ZA14J (ZA45J)

Service and Maintenance Manual

ZOOMLION

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ZA14J (ZA45J)
Service and Maintenance Manual

Comply with ANSI SAIA_A92.20-2018 and CSA-B354.6-2017 Standard

2020.1 A

Foreword

This Service and Maintenance Manual applies to the ZA14J 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.

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

Users must comply with the highest standards of 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 service center 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.

Foreword

Symbols and their description:

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

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

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

Notice indicates information of property and device damage, or wrong operation. 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.

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

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Section 1 Maintenance Safety Instruction

SECTION ONE MAINTENANCE SAFETY INSTRUCTION

1.1 Maintenance Personnel Duties, Requirements and Safety Equipment

1.1.1Duties

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.

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;

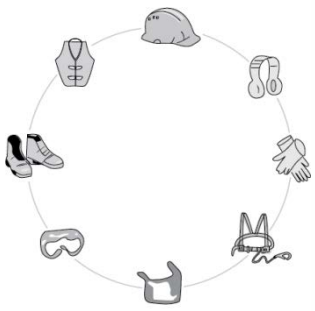

Figure 1-1 Personnel safety equipment

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.

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.

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.

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.

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

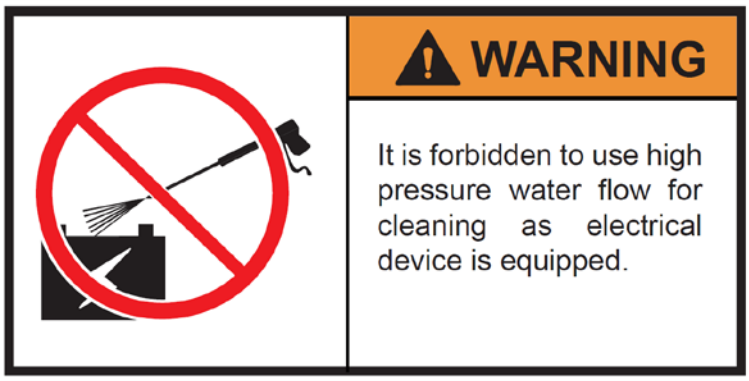

Figure 1-2 Mind electric shock

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 every part and wear-resistant parts.

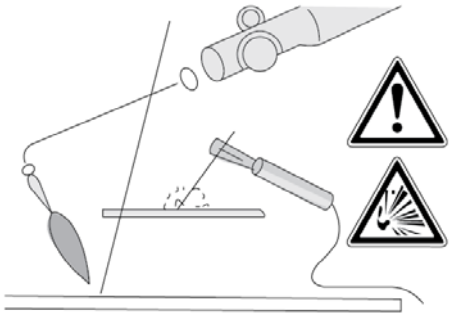

Figure 1-3 Mind explosion

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 unit 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 Mind burn hazard

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

c) 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.

d) 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.

e) 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 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 fluid

f) 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.

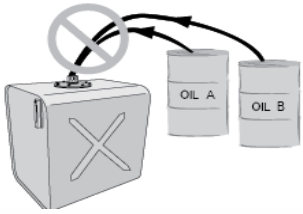

Figure 1-7 Prohibition of mixing oil

g) Maintenance is prohibited when the platform is in the raised position; If there is a special demand for maintenance, the boom and platform should have reliable support to ensure the safety and reliability;

h) 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, replace 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;**

3. **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	300kg	661 lb
Max travel speed (on slope)	45% (platform uphill) 25% (platform downhill)	
Max travel speed (side slope)	25%	
Platform height	13.72m	45ft
Horizontal outreach	7.62m	25ft
Turning radius	4.73 m (outside) 1.96 m (inside)	15ft 6in (outside) 6ft 5in (outside)
Max travel speed	6.8 km/h	4.23mph
Max hydraulic system pressure	21Mpa	
Max wind speed	12.5m/s (force 6 wind)	27.96mph (force 6 wind)
Max manual force	400N	90 lbs force
Electrical system pressure	12V DC	
Gross weight	7250kg	15984 lb

* Stowed position

2.2 Specification and Performance

Table 2-2 Specification and performance

Turntable swing	355° non-continuous	
Tail swing	0 m	0in
Platform dimension	1.83 m×0.76 m	6ft×2ft 6in
Width	1.84 m	6ft
Stowed height	2.30 m	7ft 7in
Stowed length	6.68 m	21ft 11in
Wheelbase	2.36 m	7ft 9in
Ground clearance	0.42m	1ft 5in
Travel speed	6.8 km/h (stowed) 0.5 km/h (working)	4.26mph (stowed) 0.31mph (working)
Ground bearing stress	1.25MPa	
Max tire capacity	3900kg	8598 lb

2.3 Capacity

Table 2-3 Capacity

Fuel tank	65 L	17.17 us gal
Hydraulic oil tank	74 L	19.55 us gal
Engine oil capacity	8 L	2.11 us gal

2.4 Components Specification

2.4.1 Engine

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

Type	Electric control
Fuel	No. 0 National IV
Engine oil capacity	About 8 L (2.11us gal)
Rotate speed	1200rpm (idling) 2000rpm (low speed) 2600rpm (high speed)
Current output of generator	14V,95A
Horsepower	49
Coolant	Cold water, about 11L (2.91 us gal)

Table 2-5 D435L3 (Deutz) engine specification

Type	Electric control
Fuel	No.0 National IV
Engine oil capacity	About 15 L (3.96 us gal)
Rotate speed	1200rpm (idling) 2000rpm (low speed) 2800rpm (high speed)
Current output of generator	14V,55A
Horsepower	49
Coolant	Cold oil, about 15L (3.96 us gal)

Table 2-6 404D-22 (Perkins) Engine specification

Type	Electric control
Fuel	No.0 National IV
Engine oil capacity	About 8 L (2.11us gal)
Rotate speed	1200rpm (idling) 2000rpm (low speed) 2600rpm (high speed)
Current output of generator	12V, 65A
Horsepower	49
Coolant	Cold water, about 11L (2.91 us gal)

2.4.2 Battery

Table 2-7 Battery specification

Rated voltage	12 V
20 hours rate capacity	90 Ah
Cold start current	750 A @ -18℃ (0ºF)
Storage capacity	160 Min @ 27℃ (80ºF)

2.5 Tire

Table 2-8 Tire size

Size	**Type**	**Ply rating**	**Max capacity**		**Weight (tire and wheel)**
			10km/h (6.21mph)	**0km/h (0mph)**	
315/55 D20	Foam-filled	12	3568 kg/7866 lb	4375 kg/9645 lb	143 kg/315 lb

2.6 Functional Speed

Table 2-9 Functional speed (Unit: s)

Function	ZA14J
Upper boom lifting	24 s ~30 s
Upper boom lowering	24 s ~30 s
Turntable swing (a round)	60 s ~70 s
Upper boom extending	10 s ~15 s
Upper boom retracting	10 s ~15 s
Platform rotation (left an right)	10 s ~15 s
Jib lifting	25 s ~28 s
Jib lowering	24 s ~28 s
Tower boom lifting	27 s ~33 s
Tower boom lowering	24 s ~30 s
Travel	6.8 km/h (forward)/4.23mph (forward) 6.8 km/h (backward)/4.23mph (backward) 0.5 km/h (raised)/0.31mph (raised)

2.6.1 Operating procedure when testing speed

a) Upper boom lifting: telescopic boom retracting. Record lifting and descending time respectively;

b) Turntable swing: upper boom lifted to maximum work height, telescopic boom retracted. Record 360°continuous turntable swing left and right respectively;

c) Upper boom extending: upper boom lifted to maximum work height, telescopic boom retracted. Record telescopic boom extending and retracting time respectively;

d) Jib lifting: platform leveling, chassis swing, upper 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 (forward/backward): select a smooth ground, position the speed switch to high speed. Record the time of forward/reverse through 100m/328ft 1in;

g) Drive (raised): select a smooth ground, position the speed switch to low speed. Record the time of forward/reverse through 50m/164ft 1in.

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 controlled 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℃/100.4℉;

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

2.7 Torque Requirements

Table 2-10 Torque requirements

Bolt diameter	Strength grade and corresponding torque Nm	
	8.8 grade	10.9 grade
M8	24.5	34.5
M10	48.3	68
M12	84.3	118
M14	135	189
M16	209	294
M18	288	405
M20	408	538
M22	555	780
M24	705	992
M27	1032	1450
M30	1400	1970

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
Viscosity index	150

2.9 Pressure Setting

Table 2-12 Pressure setting

Upper boom lifting	21MPa
Upper boom extending	21MPa
Turntable swing	12MPa
Chassis diversion	18MPa
Jib lifting	21MPa
Platform rotation	21MPa
Platform leveling	17MPa
Tower boom lifting	21MPa

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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 Lubrication Table in Section 2.

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 Hydraulic Table in Section 2. 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 hydraulic oil）	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 hydraulic oil N32 (environmental friendly)
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 /-32.8	-36 /-32.8	-50 /-58	-39 /-38.2	-37 /-34.6	-20 /-4
Flash point℃/℉	185 /365	224/ 435.2	250 /482	232/ 449.6	190 /374	210 /410	92 /197.6	231/ 447.8	240 /464	270 /518
Motion viscosity cSt（40℃/104℉）	32	22.4	32.7	45.6	22.5	33.5	10 (50℃ /122℉)	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 5 cm/2 inches. If the machine fails this test, please conduct the following operation.

3.4.2 Cylinder drift

Table 3-2 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	0.0030

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.

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

Items	Time intervals					
	Pre-start	Weekly	Monthly	Pre-delivery or daily	Annually	Every 2 years
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	
Exhaust system			1,9	9	9	
Batteries	5	1,9			19	
Battery fluid		11		11	11	
Battery charger		5			5	

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

Items	Time intervals					
	Pre-start	Weekly	Monthly	Pre-delivery or daily	Annually	Every 2 years
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	
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	

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

Items	Time intervals					
	Pre-start	Weekly	Monthly	Pre-delivery or daily	Annually	Every 2 years
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
20 —The joint is not loose, corroded or worn
21 —Confirmation
22 —Perform performance check
23 —Correct seal
24 —Discharge, clean, refill

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.

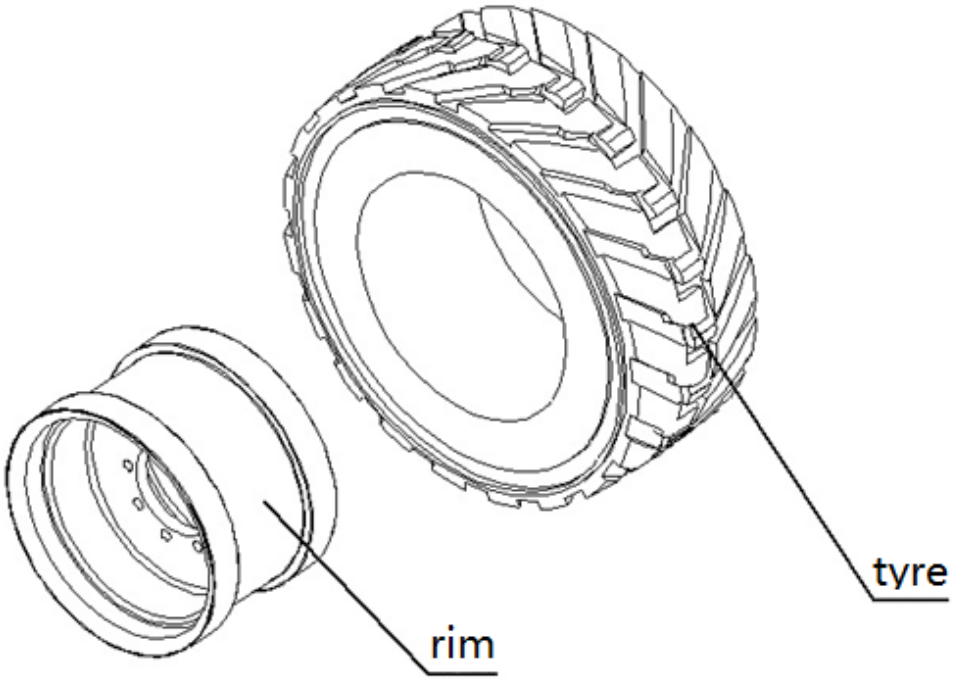


Figure 4-1 Wheel composition

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 7.5cm/3 inches in the ply;
b) Cracks (uneven edges) in any direction that exceed 2.5cm/1 inch in the ply;
c) Perforations having a diameter of more than 2.5cm/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

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:

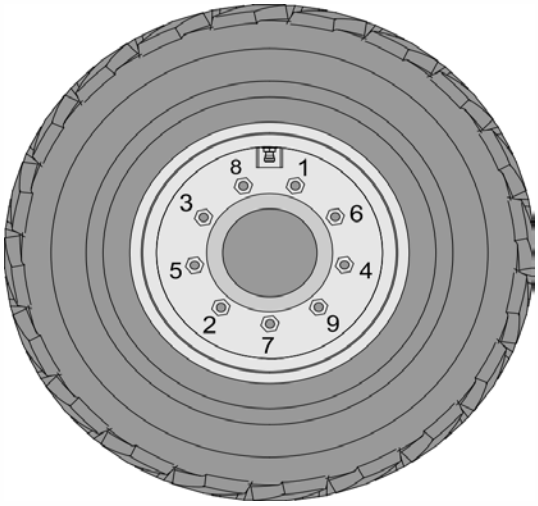


Figure 4-2 Wheel fastening nut tightening sequence

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/54.3 ft·lb	150Nm/108.5 ft·lb	260 Nm/188 ft·lb

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;
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.

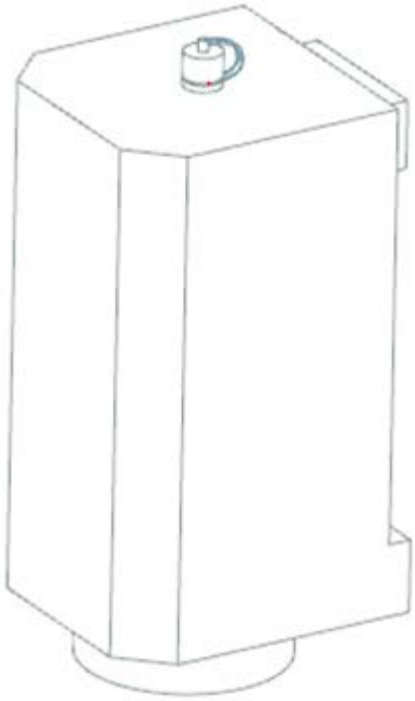


Figure 4-3 Exhaust valve connector position

4.2.2 Swing axle lock test

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 15.2cm/6 inch 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 0.6m/2ft;
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. The turntable will be limited when the chassis rotates more than the preset value. It is necessary to manually confirm whether the turntable is rotating in the correct direction and press the confirmation switch to release the limit to prevent a safety accident caused by wrong operation,

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 569mm/22.4 inches or the boom angle is more than 5° 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.

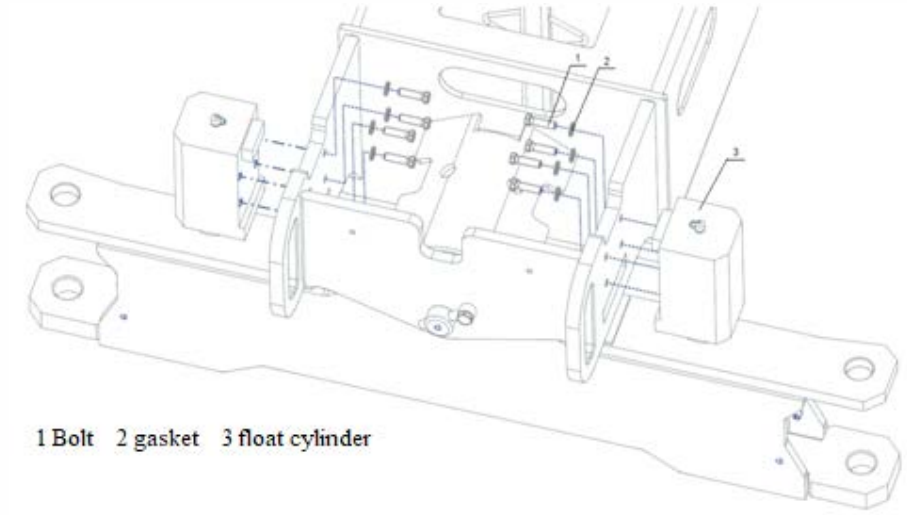


Figure 4-4 Floating cylinder disassembly diagram

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).

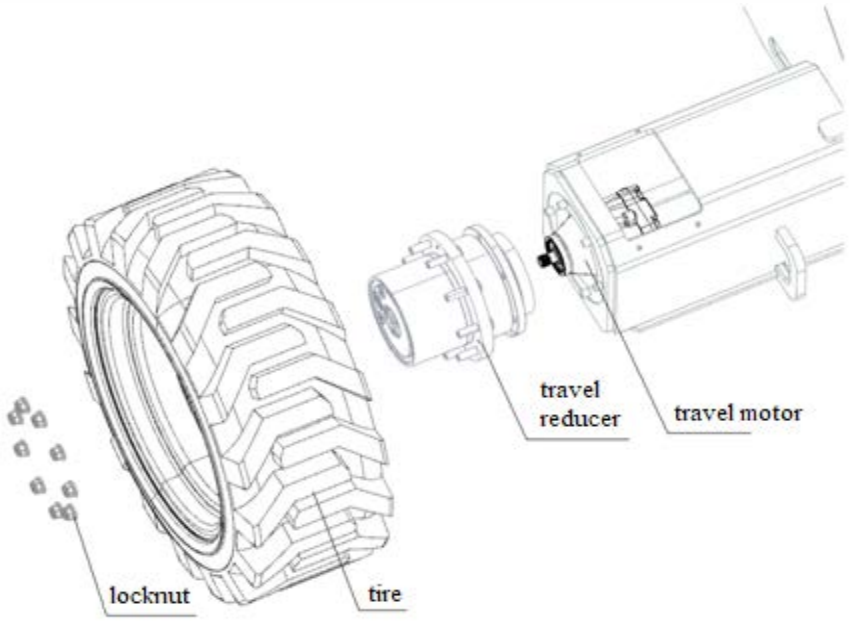
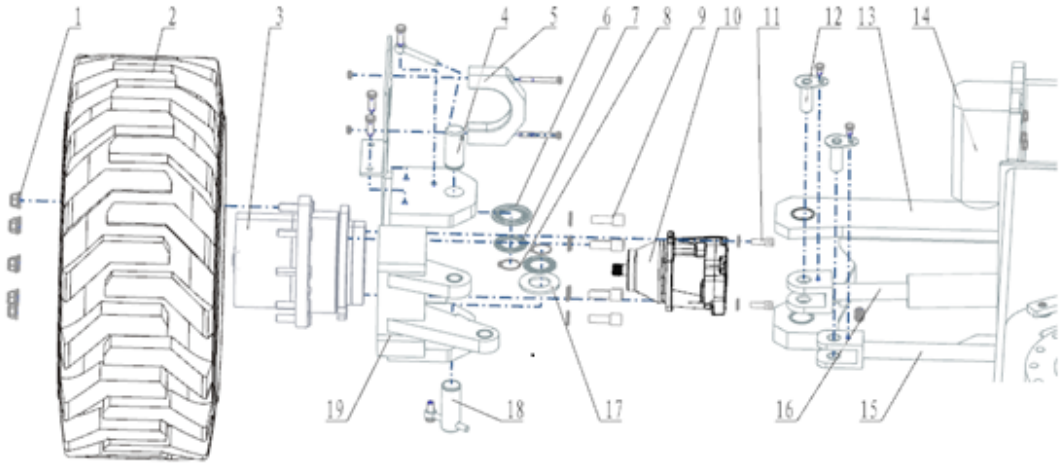


Figure 4-5 Travel system disassembly diagram 1



1 locknut 2 tire 3 travel reducer 4 pin 5 fuel tank bracket 6 gasket 7 gasket 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 knuckle

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 /110 lb;

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.

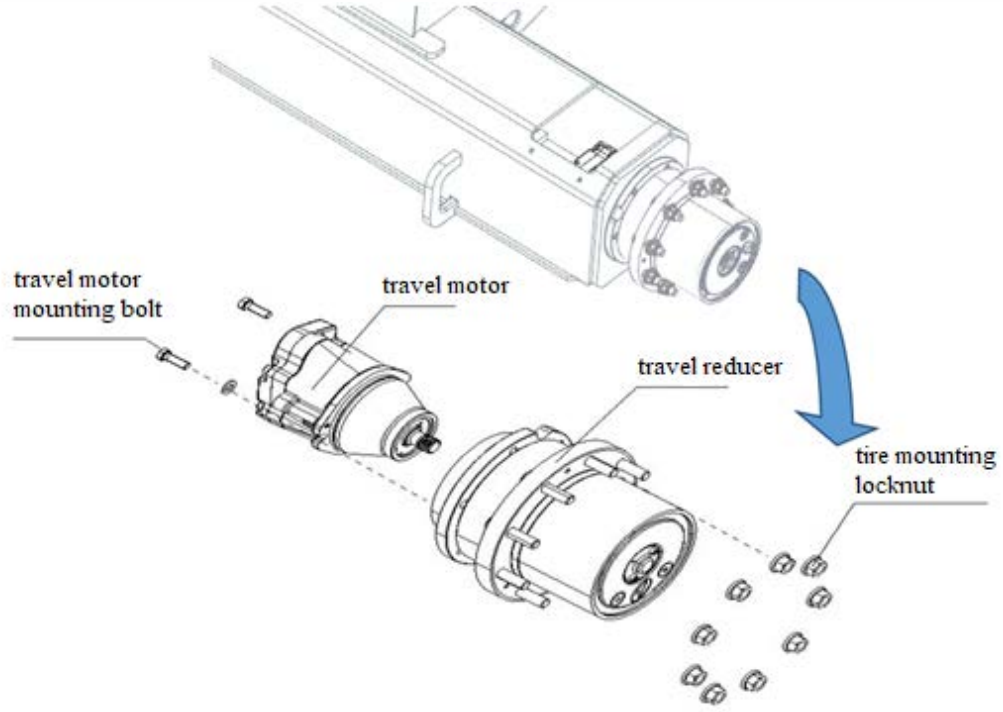


Figure 4-7 Travel reducer disassembly diagram

4.7.2 Installation

a) Use a suitable lifting device to support the travel reducer. The travel reducer weighs approximately 50kg/110 lb;

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/188 ft·lb;

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/34 lb;
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.

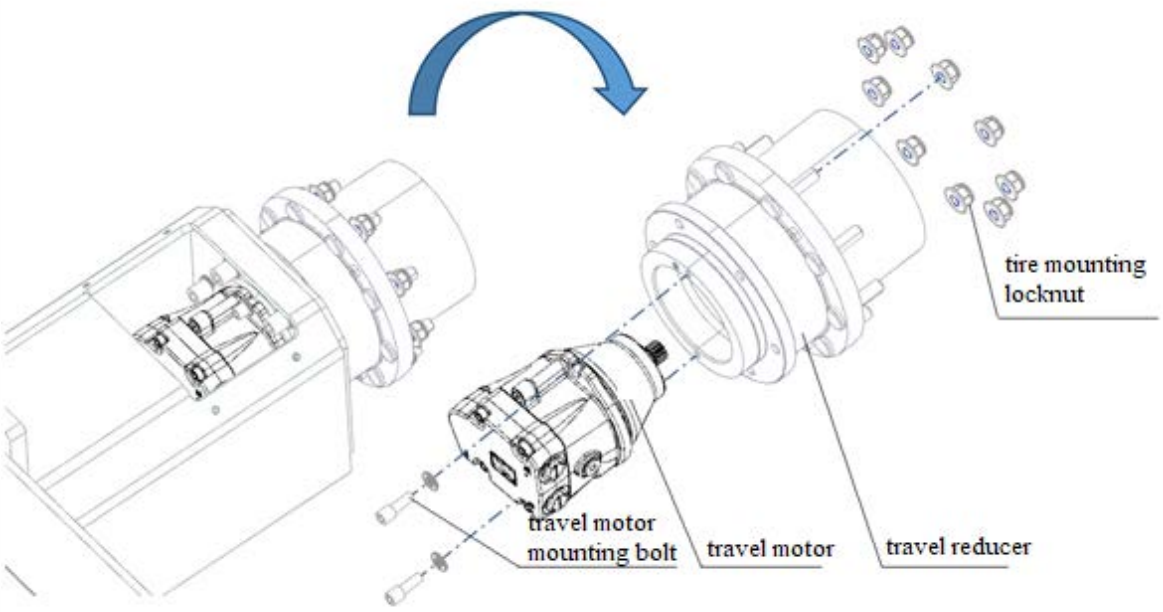


Figure 4-8 Traveling motor disassembly diagram

4.8.2 Installation

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

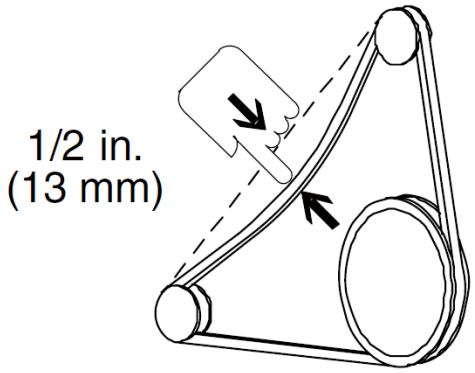
torque reaches 95Nm/68.7 ft·lb;

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 Generator

a) Every 250 hours;

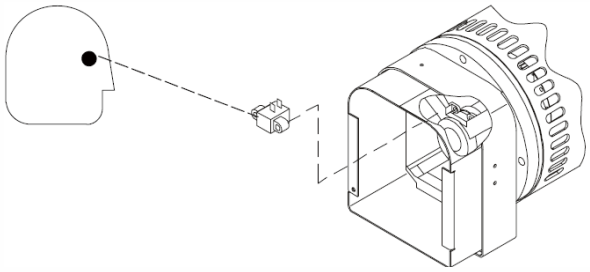


Check that the drive belt tension is appropriate every 250 hours of operation.

b) Every 500 hours;

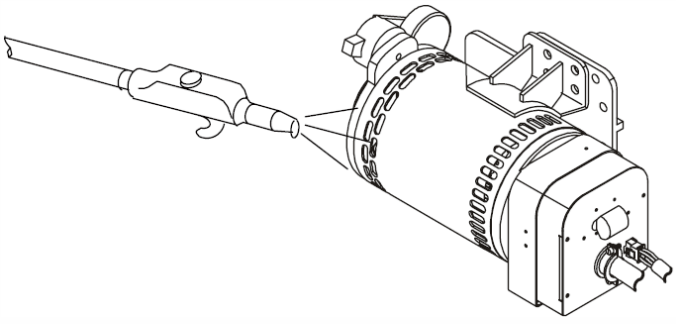
The generator carbon brush and slip ring should be maintained every 500 hours of operation.

More frequent maintenance may be required in adverse environments.



Use a hair dryer to blow the inside of the generator every 500 hours of operation.

If the unit used in adverse environments, it should be cleaned once a month.

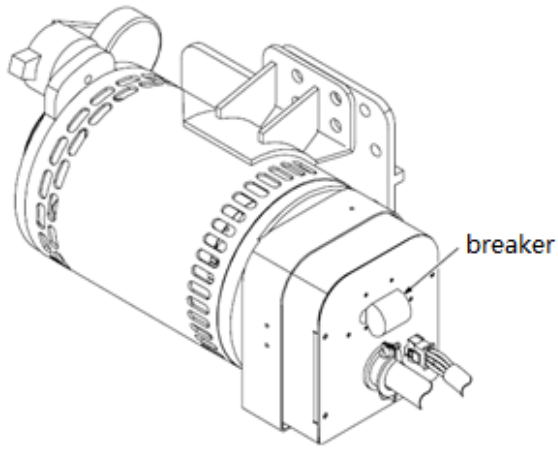


c) Overload protection

When checking or maintaining the circuit breaker, stop the engine operation;

The circuit breaker provides overload protection for the generator windings. If the circuit breaker is

open, the generator will stop outputting. If the circuit breaker remains open, check the equipment connected to the platform socket for any malfunction.



Check the carbon brush, replace the carbon brush, clean the slip ring

a) Check the carbon brush position;

Check that the carbon brush is aligned with the slip ring. Check the alignment through the air holes in the stator. The carbon brush should be completely aligned with the slip ring.

b) Check the carbon brush;

Remove the terminal switch board. Check the wires. Remove the carbon brush holder assembly. Pull the carbon brush off the brush holder;

If the carbon brush is damaged, or the carbon brush is at or near the minimum length, it should be replaced immediately.

c) Check slip ring;

Visually check the slip ring. The slip ring usually turns dark brown under normal use;

If the slip ring is corroded or its surface is not flat, loosen the belt and manually rotate the shaft to clean it;

Use 220 emery paper to clean the ring. Be as careful as possible when removing debris. If the depression of the ring is deep and cannot be cleaned, contact the generator manufacturer’s service personnel;

d) Reinstall the belt, brush holder assembly and terminal switch board.

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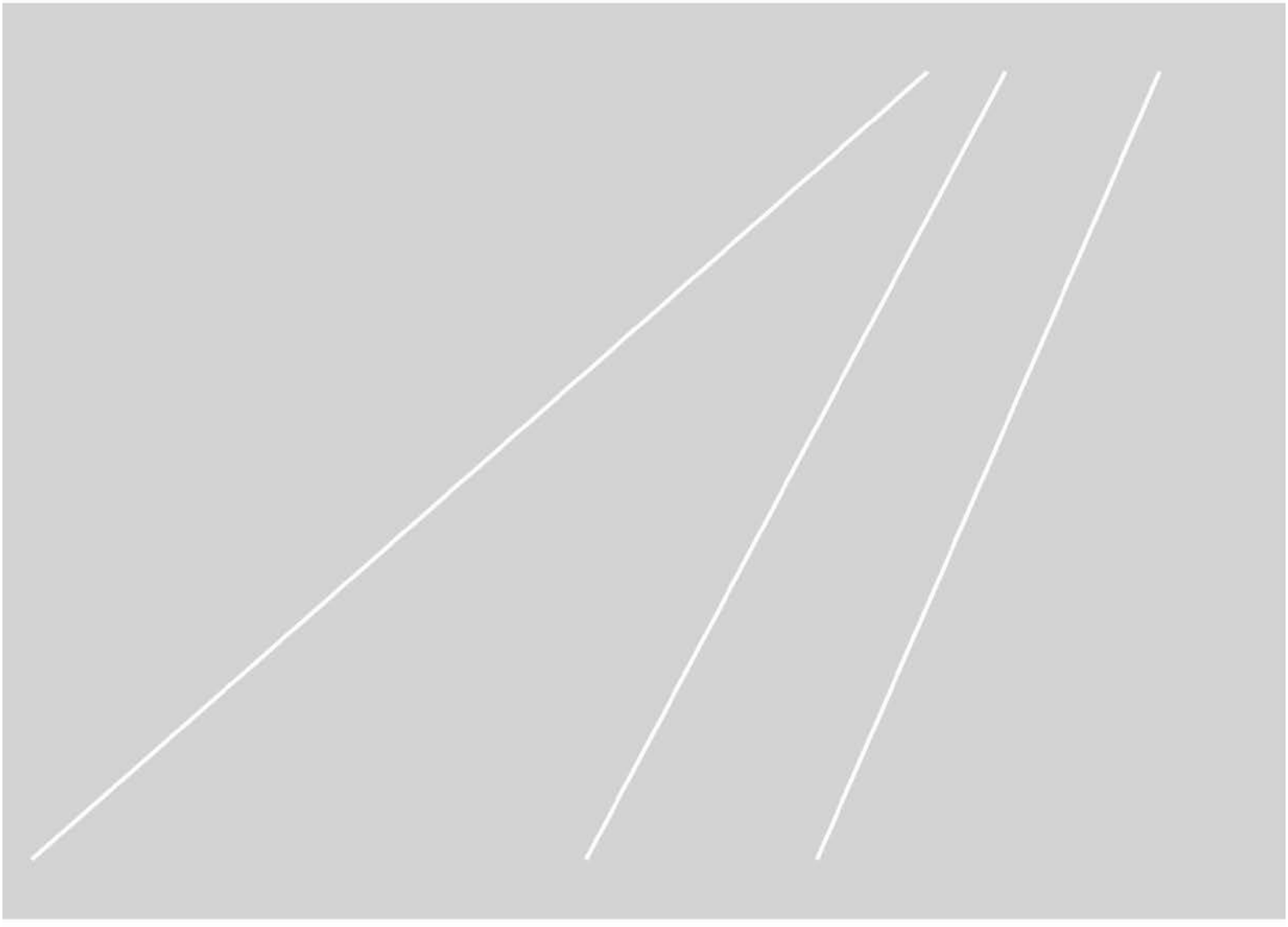
Section 5 Boom and Platform



SECTION 5 BOOM AND PLATFORM

5.1 Platform and Jib

5.1.1 Load cell

5.1.1.1 Disassembly

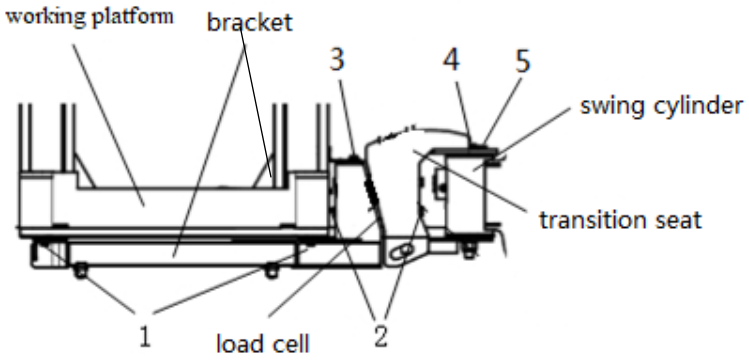


Figure 5-1 Load cell disassembly diagram

CAUTION

a) Retract the tower boom and the upper boom;
b) Disconnect the wiring harness at the platform control box and the load cell, disconnect the pipeline at the platform valve, and mark it at the same time;
c) 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;
d) Remove the connecting bolts 1 and 3 of the bracket and the working platform, and use the appropriate lifting equipment to remove the working platform from the bracket;
e) Disassemble the connecting bolts 4 and 5 of the swing cylinder and the transition seat, and remove the bracket from the swing cylinder using suitable lifting equipment;
f) The load cell can be removed by removing the connection bolt 2 between the load cell and the bracket or 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) 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

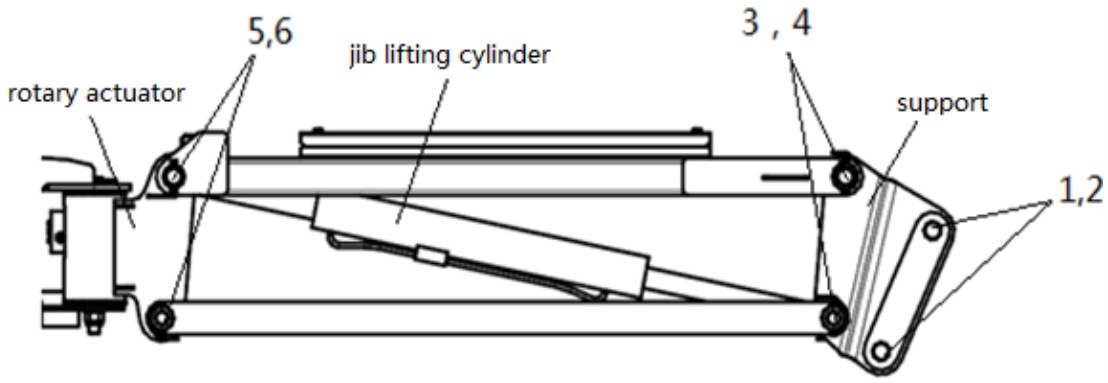


Figure 5-2 Jib lifting cylinder disassembly diagram

a) 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) Disassemble the support and the stop pin 1 of the upper boom and the connecting pin 2, and remove the jib using a suitable lifting device;

c) Remove the connecting bolt 5 between the rotary actuator and the upper and lower links, and remove the pin 6, then remove the rotary actuator.

5.1.2.2 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.

5.1.2.3 Installation

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.

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) Remove the connecting bolts 3 and 5 of the support and the upper and lower links, and remove the pins 4 and 6, so that the jib lifting cylinder can be removed.

5.1.3.2 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.

5.1.3.3 Installation

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.

5.2 Boom Assembly

Extrusion hazard. If the lifting equipment fails to securely fix the removed parts, the disassembled parts may fall and cause personal injury and equipment damage. When disassembling, personnel must be away from nearby areas.

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.

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

5.2.1 Cable

5.2.1.1 Disassembly

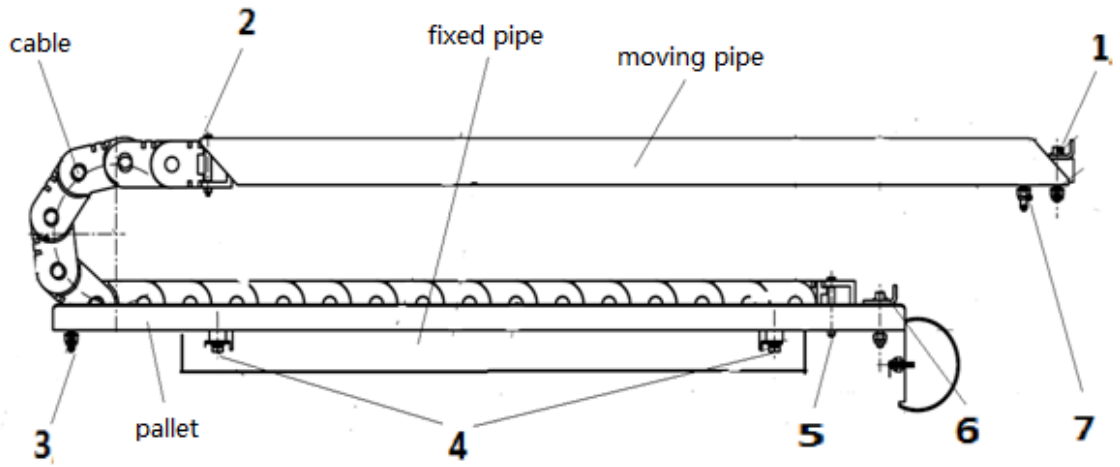


Figure 5-3 Cable system disassembly

a) Adjusting the boom to a fully retracted state;
b) Disconnect the pipeline from the ground control box;
c) Mark and disconnect the hydraulic lines from upper 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;
d) Mark and disconnect the harness of the travel switch from the side of base boom;
e) 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;
f) Use suitable lifting equipment to hang the ends of the fixed pipe of the cable along the entire length;
g) Remove the bolts 1 and 7 that fix the moving tube on the telescopic boom;
h) Disassemble the bolts 3 and 6 of the fixed bracket on base boom;
i) Take all feasible safety precautions and use the lifting equipment to lift the cable together with the moving pipe and pallet;
j) The cable can be removed separately by removing the bolts 2 and 5.

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

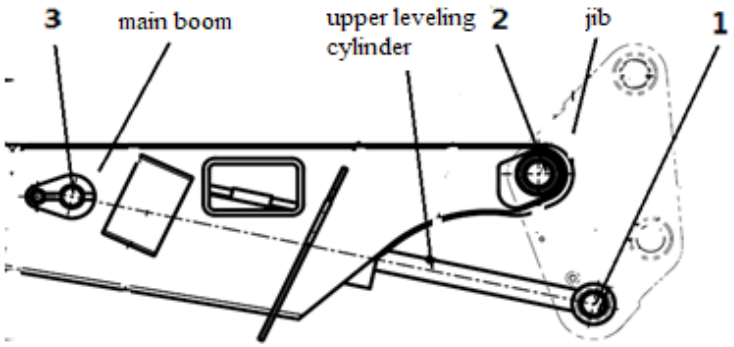


Figure 5-4 Upper leveling cylinder disassembly diagram

a) Adjust the posture of the boom and the jib to 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 lift 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 aid of the lifting equipment, slowly and carefully remove the upper leveling cylinder from the telescopic boom to avoid damage to the leveling cylinder and the boom;

f) Use a suitable plug to block the connector of the 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.

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 and lifting cylinder

5.2.2.1 Disassembly

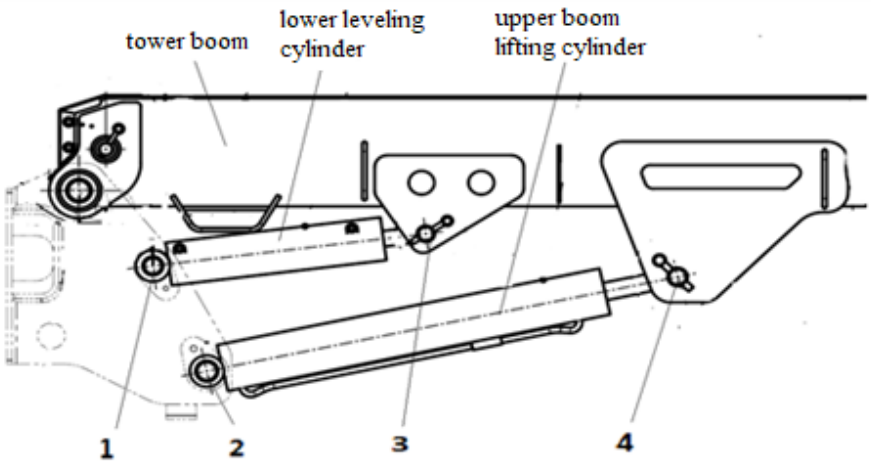


Figure 5-5 Lower lifting cylinder and upper boom lifting cylinder disassembly diagram

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 3 and the pin 4 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 suitable lifting equipment to hoist the two ends of the leveling cylinder, disassemble the pin shaft 3 and the pin shaft 1, and remove the lower leveling cylinder;

e) Use a suitable lifting device to support the tower boom to prevent the upper boom from falling when disassembling the other cylinder;

f) Use suitable lifting equipment to hang the two ends of the upper boom lifting cylinder, disassemble the pin shaft 4 and the pin shaft 2 respectively, and remove the upper boom lifting cylinder;

g) Use a suitable plug to block the connector of the main 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.

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 Upper boom

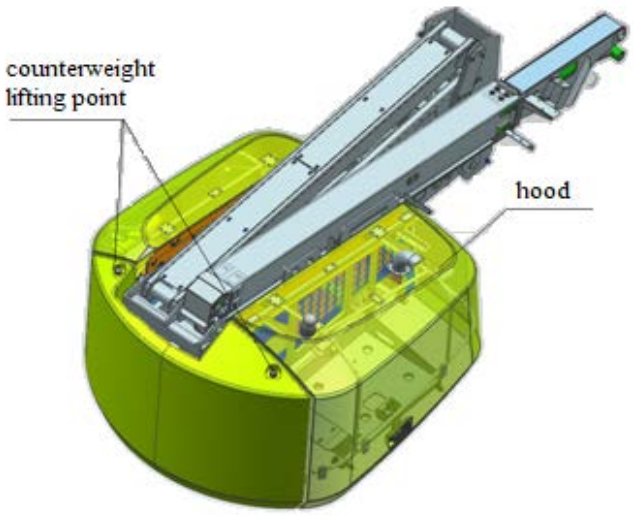


Figure 5-6 Counterweight and hood disassembly diagram

5.2.4.1 Disassembly

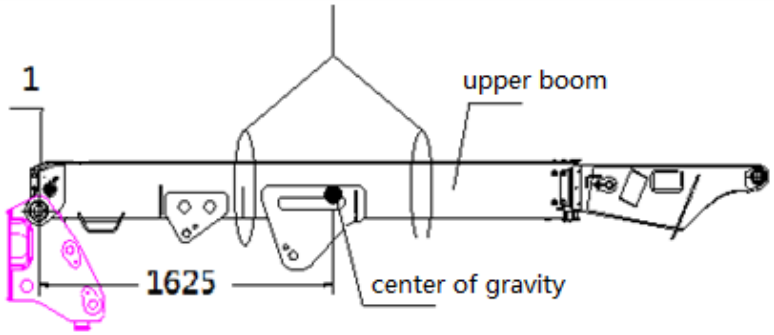


Figure 5-7 Upper boom disassembly diagram

a) Before disassembling the upper boom, it is necessary to disassemble working platform, jib, cable, upper leveling cylinder, counterweight (weight about 1800kg/3968 lb) and hood, according to the disassembly steps;
b) Fully retract the upper boom to the horizontal position;
c) Use the appropriate lifting equipment to hang the upper boom (weight about 400kg/882 lb). The two lifting points should be symmetrically placed on both sides of the center of gravity of the upper boom, as shown in the figure. After disassembling the pin 1, the upper boom can still be basically horizontal or does not have large shaking and bumps other structural members;
d) Remove shaft pin 1;
e) Operate the lifting device and slowly and smoothly remove the upper boom from the device and place it securely on a hard floor.

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.

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 Telescopic cylinder

5.2.5.1 Disassembly

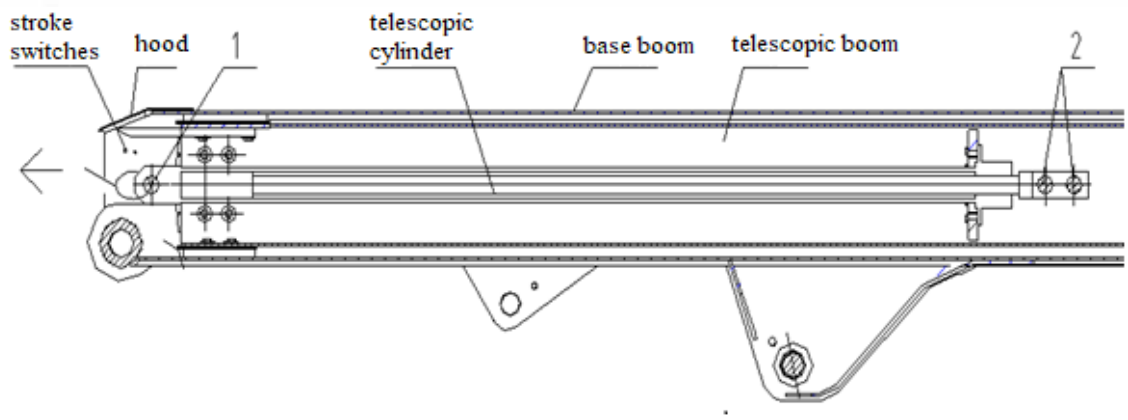


Figure 5-8 Telescopic cylinder disassembly diagram

a) Need to unload the working platform, jib, cable, upper leveling cylinder, counterweight (weight about 1800kg/3968 lb), hood and upper boom according to the disassembly steps;
b) Disassemble the hood and two stroke switches at the tail of the telescopic cylinder;
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) Remove the pin 1 that connects base boom to the telescopic cylinder;
e) Remove the pin 1 that connects telescopic boom to the telescopic cylinder;
f) Use a suitable lifting device and fix one end of the rope to the connecting hole on the left side of the telescopic cylinder as shown in the figure;
g) Operate the lifting equipment, slowly and smoothly pull the telescopic cylinder out of base boom, then hoist it on the appropriate support frame;
h) Operate the lifting device, fasten the rope to the end of the telescopic boom on the right side of the figure, and slowly pull the telescopic boom out of the arm.

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.

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;

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

5.2.6 Tower boom and its cylinder

5.2.6.1 Disassembly

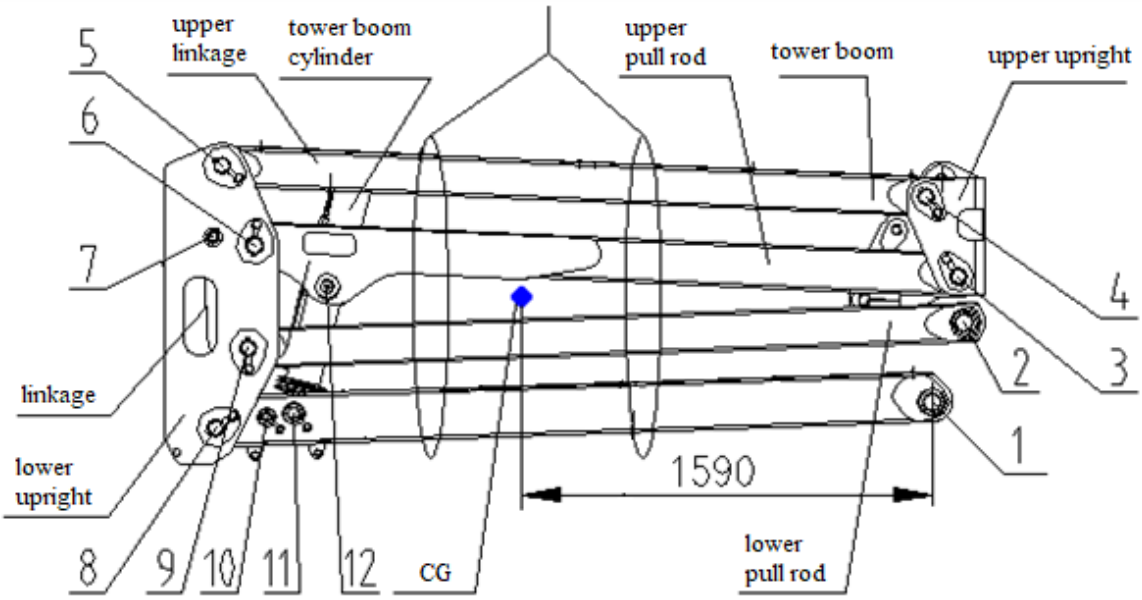


Figure 5-9 Tower boom disassembly diagram

a) Need to unload the working platform, jib, cable, upper leveling cylinder, counterweight (weight about 1800kg/3968 lb), hood and upper boom according to the disassembly steps in advance;

b) Mark and disconnect the hydraulic lines and harnesses connected to the components on the turntable, collect the hydraulic oil in the pipeline with a suitable container, and seal the ports of the pipeline after collection;

c) Remove the pins 1 and 2 that connect the tower boom to the turntable;

d) Use the appropriate lifting equipment to hoist the tower boom (weight about 1050kg/2315 lb). The two lifting points should be in the symmetrical position on both sides of the center of gravity of the tower boom as shown in the figure. After disassembling the pins 5 and 2, the tower boom can still remain horizontal level or does not sway and bumps other structural parts;

e) Operate the lifting equipment, slowly and smoothly lift the tower boom off the turntable and place it on a suitable support frame;

f) Lift the upper upright with lifting equipment, remove the pin 3 and 4, and hang it;
g) Lift the upper linkage with lifting equipment, remove the pin 5, and hang it;
h) Lift the tower boom cylinder with lifting equipment, remove the pin 12 and 11 and then hang it;
i) Lift the pull rod with the lifting device, remove the pin 6 and 7 and then hang it;
j) Hang the linkage with lifting equipment, remove the pin 10, and hang it;
k) Lift the lower pull rod with the lifting device, remove the pin 9 and then hang it;
l) Hang the lower pressing rod with the lifting device, remove the pin 8 and then hang it.

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.

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.

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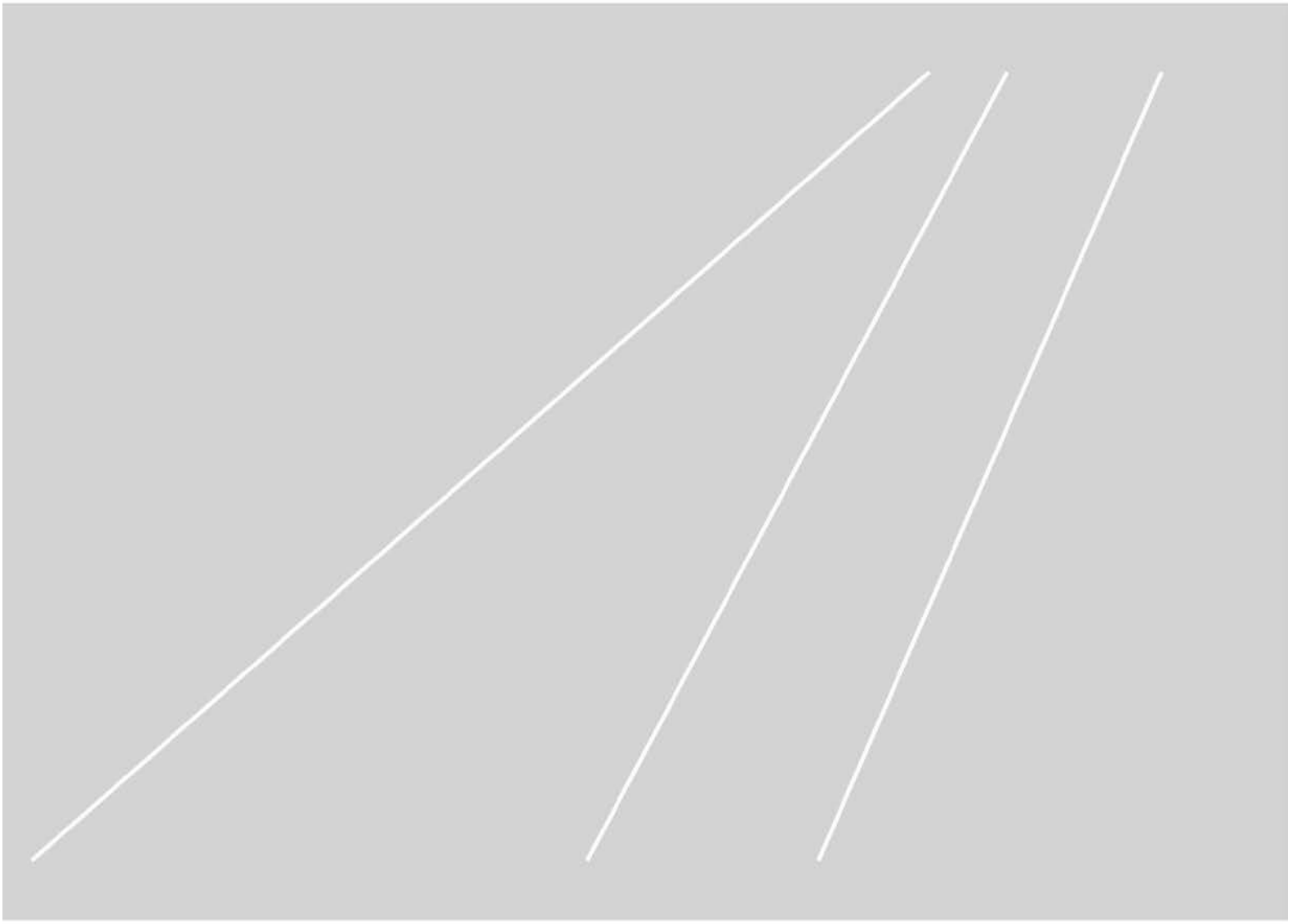
Service and Maintenance Manual

Section 6 Hydraulic and Electrical System Maintenance



SECTION 6 ELECTRICAL SYSTEM MAINTENANCE

6.1 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 list

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_Pressur
	22054	Dtc_Low_Fuel
	22055	Dtc_Fuel_Cut_Off
Sensor	14151	Dtc_Load_Sensor_Not_Standardization
	14152	Dtc_Load_Cell_Comm_Error
	24153	Load_Sensor_Reading_Under_Weight
	11154	Dtc_Incline_Sensor_Out_Of_Range
	11155	Dtc_Incline_Sensor_Comm_Erro
	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
	22161	Dtc_Fault_Swing_Sensor
	14162	Dtc_Fault_Load_Sensor_Redundancy
	13163	Dtc_Boom_Angle_Singal_Redundancy
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
	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

Table 6-1 Fault code list (continuous)

Classification	Fault code	Fault code list
Switch/handle	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
	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
	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
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
	21559	Dtc_Float_Control_Valve_Short_To_Ground

Table 6-1 Fault code list (continuous)

Classification	Fault code	Fault code list
Valve	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
	22582	Dtc_Function_Unload_Valve_Short_To_Ground
	22583	Dtc_Function_Unload_Valve_Short_To_Power
	22584	Dtc_Function_Unload_Valve_Open_Circuit
	22585	Dtc_4select_Main_Control_Left_Valve_Short_To_Ground
	22586	Dtc_4select_Main_Control_Left_Valve_Short_To_Power
	22587	Dtc_4select_Main_Control_Left_Valve_Open_Circuit
	22588	Dtc_4select_Main_Control_Right_Valve_Short_To_Ground
	22589	Dtc_4select_Main_Control_Right_Valve_Short_To_Power
	22590	Dtc_4select_Main_Control_Right_Valve_Open_Circiut
	22593	Dtc_Main_Lift_Up_Valve_Short_To_Ground
	12594	Dtc_Main_Lift_Up_Valve_Short_To_Power
	22595	Dtc_Main_Lift_Up_Valve_Open_Circuit
	22597	Dtc_Tower_Lift_Up_Valve_Short_To_Ground
	12598	Dtc_Tower_Lift_Up_Valve_Short_To_Powe
	22599	Dtc_Tower_Lift_Up_Valve_Open_Circuit
	23601	Dtc_Telescope_Valve_Short_To_Ground

Table 6-1 Fault code list (continuous)

Classification	Fault code	Fault code list
Valve	13602	Dtc_Telescope_Valve_Short_To_Power
	23603	Dtc_Telescope_Valve_Open_Circui
	23604	Dtc_Hand_Leveling_Valve_Short_To_Ground
	13605	Dtc_Hand_Leveling_Valve_Short_To_Power
	23606	Dtc_Hand_Leveling_Valve_Open_Circuit
	23607	Dtc_Jib_Valve_Short_To_Ground
	13608	Dtc_Jib_Valve_Short_To_Power
	23609	Dtc_Jib_Valve_Open_Circuit
	23610	Dtc_Main_Lift_Dn_Safe_Vavle_Short_To_Ground
	13611	Dtc_Main_Lift_Dn_Safe_Valve_Short_To_Power
	23612	Dtc_Main_Lift_Dn_Safe_Valve_Open_Circuit
	23613	Dtc_Main_Lift_Dn_Speed_Valve_Short_To_Groun
	23614	Dtc_Main_Lift_Dn_Speed_Valve_Short_To_Power
	23615	Dtc_Main_Lift_Dn_Speed_Valve_Open_Circuit
	23617	Dtc_Tower_Lift_Dn_Safe_Valve_Short_To_Ground
	13618	Dtc_Tower_Lift_Dn_Safe_Valve_Short_To_Powe
	23619	Dtc_Tower_Lift_Dn_Safe_Valve_Open_Circuit
	23620	Dtc_Tower_Lift_Dn_Speed_Valve_Short_To_Ground
	23621	Dtc_Tower_Lift_Dn_Speed_Valve_Short_To_Power
	23622	Dtc_Tower_Lift_Dn_Speed_Valve_Open_Circuit

6.2 Common Faults and Solutions

Table 6.2 Common faults and solutions

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	Push the operating switch or handle back to the neutral position
		3. Emergency stop button is pressed	Reset emergency stop button
		4. The main power switch does not turned on	Turn on the main power switch on the turntable
		5. Engine overheat	Shutdown and radiating
		6. Engine oil pressure excessive low	Add engine oil
		7. Low fuel level	Add fuel
2	Overcapacity alarm	1. Platform overcapacity	Unload platform
		2. Load cell communication fault	Check load cell harness or replace sensor
		3. Platform controller fault	1. Check platform controller fuse and harness 2. Replace controller
3	Chassis tilt alarm	1. Chassis tilt exceeds set angle	Move the device to a horizontal position
		2. Chassis inclination sensor communication failure	Check inclination 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

Table 6.2 Common faults and solutions (continuous)

No.	Fault Feature	Fault Cause	Solution
5	The motion cannot be executed normally	1. Whether the authorization switch is pressed	First operate the authorization switch, then operate the action
		2. Motion switch damaged	Replace switch
		3. Motion handle damaged	Replace handle
		4. Solenoid valve wiring open circuit failure	Check solenoid valve wiring
		5. Solenoid valve wiring short circuit fault	Check solenoid valve wiring
		6. Solenoid valve damage	Replace solenoid valve
6	CAN bus fault	1. CAN bus wiring failure	Check CAN bus wiring and 120Ω termination resistor
		2. Controller failure	Replace controller

REMIND

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

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

3. 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 not 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 contacted on the same side of the wire, in 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

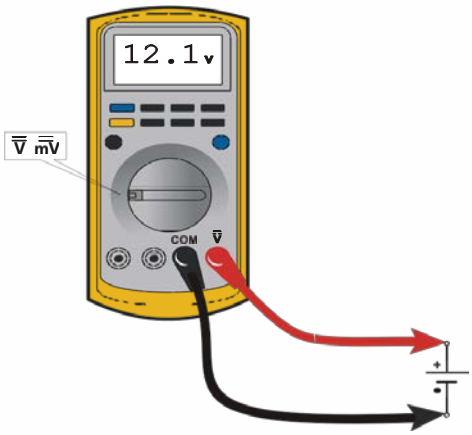


Figure 7-1 Voltage measurement (direct current)

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

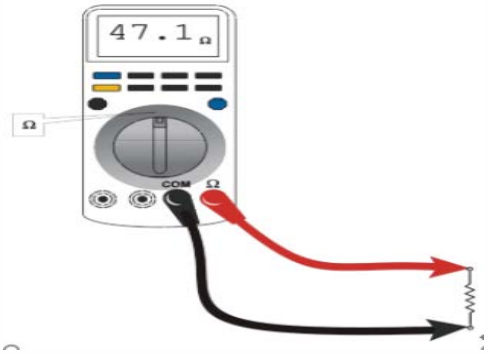


Figure 7-2 Resistance measurement

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

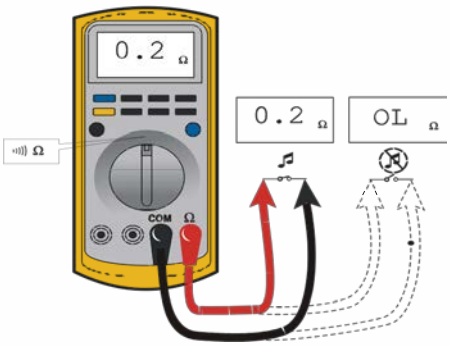


Figure 7-3 Conduction test

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

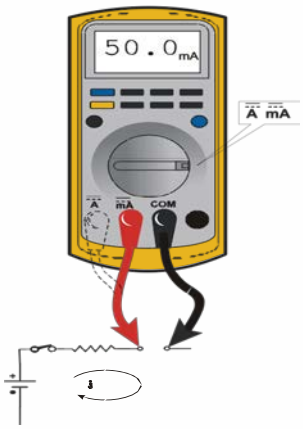


Figure 7-4 Current measurement (direct current)

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

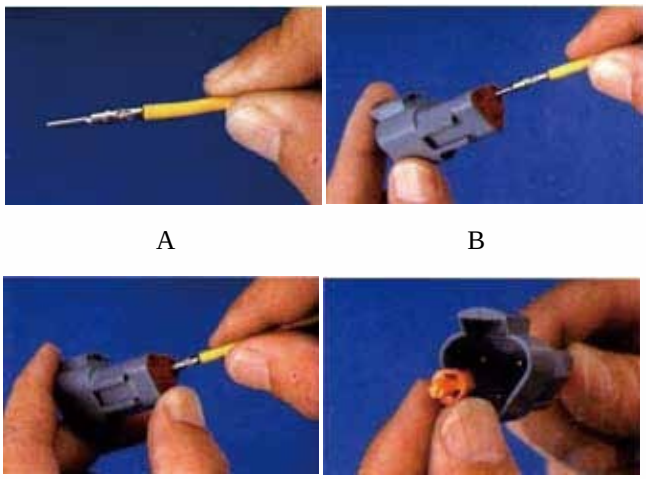
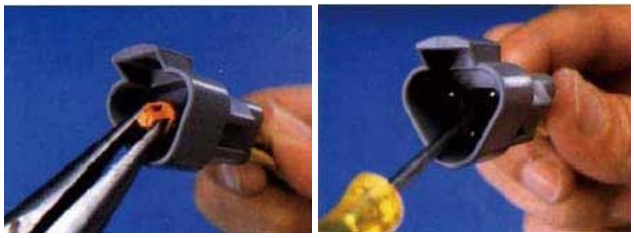


Figure 7-5 DT/DTP contact installation

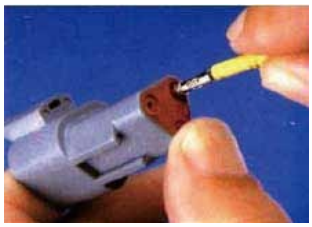
a) Pinch the crimped contact about 25mm (1 in) behind the contact cylinder;
b) Hold the connector so that the rear guard ring faces toward you;
c) Push the contacts straight into the retaining ring until you hear a slight click. Gently pull to confirm that the connector is fully locked;
d) When all the 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 which 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 (1 in) after the crimping cylinder;
b) Hold the connector so that the rear guard ring faces toward you;
c) Push the contact straight into the retaining ring until the main motion stops. Gently pull to confirm

that the connector is fully locked.

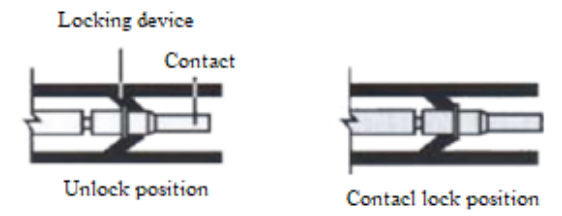


Figure 7-8 HD/HDP lock contact position

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

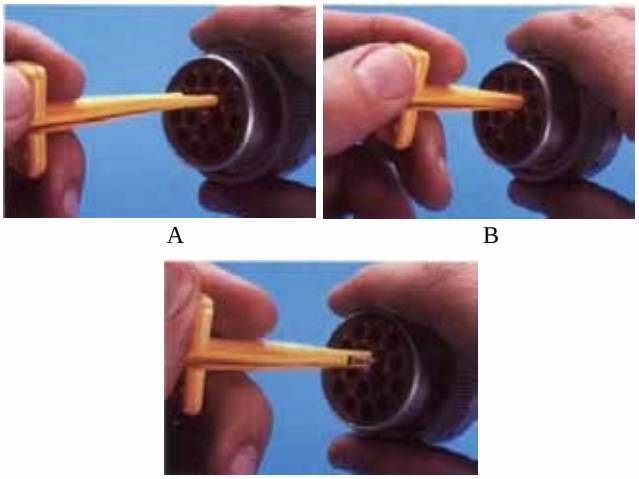


Figure 7-9 HD/HDP contact removal

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.

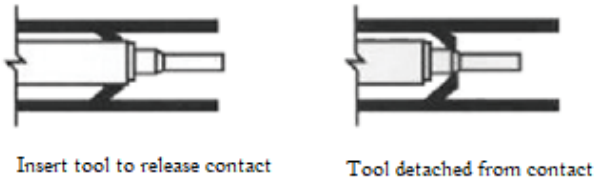


Figure 7-10 HD/HDP non-locking contact

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

7.4 Electrical Schematics

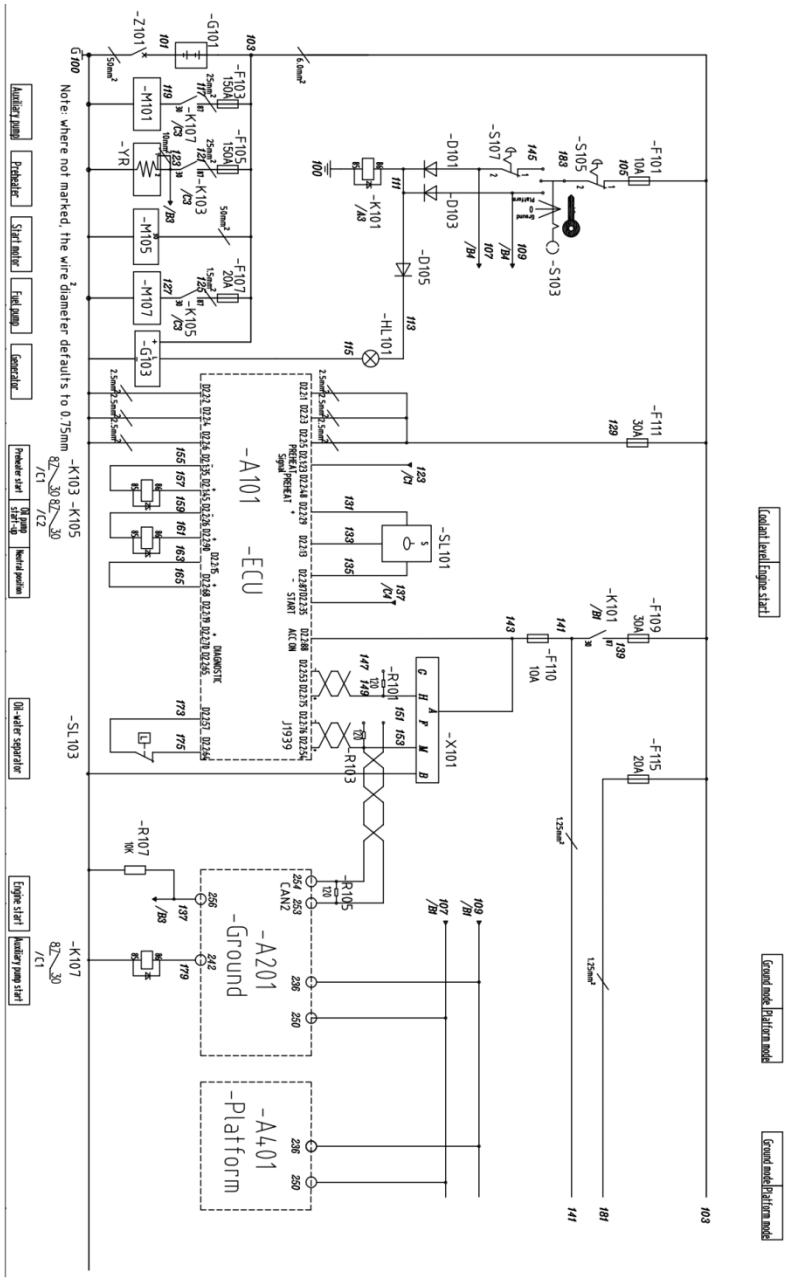


Figure 7-11 Electrical schematics (Figure 1/6）

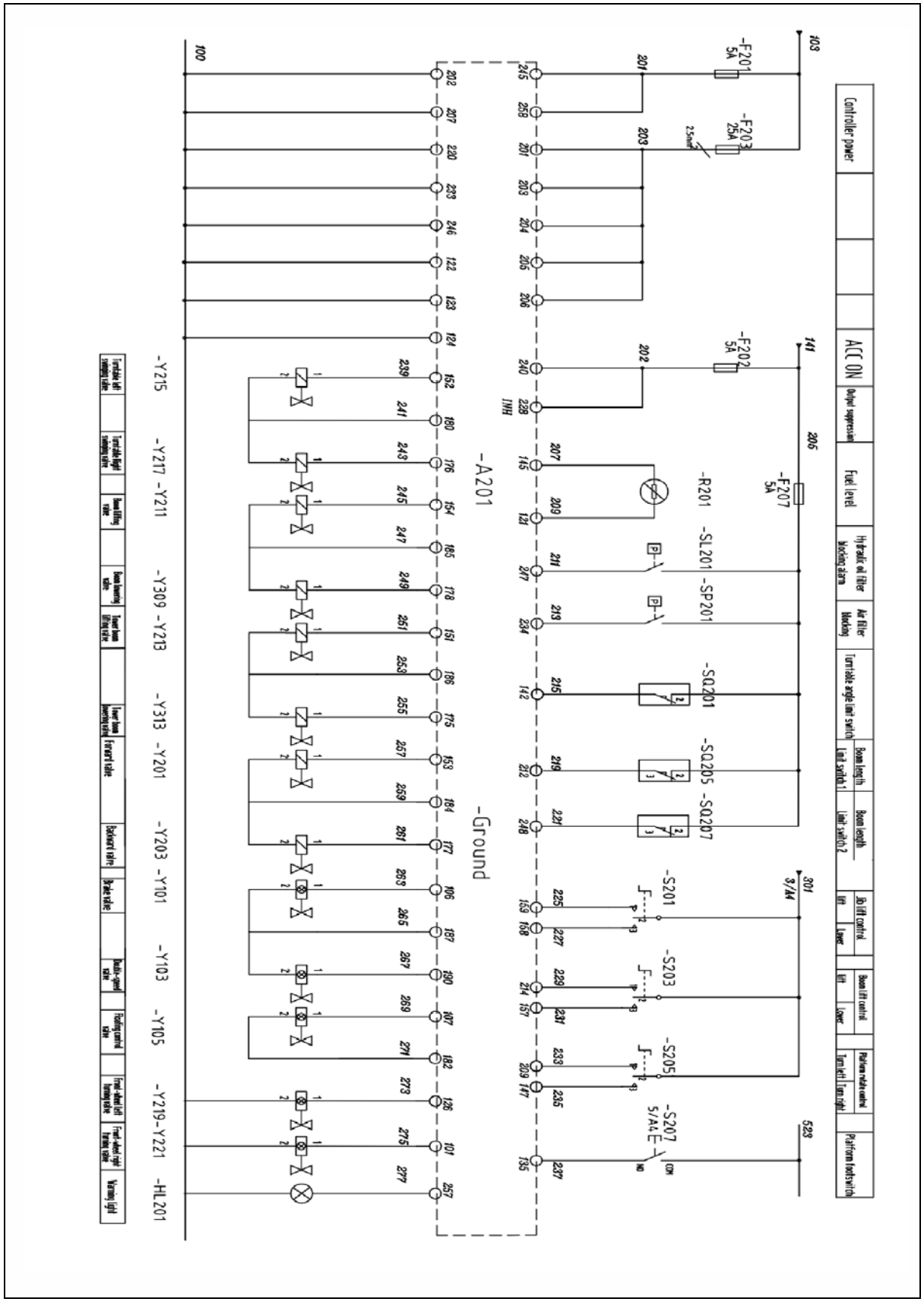


Figure 7-12 Electrical schematics (Figure 2/6)

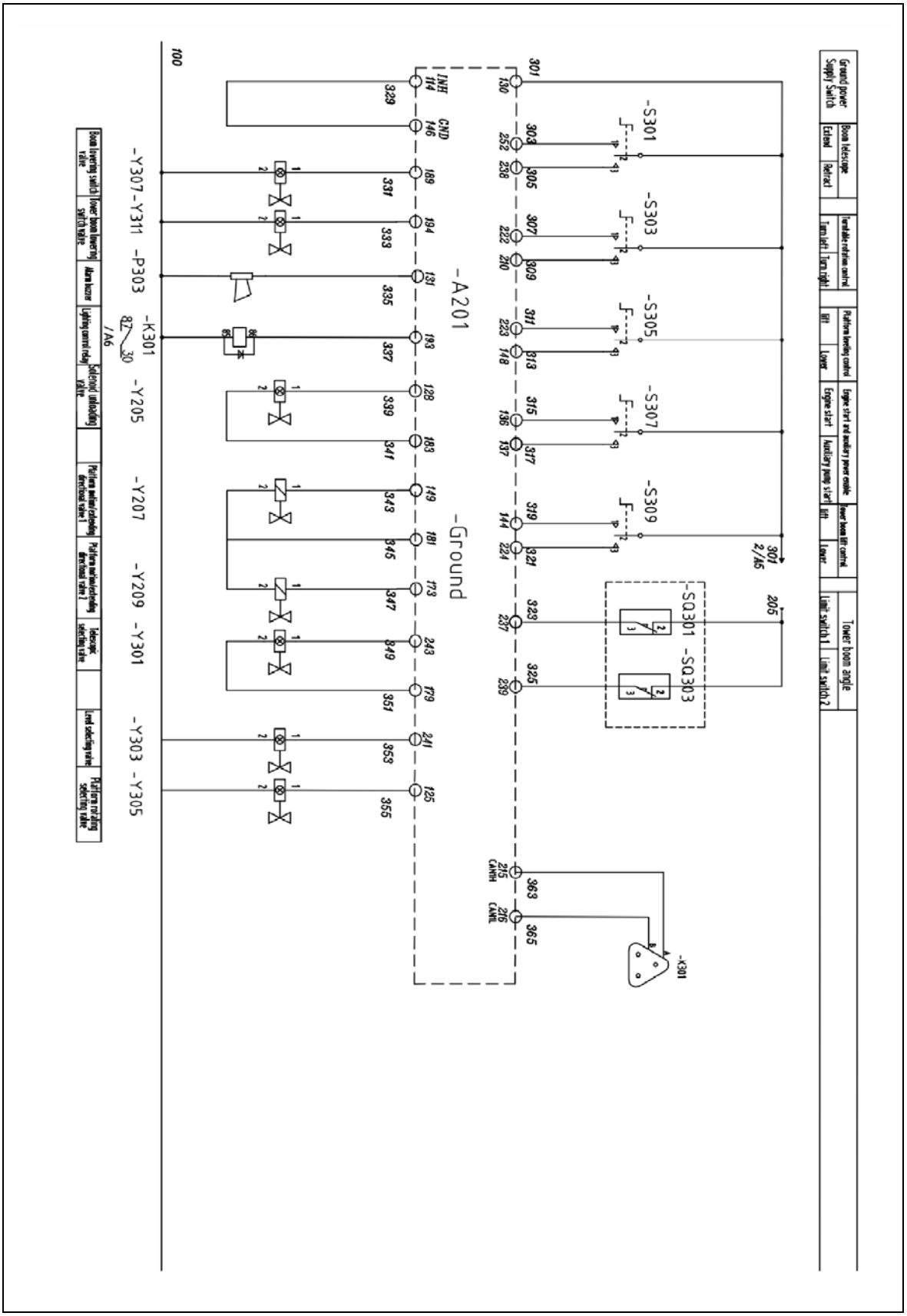


Figure 7-13 Electrical schematics (Figure 3/6)

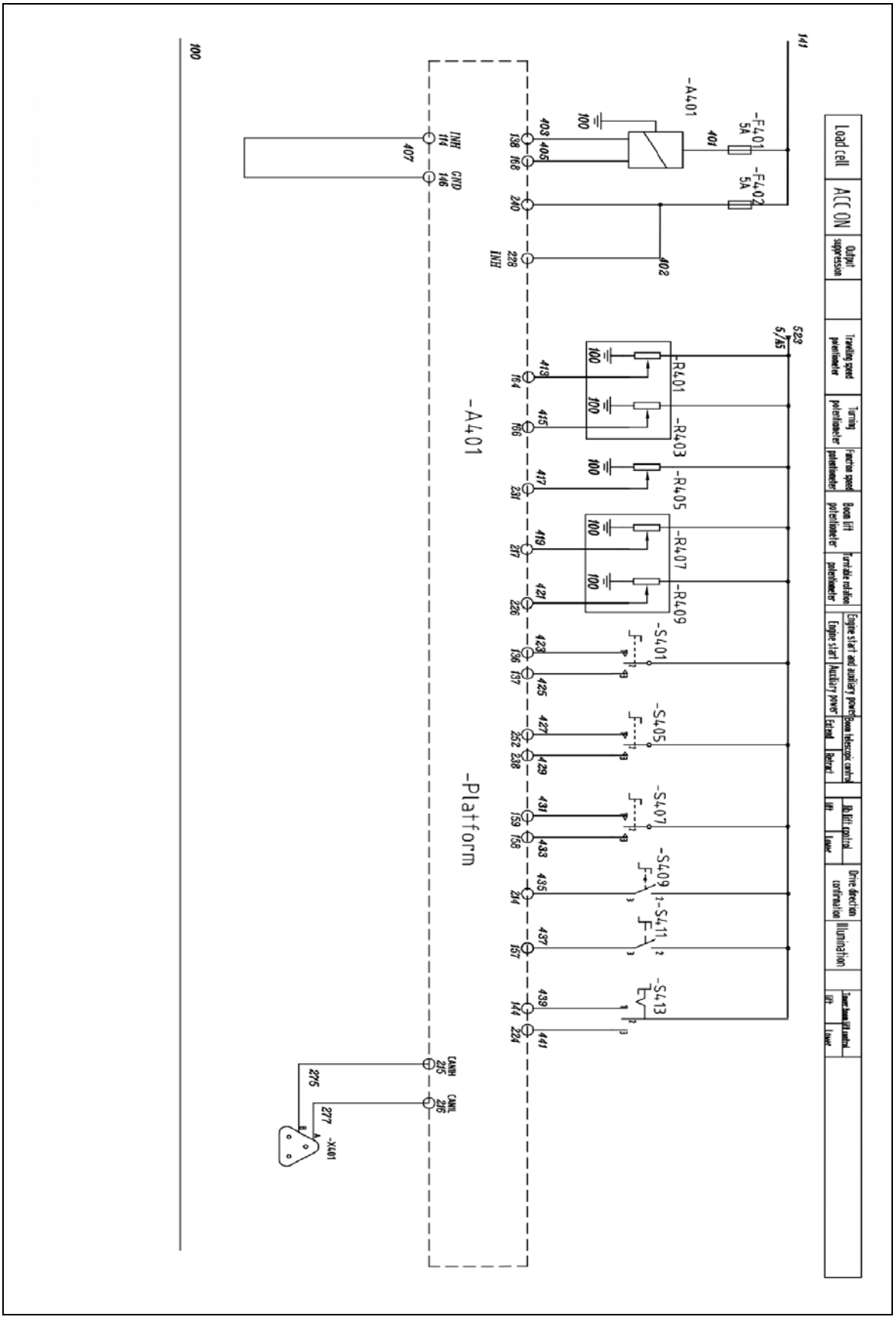


Figure 7-14 Electrical schematics (Figure 4/6)

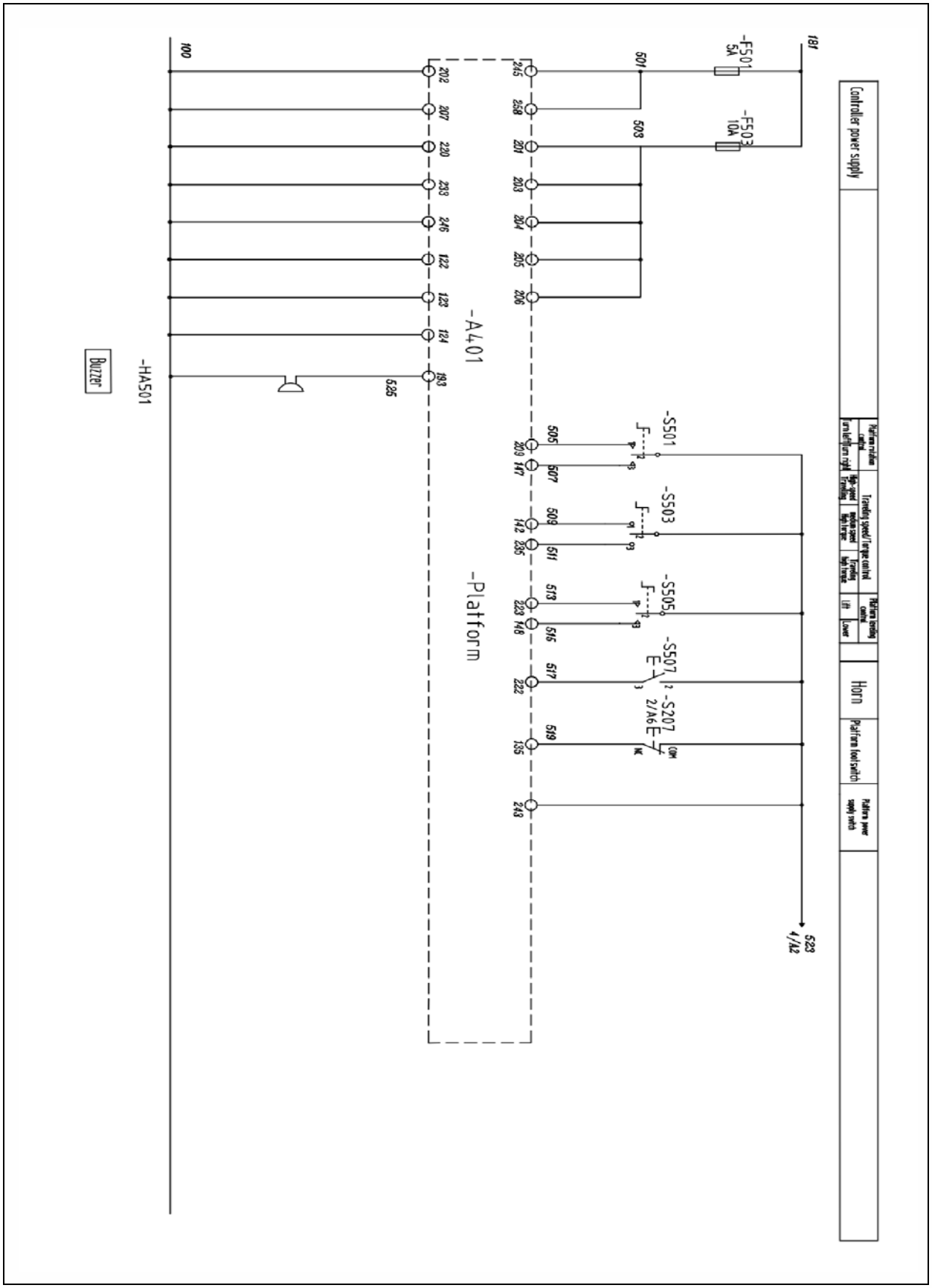


Figure 7-15 Electrical schematics (Figure 5/6)

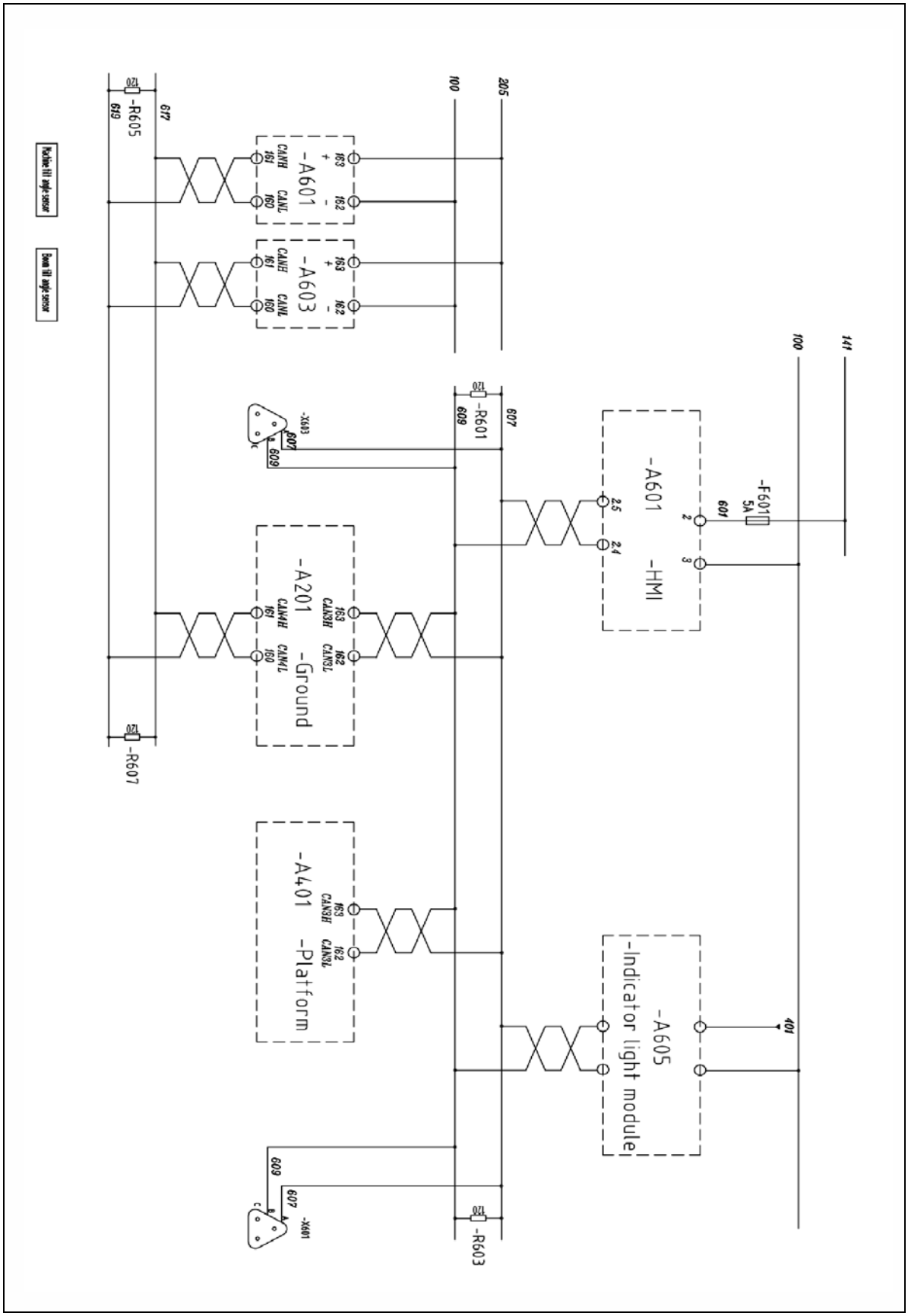


Figure 7-16 Electrical schematics (Figure 6/6)

7.5 Hydraulic Schematics

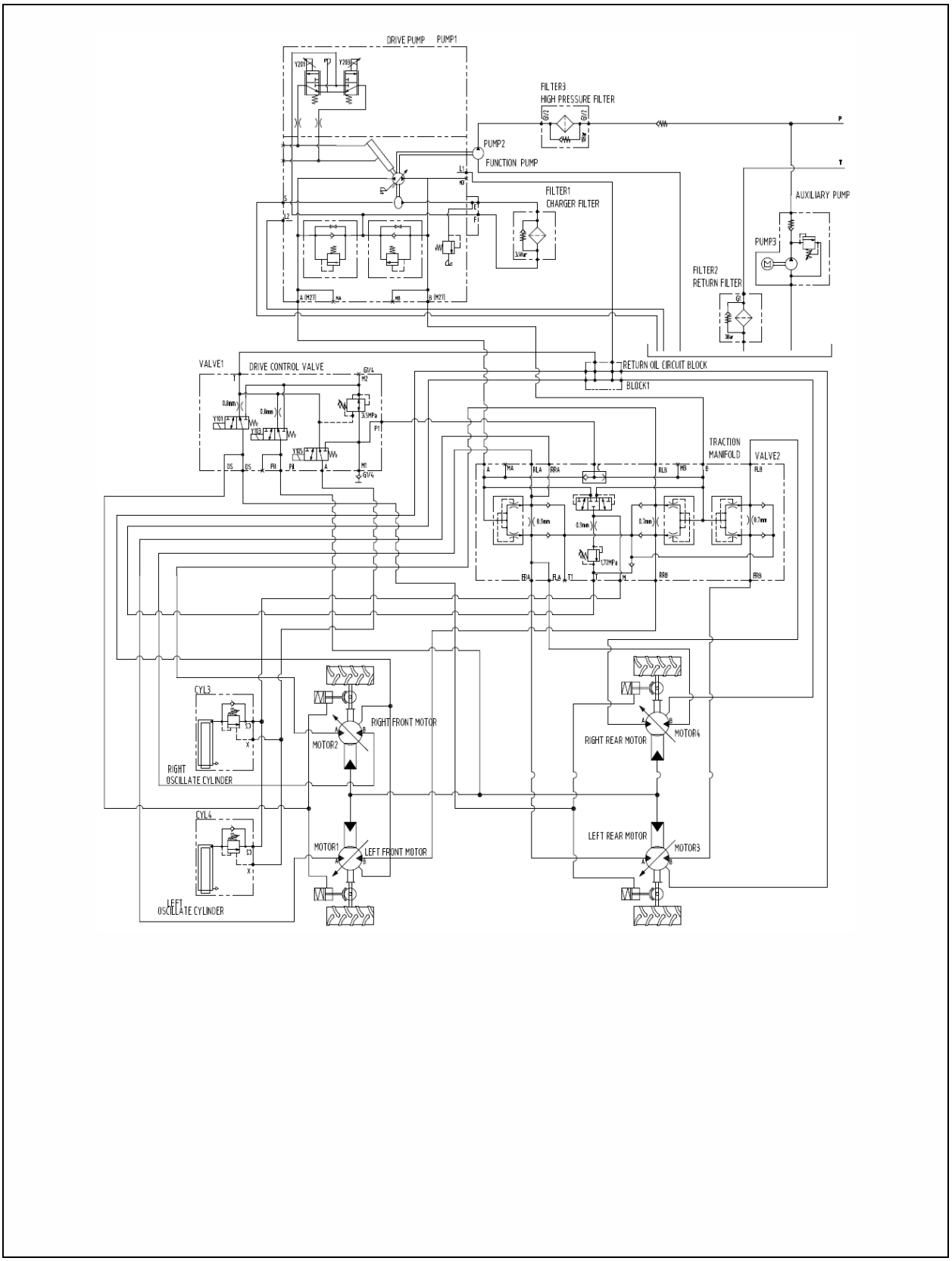


Figure 7-17 Hydraulic schematics (Figure 1/2)

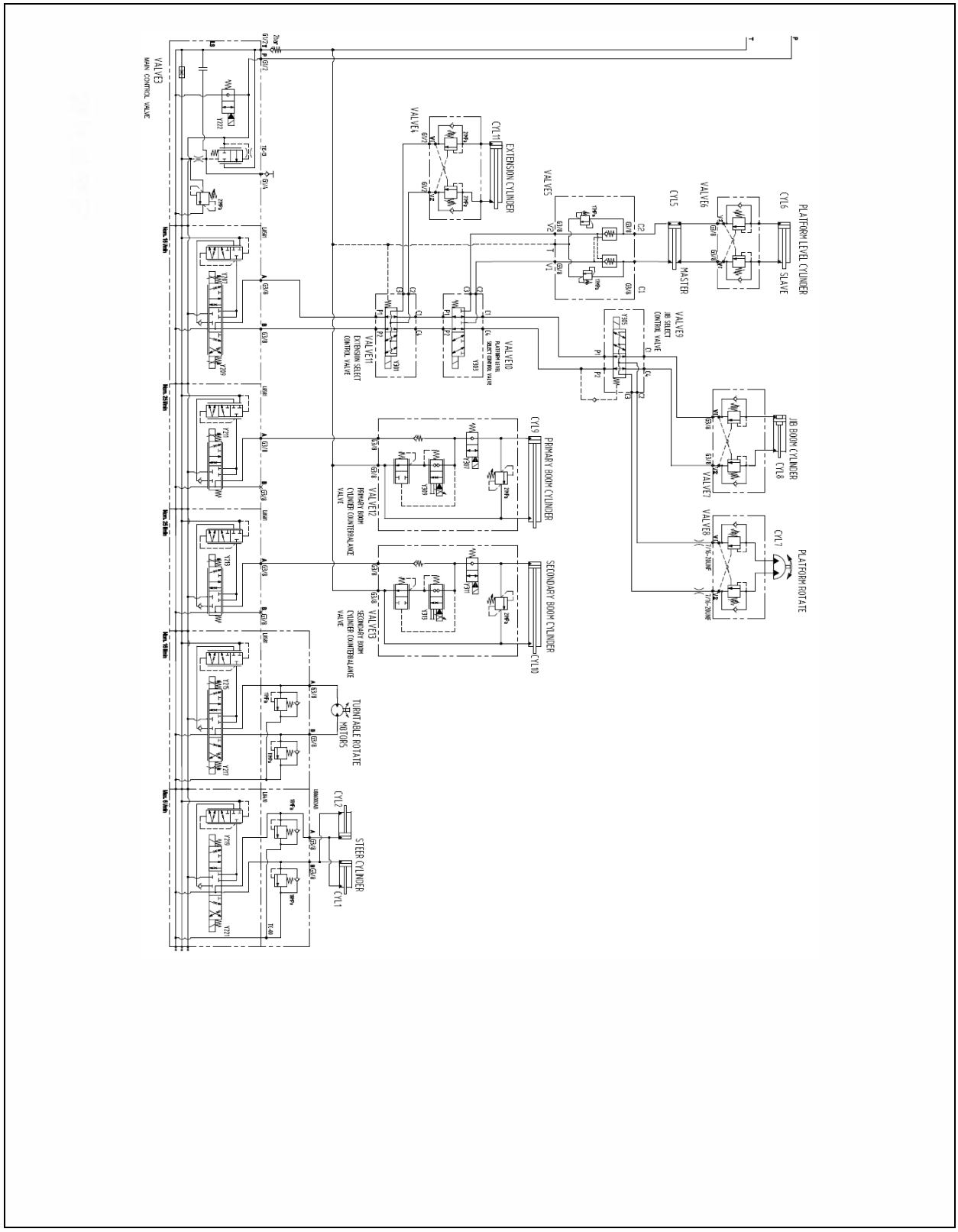


Figure 7-18 Hydraulic schematics (Figure 2/2)