reverse Signal lamp relay
15K2——Brake lamp relay
15K3——Retarder lamp relay
15S2——Transmission case retarder switch
15M1——Retarder linear actuator motor

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25 VEHICLE DETECTING SYSTEM

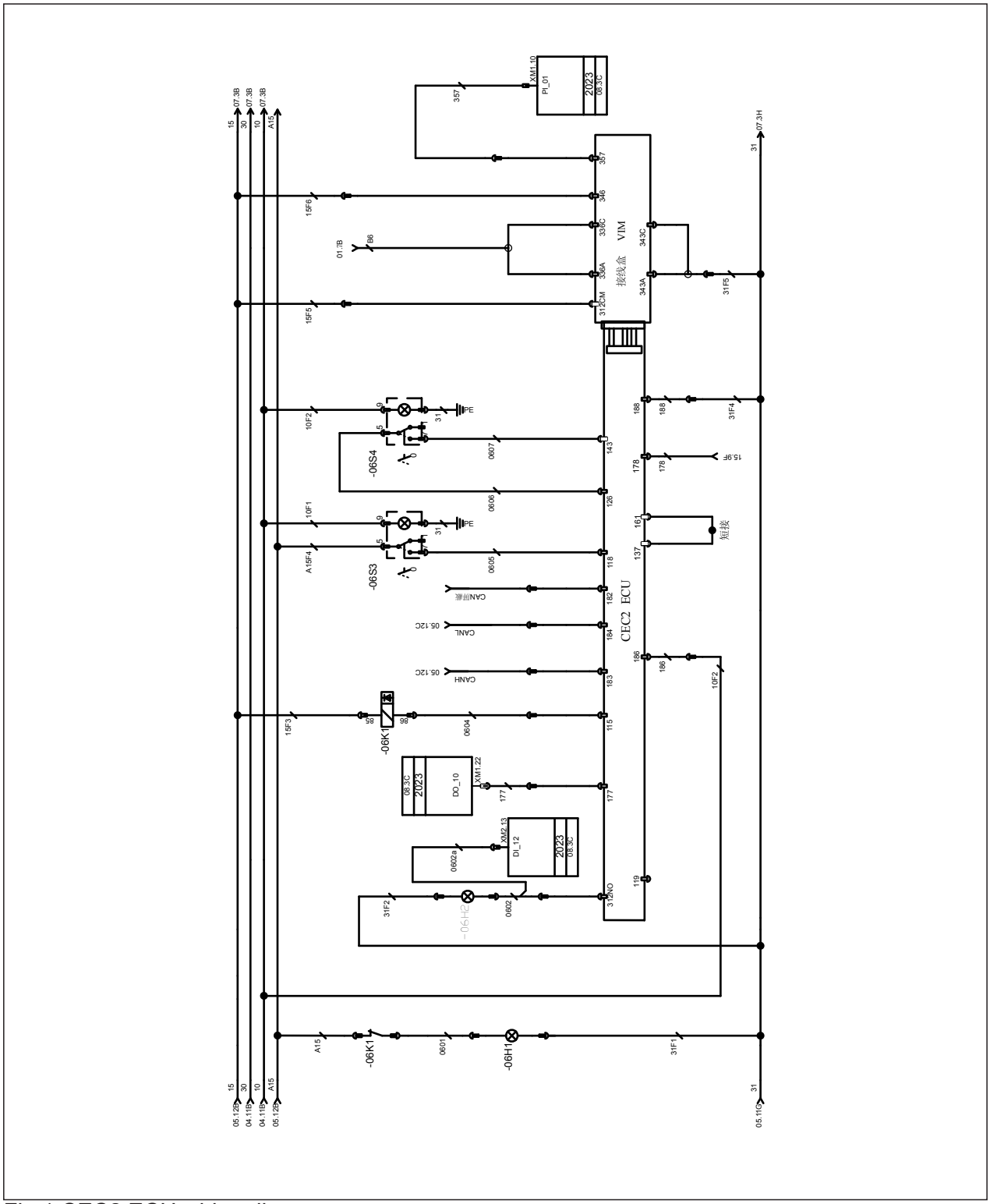


Fig.1 CEC2 ECU wiring diagram

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Names of Standard Components	
06H1—Transmission fault indicator	06K1—transmission case fault relay
06H2—Over speed indicator	06S4—Economic/power mode switch
06S3—Stall detection switch	CAN1H—CAN communication interface
CAN1L—CAN communication interface	

25.1 Transmission

Refer to Fig.23-1 for specific circuit and components.

⚠ warning

Sliding of truck in neutral position is strictly prohibited because it will lead to serious damage to the transmission.

Electronic Control Unit (ECU) - Contains an electronic microcomputer. The ECU receives and processes information defining: shift selector position, throttle position, sump temperature, input speed, turbine speed and transmission output speed. The ECU, uses this information to control the transmission solenoids and valves, supply system status and provide diagnostic information.

The ECU is programmed to take corrective action to prevent damage to the transmission if a failure occurs in the CEC–2 system and has diagnostic capabilities which allow the serviceman to quickly find and repair or replace a failed component. The ECU has 3 connectors; Blue -Transmission Connector (T), Gray -Vehicle Connector (V), Black - Shifter Connector (S).

Power Module - The Power Module is located on the side of the battery box. The Power Module contains ignition run fuses and relays, and a timer relay for the switch off function of the ECU. The ignition fuses and relays open power to the ECU. On power shut down the timer relay remains open for a 30

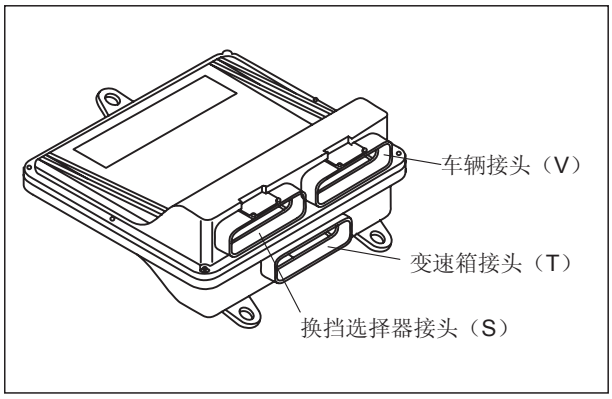


Fig.2 ECU

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second period to allow the ECU to down load information and close down properly.
CEC2 Interface Box - Provides the electrical link between the vehicle harnesses and the CEC2 harnesses. The interface box contains an ignition signal fuse and function relays.

Operations of Quantum Electronic fuel control system of engine

If the 'Stop' indicator on the dash panel is on, it indicates that a major fault of the engine has been detected. This should be paid attention to immediately at this time. The driver should shut down the engine immediately to avoid serious damages. The truck should be equipped with the engine protection system which records the fault code in case of an engine accident. In case of an engine accident, the 'detection' indicator will be on. Based on severity of the accident, the engine speed and power will drop by different degrees. If the accident deteriorates, then the 'detection' indicator will flash. At this point, the driver should shut down the engine to avoid serious damages.
For the shut-off engine whose engine protection system is activated, it can be started only after the fault is diagnosed clearly and solved.
Under the following conditions, if the yellow 'troubleshooting' indicator is on, it indicates that the coolant level is low and therefore, the coolant temperature increases. Verify if idle validation and throttle pedal switch mismatch, the intake manifold temperature is on the high side, the oil pressure is too low, and the fuel rail pressure is too high. When 'Stop', 'Warning' and 'troubleshooting' indicators are on, the electronic fuel control system will detect the fault and store information into the memory. If there is any fault interruption, the computer will determine the change of engine states and the indicator will be on and off.
A special diagnostic data reader (INSITE)

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can be used to connect the engine and the memory so as to extract the information related to the reason leading to the fault. After the fault is eliminated, the electronic fuel control system will return to the state that makes the engine work normally. This data reader can also identify the real time code from the code (non-real-time code) stored in the historical data memory. The non-real-time code can only be displayed with the data reader. The fault code recorded in the ECM memory will always be kept unless it is erased by maintenance personnel.

The operator can check for active faults by turning the ignition key switch to the 'OFF' position, switching the diagnostic switch 'ON' and then turning the ignition key switch to position '1'. If no active fault codes are recorded, all three ('Stop','Warning' & 'Fluid') indicators will come on and stay on. If active codes are recorded, all three indicators will come on momentarily. The yellow ('Warning') and red ('Stop') indicators will begin to flash the code of the recorded fault. The fault codes flash in the following sequence: the yellow indicator flashes once, then there is a pause where both indicators are off. Then the numbers of the recorded fault code flash in red. There is a pause between each number. When the number is done, the yellow indicator flashes again. e. G. yellow flashes once - pause - red flashes twice - pause - red flashes three times - pause- red flashes five times - pause - yellow flashes once, indicates fault code 235. The number will repeat in the same sequence until the system is advanced to the next active fault code or the diagnostic switch is switched to the 'OFF' position. Refer to 'Electronic Fuel System Diagnostic Codes' table for fault code descriptions.

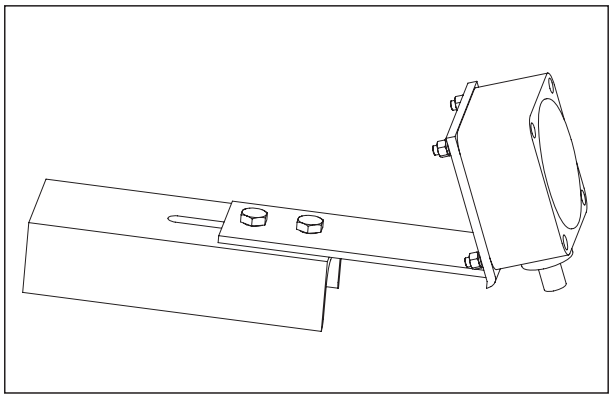


Fig.3 Bed Hoist Interlock (body-up switch)

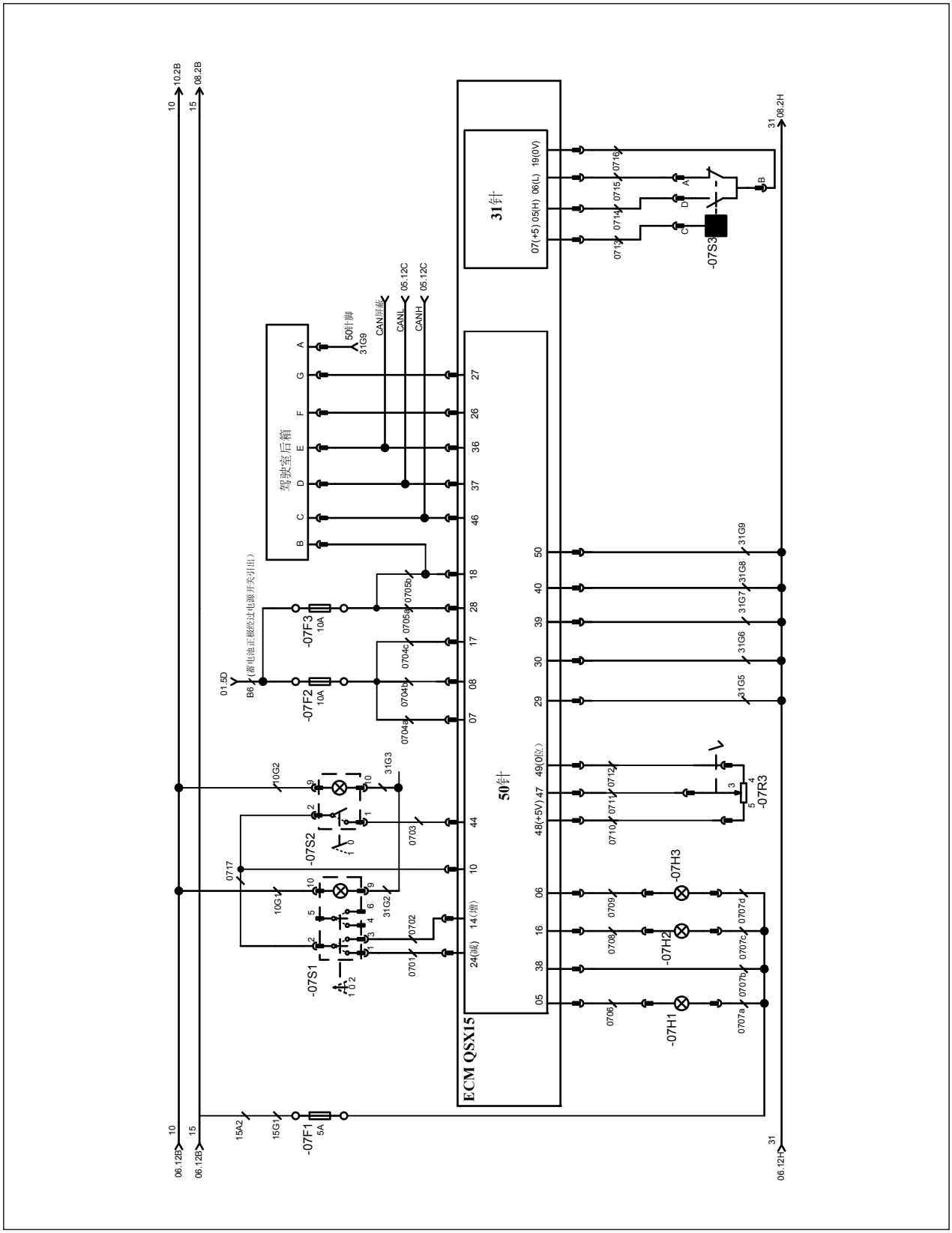
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Table 2 Electronic Fuel System Diagnostic Codes		
Error Code	Description	Fault Lamp
111	ECM Hardware Internal Failure - Mission disabling	Red
112	Timing Actuator - Mechanically stuck	Red
113	Timing Actuator - Component shorted high	Yellow
114	Timing Actuator - Component shorted low	Yellow
115	Engine Speed Sensor - Both signals lost	Red
116	Fuel Timing Pressure Sensor - Component shorted high	Red
117	Fuel Timing Pressure Sensor - Component shorted low	Red
118	Fuel Pump Pressure Sensor - Component shorted high	Yellow
119	Fuel Pump Pressure Sensor - Component shorted low	Yellow
121	Engine Speed Sensor - One signal lost	Yellow
122	Boost Pressure Sensor - Component shorted high	Yellow
123	Boost Pressure Sensor - Component shorted low	Yellow
131	Throttle Position Sensor - Component shorted high	Red
132	Throttle Position Sensor - Component shorted low	Red
135	Oil Pressure Sensor - Component shorted high	Yellow
141	Oil Pressure Sensor - Component shorted low	Yellow
143	Oil Pressure Sensor - Data below normal range	Yellow
144	Engine Coolant Temperature Sensor - Component shorted high	Yellow
145	Engine Coolant Temperature Sensor - Component shorted low	Yellow
151	Engine Coolant Temperature Sensor - Data above normal range	Yellow
153	Intake Manifold Temperature Sensor - Component shorted high	Yellow
154	Intake Manifold Temperature Sensor - Component shorted low	Yellow
155	Intake Manifold Temperature Sensor - Data above normal range	Yellow
221	Ambient Air Pressure Sensor - Component shorted high	Yellow
222	Ambient Air Pressure Sensor - Component shorted low	Yellow
231	Coolant Pressure Sensor - Component shorted high	Yellow
232	Coolant Pressure Sensor - Component shorted low	Yellow
233	Coolant Pressure, Engine Protection - Low coolant pressure	Yellow
234	Engine Speed - Data above normal range	Red
235	Engine Coolant Level - Data below normal range	Yellow
254	Fuel Shutoff Value - Component shorted low	Red
259	Fuel Shutoff Solenoid - Fuel shutoff valve stuck open	Red
261	Fuel Temperature, Engine Protection - Fuel temperature high	Yellow
263	Fuel Temperature Sensor - Component shorted high	Yellow
265	Fuel Temperature Sensor - Component shorted low	Yellow

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316	Fuel Pump Actuator - Component shorted high or low	Yellow
318	Fuel Pump Flow - Mismatch between estimated and desired pressures	Yellow
342	ECM Not Calibrated - ECM software mission disabling failure	Red
343	ECM Hardware Failure - Warning non mission disabling	Yellow
346	ECM Software - Read/write, checksum error - Non mission disabling	Yellow
415	Oil Pressure Sensor - Data indicates very low oil pressure	Yellow
422	Engine Coolant Level Sensor Signals - Data invalid	Yellow
423	Fuel Timing Pressure Sensor - In-range failure	Yellow
431	Throttle Position Idle Validation Switch - Invalid	Yellow
432	Throttle Position Idle Validation Switch - Switch position & throttle percent mismatch	Yellow
441	Battery Voltage, Unswitched - Data below normal engine range	Yellow
442	Battery Voltage, Unswitched - Data above normal engine range	Yellow
451	Fuel Pressure Sensor - Component shorted high	Red
452	Fuel Pressure Sensor - Component shorted low	Red
455	Fuel Control Valve - Component shorted high or open	Red
467	Timing Fuelling Flow - Mismatch between estimated and desired timing	Yellow
468	Fuelling Rail Flow - Mismatch between estimated and desired rail pressure	Yellow
511	Fuel Control Valve - Component shorted low	Red
514	Fuel Control Valve - Actuator mechanically stuck open	Red
524	Alternate Droop Switch Fault	Yellow
551	Idle Validation Circuit - No voltage detected on both off-idle and idle pins	Red
553	Engine Fuelling Pressure Exceeded - Data above normal range	Red
554	Fuel Pressure Sensor - In-range failure	Yellow
555	Blowby Pressure, Engine Protection - Blowby pressure high	Yellow
719	Blowby Pressure Sensor - Component shorted high	Yellow
729	Blowby Pressure Sensor - Component shorted low	Yellow

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Names of standard mounting components

07F1- Indicator fuse
07F2- ECM power supply fuse
07F3- ECM power supply fuse
07S1- Idle speed adjustment rocker switch
07S2- Diagnostic rocker switch
07H1- Engine maintenance indicator (White)
07H2- Engine warning indicator (Yellow)
07H3- Engine stop indicator (Red)
07S3- Coolant sensor
07R3- Accelerator pedal

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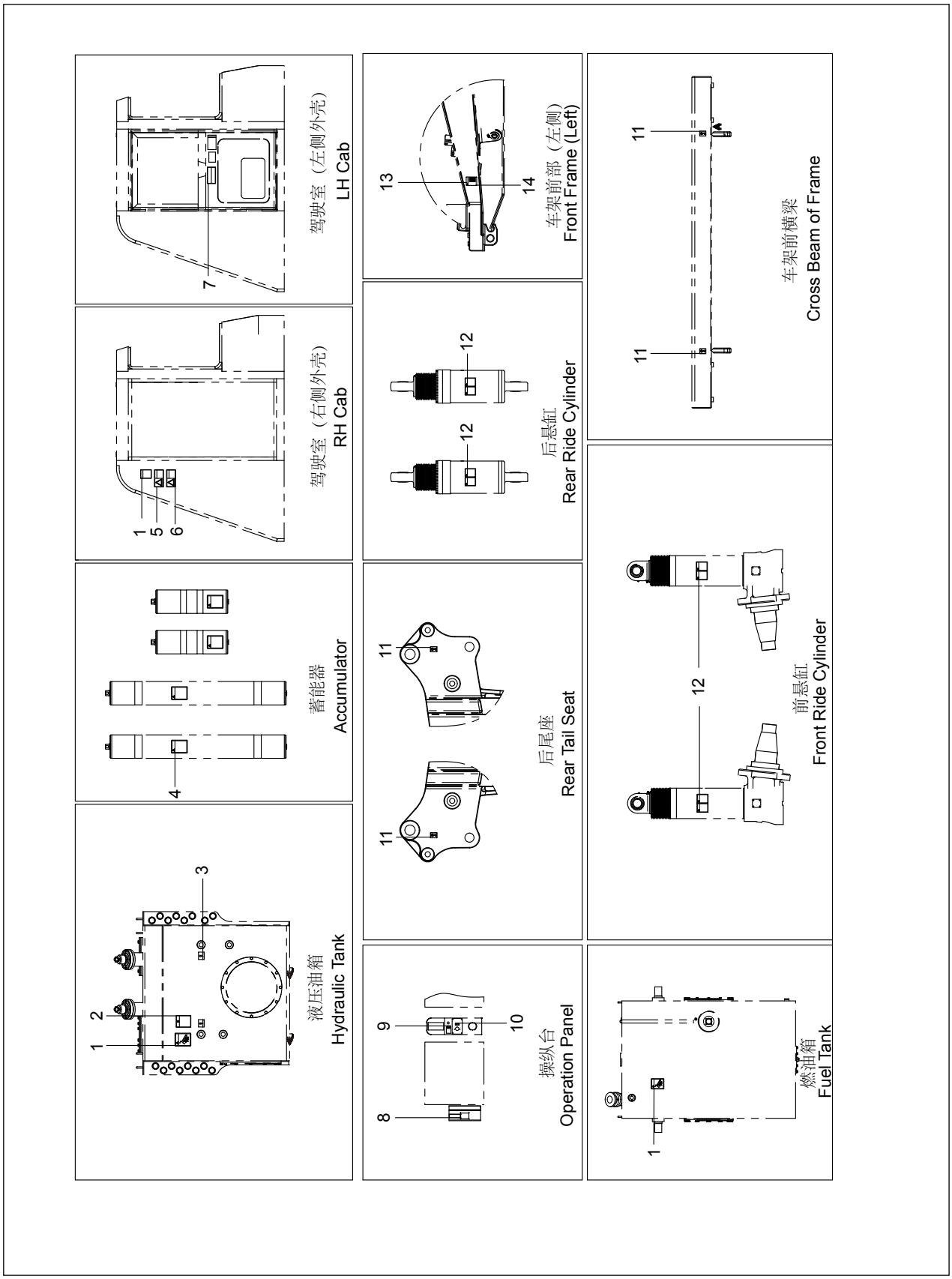


Fig.28.1

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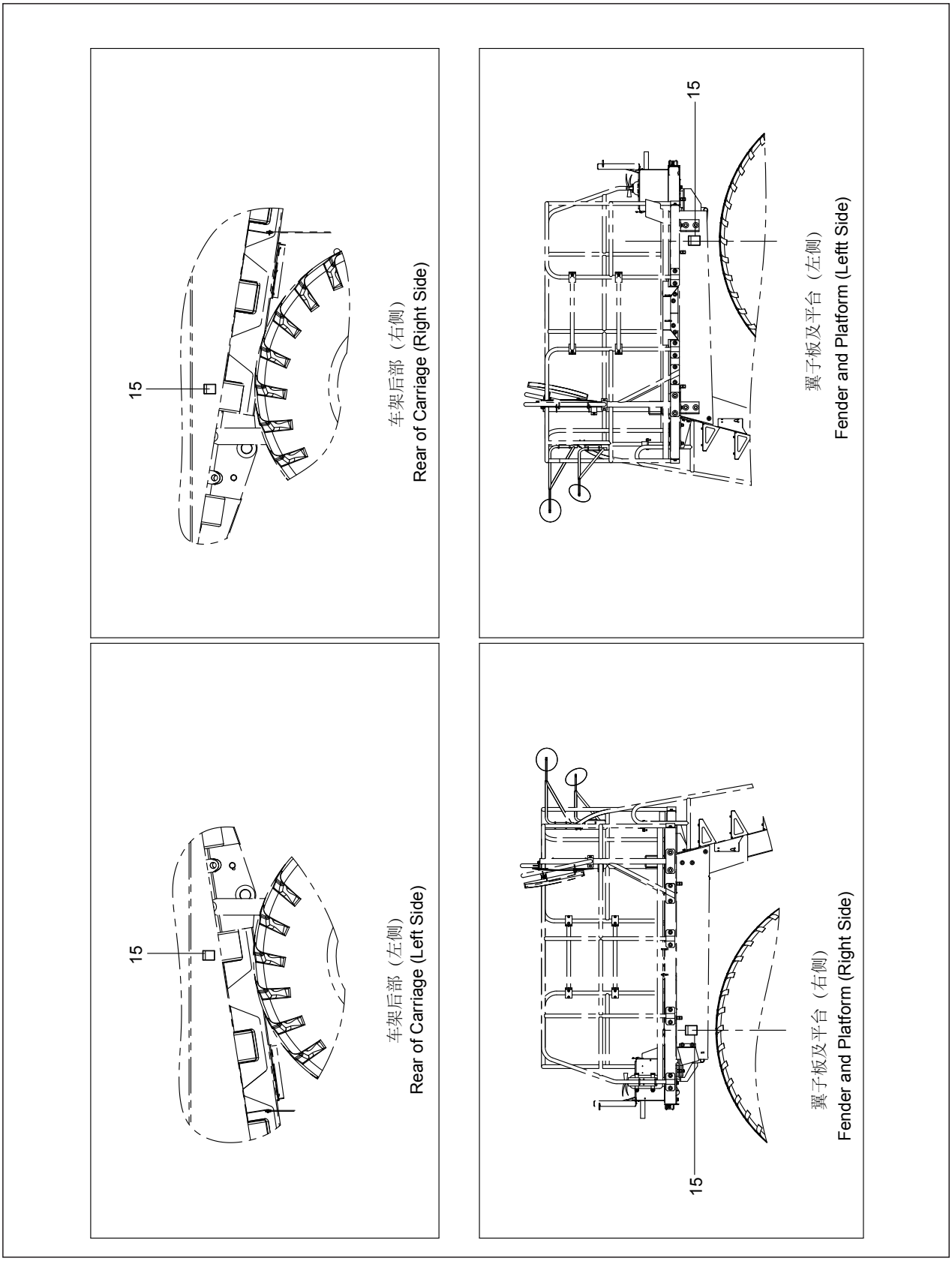


Fig.28.2

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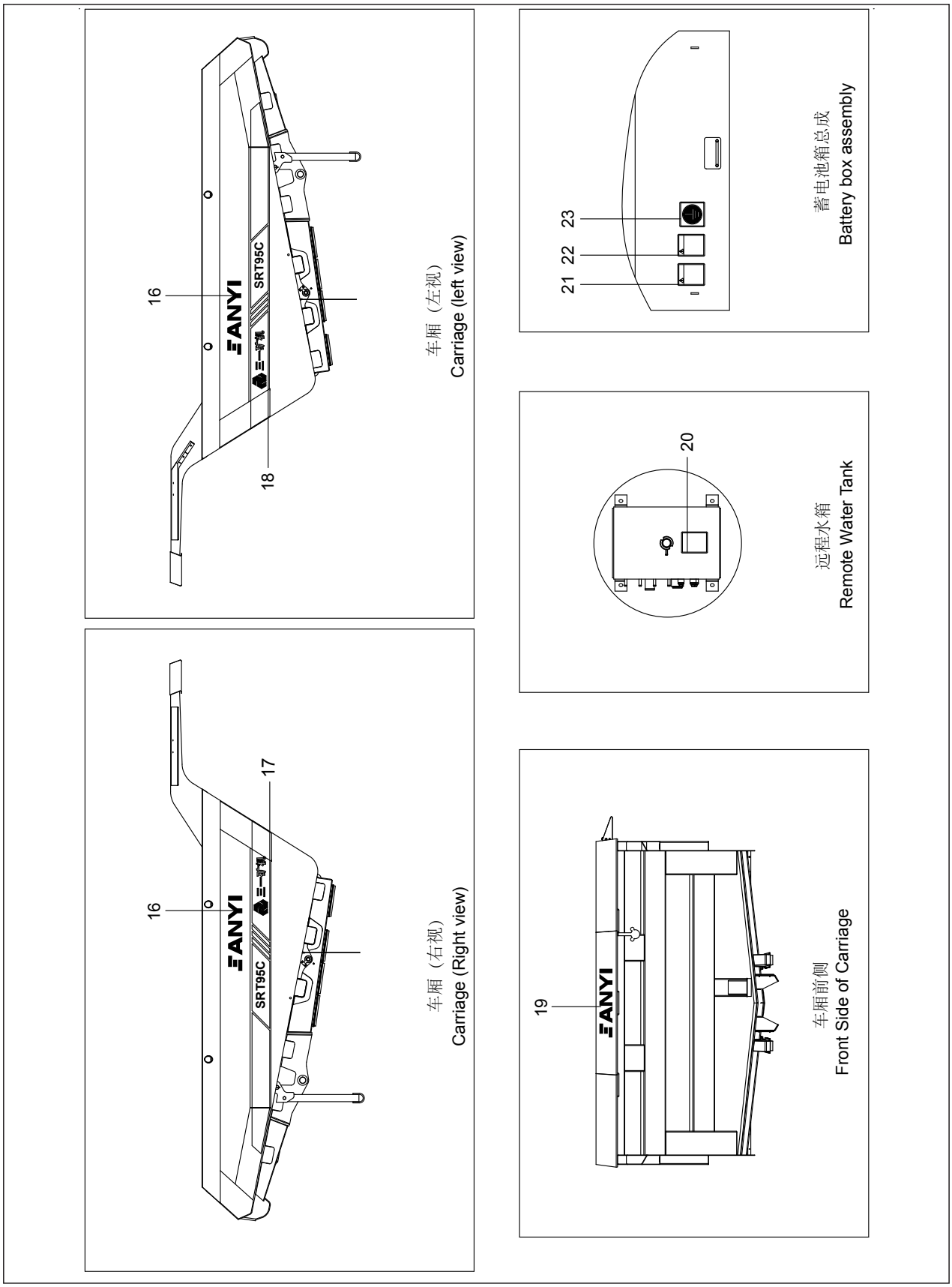


Fig.28.3

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26 ARRANGEMENT PLAN OF SRT95C

1.Decal--body warning
2.Decal--hydraulic illumination
3.Decal--hydraulic level
4.Decal--accumulator warning
5.Decal--cab welding warning
6.Decal--stand forbidden
7.Decal--driving height warning
8.Decal--hydraulic control
9.Decal--transmission retarding control
10.Decal--brake retarding control
11.Decal--lifting point
12.Decal--ride cylinder press warning
13.Truck nameplate
14.Rivet
15.Decal--tyre warning
16.Decal--body
17.Decal--right body
18.Decal--left body
19.Decal--front body
20.Decal--water tank open warning
21.Decal--battery cable warning
22.Decal--alternator warning
23.Decal--battery earth

Fig1-Fig3 Decal

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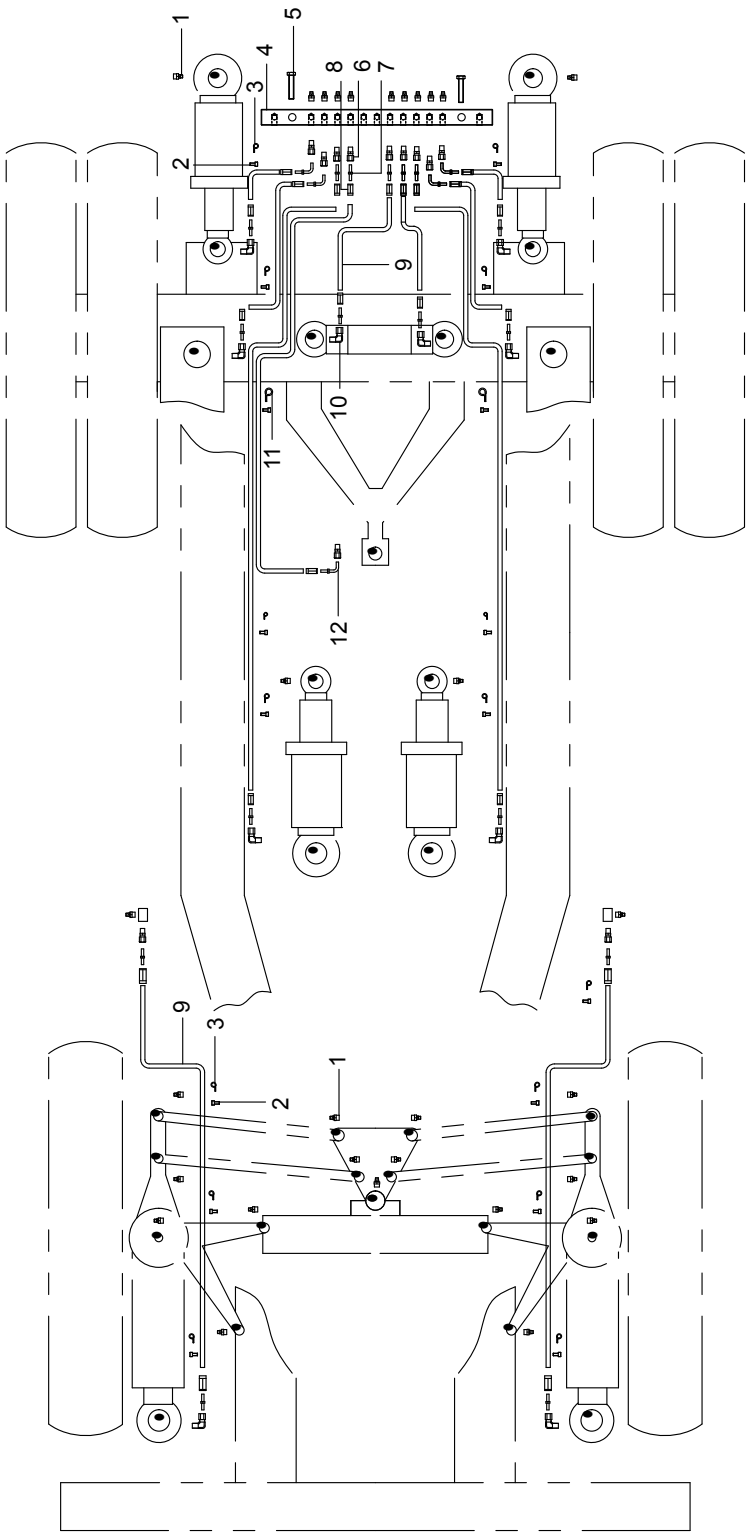


Fig.1 Distribution diagram of centralized lubrication trucks

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Lubrication position corresponding to each serial number of Fig.1:

1.Oil fitting
2.Screw
3.Pipe Clamp
4.Rear distributor
5.Bolt
6.Straight joint
7.Straight joint core
8.Adaptor outer cover
9.liquid pipe
10.Bent joint
11.Pipe Clamp
12.Bent joint core

27 CENTRALIZED LUBRICATION SYSTEM

27.1 Manual Operation-Centralized Lubrication System

Overview and operating principle:

This system is a manual operation centralized lubrication system. Fill the butter to a relatively low position through the pipeline for the limited height lubrication point which human can reach.

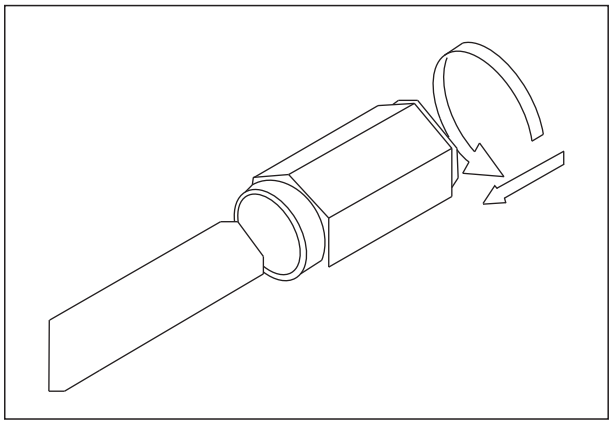


Fig.2

Disassembly

1. Dismantle the pipe clamp and the protecting jacket of the lubrication pipe , loosen the straight joint core(6) or the cap of bend joint(10), remove the pipe.
2.Fixed the joint jacket(8) with a wrench, contrarotate the striaght joint core(7) or the bent joint core(12) with other wrench, dismantle the core.
3. Rolled the tube (9), grasp it in hand. unscrew the joint jacket clockwise.
4. Finally, remove the lubricating pump, grease oil filter, step type master oil distributor and sub-distributor from corresponding mounting seats.

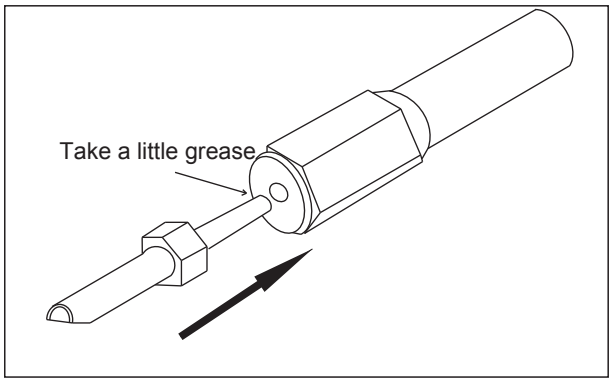


Fig.3

Installation

Reinstall the all parts of the whole lubrication system according to a four steps how does to remove them out from the whole unit before after repairing and cleaning, replace new ones if it is required. Take a little grease when install

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the joint core.

System commissioning

1.Oiling

Implement oiling according to the instructions on oil supplement for maintenance and servicing.

Note: The type of grease used: lithium grease (calcium grease is prohibited).

Maintenance and servicing

1.Grease supplement

(1).Supplementation method: Refill the grease to the lubricating points. (Finish this step slowly. Insure that there are not any leakage or damages to the pipeline of the system).

(2).Insure cleanliness of grease entering into the system.

Fig 3. Take a little grease

2.Daily inspection

Regularly observe all of pipeline and joints of lubrication system at every day to inspects there are any leakages or damages of the pipeline or joints of the system, replace them if required.

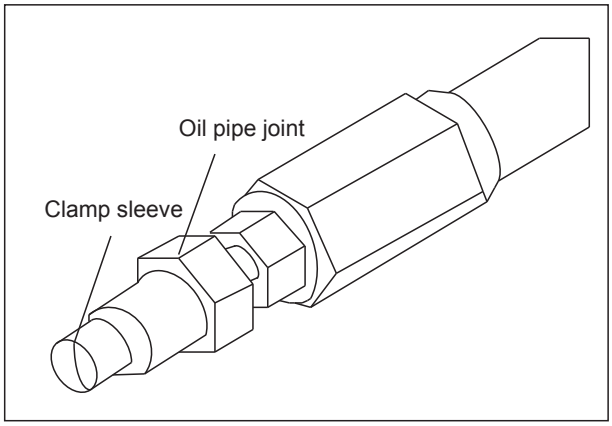


Fig.4

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27.2 Automatic Centralized Lubrication System (optional configuration)

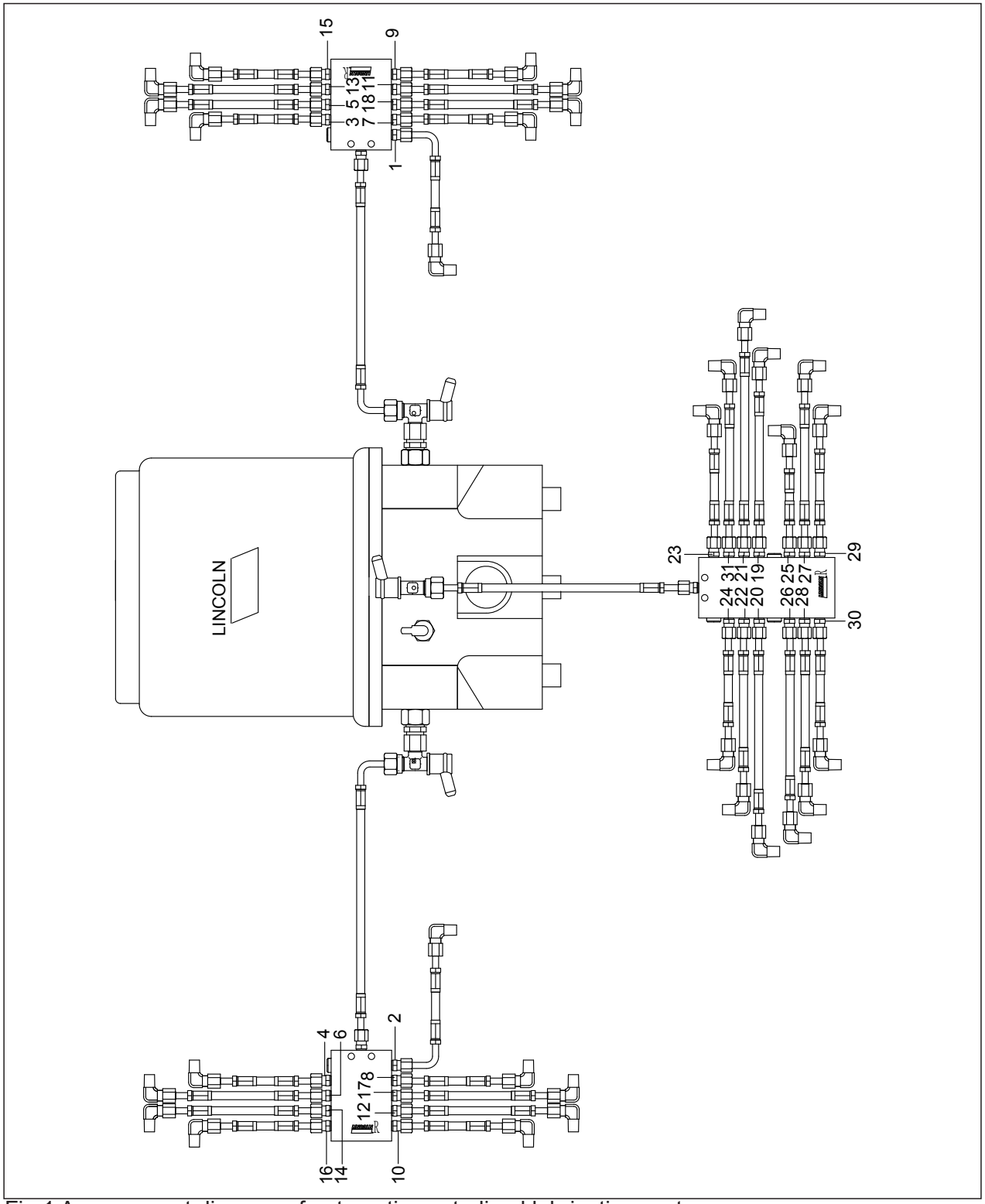


Fig.1 Arrangement diagram of automatic centralized lubrication system

Fig.1 Arrangement diagram of centralized lubrication system

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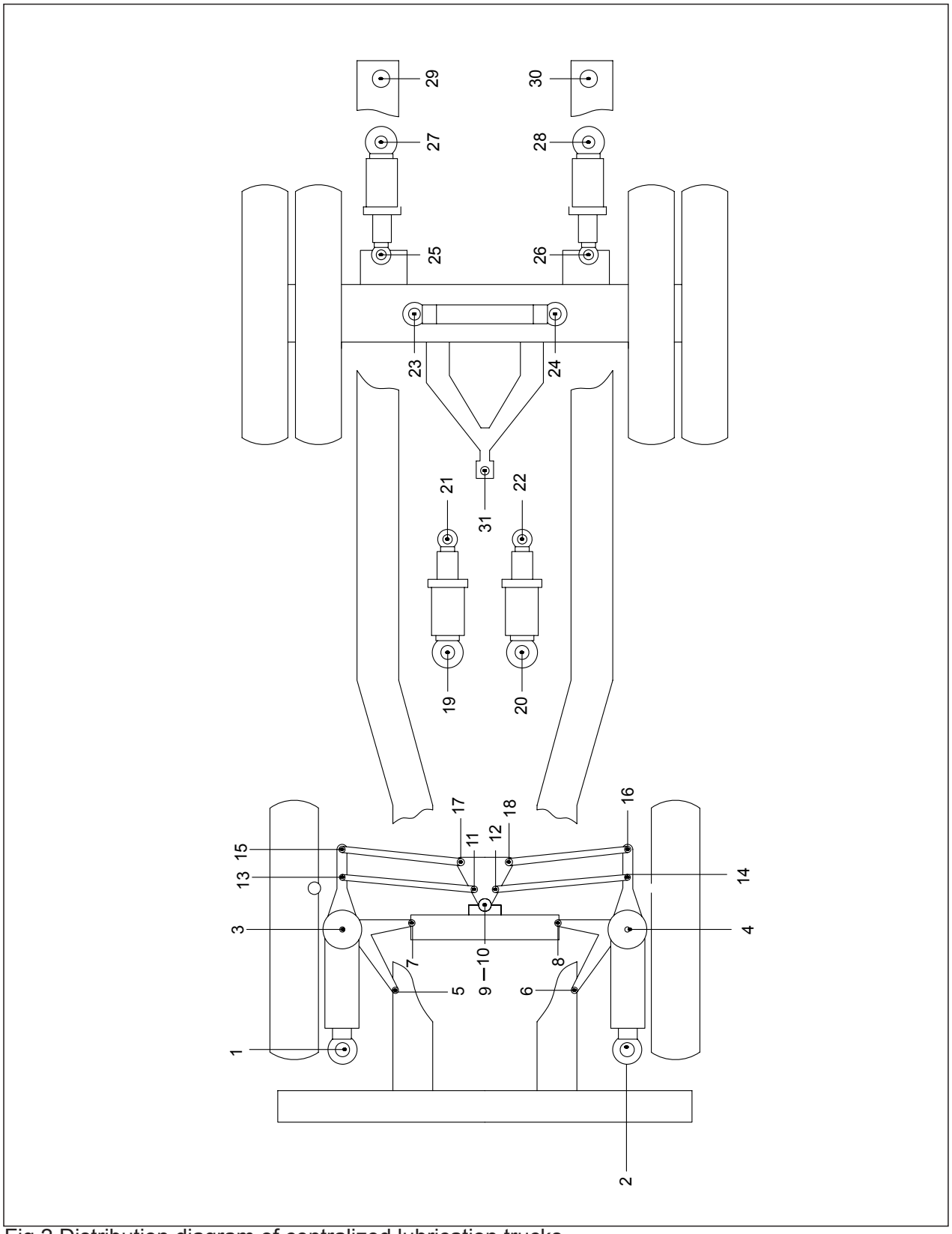


Fig.2 Distribution diagram of centralized lubrication trucks

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Lubrication position corresponding to each serial number of Fig.1&Fig.2:

1.Right suspension cylinder-up
2.Left suspension cylinder-up
3.Right suspension cylinder-up
4.Left suspension cylinder- down
5.Right A-shaped arm-front
6. Left A-shaped arm-front
7.Right A-shaped arm-rear
8. Left A-shaped arm-rear
9. Double crank-up
10.Double crank-down
11.Right steering cylinder-inside
12. Left steering cylinder-outside
13. Left steering cylinder-outside
14. Left steering cylinder-outside
15. Right steering coupling bar –outside
16. Left steering coupling bar –outside
17.Right steering coupling bar-inside
18.Left steering coupling bar-inside
19.Right hoist cylinder-up
20. Left hoist cylinder up
21.Right hoist cylinder-down
22.Left hoist cylinder-down
23.Bridge horizontal stabilizing coupling bar-up
24.Bridge horizontal stabilizing coupling bar-down
25.Right rear suspension-up
26.Left rear suspension-up
27.Right rear suspension-down
28.Left rear suspension-down
29.Right body rollover
30.Left body rollover
31. A-shaped frame

Overview and operating principle:

1. Oiling

This system is a progressive system source of the centralized lubrication system. The system mainly consist of electric lubrication pump, three sub-distributors, pipeline accessories and control components. The system has 31 lubricating points. When it running, the pistons does reciprocating motions insider of the distributor to distributing grease to various wiring points one by one.

Disassembly

1.Take wiring off from the electric lubrication pump.

2.Dismantle the pipe clamp and loosen the winding strap. Dismantle the branch joints from the lubrication system and remove the master pipeline between pump, master distributor and sub-distributor.

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3.Finally, remove the lubricating pump and sub-distributor from corresponding mounting seats.

Installation

Reinstall the all parts of the whole lubrication system according to a four steps how does to remove them out from the whole unit before after repairing and cleaning, replace new ones if it is required.

System commissioning

1.Oiling

Implement oiling according to the instructions on oil supplement for maintenance and servicing.

Note: the type of grease used: lithium grease (calcium grease is prohibited).

Scope of grease use: NLG1 000#~1#

Selections in winter: NLG1 000#~0#

Selections in summer: NLG1 0#~1#

Grease for initial system commissioning: NLG1 0#

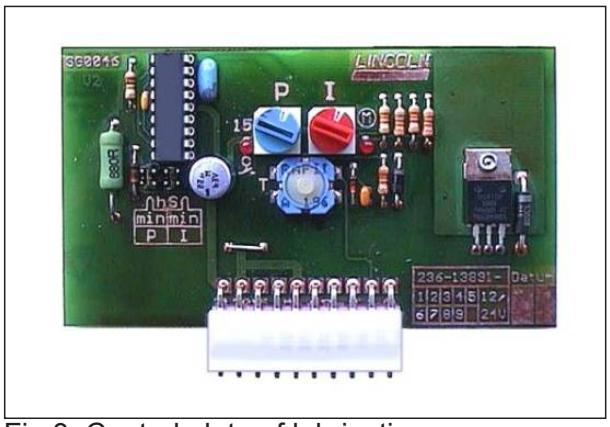


Fig.3 Control plate of lubrication pump

2.Setting of program controller

(1).Standard application setting of program controller is working 6 minutes each 6 hours. initial setting and replacement of new pipelines, the interval should be set to be 2 hours, working time should be set to be 30 minutes so as to enable grease to fill pipelines. (The interval do not set to be 0).

(2).Time setting

This system operation modes is time mode which can be set and adjusted on the program controller. Open the protect cover from the pump body. (Fig 4)

Notice: Restore the protect cover after finish time setting.

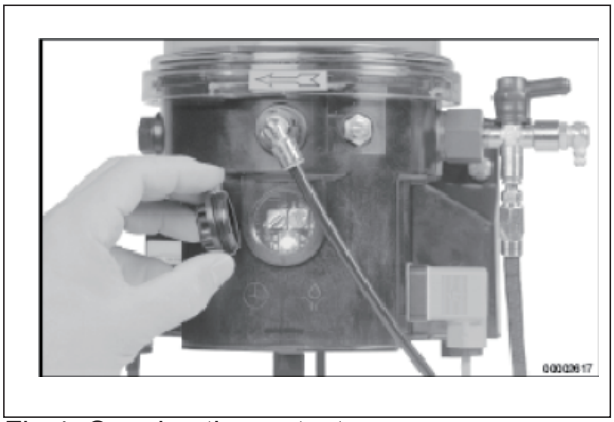


Fig.4 Opening the protect cover

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a.Setting the interval time (Blue Button P), Fig .5

Knob position	1	2	3	4	5	6	7	8
Hours	1	2	3	4	5	6	7	8
Knob position	9	A	B	C	D	E	F	
Hours	9	10	11	12	13	14	15	

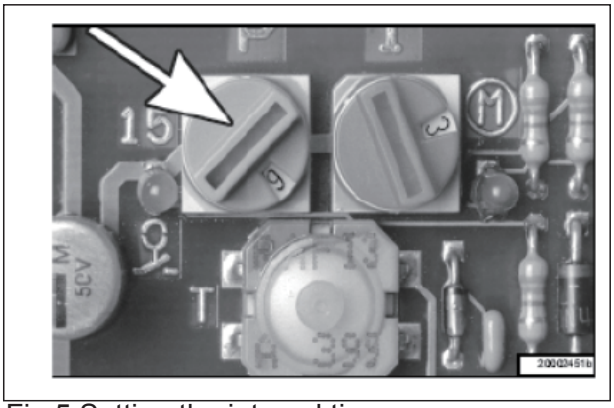


Fig.5 Setting the interval time

b.Setting the working time (Red Button I), Fig.6

Knob position	1	2	3	4	5	6	7	8
Hours	2	4	6	8	10	12	14	16
Knob position	9	A	B	C	D	E	F	
Hours	18	20	22	24	26	28	30	

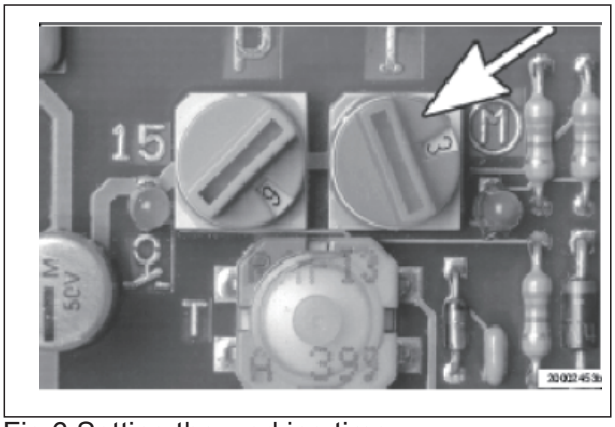


Fig.6 Setting the working time

c.Manual button , Fig.7
Starting up the button 5 (which add-ons lubricating) can run the compel lubricating and testing whether the system is working order.

Maintenance and servicing:
1.Grease supplement
(1)Supple mentation method: Refill the grease to the oil tank of lubrication system via grease gun or other (keep the grease sealed in the whole process).
(2)Observe the oil level regularly: the lubrication pump equipped with a invisible tank to the system demand and oil level to supplement via regularly inspection.
2.Daily inspection:
Regularly observe all of pipeline and joints of lubrication system at every day to inspects there are an leakages or damages of the pipeline or joints of the system, replace them if required.

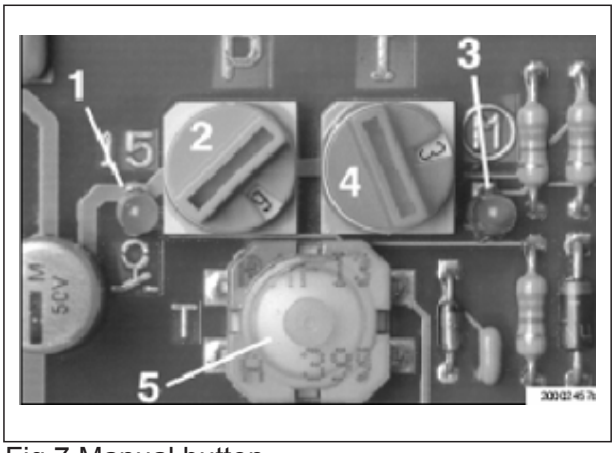


Fig.7 Manual button

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Serial No.	Fault type	Phenomenon	Solution for fault
1	Electric pump does not work	Electric pump does not work (press the manual lubricating button, the pump do not have any action.)	a. Check pump circuit b. The interval do not set to be 0 c. the circuit board of the pump has be damaged.
2	The output pressure of electric pump is too low	The pressure of oil outlet of electric pump is too low (it can be blocked with fingers)	Because the outlet piston of oil pump is clogged, replace the oil pump piston.
3	The electric pump operates normally but no oil goes out from a certain injection point of an individual system.	The electric pump operates normally but no oil goes out from the oil inlet of the distributor.	The pipeline from electric pump to distributor is clogged, so check pipeline to correct the fault.
		The electric pump operates normally and there is oil at the oil inlet of distributor. However, there is no oil out at the oil outlet of the distributor.	Corresponding distributor is clogged, so replace the distributor.
		The electric pump operates normally and there is oil at the oil outlet of the distributor, but there is not oil at one of the lubricating points.	The pipeline from lubricating points to distributor is clogged, so check pipeline to correct the fault.
		The electric pump operates normally, but oil leaks at the relief valve of electric pump.	A certain distributor or pipeline of the system is clogged, so inspect the distributors or pipelines one by one to correct the fault.
4	Insufficient oil supply of the system	Abnormal noise occurs to the lock pin but each refueling pipeline works normally.	Increase the operation time of pump as required by the system.
5	Excessive oil supply of the system	Oil relief occurs to lock pin sleeve of some lubrication points	Decrease the operation time of pump as required by the system.
6	Leakage of pipeline	Leakage occurs to some injection pipelines	Eliminate leakage

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28 TRANSMISSION OIL FILTER ASSEMBLY

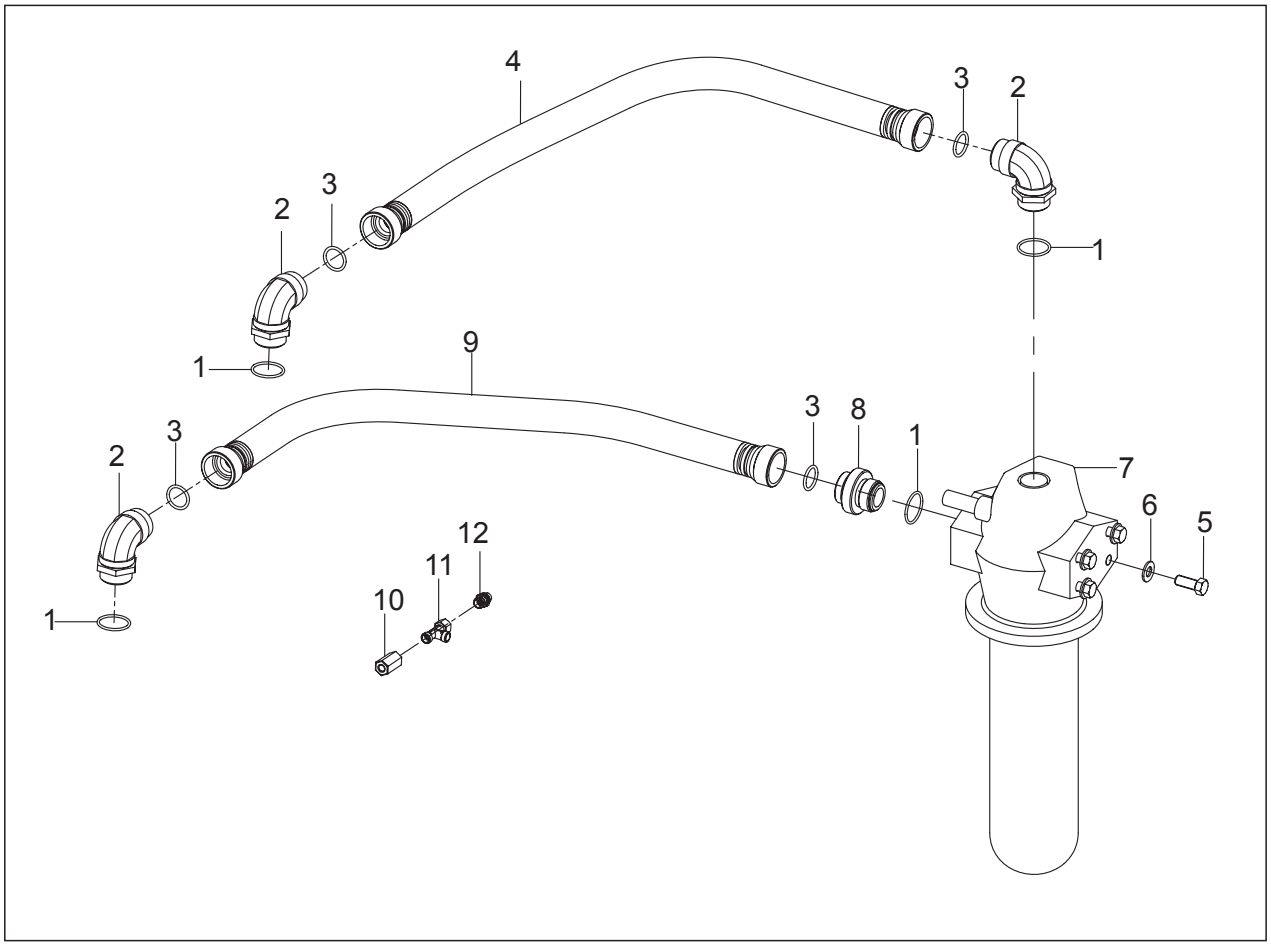


Fig.1 Transmission Oil Filter Assembly

1. 'O' ring
2. Elbow
3. 'O' ring
4. Hose assembly 1
5. Bolt
6. Washer
7. Filter assembly
8. Adaptor
9. Hose assembly 2
10. Connector
11. Adaptor
12. Adaptor

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Overview

Numbers in parentheses refer to Fig.2.

The transmission oil filter assembly is installed on the frame to remove dirt, metals and other contaminants from the transmission oil to reduce wear and provide maximum service life for the transmission.

A bypass valve in filter head (1) ensures an adequate flow of oil to the transmission if element (2) becomes clogged and cannot pass oil through quickly enough to satisfy demand. Pressure switch (4, Fig.2) is located in the main filter assembly valve block. When the filter is blocked to a certain degree, Installed in filter head (1) is pressure switch (4) which sends a signal to a filter restriction indicator warning light (mounted on the dash panel) to warn the operator when element (2) becomes sufficiently clogged to restrict oil flow. This indicates that element (2) should be changed.

Oil flows from the transmission to the inlet side of filter head (1) where the oil will then take one of two paths:

a. If the oil is cold and thick, or element (2) is clogged, oil pressure increases and opens the bypass valve allowing the oil to bypass the filter and flow through filter head (1) and exit at the outlet port to the transmission.

b. If the oil is not thick and element (2) is not clogged, oil will flow through element (2) before returning to the transmission.

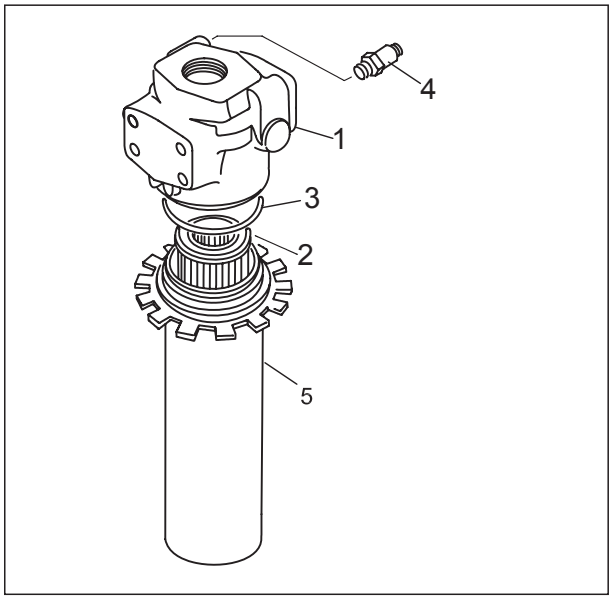


Fig.2 Main filter assembly

1. Filter head
2. Element
3. 'O' ring
4. Pressure switch
5. Housing

Removal

Numbers in parentheses refer to Fig.1, unless otherwise specified.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks are properly secured and of adequate capacity to do the job safely.

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1. Position the vehicle in a level work area, raise the body and secure in place with the body safety pins. Apply the parking brake and switch off the engine. Turn steering wheel in both directions several times to relieve pressure in the steering system.
2. Operate the treadle valve continuously to discharge the brake accumulators. Block all road wheels. Set the battery in the ' off ' position.
3. Tag filter hose assembly 1 (4) and hose assembly 2 (9) to aid in installation and disconnect from adaptor (8) and elbow (2) in filter assembly (10). remove 'O' ring (3) . Cap open line ends and fittings to prevent entry of dirt.
4. Support filter assembly (7) and remove bolts (5) and washers (6). Then remove filter assembly (7) and drain oil from assembly into a suitable container.
5. If filter assembly (7) is being replaced, remove adaptors (8) and elbow (2) . If filter element (2, Fig.2) is only being replaced, disassemble filter assembly (7) and replace element (2, Fig.2) as described under changing filter element.
6. If required, remove filter hose assembly 1 (4) and hose assembly 2 (9) from adaptors (2) in the transmission. Cap open line ends and fittings to prevent entry of dirt.

Installation

Numbers in parentheses refer to Fig.1, unless otherwise specified.
1. If new filter assembly (7) is being fitted, install adaptors (8) and elbow (2) in filter head (1, Fig.2).
2. Position filter assembly (7) to frame and secure with bolts (5) and washers (6).
3. If filter hose assembly 1 (4) and hose assembly 2 (9) were removed, remove blanking caps, fit 'O' ring (3) and install lines on elbow(2) in the transmission, as tagged during removal.

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4. Remove blanking caps, fit 'O' ring (3) and connect filter hose assembly 1 (4) and hose assembly 2 (9) to adaptor (8) and elbow (2) in filter assembly (7), as tagged during removal.
5. Set the battery in the ' on ' position. Start the engine and check for leaks.
6. Check transmission oil level and add oil if required.
Refer to chapter 6, ' Transmission And Mounting ' for correct fill level and Section 36.1, ' LUBRICATION AND MAINTENANCE ' for oil specification.
7. Ensure parking brake is applied, remove the body safety pins and lower the body. Remove wheel blocks from all road wheels.

Changing filter element

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks are properly secured and of adequate capacity to do the job safely.

Numbers in parentheses refer to Fig.2, unless otherwise specified.
Change filter element (2) at intervals specified in Section 36.1, ' LUBRICATION AND MAINTENANCE '. Element (2) should also be changed whenever a transmission overhaul is performed, or other internal servicing is carried out.
1. Position the vehicle in a level work area, raise the body and secure in place with the body safety pins. Apply the parking brake and switch off the engine. Turn steering wheel in both directions several times to relieve pressure in the steering system.
2. Operate the treadle valve continuously to discharge the brake accumulators. Block all road wheels. Set the battery in the ' off ' position.

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3. With a suitable container under the filter assembly(7, fig.1) to catch draining oil, unscrew locking collar on housing (5) and remove housing (5) and element (2). Discard element (2).
4. Remove and discard 'O' ring (3) from filter head (1).
5. Clean housing (5) with clean fuel oil and dry with a clean lint free cloth. Lubricate new 'O' ring (3) and install on filter head (1).
6. Install new element (2) on filter head (1), making sure plastic insert in element centre contacts spiral snap ring on filter head (1).
7. Install housing (5) over element (2) and secure tightly with locking collar.
8. Set the battery in the ' on ' position. Start the engine and check for leaks. Tighten lines, fittings and filter locking collar as required.
9. Check transmission oil level and add oil if required. Refer to chapter 6, ' Transmission And Mounting ' for correct fill level and Section 36.1, ' LUBRICATION AND MAINTENANCE ' for oil specification.
10. Ensure parking brake is applied, remove the body safety pins and lower the body. Remove wheel blocks from all road wheels.

Special tools

There are no special tools required for procedures outlined in this section. Refer to Section 36.3, ' SERVICE TOOLS '.

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29 DISC BRAKE COOLING SYSTEM PIPELINE AND JOINT

Overview

The double-gear pump II installed to the transmission PTO supplies oil to the disc brake cooling system.

The double-gear pump II is a composite gear pump assembly consisting of two independent parts. The front part includes: driving shaft and gear, driven gear and transmission. The rear part includes: driving gear, driven gear and transmission. The rear part is connected to the driving shaft and gear through connecting shaft.

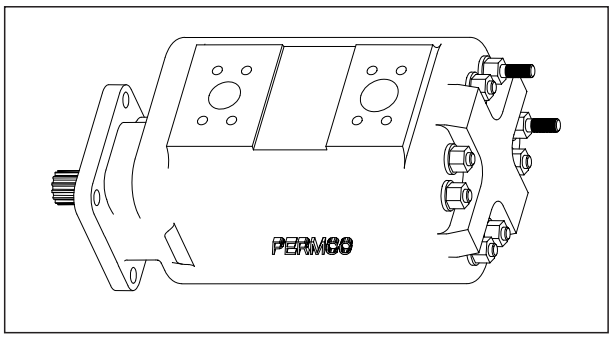


Fig.1 Outline drawing of double-gear pump II

Operation

See Fig.2 for the principle of double-gear pump II.

When the drive gear rotates, the driven gear rotates in the reverse direction. The tooth socket between the teeth of gear will bring the hydraulic oil from the gear pump case inlet to the outlet. When the teeth of gears are engaged again, the hydraulic is forced out of the outlet. The delivery capacity of gear pump is determined by the width of its corresponding gear set and the rotating speed of drive gear.

The double-gear pump II pumps oil from the the tank of hoist and disc brake system and send it to the disc brake cooling circuit.

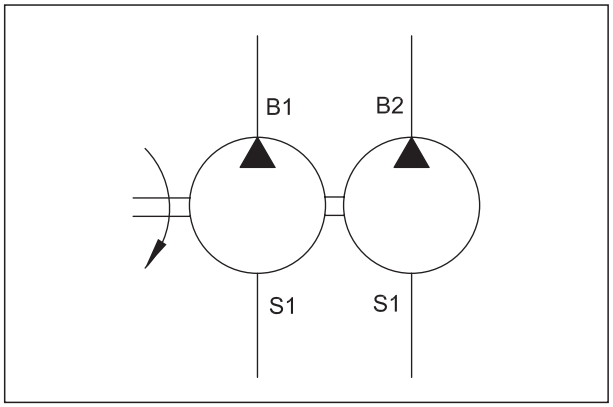


Fig.2 Outline drawing of double-gear pump II

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30 BRAKE OIL COOLER AND INSTALLATION

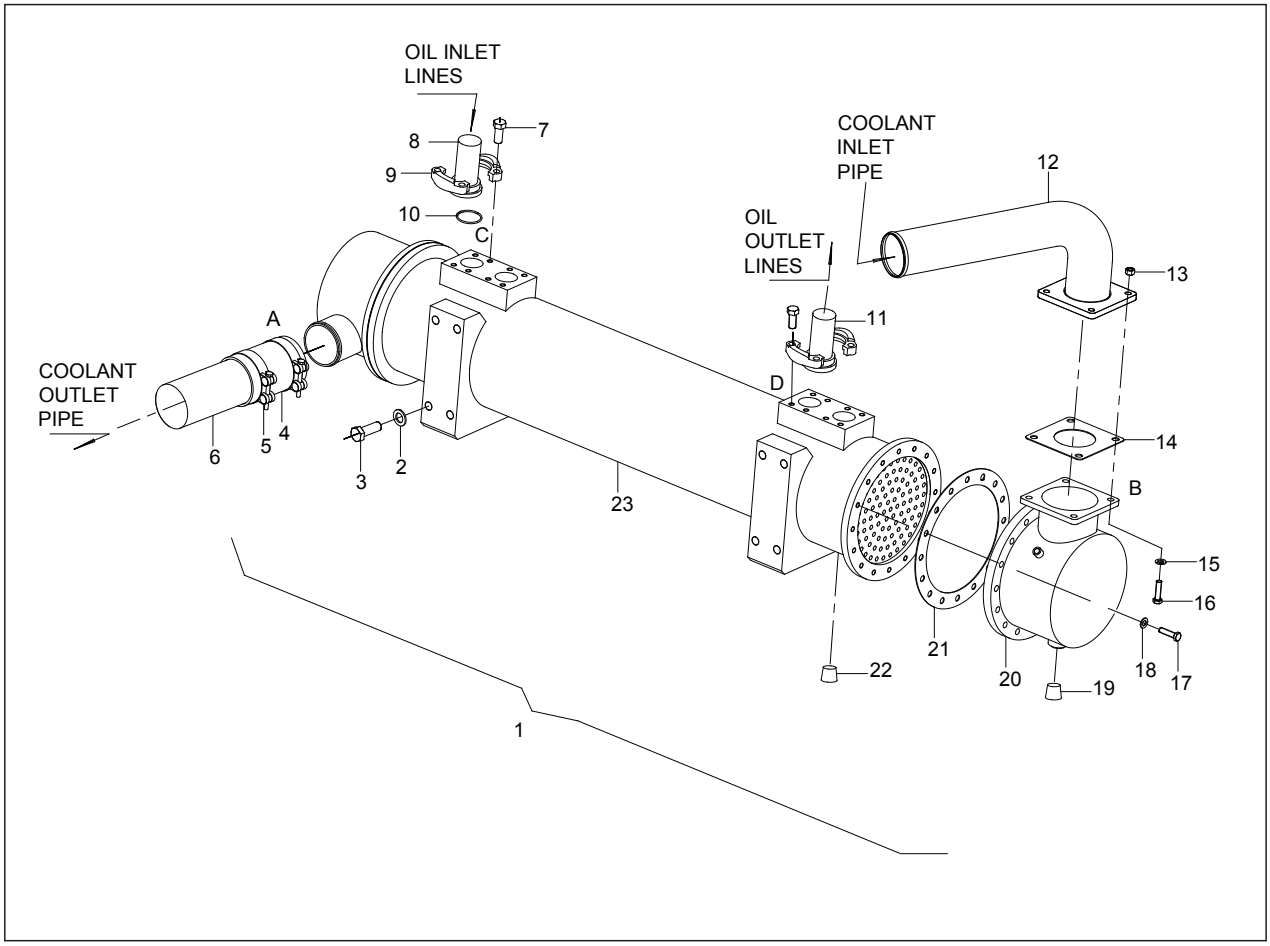


Fig.1 Disc brake oil cooler

1. Disc brake oil cooler
2. Washer
3. Bolt
4. Sleeve
5. Clamp
6. Coolant outlet pipe
7. Bolt
8. Oil Inlet lines
9. Split flange
10. 'O' Ring
11. Oil out lines
12. Coolant inlet pipe
13. Nut
14. Gasket
15. Washer
16. Bolt
17. Bolt
18. Washer
19. Drain plug
20. Cooler flanges
21. Gasket
22. Drain plug
23. Heat exchanger

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Overview and operation

Numbers and letters in parentheses refer to Fig.1

The disc brake oil cooler is connected in the cooling system between the transmission oil cooler and engine oil cooler. The disc brake oil cooler is connected in the hydraulic system between disc brake filters and disc brake assemblies, and is used to cool disc brake cooling oil.

The disc brake oil cooler consists mainly of heat exchanger (23) and two cooler flanges (20), and is mounted at the engine front crossmember.

Coolant enters disc brake oil cooler (1) at port 'B' from the engine water pump. The coolant circulates through cooler tubes in heat exchanger (23) and exits at port 'A' to the transmission oil cooler. Disc brake cooling oil enters through ports 'C' from disc brake oil filters, circulates around cooler tubes in heat exchanger (23) and exits from ports 'D' to rear disc brakes.

Note: Oil flow must always flow in the opposite direction to coolant flow through the disc brake oil cooler.

Removal

Numbers in parentheses refer to Fig.1.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks and lifting equipment are properly secured and of adequate capacity to do the job safely.

1. Position the vehicle in a level work area, apply the parking brake and shutdown the engine. Turn the steering wheel in both directions several times to relieve pressure in the steering system.
2. Block all road wheels, set the switch of

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accumulator into the “off” position.
3. Remove filler cap from the hydraulic oil tank to relieve pressure. With a suitable container in position, remove drain plug from the bottom of the hydraulic oil tank and drain the oil.
4. Using a suitable lifting device, support engine pan guard and remove mounting hardware. Remove engine pan guard from truck. Open drain cocks and drain cooling system. Refer to Section 32.1 RADIATOR AND MOUNTING.
5. Remove drain plugs (22) from the disc brake oil cooler (1) and drain oil into a suitable container. Remove bolt (7) and split flange (9) securing oil inlet lines (8) to ports 'C', and oil outlet line (11) to port ‘D’. Drain oil from oil inlet and outlet lines (8 & 11) into a suitable container and discard 'O' rings (10). Cap oil inlet and outlet lines (8 & 11) and ports 'C','D’ to prevent ingress of dirt.
6. Remove drain plugs (19) from cooler flanges (20) and drain coolant into a suitable container. Remove clamp (5) securing sleeve (4) to ports ‘A’.
7. Support disc brake oil cooler (1) with a suitable lifting device and remove bolts (3) and washers (2) securing disc brake oil cooler (1) to mounting bracket at engine front crossmember. Lower disc brake oil cooler (1) and remove to a clean work area for disassembly.

Cleaning and Disassembly
Numbers in parentheses refer to Fig.1
Note: In the event of a major mechanical failure, transmission oil cooler assembly should be cleaned thoroughly or replaced. Do not attempt to clean cooler cores, after a transmission failure in which metal particles from worn or broken parts are released into the oil. Replace the cooler cores.
In many areas, raw water is extremely corrosive or scale forming and should be treated to prevent damage to the disc

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brake oil cooler (1). A properly maintained cooling system will significantly reduce cleaning intervals. Refer to Section 36.1, LUBRICATION AND MAINTENANCE.

Cleaning oil side

⚠ WARNING

Dangerous fumes. To prevent personal injury, use trichloroethylene only in the open or in a well ventilated room.

1. Clean disc brake oil cooler (1) before sludge hardens. After disc brake oil cooler (1) is completely drained, circulate a solution of trichloroethylene through the passages surrounding the cooler tubes in heat exchanger (23) to remove sludge.
2. If cooler tubes are badly clogged, circulate an alkaline solution through the heat exchanger (23). Solution should be circulated through the heat exchanger (23), in the reverse direction to normal flow, for approximately 15 minutes, after soaking for 10 minutes. The duration of circulation depends on how badly clogged the cooler tubes are. Flush thoroughly with clean hot water.

Cleaning water side

1. Match mark cooler flanges (20) and heat exchanger (23) to aid in assembly.
2. Remove washers (18), bolts (17) securing cooler flanges (20) to heat exchanger (23). Discard gaskets (21).
3. Make up a solution composed of 1/3 muriatic acid and 2/3 water. To each 9.5 litres (2.5 gal) of solution, add 225 g (0.5 lb) of oxalic acid.
4. Immerse heat exchanger (23) in the cleaning solution. Cleaning action is noticeable by bubbling and foaming. The process must be carefully observed and when bubbling

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stops, usually between 30 - 60 sec, remove heat exchanger (23) from cleaning solution and flush thoroughly with clean, hot water. After cleaning, dip disc brake oil cooler in light oil.

Note: Severely fouled cooler tubes can be cleaned by use of a rotary brush if normal cleaning is not sufficient.

Assembly

Numbers in parentheses refer to Fig.1.

Note: Tighten all fasteners without special torques specified to standard torques listed in Section 36.2, TECHNICAL CONDITIONS FOR BOLTS AND NUTS.

1. Install new gaskets (21) to cooler flanges (20) and secure cooler flanges (20) to heat exchanger (23) with bolts (17), washers (18). Tighten bolts securing cooler flanges (20) alternately to give an even seal around cooler flange area.
2. Install drain plugs (19 & 22) in underside of disc brake oil cooler (1).

Installation

Numbers and letters in parentheses refer to Fig.1

Note: Tighten all fasteners without special torques specified to standard torques listed in Section 36.2, TECHNICAL CONDITIONS FOR BOLTS AND NUTS.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel chocks and lifting equipment are properly secured and of adequate capacity to do the job safely.

1. Using suitable lifting equipment, position disc brake oil cooler (1) to mounting bracket at engine front crossmember and secure with bolts (3) and washers (2).

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2. Install sleeve (4) on coolant outlet pipe (6) and secure sleeve (4) to port 'A' with clamps (5).
3. Install new gasket (14) on coolant inlet pipe (12) and secure coolant inlet pipe (12) to port 'B' with bolts (16) and nuts (13).
4. Install new 'O' rings (10) on oil inlet lines (8) and oil outlet lines (11). Secure oil inlet lines (8) to ports 'C' and oil outlet lines (11) to ports 'D' with split flanges (9), and bolts (7).
5. Fill the hydraulic oil tank with hydraulic oil specified in Section 36.1, LUBRICATION AND MAINTENANCE. Refer to Section 15, 'HYDRAULIC OIL TANK ASSEMBLY' for correct fill level. Install filler cap.
6. Ensure all drain cocks on the cooling system are securely locked and fill cooling system with coolant specified in Section 32.1 'RADIATOR AND MOUNTING'.
7. Using suitable lifting equipment, install engine pan guard on the truck. Secure engine pan guard to the truck with mounting hardware removed during removal.
8. Start the engine and check for leaks. Tighten lines and fittings as required.
9. Remove wheel blocks from all road wheels.

Special tools

There are no special tools required for procedures outlined in this section. Refer to Section 36.3, MAINTENANCE TOOLS, for part numbers of general service tools required.

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31 TRANSMISSION COOLING PIPING MOUNTING

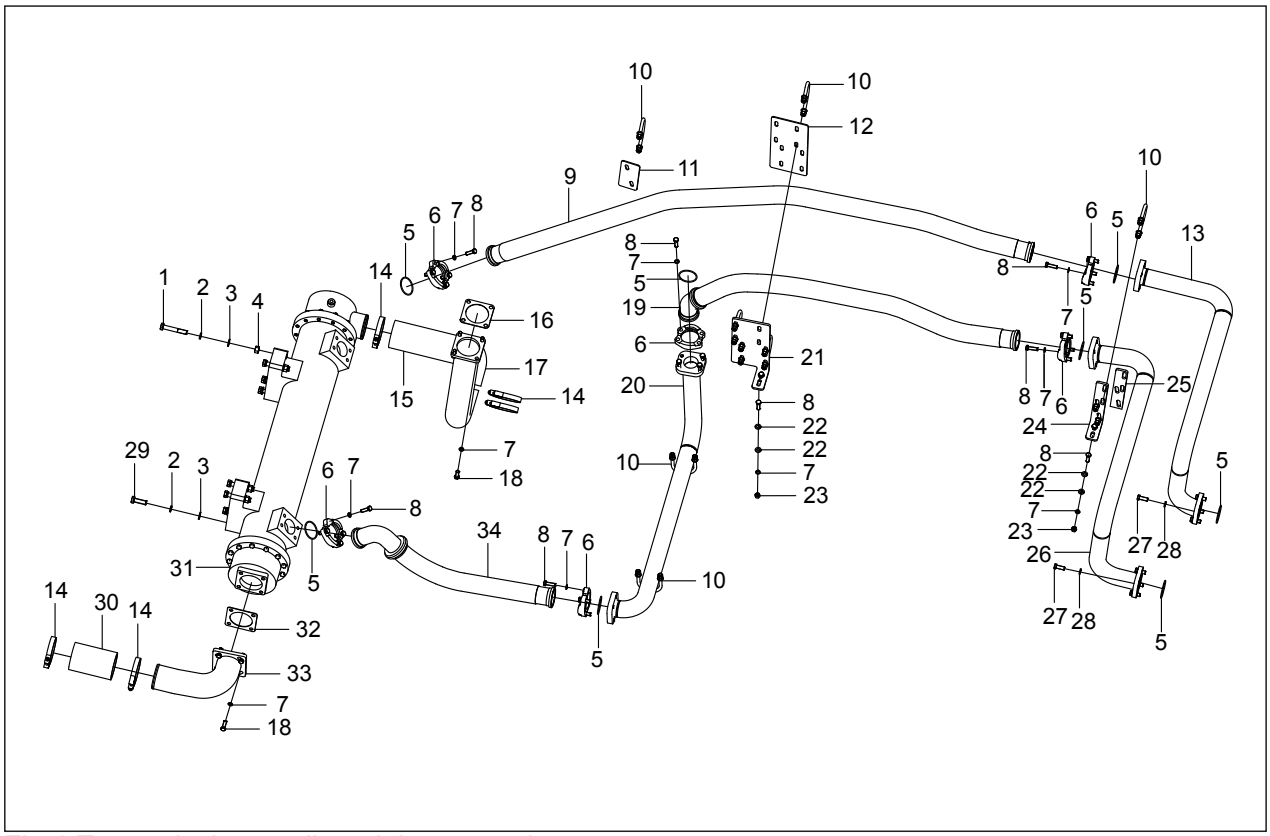


Fig.1 Transmission cooling piping mounting

1.Bolt
2.Washer
3.Washer
4.Nut
5.' O 'ring
6.Flange
7.Washer
8.Bolt
9.Oil inlet pipe assembly
10.Clamp
11.Rubber pad
12.Rubber pad
13.Steel tube assembly
14.Clamp
15.Hose silicone
16.Gasket
17.Water outlet tube assembly
18.Bolt
19.Oil outlet pipe assembly
20.Steel tube assembly
21.Fixed plate
22.Washer
23.Nut
24.Fixed plate
25.Rubber pad
26.Steel tube assembly
27.Bolt
28.Lockwasher
29.Bolt
30.Hose silicone
31.Oil cooler
32.Gasket
33.Water inlet tube assembly
34.Oil outlet pipe assembly

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Overview

Numbers in parentheses refer to Fig.1.

The transmission oil cooler is connected between the radiator and transmission to maintain transmission oil within its required operating temperature range. Coolant enters port ' D ' from disc brake oil cooler, circulates through cores in transmission oil cooler (31), and exits at port ' A ' to the engine water pump. Oil to be cooled enters port ' B ' from the transmission convertor outlet port, circulates around cores in transmission oil cooler (31), and exits at port ' C ' to the transmission convertor inlet port.

Note: Oil flow must always flow in the opposite direction to coolant flow through transmission oil cooler.

Removal

⚠ WARNING

To prevent personal injury and property damage, be sure wheel blocks and lifting equipment are properly secured and of adequate capacity to do the job safely.

1. Position the vehicle in a level work area, apply the parking brake and switch off the engine. Turn the steering wheel in both directions several times to relieve pressure in the steering system.
2. Block all road wheels. Set the battery in the ' off ' position.
3. Open drain cocks and drain the cooling system. Refer to chapter 32, ' RADIATOR AND MOUNTING ', for procedure.
4. Remove drain plugs from oil cooler (31) and drain transmission oil into a suitable container.
5. Remove bolts (8), washers (7) , flange(6) and ' O ' ring (5) securing oil inlet pipe assembly (9) to ports 'B' of oil cooler (31).
6. Drain oil into a suitable container. Cap

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oil inlet pipe assembly (9) and port ' B ' to prevent ingress of dirt.
7. Remove the oil outlet pipe assembly (34) from oil cooler (31) in same method as step 5. Cap oil outlet pipe assembly (34) and port ' C ' to prevent ingress of dirt.
8. Slacken clamps (14), drain coolant into a suitable container. Remove bolts (18) , washers (7) and gasket (32)securing water inlet tube assembly (33) to port ' D '. Cap water inlet tube assembly (33) and port ' D ' to prevent ingress of dirt.
9. Slacken clamps (14), drain coolant into a suitable container. Remove bolts (18) , washers (7) and gasket (16) securing water outlet tube assembly (17) to port ' A '. Cap water outlet tube assembly (17) and port ' A ' to prevent ingress of dirt.
10. Support transmission oil cooler (31) with a suitable lifting device and remove nut (4) , bolts (1,29) and washers (9,10). Lower transmission oil cooler (31) and remove to a clean work area.

Cleaning and inspection
Numbers in parentheses refer to Fig.1.
Note: In the event of a major mechanical failure, transmission oil cooler (31) should be cleaned thoroughly or replaced. Do not attempt to clean cooler cores, after a transmission failure in which metal particles from worn or broken parts are released into the oil. Replace the cooler cores. In many areas, raw water is extremely corrosive or scale forming and should be treated to prevent damage to transmission oil cooler (31). A properly maintained cooling system will significantly reduce cleaning intervals. Refer to chapter 32, ' RADIATOR AND MOUNTING ', for procedure.

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Clean oil side

⚠ WARNING

Dangerous fumes. To prevent personal injury, use trichloroethylene only in the open or in a well ventilated room. Avoid direct contact with eyes or skin as irritation can occur.

1. Clean oil cooler (31) before hardening deposits, the oil passages in oil cooler (31) by circulating a solution of trichloroethylene through the passages, remove all deposits.
2.If the passages are badly clogged, circulate an alkaline solution through the oil cooler (31). After 10 minutes, circulate reversely for 15 minutes. Flush thoroughly with hot water.

Clean water side

1. Solution is made as follows: add 227 g (0.5 lb) of oxalic acid to each 9.5 litres (2.5 gal) of solution composed of 1/3 muriatic acid and 2/3 water.
2. Clean the oil cooler (31) by immersing in the solution, cleaning action is noticeable by bubbling and foaming. The process must be carefully observed and when bubbling stops, usually between 30 - 60 seconds, remove oil cooler (31) from cleaning solution and flush thoroughly with clean, hot water. After cleaning, dip oil cooler (31) in light oil.

Caution: If the ordinary cleaning mode is not effective, use the rotary brush to remove the excessive deposits.

Assembly

Numbers in parentheses refer to Fig.1.
1. Install new gasket on oil cooler flange and position oil cooler flange onto oil cooler (31). Tighten the bolt.
2.Install the drain plugs onto oil cooler (31).

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Installation

Numbers in parentheses refer to Fig.1.

⚠ WARNING

To prevent personal injury and property damage, be sure wheel chocks and lifting equipment are properly secured and of adequate capacity to do the job safely.

1. Using suitable lifting equipment, position oil cooler (31) to mounting bracket, and secure oil cooler (31) to mounting bracket with nut (4) , bolts (1,29) and washers (2,3) .
2. Secure oil inlet pipe assembly (9) and oil outlet pipe assembly (34) to oil cooler (31) with ' O ' ring (5), flange(6) , washers (7)and bolts (8).
3. Secure water outlet tube assembly (17) to port ' A ' with clamps (14).
4. Secure water inlet tube assembly (33) to port ' D ' with bolts (18) , washers (7) and gasket (32).
5. Fill transmission with transmission oil specified in Section 36.1,' LUBRICATION AND MAINTENANCE '.
6. Ensure all drain cocks on the cooling system are securely locked and fill cooling system with coolant as specified in chapter 32, ' RADIATOR AND MOUNTING '.
7. Start the engine and check for leaks. Tighten lines and fittings as required.
8. Remove wheel blocks from all road wheels.

Special tools

There are no special tools required for procedures outlined in this section. Refer to 36.3,' SERVICE TOOLS '.

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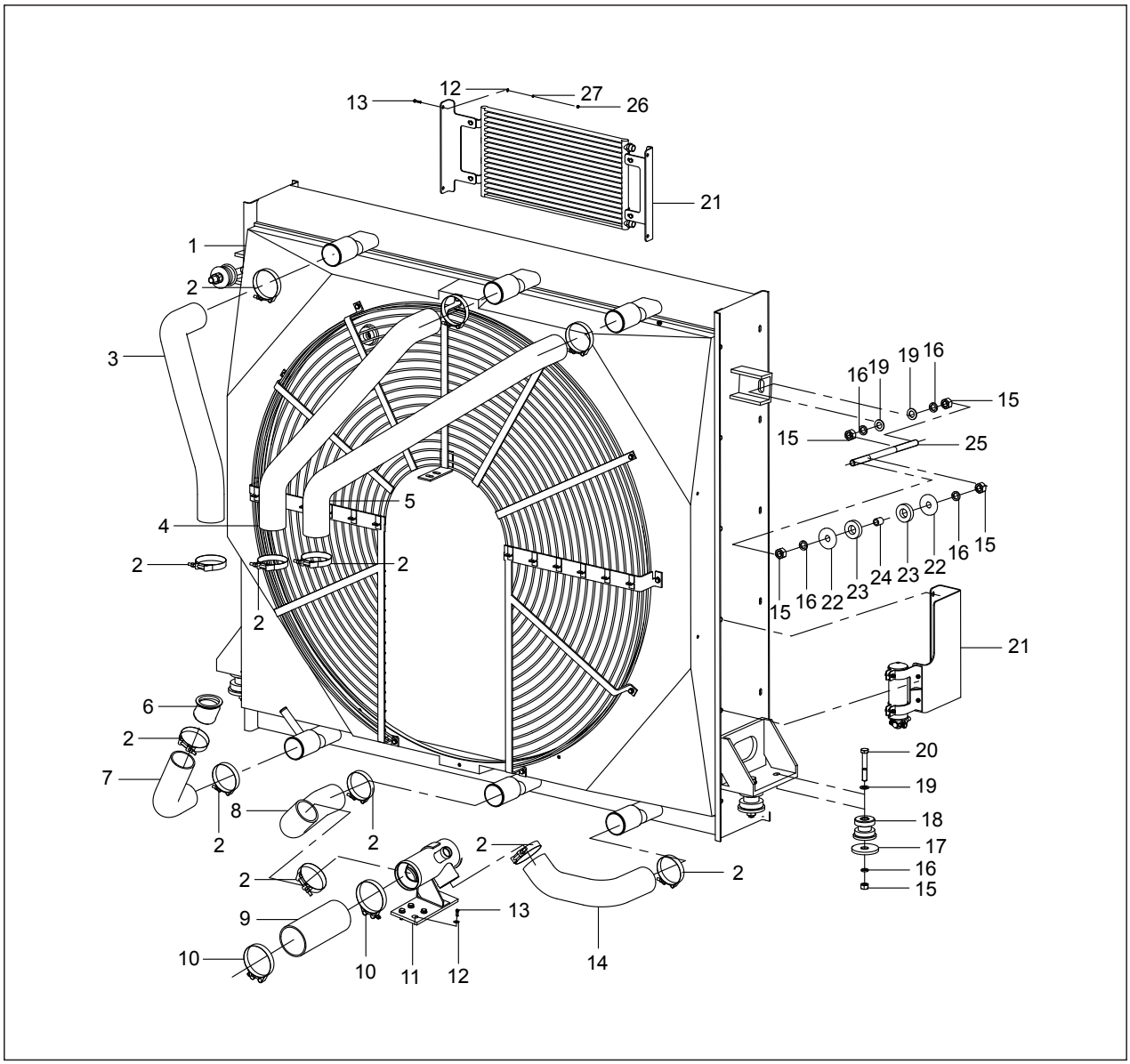


Fig.1 Radiator And Mounting

1.Radiator assembly	10.Clamp	19.washer
2.Clamp	11.Cross pipe assembly	20.Bolt
3.Inlet pipe	12.Washer	21.Cooler
4.Inlet pipe	13.Bolt	22.washer
5.Inlet pipe	14.Outlet pipe	23.Damper
6.Elbow	15.Nut	24.Sleeve
7.Outlet pipe	16.Washer	25.Support Rod
8.Outlet pipe	17.Plate	26.Nut
9.Hose	18.Damper	27.Washer

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32 RADIATOR AND MOUNTING

32.1 Radiator and Mounting

Overview

Numbers in parentheses refer to Fig.1, unless otherwise specified.

Radiator assembly (1) is mounted at the front of the chassis in front of the engine cooling fan.

A fan shroud assembly comprising of shroud and ring improves the engine cooling fan efficiency and avoid to injury the engine cooling fan Radiator assembly (4) includes two parts, the narrow part Is for the compressed air cooling and the other Is for the cylinder, the oil brake, and the gearbox cooling.

Removal

Numbers in parentheses refer to Fig.1, unless otherwise specified.

Remove the components as following:

1. Position the vehicle in a level work area, apply the parking brake and shutdown the engine. Turn the steering wheel in both directions several times to relieve pressure in the steering system. Block all road wheels.
2. Depress pressure relief button on filler cap and remove filler cap from filler neck.
3. With a suitable container in position, open drain cock at the bottom of radiator assembly (4) and drain the cooling system. Close drain cock securely when coolant is completely drained.
4. Slacken clamps of hose connected to the water tank, remove the hose for sealing and tag them correctly.
5. Slacken clamps (2) and remove inlet pipe (3, 4, 5) away from the radiator top container connections. Cap open pipe ends to prevent entry of dirt.
6. Slacken clamps (10) and slide the hose (9) away from cross pipe assembly (11).
7. Slacken clamps (2) and remove outlet pipe

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(7, 8, 14).Cap open pipe ends to prevent entry of dirt.
8. Remove bolts (13) and washers (12) securing cross pipe assembly (11) to the frame.
9. Remove bolts(13),washers(12,27) and nuts(26) securing cooler (21) to radiator assembly (1).
10. Remove nuts (15), washers (16), washers (19), washers (23), sleeves (24) and flexible mounts (22). Remove support rods (25) from radiator assembly (1) and chassis brackets.
11. Attach suitable lifting equipment to radiator assembly (1) and remove nuts(15),washers (16,19), plates(17), dampers(18), and bolts(20) securing radiator assembly(1) to chassis brackets. Remove radiator assembly(1).

Installation

Numbers in parentheses refer to Fig.1, unless otherwise specified.
1.Using suitable lifting equipment to radiator assembly (1), position plates(17)and dampers(18) on flexible mounts and secure with bolts(20), washers (16,19) and nuts(15).
2.Install nuts (15), washers (16,19), washers (22), damper (23), sleeves (24) , on end of support rods (25) and secure support rods (25) to mounting brackets on radiator side frames and truck frame with nuts (18).
3.Position cooler (21) on radiator assembly (1) and secure with bolts (13),washers (12,27) and nuts(24).
4.Position cross pipe assembly (11) on frame and secure with bolts (13) and washers (12).
5.Secure outlet pipe (7) to Elbow (6) and radiator assembly (1) with clamps (2).
6.Secure outlet pipe (8,14) to cross pipe assembly (11) and radiator assembly (1) with clamps (2).
7. Secure hose (9) to engine and cross pipe assembly (11) with clamps (10).
8.Position inlet pipe (3, 4, 5) on radiator

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assembly (1) and secure with clamps (2).
9. Install successively the disassembled hose connected to the remote water tank to radiator assembly (1).

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32.2 Condenser Assembly

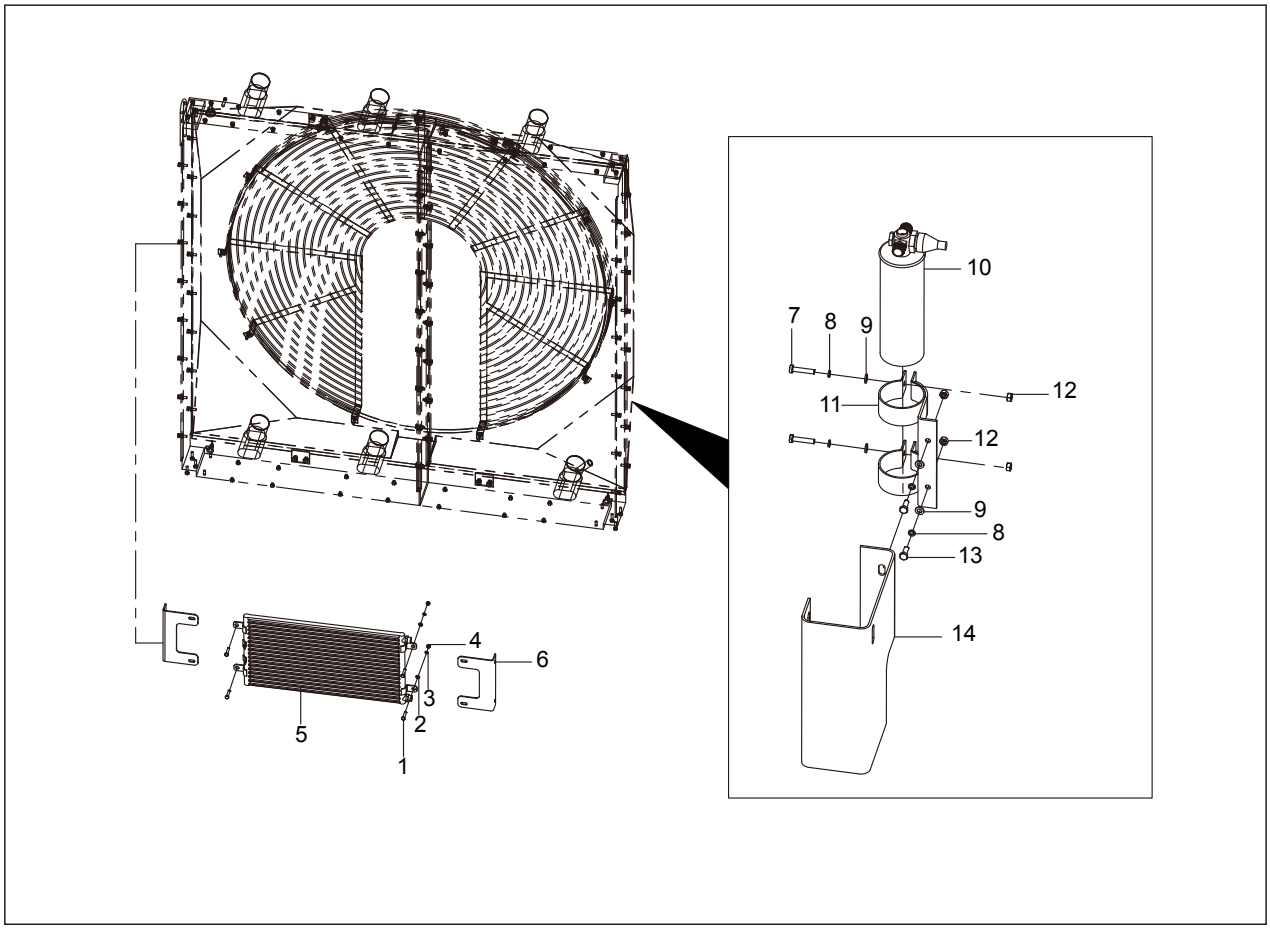


Fig.2 Installation and breakdown drawing of condenser

1. Bolt	6. Bracket	11.Liquid reservoir support
2. Washer	7. Bolt	12.Nut
3. Washe	8. Washer	13.Bolt
4.Nut	9.Washer	14.Pinboard
5.Condenser	10.Liquid reservoir assembly	

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Remvoal

See the fig.2 for the numbers in the brackets.

1. Install use plugs defend the end of the refrigerant hoses.
2. Loosen the bolt (13), washer (8、9) and nut (12), take off the liquid reservoir support (11) from the pinboard (14).
3. Loosen the bolt (7), washer (8、9) and nut (12), take off the liquid reservoir assembly(10) from the liquid reservoir support (11).
4. Loosen the bolt (1), washer (2、3) and nut (4), take off the condenser (5) from the bracket (6).

Installation

See the fig.2 for the numbers in the brackets.

1. Fasten the condenser (5) in the bracket (6) by the bolt (1), washer (2、3) and nut (4).
2. Fasten the liquid reservoir assembly(10) in the liquid reservoir support (11) by the bolt (7), washer (8、9) and nut (12).
3. Fasten the liquid reservoir support (11) in the pinboard (14) by the bolt (7), washer (8、9) and nut (12).
4. Take off the plugs and connect the refrigerant hoses.

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32.3 Liquid Accumulator Assembly

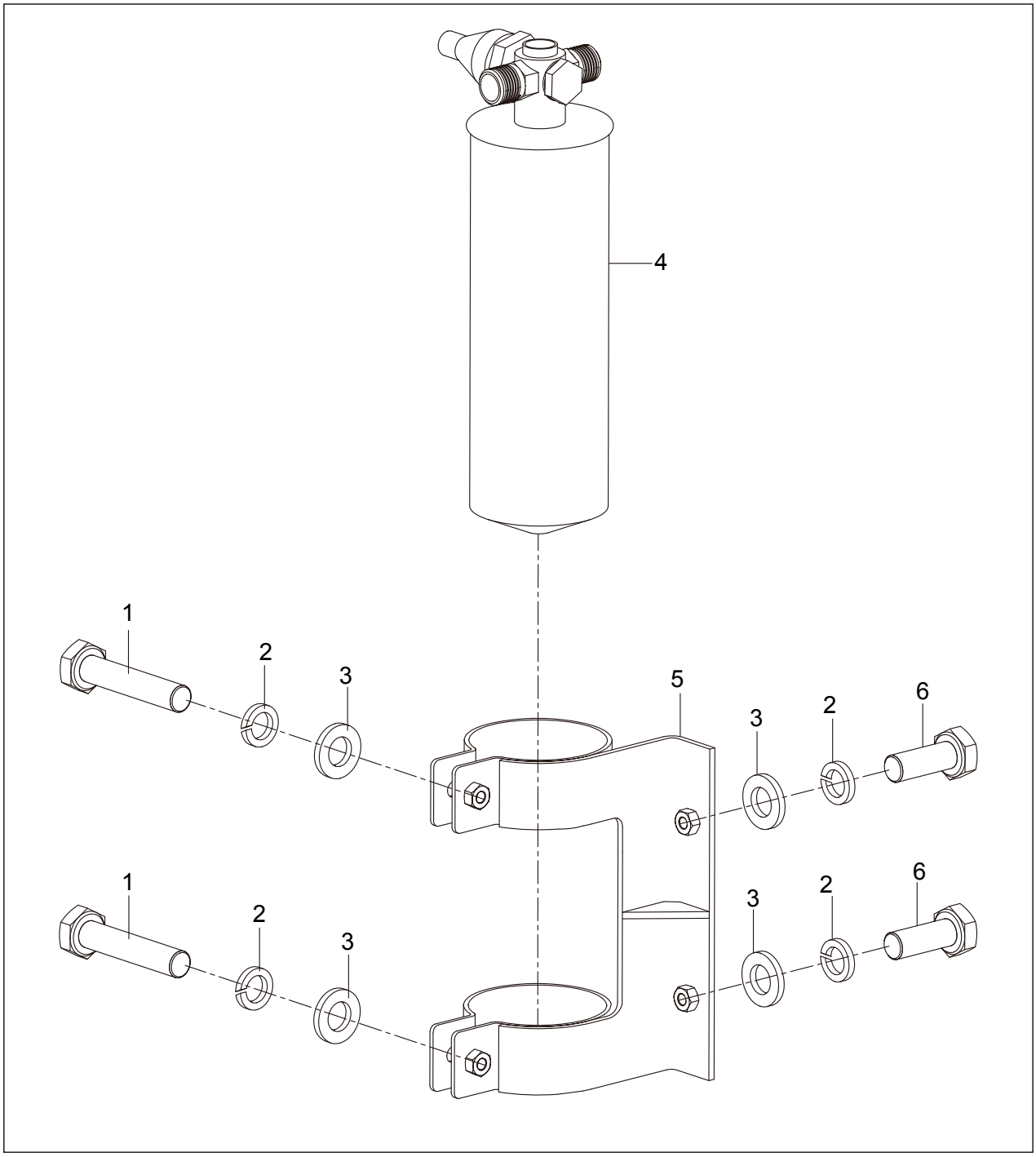


Fig.3 Installation and breakdown drawing of liquid accumulator

1. Bolt
2. Lockwasher
3. Washer
4. Liquid accumulator assembly
5. Liquid accumulator support
6. Bolt

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Installation of liquid accumulator

See the fig.3 for the numbers in the brackets.

1. Install liquid accumulator assembly (4) to the middle of liquid accumulator support (5) clip.
2. Tighten the upper and lower two clips of liquid accumulator support (5) with bolt (1), spring washer (2), washer (3) to ensure that liquid accumulator assembly (4) is fastened firmly inside the clips.
3. Install liquid accumulator support (5) to the corresponding position of condenser support.

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33 WATER TANK MOUNTING AND LINES

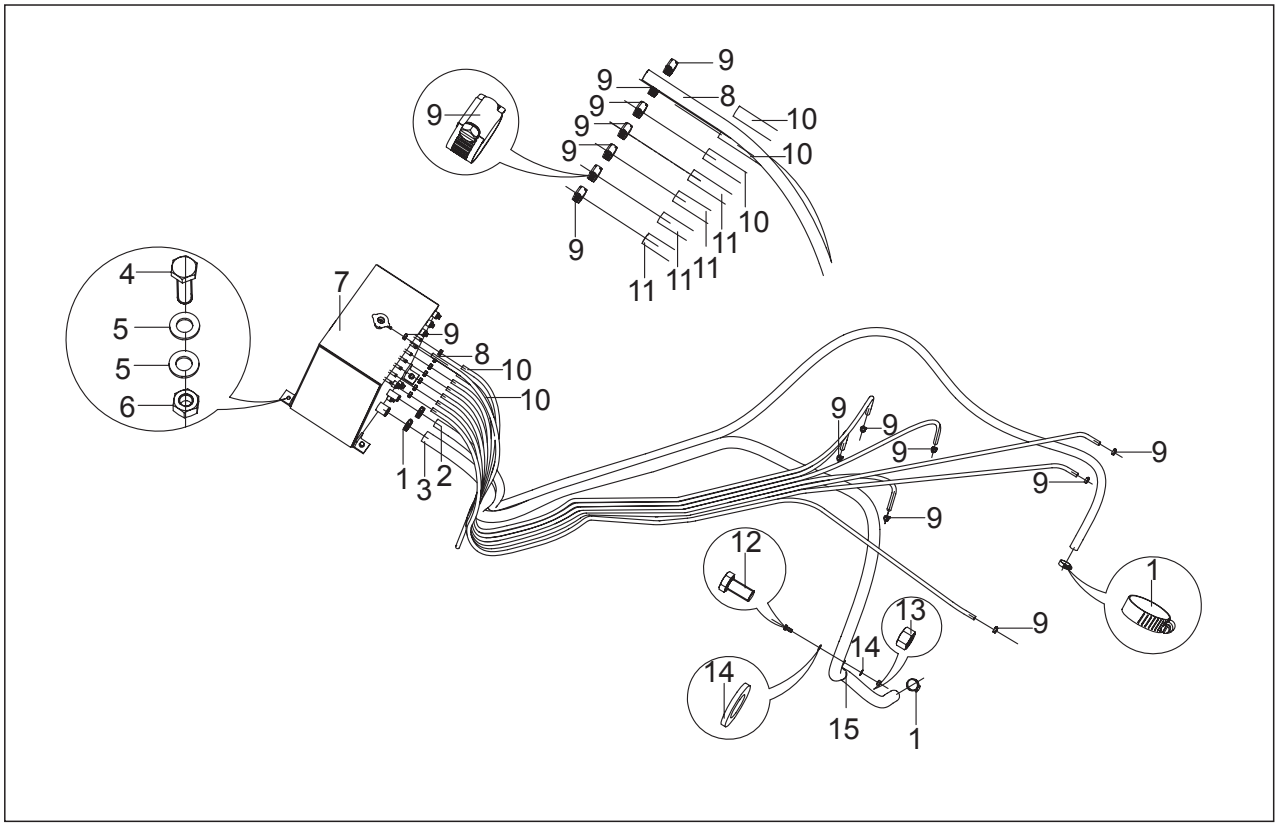


Fig.1 water tank mounting and lines

1. Clip
2. Make-up line
3. Make-up line
4. Bolt
5. Washer
6. Nut
7. Water tank
8. Overflow tubing
9. Clip
10. Deaeration line
11. Deaeration line
12. Bolt
13. Nut
14. Washer
15. Clamp

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Removal

⚠ WARNING

To prevent personal injury and property damage, be sure wheel chocks and lifting equipment are properly secured and of adequate capacity to do the job safely. Be sure the water tank has cooled and the coolant has drained, which can result in a loss of coolant and possible personal injury.

1. Slacken clip (9) off water tank (7), and disconnect overflow tubing (8) from water tank (7).
2. Slacken clip (1, 9) off radiator, and disconnect Make-up Line (2, 3) and Deaeration Line (10) from water tank (7).
3. Remove bolts (12), nuts (13), washers (14) and clamp (15) securing Make-up Line (2).
4. Slacken clip (1, 9) off water tank (7), identify and disconnect Make-up Line (2, 3), Deaeration Line (10) from water tank (7).
5. Slacken clip (9) off engine, and disconnect Deaeration Line (11) from engine.
6. Slacken clip (9) off water tank (7), identify and disconnect Deaeration Line (11) from water tank (7).
7. Disconnect electrical connection from float level Switch.
8. Remove bolts (4), washers (5) and nuts (6) securing water tank (7) to the platform. Attach suitable lifting equipment to water tank (7) and remove water tank (7) from the platform.

Installation

1. Using suitable lifting equipment, position water tank (7) on the platform and secure with bolts (4) and washers (5) and nuts (6).
2. Secure make-up Line (2, 3) and deaeration Line (10, 11) to water tank (7) with clip (1, 9).
3. Secure make-up Line (2) with bolts (12),

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nuts (13), washers (14) and clamp (15).
4. Secure make-up Line (2, 3) and deaeration Line (10) to radiator with clip (1, 9).
5. Secure deaeration Line (11) to engine with clip (9).
6. Secure Overflow Tubing (8) to water tank (7) with clip (9).
7. Connect electrical connection to float level switch.

Maintenance

Refer to Section COOLING SYSTEM for recommended preventive maintenance procedures, service intervals and coolant selection procedures.

Internal cleaning - water tubes

If scale deposits are present inside the water tubes of the radiator, it is necessary to use a suitable scale remover such as 'Powdered Scale Solvent', or equivalent. This material is a free-flowing powder, inhibited to prevent attack on the cooling system materials.
For general cleaning use it is recommended to use a concentration of 50 - 100 kg/m³ of water at a temperature of up to 60° C. Rapid circulation or agitation with compressed air will reduce the time for cleaning.
Note: If scale deposits within the radiator are exceptionally heavy, concentrations up to 200 kg/m³ may be used.
The most convenient method of use is to prepare a concentrated solution by mixing the powder in hot water in a tank and then adding the concentrated solution to water contained in the radiator.
Note: The solvent must always be added carefully to water, not water to solvent.

External Cleaning

Note: If a build up of dirt is apparent during routine inspection, the following cleaning procedure should beadopted.
1. Direct a steam jet at 100 - 300 kN/m², or

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compressed air at 500 - 700 kN/m² on to the faces of the radiator core assembly.
2. Liberally brush a liquid detergent on to those surfaces which were not satisfactorily cleaned at step 1. Leave to soak for at least 1 hour.
3. Apply a high pressure steam jet at 100 - 300 kN/m², or compressed air at 500 - 700 kN/m² on to the treated surfaces, forcing the fouling material out from the radiator core assembly.
4. Leave radiator core assembly to dry before reinstalling the cooling equipment.
Note: In the case of grossly fouled surfaces which are not cleaned adequately in steps 1 through 4, the following procedure may be used.
5. Ensure that the radiator core assembly is dry.
6. Liberally brush on to both sides of the radiator core assembly an emulsifying cleaner such as 'Gunk', or equivalent, and leave to soak for at least 1 hour.
7. Apply a high pressure steam jet at 100 -300 kN/m², or compressed air at 500 - 700 kN/m² on to the treated surfaces, from several different angles, forcing the fouling material out from the radiator core assembly.
8. For surfaces with stubborn deposits, it may be necessary to repeat steps 5 through 7, brushing the surfaces between stages using a stiff bristle brush.
9. Leave radiator core assembly to dry before reinstalling the cooling equipment.

Special tools

There are no special tools required for procedures outlined in this section. Refer to Section 38.2, SERVICE TOOLS, for part numbers of general service tools required.

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34 BATTERY AND INSTALLATION

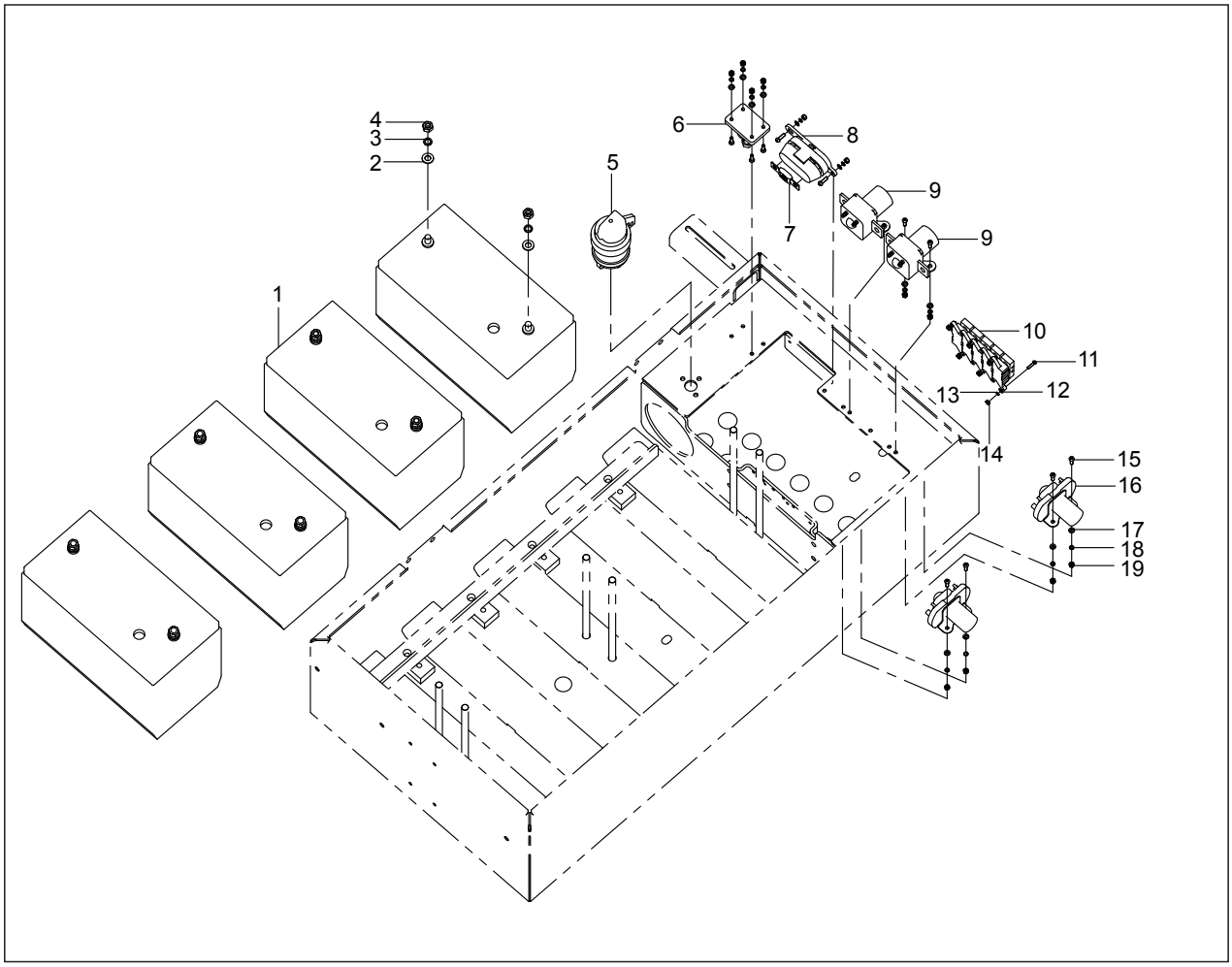


Fig.1 Battery and Installation

1. Battery	6. Connector	11. Screw	16. DC contactor
2. Washer	7. Fuse	12. Washer	17. Washer
3. Washer	8. Fuse base	13. Washer	18.Washer
4. Nut	9. DC contactor	14. Nut	19.Nut
5. Battery switch	10. Fuse base	15. Screw	

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Battery instruction

SRT95C off-highway truck uses four VARTA maintenance free batteries, of which two are connected in series and then in parallel, in order to provide 24V power supply to the engine.

1 Safety

1.1 The battery contains strong corrosive sulfuric acid and it should be kept away from children. The user should wear protective glasses and rubber gloves when using the battery. Clean with large quantity of clean water if the eye, skin or clothes has contacted sulfuric acid. The seriously injured user should be sent to the hospital.

1.2 The hydrogen and oxygen produced by battery during charging may explode when meeting open flame or if the exhaust port is blocked. Therefore, the battery should be kept away from open flame and avoid short circuit.

1.3 The battery housing made of polypropylene is flammable and should be kept away from open fire.

1.4 Please follow the cautions on the label strictly in battery use and maintenance.

2 Storage

1. The battery should be kept in a dry, clean and well-ventilated room with the temperature of 5-25°C and be kept away from direct sunshine and at least 2m away from heat source.

2. The battery should not be reversed or laid down. Additionally, it should not bear any mechanical shock and stress.

3 Charging

The constant voltage and constant current charging method can both be applied.

However, the constant voltage charging method is recommended.

3.1 Charging battery

3.1.1 Constant voltage charging method

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Charge the battery with constant voltage (between 26V and 28V) till the charging current reaches zero. During the process of charging the charging current is large initially and decrease gradually. The battery generates a little of gas and consumes a small amount of water. Therefore, constant voltage charging method is usually applied to maintenance free lead-acid battery.

3.1.2 Constant current charging method

Charge till the voltage reaches 27.6V with 1/20 current (A) of C20 rated capacity of battery and keep on charging for 2-3 hours. In this charging procesure, compared with constant voltage charging method the charging current is smaller initially and can not damage chlorideplate. The temperature of electrolyte increase at the end of charging because the batteries charged completely the electrical energy are consumed in water electrolysis. So this charging method is not recommended.

3.2. When the battery is charged, the positive electrode of the charger should be connected with the positive electrode of the battery while the negative electrode of the charger should be connected with the negative electrode of the battery. Reverse charging is strictly forbidden.

3.3. In the process of charging, when the electrolyte in the battery has a temperature of more than 35°C, the charging voltage or charging current should be reduced accordingly so as to protect the electrolyte splashing.

4 Installation

4.1 The batteries of this series only apply to the starting of engine.

4.2 Keep the end post clean before battery installation. The wiring should be firm and reliable. Do not knock the end post, in order to avoid acid leakage of battery.

4.3 Connect battery anode to engine anode before connecting battery cathode to engine

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cathode when installing the battery.

5 Maintenance

5.1 The battery cover has an indicator that can display battery load. When the indicator is green, the battery can be used normally.
When the indicator is black, the battery should be charged timely. When the indicator is white, the battery should be immediately replaced.
5.2 The battery short of power during the use should be charged timely.
5.3 The battery must not overcharge during the use and charging.
5.4 The battery may produce gas during charging. Check the exhaust hole of battery at regular intervals to prevent blocking which can lead to explosion.
5.5 Regularly check the connecting parts for firmness and end post surface for cleanness to ensure good contact.
5.6 The battery that will not been used for a long time (more than 15 days in general) should be removed from the truck and stored in a ventilative and dry place. The battery should be charged for each 3-6 months (depending on whether the indicator turns black).
5.7 Do not open or loosen battery cover without authorization.
5.8 Please contact the distributor for a solution if a battery is suspected of a problem.

Specifi c Components and Models

1	60125384	Battery switch
2	A242200000057	Battery 31750T

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35 CABLES AND HARNESSES

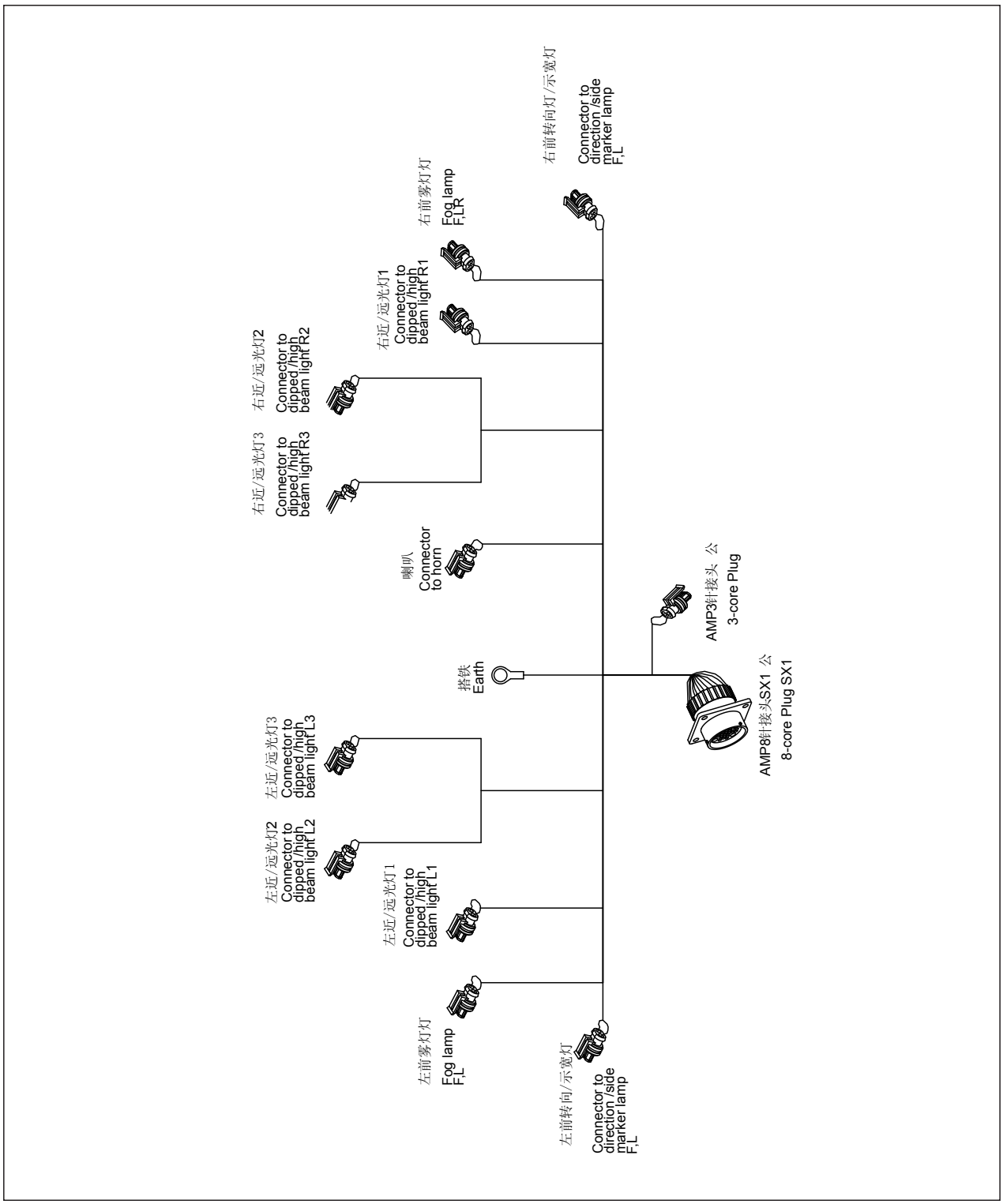


Fig.1 Harness Of Front Lamp

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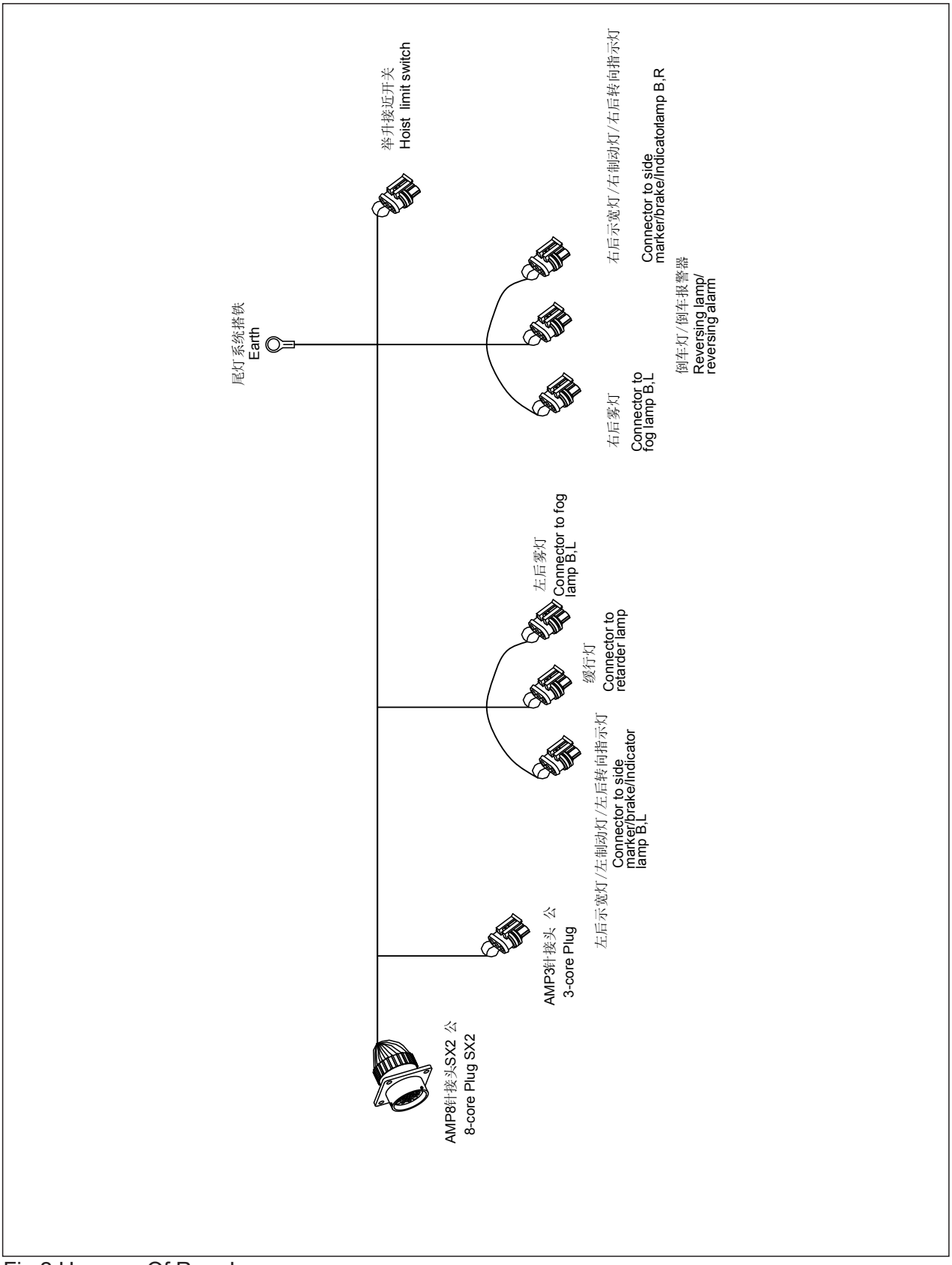


Fig.2 Harness Of Rear Lamp

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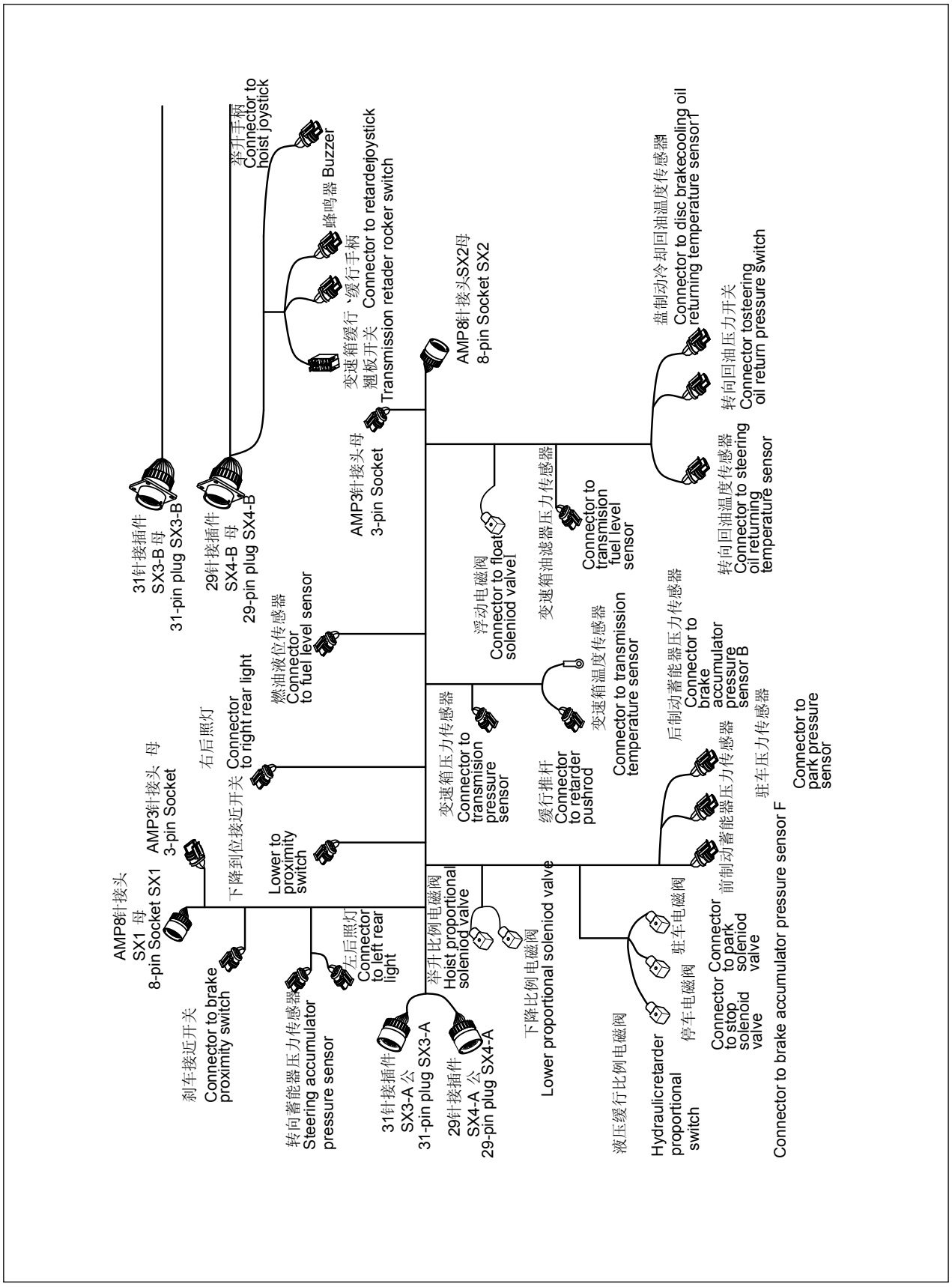


Fig.3 Harness Of Truck Body

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Installation and connection of harness

1. The harness of the truck should be protected properly. It should be protected from touching projecting corner, sharp edge or abrasive surface. When the harness passes through a hole, a sleeve should be provided for protection.
2. The harness should be fixated properlyevery 200 to 400 mm. It is not allowed to fixate the wire harness too tightly. It should not be fixated near oil, water and gas pipelines.
3. There should be a proper distance between the wire harness and the heat source, including the exhaust system, oil cooler, water tank, heater, radiator and so on, or effective heat insulation measures should be taken.
4. If the harness is too long, then it should be effectively bundled up for fixation so as to avoid friction due to the relative motion.
5. When the electric welding and the gas welding are in progress, the harness should be protected effectively from spark and flame.
6. If the harness is not installed or adjusted properly, the electronic connection signals passing through the harness may be disrupted. It may lead to control failure of transmission or periodically produce some unnecessary error codes which are difficult to detect. Therefore, the harness should be installed properly.

Detection and determination of circuit faults of harness

1. Detection and determination of harness burn-out fault.

All harness burn-outs happen suddenly with a fast burning speed. In the burned-out circuit, there is generally no fuse device. The rule of harness burn-out is: In the circuit of the power supply system, the harness is burned out till the ground circuit is reached. The place where the burned-out harness and the intact harness join is considered to be ground. If the harness is burned out till the connecting part of a piece of electrical equipment, then it indicates that

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this electrical equipment is faulty.

2. Detection and determination of short circuit, open circuit and poor contact among circuits

a. The harness is externally extruded or shocked and insulation layers of wires in the harness are damaged, which results in the short circuit among wires, out-of-control of some pieces of electrical equipment and burning out of fuses. When determining the cause, the harness connectors which are at both ends of the electrical equipment and the control switch can be disassembled. After that, a multimeter can be used to detect short circuit.

b. Open circuit of wires. Except obvious fracture, common faults occur mainly between wire and wire terminal. For some wires with open circuit, the outer insulation layer and the wire terminal are intact, but the core thread in the wire and the wire terminal have disconnected. In order to find the reason, a multimeter can be used to test the circuit, or a tension test can be conducted for the wire and the wire terminal suspected of open circuit. In the process of the tension test, if the wire insulation layer is elongated by degrees, it can be determined that this wire is disconnected.

c. Poor contact of the circuit. This kind of fault occurs mainly inside connectors. When this fault occurs, electrical equipment cannot work normally. In order to find the reason, connect this electrical equipment with the power supply, touch or pull related connectors of this electrical equipment. When a connector is touched, this electrical equipment can work normally sometimes but abnormally some other times; it indicates that there is something wrong with this connector.

3. Replacement of harness assembly

External examination

The model of new harnesses should be as same as original truck model. The wire terminal is connected reliably with the wire. Pull each connector and wires to check for

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such phenomena as looseness or separation. Compare the new harness with the original one. For example, the colors, size and terminal should be basically consistent. If there is any doubt, a multimeter can be used to test. Only after ensuring intactness can this wire harness be used for replacement.

Cables

⚠ warning

Be careful of dangerous hydrogen and the sulphuric acid solution. Check the required voltage and polarity of the cable connected with discharged batteries. The battery may blow due to a too-high voltage, misconnected cables, open fire, lighted cigar, or other ignition source, thus resulting in fire. Keep fire source far away from the battery. Your body should be over the battery. Glasses should always be worn to avoid burning.

Caution: When the mode of jumper cables is used to start the engine, it should be ensured that two trucks don't contact each other and the cable with the same specifications as the original truck should be used. If the engine is started by jumper cables, the following steps should be followed:

1. Connect one end of jumper cable, usually the red end, to the positive (+) terminal rod of the uncharged battery.
2. Connect the other end of the cable above to the positive (+) terminal rod of the auxiliary power supply or the charged battery.
3. Connect one end of the second cable, usually the black end, to the negative (-) terminal rod of the auxiliary battery.

Connect the other end of the original cable connected with the negative electrode to the ground terminal of the truck frame. As it is far

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away from the battery vapor (inflammable and explosive gas -- hydrogen), so accident is not likely to happen even though there are sparks.

⚠ warning

It is not allowed to start the truck by connecting the cables with the power supply from electric arc welding equipment because there is not any safe and reliable method that can reduce the dangerous high voltage and the strong current.

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36 OTHERS

36.1 Lubrication and Maintenance

36.1.1 Lubrication and maintenance

⚠ WARNING

The truck is equipped with engine and transmission oil sump, thus enabling it to drive on a road with a gradient of no more than 30° (60%). In case of a bigger gradient, please consult the manufacturer.

Lubrication is a main part of preventive maintenance. Its operation procedure, lubricant types as well as application cycles are all of great significance to extending the efficient service life of a truck. Lubrication of moving parts at regular intervals can minimize the possibility of mechanical faults.

All the recommended specifications for replacement and maintenance intervals are determined according to the general working conditions. In case of severe phenomena such as over-heating, oxidation or pollution of lubricant during operation, change the lubricant more frequently to prevent the aforesaid phenomena from happening again.

Lubricant replacement and maintenance period should be determined according to the sampling of specific working conditions and suggestions by the supplier of lubricant.

All the joints, blocking covers and screw covers should be cleaned thoroughly so as to prevent dirt from entering. Lubricant should remain at the working temperature when the system discharges.

Note: Check whether the oil volume falls within the specified working scope on the basis of liquid level indicated by oil gauge, liquidometer or oil level screw cover. Otherwise, no system is allowed to go into operation.

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Table of lubrication and maintenance

The small dots in the following Fig.indicate the parts that have to be lubricated and maintained. The digits on the left hand side indicate the lubrication and maintenance interval.

The digits in Fig.1 should match with the numbers correspondingly in the lubrication and maintenance table.

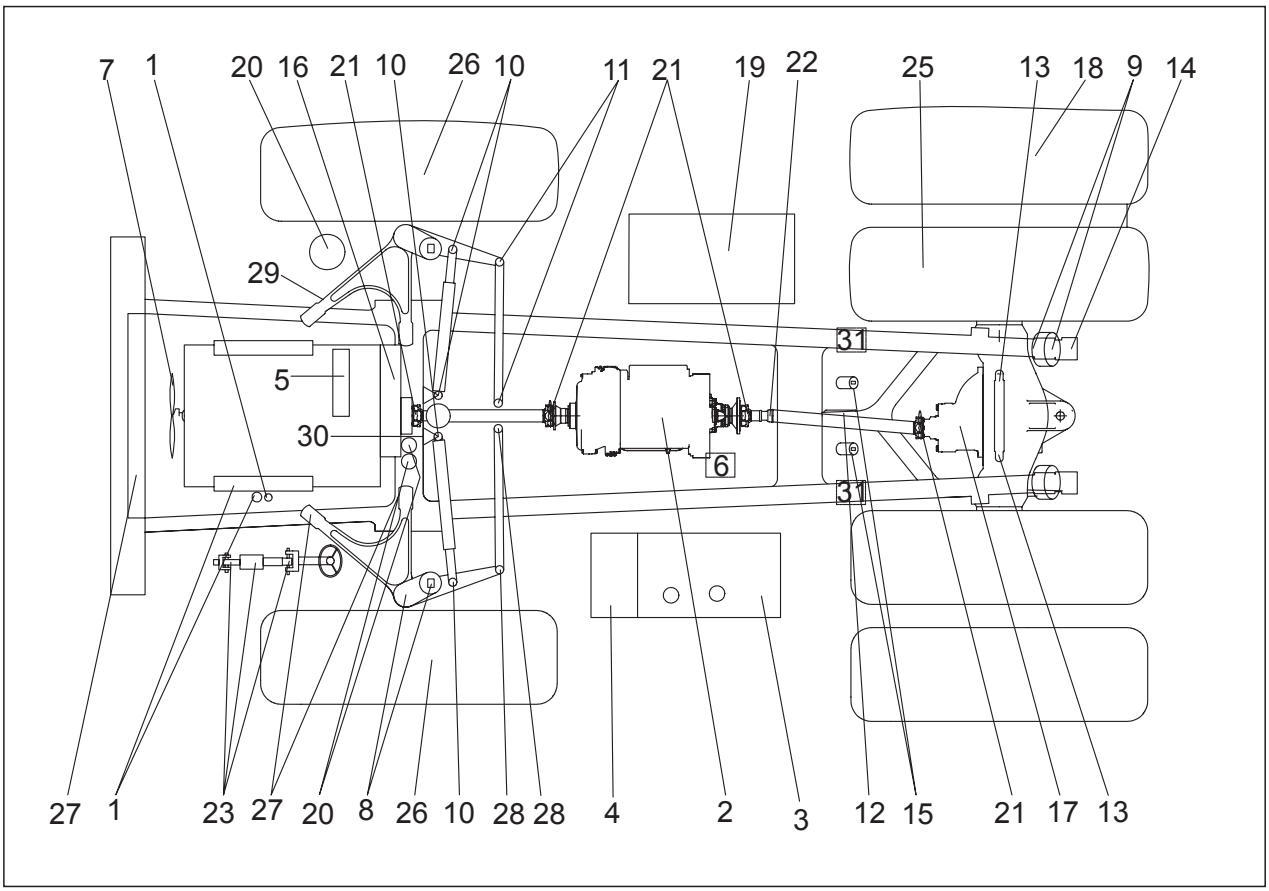


Fig.38-1 Lubrication and maintenance points

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Lubrication and Service Chart						
Interval hours	Ref. Points	Identification	Service Instructions	No. of Points	Lubricant	Service/Quantities
10	1	Engine	Check oil level. Add if low.	1	EO	As Required
	2	Transmission	Check oil level. Add if low.	1	HTF	As Required
	3	Hydraulic Tank(Hoist/ Cool)	Check oil level. Add if low.	1	HO	As Required
	4	Hydraulic Tank(Steer/ Brake)	Check oil level. Add if low.	1	HO	As Required
	5	Remote water tank	Check oil level. Add if low.	1	Antifreeze	see page chapter 35 "Remote water tank and pipe installation"
	6	Filter(Steer/Brake)	-	1	-	-
	7	Cooling Fan	Visually inspect for debris and damage.	1	-	-
	_	Drive Belts	Visually inspect all belts.	_	_	Ref Engine Manual
	8&9	Front and Rear Ride Cylinders	Visually inspect heights.	_	_	Ref "Ride cylinder" and "Rear ride system"
	-	Air Cleaner Restriction W/Light	Check. Replace element if reqd.	3	_	Refer to “Air Cleaner Service ”
	-	Air Cleaner Vacuator Valve(s)	Check for proper operation.	3	_	-
	-	Fuel Filter/Water Separator	Drain water and sediment.	1	_	-
	-	Tyres	Check condition. Check pressures when tyres are cold.	6	_	Ref " Front wheel assembly" and "Rear wheel assembly"
	-	Controls, Instruments and W/Lights	Check for proper operation.	_	_	-
	-	General Inspection	Check for leaks and worn/damaged parts. Repair/replace as required.	_	_	-

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50	9	Rear Ride Cylinders	Lube	4	EP,NLGI	-
	10	Steering Cylinder Bushings	Lube	4	EP,NLGI	
	11	Low Pressure Filter	Lube	4	EP,NLGI	
	12	A-Frame Nose Spherical Bushing	Lube	1	EP,NLGI	
	13	Banjo Stabilizer Spherical Bushings	Lube	2	EP,NLGI	
	14	Body Hinge Pins	Lube	2	EP,NLGI	
	15	Body Hoist Bushings	Lube	4	EP,NLGI	
	29	A-sharp Arm	Lube	6	EP,NLGI	
	8	Front Ride Cylinders	Lube	2	EP,NLGI	
	30	Crank pin	Lube	2	EP,NLGI	
	21	Cross shaft	Lube	6	EP,NLGI	
250	1	Engine	Drain and refill.	1	EO	-
	_	Engine Oil Filters	Replace filters.	4	_	Ref Engine Manual
	_	Engine Fuel Filters	Replace filters.	2	_	Ref Engine Manual
	–	Engine Coolant Additive	Check DCA concentration and replenish.	_	DCA4	Ref Engine Manual
	–	Engine Coolant Filter(s)	Replace filter(s) if required.	2	–	-
	–	Engine Crankcase Breather	Clean	1	_	Ref Engine Manual
	7	Engine Cooling Fan	Check condition.	1	_	-
	16	Engine Power Takeoff	Check oil level. Add if low.	1	EPL	-
	18	Wheel Planetaries	Check oil level. Add if low.	2	EPL	-
	_	Differential Breather	Clean.	1	EPL	-
	_	Transmission Breather	Clean.	1	_	-
	_	Alternator Drive Belt	Check belt tension. Adjust if required.	1	_	Ref Engine Manual
	–	Accessory Drive Belts (if fitted)	Check belt tension. Adjust if required.	2	_	Ref Engine Manual
	-	Air Cleaner	Clean the primary cleaner	3	-	-
	_	Front Brake Pads	Check wear. Replace as required.	4	–	-

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1000	-	Return filter of hoisting system	Replace filter	1	-	-
	-	Return filter of steering system	Replace filter	1	-	-
	-	Filter of steering pipeline	Replace filter	1	-	-
	-	Filter of cooling pipeline	Replace filter	2	-	-
	-	Filter of brake van	Replace filter	1	-	-
	-	Breath valve of steering	Replace breath valve	1	-	-
	-	Breath valve of hoisting	Replace breath valve	1	-	-
1200	2	Transmission	Drain and refill.	1	HTF	-
	_	Transmission Oil Filter	Replace element.	1	-	-
	-	Engine PTO	Drain,clean and refill	1	-	-
	-	Differential	Drain,clean and refill	1	-	-
	-	Wheel Planetaries	Drain and refill	2	-	-
2000	19	Fuel Tank	Drain and refill	1	Diesel	-
	25	Rear Brake Packs	Drain and refill	2	HO	-
3000	4	Hydraulic Tank(steer/brake)	Change,clean and refill	1	HO	-
	3	Hydraulic Tank(hoist/cool)	Change,clean and refill	1	HO	-
	-	Suction filter of hoisting system	Replace filter	-	-	-
	-	Suction filter of steering system	Replace filter	-	-	-
	-	Suction filter of cooling system	Replace filter	-	-	-
4000	27	Cooling System	Drain, flush and refill	1	Antifreeze	-
	26	Front Wheel Bearing	Inspect , readjust gap,replace the grease as the case may be.	2	*EP NLGI	-

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*The refilling amount is half of wheel hub cavity.
Note – The lubricant should be refilled slowly until it reliefs.
EO—Engine lubricant, please refer to 'Recommended Lubricants'.
EPL—EP gear oil, meeting the requirements of MIL-L-2105C standard.
HTF—Allison C-4 hydraulic transmission oil, please refer to 'Recommended Lubricants'.
HO—hydraulic oil, please refer to 'Recommended Lubricants'.
EP, NLGI—2 EP lithium base grease, please refer to 'Recommended Lubricants'.
EP, NLGI—2 EP lithium base grease (molybdenum free), please refer to 'Recommended Lubricants'.
PAG OIL-Polyalkene Glycol(PAG) compressor lubricant-The number of low viscosity (ISO46).
Numbers in the figure represents the points entailing lubrication and maintenance at regular intervals according to requirements in Table of Lubrication and Maintenance. The numbers of figure are corresponding to the 'Serial Numbers' in Lubrication and Maintenance.
Note: For each specified maintenance interval, prior examination should be performed apart from the prescribed checks.

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36.1.2 Other maintenance

As required

Seat safety belt-Check the condition and replace if it is damaged.

Note: Replace it for every three years despite its conditions.

Windshield and wiper-Check the wiper arm and replace if it is damaged. Fill the cleanser water tank and keep the water accumulator upright.

Rim nut- Adjust the torsion to 690 N•m (510 lb/ft) after working for 10 h for the first time, then check the torsion for each 50 hours.

Every 10 hours of operation

Walk around the truck for inspection –check according to chapter 4.

Engine-visually check the engine for damage, bolt fracture, looseness and abnormal noise.

Engine air cleaner-check the air cleaner air intake steel pipe, hose and pipe clamp. Replace the filter if the air filter resistance warning turns on. Clean the dust collection valve daily, check and remove the dust in such valve; the dedusting lip opening can be opened and kept flexible after the engine is shut down.

Caution: Maintain the air cleaner more frequently in a dusty working place.

Expansion water tank-check the cooling liquid level and refuel if it is low; fill the cooling liquid into the water tank and keep the liquid level at the bottom of filling neck.

Note: Check DCA4 density after plenty of cooling liquid is filled because the low density may damage the engine; the excessive antifreeze liquid may lead to the deposition of silicate, see chapter 35 'Remote Water Tank and Pipeline Installation' of the Maintenance Manual.

Steering, braking and hoist systems - Check whether each system can work normally prior to operation of the truck.

Steering hydraulic oil tank filter-keep the truck

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empty, release the brake, run the engine with the speed of 1,500 RPM, rotate the steering wheel with 1 r/s after the oil temperature is normal, replace the filter if the filter warning light is on.
Rear disc brake cooling oil filter-replace the filter when the indicator shows that the oil surface has reached the limit position.

New or overhauled part after working for 150 hours for the first time
Transmission - Discharge oil, replace the filter and refill oil.
Differential mechanism-drain the oil and refuel with new oil.
Hub reducer- drain the oil and refuel with new oil.

Every 250 hours of operation
Filling point of oiler – instill engine oil throttle connecting rod, articulating pin and other moving parts.
Cooling liquid filter-replace the filter. Refer to chapter 35 'Remote Water Tank and Pipeline Installation' in the Maintenance Manual, correctly select the cooling liquid filter to keep proper additive DCA4 density in the cooling system.
Cooling liquid additive-check and supplement DCA4 according to chapter 35 'Remote Water Tank and Pipeline Installation' in the Maintenance Manual.
Cooling fan-visually check the fan blade for cracking, rivet looseness or bending, check fan installation and tightness and replace the damaged fan.
Note: The correct tension of fan belt is kept by spring belt. Therefore, it is not necessary to check or adjust the belt tension.
Driving belt-visually check each driving belt and replace the cracked or worn belt. Adjust the worn and slipping belt. The correct installation and tensioning of belt can reduce belt and belt wheel wearing. Refer to chapter 5 'Engine

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Installation' of the Maintenance Manual to adjust the tension of a new belt or recycled belt.
Front brake-check and replace the worn brake pads and brake disc.
Caution: Such maintenance interval is applicable for normal working conditions. The maintenance should be conducted more frequently under poor working conditions. The friction material of brake pads can not be worn less than 3 mm (0.12 in.).

Every 1000 hours of operation
Inspection of the pressure of hydraulic system - Check the pressures of all steering, hoist and braking systems.
Caution: The procedure and positions of inspection points are detailed in the Maintenance Manual. Repair or replace the elements of related system if the detected pressure does not match with the set value, so as to make sure the system can work normally. Moreover, the safety regulations described in related chapters must be strictly followed.
Main hydraulic oil tank filter-clean the filter housing and replace the filter.
Rear disc brake cooling oil filter-Replace the filter if the indicator has exceeded the limit or worked for 1,000 hours.

Every 2000 hours of operation
Steering hydraulic oil filter-Clean the filter housing and replace the filter when the instrument indiciates blocking or has worked for 2,000 hours.

Engine and transmission
The data included in the 'Table of Lubrication and Maintenance' is cited from the 'Usage and Maintenance Manual' provided by the manufacturer and it is effective during the issuance period. The data obtained by the user from this figure should be consistent with the 'Usage and Maintenance Manual' provided

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by the manufacturer. If not, the engine and transmission data provided with the machine should prevail. Our company will regularly contact the manufacturer for updates of the 'Usage and Maintenance Manual'.

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Working capacity

Maintenance volume				
Serial No.	Description	lubricant	Maintenance volume	
			L	U. S. gallon
1	Engine crankcase and filter	EO	134	35.4
2	Transmission and filter	HTF	100	26.0
3	Hoist cooling oil tank	HO	300	79.2
4	Hoist system and brake cooling system	HO	560	148.0
5	Steering brake oil tank	HO	62	16.4
6	Steering brake system (total)	HO	65	17.2
7	Cooling system	Cooling liquid	304	80.3
8	Fuel tank	Diesel	1030	272.1
9	Front suspension cylinder (per piece)	HO	30	8.0
10	Rear suspension cylinder (per piece)	HO	21	5.6
11	Power output device	EPL	4	1.1
12	Differential	EPL	61	16.1
13	Hub reducer (total)	EPL	57	15.1
14	Air-conditioning compressor	PAG Oil	0.125	0.033

Note: The refuel amount given is not precise. Oil gauge, liquidometer or liquid level cover should be combined with 'Recommended Lubricants'.

Temperature conversion table																		
℃	-32	-30	-27	-25	-20	-18	-15	-10	0	10	15	25	32	35	38	45	93	190
℉	-26	-22	-17	-13	-4	0	5	14	32	50	59	77	90	95	100	113	200	375

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Selection of lubricants

Application and lubrication		Name of Material		Ambient Temperature	Grade/Level of Viscosity		Quality Grade	Recommended	Recommended Material
Cummins engine	Oil sump of diesel engine	Diesel engine oil		Above -10°C	SAE 15W/40		Standard: API CF4SG, cG-4/SH Senior: API CH-4, cI-4 Cummins CES20078	Mobil Housing	Mobil Delvac MX 15W/40
				-25°C-(-10°C)	SAE 10W/30				
				-40°Cto-25°C	SAE 5W/30				Mobil Delvac No. 1 5W/30
	Fuel tank	Light diesel oil		Above 0°C	0#	The content of sulfate is no more than 0.5%	GB 252 DIN EN590 ASTM 23379001	Kunlun Great wall	
				Above -10°C	-10#				
				Above -20°C	-20#				
				Above -35°C	-35#				
				Above -50°C	-50#				
	Engine water tank	Anti-freezing fluid		Above -62°C	40% water		BS6580:1992, ASTM D3306 antifreeze, to be mixed with soft water	Mobil Housing TEEC	Mobil anti-freezing fluid (-45°C); TEEC anti-freezing fluid L-35
				Above -38°C	40% water				
				Above -24°C	40% water				
Transmission		Trans-mission oil	Other Truck type	Below -35°C	SAE 0W/30		ATF C-4 CAT T0-4	Mobil Housing	
				-30°C--35°C	SAE 0W/20				
				-20°C- +10°C	SAE 10W				Mobil transmission oil HD 10W Housing Donax TC10W
				0°C - +35°C	SAE 30				Mobil transmission oil HD 30
				+10°C-+50°C	SAE 50				Mobil transmission oil HD 50
			SRT33	Above -35°C	TranSynd RD		TES-295	Allison	Allison TranSynd RD

Main hydraulic oil tank steering oil tank		Transmission oil	-5°C-+35°C	SAE 10W	ATF C-4 CAT T0-4	Mobil Housing	Mobil transmission oil HD 10W Housing Donax TC10W
			+10°C-+50°C	SAE 30			Mobil transmission oil HD 30
Suspension cylinder			Above -20°C	SAE 10W			Mobil transmission oil HD 10W Housing Donax TC10W
Drump brake	Hoist oil tank ste-ering oil tank (all-owed)	Anti-abrasive hydraulic oil	-10°C-+40°C	46		Housing	Anti-abrasive hydraulic oil VG46
Differential Hub reducer PTO		Gear oil	Above +40°C	SAE 85-W/140	API GL-5	Mobil Housing	
			-25°C-+40°C	SAE 80-W/90			Mobil automotive gear oil HD 80W/90 Housing hypoid gear oil GL-5 80W/90
			Below -25°C	SAE 75-W/90			Mobilube 1 SHC 75W/90 Mobil Delvac MX synthetic gear oil 75W/90
Front wheel hub bearing Steering column Yoke bearing of transmission shaft		Multifunctional lithium base grease (molybdenum free), melting point being 190°C(compo-und lithium base synthetic grease)	Above -40°C	ISO VG-460	NLGI 1.5	Mobil Housing	Mobilith SHC 460
			Above -30°C		NLGI 2		Lithium base grease 2#

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The parts for centralized lubrication and	Multi-functional lithium base grease (molybdenum free), (compound lithium	Above 25°C and other lubrication	With or without molybdenum	NLGI 2	Mobil Housing Kunlun Great wall	Lithium base grease 2#
			With or without molybdenum	NLGI 1		Mobil grease XHP321Mine Mobil grease XHP221Mine
		Below -20°C	With or without molybdenum	Consult local grease suppliers		

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Note1: When the ambient temperature remains higher or lower than the specified ambient temperature, consult the grease manufacturer for the correct viscosity.

Note 2: Cummins Engine Company Limited only recommends such engine oil as complies with API grade but not other oil brands. Cummins recommends that only oil with multi-grade viscosities under various ambient temperatures listed above be applied.

Note 3: Operation at the lowest temperature listed above without correct pre-heating or heating may result in reducing the service life of transmission. If an auxiliary heater is provided for oil, pre-heat oil to the minimum temperature limit. In case of no auxiliary heater, operate the accelerator of engine to a certain degree and heat oil to a certain temperature with the transmission remaining in the neutral position.

Hydraulic oil of transmission should meet the requirements of Allision C-4. Consult the lubricant manufacturer for verification.

Other lubricant manufacturers may also provide similar products, so please consult them for verification.

Note 4: If the rear axle with antiskid differential adopts SAE90 standard oil, great noises and wheel clamping will occur upon sudden turn and slow drive. EP oil with anti-skidding additive should be applied.

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36.2 Technical Conditions for Bolts and Nuts

Threaded connection is a very important and it is a type of widely-used mechanical connection. Most threaded connections need to be tightened for installation so as to enhance rigidity, tightness and anti-looseness capacity of connection. It is particularly true for the threaded connection at an important position, where the corresponding tightening torque must be reached. These threaded fasteners may affect related components and even the reliability, performance and security of the entire system. In case that any fastener get loosened or damaged and it is required to make replacement during operation, the fastener must be tightened in accordance with designated tightening torque values.

We have prepared the following tables for all fasteners used in the truck such as bolts, nuts, double-screw bolts as so as to prevent overload damage resulting from overexertion during assembly and meanwhile to establish a unified standard for tightening these fasteners in a secure manner.

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Table 1 Maximum tightening torques of threaded fasteners (metric)								
Thread specification (Nominal DiameterScrew Pitch)	Performance Level							
	8.8		9.8		10.9		12.9	
	Tightening torque							
	N•m	Lb/ft	N•m	Lb/ft	N•m	Lb/ft	N•m	Lb/ft
M1.6	–	–	0.20	0.15	–	–	0.20	0.15
M2.0	–	–	0.25	0.20	–	–	0.45	0.30
M2.5	–	–	1	0.75	–	–	1	0.75
M3.0	–	–	1	0.75	–	–	2	1.5
M3.5	–	–	2	1.5	–	–	3	2
M4.0	–	–	3	2	–	–	4	3
M5.0	–	–	5	4	–	–	8	6
M6.0	–	–	9	6	–	–	13	10
M8.0×1.25	–	–	21	15	27	20	32	23
M8.0×1.00	–	–	23	17	29	21	34	25
M10.0×1.50	–	–	42	31	54	39	63	46
M10.0×1.25	–	–	45	32	57	41	67	48
M12.0×1.75	–	–	74	53	94	68	110	80
M12.0×1.25	–	–	81	58	103	74	121	87
M14.0×2.00	–	–	118	85	151	109	176	127
M14.0×1.50	–	–	128	92	163	118	190	137
M16.0×2.00	169	122	–	–	234	169	274	197
M16.0×1.50	181	130	–	–	250	180	292	211
M18.0×2.50	234	169	–	–	323	234	378	273
M18.0×1.50	263	190	–	–	363	262	425	307
M20.0×2.50	330	239	–	–	457	330	531	386
M20.0×1.50	367	265	–	–	507	366	593	423
M22.0×2.50	451	325	–	–	623	450	728	526
M22.0×1.50	495	357	–	–	684	494	800	577
M24.0×3.00	571	412	–	–	790	570	923	667
M24.0×2.00	623	450	–	–	861	622	1007	727
M27.0×3.00	837	605	–	–	1158	836	1354	977
M27.0×2.00	903	652	–	–	1250	902	1461	1055
M30.0×3.00	1135	820	–	–	1570	1134	1835	1325
M30.0×2.00	1258	908	–	–	1740	1256	2034	1468
M30.0×1.50	1300	939	–	–	1799	1299	2102	1516
M36.0×4.00	1985	1433	–	–	2745	1982	3208	2317
M36.0×3.00	2102	1517	–	–	2907	2099	3398	2453

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Note:
1. The maximum tightening torque value of standard bolt (nut) in this table is approximately 75% of the yielding limit of bolt (nut) materials.
2. All the torque values in the table 'Lubrication' defined here includes the usage of threaded lubricant, cadmium plating or quenching gasket.
3. The torque values in the table is the recommended ones for general fasteners and a variation of ±10% is allowed for tightening torque in practice.

Table 2 Maximum Tightening Torque of Threaded Fastener (British)

Thread Specifications (Nominal Diameter - Number of teeth)	Performance Level								With 12 cap screws	
	GM 260-M steel SAE 2		GM 280-M steel SAE 5		GM 290-M steel SAE 7		GM 300-M steel SAE 8			
	Tightening moment									
	N•m	Lb/ft	N•m	Lb/ft	N•m	Lb/ft	N•m	Lb/ft	N•m	Lb/ft
0.25-20	5	4	8	6	11	8	12	9	14	10
0.25-28	7	5	10	7	12	9	14	10	15	11
0.31-18	11	8	18	13	22	16	24	18	27	20
0.31-24	12	9	19	14	24	18	27	20	30	22
0.38-16	20	15	31	23	38	28	43	32	49	36
0.38-24	23	17	34	25	43	32	49	36	56	41
0.44-14	33	24	47	35	59	43	68	50	75	55
0.44-20	37	27	54	40	68	50	79	58	87	64
0.50-13	50	37	75	55	94	69	106	78	119	88
0.50-20	56	41	88	65	106	78	122	90	134	99
0.56-12	75	55	108	80	136	100	156	115	171	126
0.56-18	81	60	122	90	149	110	176	130	191	141
0.62-11	102	75	149	110	190	140	217	160	237	175
0.62-18	115	85	169	125	210	155	244	180	270	199
0.75-10	176	130	271	200	332	245	380	280	420	310
0.75-16	203	150	298	220	366	270	420	310	472	348
0.88-9	169	125	434	320	536	395	610	450	679	501
0.88-14	190	140	488	360	590	435	678	500	751	554
1.00-8	258	190	651	480	800	590	915	675	1021	753
1.00-12	285	210	719	530	881	650	1003	740	1119	825
1.00-14	285	210	732	540	902	665	1030	760	1148	847
1.12-7	366	270	800	590	1132	835	1302	960	1447	1067
1.12-12-	407	300	902	665	1274	940	1451	1075	1624	1198

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1.25-7	515	380	1132	835	1600	1180	1830	1350	2043	1507
1.25-12	569	420	1254	925	1776	1310	2034	1500	2267	1672
1.38-6	664	490	1478	1090	2095	1545	2400	1770	2676	1974
1.38-12	759	560	1688	1245	2393	1765	2739	2020	3056	2254
1.50-6	881	650	1966	1450	2786	2055	3186	2350	3556	2623
1.50-8	936	690	2088	1540	2962	2185	3390	2500	3781	2789
1.50-12	990	730	2217	1635	3145	2320	3593	2650	4010	2958
1.75-5	–	–	–	–	4393	3240	5016	3700	5604	4133
1.75-12	–	–	–	–	5091	3755	5830	4300	6497	4792
1.88-8	–	–	–	–	6006	4430	6874	5070	7664	5653
1.88-12	–	–	–	–	6304	4650	7213	5320	8048	5936
2.00-4.5	–	–	–	–	6623	4885	7565	5580	8448	6231
2.00-8	–	–	–	–	7342	5415	8406	6200	9367	6909
2.00-12	–	–	–	–	7687	5670	8786	6480	9811	7236
2.25-4.5	–	–	–	–	9701	7155	11090	8180	12377	9129
2.25-8	–	–	–	–	10629	7840	12148	8960	13566	10006
2.25-12	–	–	–	–	11050	8150	12636	9320	14102	10401
2.5-12	–	–	–	–	15280	11270	17463	12880	19500	14383

Note:

1. The maximum tightening torque value of standard bolt (nut) in this table is approximately 75 % of the yielding limit of bolt (nut) materials.
2. Thread specification '0.25-20': 0.25 indicates that thread nominal diameter is 0.25in and 20 that screw pitch is 20 teeth per foot (screw pitch), which is 25.4mm/20=1.27mm after conversion into metric system, i. E. screw pitch is 1.27mm.
3. All the torque values in the table 'Lubrication' defined here includes the usage of threaded lubricant, cadmium plating or quenching gasket.
4. The tightening torque values in the table is the recommended ones for general fasteners and a variation of ±10% is allowed for tightening torque in practice.
5. The tightening values in the table correspond to the materials as specified by GM standard. As for materials beyond GM standard, refer to Table 3 for converting the materials into GM standard materials and then search for torque values.

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Table 3 Correspondence between Non-GM standard materials and GM standard materials			
Non-GM Standard Material		Hardness	Non-GM Standard Material
Common low-carbon steel	SAE1018	ROCKWELL 'B'85-100	GM 260-M
	SAE1020		
Common medium-carbon steel	SAE1035	ROCKWELL 'C'19-30	GM 280-M
	SAE1038		
	SAE1045		
Medium-carbon alloy steel	SAE4140	ROCKWELL 'C'28-34	GM 290-M
		ROCKWELL 'C'32-38	GM 300-M
	SAE8642	ROCKWELL 'C'28-34	GM 290-M
		ROCKWELL 'C'32-38	GM3 00-M
	SAE5157	ROCKWELL 'C'28-34	GM 290-M
	SAE5147	ROCKWELL 'C'32-38	GM 300-M

Caution:

1. Inappropriate turning tools and wrenches are strictly forbidden for tightening of bolts and nuts. For tightening of the bolts and nuts in group, they should be uniformly tightened in a certain order gradually (generally 2~3 times) according to the shapes of adapted pieces and distribution of bolts or nuts so as to ensure identical pre-tightening force for all bolts or screws. For tightening groups of bolts arranged in a rectangle, start from the middle and then expand to two sides symmetrically. For tightening groups of bolts or nuts arranged in a circle or square, it must be done symmetrically. If there is a locating pin, start tightening from the bolt or screw adjacent to the locating pin.
2. If anti-loosing safety iron wire applies to bolt head, thread and secure them in the turning direction of thread. If double nuts are used without anti-loosing bonder, the thin nut should be installed first and tightened to approximately 80% of the tightening torque. Then apply 100% tightening torque to tighten the thick nut.
3. If fasteners need to be replaced, the new ones of the same type or substitutes with equivalent performance as the original fasteners should be used. Substitutes with inferior quality or different design may not be used so as to avoid unnecessary damages including equipment damages or personal injuries.

Self-locking fasteners

After being disassembly and reinstalled onto the original fitting pieces, self-locking fasteners can generate a kind of measurable engagement or torque for re-locking. However, the locking function of a self-locking nut will degenerate to a certain degree after each use. To ensure the reliability of self-locking fasteners, the self-locking fasteners specified for the truck can be used 5 times to the maximum according to technical requirements. A mark should be made on the head of a self-locking fastener each time it is dismantled so as to inform the assembly operators of the times that this self-locking fastener has been used. If it has been used for 5 times, it should be replaced with new self-locking fastener.

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The table below gives out the minimum torque of a self-locking fastener for disassembly after initial use. If the self-locking fastener whose torque fail to reach the minimum torque value as provided in the table can not be reused regardless of whether it has not been used for 5 times.

Table 4 Minimum disassembly torque of self-locking fastener

Thread specification	Self-locking screw		Self-locking nut			
	Performance Level					
	SAE Grade 5, SAE Grade 8 and ASTM A-574		SAE Grade 5		SAE Grade 8	
	N•m	Lb/ft	N•m	Lb/ft	N•m	Lb/ft
0.25-20	0.3	3	0.4	3.5	0.5	4.5
0.25-28	0.3	3	0.4	3.5	0.5	4.5
0.31-18	0.6	5	0.6	5.5	0.9	7.5
0.31-24	0.6	5	0.6	5.5	0.9	7.5
0.38-16	1.0	9	1.0	8.5	1.3	11.5
0.38-24	1.0	9	1.0	8.5	1.3	11.5
0.44-14	1.4	12	1.4	12	1.8	16
0.44-20	1.4	12	1.4	12	1.8	16
0.50-13	1.8	16	1.7	15	2.3	20
0.50-20	1.8	16	1.7	15	2.3	20
0.56-12	2.5	22	2.4	21	3.2	28
0.56-18	2.5	22	2.4	21	3.2	28
0.62-11	3.4	30	3.1	27	4.1	36
0.62-18	3.4	30	3.1	27	4.1	36
0.75-10	5.1	45	4.6	41	6.1	54
0.75-16	5.1	45	4.6	41	6.1	54
0.88-9	7.3	65	7.0	62	9.3	82
0.88-14	7.3	65	7.0	62	9.3	82
1.00-8	9.6	85	9.5	84	12.7	112
1.00-12	9.6	85	9.5	84	12.7	112
1.00-14	–	–	9.5	84	12.7	112

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36.3 Maintenance Tools

IntroductionThis chapter involves recommended tools or devices for repair, maintenance, and troubleshooting, to some of which both the metric system and British unit system are applicable. These tools can be purchased from manufacturers or relevant agents.

Note: The company reserves the right of designing and manufacturing tools and devices, and such tools and equipment sold previously can be modified free of restraint.

Note: One tool may consist of one piece or many pieces.

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General tools

Material code	Name of Material
21082029	Preset torque wrench
21082357	AC-type torque wrench
21082140	Torque wrench
B260401090201	Manual torque wrench
21082597	Industrial torque wrench
B260401090200	Torque spanner
21085392	1’ Torque spanner
A260401090255	Open torque spanner
21085398	6 torque wrench with changeable head
A260401090198	Manual torque wrench
21084144	Ratchet wrench
21085383	Pneumatic wrench
21085384	Pneumatic inner hexagon socket
21085386	Pneumatic inner hexagon socket
21085387	Pneumatic socket
21085388	Pneumatic socket
B260401010153	Pneumatic socket
B260401010154	Pneumatic socket
B260401090213	Pneumatic wrench
B260401090170	Pneumatic impact wrench
B260401090167	Pneumatic impact wrench
23000385	Heavy socket wrench
A260401030089	Socket wrench
21006035	Socket drawbar
21082977	Cross screwoperator
21084299	Cross screwoperator
21085081	Cross screwoperator
A260402020020	Cross screwoperator (wooden handle)
21005839	Cross screwoperator (wooden handle)
A260404000064	Bench vice (fixed)
21083138	Digital multimeter
21084296	Slotted screwoperator
21084297	Slotted screwoperator
21084298	Slotted screwoperator
A260402010022	Slotted screwoperator (plastic handle)
21006722	Flared tip screwoperator

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A260404000002	Cutting pliers
A260404000001	Cutting pliers
21004526	Diagonal pliers
21083797	Diagonal pliers
B260404000083	Diagonal pliers
B260404000080	Crimping pliers
B260404000081	Wire strippers
21080200	Sharp-nose pliers
21080201	Sharp-nose pliers
A260404000010	Sharp-nose pliers
B260404000082	Sharp-nose pliers
21018648	Electric iron bracket (including rosin and sponge)
A260409000679	Adjustable thermostatic electric iron
21018647	Directly-heated electric iron
21022552	Grease gun
21005407	Double offset ring wrench
21005904	BSW double offset ring wrench
21083801	Open-end wrench
21083762	Pistol drill
21083802	Electric hand drill
A260299000010	Angle grinder
23004510	Sledge hammer
A239900001247	Quakeproof rubber mallet
A239900001248	Quakeproof rubber mallet
21000589	Cabinet file
21084054	Round file
A290000002775	Hoist jack
A290000002777	Hoist jack
A290000002931	Hoist jack
21008017	Utility knife
A260302040006	Steel tape
A260302040000	Steel tape
A290000002810	Charging flashlight
21008415	Manual riveting gun
A249900001088	Wiring board
21085444	Inner jump ring tongs
B260404000002	Inner jump ring tongs
B260404000005	Outer jump ring tongs

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21085079	Flat hanging strip with protection
A230200000757	Flat hanging strip with protection
A230200000767	Flat hanging strip
A230200000768	Flat hanging strip
60002297	One-leg chain sling
60002298	Dual-leg chain sling
A290000002675	Dual-leg chain sling
21003504	Monkey wrench
21084294	Monkey wrench
A260401040007	Monkey wrench
A260401040001	Monkey wrench
A260401040010	Monkey wrench
21084375	Feeler gauge
21007746	Flat spade
A260302010008	Vernier height caliper
A880305010022	Vernier depth caliper
21000872	Dial vernier caliper
23003828	Inside micrometer
A260302010012	Outside micrometer
A260302010013	Outside micrometer
A260302010015	Outside micrometer
A260302010016	Outside micrometer
A260302010017	Outside micrometer
A260302010018	Outside micrometer
A260302010019	Outside micrometer
A260302010020	Outside micrometer
A260301000001	Dial gage
A260309000008	Magnetic force gauge stand
21084880	Stainless steel ruler
A260302050002	Steel ruler
A260302050004	Steel ruler
A260302050013	Steel ruler
A260409000795	Nitrogen inflation tool
A550200000458	Dressmaker shears
21083609	Electrical grinder
A250100000296	Tension spring balance
21083602	Iron sheet shears
21005892	Digital electroprobe

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21084584	(K-01) No. 1 tool kit 5
21084280	Terminal block
21014346	Mobile pump station
21026895	Multipurpose screw turning tool
21002059	Diamond file

Accumulator/inflation tool of suspension cylinder

A260409000795 nitrogen inflation tool

The above components can be assembled for inflating the front and rear suspension cylinders.

Glue and sealant

A420300000032 Kesaixin 1277

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36.4 List of Wearing Parts of SRT95C Mining Truck

Serial No.	**Material code**	**Name of Material**	Number
1	A222100000615	Filter, diesel	2
2	21083623	Filter, water	2
3	60013897	Main cartridge of air cleaner	2
4	60216402	Dowm tail mirror	3
5	B222100000595	Filter, engine oil	2
6	60209392	Repair kits of front suspension cylinder	1
7	B222100000622	Oil-water separator filter core	1
8	60209393	Repair kits of rear suspension cylinder	1
9	A241100000649	Combination type front steering light assembly	2
10	60046289	High pressure filter	1
11	A241100000650	Combination type rear steering light assembly	2
12	60149949	Oil Seal	1
13	60149950	Oil Seal	1
14	60004471	Seal component	2
15	60004470	Lining kit	2
16	60037002	Valve Stem Assy	2
17	60037003	Valve Stem Assy	2
18	60037012	Valve Extension Bar	2
19	60050650	Rearview mirror	2
20	60215480	Oil return filter element	2
21	60141948	Rearview mirror	1
22	60215915	Filter core	1
23	60186788	Filter core	2
24	B230101002023	Dynamic seal assembly	2
25	B230101002024	Dynamic seal assembly	2
26	60209904	Oil suction filter element	1
27	60209906	Oil suction filter element	3
28	60231041	Repair kit of steering cylinder	2
29	60232234	Repair kit of hoisting cylinder	2
30	60211735	Energy storage repair kit	4

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31	60197257	Repair kit of filter of lower pressure pipeline	2
32	60204007	Repair kits of steering control unit	1
33	60004579	Tyre	6
34	A241100000053	Bulb	2
35	60037011	Seal ring	4
36	60013930	Bulb	2
37	21011354	Bulb	2
38	12829446	Locating bushing	16
39	60013932	Bulb	2
40	11123586	Wearing cover sleeve	2
41	21019917	Fuse	5
42	10554209	Spacer	2
43	60014830	Fuse	5
44	12147069	Retainer ring	4
45	21019916	Fuse	5
46	12564516	Wearing cover sleeve	2
47	21019915	Fuse	5
48	12148150	Spacer	2
49	60014829	Fuse	5
50	12568820	Auti-dust cover	8
51	21019914	Fuse	5
52	A222100000615	Filter, diesel	2
53	60144045	Rear Oil Seal	1

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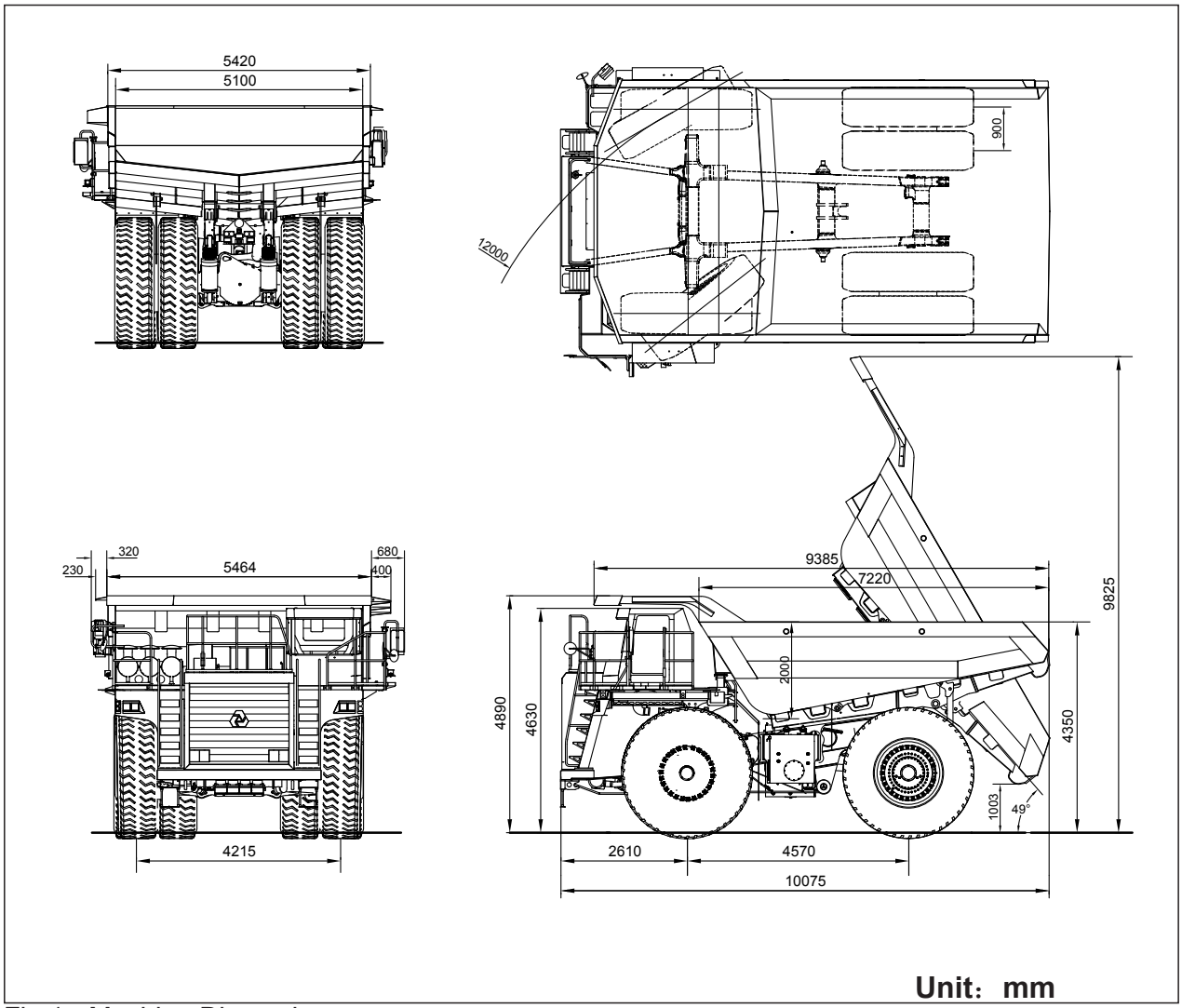


Fig.1 - Machine Dimensions

36.5 Technical parameters

Engine

Model·····Cummins engine
CumminsQST30-C1050

Type·····4 Cycle, water-cooled direct injection, Turbocharged/Aftercooled

Gross power

At the rate of 2100 r/min·····728kW
（976hp）

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Net power

At the rate of 2100rpm·····

728kW(976hp)

Note: Power ratings to SAE J1995 June 1990; the engine emission shall comply with TIER II USA EPA/CARB MOH 40 CFR 89 and EU non-highway vehicle standard.

Maximum torque (1300rpm)·····4629N•m

(3415 lb ft)

Number of Cylinders/Configuration .....12 /V

Bore x Stroke ..... Φ140×165mm

(5.51 × 6.49 in)

Total Displacement ·····15 L (915 in^3)

Transmission

Make/model·····Allison H8610AR

Automatic electronic control with soft shift feature.Remote mounted in the frame. Integral TC 682 torque converter and planetary gearing. Six speeds forward, one reverse. Automatic converter lockup action in all speed ranges. Downshift inhibitor. Integral hydraulic retarder.

Forward gear	1st gear	2nd gear	3rd gear	4th gear	5th gear	6th gear
Ratio	4.24	2.32	1.69	1.31	1	0.73
km/h	8	14.7	20.1	26	34	47
mile/h	5	9.2	12.5	16.2	21.2	36.2

Reversing gear	R1				
Ratio	5.75				
km/h	6				
mile/h	3.8				

Drive axle

Heavy duty axle with single reduction spiral bevel gear differential, full floating axle shafts, and planetary reduction at each wheel.

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Ratios:

Differential·····2.16 : 1

Planetary·····13.75:1

Total reduction·····29.70:1

Suspension

Front: Macpherson type independent suspension with variable rate ,nitrongen/oil cylinder for effective absorption of road shocks

Rear: Variable rate nitrogen/oil cylinders with A-frame linkage,lateral stabilizer bar .

Maximum strut stroke:

Front·····300mm（11.8in）

Rear·····200mm（6.9in）

Maximum rear axle oscillation·····±7°

Wheel and tyres

Wheel rim width·····19.5in

Tyre·····27.00-49/（48PR）E-4

Note: Under certain working conditions,TKPH (ton-km/h)capabilities of standard tyres could be exceeded.consult tyre manufactures for optimum tyre selection.

Brakes

Service:

All hydraulic brake system control.Transmission PTO mounted pressure compensating piston pump provides hydraulic pressure for brake and steering. Independent circuits front and rear.Each circuit incorporates a accumulator which stores energy to provide instant braking response.

Front brake circuit pressure·····15.5~15.9MPa (2300 lbf/ in^2)

Rear brake circuit pressure·····5.2MPa (750 lbf/in^2)

Accumulators:

Nitrogen precharge pressure·····5.5MPa (800 lbf/in^2)

Front:

Type·····Dry disc with 1 calliper per wheel

Disc diameter·····965mm（38in）

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Pad area,total·····1960cm^2（304in^2）

Rear:

Type·····Oil cooled, multiple friction discs,completely sealed from dirt and water.

Braking surface, total·····91000cm^2（14105in^2）

Parking:

Application of rear brakes by springs in brake disc pack.Hydraulically released.

Hold-off pressure·····8.3MPa (1200 lbf/in^2)

Steering system

Independent hydrostatic steering with closed-centre steering valve, accumulator and pressure compensating piston pump.

Accumulator provides uniform steering regardless of engine speed. In the event of loss of engine power it provides steering of approximately two lock-to-lock turns.

A low pressure indicator light warns of system pressure below 11.5MPa (1660 lbf/in^2).

Steering meets ISO 5010 and SAE J53.

Steering angle (left /right)·····±40°

Hoist system

It is set up separately from the power hydraulic system.Two body hoist cylinders are mounted between the frame rails. Cylinders are two-stage with power down in the second stage.

System pressure·····180bar (2610 lbf/in^2)

Hoist pump:

Type·····Gear type

Capacity at (at 2100 r/min)·····375L/min

Control valve:

Type·····Servo control, neutral gear open

Body raise time·····19 s

Body lower time·····15 s

Body

Longitudinal 'V' type floor with integral

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transverse box-section stiffeners. The body is exhaust heated and rests on resilient impact absorption pads.

Body wear surfaces are high hardness abrasion resistant steel.

Plate thicknesses:

Floor·····18 mm (0.71 in)
Side·····8 mm (0.31 in)
Front lower·····8 mm (0.39 in)

Deluxe operator cabin with integrated ROPS/ FOPS conform to ISO 3471 and SAE JI040C Fed86.

Volume:

Struck(SAE std) ·····42m^3(55yd^3)
Heaped 2:1 (SAE std) ·····60m^3(79yd^3)

Frame

Highly rigid frame with the whole box-shaped section, which is equipped with anti-twisting beam, is adopted. Integral front bumper and closed-loop crossmember are equipped. Front and rear beam, twisting drum, rear mounting rack and bumper are made of low-carbon steel. At the stress concentrated areas, cast steel parts with high tenacity are used, and in this way, the frame boasts high tenacity and stronger impact resistance.

Maintenance service capacities

Description	Maintenance volume	
	L	US gal
Engine crankcase and filters	134	35.4
Transmission and filters	100	26.4
Cooling system	300	79.3
Fuel tank	1030	272.1
Steering hydraulic tank	62	16.4
Steering system	170	44.9
Lifting hydraulic tank	280	74

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Lifting and brake cooling system	480	126.8
Planetaries (total)	57	15.1
Differential	61	16.1
Front ride strut (each)	30	8.0
Rear ride strut (each)	21	5.5
Power takeoff	4	1.1

Typical noise levels

Operator ear (ISO 6394)·····78dB
*Exterior sound rating (ISO 6395) ·····89dB
*The above result is for the mode giving the highest exterior sound level when measured and operated as per the prescribed procedures of the standard. Results shown are for the vehicle in base configuration.
Note: Noise Level Exposure to the operator and bystander personnel may be higher depending upon proximity to buildings, rock piles, machinery etc.. The actual job site Noise Level Exposure must be measured and applicable regulations complied with in respect to Employee Hearing Protection.

Vehicle weights (Mass)

Vehicle weights (Mass)		
	kg	lb
Chassis, with hoists	52000	114000
Body, standard	13000	29000
Net weight	65000	143000
Rated loading capacity	95000	209000
Maximum gross weight*	160000	352000
Weight distribution	Front axle	Rear axle
Empty	48%	52%
Loaded	32%	68%

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Proponent		Positon		Contact	
Manual Name		Chapter		Page	
Issues description:					
Suggestion:					
Signature (Service Engineer)				DATE	

Note:

1.If you have any questions or advises during your daily job with manual, please fill this table out with your points, we will get that perious advises via our service engineer.

2. Copy this table, if you found another issues out during your daily job with this manual

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2. Copy this table, if you found another issues out during your daily job with this manual

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Suggestion Feedback Table					
Proponent		Positon		Contact	
Manual Name		Chapter		Page	
Issues description:					
Suggestion:					
Signature (Service Engineer)				DATE	

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