ZOOMLION

ZT38JE
Service and Maintenance Manual

Apr 2023 Version A

Foreword

This Service and Maintenance Manual applies to the ZT38JE mobile elevated work platform (hereinafter referred to as the MEWP).

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

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

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

⚠CAUTION

Do not repair the parts marked with professional maintenance. Zoomlion Intelligent Access Machinery Co., Ltd. does not take the consequence for wrong maintenance.

⚠WARNING

Users should give top priority to Safety! 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 mobile elevated work platform is as specified in this Service and Maintenance Manual. When maintenance is required, our company provides on-site service or please go to our designated maintenance point for maintenance.

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

Foreword

Symbols and their description:

⚠DANGER

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

⚠WARNING

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

⚠CAUTION

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

NOTICE

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

⚠REMIND

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 1 MAINTENANCE SAFETY INSTRUCTION

1.1 Maintenance Personnel Duties, Requirements and Safety Equipment

1.1.1 Duties

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

1.1.2 Basic requirements

Maintenance personnel should meet the following conditions:

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

b) Experienced technicians or professional engineers.

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

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

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

⚠CAUTION

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

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

1.1.3 Personnel safety equipment

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

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

Figure 1-1 Personnel safety equipment

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

d) Keep inspection and maintenance records if needed.

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

⚠CAUTION

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

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

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

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

⚠WARNING

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

1.2 Maintenance Precautions

1.2.1 Precautions

a) 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.

b) Stop the engine before performing inspections or maintenance work.

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

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

⚠WARNING

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

a) Inspection or maintenance must be carried out by at least 2 people while the engine is running. One of them must be in front of the turntable or platform control panel so that the engine can be shut down at any time if necessary, and others can conduct inspection or maintenance. Personnel should keep close contact to work safely.

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

or make the floor slippery that results in injury.

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

⚠WARNING

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

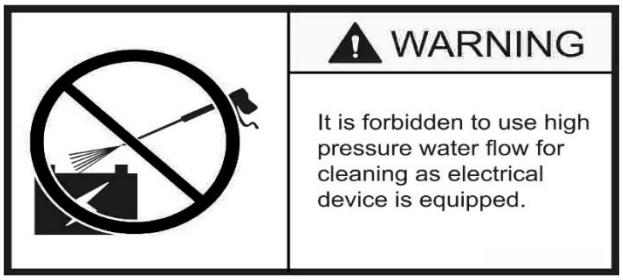

Figure 1-2 Mind Electric Shock

1.2.2 Precautions in maintenance

a) Prevent fire.

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

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

3) No smoking.

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

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

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

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

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

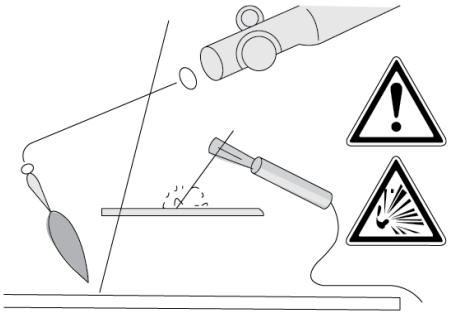

Figure 1-3 Beware of Explosion

⚠CAUTION

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

⚠WARNING

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

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

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

Figure 1-4 Caution Hot

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

⚠CAUTION

It is strictly forbidden to disassemble electronic components.

a) Do not allow tools or parts to fall into the inspection hole; Do not allow objects to fall into the holes during work. Falling objects can damage the machine or cause the machine to malfunction. Any tools or objects that fall into the inspection hole must be removed.

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

⚠WARNING

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

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

b) Pay attention to high pressure oil.

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

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

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

Figure 1-5 Prevent burns from high pressure oil

c) 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.

d) Mind battery liquid.

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

If the eyes or skin are in contact with the battery fluid, rinse immediately with plenty of water and

get medical attention promptly.

Figure 1-6 Mind battery liquid

e) 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.

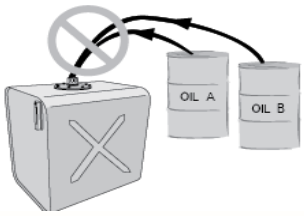

Figure 1-7 Prohibition of mixing oil

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

g) Precautions after maintenance:

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

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

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

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

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

NOTICE

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

environment.

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

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
Max Travel Speed (on slope)	45%(24°)
Max Travel Speed (on side slope)	45%(24°)
Platform Height	38.22m
Horizontal Outreach	22.64m
Turning Radius （working/stowed）	8.2/10.8m (outside) 3.3/7.7m (inside)
Max Travel Speed	5 km/h
Max Hydraulic System Pressure	21 Mpa
Max Wind Speed	12.5m/s (force 6 wind)
Max Working Force	400N
Electrical System Pressure	12V DC
Gross Weight	19200kg

*In stowed position

2.2 Specification and Performance

Table 2-2 Specification and Performance

Turntable Swing	360° continuous
Tail Swing	1.46m
Platform Dimension	0.91×2.44 m
Width	2.49m
Stowed Height	3m
Stowed Length (not folded)	12.26/14.35m
Wheelbase	3.81m
Ground Clearance	410mm
Travel Speed	5 km/h (stowed) 0.4 km/h (working)
Ground Bearing Stress	0.787MPa
Max Tire Capacity	10000kg

2.3 Capacity

Table 2-3 Capacity

Hydraulic tank	200 L

2.4 Battery

Table 2-4 Battery parameters

Rated voltage	80V
Capacity	606Ah
12V lead-acid battery – Rated voltage	12V
3hrs capacity	150Ah

2.5 Tire

Table 2-4 Tire Size

Size	**Type**	**Ply Rating**	**Max Capacity**		**Weight (tire and wheel)**
			8km/h	**0km/h**	
IN445/50D710	Foam-filled	18	9250 kg	11500 kg	390±5 kg

2.6 Functional Speed

Table 2-5 Functional speed

Function	ZT38JE
Boom Lifting	120~130
Boom Descending	120~130
Turntable Swing (a round)	135~145
Boom Extending	95~105
Boom Retracting	85~95
Platform Rotation	40~50
Jib Lifting	25~35
Jib Descending	25~30
Travel	5.5 km/h (stowed) 0.4 km/h (working)

2.6.1 Operating procedure when testing speed

a) Main boom lifting: Boom fully retracted. Record lifting and descending time respectively.

b) Turntable swing: Boom leveling and retracting. Record 360° continuous turntable swing left and

right respectively.

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

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

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

f) Drive (stowed): choose a smooth ground with the main boom less than 12 ° and the extension length less than 1m. Adjust the speed switch to high speed. Record the time of forward/reverse through 100m.

g) Drive (working): choose a smooth ground with the main boom larger than 12 ° and the extension length greater than 1m. Adjust the speed switch to high speed. Record the time of forward/reverse through 50m.

2.6.2 Test Cautions

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

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

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

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

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

2.7 Torque Requirements

Table 2-6 Toque Requirements

Bolt Diameter	Strength Grade and Corresponding Torque	
	8.8 grade	10.9 grade
M8	24.5Nm/18ftlb	34.5 Nm/25.4ftlb
M10	48.3 Nm/35.6ftlb	68 Nm/50.2ftlb
M12	84.3 Nm/62.2ftlb	118 Nm/87ftlb
M14	135 Nm/99.5ftlb	189 Nm/139.4ftlb
M16	209 Nm/154.2ftlb	294 Nm/217ftlb
M18	288 Nm/212.4ftlb	405 Nm/298.7ftlb
M20	408 Nm/301ftlb	538 Nm/396.8ftlb

M22	555 Nm/409.4ftlb	780 Nm/575.3ftlb
M24	705 Nm/520ftlb	992 Nm/731.7ftlb
M27	1032 Nm/761.2ftlb	1450 Nm/1069.5ftlb
M30	1400 Nm/1032.6ftlb	1970 Nm/1453ftlb

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

Table 2-7 Special toque Requirements

Instruction:	Torque value (N.m)	Time intervals
Hub fastening bolt M20	400	50 hours after the first run, every 150 hours or 3 months thereafter
Slew bearing bolt M20	520	100 hours after the first run, every 500 hours thereafter
Slew reducer connecting bolt M20	520	100 hours after the first run, every 500 hours thereafter
Rotary actuator bolt M12	100	First installation or disassembly
Load cell bolt M16	320	First installation or disassembly

Note: when maintenance is required or the fasteners are loose, follow the torque gauge to determine the appropriate torque value, the bolt pre-tightening force is not marked, please follow DIN267-27.

2.8 Lubrication

2.8.1 Hydraulic oil

Table 2-8 Hydraulic oil specification

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

2.9 Pressure Setting

Table 2-9 Pressure Setting

Main boom lifting:	21MPa
Boom telescoping:	21MPa
Turntable swing	21MPa
Chassis diversion	21MPa

Jib lifting	16MPa
Platform rotation	21MPa
Platform leveling	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.

3.1.3 Pre-start inspection

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

3.1.4 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 maintain, repair and maintain the product models 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 harsh 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.

3.1.5 Machine annual inspection

The factory-certified maintenance engineer shall perform annual inspections of the machine every year for 13 months after the date of the last annual inspection. The maintenance engineer shall receive professional training for the relevant model products 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.

3.1.6 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 maintain, repair and maintain the product models 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 a harsh environment or with a high frequency of operation.

Table 3-1 Inspection and Maintenance

Type	**Frequency**	**Main Responsibility Person**	**Maintenance Certification**	**Reference**
Pre-start	Before daily use or each shift	User or operator	User or operator	Operation 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
Machine annual inspection	Implemented annually, within 13 months from the date of the last inspection.	Owner, dealer or user	Factory-recognized 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 life. 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 openings 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, slings, 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-based compound.

3.2.7 Bearings

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 your local supplier for the 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. When the battery is completely dry, apply the battery terminals with an anti-corrosion compound.

3.2.13.1 Battery inspection

Check the battery appearance. The battery top and terminal connections should be kept clean, free of dust, corrosion and dryness. See 3.2.13.3 Cleaning for reference.

If there is liquid on the top of a deep-cycle flooded / wet battery, this indicates that the battery had added too much water or overcharged. See 3.2.13.2 Add water for proper watering steps. If there is liquid on the top of AGM or gel battery, this indicates that the battery overcharge, as result, the performance and service life of the battery might shorten.

Check the battery cable connection. Replace damaged cable. Tighten any loose connection.

3.2.13.2 Add water (Suit for deep-cycle flooded/wet battery only)

Never add water to deep-cycle AGM or gel batteries, since they will not lose water during operation. Deep-cycle flooded/wet batteries should add water regularly, and the frequency is determined by the usage and running temperature. Check the new battery every few weeks to set a proper watering frequency. Normally, the longer the service life is, the more frequent the watering interval should be.

a) Fully charge the battery before adding water. If the pole plate exposed, add water to the discharged or partially discharged batteries only. In this case, add water that just happens to pass through the plate, then charge the battery, and continue with the steps below;
b) Remove the filling plug and put it upside down to prevent dust from entering its underside. For Plus Series™ battery, simply open the filp-type filling plug. Check the electrolyte level;
c) If the electrolyte level is much higher than the electrode plate, which indicates that there is no need to add water;
d) If the electrolyte level does not reach the electrode plate, add distilled water or deionized water. For standard batteries, add water to the bottom of filling hole 1/8 inch (3mm) below (This is the plastic cap inside the filling hole). For Plus Series™ batteries, add water to Max.
e) After adding water, place the filling plug back.

3.2.13.3 Cleaning

Please clean the battery regularly to prevent the terminals and connectors from corrosion. Corroded terminals may adversely affect battery performance and bring safety threat.

Check whether all filling plugs are secured properly.

Use cloth or brush and mixture of baking soda and water (a cup of baking soda and one gallon of water) to clean the top of the battery, terminals and connections.

Prevent the cleaning solution from entering the inside of batteries. Rinse with water, and use cloth to dry it.

Coat the terminals with protecting spray (available through local battery dealer).

Keep the surrounding area clean and dry.

3.2.14 Lubrication and maintenance

Parts and components that require lubrication and maintenance refer to the Lubrication Table in SECTION 2.

3.3 Inspection and Maintenance of Hydraulic System

3.3.1 Regular inspection

It is necessary to conduct regular maintenance of hydraulic system on time for good performance. The following table shows some routine inspections and maintenance:

Table 3-2 Hydraulic system inspection period

No.	Inspection and Maintenance Items	Inspection Intervals (hrs)							Remark
		5	25	100	250	500	1000	2000	
1	Oil capacity inspection	★							
2	Hydraulic oil deposit inspection				★				
3	Tank exhaust cap blocked inspection	★							
4	Hydraulic motor, pump leakage, and sound abnormality inspection	★							
5	Hydraulic valve oil leakage inspection	★							

Table 3-3 Hydraulic system maintenance period

No.	Maintenance Items		Replacing Period				Mounting position
		First 50hrs or 30 days	Every 500hrs or 2 months	Every 1,000hrs or 6 months	Every 2,000hrs or 12 months	Every 24 months (not working)	
1	Replace return oil filter element	★ (first)		★			Control oil line
2	Replace hydraulic tank exhaust		★				Hydraulic tank

	cap filter						
3	Replace return oil filter element	★(first)		★			Control oil line
4	Replace hydraulic oil					Mandatory replacement	

The following items should note in routine maintenance:

a) Select suitable hydraulic oil for pressure transmitting, lubricating, cooling and sealing. Improper hydraulic oil will cause system fault in early stage and decline in durability. Choose recommended hydraulic oil. If it is necessary to use alternative oil in a specific circumstance, the performance should be the same as that of the original brand. Do not mix different hydraulic oil to prevent chemical reactions or performance changes. Metamorphic oil appears deep brown or milk white with smells, which cannot not in use;

b) Prevent solid impurities from mixing into hydraulic system. Clean hydraulic oil matters to hydraulic system. Hydraulic system contains a lot of nice assemblies, and some are equipped with damping holes or slits. Intrusion of solid impurities will result in assemblies strain, block and etc., endangering the safe operation of hydraulic system. Channels of solid impurities invasion:
   1) Unclean hydraulic oil;
   2) Unclean tools;
   3) Improper oil feeding or maintenance;
   4) Components shedding.

c) Prevent air and water invasion. If the volume ratio of air in hydraulic oil reaches 6-8% in normal temperature and pressure, the air will be released from the oil when the pressure is lowered. And the bubble breakage will cause “cavitation” generating noise. The air will not only oxidize hydraulic oil, accelerating its deterioration. A large amount of air entering the oil will aggravate the "cavitation" phenomenon that the hydraulic oil compressibility will be increased, and the machine performance will be affected. As such, the following instructions should be noted for air invasion preventing:
   1) Eliminate air after maintenance or oil replacement;
   2) Single-lip oil seal could not block the air, therefore, the oil seal in oil pump driving axle should use two-lip seal;
   3) The oil suction pipe port of the hydraulic oil pump must not be exposed to the oil surface, and the oil suction pipe must be well sealed;
   4) Tighten the lid when not in use, it is better to put it upside down;
   5) The hydraulic oil with large water content should be filtered more, and the filter paper to be dried should be changed every time it is filtered;
   6) Refueling tools should be clean and reliable and the hydraulic oil must be filtered when refueling.

The filter at the filler port of the hydraulic oil tank cannot be removed because of the need to increase the refueling speed;

7) Operators should use clean gloves and work clothes;

8) The cleaning oil of the hydraulic system must use the same type of hydraulic oil used in the system. The oil temperature is between 45 ℃/113°F and 80 ℃/176°F, and the impurities in the system should be removed as much as possible with a large flow rate. The hydraulic system should be cleaned repeatedly more than three times, and after the cleaning is completed, release all of the oil while the oil is hot. After cleaning, clean the filter, replace with a new filter and add new oil.

d) When removing the fuel tank filler cap, first remove the dirt around the fuel tank cap, loosen the fuel tank cap and remove the debris remaining at the joints, and only open the fuel tank cap after confirming the cleaning. When maintenance, dismantle the hydraulic oil tank refueling cap, detection hole, hydraulic tubing and other parts. When the hydraulic system oil channel is exposed, avoid dust, and the disassembly part must be thoroughly cleaned before opening. If there is a need to use the test material and hammer, choose a special hammer with rubber attached to the hitting surface and a wiping material that does not lose fiber impurities. It is necessary to carefully clean the hydraulic components and hydraulic hoses, dry them with high-pressure air and assemble them. Use genuine filter elements in good packaging. Before installing the filter element, wipe the material carefully to remove the dirt inside the filter housing, and also change the oil at the same time as cleaning the filter.

3.3.2 Hydraulic tank and hydraulic oil

3.3.2.1 Hydraulic tank check

There are scales on the side of the hydraulic tank, and the scales have corresponding capacity values.

Table 3-4 Oil capacity

Model	ZT38JE
Hydraulic Tank	200L
Oil mass of hydraulic system (including tank)	265KG

Check the oil capacity before starting the machine. The capacity value should be between the maximum value and the minimum value when the machine is in stowed position. When the machine is placed horizontally, if the capacity is below the minimum requirement, it means that the hydraulic oil in the hydraulic system is insufficient, please fill hydraulic oil before starting.

If the oil consumes too fast, there must be a leak in pipeline or hydraulic components. Check the hydraulic line and components for leakage, starting the machine after repairing the leakage.

If the hydraulic oil temperature is too low (below 20℃/68°F), the liquidity of oil will be poor, excessive operation at this time will damage the hydraulic components. If the oil temperature is too high (above

80℃/176℉), the degradation of the hydraulic oil will be accelerated, as such, the service lifespan of hydraulic components will be shortened. Therefore, sufficient warm-up is required to make the oil temperature reach 20℃/68℉ after starting the engine in cold environment.

Refer to Table 3-5 Hydraulic oil parameters (not for models with specified hydraulic oil) for hydraulic oil types and models. Select suitable hydraulic oil types according to specific application. For special environments or users with special requirements, please contact ZOOMLION or hydraulic oil manufacturers.

3.3.2.2 Replace filter

Return oil filter

Maintenance point- replaceable filter element.

Time interval- first 50hrs after usage, every 6 months or 1000hrs thereafter.

High pressure filter

Maintenance point- replaceable filter.

Time interval- first 50hrs after usage, every 6 months or 1000hrs thereafter.

Breather plug

Maintenance point- breather plug of tank

Time interval- first 50hrs after usage, every 6 months or 1000hrs thereafter

Note- remove and replace the wing nut and outer cover. Replacement might be conducted frequently in some circumstances.

Please be careful not to reverse the filter inlet and outlet when replacing the filter element, otherwise it will cause serious consequences.

3.3.2.3 Hydraulic oil replacement

When this product leaves the factory, the hydraulic oil tank is filled with hydraulic oil, and the hydraulic oil type is selected according to customer or environmental needs.

Keep the machine in horizontal level when replacing oil, the oil change steps are as follows:

a) Turn off the engine and depressurize hydraulic system;

b) Install the oil drain pipe to the plug of the hydraulic oil tank and drain the hydraulic oil into a suitable container. Pay attention to the treatment of waste oil in an environmentally friendly manner;

c) Loosen the oil plug, first clean it with a chemical cleaning agent with a solid particle pollution level not exceeding 18/15, and after washing and drying, rinse with new hydraulic oil with a solid particle pollution level not exceeding 18/15, then release the flushing oil and pour new hydraulic oil into the hydraulic oil tank;

d) Start the machine, rotate at a low speed to make the oil pump start to operate, operate each mechanism separately, and discharge the old oil of each circuit of the system one by one with new hydraulic oil, and the discharged old oil must not flow into the hydraulic oil tank. When changing the oil in each circuit, pay attention to constantly add new oil to the hydraulic oil to prevent the oil pump from sucking out;

e) Install the oil drain plug, and finally put the components in the initial state of work, add hydraulic oil to the oil tank until the specified liquid level position; Check that all shut-off valves and quick connectors are open. All shut-off valves and quick connectors must be opened to keep the entire oil

circuit unobstructed.

Refer to Table 3-5 Hydraulic oil parameters (not for models with specified hydraulic oil) for hydraulic oil types and models. Select suitable hydraulic oil types according to specific application. 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 3-5 Hydraulic oil technical parameter

Parameters / Brands	ISO viscosity grade	Pour point ℃	Flash point ℃	Motion viscosity cSt (40℃)	Viscosity index
Great Wall 4632 grease non-flammable hydraulic oil N32 (environmental friendly)	32	-20	270	28.8-35.2	180
Great Wall Ground No.10 Aviation hydraulic oil	—	-55	107	10.53 (50℃)	120
Great Wall Zhuoli L-HS 15 Ultra-low temp hydraulic oil	15	-57	164	15.35	172
Great Wall Zhuoli L-HS 32 Ultra-low temp hydraulic oil	32	-48	224	31.35	166
Great Wall Zhuoli L-HS 46 Ultra-low temp hydraulic oil	46	-43	238	45.81	170
Great Wall Zhuoli L-HV 15 Low temperature hydraulic oil	15	-45	173	15.51	140
Great Wall Zhuoli L-HV 32 Low temperature hydraulic oil	32	-39	231	33.4	150
Great Wall Zhuoli L-HV 46 Low temperature hydraulic oil	46	-37	240	48.7	150
Great Wall Zhuoli L-HV 68 Low temperature hydraulic oil	68	-35	238	70.47	150
Great Wall Zhuoli L-HM 46 Anti-wear hydraulic oil (high pressure)	46	-15	240	45.8	97
Great Wall Zhuoli L-HM 68 Anti-wear hydraulic oil (high	68	-13	245	67.4	98

pressure)					
Mobil SHC Aware H 32 (Environmental friendly)	32	-30	185/	32	140
Chevron (Clarity Synthetic EA Hydraulic Oil)	46	-44	221	46	180
Mobil DTE 10 Ultra 22	22	-54	224	22.4	164
Mobil DTE 10 Ultra 32	32	-54	250	32.7	164
Mobil DTE 10 Ultra 46	46	-45	232	45.6	164
Chevron/Caltex Rando HDZ 15	15	-60	150	15.7	144
Chevron/Caltex Rando HDZ 32	32	-49	204	33	150
Chevron/Caltex Rando HDZ 46	46	-47	216	46.7	153
Chevron/Caltex Rando MV 15	15	-42	154	15.8	155
Chevron/Caltex Rando MV 32	32	-36	210	33.5	154
Chevron/Caltex Rando MV 46	46	-33	214	44	154

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℉ (viscosity grade reaches 32). 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.

If the equipment is used at an altitude of more than 4000m above sea level, in order to ensure the normal oil absorption of the hydraulic pump, please use hydraulic oil with a lower viscosity grade on the basis of meeting the aforementioned hydraulic oil use requirements.

The cleanliness of the hydraulic oil when the equipment leaves the factory is NAS9 (ISO4406 18/15). The normal operation of the equipment requires that the cleanliness of the hydraulic oil is not lower than NAS10 (ISO4406 19/16). We recommend that the cleanliness of the hydraulic oil be tested every 6 months. When the oil needs to be changed, at least one oil sample should be taken, and it would be better to do it

multiple times. The oil sample can be sent to the hydraulic oil manufacturer or a qualified third-party testing agency for analysis and to determine whether it is still available.

REMIND

1. **The use time of hydraulic oil should not exceed 24 months. After 24 months, it is not recommended to use it even after filtering;**
2. **Whenever serious or obvious abnormality of hydraulic oil pollution is found, it should be filtered or replaced in time;**
3. **Select the appropriate hydraulic oil according to the ambient temperature;**
4. **Hydraulic oils of different brands cannot be mixed;**
5. **When changing the oil, all the original oil should be rinsed out and care should be taken not to allow sand, dust and other debris to mix into the oil tank;**
6. **When changing the oil in each circuit, pay attention to constantly add new oil to the hydraulic oil to prevent the oil pump from sucking out;**
7. **When starting the machine in a cold area, the minimum starting temperature must be reached and the no-load is applied, when the minimum operating temperature is reached, then slowly load to keep the system running above the minimum load temperature;**
8. **Pay attention to environmental protection when handling hydraulic oil.**

3.3.3 Hydraulic system exhaust

Normally, the hydraulic system will automatically exhaust. For this reason, the equipment operates at low speed and low pressure. Slowly operate each cylinder to run back and forth until the air is completely exhausted.

3.3.4 Check for damage to hydraulic system piping

The hose placed at the bend of the hydraulic tray is prone to friction damage. Check to make sure it is intact. Replace it if damaged. Make sure that all pipelines and hoses are kept at a sufficient distance at transitions (such as the corners of hydraulic pallets) so that there is no friction when laying.

3.3.5 Check hydraulic cylinder

Check the cylinder regularly, the checking items are listed as follows:

a) Check the piston rod for scratches;

b) When performing the corresponding auxiliary action, check whether there is oil leakage at the seal between the piston rod and the cylinder;

c) Check whether the piston rod of the long stroke cylinder is bent;

d) If there is oil leakage between the piston rod and the cylinder, it should be repaired by the manufacturer or professional maintenance personnel. Every effort should be made to prevent the piston rod from being scratched. When the piston rod scratches seriously cause oil leakage, it should be repaired by the manufacturer or professional maintenance personnel. If it cannot be repaired, it

should be replaced. When the piston rod is bent and cannot work normally, you should find the manufacturer or professional maintenance personnel to replace the cylinder.

Pay attention to the following aspects when using and transporting hydraulic cylinders:

a) Packing should be added during the storage and transportation of the hydraulic cylinder, and protective devices should be added to the oil port joint surface and the exposed part of the piston rod;
b) It should be fixed firmly during storage and transportation to prevent knocking;
c) When hoisting, it should be tied firmly to avoid falling;
d) Before disassembling the hydraulic cylinder, the oil pressure drop in the hydraulic cylinder circuit should be zero;
e) To prevent damage to the hydraulic cylinder parts during disassembly;
f) Protect the outer surface of the piston rod to prevent the bumps and scratches from damaging the seals, and frequently clean the mud and dust on the dynamic seal dust ring of the cylinder and the exposed piston rod to prevent sticking on the surface of the piston rod. Dirt enters the cylinder and damages the piston, cylinder or seal;
g) Regularly check the connection parts of various threads, bolts, etc., and find that it is loose and tightened immediately;
h) Frequently lubricate the connection parts to prevent corrosion or abnormal wear in the absence of oil.

3.3.6 Check hydraulic hose

All hydraulic hoses need to be checked regularly for damage. During these visual inspections, even if only very minor damage is found, all damaged hoses should be replaced immediately.

Possible problems with hydraulic hoses:

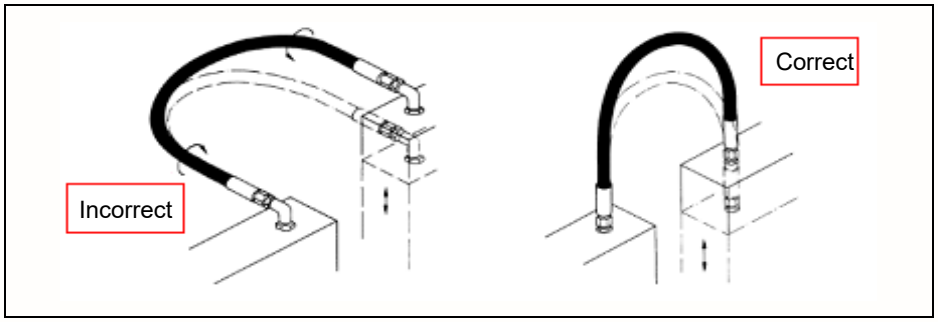
a) Outer layer damage, such as wear, cuts, cracks, etc.;
b) The outer layer material is aging, forming cracks;
c) Deformation that does not conform to the natural shape of the hose, such as loose surface, severe squeezing, twisting, etc.;
d) Leak;
e) Failure to comply with installation and positioning requirements (refer to the notes on installing hydraulic lines mentioned below);
f) The fixed equipment on the hose device is damaged;
g) Corrosion, deformation or damage of the hose device;
h) Exceeding storage time or use period.

Even if no damage is found, the hose cannot be replaced by more than 6 years (including a maximum of 2 years of storage time) at the latest. For the period of use or storage, the date of manufacture on the hydraulic hose should be used as the basis.

When installing hydraulic lines, the following should be noted:

1) Avoid hose twisting:
   ① When the hose is twisted, the bearing pressure will be reduced;
   ② The twisted hose will also loosen the connection of the joint;

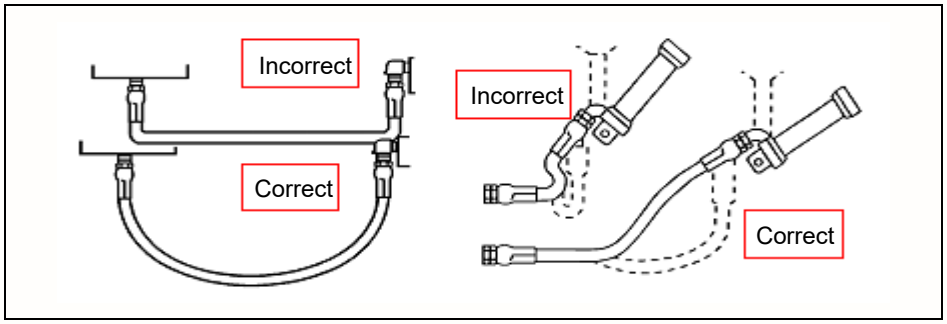
③ Hose twisted by 7 ° can reduce the service life of the hose by 10%.



2) To have sufficient bending radius:

① It can ensure smooth fluid flow and effectively avoid pipeline damage;

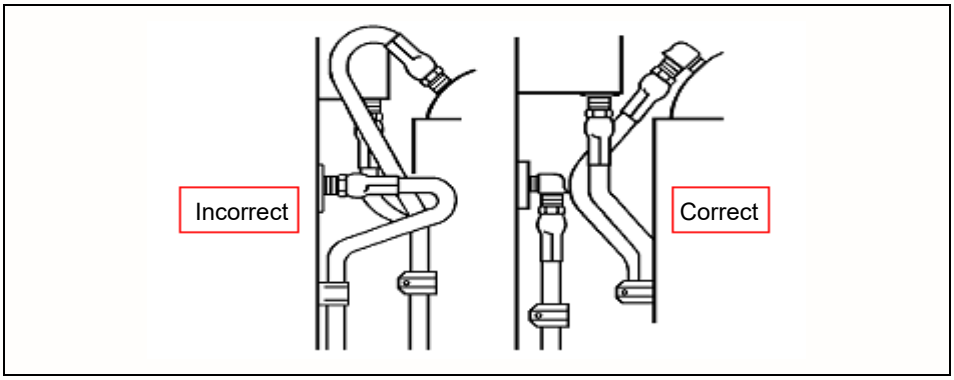
② Too small bending radius will greatly reduce the life of the hose assembly.



3) Use elbows and other connectors when necessary:

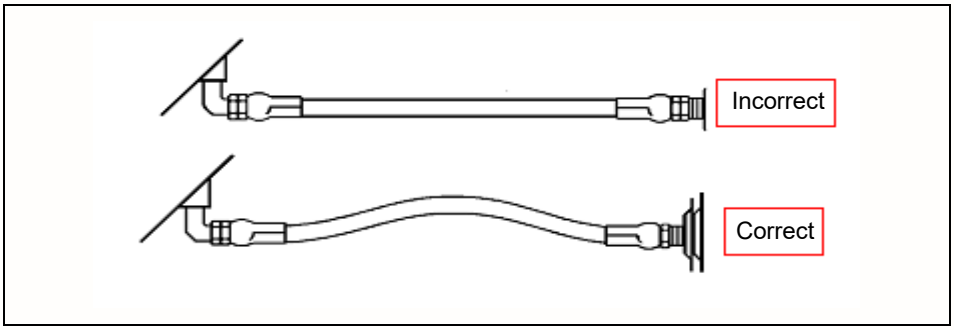
① Avoid too long hose assembly;

② It can ensure tidy installation and convenient maintenance in the future.



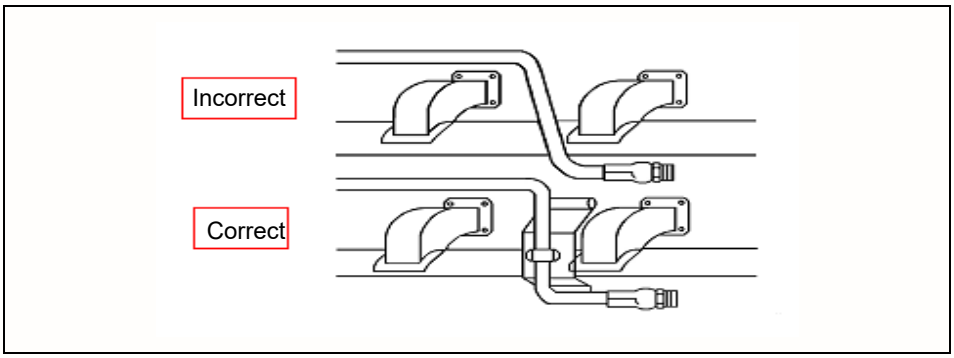
4) A certain slack compensates for the shrinkage of the hose when it is under pressure;

The hose usually has a length change rate of -4% to + 2% when under pressure.



5) Use a pipe clamp to ensure the positioning of the hose:

Effectively reduce wear between hoses and related components.

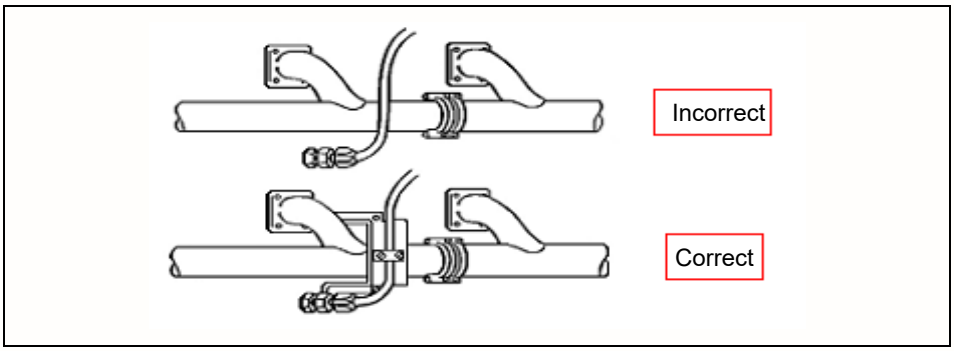


6) Arrange the hose:

① Avoid overheated surfaces and sharp edges;

② Avoid friction with components;

③ There must be enough free length for bending activities.



3.4 Cylinder Drift Test

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

3.4.1 Platform drift

Measure drift from the platform to the ground. Raise the lower boom slightly (if equipped) and fully extend the upper boom with the platform capacity and power off.

The maximum allowable drift in 10 minutes is 2 inches /5 cm.

3.4.2 Cylinder drift

Table 3-3 Cylinder drift

Cylinder bore size		Maximum acceptable drift value in 10 minutes	
Inch	Millimeter	Inch	Millimeter
3	76.2	0.026	0.66
3.5	89	0.019	0.48
4	101.6	0.015	0.38

5	127	0.009	0.22
6	152.4	0.006	0.15
7	177.8	0.005	0.13
8	203.2	0.0038	0.10
9	228.6	0.0030	0.08

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 chassis.

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

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

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

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

⚠CAUTION

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

Table 3-4 Inspection and preventive maintenance schedule

Items	Time intervals					
	Pre-start	Weekly	Monthly	Pre-delivery or daily	Annually	Every 2 years
Boom assembly	9					
Boom weldment				1,2,4	1,2,4	
Oil pipe/wire rope bracket device				1,2,9,12	1,2,9,12	
Shaft pin and pin bolt limiting stopper				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 rope				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 point	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 systems				5,8	5,8	
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	
Fluid reservoir, cap and breather	11,9		2	1,5	1,5	
Hydraulic/Electrical system	9					
Hydraulic pump		1,9		1,2,9		

Hydraulic cylinder		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 labels and decals	21			21	21	
Check around the unit	21					
Machine annual inspection expires				21		
No unauthorized changes or additions				21	21	
Consolidate all relevant security publications				21	21	
General structural state and welding				2,4	2,4	
All fasteners, pins, hood and covering				1,2	1,2	
Lubricating grease and lubricating specification				22	22	
All system functional test	21			21	21, 22	
Paint 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. Implemented 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 or 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 specifications
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 wheel is composed of tires and rims. Its function is to support the weight of the vehicle; to ensure good adhesion to the road surface, to transmit driving torque and braking torque; to determine the driving direction of the vehicle, alleviate the impact of the vehicle on uneven roads while driving, and attenuate the resulting vibration.

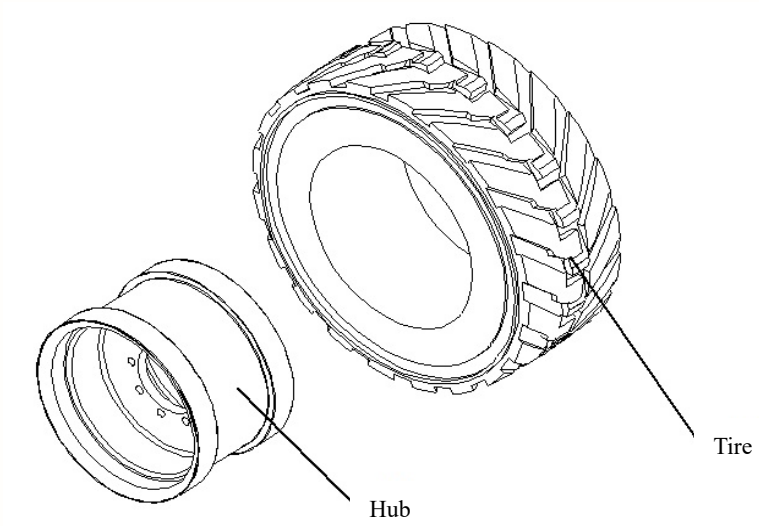


Figure 4-1 Wheel composition

4.1.1 Tire inflation

In order to ensure 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 units 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 that 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 25.4/1 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) Ply/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 tires, the same brand should be used for the two tires on the same axle.

4.1.4 Wheel replacement

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

4.1.5 Wheel installation

⚠WARNING

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

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

a) Manually screw all the nuts to prevent threading. Do not use lubricant on threads or nuts.

b) Please tighten the nuts in the following order.

Figure 4-2 Wheel fastening nut tightening sequence

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

Table 4-1 Wheel torque table

Torque application sequence		
First step	**Second step**	**Third step**
135 Nm	270 Nm	540 Nm

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) Take out the exhaust valve washer, and mount it back when the hydraulic oil flows out stably.

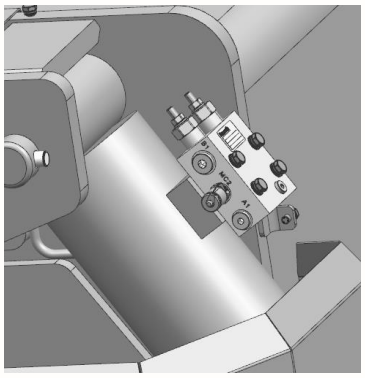


Figure 4-3 Exhaust valve connector position

d) Find the exhaust valve on the opposite side of the floating cylinder and repeat the above steps.

4.2.2 Swing axle lock test

⚠CAUTION

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

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

a) Place a 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/2 ft.

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 ground. The control system reads the sensor reading and compares the reading to a preset turntable angle value. The unit could drive at the highest speed when transporting. When the turntable angle is greater than 3°, the control system will limit the speed to low drive speed. When the unit is in stowed state and the turntable angle is greater than 24°, boom function could be positive only at turtle speed mode, and traveling function is disabled. As such, the unit must switch to transporting mode to continue traveling. The preset value of the tilt sensor is 3° according to the manufacturer default settings.

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. However, the auxiliary power system does not support drive function.

4.5 Oscillating axle system

The oscillating front axle is mounted to the frame by a pivot pin that allows the four wheels to remain in contact with the ground traveling over rough terrain. The oscillating axle system also includes two floating cylinders for connecting the frame to the front axle. The floating cylinder allows the front axle to oscillate when the boom is retracted in transit. When the boom is extended by 1,500mm/59 inches or the boom angle is more than 12° 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 the 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 control electrical signal to the two-speed lock compound valve to provide hydraulic 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.

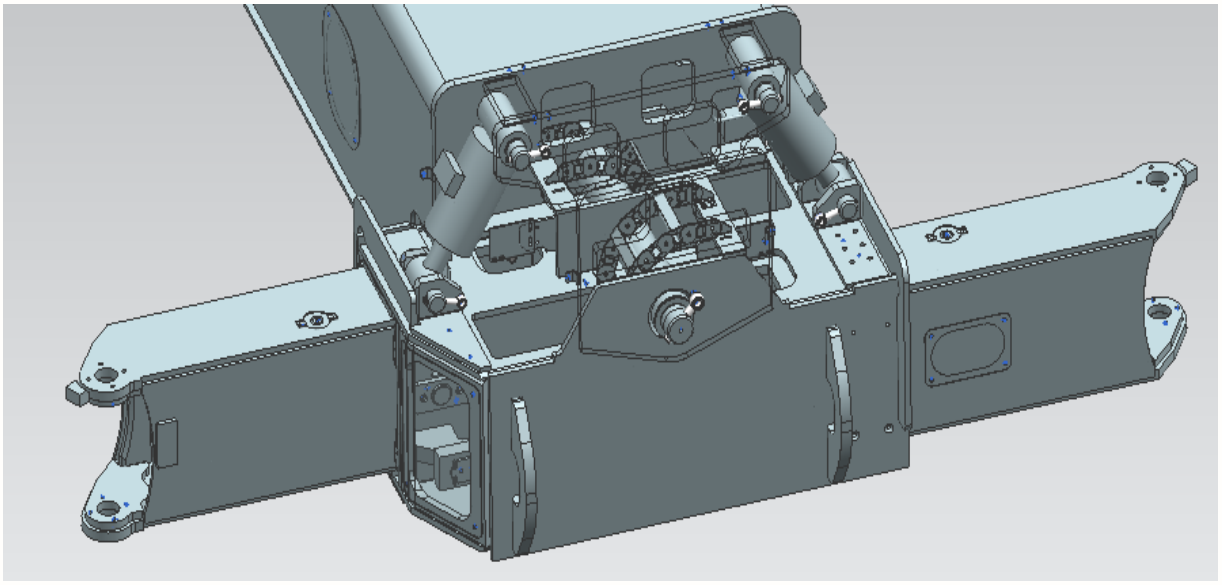


Figure 4-4 Floating cylinder disassembly diagram

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. The drive system function is determined by the position of the boom (in the transport state or not in the transport state).

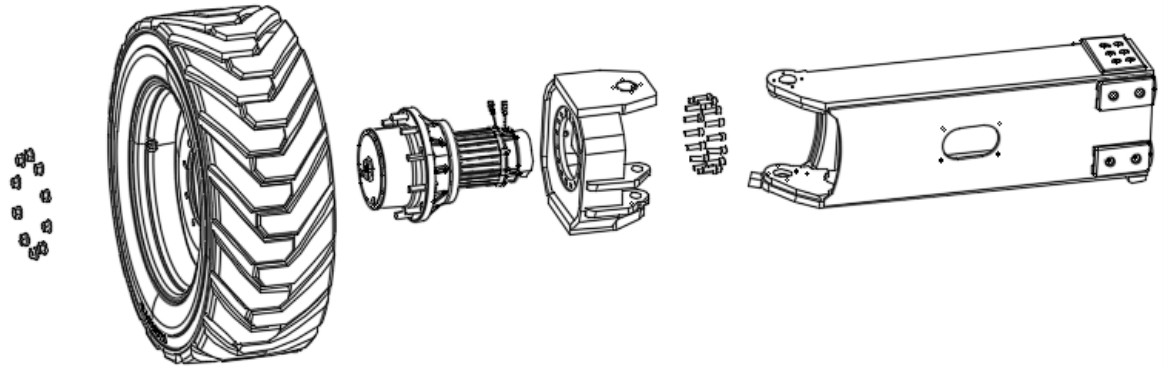


Figure 4-5 Travel system disassembly diagram 1

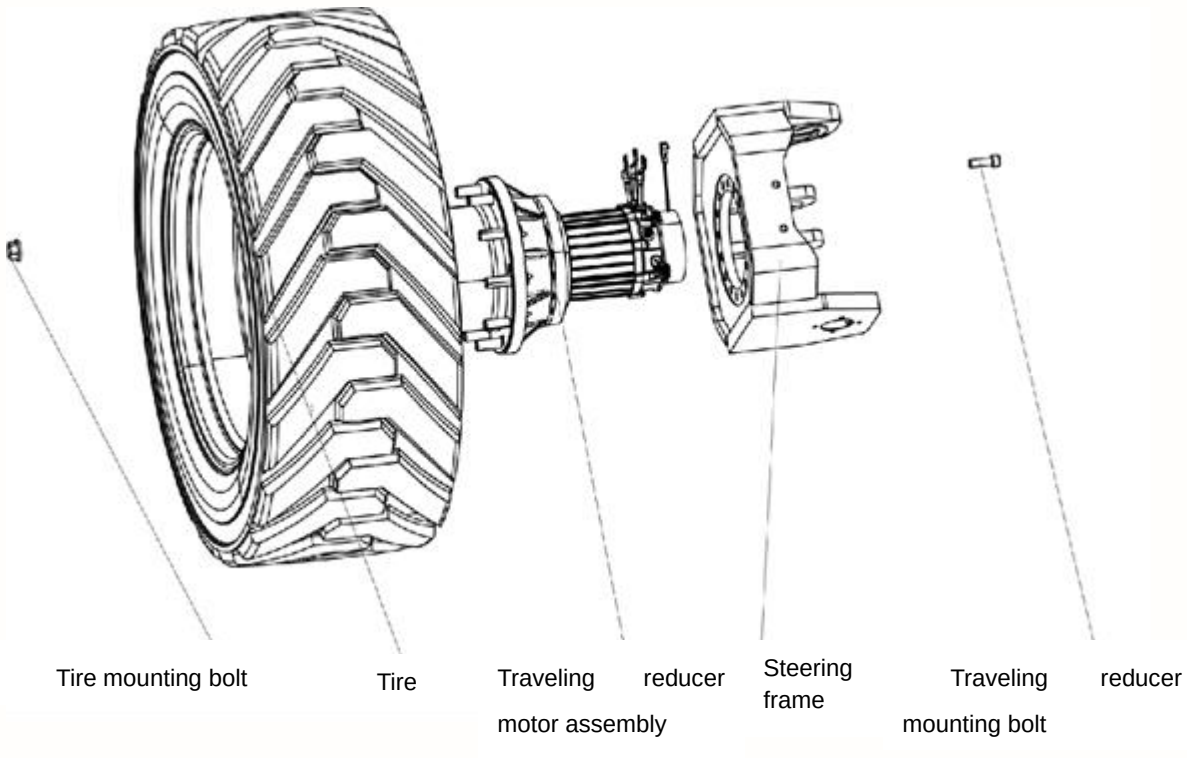


Figure 4-6 Travel system disassembly diagram 2

4.7 Travel Reducer

4.7.1 Disassembly

a) Place the machine on a solid level surface.

b) Remove and mark all hydraulic lines connected to the travel motor on the travel reducer;

c) Use a suitable lifting device to support the travel reducer (the travel reducer weighs approximately 145kg).

d) Disassemble the ten 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.

4.7.2 Installation

a) Use a suitable lifting device to support the travel reducer (the travel reducer weighs approximately 145kg).

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 294Nm.

d) Connect the hydraulic line that was previously disassembled to the travel motor.

4.8 Rotary Motor

This type of rotary motor is a cycloid motor, which is the actuator of the rotary system.

Maintenance motor disassembly method:

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

⚠CAUTION

When disassembling the oil pipe, the joint should be slowly disassembled to prevent high-pressure hydraulic oil from being splashed and hurting people.

b) Remove the connection bolt between the motor and the reducer, and remove the motor.

4.9 Rotary reducer

4.9.1 Check and maintenance

a) Please clean the inside of the reducer and brake with cleaning fluid after 100 hours usage, and replace the oil. Change the oil once every 2000 hours running, or at least once a year;

⚠CAUTION

1. Check whether there are metal chips in the reducer and brake;
2. It is best to change the oil when the oil temperature has not cooled, because it is more beneficial to drain the oil in the tank at this time;
3. Do not mix oil.

b) The rotary reducer is equipped with multiple disc brakes. The brakes are normally closed. When the pressure oil enters the brakes, the brakes are opened and the mechanism can rotate freely. When one of the following parts of the brake occurs, its parts should be replaced or the brake is scrapped:
There is oil leakage at the input end, and the brake oil seal needs to be replaced if the oil seal is damaged;
Insufficient braking torque: brake torque is reduced or the friction pad is deformed cause by severe friction, the friction pad should be replaced.

4.9.2 Gear oil replacement

a) Determine the correct position of the oil ports on the reducer and brake;

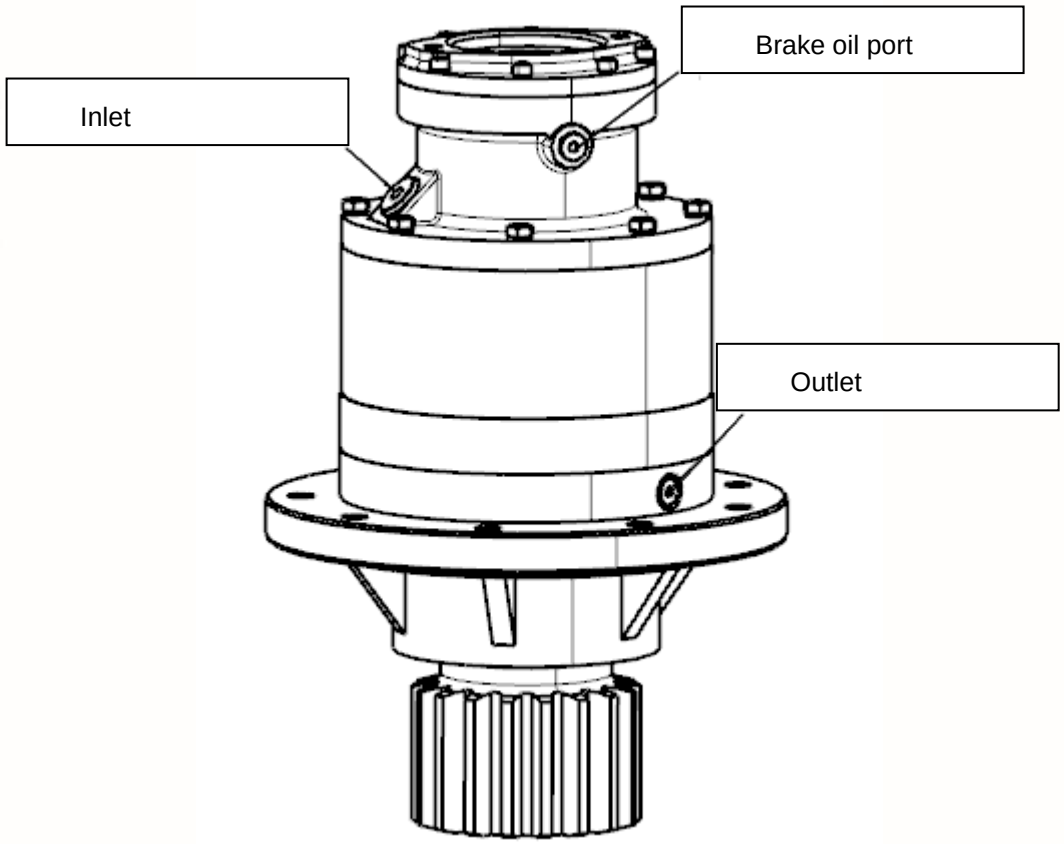


Figure 4-9 Position of each port of the reducer

⚠CAUTION

b) Remove the oil drain plug and oil filling plug, drain the oil in reducer and brake.
   1. Clean the inside of rotary reducer and brake before refill.
   2. Inject the cleaning fluid into the rotary reducer and brake, install the oil plug, run at high speed for several minutes, and then drain the cleaning fluid

⚠CAUTION

The use of aggressive cleaning agents or unsuitable lubrication products will change the characteristics of the oil esters, which will harm the trajectory and related parts.

4.10 Slewing Bearing

4.10.1 Slewing bearing lubrication

Proper lubrication is necessary for the durability of the track and gear. Lubrication cycle is determined according to the use situation and environment; it is recommending to lubricate once every 150 hours.

⚠CAUTION

When the unit is not used for a long time, the slewing bearing should be lubricated, and the

lubrication cycle should be shortened when the unit is located in tropical climates affected by temperature irregularities or sandy or humid areas.

a) Use a grease gun to inject Mobilux EP 2, Shell Alvania EP (LF) 2 grease, etc. into the slewing ring from the grease fitting at the slewing ring until the grease leaks from the seal and fills the ring. Lubricate the slewing bearing, generally add grease once every 150 hours of work. If the application requires strict dusty and humid environment, shorten it to 50 hours for lubrication; If the unit is out of service for a long time, lubricate once every 6 months.

b) Lubricate gear. The tooth surface should always be clear of debris and coated with corresponding grease. Regardless of whether it is sprayed or brushed for lubrication, the grease must completely cover the pinion and the toothed surface with the ring gear.

4.10.2 Check and Maintenance

a) After the slewing bearing is operated for 100 hours, check the pre-tightening force of the bolt. If it is abnormal, tighten it in time. The bolt tightening torque is not less than 520Nm/383.5ftlb. After every 500h of operation, it must be maintained with sufficient pretension. Generally, the bolts must be replaced every 7 years or after working for 14000h.

b) In use, avoid direct exposure of the slewing bearing to sunlight, and it is prohibited to flush the slewing bearing with water directly, prevent water from entering the raceway, and prevent hard foreign objects from approaching or entering the meshing area.

c) Check the sealed slewing bearing, repair or replace if damaged.

d) Check the meshing operation of slewing bearing, adjust the meshing clearance between small gear and large gear within the range of 0.15-0.25mm to reduce the wear.

4.10.3 Disassembly

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

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

c) Remove rotary bearing and connecting bolt of turntable.

d) Lift the upper part, see Figure 2, and the weight of upper part is 13t. Use a crane of 15t or greater to ensure safety.

e) Remove rotary bearing and connecting bolt of chassis.

f) Mounting 2 eyebolt of M20, and lift away the slewing bearing and place it properly.

g) The installation of the slewing bearing is the reverse of the above process. The bolts must be installed with thread locking glue, and the tightening torque of the bolts should not be less than 520Nm.

⚠CAUTION

The bolt of slewing bearing is important to the unit. Do not use the removed bolt, the new bolt should be used.

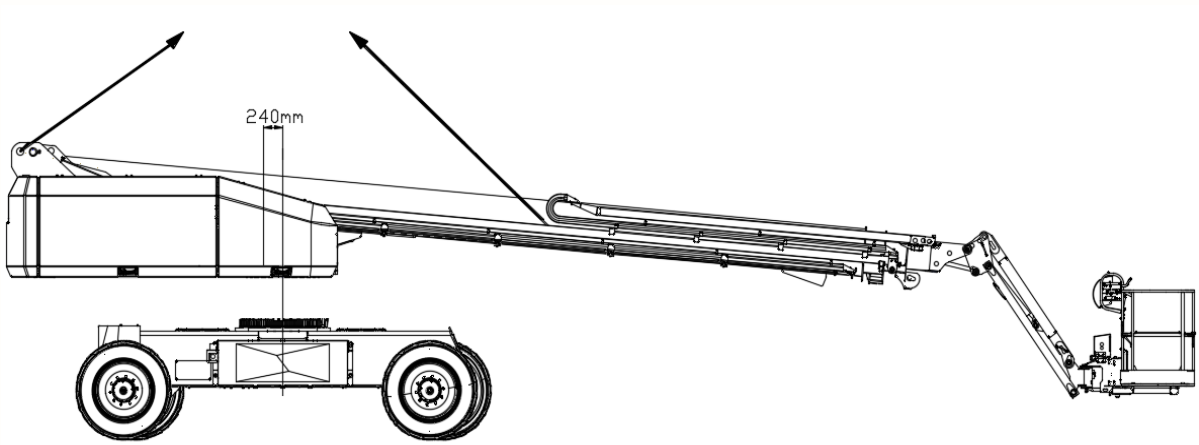


Figure 4-10 Upper part disassembly

4.11 Slewing Gear Clearance Adjustment

The gear clearance of slewing mechanism refers to the meshing gap between small gear on the rotary reducer and slewing bearing (large gear). If the clearance is too tight, it will cause unsmooth rotation and even damage to components. If the clearance is too loose, it will cause violent shaking when slewing or braking. Proper gear clearance could guarantee good machine performance and extend the service life of the unit, as such, proper adjustment is necessary. Adjust the clearance as shown below.

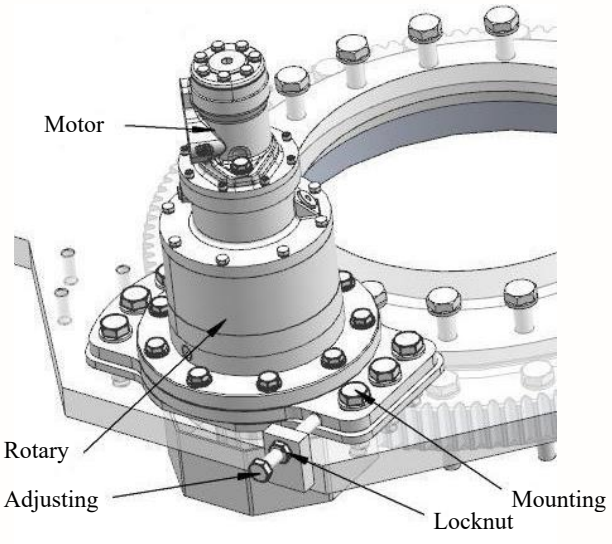


Figure 4-11 Gear clearance adjustment

The replacement steps are as follows:

a) Loose the locknut without completely unscrewing it.

b) Loose the mounting bolt without completely unscrewing it.

c) Adjust the adjusting bolt and measure the backlash between the slewing gear and the slewing bearing with a plug gauge. Repeatedly adjust and measure the clearance to 0.15-0.25mm.

d) Tighten the mounting bolt with a tightening torque of not less than 520Nm.

e) Hold the adjustment bolt and tighten the locking bolt.

ZOOMLION

Service and Maintenance Manual

Section 5 Boom and Platform

SECTION 5 BOOM AND PLATFORM

5.1 Platform and Jib

5.1.1 Anti-crushing device

5.1.1.1 Disassembly

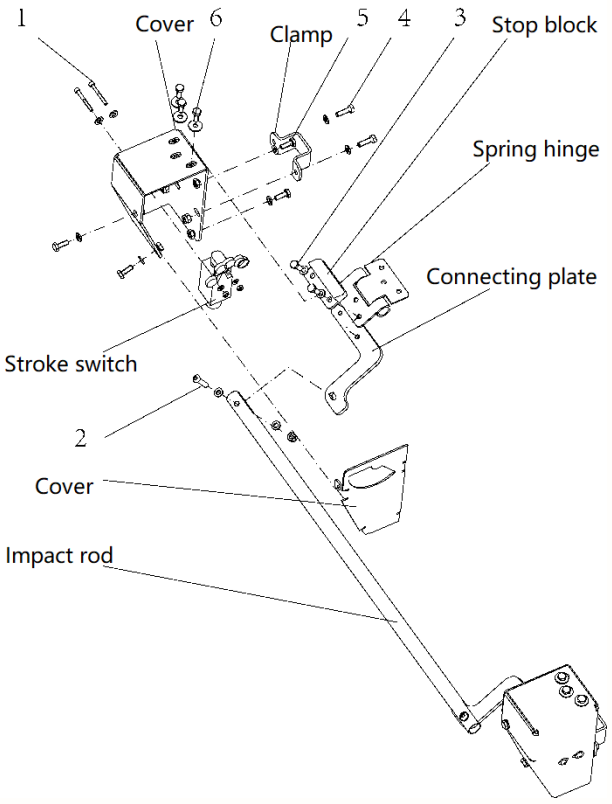


Figure 5-1 Load cell disassembly diagram

a) Disconnect the wiring in anti-crushing device;

b) Remove the bolt 4 connecting steel clamp and platform weldment, then remove the steel clamp;

c) Remove bolt 5 and cover plate;

d) Remove the bolt 2 connecting junction plate and impact rod, and remove the hood on the anti-crushing device side;

e) Remove bolt 2, then take out stroke switch;

f) Disassemble bolt 6, and remove the spring hinge, connecting plate and limit block from hood;

g) Remove bolt 3, then remove spring hinge, limit block and connecting plate separately;

h) Remove the other side guard in the same way.

5.1.1.2 Inspection

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

b) Check whether the impact rod is bent, broken or otherwise damaged, and replace the it if necessary;

c) Check whether the spring hinge is worn, spring failure or other damage, and replace the spring hinge if necessary;

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

5.1.1.2 Installation

a) Follow the reverse steps of disassembly.

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

5.1.2 Load cell

5.1.2.1 Disassembly

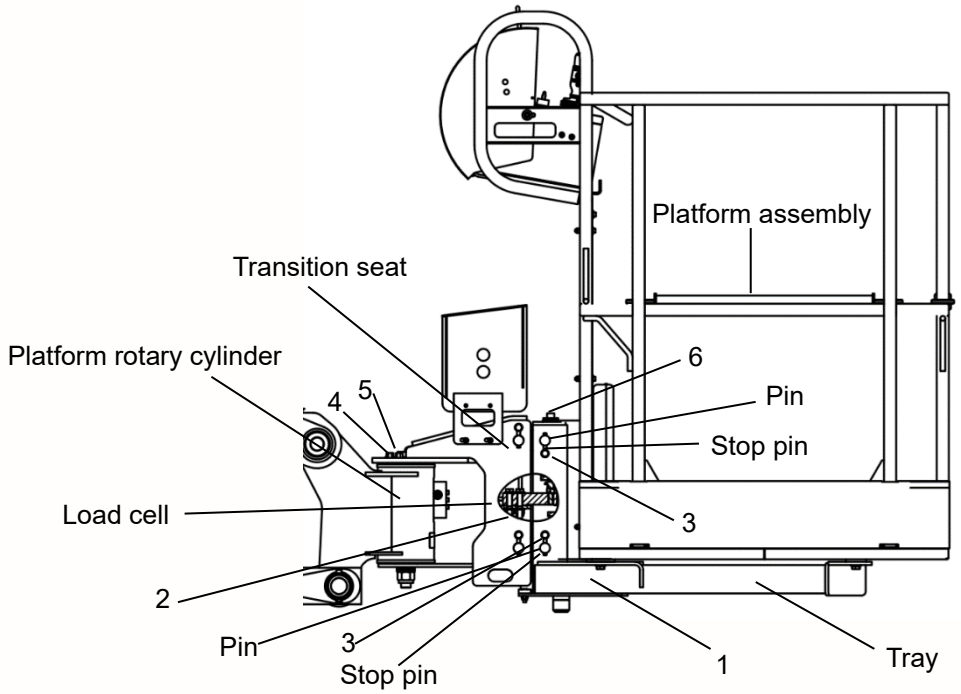


Figure 5-1 Load cell disassembly diagram

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

⚠CAUTION

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

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

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

d） Remove the bolt 3, then the stop pin and pin, use a suitable lifting device to remove the tray from the transition seat.

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

5.1.1.2 Inspection

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

d) Check hydraulic oil leaks and replace the line if necessary.

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

5.1.1.2 Installation

f) 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.

g) A hydraulic system pipes joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

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

5.1.3 Rotary actuator

5.1.3.1 Disassembly

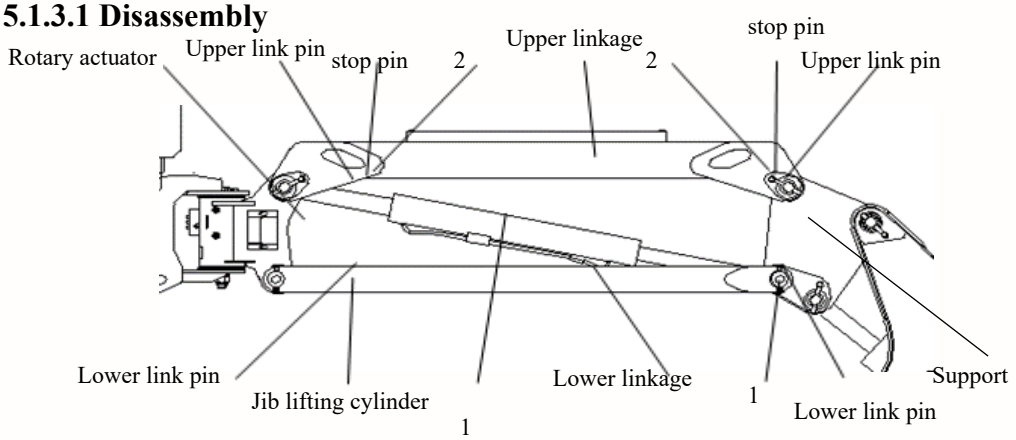


Figure 5-2 Rotary actuator and jib lifting cylinder disassembly diagram

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

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

c) Remove the connecting bolt 1, the connecting bolt 2 of the swing cylinder and the upper link, and remove the pin, and then the swing 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

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 pipes joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

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

5.1.4 Jib lifting cylinder

5.1.4.1 Disassembly

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

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

5.1.4.2 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.

5.1.4.3 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 pipes joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

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

5.2 Boom Assembly

⚠WARNING

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 removing, keep personnel away from the area near the boom.

⚠CAUTION

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

⚠CAUTION

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

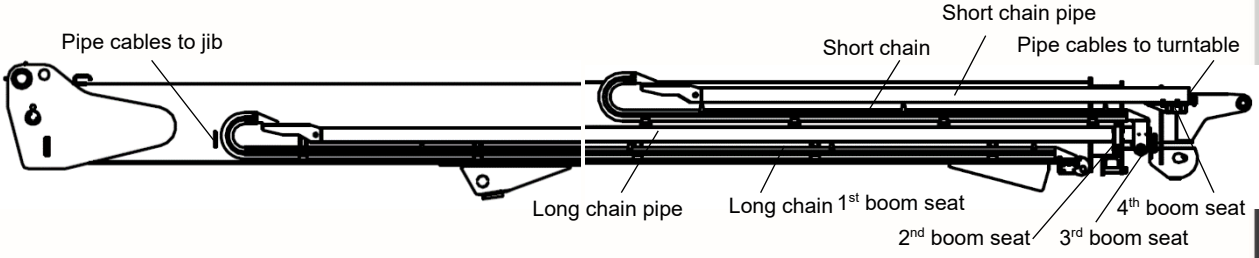


Figure 5-3 Cable system disassembly

a) Adjusting the boom to a fully retracted state.

b) Disconnect the pipeline from the ground control box.

c) Release the pressing plate on the side of base boom. Mark and disconnect the hydraulic pipeline and harness connected to the turntable. 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 pipeline and harness from the telescopic boom to jib. Collect the hydraulic oil in the pipeline with a suitable container, and seal the port of the pipeline after collecting.

f) Use proper lifting device to hoist or support cable chain and pipe, and take appropriate safety

precautions.

g) Remove the fasten bolt of connecting seat on base boom and telescopic boom.

h) Remove the cable chain from the base boom.

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 pipes joint equipped with a sealing device needs to replace a sealing device before the hydraulic line is connected.

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

5.2.2 Leveling cylinder

5.2.2.1 Disassembly

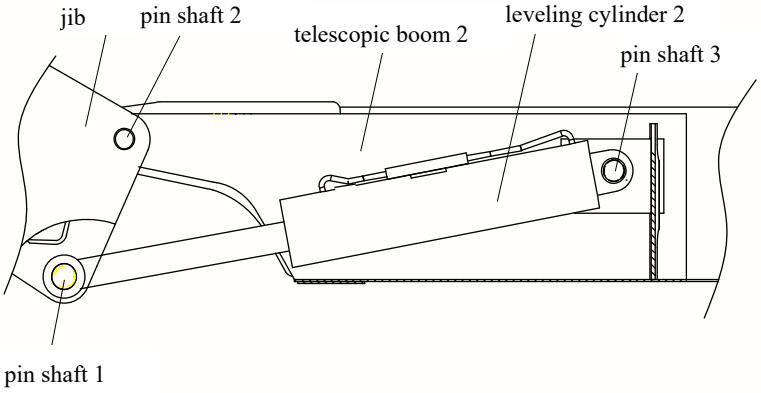


Figure 5-4 Upper leveling cylinder disassembly diagram

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

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

c) Use the appropriate lifting equipment to 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 shaft 3 fixing the upper leveling cylinder on the 4th 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 pipes 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 Lifting cylinder

5.2.3.1 Disassembly

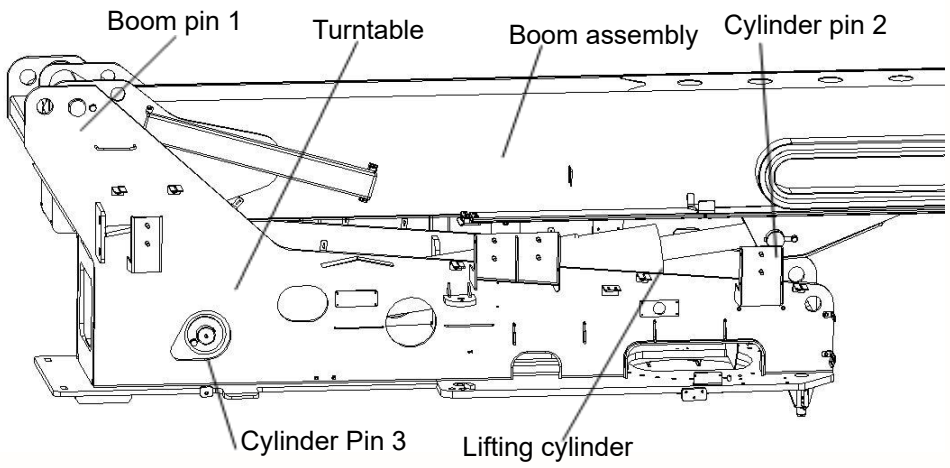


Figure 5-5 Lifting cylinder disassembly diagram

a) If the lifting cylinder run normally, fully stow the boom, use appropriate lifting equipment (lifting weight: 5t) to lift the boom. At the same time, appropriate wood or cushion support can be inserted between the boom and the turntable, and between the lifting cylinder and the turntable;

b) If the lifting cylinder cannot run, remove the balance valve on the lifting cylinder, unlock the pressure of the balance valve, use the lifting equipment to lift the boom, make the boom slowly upward to horizontal, and insert appropriate wood or cushion support between the boom and the turntable, and between the lifting cylinder and the turntable;

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

d) Remove the cylinder pin 2 connecting base boom and lifting cylinder, and remove bolt 3 connecting turntable and lifting cylinder;

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

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

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 pipes 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 Boom

5.2.4.1 Disassembly

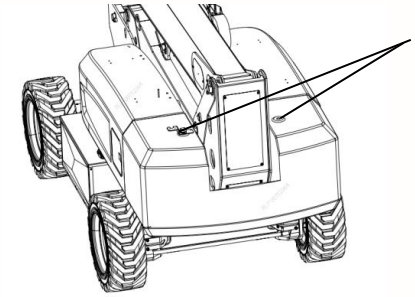


Figure 5-6 Counter-weight disassembly diagram

⚠DANGER

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

⚠DANGER

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

⚠DANGER

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

⚠WARNING

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

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

b) Fully retract the boom.

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

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

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

f) Use suitable lifting equipment (lifting weight greater than 7t) to connect the lifting point of the

counterweight to support the counterweight.

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

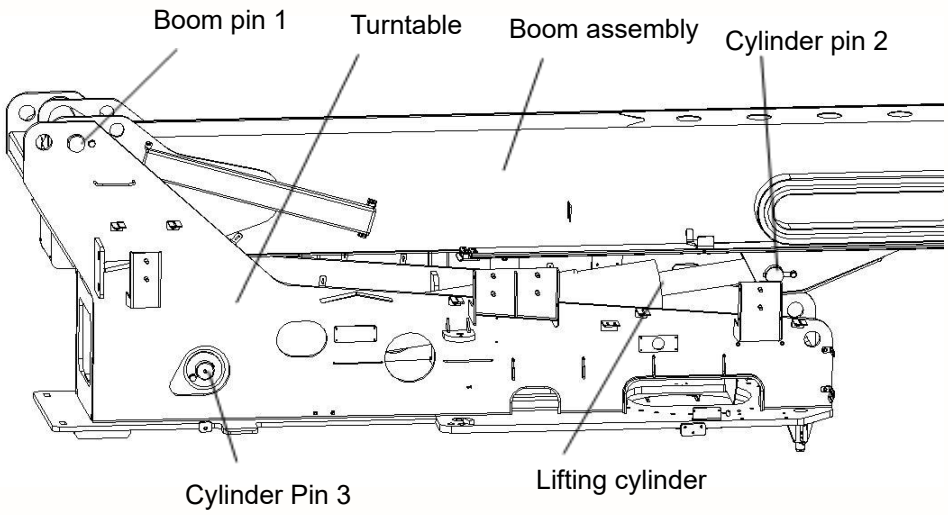


Figure 5-7 Lifting cylinder disassembly diagram

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

i) Use suitable lifting equipment (lifting weight greater than 5t) to support the head and tail of the boom, yet do not apply lifting force.

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

k) Remove pin 1.

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

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

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

⚠WARNING

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

5.2.4.2 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 pipes 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

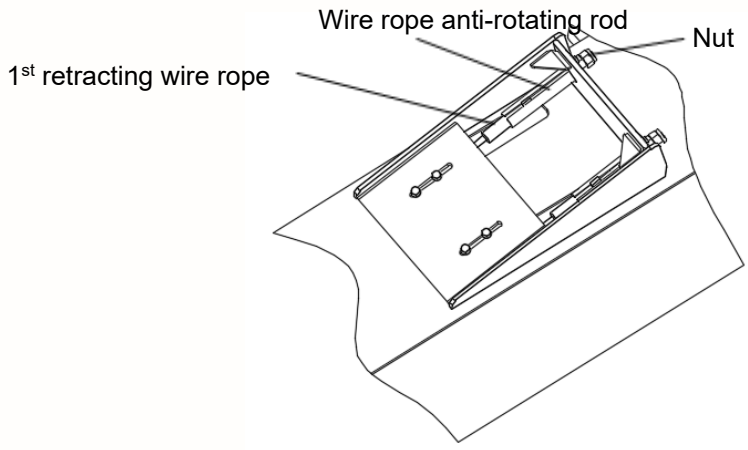


Figure 5.8 Telescopic cylinder disassembly 1

a) Fully retract the boom.

b) Use suitable tools to remove nut 2 and make the wire rope loose;

c) Remove the length sensor and angle sensor on the base boom end (note: the pipeline in boom tail has been removed);

d) Remove the cables of the wire rope tension sensing assembly, and leave the sensing assembly on the mounting plate;

e) Use suitable tools to unscrew nut 1, but not remove it;

f) Use suitable tools remove cylinder pin 1;

g) Remove the bolt in pressure plate 1, and release the plate;

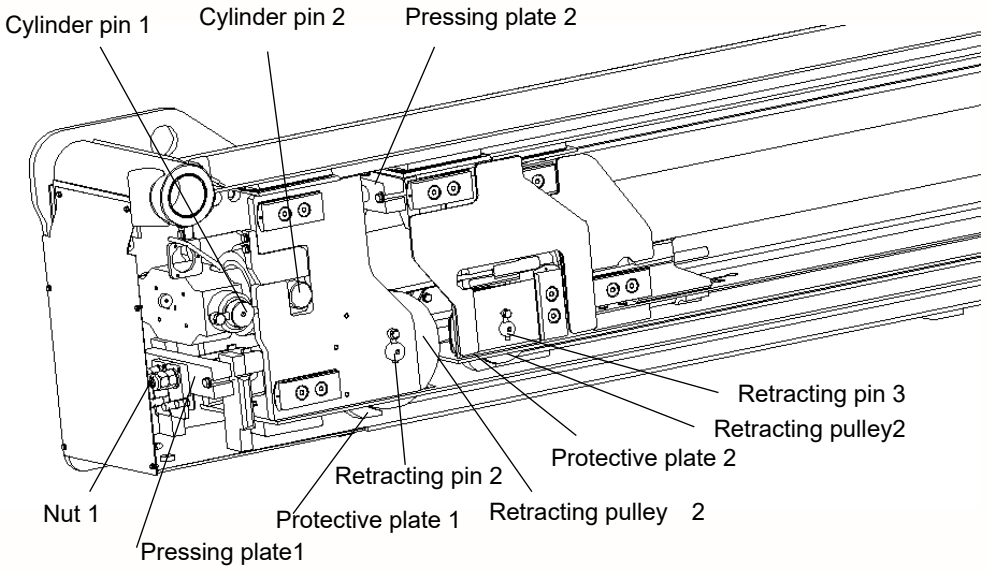


Figure 5-10 Telescopic cylinder disassembly 2

h) Use proper lifting device to support cylinder piston seat, and lift the telescopic cylinder till the seat leave the slot;

i) With the help of lifting device, slowly extend the telescopic cylinder 0.5m towards to boom tail, the end of pressing plate 1 connecting wire rope dragged out for 1 meter;

j) Remove nut 2 and pressing plate 1, free one end of wire rope, and remove the approach sensor and place it well;

k) Remove the bolt in pressing plate 2 and release the pressing plate 2;

l) The end of pressing plate 2 connecting wire rope dragged out for 1 meter;

m) Both ends of 1st extending wire rope and telescopic cylinder are dragged out from base boom;

n) Use lifting device to support two ends of telescopic cylinder, and slowly move the telescopic cylinder to supporting frame

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.

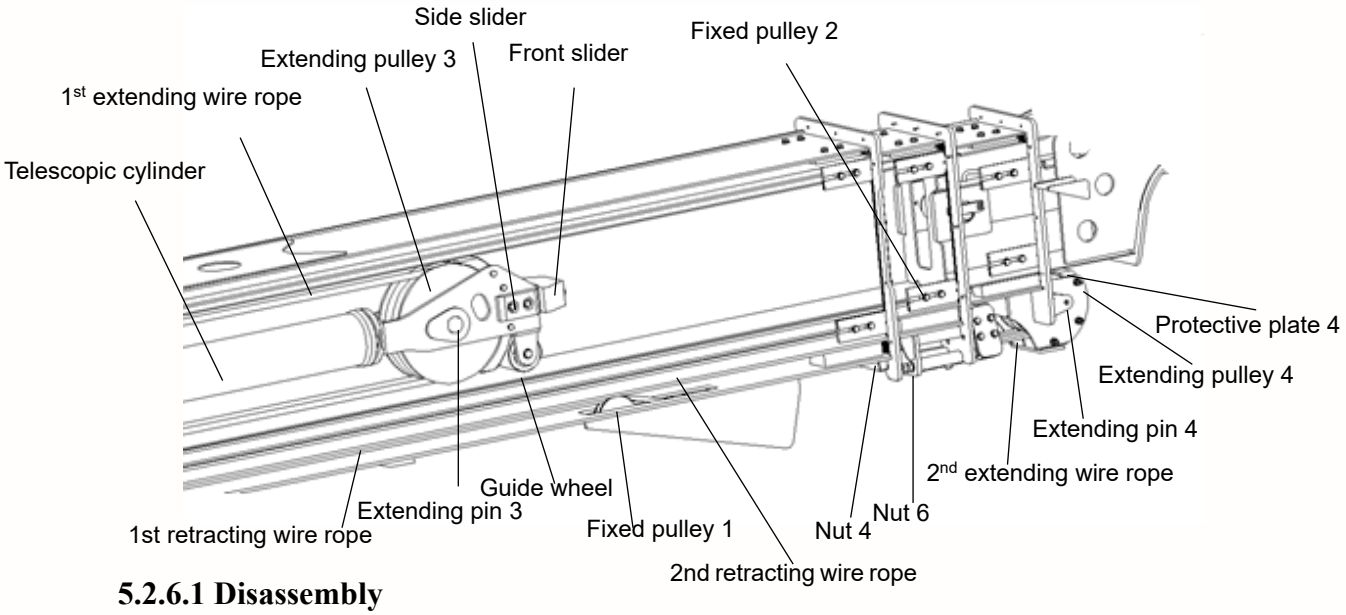
5.2.5.3 Installation

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 pipes 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 Wire rope pulley disassembly



5.2.6.1 Disassembly

Figure 5-10 Wire rope pulley disassembly diagram 1

a) Remove the telescopic cylinder from base boom, then remove the side slider and guide wheel;

b) Remove the 1st extending wire rope and place it in place;

c) Use proper tools to remove pin 3 and pulley 3;

d) Remove nut 4 and protective plate 4, loose 2nd extending wire rope;

e) Use proper tools to remove extending pin 4 and pulley 4;

f) Remove the nut under the front end of base boom, remove the fixed pulley 1, then

release the 1st retracting wire rope;

g) Drag out the 2nd boom section and the wire rope end near the boom from the base boom;

h) Remove nut 6 and fixed pulley 2, and release the 2nd retracting wire rope;

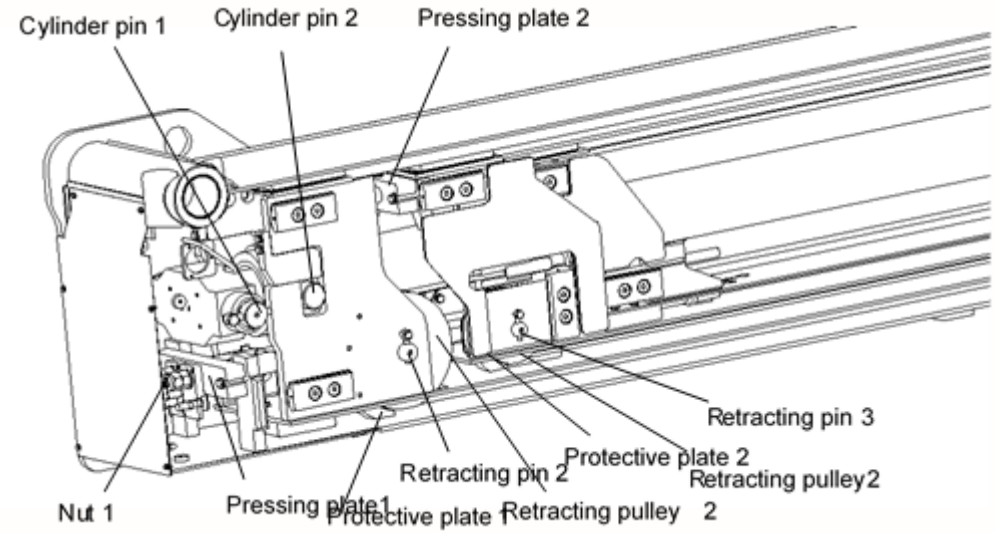


Figure 5-11 Wire rope pulley disassembly diagram 2

i) Drag out the 3rd boom section and the wire rope end near the boom from the 2nd boom section;

j) Put the boom tail end of the first retracting wire rope through the side hole of 3rd boom end, remove first retracting wire rope and place it in place;

k) Remove protective plate 1, and use proper tools to disassemble pin 3, then take out the retracting pulley 2 from the 2nd boom tail;

l) Drag out the 4th boom from the 3rd boom;

m) Put the boom tail end of the 2nd retracting wire rope through the side hole of 4th boom end, remove second retracting wire rope and place it in place;

n) Remove the protective plate2, and use proper tools to disassemble pin 2, then take out the retracting pulley 2 from the 3rd boom tail;

o) Put the boom tail end of the 2nd extending wire rope through the side hole of 4th boom end, remove second extending wire rope and place it in place;

5.2.6.2 Inspection

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

⚠CAUTION

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

b) Check whether the wire rope is corroded.

c) Check whether the rope is tangled or misused.

⚠CAUTION

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

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

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

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

g) Check all threaded parts for damage such as stretching, thread deformation or twisting, and replace them if necessary;

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

5.2.6.3 Installation

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

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

5.2.7 Wire rope and pulley check

5.2.7.1 Daily inspection

Before operation:

a) Fully retract the boom.

b) Extending and retracting the boom.

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

5.2.7.2 Three months' check

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

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

5.2.7.3 12 years or 7000 hours' replacement

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

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

1) The machine is exposed to harsh environments.

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

3) The machine is idle for a long time.

4) The boom is overloaded or holds shock load.

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

5.2.7.4 Additional replacement criteria

⚠CAUTION

Pulleys and wire ropes must be replaced in sets.

a) Wire rope is rusted or corroded.

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

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

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

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

5.2.7.5 Wire rope fastening

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

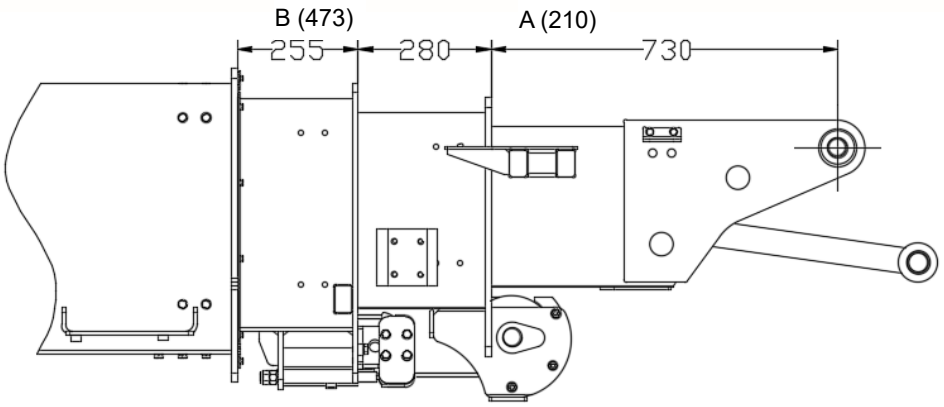


Figure 5-12 Initial extension of boom

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

⚠CAUTION

Do not pinch the threads when tightening, otherwise the threads may be damaged. When

tightening, clamp the end of the wire rope near the thread to prevent the wire rope from rotating, otherwise it will cause damage to the wire rope.

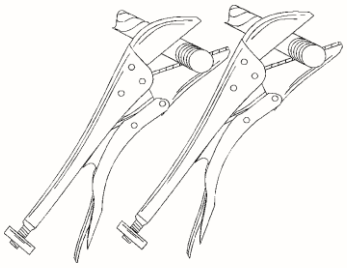


Figure 5-13 Clamp the rope

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

d) Pre-tighten the nuts on extending or retracting wire rope, the twisting force of first extending wire rope reaches 50Nm, the first extending wire rope 100Nm, the second extending wire rope 15Nm, and the second retracting wire rope 40Nm;

e) Adjust the nut 5 of the retracting wire rope, make the rope parallel with the base boom upright (if the boom not parallel with the upright when using, the retracting wire rope is loose);

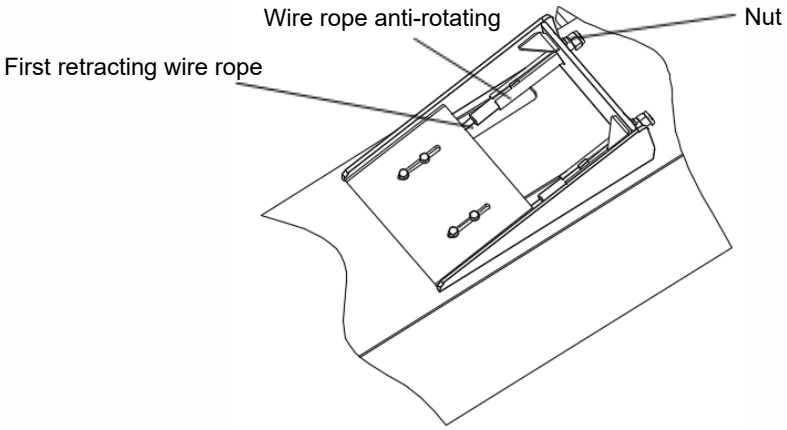


Fig. 5-14 Parallel the boom

f) Use wrench screw two M24 nuts of first extending wire rope alternately with twisting force of 60Nm;

g) Use wrench screw two M12 nuts of second extending wire rope alternately with twisting force of 20Nm;

h) Enable boom extension function to extend the boom of 1 to 1.5m;

i) Use wrench screw the M24 nut 1 on the rod of tightening device with twisting force of 120Nm;

j) Use wrench screw two M16 nuts of second retracting wire rope alternately with twisting force of 55Nm;

k) Enable boom extension function to retract the boom of 0.5 to 0.8m (do not retract the extending

cylinder to limit switch), then extend the boom for 1 to 1.5m again;

l) Check the twisting force of retracting wire rope nut, if the twisting force does not meet the requirements, repeat Step i and Step j, check again until the twist force meets the standard;

⚠CAUTION

In order to make all the tension of the wire rope meet the same value, Step i and Step j might need to be repeated.

m) After all wire ropes are properly fastened, install nylon sleeve locking nuts. Remove all grippers and install all covers and shields. Check whether the boom function is normal.

5.3 Load Cell Check

5.3.1 Load Cell Check

a） Set the device to the following status position:

1） Boom-lower.

2） Telescopic-retract.

3） Jib-move to horizontal 0°.

4） Turntable-turn to 0 °.

5） Platform level-level to 0 °.

6） Platform Rotation-Rotate to 0 °.

7） Load in platform-remove all load items.

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

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

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

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

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

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

g） Remove load items from the platform.

h） The load cell adjustment is completed.

5.3.2 Platform leveling sensor check

a） Keep the working platform unloaded.

b） Check the platform angle sensor wires.

c） Confirming that the wiring is correct, then power the unit in turntable control box.

d） Check that the platform angle sensor working indicator will flash.

e） Observe the platform angle value on the display of turntable electrical control box.

f） Start the unit in ground mode, and level the platform to a horizontal position.

g） Use an angle tester to measure the platform angle to zero degrees and calibrate the zero position of the platform angle sensor.

h） Confirm that the angle of the platform on the display is zero degrees.

i） Operates the manual leveling function in ground mode, and the platform angle value change could be observed on the display.

5.3.3 Boom Tilt Sensor Check

a） Keep the working platform unloaded.

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

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

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

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

f） Lift the boom to the limit position in ground mode, and confirm that the angle value is 75° on display.

5.3.4 Calibration of boom length sensor

a) Keep the working platform unloaded.

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

c) Calibrate the zero position of the boom length sensor, and record the 11.64m of the initial value of the boom length on the display screen.

d) Extend the boom 1m/3.28ft, record the length of the boom on the display screen.

e) Compare the boom length values twice. The absolute value should be 1m/3.28ft.

f) Extend the boom horizontally to the limit position, and confirm the boom length of 24.1m on display.

5.3.5 Check of Wire Rope Damage Indication System

a） Two approach switches are installed at the end of the boom to detect the loose state of the wire rope.

b） Approach switch indicator will light up if the wire rope is not loose. Approach switch indicator will go out if the wire rope is loose.

c） When the wire rope is loose, a loose alarm will be triggered.

d） When the steel wire rope is loose and alarmed, the telescopic function of the operation boom is: the boom is forbidden to extend, only the turtle can retract quickly.

e） Fasten the wire rope according to the processing requirements, and make sure that two approach switches indicator light up.

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

5.3.6 Drive speed limit check

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

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

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

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

e） Raise the boom beyond the stowed position (the boom lifting angle exceeds 12 °).

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

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

h） Turn the turntable beyond the rear wheel position.

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

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

k） Extend the boom over 1.5m.

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

⚠CAUTION

Wear a seat belt when performing a speed limit check.

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

ZOOMLION

Service and Maintenance Manual

Section 6 Electrical System Maintennance

SECTION 6 ELECTRICAL SYSTEM MAINTENANCE

6.1 Fault code

If the unit fails, please check the fault code indicated on the display of turntable control box. If the following code displays, please remove the fault condition and restart the device before continuing the device operation.

Table 6-1 Fault Code list

Item	Fault Code	Description
Battery	22001	DTC_SYSTEM_LOW_VOLTAGE
	22002	DTC_SYSTEM_OVER_VOLTAGE
	31003	DTC_LOW_SOC
	21004	DTC_LOW_SOC_CUTOFF
	31005	DTC_POWER_LOW_VOLTAGE
	21006	DTC_POWER_CUTOFF
	22007	DTC_POWER_SHORTAGE_RISK
CAN Bus	24021	DTC_CANBUS_FAULT_PM2GM
	22022	DTC_CANBUS_FAULT_Engine2GM
	22023	DTC_CANBUS_FAULT_HMI2GM
	12024	DTC_CANBUS_FAULT_CM2GM
Power System	22051	DTC_GENERATOR_FAULT
	22052	DTC_ENGINE_HIGH_TEMP
	22053	DTC_LOW_OIL_PRESSURE
	22054	DTC_LOW_FUEL
	22055	DTC_FUEL_CUT_OFF
	22056	DTC_LOW_COOLANT_LEVEL
	22057	DTC_ENGINE_START_FAULT
	22058	DTC_THROTTLE_MOTOR_FAULT
	22059	DTC_ENGINE_SPEED_FAULT
	22060	DTC_ENGINE_OVER_TIME
	31070	DTC_HIGH_VOLTAGE_LEVEL1
	21071	DTC_HIGH_VOLTAGE_LEVEL2
	31072	DTC_LOW_VOLTAGE_NORMAL_TEMP_LEVEL1
	31073	DTC_LOW_VOLTAGE_LOW_TEMP_LEVEL1
	21074	DTC_LOW_VOLTAGE_LOW_TEMP_LEVEL2
	21075	DTC_LOW_VOLTAGE_NORMAL_TEMP_LEVEL2
	31076	DTC_HIGH_SOC
	31077	DTC_LOW_SOC_LEVEL1

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Power System	21078	DTC_LOW_SOC_LEVEL2
	31079	DTC_HIGH_CHARGING_CURRENT_LEVEL1
	21080	DTC_HIGH_CHARGING_CURRENT_LEVEL2
	31081	DTC_HIGH_DISCHARGING_CURRENT_LEVEL1
	21082	DTC_HIGH_DISCHARGING_CURRENT_LEVEL2
	31083	DTC_HIGH_CELL_VOLTAGE_LEVEL1
	21084	DTC_HIGH_CELL_VOLTAGE_LEVEL2
	31085	DTC_LOW_CELL_VOLTAGE_NORMAL_TEMP_LEVEL1
	31086	DTC_LOW_CELL_VOLTAGE_LOW_TEMP_LEVEL1
	21087	DTC_LOW_CELL_VOLTAGE_LOW_TEMP_LEVEL2
	21088	DTC_LOW_CELL_VOLTAGE_NORMAL_TEMP_LEVEL2
	31089	DTC_LOW_CONSISTENCY_LEVEL1
	21090	DTC_LOW_CONSISTENCY_LEVEL2
	31091	DTC_HIGH_DIFFERENCE_IN_TEMP_LEVEL1
	21092	DTC_HIGH_DIFFERENCE_IN_TEMP_LEVEL2
	31093	DTC_LOW_DISCHARGING_TEMP_LEVEL1
	21094	DTC_LOW_DISCHARGING_TEMP_LEVEL2
	31095	DTC_LOW_CHARGING_TEMP_LEVEL1
	21096	DTC_LOW_CHARGING_TEMP_LEVEL2
	31097	DTC_HIGH_CHARGING_TEMP_LEVEL1
	21098	DTC_HIGH_CHARGING_TEMP_LEVEL2
	31099	DTC_HIGH_DISCHARGING_TEMP_LEVEL1
	21100	DTC_HIGH_DISCHARGING_TEMP_LEVEL2
	31101	DTC_CELL_VOLTAGE_ACQUISITION_DISCONNECTED
	31102	DTC_BATTERY_CURRENT_ACQUISITION_DISCONNECTED
	31103	DTC_TEMPERATURE_ACQUISITION_DISCONNECTED
	21104	DTC_COMMUNICATION_WITH_ECU_TIME_OUT
	21105	DTC_COMMUNICATION_WITH_OBC_TIME_OUT
	31106	DTC_LOW_INSULATION_LEVEL1
	21107	DTC_LOW_INSULATION_LEVEL2
	21108	DTC_MAIN_CONTACTOR_FAULT
	21109	DTC_CHARGING_CONTACTOR_FAULT
	21110	DTC_HEAT_CONTACTOR_FAULT
	21111	DTC_MOS_SHORT_CIRCUIT
	21112	DTC_MOS_OPEN_LOAD
	21113	DTC_BMS_HARDWARE_FAULT

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Power System	21114	DTC_MAIN_MOS_OPEN_CIRCUIT
	21115	DTC_MAIN_MOS_SHORT_CIRCUIT
	21116	DTC_MAIN_MOS_VOLTAGE_FAULT
	21117	DTC_ARST_MOS_OPEN_CIRCUIT
	21118	DTC_ARST_MOS_SHORT_CIRCUIT
	31119	DTC_ARST_HIGH_TEMP
	31120	DTC_ARST_COMM_FAULT
	21121	DTC_DRIVER_COMM_FAULT_1
	21122	DTC_DRIVER_COMM_FAULT_2
	21123	DTC_DRIVER_COMM_FAULT_3
	21124	DTC_DRIVER_COMM_FAULT_4
	21125	DTC_DRIVER_COMM_FAULT_5
	21126	DTC_EPOWER_SYSTEM_FAULT
	31127	DTC_FRONT_MAIN_CONTACTOR_DISCONNECT
	31128	DTC_BACK_MAIN_CONTACTOR_DISCONNECT
	31129	DTC_PUMP_MAIN_CONTACTOR_DISCONNECT
	31130	DTC_MOTOR_BRAKE_CLOSE_FAULT_1
	31131	DTC_MOTOR_BRAKE_CLOSE_FAULT_2
	31132	DTC_MOTOR_BRAKE_CLOSE_FAULT_3
	31133	DTC_MOTOR_BRAKE_CLOSE_FAULT_4
	21134	DTC_FRONT_ARST_MAIN_MOS_OPEN_CIRCUIT
	21135	DTC_FRONT_ARST_MAIN_MOS_SHORT_CIRCUIT
	21136	DTC_FRONT_ARST_MAIN_MOS_VOLTAGE_FAULT
	21137	DTC_FRONT_ARST_MOS_OPEN_CIRCUIT
	21138	DTC_FRONT_ARST_MOS_SHORT_CIRCUIT
	31139	DTC_FRONT_ARST_HIGH_TEMP
	31140	DTC_FRONT_ARST_COMM_FAULT
	31141	DTC_PRE_CHARGE_FAIL
	31143	DTC_BATTERY_LOWTEMP_LIMIT_DRIVESPEED
Sensor	14151	DTC_LOAD_SENSOR_NOT_STANDARDIZATION
	14152	DTC_LOAD_CELL_COMM_ERROR
	24153	DTC_FAULT_PLATFORM_HIT_GROUND
	11154	DTC_INCLINE_SENSOR_OUT_OF_RANGE
	11155	DTC_INCLINE_SENSOR_COMM_ERROR
	11156	DTC_INCLINE_SENSOR_NOT_STANDARDIZATION
	13157	DTC_BOOM_ANGLE_SENSOR_OUT_OF_RANGE

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Sensor	13158	DTC_BOOM_ANGLE_SENSOR_COMM_ERROR
	13159	DTC_BOOM_ANGLE_SENSOR_NOT_STANDARDIZATION
	13160	DTC_FAULT_LIFT_WIRE_ROPE_SENSOR_LOOSE
	22161	DTC_FAULT_SWING_SENSOR
	14162	DTC_FAULT_LOAD_SENSOR_REDUNDANCY
	13163	DTC_BOOM_ANGLE_SINGAL_REDUNDANCY
	13164	DTC_BOOM_LENGTH_SENSOR_NO_RESPOND
	13165	DTC_BOOM_LENGTH_SENSOR_ERROR_DETECTION
	14166	DTC_LEVELING_SENSOR_COMM_ERROR
	13167	DTC_BOOM_LENGTH_SENSOR_REDUNDANCY
	32168	DTC_FAULT_AIR_FILTER_SENSOR
	32169	DTC_FAULT_OIL_WATER_SEPARATION_SENSOR
	32170	DTC_FAULT_HYDRAULIC_OIL_FILTER_SENSOR
	21171	DTC_FAULT_LEFT_FRONT_WHEEL_ANGEL_SENSOR
	21172	DTC_FAULT_RIGHT_FRONT_WHEEL_ANGEL_SENSOR
	21173	DTC_FAULT_LEFT_REAR_WHEEL_ANGEL_SENSOR
	21174	DTC_FAULT_RIGHT_RREAR_WHEEL_ANGEL_SENSOR
	14175	DTC_FAULT_LOAD_SENSOR_OUT_RANGE
	31176	DTC_FAULT_STEER_SENSOR_NO_RESPOND
	31177	DTC_FAULT_STEER_SENSOR_PARA
	13178	DTC_FAULT_LIFT_BIG_PRESS_SENSOR
	13179	DTC_FAULT_LIFT_LITTLE_PRESS_SENSOR
	13180	DTC_FAULT_TELE_BIG_PRESS_SENSOR
	13181	DTC_FAULT_TELE_LITTLE_PRESS_SENSOR
	12182	DTC_FAULT_MAIN_VALVE_PRESS_SENSOR
	13183	DTC_FAULT_JIB_PROXIMATE_SENSOR1
	13184	DTC_FAULT_JIB_PROXIMATE_SENSOR2
	14185	DTC_FAULT_WIND_SPEED_SENSOR
	14186	DTC_FAULT_JIB_LIFT_LENGTH_SENSOR
	14187	DTC_FAULT_PM_LEVLE_LENGTH_SENSOR
	12188	DTC_FAULT_TURNTABLE_AGNLE_SENSOR_REDUNDANT
	12189	DTC_FAULT_TURNTABLE_AGNLE_SENSOR_COMM
	14190	DTC_FAULT_JIB_LEVEL_AGNLE_SENSOR_REDUNDANT
	14191	DTC_FAULT_JIB_LEVEL_AGNLE_SENSOR_COMM
	14192	DTC_FAULT_JIB_LIFT_AGNLE_SENSOR_REDUNDANT
	14193	DTC_FAULT_JIB_LIFT_AGNLE_SENSOR_COMM

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Sensor	11194	DTC_FAULT_LEFT_FRONT_AXLE_SENSOR
	11195	DTC_FAULT_RIGHT_FRONT_AXLE_SENSOR
	11196	DTC_FAULT_LEFT_REAR_AXLE_SENSOR
	11197	DTC_FAULT_RIGHT_REAR_AXLE_SENSOR
	13198	DTC_TOWER_ANGLE_SENSOR_COMM_ERROR
	13199	DTC_TOWER_ANGLE_SINGAL_REDUNDANCY
	11200	DTC_FAULT_FLOAT_PRESSURE_SENSOR_COMM
	11201	DTC_FAULT_FLOAT_VALVE_FAILURE
	12202	DTC_SWING_VALVE_STUCKED_MOVEMENT
	31203	DTC_FAULT_INSPECT_VALVE_PRESS_SENSOR
	13225	DTC_BOOM_LENGTH_SENSOR_COMM
	11226	DTC_INCLINE_SENSOR_REDUNDANCY
	13227	DTC_FAULT_TOWER_LENGTH_SENSOR_COMM
	13228	DTC_FAULT_TOWER_LENGTH_SENSOR_REDUNDANT
	14229	DTC_FAULT_ANTI_COLLISION_SYSTEM_COMM
	14230	DTC_FAULT_ANTI_COLLISION_SENSOR_FAULT_1
	14231	DTC_FAULT_ANTI_COLLISION_SENSOR_FAULT_2
	14232	DTC_FAULT_ANTI_COLLISION_SENSOR_FAULT_3
	14233	DTC_FAULT_ANTI_COLLISION_SENSOR_FAULT_4
	14234	DTC_FAULT_ANTI_COLLISION_SENSOR_FAULT_5
	14235	DTC_FAULT_ANTI_COLLISION_SENSOR_FAULT_6
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
	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

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Switch/ Handle	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
	24388	DTC_FAULT_PM_AXLE_SWITCH_DOUBLE_POWER_ON
	22389	DTC_FAULT_PM_STEER_MODE_SWITCH_DOUBLE_POWER_ON
	12390	DTC_FAULT_KEY_SWITCH
	14391	DTC_FAULT_PM_JIB_SWING_SWITCH_DOUBLE_POWER_ON
	12392	DTC_FAULT_UG_JIB_TELESCOPE_SWITCH_DOUBLE_POWER_ON
	14393	DTC_FAULT_PM_JIB_TELESCOPE_SWITCH_DOUBLE_POWER_ON
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
	21560	DTC_FLOAT_CONTROL_VALVE_SHORT_TO_POWER
	21561	DTC_FLOAT_CONTROL_VALVE_OPEN_CIRCUIT

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Valve	21562	DTC_BRAKE_VALVE_SHORT_TO_GROUND
	11563	DTC_BRAKE_VALVE_SHORT_TO_POWER
	21564	DTC_BRAKE_VALVE_OPEN_CIRCUIT
	21565	DTC_2SPEED_VALVE_SHORT_TO_GROUND
	21566	DTC_2SPEED_VALVE_SHORT_TO_POWER
	21567	DTC_2SPEED_VALVE_OPEN_CIRCUIT
	22568	DTC_STEER_LEFT_VALVE_SHORT_TO_GROUND
	12569	DTC_STEER_LEFT_VALVE_SHORT_TO_POWER
	22570	DTC_STEER_LEFT_VALVE_OPEN_CIRCUIT
	22571	DTC_STEER_RIGHT_VALVE_SHORT_TO_GROUND
	12572	DTC_STEER_RIGHT_VALVE_SHORT_TO_POWER
	22573	DTC_STEER_RIGHT_VALVE_OPEN_CIRCUIT
	22574	DTC_SWING_LEFT_VALVE_SHORT_TO_GROUND
	22575	DTC_SWING_LEFT_VALVE_SHORT_TO_POWER
	22576	DTC_SWING_LEFT_VALVE_OPEN_CIRCUIT
	22577	DTC_SWING_RIGHT_VALVE_SHORT_TO_GROUND
	22578	DTC_SWING_RIGHT_VALVE_SHORT_TO_POWER
	22579	DTC_SWING_RIGHT_VALVE_OPEN_CIRCUIT
	22624	DTC_JIB_FLOW_VALVE_SHORT_TO_GROUND
	22625	DTC_JIB_FLOW_VALVE_SHORT_TO_POWER
	22626	DTC_JIB_FLOW_VALVE_OPEN_CIRCUIT
	22627	DTC_MAIN_LIFT_UP_FLOW_VALVE_SHORT_TO_GROUND
	22628	DTC_MAIN_LIFT_UP_FLOW_VALVE_SHORT_TO_POWER
	22629	DTC_MAIN_LIFT_UP_FLOW_VALVE_OPEN_CIRCUIT
	22633	DTC_MAIN_LIFT_UP_VALVE_SHORT_TO_GROUND
	12634	DTC_MAIN_LIFT_UP_VALVE_SHORT_TO_POWER
	22635	DTC_MAIN_LIFT_UP_VALVE_OPEN_CIRCUIT
	22636	DTC_MAIN_LIFT_UP_VALVE_FEEDBACK_CURRENT_FAULT
	22637	DTC_TELESCOPE_FLOW_VALVE_SHORT_TO_GROUND
	22638	DTC_TELESCOPE_FLOW_VALVE_SHORT_TO_POWER
	22639	DTC_TELESCOPE_FLOW_VALVE_OPEN_CIRCUIT
	22640	DTC_TELESCOPE_FLOW_VALVE_FEEDBACK_CURRENT_FAULT
	22641	DTC_TELESCOPE_IN_VALVE_SHORT_TO_GROUND
	12642	DTC_TELESCOPE_IN_VALVE_SHORT_TO_POWER
	22643	DTC_TELESCOPE_IN_VALVE_OPEN_CIRCUIT
	22644	DTC_TELESCOPE_OUT_VALVE_SHORT_TO_GROUND

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Valve	12645	DTC_TELESCOPE_OUT_VALVE_SHORT_TO_POWER
	22646	DTC_TELESCOPE_OUT_VALVE_OPEN_CIRCUIT
	22647	DTC_SWING_FLOW_VALVE_SHORT_TO_GROUND
	22648	DTC_SWING_FLOW_VALVE_SHORT_TO_POWER
	22649	DTC_SWING_FLOW_VALVE_OPEN_CIRCUIT
	22650	DTC_SWING_FLOW_VALVE_FEEDBACK_CURRENT_FAULT
	23651	DTC_MAIN_LIFT_DN_FLOW_VALVE_SHORT_TO_GROUND
	23652	DTC_MAIN_LIFT_DN_FLOW_VALVE_SHORT_TO_POWER
	23653	DTC_MAIN_LIFT_DN_FLOW_VALVE_OPEN_CIRCUIT
	23654	DTC_MAIN_LIFT_DN_VALVE_SHORT_TO_GROUND
	13655	DTC_MAIN_LIFT_DN_VALVE_SHORT_TO_POWER
	23656	DTC_MAIN_LIFT_DN_VALVE_OPEN_CIRCUIT
	23657	DTC_MAIN_LIFT_DN_VALVE_FEEDBACK_CURRENT_FAULT
	24658	DTC_JIB_UNLOAD_VALVE_SHORT_TO_GROUND
	24659	DTC_JIB_UNLOAD_VALVE_SHORT_TO_POWER
	24660	DTC_JIB_UNLOAD_VALVE_OPEN_CIRCUIT
	24661	DTC_PM_ROTATE_LEFT_VALVE_SHORT_TO_GROUND
	24662	DTC_PM_ROTATE_LEFT_VALVE_SHORT_TO_POWER
	24663	DTC_PM_ROTATE_LEFT_VALVE_OPEN_CIRCUIT
	24664	DTC_PM_ROTATE_RIGHT_VALVE_SHORT_TO_GROUND
	24665	DTC_PM_ROTATE_RIGHT_VALVE_SHORT_TO_POWER
	24666	DTC_PM_ROTATE_RIGHT_VALVE_OPEN_CIRCUIT
	24667	DTC_PM_LEVELING_UP_VALVE_SHORT_TO_GROUND
	14668	DTC_PM_LEVELING_UP_VALVE_SHORT_TO_POWER
	24669	DTC_PM_LEVELING_UP_VALVE_OPEN_CIRCUIT
	24670	DTC_PM_LEVELING_DN_VALVE_SHORT_TO_GROUND
	14671	DTC_PM_LEVELING_DN_VALVE_SHORT_TO_POWER
	24672	DTC_PM_LEVELING_DN_VALVE_OPEN_CIRCUIT
	24673	DTC_PM_LEVELING_UP_VALVE_FEEDBACK_CURRENT_FAULT
	24674	DTC_PM_LEVELING_DN_VALVE_FEEDBACK_CURRENT_FAULT
	24675	DTC_JIB_UP_VALVE_SHORT_TO_GROUND
	14676	DTC_JIB_UP_VALVE_SHORT_TO_POWER
	24677	DTC_JIB_UP_VALVE_OPEN_CIRCUIT
	24678	DTC_JIB_DN_VALVE_SHORT_TO_GROUND
	14679	DTC_JIB_DN_VALVE_SHORT_TO_POWER
	24680	DTC_JIB_DN_VALVE_OPEN_CIRCUIT

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Valve	21681	DTC_LEFT_FRONT_STEER_OUT_VALVE_SHORT_TO_GROUND
	11682	DTC_LEFT_FRONT_STEER_OUT_VALVE_SHORT_TO_POWER
	21683	DTC_LEFT_FRONT_STEER_OUT_VALVE_OPEN_CIRCUIT
	21684	DTC_LEFT_FRONT_STEER_IN_VALVE_SHORT_TO_GROUND
	11685	DTC_LEFT_FRONT_STEER_IN_VALVE_SHORT_TO_POWER
	21686	DTC_LEFT_FRONT_STEER_IN_VALVE_OPEN_CIRCUIT
	21687	DTC_RIGHT_FRONT_STEER_OUT_VALVE_SHORT_TO_GROUND
	11688	DTC_RIGHT_FRONT_STEER_OUT_VALVE_SHORT_TO_POWER
	21689	DTC_RIGHT_FRONT_STEER_OUT_VALVE_OPEN_CIRCUIT
	21690	DTC_RIGHT_FRONT_STEER_IN_VALVE_SHORT_TO_GROUND
	11691	DTC_RIGHT_FRONT_STEER_IN_VALVE_SHORT_TO_POWER
	21692	DTC_RIGHT_FRONT_STEER_IN_VALVE_OPEN_CIRCUIT
	21693	DTC_FRONT_AXLE_OUT_VALVE_SHORT_TO_GROUND
	11694	DTC_FRONT_AXLE_OUT_VALVE_SHORT_TO_POWER
	21695	DTC_FRONT_AXLE_OUT_VALVE_OPEN_CIRCUIT
	21696	DTC_FRONT_AXLE_IN_VALVE_SHORT_TO_GROUND
	11697	DTC_FRONT_AXLE_IN_VALVE_SHORT_TO_POWER
	21698	DTC_FRONT_AXLE_IN_VALVE_OPEN_CIRCUIT
	21699	DTC_LEFT_REAR_STEER_OUT_VALVE_SHORT_TO_GROUND
	11700	DTC_LEFT_REAR_STEER_OUT_VALVE_SHORT_TO_POWER
	21701	DTC_LEFT_REAR_STEER_OUT_VALVE_OPEN_CIRCUIT
	21702	DTC_LEFT_REAR_STEER_IN_VALVE_SHORT_TO_GROUND
	11703	DTC_LEFT_REAR_STEER_IN_VALVE_SHORT_TO_POWER
	21704	DTC_LEFT_REAR_STEER_IN_VALVE_OPEN_CIRCUIT
	21705	DTC_RIGHT_REAR_STEER_OUT_VALVE_SHORT_TO_GROUND
	11706	DTC_RIGHT_REAR_STEER_OUT_VALVE_SHORT_TO_POWER
	21707	DTC_RIGHT_REAR_STEER_OUT_VALVE_OPEN_CIRCUIT
	21708	DTC_RIGHT_REAR_STEER_IN_VALVE_SHORT_TO_GROUND
	11709	DTC_RIGHT_REAR_STEER_IN_VALVE_SHORT_TO_POWER
	21710	DTC_RIGHT_REAR_STEER_IN_VALVE_OPEN_CIRCUIT
	21711	DTC_REAR_AXLE_OUT_VALVE_SHORT_TO_GROUND
	11712	DTC_REAR_AXLE_OUT_VALVE_SHORT_TO_POWER
	21713	DTC_REAR_AXLE_OUT_VALVE_OPEN_CIRCUIT
	21714	DTC_REAR_AXLE_IN_VALVE_SHORT_TO_GROUND
	11715	DTC_REAR_AXLE_IN_VALVE_SHORT_TO_POWER
	21716	DTC_REAR_AXLE_IN_VALVE_OPEN_CIRCUIT

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Valve	21717	DTC_LEFT_DRIVE_FWD_VALVE_SHORT_TO_GROUND
	11718	DTC_LEFT_DRIVE_FWD_VALVE_SHORT_TO_POWER
	21719	DTC_LEFT_DRIVE_FWD_VALVE_OPEN_CIRCUIT
	21720	DTC_LEFT_DRIVE_REV_VALVE_SHORT_TO_GROUND
	11721	DTC_LEFT_DRIVE_REV_VALVE_SHORT_TO_POWER
	21722	DTC_LEFT_DRIVE_REV_VALVE_OPEN_CIRCUIT
	21723	DTC_RIGHT_DRIVE_FWD_VALVE_SHORT_TO_GROUND
	11724	DTC_RIGHT_DRIVE_FWD_VALVE_SHORT_TO_POWER
	21725	DTC_RIGHT_DRIVE_FWD_VALVE_OPEN_CIRCUIT
	21726	DTC_RIGHT_DRIVE_REV_VALVE_SHORT_TO_GROUND
	11727	DTC_RIGHT_DRIVE_REV_VALVE_SHORT_TO_POWER
	21728	DTC_RIGHT_DRIVE_REV_VALVE_OPEN_CIRCUIT
	22729	DTC_CHASSIS_FLOW_VALVE_SHORT_TO_GROUND
	12730	DTC_CHASSIS_FLOW_VALVE_SHORT_TO_POWER
	22731	DTC_CHASSIS_FLOW_VALVE_OPEN_CIRCUIT
	22732	DTC_EMG_LIFT_DN_VALVE_SHORT_TO_GROUND
	12733	DTC_EMG_LIFT_DN_VALVE_SHORT_TO_POWER
	22734	DTC_EMG_LIFT_DN_VALVE_OPEN_CIRCUIT
	22735	DTC_PM_FLOW_VALVE_SHORT_TO_GROUND
	12736	DTC_PM_FLOW_VALVE_SHORT_TO_POWER
	22737	DTC_PM_FLOW_VALVE_OPEN_CIRCUIT
	22738	DTC_DUMP_VALVE_SHORT_TO_GROUND
	12739	DTC_DUMP_VALVE_SHORT_TO_POWER
	22740	DTC_DUMP_VALVE_OPEN_CIRCUIT
	22741	DTC_BOOM_UP_VALVE_STUCKED
	22742	DTC_BOOM_DN_VALVE_STUCKED
	24743	DTC_LEVEL_UP_VALVE_STUCKED
	24744	DTC_LEVEL_DN_VALVE_STUCKED
	21745	DTC_FRONT_LEG_VALVE_SHORT_TO_GROUND
	11746	DTC_FRONT_LEG_VALVE_SHORT_TO_POWER
	21747	DTC_FRONT_LEG_VALVE_OPEN_CIRCUIT
	21748	DTC_REAR_LEG_VALVE_SHORT_TO_GROUND
	11749	DTC_REAR_LEG_VALVE_SHORT_TO_POWER
	21750	DTC_REAR_LEG_VALVE_OPEN_CIRCUIT
	24751	DTC_PM_REVERSE_VALVE_SHORT_TO_GROUND
	14752	DTC_PM_REVERSE_VALVE_SHORT_TO_POWER

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Valve	24753	DTC_PM_REVERSE_VALVE_OPEN_CIRCUIT
	22754	DTC_PM_CONTROL_VALVE_1_SHORT_TO_GROUND
	12755	DTC_PM_CONTROL_VALVE_1_SHORT_TO_POWER
	22756	DTC_PM_CONTROL_VALVE_1_OPEN_CIRCUIT
	22757	DTC_PM_CONTROL_VALVE_2_SHORT_TO_GROUND
	12758	DTC_PM_CONTROL_VALVE_2_SHORT_TO_POWER
	22759	DTC_PM_CONTROL_VALVE_2_OPEN_CIRCUIT
	22796	DTC_ENGINE_START_SHORT_TO_GROUND
	22797	DTC_ENGINE_START_SHORT_TO_POWER
	22798	DTC_ENGINE_START_OPEN_CIRCUIT
	32799	DTC_ALARM_SHORT_TO_GROUND
	32800	DTC_ALARM_SHORT_TO_POWER
	32801	DTC_ALARM_OPEN_CIRCUIT
	32802	DTC_LIGHT_SHORT_TO_GROUND
	32803	DTC_LIGHT_SHORT_TO_POWER
	32804	DTC_LIGHT_OPEN_CIRCUIT
	12805	DTC_GROUND_SW_POWER_SHORT_TO_GROUND
	12806	DTC_GROUND_SW_POWER_SHORT_TO_POWER
	12807	DTC_GROUND_SW_POWER_OPEN_CIRCUIT
	12808	DTC_AUX_POWER_SHORT_TO_GROUND
	12809	DTC_AUX_POWER_SHORT_TO_POWER
	12810	DTC_AUX_POWER_OPEN_CIRCUIT
	34811	DTC_PM_BUZZER_SHORT_TO_GROUND
	34812	DTC_PM_BUZZER_SHORT_TO_POWER
	34813	DTC_PM_BUZZER_OPEN_CIRCUIT
	14814	DTC_PLATFORM_SW_POWER_SHORT_TO_GROUND
	14815	DTC_PLATFORM_SW_POWER_SHORT_TO_POWER
	14816	DTC_PLATFORM_SW_POWER_OPEN_CIRCUIT
	14817	DTC_JIB_LEFT_VALVE_SHORT_TO_GROUND
	14817	DTC_JIB_LEFT_VALVE_SHORT_TO_GROUND
	14818	DTC_JIB_LEFT_VALVE_SHORT_TO_POWER
	14819	DTC_JIB_LEFT_VALVE_OPEN_CIRCUIT
	14820	DTC_JIB_RIGHT_VALVE_SHORT_TO_GROUND
	14821	DTC_JIB_RIGHT_VALVE_SHORT_TO_POWER
	14822	DTC_JIB_RIGHT_VALVE_OPEN_CIRCUIT
	14823	DTC_JIB_TELESCOPE_OUT_VALVE_SHORT_TO_GROUND

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Valve	14824	DTC_JIB_TELESCOPE_OUT_VALVE_SHORT_TO_POWER
	14825	DTC_JIB_TELESCOPE_OUT_VALVE_OPEN_CIRCUIT
	14826	DTC_JIB_TELESCOPE_IN_VALVE_SHORT_TO_GROUND
	14827	DTC_JIB_TELESCOPE_IN_VALVE_SHORT_TO_POWER
	14828	DTC_JIB_TELESCOPE_IN_VALVE_OPEN_CIRCUIT
	13829	DTC_LIFT_VALVE_STUCKED_MOVEMENT
	13830	DTC_TELESCOPE_VALVE_STUCKED_MOVEMENT
	14831	DTC_LEVELING_VALVE_STUCKED_MOVEMENT
	12832	DTC_MAIN_LIFT_SAFETY_VALVE_SHORT_TO_GROUND
	12833	DTC_MAIN_LIFT_SAFETY_VALVE_SHORT_TO_POWER
	12834	DTC_MAIN_LIFT_SAFETY_VALVE_OPEN_CIRCUIT
	12835	DTC_MAIN_TELE_SAFETY_VALVE_SHORT_TO_GROUND
	12836	DTC_MAIN_TELE_SAFETY_VALVE_SHORT_TO_POWER
	12837	DTC_MAIN_TELE_SAFETY_VALVE_OPEN_CIRCUIT
	12838	DTC_SWING_SAFETY_VALVE_SHORT_TO_GROUND
	12839	DTC_SWING_SAFETY_VALVE_SHORT_TO_POWER
	12840	DTC_SWING_SAFETY_VALVE_OPEN_CIRCUIT
	23849	DTC_BOOM_OUT_VALVE_STUCKED
	23850	DTC_BOOM_IN_VALVE_STUCKED
Unit Condition	33851	DTC_STEEL_WIRE_ROPE_LOOSE
	41852	DTC_DRIVE_DIRECTION_REVERSE
	24853	DTC_OVER_LOAD
	23854	DTC_RESTRICT_OR_UNRESTRICT
	24855	DTC_LEVELING_FAULT
	23856	DTC_SHORT_ROPE_FAULT
	23857	DTC_MAIN_LIFT_CONTROL_SYSTEM_FAULT
	41858	DTC_LOWER_SPEED_FAULT
	32859	DTC_SYSTEM_FAULT
	34860	DTC_SOFT_TOUCH_FAULT
	32861	DTC_ALTERNATOR_FAULT
	32862	DTC_GLOW_PLUG_FAULT
	12863	DTC_TILT_FAULT
	32864	DTC_LOW_FUEL_FAULT
	14865	DTC_ANTI_CRUSH_ALARM
	12866	DTC_SYSTEM_INITIAL_FAULT
	12867	DTC_INH_FAULT

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Unit Condition	11868	DTC_LEG_EXTENTED
	21869	FRONT_WHEEL_STEER_ERROR
	21870	REAR_WHEEL_STEER_ERROR
	23878	DTC_BOOM_TELESCOPE_CYLINDER_LEAKAGE
	23879	DTC_BOOM_LIFT_CYLINDER_LEAKAGE
	22880	DTC_SWING_LEFT_VALVE_STUCKED
	22881	DTC_SWING_RIGHT_VALVE_STUCKED
	21882	DTC_TRANSPORT_DRIVE_WITHOUT_FLOAT
	11883	DTC_WORK_POSITION_WITH_FLOAT
	31884	DTC_DC_ENBLE_SHORT_TO_GROUND
	31885	DTC_DC_ENBLE_SHORT_TO_POWER
	31886	DTC_DC_ENBLE_OPEN_CIRCUIT
	12887	DTC_CHASIS_CUT_OFF_VALVE_SHORT_TO_GROUND
	12888	DTC_CHASIS_CUT_OFF_VALVE_SHORT_TO_POWER
	12889	DTC_CHASIS_CUT_OFF_VALVE_OPEN_CIRCUIT
	12890	DTC_GROUND_SWITCH_SHORT_TO_POWER
	14891	DTC_PLATFORM_SWITCH_SHORT_TO_POWER
	34892	DTC_SUCTION_CUP_TELE_UP_VALVE_OPEN_CIRCUIT
	34893	DTC_SUCTION_CUP_TELE_DOWN_VALVE_SHORT_TO_POWER
	34894	DTC_SUCTION_CUP_TELE_DOWN_VALVE_OPEN_CIRCUIT
	34895	DTC_SUCTION_CUP_INCLINE_SENSOR_OUT_OF_RANGE
	34896	DTC_SUCTION_CUP_INCLINE_SENSOR_COMM_ERROR
	34897	DTC_SUCTION_CUP_INCLINE_SENSOR_NOT_STANDARDIZATION
	34898	DTC_SUCTION_CUP_LOAD_SENSOR1_OUT_OF_RANGE
	34899	DTC_SUCTION_CUP_LOAD_SENSOR1_COMM_ERROR
	34900	DTC_SUCTION_CUP_LOAD_SENSOR1_NOT_STANDARDIZATION
	34901	DTC_SUCTION_CUP_LOAD_SENSOR2_OUT_OF_RANGE
	34902	DTC_SUCTION_CUP_LOAD_SENSOR2_COMM_ERROR
	34903	DTC_SUCTION_CUP_LOAD_SENSOR2_NOT_STANDARDIZATION
	34904	DTC_SUCTION_CUP_1_ACTUATION_VALVE_SHORT_TO_POWER
	34905	DTC_SUCTION_CUP_1_ACTUATION_VALVE_OPEN_CIRCUIT
	34906	DTC_SUCTION_CUP_2_ACTUATION_VALVE_SHORT_TO_POWER
	34907	DTC_SUCTION_CUP_2_ACTUATION_VALVE_OPEN_CIRCUIT
	12908	DTC_CHASIS_CUT_OFF_VALVE_LOCKED
	11909	DTC_PIT_LIMITED
	31910	WARNING_OSCILLATING_ARM_NOT_IN_PLACE

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Unit Condition	21911	DTC_EMERGENCY_STOP_DRIVE
	22951	DTC_CONTROL_READ_PARA_ERROR
Driver	1018	DTC_CONTROLLER_OVERCURRENT_1
	1019	DTC_CURRENT_SENSOR_FAULT_1
	1020	DTC_PRECHARGE_FAILED_1
	1021	DTC_CONTROLLER_SEVERE_UNDERTEMP_1
	1022	DTC_CONTROLLER_SEVERE_OVERTEMP_1
	1023	DTC_SEVERE_UNDERVOLTAGE_1
	1024	DTC_SEVERE_OVERVOLTAGE_1
	1034	DTC_CONTROLLER_OVERTEMP_CUTBACK_1
	1035	DTC_UNDERVOLTAGE_CUTBACK_1
	1036	DTC_OVERVOLTAGE_CUTBACK_1
	1037	DTC_SUPPLY_5V_FAILURE_1
	1038	DTC_DO6_OPEN_OR_SHORT_1
	1039	DTC_DO7_OPEN_OR_SHORT_1
	1040	DTC_MOTOR_TEMP_HOT_CUTBACK_1
	1041	DTC_MOTOR_TEMP_SENSOR_FAULT_1
	1049	DTC_MAIN_OPEN_SHORT_1
	1050	DTC_EMBRAKE_OPEN_SHORT_1
	1051	DTC_COIL3_DRIVER_OPEN_SHORT_1
	1052	DTC_COIL4_DRIVER_OPEN_SHORT_1
	1053	DTC_PD_OPEN_SHORT_1
	1054	DTC_ENCODER_FAULT_1
	1055	DTC_MOTOR_OPEN_1
	1056	DTC_MAIN_CONTACTOR_WELDED_1
	1057	DTC_MAIN_CONTACTOR_DID_NOT_CLOSE_1
	1065	DTC_THROTTLE_WIPER_HIGH_1
	1066	DTC_THROTTLE_WIPER_LOW_1
	1067	DTC_POT2_WIPER_HIGH_1
	1068	DTC_POT2_WIPER_LOW_1
	1069	DTC_POT_LOW_OVERCURRENT_1
	1070	DTC_EEPROM_FAILURE_1
	1071	DTC_HPD_SEQUENCING_FAULT_1
	1073	DTC_PARAMETER_CHANGE_FAULT_1
	1104	DTC_VCL_RUN_TIME_ERROR_1
	1105	DTC_EXTERNAL_SUPPLY_OUT_OF_RANGE_1

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Driver	1113	DTC_OS_GENERAL_1
	1114	DTC_PDO_TIMEOUT_1
	1115	DTC_STALL_DETECTED_1
	1116	DTC_FAULT_ON_OTHER_TRACTION_CONTROLLER_1
	1117	DTC_DUAL_SEVERE_FAULT_1
	1119	DTC_SUPERVISOR_FAULT_1
	1120	DTC_SUPERVISOR_INCOMPATIBLE_1
	1135	DTC_MOTOR_CHARACTERIZATION_FAULT_1
	1136	DTC_ENCODER_PULSE_ERROR_1
	1137	DTC_MOTOR_TYPE_FAULT_1
	1145	DTC_VCL_OS_MISMATCH_1
	1146	DTC_EM_BRAKE_FAILED_TO_SET_1
	1147	DTC_ENCODER_LOS_1
	1148	DTC_EMR_REV_TIMEOUT_1
	1152	DTC_ILLEGAL_MODEL_NUMBER_1
	1153	DTC_DUALMOTOR_PARAMETER_MISMATCH_1
	2018	DTC_CONTROLLER_OVERCURRENT_2
	2019	DTC_CURRENT_SENSOR_FAULT_2
	2020	DTC_PRECHARGE_FAILED_2
	2021	DTC_CONTROLLER_SEVERE_UNDERTEMP_2
	2022	DTC_CONTROLLER_SEVERE_OVERTEMP_2
	2023	DTC_SEVERE_UNDERVOLTAGE_2
	2024	DTC_SEVERE_OVERVOLTAGE_2
	2034	DTC_CONTROLLER_OVERTEMP_CUTBACK_2
	2035	DTC_UNDERVOLTAGE_CUTBACK_2
	2036	DTC_OVERVOLTAGE_CUTBACK_2
	2037	DTC_SUPPLY_5V_FAILURE_2
	2038	DTC_DO6_OPEN_OR_SHORT_2
	2039	DTC_DO7_OPEN_OR_SHORT_2
	2040	DTC_MOTOR_TEMP_HOT_CUTBACK_2
	2041	DTC_MOTOR_TEMP_SENSOR_FAULT_2
	2049	DTC_MAIN_OPEN_SHORT_2
	2050	DTC_EMBRAKE_OPEN_SHORT_2
	2051	DTC_COIL3_DRIVER_OPEN_SHORT_2
	2052	DTC_COIL4_DRIVER_OPEN_SHORT_2
	2053	DTC_PD_OPEN_SHORT_2

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Driver	2054	DTC_ENCODER_FAULT_2
	2055	DTC_MOTOR_OPEN_2
	2056	DTC_MAIN_CONTACTOR_WELDED_2
	2057	DTC_MAIN_CONTACTOR_DID_NOT_CLOSE_2
	2065	DTC_THROTTLE_WIPER_HIGH_2
	2066	DTC_THROTTLE_WIPER_LOW_2
	2067	DTC_POT2_WIPER_HIGH_2
	2068	DTC_POT2_WIPER_LOW_2
	2069	DTC_POT_LOW_OVERCURRENT_2
	2070	DTC_EEPROM_FAILURE_2
	2071	DTC_HPD_SEQUENCING_FAULT_2
	2073	DTC_PARAMETER_CHANGE_FAULT_2
	2104	DTC_VCL_RUN_TIME_ERROR_2
	2105	DTC_EXTERNAL_SUPPLY_OUT_OF_RANGE_2
	2113	DTC_OS_GENERAL_2
	2114	DTC_PDO_TIMEOUT_2
	2115	DTC_STALL_DETECTED_2
	2116	DTC_FAULT_ON_OTHER_TRACTION_CONTROLLER_2
	2117	DTC_DUAL_SEVERE_FAULT_2
	2119	DTC_SUPERVISOR_FAULT_2
	2120	DTC_SUPERVISOR_INCOMPATIBLE_2
	2135	DTC_MOTOR_CHARACTERIZATION_FAULT_2
	2136	DTC_ENCODER_PULSE_ERROR_2
	2137	DTC_MOTOR_TYPE_FAULT_2
	2145	DTC_VCL_OS_MISMATCH_2
	2146	DTC_EM_BRAKE_FAILED_TO_SET_2
	2147	DTC_ENCODER_LOS_2
	2148	DTC_EMR_REV_TIMEOUT_2
	2152	DTC_ILLEGAL_MODEL_NUMBER_2
	2153	DTC_DUALMOTOR_PARAMETER_MISMATCH_2
	3018	DTC_CONTROLLER_OVERCURRENT_3
	3019	DTC_CURRENT_SENSOR_FAULT_3
	3020	DTC_PRECHARGE_FAILED_3
	3021	DTC_CONTROLLER_SEVERE_UNDERTEMP_3
	3022	DTC_CONTROLLER_SEVERE_OVERTEMP_3
	3023	DTC_SEVERE_UNDERVOLTAGE_3

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Driver	3024	DTC_SEVERE_OVERVOLTAGE_3
	3034	DTC_CONTROLLER_OVERTEMP_CUTBACK_3
	3035	DTC_UNDERVOLTAGE_CUTBACK_3
	3036	DTC_OVERVOLTAGE_CUTBACK_3
	3037	DTC_SUPPLY_5V_FAILURE_3
	3038	DTC_DO6_OPEN_OR_SHORT_3
	3039	DTC_DO7_OPEN_OR_SHORT_3
	3040	DTC_MOTOR_TEMP_HOT_CUTBACK_3
	3041	DTC_MOTOR_TEMP_SENSOR_FAULT_3
	3049	DTC_MAIN_OPEN_SHORT_3
	3050	DTC_EMBRAKE_OPEN_SHORT_3
	3051	DTC_COIL3_DRIVER_OPEN_SHORT_3
	3052	DTC_COIL4_DRIVER_OPEN_SHORT_3
	3053	DTC_PD_OPEN_SHORT_3
	3054	DTC_ENCODER_FAULT_3
	3055	DTC_MOTOR_OPEN_3
	3056	DTC_MAIN_CONTACTOR_WELDED_3
	3057	DTC_MAIN_CONTACTOR_DID_NOT_CLOSE_3
	3065	DTC_THROTTLE_WIPER_HIGH_3
	3066	DTC_THROTTLE_WIPER_LOW_3
	3067	DTC_POT2_WIPER_HIGH_3
	3068	DTC_POT2_WIPER_LOW_3
	3069	DTC_POT_LOW_OVERCURRENT_3
	3070	DTC_EEPROM_FAILURE_3
	3071	DTC_HPD_SEQUENCING_FAULT_3
	3073	DTC_PARAMETER_CHANGE_FAULT_3
	3104	DTC_VCL_RUN_TIME_ERROR_3
	3105	DTC_EXTERNAL_SUPPLY_OUT_OF_RANGE_3
	3113	DTC_OS_GENERAL_3
	3114	DTC_PDO_TIMEOUT_3
	3115	DTC_STALL_DETECTED_3
	3116	DTC_FAULT_ON_OTHER_TRACTION_CONTROLLER_3
	3117	DTC_DUAL_SEVERE_FAULT_3
	3119	DTC_SUPERVISOR_FAULT_3
	3120	DTC_SUPERVISOR_INCOMPATIBLE_3
	3135	DTC_MOTOR_CHARACTERIZATION_FAULT_3

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Driver	3136	DTC_ENCODER_PULSE_ERROR_3
	3137	DTC_MOTOR_TYPE_FAULT_3
	3145	DTC_VCL_OS_MISMATCH_3
	3146	DTC_EM_BRAKE_FAILED_TO_SET_3
	3147	DTC_ENCODER_LOS_3
	3148	DTC_EMR_REV_TIMEOUT_3
	3152	DTC_ILLEGAL_MODEL_NUMBER_3
	3153	DTC_DUALMOTOR_PARAMETER_MISMATCH_3
	4018	DTC_CONTROLLER_OVERCURRENT_4
	4019	DTC_CURRENT_SENSOR_FAULT_4
	4020	DTC_PRECHARGE_FAILED_4
	4021	DTC_CONTROLLER_SEVERE_UNDERTEMP_4
	4022	DTC_CONTROLLER_SEVERE_OVERTEMP_4
	4023	DTC_SEVERE_UNDERVOLTAGE_4
	4024	DTC_SEVERE_OVERVOLTAGE_4
	4034	DTC_CONTROLLER_OVERTEMP_CUTBACK_4
	4035	DTC_UNDERVOLTAGE_CUTBACK_4
	4036	DTC_OVERVOLTAGE_CUTBACK_4
	4037	DTC_SUPPLY_5V_FAILURE_4
	4038	DTC_DO6_OPEN_OR_SHORT_4
	4039	DTC_DO7_OPEN_OR_SHORT_4
	4040	DTC_MOTOR_TEMP_HOT_CUTBACK_4
	4041	DTC_MOTOR_TEMP_SENSOR_FAULT_4
	4049	DTC_MAIN_OPEN_SHORT_4
	4050	DTC_EMBRAKE_OPEN_SHORT_4
	4051	DTC_COIL3_DRIVER_OPEN_SHORT_4
	4052	DTC_COIL4_DRIVER_OPEN_SHORT_4
	4053	DTC_PD_OPEN_SHORT_4
	4054	DTC_ENCODER_FAULT_4
	4055	DTC_MOTOR_OPEN_4
	4056	DTC_MAIN_CONTACTOR_WELDED_4
	4057	DTC_MAIN_CONTACTOR_DID_NOT_CLOSE_4
	4065	DTC_THROTTLE_WIPER_HIGH_4
	4066	DTC_THROTTLE_WIPER_LOW_4
	4067	DTC_POT2_WIPER_HIGH_4
	4068	DTC_POT2_WIPER_LOW_4

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Driver	4069	DTC_POT_LOW_OVERCURRENT_4
	4070	DTC_EEPROM_FAILURE_4
	4071	DTC_HPD_SEQUENCING_FAULT_4
	4073	DTC_PARAMETER_CHANGE_FAULT_4
	4104	DTC_VCL_RUN_TIME_ERROR_4
	4105	DTC_EXTERNAL_SUPPLY_OUT_OF_RANGE_4
	4113	DTC_OS_GENERAL_4
	4114	DTC_PDO_TIMEOUT_4
	4115	DTC_STALL_DETECTED_4
	4116	DTC_FAULT_ON_OTHER_TRACTION_CONTROLLER_4
	4117	DTC_DUAL_SEVERE_FAULT_4
	4119	DTC_SUPERVISOR_FAULT_4
	4120	DTC_SUPERVISOR_INCOMPATIBLE_4
	4135	DTC_MOTOR_CHARACTERIZATION_FAULT_4
	4136	DTC_ENCODER_PULSE_ERROR_4
	4137	DTC_MOTOR_TYPE_FAULT_4
	4145	DTC_VCL_OS_MISMATCH_4
	4146	DTC_EM_BRAKE_FAILED_TO_SET_4
	4147	DTC_ENCODER_LOS_4
	4148	DTC_EMR_REV_TIMEOUT_4
	4152	DTC_ILLEGAL_MODEL_NUMBER_4
	4153	DTC_DUALMOTOR_PARAMETER_MISMATCH_4
	5018	DTC_CONTROLLER_OVERCURRENT_5
	5019	DTC_CURRENT_SENSOR_FAULT_5
	5020	DTC_PRECHARGE_FAILED_5
	5021	DTC_CONTROLLER_SEVERE_UNDERTEMP_5
	5022	DTC_CONTROLLER_SEVERE_OVERTEMP_5
	5023	DTC_SEVERE_UNDERVOLTAGE_5
	5024	DTC_SEVERE_OVERVOLTAGE_5
	5034	DTC_CONTROLLER_OVERTEMP_CUTBACK_5
	5035	DTC_UNDERVOLTAGE_CUTBACK_5
	5036	DTC_OVERVOLTAGE_CUTBACK_5
	5037	DTC_SUPPLY_5V_FAILURE_5
	5038	DTC_DO6_OPEN_OR_SHORT_5
	5039	DTC_DO7_OPEN_OR_SHORT_5
	5040	DTC_MOTOR_TEMP_HOT_CUTBACK_5

Table 6-1 Fault Code list (continuous)

Item	Fault Code	Description
Driver	5041	DTC_MOTOR_TEMP_SENSOR_FAULT_5
	5049	DTC_MAIN_OPEN_SHORT_5
	5050	DTC_EMBRAKE_OPEN_SHORT_5
	5051	DTC_COIL3_DRIVER_OPEN_SHORT_5
	5052	DTC_COIL4_DRIVER_OPEN_SHORT_5
	5053	DTC_PD_OPEN_SHORT_5
	5054	DTC_ENCODER_FAULT_5
	5055	DTC_MOTOR_OPEN_5
	5056	DTC_MAIN_CONTACTOR_WELDED_5
	5057	DTC_MAIN_CONTACTOR_DID_NOT_CLOSE_5
	5065	DTC_THROTTLE_WIPER_HIGH_5
	5066	DTC_THROTTLE_WIPER_LOW_5
	5067	DTC_POT2_WIPER_HIGH_5
	5068	DTC_POT2_WIPER_LOW_5
	5069	DTC_POT_LOW_OVERCURRENT_5
	5070	DTC_EEPROM_FAILURE_5
	5071	DTC_HPD_SEQUENCING_FAULT_5
	5073	DTC_PARAMETER_CHANGE_FAULT_5
	5104	DTC_VCL_RUN_TIME_ERROR_5
	5105	DTC_EXTERNAL_SUPPLY_OUT_OF_RANGE_5
	5113	DTC_OS_GENERAL_5
	5114	DTC_PDO_TIMEOUT_5
	5115	DTC_STALL_DETECTED_5
	5116	DTC_FAULT_ON_OTHER_TRACTION_CONTROLLER_5
	5117	DTC_DUAL_SEVERE_FAULT_5
	5119	DTC_SUPERVISOR_FAULT_5
	5120	DTC_SUPERVISOR_INCOMPATIBLE_5
	5135	DTC_MOTOR_CHARACTERIZATION_FAULT_5
	5136	DTC_ENCODER_PULSE_ERROR_5
	5137	DTC_MOTOR_TYPE_FAULT_5
	5145	DTC_VCL_OS_MISMATCH_5
	5146	DTC_EM_BRAKE_FAILED_TO_SET_5
	5147	DTC_ENCODER_LOS_5
	5148	DTC_EMR_REV_TIMEOUT_5
	5152	DTC_ILLEGAL_MODEL_NUMBER_5
	5153	DTC_DUALMOTOR_PARAMETER_MISMATCH_5

6.2 Common Faults and Solutions

Table 6-2 Common faults and solutions

NO.	Fault	Cause	Solution
1	Overload alarm	1. Platform overcapacity	Platform unloading
		2. Load cell communication fault	Check load cell harness or replace sensor
		3. Platform controller fault	1. Check the platform controller fuse and harness; 2. Replace controller.
2	Chassis tilt alarm	1. Chassis tilt exceeds set angle	Move the device to a horizontal position
		2. Chassis inclination sensor communication failure	Check angle sensor harness or replace sensor
3	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
4	Action cannot be performed normally	1. Whether the authorization switch is pressed	1. First operate the authorization switch, then operate the action
		2. Motion switch damaged	2. Replace switch
		3. Motion handle damaged	3. Replace handle
		4. Solenoid valve wiring open circuit failure	4. Check solenoid valve wiring
		5. Solenoid valve wiring short circuit fault	5. Check solenoid valve wiring
		6. Solenoid valve damage	6. Replace solenoid valve
		7. Motor damage	Replace motor
		8. Motor controller pin damage	Replace motor controller
5	CAN bus fault	1. CAN bus wiring failure	1. Check CAN bus wiring
		2. Controller failure	2. Replace controller

⚠ REMIND

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

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

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

ZOOMLION

Service and Maintenance Manual

Section 7 Electrical Information and Schematic

SECTION 7 ELECTRICAL INFORMATION AND SCHEMATIC

7.1 General Introduction

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

7.2 Multimeter basic operation

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

Please refer to the Voltmeter User Manual for details.

7.2.1 Grounding

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

7.2.2 Backside detection

Backside Detection refers to the measurement by connecting the connector contacts on the same side of the wire, 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

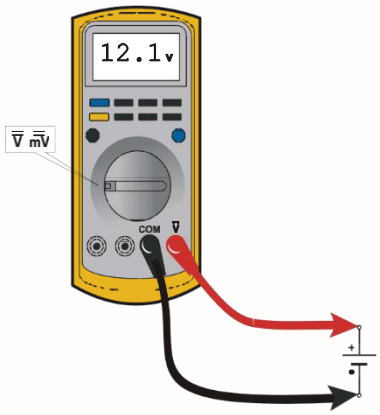


Figure 7-1 Voltage measurement (direct current)

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.

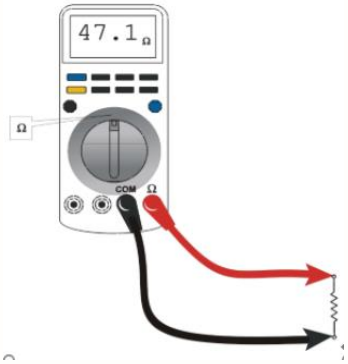


Figure 7-2 Resistance measurement

7.2.7 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

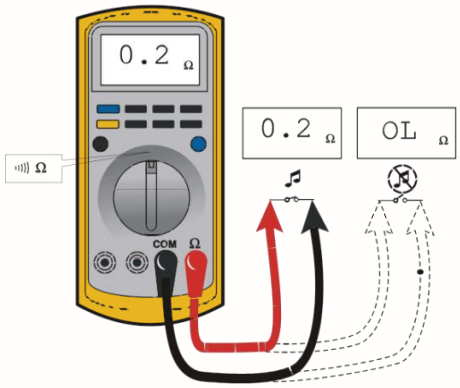


Figure 7-3 Conduction test

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 the lead by touching the two leads. The multimeter should be able to emit a beep sound and show continuity.

7.2.9 Current measurement

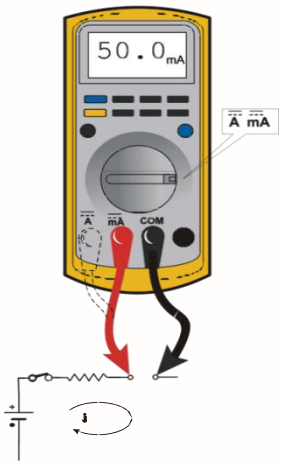


Figure 7-4 Current measurement (direct current)

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

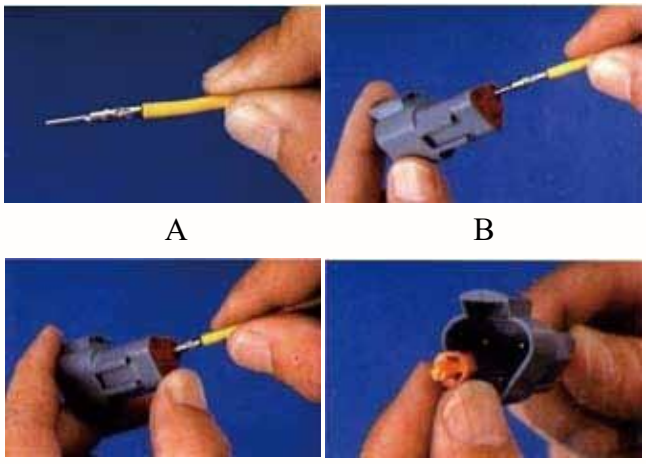


Figure 7-5 DT/DTP contact installation

a) Pinch the crimped contact about 25mm behind the contact cylinder.

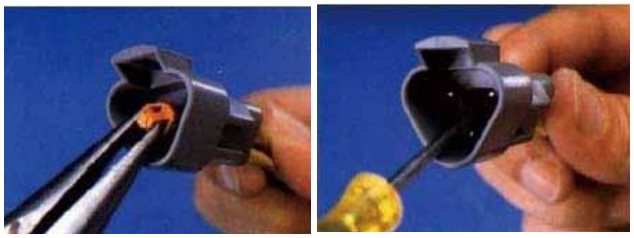
b) Hold the connector so that the rear guard ring faces toward you.

c) Push the contacts into the retaining ring in a straight line until you hear a slight click, and pull gently to confirm that the connector is completely locked.

d) After all the contacts are in place, insert the wedge-shaped locker according to the arrow direction to the external locking device. The wedge-shaped locker will snap into place immediately. The rectangular wedge-shaped body is non-directional and can be used in any direction.

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

7.3.2 DT/DTP Series Connector Disassembly



A B

C

Figure 7-6 DT/DTP contact removal

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

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

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

7.3.3 HD30/HDP20 Series Connector Assembly

A B

C

Figure 7-7 HD/HDP contact installation

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

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

c) Push the contacts straight into the retaining ring until they are obstructed. Pull gently to confirm that the connector is fully locked.

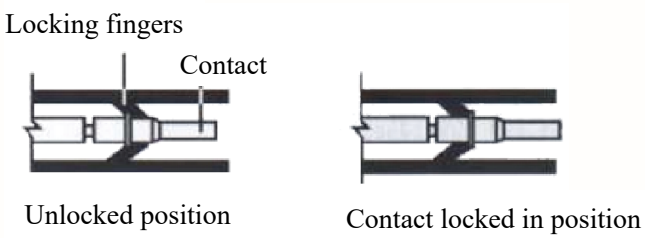


Figure 7-8 HD/HDP lock contact position

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

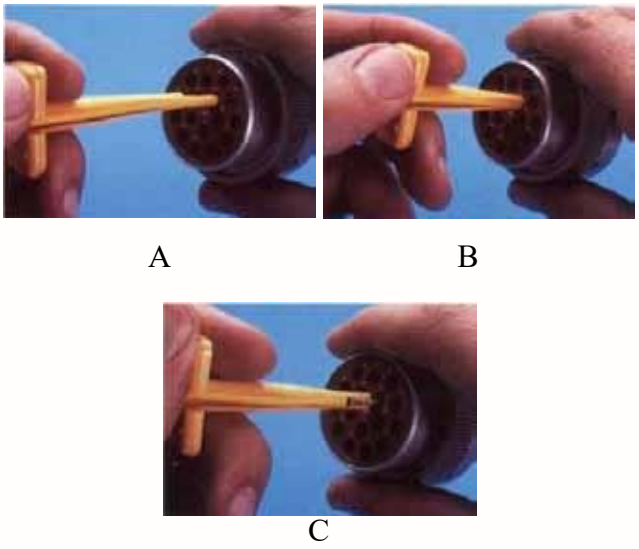


Figure 7-9 HD/HDP contact removal

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.

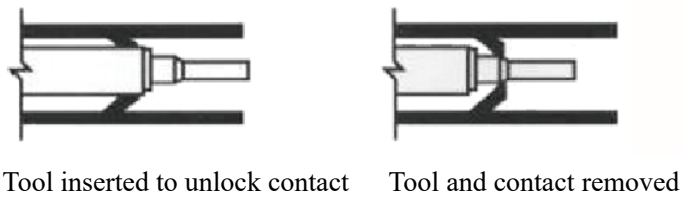


Figure 7-10 HD/HDP non-locking contact

7.4 Electrical Schematics

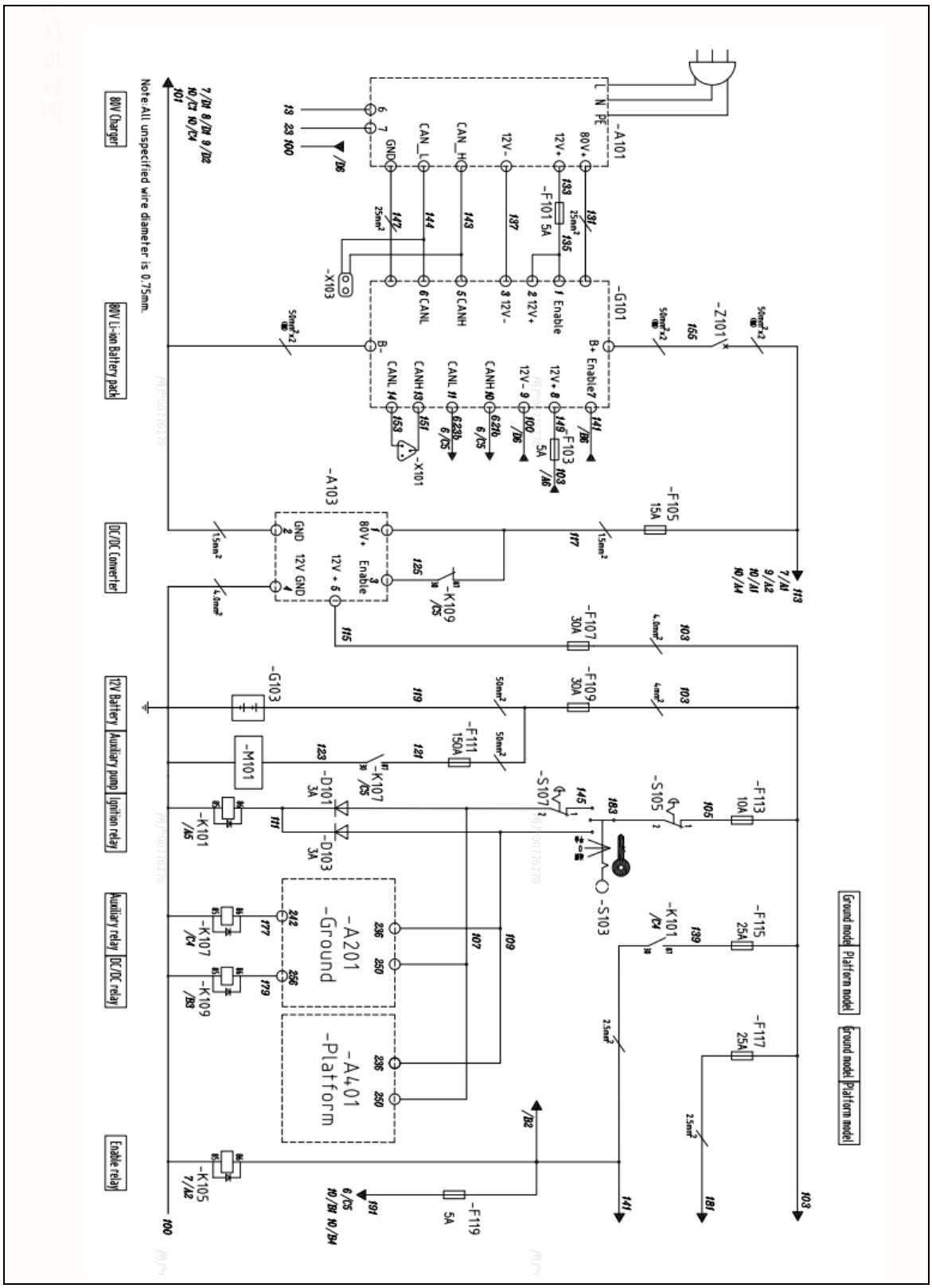


Figure 7-11 Electrical Schematics (CE) 1/11

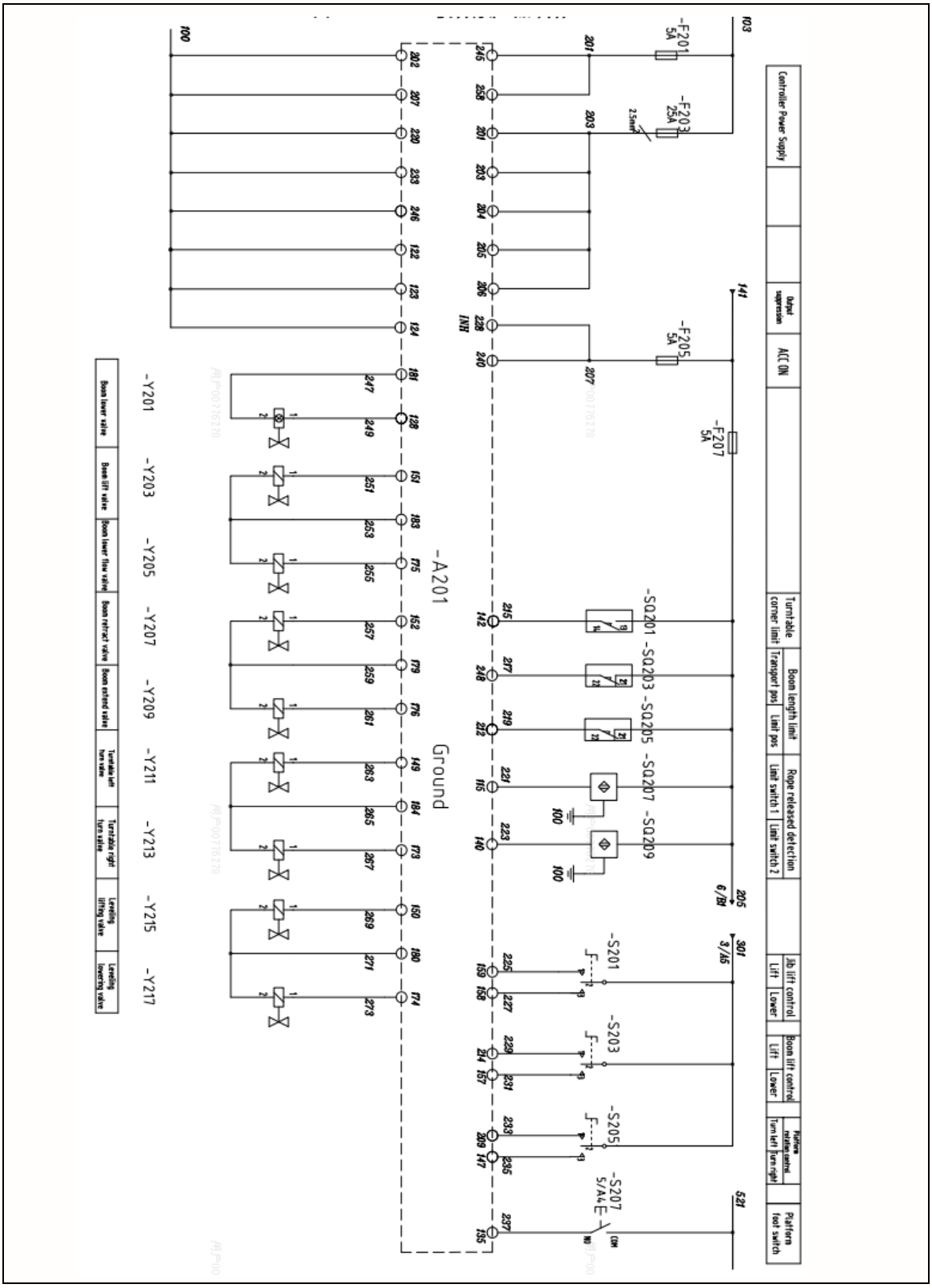


Figure 7-12 Electrical Schematics (GB) 2/11

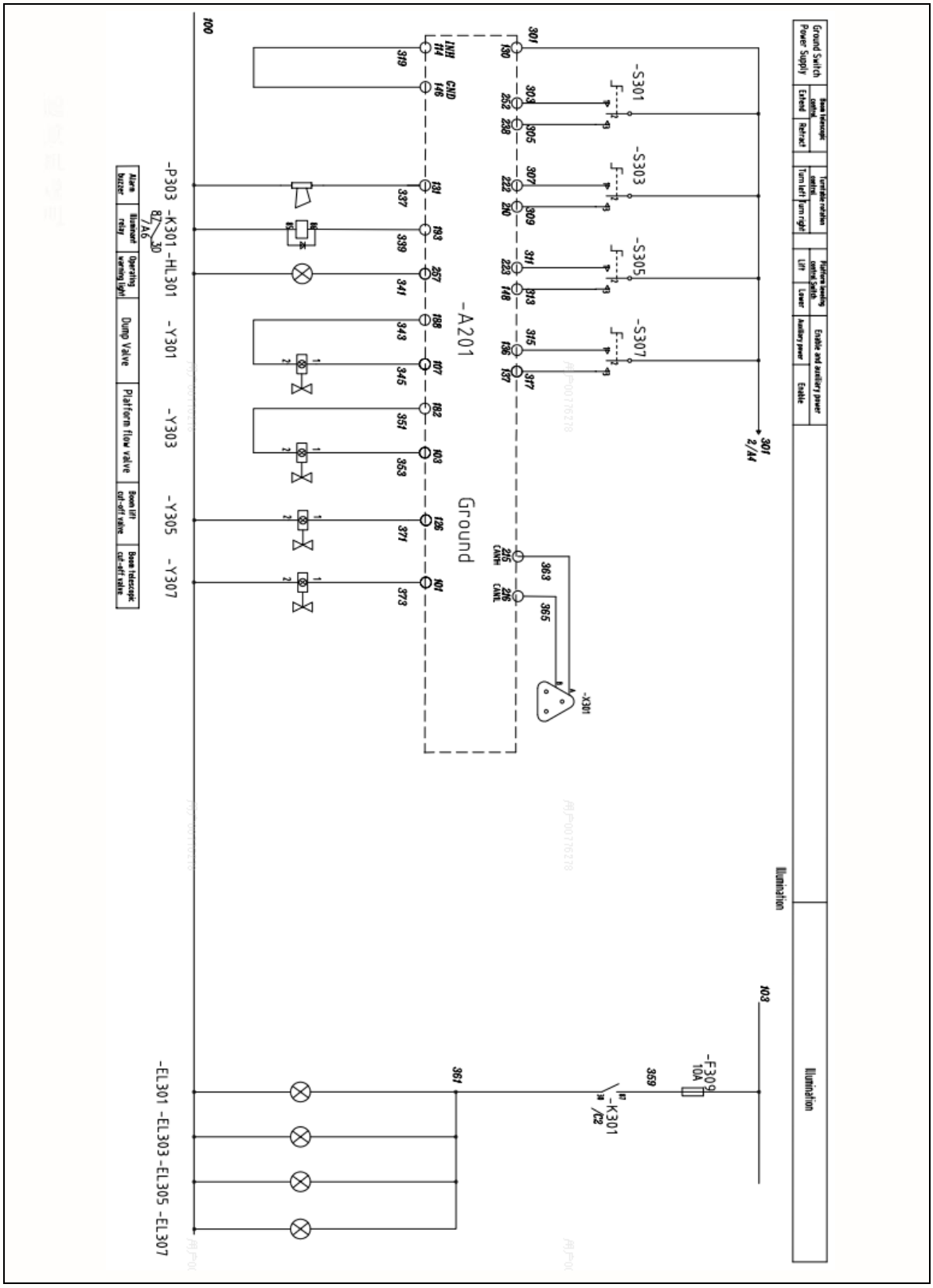


Figure 7-13 Electrical Schematics 3/11

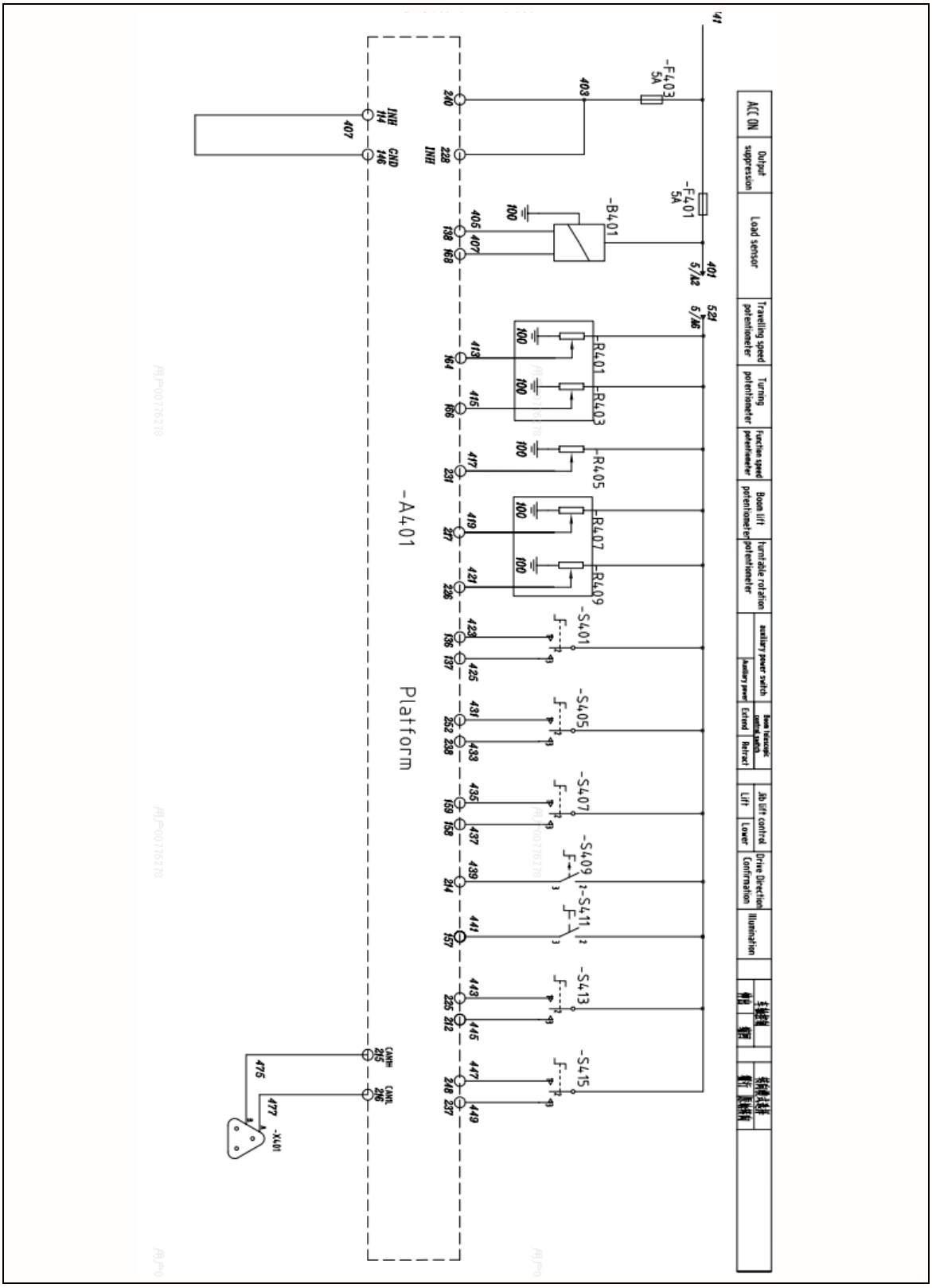


Figure 7-14 Electrical Schematics 4/11

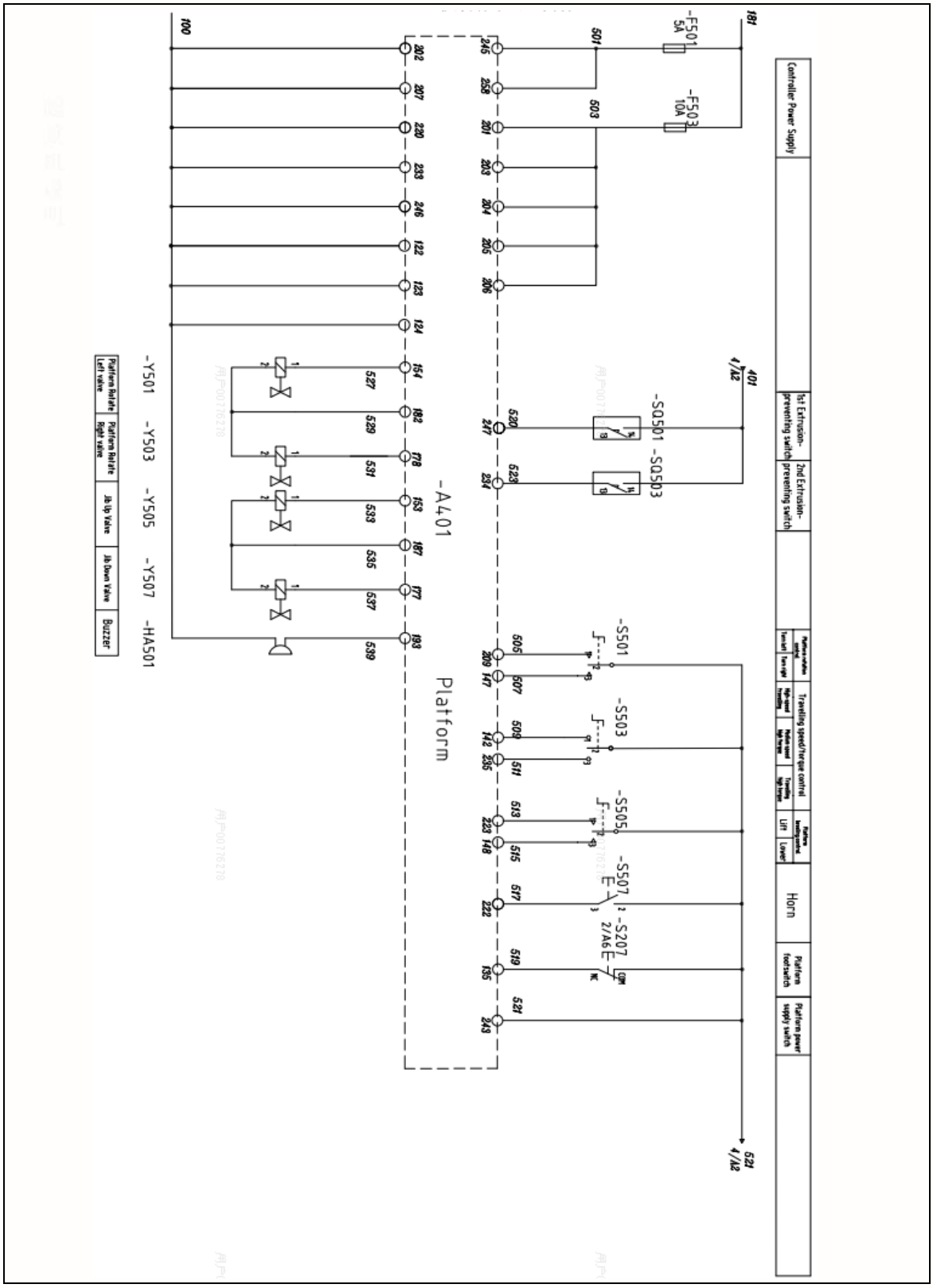


Figure 7-15 Electrical Schematics 5/11

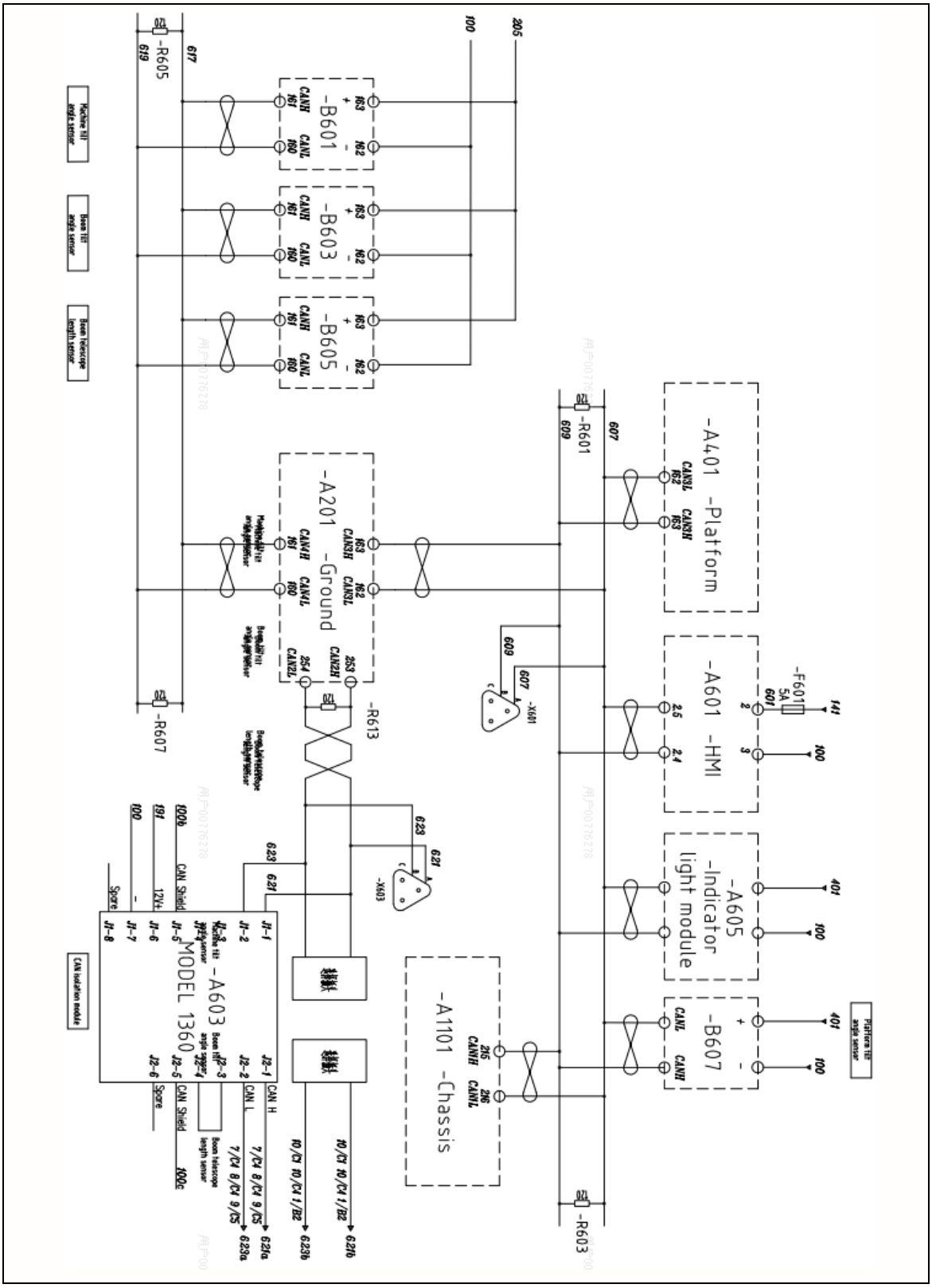


Figure 7-16 Electrical Schematics 6/11

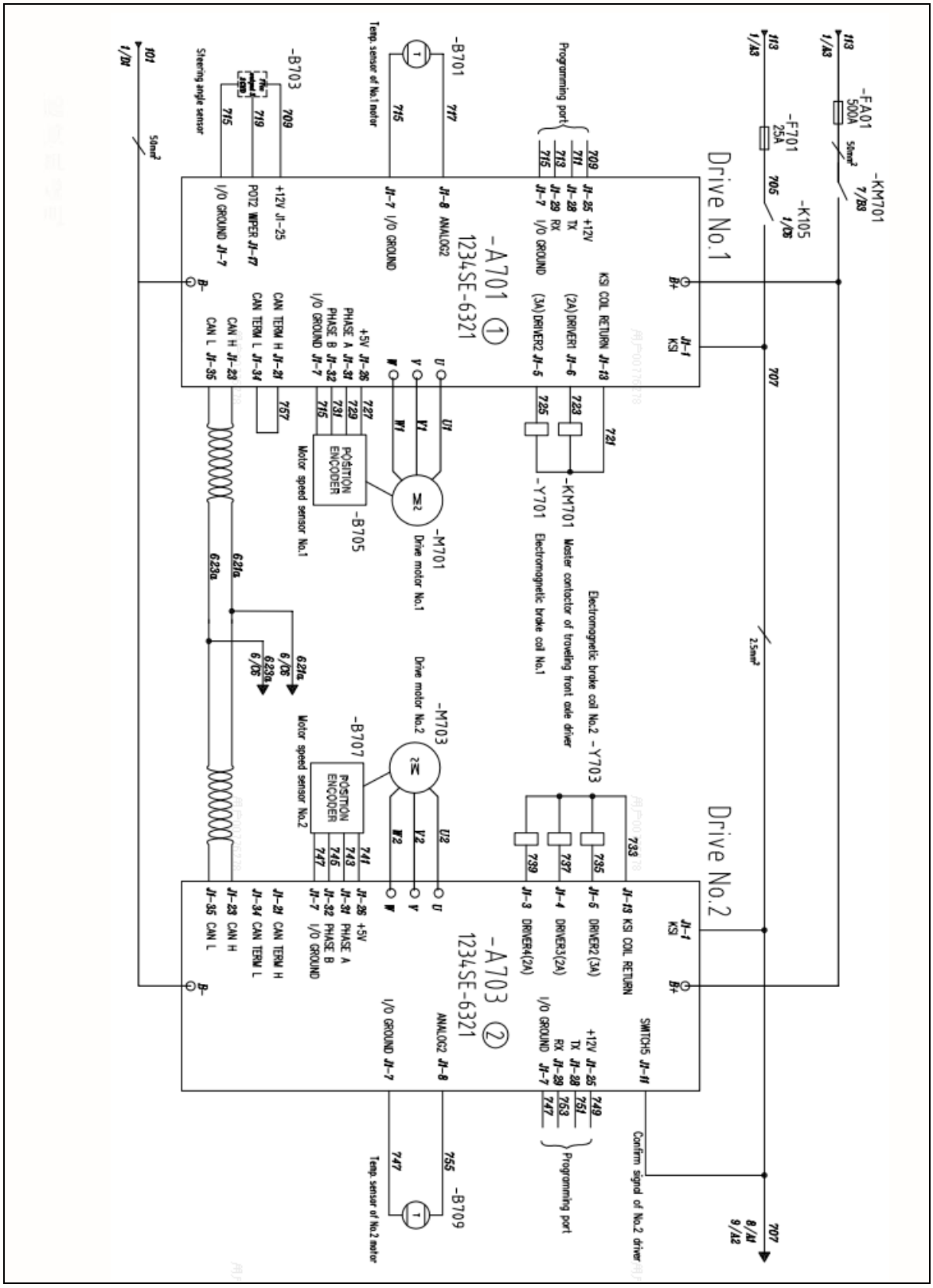


Figure 7-17 Electrical Schematics 7/11

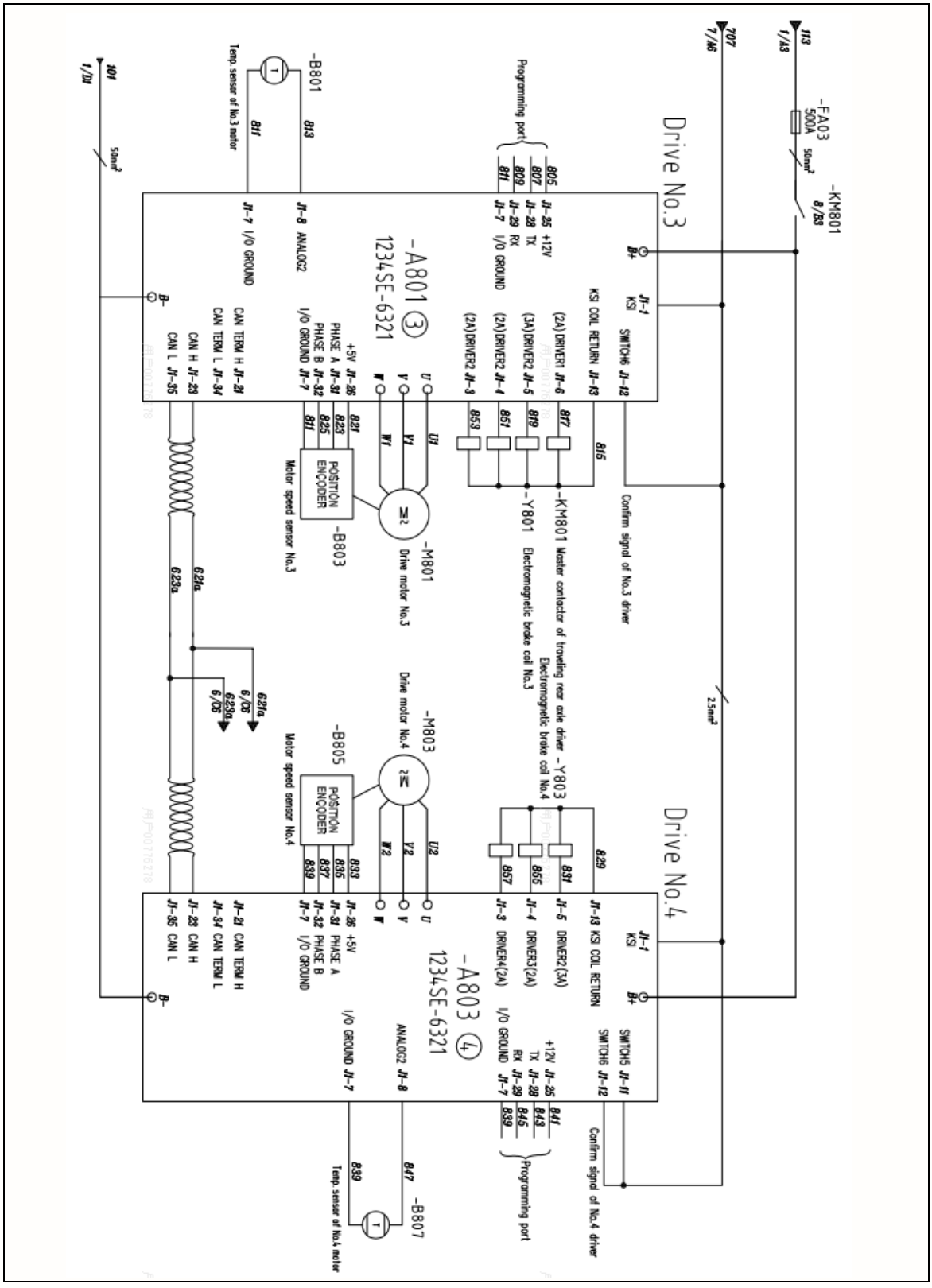


Figure 7-18 Electrical Schematics 8/11

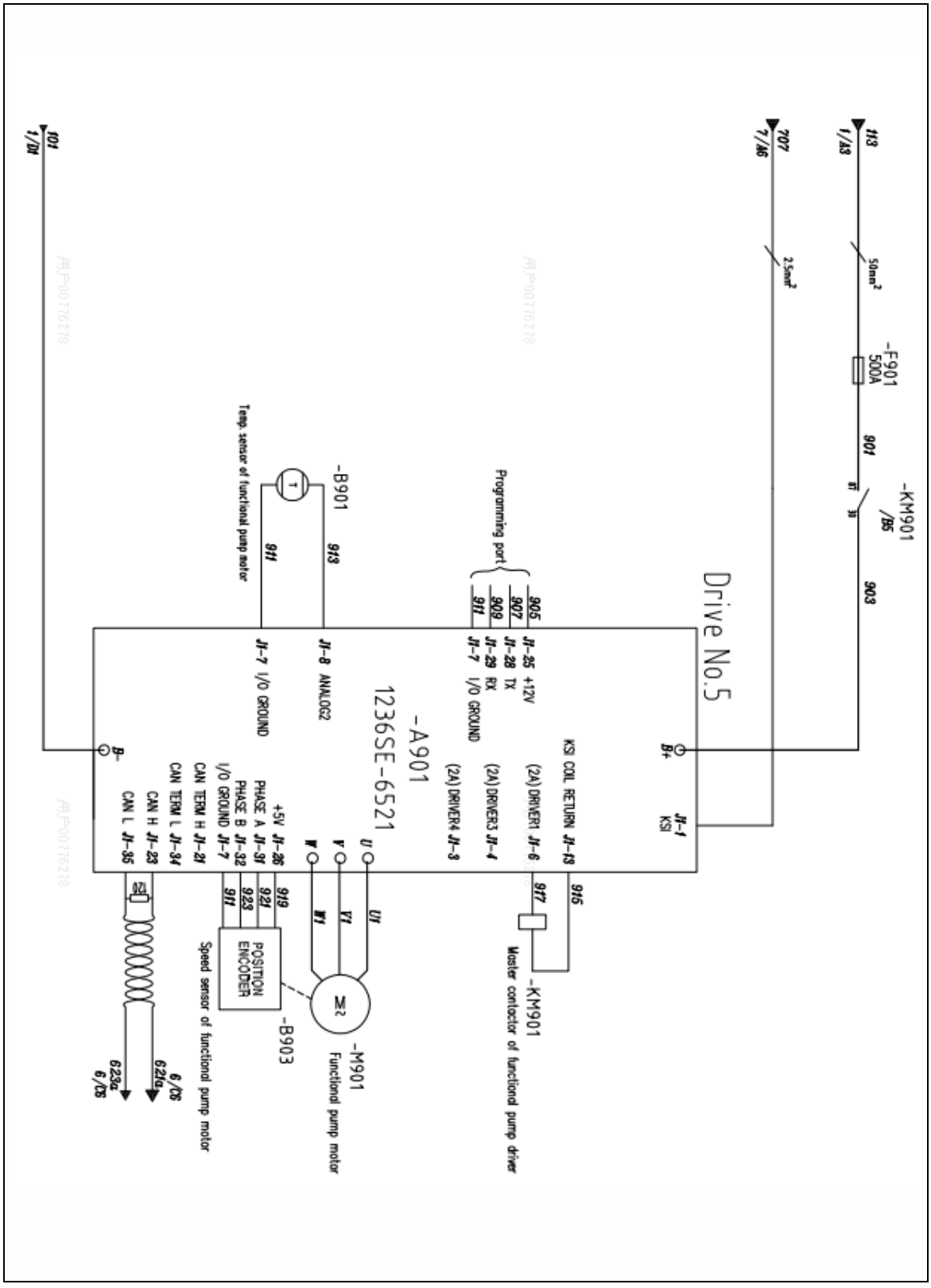


Figure 7-19 Electrical Schematics 9/11

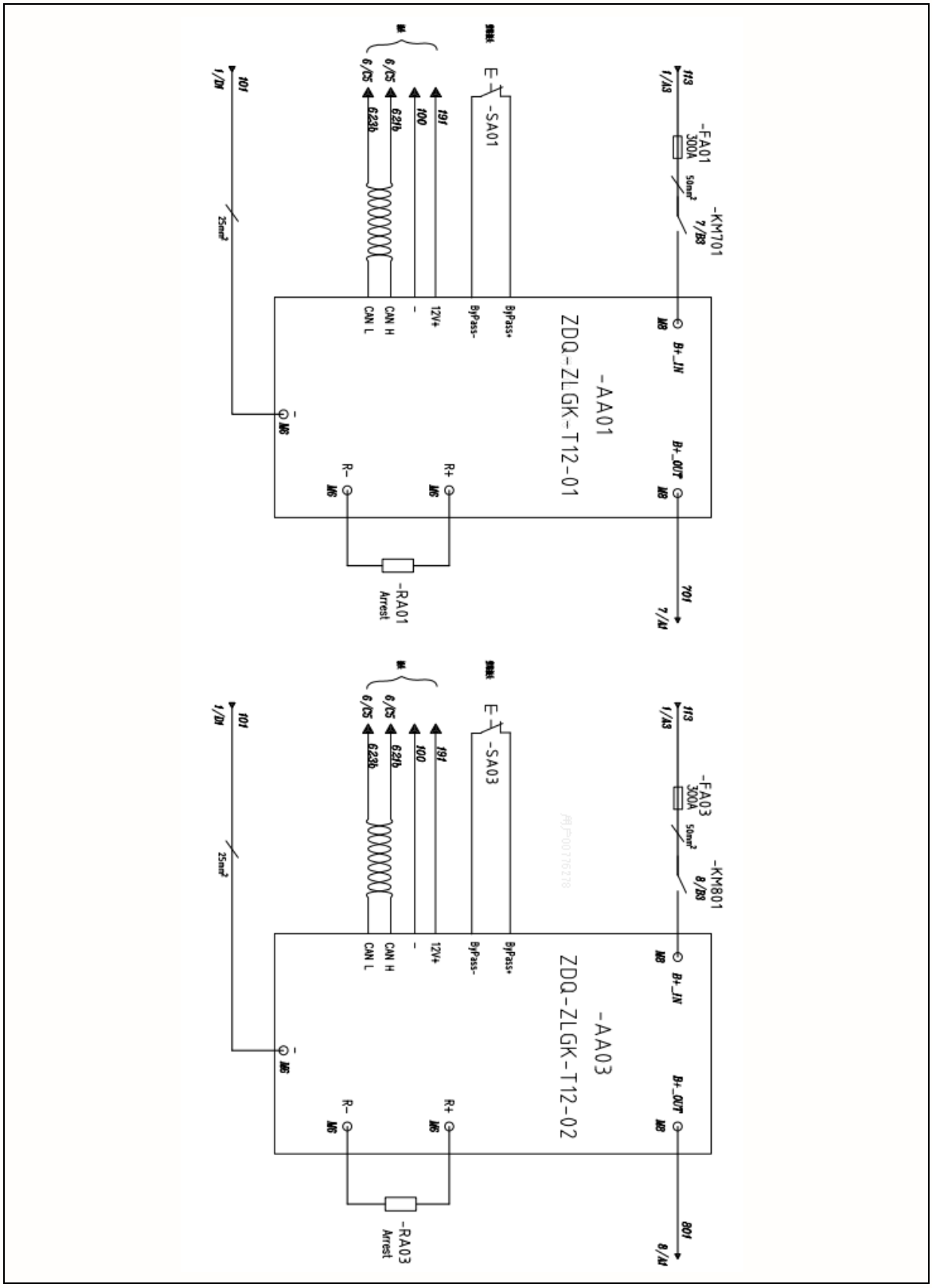


Figure 7-20 Electrical Schematics 10/11

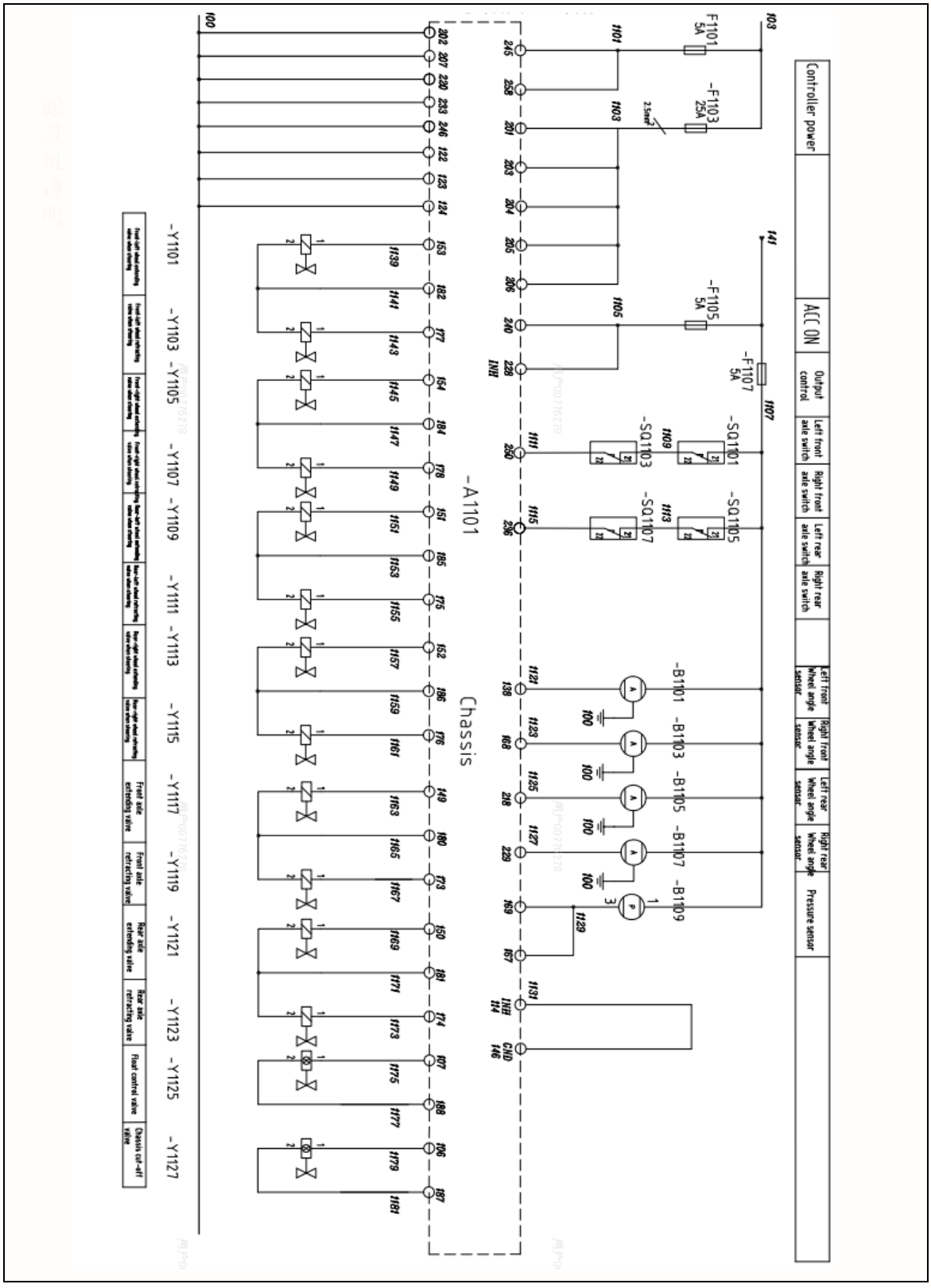


Figure 7-21 Electrical Schematics 11/11

7.5 Hydraulic Schematics

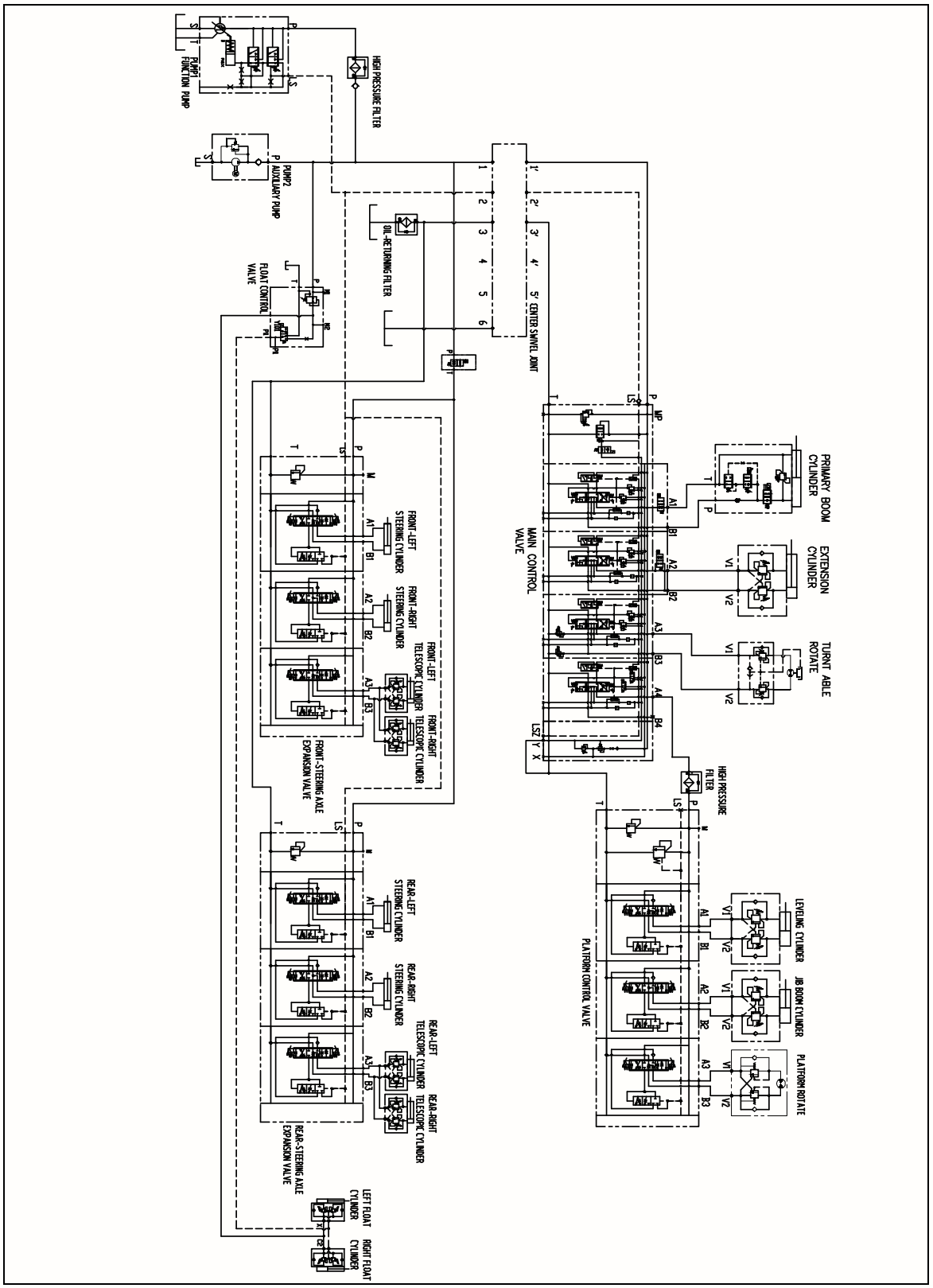


Figure 7-23 Hydraulic Schematics

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ZOOMLION INTELLIGENT ACCESS MACHINERY CO.,LTD.

Add:701 Xulong Nan Lu, Xiangjiang New District, Changsha, Hunan.

Zip Code:410200

E-mail:awm@zoomlion.com

Tel:400-800-0157

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