Foreword

This Service and Maintenance Manual applies to the ZT20J (ZT68J) aerial work platform (hereinafter referred to as the AWP).

This manual describes proper inspection, servicing and maintenance. Users must fully understand and apply the contents described in this manual to maximize the performance and ensure the long-term safe and efficient use. This manual does not cover the use and maintenance of the engine. For details on engine, please refer to the engine instruction manual.

The manual includes the structure and schematic diagram of the main components. If it is necessary to repair and replace the components, the material code of the required replacement parts can be found in Parts Manual.

This manual should be considered a permanent part of your machine and should remain the machine at all times.

⚠CAUTION

Do not repair the parts marked with professional maintenance. Zoomlion AWP Machinery Company does not take the consequence for wrong maintenance.

⚠WARNING

The highest criterion users must keep in mind that Safety first! Pay special attention to the safety control device for regular inspection. Do not operate the machine when the safety device fails or working abnormally. Do not modify the structure or add additional parts for more functions. Otherwise, you will be responsible for any personal injury or damage caused by the unauthorized modification.

The warranty period for the aerial work platform is as specified in this Service and Maintenance Manual. When maintenance is required, our company provides on-site service or please go to our designated maintenance point for maintenance.

Our company reserves the right to continually revise the contents of this manual with technical improvements. Any changes are subject to change without notice. Some of the pictures in this manual may not match the actual product due to design improvement, etc., but it does not affect your use. The product status is subject to the actual product.

Symbols and their description:

⚠DANGER

Danger indicates an imminently dangerous situation. If not avoided, will result in death or

Foreword

⚠WARNING

Serious injury.

Warning indicates a potential hazardous situation. If not avoided, will result in death or serious injury.

⚠CAUTION

Caution indicates a potential hazardous situation. If not avoided, will result in minor or moderate injury.

NOTICE

Notice indicates information of property and device damage, or wrong operations. If not avoided, could result in property loss, damage to machine parts or reduced mechanical properties.

Used to indicate or add additional information to individual information.

⚠REMIND

Indicates that this operation does not comply with safety regulations and is prohibited or prone to casualties.

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Service and Maintenance Manual

Section 1 Maintenance Safety Instruction

SECTION 1 MAINTENANCE SAFETY INSTRUCTION

1.1 Maintenance Personnel Duties, Requirements and Safety Equipment

1.1.1 Duties

The maintenance personnel must maintain the aerial work platform and to be responsible for the safe use and normal operation. The Maintenance and Service Manual provided by the company shall be observed and all necessary maintenance shall be carried out under the safe working system.

1.1.2 Basic requirements

Maintenance personnel should meet the following conditions:

a. Inspectors and maintenance personnel should have appropriate qualifications or authorization.

b. Experienced technicians or professional engineers.

c. Familiar with the aerial work platforms maintenance and the potential danger.

d. Received appropriate education and training, including courses related to the use of special equipment.

e. Familiar with the relevant maintenance procedures and safety precautions of aerial work platforms.

⚠CAUTION

1．Only the trained and qualified personnel who have obtained the qualification certificate can repair the aerial work platform.

2．Do not perform any maintenance when you cannot work properly after being unwell, drinking or taking medicine.

1.1.3 Personnel safety equipment

a. The operator must use safety equipment when operating the machine.

b. Select suitable safety equipment such as helmets, gloves, protective goggles, safety belts, boots and hearing protection devices according to the work site conditions.

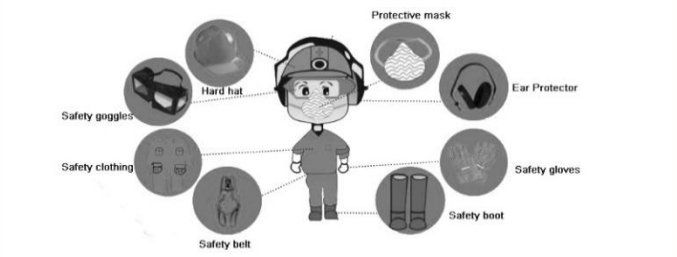

Figure 1-1 Personnel safety equipment

c. Check safety equipment before and after work, perform maintenance according to specified procedures or replacement if necessary.

d. Keep inspection and maintenance records if needed.

e. Certain safety equipment (such as helmets and seat belts) might be damaged after prolonged use and should be inspected and replaced periodically.

⚠CAUTION

1. Inspect safety equipment regularly, replace damaged parts if necessary.

2. All personal protective equipment does not provide 100% protection.

3. Please wear protective gear properly and be familiar with the various hazards that may be encountered during the operation for safety consideration.

4. Periodic maintenance and repair must be carried out by professional maintenance personnel.

⚠WARNING

Inspection or maintenance in a space-constrained, poorly ventilated location may result in poisoning.

1.2 Maintenance Precautions

1.2.1 Precautions

a. Ventilation:

Ventilation is required when starting the engine in a space-constrained site. Connect a hose to the exhaust pipe to discharge the smoke to the outside. Open the doors and windows to keep air flowing.

b. Clean up the work site.

Implementing the inspecting or maintaining works in a messy place may result in personal injury or a fall accident. All obstacles should be removed before work.

c. Stop the engine before performing inspections or maintenance work.

Do not perform inspections or maintenance while the engine is running to prevent accidents.

Remove the key before inspection and maintenance, and place a “No Operation” warning sign on the door or on the joystick of the control panel.

⚠WARNING

During inspection or maintenance, any unrelated personnel inadvertently start the engine, which may cause mechanical damage or personal injury.

a. Inspection or maintenance must be carried out by at least 2 people while the engine is running. One of them must be in front of the turntable or platform control panel so that the engine can be shut

down at any time if necessary, and others can conduct inspection or maintenance. Personnel should keep close contact to work safely.

b. Clean the aerial work platform before inspection or maintenance. The dust or debris on the aerial work platform not only makes the faulty components or parts difficult to find, but also can be mixed into the components or parts during operation.In addition, dust or mud can cause injury to the eyes or make the floor slippery that results in injury.

c. When cleaning the machine with a high-pressure water gun, it is forbidden to directly align the electrical control box and the connector, otherwise it will cause an electrical short circuit.

⚠WARNING

It is strictly forbidden to align water or water jets with electrical components! Otherwise there is danger of electric shock!

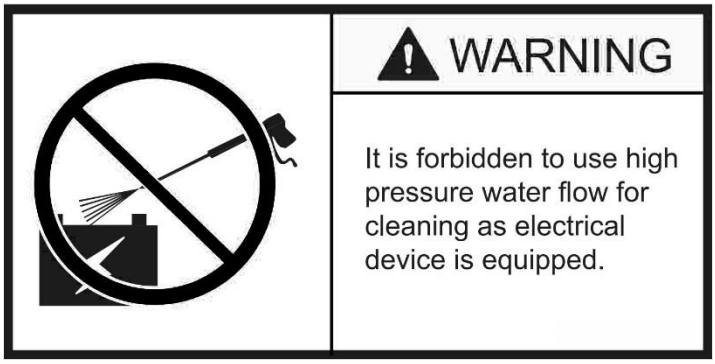

Figure 1-2 Mind Electric Shock

1.2.2 Precautions in maintenance

a. Prevent fire

1) Use non-flammable cleaning fluids for parts and components cleaning.

2) Store fuel and grease items away from flames or sparks.

3) No smoking.

4) Do not allow flames or sparks to get close to flammable objects.

5) Have a fire extinguisher and understand how to use it.

6) Use explosion-proof lights when checking fuel, oil and battery fluids.

7) Keep flammable objects away from flying sparks or molten metal during grinding or welding.

b. Only trained technicians could conduct welding and repairing for Welding and repair of every part of the aerial work platform.

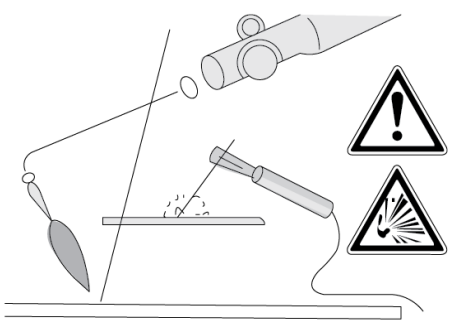

Figure 1-3 Beware of Explosion

⚠CAUTION

The positive and negative wires of the battery must be removed when welding to prevent the positive and negative poles of the welder from forming a loop with the vehicle body, thereby burning electrical components such as controllers and sensors. The company does not take the consequences for wrong operation.

⚠WARNING

It is forbidden to use the machine as a ground wire during welding.

a. Check or maintain the machine after the temperature has been lowered.

Contact with the components might cause burn hazard, as the temperature of components goes high when the machine is running. These components include engines, mufflers, engine cooling water, radiators, hydraulic oil, reducers, hydraulic kits and hydraulic accessories. These components or parts should be allowed to cool down before starting inspection or maintenance.

Figure 1-4 Caution Hot

b. Pay attention to the installed position of parts when unloading. Technicians performing the installation must be familiar with each part to ensure proper installation.

⚠CAUTION

It is strictly forbidden to disassemble electronic components.

a. Do not allow tools or parts to fall into the inspection hole. Do not allow objects to fall into the holes

during work. Falling objects can damage the machine or cause the machine to malfunction. Any tools or objects that fall into the inspection hole must be removed.

b. If electrical, circuit or hydraulic components (valves, pumps, etc.) need to be replaced, the replaced parts should be checked and adjusted according to the data on the machine schematic.

⚠WARNING

Manufacturer-approved parts must be used, especially those that affect load bearing performance and safety performance.

a. The components that affect the stability, strength and performance of the platform could be modified only after obtaining the approval of the manufacturer, such as structural parts, carriers, electrical components, and hydraulic components. Otherwise, any modifications to the aerial work platform are prohibited.

b. Pay attention to high pressure oil.

High pressure fuel or hydraulic oil can cause serious damage to the skin or eyes. To avoid this danger, the following instructions should be followed:

1) The pressure inside the pipe must be released before disassembling the pipe.

2) Wear goggles and protective gloves when checking for leaks. Leakage of high pressure oil may not be visible, use cardboard or wood chips to confirm oil leakage. DO NOT use your hand to check for leaks.

Figure 1-5 Prevent burns from high pressure oil

a. Mind the high temperature part of the cooling system.

If the cover of the radiator is removed while the engine coolant temperature is high, steam or hot water will be ejected, causing burns. Waiting for the temperature drop of coolant, stand in front of the radiator cover and slowly loosen the cover to release the steam pressure before removing the cover.

b. Remove the cable from the battery before inspecting or maintaining the electrical system.

Inspection or maintenance of the electrical system without removing the cable of the battery may cause a short circuit and damage the wiring, electrical components and electronic components of the electrical system.

The cable on the negative terminal side (ground side) must be removed before the inspection or maintenance work on the electrical system.

c. Mind battery liquid.

Battery fluid contains dilute sulfuric acid. Battery fluid can cause blindness when it enters the eyes, and burns when it comes into contact with the skin. Wear goggles, protective gloves long-sleeved overalls when handling the battery.

If the eyes or skin are in contact with the battery fluid, rinse immediately with plenty of water and get medical attention promptly.

Figure 1-6 Mind battery liquid

d. Use the specified greased items.

Use the recommended grade or the same grade of oil and grease when replenishing or replacing. The combination of different grades of grease will result in a chemical reaction that changes the properties of the grease and adversely affects the mechanical properties. When using a grease that is different from the grade used in the machine, remove the original grease thoroughly before adding new grease.

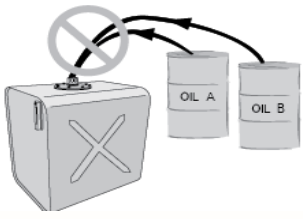

Figure 1-7 Prohibition of mixing oil

e. Support the boom and platform during maintenance. Maintenance is prohibited when the platform is in the raised position. If there is special demand, the boom and platform should have reliable support to ensure the safety and reliability during maintenance.

f. Precautions after maintenance:

1) After maintenance, the operation function must be confirmed to detect the oil leakage or malfunction in the early stage.

2) It is necessary to confirm the machine movement, oil leakage, loose bolts and other problems on the mechanically maintained parts.

3) Restore or reset the safety device and recalibrate the safety device if necessary.

4) Remove the tools and equipment for maintenance, replaced parts and scattered objects, and clean up the site.

5) It should always be borne in mind that all maintenance should include mandatory confirmation of normal mechanical movement.

NOTICE

1. Handle hazardous wastes according to law such as oil, fuel, filter, battery, hydraulic oil, etc. Reasonable recycling of used oil, coolant or filter element to save resources and protect the environment.

2. It is forbidden to dump waste liquid at the sewage pipe, ground surface, river, etc. at will. The waste liquid should be discharged into a suitable container for proper disposal.

The disposal of hazardous substances should be in compliance with all environmental regulations, otherwise it will be fined or punished by relevant departments.

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Section 2 Technical Parameters

SECTION 2 TECHNICAL PARAMETERS

2.1 Performance

Table 2-1 Performance

Platform Capacity	454kg (restricted) 300kg (unrestricted)	1000lb(restricted) 660lb(unrestricted)
Max Travel Speed (on slope)	45% (platform uphill) 30% (platform downhill)	45% (platform uphill) 30% (platform downhill)
Max Travel Speed (on side slope)	17%	17%
Platform Height	20.75m	68ft
Horizontal Outreach	16.8m	55ft
Turning Radius	5.4m (outside) 2.4m (inside)	17ft8in (outside) 7ft10in (inside)
Max Travel Speed	6 km/h	3.73mph
Max Hydraulic System Pressure	21Mpa	21Mpa
Max Wind Speed	12.5m/s (force 6 wind)	28mph(force 6 wind)
Max Working Force	400N	90lb
Electrical System Pressure	12V DC	12V DC
Gross Weight	12200kg	26896lb

*In stowed position

2.2 Specification and Performance

Table 2-2 Specification and Performance

Turntable Swing	360 °	360 °
Tail Swing	1.45m	4ft9in
Platform Dimension	2.44×0.91 m	8×3ft
Width	2.49m	8ft2in
Stowed Height	2.78m	9ft1in
Stowed Length	10.36m	34ft
Wheelbase	2.52 m	8ft3in
Ground Clearance	415mm	1ft4in
Travel Speed	6 km/h (stowed) 1 km/h (working)	3.73mph (stowed) 0.62mph (working)
Ground Bearing Stress	0.49MPa	0.49MPa
Max Tire Capacity	7110kg	15675lb

2.3 Capacity

Table 2-3 Capacity

Fuel Tank	130L	34 us gal
Hydraulic tank	150L	39.6 us gal
Engine Oil Capacity	8L (Perkins 404D-22T) 8L (Deutz D2.9L4) 15L (Deutz D447-L4)	2.1 us gal (Perkins 404D-22T) 2.1 us gal (Deutz D2.9L4) 4 us gal (Deutz D447-L4)

2.4 Components Specification

2.4.1 Engine

Table 2-4 D2.9L4 (Deutz) Engine Specification

Type	Electric Control	Electric Control
Fuel	No.0 National IV	No.0 National IV
Engine Oil Capacity	8L	2.1 us gal
Rotate Speed	1200 (idle speed) 2000 (low speed) 2600 (high speed)	1200 (idle speed) 2000 (low speed) 2600 (high speed)
Current Output of Generator	14V,95A	14V,95A
Horsepower	49	49
Coolant	Cold water, 11L	Cold water, 2.9 us gal

Table 2-5 D447L4 (Deutz) Engine Specification

Type	Electric Control	Electric Control
Fuel	No.0 National IV	No.0 National IV
Engine Oil Capacity	15L	4 us gal
Rotate Speed	1200 (idle speed) 2000 (low speed) 2500 (high speed)	1200 (idle speed) 2000 (low speed) 2500 (high speed)
Current Output of Generator	14V,55A	14V,55A
Horsepower	49	49
Coolant	Cold oil, 15L	Cold oil, 4 us gal

Table 2-6 404D-22T (Perkins) Engine Specification

Type	Electric Control	Electric Control
Fuel	No.0 National IV	No.0 National IV
Engine Oil Capacity	8L	2.1 us gal
Rotate Speed	1400 (idle speed) 2000 (low speed) 2800 (high speed)	1400 (idle speed) 2000 (low speed) 2800 (high speed)
Current Output of Generator	12V,65A	12V,65A
Horsepower	61	61
Coolant	Cold water, 11L	Cold water, 2.9 us gal

2.4.2 Battery

Table 2-7 Battery Specification

Rated Voltage	12 V
20 hour rate capacity	90 Ah
Cold Start Current	750 A @ 0℉（-18℃）
Storage Capacity	160 Min @ 80℉（27℃）

2.5 Tire

Table 2-8 Tire Size

Size	**Type**	**Ply Rating**	**Max Capacity**		**Weight (tire and wheel)**
			8km/h(5mph)	**0km/h(0mph)**	
355/55D-625	Foam-filled	14	5600kg/12346lb	7300 kg/16094lb	200±5kg/441±11lb

2.6 Functional Speed

Table 2-9 Functional speed (unit:s）

Function	ZT20J	
Boom Lifting	60~70 s	60~70 s
Boom Descending	60~70 s	60~70 s
Turntable Swing (a round)	75~85 s	75~85 s
Boom Extending	55~65 s	55~65 s
Boom Retracting	55~65 s	55~65 s
Platform Rotation	8~12 s	8~12 s
Jib Lifting	60~70 s	60~70 s
Jib Descending	40~50 s	40~50 s
Travel	6 km/h (stowed) 1 km/h (working)	3.73mph (stowed) 0.62mph (working)

2.6.1 Operating procedure when testing speed

a. Main boom lifting:Telescopic boom retracting. Record lifting and descending time respectively.

b. Turntable swing: boom leveling and retracting. Record 360 ° continuous turntable swing left and right respectively.

c. Boom telescoping: lifted to highest position. Record boom extending and retracting time respectively.

d. Jib lifting: platform leveling, chassis swing, boom positioned to the center of chassis. Record lifting and descending time respectively.

e. Platform Rotation: platform leveling. Platform reaches extreme position, rotate the platform to reach the extreme position of another side, record the rotating time; rotate the platform to the original position, record the rotating time.

f. Drive (raised): choose a smooth ground with the main boom less than 7 °and the extension length less than 1m. Adjust the speed switch to high speed. Record the time of forward/reverse through 100m/328ft.

g. Drive (raised): choose a smooth ground with the main boom larger than 7 ° and the extension length greater than 1m. Adjust the speed switch to high speed. Record the time of forward/reverse through 50m/164ft.

2.6.2 Test Cautions

a. The stopwatch should be timed from the beginning of the actual action, not when the switch or controller is activated.

b. Operation should be control by platform console when testing speed.

c. The platform speed knob should be in the full speed position.

d. The function speed may vary depending on the temperature and thickness of the hydraulic oil. When running the test, the hydraulic oil temperature must exceed 38 ℃/100℉.

e. Some flow control functions may be disabled when the speed knob is positioned to low speed.

2.7 Torque Requirements

Table 2-10 Toque Requirements

Bolt Diameter	Strength Grade and Corresponding Torque	
	8.8 grade	10.9 grade
M8	24.5Nm/18ftlb	34.5 Nm/25.4ftlb
M10	48.3 Nm/35.6ftlb	68 Nm/50.2ftlb
M12	84.3 Nm/62.2ftlb	118 Nm/87ftlb
M14	135 Nm/99.5ftlb	189 Nm/139.4ftlb
M16	209 Nm/154.2ftlb	294 Nm/217ftlb
M18	288 Nm/212.4ftlb	405 Nm/298.7ftlb
M20	408 Nm/301ftlb	538 Nm/396.8ftlb
M22	555 Nm/409.4ftlb	780 Nm/575.3ftlb
M24	705 Nm/520ftlb	992 Nm/731.7ftlb
M27	1032 Nm/761.2ftlb	1450 Nm/1069.5ftlb
M30	1400 Nm/1032.6ftlb	1970 Nm/1453ftlb

Note: when maintenance is required or the fasteners are loose, follow the torque gauge to determine the appropriate torque value.

2.8 Lubrication

2.8.1 Hydraulic oil

Table 2-11 Hydraulic oil specification

ISO viscosity grade	32
Pour Point	-39℃/-38.2℉
Flash Point	231℃/447.8℉
Motion Viscosity cSt（40℃/104℉ ）	33.4
VI viscosity index	150

2.9 Pressure Setting

Table 2-12 Pressure Setting

Main boom lifting:	21MPa
Boom telescoping:	21MPa
Turntable swing	21MPa
Chassis diversion	21MPa
Jib lifting	21MPa
Platform rotation	21MPa
Platform leveling	21MPa

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Service and Maintenance Manual

Section 3 General Introduction

SECTION 3 GENERAL INTRODUCTION

3.1 Machine Preparation, Inspection and Maintenance

3.1.1 General introduction

This section provides the necessary information to the operator responsible for pre-operational inspection and safe operation. In order to obtain the longest service life and ensure safe operation, all necessary inspections and maintenance should be completed before the machine is put into use.

3.1.2 Preparation, inspection and maintenance

Comprehensive inspection and preventive maintenance programs must be developed and adhered to. The table below describes the regular inspections and maintenance recommended by our company. Please check the relevant national or regional regulations or local provisions to get more information about the aerial work platform. The frequency of inspection and maintenance is increased correspondingly for equipment that is often operated in a harsh environment or with a high frequency of operation.

The user or operator should first perform a pre-start check before daily use or each shift change. For detailed steps on pre-start inspection, please refer to the Operation Manual. Read and fully understand the Operation Manual before proceeding with the pre-operation check.

3.1.3 Pre-delivery and daily inspections

Pre-delivery inspections must be performed by a qualified equipment engineer. Equipment engineers recognized by our company should have recognized qualifications, certificates, extensive knowledge and experience, and have received relevant training, as well as the ability and level required to repair and maintain the products described in this manual. Pre-delivery and daily inspections are performed in the same way, but at different times. Pre-delivery inspections must be carried out each time before being sold, rented or leased. Every equipment used for 3 months or 150 hours (whichever comes first), or idle for more than 3 months, or purchased as a used equipment, must be routinely inspected. The frequency of inspection is increased correspondingly for equipment that is often operated in a adverse environment or with a high frequency of operation. Please refer to the Pre-delivery Inspection and Daily Inspection Form and the Preventive Maintenance Schedule for inspections. Please refer to the relevant contents of this manual for maintenance and service procedures.

3.1.4 Machine annual inspection

The factory-certified maintenance engineer shall perform annual inspections of the machine every year for 13 months after the date of last annual inspection. The maintenance engineer shall receive professional training for the relevant models and pass the training test. Please refer to the Maintenance Manual and the applicable checklist for this inspection.

Refer to the Machine Annual Inspection Form and the Preventive Maintenance Schedule for this

inspection. Please refer to the relevant contents of this manual for maintenance and service procedures.

To ensure that safety reports are obtained, our company needs to update the ownership information of each machine. Please inform us of the current machine ownership information each time the machine annual inspection is carried out.

3.1.5 Preventive maintenance

Equipment engineers should perform preventive maintenance in conjunction with prescribed inspections. Equipment engineers recognized by our company should have recognized qualifications, certificates, extensive knowledge and experience, and have received relevant training, as well as the ability and level required to repair and maintain the products described in this manual.

Please refer to the Preventive Maintenance Schedule of this manual for maintenance and service procedures. The frequency of maintenance is increased correspondingly for equipment that is often operated in an adverse environment or with a high frequency of operation.

Table 3-1 Inspection and maintenance

Type	Frequency	Main responsibility	Maintenance certification	Reference
Pre-start	Before daily use of each shift	User or operator	User or operator	Operation and Safety Manual
Pre-delivery	Ex-factory after sold, rented or leased	Owner, dealer or user	Qualified engineer	Maintenance Manual and the applicable checklist
Daily use	Run for 3 months or 150 hours, whichever comes first; idle for more than 3 months; or when purchasing a used machine	Owner, dealer or user	Qualified engineer	Maintenance Manual and the applicable checklist
Annual inspection	Implemented annually, within 13 months from the date of the last inspection	Owner, dealer or user	Factory-certified maintenance engineer	Maintenance Manual and the applicable checklist
Preventive maintenance	Follow the time intervals specified in the Maintenance Manual	Owner, dealer or user	Qualified engineer	Maintenance Manual

3.2 Maintenance and Instruction

3.2.1 General description

The following information is provided to assist you in the use and application of the repair and maintenance procedures contained in this manual.

3.2.2 Safety and operating standards

Safety is paramount when performing equipment maintenance. Always pay attention to weight. Never attempt to move heavy parts without mechanical assistance. Do not park heavy objects in unstable locations. Ensure that adequate support is provided when lifting.

3.2.3 Cleaning

a) Prevent dirt or impurities from entering critical parts of the machine for longer service lift. This unit has taken preventive measures to protect against such violations. Shields, covers, seals and filters are used to keep the air, diesel and oil supplies clean. However, maintenance should be conducted according to the scheduled time for protective measures functioning properly.

b) When the air, diesel or oil lines are disconnected, the adjacent areas, as well as the opening and joints, should be cleaned. Once a pipe or component is disconnected, cover all openings immediately to prevent foreign matter from entering.

c) All parts should be cleaned and inspected during maintenance and all channels and openings should be clear. Cover all parts to keep them clean. All parts must be cleaned before installation. New parts should be stored in containers before use.

3.2.4 Component disassembly and installation

a) Use an adjustable lifting device if needed. All spreaders (slings, chains, etc.) must be parallel to each other and as perpendicular as possible to the top of the hoisted part.

b) The angle between the support structure and the part is less than 90 degrees, the load capacity of the eye bolt or similar bracket will be reduced when disassemble a part on a corner.

c) If a part is difficult to disassemble, check if all nuts, bolts, cables, brackets, and wiring have been removed, and whether adjacent parts obstruct removal.

3.2.5 Component disassembly and reinstallation

Implement disassembling or reassembling in order. If the removal or assembly of a part has not been completed, do not assemble or disassemble another part. Please review your work at all times to ensure that there are no omissions, no adjustments may be made without approval (except for the proposed adjustments).

3.2.6 Pressure-fit parts

When assembling the press-fit parts, lubricate the mating surfaces with an anti-seize type or molybdenum disulfide-base compound.

3.2.7 Bearing

a) After removing the bearing, cover it to avoid stains or abrasives. Clean the bearing in a non-flammable cleaning agent and allow it to drip dry. Compressed air can be used, but the

bearings cannot be rotated.

b) If the bearing race and the steel ball (or roller) are sunken, scratched or burnt, scrap the bearing;

c) If the bearing is still serviceable, apply a layer of oil and wrap it in clean paper (or wax paper). Do not open the reusable or new bearing packaging until you are ready to install it.

d) Lubricate the new or refurbished bearings before installation. When pressing the bearing into the cage or bore, apply pressure to the outer bearing race. Apply pressure on the inner race when installing the bearing on the shaft.

3.2.8 Washer

Check if holes in the washer are aligned with the opening of the fitting. Hand-made washer should be made of washer material or stock material of the same material and thickness. Open the hole in the correct position. Otherwise the washer will not seal properly and can seriously damage the system.

3.2.9 Bolt and torque applications

a) Use bolts of the appropriate length. If the bolt is too long, the bolt will bottom out before the bolt head is tightened onto the corresponding part. If the bolt is too short, there will not be enough threaded parts to bite the fixed part. When replacing bolts, only bolts of the same or equivalent size as the original bolts may be used.

b) In addition to the specific torque requirements given in this manual, standard torque values shall be applied to heat-treated bolts, studs and steel nuts in accordance with the recommended factory practice (see torque tables in Section 2).

3.2.10 Hydraulic line and electric wiring

When hydraulic lines and electrical wiring are removed from the equipment, they should be clearly marked on the hydraulic lines and electrical wiring and their sockets for proper re-installation.

3.2.11 Hydraulic system

a) Keep the hydraulic system clean. If metal or rubber particles are found in the hydraulic system, immediately drain and flush the entire system.

b) Remove or reassemble parts on a clean operating surface. Clean all metal parts with a non-flammable cleaner. Lubricate the parts as needed to help the assembly.

3.2.12 Lubrication

Please lubricate the relevant parts at the specified intervals, use the quantity, type and grade of lubricant recommended in this manual. If there is no recommended lubricant, consult local supplier for equivalent lubricant that meets or exceeds the listed specifications.

3.2.13 Battery

The battery was cleaned with a non-metallic brush and an aqueous solution of sodium bicarbonate. Then rinse with clean water. When the battery is completely dry, apply the battery terminals with an anti-corrosion compound.

3.2.14 Lubrication and maintenance

Parts and components that require lubrication and maintenance refer to the Regular Maintenance in Section 5.

3.3 Lubrication and Information

3.3.1 Hydraulic system

a) Contaminants are the primary factor in invading the hydraulic system. Contaminants can invade in various ways, such as improper use of hydraulic oil, or the moisture, grease, metal shavings, sealing elements, sand, etc. enter the system during maintenance, or the hydraulic pump forms cavitation due to insufficient preheating of the system or leakage of the hydraulic pump inlet pipe.

b) The design and manufacturing tolerances of the working part of the component are very strict, so even if a small amount of dirt or foreign matter enters the system, it may cause wear or damage to the component and may cause operational failure. Always take precautions to keep the hydraulic fluid clean, including stored spare oil. The hydraulic system filter is inspected, cleaned, or replaced as necessary, at intervals specified in the Regular Maintenance in Section 5. Always check for the presence of metal particles in the filter.

c) Turbidity of the hydraulic fluid indicates that the water content is too high, which may promote the growth of organic matter and cause oxidation or corrosion. If this happens, the system should be drained, flushed, and refilled with clean hydraulic fluid.

d) Other hydraulic fluids may not contain the specified additives or have different viscosities, so do not mix products of different brands or types. It is recommended to use high quality mineral oils with a viscosity suitable for the machine's operating environment.

The hydraulic oil cleanliness of the machine at the factory is NAS9 (ISO4406 18/15). The normal operation of the machine requires that the hydraulic oil cleanliness is not lower than NAS10 (ISO4406 19/16). We recommend that the hydraulic oil be inspected every 6 months. When it is time to change the oil, at least the oil should be sampled once. The oil sample can be sent to a hydraulic oil manufacturer or a qualified third-party testing agency for analysis and to determine if it is still available.

Note: due to the wear of the screen components, metal particles may appear in the hydraulic fluid or filter of the new machine.

3.3.2 Hydraulic oil

For hydraulic oil types and models, please refer to Table 2-3 Hydraulic oil technical parameters (Table 3-2 is not used to specify the type and parameters of hydraulic oil). Please select the hydraulic oil of the

appropriate brand and technical parameters according to the specific use environment of the equipment. For special environments or users with special requirements, please contact ZOOMLION or hydraulic oil manufacturers.

Note: do not mix different brands or types of oils, and the mixing of additives in different oils will have negative impact. If hydraulic oil mixing is unavoidable, it must be approved by the hydraulic oil manufacturer. Our after-sales service does not take the consequence of the use of fluid mixing.

Table 3-2 Hydraulic oil technical parameter

Technical parameter	Mobil SHC Aware H 32 （environmental friendly	Mobil DTE 10 Ultra 22	Mobil DTE 10 Ultra 32	Mobil DTE 10 Ultra 46	Caltex Rando MV 22	Caltex Rando MV 32	Kunlun 10 aviation hydraulic oil (ground)	Great wall L-HV 32	Great wall L-HV 46	Great wall 4632grease non-flammable
ISO viscosity grade	32	22	32	46	22	32	10	32	46	32
Pour point℃/℉	-30/-22	-54/-65.2	-54/-65.2	-45/-49	-36/-33	-36/-33	-50/-58	-39/-38	-37/-35	-20/-4
Flash point℃/℉	185/365	224/435	250/482	232/450	190/374	210/410	92/198	231/448	240/464	270/518
Motion viscosity cSt（40℃ ）	32	22.4	32.7	45.6	22.5	33.5	10（50℃）	33.4	48.7	28.8-35.2
Viscosity index	140	164	164	164	155	155	150	150	150	180

Proper use of hydraulic fluid. Please note the corresponding oil viscosity and temperature limits. Under normal operating conditions, the recommended oil temperature should be controlled between 30 ℃/86 ℉ and 60℃/140℉ and the maximum is not more than 90 ℃/194℉. The oil temperature will affect the viscosity of the oil and the thickness of the oil film. High oil temperature will reduce the lubrication effect and the life of the component. High temperatures also shorten the life of oil seals and other rubber components, while the oil also evaporates and oxidizes.

Add the corresponding type of hydraulic oil according to the customer’s requirements before ex-factory. When the working environment temperature changes beyond the working range of the hydraulic oil, please replace other suitable types of hydraulic oil according to the actual situation. Considering the safety of the components and the efficiency of the work, it is recommended that the starting temperature of the equipment is higher than the selected hydraulic oil pour point temperature of 25 ℃/77℉ or

more.

3.3.3 Hydraulic oil replacement

Good quality hydraulic fluids are critical to machine performance and service life. Unclean hydraulic fluid can affect machine performance and can cause damage to parts if used continuously. This operation should be performed more frequently in adverse working conditions.

a) Regular hydraulic fluid changes are required to use the recommended crankcase or hydraulic fluid. Run for the first time for 50 hours, and the filter element should be replaced every 300 hours thereafter. If the hydraulic oil has not been replaced for two years, it should be tested once every quarter, and the hydraulic oil should be replaced if the test fails. If you need to replace the hydraulic fluid, use a hydraulic fluid that meets or exceeds the specifications described in this manual. If you are unable to obtain the same type of product with random hydraulic oil, please consult your local supplier for the right equivalent. Do not mix petroleum with synthetic oil. We recommend the hydraulic oil replacement time used by the machine as follows:

b) First replacement: run for 500 hours after debugging.

c) Second or thereafter replacement: run 2,000 hours or once every two years.

d) The above recommended values are suitable for most applications. Higher temperatures, pressures and adverse working conditions will accelerate oil failure, so hydraulic oil should be replaced earlier. If the system load is small, the oil change time can be extended.

e) Always take the necessary measures to keep the hydraulic oil clean. Ensure all the containers used are clean. After replacing the hydraulic fluid of the hydraulic system, the mesh element of the filter must be cleaned and the cartridge filter replaced.

f) After shutting down the equipment, conduct good preventive maintenance measures, that is, implement a thorough inspection of all hydraulic components, piping, fittings, etc., and perform a functional check of each system before reusing the machine.

3.3.4 Lubrication specification

Special lubricants recommended by the component manufacturer are always the best choice. However, multi-purpose greases typically have characteristics that meet the requirements of various single function greases. If you have any questions regarding the use of grease in maintenance supplies, please consult your local supplier. Please refer to the description of the lubricant abbreviation in the Lubrication Table in Section 2.

3.4 Cylinder Drift Test

Use the following method to determine the maximum acceptable cylinder drift.

3.4.1 Platform drift

Measure drift from the platform to the ground. Raise the lower boom slightly (if equipped) and fully

extend the upper boom with the platform capacity and power off.

The maximum allowable drift in 10 minutes is 2 inches /5 cm. If the machine fails this test, please conduct the following operation.

3.4.2 Cylinder drift

Table 3-3 Cylinder drift

Cylinder bore size		**Maximum acceptable drift value in 10 minutes**	
Millimeter	Inch	Millimeter	Inch
76.2	3	0.66	0.026
89	3.5	0.48	0.019
101.6	4	0.38	0.015
127	5	0.22	0.009
152.4	6	0.15	0.006
177.8	7	0.13	0.005
203.2	8	0.10	0.0038
228.6	9	0.08	0.003

a) Use a calibrated dial gauge to measure drift on the cylinder rod. The oil in the cylinder must be in a stable ambient temperature.

b) The cylinder must have the normal load applied by the platform.

c) If the cylinder passes this test, it is acceptable.

Note: this information is based on a leak of 6 drops of cylinder per minute.

3.5 Pin and Bearing Inspection Instructions

3.5.1 Fiber bearing

a) Disconnect and inspect the connecting pin when one of the following conditions occurs:

1) Joint tilting.

2) Noise is generated at the joint during operation.

b) Fiber bearings should be replaced in one of the following situations:

1) Wear or separate fibers on the surface of the liner.

2) Broken or damaged bearing bushing.

3) The bearing has moved or rotated into the bearing housing.

4) Debris is embedded in the surface of the bushing.

c) The pin should be replaced when one of the following conditions is found (the pin should be properly cleaned before inspection):

1) Wear is found in the bearing area.

2) The surface of the pin has flakes or scratches.

3) The pins in the bearing area are rusty.

d) Reassemble the connecting pin with a fiber bearing.

1) The dirt and debris on the housing should be blown off. There must be no foreign objects on the bearings and housings.

2) Bearings and pins should be cleaned with a cleaning agent to remove all grease and lubricant. Fiber bearings do not require lubrication.

3) During installation and operation, the pins should be inspected to ensure that there are no burrs, nicks or scratches that could damage the bearings.

3.6 Welding on the Device

Note: this instruction applies to the repair or adjustment and to the welding of external structures or components on the machine.

3.6.1 Please perform the following operations when welding on the device

a) Disconnect the battery.

b) Disconnect the torque pin connector (when equipped).

c) Grounding only the structure being welded.

3.6.2 Do not perform the following operations when welding on the device

a) Ground the hood and weld it in any area other than the turntable.

b) Ground the turntable and weld it in any area other than the turntable.

c) Ground the platform/support and weld it in any area other than the platform/support.

d) Ground a specific boom section and weld it in any area other than the specific boom section.

e) Place pins, wear pads, wire ropes, bearings, gears, seals, valves, electrical wiring or tubing between the grounded location and the weld zone.

⚠CAUTION

Violation of the above requirements may result in damage to components (such as electronic module, rotating bearing, collector ring, etc.).

3.7 Use Insulating Grease in Electrical Connection Locations

Insulating silicone grease should be used for all electrical connections for the following reasons:

Prevent the mechanical joint between the male and female pins from being oxidized.

Prevent electrical failure caused by too low conductivity between pins when wet. Follow the steps below to use insulating grease for electrical connectors. This procedure applies to all plug connections installed outside the distribution box. Silicone grease is not suitable for use with externally sealed connectors.

a) The silicone grease should be placed around the male and female pins on the inside of the connector before assembly to prevent oxidation. It can be operated with a syringe for convenience.

Note: oxidation for a certain period of time will increase the resistance of the connector and eventually cause a circuit failure.

b) Each wire that exposes the connector housing should be wrapped with silicone grease to prevent short circuits. In addition, silicone grease should also be used at the joint where the male and female plugs are connected to each other. Other joints (such as around the buckle) that may cause the connector to enter the water should also be sealed.

Note: since the conductivity of the cleaning fluid is stronger than that of water, it is particularly prone to occur when the machine is cleaned by pressure cleaning.

c) Battery boxes and battery chargers should be sealed with silicone grease.

Note: coagulating sealants can also be used to prevent short circuits and are relatively clean, but will be more difficult to handle later when removing the pins.

3.8 Engine Electrical System Maintenance

The engine electrical system integrates a computer and microprocessor to control engine ignition, fuel control, and emissions. Since the computer is very sensitive to good electrical connections, the electrical

wiring must be checked regularly. The following steps should be taken when checking the electrical system:

a) Check and clean the battery terminal connections to ensure a secure connection.

b) Inspect the battery case for cracks or damage.

c) Check the positive and negative battery cables for corrosion, abrasion or scratches. Check the connection on the chassis to confirm that the connection is secure.

d) Inspect the wiring harness of the entire engine to confirm the presence of worn, severed or damaged connections and repair if necessary.

e) Check all harness connectors to ensure they are fully seated and locked.

f) Check the ignition coil and spark plug cable for hardening, cracking, wear, separation, cracking of the dust cover, and proper meshing.

g) Replace the spark plug at the time intervals specified in the engine manufacturer's manual.

h) Check and confirm that all electrical components are securely connected.

i) Check the ground and platform control consoles to verify that all warning indicators are working properly.

Table 3-4 Inspection and preventive maintenance schedule

Items	Time intervals					
	Pre-start	Weekly	Monthly	Pre-delivery or daily	Annually	Every 2 years
Boom assembly	9					
Boom weldment				1,2,4	1,2,4	
Oil pipe/wire rope				1,2,9,12	1,2,9,12	
Shaft pin and pin				1,2	1,2	
Pulley and pulley pins				1,2	1,2	
Bearings				1,2	1,2	
Wear pad				1,2	1,2	
Covers or shields				1,2	1,2	
Cables or wire				1,2,3	1,2,3	
Platform assembly	9					
Platform	1,2				1,2	
Railing	1,2			1	1,2	
Door			5	1	1,5	
Floor	1,2			1	1,2	
Rotary motor		9,5		15		
Lanyard anchorage	2			1,2,10	1,2,10	
Turntable assembly	9					
Swing bearing or worm gear				1,2,14	1,2,3,13,14	
Swivel joint		9				
Turntable drive system						
Turntable pin				1,2,5	1,2,5	
Hood, hood props and hood latches				5	1,2,5	
Chassis assembly	9					
Tire	1	16.17		16,17,18	16,17,18	
Wheel nuts/screw	1	15		15	15	
Wheel bearing						14,24
Oscillating axle/Lockout cylinder system					5,8	
Outrigger or extendable axle				5,8	5,8	

Table 3-4 Inspection and preventive maintenance schedule (continuous)

Items	Time intervals					
	Pre-start	Weekly	Monthly	Pre-delivery	Annually	Every 2
Steer components						
Drive motor						
Torque hub				11	11	
Function/Control	9					
Platform control	5	5		6	6	
Ground control	5	5		6	6	
Function control locks, protective device or brake device	1,5	1,5		5	5	
Foot switch	1,5			5	5	
Emergency switch (Ground and platform)	5			5	5	
Function limit or cutout switch system				5	5	
Capacity indicator					5	
Drive brake				5		
Swing brake				5		
Boom synchronization/sequencing system					5	
Manual descent/auxiliary power				5	5	
Power system	9					
Engine idle, throttle and RPM				3	3	
Engine fluid (engine oil, engine coolant, diesel oil)	11	9,11		11	11	
Air/diesel filter		1,7		7	7	

Table 3-4 Inspection and preventive maintenance schedule (continuous)

Items	Time intervals					
	Pre-start	Weekly	Monthly	Pre-delivery or daily	Annually	Every 2 years
Exhaust system			1,9	9	9	
Batteries	5	1,9			19	
Battery fluid		11		11	11	
Battery charger		5			5	
Fluid reservoir, cap and breather	11,9		2	1,5	1,5	
Hydraulic/Electrical system	9					
Hydraulic pump		1,9		1,2,9		
Hydraulic oil tank		1,9,7	2	1,2,9	1,2,9	
Cylinder pinned joints and pins retainer		1,9		1,2	1,2	
Hydraulic hose and other hydraulic fittings		1,9	12	1,2,9,12	1,2,9,12	
Hydraulic oil tank, cap and breather hole	11	1,9	2	1,5	1,5	24
Hydraulic oil filter		1,9		7	7	
Hydraulic oil	11			7,11	7,11	
Electrical connections		1		20	20	
Instruments, meter, switch, light and horn		1			5,23	
General description						
Operation and Safety Manual in storage container	21			21	21	
Equipped with ANSI and EMI manual/guide					21	

Table 3-4 Inspection and preventive maintenance schedule (continuous)

Items	Time intervals					
	Pre-start	Weekly	Monthly	Pre-delivery or daily	Annually	Every 2 years
Complete and clear capacity decal	21			21	21	
Complete and clear decals	21			21	21	
Visual inspection of the machine appearance	21					
Machine annual inspection expires				21		
No unauthorized changes or additions				21	21	
Consolidate all relevant security publications				21	21	
General structural state and welding				2,4	2,4	
All fasteners, pins, hood and covering				1,2	1,2	
Lubricating grease and its specification				22	22	
All system functional test	21			21	21, 22	
Painting and appearance				7	7	
Imprint check date on the frame					22	
Notifying Zoomlion machine ownership					22	

Footnote:

1. Before daily use or each shift
2. Before each sale, rental or delivery
3. Use 3 months or 150 hours, or idle for more than 3 months, or buy as a used machine
4. Implement inspection annually within 13 months from the date of the last inspection

Performance code:

1 —Confirm that the installation is correct and secure

2 —Visually inspect for damage, cracks, deformation or excessive wear

3 —Check if the adjustment is correct

4 —Check for cracked or damaged welds

5 —Correct operation

6 —Return to neutral of OFF position when released

7 —Clean and free of dirt

8 —Interlock function

9 —Check for signs of leaks

10 —Complete and secure decal

11 —Level check

12 —Check for wear and correct routes

13 —Correct tolerance check

14 —Correct lubrication

15 —Reverse to appropriate torque specification

16 —No boring, excessive wear or bare rope

17 —Properly inflated and mounted to the rim

18 —Appropriately authorized parts

19 —Fully charged

ZOOMLION

Service and Maintenance Manual

Section 4 Chassis and Turntable

SECTION 4 CHASSIS AND TURNTABLE

4.1 Tire and wheel

The wheels consist of tires and rims.

Function: support the machine; ensure good adhesion to the road surface and transmit driving torque and braking torque; determining the direction of travel, alleviating the impact of the vehicle on the uneven road surface while driving, and attenuating the vibration generated thereby.

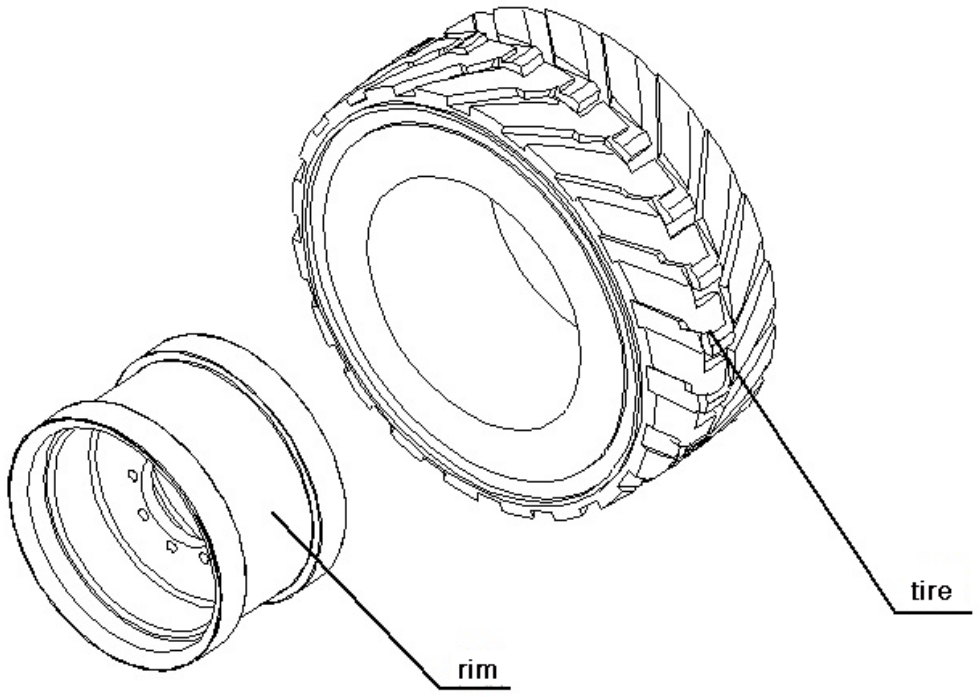


Figure 4-1 Wheel composition

4.1.1 Tire inflation

In order to endure the safety and normal operation, the air pressure of the pneumatic tire must be the same as the air pressure indicated on the side of the Zoomlion machines or the rim sticker.

4.1.2 Tire damage

For pneumatic tires, our company recommends:

When any cuts or cracks in the tire are found to expose the sidewalls of the tire or the tread, take immediate action to stop using our products. Also prepare to replace the tire or tire assembly.

For polyurethane foam tires, our company recommends:

Any of the following conditions are found, measures should be taken immediately to stop using our products and prepare to replace the tires or tire assemblies.

a) A smooth, uniform cut with a total length of more than 3 inches /7.5cm in the ply.
b) Cracks (uneven edges) in any direction that exceed 1 inch /2.5cm in the ply.
c) Perforations having a diameter of more than 1 inch.
d) Any damage to the ply of the tire bead. If the tire is damaged but still within the above criteria, the tire must be inspected daily to ensure that the damage does not exceed the permissible standard.

4.1.3 Tire replacement

Our company recommends replacing the tires of the same size, grade and brand as the original tires of the machine. Please refer to our company's parts manual for the part number of the certified tire for a specific machine model. If you do not use our company-certified tires, the replacement tires used should have the following characteristics:

a) Play/rated load and size equal or better than original tires.
b) The tread grounding width is equal to or better than the original tire.
c) Wheel diameter, width and compensation dimensions are equivalent to original tires.

Do not replace the foam-filled or solid-filled tire components with pneumatic tires without special approval from our company. Ensure that all selected tires are inflated to the pressure recommended by our company. Due to the dimensional differences between different brands of tire, the same brand should be used for the two tires on the same axle.

4.1.4 Wheel replacement

The rims installed on each model are rigorously designed for stability requirements such as track, tire pressure and load capacity. Unauthorized changes to the rim width, center piece position, and diameter size without the written advice of the factory may result in an unstable hazardous situation.

4.1.5 Wheel installation

⚠WARNING

It is extremely important to use and maintain proper wheel mounting torque.

The wheel tightening nut should be mounted and held with proper torque to prevent loosening of the wheel, damage to the stud and disengagement of the wheel from the axle. Use nuts that match the cone angle of the wheel only. Tighten the nut to the proper torque to prevent the wheel from loosening. Use a torque wrench to tighten the fasteners. If you do not have a torque wrench, use a socket wrench to tighten the fasteners and then immediately ask the service station or dealer to tighten the nuts to the correct torque. Excessive tightening will cause the stud to break or permanently deform the stud holes on the wheel. The correct steps to tighten the wheel are as follows:

a) Manually screw all the nuts to prevent threading. Do not use lubricant on threads or nuts.
b) Please tighten the nuts in the following order.

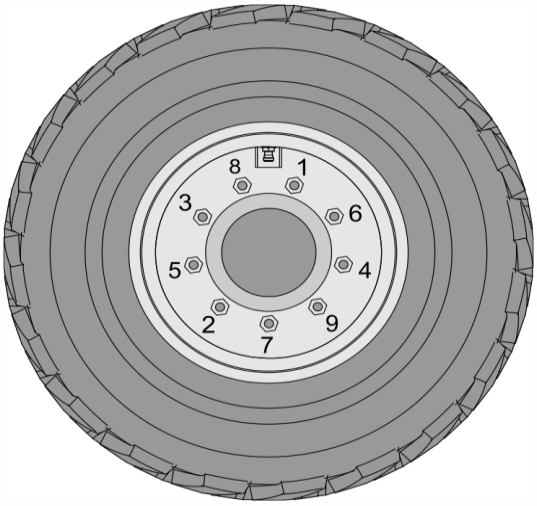


Figure 4-2 Wheel fastening nut tightening sequence

c) Nut tightening should be carried out in steps. Please refer to the wheel torque table and tighten the nuts in the recommended order.

Table 4-1 Wheel torque table

Torque application sequence		
First step	Second step	Third step
75 Nm/55ftlb	210 Nm/155ftlb	310 Nm/229ftlb

d) The fastening nut should be tightened for the first time of 50 hours or after each disassembly of the unit. Torque should be checked every 3 months or 150 hours of operation.

4.2 Swing axle exhaust and locking test

4.2.1 Floating cylinder exhaust

a) Start engine.

b) The turntable is in a stowed position.

c) Connecting the cleaning tube to the threaded joint of the exhaust valve.

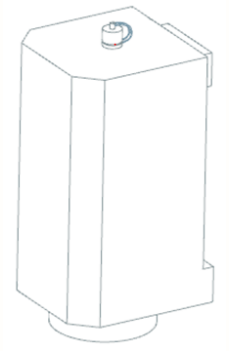


Figure 4-3 Exhaust valve connector position

d) Place a small bucket or bottle in front of the floating cylinder exhaust valve and insert the cleaning tube.
e) Loosen the exhaust valve and slowly unscrew it counterclockwise. Air is exhausted from the top of the floating cylinder. Use a small bucket or bottle to catch the hydraulic oil that flows out. Close and tighten the exhaust valve at the same time.
f) Find the exhaust valve on the opposite side of the floating cylinder and repeat the above steps.

4.2.2 Swing axle lock test

⚠CAUTION

Locking system testing must be performed quarterly when components of the locking system are replaced or improper system operation conducted.

Note: before starting the floating cylinder test, make sure the boom is fully retracted, lowered and centered in the middle of the two drive wheels.

a) Place a 3.94 inch /10 cm block with a rising ramp in front of the left front wheel.
b) Start the engine from the working platform controller side.
c) Place the drive lever in the forward position and very carefully climb on the ascending ramp so that the left front wheel is at the top of the block.
d) Drive the telescopic cylinder very carefully, with the boom extended at least 3.33 feet /1 m.
e) Position the drive lever in the reverse gear position and drive the mechanical device away from the block and ramp.
f) Ensure that the left front wheel is locked on the ground.
g) Drive the telescopic cylinder very carefully to return the boom to the stowed position. The floating cylinder should be released and allow the wheel to rely on the ground, and it may be necessary to activate the system to release the cylinder.
h) Repeat the above steps to operate the right front wheel.
i) If the function of the floating cylinder is abnormal, contact the qualified personnel to correct the malfunction, then perform other operations.

4.3 Chassis Angle Sensor System

The chassis angle sensor system is used to measure the angle of the turntable relative to the chassis. The control system reads the sensor reading and compares the reading to a preset turntable angle value. When the unit is in the stowed position, the equipment can travel at the highest speed, but when the tilt angle of the turntable is greater than 5 °, the control system limits the travel speed to the low driving speed mode. When the unit is in the stowed position and the tilt angle of the turntable is greater than 3 °, the boom function can only be operated in the turtle speed mode. When the device is in the working position, the travel function is disabled. Therefore, when a safety accident occurs during operation, the device must be returned to the stowed position to continue driving the device.

4.4 Auxiliary Power System

In the event that the main power is not working, the auxiliary power system is used as an alternative to take the operator away from the height of the work to the safe ground. This system uses an electric motor/pump unit powered by a 12V battery. The auxiliary power system is not intended to be used as the primary power source. The auxiliary power system allows all functional units to return to the stowed or lowered state and supports the jib lifting. The auxiliary power system keeps the work platform in a horizontal position when the boom is lowering. The auxiliary power system does not support the driving function.

4.5 Oscillating axle system

The oscillating front axle is mounted to the frame by a pivot pin that allows the four wheels to remain in contact with the ground traveling over rough terrain. The oscillating axle system also includes two floating cylinders for connecting the frame to the front axle. The floating cylinder allows the front axle to oscillate when the boom is retracted in transit. When the boom is extended by 1,000 mm/3.28ft or the boom angle is more than 7 °with respect to the horizontal level, the floating cylinder will keep the front axle in its original position and prevent it from swinging.

The ground controller monitors the boom angle by installing an angle sensor at the end of upper boom. The ground controller monitors the boom extension by a wire sensor mounted on the inside of the boom. When the ground controller detects that the condition for releasing the front axle lock is satisfied, the controller sends a pilot pressure to the floating cylinder. The pilot pressure is provided by driving the pump charge pressure. When the pilot pressure is applied to the balancing valve mounted on the floating cylinder, the front axle is unlocked, and when the pilot pressure is released, the front axle is locked. The first lock compound valve is normally closed, and it opens when oil flows into the floating cylinder. The second valve is connected to the tank and is located between the first valve and the floating cylinder. It closes when it blocks the oil return to the tank or the oil flowing to the floating cylinder. Any of these valves are in their normal state, the front axle should be locked. The ground control provides power and monitors the boom angle sensor and wire sensor. If the status of the sensor is inconsistent, the ground control will cut off the power supply, which will cause the swing front axle to lock in an unsafe state until it is re-powered.

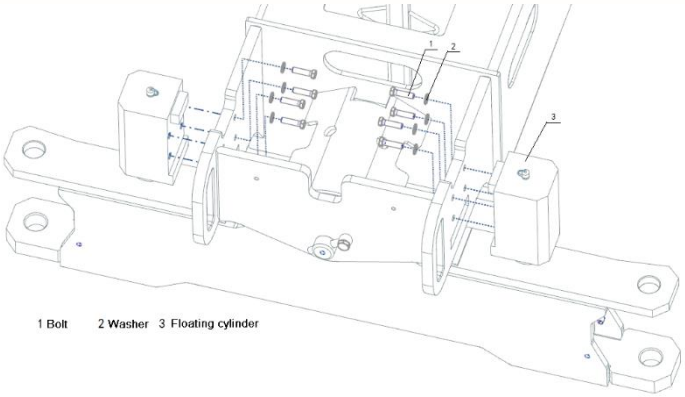


Figure 4-4 Floating cylinder disassembly diagram

4.6 Traveling Drive System

The traveling system is mainly composed of wheels, traveling reducer and traveling motor. Specifically, the four-wheel drive system consists of a variable displacement closed pump, four variable displacement piston motors, four gear reducers, and a split/flow-combining travel control valve. The two-wheel drive system consists of a variable displacement closed pump, two variable displacement piston motors, two gear reducers and a split/flow-combining travel control valve. The walking speed is changed according to the three factors of driving pump displacement, engine speed and motor displacement. Traction control is full-time full mode. Our equipment has three drive modes to choose from at the platform console. The drive system function is determined by the position of the boom (in the transport state or not in the transport state).

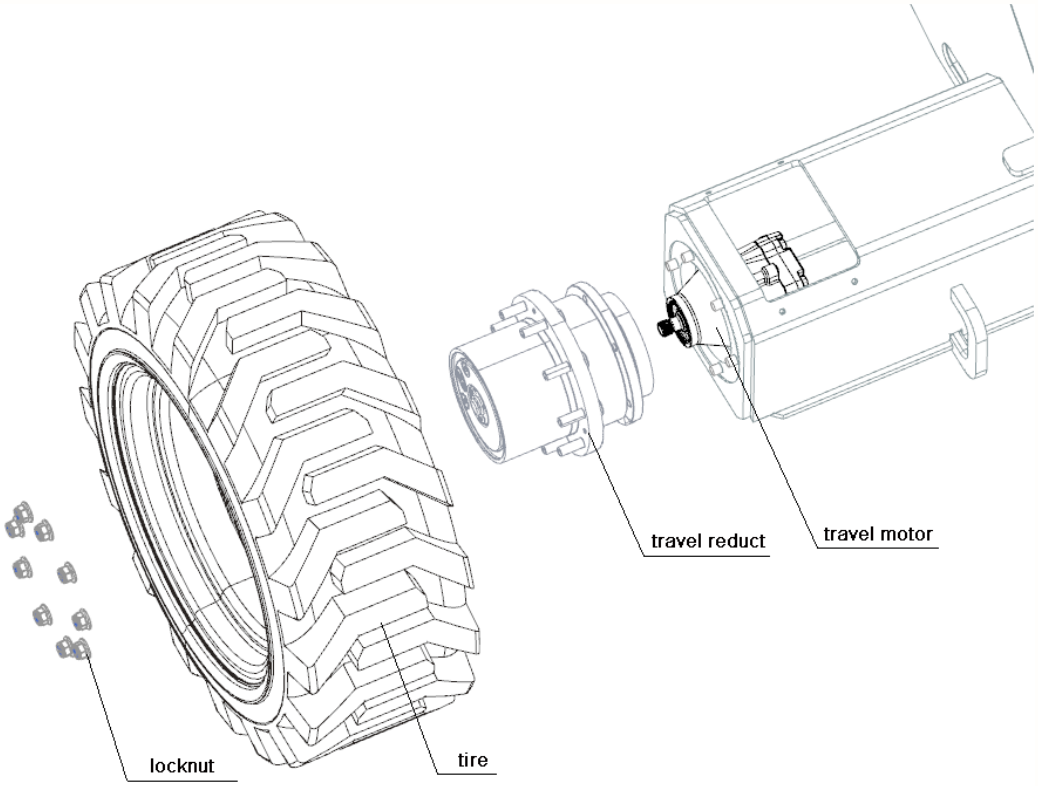
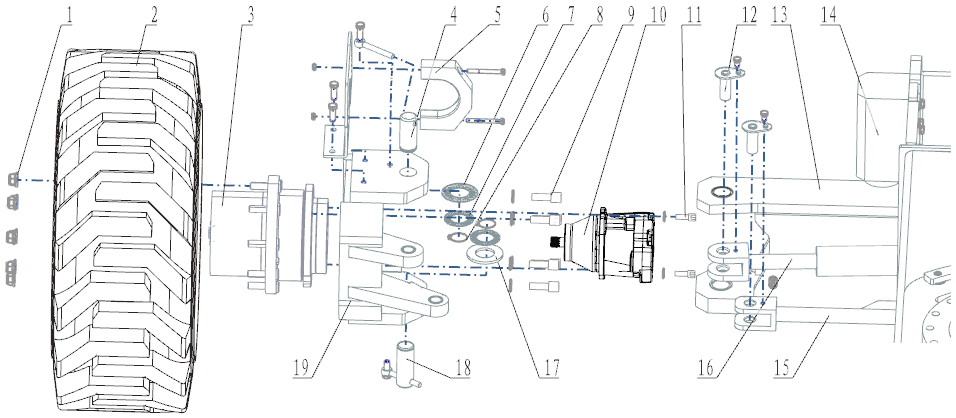


Figure 4-5 Travel system disassembly diagram 1



1 lock 2 tire 3 travel reduct 4 pin 5 6 7 washer 8 retainer ring 9 reducer mounting bolt 10 travel motor
11 travel motor mounting bolt 12 pin 13 front axle weldment 14 float cylinder 15 steering linkage 16 steering cylinder
17 wear spacer 18 pin 19 steering cylinder

Figure 4-6 Travel system disassembly diagram 2

4.7 Travel Reducer

4.7.1 Disassembly

a) Place the machine on a solid level surface.
b) Remove all hydraulic lines connected to the travel motor on the travel reducer and close the port;
c) Use a suitable lifting device to support the travel reducer (the travel reducer weighs approximately 50kg/110lb).
d) Disassemble the six bolts used to connect the travel reducer and the chassis structure.
e) Remove the travel reducer from the equipment and place it in a clean work area.

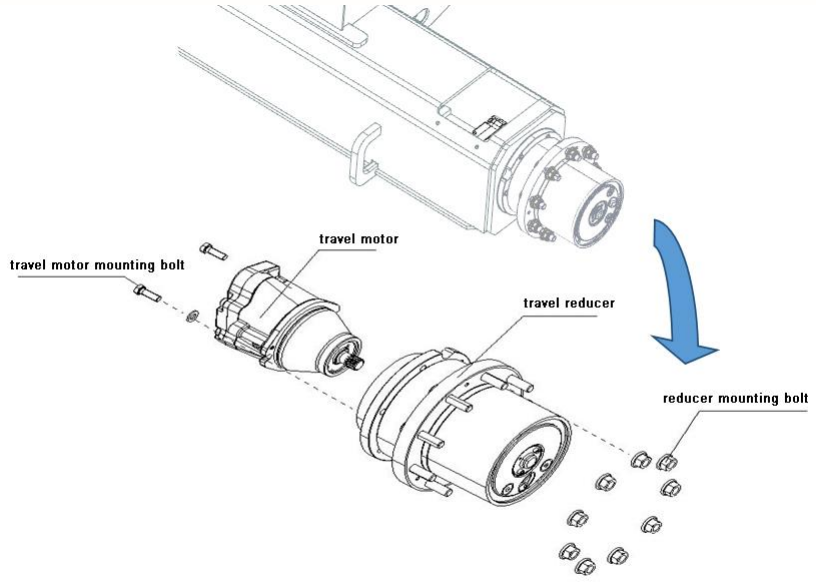


Figure 4-7 Travel reducer disassembly diagram

4.7.2 Installation

a) Use a suitable lifting device to support the travel reducer (the travel reducer weighs approximately 50kg/110lb).
b) Align the mounting holes on the travel reducer with the holes of the reducer mounting plate.
c) The travel reducer is mounted on the axle with six bolts, and the bolt torque is 260Nm.
d) Connect the hydraulic line that was previously disassembled to the travel motor.

4.8 Traveling Motor

4.8.1 Disassembly

a) Place the machine on a solid level surface.
b) Remove all hydraulic connections to the traveling motor and mark them.
c) Use a suitable lifting device to support the traveling motor (the traveling motor weights approximately 15.4kg/34lb).
d) Disassemble the two mounting bolts used to connect the traveling motor to the steering knuckle.
e) Disassemble the traveling motor from the steering knuckle and place it in a clean work area.
f) Clean the dirt on the traveling motor. Remove the rust from the output shaft.

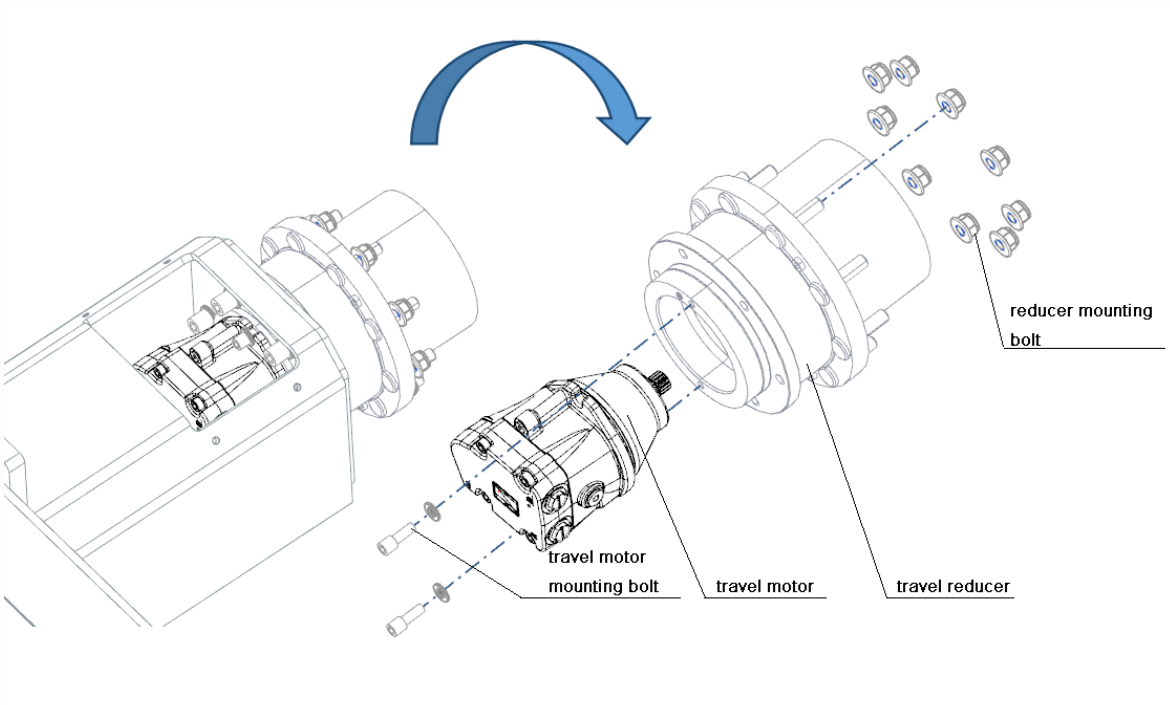


Figure 4-8 Traveling motor disassembly diagram

4.8.2 Installation

a) Use a suitable lifting device to support the traveling motor (the traveling motor weights approximately 15.4kg/34lb).

b) Mounting the traveling motor on the machine.
Note: if the travel motor output shaft is not aligned, it will cause damage to the bearings and seals of the traveling motor output shaft and its surroundings. Damage to the seal can cause oil leakage.

c) Make sure that the traveling motor output shaft is properly aligned with the mounting ring gear on the reducer.

d) Tighten the two bolts used to connect the travel motor to the steering knuckle. The tightening torque reaches 95Nm/70ftlb.

e) Reinstalling the previously removed hydraulic line connected to the traveling motor.

f) Start the unit and check the function of the traveling motor.

4.9 Rotary Motor

This type of rotary motor is a cycloid motor, which is the actuator of the rotary system.
Maintenance motor disassembly method:

a) Remove the hydraulic hose connected to the motor, mark it properly and plug it properly, and plug the motor oil port.

⚠CAUTION

When disassembling the oil pipe, the joint should be slowly disassembled to prevent high-pressure hydraulic oil from being splashed and hurting people.
Remove the connection bolt between the motor and the reducer, and remove the motor.

⚠CAUTION

1. DO NOT disassemble the hydraulic motor by your own. If there is a problem with the hydraulic motor, please contact your nearest after-sales service directly.
2. Keep in mind the installation position of each interface and part during disassembly.
3. It is not allowed to disassemble the hydraulic motor using hard tools such as a hammer or forcible knocking.
4. Before installing any parts in the motor, it must be cleaned, and foreign matter is not allowed to be brought into the motor.

4.10 Rotary Reducer

4.10.1 Check and maintenance

a) After the reducer has been running for 100 hours for the first time (including intermittent operation), please clean the inside of the reducer and brake with cleaning fluid and replace the oil. After each operation (2000-2500 h), please change the oil once, or at least once a year.

CAUTION

1. Check whether there are metal shavings in the reducer and brake.
2. Change the oil when the oil temperature has not cooled, it is more beneficial to drain the oil in the tank at this time.
3. Do not use mixed oil.

b) The rotary reducer is equipped with multiple brakes. The brake is normally closed. When the pressure oil enters the brake, the brake is opened and the mechanism can freely rotate. When one of the following parts of the brake occurs, its parts should be replaced or the brake is scrapped.

There is oil leakage at the input end, the brake oil seal needs to be replaced if the oil seal is damaged.

Insufficient braking torque.

When the braking torque is severely reduced or the friction pad is deformed, the friction pad needs to be replaced.

4.10.2 Gear oil replacement

a) Determine the correct positions of the oil ports on the reducer and the brake.

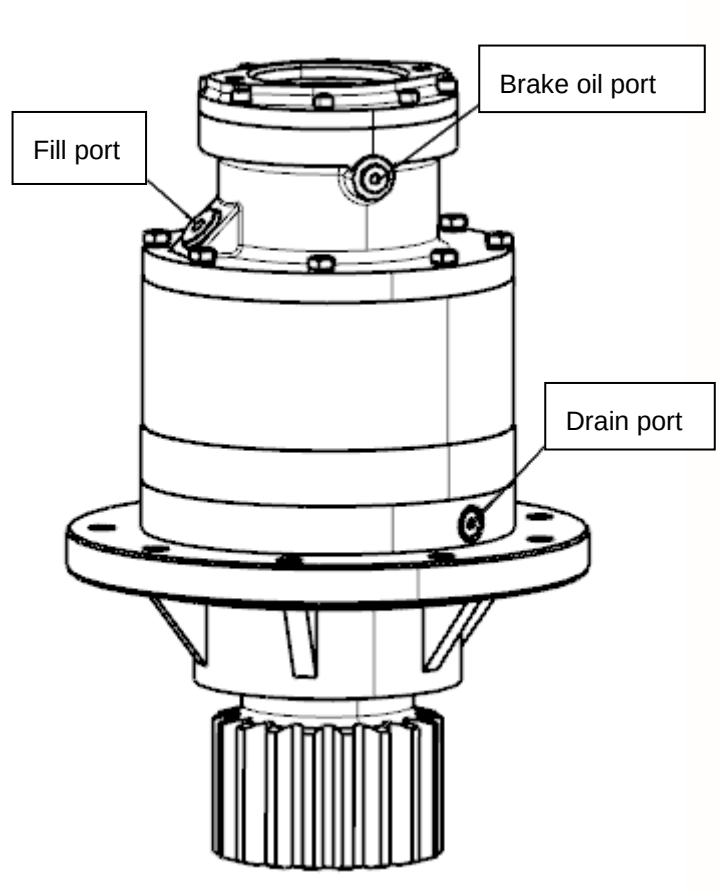


Figure 4-9 Position of each oil port of the reducer

b) Remove the oil drain plug and oil filler plug, drain the oil in the reducer, and drain the oil in the brake.

⚠CAUTION

1. Before injecting new oil, clean the inside of the rotary reducer and brake with cleaning fluid.
2. Inject the cleaning fluid into the rotary reducer and brake, install the oil filling plug, run at high speed for several minutes, and then drain the cleaning fluid.

⚠WARNING

The use of aggressive cleaning agents or unsuitable lubricating products can change the characteristics of oil esters, thereby causing damage to the trajectory and related parts.

4.11 Slewing Bearing

4.11.1 Slew bearing lubrication

Proper lubrication is necessary for the durability of the track and gear. The lubrication cycle is determined according to the use situation and the environment. It is recommended to lubricate once every 150 hours under normal circumstances.

⚠CAUTION

When the equipment is not used for a long time, the slewing bearing should be lubricated, and the lubrication frequency should be more frequent in tropical climates affected by temperature, windy sand or humid areas.

a) Use a grease gun to inject Mobilux EP 2, Shell Alvania EP (LF) 2 grease from the grease nipple on the slewing ring into the slewing ring until the grease leaks from the seal and fills the ring. Lubricate the slewing bearing, generally add grease every 150 hours of work; if it is used in strict dusty and humid environments, shorten it to 50 hours; if it is stopped for a long time, lubricate every 6 months.

b) Lubricate the gear. The tooth surface should always be clear of debris and coated with corresponding grease. Regardless of spraying or brushing, the grease must completely cover the pinion and the toothed surface of the ring gear.

4.11.2 Check and maintenance

a) After the slewing bearing is operated for 100 hours, check the pre-tightening force of the bolt. If there is any abnormality, tighten it in time, and the bolt tightening torque is not less than 520Nm/384ftlb. After every 500h of operation, it must be maintained with sufficient pretension. Generally, the bolts must be replaced every 7 years or after 14000h of work.

b) In use, avoid direct exposure of the slewing bearing to direct sunlight, prohibit direct washing of the slewing bearing with water, prevent water from entering the raceway, and prevent hard foreign

objects from approaching or entering the meshing area.

c) Check the integrity of the slewing bearing seal and repair or replace it in time if damaged.

d) Check the meshing operation of the slewing gear. In order to reduce the wear of the small gear and the large gear, adjust the meshing gap between the small gear and the large gear within the range of (0.15 to 0.25) mm/(0.00591-0.00984)in.

4.11.3 Disassembly

a) Install the appropriate spreader on the turntable and tension the spreader properly. Provide support or obstructions to the boom if feasible.

b) Remove the hydraulic pipe of the rotary joint and properly fix the hydraulic pipe; remove the rotary reducer and keep it properly.

c) Remove the connecting bolts between the slewing bearing and the turntable.

d) Lift off the car part, as shown in Figure 2. The weight of the car part is about 10T/22046lb. To ensure safety, please use a crane of more than 15T/33069lb.

e) Remove the connecting bolts between the slewing bearing and the chassis.

f) Install 2 M16 eyebolts, lift off the slewing bearing and place it properly.

g) The slewing bearing installation process is the reverse of the above process. Bolt installation must use thread locking glue, and the bolt tightening torque is not less than 520Nm/384ftlb.

⚠CAUTION

The bolt of the slewing bearing is a very important connection piece of this equipment. Users should not continue to use the removed bolt, but use a new bolt.

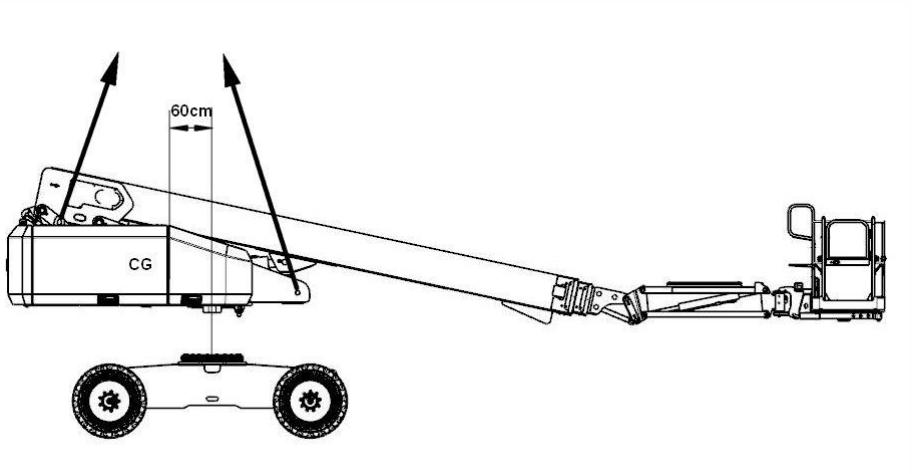


Figure 4-10 Upper Part Disassembly

4.12 Gear clearance adjustment of slewing mechanism

The gear gap of the slewing mechanism refers to the meshing clearance between the small gear on the slewing reducer and the slewing bearing (large gear). If the clearance is too tight, it will cause unsmooth rotation and even damage to components. If the clearance is too loose, it will cause the vehicle to shake

violently during turning braking. Good gear clearance can make the performance of the machine and extend the life of the machine, so it needs to be adjusted. Adjust as shown in the figure below.

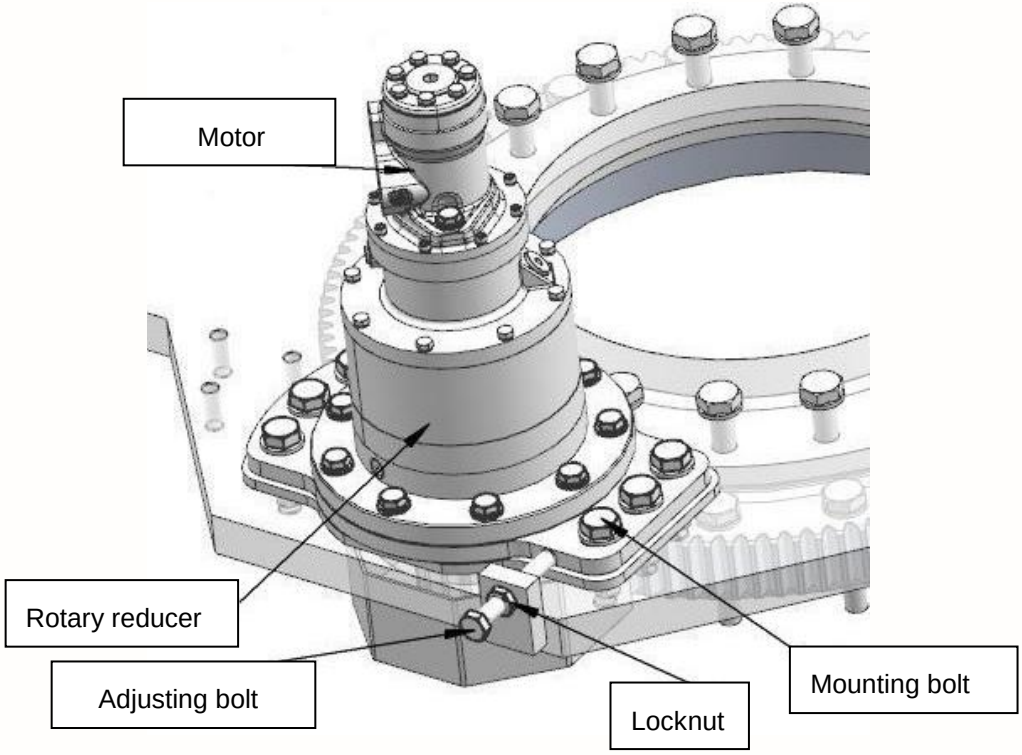


Figure 4-11 Gear clearance adjustment

The adjustment steps are as follows:

a) Loosen the lock nut without completely unscrewing it.

b) Loosen the mounting bolts without completely unscrewing them.

c) Adjust the adjusting bolt and measure the backlash between the slewing gear and the slewing bearing with a plug gauge. Adjust and measure repeatedly until the gap is between 0.15mm/0.00591in and 0.25mm/0.00984in.

d) Tighten the mounting bolts with a tightening torque of not less than 520Nm/384ftlb.

e) Hold the adjusting bolt and tighten the locking bolt (sequence 1).

ZOOMLION

Service and Maintenance Manual

Section 5 Boom and Platform

SECTION 5 BOOM AND PLATFORM

5.1 Platform and Jib

5.1.1 Load cell

5.1.1.1 Disassembly

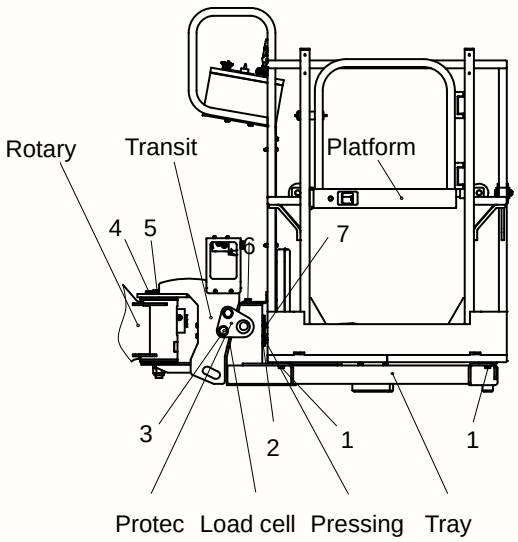


Figure 5-1 Load cell disassembly diagram

a. Disconnect the wiring harness at the platform's electrical control box and load cell, disconnect the tubing at the platform valve, collect the hydraulic oil in the pipeline with a suitable container, block the port of the pipeline after the collection, and Make a mark.

⚠CAUTION

After the hydraulic line is disconnected, the port of the pipeline should be blocked immediately to prevent dust and other pollutants from entering the hydraulic system.

b. Remove the connecting bolts 1, 6 of the bracket and the platform component, and use a suitable lifting device to remove the platform component from the bracket.

c. Remove the connecting bolts 4 and 5 of the swing cylinder and the transition base, and use appropriate lifting equipment to remove the bracket and the transition base from the swing cylinder;

d. Remove the bolt 3 at the protective hook and remove the protective hook.

e. Remove the connecting bolt 7 between the pressure plate, the bracket and the transition base, and then the pressure plate can be removed.

f. The load cell can be removed by removing the connection bolt 2 between the load cell and the bracket and the transition seat.

5.1.1.2 Inspection

a. Check the line for wear and replace the wiring harness if necessary.

b. Check hydraulic oil leaks and replace the line if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

5.1.1.3 Installation

a. Follow the reverse steps of disassembly. The interface of the hydraulic pipe joint before installation should be cleaned to prevent contaminants from entering the hydraulic system.

b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

c. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.1.2 Rotary actuator

5.1.2.1 Disassembly

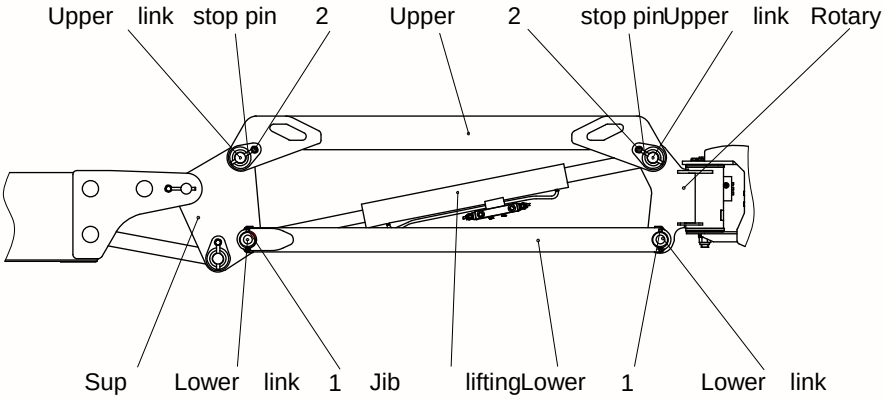


Figure 5-2 Rotary actuator and jib lifting cylinder disassembly diagram

a. Mark and disconnect the hydraulic line connecting the rotary actuator balancing valve, collect the hydraulic oil in the pipeline with a suitable container, and seal the port of the pipeline after collecting.

b. Remove the stop pin and connecting pin of the support and the main boom, and use a suitable lifting device to remove the jib.

c. Remove the connecting bolt 1 of the swing cylinder and the lower link 1, the connecting bolt 2 of the swing cylinder and the upper link 2, and remove the pin, and then the swing cylinder can be removed.

5.1.2.2 Inspection

a. Inspect the shaft pin for wear, scratches, taper, ovality or other damage and replace the pin if necessary.

b. Inspect the inner ring of the bearing for scratches, distortion, wear or other damage and replace the

bearing if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

5.1.2.3 Installation

a. Follow the reverse steps of disassembly. The interface of the hydraulic pipe joint and balance valve before installation should be cleaned to prevent contaminants from entering the hydraulic system.

b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

c. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.1.3 Jib lifting cylinder

5.1.3.1 Disassembly

a) Mark and disconnect the hydraulic line connecting the jib lifting cylinder balancing valve, collect the hydraulic oil in the pipeline with a suitable container, and seal the port of the pipeline after collecting.

b) Disassemble the connecting bolt of the support and the lower link 1, the connecting bolt of the support and the upper link 2, the stopper pin, and remove the pin to remove the jib lifting cylinder.

5.1.3.2 Inspection

a. Inspect the shaft pin for wear, scratches, taper, ovality or other damage and replace the pin if necessary.

b. Inspect the inner ring of the bearing for scratches, distortion, wear or other damage and replace the bearing if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

5.1.3.3 Installation

a. Follow the reverse steps of disassembly. The interface of the hydraulic pipe joint and balance valve before installation should be cleaned to prevent contaminants from entering the hydraulic system.

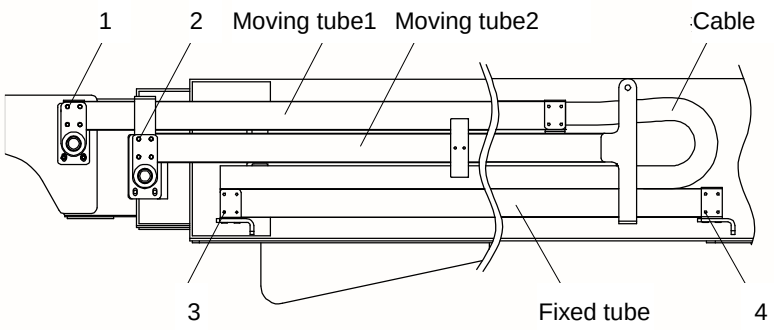
b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

c. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

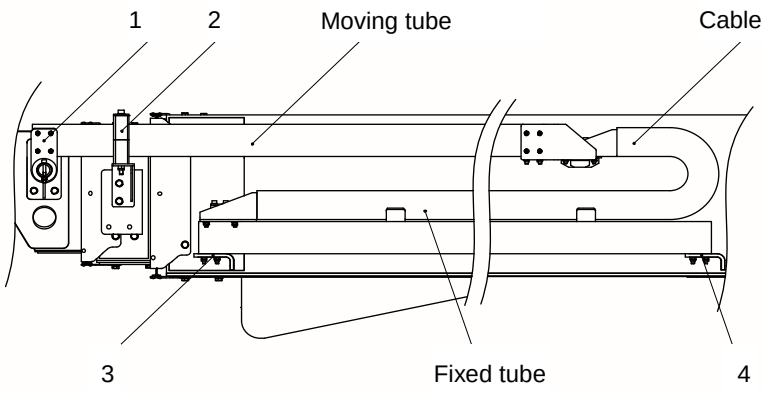
5.2 Boom Assembly

5.2.1 Cable

5.2.1.1 Disassembly



Plastic chain



Steel cable chain

Figure 5-3 Cable system disassembly

a. Adjusting the boom to a fully retracted state.

b. Disconnect the pipeline from the ground control box.

CAUTION

After the hydraulic line is disconnected, the port of the pipeline should be blocked immediately to prevent dust and other pollutants from entering the hydraulic system.

a. Mark and disconnect the hydraulic lines from base boom to the control valve. Collect the hydraulic oil in the pipeline with a suitable container, and seal the port of the pipeline after collecting.

b. Mark and disconnect the harness of the travel switch from the side of base boom.

c. Mark and disconnect the hydraulic lines and harness from the telescopic boom to the upper leveling cylinder, from the telescopic boom to the jib. Collect the hydraulic oil in the pipeline with a suitable

container, and seal the port of the pipeline after collecting.

d. Use suitable lifting equipment to hang the ends of the fixed pipe of the cable along the entire length.

e. Remove the bolts 1 fixing the moving pipe 1 on the three-section arm.

f. Remove the bolt 2 supporting the moving pipe 1 on the two-section arm.

g. Support the towline, take all feasible safety protection measures, remove the bolts 3 and 4 that fix the fixed pipe on the base boom, and use the lifting equipment to lift the towline together with the moving pipe and fixed pipe.

5.2.1.2 Inspection

a. Check the line for wear and replace the wiring harness if necessary.

b. Check hydraulic oil leaks and replace the line if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

d. Check the cable structure for bending, cracking, weld separation or other damage and replace the cable structure if necessary.

5.2.1.3 Installation

a. Follow the reverse steps of disassembly. The pipe joints of the hydraulic lines before installation should be cleaned to prevent contaminants from entering the hydraulic system.

b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

c. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.2.2 Leveling cylinder

5.2.2.1 Disassembly

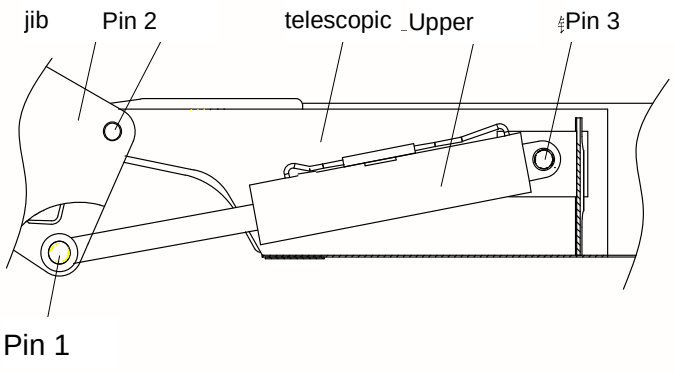


Figure 5-4 Upper leveling cylinder disassembly diagram

a. Adjust the posture of the boom and the jib to the level.

b. Mark and disconnect the hydraulic line connecting the leveling cylinder balancing valve, collect the hydraulic oil in the pipeline with a suitable container, and seal the port of the pipeline after collecting.

c. Use the appropriate lifting equipment to support the head of the cylinder rod of the leveling cylinder, disassemble the pin shaft 1 and 2, and remove the jib (Follow the jib removal step).

d. Disassembling the pin 3 fixing the upper leveling cylinder on the telescopic boom.

e. With the assistance of lifting equipment, slowly and carefully remove the upper leveling cylinder from the telescopic arm to avoid damage from the collision between the leveling cylinder and the inner cavity of the telescopic arm.

f. Use a suitable plug to block the connector of the upper leveling cylinder balancing valve to prevent dust and other pollutants from entering the oil line.

5.2.2.2 Inspection

a. Inspect the shaft pin for wear, scratches, taper, ovality or other damage and replace the pin if necessary.

b. Inspect the inner ring of the bearing for scratches, distortion, wear or other damage and replace the bearing if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

⚠CAUTION

Refer to the Pin and Bearing Inspection Instructions in the Section 3 for pin and bearing inspection.

5.2.2.3 Installation

a. Follow the reverse steps of disassembly. The interface of the hydraulic pipe joint and balance valve before installation should be cleaned to prevent contaminants from entering the hydraulic system.

b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

c. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.2.3 Lower leveling cylinder

5.2.3.1 Disassembly

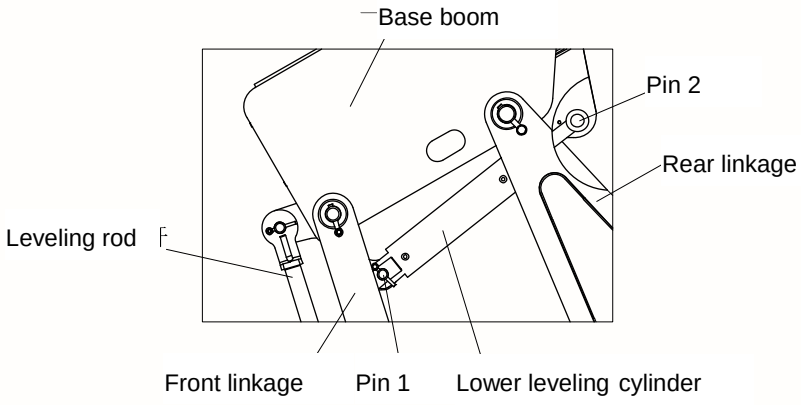


Figure 5-5 Lower leveling cylinder disassembly diagram

a. Follow the removal steps to disassemble the working platform, the jib and the upper leveling cylinder.

b. Adjusting the attitude of the boom to a position where the pin 1 and the pin 2 are completely exposed and easy to disassemble.

c. Mark and disconnect the hydraulic line connecting the two cylinders balancing valve, collect the hydraulic oil in the pipeline with a suitable container, and seal the port of the pipeline after collecting.

d. Use appropriate lifting equipment to support leveling both ends of the cylinder, and remove pin 2 and pin 1.

e. With the assistance of lifting equipment, slowly and carefully remove the leveling cylinder to avoid damage caused by the collision between the leveling cylinder and the connecting rod.

f. Use a suitable plug to block the connector of the lower leveling cylinder balancing valve to prevent dust and other pollutants from entering the oil line.

5.2.3.2 Inspection

a. Inspect the shaft pin for wear, scratches, taper, ovality or other damage and replace the pin if necessary.

b. Inspect the inner ring of the bearing for scratches, distortion, wear or other damage and replace the bearing if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

⚠CAUTION

Refer to the Pin and Bearing Inspection Instructions in the Section 3 for pin and bearing inspection.

5.2.3.3 Installation

a. Follow the reverse steps of disassembly. The interface of the hydraulic pipe joint and balance valve before installation should be cleaned to prevent contaminants from entering the hydraulic system.

b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

c. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.2.4 Lifting cylinder

5.2.4.1 Disassembly

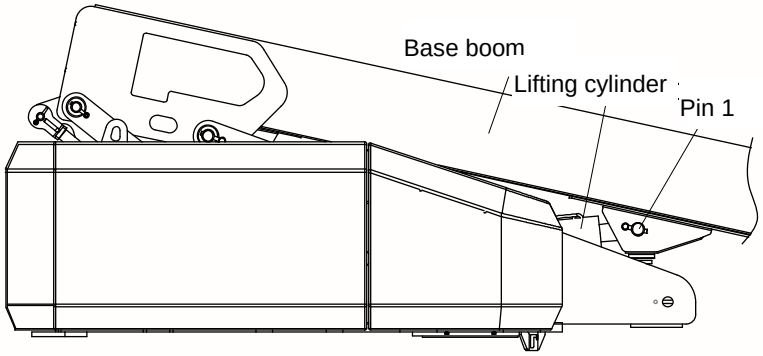


Figure 5-6 Lifting cylinder disassembly diagram

a. Adjust the boom to the minimum angle, the weight of the boom assembly is supported by the turntable and the connecting rod, and the lifting cylinder is under no force.

b. Mark and disconnect the hydraulic pipeline connected to the lifting cylinder, collect the hydraulic oil in the pipeline with a suitable container, and block the port of the pipeline after the collection.

c. Remove the pin 1 of the base boom connected to the lifting cylinder.

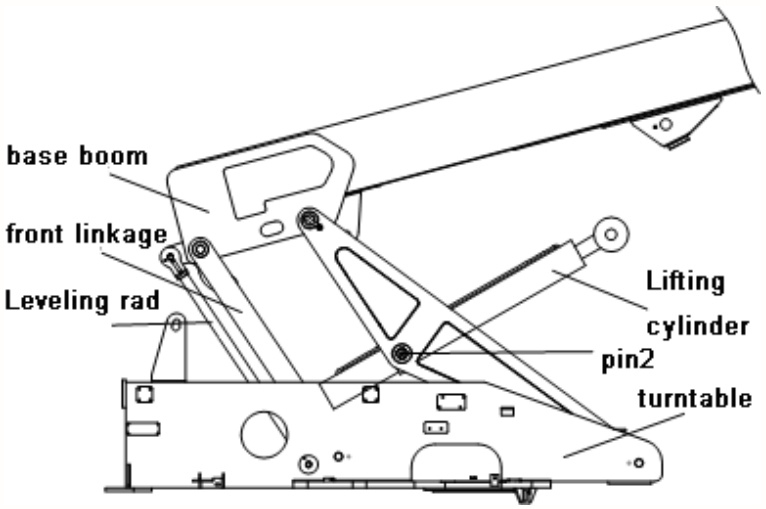


Figure 5-7 Lifting cylinder disassembly diagram

d. Use suitable lifting equipment to support the luffing cylinder near the end of the pin.

e. Use the lifting equipment to support the boom to make the boom slowly swing upward, and adjust the support of the swing cylinder at the same time. During the boom swing upward, one end of the swing cylinder pin will be separated from the base boom.Continue to lift the boom until the pin 2 is completely exposed and in a position that is easy to disassemble.

f. Use suitable lifting equipment to support the lifting cylinder near the end of pin 2 and remove pin 2.

g. With the assistance of lifting equipment, slowly and carefully take out the lifting cylinder to avoid damage from the collision between the luffing and the connecting rod.

h. Plug the connector of the lifting cylinder with a suitable plug to prevent dust and other pollutants from entering the oil circuit.

5.2.4.2 Inspection

a. Inspect the shaft pin for wear, scratches, taper, ovality or other damage and replace the pin if necessary.

b. Inspect the inner ring of the bearing for scratches, distortion, wear or other damage and replace the bearing if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

⚠CAUTION

Refer to the Pin and Bearing Inspection Instructions in the Section 3 for pin and bearing inspection.

5.2.4.3 Installation

a. Follow the reverse steps of disassembly. The interface of the hydraulic pipe joint and balance valve before installation should be cleaned to prevent contaminants from entering the hydraulic system.

b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

c. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.2.5 Boom

5.2.5.1 Disassembly

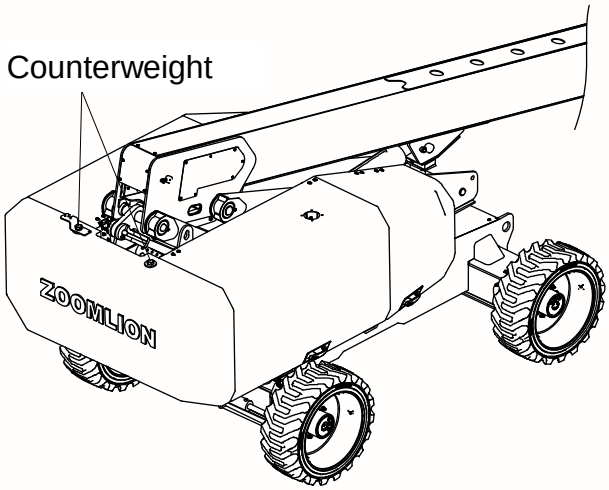


Figure 5-8 Counterweight disassembly diagram

Tilt hazard

DANGER

The steps of removing the boom include removing the counterweight. Failure to remove the counterweight before removing the boom assembly may cause the device to tip over. Therefore, Please do not remove the boom assembly without removing the counterweight.

DANGER

Tilt hazard

When installing the boom, the boom assembly should be assembled first, followed by the counterweight, otherwise the equipment may tip over, causing the risk of personal injury and equipment loss.

DANGER

Tilt hazard

The counterweight plays a vital role in the stability of the equipment.After the boom assembly is installed, if the weights are incorrectly assembled, there will be a risk of instability and tipping of the equipment, causing personal injury and property damage.

WARNING

Risk of personal injury or death

The disassembly of the boom assembly requires personnel with specialized maintenance skills, lifting equipment and a suitable plant. Without special skills and special tools, disassembly of the boom may cause personal injury or serious damage to the equipment. Repair of the boom system must be done by after-sales service.

a. Insert the locking pin to prevent the turntable from turning.

b. Remove the work platform, jib, energy chain, leveling cylinder and hood, please follow the removal steps.

c. Fully retract the boom.

d. Use suitable wood to support the rear link (cross the wood across the turntable and place it between the turntable and the rear link).

e. Use suitable wood to support the front link (cross the wood across the turntable and place it between the turntable and the front link).

f. Slowly lower the boom's lifting angle until the front and rear links are in contact with the wood. Do not support all the weight of the boom assembly by wood. Turn off the device.

g. Use suitable lifting equipment (lifting weight greater than 7t/15432lb) to connect the lifting point of the counterweight to support the counterweight.

h. Loosen the bolts connecting the counterweight to the turntable, slowly and carefully remove the counterweight from the equipment, and place it on the hard ground reliably.

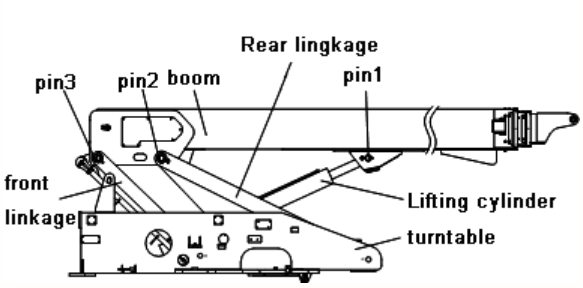


Figure 5-9 Disassembly of the boom assembly

a. Mark and disconnect the wiring harness connected to the sensor and the hydraulic pipeline connected to the oil cylinder in the boom, collect the hydraulic oil in the pipeline with a suitable container, and block the port of the pipeline after the collection.

b. Use suitable lifting equipment (lifting weight greater than 5t/11023lb) to support the head and tail of the boom.But no lifting force is applied.

c. Use appropriate lifting equipment to support the luffing cylinder near the piston rod end and protect it from damage.

d. Remove pin 1.

⚠WARNING

Extrusion hazard.When the lifting cylinder piston rod end pin shaft is removed, if the boom support fails, the boom will fall down, causing personal injury and equipment damage.When removing this pin, keep personnel away from the area under the boom.

a. The standby power is used to drive the boom lowering function, so that the lifting cylinder is retracted to the head of the piston rod and can be better supported on the boom support base of the turntable. With the assistance of lifting equipment, support the end of the luffing cylinder piston rod on the arm support and protect it.

b. Remove the bolts of the rear link and the front link lock pin. Use lifting equipment to adjust the boom to release the pin force acting between the boom and the connecting rod.

c. Remove the pin 2 and pin 3 that connect the connecting rod to the boom, slowly and carefully remove the boom assembly from the turntable and place it on a suitable support.

⚠WARNING

Extrusion hazard.

If the lifting equipment fails to reliably support the boom assembly, when the pin is removed or disassembled, the boom may fall and cause personal injury and equipment damage. When removing, keep personnel away from the area near the boom.

5.2.5.2 Inspection

a. Inspect the shaft pin for wear, scratches, taper, ovality or other damage and replace the pin if necessary.

b. Inspect the inner ring of the bearing for scratches, distortion, wear or other damage and replace the bearing if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

⚠CAUTION

Refer to the Pin and Bearing Inspection Instructions in the Section 3 for pin and bearing inspection.

5.2.5.3 Installation

a. Follow the reverse steps of disassembly. The interface of the hydraulic pipe joint and balance valve before installation should be cleaned to prevent contaminants from entering the hydraulic system.

b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.2.6 Telescopic cylinder

5.2.6.1 Disassembly

⚠CAUTION

The telescopic oil cylinder must be removed with the boom fully retracted.

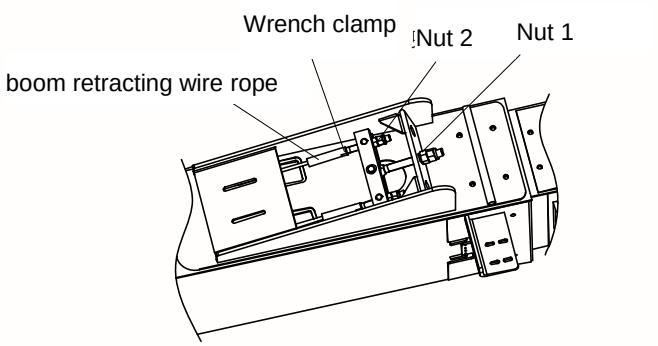


Figure 5-10 Removal view of the retractable boom rope balancing mechanism

a. Fully retract the boom.

b. Use suitable tools to remove the nut 1 so that the retracted wire rope is in a relaxed state.

c. Use a suitable wrench to be clamped on the wrench, and remove the nut 2.

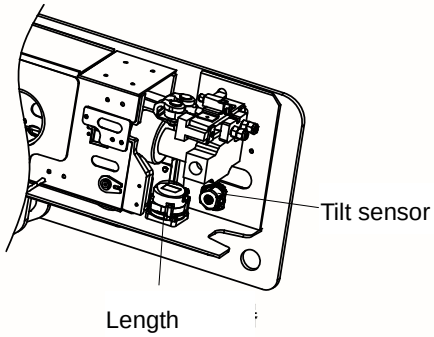


Figure 5-11 Sensor disassembly diagram

d. Remove the length sensor and the inclination sensor installed at the end of the boom (Note: the pipeline at the end of the boom has been removed).

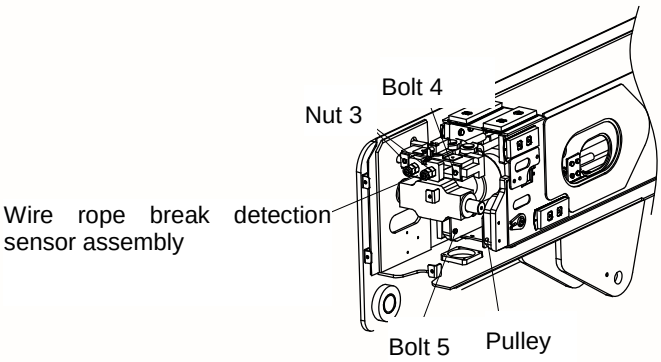


Figure 5-12 Disassembly of the wire rope sensor assembly

e. Use a suitable tool to loosen nut 3, but do not remove nut 3.

f. Remove the bolt 4 and pull out the wire rope break detection sensor assembly in the direction of the boom tail. When the component leaves the mounting base, move the component toward the head of the boom (make the outrigger wire rope in a relaxed state), and place the wire rope break detection sensor component on the telescopic oil cylinder.

g. Remove the bolt 5 and remove the pulley cover.

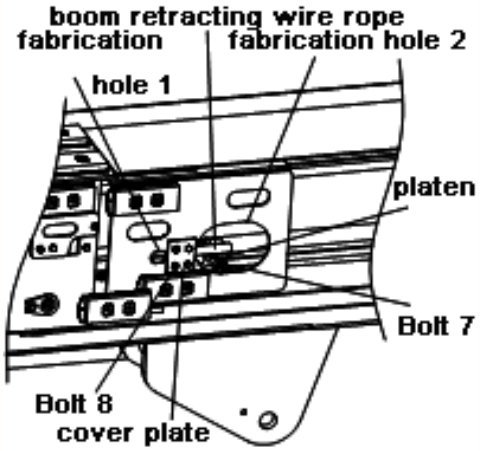


Figure 5-13 Removal of the retractable rope seat

h. Remove bolt 6 and remove the retractable wire rope limit cover. Move the retracted wire rope to the outside of the boom and place it near the fabrication hole 1 to release the shield of the retracted wire rope head from the fabrication hole 2.

i. Within the scope of the fabrication hole 2, remove the bolt 7 and remove the pressure plate.

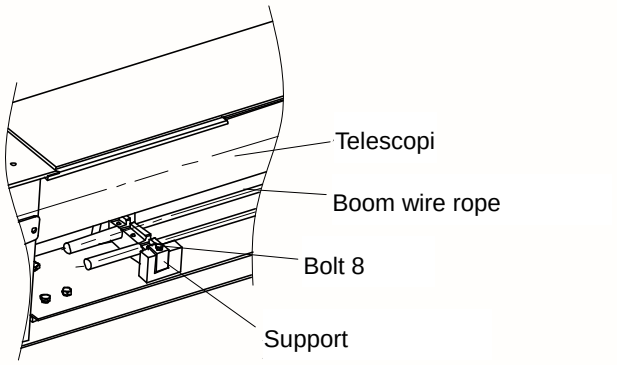


Figure 5-14 Removal of the extending rope seat

j. Take out the outrigger wire rope, remove the bolt 8 and take out the support through the fabrication hole 2.

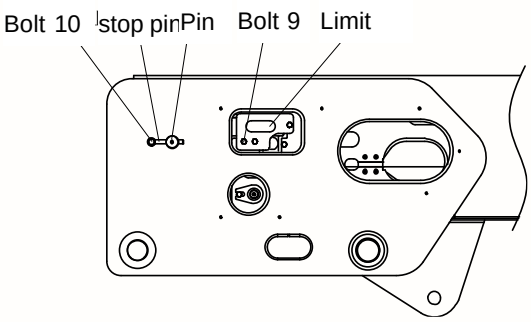


Figure 5-15 Disassembly of the pin of the telescopic cylinder

k. Remove the bolt 9 and remove the limit block.

l. Remove the bolt 10 and the stopper pin, and pull out the pin shaft with a suitable tool.

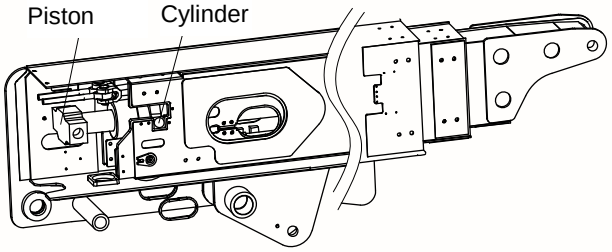


Figure 5-16 Disassembly of the pin of the telescopic cylinder

m. Use suitable lifting equipment to support the piston rod seat, and slowly and carefully lift the telescopic cylinder up until the cylinder pin leaves the pin slot.

n. With the support of the lifting equipment, slowly and carefully move the telescopic cylinder out towards the tail of the boom.

o. Use lifting equipment to support the two ends of the telescopic oil cylinder, and slowly move the telescopic oil cylinder to a suitable support frame.

⚠WARNING

Extrusion hazard.

If the lifting equipment fails to reliably support the telescopic oil cylinder, the telescopic oil cylinder may fall when disassembling the telescopic oil cylinder, resulting in personal injury and equipment damage. When disassembling, keep personnel away from the area near the telescopic cylinder.

5.2.6.2 Inspection

a. Inspect the shaft pin for wear, scratches, taper, ovality or other damage and replace the pin if necessary.

b. Inspect the inner ring of the bearing for scratches, distortion, wear or other damage and replace the bearing if necessary.

c. Inspect all threaded parts for damage such as stretching, thread deformation or distortion and replace if necessary.

⚠CAUTION

Refer to the Pin and Bearing Inspection Instructions in the Section 3 for pin and bearing inspection.

5.2.6.3 Installation

a. Follow the reverse steps of disassembly. The interface of the hydraulic pipe joint and balance valve before installation should be cleaned to prevent contaminants from entering the hydraulic system.

b. A hydraulic system pipe joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

c. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.2.7 Wire rope pulley disassembly

⚠CAUTION

When replacing the wire rope, the pulleys need to be replaced simultaneously.

5.2.7.1 Disassembly

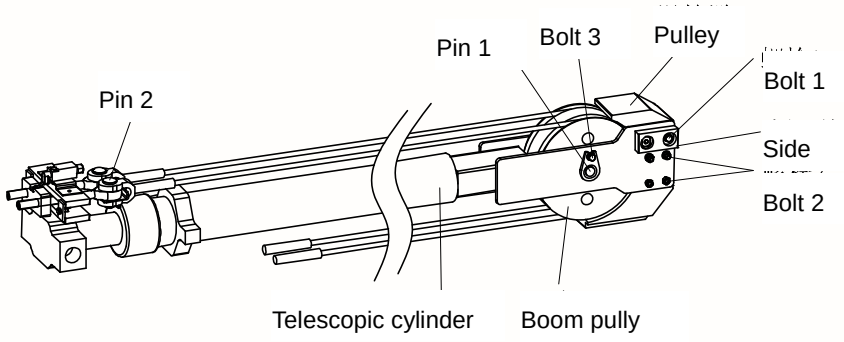


Figure 5-17 Removal of the extending boom wire rope

a. To remove the telescopic oil cylinder, please refer to the telescopic oil cylinder removal steps.

b. Remove the bolt 1 and remove the side slider.

c. Remove the bolt 2 and take down the wheel cover.

d. Use appropriate tools to disassemble pin 2 and disconnect the extending boom wire rope from the wire rope fracture inspection sensor assembly.

e. Remove the extending boom wire rope from the telescopic oil cylinder.

f. Remove the bolt 3, use a suitable tool to remove the pin 1, and remove the extending boom pulley.

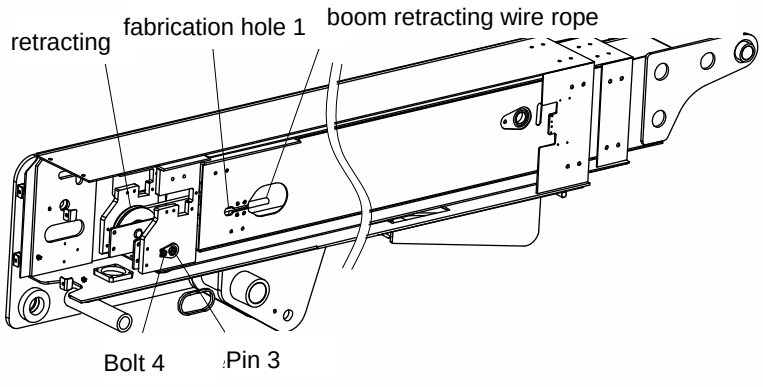


Figure 5-18 Removal of the retracting boom wire rope

g. Remove the bolt 4, use a suitable tool to pull out the pin 3, and take out the retractable boom pulley from the end of the base boom.

h. Pull the rope head of the retractable wire rope placed on the inner side of the three-joint boom to the outside, pass through the fabrication hole 1, and pull out the retractable wire rope from the tail of the base boom.

Note: retracted boom rope installed at the bottom (platform end) of the boom have been removed.

5.2.7.2 Inspection

a. Inspect the wire rope for damage, especially if the wire rope is broken at the valley and joints.

⚠CAUTION

When the wire rope is in a tight state, the valley break may be exposed.

b. Check whether the wire rope is corroded.

c. Check whether the rope is tangled or misused.

⚠CAUTION

Install or operate the wire rope not as required, and make the wire rope rotate around its own axis, which may cause tangling when tensioning the wire rope.

d. Inspect the extended and retracted wire rope pulley bearings for wear, scratches, or other damage, and for ovality. Replace bearings if necessary.

e. Inspect the extending wire rope and retracted wire rope pulley pin for scratches, tapers, and ovality. Replace pin if necessary.

f. Inspect all pulleys for excessive wear, grooves, burrs, or other damage. Replace pulley if necessary. Use a groove abrasion meter to check whether the pulley is excessively worn.

g. The inspected wire rope should be lubricated with wire rope lubricant before reinstallation.

5.2.7.3 Installation

a. Please follow the reverse steps of disassembly, the wire rope needs to be lubricated with wire rope lubricant before installation.

b. Threaded fasteners should be tightened in place according to the torque values in Section 2 Specifications.

5.2.8 Wire rope and pulley check

5.2.8.1 Daily inspection

Before operation:

a. Fully retract the boom.

b. Extending and retracting the boom.

c. Check for delays and irregularities in the expansion and contraction of the three-section boom. If a delay occurs, the wire rope is loose.

5.2.8.2 Three months check

a. Remove the tail cover of the base boom and the cover of the side fabrication hole, and use a flashlight to visually inspect the wire rope for rust, damage, wear, misuse and other abnormal phenomena.

b. Pull the wire rope manually to check the tightness of the wire rope. The tensioned wire rope has almost no lateral displacement.

5.2.8.3 12 years or 7000 hours replacement

a. After 12 years or 7000 hours of use, the wire rope and pulley must be replaced compulsorily.

b. The ropes and pulleys need to be inspected more often if:

1) The machine is exposed to harsh environments.

2) The boom operation is not smooth or there is abnormal noise.

3) The machine is idle for a long time.

4) The boom is overloaded or holds shock load.

5) The boom is exposed to an arc, and the inside of the wire rope may fuse together.

5.2.8.4 Additional replacement criteria

⚠CAUTION

Pulleys and wire ropes must be replaced in sets.

a. Wire rope is rusted or corroded.

b. Wire rope tangled, "knotted" or wrinkled.

c. The adjustment of the steel wire rope has reached the limit adjustment range and cannot be adjusted further.

d. The pulley fails to pass the wear gauge inspection.

e. Six wires break in one wire rope, or three wires break in one wire rope, or one valley breaks, or one break occurs at the wire rope joint.

5.2.8.5 Wire rope fastening

a. Adjust the boom to the horizontal fully retracted attitude, and adjust the initial extension lengths A and B of the boom as required. The allowable error of A and B is ±5mm/0.197in.

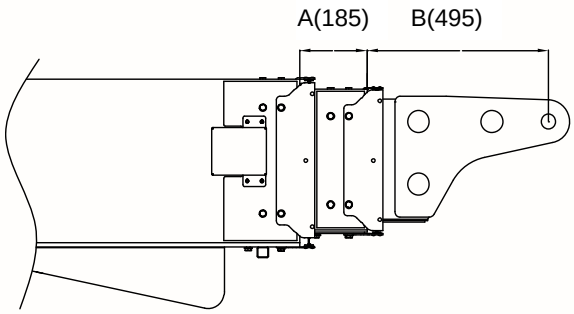


Figure 5-19 Initial extension of boom

b. Clamp the rope head to prevent the rope from rotating.

⚠CAUTION

Do not pinch the threads when tightening, otherwise the threads may be damaged. When tightening, clamp the end of the wire rope near the thread to prevent the wire rope from rotating, otherwise it will cause damage to the wire rope.

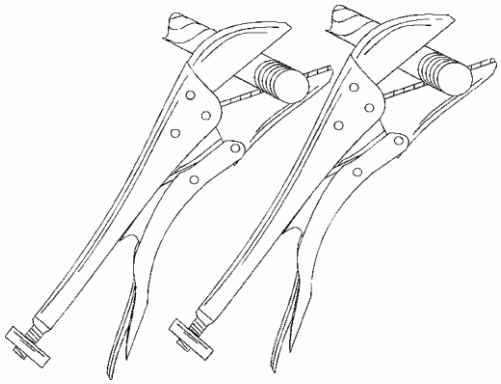


Figure 5-20 Clamping the rope

c. Install adjusting nuts on the outrigger and retracting arm ropes (if readjusting, remove the nylon sleeve lock nut).

d. At the same time, pre-tighten the nuts of the outrigger and retract arms, and the torque does not exceed 20Nm/15ftlb.

e. Adjust the nut of the retractable wire rope so that the swing boom is parallel to the base boom vertical plate (during use, if the swing arm is not parallel to the vertical plate, it can be determined that the retractable wire rope is loose).

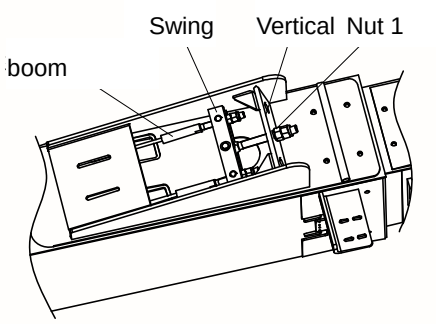


Figure 5-21 Swing boom parallel

f. Tighten the two nuts of the extending boom wire rope alternately, and use a torque wrench to tighten the nuts of the extending boom wire rope to 25 ~ 30Nm/18~22ftlb (note that the roller of the travel switch should be placed in the center of the groove of the support when tightening).

g. Tighten the nut 1 of the retractable boom rope M20, and use a torque wrench to tighten the nut of the retractable boom rope to 55 ~ 60Nm/40~44ftlb.

h. Enable the boom telescopic function and extend the boom 1 ~ 1.5m/3.28~4.92ft.

i. Torque of shortened boom rope M20 nut 1 to 55 ~ 60Nm/40~44ftlb.

j. Enable the boom telescopic function, make the boom retract about 0.5 ~ 0.8m/1.64~2.62ft first (do not retract the telescopic cylinder to the extreme position), and extend the boom again to the position of 1 ~ 1.5m/3.28~4.92ft.

k. Check the torque of the retracted boom rope nut 1. If the torque is less than 55Nm, repeat steps i and j, and check again until the torque reaches the standard.

⚠CAUTION

To make the torque on all 4 ropes the same, steps i and j may need to be repeated.

l. After all wire ropes are properly tightened, install nylon sleeve lock nuts. Remove all clamping devices and install all covers and guards. Check whether the boom function is normal.

5.3 Load Cell Check

Please follow the steps below to operate the device to adjust the load cell:

a. Set the device to the following status position:

   1) **Boom-lower.**

   2) Telescopic-retract.

   3) Jib-adjusted to 0 °.

   4) Turntable-turn to 0 °.

   5) Platform level-level to 0 °.

   6) Platform Rotation-Rotate to 0 °.

   7) Load in platform-remove all load items.

   8) The machine is on a hard, level surface.

b. Start the ground and platform emergency stop switches and turn the key switch to the platform position.

c. Remove all payloads from the work platform, including the operator.

d. At this time, the load cell can be adjusted to calibrate the zero position of the weighing.

e. After calibrating the zero point position, increase the load on the work platform to 454kg/1000lb to full load.

f. Under the overload condition, the overload indicator of the platform and the ground is continuously lit, and the alarm is issued.

g. Remove load items from the platform.

h. The load cell adjustment is completed.

5.4 Boom Tilt Sensor Check

a. Keep the working platform unloaded.

b. Retract the boom to the extreme position and raise the boom to a horizontal position.

c. Use an angle tester to measure the boom angle to zero degrees and calibrate the zero position of the boom angle sensor.

d. Confirm that the angle of the boom on the display is zero degrees.

e. Ground mode operates the boom lifting function, and the boom angle value on the display changes.

5.5 Calibration of boom length sensor

a. Keep the working platform unloaded.

b. Lift the boom to the horizontal position, and retract the boom to the extreme position.

c. Calibrate the zero position of the boom length sensor, and record the initial value of the boom length on the display screen.

d. Extend the boom 1m, record the length of the boom on the display screen.

e. Compare the boom length values twice. The absolute value should be 1m.

5.6 Check of Wire Rope Damage Indication System

a. A limit switch is installed at the end of the boom to detect the loose state of the wire rope.

b. When the wire rope is loose, the limit switch will be triggered, and the wire rope will be alarmed.

c. When the steel wire rope is loose and alarmed, the telescopic function of the operation boom is:

The boom is forbidden to extend, only the turtle can retract quickly.

d. Tighten the steel wire rope according to the tightening requirements.

e. Make sure that there is no alarm for loose wire rope on the display. At this time, the boom telescopic function can be operated normally.

5.7 Beyond the stowed position-limited speed check

a. Start the unit in platform mode and adjust the device to the favorite position.

b. Select “ground rabbit speed” for engine speed, turn the function speed knob to rabbit speed.

c. Operate the travel function. At this time, the two-speed valve will open to enable the high-speed travel function.

d. Retracted the boom to the stowed position, and the turntable is turned to the stowed position.

e. Raise the boom beyond the stowed position (the boom lifting angle exceeds 7).

f. Operate the travel function, at this time the two-speed valve will be closed, and the high-speed travel function cannot be enabled.

g. Operate the boom to retract to the stowed position, and lower the boom to the stowed position.

h. Turn the turntable beyond the rear wheel position.

i. Operate the travel function, at this time the two-speed valve will be closed, and the high-speed travel function cannot be enabled.

j. Lower the boom to the stowed position, and the turntable is turned to the stowed position.

k. Extend the boom over 1m/3.28ft.

l. Operate the travel function, at this time the two-speed valve will be closed, and the high-speed travel function cannot be enabled.

⚠CAUTION

Wear a seat belt when performing a speed limit check.

Do not lift the boom to an excessively high position for testing, and pay attention to driving safety to avoid accidents.

ZOOMLION

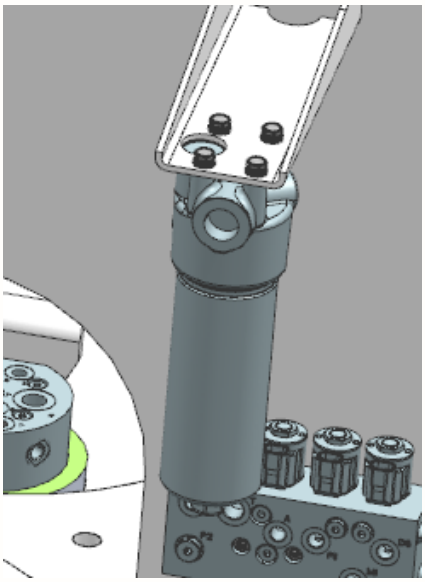
Service and Maintenance Manual

Section 6 Hydraulic and Electrical System Maintenance

SECTION 6 HYDRAULIC AND ELECTRICAL SYSTEM MAINTENANCE

6.1 Hydraulic Filter Maintenance

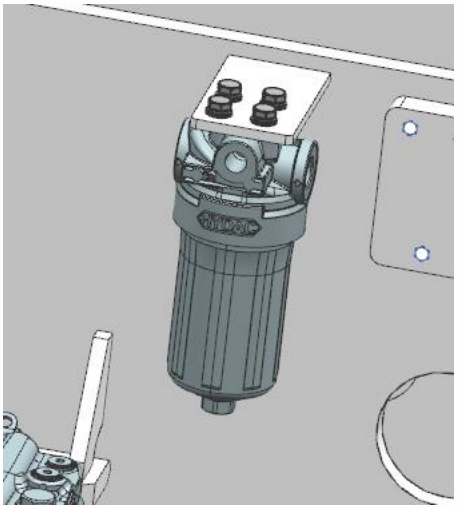
6.1.1 High pressure filter



Time intervals

Run for the first time for 50 hours, and the filter element should be replaced every 300 hours thereafter.

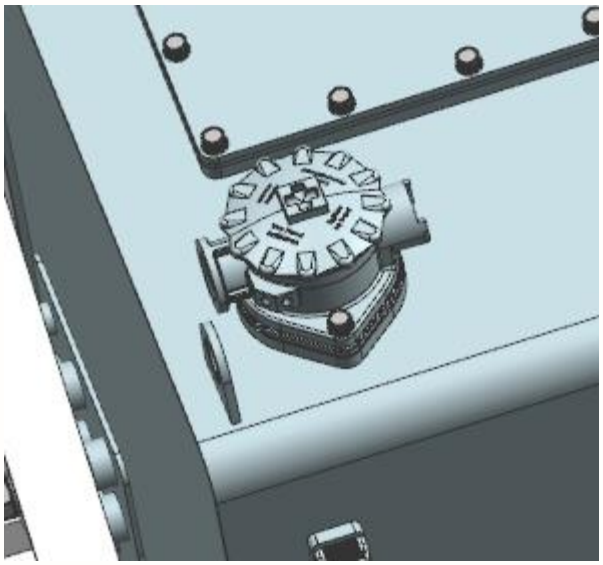
6.1.2 Oil filling filter



Time intervals

Run for the first time for 50 hours, and the filter element should be replaced every 300 hours thereafter.

6.1.3 Return oil filter



Time intervals

Run for the first time for 50 hours, and the filter element should be replaced every 300 hours thereafter.

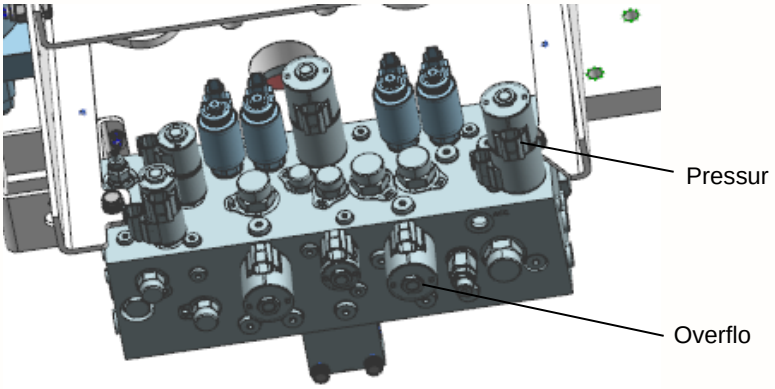
6.2 Pressure Setting

Low temperatures can seriously affect the accuracy of pressure gauge readings. Preheat the hydraulic system to normal operating temperature before starting the unit when testing the pressure. Recommend to use a calibrated pressure gauge. Acceptable only if the pressure reading is within ± 5% of the specified pressure. To ensure that all pressure settings are correct, the following operating procedures must be strictly followed:

a. Install a pressure measuring connector on the "M" port of the main valve group and connect the pressure gauge.

b. Start the boom lowering function, the meter reading should be 210 bar/3046psi.

c. The relief valve is located below the M port and rotates clockwise to increase pressure and counterclockwise to reduce pressure.



6.3 Starting Procedure

6.3.1 Drive pump oiling

Machine without hydraulic oil cooler:

When filling hydraulic oil, fill it all the way to the top of the tank. This creates sufficient outlet pressure from the hydraulic tank to fill the housing that drives the pump. Excess hydraulic fluid will be used to fill the individual cylinders during start-up. Failure to do this will cause the pump to dry start, which will reduce the efficiency of the pump and may cause premature damage.

Machines with hydraulic oil cooler:

Remove the drain pipe on the port of the outer casing of the pump, and plug the oil pipe with a plug. Fill the drive pump housing with hydraulic oil, and then reinstall the drain pipe, and then the hydraulic oil to the top of the tank. Fill each cylinder during startup. Failure to do this will cause the pump to dry start, which will reduce the efficiency of the pump and may cause premature damage.

6.3.2 Exhaust air in the pump inlet pipe

A large amount of air trapped in the pipeline should be discharged under low pressure conditions. There are two ways to discharge air from the tubing under low pressure conditions.

a. On the main control valve, remove the 3 / 4-inch/19mm tubing from port "P1", and then remove the 1-inch/25.4mm tubing from port "T". Use 12-16 connectors to connect them together. Start the machine and let it run for about 10 seconds. Shut down, remove the 12-16 converter, and reconnect the tubing.

b. Remove the 3 / 4-inch/19mm tubing from port "P1", place it in a 15L/3.96us gal bucket, and start the machine.The air should be expelled quickly (several seconds). Turn off the machine and reconnect the tubing.

⚠CAUTION

a. If a new functional pump is installed, steps "1" and "2" are required.

b. If a new functional pump is installed, the oil inlet pipe is connected without draining a large amount of oil from the oil pipe, and a large vacuum is generated in the pipe, and the operation of step "2" is not required.

c. When operating a function such as raising the boom, if the function pump generates a lot of noise, and it stops moving when the function is raised, it means that there is cavitation. Air passes the function pump under high pressure, which will damage the function in a short time Pump, and pollute the entire system.Ensure that all oil inlet lines are tight and that there are no leaks from the fuel tank and pump.

6.4 Fault code

When the unit fails, check the fault message indicated by the display on the ground console.If the display on the ground console indicates the following fault code, remove the fault condition and restart the device before continuing operation.

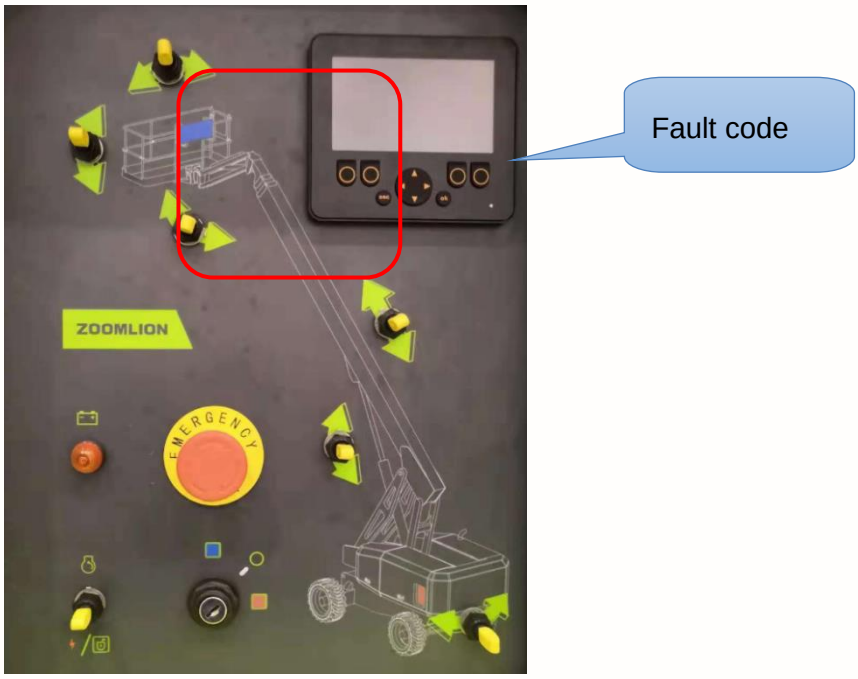


Table 6-1 Fault code

Classification	Fault code	Fault code list
Battery	22001	DTC_SYSTEM_LOW_VOLTAGE
	22002	DTC_SYSTEM_OVER_VOLTAGE
CAN bus	24021	DTC_CANBUS_FAULT_PM2GM
	22022	DTC_CANBUS_FAULT_Engine2GM
	22023	DTC_CANBUS_FAULT_HMI2GM
Engine	22051	DTC_GENERATOR_FAULT
	22052	DTC_ENGINE_HIGH_TEMP
	22053	DTC_LOW_OIL_PRESSURE
	22054	DTC_LOW_FUEL
	22055	DTC_FUEL_CUT_OFF
	22056	DTC_LOW_COOLANT_LEVEL
	22057	DTC_ENGINE_START_FAULT
	22058	DTC_THROTTLE_MOTOR_FAULT
Sensor	14151	DTC_LOAD_SENSOR_NOT_STANDARDIZATION
	14152	DTC_LOAD_CELL_COMM_ERROR

Table 6-1 Fault code(continuous)

Classification	Fault code	Fault code list
Sensor	24153	DTC_FAULT_PLATFORM_HIT_GROUND
	11154	DTC_INCLINE_SENSOR_OUT_OF_RANGE
	11155	DTC_INCLINE_SENSOR_COMM_ERROR
	11156	DTC_INCLINE_SENSOR_NOT_STANDARDIZATION
	13157	DTC_BOOM_ANGLE_SENSOR_OUT_OF_RANGE
	13158	DTC_BOOM_ANGLE_SENSOR_COMM_ERROR
	13159	DTC_BOOM_ANGLE_SENSOR_NOT_STANDARDIZATION
	13160	DTC_FAULT_LIFT_WIRE_ROPE_SENSOR_LOOSE
	22161	DTC_FAULT_SWING_SENSOR
	14162	DTC_FAULT_PM_TOWER_LIFT_SWITCH_DOUBLE_POWER_ON
	13163	DTC_BOOM_ANGLE_SINGAL_REDUNDANCY
	13164	DTC_BOOM_LENGTH_SENSOR_NO_RESPOND
	13165	DTC_BOOM_LENGTH_SENSOR_ERROR_DETECTION
	14166	DTC_LEVELING_SENSOR_COMM_ERROR
	13167	DTC_BOOM_LENGTH_SENSOR_REDUNDANCY
	32168	DTC_FAULT_AIR_FILTER_SENSOR
	32169	DTC_FAULT_OIL_WATER_SEPARATION_SENSOR
	32170	DTC_FAULT_HYDRAULIC_OIL_FILTER_SENSOR
	14175	DTC_FAULT_LOAD_SENSOR_OUT_RANGE
Switch/handle	22351	DTC_FAULT_UG_FUNCTION_SWITCH_CLOSED
	24352	DTC_FAULT_PM_FUNCTION_SWITCH_CLOSED
	12353	DTC_FAULT_UG_MAIN_LIFT_SWITCH_DOUBLE_POWER_ON
	12355	DTC_FAULT_UG_JIB_SWITCH_DOUBLE_POWER_ON
Switch/handle	12356	DTC_FAULT_UG_TELESCOPE_DOUBLE_POWER_ON
	22357	DTC_FAULT_UG_ROTATE_SWITCH_DOUBLE_POWER_ON
	12358	DTC_FAULT_UG_LEVELING_SWITCH_DOUBLE_POWER_ON
	22359	DTC_FAULT_UG_SWING_SWITCH_DOUBLE_POWER_ON
	22360	DTC_FAULT_UG_ENGINE_SWITCH_DOUBLE_POWER_ON
	14361	DTC_FAULT_PM_MAIN_LIFT_JOYSTICK_DOUBLE_POWER_ON
	14363	DTC_FAULT_PM_JIB_SWITCH_DOUBLE_POWER_ON
	14364	DTC_FAULT_PM_TELESCOPE_DOUBLE_POWER_ON

Table 6-1 Fault code(continuous)

Classification	Fault code	Fault code list
Switch/handle	24365	DTC_FAULT_PM_ROTATE_SWITCH_DOUBLE_POWER_ON
	14366	DTC_FAULT_PM_LEVELING_SWITCH_DOUBLE_POWER_ON
	24367	DTC_FAULT_PM_SWING_JOYSTICK_DOUBLE_POWER_ON
	24368	DTC_FAULT_PM_ENGINE_SWITCH_DOUBLE_POWER_ON
	14369	DTC_FAULT_PM_DRIVE_JOYSTICK_DOUBLE_POWER_ON
	14370	DTC_FAULT_PM_STEER_JOYSTICK_DOUBLE_POWER_ON
	14371	DTC_FAULT_UG_FOOTSWITCH_CLOSED
	14372	DTC_FAULT_FOOTSWITCH_FUNCTION
	14373	DTC_FAULT_PM_DRIVE_DIRECTION_CONFIRM_SWITCH
	24374	DTC_FAULT_PM_DRIVE_SPEED_GEER_SWITCH
	24375	DTC_FAULT_PM_SWING_JOYSTICK_UP_LIMIT
	24376	DTC_FAULT_PM_SWING_JOYSTICK_DN_LIMIT
	24377	DTC_FAULT_PM_SWING_JOYSTICK_MEDIUM_OFFSET
	24378	DTC_FAULT_PM_MAIN_LIFT_JOYSTICK_UP_LIMIT
	24379	DTC_FAULT_PM_MAIN_LIFT_JOYSTICK_DN_LIMIT
	24380	DTC_FAULT_PM_MAIN_LIFT_JOYSTICK_MEDIUM_OFFSET
	24381	DTC_FAULT_PM_DRIVE_JOYSTICK_UP_LIMIT
	24382	DTC_FAULT_PM_DRIVE_JOYSTICK_DN_LIMIT
Switch/handle	24383	DTC_FAULT_PM_DRIVE_JOYSTICK_MEDIUM_OFFSET
	24384	DTC_FAULT_PM_STEER_JOYSTICK_UP_LIMIT
	24385	DTC_FAULT_PM_STEER_JOYSTICK_DN_LIMIT
	24386	DTC_FAULT_PM_STEER_JOYSTICK_MEDIUM_OFFSET
	22389	DTC_FAULT_KEY_SWITCH
Valve	22551	DTC_DRIVE_FORWARD_VALVE_SHORT_TO_GROUND
	12552	DTC_DRIVE_FORWARD_VALVE_SHORT_TO_POWER
	22553	DTC_DRIVE_FORWARD_VALVE_OPEN_CIRCUIT
	22554	DTC_DRIVE_REVERSE_VALVE_SHORT_TO_GROUND
	12555	DTC_DRIVE_REVERSE_VALVE_SHORT_TO_POWER
	22556	DTC_DRIVE_REVERSE_VALVE_OPEN_CIRCUIT
	22557	DTC_DRIVE_FORWARD_VALVE_FEEDBACK_CURRENT_FAULT
	22558	DTC_DRIVE_REVERSE_VALVE_FEEDBACK_CURRENT_FAULT

Table 6-1 Fault code(continuous)

Classification	Fault code	Fault code list
Valve	21559	DTC_FLOAT_CONTROL_VALVE_SHORT_TO_GROUND
	21560	DTC_FLOAT_CONTROL_VALVE_SHORT_TO_POWER
	21561	DTC_FLOAT_CONTROL_VALVE_OPEN_CIRCUIT
	21562	DTC_BRAKE_VALVE_SHORT_TO_GROUND
	11563	DTC_BRAKE_VALVE_SHORT_TO_POWER
	21564	DTC_BRAKE_VALVE_OPEN_CIRCUIT
	21565	DTC_2SPEED_VALVE_SHORT_TO_GROUND
	21566	DTC_2SPEED_VALVE_SHORT_TO_POWER
	21567	DTC_2SPEED_VALVE_OPEN_CIRCUIT
	22568	DTC_STEER_LEFT_VALVE_SHORT_TO_GROUND
	12569	DTC_STEER_LEFT_VALVE_SHORT_TO_POWER
	22570	DTC_STEER_LEFT_VALVE_OPEN_CIRCUIT
	22571	DTC_STEER_RIGHT_VALVE_SHORT_TO_GROUND
	12572	DTC_STEER_RIGHT_VALVE_SHORT_TO_POWER
	22573	DTC_STEER_RIGHT_VALVE_OPEN_CIRCUIT
	22574	DTC_SWING_LEFT_VALVE_SHORT_TO_GROUND
	22575	DTC_SWING_LEFT_VALVE_SHORT_TO_POWER
	22576	DTC_SWING_LEFT_VALVE_OPEN_CIRCUIT
	22577	DTC_SWING_RIGHT_VALVE_SHORT_TO_GROUND
	22578	DTC_SWING_RIGHT_VALVE_SHORT_TO_POWER
	22579	DTC_SWING_RIGHT_VALVE_OPEN_CIRCUIT
	22624	DTC_JIB_FLOW_VALVE_SHORT_TO_GROUND
	22625	DTC_JIB_FLOW_VALVE_SHORT_TO_POWER
	22626	DTC_JIB_FLOW_VALVE_OPEN_CIRCUIT
	22627	DTC_MAIN_LIFT_UP_FLOW_VALVE_SHORT_TO_GROUND
	22628	DTC_MAIN_LIFT_UP_FLOW_VALVE_SHORT_TO_POWER
	22629	DTC_MAIN_LIFT_UP_FLOW_VALVE_OPEN_CIRCUIT
	22633	DTC_MAIN_LIFT_UP_VALVE_SHORT_TO_GROUND
	12634	DTC_MAIN_LIFT_UP_VALVE_SHORT_TO_POWER
	22635	DTC_MAIN_LIFT_UP_VALVE_OPEN_CIRCUIT
	22636	DTC_MAIN_LIFT_UP_VALVE_FEEDBACK_CURRENT_FAULT
	22637	DTC_TELESCOPE_FLOW_VALVE_SHORT_TO_GROUND

Table 6-1 Fault code(continuous)

Classification	Fault code	Fault code list
Valve	22638	DTC_TELESCOPE_FLOW_VALVE_SHORT_TO_POWER
	22639	DTC_TELESCOPE_FLOW_VALVE_OPEN_CIRCUIT
	22640	DTC_TELESCOPE_FLOW_VALVE_FEEDBACK_CURRENT_FAULT
	22641	DTC_TELESCOPE_IN_VALVE_SHORT_TO_GROUND
	12642	DTC_TELESCOPE_IN_VALVE_SHORT_TO_POWER
	22643	DTC_TELESCOPE_IN_VALVE_OPEN_CIRCUIT
	22644	DTC_TELESCOPE_OUT_VALVE_SHORT_TO_GROUND
	12645	DTC_TELESCOPE_OUT_VALVE_SHORT_TO_POWER
	22646	DTC_TELESCOPE_OUT_VALVE_OPEN_CIRCUIT
	22647	DTC_SWING_FLOW_VALVE_SHORT_TO_GROUND
	22648	DTC_SWING_FLOW_VALVE_SHORT_TO_POWER
	22649	DTC_SWING_FLOW_VALVE_OPEN_CIRCUIT
	22650	DTC_SWING_FLOW_VALVE_FEEDBACK_CURRENT_FAULT
	23651	DTC_MAIN_LIFT_DN_FLOW_VALVE_SHORT_TO_GROUND
	23652	DTC_MAIN_LIFT_DN_FLOW_VALVE_SHORT_TO_POWER
	23653	DTC_MAIN_LIFT_DN_FLOW_VALVE_OPEN_CIRCUIT
	23654	DTC_MAIN_LIFT_DN_VALVE_SHORT_TO_GROUND
	13655	DTC_MAIN_LIFT_DN_VALVE_SHORT_TO_POWER
	23656	DTC_MAIN_LIFT_DN_VALVE_OPEN_CIRCUIT
	23657	DTC_MAIN_LIFT_DN_VALVE_FEEDBACK_CURRENT_FAULT
	24658	DTC_JIB_UNLOAD_VALVE_SHORT_TO_GROUND
	24659	DTC_JIB_UNLOAD_VALVE_SHORT_TO_POWER
	24660	DTC_JIB_UNLOAD_VALVE_OPEN_CIRCUIT
	24661	DTC_PM_ROTATE_LEFT_VALVE_SHORT_TO_GROUND
	24662	DTC_PM_ROTATE_LEFT_VALVE_SHORT_TO_POWER
	24663	DTC_PM_ROTATE_LEFT_VALVE_OPEN_CIRCUIT
	24664	DTC_PM_ROTATE_RIGHT_VALVE_SHORT_TO_GROUND
	24665	DTC_PM_ROTATE_RIGHT_VALVE_SHORT_TO_POWER
	24666	DTC_PM_ROTATE_RIGHT_VALVE_OPEN_CIRCUIT
	24667	DTC_PM_LEVELING_UP_VALVE_SHORT_TO_GROUND

Table 6-1 Fault code(continuous)

Classification	Fault code	Fault code list
Valve	14668	DTC_PM_LEVELING_UP_VALVE_SHORT_TO_POWER
	24669	DTC_PM_LEVELING_UP_VALVE_OPEN_CIRCUIT
	24670	DTC_PM_LEVELING_DN_VALVE_SHORT_TO_GROUND
	14671	DTC_PM_LEVELING_DN_VALVE_SHORT_TO_POWER
	24672	DTC_PM_LEVELING_DN_VALVE_OPEN_CIRCUIT
	24673	DTC_PM_LEVELING_UP_VALVE_FEEDBACK_CURRENT _FAULT
	24674	DTC_PM_LEVELING_DN_VALVE_FEEDBACK_CURRENT _FAULT
	24675	DTC_JIB_UP_VALVE_SHORT_TO_GROUND
	14676	DTC_JIB_UP_VALVE_SHORT_TO_POWER
	24677	DTC_JIB_UP_VALVE_OPEN_CIRCUIT
	24678	DTC_JIB_DN_VALVE_SHORT_TO_GROUND
	14679	DTC_JIB_DN_VALVE_SHORT_TO_POWER
	24680	DTC_JIB_DN_VALVE_OPEN_CIRCUIT
	22741	DTC_BOOM_UP_VALVE_STUCKED
	22742	DTC_BOOM_DN_VALVE_STUCKED
	24743	DTC_LEVEL_UP_VALVE_STUCKED
	24744	DTC_LEVEL_DN_VALVE_STUCKED
	33851	DTC_STEEL_WIRE_ROPE_LOOSE
	41852	DTC_DRIVE_DIRECTION_REVERSE
	24853	DTC_OVER_LOAD
	23854	DTC_RESTRICT_OR_UNRESTRICT
	24855	DTC_LEVELING_FAULT
	23856	DTC_SHORT_ROPE_FAULT
Unit Condition	23857	DTC_MAIN_LIFT_CONTROL_SYSTEM_FAULT
	41858	DTC_LOWER_SPEED_FAULT
	32859	DTC_SYSTEM_FAULT
	34860	DTC_SOFT_TOUCH_FAULT

Table 6-1 Fault code(continuous)

Classification	Fault code	Fault code list
Unit Condition	32861	DTC_ALTERNATOR_FAULT
	32862	DTC_GLOW_PLUG_FAULT
	12863	DTC_TILT_FAULT
	32864	DTC_LOW_FUEL_FAULT
	14865	DTC_ANTI_CRUSH_ALARM
	12866	DTC_SYSTEM_INITIAL_FAULT
	12867	DTC_INH_FAULT

6.5 Common Faults and Methods

Table 6-2 Common faults and methods

No.	Fault Feature	Fault Cause	Solution
1	Engine cannot start	1. Battery exhausted	Remove the battery or replace it with a new one.
		2. Operation switch or handle is not returned to neutral position	2. Return the operation switch or handle to neutral position
		3. Emergency stop button is pressed	Reset emergency stop button
		4. The main power switch is not turned on	Turn on the main power switch on the turntable
		5. Engine overheat	Shutdown and radiating
No.	**Fault Feature**	**Fault Cause**	**Solution**
1	Engine cannot start	6. Engine oil pressure excessive low	Add engine oil
		7. Low fuel level	Add fuel
2	Overload alarm	1. Platform overcapacity	1. Platform unloading
		2. Load cell communication fault	Check load cell harness or replace sensor

Table 6-2 Common faults and solutions(continuous)

3	Chassis tilt larm	1. Chassis tilt exceeds set angle	Move the device to a horizontal position
		2. Chassis inclination sensor communication failure	Check angle sensor harness or replace sensor
4	Boom system fault alarm	1. Main boom exceeds range of motion	Operate the main boom into the range of motion
		2. Main boom angle sensor communication fault	Check main boom angle sensor harness or replace sensor
		3.Boom length sensor communication failure	Check the boom length sensor harness or replace the sensor
5	Boom wire rope loose alarm	1. The boom wire rope is loose	1. Adjust the tightness of the wire rope
		2. Communication failure of wire rope loose sensor	2. Check the wire rope for loose sensor wiring harness or replace the sensor
6	Leveling system fault alarm	1.Leveling valve wiring failure	1. Check the leveling valve wiring for short circuit or open circuit
		2.Failure to level solenoid valve	2. Replace the leveling solenoid valve
7	Action cannot be performed normally	1. Whether the authorization switch is pressed	1. First operate the authorization switch, then operate the action
		2. Motion switch damaged	2. Replace switch
		3. Motion handle damaged	3. Replace handle
		4. Solenoid valve wiring open circuit failure	4. Check solenoid valve wiring
		5. Solenoid valve wiring short circuit fault	5. Check solenoid valve wiring
		6. Solenoid valve damage	6. Replace solenoid valve
8	CAN bus fault	1. CAN bus wiring failure	1. Check CAN bus wiring
		2. Controller failure	2. Replace controller

REMIND

If you encounter any equipment failure, contact Zoomlion for timely troubleshooting.

a. If there is no absolute understanding of the fault resolution, please contact Zoomlion or Zoomlion dealers to solve it.

b. It is forbidden to open the electric control cabinet to change the wire.

ZOOMLION

Service and Maintenance Manual

Section 7 Electrical Information and Schematic

SECTION 7 ELECTRICAL INFORMATION AND SCHEMATIC

7.1 General Introduction

This section introduces basic electrical information and schematics for locating and correcting most operational problems that may arise. If problems that are not listed in this section, or problems that cannot be corrected by the listed solutions, occur, you should obtain authoritative technical guidance before performing maintenance.

7.2 Multimeter Basic Operation

Various types of multimeters or Voltmeters (VOM) can be used for troubleshooting. This section lists the schematics of commonly used digital voltmeters in several different circuit measurements. Some of the content may not match your Volt table.

Please refer to the Voltmeter User Manual for details.

7.2.1 Grounding

Multimeter Grounding means connecting the black lead (connected to the COM, common pole, or negative terminal) to the negative side of the power supply with an appropriate path.

7.2.2 Backside detection

Backside Detection refers to the measurement by connecting the connector contacts on the same side of the wire, ie the rear end of the connector.In this way, the circuit is turned on to obtain a reading. If the connector is sealed, backside detection should be conducted carefully to avoid damaging the sealing material around the wire. It is best to use probes designed specifically for this technology, especially when operating on sealed connectors. Insert the detector into the side of the connector as much as possible to ensure that the test can detect both ends of the connection. The connection inside the closed connector can be detected by back detecting both sides of the connector terminal and measuring the resistance. Prior to this, the wire should be gently pulled to verify that the wire is still connected to the contacts and that the contacts are sealed in the connector.

7.2.3 Minimum value/maximum value

Intermittent load conditions can be measured separately using the Min/Max recording function of some multimeters. For example, if a certain electromagnetic coil is energized only when the switch is kept away from the coil and the multimeter, the voltage of the electromagnetic coil can be read by this function.

7.2.4 Polarity

The predicted voltage is positive and the actual voltage or current reading is negative, indicating that the

leads are reversed. Check the voltage prediction value, signal position, and whether the lead is properly connected to the device under test. Also check that the lead of the COM port is grounded or the negative signal is connected, and that the lead of the other port is connected to the positive signal.

7.2.5 Range

M = mega = 1,000,000 * (displayed number).

k = thousand = 1,000 * (displayed number).

m = milli = (displayed number) /1,000.

μ= micro = (displayed number) /1,000,000.

For example:1.2 kΩ＝1200Ω.

For example:50 mA = 0.05 amps.

7.2.6 Voltage measurement

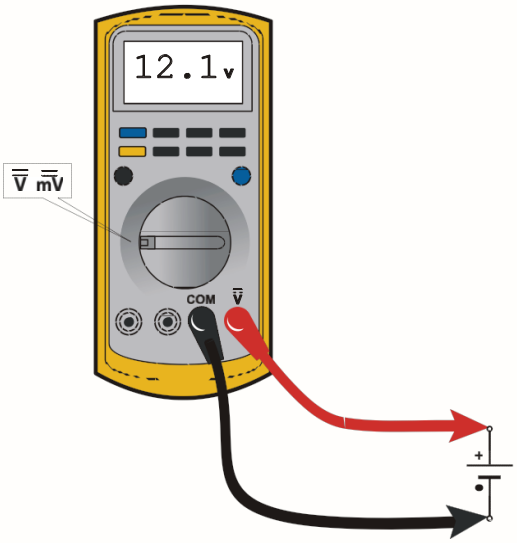


Figure 7-1 Voltage measurement (direct current)

If the multimeter cannot automatically adjust the range, set the correct range (refer to the multimeter operation manual).

Make sure the multimeter leads are securely connected.

7.2.7 Resistance measurement

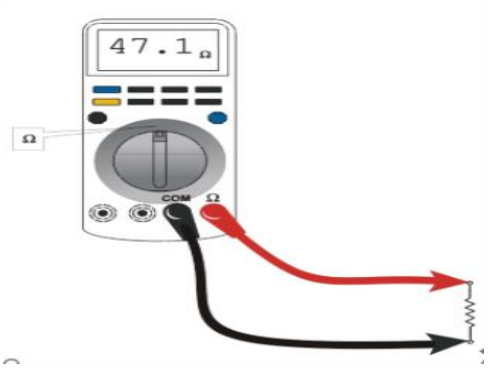


Figure 7-2 Resistance measurement

a. First test the multimeter and leads by touching the two leads. The result should show a short circuit of resistance (very low resistance).

b. The circuit power must be turned off before testing the resistor.

c. Disconnect each component from the circuit before testing.

d. If the multimeter cannot automatically adjust the range, set the correct range (refer to the multimeter operation manual).

e. Make sure the multimeter leads are securely connected.

7.2.8 Conduction test

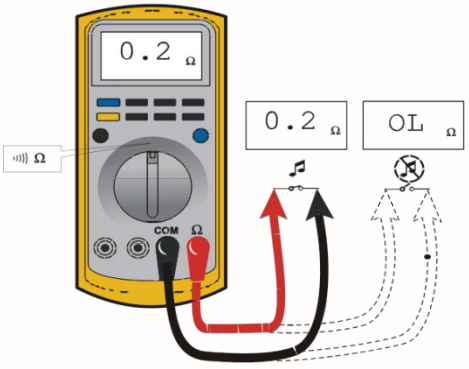


Figure 7-3 Conduction test

a. The multimeter needs to use a separate button to initiate the continuity test of the beep.

b. The circuit power must be turned off before testing the conduction.

c. Disconnect each component from the circuit before testing.

d. Make sure the multimeter leads are securely connected.

e. First test the multimeter and leads by touching the two leads. The multimeter should alarm and display continuity.

7.2.9 Current measurement

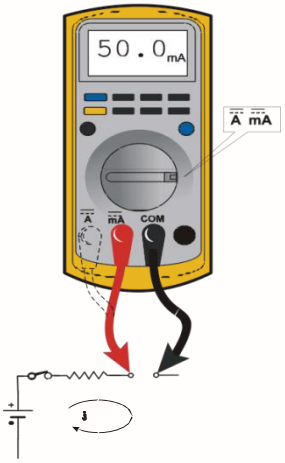


Figure 7-4 Current measurement (direct current)

a. Set the expected current range of the multimeter.

b. Verify that the multimeter leads and jacket are properly connected within the current range of your choice.

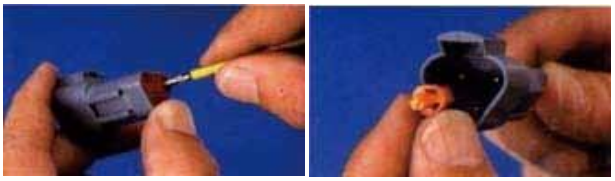
c. If the multimeter cannot automatically adjust the range, set the correct range (refer to the multimeter operation manual).

d. Make sure the multimeter leads are securely connected.

7.3 DEUTSCH Connector

7.3.1 DT/DTP series connector assembly

A B



C D

Figure 7-5 DT/DTP contact installation

a. Pinch the crimped contact about 25mm/0.984in behind the contact cylinder.

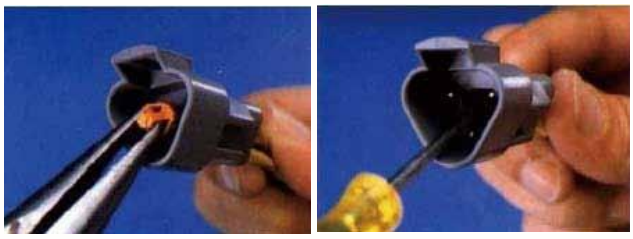
b. Hold the connector so that the rear guard ring faces toward you.

c. Push the contacts straight into the retaining ring until you hear a slight click. Gently pull to confirm that the connector is fully locked.

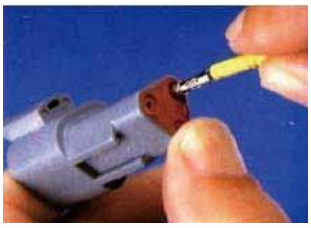
d. When all the contacts are in place, insert the wedge lock as indicated by the arrow pointing to the external locking device. The wedge lock will snap into place immediately. The rectangular wedge is non-directional. Can be used in any direction.

Note: the socket is as shown, follow the same steps to complete the plug connection.

7.3.2 DT/DTP Series Connector Disassembly



A B



C

Figure 7-6 DT/DTP contact removal

a) When disassembling, use a non-toothed nose pliers or hook line to pull the wedge locker vertically.

b) Use a screwdriver to remove the retaining finger from the contact, release the retaining finger, and gently pull the wire to remove the contact.

c) Hold the rear seal, otherwise the seal may be displaced when the contact is removed.

7.3.3 HD30/HDP20 Series Connector Assembly

A B

C

Figure 7-7 HD/HDP contact installation

a) Pinch the contact piece about 25 mm/0.984in after the crimping cylinder.

b) Hold the connector so that the rear guard ring faces toward you.

c) Push the contacts straight into the retaining ring until you hear a slight click. Gently pull to confirm that the connector is fully locked.

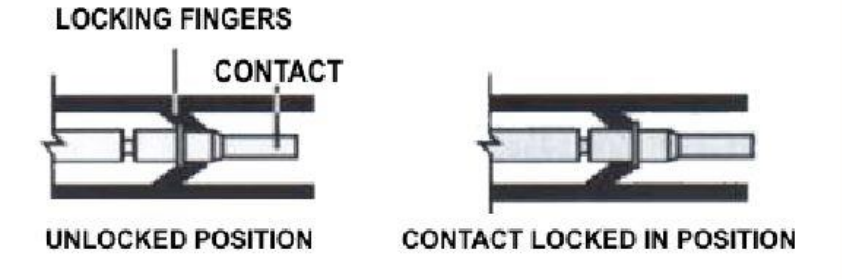


Figure 7-8 HD/HDP lock contact position

Note: for unused wire cavities, a sealing plug should be inserted to achieve complete isolation from the environment.

7.3.4 HD30/HDP20 Series Connector Removal

A B

Figure 7-9 HD/HDP contact removal

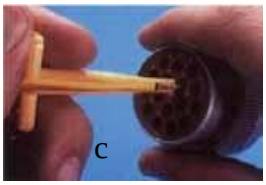


Figure 7-9 HD/HDP contact removal

a. With the rear insert facing the side, select the appropriate size of the insertion and removal tool to clamp the wire of the contact to be removed.

b. Slide the tool into the cavity of the insert until the tool catches the contact and feels stressed.

c. Pull the contact wire assembly out of the connector.

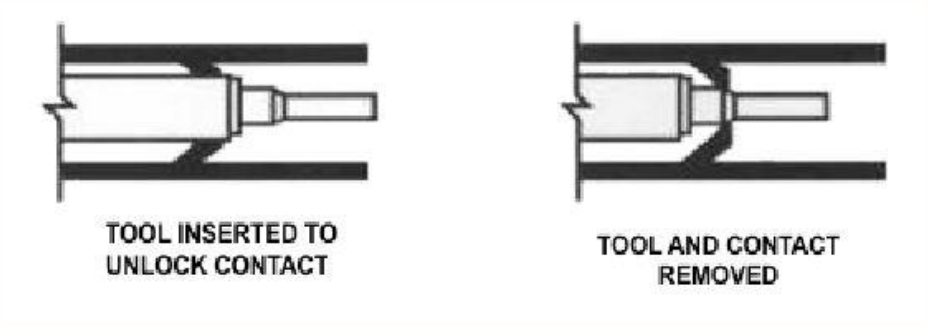


Figure 7-10 HD/HDP Unlocking contact

Note: do not twist or tilt the insertion tool.7.4 Electrical Schematics.

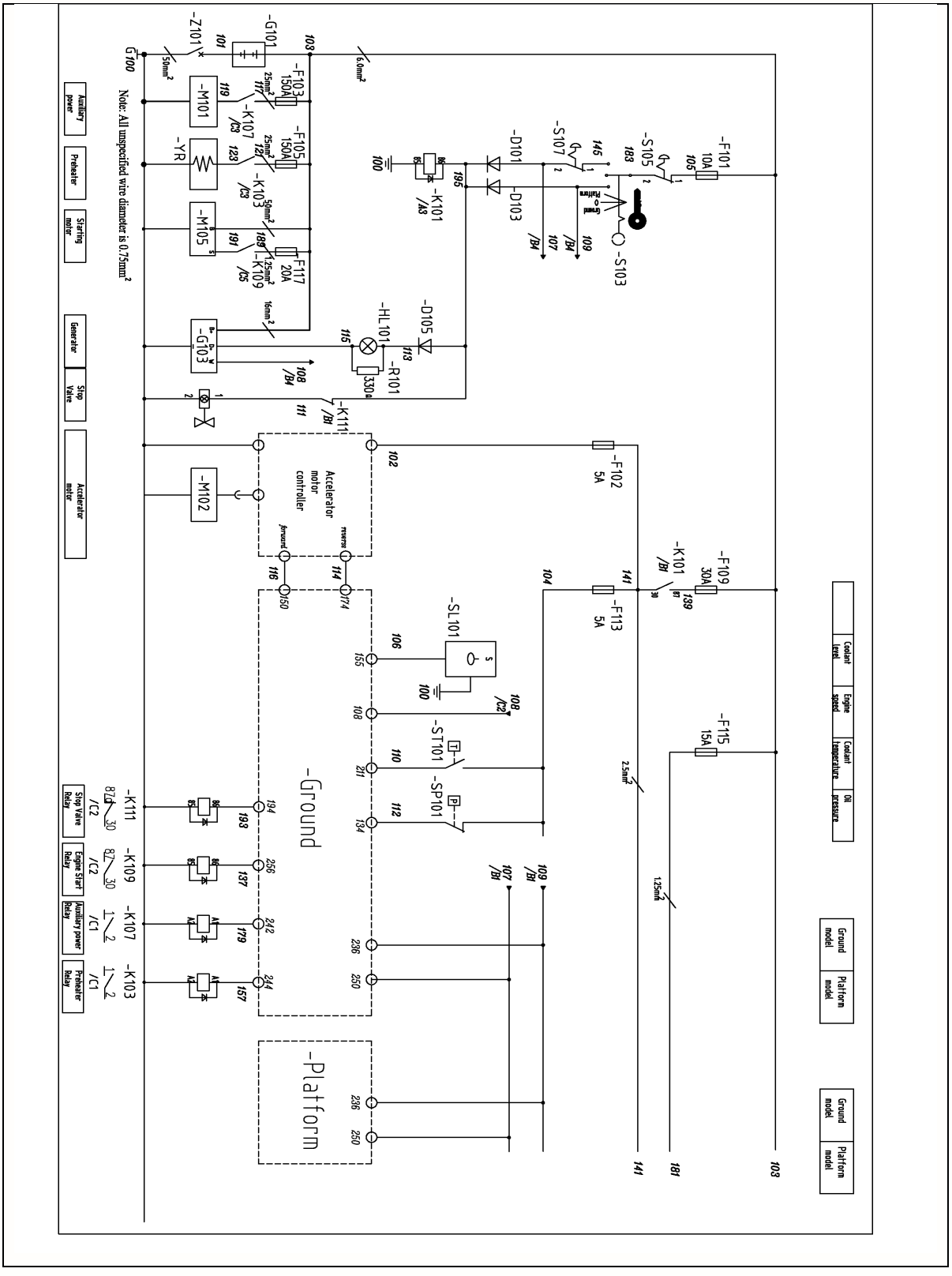


Figure 7-11 Electrical Schematics Figure 1/6-Perkins engine

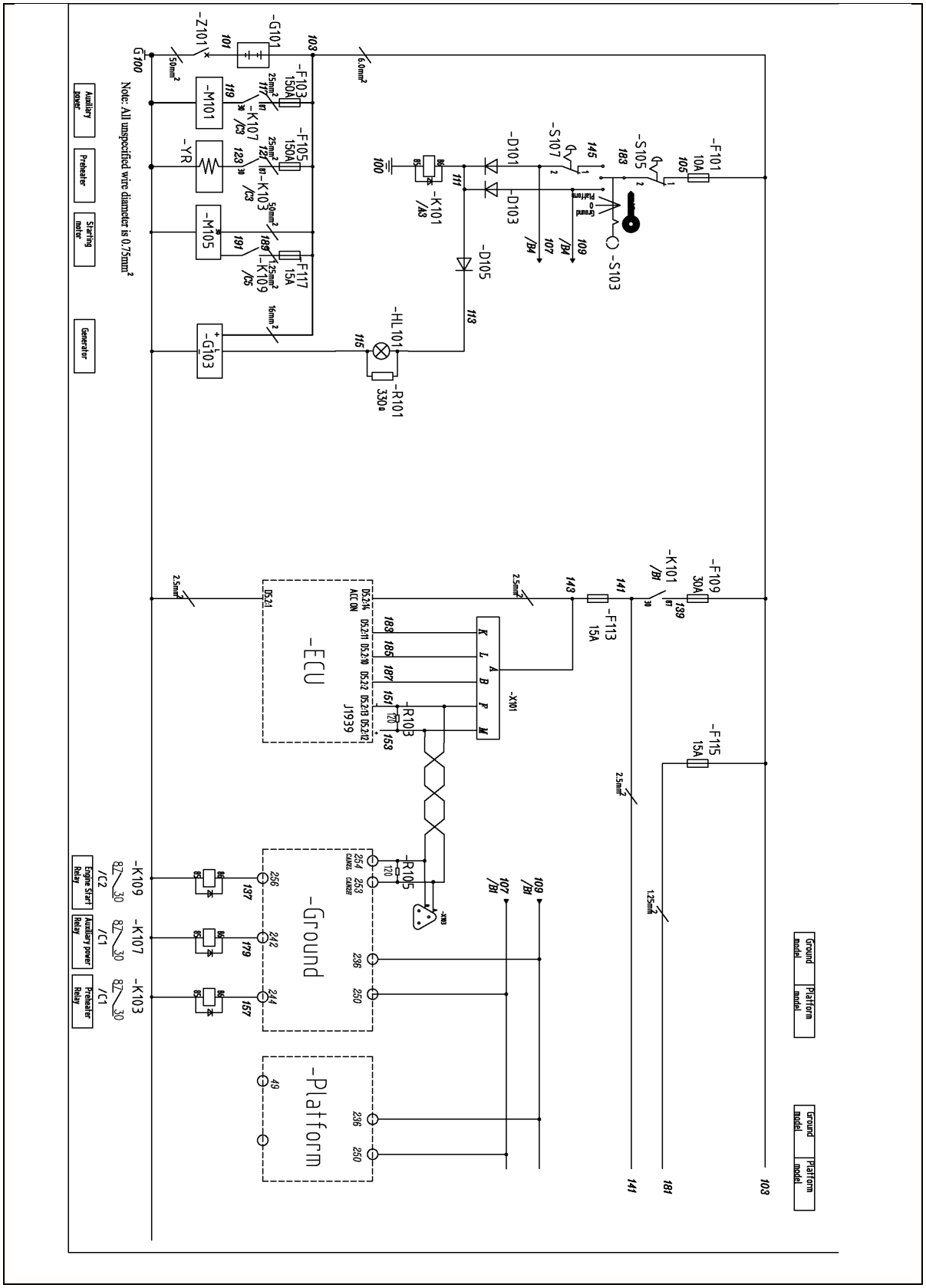


Figure 7-12 Electrical Schematics Figure 1/6-Deutz D447 engine

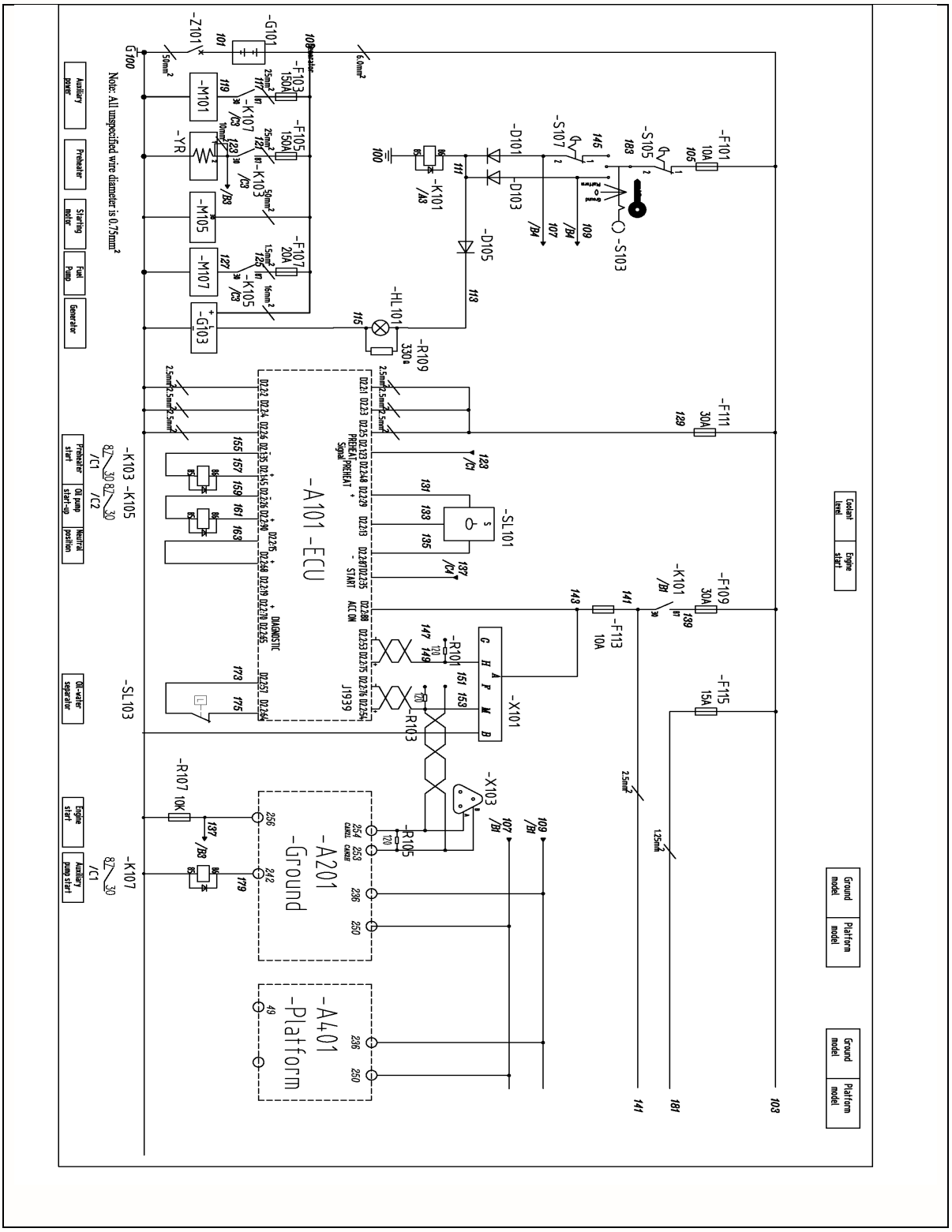


Figure 7-13 Electrical Schematics Figure 1/6-Deutz D2.9 engine

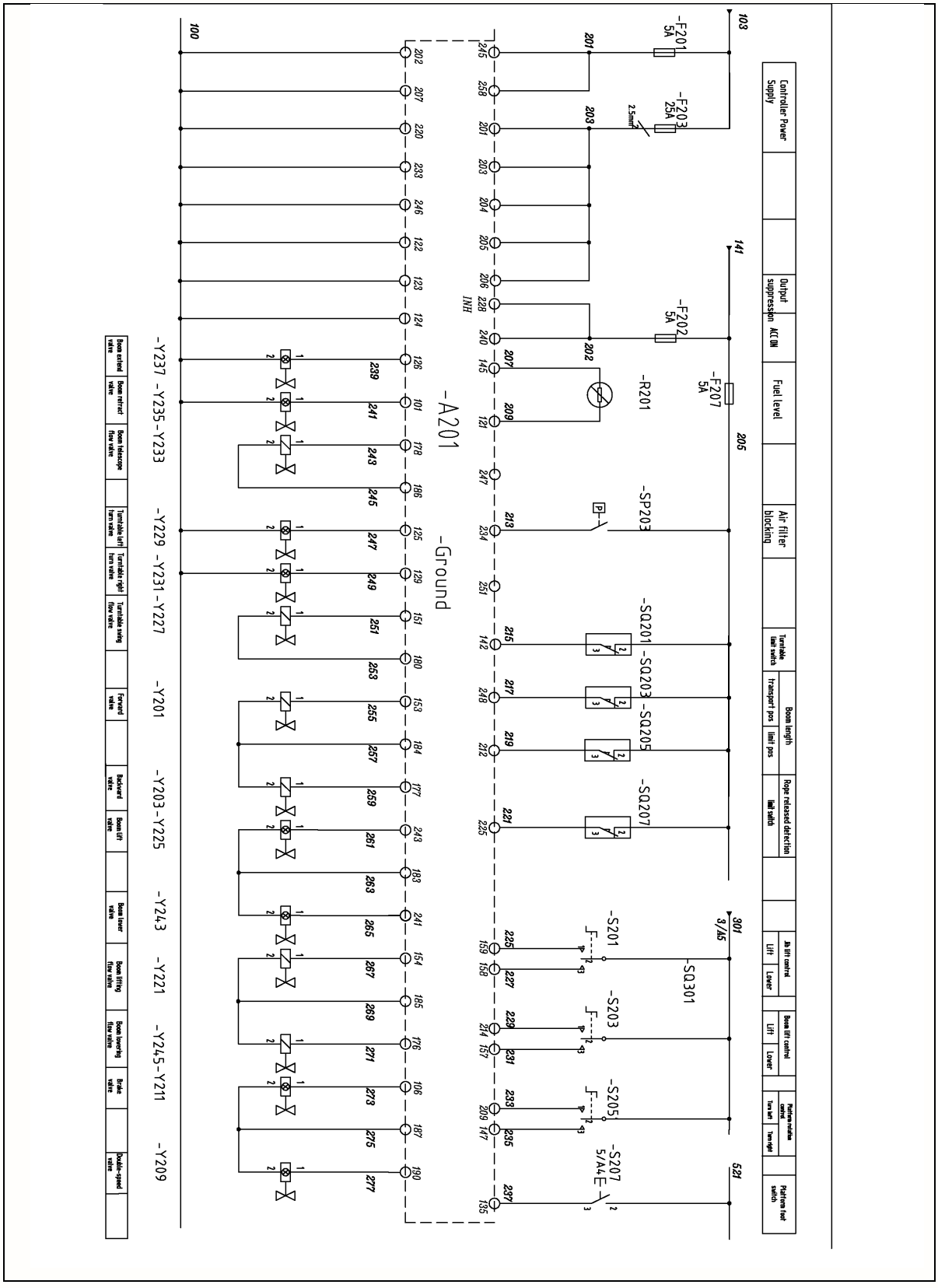


Figure 7-14 Electrical Schematics Figure 2/6

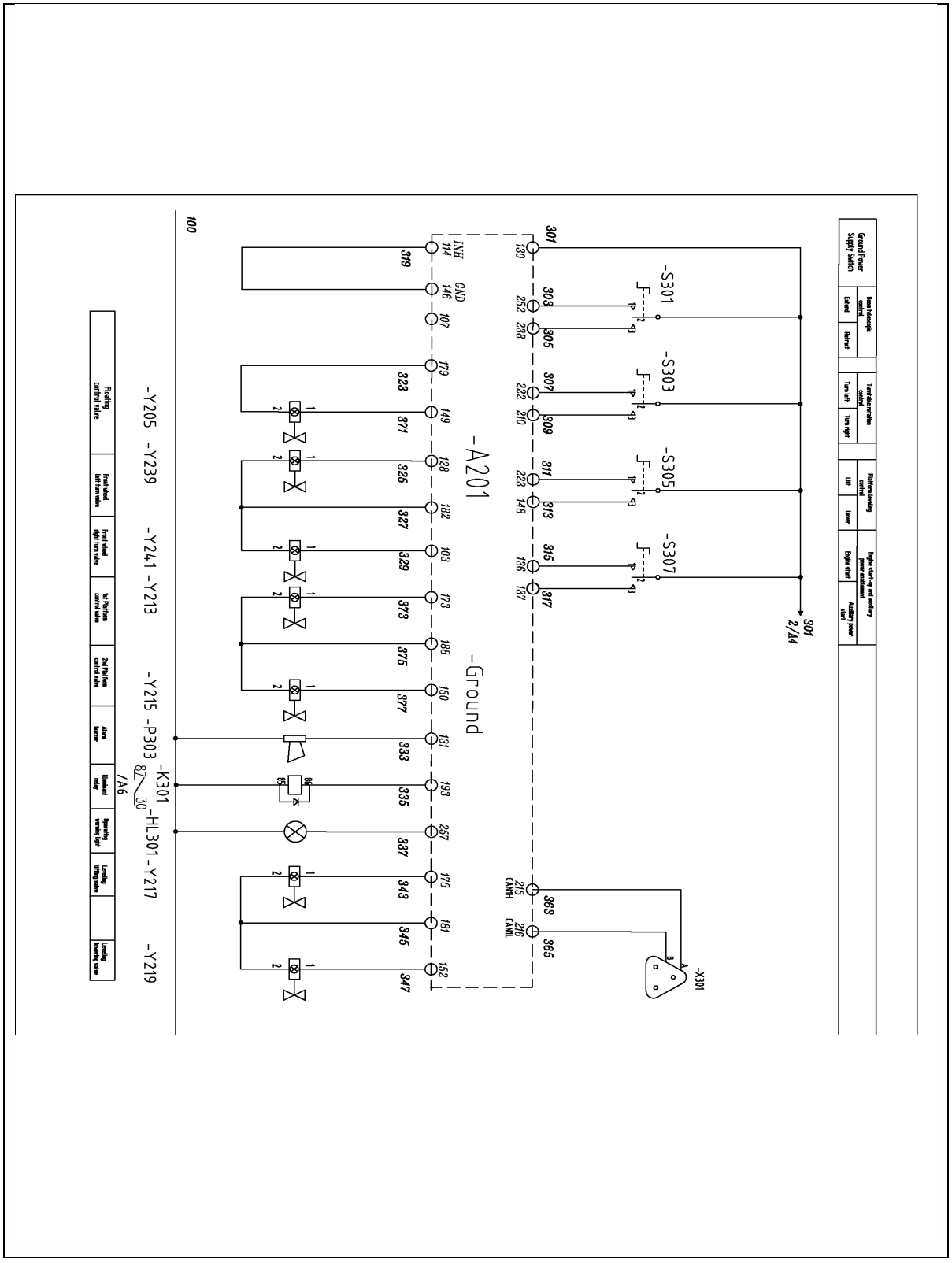


Figure 7-14 Electrical Schematics Figure 3/6

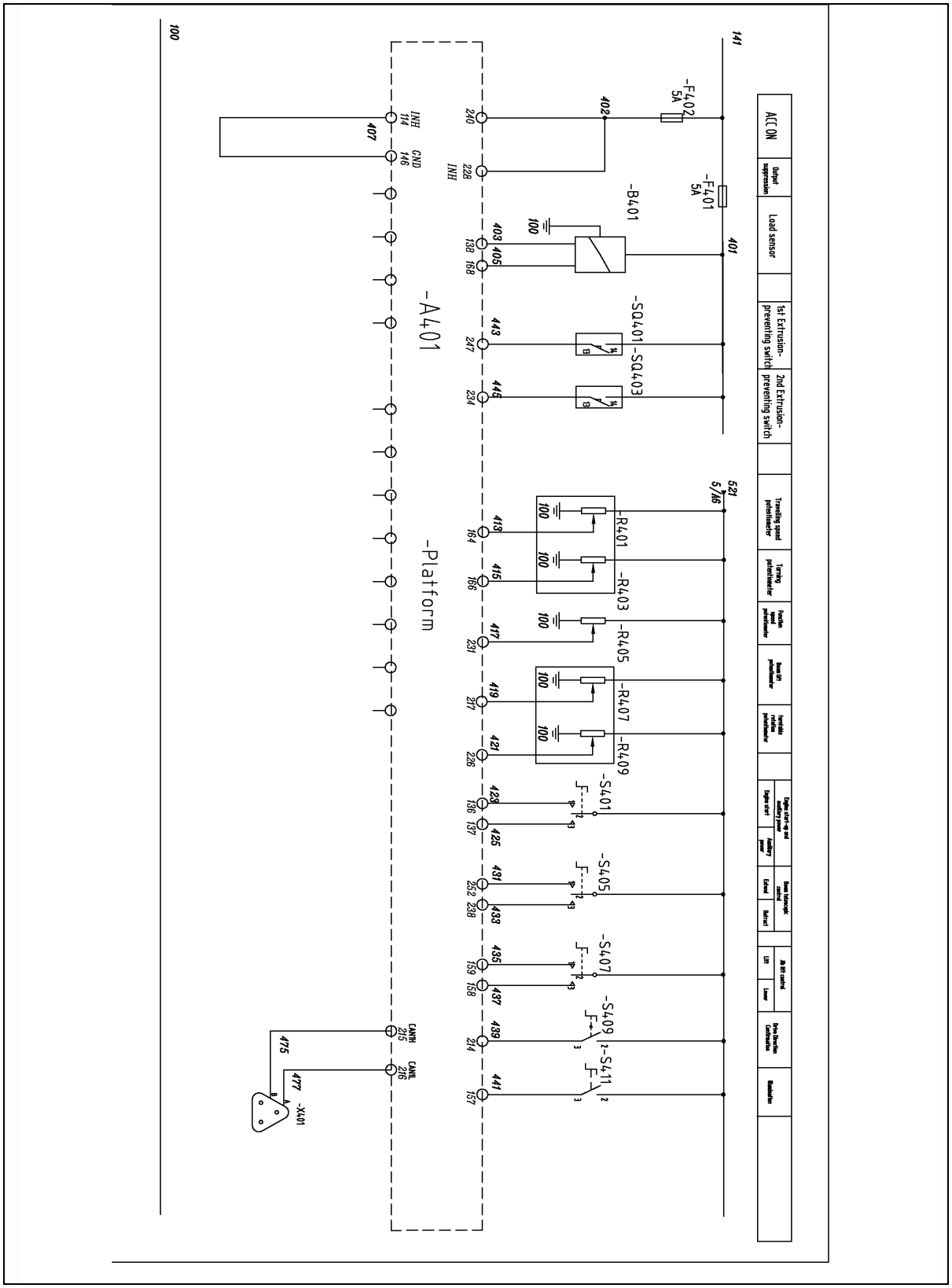


Figure 7-16 Electrical Schematics Figure 4/6

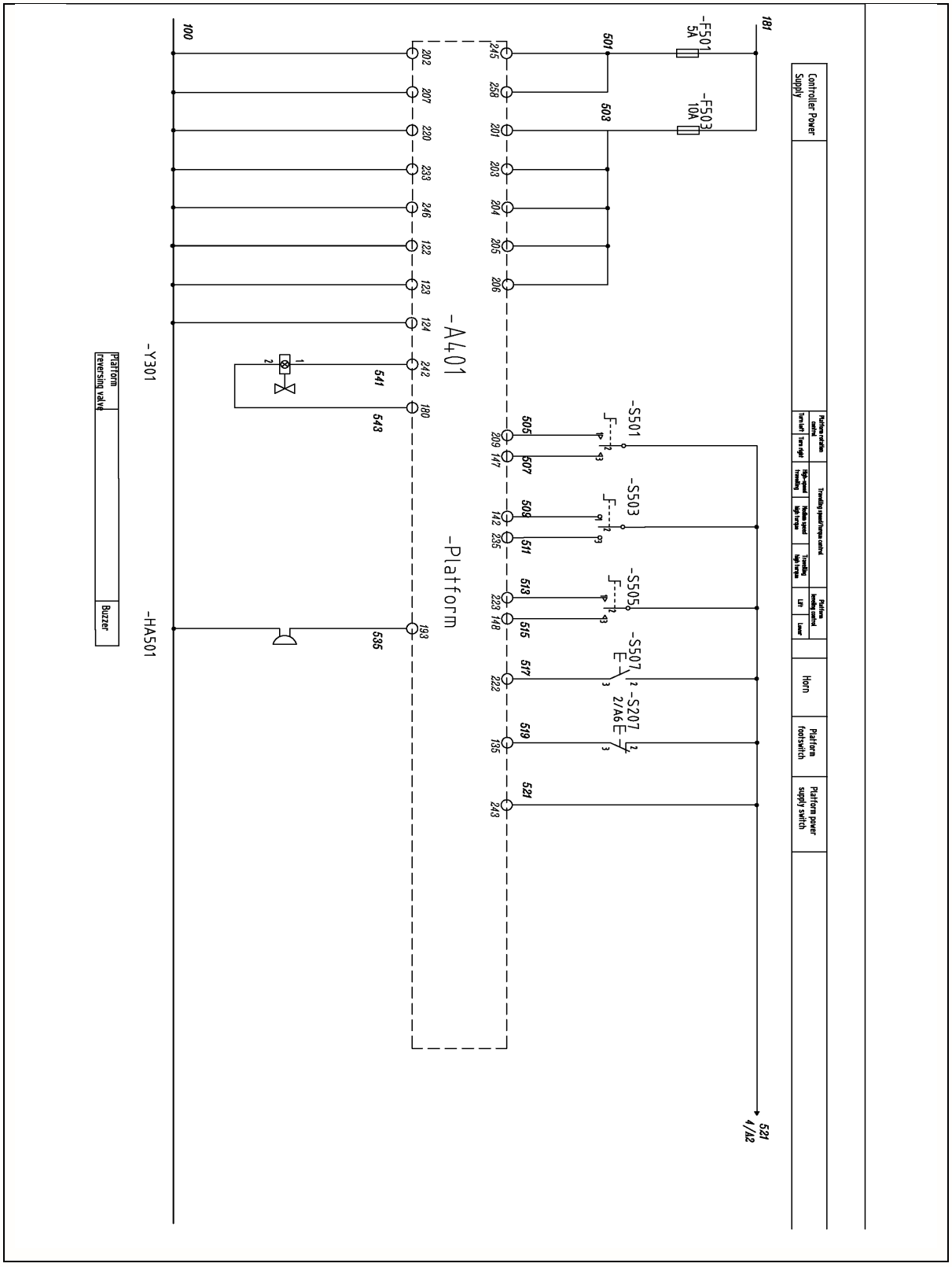


Figure 7-17 Electrical Schematics Figure 5/6

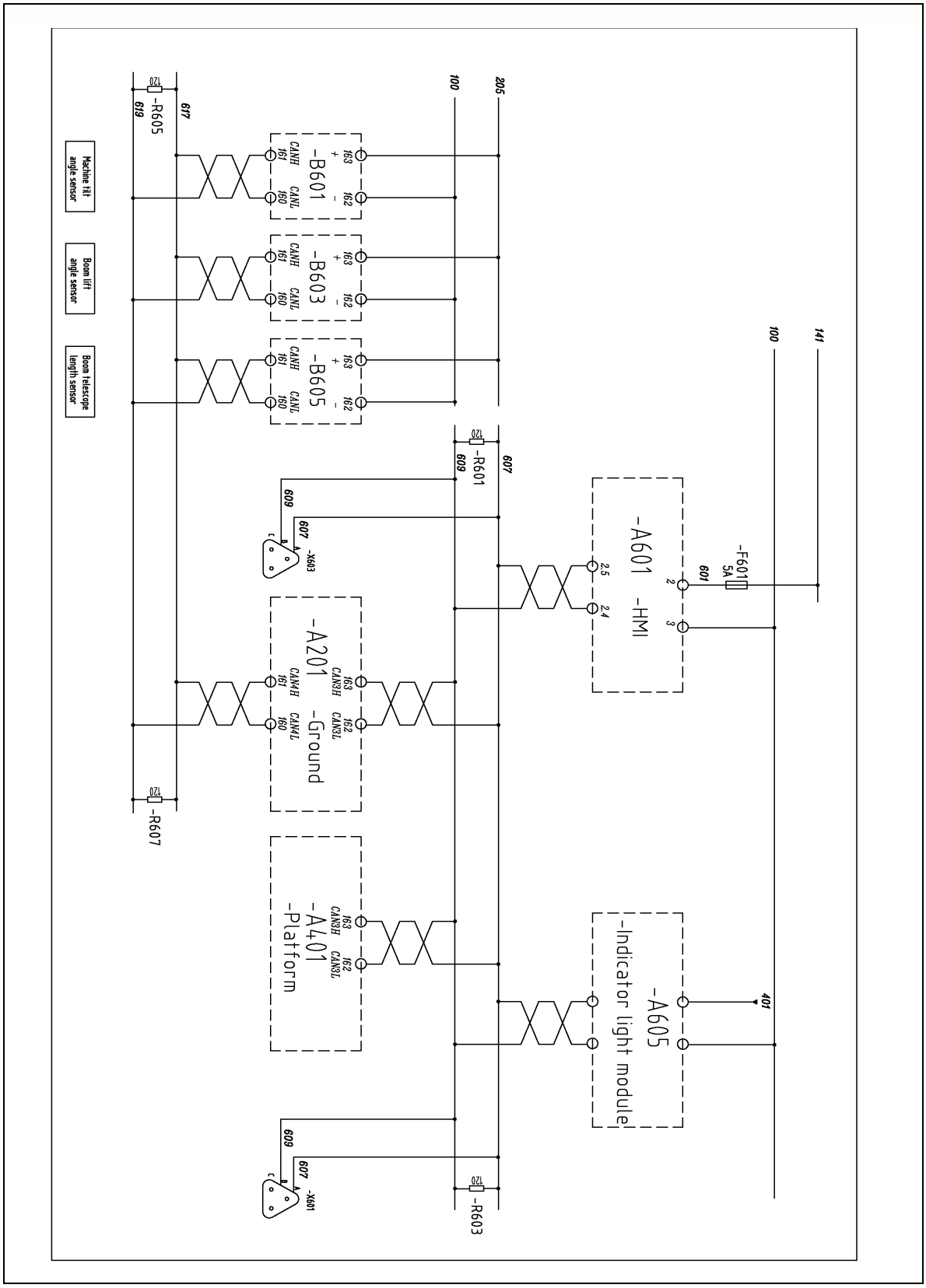


Figure 7-18 Electrical Schematics Figure 6/6

7.5 Hydraulic Schematics

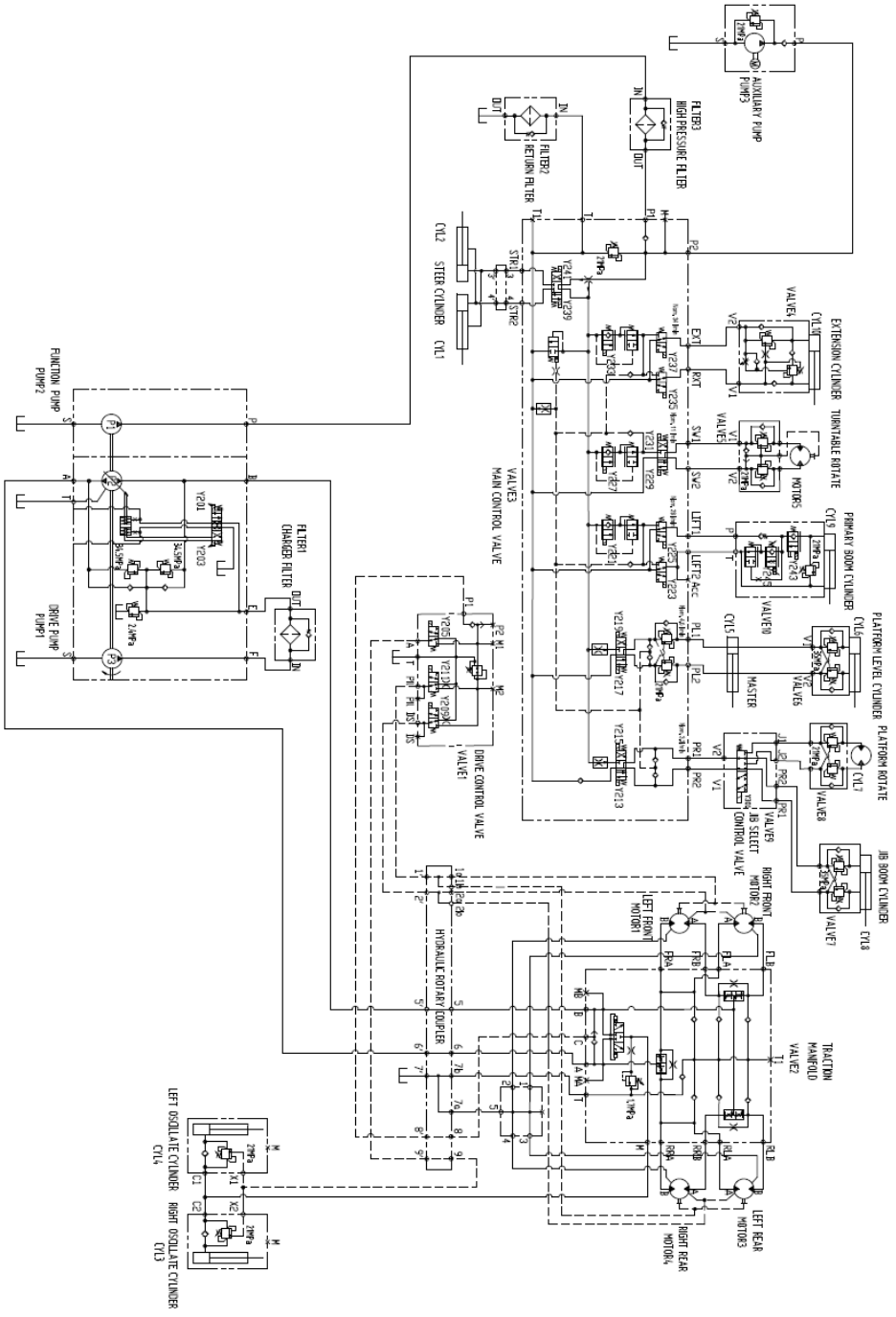


Figure 7-19 Hydraulic Schematics Figure