Self Propelled Articulating Boom Lifts

Maintenance Manual

Applicable for SWA16J

Sunward Intelligent Equipment Co., Ltd.

FOREWORD

Please read the instructions in the manual carefully to learn how to operate and maintain your telescopic handler correctly before operation. Failure to comply may result in personal injury and machine damage.

SUNWARD is unable to predict all potential risks. Thus, the safety information in this manual and on the machine only includes basic safety rules, without all possible safety measures. If there are no recommended or allowable methods in this manual, it's your responsibility to take necessary measures for safety.

This machine is designed in a metric system, and the sizes in this manual are in the metric unit, even if the inch size is shown, it's also transferred by the metric unit. Thus, please use specified metric parts and tools.

This manual shall be considered as a permanent part of your machine, which should be placed at an easy access position for the operator; If it's damaged or lost, please purchase from SUNWARD or our distributors. When the machine is transferred or sold, this manual should be attached.

Only qualified and experienced operators who have participated the formal training and obtained authorized licenses can operate, check and maintain the machine. Besides, operators should be in good physical and mental condition with normal reaction and reaction time. During working, operators are forbidden to take any medicines which are harmful to health, drink beverages with ethyl alcohols or inject any other anesthetics. All data, charts and specifications in this manual are based on the latest product information available at the time of publication. The improved changes of the machine design are always shown on details which may be not mentioned in this manual. SUNWARD Intelligent Equipment Co. Ltd. reserves the right to change the design of the machine without any notice.

Warning

Some related chemicals may be exposed during the operation, repair and maintenance of the machine, including engine emission, carbon monoxide, phthalate and plumbum that may result in cancers, children who are born with developmental defects or others reproductive hazard. To reduce the exposure and avoid excessive inhalation of the exhaust gas, don’t idle the engine if it’s not necessary, and repair or maintain the machine at a ventilated site, and always wear good gloves or keep hands clean.

Table of Contents

1. MAINTENANCE GUIDE

1.1 Preparation, Inspection and Maintenance

1.1.1 Overview

This manual provides instructions for operators to perform the maintenance. Operators should strictly maintain this machine as follow the maintenance plan in following pages.

Maintenance manual includes the instruction information about this machine which should be abided by, enabling the machine in a good condition for operation.

Equipped protective clothes and safety protection device should be put on.

1.1.2 Instruction of Machine Condition

Work Status: main boom extend or retract, and luff, tower arm rise or lower at any an extend or luffing angle, and the work mode is showed on the display screen.

Stowed Status: main boom extend or retract, main boom luff, tower arm rise or lower, and the stowed mode is showed on the display screen.

Stored Status: main boom extend or retract, tower arm rise or lower, fly jib rise or lower.

Transport Status: main boom extend or retract, main boom luff, tower arm retracted, fly jib and working column should be adjusted to transport status.

1.1.3 Preparation, Inspection and Maintenance

It’s essential to make and follow the whole procedure for inspection and prevention. This manual provides details about recommended periodical maintenance items. Besides, please figure out related laws and regulations for aerial work platforms in your country or at local. The inspection and maintenance should be increased with the real working conditions, requirements and using frequency.

1.1.4 Pre-start Inspection

Pre-start inspection should be performed by users or operation before daily use or when changing operators. Please carefully read the operator’s manual for details about pre-start inspection.

1.1.5 Pre-delivery Inspection and Daily Inspection

The checking items for pre-delivery inspection and daily inspection are the same, but the time is different. The

pre-delivery inspection should be done before each selling, leasing or delivery. The daily inspection should be performed after the machine is used for 3 months or 150 hours (whichever comes first), or idling over than 3 months, or it's purchased as a second-hand equipment. The checking interval should be increased with the real working conditions, requirements and using frequency.

1.1.6 Annual Inspection

The annual inspection should be performed at every year, besides, the inspection interval should be not over than 13 months. It's recommended to perform this work by qualified maintenance engineers from the factory, who has joined related training about aerial work platforms from SUNWARD and has the required ability and knowledge for repair and maintenance.

1.1.7 Preventive Maintenance

Preventive maintenance should be performed by equipment engineers who approved by SUNWARD. Refer to the "Maintenance and Inspection Report" and "Maintenance Schedule" in this manual to confirm the inspection and time, and check procedures for inspection and maintenance in the "Inspection Procedures" in this manual.

1.2 MAINTENANCE NOTE

1.2.1 Overview

This section describes maintenance procures.

1.2.2 Safety and Working Criteria

Personnel safety should be the priority before machine maintenance. Never move heavy components without any assistance of mechanical equipment. It's forbidden to put heavy objects on unstable position. Enough support should be ensured when lifting machine components.

1.2.3 Cleanness

1. The most important point to prolong the service life of machine is to prevent impurities from entering the key component of the machine. Preventive measures have been taken to avoid such contamination. Protective plates, outer cap, seal and filters are used to keep the cleanness of air, fuel and engine oil. However, maintenance should be carried out as specified time to ensure the normal effect of those protective measures.
2. Clean surrounded area, openings and joints after air, fuel or engine oil pipeline is disconnected, and cover that to

prevent foreign matters from entering.
3. Clean and check all parts during maintenance to keep pipelines and openings unblocked. Cover these parts to keep them clean. Before assembly, make sure that are clean. And store that in containers before using.

1.2.4 Components Disassembly and Assembly

If any auxiliary machinery is required, please use an adjustable hoisting device. All lifting tools (lifting chains and slings) should be parallel, and that should be kept vertical with the lifted components.

If components on some corners should be disassembled at the angle between supporting structure and component less than 90°， please pay attention to that the loading capacity of bolts of lifting rings or such bracket will reduce. If some component is hard to be disassembled, please check nuts, bolts, cables, brackets or connecting wires are completely disassembled, at the same time, check adjacent component for blocking.

1.2.5 Components Disassembly and Re-assembly

All procedures should be finished in sequence for the assembly or disassembly of each component. If one part isn’t disassembled or assembled completely, please never skip to next part. Please check for several times to make sure that there’s nothing lost. And don’t adjust without permission (except recommended adjustment).

1.2.6 Pressed Parts

Lubricate the meshing surface with anti-seize or molybdemum disulfide based compound.

1.2.7 Bearing

1. After the disassembly of bearing, please cover it to prevent dust attachment or abrasion. Clean bearing with nonflammable cleaning solvent and dry it with compressed air, but not rotate it.
2. Discard the bearing if any concaves, notches or burn marks are found on bearing ring and balls, discard the bearing.
3. If bearing still can be maintained, pack it with a clean paper after applying a layer of oil on it. Before assembly, never open the package.
4. Prior to assembly, lubricate the new bearing or repaired bearing. Press it into the bearing support or boring hole, and apply pressure on the outer ring of the bearing. If the bearing should be installed onto the shaft, the pressure should be applied on the inner bearing.

1.2.8 Washer

Check whether the hole on washer aim at the opening of the matched component. If the washer should be made manually, washer or other equal material with the same thickness should be used. Please make sure that the hole is set at correct position, otherwise unsealed washed may result in the damage of system.

1.2.9 Bolt Use and Applied Torque

New replaceable part should be always used when assembling the lock part. Use bolts with proper length. If it's too long, it may interfere with other components before tightening its head to corresponding parts; If it's too short, there'll be no enough thread to fix the part. Only use the bolt with the same specification as the original bolt for replacement.

Except specific torque required in this manual, standard torque should be adopted on bolts after heating treatment, double-head bolt and steel nuts.

1.2.10 Hydraulic Pipeline and Electric Wire Connection

Pull out or disassemble hydraulic pipelines and electrical connection from the equipment, and mark clearly on the hydraulic pipelines, electric connection and its sockets. In this way, correct reinstallation is ensured.

1.2.11 Hydraulic System

Contamination is the main hazard to the hydraulic system. Contamination may invade in various kinds of methods, such as improper use of hydraulic oil, and the entering of water, lubricating grease, metal scrappers, seal parts and sand when maintenance.

Keep hydraulic system clean. If any metal or rubber particles are found in the hydraulic system, discharge and flush the whole system immediately.

Disassemble or reassemble parts on clean worktable. Use nonflammable cleaning solvent to clean all metal components. Lubricate parts as required for easy assembly.

1.2.12 Lubrication

Lubricate relevant components as required time interval with the recommended capacity, type and level of lubricating grease in this manual. If recommended lubricating grease is unable to obtained, please contact with local distributors. Buy recommended lubricating grease or that with the same requirements.

1.2.13 Battery

Clean battery with non-metal brushes, sodium bicarbonate and aqueous solution, and flush it with cleaning water. After cleaning and drying completely, apply anticorrosive compound onto the battery terminal.

1.3 PIN SHAFT AND COMPOUND BEARING

1. Disassemble and check the connecting pin if any one of condition is found:

（1）The joint is tilted.

（2）Noise occurs at the joint when working.

2. Change the compound bearing if any one of following condition is found:

（1）Fiber abrasion or separation on the bushing surface.

（2）Bearing bushing pedestal broken or damaged.

（3）Bearing moved or rotated to the bearing base;

（4）Scrappers inserted into the bushing surface.

3. Change the pin roll if any one of following condition is found: (clean pin roll correctly before inspection)

（1）Abrasion on bearing.

（2）Fragment, falling, scratches or marks on the surface of pin roll.

（3）The bearing rust.

4. Reassemble Connecting Pin and Compound Bearing

（1）Impurities and contamination on the bearing base should be cleaned, and there is no foreign matters should be on bearing and its base.

（2）Clean the cleaning solvent with bearing and pin roll to remove lubricating grease and oil. Compound bearing is dry type joint, there’s no need to lubricate.

（3）During installation and operation, check pin rolls for burrs or notches to avoid the damage of bearing.

2. MAINTENANCE

Maintenance

Following signs, icons and symbolic texts are used by SUNWARD to identify below contents:

Safety Alert Symbols—used to alert personnel to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury

⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury

NOTICE Indicates a potentially hazardous situation which, if not avoided, will result in property damage.

Please contact with Sunward or the distributor for the latest material or questions related with this manual.

This section provides detailed operation procedures for periodical maintenance and inspection.

⚠ CAUTION

Unsafe operation and incorrect maintenance may result in death, serious injuries or machine damage.

Fundamentals:

1. Only qualified personnel with profession training can maintain and inspect the machine.
2. Regular maintenance and inspection consists of the daily inspection items. Maintenance and inspection should be performed as the maintenance and inspection report, and the details should be recorded.
3. Periodical maintenance is carried out by each quarter, each half a year and each year.
4. Remove damaged machine or machine with failures in time, and set a mark, stop the operation.
5. Repair should be done prior to operation.
6. During maintenance process, parts for replacement should be as the same as the original part.
7. Quarterly inspection should be performed for machine which haven't maintained for three months.
8. All inspection records should be kept for no less than 10 years or till the machine is out of service, or as the requirements of machine owners/companies/keepers.
9. Except special regulations, the maintenance procedure should be carried out in accordance with below clauses:

（1）Machine is parked on level and firm ground surface.

（2）Machine is stopped and not working.

（3）The “Key Switch” of ground controller is set at “OFF” position, and the key is pulled out to keep the machine is unable to be started.

（4）Se the red “Emergency Switch” on the platform controller and ground controller at the “OFF” position to avoid accidental starting of the operation system.

（5）Disconnect the power switch to cut off the DC power supply .

（6）Lock all tires to prevent machine from moving.

（7）Release the pressure in the hydraulic parts prior to releasing or discharging hydraulic parts, especially the balance valve on the cylinder.

2.1 PRE-DELIVERY INSPECTION

When the machine owner or the company is changed, besides the pre-delivery inspection, corresponding inspection also should be performed with the required inspection time and inspection procedures. Meanwhile, following requirements should be obeyed for the pre-delivery inspection:

1. Pre-delivery inspection is the liability of machine owners and company.
2. This step should be performed before each delivery to find obvious faults before putting the machine into use.
3. Damaged machine or machine with faults should not be used. Once damage or abnormal condition is found, make labels and move away the machine.
4. Machine should be strictly repaired by qualified technical personnel with this manual.
5. Daily maintenance should be carried out by qualified technical personnel with this manual.

Fill the record as below instruction before machine delivery.

1. Preparation work before delivery includes the pre-start inspection and function test.
2. Record the result with this table. And mark at each finished part.

Table 2-1

Preparation before Delivery		
Product Model		
Product ID		
Inspection Items	Normal	Damage or Stoppage
Pre-start Inspection	□	□
Function Inspection	□	□
Signature of Inspector		
Date		

2.2 MAINTENANCE SCHEDULE

1. Periodical maintenance and inspection should be performed at every day, every quarter, every season, every half a year (every 6 months) and every year, this table is the help for you to follow the maintenance plan.
2. According to the maintenance procedure, time requirements and procedures in the maintenance schedule, there are four periods of maintenance report, which contains the periodical inspection table of each item.
3. Copy the maintenance report for each inspection. All inspection records should be kept for no less than 10 years or till the machine is out of service, or as the requirements of machine owners/companies/keepers.
4. Record the result with following tables. After the basic information is filled, mark at each finished part.

Table 2-2

Inspection Interval	Inspection Procedures
Every day or every 8 hours	Ⅰ
Every quarter or every 200 hours	Ⅰ+Ⅱ
Every half a year or every 500 hours	Ⅰ+Ⅱ+Ⅲ
Every year or every 1000 hours	Ⅰ+Ⅱ+Ⅲ+Ⅳ

Table 2-3

Report for Maintenance and Inspection			
Product Model			
Product ID			
Inspection Interval Ⅰ			
Item	Yes	No	Remark
Check manuals			
Check signs			
Check parts for damage, looseness or lost			
Check hydraulic oil level			
Check hydraulic oil leakage			
Check fuel oil			
Check the leakage of fuel tank			
Check engine oil level			
Check coolant level			
Check engine belt			

Check fuel filter			
Check cooling fan			
Check the air intake system of engine			
Check functions			
Check travel speed			
Check emergency lowering function			
Check tilt protection system			
Check weighing system			
Inspection Interval Ⅱ			
Item	Yes	No	Remark
Check and change the oil return filter of hydraulic tank			
Check wheel rim, tires and fasteners			
Check hydraulic oil			
Check cooling system			
Change fuel filter			
Item	Yes	No	Remark
Check air filter of hydraulic tank			
Change air filter of the engine			
Check Limit Switch			
Check engine exhaust system			
Check the fastener of platform swing cylinder			
Check the exhaust of floating system			
Check wires			
Check battery			
Inspection Interval Ⅲ			
Item	Yes	No	Remark
Change the element of fuel filter			
Change engine oil			
Change engine oil filter			

Inspection Interval Ⅳ			
Item	Yes	No	Remark
Change hydraulic oil			
Change suction filter of hydraulic tank			
Change coolant and hoses			
Change fuel hoses			
Check the sliding block of boom frame			
Lubricate swivel bearing and swing gear of the turntable			
Check key structural parts			

2.2.1 Checking Manual

It is important to put the operator's manual and maintenance manual in a suitable place for the safe operation of the machine. That should be stored in the specified file box on the platform. If the manual is lost or vague, required safe operation information will not be provided.

2.2.2 Checking Signs

All sings should be intact, as that's important for the safe operation of the machine. It indicates that possible dangers may be occurred during the operation. Meanwhile, it offers the information of operation and maintenance with users. Unclear sings is unable to guide operators correctly, this may cause unsafe operation.

2.2.3 Checking Parts for Damage, Looseness or Lost

Check below component or area for damage, improper assembly, looseness or lost parts and refitting conditions without permission:

（1）Electrical component, wire connection and cables
（2）Hydraulic hoses, pipe coupling, hydraulic cylinder and valve block sets
（3）Fuel tank and hydraulic tank
（4）Battery set and other connection
（5）Travel motor and reduction gearbox, swing motor and reduction gearbox
（6）Tires and wheel rim
（7）Engine and related component
（8）Platform guardrail and door
（9）Structural part and cracked soldering seam
（10）Nut, bolt and other fastener
（11）Sliding block of boom frame and telescopic shaft

NOTICE

Change with new parts and install correctly if any damage, improper assembly or loss of parts are found; Fasten immediately if fasteners falls or loosens.

2.2.4 Checking Hydraulic Oil Level

Suitable hydraulic oil level is important for the machine operation. If the hydraulic oil level is too high, oil will flow out during machine operation; If it's too low, oil pump may suck empty, causing the damage of hydraulic parts. Inspectors can know the change of hydraulic oil level from daily inspection, this change can indicate the potential problem existing in the hydraulic system.

Following procedures should be performed when boom frame is stowed.

(1) Open the left covering part, visually check the side of hydraulic tank. Hydraulic oil level should be above the medium scale of the level gauge.

(2) Make sure that there is no leakage of hydraulic tank housing and joints.

（3）Fill hydraulic oil as required, never overfilled.

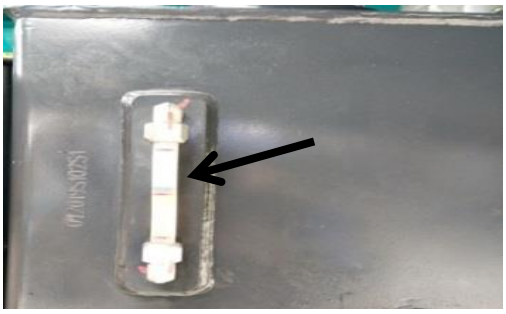


FIG. 2-1

NOTICE

Don’t mix hydraulic oil with different types.

2.2.5 Checking the Leakage of Hydraulic Oil

It’s important to avoid the hydraulic oil leakage for the safe and normal operation of machine. If any leakage is not found, dangerous condition will happen, and the machine performance will be reduced, parts will be damaged. Check the overflow, dropping or contamination of hydraulic oil on below components or nearby area.

(1) Hydraulic tank, filter, pipe coupling, oil tube and auxiliary power unit

(2) Hydraulic cylinders, hydraulic valve sets and pumps

(3) Engine

(4) Boom frame

(5) Swivel bearing

(6) Driving chassis

(7) Machine surrounding area

2.2.6 Checking Fuel Level

NOTICE

Don’t fill diesel oil with different diesel oil.

NOTICE

Only check the engine when it’ s shut down.

Keeping engine diesel at proper oil level is important to maintain the good performance and service life of the engine. Improper diesel oil level may cause the stoppage of engine or machine. Following procedures should be performed when boom frame is stowed.

1. Turn on the “Key switch” on the ground controller, the percentage of diesel oil level will be showed on the controller panel.
2. Machine alarm will sound if diesel oil level is not over than 20%.
3. Make sure that there’s no leakage of fuel tank and joints.
4. Shut down the engine when filling diesel.
5. Open the fuel tank cap, and fill in diesel as required, and never overfilled, it’s recommended add to the capacity of 60%-100%.

FIG. 2-2

⚠WARNING

Don’ t mix gasoline, alcohol or the mixture of these two liquid with diesel. Don’ t fill oil when operating the engine.

2.2.7 Checking Fuel Leakage

Checking for fuel leakage is critical to the safe operation and normal operation of the machine. If the fuel leakage problem is not found and solved in time, it will lead to unsafe conditions.

NOTICE

The inspection must be carried out when engine is shut down.

Observe the following areas for diesel leakage, dropping or residue:

(1) Fuel tank, oil pipe and pipe joint.

(2) Fuel pump, fuel filter.

(3) Fuel injection system.

⚠WARNING

Diesel oil is a flammable substance. This procedure must be carried out outdoors in a ventilated place away from the fire source. And ensure that there are qualified fire extinguishers near the inspection procedure.

2.2.8 Checking Engine Oil Level

NOTICE

The inspection must be carried out when engine is shut down.

Checking the oil level and maintaining the engine oil at the appropriate level is very important to maintain the good performance and service life of the engine. If the oil is at an inappropriate level, engine components will be damaged. Through daily inspection, the inspector can determine the change of oil level, which can indicate the problem of engine system.

1. Set the "ground / platform control switch" of the turntable control box to the "ground control position".

2. Turn the "Emergency Stop" button on the turntable control box to "ON" position.

3. Turn the "Engine Start Switch" and idle for 2 minutes.

4. Turn off the engine and open the right cover of the turntable five minutes later.

5. Unscrew the engine oil dipstick and check the oil level.

6. Add engine oil as required, and do not add too much.

NOTICE

The oil grade shall not be lower than API CH-4.

Do not mix engine oils of different brands.

2.2.9 Checking the Coolant Level

Keeping the engine coolant at a proper level is very important to maintain the good performance and service life of the engine. If the coolant is at an inappropriate level, engine components will be damaged. Through daily inspection, the inspector can determine the change of coolant level, which can indicate the problem of engine system.

1. Turn off the engine and open the right cover of the turntable.

2. Open the coolant tank cover above the radiator and check the coolant level.

3. The coolant level should be located at the coolant filling port of the box.

4. Add coolant as required. Do not add too much.

⚠WARNING

Before checking the coolant level, cool the liquid in the cooling tank to the temperature as the room, and slowly open the cover to release the pressure.

NOTICE

The inspection must be carried out when the engine is shut down.

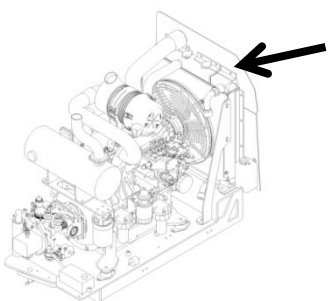


FIG. 2-3

2.2.10 Checking Engine Belt

Maintaining the engine belt is very important for the normal operation of the engine and the extension of its service life. The machine cannot work when the belt is loose or defective. If it continues to be used, component damage will be result in.

NOTICE

The inspection must be carried out when the engine is shut down.

Check engine belt for following conditions:

(1) Crack or fracture

(2) Worn or misaligned

(3) Abscission

(4) Glazed or hardened

(5) The tightness is not appropriate (press the belt at the CLP position with the longest extension between the pulleys to check the tightness of the belt. The belt shall not exceed 13mm after being pressed.)

2.2.11 Checking Fuel Filter

Checking the fuel filter is very important for the normal operation of the engine. Failure to perform this inspection procedure will result in the abnormal operation of the engine and component damage.

1. Open the right cover of the turntable.

2. Find the fuel filter.

3. Loosen the drain valve plug at the bottom and drain the water into a suitable container until the fuel flows out.

4. Tighten the valve plug.

5. Clean up the spilled fuel.

6. Start the engine through the ground controller and check the leakage of fuel filter.

Checking the engine cooling fan is very important for the normal operation of the engine and the extension of its service life.

1. Open the right side cover of the engine.

2. Find the cooling fan in the engine radiator.

3. Check whether the cooling fan for following conditions:
(1) Crack

(2) Tilt loose

(3) Breakage

4. If any of the above conditions occurs, it should be replaced immediately.

2.2.12 Checking Cooling Fan

Checking the engine cooling fan is very important for the normal operation of the engine and the extension of its service life.

NOTICE

The inspection must be carried out when the engine is shut down.

1. Open the right side cover of the engine.

2. Find the cooling fan in the engine radiator.

3. Check whether the cooling fan has the following conditions:

(1) Crack

(2) Tilt loose

(3) Breakage

4. If any of the above conditions occurs, it should be replaced immediately.

2.2.13 Check Engine Intake System

Checking the engine air intake system is very important for the good operation of the engine and the extension of its service life.

NOTICE

The inspection must be carried out when the engine is shut down.

1. Check whether the engine intake pipe is damaged or flattened, and whether the pipeline connection is loose. If these conditions occur, dust and debris may enter the engine.

2. Tighten or replace parts as required to ensure that there is no leakage in the air intake system.

2.2.14 Function Inspection

Checking the functions of the machine is very important for the safe operation of the machine. If any function fails to work properly, unsafe conditions will occur. Any function should be stable and reliable without shaking, violence and abnormal noise.

⚠WARNING

Please be sure to follow the instructions and safety rules in this manual and the operator's manual. Failure to do that may result in death or serious injury.

Please refer to the operator's manual for the complete steps of machine function inspection. Before the inspection, please be sure to fully read and understand the safety rules in the operator's manual.

2.2.15 Testing Travel Speed

1. Turn the "Key Switch" of the turntable control box to the right to the "Platform Control" position.

2. Pull out the "Emergency Stop" button on the turntable control box and platform control box.

3. Push the "Engine Starting Switch" on the platform control box.

4. Push the "Engine High / Low Speed Switch" on the platform control box to switch to high speed.

5. Push the platform control box "Climbing / Leveling Switch" to switch to leveling.

6. Step on the "Foot Switch".

7. Slowly push the "Travel / Steering Proportional Control Handle" forward to the full drive position.

8. The test result is: when the boom is not working, the maximum driving speed is 6.8km/h; When the boom is working, the maximum driving speed is 1.1km/h.

2.2.16 Checking Emergency Lowering Function

When the engine power unit fails, the emergency power unit on the turntable control box or platform control box can be used according to the actual situation. Operating any emergency power unit switch can start the hydraulic pump on the power motor, and at the same time, push the relevant action switch to control the luffing lowering, retraction and swing of the main boom.

⚠WARNING

(1) "Emergency Power Unit Switch" is only used for a short time (lowering the work bar to the position from the maximum angle and position) when the engine cannot work.

(2) When operating the emergency power, do not use two or more action functions at the same time. Operating several functions at the same time will overload the auxiliary motor and pump.

Operation on the ground:

1. Turn the "Key Switch" of the turntable control box to the right to the "Ground Control" position.

NOTICE

The inspection must be carried out when the engine is shut down.

2. Pull out the "Emergency Stop" button on the turntable control box.

3. Turn and hold the "Emergency Power Unit Switch" on the turntable control box.

4. Turn the corresponding boom function switch on the turntable control box to lower the platform.

Operate on the platform:

1. Turn the "Key Switch" of the turntable control box to the right to the "Platform Control" position.

2. Turn the "Emergency Stop" button on the turntable control box and platform control box to the "ON" position.

3. Turn and hold the "Emergency Power Unit Switch" on the platform control box.

4. Turn the corresponding boom function switch on the platform control box to lower the platform.

2.2.17 Checking Tilt Protection System

1. Turn the "Key Switch" of the turntable control box to the right to the "Ground Control" position.

2. Pull out the "Emergency Stop" button on the turntable control box.

3. Test the tilt alarm function when the machine exceeds 5° in the X (left and right) /Y (front and rear) direction.

4. When the machine is not working, put two wooden blocks under the two wheels on the left (or right) / front (or rear) of the machine, and then drive the machine onto these two wooden blocks. The manufacturing angle of wood blocks shall not exceed 5.5°.

5. At this time, the tilt alarm appears, and the "frame non horizontal indicator" flashes, limiting some actions and allowing the boom to retract and lower.

6. The boom retracts and then descends. After the machine stops, drive down and remove the wood blocks.

2.2.18 Check the Weighing System

When the boom is working and the platform is loaded more than 250kg, the buzzer will sound constantly, the overweight indicator will flash, and the display screen will show overweight, limiting all actions. After removing the overloaded object, all actions are resumed.

2.3 INSPECTION CYCLE Ⅱ

2.3.1 Checking and Replacing the Oil Return Filter of Hydraulic Oil Tank

Regular replacement of the return oil filter of the hydraulic oil tank is very important for the normal operation of the hydraulic system and prolonging the service life of the equipment. A dirty or blocked filter may cause abnormal operation of the machine, and continued use may cause component damage. Working in a particularly dirty working environment requires frequent replacement of the oil return filter.

⚠ DANGER

Cool the hydraulic oil to the room temperature before the maintenance of hydraulic system.

NOTICE

The inspection must be carried out when the engine is shut down.

1. Open the left cover of the machine turntable.

2. Find the oil return filter at the hydraulic oil tank.

3. Remove the oil return filter with a wrench.

4. Apply a thin oil film on the gasket of the new oil return filter.

5. Install a new oil return filter and tighten it by hands.

6. Clean up the hydraulic oil spilled in the process.

7. Start the engine with the ground controller.

8. Check the filter and relevant parts to ensure no leakage.

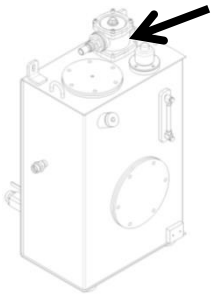


FIG. 2-4

2.3.2 Checking Rims, Tires and Fasteners

Maintaining the rims, tires and their fasteners is very important for the normal and safe operation of the machine. Problems with rims or tires may cause the machine to overturn. Any problems with rims and tires need to be repaired before machine operation. This machine uses solid tires or foam tires, which do not need inflation.

1. Check the tires every day. If any of the following conditions are found, take immediate measures to stop using the machine and replace the tires or tire assembly (including rims) at the same time.

(1) Tire delamination refers to circumferential cracks or delaminations between rubbers.

(2) Delamination, that is, the rubber is separated from the steel ring.

(3) The rubber surface falls off locally.

(4) The rubber cracks along the diameter direction.

(5) The rubber is worn to the wear line.

NOTICE

Tire nuts should be tightened before initial use and after each tire is removed. Check and adjust the torque every 3 months or 150 hours of operation.

2. Check the fastening nuts of tires for specified torque.

2.3.3 Checking Hydraulic Oil

Checking the hydraulic oil is very important for the normal operation of the machine and the extension of its service life. Dirty hydraulic oil may cause abnormal machine action, and cause damage to hydraulic parts. Particularly dirty working environment requires frequent replacement of hydraulic oil.

DANGER

Cool the hydraulic oil to the room temperature before the maintenance of hydraulic system.

DANGER

Slowly disassemble the hydraulic components to reduce the hydraulic oil pressure. High hydraulic oil pressure may penetrate the skin. If you are injured, please see a doctor immediately.

Replace the hydraulic oil in time in case of any of the following conditions:

(1) The hydraulic oil is milky white and turbid.

(2) The hydraulic oil is black.

(3) Take out a part of the hydraulic oil and check it in the sun. There are metal light spots, or there is an obvious sense of particles when rubbing with two fingers dipped in the hydraulic oil.

(4) The hydraulic oil stinks.

2.3.4 Checking Cooling System

Regular inspection of the radiator is crucial to the normal operation of the engine and the extension of its service life.

NOTICE

The inspection must be carried out when the engine is shut down.

DANGER

Pay attention to the hot parts of the engine, if body contacts with these parts may cause serious burns.

(1) Check the cooling system for leaks or loose connections.

(2) Check all hoses of the radiator for cracks, scratches or flattening, and whether the pipe clamps are loose.

(3) Check whether there are sundries blocking the radiator fins. Replace the fuel filter

(4) Ensure that there is a standard fire extinguisher near the place where this procedure is checked.

2.3.5 Replacing the Fuel Filter

Regular replacement of the fuel filter element is crucial to the normal operation of the engine and the extension of its service life. A dirty or blocked filter may cause abnormal operation of the machine, and may cause component damage. Working in poor fuel quality or humid working environment requires frequent replacement of fuel filter element.

Ensure that there is a standard fire extinguisher near the place where this procedure is checked.

1. Open the right cover of the turntable.

2. Find the fuel filter.

3. Disconnect the fuel flowing from the fuel tank to the fuel filter.

4. Loosen the valve plug located above the fuel filter.

NOTICE

The inspection must be carried out when the engine is shut down.

5. Place a suitable container under the fuel filter

6. Loosen the drain valve plug at the bottom and drain all the water and remaining fuel into the container.

⚠ DANGER

(1) Diesel oil is a flammable substance. This procedure must be carried out outdoors in a ventilated place away from the fire source.
(2) Ensure that there is a standard fire extinguisher in the vicinity.

7. Remove the fuel filter, replace it with a new filter element, and then install the fuel filter.

8. Tighten the valve plug.

9. Clean up the spilled fuel.

10. Start the engine from the ground and check the leakage of fuel filter.

2.3.6 Checking Air Filter of Hydraulic Tank

Good ventilation of the hydraulic oil tank cover is very important for the normal operation and the extension of the service life of the hydraulic pump. Dirty or blocked hydraulic oil tank air filter may cause poor oil suction of the hydraulic pump and component damage. The particularly dirty working environment requires frequent

inspection of the air filter of the hydraulic oil tank.

1. Remove the hydraulic oil tank air filter.

2. Check the air filter element of the hydraulic oil tank.

3. The air should pass through the air filter smoothly.

4. If the air cannot pass through the air filter smoothly, the air filter must be cleaned according to the following steps.

5. Clean the air filter with neutral solvent, and then dry it with air gun. Repeat step 2.

6. Install the air filter on the oil tank.

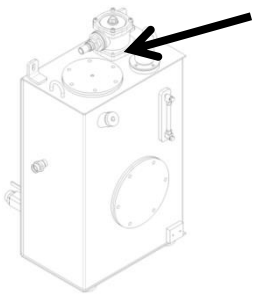


FIG. 2-5

2.3.7 Replacing Engine Air Filter

Checking the engine air filter is very important for the normal operation of the engine. If this inspection procedure is not carried out, the engine will not work normally and components will be damaged.

NOTICE

The inspection must be carried out when the engine is shut down.

1. Open the right cover of the turntable.

2. Find the engine air filter. See the following figure for the specific location.

3. Remove the air filter element.

4. Wipe the inside of the filter cartridge and the tail cover with a wet cloth.

5. Check the air filter element for dirt or blockage. Replace the filter element if necessary.

2.3.8 Checking Limit Switch

Regular inspection of the limit switch is very important for the safe operation of the machine. If the switch cannot work normally, unsafe conditions will occur.

FIG. 2-6

1. Turn the “Key Switch” right to the position of “Ground Control”.
2. Push the “Emergency Stop Switch” to the “ON” position.
3. Press down the button “Monitor” on the right corner of the control panel.
4. Hoist/lower the tower arm, luff the main boom, and extend the main boom, and adjust the tower arm and main boom to the stowed position, watch the display screen for the indicator light of these actions.
5. Hoist/lower the tower arm, luff the main boom, and extend/retract the main boom, adjust the tower arm and main boom to the working mode, and watch the display screen for the indicator light of these actions.

2.3.9 Checking the Exhaust System of Engine

Checking the exhaust system of engine is very important for the normal operation and the extension of the service life of the machine.

1. Checking the exhaust pipe of engine for damage or flat.
2. Checking the exhaust pipe of engine for looseness.
3. Checking the muffler for hot fatigue or internal fault.
4. Checking catalytic converter for clogging.
5. Tighten or change parts as required.

Make sure that the exhaust system has no leakage.

⚠ DANGER

Before checking wires, make sure that the battery and the charger of the AC socket are turned off. Touching guide wires with electricity may result in death or serious injury.

2.3.10 Check Fasteners on Platform Swing Cylinder

1. The machine is at stowed position.
2. Find the swing motor on the platform.
3. Check bolts in the figure 1 for correct tightening torque（68Nm[50ft-lb]）.
4. Check bolts in the figure 2 for correct tightening torque（650Nm[480ft-lb]）.

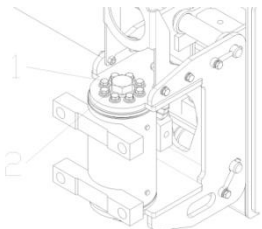


FIG. 2-7

If the bolt should be changed, please tight it with specified torque.

2.3.11 Exhaust Inspection of Floating Cylinder

NOTICE

Please make sure that the platform is at stowed position when exhausting the floating cylinder.

1. Loosen the plug above the floating balance valve on the left side of the machine until oil flows out.
2. Place a 120mm inclined wood block in front of the left front wheel of the machine.
3. Travel the machine to make the left front tire onto the wooden block.
4. During this process, the hydraulic oil and air mixture shall flow out of the loosened plug.
5. Drive the machine repeatedly to and from the inclined wood block, and tighten the plug after hydraulic oil flows out of the loosened plug.
6. At this time, the left floating cylinder is vented successfully.
7. Drive the machine down from the cushion block.
8. Exhaust the right floating cylinder with the above steps.
9. Check the locking of balance valve.

2.3.12 Checking Wires

The maintenance of electrical equipment is vital to the normal operation and safe working of the machine. If the machine is still used in the condition with damage and corrosion, that may result in unsafe operation or serious injuries. Prior to operation, please change or repair damaged or corrosive wires.

1. Check whether the wires in the following areas are damaged or corroded:

(1) Engine Harness

(2) Harness of Rotary Table Valve Set

(3) Ground controller junction box

(4) Junction box of platform controller

2. Start the engine from the ground and raise the boom above the turntable.
3. Turn off the engine.
4. Check whether there are damaged or corrosive wires in the drag chain system.
5. Start the engine from the ground and lower the boom to the parking position.
6. Turn off the engine.

2.3.13 Checking Battery

Good condition of battery is important for the machine performance and safe operation. Improper electrolyte level or damaged cables and wiring may cause component damage and dangerous situations.

NOTICE

Always wear protective gloves for inspection.

(1) Ensure that the wiring of the battery cable is not corroded.

(2) Ensure that the battery is firmly fixed and the cable wiring is tight.

2.4 INSPECTION CYCLE Ⅲ

2.4.1 Changing the Element of Fuel Filter

Periodical replacement of fuel filter element is important to the normal operation and the extension of service life. A dirty or clogged filter will affect the normal operation of engine and result in component damage. The filter element should be changed frequently in the dirty condition.

⚠WARNING

(1) Diesel oil is a flammable substance. This procedure must be carried out outdoors in a ventilated place away from the fire source.

(2) Ensure that there is a standard fire extinguisher in the vicinity of the inspection procedure.

1. Open the cover on the right side of the turntable and find the fuel filter.
2. Disconnect and plug the oil pipe from the fuel tank to the fuel filter.
3. Remove the fuel filter element.

NOTICE

The inspection must be carried out when the engine is shut down.

O ring on hoses and pipe coupling should be changed when discharging hoses and pipe coupling.

4. Clean the inner surface on the head of the filter.
5. Fill the new filter element with clean diesel oil, lubricate the sealing ring with clean diesel oil and install it on the filter head.
6. Clean the diesel spilled during the inspection.

2.4.2 Changing Engine Oil

1. Turn the "key switch" of the turntable control box to the right to the "ground control" position.

2. Pull out the "Emergency Stop Switch" button on the turntable control box.
3. Push the "Engine Start Switch" and idle for 2 minutes.
4. Turn off the engine.
5. Open the oil drain valve to drain the oil.
7. Close the oil drain valve.
8. Add new engine oil.

⚠WARNING

Engine oil is very hot at this moment, please avoid touching it when discharging.

NOTICE

Collect the waste engine oil in a suitable container for recycling. Dispose of waste engine oil in accordance with environmental regulations or laws and regulations.

2.4.3 Changing Engine Oil of Filter

1. Wipe the area around the filter.
2. Remove and discard the machine seal ring of oil filter.
3. Thoroughly clean the residue on the sealing surface of the filter bracket.
4. Apply clean engine oil on the rubber gasket of the new engine oil filter.
5. Install the new filter.
6. Check the oil level.
7. Check the filter element of the refueling filter to ensure that there is no leakage.

2.5 INSPECTION CYCLE Ⅳ

2.5.1 Changing Hydraulic Oil

Periodical replacement of hydraulic oil is important to the normal operation of the machine and the extension of its service life. Contaminated hydraulic oil may result in improper working of the machine and the damage of hydraulic parts. Hydraulic oil should be changed frequently when in extremely dirty working conditions.

NOTICE

Engine oil filter should be changed when changing engine oil each time. Start the engine, and change oil to make engine oil flows smoothly and eliminate more impurities.

1. Open the cover on the left side of the turntable and find the hydraulic oil tank.
2. Close the hydraulic stop valve located on the side of the oil tank.
3. Remove the oil drain plug at the bottom of the oil tank and drain oil into a suitable container.

⚠WARNING

Slowly disassemble the hydraulic components to reduce the hydraulic oil pressure. High pressure of hydraulic oil may penetrate the skin. If you are injured, please see a doctor immediately.

4. Disconnect and plug the oil suction pipe.
5. Disconnect and plug the oil return pipe.
6. Remove the hydraulic oil tank from the machine after removing the fastening bolts of the hydraulic oil tank.
7. Clean the inside of the oil tank with neutral solvent and dry the hydraulic oil tank.
8. Install the hydraulic oil tank on the machine.
9. Connect the oil suction pipe and oil return pipe to the hydraulic oil tank.

2.5.2 Changing Oil Suction Filter of Hydraulic Oil

Regularly replacing the oil suction filter of the hydraulic oil tank is very important for the normal operation of the machine and the extension of service life. Dirty hydraulic oil may cause abnormal machine action, and damage to hydraulic parts. Particularly dirty working environment requires frequent replacement of hydraulic oil. When changing the hydraulic oil, replace the oil suction filter of the hydraulic oil tank.

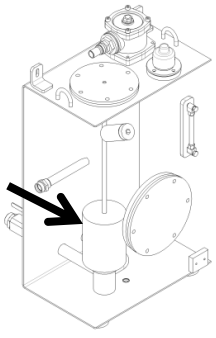


FIG. 2-8

⚠WARNING

Prior to the maintenance of hydraulic system, cool the hydraulic oil to room temperature.

2.5.3 Changing Coolant and Hoses

Regular replacement of coolant and coolant hoses is essential to maintain good engine performance and service life. Dirty coolant may cause abnormal operation of the machine and damage to hydraulic components.

Particularly dirty working environment requires frequent replacement of coolant.

NOTICE

The inspection must be carried out when the engine is shut down.

1. Open the right cover of the turntable and find the cooling water tank.
2. Disconnect the coolant return pipe and drain the water in the return pipe into a suitable container.
3. Open the coolant tank cover.
4. Open the drain valve of the coolant tank and drain all the coolant into a suitable container.

⚠WARNING

Before checking the coolant level, cool the liquid in the cooling tank to room temperature, and then replace the coolant.

5. After the coolant is completely drained, close the drain valve.
6. Remove the coolant hose clamp and remove the coolant hose from each connector.
7. Install the hose clamp onto the new coolant hose and connect the hose to each corresponding connector.
8. Fix the hose by positioning each clamp.
9. Inject new coolant into the coolant tank so that the coolant level is at the filling port of the tank.
10. Clean the coolant spilled in this procedure.
11. Start the engine with the ground controller to make the coolant circulate normally in the cooling system.
12. Turn off the engine.

2.5.4 Changing Fuel Hoses

Regular replacement of fuel hoses is essential to maintain the safe operation and service life of the engine. The long-term use of old, broken or leaked fuel hoses may cause the hazard of unsafe operation.

⚠WARNING

(1) Diesel oil is a flammable substance. This procedure must be carried out outdoors in a ventilated place away from the fire source.

(2) Ensure that there is a standard fire extinguisher near the place where this procedure is checked.

1. Open the right cover of the turntable.
2. Disconnect and plug the oil pipe from the fuel tank to the fuel filter.
3. Find the following fuel hoses.

(1) Hose from fuel tank to fuel filter

(2) Hose from fuel filter to fuel pump

(3) Hose from fuel injector to fuel tank

4. Remove the clamps of the above hoses and remove each hose from each connector.
5. Install the hose clamp on the new hose and connect the hose to each corresponding connector.
6. Fix the hose by positioning each clamp.
7. Clean the fuel spilled during this procedure.
8. Install the oil pipe from the fuel tank to the fuel filter.

2.5.5 Checking the Slider on Boom Frame

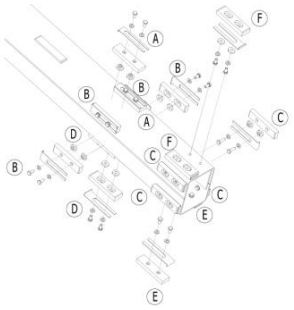


FIG. 2-9

1. Remove the cover plate or nylon brush on two ends of the boom frame.
2. Measure the thickness of each slider on the figure. Below table shows the specified thickness of each slider.

Table 2-4

No.	Slider Thickness
1	A+E（19mm）
2	C+B（18mm）
3	D+F（17mm）

The slider assembly should be changed when the abrasion is larger or equal to 3mm.

NOTICE

The slider after disassembly should not be used repeatedly, and change it with a new one.

2.5.6 Lubricating Turntable Rotary Bearing and Rotary Gear

Regular lubrication of the rotary bearing and rotary gear of the turntable is very important for the normal operation of the machine and the extension of its service life. Continued use of the rotary bearing and rotary gear without proper lubrication will cause component damage.

1. Remove the fastening bolts of the rotary gear cover and remove the rotary gear cover from the machine.
2. Open the turntable cover on the ground controller side.
3. Find the lubrication connector located behind the ground controller box.
4. Spray lubricating oil into the slewing support and rotate it repeatedly for 10-13cm (3.9-5.1in) until it is fully lubricated.
5. Spray lubricating oil between the teeth of the rotary gear.
6. Install the cover.

2.5.7 Inspection of Key Structural Components

Maintaining key structural components is very important for the safe operation of the machine. The use of key structural components that have cracks or deformation may lead to component damage and unsafe operation.

Table 2-5

Key Structural Parts	Inspection Requirements
Working Platform	No permanent transformation and cracks of working platform
Boom Frame	No permanent transformation, crack and interference
Turntable	No permanent transformation and cracks
Cylinder	No oil leakage of cylinder, valve blocks and oil pipes, and no transformation, cracks and interference of mounting shaft
Bottom Frame	Oil contamination, impurities of bottom frame and no transformation of sliding groove; No looseness of bolt junction; no crack of structural parts

3. MAINTENANCE PROCEDURE

⚠ CAUTION

1. Only professionally trained and qualified personnel can carry out maintenance procedures.

2. Replace or repair the damaged parts immediately, and don't operate the machine with damage parts.

3. Before operating the machine, the machine should be properly maintained.

Before starting the machine:

(1) Read, understand and follow the safety rules and operation instructions in the operator's manual.

(2) Read all procedures and rules.

(3) Unless otherwise specified, perform the maintenance procedure of this machine under following cases.

(1) Place the machine on a flat, level and firm ground.

(2) The platform should be stowed.

(3) Turn the key switch to the "off" position and remove the key.

(4) Lock all wheels.

3.1 PLATFORM AND BOOM FRAME

3.1.1 PLATFORM CONTROL BOX

⚠ WARNING

Before performing this procedure, make sure that the battery and the charger of the AC socket are turned off. Touching guide wires with electricity may result in death or serious injury.

NOTICE

This operation should be performed when the machine is retracted.

1. Disconnect the external power supply and press down the emergency stop switch of the platform control box and the ground controller.
2. Find the cable connecting the bottom of the platform control box.
3. Disconnect the cable from the bottom of the platform control box and mark it.
4. Remove the fastening bolts of the platform control box.
5. Remove the platform control box.

3.1.2 Foot Pedal Switch

NOTICE

This operation should be performed when the key switch is at the OFF position.

1. Disconnect the cable connector of foot switch at the bottom of the platform.
2. Remove the mounting bolts of switch protective cover from the platform.
3. Remove the mounting bolts connecting the foot switch and its protective cover.
4. Remove the cover plate close to the wire terminal of the foot switch from the bottom.
5. Use an ohmmeter to detect the circuit continuity without pressing the foot switch.
6. Press down the foot switch and use an ohmmeter to check the circuit continuity.

3.1.3 Working Platform

NOTICE

This operation should be performed when the machine is retracted.

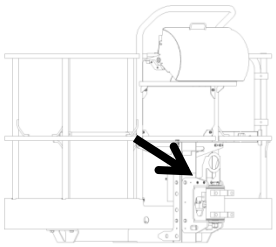


FIG. 3-1

1. Remove the platform control box and foot switch from the platform.
2. Support the platform with appropriate supporting equipment.
3. Remove the platform mounting bolts.
4. Use brass rod and mallet to knock out the connecting pin shaft.
5. Use lifting equipment to slowly remove the platform.

3.1.4 Platform Swing Motor

1. Remove the platform.
2. Disconnect and plug the oil port on the rotary motor valve of the platform, and mark and paste it.
3. Remove the mounting bolts of the platform valve table. Put the valve stand aside.
4. Remove the central bolt and disassemble the platform mounting weldment from the platform rotating body.

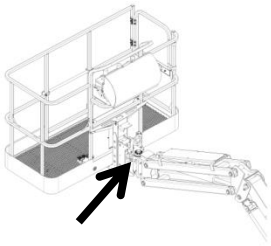


FIG. 3-2

5. Remove the fastening bolts from the connecting pin shaft at the end of the piston rod of the platform leveling cylinder and the connecting pin shaft of the platform rotating body.
6. Use a brass hammer to remove the two pin shafts and remove the platform rotating body from the machine.

3.1.5 Fly Jib Assembly

NOTICE

When removing the rubber hose and pipe joint, the O-ring at the end of the rubber hose or pipe joint must be removed and marked at the same time.

⚠WARNING

Please wear goggles when hitting the brass rod with a mallet.

1. Remove the platform and the platform swing motor.

2. Level the main boom with the ground, and lift the boom assembly with suitable lifting equipment.

3. Remove the pin of the leveling cylinder pin shaft. Remove the cylinder pin from the boom with a suitable copper punch and hammer, r.

4. Remove the pin on the connecting pin shaft of the flying arm. Using a suitable copper punch and hammer, remove the pivot pin from the boom assembly.

5. Separate the boom assembly from the main boom with suitable lifting equipment.

6. Remove the pin shaft from the boom shaft with a suitable copper punch and hammer.

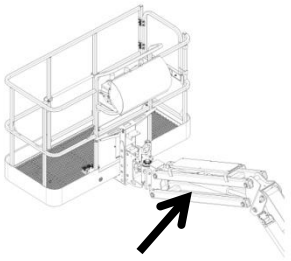


FIG. 3-3

3.1.6 Drag Chain Assembly

Drag chain and main boom guide rail are used to protect cables and rubber hoses in motion. The drag chain can be repaired without removing cables and hoses. It is necessary to remove the drag chain when performing an overhaul.

1. Disassemble the fixing bolts of the drag chain guide rail and remove the guide rail from the machine.

2. Remove the protective roll sleeve from the wiring harness of drag chain guide rail pipe at the end of the

platform.

NOTICE

Perform this operation when the main boom is retracted.

3. Disconnect and plug all hydraulic hoses at inlet and outlet from the drag chain guide rail of main boom to the platform drag chain.

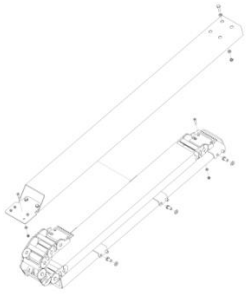


FIG. 3-4

4. Pull out the hydraulic hose from the drag chain guide rail.

5. Place supports on the drag chain and drag chain guide bracket.

6. Bind guide rails, wooden supports and drag chains.

7. Bind two drag chain components.

8. Lock both ends of the drag chain with the crane hook, carefully lift the drag chain and place it on a support with sufficient capacity.

3.1.7 Main Boom Assembly

1. Remove the platform.

2. Remove the platform swing motor.

3. Remove the fly jib assembly.

4. Remove the drag chain.

⚠WARNING

Before the disassembly of main boom assembly and luffing cylinder, following operations should be performed.

(1) Rotate the boom to be parallel to the travel direction of the chassis.

(2) A solid and reliable rigid support should be

used to hold the counterweight.

5. Raise the main boom about 1.2m.

NOTICE

When removing the rubber hose and pipe joint, the O-ring at the end of the rubber hose or pipe joint must be removed and marked at the same time.

6. Tie the end of the piston rod of the luffing cylinder of the main boom with the crane lifting strap.

7. Tie the tail of the main boom with a crane of more than 2 tons.

8. Place supporting wood blocks under the luffing right cylinder of the main boom.

9. Remove the fixed pin of the pin shaft connecting the main boom luffing cylinder and the main boom.

10. Lift the main boom with the crane until the pin shaft connected between the luffing cylinder and the boom can be removed.

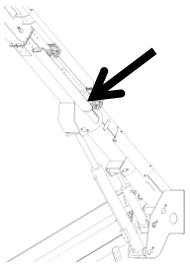


FIG. 3-5

11. Carefully lower the luffing cylinder and place it on the support block.

12. Slowly lower the main boom to the horizontal position.

13. Use another crane with more than 2 tons to tie the tail of the boom as a support, but do not give any lifting force.

14. Remove the fixed pin of the pin shaft connecting between the turntable and the boom.

15. Use soft materials to remove the pin shaft connecting the turntable and the boom.

⚠ CAUTION

Please wear goggles when hitting the brass rod with a mallet.

16. Carefully remove the boom from the machine and place it on a support frame that can support it.

3.1.8 Telescopic Boom Assembly

1. Remove the platform.
2. Remove the platform swing motor.
3. Remove the fly jib assembly.
4. Remove the drag chain.
5. Remove the main boom assembly.
6. Disassemble the fixed shaft of the telescopic cylinder at the boom head.
7. Remove the dust brush at the end of the boom frame.
8. Remove the cotter pins and sliders on the upper surface and both sides of boom frame.
9. Pull out the telescopic boom together with the telescopic cylinder of the main boom from the end of the basic boom, pay attention to prevent the telescopic cylinder from rotating, and place it on a suitable support.
10. Remove the fixed shaft of the telescopic cylinder piston rod and the telescopic arm, and pull the telescopic cylinder out of the tail of the telescopic arm.
11. Place the telescopic cylinder on a suitable support.

3.1.9 Tower Arm Assembly

⚠WARNING

Please wear goggles when hitting the brass rod with a mallet.

NOTICE

When removing the rubber hose and pipe joint, the O-ring at the end of the rubber hose or pipe joint must be removed and marked at the same time.

1. Remove the platform.
2. Remove the platform swing motor.
3. Remove the boom assembly
4. Remove the drag chain.
5. Remove the main boom assembly.

6. Support the folding arm head, leveling cylinder and main luffing cylinder with lifting equipment.

7. Remove the pin shaft and inserted pin between the piston rod of the main luffing cylinder and the upper connecting frame, and that between the leveling cylinder and the connecting frame.

8. Lift the main luffing cylinder and leveling cylinder away with lifting equipment.

9. Remove the pin shaft and bolt of the tower arm and the upper connecting frame, fold down the upper connecting frame, and lift it away, and place in a fixed position.

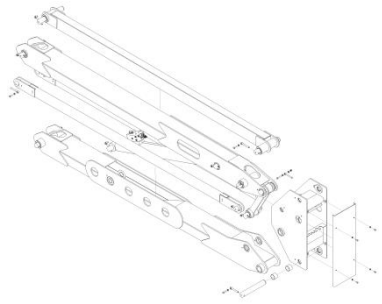


FIG. 3-6

10. Support the lower luffing cylinder, and remove the fixed shaft and bolt of tower arm and lower luffing cylinder.

11. Remove the fixing pin and bolt between the tower arm and the lower connecting frame, and lift the upper tower arm and connecting rod away from the boom frame assembly.

12. Support the head of the lower tower arm, remove the fixed shaft and bolt of the lower luffing cylinder and the lower connecting frame, and lift the lower luffing cylinder away from the boom assembly.

注 意

Tire nuts should be tightened after initial use and each disassemble of tires. Check and adjust the torque every three months or 150 hours.

13. Remove the fixed shaft and bolt between the lower tower arm and the lower connecting frame, lift the lower connecting frame away from the turntable and place it in a fixed position.

14. Remove the fixed shaft pin between the lower tower arm and the turntable, lift the lower tower arm away from the turntable and place it in a fixed position.

3.2 COMPONENTS OF CHASSIS AND TURNTABLE

3.2.1 Tires and Rims

It is recommended to use tires with the same size, grade and brand as the original tires of the machine for replacement, please refer to the machine parts manual for the tire part number of a specific machine model. If the tire is not recommended for replacement, the replaced tire shall have following characteristics:

⚠WARNING

The tires and rims on the machine are strictly designed and selected according to the requirements of the overall performance and load stability of the machine, so its model and specification, rim width, installation center surface, diameter, etc. must not be changed, otherwise it will cause serious danger of operation instability.

1. The grade / rated load and size are equal to or better than the original tires.
2. The tread grounding width is equal to or better than the original tire.
3. The wheel diameter, width and compensation size are equal to the original tires.

4. The tire manufacturer allows such applications (including application scope, application occasion, maximum speed, maximum tire load, etc.).
5. Due to the size difference between tires of different brands, two tires on the same axle should be the same brand.

The tightening of nuts should be carried out in steps. Refer to the recommended torque in the table below and tighten the nuts in the recommended sequence.

Table 3-1

Initial time	2nd time	3rd time
150Nm （110ft-lb）	250Nm （185ft-lb）	300Nm （221ft-lb）

3.2.2 Gear Box and Travel Motor

Gear box and travel motor not only drive the machine but also fix the rear wheel. Therefore, before disassembling the travel gear box and motor, fix the machine on a suitable rack or place a jack with sufficient capacity under the chassis platform.

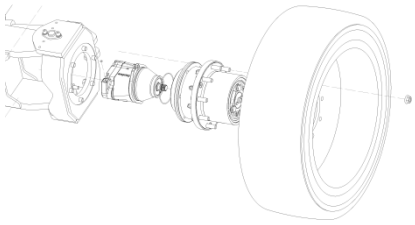


FIG. 3-7

Disassembly of Gear Box and Travel Motor

1. Place the machine on a firm and level ground.
2. Place a jack with sufficient capacity on the side to be removed under the chassis of the machine. Lift the jack to let wheels away from the ground.
3. Remove the bolts and washers used to fix the wheel to the gear box, and remove the wheels with suitable lifting equipment.
4. Mark, disconnect and plug the hydraulic pipeline connected to the travel motor.
5. Disassemble the fixed bolt and washer on the flange of travel gear box and outriggers, remove the flange and travel gear box, and lift them away from the chassis.
6. Remove the mounting flange of the motor on the travel gear box, pay attention to not damage the O-ring.
7. Remove the fixed bolts between the flange and the travel gear box.
8. Remove the fixed bolts between the flange and the travel motor.

Assembly of Gear Box and Travel Motor

1. Support the outriggers with lifting equipment which has sufficient capacity.
2. Install the travel motor and tighten the bolts diagonally with a torque wrench.
3. Align the brake oil port of gear box with the bracket notch.
4. Fit the washer plane with the mounting surface, coat the bolts with thread sealant, and install them one by one.
5. Tighten the bolts with a torque wrench.
6. After installation, fill an appropriate amount of gear oil immediately.
7. Clean the mounting surface, lift the motor, and align the position of gear box: the motor spline shaft engages with the internal teeth of the gear box, slowly rotate the motor housing, and align the motor mounting groove with the mounting screws of the gear box.
8. Connect the hydraulic hose.
9. Install the wheel.

3.2.3 Steering Mechanism

Steering mechanism is mainly composed of steering cylinder, steering connecting rod and pin shaft. The

extension or retraction of steering cylinder drives the steering of the chassis. When the machine travels in a straight line, travelling track of left and right wheels coincide with that of the rear wheel forming a straight line. When the machine is unable to work in a straight line during operation, the steering motion of steering cylinder should be checked for coordination.

1. Disassemble the cotter pin and shaft assembly at the two ends of connecting rod.
2. Lift or support the steering cylinder with straps or support tools, disassemble the mounting bolt of steering cylinder and remove the steering cylinder.

3.2.4 Turntable Swing Mechanism

Disassembly of slewing bearing

1. Install a suitable supporting sling to the tower arm and tension the sling. If possible, provide the tower arm with support or partition. After the hydraulic pipe is disconnected, the hydraulic pipe and port should be closed immediately to prevent pollutants from entering the system

2. Mark the hydraulic pipe at the fixed position on the top of rotary joint and disconnect it. Collect the residual liquid with a suitable container, and seal up hydraulic pipes and ports immediately.
3. Lift the turntable with appropriate equipment which is higher than the machine top.
4. Use appropriate tools to draw a line on the inner ring of the slewing bearing, that is, the bottom of the slewing bearing and the turntable, so as to align the slewing bearing during installation. Remove the bolts and washers that connect the turntable to the inner ring of the slewing bearing. These bolts are no longer used.
5. Lift the whole turntable assembly from the slewing bearing with lifting equipment. Ensure that the turntable, slewing bearing and components installed on the frame are not damaged.
6. Carefully place the turntable on a bracket with proper support.
7. Draw a line on the outer ring of the slewing bearing with appropriate tools, that is, the base and the frame, so as to align the bearings during installation. Remove the bolts and washers that connect the turntable to the outer ring of the slewing bearing. These bolts are no longer used. Use a suitable lifting device to remove the slewing bearing from the frame, and then move the slewing bearing to a properly supported clean work area.
8. Remove the two bolts fixing the slewing bearing on the base, and separate the two parts for inspection.

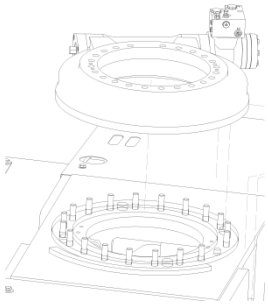


FIG. 3-8

Installation of Slewing Bearing

1. Clean the parts after maintenance. Clean the outside of the mounting surface with cleaning fluid (such as diesel, gasoline, etc.), and pay attention that the cleaning fluid cannot damage the performance of the rubber seal.

2. Install the slewing bearing on the base with two screws, so that the oil plug of the slewing bearing depends on the gear as much as possible according to the allowable range of the bolt type. Do not tighten the bolts.

⚠ DANGER

Only work under the folded boom with a safe support of tower arm or enough support and/or partition of upper lifting sling.

3. Align the high point (blue) of the slewing bearing with the center tooth of the worm gear.

4. Apply high-temperature grease on the slewing bearing and the teeth of worm gear. The oil cup is located on the inner wall of the slewing bearing.

5. Install the slewing bearing on the frame with a suitable lifting device, making the soft spot (red) at 90 °to the load shaft. If the slewing bearing is reused, ensure that the scribed line of the outer ring of the slewing bearing is aligned with the scribed mark on the frame.

6. Apply a layer of thread locking glue on the new bolt, and install the bolt and washer through the frame and the outer ring of the slewing bearing.

7. The pre-tightening bolts and washers should be tightened crosswise; Tighten all bolts diagonally to 30% tightening torque, then repeat diagonally to 50% tightening torque, and finally diagonally to 100% tightening torque.

8. After the bolt is tightened, please mark the bolt head and its connection, so as to check whether the bolt is loose afterwards. Finally, remove the lifting device from the bearing.

NOTICE

If compressed air or electric socket wrench is used to tighten the bearing connecting bolts, check the torque setting of the tool before use.

9. Place the turntable assembly above the frame. Carefully lower the turntable onto the slewing bearing. Ensure that the marking on the inner ring of the slewing bearing is aligned with the marking on the turntable. If a new slewing bearing is used, make sure that the filler plug joint is 90 °from the center line of the turntable.

10. Apply a layer of thread locking glue on the new bolt and install it through the inner ring of the turntable and slewing bearing.

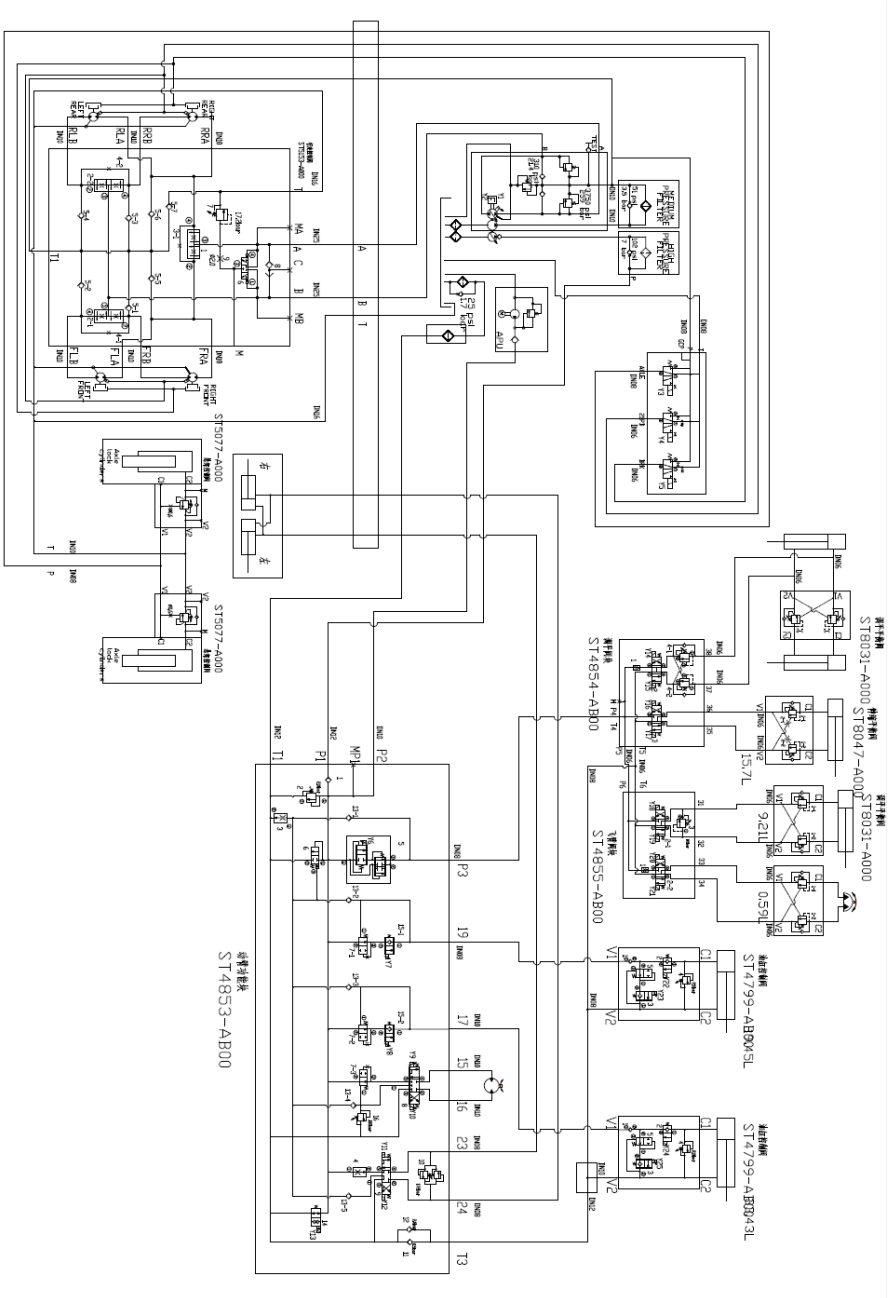
11. Tighten all bolts diagonally to 30% tightening torque, then repeat diagonally to 50% tightening torque, and finally diagonally to 100% tightening torque.

12. Disassemble the lifting equipment.

13. Pass the hydraulic pipeline through the center of the turntable and frame, and connect it according to the marks before disassembly.

14. Take all applicable safety precautions, start the hydraulic system, and check whether the slewing mechanism operates safely and normally.

3.3 HYDRAULIC SYSTEM



NOTICE

The correct use and maintenance about battery from the battery manufacturer should be read and followed. The battery contains sulfuric acid, and it generates the explosive mixture of hydrogen and oxygen. Protective glasses and

clothes should be put on when using it. All the instructions about the safety, maintenance and installation of battery from the manufacturer should be abided with strictly.

3.4 ELECTRICAL SYSTEM

This machine adopts maintenance-free lead-acid batteries, and the requirements for its use and maintenance is as below:

1. Preparation

(1)Operators should wear necessary safety devices, such as insulation gloves and safety helmet, and prepare a universal meter before checking failures.

(2) Check the battery for transformation and the breakage of positive and negative wiring terminal.

(3) Check and confirm faults condition and analysis causes.

2. Charging

(1) Don't use external charger.

(2) Charge the battery with the correct AC input voltage as indicated on the operation sign.

(3) Make sure that the battery is connected before charging.

(4)Connect the battery charger onto the grounded AC circuit.

(5) Charge the battery in time after using.

3. Maintenance

(1)Take proper protective measurements for hands and face, wipe off the top and sides of the battery.

(2)Don't flush or spray the battery with water hoses.

(3)Regularly check cables and fixed nuts.

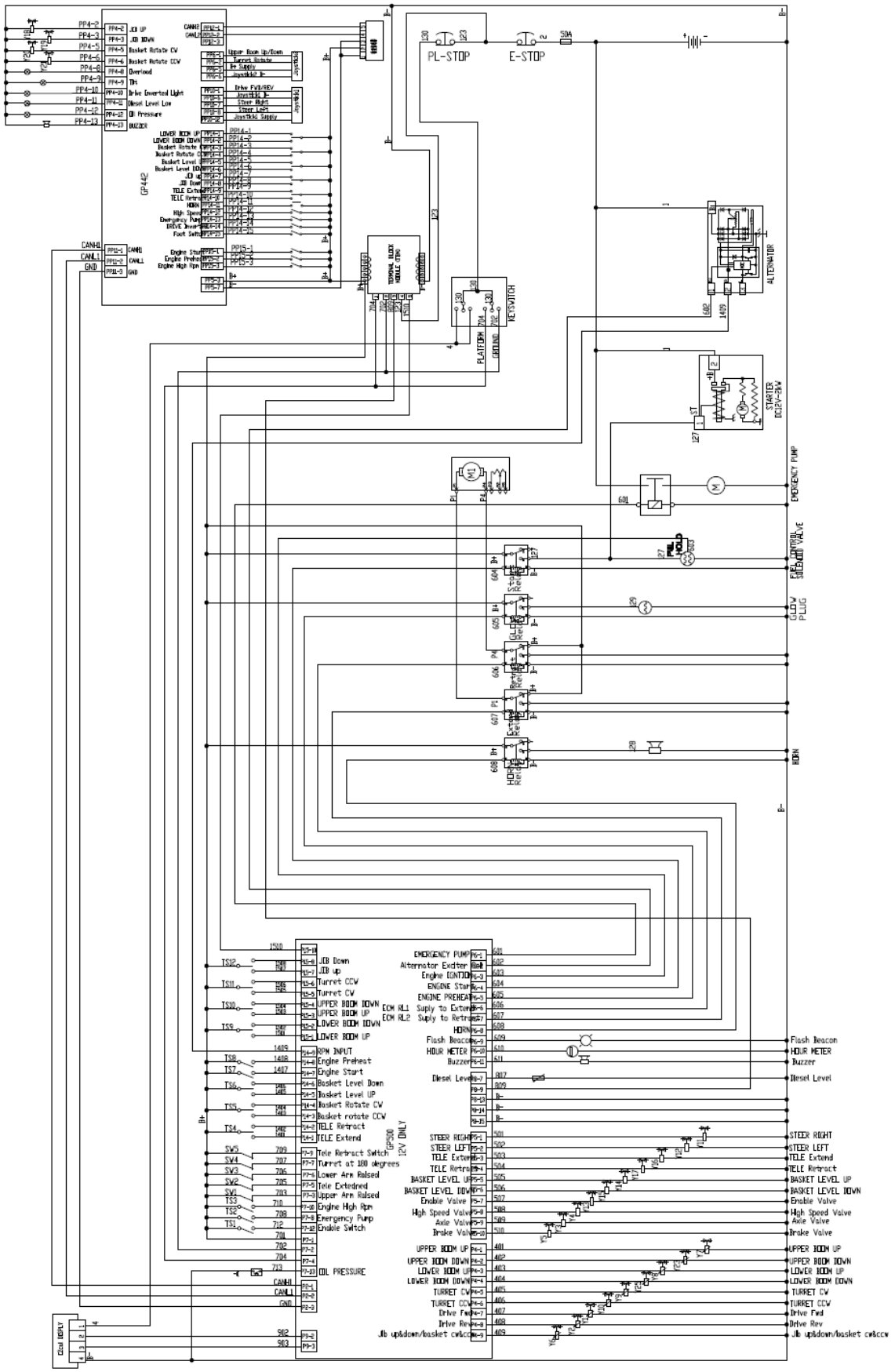
(4) Don't let the battery is discharged, otherwise its service life will be shortened.

4. Notes

(1)There is the risk of high pressure, please don't touch noninsulated terminal or the connector.

(2)Battery terminal and its accessories contain plumbum, please wash hands after dealing with that.

Electrical Schematic


PL-STOP
E-STOP
50A
ALTERNATOR
KEYSWITCH
STARTER DC12V-2KW
EMERGENCY PUMP
FUEL CONTROL SOLENOID VALVE
GLOW PLUG
HORN
GP442
GP500 12V ONLY
JOB Down
JOB up
Turret CCW
Turret CW
UPPER BOOM DOWN
UPPER BOOM UP
LOWER BOOM DOWN
LOWER BOOM UP
RPM INPUT
Engine Preheat
Engine Start
Basket Level Down
Basket Level UP
Basket Rotate CW
Basket rotate CCW
TELE Retract
TELE Extend
Tele Retract Switch
Turret at 180 degrees
Lower Arm Raised
Tele Extended
Upper Arm Raised
Engine High Rpm
Emergency Pump
Enable Switch
OIL PRESSURE
EMERGENCY PUMP
Alternator Exciter
Engine IGNTION
ENGINE Start
ENGINE PREHEAT
Suply to Extend
Suply to Retract
HORN
Flash Beacon
HOUR METER
Buzzer
Diesel Level
STEER RIGHT
STEER LEFT
TELE Extend
TELE Retract
BASKET LEVEL UP
BASKET LEVEL DOWN
Enable Valve
High Speed Valve
Axle Valve
Brake Valve
UPPER BOOM UP
UPPER BOOM DOWN
LOWER BOOM UP
LOWER BOOM DOWN
TURRET CW
TURRET CCW
Drive Fwd
Drive Rev
Jib up&down/basket cw&ccw

Appendix 1
Oil Specification

Closed internal chamber or system	Types and Classification	Viscosity	Range of Temperature in Working Environment			
			℉		℃	
			minimum temperature	maximum temperature	minimum temperature	maximum temperature
Engine crankcase	API CJ-4 CES-20078	SAE 5W-40	-13	115	-25	46
		SAE 15W-40	15	115	-9-	46
		SAE 10W-30	10	104	-12	40
		SAE 5W-30	-13	104	-25	40
		SAE 0W-30	-40	104	-40	40
Hydraulic system	46# anti-wear hydraulic oil					
Lubricating grease of boom frame and sliders	High-pressure lubricating grease	NLGI grade 000	-31	122	-35	50
Grease nozzle	High-pressure lubricating grease	NLGI 2 EP or NLGI 3 EP containing molybdenum additives	5	122	-15	50
Engine coolant	Ethylene glycol and water	50/50 mixed				
		60/40 mixed	environment with low temperature			
Fuel	EN590 ASTM D 975 1-D ASTM D 975 2-D （Max. B5 biodiesel）	Ultra-low sulphur （S≥500 mg/kg）				
Braking liquid	Mobil ATF-D / M		-40	115	-40	46

Appendix 2

Tightening Torque of Bolts (N.m)

	M6	M8	M10	M12	M14	M16	M18	M20	M22
Grade 8.8	10	20	45	78	130	190	260	370	510
Grade 10.9	12	30	65	100	160	265	350	500	680
Grade 12.9		34	72	124	200	304	413	620	800
Wrench size	11	13	16	18	22	24	27	30	32
	M24	M27	M30	M33	M36				
Grade 8.8	640	950	1300	1700	2300				
Grade 10.9	850	1220	1700	2200	2780				
Grade 12.9	1080	1540	2050						
Wrench size	36	41	46	50	55				

Appendix 3

Work Record for Preparation before Delivery

Preparation before Delivery		
Product Model		
Product ID		
Inspection Items	Normal	Damage or Stoppage
Pre-start Inspection	□	□
Function Inspection	□	□
Signature of Inspector		
Date		

Appendix 4

Report for Maintenance and Inspection

Maintenance Inspection Report			
Product Model			
Product ID			
Inspection Interval Ⅰ			
Item	Yes	No	Remark
Check manuals			
Check signs			
Check parts for damage, looseness or lost			
Check hydraulic oil level			
Check hydraulic oil leakage			
Check fuel oil			
Check the leakage of fuel tank			
Check engine oil level			
Check coolant level			
Check engine belt			
Check fuel filter			
Check cooling fan			
Check the air intake system of engine			
Check functions			
Check travel speed			
Check emergency lowering function			
Check tilt protection system			
Check weighing system			
Inspection Interval Ⅱ			
Item	Yes	No	Remark
Check and change the oil return filter of hydraulic tank			
Check wheel rim, tires and fasteners			

Check hydraulic oil			
Check cooling system			
Change fuel filter			
Item	Yes	No	Remark
Check air filter of hydraulic tank			
Change air filter of the engine			
Check Limit Switch			
Check engine exhaust system			
Check the fastener of platform swing cylinder			
Check the exhaust of floating system			
Check wires			
Check battery			
Inspection Interval Ⅲ			
Item	Yes	No	Remark
Change the element of fuel filter			
Change engine oil			
Change engine oil filter			
Inspection Interval Ⅳ			
Item	Yes	No	Remark
Change hydraulic oil			
Change suction filter of hydraulic tank			
Change coolant and hoses			
Change fuel hoses			
Check the sliding block of boom frame			
Lubricate swivel bearing and swing gear of the turntable			
Check key structural parts			

Appendix 5

4. MANUFACTURER INFORMATION

Company： SUNWARD INTELLIGENT EQUIPMENT CO., LTD.

Trade mark：

Add：Sunward Industrial Park, No.1335 Liangtang Road (E), Xingsha, Changsha, Hunan, China

Sales hotline：400-887-6230; Service hotline：400-887-8230

Maintenance point：Our office in various provinces and cities of China

Distributor information	
Distributor :	
Add:	
Tel:	
Fax:	
Email:	
Contact:	
Remark:	

Overseas subsidiary information			
No.	Subsidiary Name	Email	Address
1	SUNWARD INTELLIGENT (M) SDN. BHD.	mal2@sunward.cc	D-09-02 MENARA MITRALAND NO.13A,JALAN PJU 5/1.KOTA DAMANSARA,PJU

			5,47810,PETALING JAYA SELANGOR.
2	Công ty TNHH SUNWARD Việt Nam	vnm1@sunward.cc	lo 33, biet thu 1, ban dao linh dam, phuong hoanh liet, quan hoang mai, hanoi, vietnam
3	SUNWARD EUROPE HEAVY INDUSTRY NV	eu@sunward.cc	Nijverheidspark 3, 3580 Beringen, Belgium
4	PT.SUNWARD INDONESIA MACHINERY	ina8@sunward.cc	JLN. PROF.LATIMENTEN NO 28, GROGOL, JAKARTA BARAT -14440
5	SUNWARD USA CORP	usa@sunward.cc	2710 geesling rd,denton tx,76208
6	SUNWARD INTELLIGENT(CAMBODIA) CO.,LTD	cambodia@sunward.cc	No.18 ,St 110B,Ideal Garden Home City,Sangkat Teuk Thla,Khan Sen Sok,Phnom Penh,Cambodia
7	ООО "САНВАРД РУС" /SUNWARD RUS LLC /	rus@sunward.cc	123001, г. Москва, ул.Большая садовая, д.5, оф. 219А/ 123001, Moscow, Bolshaya Sadovaya Street, No. 5, office 219A/
8	SUNWARD KOREA CO., LTD.	kor@sunward.cc	경기도 용인시 기흥구 구갈로 64, 603 실 Zip: 16972 Add: Rm603, No.64 Gugal-ro, Giheung-gu, Yongin-si 16972, Gyeonggi-do, South Korea
9	SUNWARD LAOS TRADE CO., LTD.	laos@sunward,cc	Donnoune, xaythany District, vientiane Laos
10	SUNWARD EQUIPMENT(THAILAND) CO.,LTD	th@sunward.cc	Arwan Building,6th Floor,1339 Pracharat 1 Road,Wongsawang,Bangsue,Bangkok.
11	SUNWARD PHILIPPINES INC.	phl1@sunward.cc	218 D. AQUINO ST. BRGY. 62 WEST GRACE PARK CALOOCAN CITY
12	PT. SUNWARD INDONESIA EQUIPMENT	ina1@sunward.cc	
13	SUNWARD SOURTH AFRICA	africa2@sunward.cc	

Appendix