



Maintenance Manual

AS/NZS 1418.10

AR24J

**Mobile Elevating
Work Platforms**

PART No. MM-2537060078

P152200001-P152209999

Original Instructions

Original Instructions

Thank you for choosing to use this Mobile Elevating Work Platform from LGMG.

This manual is a guide for safe and proper operation and maintenance of the machine, which introduces technical parameters and mechanism and operation herein.

We sincerely hope that you will read through this manual before attempting to operate the machine for the first time and before repairing and maintaining the machine, and that you will master the operation and maintenance described therein.

The information contained in this manual is correct at the time of publication. However, LGMG has endeavored to deliver the highest degree of accuracy possible. And continuous improvement of our product is a LGMG policy. Therefore, product specifications are subject to change without notice.

Due to the impossibility of foreseeing all possible hazards, therefore, it is not possible to include all safety precautions in this manual and the machine's safety precautions in this manual and the machine's safety instructions. If some operations that are not recommended in this manual, you must ensure that you and others are safe and will not damage the machine. If the security of certain operations cannot be determined, please call LGMG industries or dealer service center.

The precautions for operation and maintenance contained in this manual are only applicable when the machine is used for the specified use. If the machine is used within the scope not listed in this manual, our company will not assume any safety responsibility, which is borne by the user and operator in such operations.

Any prohibited operations in this manual shall not be performed.

This manual should always be placed in the designated location for read. This manual is part of the machine, when the ownership or use right of the machine is transferred, please hand over this manual together. If the manual is lost, damaged or illegible, please replace it promptly.

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Safety Notices

Operators should understand and follow the current national and local safety regulations, and use the safety instructions in this manual if there are no corresponding regulations.

Most accidents are caused by the user's violation of the regulations on machine operation and maintenance. To avoid accidents, please read, understand and comply with all requirements, precautions and warnings in this manual and machine labels before operation and maintenance.

This manual is not a training manual for lifting platform operators! All operating instructions are for professionals who have received lifting platform relevant training.


Since it is impossible to foresee all possible hazards and accidents, the safety instructions in this manual cannot include all safety precautions, and other existing safety risks must be taken into account in the actual operation. If a procedure or operation not recommended in this manual is used, the operator must carry out a risk assessment and must ensure the safety of himself and others and that no damage is done to the machine. If the safety of some operations is not certain, please contact our company or dealer.


If the content of this manual is inconsistent with the standards or laws and regulations issued by the local government or authorities, please enforce the stricter policy.


The operation and maintenance precautions given in this manual are only applicable to the specified use of this machine. If the machine is used outside the specified purpose, our company will not assume any responsibility, and all responsibilities shall be borne by the user and the operator.

In any instance, the prohibited operations in the manual cannot be carried out.

The following markers are used to identify safety information in this manual:

 **DANGER** - Indicating any dangers that, if not avoided, will cause serious injury or even death, and also serious machine damage.

 **WARNING** - Indicating any dangers that, if not avoided, may cause injury, serious injury or even death, and also serious machine damage.

 **CAUTION** - Indicating dangers that, if not avoided, may cause minor or moderate injury, and also machine damage or shortened machine service life.

Chapter 1 Maintenance



1.1 Observing the Regulations

- 1) You are properly trained and qualified to operate and maintain the machine safely.
 - 2) All safety regulations in this manual, workplace safety regulations and applicable government laws and regulations must be read, understood and complied.
 - 3) Equipped with PPE, such as helmet, seat belt, safety shoes, goggles, protective clothing, insulating gloves, insulating shoes, etc., and in good physical condition.
 - 4) When maintenance and repair procedures are being performed, many dangers indicated in the Operation Manual will also become potential safety hazards.
 - 5) Scheduled maintenance and repair can only be completed by trained and qualified maintenance technician.
 - 6) Dispose of waste materials in accordance with government regulations and workplace regulations.
 - 7) Only parts and consumables approved by the LGMG can be used.
 - 8) Always perform functional tests after maintenance.
- in the file box.
- 2) Check each page of the inspection manual to ensure that it is legible and in good condition.
 - 3) Put the manual into the file box after use.



CAUTION: If the manual needs to be replaced, please contact the LGMG service personnel.

1.3 Check Labels and Decals

It is necessary for safe operation of equipment to keep all safety and description labels and decals in good condition. The label warns the operator and staff of many possible hazards during use of this equipment. It also provides the user with operation and maintenance information. The illegible label cannot warn the staff of steps or dangers, which may also lead to unsafe operation.

Refer to the label section of this operation manual to check whether all label are where they shall be.

Check the clarity and damage of all label and immediately replace any damaged or illegible label.



CAUTION: If you need to replace the label, please contact the LGMG service personnel.

1.2 Inspection Manual

It's necessary for safe equipment operation to keep operation manual and maintenance manual in good condition. An illegible or missing manual will not provide the necessary safety and operational information for the safe operation.

- 1) Make sure that the operation manual and maintenance manual are complete

1.4 Every Day or Every 8 Hours

1.4.1 Check for Damaged and Loose or Missing Part

Perform this step every 8 hours or every day.

Daily equipment status checks will be necessary for safe equipment operation and good equipment performance. Incorrect positioning and repair damage, and loose or missing parts may lead to unsafe operating conditions.

- 1) Check the damage of the whole equipment and incorrect installation or loss of parts, including:
 - Electrical components, wiring and cable
 - Hydraulic hose, joint, valve block, hydraulic cylinder
 - Fuel and hydraulic tank
 - Sliders
 - Tires and hubs
 - Engine and related components
 - Limit switches, horns
 - Nuts, bolts and other fasteners
 - Indicator lamps and alarms
 - Drive shafts

Check the entire machine to find:

- Cracks in weld or structural parts
- Whether the chassis is deformed or open weld
- Dent or damage to the machine
- Ensure that all structural parts and other key components are complete and all relevant fastener and pin are in the correct position and tightened

Scheduled maintenance

In extremely cold, dusty or humid working environment, more frequent lubrication and maintenance than specified in "scheduled maintenance" is required. During maintenance, the maintenance items listed in the original requirements shall be repeated.

For example, when proceeding the maintenance item for 500 working hours, the maintenance items listed for every 250 working hours and every 100 working hours shall be carried out at the same time.

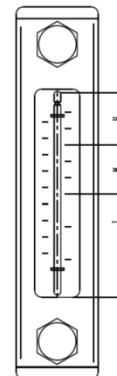
1.4.2 Check the Hydraulic Oil Level and Hydraulic Oil Leaks

Check the hydraulic oil level every 8 hours or every day.



CAUTION: Perform this step when the arm rod is in the stowed position.

- Park the machine on a flat ground. The arm rod shall retract to the stowed position.



Hydraulic oil dipstick

- Check the oil dipstick on the hydraulic oil tank. The liquid level shall be within the M range. If the liquid level is lower than M, the hydraulic oil shall be filled. Select the hydraulic oil grade according to the temperature.

Grade	Brand
Rando MV32	Chevron

 **CAUTION: Do not top off with**

incompatible hydraulic fluids. Hydraulic fluids may be incompatible due to the differences in base additive chemistry. When incompatible fluids are mixed, insoluble materials may form and deposit in the hydraulic system, plugging hydraulic lines, filters, control valves and may result in component damage.

Check for hydraulic oil leaks every 8 hours or every day.

 **CAUTION: Danger of personal**

injury: Spilled hydraulic oil can penetrate and burn the skin, Goggles and protective gloves must be worn.


- The leakage of high-pressure oil may not be visible to eyes. Cardboard or wood chip shall be used as a tool to check for hydraulic oil leakage. It is forbidden to confirm it by hand. Check oil droplets or oil residues on the following components:
- Hydraulic tank, filter, pump, hydraulic cylinder, motor, reducer, valve block, hydraulic pipe
- Check oil droplets or oil residues in the following areas:
- Rear of arm rod, fly jib, upper of rotary table, upper and lower of drive chassis, ground area under equipment

1.4.3 Check for Engine Oil Level

 **Do not operate on running engines!**


No smoking and open fires!

Be careful when contacting with high temperature engine oil. Danger of scalding!

 **When operating on the oil system, pay attention to the surface cleaning. Carefully clean all areas involved. Blow wet parts with compressed air.**

 **Please observe the safety**

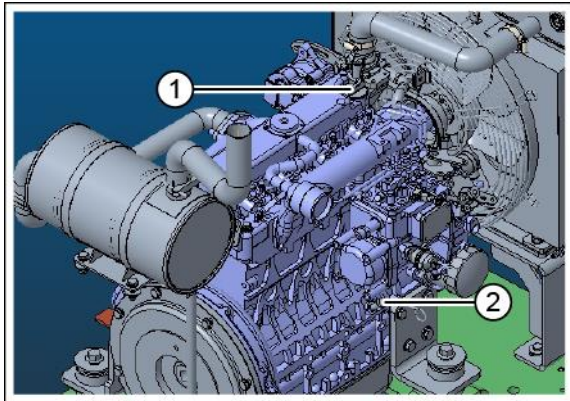
regulations for engine oil and relevant local regulations. Dispose of spilled engine oil and filter elements as required. Waste oil cannot penetrate into the ground.

 **Test run shall be carried out after each operation. At the same time, pay attention to the sealing and lubricating oil pressure, and then check the engine oil level.**

Check the engine oil level every 8 hours or every day.

Insufficient or excessive engine oil may cause damage to the engine. The engine oil level can only be checked when the engine is placed horizontally and closed. If the engine is hot, close the engine and check the engine oil level 5 minutes later. Check it immediately

if the engine is cooled.



1. Oil measuring rod

2. Oil filler plug

- 1) Pull out the oil measuring rod and clean it with a piece of clean and fiber-free cloth.
- 2) Insert the oil measuring rod into the bottom.
- 3) Pull out the oil measuring rod and read the value of engine oil level.
- 4) The engine oil level shall always be between MIN and MAX!
- 5) Fill up to the maximum liquid level if necessary.

1.4.4 Check for Fuel Leakage

Visually check for fuel leakage every 8 hours or every day.

 **The engine must be shut down!**

No smoking and open fires!

Be careful when contacting high temperature fuel!

Please observe the safety regulations for fuel and relevant

local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

Visually check for fuel leakage every 8 hours or every day.

 **There is danger of explosion**

and fire. The fuel of the engine is combustible. Check the position of the machine. When this step is performed, the machine should be in a well-ventilated area away from the heater, spark, flame, and burning tobacco. A qualified fire extinguisher shall be placed in an easily accessible place.

 **There is danger of explosion**

and fire. If fuel leaks, prevent any additional person from entering the area or operating the equipment. Repair the leakage immediately.

1.4.5 Check for Engine Air Filter

Check the maintenance indicator for the air filter every 8 hours or every day.

 **Perform this step when the**

engine is turned off.

When the primary filter element is cleaned more than 5 times or the filter element has been damaged, the primary filter element needs to be replaced.

Under ordinary conditions, open the dust discharge valve once a week; When used in

dusty places, open it once a day, which can remove large particles of dust and something dirty.

1.4.6 Check for Coolant Liquid Level

Check the coolant liquid level every 8 hours or every day.



The coolant at high temperature has the risk of scald.

The cooling system is under pressure! The cover can only be opened in the cooling state.

Coolant must have a specified concentration of cooling system protectant!

Please observe the safety regulations for coolant and relevant local regulations.

Dispose of the spilled coolant as specified, without leaving it on the ground.

Never run the engine without coolant, even if it's a very short time.

- 1) Carefully open the cover for the cooling system.
- 2) The coolant liquid level shall always be between min and max! Fill up to the maximum liquid level if necessary.

1.4.7 Check for Engine Belt



Only when the engine is

stationary can the belt drive operation be carried out.



There is danger of burn. Be cautious of high-temperature engine components. Contact with them may

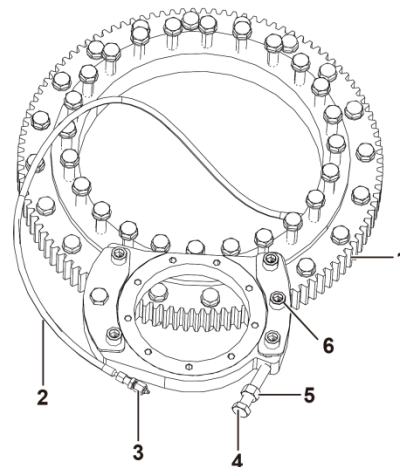
cause serious burn.

- 1) Visually inspect whether all belt drives for damage.
- 2) Replace damaged components.
- 3) Reinstall the protector if necessary.
- 4) When it is a new belt, check whether the position is correct. After running for 15 minutes, check the tension.

1.5 Every 100 Hours

1.5.1 Slewing Bearing and Slewing Gear Lubrication


Fill the slewing bearing and slewing gear with grease every 100 hours. Regular lubrication of slewing bearings is necessary to maintain good equipment performance and service life. Incorrect lubrication can lead to component damage.



Slewing mechanism

1. Slewing bearing
2. Oil pipe
3. Grease nipple
4. Adjusting bolt
5. Lock nut
6. Fixing bolt

- Find the grease filler 3 next to the slewing reducer, connect the greaser, and rotate the rotary table several times while filling grease until the grease overflows from the upper and lower fixing surfaces of the slewing bearing. Grease grade: lithium base grease 2#.
- Check the lubrication of slewing bearing gear and slewing reducer gears, clean the gear surface if necessary, and apply the grease again.

 **CAUTION: If there is too much dust in the working environment, increase the frequency of filling grease.**

1.5.2 Grease the Exposed Piston

Rod

If storing the machine for a long time with the piston rod exposed, carry out the maintenance monthly; if not, carry it out quarterly.

Component requiring maintenance:

Tower boom lift cylinder.

Grease specification:

Lithium-based grease and hydraulic oil mix, with the ratio of lithium-based grease to hydraulic oil as 3:1.

Maintenance procedure:

- 1) Apply the mix evenly onto lint-free wipers.
- 2) Fully raise the tower boom and apply the mix evenly to the surface of the exposed piston rod using lint-free wipers.
- 3) Fully lower the tower boom and fully

raise it. Then wipe the residual mix off the piston rod using lint-free wipers.

1.6 Every 250 Hours

1.6.1 Check the Air Filter of Hydraulic Tank

This inspection is carried out every 250 hours or quarterly, whichever comes first.

A hydraulic tank cap with smooth ventilation is essential for achieving good mechanical performance and service life. Dirty or clogged vent caps may lead to poor performance of the machine. Inspection shall be carried out frequently in the harsh working environment.

- ① Remove the vent cap from the hydraulic tank cover.
- ② Ventilation check.

Result: air can pass through the vent cap.

Result: if the air cannot pass through the vent cap, clean or replace the vent cap. Continue with Step 3.

Note: when checking the ventilation of the hydraulic oil tank cap, the air shall be able to pass freely.

- ③ Clean the tank vent cap carefully with a mild solvent and dry it with low pressure compressed air. Repeat step 2.
- ④ Install the hydraulic tank vent cap.

1.6.2 Check the Battery

Check the battery once every 250 hours or quarterly, whichever comes first.

 **DANGER:**

Explosion Hazard!

Danger of Electric Shock!

Burn Danger!

When operating, keep away from fireworks and remove all rings, watches and other accessories. Wear goggles, protective gloves and protective clothing if necessary. Avoid touching the spilled electrolyte with hands or other parts of the body, and neutralize spilled electrolyte with baking soda.

Good battery condition is critical to machine performance and safe operation. Unsuitable voltage or damaged cable and wiring may cause damage to components and create dangerous conditions.

Check maintenance-free lead-acid battery:

- Check whether the battery lock lever is stable.
- Check the wiring of the battery cable, which shall be secure and free from corrosion.
- Check whether the electrolyte is leaking and whether the battery is dry and clean.

Check electric eye status every three months (maintenance-free lead-acid battery)

check the battery hydrometer color:



Hydrometer

Battery Hydrometer

Color of electric eye	Meaning and processing method
White	Insufficient electrolyte. Please shut down the machine and stop using it.
Black	Under voltage or damage

Green	Measure the voltage of each battery. If the voltage is lower than 11 V, it indicates that the battery is damaged (open circuit or short circuit); The voltage is between 12.4 V-12.7 V, indicating that the battery is in good condition
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Color and description of battery hydrometer

- If the battery hydrometer color is green and the voltage is above 12V, but it cannot work normally, please ask the trained maintenance personnel who have obtained the corresponding qualifications to further test the battery.

Battery recharge:

- Before charging, disconnect the negative connection of the battery first, and then the positive connection of the battery.
- Before replenishing electricity, clean the end column and remove the oxide scale on the surface.

 **NOTE: If an external power**

supply is required to charge the battery, only the charger approved by the LGMG can be used.

- **Do not replenish the battery with white eyes. Replace the battery.**
- **When wiring after charging, connect the positive wire first and then the negative wire.**

! NOTICE: Adding a terminal

protector and an anti-corrosion sealant will help remove corrosion caused to battery terminals and cables.

1.6.3 Check the Tire and Nut Torque

This inspection is carried out every 250 hours or quarterly, whichever comes first.

Maintaining the tire and hub in good condition is essential for the safe operation and good performance. Failure of tire and hub may cause the machine to roll over. If not find the failure and repair it in time, it will also cause damage to the machine parts.

Filled tire and solid tire do not need inflation.

- 1) Check the tire tread and sides for scratches, cracks, piercing and other abnormal wear.
- 2) Check the hub for damage, bending and cracking.

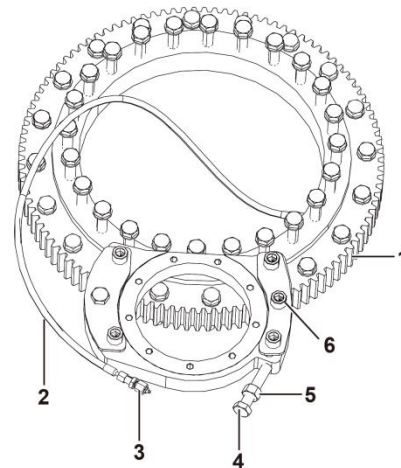
Check tire nut torque

Type	Torque
AR24J	595±55N.m

1.6.4 Check the Clearance Between the Slewing Bearing and the Slewing Reducer

This inspection is carried out every 250 hours or quarterly, whichever comes first.

The rotary table shall rotate smoothly without jam and pause. Measure the backlash between slewing bearing gear and slewing reducer with feeler gauge. The backlash shall be between 0.2-0.3mm. If it is out of the range, please adjust it.



Slewing mechanism

1. Slewing bearing
 2. Oil pipe
 3. Grease nipple
 4. Adjusting bolt
 5. Lock nut
 6. Fixing bolt
- Loosening fixing bolt 6 and lock nut 5
 - Turn adjusting bolt 4 to adjust reducer position
 - Measure slewing bearing gear and slewing reducer gear backlash with feeler gauge
 - If the clearance is between 0.2-0.3 mm, tighten lock nut 5 and tighten fixing bolt 6
 - Measure the backlash between slewing bearing gear and slewing reducer gear again to verify that requirements are met.
 - Tighten the fixing bolt 6, torque: 595±55N•m.

1.6.5 Visual Inspection of Hydraulic Oil

This inspection is carried out every 250

hours or quarterly, whichever comes first.

Collect a hydraulic oil sample and place it in a transparent container. The operation of the visual inspection of hydraulic oil is as follows:

- Color: the oil color should be transparent and light honey.
- Appearance: the oil should be clear and not cloudy, and the viewing angle should not be visibly distorted when viewing through the sight glass or container. Without particles, foreign matter or other contaminants.
- The hydraulic oil can be checked by smell (the smell of "hot" can be smelled, but not "burnt" smell) or friction between fingers (It should be sticky without any graininess).

If all the hydraulic oil passes the above inspection, continue maintenance at predetermined intervals. If the hydraulic oil fails in any of the above checks, the hydraulic oil must be tested.

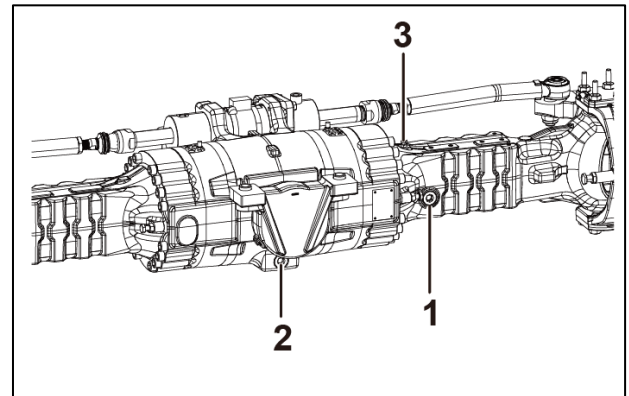
1.6.6 Check the Oil Level of the Drive Axle Main Reducer and Close-to-wheel Reducer

This inspection is carried out every 250 hours or quarterly, whichever comes first.

! CAUTION: The vehicle must be parked on a level, solid ground before operation. Place a cushion block under the tire to prevent the machine from moving.

! CAUTION: To drain or fill oil and check the oil level, the drive axle must be level and installed on the vehicle.

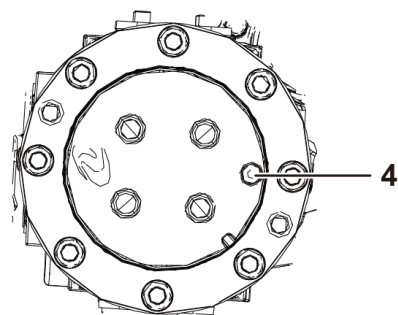
Check main reducer oil level



1. Filler port/sight port
2. Drain port
3. Breather

- Carefully clean breather 3 and the surrounding area.
- Remove plug 1 and check if the oil level is at the lower edge of the filler port, otherwise add oil.
- Tighten the plug.
- Act on each main reducer in the same way.

Check close-to-wheel reducer oil



4. Filler port/sight port/drain port

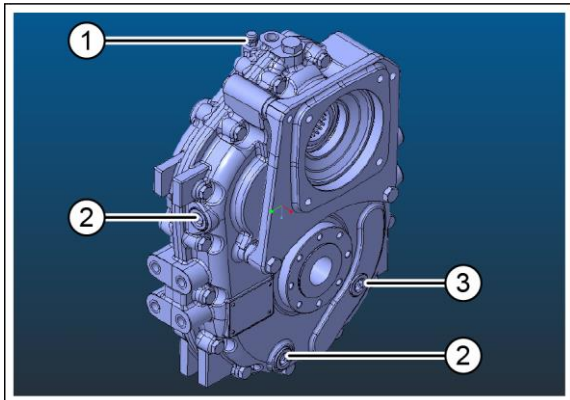
- Turn the wheel so that the plug 4 is in the highest position, and partially loosen it to release the pressure that may exist.
- Turn the wheel so that the plug 4 is in a horizontal position, remove the plug to

check whether the oil level is at the lower edge of the filler port, otherwise add oil and tighten the plug.

- Work on each close-to-wheel reducer in the same way.

1.6.7 Check the Transfer Case Oil Level

This inspection is carried out every 250 hours or quarterly, whichever comes first.



1. Breather
2. Drain port
3. Filler port/sight port

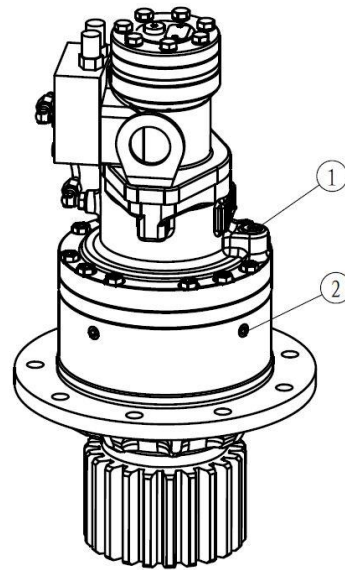
- Carefully clean breather and the surrounding area.
- Remove plug 3 and check if the oil level is at the lower edge of the filler port, otherwise add oil.
- Tighten the plug.

1.6.8 Check the Oil Level of the Slewing Reducer

This inspection is carried out every 250 hours or quarterly, whichever comes first.

Improper oil level in the reducer will reduce the performance of the equipment, and continuous use will lead to component damage.

- 1) Slewing reducer oil level inspection



Slewing reducer

1. Filler port 2. Sight port

- Remove the plug 2 on the reducer side and check the oil level.

Result: the oil level should be the same as sight port 2 height.

- When it is needed, please add gear oil through filler port 1 until the oil level is the same as the bottom height of sight port 2.
- Apply pipe thread sealant to the plug and install the plug into the reducer.
- Replace lubricant after the first 50h of use, then every 1,000 h or yearly, whichever comes first.

The gear oil recommended is as the following table

Item	Condition	Grade API GI-5
Gear oil	30°C < Minimum temperature	85W/140
	-10°C < Minimum temperature < 30°C	85W/90
	-30°C < Minimum temperature < -10°C	80W/90

	Minimum temperature <-30°C	75W
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1.6.9 Check the Wires

This inspection is carried out every 250 hours or quarterly, whichever comes first.

It is important for safe operation and good machine performance to keep the wires in good conditions. Failure to find and replace the burn-out, scratched, corroded or bent wires will result in unsafe operating conditions and damage to the parts.

Risk of electric shock/explosion

Contact with live circuits may cause serious injury or death. Do not wear rings, watches or other jewelry.

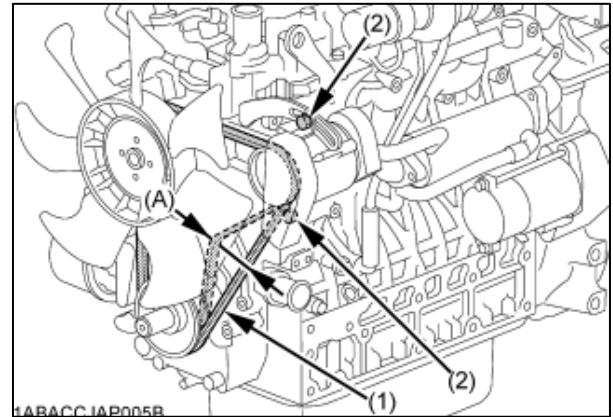
1) Check the following areas for burn-out, scratched, corroded, bent or loose wires:

- Engine wiring harness
- All wire harness connectors to ground control box
- All wire harness connectors to platform control box
- Hydraulic manifold wiring

2) Check whether all wire harness connectors are coated with insulating grease:

- Ground control unit
- Platform control unit
- Harness connectors
- Sensor

1.6.10 Adjustment of Belt Tension



1. Fan belt
2. Bolt and nut

Apply moderate thumb pressure to belt between the pulleys.


If tension is incorrect, loosen the alternator mounting bolts and, using a lever placed between the alternator and the engine block, pull the alternator out until the deflection of the belt falls within acceptable limits.

Replace fan belt if it is damaged.

Proper fan belt tension	A deflection when the belt is pressed in the middle of span.
7 to 9 mm	under load of 10 kg

1.6.11 Cleaning or Replacement of Air Filter

Clean it every 250 hours or quarterly and replaced it for every 1000 hours or every year, whichever comes first.

 **Do not operate on running engines!**

! Be sure to pay attention to the

cleanliness of the external surface when operating on the engine suction system, and close the suction inlet when necessary. The old filter elements are handled in an environmentally friendly manner.

Cleaning of air filter

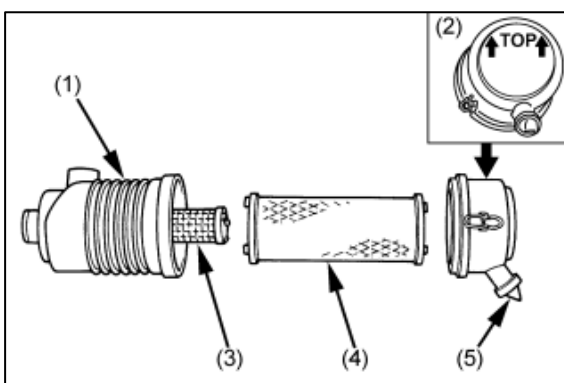
! Do not clean the filter element

(4) with gasoline or high temperature liquid.

If the primary element is stained heavily, replace it soon. At this time, replace the secondary element too.

The secondary element should be removed only if it is to be replaced.

To protect the engine, do not remove the secondary element in servicing the primary element.



1. Air cleaner body
2. Dust cup
3. Secondary element (If equipped)

4. Primary element

5. Evacuator valve

Make sure the hooking clip for the element is tight enough. If it is loose, dust and dirt may be sucked in wearing down the cylinder liner and piston ring earlier and thereby resulting in poor power output.

Do not excessively service the air cleaner element. Over-service may cause dirt to enter the engine causing premature wear. Use the dust indicator as a guide on when to service.

- 1) Open the hooking clip.
- 2) Remove the filter cover (2) and screw off the filter element (4).
- 3) Filter element (4): For slight contamination, purge with dry compressed air (maximum 205 Kpa) from inside to outside for cleaning (general cleaning times are no more than 5 times);

Replace it in case of serious contamination.

Replacement of the Safety Filter Tube of the Air Filter

! Never clean the safety filter tube (3).

- 1) Screw off the Primary element (4) and the Secondary element (3).
- 2) Install the new Secondary element.
- 3) Install the filter element (4), place the outer cover (2) and fix it with the hooking clip.

1.7 Every 400 Hours

1.7.1 Replacement of Engine Oil and Filter

The following steps apply to engine


 **Do not operate on running**

engines!


No smoking and open fires!


Be careful when contacting with high temperature engine oil.

Danger of scalding!

 **When operating on the oil system, pay attention to the surface cleaning. Carefully clean all areas involved.**


Blow wet parts with compressed air.


 **Please observe the safety regulations for engine oil and relevant local regulations. Dispose of spilled engine oil and filter elements as required. Waste oil cannot penetrate into the ground.**

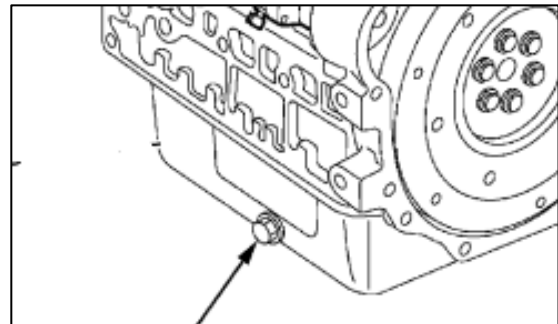
 **Test run shall be carried out after each operation. At the same time, pay attention to the sealing and lubrication oil pressure, and then check the engine oil level.**

It is available in the first 50 hours, and the engine oil and filter shall be replaced every

400 hours or half a year. (If the ambient temperature continues to be below -10°C (14°F) or the temperature of engine oil is below 60°C (84°F), or the sulphur content in the diesel fuel is 0.5 - 1%, the oil change period is reduced by a half; if the engine oil does not reach the replacement interval period within a year, the oil shall be replaced at least once a year.)

 **Danger of burn, be careful of high-temperature engine parts and oil, contacting with high temperature engine oil and/or engine parts will cause severe burns.**

 **Perform the function after engine warm up to normal operation temperature.**

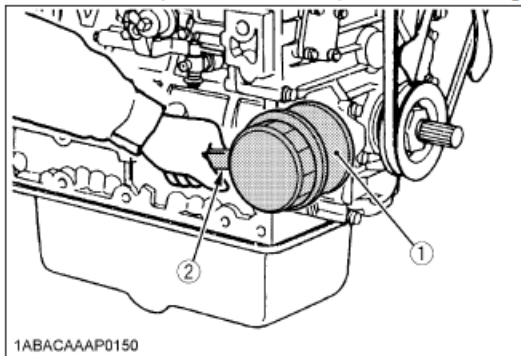


1. Oil drain plug

- 1) Warm up and run the engine.
- 2) Place the engine horizontally.
- 3) Shut down the engine.
- 4) Place the container under the engine oil drain plug.
- 5) Screw off the engine oil drain plug to drain the old engine oil.
- 6) Install the new seal ring for the engine oil drain plug and screw in and tighten it.

- 7) Add engine oil at the engine oil filler.
- 8) Warm up and run the engine.
- 9) Place the engine horizontally.
- 10) Wait for more than five minutes after filling the oil. Check the engine oil level and fill it if necessary.

Replacement of the Engine Oil Filter



1. Oil filter
2. Remove with a filter wrench (Tighten with your hand)

The engine oil filter element must also be replaced every time the engine oil is replaced.

- 1) Release and unscrew the filter element with a wrench.
- 2) Contain the oil that was drained.
- 3) Clean the sealing surface of the filter holder with a clean fiber-free wiper.
- 4) Apply a thin layer of engine oil to the seal ring of the new filter.
- 5) Screw in the cartridge by hand. When the seal ring contacts the seal surface, tighten the cartridge enough by hand. Because, if you tighten the cartridge with a wrench, it will be tightened too much.

1.7.2 Clean or Replace the Fuel Filter

The following steps apply to engine

⚠ The engine must be shut down!

**No smoking and open fires!
Be careful when contacting high temperature fuel!**

⚠ Do not release the injection

pipeline or the high-pressure oil pipeline when the engine is running.

⚠ Carefully clean all areas

involved in cleaning. Blow wet parts with compressed air.

⚠ Please observe the safety

regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

⚠ After completing the operation

on the fuel system, exhaust the system, perform the trial operation and check the seal performance.

⚠ There is danger of explosion

and fire. The fuel of the engine is combustible. Check the position of the machine.

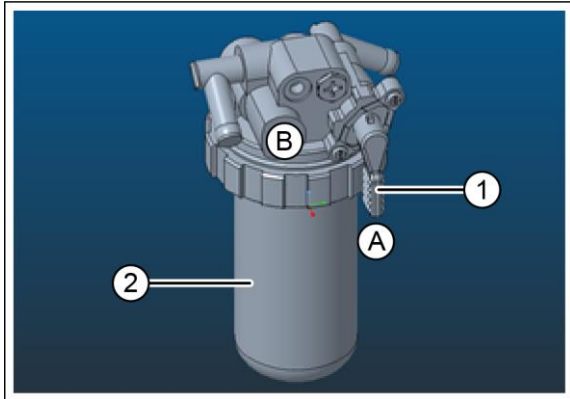
When this step is performed, the machine should be in a well-ventilated area away from the heater,

spark, flame, and burning tobacco.

A qualified fire extinguisher shall be placed in an easily accessible place.

Clean the Fuel Pre-filter

Clean the fuel filter every 100 hours operation to prevent dust from entering.



1. Fuel filter handle

2. Fuel filter pot

A: Open state

B: Close state

- 1) Close the fuel filter handle.
- 2) Remove the top cover and clean the interior with diesel.
- 3) Take out the filter and clean it with diesel oil or replace a new one.
- 4) Apply a thin layer of diesel to the seal ring of the new filter.
- 5) Reinstall the fuel filter.
- 6) Exhaust the fuel system.

Replacement of fuel filter

It will be replaced every 400 hours, but an increase in the number of replacement filters is required for the extremely dirty work environment.

- 1) Release and unscrew the filter element

with a wrench.

- 2) Contain the diesel fuel drained.
- 3) Clean the sealing surface of the filter holder with a clean fiber-free wiper.
- 4) Apply a thin layer of diesel to the seal ring of the new filter.
- 5) Screw in a new filter manually until seal fit and tighten it.
- 6) Exhaust the fuel system.

1.7.3 Clean or Replace the Fuel Filter

 **The engine must be shut down!**

No smoking and open fires!

Be careful when contacting high temperature fuel!

 **Do not release the injection**

pipeline or the high-pressure oil pipeline when the engine is running.

 **Carefully clean all areas**

involved in cleaning. Blow wet parts with compressed air.

 **Please observe the safety**

regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

 After completing the operation

on the fuel system, exhaust the system, perform the trial operation and check the seal performance.

 There is danger of explosion

and fire. The fuel of the engine is combustible. Check the position of the machine.

When this step is performed, the machine should be in a well-ventilated area away from the heater, spark, flame, and burning tobacco.

A qualified fire extinguisher shall be placed in an easily accessible place.

Draining of water separator


 Risk of explosion and fire.

Engine fuel is combustible. The position where the equipment is located shall be inspected. When the step is executed, equipment shall be located in an open and well-ventilated area that keeps away from the heater, spark, flame and burning tobacco. A qualified fire extinguisher shall be placed at the location that is easily accessible.

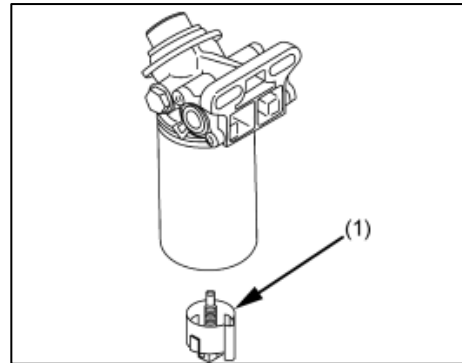
 Risk of explosion and fire.

Where there is fuel leakage, prevent any irrelevant personnel from entering the area and strictly prohibit operating the equipment.

Repair the leak immediately.

 Perform the step when the engine flames out.

Drain the water separator if required.



1. Drain plug

- 1) Shut down the engine, and find the water separator.
- 2) Disconnect cable connection.
- 3) Loosen the drainage plug located at the bottom of the filter cartridge, allowing the water drained to an appropriate container.
- 4) Finally be sure to air-bleed the fuel system before getting the engine restarted.
- 5) Wipe up any fuel that may be splashed.
- 6) Start the engine from the ground control and inspect whether or not there is leakage in the fuel filter.

Replacement of water separator filter

Replace the water separator filter with a new one every 400 hours.

- 1) Remove the old water separator filter

with a filter wrench.

- 2) Apply a film of oil to the gasket for the new water separator filter.
- 3) Screw in the water separator filter by hand. Because, if you tighten the water separator filter with a wrench, it will be tightened too much.

Replace the water separator filter periodically to prevent wear of the supply pump or the injector, due to dirt in the fuel.

Replacement of the Fuel filter

 **The engine must be shut down!**

No smoking and open fires!

Be careful when contacting high temperature fuel!

 **Do not release the injection**

pipeline or the high-pressure oil pipeline when the engine is running.

 **Carefully clean all areas**

involved in cleaning. Blow wet parts with compressed air.

 **Please observe the safety**

regulations for fuel and relevant local regulations. Dispose of spilled fuel and filter elements in accordance with national regulations. The fuel cannot seep into the ground.

 **After completing the operation**

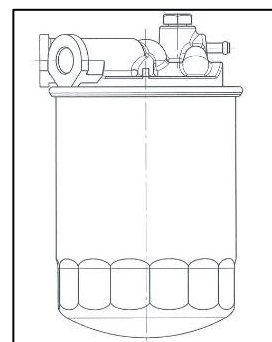
on the fuel system, exhaust the system, perform the trial operation and check the seal performance.

Replace the fuel filter cartridge with a new one every 400 operating hours, or half a year, but an increase in the number of replacement filters is required for the extremely dirty work environment.

 **There is danger of explosion**

and fire. The fuel of the engine is combustible. Check the position of the machine. When the step is executed, equipment shall be located in an open and well-ventilated area that keeps away from the heater, spark, flame and burning tobacco.

A qualified fire extinguisher shall be placed in an easily accessible place.



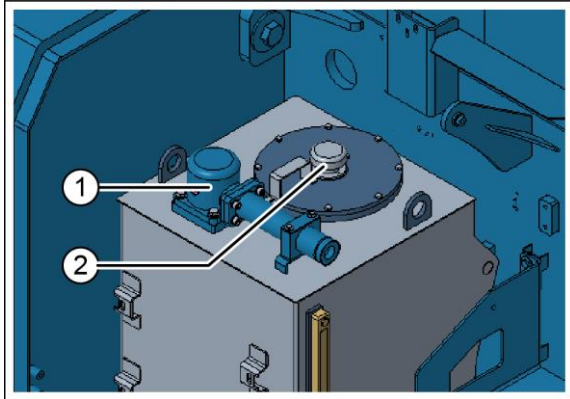
- 1) Release and unscrew the filter element with a wrench.
- 2) Contain the diesel fuel drained.
- 3) Clean the sealing surface of the filter holder with a clean fiber-free wiper.
- 4) Apply a thin layer of diesel to the seal

ring of the new filter.

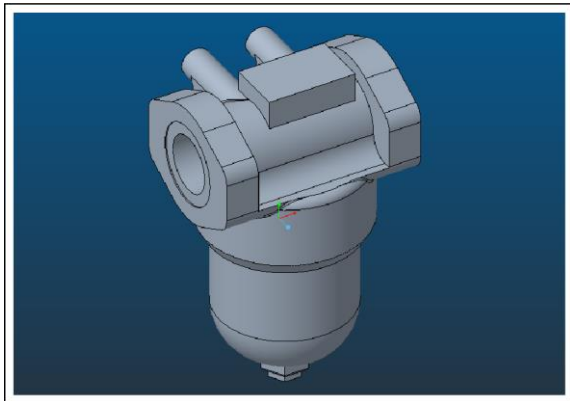
- 5) Screw in a new filter manually until seal fit and tighten it.
- 6) Exhaust the fuel system.

1.8 Every 500 Hours

1.8.1 Replace Hydraulic Filter



1. Return filter
2. Hydraulic tank air filter



High pressure filter

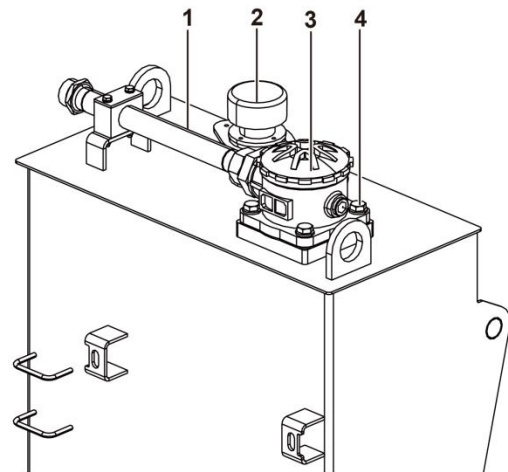
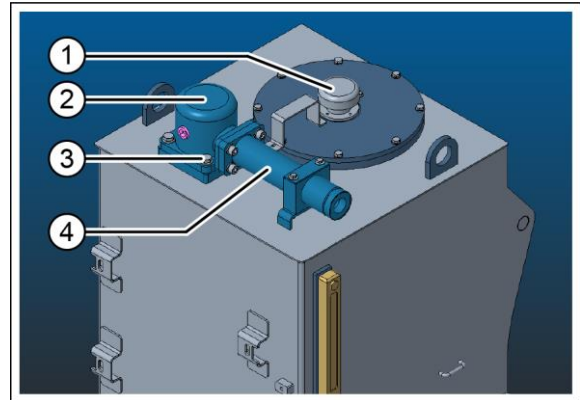
Replace the hydraulic return filter and high pressure filter element every 500 hours or half a year, whichever comes first.

The replacement of the hydraulic filter is necessary to maintain good machine performance and longevity. Dirty or clogged filters may cause performance degradation of hydraulic components, and continuous use may result in component damage.

Extreme operating conditions require increased filter replacement times.

Park the vehicle on a solid level ground. Lower the arm rod so that the vehicle is in the stowed position.

Replace return filter



No.	Name	Torque
1	Air filter	
2	Return filter	-
3	Bolt	90±9N.m
4	Main return pipe	-

- ① Disconnect the connection between main return pipe and return filter.
- ② Remove the plug on the return filter.

- ③ Disconnect the connection between the return filter and the hydraulic tank.
- ④ Remove the old filter and install the new filter.
- ⑤ Install the main return pipe and plug.
- ⑥ Use the marker pen to note the replacement date on the Filter Replacement Record.
- ⑦ Use GCU to operate any arm rod function.
- ⑧ Check filter components for oil leakage.

Replace high pressure filter

 **Danger of personal injury. Be**

careful with hot oil, and contact with hot oil can cause severe burns.

 **If the working environment is**

dusty, increase the number of times to perform this step.

This step is performed every 500 hours or half a year, whichever comes first.

Replacing the high pressure filter element is essential for the good performance and service life of the machine. Dirty or blocked filter may affect the performance of the machine, and continuous use will lead to part damage. Filter element should be replaced more frequently in harsh working environment.

Park the vehicle on a solid level ground. Lower the arm rod so that the vehicle is in the stowed position.

- 1) Place a suitable container under the filter.
- 2) Remove the nut at the bottom of the

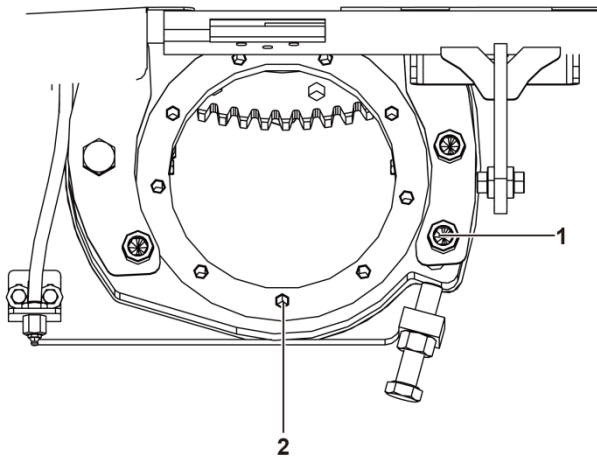
filter cover with the wrench and remove the filter cover.

- 3) Remove the filter element from the filter cover.
- 4) Check the seal of the filter cover and replace it if necessary.
- 5) Install new high pressure filter element and tighten it.
- 6) Scrub off any oil droplets splashed during installation.
- 7) Use the marker pen to note the replacement date on the Filter Replacement Record.
- 8) Use GCU to operate any arm rod function.
- 9) Check filter components for oil leakage.

1.8.2 Inspection of Fixing Bolts and Adjusting Bolts of Slewing Reducer

This inspection shall be performed every 500h or every six months, whichever comes first.

An appropriate tightening of fasteners is essential for the safe operation of the machine, and if any fastener is loose, machine damage or other safety hazards may be caused.



Tightening torque of bolt 1: $595 \pm 55 \text{ N.m}$

Tightening torque of bolt 2: $190 \pm 19 \text{ N.m}$

1.9 Every 1000 Hours

1.9.1 Replacement of Hydraulic Tank Air Filter

Replace the hydraulic tank air filter every 1000 hours or every year, whichever comes first.

Park the machine on a level ground.

Remove the old air filter and replace it with a new air filter.

1.9.2 Check Boom Wear-Resistant Slider

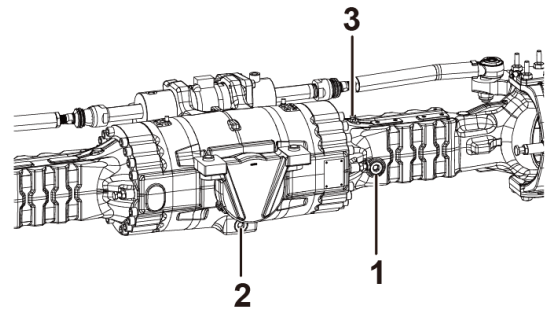
Check the fixing and wearing of the wear-resistant slider once every 1000 hours or every year, whichever comes first.

- 1) The slider is located on the surface and inner wall of the arm rod housing to reduce friction and keep the boom rod slider in good condition, which is necessary for safe machine operation. Improper padding or continuous use of extremely worn wear gaskets could lead to component damage and unsafe operating conditions.

- 2) Extend the arm rod to check whether the slider is loose. If the slider is loose, please tighten the fixing bolt. Check the clearance between the slider and the arm rod. If the clearance between the slider and the arm rod is greater than 1 mm, increase the gasket to obtain zero clearance and zero resistance, and replace the slider if necessary. As for the part number of the slider gasket, please refer to the Parts Catalog and select the slider gasket according to the actual situation. After adding gaskets, extend and retract the arm rod several times to eliminate potential dead points.

1.9.3 Change Drive Axle Reducer Oil and Gear Box Oil

First 500 hours or one year, whichever comes first, thereafter every 1000 hours.



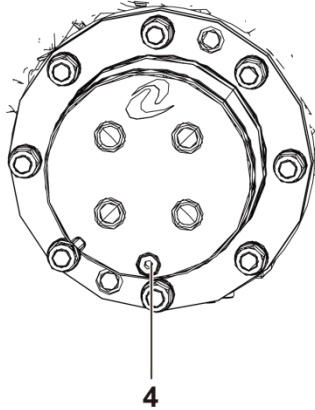
1. Filler port/sight port
2. Drain port
3. Breather

Change drive axle main reducer oil

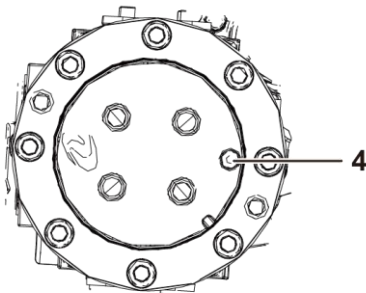
1. Place a suitable container under the plug 2, first remove the plug 1, and then remove the drain plug 2. Drain all oil. Install and tighten drain plug 2.
2. Fill the specified oil for drive axle to the lower edge of plug 1. Wait for 5 minutes before checking the oil level, and fill the oil to the specified position if necessary. Install and tighten filler plug 1.

- Act on each main reducer in the same way.

Change the oil of close-to-wheel reducer of drive axle

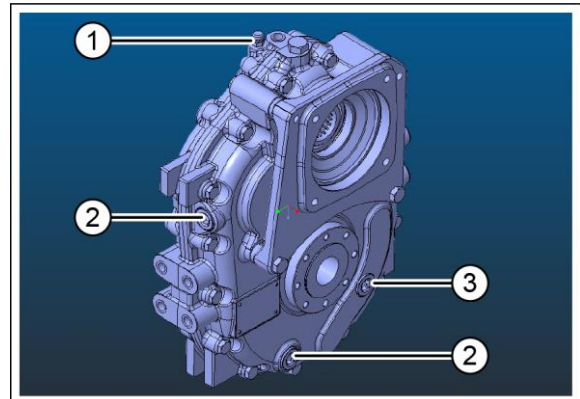


- Turn the wheel so that the plug 4 is in the highest position and partially unscrew the plug to release the possible pressure.
- Rotate the wheel so that the drain plug 4 is in the lowest position and place a suitable container underneath. Remove the screw plug and drain oil.



- Turn the wheel so that the plug 4 is in the horizontal position. Fill the lower edge of the filler port with the specified oil.
- Tighten the plug.
- Work on each close-to-wheel reducer in the same way.

Change the oil of gear box



- Breather
- Drain port
- Filler port/sight port

- Place a suitable container under the transfer box.
- Remove the plug 2, 3 and drain oil.
- Tighten the plug 2, and fill the lower edge of the filler port 3 with the specified oil.
- Carefully clean breather 1 and the surrounding area.
- Tighten the plug 1.

1.10 Every 2000 Hours

1.10.1 Test or Change of Hydraulic Oil

The hydraulic oil is tested or changed every 2000 hours or every two years, whichever comes first.

Changing hydraulic oil and replacing the filter are crucial for superior performance and service life of the machine. Dirty hydraulic oil and filter may affect the performance of the machine, and if not replaced, may cause damage to the parts. Hydraulic oil and filter shall be replaced more frequently in a harsh working environment.

Specific:

Grade	Brand
Rando MV32	Chevron

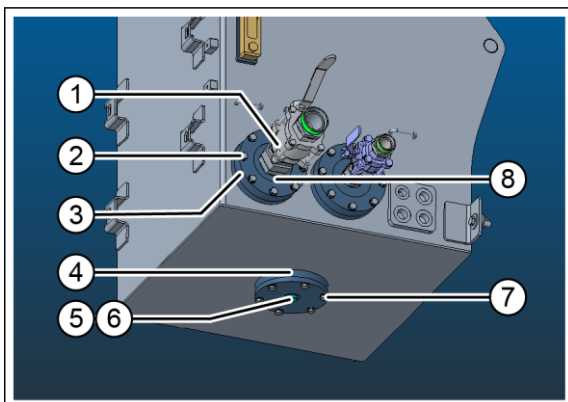
! CAUTION: If the hydraulic oil is not changed during the two-year test, it shall be tested quarterly and changed when it fails the test.

! CAUTION: The hydraulic suction filter should be replaced when the hydraulic oil is changed.

! This step shall be performed when the engine is shut down.

! In a dusty working environment, this step should be performed more frequently.

Replace hydraulic oil and suction filter



No.	Name
1	Ball valve

2	Bolt
3	Oil suction hose
4	Drain hole cap
5	Threaded plug
6	Magnet
7	Bolt
8	Oil suction filter

1) Park the vehicle on a level ground so that the vehicle is in the stowed position.

! WARNING: Danger of physical injury. The sprayed hydraulic oil may penetrate and burn the skin. Slowly loosen the hydraulic connectors to gradually reduce the oil pressure. Do not spray or splash oil.

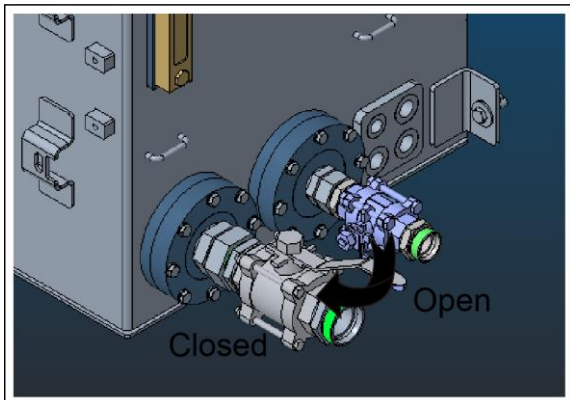
- 2) Place a suitable container under the hydraulic tank.
- 3) Remove the drain plug from the hydraulic tank.
- 4) Completely drain the hydraulic oil from the hydraulic tank into a suitable container. To speed up the oil drain, remove the tank vent cap.
- 5) Remove the drain flange and ring magnet.
- 6) Place a suitable container under the suction filter.
- 7) Remove the suction filter plate and then remove the suction filter.
- 8) Flush the inside of the hydraulic tank with a mild solvent. (Clean one side with a chemical cleaner first. After drying, rinse with clean hydraulic oil, and then drain the cleaning oil.)

- 9) Clean foreign matter adsorbed by the ring magnet.
- 10) Install a new suction filter.
- 11) Install the suction filter plate.
- 12) Install the ring magnet, drain flange and drain plug.

⚠ CAUTION: When installing drain plug and filter, be sure to apply pipe thread sealant.

- 13) Add the hydraulic oil into the hydraulic tank until the liquid level is at the specified position of the sight gauge, and it is strictly prohibited to overflow.
- 14) Scrub off hydraulic oil that may be splashed out.
- 15) Check the function of all machines and check for oil leakage through one full cycle.
- 16) After a working cycle, recheck the tank level and add oil to the specified position.

Turning on or off the suction filter:



Note: Turn the screw (1) counterclockwise to the limit position, and turn off the suction filter. Then, the

oil in the hydraulic tank cannot flow out. Before starting the machine, turn the screw (1) clockwise to the limit position, and turn on the suction filter. Then, the oil in the hydraulic tank can flow out.

⚠ Risk of part damage. Do not

start the engine or use the emergency power unit when the suction filter of the hydraulic tank is turned off, otherwise the parts will be damaged. If the suction filter is turned off, remove the key from the ignition switch and put a warning sign on the equipment.

1.10.2 Filling or Replacement of Engine Coolant

Replace it every 2,000 hours or two years, whichever comes first.

⚠ The coolant at high temperature has the risk of scald.

The cooling system is under pressure! The cover can only be opened in the cooling state.

Coolant must have a specified concentration of cooling system protectant!

Please observe the safety regulations for coolant and relevant local regulations.

Dispose of the spilled coolant as specified, without leaving it on the ground.

Never run the engine without coolant, even if it's a very short time.

Draining of the Cooling System

- 1) Carefully open the cooler cover.

- 2) Place the receiving container under the coolant interface.
- 3) Drain the coolant.
- 4) Reconnect and tighten the coolant interface.
- 5) Close the cooler cover.

the maintenance of this machine and have obtained corresponding qualifications.

- 2) Machines that have been idle for more than three months must be checked and maintained quarterly before they can be put into use again.

Filling of the Coolant

- 1) Carefully open the cover for the cooling system.
- 2) Loosen the cooler exhaust bolts that may be present.
- 3) Fill the coolant to max or the filling limit position.
- 4) Close the cooler exhaust bolts.
- 5) Close the cooler cover.
- 6) Run the engine to the running temperature.
- 7) Shut down the engine.
- 8) Check the coolant liquid level when the engine is cooled, and fill it to max if necessary.



NOTICE: The coolant with

different freezing point should be selected according to the local ambient temperature. In theory, the freezing point of coolant is 10°C -15°C lower than the local minimum temperature.

1.11 Scheduled maintenance

- 1) Quarterly, annual and biannual maintenance items must be performed by personnel who have been trained in

1.12 Engine Fault Table

Fault	Cause	Measures
When it is difficult to start the engine	Thick fuel hard to flow	Check the fuel tank and fuel filter. Remove water, dust and other impurities. Because all fuel will be filtered by the fuel filter, if there is water or other foreign matter in the fuel filter, please clean the fuel filter with kerosene.
	Air or water mixed in the fuel system	If there is air in the fuel filter or fuel injection line, the fuel pump will not work properly. To obtain the correct fuel injection pressure, check the machine carefully for loose fuel pipe fittings, locking nuts, etc. Remove all air from the fuel system by loosening the connecting bolts of the fuel injection pump and immobilizing the fuel filter and the vent cock.
	Incorrect valve clearance	When the engine cools down, adjust the valve clearance.
	Valve leakage	Grind the valve.
	Fuel injection timing error	Check the fuel injection timing.
	Thickened lubricating oil of the machine in cold weather, resulting slow engine start	Change the oil grade according to the weather (temperature).
	Insufficient compression	The valve is in poor condition or the ring, piston and bushing are excessively worn, leading to insufficient compression. Replace them with new ones.
When output is insufficient	Depleted battery, resulting in engine unable to start	Charge the battery. In winter, remove the battery from the machine, fully charge it and store it indoors. When the battery is needed, install it on the machine.
	Insufficient compression Valve leaks.	The valve is in poor condition or the ring, piston and bushing are excessively worn, leading to insufficient compression. Replace them with new ones. Grind the valve.
	Insufficient fuel	Check the fuel system.
	Moving parts overheat.	Check the lubricating oil system. Check whether the lubricating oil filter works properly. Filter element with deposited impurities will cause poor lubrication. Replace the filter element. Check whether the clearance of bearings is within the factory specifications. Check the fuel injection timing. Adjust the timing.
	Incorrect valve clearance	When the engine cools down, adjust the valve clearance appropriately.
	Dirty air cleaner	Clean the filter element once every 100 hours of operation.
	Wrong fuel injection pressure Worn injection pump	Check the injection pressure. Do not use inferior fuel, because it will

		cause wear of the pump. Please use No. 2-D diesel only. Check the fuel injection pump filter element and fuel outlet valve assembly and replace them as needed.
When engine suddenly stops	Insufficient fuel	Check the fuel tank. Add the fuel again if necessary. In addition, check the fuel system for air or leakage.
	Poor nozzle	If necessary, replace the nozzle with a new one.
	Lack of lubricating oil or poor lubrication, resulting in overheating moving parts	Check the amount of engine oil with an oil level gauge. Check the lubricating oil system. After every 2 oil changes, be sure to replace the oil filter element. Check whether the clearance of engine bearings is within the factory specifications.
The color of exhaust gas is abnormal	Damaged fuel regulating device	Contact the service personnel of LGMG.
	Inferior fuel	Choose quality fuel. Please use No. 2-D diesel only.
	Damaged nozzle	If necessary, replace the nozzle with a new one.
	Insufficient combustion	There may be insufficient vaporization, improper injection timing, etc., which are caused by faulty fuel injection system, improperly adjusted valve, compression leakage, improper compression, etc. Check the cause of the failure.
When engine overheats	Insufficient engine oil	Check the oil level. Replenish the oil if necessary.
	Damaged or elongated fan belt	Replace the belt or adjust the belt tension.
	Insufficient coolant	Add coolant.
	High concentration of antifreeze	Change the antifreeze only with water or coolant of specified mixing ratio.
	Radiator grille or radiator fins blocked by dust	Carefully clean the radiator grille or radiator fins
	Corroded radiator interior or coolant circuit	Clean or replace the radiator and its parts.
	Faulty fan, radiator or radiator cover	Replace the faulty components.
	Faulty thermostat	Check the thermostat, and if necessary, replace it.
	Faulty thermometer or temperature sensor	Check the temperature with a thermometer and replace it if necessary.
	Faulty or leaking cylinder head gasket	Replace parts.
	Improper fuel injection timing	Adjust to the right timing
Unsuitable engine oil	Use the specified fuel.	

1.13 Engine fault codes

DTC Description	SPN	FMI	Inspection Item	DTC Set Parameter
NE-G Phase Shift	636	7	Large phase shift between NE (crankshaft position sensor) pulse and G (camshaft position sensor) pulse	Phase difference between NE pulse and G pulse within +30 --20°
IAT Sensor Integrated MAF Sensor: Low	171	4	Sensor / harness shorted to ground	IAT sensor integrated MAF sensor voltage: Below 0.2 V
IAT Sensor Integrated MAF Sensor: High	171	3	Sensor/harness open or shorted to +B	IAT sensor integrated MAF sensor voltage: Above 4.85 V
PLV Emergency Open	633	7	PLV emergency open	PLV is opened in emergency; Engine speed is greater than 700 min-1 (rpm)
High Rail Pressure	157	0	Actual pressure above the command pressure	Rail pressure sensor is normal; Sensor supply voltage VCC # is normal
SCV (MPROP) Stuck	1347	7	SCV stuck in the open position (the actual rail pressure stays higher than the command pressure)	The drain request of the fuel supply pump drops below -730 mm3/st, and the actual rail pressure is 20 MPa (100 kgf/cm2, 1400 psi) higher than the command pressure
Fuel Leak (in High Pressure Fuel System)	1239	1	Fuel leak in high pressure fuel system (This fault will be detected when the fuel consumption is too high, which is calculated from the fuel pressure difference before and after the fuel injection)	The pump fully supplies fuel; The deviation between the actual rail pressure and the target pressure is greater than 20 MPa
Intake Air Flow: Low	132	1	Low engine intake air mass flow (with turbo-blower intake hose disconnected)	Engine intake air mass flow: Below 50% of the target value
MAF Sensor: Low	132	4	Sensor/harness open or shorted to ground	MAF sensor voltage: Below 0.1 V
MAF Sensor: High	132	3	Sensor/harness shorted to +B	MAF sensor voltage: Above 4.9 V under normal operating conditions
Intake Air Temperature Error: Low	172	4	Sensor/harness shorted to ground	IAT sensor voltage: Below 0.2 V
Intake Air Temperature Error: High	172	3	Sensor/harness open or shorted to +B	IAT sensor voltage: Above 4.95 V
Coolant Temperature Sensor: Low	110	4	Sensor/harness shorted to ground	Coolant temperature sensor voltage: Below 0.176 V
Coolant Temperature Sensor: High	110	3	Sensor/harness open or shorted to +B	Coolant temperature sensor voltage: Above 4.870 V
Rail Pressure Sensor: Low	157	4	Sensor/harness shorted to ground; Sensor failure	Rail pressure sensor voltage: Below 0.065 V
Rail Pressure Sensor: High	157	3	Sensor/harness open or shorted to +B; Sensor failure	Rail pressure sensor voltage: Above 3.235 V
Injector Charge Voltage: High	523535	0	Injector Charge Voltage: High	Injector Charge Voltage: High
No.1 Cylinder Injector Harness/Coil Open Circuit	651	3	Harness open circuit; Injector coil open circuit	Harness or injector coil open circuit

No.3 Cylinder Injector Harness/Coil Open Circuit	653	3	Harness open circuit; Injector coil open circuit	Harness or injector coil open circuit
No.4 Cylinder Injector Harness/Coil Open Circuit	654	3	Harness open circuit; Injector coil open circuit	Harness open circuit; Injector coil open circuit
No.2 Cylinder Injector Harness/Coil Open Circuit	652	3	Harness or injector coil open circuit	Harness or injector coil open circuit
Engine Overheat	110	0	Engine coolant overtemperature	Engine coolant temperature $\geq 120^{\circ}\text{C}$ (248°F)
Engine Overrun	190	0	Engine speed above threshold	Engine speed ≥ 3500 min-1 (rpm)
Boost Pressure Sensor: Low	102	4	Sensor/harness shorted to ground; Sensor failure	Boost pressure sensor voltage below 0.2 V
Boost Pressure Sensor: High	102	3	Sensor/harness open or shorted to +B; Sensor failure	Boost pressure sensor voltage above 4.9 V
No Pulse Input from NE Sensor (Crankshaft Position Sensor)	636	8	Sensor/harness open circuit or short circuit; Sensor failure	Failure to recognize NE sensor pulse
NE Sensor (Crankshaft Position Sensor) Pulse Number Error	636	2	Sensor/harness open circuit or short circuit; Sensor failure	Pulse count per revolution is not 58 teeth
No Pulse Input from G Sensor (Camshaft Position Sensor)	723	8	Sensor/harness open circuit or short circuit; Sensor failure	Sensor/harness open circuit or short circuit; Sensor failure
G Sensor (Camshaft Position Sensor) Pulse Number Error	723	2	Failure to recognize G sensor pulse	Pulse count per revolution is not 3 teeth
Glow Plug Relay Drive Circuit Open	676	5	Intake air glow plug relay open circuit	Harness open circuit, or relay coil open circuit
Drive Circuit Shorted to +B	523544	3	Drive circuit shorted to +B	Harness shorted to +B
Glow Plug Relay Drive Circuit Shorted to Ground	523544	4	Intake air glow plug relay drive circuit shorted to ground	Harness shorted to ground
Glow Heater Relay Drive Circuit Overheat	676	0	Glow plug drive circuit overheat	Glow plug relay coil resistance or load above the specified value in ECU
EGR Actuator Open Circuit	523574	3	EGR actuator open circuit	EGR actuator open-circuit error signal received via CAN
EGR Actuator Coil Short Circuit	523574	4	EGR actuator coil short circuit	EGR actuator coil short-circuit error received via CAN
EGR Position Sensor Failure	523572	4	EGR position sensor failure	EGR position sensor error signal received via CAN
Oil Pressure Error	100	1	Oil pressure switch	Oil pressure switch ON: > 1 s
Exhaust Gas Temperature Sensor 1: Low	3242	4	Sensor/harness shorted to ground	Diesel particulate filter (hereinafter referred to as the "DPF") inlet temperature sensor (T1) voltage: Below 0.08 V
Exhaust Gas Temperature Sensor 1: High	3242	3	Sensor/harness open or shorted to +B	DPF inlet temperature sensor (T1) voltage: Above 4.92 V
Exhaust Gas Temperature Sensor 0: Low	4765	4	Sensor/harness shorted to ground	DOC inlet temperature sensor (T0) voltage:

				Below 0.08 V
Exhaust Gas Temperature Sensor 0: High	4765	3	Sensor/harness open or shorted to +B	DOC inlet temperature sensor (T0) voltage: Above 4.92 V
Battery Voltage: Low	168	4	Harness open circuit, short circuit or damage; Battery failure	The battery voltage identified by the ECU in the 12 V system is below 8 V, and is not monitored during startup.
Battery Voltage: High	168	3	Harness open circuit, short circuit or damage; Battery failure	The battery voltage identified by ECU in the 12 V system is above 16 V.
QR (IQA) Data Error	523538	2	QR Data Read Error	Read error of QR data from EEPROM
No QR (IQA) Data	523538	7	QR data not written	Area of QR data on EEPROM is vacant
ECU Flash-ROM Error	628	2	Flash ROM error	<ul style="list-style-type: none"> ● Checksum error ● Delete error ● Write error ● Read error
ECU CPU (Master IC) Error	1077	2	CPF and/or IC failure	Critical CPU and/or IC errors
ECU CPU (Monitoring IC) Error	523527	2	CPU Monitor IC Failure	CPU monitor IC failure
Injector Charge Voltage: Low	523525	1	Injector charge voltage: Low ECU charge circuit failure	Injector charge voltage: Low ECU charge circuit failure
SCV (MPROP) Open Circuit	1347	5	SCV open circuit	SCV open circuit
SCV (MPROP) Drive System Failure	1347	4	SCV open or shorted to ground	SCV open or shorted to ground
SCV (MPROP) Shorted to +B	1347	3	SCV shorted to +B	SCV shorted to +B
Injector Driver IC Error or Open Circuit	1077	12	Injector driver IC error, or No. 1 & No. 4 cylinder injector open circuit, or No. 2 & No.3 cylinder injector open circuit	Injector driver IC error, or No. 1 & No. 4 cylinder injector open circuit, or No. 2 & No.3 cylinder injector open circuit
Injector Driver IC Short Circuit	523605	6	Intake air glow plug relay open circuit	Injector IC error reported
Sensor Supply Voltage 1: Low	3509	4	Sensor supply voltage 1 error or recognition error	Sensor supply voltage below 4.75 V
Sensor Supply Voltage 1: High	3509	3	Sensor supply voltage 1 error or recognition error	Sensor supply voltage above 5.25 V
Sensor Supply Voltage 2: Low	3510	4	Sensor supply voltage 2 error or recognition error	Sensor supply voltage below 4.75 V
Sensor Supply Voltage 2: High	3510	3	Sensor supply voltage 2 error or recognition error	Sensor supply voltage above 5.25 V
Sensor Supply Voltage 3: Low	3511	4	Sensor supply voltage 3 error or recognition error	Sensor supply voltage below 4.75 V
Sensor Supply Voltage 3: High	3511	3	Sensor supply voltage 3 error or recognition error	Sensor supply voltage above 5.25 V
Main Relay Locked in Closed Position	1485	2	Main relay failure	The main relay stays on for more than 1 s with no command given
Starter Motor Relay Drive Circuit Shorted to Ground	677	4	Starter motor relay drive circuit shorted to ground	Harness shorted to ground
EEPROM Checksum Error	523700	13	KBT-EEPROM checksum error	EEPROM checksum error
Intake Throttle Feedback Error	523580	2	Intake throttle feedback error	Throttle position deviation is not corrected after 20 load error recovery operations
Accelerator Position Sensor 1: Low	91	4	Sensor/harness shorted to ground or open	Accelerator position sensor 1 voltage below 0.3 V

Accelerator Position Sensor 1: High	91	3	Short circuit to ground outside sensor/harness	Accelerator position sensor 1 voltage below 4.8 V
Accelerator Position Sensor 2: Low	29	4	Sensor/harness shorted to ground or open	Accelerator position sensor 2 voltage below 0.3V
Accelerator Position Sensor 2: High	29	3	Short circuit to ground outside sensor/harness	Accelerator position sensor 2 voltage below 4.8V
Accelerator Position Sensor Error (CAN)	523543	2	Accelerator position sensor error signal (sensor/harness open or shorted to ground, etc.)	Accelerator position sensor error signal received via CAN
Accelerator Position Sensor Association Error	91	2	Deviation with two designed sensor associations	Deviation with two designed sensor associations
No.1 & No.4 Cylinder Injector Shorted to Ground, or All Cylinder Injectors Shorted to Ground	523523	3	Harness shorted to ground	Harness shorted to ground
No.1 & No.4 Cylinder Injector Shorted to +B, or All Cylinder Injectors Shorted to +B	523523	3	Harness shorted to +B	Harness shorted to +B
No.2 & No.3 Cylinder Injector Shorted to Ground, or All Cylinder Injectors Shorted to Ground	523524	3	Harness shorted to ground	Harness shorted to ground
No.2 & No.3 Cylinder Injector Shorted to +B, or All Cylinder Injectors Shorted to +B	108	4	Harness shorted to +B	Harness shorted to +B
Barometric Pressure Sensor Failure (Low Side)	108	3	Sensor/ECU internal circuit shorted to ground	Barometric pressure sensor voltage: Below 0.2 V
Barometric Pressure Sensor Failure (High Side)	679	7	Sensor/ECU internal circuit shorted to +B	Barometric pressure sensor voltage: Above 4.850 V
PLV Not Opened	679	16	PLV not opened as the rail pressure remains unchanged or the engine power is not high enough	The opened PLV responds, but the rail pressure is still too high or too low
Rail Pressure Error After PLV Opening	523575	7	Rail pressure above 160 MPa after PLV is opened by error	PLV is opened (with open response detected); The rail pressure is within 50 MPa ~ 120 MPa
EGR (DC Motor) Overheat	523576	2	EGR (DC Motor) overheat	EGR (DC motor) temperature error signal (thermistor: 125°C) received via CAN
EGR (DC Motor) Temperature Sensor Failure	523577	2	EGR (DC Motor) temperature sensor failure	EGR (DC motor) temperature sensor error signal received via CAN
Exhaust Gas Temperature Sensor 2: Low	3246	4	Sensor/harness shorted to ground	DPF outlet temperature sensor (T2) voltage: Below 0.08 V
Exhaust Gas Temperature Sensor 2: High	3246	3	Sensor/harness open or shorted to +B	DPF outlet temperature sensor (T2) voltage: Above 4.92 V
Differential Pressure Sensor 1: Low	3251	4	Sensor/harness shorted to ground	DPF differential pressure sensor voltage: Below 0.2 V
Differential Pressure Sensor 1: High	3251	3	Sensor/harness open or shorted to +B	DPF differential pressure sensor voltage: Above 4.8 V
Intake Throttle Lift Sensor: Low	523582	4	Intake throttle lift sensor low	Intake throttle lift sensor voltage: Below 0.151 V

Intake Throttle Lift Sensor: High	523582	3	Intake throttle lift sensor high	Intake throttle lift sensor voltage: Above 4.848 V
Emission Deterioration	3252	0	DOC is heated up due to unburned fuel	T1 - T0 ≥ 250°C (482°F)
Exhaust Gas Temperature Sensor 0: Emergency High	4765	0	DOC inlet temperature (T0) high	DOC inlet temperature (T0): Above 700°C (1292°F)
Exhaust Gas Temperature Sensor 1: Emergency High	3242	0	DPF inlet temperature (T1) high	DPF inlet temperature (T1): Above 715°C (1319°F)
Exhaust Gas Temperature Sensor 2: Emergency High	3246	0	DPF outlet temperature (T2) high	DPF outlet temperature (T2): Above 820°C (1508°F)
Excessive PM3	3701	15	PM accumulation level 3	PM accumulation above trigger level Regeneration level = 3
Excessive PM4	3701	16	PM accumulation level 4	PM accumulation above trigger level Regeneration level = 4
Excessive PM5	3701	0	PM accumulation level 5	PM accumulation above trigger level Regeneration level = 5
Low Boost Pressure	132	15	Hose between turbo-blower outlet and inlet flanges disconnected Boost pressure sensor failure	Boost pressure sensor output below the target in high air flow operating condition
Low Coolant Temperature During Shutdown Regeneration	523589	17	Engine warm-up conditions not met during regeneration mode (Low coolant temperature)	Engine coolant temperature stays below 65°C (149°F) for more than 1500 s during shutdown regeneration
Shutdown Regeneration Timeout	523590	16	Timeout error: Incomplete regeneration due to low DPF temperature	Regeneration not completed in 2700 s
All Exhaust Temperature Sensors Failure	523599	0	Simultaneous failure of all exhaust temperature sensors	Simultaneous failure of all exhaust temperature sensors (sensor low)
Emergency High Temperature: DTC Downstream Exhaust Gas Temperature High	523601	0	Outputs of exhaust temperature sensors 0, 1, 2	All exhaust gas temperatures (T0, T1 and T2) reduced to 300°C (572°F)
High Regeneration Frequency	523602	0	Time interval from the end time to the start time of the regeneration	The regeneration time interval occurs three times continuously within 30 min
Overheat Prevention	523603	15	Coolant temperature	Engine coolant temperature ≥ 110°C (230°F)
CAN2 Bus Off	523547	2	CAN2 shorted to +B/GND, or high traffic error	CAN2 Bus Off
No Communication with EGR	523578	2	No communication with EGR	CAN off
CAN1 Bus Off	523604	2	CAN1 shorted to +B/GND, or high traffic error	CAN1 Bus Off
CAN-KBT Frame Error	523548	2	CAN-KBT original frame open circuit	CAN2 KBT frame open circuit
CAN CCVS (Stop Switch and Vehicle Speed) Frame Error	523591	2	CAN_CCVS communication interruption	CAN CCVS frame timeout
CAN CM1 (Regeneration Switch) Frame Error	523592	2	CAN_CM1 communication interruption	CAN CM1 frame timeout
CAN ETC5 (Neutral Switch) Frame Error	523595	2	CAN_ETC5 communication interruption	CAN ETC 5 frame timeout

CAN TSC1 Frame Error	523596	2	CAN_TSC1 communication interruption	No "C1 cache" request initiated for 3 consecutive times after the override control request (non-0x00) is issued
CAN EBC1 Frame Error	523598	2	CAN_EBC1 communication interruption	CAN EBC1 frame timeout

1.14 Maintenance Point

1.14.1 Routine Inspection and Maintenance Intervals

Maintenance level	Routine inspection	Level 1 maintenance	100h	Level 2 maintenance	Level 3 maintenance	Level 4 maintenance	Level 5 maintenance
Maintenance interval	Every day	50h	100h	250h	400h	800h	1000h

1.14.2 Maintenance and Inspection Schedule

System	Operation content	Maintenance level							Remarks
		Routine inspection	Level 1 maintenance	100h maintenance	Level 2 maintenance	Level 3 maintenance	Level 4 maintenance	Level 5 maintenance	
Power train	Check the engine oil level	•							
	Check the fuel level in the fuel tank	•							
	Check if the fuel system pipeline leaks	•							
	Check the radiator coolant level	•							
	Check if the cooling system pipeline leaks	•							
	Check the connection between the engine and the tray				•	•	•	•	
	Change the engine oil	First 50h, thereafter every 400h or every six months, whichever comes first.							At least once a year
	Replace the engine oil filter element	First 50h, thereafter every 400h or every six months, whichever comes first.							At least once a year
	Check and adjust the tightness of the fan belt		•	•	•	•	•	•	
	Clean the radiator with compressed air			•	•	•	•	•	
	Clean the fuel filter of fuel tank			•	•	•	•	•	
	Drain deposits from the fuel tank			•		•		•	
	Replace the fine diesel filter	Every 400h or every six months, whichever comes first.							
Replace the primary fuel filter	Every 400h or every six months, whichever comes first.								

	element							
	Check the water level in the water separator, and drain the water regularly		•	•	•	•	•	
	Clean or replace the air cleaner outer element and inner element	Clean the air cleaner outer element every 250h or when the indicator alarms, and it is forbidden to clean the air cleaner inner element						It can be cleaned for at most 5 times generally.
	Change coolant	Every 2000h or every two years, whichever comes first.						
	Check the fixing of the battery terminals and apply grease to the electrodes (if necessary)			•	•	•	•	
	Re-tighten the drive shaft bolt		•	•	•	•	•	
	Check the connection and wear of the drive shaft		•	•	•	•	•	
	Universal joint lubrication		•	•	•	•	•	
	Check the oil level of the main reducer and the close-to-wheel reducer			•	•	•	•	
	Change the lubricating oil of the main reducer (at least once a year)	First 500h or one year, whichever comes first, thereafter every 1000h						
	Change close-to-wheel reducer lubricating oil (at least once a year)	First 500h or one year, whichever comes first, thereafter every 1000h						
	Check fixing of wheel nut			•	•	•	•	
	Check gear box oil level			•	•	•	•	
	Change gear box lubricating oil (at least once a year)	First 500h or one year, whichever comes first, thereafter every 1000h						
Electric system	Check whether the battery is under-voltage.	Every day						
	Check whether the buttons on the PCU	Every day						

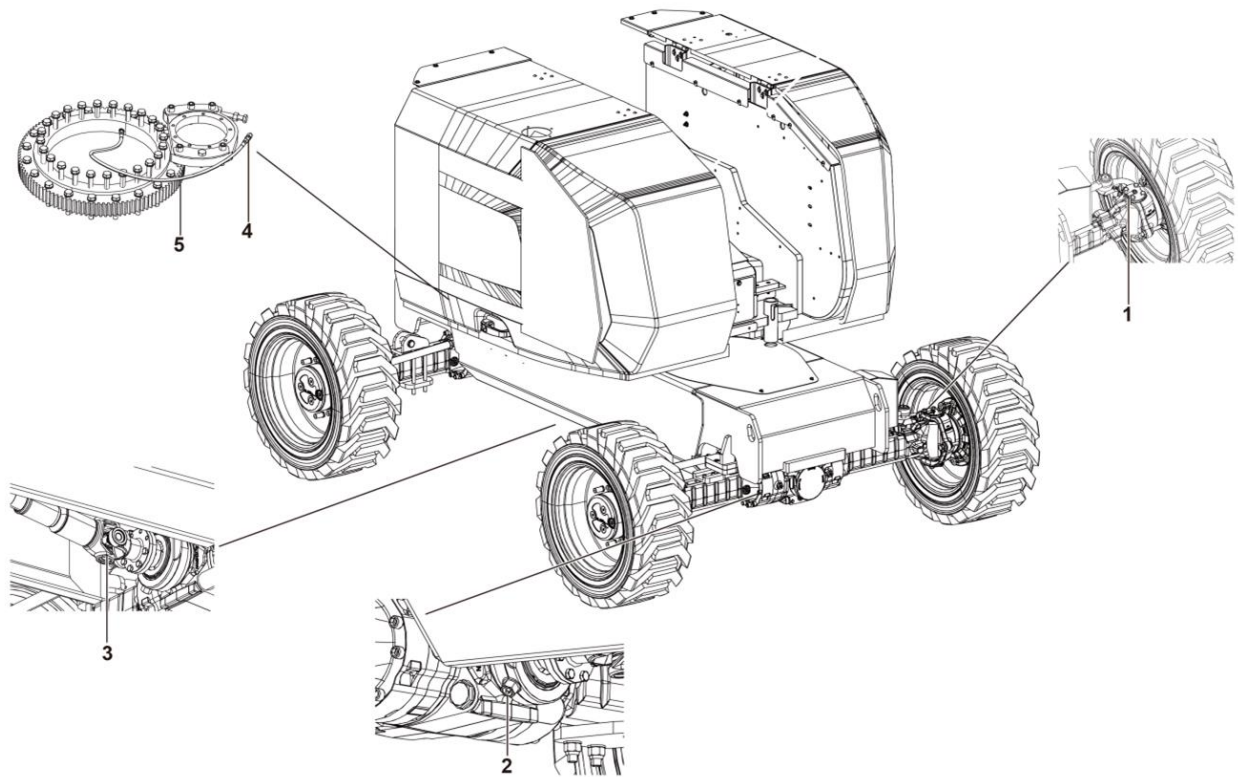
	panel are in normal operation.								
	Check if the PCU harness connector is in firm connection.				Every day				
	Check if the PCU harness connector is contaminated and damaged.				Every day				
	Check if the PCU wire harness is extruded or broken.				Every day				
	Check whether the wiring of angle sensor and length sensor, tilt sensor and weighting sensor are firm				Every day				
	Check the rotary table slewing limit switch rocker arm and if it is wired loosely				Every day				
	Check whether the buttons of ground control panel are operated normally.				Every day				
	Check whether the warning lamp and horn function are normal				Every day				
	Check whether the wiring of each solenoid valve coil of the main valve block is normal or loose				Every day				
	Load cell calibration				•	•	•	•	
	Check the wires				•	•	•	•	
	Whether the battery terminal is loose or rusted				Every day				
Hydraulic system	Check whether the system pressure is normal				•	•	•	•	
	Check whether the steering system pressure is normal				•	•	•	•	

Whether the oil pipes and joints are loose	Every day							
Check cylinder for oil leakage	Every day							
Check each spool for oil leakage	Every day							
Check if the ball valve at the suction port at the bottom of the hydraulic tank is open or whether the oil suction filter switch is open (self-sealing filter)	Every day							
Check whether the oil pipe fixing clip is loose	Every day							
Check the oil level of hydraulic tank	Every day							Add hydraulic oil Rando MV32 when oil level is below "M" position
Visual inspection of hydraulic oil	Check quarterly							
Change hydraulic oil	Every 2000h or every two years, whichever comes first							Hydraulic oil Rando MV32
Replace suction filter	Every 2000h or every two years, whichever comes first							Replace when replacing hydraulic oil
Check hydraulic tank air filter				•	•	•	•	
Replace air filter							•	
Check reducer for oil leakage	Every day							
Check motor for oil leakage	Every day							
Check slewing reducer oil level and fill oil				•	•	•	•	
Change slewing reducer oil	First 50h, thereafter every 1000 h or every year, whichever comes first.							
Replace return filter element and high pressure filter element					•		•	

	Grease the exposed piston rod			•	•	•	•	•	
Complete machine	Check whether the attached documents are complete, easy to read, and in the file box.	Every day							
	Check whether the safety sign is correct and not defaced	Every day							
	Whether the bolts, nuts and other fasteners of the whole machine are loose and make abnormal noise	Every day							
	Check whether the structural parts of the whole machine have cracks and whether the weld is open weld	Every day							
	Check whether the paint of the whole vehicle falls off and whether there is serious rust, corrosion or oxidation	Every day							
	Whether the sliding block is loose and whether there is zero clearance with the arm rod							•	
	Measure the backlash between the slewing bearing gear and the slewing reducer gear				•	•	•	•	0.2-0.3mm
	Check the turntable rotation bearing bolts	Every 1000h or every year, whichever comes first							Torque::595 ±55N.m
Lubrication	Slewing bearing lubrication			•	•	•	•	•	Lithium base grease 2#
	Lubrication of slewing bearing and slewing reducer			•	•	•	•	•	Lithium base grease 2#

gear									
Tire steering lubrication			•	•	•	•	•		
Front and rear axle slewing lubrication			•	•	•	•	•		
Drive shaft lubrication			•	•	•	•	•		
Platform weighing structure lubrication					•		•		

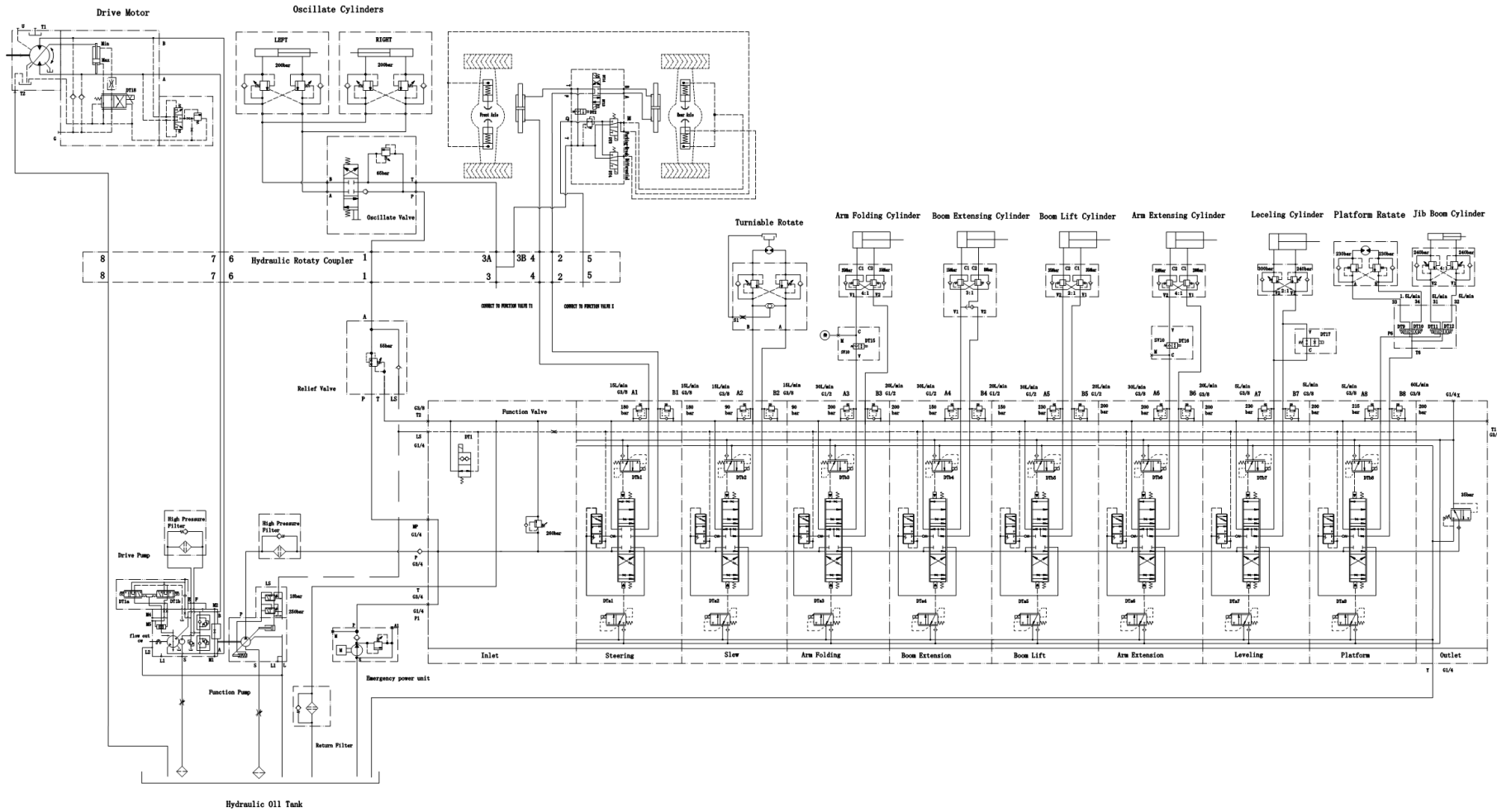
1.14.3 Machine Lubrication



No.	Location	Qty.
1	The lubricating point for tire steering	8
2	The slewing lubrication points of the front and rear axles	4
3	The lubricating point of the drive shaft	6
4	The lubricating point for slewing bearing	1
5	Slewing bearing and slewing gear contact surface	1

Chapter 2 Schematic Diagram

AR24J Hydraulic schematic



AR24J Electrical schematic

