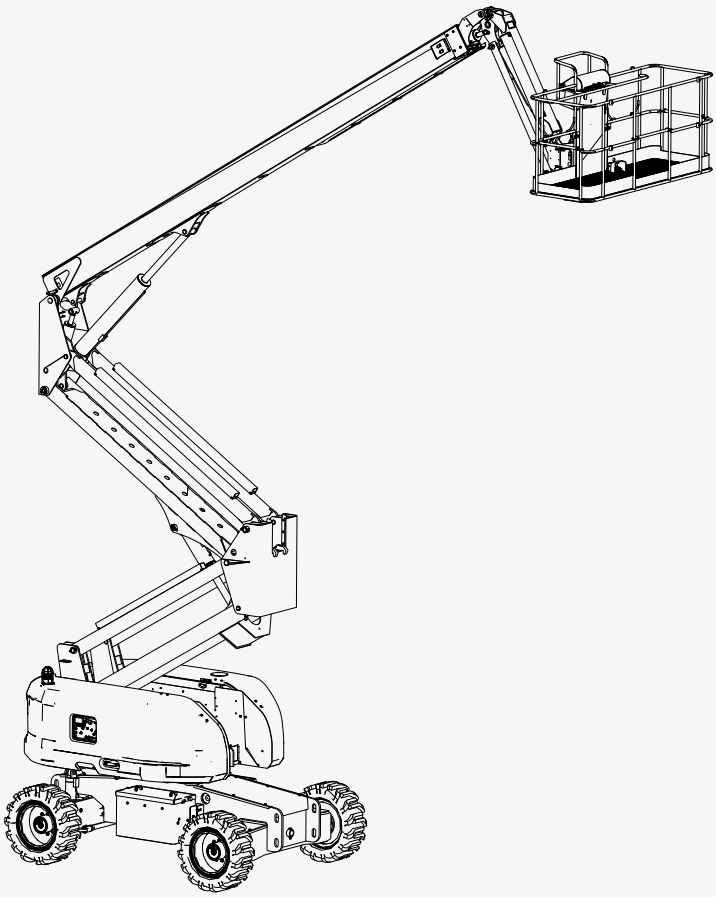
Part No.503009110002
Rev: B
Nov. 2022

Maintenance Manual

AB22EJ Plus/AB710EJ Plus



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SINOBOOM

⚠ WARNING

Operating, servicing and maintaining this vehicle or equipment can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle or equipment in a well-ventilated area and wear gloves or wash your hands frequently when servicing. For more information go to: www.P65warnings.ca.gov.
For disposal, please follow your nation regulation.

Manual revision history:

REV	DATE	DESCRIPTION	REMARK
A	Apr. 2022	Original issue	
B	Nov. 2022	Updated manual, implemented the BS EN 280-1:2022 standard requirements, revised the logic description of drive speed select switch, etc.	

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APPLICABLE RANGE

Use the following table to identify the specific serial number for models included in this manual. Check the model of your machine before consulting the manual, and then use the correct manual according to the serial number of the model. See the nameplate on your machine to identify the model and serial number. (See ***Decals/Nameplates Inspection*** of the Operation Manual for details.)

Model	Trade Identification		Serial No.
	Metric	Imperial	
AB22EJ Plus	AB22EJ Plus	AB710EJ Plus	From 0300900148 to present

NOTE:

- Product model is applied in product nameplate for distinction of products of different main parameters.
- Product trade identification is applied in marketing and machine decals for distinction of products of different main parameters, and can be classified as metric type and imperial type: metric trade identification is applicable to machines for countries/regions using metric system or as specially required by customers; imperial trade identification is applicable to the machines for countries/regions using imperial system or as specially required by customers.

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STATEMENTS

Hunan Sinoboom Intelligent Equipment Co., Ltd. (Hereinafter referred to as Sinoboom) will upload the latest product manual information to the website www.sinoboom.com as soon as possible. However, due to continuous product improvement, the information in this manual is subject to change without prior notice.

This manual covers the basic parts information of one or more products. Therefore, please use this manual according to your needs. If you find problems in the manual or have suggestions for improvement, feel free to share your feedback with Sinoboom, and we will address these issues as soon as possible.

Feel free to consult and download the *Operation Manual*, *Maintenance Manual* and *Parts Manual* of the products you need online at www.sinoboom.com.

Hunan Sinoboom Intelligent Equipment Co., Ltd. retains the right of final interpretation of the manual.

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TABLE OF CONTENTS

INTRODUCTION

Thank you for choosing and using the machinery of Hunan Sinoboom Intelligent Equipment Co., Ltd. Always read, understand and become familiar with the operation requirements of the machine and its associated safety procedures before operating, maintaining and repairing the machine. Operating the machine without becoming familiar with its specific operation requirements and safety procedures poses serious risks. Operators who follow safety rules and operate the machine carefully and effectively will prevent personal injury, property loss and accidents.

Use this machine only to transport tools to work locations and for performing tasks on the work platform. Operators must be competent and must obtain training to carefully use the machine and follow safety procedures. Only trained and authorized personnel may operate the machine.

This manual guides the operator in operating and using the machine. The operator is responsible for reading, understanding and implementing the operation and safety procedures in this manual and for following the manufacturer's instructions before beginning any work. Read, understand and follow all safety rules and operating instructions. The operator must also consider the machine's uses and limitations and the conditions at the jobsite before using this machine. Strictly following all safety requirements in this manual is critical.

Consider this manual a part of the machine, along with *Maintenance Manual* and *Parts Manual*, and always keep the manuals with the machine. The owner or administrator of the machine shall offer all manuals and other necessary information provided by the machine manufacturer regarding the daily inspection and maintenance to each of the renters. If the machine is sold, the owner or administrator must pass along the manuals and other necessary information to the purchaser. The owner or administrator of the machine shall also provide the manufacturer's maintenance information to the person responsible for maintaining the machine.

If you have any questions, contact Hunan Sinoboom Intelligent Equipment Co., Ltd..

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1 SAFETY

Read, understand and comply with the safety rules and regulations of your workplace and your government.

Before using the machine,ensure the operator is properly trained and qualified in safely operating the machine. The training includes but is not limited to：

- Warning and instruction decals on the machine
- Pre-operation inspection
- Any factors that may affect the machine stability
- Common hazards and countermeasures
- Jobsite inspection
- Functions of all controls and associated knowledge, including emergency control.
- Personal protection equipment that suits the task, workplace and environment.
- Safety operation
- Transporting the machine
- Measures against unauthorized use
- Operating instructions

Understand that as the operator you have the responsibility and right to shut down the machine in case of failure with the machine or other emergency at your workplace.

NOTICE

People suffering from heart disease, hypertension, epilepsy and other diseases and people who fear heights must never operate or use this machine. Also, people who have alcohol or drugs in their system, or experience excessive fatigue or depression, are prohibited from operating or using this machine.

SAFETY DEFINITIONS

This safety alert symbol appears with most safety statements. It means attention, become alert, your safety is involved! Please read and abide by the message that follows the safety alert symbol.

⚠ DANGER

Indicates a hazardous situation that, if not avoided, *will* result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation that, if not avoided, *could* result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation that, if not avoided, *could* result in minor or moderate injury.

NOTICE

Indicates a situation that can cause damage to the engine, personal property and/or the environment, or cause the equipment to operate improperly.

NOTE: Indicates a procedure, practice or condition that should be followed in order for the engine or component to function in the manner intended.

REPORTING ACCIDENTS

In case of any accident involving the machinery of Hunan Sinoboom Intelligent Equipment Co., Ltd., notify Hunan Sinoboom Intelligent Equipment Co., Ltd. Immediately, even if no personal injury or property damage occurs during the accident. Contact Hunan Sinoboom Intelligent Equipment Co., Ltd. by telephone and provide all necessary details. Failure to notify the manufacturer within 48 hours of the incident involving the machinery of Hunan Sinoboom Intelligent Equipment Co., Ltd. may void the product's warranty.

NOTICE

Thoroughly inspect the machine and all its functions after any accident, being sure to test first from the ground controller and then from the platform controller. Ensure the machine's lifting height does not exceed 3 m(9.8 ft) until all damage has been repaired and all controllers operate properly.

ELECTROCUTION HAZARDS

NOTE: This machine is not insulated and does not have an electric shock protection function.

All operators and managers shall comply with national or local regulations regarding the minimum safe distance of live conductors above the ground. In the absence of such requirements, operators and managers should follow the minimum safety distance requirements in ***Table 1-1 Minimum Safe Distance, page 1-2***.

⚠ WARNING

ELECTRICAL SHOCK HAZARDS

- **Always maintain a safe distance from power lines and electrical equipment in accordance with applicable government regulations and see *Table 1-1 Minimum Safe Distance, page 1-2*.**
- **Consider platform and boom movement, wire swinging or drooping, beware of strong winds or gusts, and do not operate the machine when there is lightning or heavy rain.**
- **If the machine comes into contact with live wires, keep away from the machine. Personnel on the ground or on the platform must not touch or operate the machine until the power is switched off.**
- **Do not use the machine as a ground wire during welding and polishing operations.**

Table 1-1 Minimum Safe Distance

Voltage (Phase to Phase, kV)	Minimum Safe Distance (m/ft)
0-50	3.05 (10)
50-200	4.60 (15)
200-350	6.10 (20)
350 -500	7.62 (25)
500 -750	10.67 (35)
750 -1000	13.725 (45)

TIPPING HAZARD AND RATED LOAD

Maximum rated load bearing capacity of the platform:

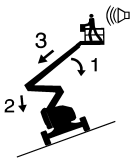
Table 1-2

AB22EJ Plus	
Metric	230kg (unrestricted/2 persons & tools)
	340kg (restricted/3 persons & tools)
	454kg (restricted/3 persons & tools)
Imperial	507 lb (unrestricted/2 persons & tools)
	750 lb (restricted/3 persons & tools)
	1000 lb (restricted/3 persons & tools)

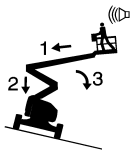
⚠ WARNING

TIPPING HAZARD

- **Personnel, equipment and materials on the platform shall not exceed the maximum load capacity.**
- **Only raise or extend the boom when the machine is on solid, level ground.**
- **Select only low speed when driving the machine on a slope.**
- **Do not use the tilt alarm as a level indicator. The tilt alarm on the platform will sound only if the machine is heavily tilted.**



- **If the tilt alarm sounds when the machine drives up a slope, please lower the boom per the following procedure and move the machine onto firm level ground. Make sure not to rotate the boom when lowering it.**



1. **Lower the main boom;**
2. **Lower the articulated boom;**
3. **Retract the telescopic boom.**

- **If the tilt alarm sounds when the machine drives down a slope, please lower the boom per the following procedure and move the machine onto firm level ground. Make sure not to rotate the boom when lowering it.**

1. **Retract the boom;**
2. **Lower the articulated boom;**
3. **Lower the main boom.**

- **Do not drive the machine faster than 1.1km/h (0.68mph) when the platform is raised.**
- **When the platform is raised, the machine cannot be driven on uneven terrain, unstable surfaces or in other dangerous conditions.**
- **Do not operate the machine in strong or gusty wind, and do not increase the surface area of the platform or load. Increasing the area exposed to the wind will reduce the stability of the machine.**
- **When the machine is driven on uneven ground, gravel or other uneven surfaces, or near holes**

⚠ WARNING

TIPPING HAZARD

and steep slopes, maintain a minimum distance of 0.6m (2ft) and reduce the speed.

- **When on the platform, do not push and pull objects outside of it. The maximum lateral force allowed is 400 N (90 lbf).**
- **Tow the machine only from the tie-down/lifting points on the chassis.**
- **Never use the boom or platform to stabilize or support any objects outside of the machine.**
- **Do not change any machine parts that may affect safety and stability.**
- **Do not replace key parts that affect machine stability with parts of different weights or specifications.**
- **Do not modify or change moving aerial platforms without the manufacturer's prior written permission.**
- **On the platform, do not attach an additional device for placing tools or other materials to the guardrail. This will increase the platform weight, surface area and load.**
- **Do not place or fasten any overhanging load on or to any part of this machine.**
- **Do not place ladders or scaffolding on the platform or against any parts of the machine.**
- **Do not operate the machine on a moving or active surface or on a vehicle. Ensure all tires are in good condition, the slotted nuts tightened and the cotter pins complete.**
- **Do not use any battery that weighs less than the original one (375kg [827 lb]) or the original lithium battery (155kg [342 lb]), and do not remove or modify the counterweight or other parts in the battery box. The battery not only provides power, but also serves as a counterweight. The battery is vital to maintaining the stability of the machine.**

⚠ WARNING

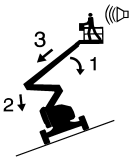
TIPPING HAZARD

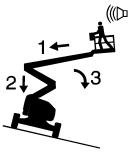
- **Do not use the platform or boom assembly to push other machines or objects.**
- **Do not allow the platform or boom assembly touch nearby structures.**
- **Do not tie off the platform with rope or other binding materials to the nearby structures.**
- **Do not put any load outside the platform.**
- **When the platform is caught or stuck or when other objects in the vicinity impede its normal movement, do not use the platform controller to lower the platform. If you intend to lower the platform with the ground controller, you must operate it only after all personnel have left the platform.**

WORK ENVIRONMENT HAZARDS

⚠ WARNING

UNSAFE JOBSITE HAZARDS





- **Do not operate the machine on surfaces, edges or potholes that cannot bear the weight of the machine. Raise or extend the boom only when the machine is on firm, flat ground.**
- **Never travel on uneven terrain or unstable surfaces or in other dangerous conditions when the platform is raised.**
- **When the machine is on rough ground with gravel or other uneven surfaces, or near holes and steep slopes, maintain a minimum distance of 0.6m (2ft) and reduce the speed.**
- **Do not use the tilt alarm as a level indicator. The tilt alarm on the platform will sound only when the machine is heavily tilted.**
- **If the tilt alarm sounds when the machine drives up a slope, lower the boom as per the following procedures and move the machine onto firm level ground. Make sure not to rotate the boom while lowering the boom.**
  1. **Lower the main boom;**
  2. **Lower the articulated boom;**
  3. **Retract the telescopic boom.**
- **If the tilt alarm sounds when the machine drives down a slope, lower the boom as per the following procedures and move the machine onto firm level ground. Make sure not to rotate the boom while lowering the boom.**
  1. **Retract the telescopic boom;**
  2. **Lower the articulated boom;**
  3. **Lower the main boom.**
- **The drive speed should not exceed 1.1 km/h (0.68 mph) when the platform is raised.**
- **If the machine can be used outdoors, never operate it in**

⚠ WARNING

UNSAFE JOBSITE HAZARDS

strong or gusty wind. Do not lift the platform when the wind speed exceeds 12.5 m/s (28 mph). If the wind speed exceeds 12.5 m/s (28 mph) after the platform is raised, lower the platform and stop operating the machine.

- **Do not use any device that may increase the wind load on the machine.**
- **Do not drive or lift the machine on slopes, steps or vaulted surfaces that exceed the maximum gradeability of the machine.**

⚠ WARNING

UNSAFE JOBSITE HAZARDS

- **Do not lift the machine and drive the machine sideways on slopes greater than 5°.**

Before or during the operation of machine, check the jobsite for possible hazards, and pay attention to environmental restrictions, including flammable and explosive gases/dust. If the machine is to be used in any special workplace or by any special work method other than those specified by **Hunan Sinoboom Intelligent Equipment Co., Ltd.**, the manufacturer's approval and guidance should be obtained first.

Table 1-3

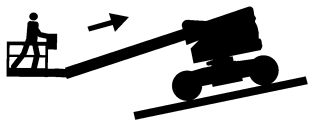
BEAUFORT SCALE	METERS/ SECOND	MILE/ HOUR	DESCRIPTI-ON	GROUND CONDITION
0	0 ~ 0.2	0 ~ 0.5	Calm	Calm. Smoke rises vertically.
1	0.3 ~ 1.5	1 ~ 3	Light air	Wind motion visible in smoke.
2	1.6 ~ 3.3	4 ~ 7	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	3.4 ~ 5.4	8 ~ 12	Gentle breeze	Leaves and smaller twigs in constant motion.
4	5.5 ~ 7.9	13 ~ 18	Moderate breeze	Dust and loose paper rise. Small branches begin to move.
5	8.0 ~ 10.7	19 ~ 24	Fresh breeze	Smaller trees sway.
6	10.8 ~ 13.8	25 ~ 31	Strong breeze	Large branches in motion. Flags waving near horizontal. Umbrella use becomes difficult.
7	13.9 ~ 17.1	32 ~ 38	Near gale/ moderate gale	Whole trees in motion. Effort needed to walk against the wind.
8	17.2 ~ 20.7	39 ~ 46	Fresh gale	Twigs broken from trees. Cars veer on road.
9	20.8 ~ 24.4	47 ~ 54	Strong gale	Light structure damage.

NOTICE

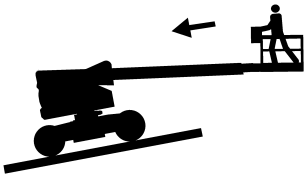
Maximum gradeability is applicable for machines with platform retracted. The maximum climbing angle of the machine: 40%/21°.

Gradeability refers to the maximum allowable tilt angle of the machine when it is on solid ground and the platform is only carrying one person. As the weight of the machine's platform increases, the machine's climbing capacity will be decreased.

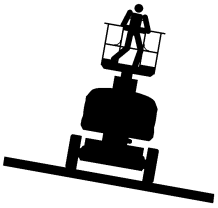
GRADEABILITY:



Uphill: 40%/21°



Downhill: 30%/16.5°



Sideslope: 25%/14°

UNSAFE OPERATION HAZARDS

At a minimum, operators must operate and maintain the machine as stated in the *Operation Manual* and the *Maintenance Manual* in addition to following more stringent industry regulations and workplace rules.

Do not use the machine in the following situations:

- Unrelated personnel/equipment is present in the working envelope of the machine.
- Use as a crane (except the custom-made ones with such function).
- Use on the truck, trailer, tracked vehicle, ship, scaffold and the like without written consent by the manufacturer or qualified professionals.
- Improper securing of the machine to another object by just leaning, fastening or binding.
- Stunt or imprudent use of the machine.
- Overloaded or over-moment situation.
- Other prohibited conditions specified in the Operation Manual and the Maintenance Manual.

⚠ WARNING

UNSAFE OPERATION HAZARDS

- **Do not push/pull any object outside the platform. The maximum lateral force allowed is 400N (90 lbf).**

- **Tow the machine only from the tie-down/lifting points on the chassis.**
- **Never use the boom or platform to stabilize or support any objects outside the machine.**
- **Do not modify any component that may affect the machine safety and stability.**
- **Do not replace key parts that affect machine stability with parts of different weights or specifications.**

- **Do not change or modify moving aerial work platforms without the manufacturer's written permission.**
- **On the platform, do not attach an additional device for placing tools or other materials to the guardrail. This will increase the platform weight, surface area and load.**
- **Do not put ladders or scaffolding on the platform or against any part of this machine.**

- **Do not use additional devices to increase the working height of the machine.**
- **Do not use the machine on any mobile or movable surface or vehicle. Ensure all tires are in good condition, the slotted nuts tightened and the cotter pins complete.**
- **Do not use a battery that weighs less than the original storage battery (375kg [827 lb] or the original lithium battery (155kg [342 lb], and do not remove or modify the counterweight or other parts inside the battery box. The battery not only provides power, but also serves as a counterweight. The battery is vital to maintaining the stability of the machine.**

⚠ WARNING

UNSAFE OPERATION HAZARDS

- **Do not place or attach any suspended load onto any part of the machine.**
- **Do not use the machine as a crane or hoist.**
- **Do not use the platform or boom to push the machine or other objects.**
- **Do not allow the platform or boom to touch nearby structures.**
- **Do not use rope or other binding materials to tie the platform or boom onto nearby structures.**
- **Do not put the load outside the platform.**
- **When the platform is caught or stuck or when other objects in the vicinity impede its normal movement, do not use the platform controller to lower the platform. If you intend to lower the platform with the ground controller, you must operate it only after all personnel have left the platform.**
- **When one or more of the machine's tires are off the ground, evacuate all personnel before attempting to stabilize the machine. Use a crane, forklift or other suitable equipment to stabilize the machine.**

FALL HAZARDS

At a minimum, operators must operate and maintain the machine as stated in the operation manual and in the maintenance manual in addition to following more stringent industry regulations and workplace rules.

⚠ WARNING

FALL HAZARDS

- **Each person on the platform must wear harnesses or use safety equipment consistent with government regulations. Fasten the cable to the fixed point of the platform. Never fasten the cable of more than one person to a fixed point on the platform.**
- **Do not sit, stand or crawl on the guardrails. When on the platform always remain standing on the platform floor.**
- **Do not enter or exit the platform through the boom.**
- **Keep the platform floor free of obstacles.**
- **Do not allow mud, oil stains, grease or other slippery substances reside on the footwear or platform floor.**
- **Do not enter or exit the platform unless the machine is fully in stowed position.**
- **Close the platform entrance door before operating the machine.**
- **Do not operate the machine if the handrails are not properly installed and the platform entry door is not closed.**

COLLISION HAZARDS

At a minimum, operators must operate and maintain the machine as stated in the *Operation Manual* and the *Maintenance Manual* in addition to following more stringent industry regulations and workplace rules.

⚠ WARNING

COLLISION HAZARDS

- **Pay attention to the field of sight and the presence of blind spots when moving or operating the machine.**
- **The non-staff must maintain a minimum of 1.8m (5.9ft) distance from the machine while it is travelling or swinging.**

- **When the work platform of a moving machine is approx. 2m (6.6ft) away from the obstructions, use the boom lifting/lowering function (rather than the driving function) to get close to the obstructions.**
- **Switch to the low speed gear before parking the machine that drives at high speed.**

- **Do not use the high speed gear when the machine is driving reverse or in restricted or enclosed work area.**
- **Check the work area to avoid ground and overhead obstructions or other possible risks.**
- **Be sure to exercise caution when using the platform controller and ground controller. Color-marked directional arrows show the function of travel, lift and steering.**
- **Users must comply with user, workplace and government rules regarding the use of personal protective equipment (hard hats, safety belts and gloves, etc.).**
- **Place the machine on level ground or in a secured position before releasing the brakes.**
- **Only lower the platform when there are no people or obstructions in the area beneath it.**
- **When the machine is conducting aerial work, warn the staff/non-staff not to work, stand or walk under the raised boom or platform.**
- **Limit the speed of travel according to ground conditions, crowding, gradients, the presence and location of personnel and any**

⚠ WARNING

COLLISION HAZARDS

other factors that may cause collisions.

- **Do not operate the machine on any crane or overhead traveling device unless the crane control is locked or precautions have been taken to prevent any potential collision.**
- **Try to prevent the machine from touching stationary objects (-buildings etc.) or mobile objects (-vehicles, cranes etc.).**
- **Never operate the machine dangerously or for fun.**

CRUSH HAZARDS

A potential crush hazard exists during movement of the machine. Always keep body parts and clothing a safe distance from the machine during machine operation.

⚠ WARNING

CRUSH HAZARDS

- **Do not place your hands and arms where they may become crushed or trapped.**
- **Do not work under the platform or the boom when the boom is not protected by a crane.**
- **Maintain good judgment and planning when using the controller on the ground to operate the machine. Maintain proper distance between operator, machine and fixed object.**

EXPLOSION AND FIRE HAZARDS

⚠ WARNING

EXPLOSION AND FIRE HAZARDS

- **Do not use the machine or charge the battery in hazardous or potentially flammable or explosive atmosphere.**
- **For the engine-powered machines, never add fuel while the engine is still running, and only add fuel when the place is well ventilated and free of flame, spark or any other hazards that may cause explosion.**
- **Never spray ether on the engine equipped with glow plug.**

DAMAGED MACHINE HAZARDS

NOTICE

To avoid machine damage, follow all operation and maintenance requirements in the Operation Manual and the Maintenance Manual.

⚠ WARNING

DAMAGED MACHINE HAZARDS

- **Do not use the machine if it is damaged or not in proper operating condition.**
- **Thoroughly inspect and test for all functions of the machine before use. Immediately stop and mark damaged or faulty machines and then contact the manufacturer.**
- **Ensure that all maintenance operations have been performed in accordance with the *Operation Manual* and the *Maintenance Manual*.**
- **Make sure all labels are in place and are legible.**
- **Ensure that the *Operation Manual* and *Maintenance Manual* are sound, easy to read and stored in the storage compartment on the platform.**

BODILY INJURY HAZARDS

Always follow all operation and maintenance requirements in the *Operation Manual* and the *Maintenance Manual*.

⚠ WARNING

UNSAFE OPERATION HAZARD

Do not operate the machine when there are oil spills/leaks. Oil spills or leaks in hydraulic fluids may penetrate and burn the skin.

NOTE: The operator must carry out maintenance during the pre-operation inspection only. During operation, keep the left and right doors of the chassis closed and locked. Only trained service personnel can open the left and right doors to repair the machine.

BATTERY HAZARDS

⚠ WARNING

FIRE AND EXPLOSION HAZARD

- **Batteries contain sulfuric acid and generate explosive mixtures of hydrogen and oxygen gases. Keep any device that may cause sparks or flames (including cigarettes/smoking materials) away from the battery to prevent explosion.**
- **Do not touch the battery terminals or cable clips with tools that may cause sparks.**

⚠ WARNING

BATTERY HAZARD

- **Be sure to read and follow the recommendations given by the battery manufacturer regarding how to correctly use and maintain the battery.**
- **Always wear protective glasses or goggles and protective clothing when working with batteries. Remove all rings, watches and other accessories.**

⚠ WARNING

CHEMICAL BURN HAZARD

Avoid battery acid from spilling or contacting with unprotected skin. Seek medical attention immediately if battery acid contacts skin.

⚠ WARNING

BATTERY HAZARD

- **The battery charger can only be connected to the grounded three-plug AC power socket. Ensure that the charger is in normal working state before charging.**
- **Please use the charger provided by the manufacturer to charge the battery.**
- **Ensure the place where the battery is charged is well ventilated and far away from sunlight, flame, spark or any other hazards that may cause explosion, and do not expose the battery to the water or rain.**
- **Only the properly trained personnel authorized by the workplace are allowed to remove the battery from the machine.**
- **Before replacing the battery, be sure to identify the appropriate number of personnel and the lifting method.**
- **During the assembling or disassembling process, never use the battery in a forcible manner, and never allow the battery to fall off.**
- **Never directly short-circuit the battery outputs with electrical cords.**
- **Should the battery acid spill out, use bicarbonate (baking soda) mixed with water to neutralize the acid.**
- **Never store the battery in water or humid atmosphere.**
- **Daily check the battery cable for damage, and replace any damaged parts before operating the machine.**

⚠ WARNING

LITHIUM BATTERY HAZARD

- **Only use the dedicated charger to charge the battery.**
- **Do not allow lens, needles or other sharp objects to contact with the battery, otherwise the battery membrane will easily get damaged.**
- **Do not immerse the battery into the sea or water for an extended period of time.**
- **Do not use the machine with the battery close to a heat source (- fire, heater, etc).**
- **Do not use the battery with the positive or negative terminals installed inversely.**
- **Do not directly connect the battery to a power outlet .**
- **Do not throw the battery into a fire or heater,**

NOTICE

After charging the battery, ensure that:

- *The battery cable connections are free of corrosion.*
- *The battery hold-down and cable connections are secured.*

Adding terminal protection and anti-corrosion sealants will help reduce corrosion of the battery terminals and cables.

HYDRAULIC HAZARDS

⚠ WARNING

BURN AND SPRAY HAZARDS

- **When the hydraulic system is hot, do not touch to avoid severe skin burn.**
- **After the machine shutdown, thoroughly clean the spilled hydraulic oil. Do not throw the oil on the ground. Once the maintenance and repair is complete, immediately clean any oil on the skin, Dispose of the used oil as per the governing laws and regulations.**
- **Do not use your hand to block the hydraulic leaks. If the leakage occurs, please first release the system pressure and maintain only after the hydraulic oil cools down. If any injury is caused by the spray of hydraulic oil, go to the doctor immediately, otherwise severe complication may develop.**

WELDING AND POLISHING REQUIREMENTS

Before welding, grinding and polishing operations, always ensure you read and understand all operation and maintenance requirements in the *Operation Manual* and the *Maintenance Manual*.

⚠ WARNING

WELDING HAZARDS

- **Comply with the welder manufacturer's recommendations for procedures concerning proper use of the welder.**
- **Welding leads or cables may only be connected after turning off the power unit.**
- **Carry out welding operations only after the welding cable has been correctly connected.**
- **Do not use the machine as a ground wire during welding operation.**
- **At all times, make sure that the power tools are completely stored in the working platform. Do not hang the power tools on the railing of the working platform or the work area outside the working platform, or hang the power tools directly by the wire.**

Before performing welding, grinding and polishing work, welders must seek permission of the responsible department at the workplace.

NOTICE

After using the machine, the power off switch must be disconnected.

AFTER USING THE MACHINE

1. Choose a safe parking location that is on sturdy, level ground and that is free of obstructions. Avoid areas with heavy traffic.
2. Lower the boom to stowed position.
3. Take off all loads from the platform.
4. Push in the emergency stop button at the platform controls to the OFF position.
5. Close the cover of platform controls to protect the control panel,handle and controller from hostile weather conditions.
6. Push in the emergency stop button at ground controls to the OFF position.
7. Turn the key switch at the ground controls to OFF position and remove the key to avoid unauthorized operation of the machine.
8. Turn off the main power switch.

2 SPECIFICATIONS

PERFORMANCE PARAMETERS

Table 2-1 AB22EJ Plus specifications

Items	AB22EJ Plus (Metric)	AB710EJ Plus (Imperial)
DIMENSION PARAMETERS		
Max platform height	21.6 m	70 ft 10 in
Max working height	23.6 m	77 ft 5 in
Max horizontal reach (230 kg, 340 kg, 454 kg)	13.4 m/11.9m/10.45m	44 ft/39 ft/34 ft 3 in
Max horizontal working envelope (230kg, 340kg, 454kg)	14.0 m/12.5m/11.05m	45 ft 11 in/41 ft/36 ft 3 in
Max up-and-over height	8.9m	29 ft 2 in
Overall length (stowed)	9.95m	32 ft 8 in
Overall length (transport)	7.73 m	25 ft 4 in
Overall width (stowed)	2.49 m	8 ft 2 in
Overall width (transport)	2.49 m	8 ft 2 in
Overall height (stowed)	2.68 m	8 ft 10 in
Overall height (transport)	2.95 m	9 ft 8 in
Wheelbase	2.49 m	8 ft 2 in
Ground clearance	0.39 m	1 ft 3 in
Tire size (spec/type)	355/55D625 (foam-filled) 36×14-20 (solid)	
Platform dimension (L×W×H)	2.44 m×0.91 m×1.1 m	8 ft×3 ft×3 ft 7 in
PERFORMANCE PARAMETERS		
Max platform capacity	230 kg (unrestricted)	507 lb (unrestricted)
	340 kg (restricted)	750 lb (restricted)
	454 kg (restricted)	1000 lb (restricted)
Allowable occupants on platform	2 persons (unrestricted)/3 persons (restricted)	
Turntable rotation/continuity	360°/continuous	
Platform rotation	180°	
Max drive speed (stowed)	4.8 km/h	3 mph
Max drive speed (raised)	1.1 km/h	0.68 mph

Items	AB22EJ Plus (Metric)	AB710EJ Plus (Imperial)
Drive mode (drive×steer)	4WD×2WS	
Gradeability	40%/21°	
Turntable tailswing	0.84 m	2 ft 9 in
Max allowable inclination	5°	
Turning radius (inside)	2.4 m	7 ft 10 in
Turning radius (outside)	5.55 m	18 ft 3 in
Max allowable side force	400 N	90 lbf
Max operating noise level	72 dB	
IP rating	IP65	
POWER PARAMETERS		
Hydraulic tank capacity	130 L	28.6 gal (UK)/34.3 gal (US)
Oil capacity of hydraulic tank	110 L	24.2 gal (UK)/29.1 gal (US)
Hydraulic system pressure	21 MPa	3046 psi
Battery (voltage, capacity)	48V/480 Ah (lead acid)/48V, 528Ah (lithium)	
System voltage	48 VDC	
Control voltage	12 VDC	
GROUND BEARING DATA		
Max tire load	6740 kg	14862 lb
Pressure against ground	675 kPa	98 psi
ENVIRONMENT REQUIREMENT		
Max allowable wind speed	12.5 m/s	28 mph
Max allowable altitude	1000 m	3280 ft
Allowable ambient temperature (- lead acid battery)	-10℃ ~ 40℃	14℉ ~ 104℉
Allowable ambient temperature (- lithium battery)	-20℃ ~ 40℃	-4℉ ~ 104℉
Max allowable RH	90%	
Storage environment	Stored at -20℃ to 50℃ (-4℉ to 122℉) in a well-ventilated environment with 90% relative humidity (20℃ [68℉]), and away from rain, sun, corrosive gases, inflammables and explosives.	
WEIGHT		

Items	AB22EJ Plus (Metric)	AB710EJ Plus (Imperial)
Gross weight (unladen)	10900 kg	24030 lb

Note:
a) The platform height plus the operator height (taken as 2m [6ft 7in]) is the working height.
b) The ground bearing data is approximate, without factoring different configurations, and should only be used in adequately safe conditions.
c) In different areas, hydraulic oil, engine oil, coolant, fuel and lubricant should be added in accordance with the environmental temperature.
d) In cold climates, auxiliary devices are needed to start the machine.
e) The loads of persons, accessories, tools and materials are factored into the rated platform capacity.
f) The total vibration value of the platform does not exceed 2.5m/s², and the maximum root-mean-square value of the weighted acceleration of the entire machine does not exceed 0.5m/s².
g) It is recommended not to use lead-acid batteries in environments below 0 °C, otherwise the battery capacity will decay rapidly and the battery life will be affected.

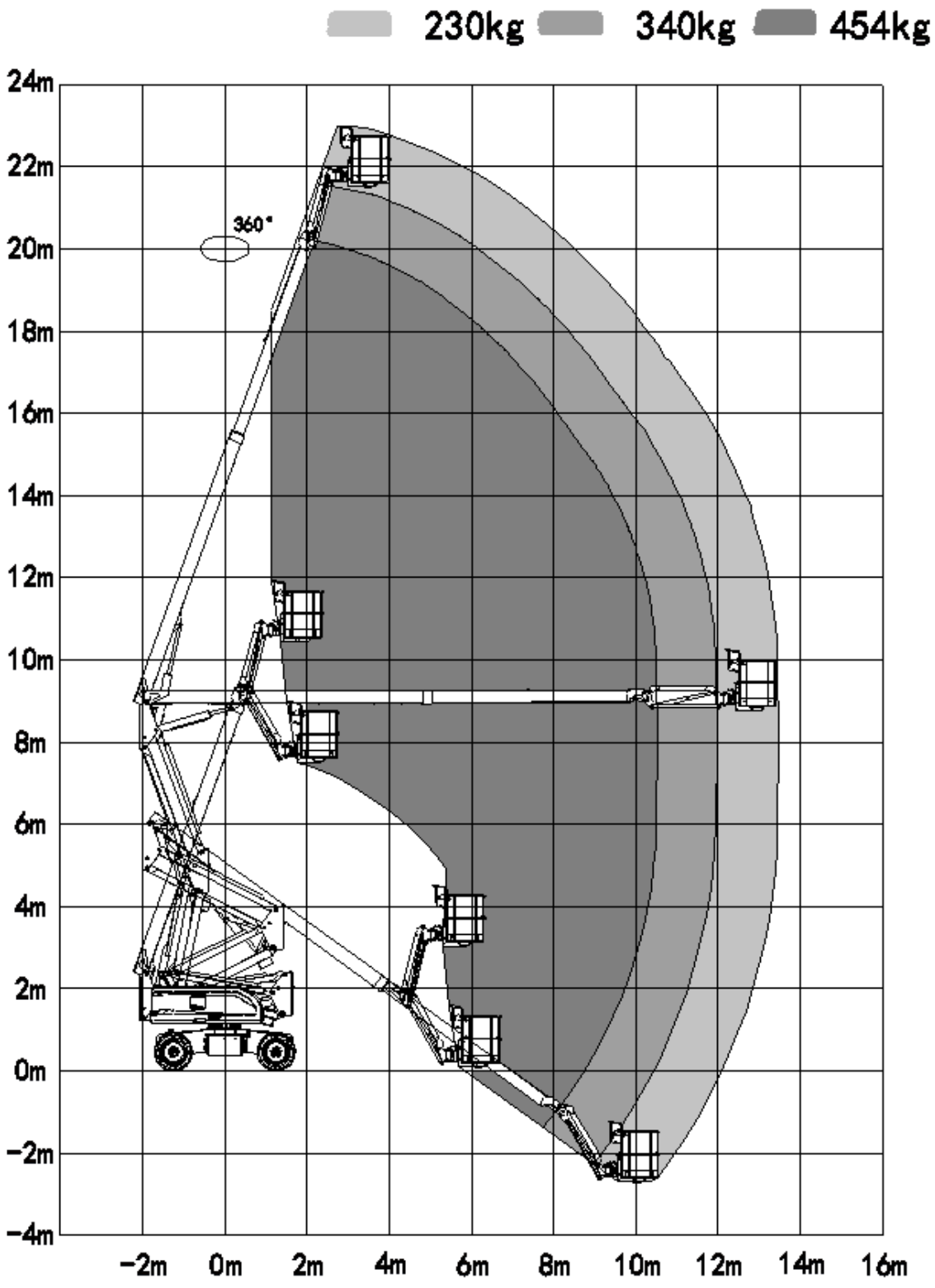


Figure 2-1 Chart of working envelope

MOTOR SPECIFICATIONS

Table 2-2 Hybrid motor

Power	15kW
Voltage	29V
Torque	34.9Nm (25.768 ft-lb)
RPM	2600rpm
Frequency	88.6Hz
Current	402A

Table 2-3 Drive motor

Power	1.5kW
Voltage	32V
RPM	4573rpm
Frequency	158.4Hz
Current	40A

SPEED OF FUNCTION OPERATIONS

Table 2-4

ITEM	VALUE
Main boom luffing up	65 ~ 75s
Main boom luffing down	60 ~ 70s
Articulated boom luffing up	42 ~ 50s
Articulated boom luffing down	46 ~ 54s
Turntable rotating (360°)-boom retracted	85 ~ 105s
Turntable rotating (360°)-boom extended	145 ~ 170s
Main boom extending	52 ~ 62s
Main boom retracting	38 ~ 46s
Platform rotating (180°)	18 ~ 22s
Platform leveling up	50 ~ 60s
Platform leveling down	40 ~ 50s
Jib up	32 ~ 38s
Jib down	22 ~ 28s
Max drive speed (30m)	S≤1.2m

a) The speed depends on the start and end point of the function operation rather than the controls/ switches.
b) The test results of drive speed vary with tires of different specifications.
c) All speed tests should be conducted from the platform controller, otherwise the test results will differ.
d) All tests should be conducted with the hydraulic system temperature between 50 ~ 60℃. If the hydraulic oil temperature is too low, the test results will be affected.

Test requirements:

Main boom luffing: With the articulated boom fully lowered and telescopic boom fully retracted, raise (from the lowest point to the maximum angle) and lower (from the maximum angle to the lowest point) the main boom twice respectively.

Articulated boom luffing: raise and lower the articulated boom twice respectively.

Turntable rotating: position the boom at the center and rotate the turntable for one turn. Repeat once.

Main boom extending/retracting: With the main boom horizontally positioned, fully extend the boom from the fully retracted position twice, and fully retract the boom from the fully extended position twice.

Platform rotating: With the platform horizontally positioned, rotate the platform from the far left to the far right twice, and rotate the platform from the far right to the far left twice.

Jib up/down: With the platform horizontally positioned and the jib fully lowered, raise and lower the jib twice respectively.

Drive: The test should be performed on a level surface. Set the machine to high drive speed mode, and push the handle to the maximum stroke to drive forward and backward for a distance of 30m twice, respectively.

WEIGHT OF MAJOR COMPONENTS

⚠ WARNING

UNSAFE OPERATION HAZARD

- **Do not move heavy components without mechanical assistance.**

⚠ WARNING

UNSAFE OPERATION HAZARD

- **Do not place heavy components upon instable surfaces.**

Table 2-5

Component	Metric (kg)	Imperial (lb)
Chassis assembly	4135	9117.7
Turntable assembly	3420	7541.1
Boom assembly	3328	7338.2
Lower articulated boom	357.2	787.6
Lower connector	377.9	833.3
Upper articulated boom	277.8	612.5
Upper connector	213.7	471.2
Upper linkage	62.2	137.2
Lower linkage	50.4	111.1
Linkage	15.0	33.1
Base boom	365.9	806.8
Telescopic boom	210.5	464.2
Jib boom	176.3	388.7
Work platform	186.6	411.5
Slewing mechanism	246.3	543.1
Turntable cover assembly	260.6	574.6
Telescopic cylinder	211.7	466.8
Main boom luffing cylinder	146.1	322.2
Articulated boom luffing cylinder	123.5	272.3
Upper leveling cylinder	38.4	84.7
Lower leveling cylinder	36.5	80.5
Jib boom cylinder	30.5	67.3
Hybrid motor	65.5	144.4
Drive reducer	38.3	84.5

Component	Metric (kg)	Imperial (lb)
Drive motor	39.0	86.0
Note: The weight of components may vary with different configurations selected.		

HYDRAULIC SYSTEM SPECIFICATIONS

Table 2-6

ITEM	SPECIFICATION
Hydraulic Oil	
Normal temperature region (0℃ ~ 40℃ [32℉ ~ 104℉])	L-HM46
Low temperature region (-25℃ ~ 25℃ [-13℉ ~ 77℉])	L-HV32
High-temperature region (> 40℃ [104℉])	L-HM68
Extremely low temperature region (< -30℃ [-22℉])	Special program to be determined
Hydraulic Pump	
Type	Open-circuit variable pump
Displacement	35 cc/r
Rated operating pressure	32 MPa (4640 psi)
Function Manifold	
Boom function valve pressure	24MPa (3480 psi)
Return Filter	
Return filter bypass pressure	0.4 MPa (58 psi)
High-pressure Filter	
High-pressure filter bypass pressure	0.7 MPa (102 psi)

NOTICE
Other hydraulic oil can be added upon delivery as required by customers, but different hydraulic oil cannot be mixed.

HYDRAULIC HOSE AND FITTING SPECIFICATIONS

HYDRAULIC HOSE TORQUE

Hydraulic hoses must be torqued to the following specifications.

Table 2-7 Hydraulic Hose Torque

METRIC THREAD	L (LIGHT-DUTY)	S (HEAVY-DUTY)
M12 × 1.5	19 ± 1 Nm (14 ± 1 ft-lb)	
M14 × 1.5	26 ± 2 Nm (19 ± 2 ft-lb)	
M16 × 1.5	40 ± 3 Nm (30 ± 2 ft-lb)	
M18 × 1.5	50 ± 4 Nm (37 ± 3 ft-lb)	
M20 × 1.5	-	60 ± 4 Nm (44 ± 3 ft-lb)
M22 × 1.5	70 ± 5 Nm (52 ± 4 ft-lb)	-
M24× 1.5	-	85 ± 6 Nm (63 ± 4 ft-lb)
M26 × 1.5	90 ± 6 Nm (66 ± 4 ft-lb)	-
M30 × 2	120 ± 8 Nm (89 ± 6 ft-lb)	140 ± 10 Nm (103 ± 7 ft-lb)
M36 × 2	150 ± 12 Nm (111 ± 9 ft-lb)	180 ± 12 Nm (133 ± 9 ft-lb)
M42 × 2	-	260 ± 16 Nm (192 ± 12 ft-lb)
M45 × 2	240 ± 15 Nm (177 ± 11 ft-lb)	-
M52 × 2	250 ± 16 Nm (184 ± 12 ft-lb)	280 ± 18 Nm(207 ± 13 ft-lb)

HYDRAULIC FITTING TORQUE

Hydraulic fittings with metric thread must be torqued to the following specifications.

Table 2-8 Hydraulic Fitting Torque – Metric

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL	
	ED, O-RING + CIRCLIP	ED, O-RING + CIRCLIP	O-RING
L (LIGHT-DUTY)			
M10×1	18 ± 1 Nm(13 ± 1 ft-lb)	20 ± 2 Nm (15 ± 2 ft-lb)	18 ± 1 Nm (13 ± 1 ft-lb)
M12×1.5	30 ± 2 Nm (22 ± 2 ft-lb)	35 ± 2 Nm (26 ± 2 ft-lb)	30 ± 2 Nm (22 ± 2 ft-lb)
M14×1.5	42 ± 3 Nm (31 ± 2 ft-lb)	48 ± 4 Nm (35 ± 3 ft-lb)	35 ± 2 Nm (26 ± 2 ft-lb)
M16×1.5	55 ± 4 Nm (41 ± 3 ft-lb)	60 ± 4 Nm (44 ± 3 ft-lb)	40 ± 3 Nm (30 ± 3 ft-lb)
M18×1.5	75 ± 5 Nm (55 ± 4 ft-lb)	75 ± 5 Nm (55 ± 4 ft-lb)	45 ± 3 Nm (33 ± 4 ft-lb)
M22×1.5	90 ± 6 Nm (66 ± 4 ft-lb)	130 ± 8 Nm (96 ± 6 ft-lb)	60 ± 4 Nm(44 ± 3 ft-lb)
M27×2	120 ± 8 Nm (89 ± 6 ft-lb)	185 ± 12 Nm (136 ± 9 ft-lb)	100 ± 7 Nm (74 ± 5 ft-lb)
M30×2	140 ± 8 Nm (103 ± 6 ft-lb)	245 ± 15 Nm (181 ± 11 ft-lb)	135 ± 8 Nm (100 ± 6 ft-lb)
M33×2	180 ± 10 Nm (133 ± 7 ft-lb)	320 ± 20 Nm (236 ± 15 ft-lb)	160 ± 10 Nm(118 ± 7 ft-lb)
M42×2	240 ± 15 Nm (177 ± 11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	210 ± 13 Nm (155 ± 10 ft-lb)
M48×2	280 ± 20 Nm (207 ± 15 ft-lb)	540 ± 30 Nm (398 ± 22 ft-lb)	260 ± 15 Nm (192 ± 11 ft-lb)

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL	
	ED, O-RING + CIRCLIP	ED, O-RING + CIRCLIP	O-RING
S (HEAVY-DUTY)			
M12×1.5	33 ± 2 Nm (24 ± 2 ft-lb)	43 ± 3 Nm (32 ± 2 ft-lb)	35 ± 2 Nm (26 ± 2 ft-lb)
M14×1.5	42 ± 3 Nm (31 ± 2 ft-lb)	50 ± 4 Nm (37 ± 3 ft-lb)	45 ± 3 Nm (33 ± 2 ft-lb)
M16×1.5	55 ± 4 Nm (41 ± 3 ft-lb)	75 ± 5 Nm (55 ± 4 ft-lb)	55 ± 4 Nm (41 ± 3 ft-lb)
M18×1.5	75 ± 5 Nm (55 ± 4 ft-lb)	95 ± 6 Nm (70 ± 4 ft-lb)	70 ± 5 Nm (52 ± 4 ft-lb)
M22×1.5	90 ± 6 Nm (66 ± 4 ft-lb)	140 ± 8 Nm(103 ± 6 ft-lb)	100 ± 10 Nm (74 ± 7 ft-lb)
M27×2	120 ± 8 Nm (89 ± 6 ft-lb)	185 ± 12 Nm (136 ± 9 ft-lb)	160 ± 10 Nm (118 ± 7 ft-lb)
M30×2	140 ± 8 Nm (103 ± 6 ft-lb)	245 ± 15 Nm (181 ± 11 ft-lb)	210 ± 13 Nm (155 ± 10 ft-lb)
M33×2	180 ± 10 Nm (133 ± 7 ft-lb)	320 ± 20 Nm (236 ± 15 ft-lb)	260 ± 15 Nm (192 ± 11 ft-lb)
M42×2	240 ± 15 Nm (177 ± 11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	330 ± 20 Nm (243 ± 15 ft-lb)
M48×2	280 ± 20 Nm (207 ± 15 ft-lb)	540 ± 30 Nm (398 ± 22 ft-lb)	420 ± 25 Nm (310 ± 18 ft-lb)

Hydraulic fittings with British Standard Pipe (BSP) thread) must be torqued to the following specifications.

Table 2-9 Hydraulic Fitting Torque – British Standard Pipe (BSP)

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL	
	ED, O-RING + CIRCLIP	ED, O-RING + CIRCLIP	O-RING
L (LIGHT-DUTY)			
G1/8A	20 ± 1 Nm (15 ± 1 ft-lb)	20 ± 1 Nm (15 ± 1 ft-lb)	-
G1/4A	35 ± 2 Nm (26 ± 2 ft-lb)	40 ± 2 Nm (30 ± 2 ft-lb)	-
G3/8A	50 ± 3 Nm (37 ± 2 ft-lb)	75 ± 5 Nm (55 ± 2 ft-lb)	-
G1/2A	75 ± 5 Nm (55 ± 2 ft-lb)	95 ± 6 Nm (70 ± 4 ft-lb)	-
G3/4A	120 ± 8 Nm (89 ± 6 ft-lb)	185 ± 12 Nm (136 ± 9 ft-lb)	-
G1A	180 ± 10 Nm (133 ± 7 ft-lb)	320 ± 20 Nm (236 ± 15 ft-lb)	-
G1-1/4A	240 ± 15 Nm (177 ± 11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	-
G1-1/2A	280 ± 20 Nm (207 ± 15 ft-lb)	540 ± 30 Nm (398 ± 22 ft-lb)	-
S (HEAVY-DUTY)			
G1/4A	40 ± 3 Nm (30 ± 2 ft-lb)	43 ± 3 Nm (32 ± 2 ft-lb)	-
G3/8A	55 ± 3 Nm (41 ± 2 ft-lb)	85 ± 5 Nm (63 ± 4 ft-lb)	-
G1/2A	80 ± 5 Nm (59 ± 4 ft-lb)	120 ± 8 Nm (89 ± 6 ft-lb)	-
G3/4A	120 ± 8 Nm (89 ± 6 ft-lb)	185 ± 12 Nm (136 ± 9 ft-lb)	-
G1A	180 ± 10 Nm (133 ± 7 ft-lb)	320 ± 20 Nm (236 ± 15 ft-lb)	-

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL	
	ED, O-RING + CIRCLIP	ED, O-RING + CIRCLIP	O-RING
G1-1/4A	240 ± 15 Nm (177 ± 11 ft-lb)	450 ± 25 Nm (332 ± 18 ft-lb)	-
G1-1/2A	280 ± 20 Nm (207 ± 15 ft-lb)	540 ± 30 Nm (398 ± 22 ft-lb)	-

Hydraulic fittings with Unified Thread Standard (UNC/UNF) thread must be torqued to the following specifications.

Table 2-10 Hydraulic Fitting Torque – Unified Thread Standard (UNC/UNF)

THREAD SIZE	INSTALLED INTO ALUMINUM	INSTALLED INTO STEEL
	O-RING	O-RING
L (LIGHT-DUTY)		
7/16-20	21 ± 2 Nm (15 ± 2 ft-lb)	21 ± 2 Nm (15 ± 2 ft-lb)
9/16-18	34 ± 2 Nm (25 ± 2 ft-lb)	35 ± 2 Nm (26 ± 2 ft-lb)
11/16-12	40 ± 3 Nm (30 ± 2 ft-lb)	50 ± 4 Nm (37 ± 3 ft-lb)
3/4-16	50 ± 3 Nm (37 ± 2 ft-lb)	65 ± 4 Nm (48 ± 3 ft-lb)
7/8-14	75 ± 5 Nm (55 ± 4 ft-lb)	110 ± 8 Nm (81 ± 6 ft-lb)
1-1/16-12	110 ± 8 Nm (81 ± 6 ft-lb)	140 ± 10 Nm (103 ± 7 ft-lb)
1-5/16-12	160 ± 10 Nm (118 ± 7 ft-lb)	210 ± 15 Nm (155 ± 11 ft-lb)
S (HEAVY-DUTY)		
7/16-20	21 ± 2 Nm (15 ± 2 ft-lb)	23 ± 2 Nm (17 ± 2 ft-lb)
9/16-18	34 ± 2 Nm (25 ± 2 ft-lb)	40 ± 3 Nm (30 ± 2 ft-lb)
11/16-12	40 ± 3 Nm (30 ± 2 ft-lb)	65 ± 4 Nm (48 ± 3 ft-lb)
3/4-16	50 ± 3 Nm (37 ± 2 ft-lb)	80 ± 6 Nm (59 ± 4 ft-lb)
7/8-14	75 ± 5 Nm(55 ± 4 ft-lb)	125 ± 10 Nm (92 ± 7 ft-lb)
1-1/16-12	110 ± 8 Nm (81 ± 6 ft-lb)	185 ± 15 Nm (136 ± 11 ft-lb)
1-5/16-12	160 ± 10 Nm (118 ± 7 ft-lb)	280 ± 20 Nm (207 ± 15 ft-lb)

HYDRAULIC HOSE AND FITTING TIGHTENING PROCEDURE

The hydraulic hose and fitting must be installed as per the following requirements.

1. Before installation, check the seals on the hose and fitting, and replace the seal or even the hose assembly and fitting if the seal is found to be damaged or oil spills out of the seal. The seal cannot be reused if the fitting or hose end has been tightened beyond specifications.
2. If the seal is to be replaced, lubricate the seal before installation.
3. Position the hose and nut squarely on the fitting. Then tighten the nut as required.
4. Tighten the nut or fitting to the torque specified in the appropriate table.
5. After installation, perform all machine functions and inspect the hose, fittings and related components to confirm there are no leaks.

FASTENER TORQUE SPECIFICATIONS

Unless special torque requirements are stated in this manual or other instructions, torque metric bolts to the values listed in the table below.

Table 2-11 Fastener Torque Specifications – Metric

NOMINAL DIAMETER (MM)	PITCH (MM)	CLASS 8.8	CLASS 10.9	CLASS 12.9
5	0.8	7 Nm (5 ft-lb)	9 Nm (7 ft-lb)	10 Nm (7 ft-lb)
6	1	12 Nm (9 ft-lb)	15 Nm (11 ft-lb)	18 Nm (13 ft-lb)
8	1.25	30 Nm (22 ft-lb)	35 Nm (26 ft-lb)	42 Nm (31 ft-lb)
	1	30 Nm (22 ft-lb)	37 Nm (27 ft-lb)	45 Nm (33 ft-lb)
10	1.5	55 Nm (41 ft-lb)	75 Nm (55 ft-lb)	85 Nm (63 ft-lb)
	1.25	56 Nm (41 ft-lb)	77 Nm (57 ft-lb)	87 Nm (64 ft-lb)
	1	60 Nm (44 ft-lb)	80 Nm (59 ft-lb)	92 Nm (68 ft-lb)
12	1.75	95 Nm (70 ft-lb)	125 Nm (92 ft-lb)	150 Nm (111 ft-lb)
	1.5	100 Nm (74 ft-lb)	130 Nm (96 ft-lb)	155 Nm (114 ft-lb)
	1.25	105 Nm (77 ft-lb)	135 Nm (100 ft-lb)	160 Nm (118 ft-lb)
14	2	150 Nm (110 ft-lb)	200 Nm (148 ft-lb)	230 Nm (170 ft-lb)
	1.5	165 Nm (122 ft-lb)	210 Nm (155 ft-lb)	250 Nm (184 ft-lb)
16	2	230 Nm (170 ft-lb)	300 Nm (221 ft-lb)	360 Nm (266 ft-lb)
	1.5	250 Nm (184 ft-lb)	320 Nm (236 ft-lb)	380 Nm (280 ft-lb)
18	2.5	320 Nm (236 ft-lb)	420 Nm (310 ft-lb)	500 Nm (369 ft-lb)
	1.5	360 Nm (266 ft-lb)	470 Nm (345 ft-lb)	550 Nm (406 ft-lb)
20	2.5	450 Nm (332 ft-lb)	600 Nm (443 ft-lb)	700 Nm (516 ft-lb)
	1.5	500 Nm (369 ft-lb)	650 Nm(479 ft-lb)	770 Nm (568 ft-lb)
22	2.5	600 Nm (443 ft-lb)	800 Nm (590 ft-lb)	980 Nm (723 ft-lb)
	2	650 Nm (479 ft-lb)	850 Nm (627 ft-lb)	1050 Nm (774 ft-lb)
24	3	750 Nm (553 ft-lb)	1050 Nm (774 ft-lb)	1250 Nm (923 ft-lb)
	2	800 Nm (590 ft-lb)	1100 Nm (811 ft-lb)	1300 Nm (959 ft-lb)
27	3	1150 Nm (848 ft-lb)	1500 Nm (1106 ft-lb)	1800 Nm (1327 ft-lb)
30	3.5	1500 Nm (1106 ft-lb)	2000 Nm (1475 ft-lb)	2400 Nm (1770 ft-lb)

Unless special torque requirements are listed in this manual or other instructions, torque Unified Thread Standard bolts (label: UNC) to the values listed in the table below.

Table 2-12 Bolt Torque Specifications Unified – Thread Standard (UNC)

NOMINAL DIAMETER (IN)	OPPOSITE NUT SIZE (S)	CLASS 5	CLASS 8
1/4-20	7/16"	10 Nm (7 ft-lb)	14 Nm (10 ft-lb)
5/16-18	1/2"	21 Nm (15 ft-lb)	29 Nm (21 ft-lb)
3/8-16	9/16"	37 Nm (27 ft-lb)	51 Nm (38 ft-lb)
7/16-14	5/8"	60 Nm (44 ft-lb)	82 Nm (60 ft-lb)
1/2-13	3/4"	90 Nm (66 ft-lb)	130 Nm (96 ft-lb)
9/16-12	13/16"	130 Nm (96 ft-lb)	180 Nm (133 ft-lb)
5/8-11	15/16"	178 Nm (131 ft-lb)	250 Nm (184 ft-lb)
3/4-10	1-1/8"	315 Nm (232 ft-lb)	445 Nm (328 ft-lb)
7/8-9	-	509 Nm (375 ft-lb)	715 Nm (527 ft-lb)

Unless special torque requirements are listed in this manual or other instructions, torque Unified Thread Standard bolts (label: UNF) to the values listed in the table below.

Table 2-13 Bolt Torque Specifications – Thread Standard (UNF)

NOMINAL DIAMETER (IN)	OPPOSITE NUT SIZE (S)	CLASS 5	CLASS 8
1/4-28	7/16"	11.5 Nm (8 ft-lb)	16 Nm (11 ft-lb)
5/16-24	1/2"	23 Nm (17 ft-lb)	32 Nm (24 ft-lb)
3/8-24	9/16"	41 Nm (30 ft-lb)	58 Nm (43 ft-lb)
7/16-20	5/8"	65 Nm (48 ft-lb)	92 Nm (68 ft-lb)
1/2-20	3/4"	100 Nm (74 ft-lb)	145 Nm (107 ft-lb)
9/16-18	13/16"	145 Nm (107 ft-lb)	200 Nm (148 ft-lb)
5/8-18	15/16"	200 Nm (148 ft-lb)	280 Nm (207 ft-lb)
3/4-16	1-1/8"	350 Nm (258 ft-lb)	495 Nm (365 ft-lb)
7/8-14	-	560 Nm (413 ft-lb)	780 Nm (575 ft-lb)

3 SYSTEM DESCRIPTIONS

POWER SYSTEM

A hybrid motor provide main power for the machine.

A 12V battery powers a 12V power unit to drive the gear pump which provides auxiliary power for the machine.

HYDRAULIC SYSTEM

The machine is driven by a hybrid motor which powers the oil pump to provide high-pressure oil. The entire hydraulic system can be divided into two parts: one for controlling boom movement and turntable rotation; the other for controlling steer and oscillation during travelling.

When the motor operates, the open-circuit variable displacement pump cooperates with the electro-proportional flow valve and solenoid directional valve on the boom function manifold to drive hydraulic components to move. According to different flow requirements of various boom functions, high-pressure oil with different flow rates will be output by the electrical control system adjusting the current of electro-proportional flow valve and the open-circuit variable pump adjusting the angle of swash plate. Pressure relief valves are fitted in the hydraulic system to prevent system overpressure which may lead to hydraulic component damage. Besides, an emergency power unit is equipped in the hydraulic system to perform the boom functions in case of an emergency.

ELECTRICAL SYSTEM

The electrical system is equipped with two 24V lead-acid batteries (in series) or two 24V lithium battery (in series) to power a 48V DC motor drive which drives the drive motor and hybrid motor for performing boom operations, turntable rotation and steer during travelling, and 12V control power is provided for the machine through a DC converter.

The electrical system is equipped with a 12V maintenance-free lead-acid battery to provide emergency power for the machine.

All batteries are charged from an external power source through the same charger. The machine is also equipped with a circuit breaker to protect the control system.

MACHINE CONTROL

The machine functions are controlled by two controllers, one installed on the left side of turntable to control turnable rotation and boom functions, the other on the platform to control machine drive, turnable rotation and boom functions. The controllers communicate signals through a high-speed data bus.

SAFETY MEASURES

A wide range of sensors and limit switches are used to provide signals for the controller.

- The level sensor measures the inclinations in X axis and Y axis of the chassis. When the inclined angle in X or Y axis exceeds 5°, the alarm will sound and such functions as lift, drive and steer will be restricted.
- The length sensor measures the extended boom length. When the extended boom length exceeds the maximum allowable horizontal reach, the boom will be restricted from further extending.
- The angle sensor measures the boom luffing angle. When the boom luffing angle exceeds the limits, the boom is restricted from further lifting/lowering.
- The weight sensor measures the weight on the platform. When the weight on the platform exceeds the rated load, the buzzer will sound continuously, the overload indicator will flash, the display will indicate platform overload, and associated functions will be restricted.

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4 SERVICE AND GUIDELINES

MACHINE PREPARATION, INSPECTION AND MAINTENANCE

GENERAL

This section provides safety and necessary information for machine operators. For maximum service life and safe operation, ensure that all necessary inspections and maintenance have been completed before placing the machine into service.

Machine positions

Stowed position:

Boom descends and retracts in place.

Non-operating position:

Main boom is raised to be no more than 0° above the horizontal plane, upper articulated boom is raised to be no more than -5°above the horizontal plane, or the travel switch detects the telescopic boom fully retracted.

Operating/raised position:

Main boom is raised to be more than 0° above the horizontal plane, upper articulated boom is raised to be more than -5°above the horizontal plane, or the travel switch detects the telescopic boom not fully retracted.

PREPARATION, INSPECTION AND MAINTENANCE

It is important to establish and conform to a comprehensive inspection and preventive maintenance program. This manual outlines the scheduled machine inspections and maintenance recommended by Hunan Sinoboom Intelligent Co., Ltd. Consult your national, regional or local regulations for aerial work platforms. The frequency of inspections and maintenance must be increased as environment, severity and frequency of usage requires.

QUALIFIED SINOBOOM EQUIPMENT MECHANICS

A qualified Sinoboom equipment mechanic is a person recognized by Sinoboom as one who, by possession of a recognized degree, certificate and training, has successfully demonstrated the ability and proficiency to service, repair and maintain the subject Sinoboom product model.

PRE-OPERATION INSPECTION

Prior to daily use or work shift of operators, the user or operator should perform a pre-operation inspection. Refer to the Operation Manual for the complete procedure of pre-operation inspection. The Operation Manual must be entirely read and understood before performing the pre-operation inspection.

PRE-DELIVERY INSPECTION AND FREQUENT INSPECTION

The pre-delivery inspection shall be performed by qualified Sinoboom equipment mechanics. The pre-delivery inspection and frequent inspection are performed in the same manner, but at different times. The pre-delivery inspection shall be performed before each sale, lease or rental delivery. The frequent inspection shall be accomplished for each machine in service for 3 months or 150 hours (whichever comes first); out of service for a period of more than 3 months; or when purchased used. The frequency of this inspection must be increased as environment, severity and frequency of usage requires.

Reference the Prepare the Work Record before Delivery and Repair & Inspection Report for items requiring inspection. Reference the Inspection Procedures in appropriate areas of this manual to perform the inspection and maintenance procedures.

ANNUAL MACHINE INSPECTION

The annual machine inspection must be performed on an annual basis, no later than 13 months from the date of the prior annual machine inspection. Hunan Sinoboom Intelligent Equipment Co., Ltd. recommends this task be performed by a factory-trained service technician, a person recognized by Sinoboom as one who, by possession of a recognized degree, certificate, training, has successfully demonstrated the ability and proficiency to service, repair and maintain the subject Sinoboom product model.

Referen to the Repair & Inspection Report for items requiring inspection. Referen to the Inspection Procedures in appropriate areas of this manual to perform the inspection and maintenance procedures.

For the purpose of receiving the safety-related bulletins, it is important that Hunan Sinoboom Intelligent Equipment Co., Ltd. has updated ownership information for each machine. When performing each annual machine inspection, notify Hunan Sinoboom Intelligent Equipment Co., Ltd. of the current machine ownership information.

PREVENTIVE MAINTENANCE

The preventive maintenance must be performed by a qualified Sinoboom equipment mechanic.

Reference the Repair & Inspection Report and Maintenance Schedule in this manual for the inspection items and intervals. Reference the Inspection Procedures in appropriate areas of this manual to perform the inspection and maintenance procedures.

Table 4-1

Type	Frequency	Primary Responsibility	Service Qualification	Reference
Pre-operation Inspection	Prior to use each day; or at each operator change.	User or operator	User or operator	Operation Manual
Pre-delivery Inspection	Prior to each sale, lease or rental delivery.	Owner, dealer or user	Qualified Sinoboom mechanic	Maintenance Manual, Pre-delivery Preparation Form, and Maintenance Inspection Report
Frequent Inspection	In service for 3 months or 150 hours, whichever comes first; or out of service for a period of more than 3 months; or purchased used.	Owner, dealer or user	Qualified Sinoboom mechanic	Maintenance Manual and Maintenance Inspection Report
Annual Machine Inspection	Annually, no later than 13 months from the date of the prior annual inspection.	Owner, dealer or user	Factory-trained service technician	Maintenance Manual, Pre-delivery Preparation Form, and Maintenance Inspection Report
Preventive Maintenance	At intervals as specified in the Maintenance Manual.	Owner, dealer or user	Qualified Sinoboom mechanic	Maintenance Manual, Maintenance Inspection Report, and Maintenance Schedule

STORAGE

Please follow the recommendations below to ensure the best performance of cylinders and avoid corrosion due to an extended period of storage (indoor/outdoor):

- The machine should be stored in stowed position with all tires adjusted to keep aligned.
- Fully raise and lower the scissor and steer left and right the wheels twice a week to lubricate the cylinders.

MAINTENANCE AND SERVICING PRECAUTIONS

GENERAL

This section assists you in the use and application of the maintenance and servicing procedures contained in this manual.

SAFETY AND WORKMANSHIP

Before servicing the machine, take the following preventive measures:

1. Cut off the power source to disable the machine and set up a sign in a readily visible place.
2. Place all controls in OFF position to prevent unintended activation of the controls.
3. Lower the platform to the lowest position if possible, or at least ensure it won't fall off.
4. Before releasing or removing any hydraulic component, dissipate the hydraulic pressure in the hydraulic circuit.

If the machine is not serviced in the state as above for the sake of the particular nature of the maintenance task, it should at least observe the safety rules regarding the maintenance and repair of the machine contained in this manual and the Operation Manual.

Your safety, and that of others, is the first consideration when engaging in the maintenance of equipment. Never attempt to move heavy parts without the aid of a mechanical device. Do not allow heavy objects to rest in an unstable position. When raising a portion of the equipment, ensure that adequate support is provided.

CLEANLINESS

1. The most important single item in preserving the service life of a machine is to keep dirt and foreign materials out of the vital components. Precautions have been taken to safeguard against this. Shields, covers, seals and filters are provided to keep air, fuel and oil supplies clean; however, these items must be maintained on a scheduled basis to function properly.
2. When air, fuel or oil lines are disconnected, clean the adjacent areas as well as the openings and fittings. As soon as a component or line is disconnected, cap or cover all openings to prevent entry of foreign matter.
3. Clean and inspect all parts during servicing and maintenance, and assure that all passages and openings are unobstructed. Cover all parts to keep them clean. Be sure all parts are clean before they are installed. New parts should remain in their containers until they are ready to be used.

COMPONENT REMOVAL AND INSTALLATION

1. Establish as per this manual a safe and reasonable program appropriate to the on-site conditions for installation of the machine.
2. The personnel engaging in disassembly and installation of this machine should be competent in the task and understand how to use the personal protection equipment in a correct manner.
3. The qualified personnel should not install the machine unless a thorough inspection of the ground for installation, the hidden foundation as well as the anchored parts is made or sufficiently evidenced to comply with the manufacturer's requirements.
4. The wind speed at the installation location should not be more than 8.3m/s.
5. Check the on-site conditions like power supply, foundation, track, etc., and install only when all are eligible.
6. All parts should be checked before installation to verify they are in good condition.
7. The high-strength bolts should be tightened as required in this manual.
8. The requirements for the reception of the on-site installed machine are as follows:
    - Conduct the required inspection and function test to confirm the machine is properly installed for the purpose of the particular application and all safety devices operate smoothly.
    - The static and dynamic load tests of the machine suggest a compliance with the relevant standard.
    - The qualified personnel should sign on the handover document to evidence the integrity of the machine. All inspection/test results should be documented (including the inspector name, title, organization and date).
9. The disassembly of the machine should also follow the same safety requirements for the installation of the machine.
10. If mechanical assistance is required for the disassembly of the machine, please choose the suitable lifting points, lifting tools, and lifting equipment according to this manual and the onsite conditions. The lifting equipment that allows adjustment is preferred. All lifting tools (chains, sling, etc.) should be parallel to each other and should better remain vertical to the top of the component being lifted.
11. Should it be necessary to remove a component on an angle, keep in mind that the capacity of an eyebolt or similar bracket lessens, as the angle between the supporting structure and the component becomes less than 90 degrees.
12. If a part resists removal, check to see whether all nuts, bolts, cables, brackets, wiring, etc., have been removed and that no adjacent parts are interfacing.

COMPONENT DISASSEMBLY AND ASSEMBLY

When disassembling or reassembling a component, complete the procedural steps in sequence. Do not partially disassemble or assemble one part, then start on another. Always recheck your work to assure that nothing has been overlooked. Do not make any adjustments, other than those recommended, without obtaining proper approval.

SCRAP OF STRUCTURAL PARTS

- When some major component fails to fulfill the safety requirements due to corrosion, wear, etc., it should be refitted or reinforced, otherwise it should be scrapped.
- When the stressed structure suffers a permanent deformation and a repair is impossible, it should be scrapped.
- When the major stressed structure loses stability at large, it should never get repaired and must be scrapped.
- When a crack is present on a structure or a weld, it can be properly reinforced according to the stress and crack conditions, and continued use is only allowed when it meets the original design requirements, otherwise it should be scrapped.

PRESSURE-FIT PARTS

When assembling pressure-fit part, use a molybdenum disulfide base compound or equivalent to lubricate the mating surface.

BEARINGS

1. When a bearing is removed, cover it to keep out dirt and abrasives. Clean bearings in nonflammable cleaning solvent and allow to drip dry. Compressed air can be used but do not spin the bearing.
2. Discard bearings if the races and balls (or rollers) are pitted, scored, or burned.
3. If bearing is found to be serviceable, apply a light coat of oil and wrap it in clean (waxed) paper. Do not unwrap reusable or new bearings until they are ready to install.
4. Lubricate new or used serviceable bearings before installation. When pressing a bearing into a retainer or bore, apply pressure to the outer race. If the bearing is to be installed on a shaft, apply pressure to the inner race.

GASKETS

Check that holes in gaskets align with openings in the mating parts. If it becomes necessary to hand-fabrictae a gasket, use gasket material or stock of equivalent material and thickness. Be sure to cut holes in the right location, as blank gaskets can cause serious system damage.

BOLT USAGE AND TORQUE APPLICATION

NOTICE

Self-locking fasteners, such as nylon insert and thread deforming locknuts, are not intended to be reinstalled after removal.

1. Always use new replacement hardware when installing locking fasteners. Use bolts of proper length. A bolt which is too long will bottom before the head is tight against its related part. If a bolt is too short, there will not be enough thread area to engage and hold the part properly. When replacing parts, use only those having the same specifications of the original, or one which is equivalent.
2. Unless specific torque requirements are given within the text, standard torque values should be used on heat-treated bolts, studs, and steel nuts, in accordance with recommended shop practices. (See ***Fastener Torque Specifications, page 2-11***)

HYDRAULIC LINES AND ELECTRICAL WIRING

Clearly mark or tag hydraulic lines and electrical wiring, as well as their receptacles, when disconnecting or removing them from the unit. This will assure that they are correctly reinstalled.

HYDRAULIC SYSTEM

1. The primary enemy of a hydraulic system is contamination. Contaminants enter the system by various means, e.g., using inadequate hydraulic oil, allowing moisture, grease, filings, sealing components, sand, etc., to enter when performing maintenance.
2. Keep the system clean. If evidence of metal or rubber particles are found in the hydraulic system, drain and flush the entire system.
3. Disassemble or reassemble parts on clean work surface. Clean all metal parts with non-flammable cleaning solvent. Lubricate components, as required, to aid assembly.

LUBRICATION

Service applicable components with the amount, type, and grade of lubricant recommended in this manual, at the specified intervals. When recommended lubricants are not available, consult your local supplier for an equivalent that meets or exceeds the specifications listed.

BATTERY

Clean battery, using a non-metallic brush and a solution of baking soda and water. Rinse with clean water. After cleaning, thoroughly dry battery and coat terminals with an anti-corrosion compound.

PINS AND COMPOSITE BEARING

1. Pinned joints should be disassembled and inspected if the following occurs:
   - Excessive sloppiness in joints.
   - Noise originating from the joint during operation.

2. The composite bearing should be replaced if the following occurs:
   - Frayed or separated fibers on the liner surface.
   - Cracked or damaged liner backing.
   - Bearing that have moved or spun in their housing.
   - Debris embedded in liner surface.
3. Pins should be replaced if any of the following is observed (pin should be properly cleaned prior to inspection:
   - Detectable wear in the bearing area.
   - Flaking, pealing, scoring, or scratches on the pin surface.
   - Rusting of the pin in the bearing area.
4. Reassembly of pins and composite bearing:
   - Housing should be blown out to remove all dirt and debris. Bearings and bearing housings must be free of all contamination.
   - Bearing/pins should be cleaned with a solvent to remove all grease and oil. The composite bearing is a dry joint and needs no lubricating.
   - Pins should be inspected to ensure it is free of burrs, nicks, and scratches which would damage the bearing during installation and operation.

APPLICATION OF INSULATING SILICONE GREASE TO ELECTRICAL CONNECTIONS

Insulating silicone grease should be applied to all electrical connections for the purpose of：

- Avoiding oxidization of the mechanical joints between the male pins and female pins.
- Avoiding electrical failure due to low conductivity between the pins in humid environment.

The following procedure should be observed to apply the insulating silicone grease to the electrical connections. The procedure applies to all plugged connections outside of the power distribution box. The silicone grease is not suitable for the connectors with enclosed outer surface.

1. Prior to the machine assembling, apply silicone grease around the male pins and female pins inside the connectors to prevent oxidization. An injector may be used for the convenience of operation.

NOTICE

The oxidization exceeding a certain period will increase the resistance of the connector and eventually lead to electrical failure.

2. Silicone grease should be applied to each electrical cord that is exposed at the outside of the connector to prevent short circuit. Besides, the joint between the male and female connectors should also been applied with silicone grease. Other joints that may allow entry of water into the connectors, like the area around the anti-pull buckle, should be properly sealed as well.

NOTICE

Since the electrical conductivity of cleaning solvent is superior to that of water, it is mostly likely that this will occur when using pressure cleaning method to clean the machine.

3. Silicone grease should be applied to each contact of the connectors for battery case and charger.

NOTICE

The setting type sealant can be used to avoid short circuit and keep the connections tidy, but it will make the future removal of pins more difficult.

5 MAINTENANCE

This section provides detailed procedures for regular maintenance inspections.

⚠ WARNING

UNSAFE OPERATION HAZARD

Failure to follow proper maintenance procedures may result in death, serious injury or damage to the machine.

Follow these general rules:

- Preventive maintenance procedure should be established by the user according to the manufacturer's recommendations, machine operational environment and intensity of use, which should include both the regular inspection and the annual inspection.
- Only professionally trained, qualified personnel can conduct routine maintenance inspections on this machine.
- The maintenance personnel must know various potential hazards that may arise during the inspection and maintenance work, and select appropriate safety protective equipment according to the maintenance work and work place conditions, such as safety helmets, protective masks, protective gloves, goggles, protective clothing, safety belts and safety shoes.
- Before conducting any inspection and maintenance work, the maintenance personnel shall prepare appropriate maintenance tools as required by the work, such as wrench, screwdriver, pliers, multimeter, pressure gauge, lubrication device, jack and lifting equipment.
- Daily routine maintenance inspections must be performed during normal operation of the machine. Maintenance inspectors must carry out inspection and maintenance according to the repair & inspection report and must complete the repair & inspection report.
- Regular maintenance inspections must be performed at quarterly, biannual and annual intervals. Qualified, trained personnel must check and maintain the machine according to the repair & inspection report and must complete the repair & inspection report.
- Immediately remove a damaged or malfunctioning machine from service, mark and stop using it.
- Repair any damaged or malfunctioning machine before operating it.
- Keep all machine inspection records for at least 10 years or until the machine is no longer in use or as required by machine owner/company/custodian.
- The inspection and maintenance intervals depend on the manufacturer's recommendations, and should also be appropriate to the operational conditions and environment.
- Conduct a quarterly inspection on machines that have been out of service for more than three months.
- Without the manufacturer's approval, do not change any parts, especially those load-bearing and safety-relevant parts. The replacement parts used in the maintenance should be identical with or equivalent to the original parts.
- Any change that may affect the stability, strength or performance of the machine, must obtain the manufacturer's prior approval.
- After any major change or maintenance that may affect the stability, strength or performance of the entire machine or its parts, the machine must be inspected and verified.
- Unless otherwise specified, the maintenance procedures must be performed according the following terms and conditions:
  - Park the machine on flat, level and solid ground.
  - Place the machine in non-operating position.
  - Turn the key switch on ground controller to OFF position and remove the key to prevent unauthorized use of the machine.
  - Push in the red emergency stop buttons on ground and platform controllers to OFF position to avoid unintended start-up of the operating system.
  - Turn off the main power switch.
  - Disconnect all DC power from the machine.
  - Lock all wheels to prevent movement of the machine.
  - Before unscrewing or removing the hydraulic components, release the hydraulic oil pressure in the hydraulic circuit, particularly with the counterbalance valve on the cylinder.

CONDUCTING A PRE-DELIVERY INSPECTION

When the machine owner/company changes, in addition to conducting a pre-delivery inspection, the corresponding inspection shall be carried out according to the maintenance schedule requirement and repair & inspection report. When conducting a pre-delivery inspection, comply with the following requirements:

1. It is the responsibility of the machine owner/ company to perform a pre-delivery inspection.
2. Follow this procedure each time before delivery. Performing a pre-delivery inspection could reveal potential problems with the machine before you begin putting the machine into service.
3. Never use a damaged or malfunctioning machine. Tag the machine and do not use it.
4. Only professionally trained, qualified personnel may repair the machine and must follow the procedures as stated in *operation manual* and *maintenance manual*.
5. A competent operator must conduct daily maintenance on this machine as stated in *operation manual* and *maintenance manual*.

Before delivering the machine, complete the following record using these instructions:

1. Prepare the machine before delivery, which includes performing a pre-delivery inspection, following maintenance procedures and performing functional inspections.
2. Use the following table to note the results. After each section is complete, mark the appropriate box.
3. Record the inspection results. If any inspection results are "NO", the machine must be stopped and re-inspected after repair is completed and marked in the box marked "inspection".

Table 5-1

PREPARE THE WORK RECORD BEFORE DELIVERY			
Model			
Serial No.			
Inspection Item	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/Machine Has Been Repaired**
Pre-operational Inspection			
Maintenance Procedure			
Functional Inspection			
Machine Buyer/ Renter			
Inspector Signature			
Inspector Title			
Inspector Company			

FOLLOWING A MAINTENANCE SCHEDULE

Regular maintenance inspections must occur daily, quarterly, biannually (every 6 months) and annually,and must be performed by the personnel qualified in the maintenance and service of the machine models involved. Use the table to help you adhere to a routine maintenance schedule.

Table 5-2

INSPECTION INTERVAL	INSPECTION PROCEDURES
Every day or every 8 hours	A
Every quarter or every 250 hours	A+B
Every half a year or every 500 hours	A+B+C
Every year or every 1000 hours	A+B+C+D

COMPLETING A REPAIR & INSPECTION REPORT

1. The Repair & Inspection Report is divided into four parts (A, B, C and D) according to the time requirements of the maintenance schedule and the maintenance procedure requirements.
2. The Repair & Inspection Report shall include the inspection form of all regular inspections.
3. Duplicate the Repair & Inspection Report template for each inspection. Store the completed forms for 10 years or until the machine is no longer in use or as required by machine owner/company.
4. Record inspection results in the following form. After one item is complete, check the corresponding box.
5. If any item is marked as “NO” based on the inspection result, the machine must be stopped, and then re-inspected after repair is completed, and the box “REPAIRED” should be checked. Select appropriate inspection procedure based on the inspection type.

Table 5-3

Repair & Inspection Report				
Model				
Serial No.				
Checklist A Procedures				
Items	YES/Good Machine	NO/Damaged or Faulted Machine	REPAIRED/ Repaired Machine	Problem Description
A-1 Inspect All Manuals				
A-2 Inspect All Decals				
A-3 Check for Damaged, Loose or Lost Parts				
A-4 Inspect Hydraulic Oil Level				
A-5 Check for Hydraulic Oil Leakage				
A-6 Perform Functional Test				
A-7 Perform Maintenance after 30 Days				
A-8 Test Oscillating Cylinder Exhausting				
A-9 Check Battery Level				
Checklist B Procedures				
Items	YES/Good Machine	NO/Damaged or Faulted Machine	REPAIRED/ Repaired Machine	Problem Description
B-1 Inspect and Replace Hydraulic Oil Tank Return Filter Element				
B-2 Inspect Rim, Tire and Fasteners				

Repair & Inspection Report				
B-3 Check Hydraulic Oil				
B-4 Inspect Electrical Wiring				
B-5 Inspect Emergency Lowering				
B-6 Inspect Air Filter of Hydraulic Tank				
B-7 Replace High-Pressure Filter Element				
B-8 Test Drive Speed				
B-9 Inspect Boom Envelope Limit Travel Switch				
B-10 Inspect Tilt Protection				
B-11 Check Drive Reducer Oil Level				
B-12 Check Slewing Reducer Oil Level				
B-13 Inspect Slewing Bearing Bolts				
B-14 Lubricate Slewing Bearing				
B-15 Inspect Platform Oscillating Cylinder Fasteners				
B-16 Test Cylinder Drift				
B-17 Test Counterbalance Valve Locking				
B-18 Test Oscillating Outrigger and Oscillating Multi-way Valve Lever				
B-19 Inspect Battery				
B-20 Test Braking Distance				
Checklist C Procedures				
Items	YES/Good Machine	NO/Damaged or Faulted Machine	REPAIRED/ Repaired Machine	Problem Description
C-1 Replace Air Filter of Hydraulic Tank				
C-2 Inspect Weighing System				
Checklist D Procedures				

Repair & Inspection Report				
Items	YES/Good Machine	NO/Damaged or Faulted Machine	REPAIRED/ Repaired Machine	Problem Description
D-1 Replace Drive Reducer Gear Oil				
D-2 Replace Slewing Reducer Gear Oil				
D-3 Replace Hydraulic Oil				
D-4 Replace Hydraulic Tank Suction Filter				
D-5 Inspect Boom Wear Pads				

User	
Inspector Signature	
Inspection Date	
Inspector Title	
Inspector Company	

MAJOR MODIFICATION AND REPAIR RECORD

1. A major modification/repair is a modification/repair made to all or part of a machine that affects the stability, strength or performance of the machine.
2. Each time the machine owner/company makes a major modification/repair to the machine, it should be documented using the form below. Keep the form properly until the machine is taken out of service, or as requested by the machine owner/ company.
3. Major modifications/repairs to the machine must be performed by a qualified service technician.
4. The machine must be inspected and verified after major modifications/repairs, with the inspection items including but not limited to all items in the maintenance and inspection report.
5. If the inspection result of each item in the Maintenance and Inspection Report is “YES”, the “Machine Status after Modification/Repair” in the form will be “Good” and the machine can be used. If either inspection result is “NO”, the machine must be re-inspected after the repair is completed until the machine is in “Good” condition before continuing to use the machine.

Table 5-4

Major Modification and Repair Record					
Model					
Serial No.					
Date	**Problem Description**	**Modification/Repair Item**	**Machine Status af- ter Change**	**Repairman’s Company and Position**	**Repair- man Signature**

CHECKLIST A PROCEDURES

A-1 Inspect All Manuals

Storing the *Operation Manual* and the *Maintenance Manual* in the appropriate place is important for the safe operation of the machine. The manuals must be stored in the manual storage container on the platform. Illegible or damaged manuals cannot provide necessary safety and operation information for safe operation.

- Inspect and confirm that the manual storage container is placed on the appropriate position of the platform.
- Inspect and confirm that the *Operation Manual* and the *Maintenance Manual* are stored in the manual storage container on the platform.
- Inspect the pages of the manuals and confirm that they are legible and intact.
- Inspect the pages of the manuals and confirm that they are legible and intact.

NOTICE

If needing to replace the manuals, contact Hunan Sinoboom Intelligent Equipment Co., Ltd..

A-2 Inspect All Decals

Ensuring that all labels are in good condition is essential for safe operation of the machine. Decals warn operators of the dangers they may encounter during operations, and they provide users with operational and maintenance information. Illegible decals do not properly guide operators, which can lead to unsafe operations.

- Refer to the decal instructions in the *Operation Manual* and use the decals list and graphic to determine the correct placement of the decal.
- Check whether all decals are legible and damaged. Replace damaged and illegible decals before operating the machine.

NOTICE

If needing to replace the decals, contact Hunan Sinoboom Intelligent Equipment Co., Ltd..

A-3 Inspect Damaged, Loose or Lost Parts

Before each use or work shift, check the machine for any damaged, improperly installed, loose or lost parts and unauthorized changes:

- Electrical components, wiring, cables and safety ropes
- Hydraulic hoses & fittings, hydraulic cylinder and manifolds

- Hydraulic tank
- Battery pack and its connection
- Drive motor & reducer, slewing motor & reducer
- Boom wear pads and telescopic axle wear pads
- Limit switch and horn
- Tires and rims
- Alarms and lighting (if equipped)
- Platform (including rails, floor plate, safety lock, brackets and entry door)
- Personal protection equipment
- Emergency control equipment
- Operation instructions, warning and control decals
- Structure and welding cracks
- Nuts, bolts and other fasteners

NOTICE

If any damaged part, incorrect installation or missing part is discovered, please replace it immediately and install it correctly; if any fastener is found detached or loose, please secure it immediately.

A-4 Inspect Hydraulic Oil Level

Ensuring appropriate hydraulic oil level is vital to proper operation of the machine. If too high, the oil will spill out from the oil tank during machine operation; if too low, the oil pump will have entrained air and hydraulic components will be damaged. Performing daily inspection of the hydraulic oil level will help you determine if any problem exists in the hydraulic system.

Perform the following procedures with the boom in stowed position:

1. Open the left turntable cover to make visual inspection of the sides of hydraulic tank. The hydraulic oil level should be within the marking range of oil level indicator.

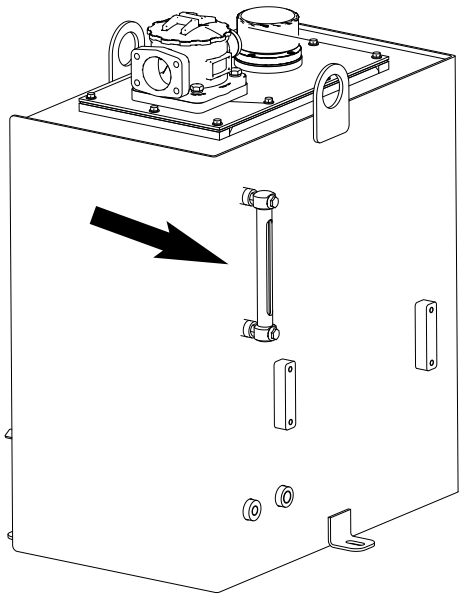


Figure 5-1

2. Ensure the hydraulic tank body and its connections are free of leaks.
3. Add oil as needed. Never overfill the tank.

Table 5-5

CUSTOMER REQUIREMENTS	HYDRAULIC OIL VISCOSITY GRADES
Normal-temperature region 0°C to 40°C (32°F to 104°F)	L-HM46
Cold region -25°C to 25°C (-13°F to 77° F)	L-HV32
High-temperature region greater than 40°C (104°F)	L-HM68
Extremely cold region less than -30°C (-22°F)	Special programmes need to be identified.

NOTICE

Other hydraulic oils can be added according to customer requirements upon factory delivery, but different hydraulic oil cannot be mixed.

A-5 Check for Hydraulic Oil Leakage

Preventing hydraulic oil from leaking is vital to safe and normal operation of the machine. If a leak goes

undetected, it will lead to hazardous situations, reduce machine performance and damage components.

Check the area on or around the following components for spills, drips or residues of hydraulic oil:

- Hydraulic tank, filter, pipe joint, oil pipe, and auxiliary power unit
- All hydraulic cylinders, hydraulic manifolds and pumps
- Boom
- Slewing bearing
- Drive chassis
- Areas around the machine

A-6 Perform Functional Test

Testing each machine function is vital to safe machine operation. If any function operates improperly, it will pose dangers to safe operation. Ensure each function operates smoothly and reliably, without shaking, sharp or unusual noise.

⚠ WARNING

UNSAFE OPERATION HAZARD

Make sure to observe the instructions and safety rules in this manual and Operation Manual, otherwise it may lead to death or severe injury.

For the specific procedure for functional test, please reference the Pre-operation Function Test section in the *Operation Manual*. Before performing the functional test, ensure that the safety rules in the Operation Manual are fully read and understood.

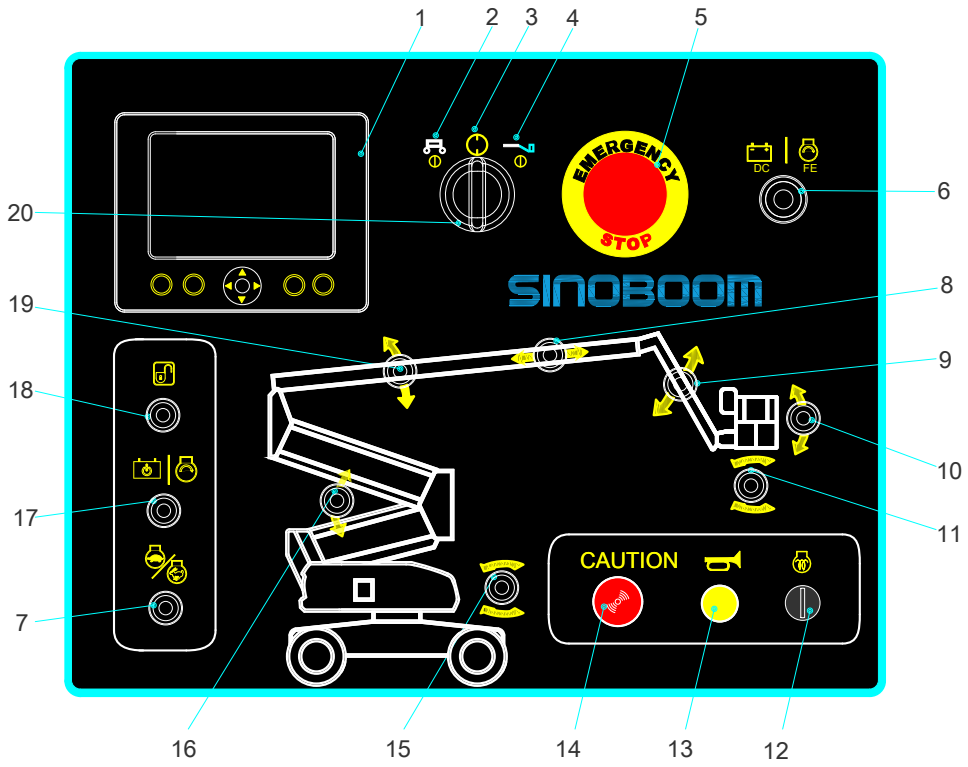


Figure 5-2 Ground controller

Table 5-6

1. Display screen (see the figure and table below)	**8.** Main boom telescoping switch	**15.** Turntable rotation switch
2. Ground control position	**9.** Jib boom up/down switch	**16.** Articulated boom luffing switch
3. OFF (neutral) position	**10.** Platform leveling switch	**17.** Emergency power switch

4. Platform control position	**11.** Platform rotation switch	**18.** Enable switch
5. Emergency stop button	**12.** Unused	**19.** Main boom luffing switch
6. Unused	**13.** Horn	**20.** Ground/Platform select switch (key switch)
7. Unused	**14.** Buzzer	

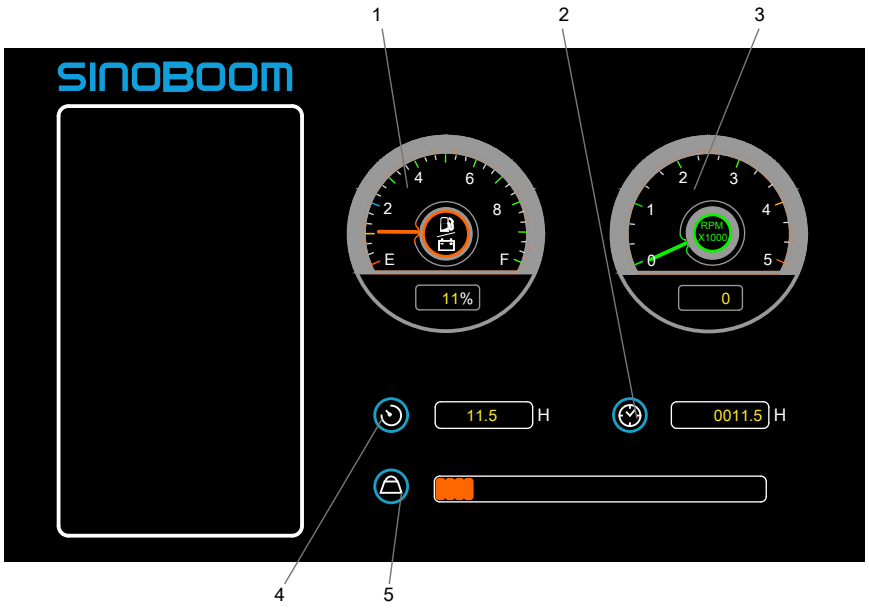


Figure 5-3 Ground controller display screen

Table 5-7

1. Diesel/Battery gauge	**3.** Tachometer	**5.** Platform load
2. Accumulated work hours	**4.** Current work hours	

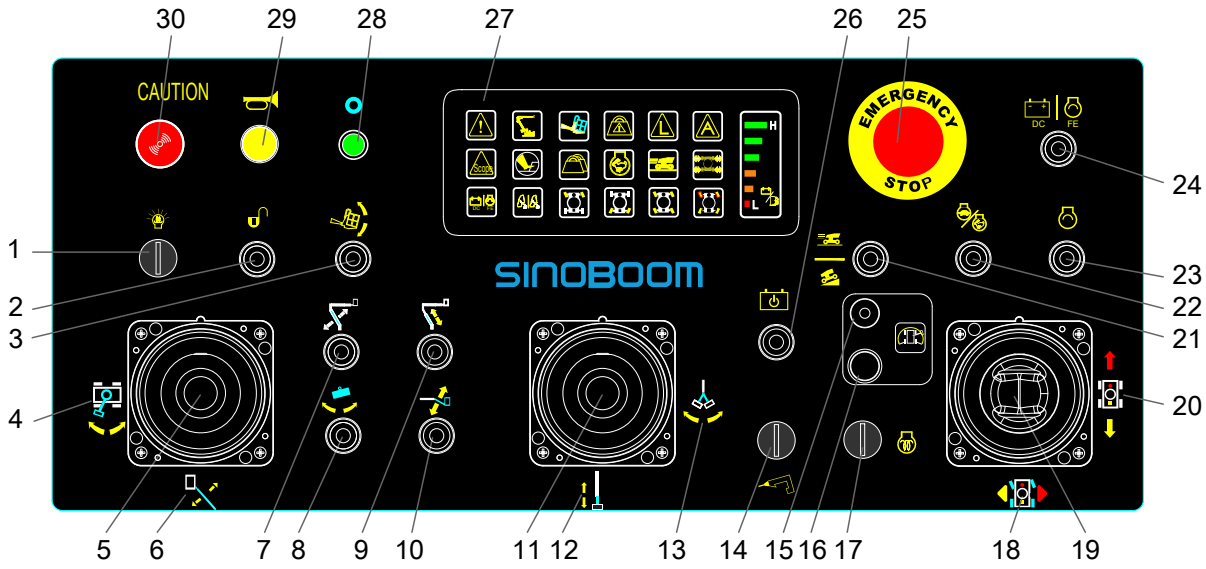


Figure 5-4 Platform Controller

Table 5-8

1. Lighting lamp switch (if equipped)	**11.** Main boom luffing/jib boom rotation proportion control handle	**21.** High/low drive speed select switch
2. Release switch (if equipped)	**12.** Main boom telescoping proportion control direction	**22.** Unused
3. Platform leveling switch	**13.** Jib boom rotation proportion control direction (unused)	**23.** Unused
4. Turntable rotation proportion control direction	**14.** Unused	**24.** Unused
5. Main boom luffing/turntable rotation proportion control handle	**15.** Rear position indicator light	**25.** Emergency stop button
6. Main boom luffing proportion control direction	**16.** Rear position drive switch	**26.** Emergency power switch
7. Articulated boom luffing switch	**17.** Unused	**27.** System distress indicator light
8. Platform rotation switch	**18.** Steer button control direction	**28.** Power indicator light
9. Unused	**19.** Drive/steer proportion control handle	**29.** Horn
10. Jib boom up/down switch	**20.** Drive proportion control direction	**30.** Buzzer

A-7 Perform Maintenance after 30 Days

Perform maintenance for a new machine after the machine is used for 30 days or 50 hours. After that, perform other maintenance items as scheduled.

Perform the following procedures:

- B-1 Inspect and replace the return filter of hydraulic oil tank.
- B-2 Inspect rims, tires and fasteners
- B-13 Inspect slewing bearing bolts
- B-15 Inspect platform rotate cylinder fasteners

A-8 Exhaust Oscillate Cylinder

NOTICE
While exhausting the oscillate cylinder, be sure to keep the platform in stowed position.

Before the first use of the new machine, the oscillate cylinder must be exhausted. This procedure must also be performed if the oscillate cylinder or counterbalance valve is replaced.

1. Place a wooden block which measures 120mm （4.7 in） with slope surface in front of the machine.
2. Drive the machine to rest the front left wheel upon the block and drive off.
3. Drive the machine to rest the front right wheel upon the block and drive off.
4. Repeat the steps 2 and 3 until the oscillate cylinders on both sides have been successfully exhausted.
5. Inspect the counterbalance valve locking.

A-9 Check Battery Level

1. Turn the ground/platform select switch at the ground controller to the ground control position, pull out the emergency stop button on the ground controller to the ON position, and then turn the key switch at the ground controller to the ON position, then the display panel of the ground controller will display the battery level in percentage.

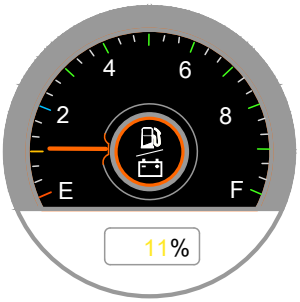


Figure 5-5

2. Or turn the ground/platform select switch at the ground controller to the platform control position, pull out the emergency stop button at the ground controller and platform controller to the ON position, and then turn the key switch at the ground controller to the ON position, then the display panel of the platform controller will display the battery capacity with progress bar.

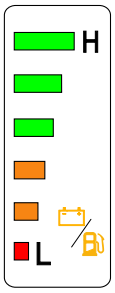


Figure 5-6

NOTICE

When the battery level is about 20%, the battery must be charged. It is forbidden to charge the battery after the it runs out.

CHECKLIST B PROCEDURES

B-1 Inspect and Replace Hydraulic Oil Tank Return Filter Element

Replacing the return filter element of hydraulic oil tank on a regular basis is vital to proper operation of hydraulic system and extending service life of the machine. Repeated use of an unclean or blocked filter could bring damage to the machine components. The return filter shall be replaced more frequently in harsh environments.

⚠ WARNING

BURN HAZARD

Allow the hydraulic oil to cool to room temperature before servicing the hydraulic system.

NOTICE

Shut off the engine before inspection.

1. Open the left turntable cover.
2. Locate the return filter of hydraulic oil tank.

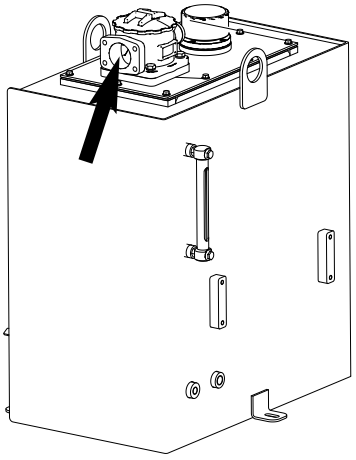


Figure 5-7

3. Remove the return filter with a wrench.

⚠ WARNING

HIGH-PRESSURE HAZARD

Slowly remove the hydraulic components to release hydraulic oil pressure. Hydraulic oil under high pressure could penetrate the skin. Seek medical attention immediately in case of any injury.

4. Loosen the filter end cap and remove the filter element.
5. Apply a thin coat of oil film over the new gasket of return filter.
6. Clean the filter housing and install a new element, then re-install the return filter.
7. Clean the oil that may spill during the process.
8. Start the engine from the ground controller.

9. Verify the filter and relevant components are free of leaks.

B-2 Inspect Rim, Tire and Fasteners

Good maintenance of rims and tires is vital to safe machine operation. The machine might tip over if the rim or the tire has problems. Repair any problems with the rims and tires before operating the machine.

The machine is equipped with solid tires that do not need to be inflated.

1. Inspect the tires on a daily basis for damage or excessive wear. If any of the following condition occurs, immediately remove the machine from service and replace tires or tire assembly (including rims). For the requirements and procedure for the replacement, please reference .
   - Ply separation of tires, i.e., circumferential rips or lamination occurring to in between the rubbers.
   - Detachment from rims: the rubber comes off from the steel rims.
   - Rubber surface locally peeling off in lumps.
   - Rubber cracks in radial direction.
   - Rubber worn to the wear mark.
2. Inspect the lug nuts are torqued to specifiion (700Nm[517ft-lb]).

NOTICE

Tighten the lug nuts prior to the first use or after each tire removal, inspect and retorque every 3 months or 150 hours of operation.

B-3 Check Hydraulic Oil

Inspecting and replacing hydraulic oil is vital to proper machine operation and extending service life. The machine may be unable to operate properly if the hydraulic oil becomes dirty, and the hydraulic parts may be damaged if using contaminated oil. Replace hydraulic oil frequently, especially when the working environment is very harsh.

Note: Due to wear and tear on the hydraulic components, metal particles may appear in the hydraulic oil or filter of a new machine.

⚠ WARNING

BURN HAZARD

Before maintaining the hydraulic system, allow the hydraulic oil to cool to room temperature.

Replace the hydraulic oil if any of the following conditions exists:

- Hydraulic oil is milky white and cloudy.
- Hydraulic oil is blackened.
- Obtain a sample of hydraulic oil and observe it in the sun to find there are luminous metal spots, or rub the hydraulic oil with two fingers to find there are metal particles obviously.
- Hydraulic oil has an abnormal smell.

See ***D-3 Replace Hydraulic Oil, page 5-23*** for the replacement steps.

B-4 Inspect Electrical Wiring

Maintaining electrical wiring in good condition is vital to safe operation and good machine performance. Continued use of the machine with damaged electrical wiring or in corrosive environment will cause severe injury. Before operating the machine, be sure to replace or repair the damaged or corroded electrical wires.

⚠ WARNING

ELECTROCUTION HAZARD

Before inspecting the electrical wires, be sure to disconnect the battery and the charger on the AC outlet. Contact with hot or live circuits could result in death or serious injury.

1. Inspect the following areas for damage or corrosion：
   - Turntable manifold wiring
   - Ground controller
   - Platform controller
2. Check the cable track system for damaged or corroded power cords.
3. Check each adjustable joint for loose connection and ensure the sensor wiring is free of damage.

B-5 Inspect Emergency Lowering

When the motor power unit fails, the operator can turn on the emergency power switch on the ground or platform controller to start the emergency power unit depending on the actual conditions, and meanwhile push corresponding function switch to enable boom functions.

NOTICE

- *The emergency power switch serves only for a short time of use (fully lower and retract the platform from the maximum degree and length possible) when the engine fails.*
- *When the emergency power is in use, do not perform two or more functions simultaneously, otherwise the auxiliary motor and pump will get overloaded.*

Operating from the ground:

1. Turn the ground/platform select switch on the ground controller to the ground control position.
2. Pull out the emergency stop button on the ground controller to ON position.
3. Push and hold the emergency power switch on the ground controller.
4. Push corresponding boom function switch on the ground controller to lower the platform.

Operating from the platform:

1. Turn the ground/platform select switch on the ground controller to the platform control position.
2. Pull out the emergency stop button on both the ground and platform controllers to ON position.
3. Depress the footswitch, and push and hold the emergency power switch on the platform controller.
4. Push corresponding boom function switch on the platform controller to lower the platform.

B-6 Inspect Air Filter of Hydraulic Tank

Keeping the breather cap of hydraulic tank in well-ventilated condition is vital to normal operation of hydraulic pump and extending service life of hydraulic components. Unclean or blocked air filter of hydraulic tank may cause the hydraulic pump to suction improperly, and continued operation may result in component damage. The air filter of hydraulic tank should be inspected more frequently in hostile working environment.

NOTICE

Shut off the machine before inspection.

1. Remove the air filter of hydraulic tank.

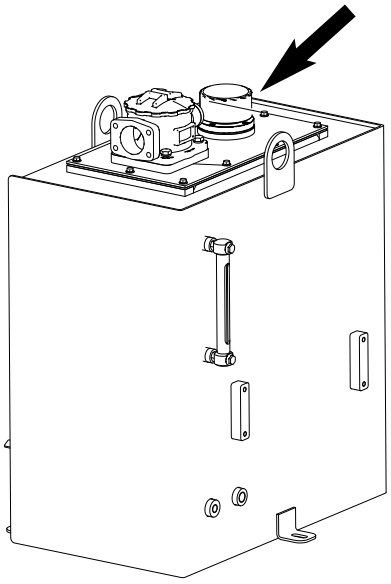


Figure 5-8

2. Check the air filter element of hydraulic tank.
3. The air should pass through the air filter smoothly.
4. If the air has difficulty in passing through the air filter, follow the steps below to clean the air filter.
5. Use neutral solvent to clean the air filter, and then blow dry it with an air gun. Repeat Step 2.
6. Install the air filter back to the hydraulic tank.

B-7 Replace High-Pressure Filter Element

Replacing high-pressure filter element on a regular basis is vital to proper machine operation and extending service life. An unclean or blocked filter could cause the machine to work improperly, and continued operation may result in component damage. The high-pressure filter element should be replaced more often in hostile working environment.

⚠ WARNING

BURN HAZARD

Be cautious of hot hydraulic oil. Bodily contact with hot hydraulic oil may result in severe burn.

NOTICE

Shut off the engine before inspection.

1. Open the left turntable cover, and locate the high-pressure filter.

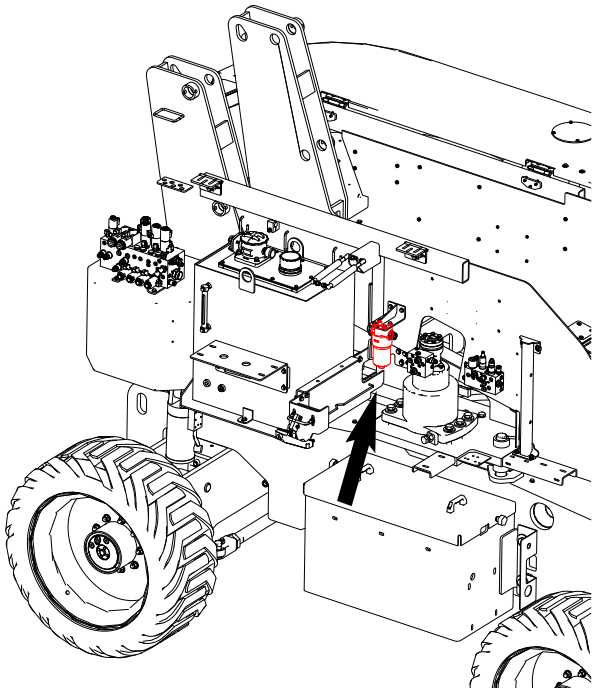


Figure 5-9 High-pressure filter

2. Place a suitable vessel under the filter.
3. Remove the filter from the mounting bracket.

⚠ WARNING

HIGH-PRESSURE HAZARD

Slowly remove the hydraulic elements to reduce the oil pressure. High-pressure oil may penetrate the skin. Should any injury occur, go to a doctor at once.

4. Replace the filter element as needed.
5. Clean up the spilled hydraulic oil.
6. Start the engine from the ground controller.
7. Inspect the high-pressure filter and relevant components for leakage.

B-8 Test Drive Speed

1. Depress the footswitch.
2. Slowly push forward the drive/steer proportion control handle to full drive speed.
3. Push upward the high/low drive speed enable switch on the platform controller to switch from low speed to high speed.
4. The test results should be as shown in the table below:

Table 5-9

POSITION	MAX DRIVE SPEED
Operating	1.1km/h (0.68 mph)
Non-operating	4.8km/h (3 mph)

NOTICE

If the drive speed exceeds the speed value as shown above by 10%, please immediately tag the machine and remove it from service.

B-9 Inspect Boom Envelope Limit Travel Switch

Periodic inspection of the boom envelope limit travel switch regularly is critical to the safe operation of the machine. An unsafe situation will arise if the sensor does not work properly.

230kg (507 lb) < platform capacity≤340kg (750 lb)

1. Turn the ground/platform select switch on the ground controller to the ground control position.
2. Pull out the emergency stop button on the ground controller to ON position.
3. Turn the key switch on the ground controller to ON position.
4. Push the articulated boom luffing switch to fully raise the articulated boom.
5. Push the main boom telescoping switch to extend the boom.
6. The main boom will stop extending after it extends to the farthest position, then the buzzer at the ground and platform controllers should be sounding, boom further extending and boom luffing should be restricted, but boom retracting and turntable rotating should be allowed. At this time, the distance from the rotation center of turntable to the outermost edge of the platform should be 11.9m.
7. Push the main boom telescoping switch to retract the boom.
8. The boom can be fully retracted.

340kg (750 lb) < platform capacity≤454kg (1000 lb)

1. Turn the ground/platform select switch on the ground controller to the ground control position.
2. Pull out the emergency stop button on the ground controller to ON position.
3. Turn the key switch on the ground controller to ON position.
4. Push the articulated boom luffing switch to fully raise the articulated boom.
5. Push the main boom telescoping switch to extend the boom.
6. The main boom will stop extending after it extends to the farthest position, then the buzzer at the ground and platform controllers should be sounding, boom further extending and boom luffing should be restricted, but boom retracting and turntable rotating should be allowed. At this time, the distance from the rotation center of turntable to the outermost edge of the platform should be 10.45m.
7. Push the main boom telescoping switch to retract the boom.
8. The boom can be fully retracted.

B-10 Inspect Tilt Protection

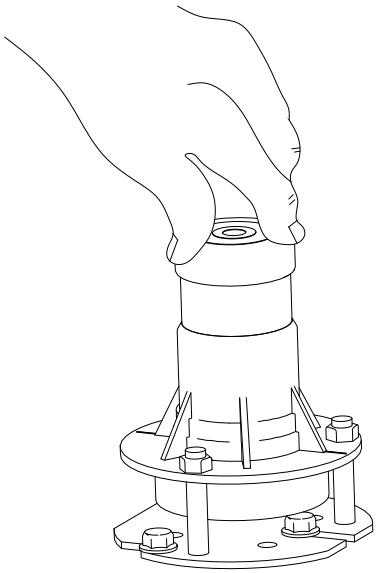


Figure 5-10

1. Turn the ground/platform select switch on the ground controller to ground control position.
2. Pull out the emergency stop button on the ground controller to ON position.
3. With the machine in non-operating position, flip the level switch to exceed 5°in the X (left-to-right)/Y (front-to-back) directions.
4. The tilt alarm shall sound, the chassis tilt indicator light shall flash, and no operation will be restricted.
5. With the machine in operating position, flip the level switch to exceed 5°in the X (left-to-right)/Y(front-to-back) directions.
6. The tilt alarm shall sound, the chassis tilt indicator light shall flash, and certain operations will be restricted, but boom retracting and lowering as well as turntable rotation will be allowed.
7. With the machine in non-operating position, place two wooden blocks under the two wheels on the left or right side of the machine, and then drive the machine onto the two blocks. The wooden blocks should be (L × W × H): 750×250×188mm (29.5 in.×9.8 in.×7.4 in.).
8. The tilt alarm shall sound, the chassis tilt indicator light shall flash, and no operation will be restricted.
9. Drive the machine down and remove the wooden blocks.
10. Place two wooden blocks under the two wheels on the front or back side of the machine, and then drive the machine onto the two blocks. The wooden blocks should be (L × W × H): 750×250×217mm (29.5 in.×9.8 in.×8.6 in.).

11. The tilt alarm shall sound, the chassis tilt indicator light shall flash, and certain operations will be restricted, but boom retracting and lowering as well as turntable rotation will be allowed.
12. Lower the retracted boom. With the machine in non-operating position, drive the machine down and remove the wooden blocks.

B-11 Inspect Drive Reducer Oil Level

Inappropriate gear oil level of drive reducers will reduce the machine performance, and continued use could result in component damage.

1. Drive the machine to rotate the reducer until one bolt at top and the other one at 90 degrees, as shown in the figure below.

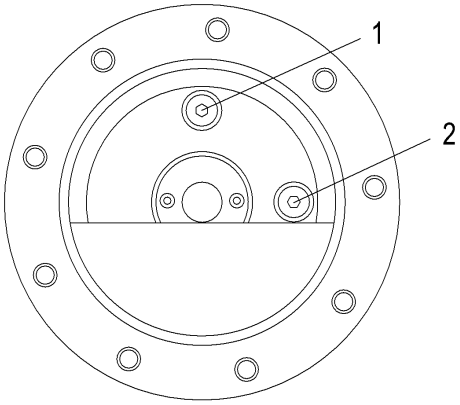


Figure 5-11

2. Remove the bolt #2, and check the oil level.
3. The oil level should be even with the bolt hole.
4. If necessary, add oil to the bolt hole.
5. Remove the bolt #1, add gear oil to the bolt hole #1 until the oil level is even with that of the bolt hole #2.
6. Install the bolts back.
7. Clean up the gear oil spills during the inpection.
8. Perform this inspection procedure to all drive reducers of the machine.

B-12 Inspect Slewing Reducer Oil Level

Inappropriate gear oil level of slewing reducers will reduce the machine performance, and continued use could result in component damage.

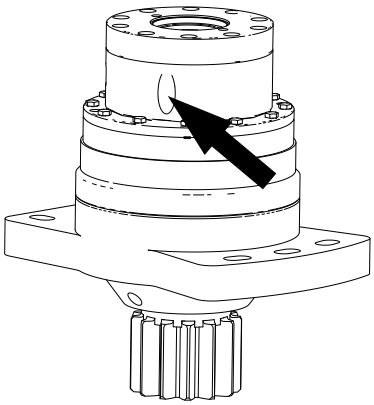


Figure 5-12

1. Open the left side cover of turntable, and locate the slewing reducer.
2. Remove the plug of fill port to check the oil level.
3. The oil level should be even with the bottom of the plug hole.
4. If the oil level is lower than the bottom of the plug hole, add oil.
5. Add gear oil from the fill port until the oil level is even with the bottom of the plug hole.
6. Install the plug back.
7. Clean up the gear oil spills during the inpection.

B-13 Inspect Slewing Bearing Bolts

Regular inspection of the slewing bearing bolts is vital to the proper operation of the machine. The slewing bearing bolts should be checked after the first 50 hours of operation and every 600 hours thereafter. If the bolts are found to be lost or loose, replace them with new ones. Apply threadlocker Loctite 272 to the bolt threads and tighten the bolts with specified torque. After the bolts are replaced and torqued, re-inspect the bolts for tightness.

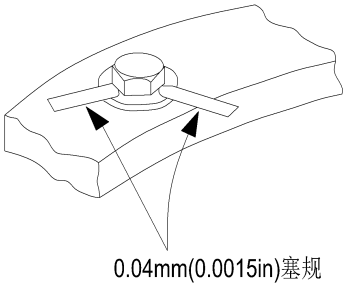


Figure 5-13

Inspecting the connecting bolts between chassis and slewing bearing

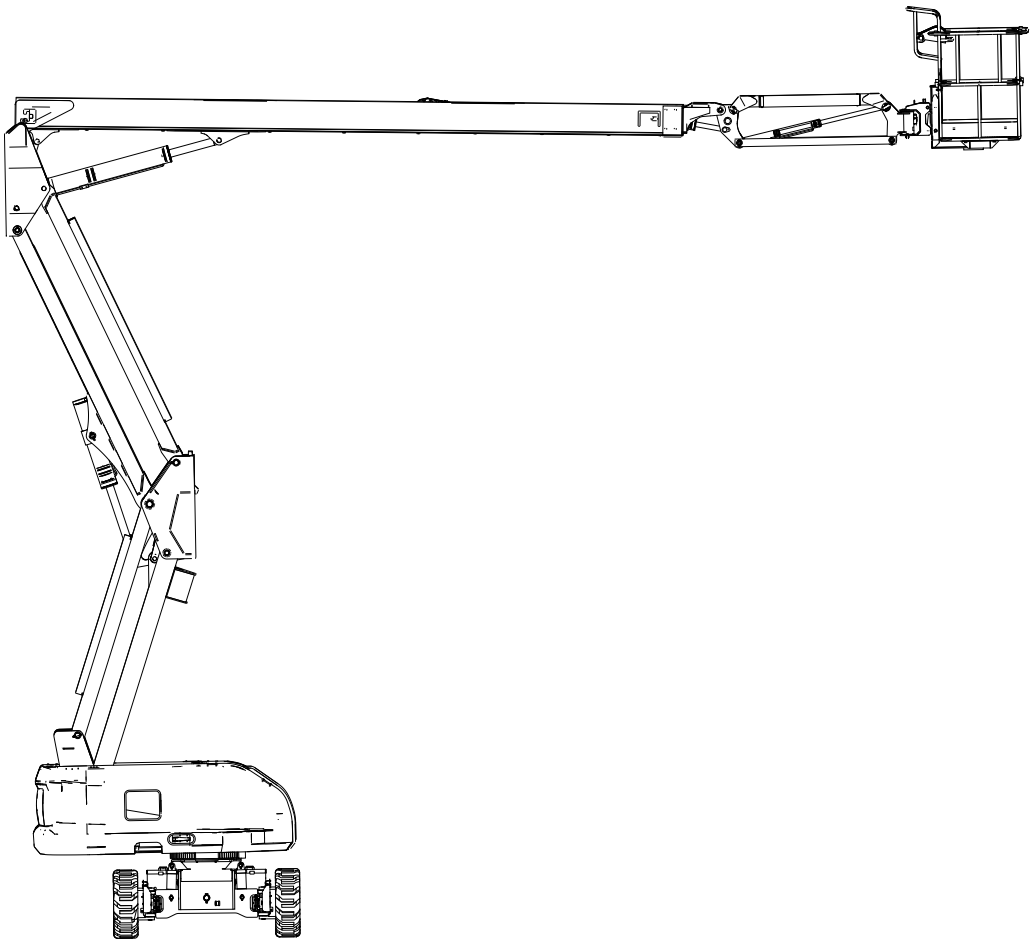


Figure 5-14

1. Fully raise the articulated boom, fully extend the main boom, position the jib to be horizontal, and rotate the turntable 90°.
2. Locate the connecting bolts between the chassis and slewing bearing.
3. As indicated by the arrow *Fig 5-12 , page 5-16*, insert a 0.04mm feeler gauge between the bolt and washer.
4. Ensure the feeler gauge won't go through the outside of bolt head to the bolt shank.
5. Rotate the turntable to check all bolts.

Inspecting the connecting bolts between turntable and slewing bearing

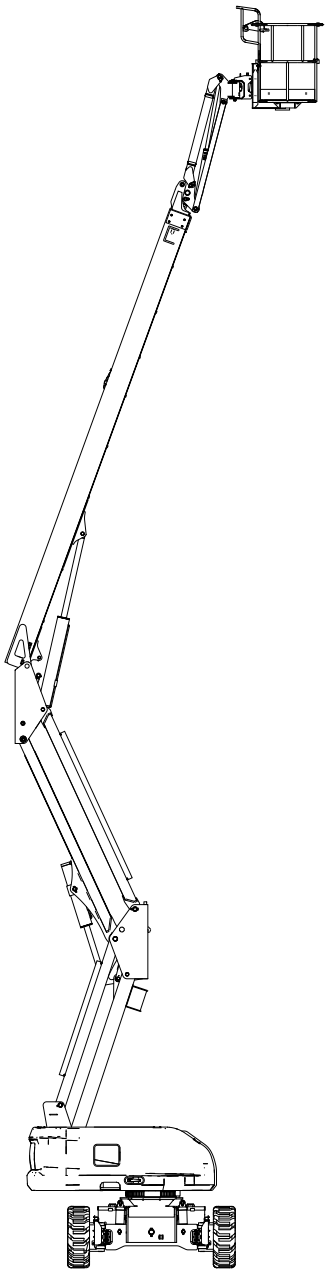


Figure 5-15

1. Fully raise the boom, fully retract the main boom, raise the jib to the highest, and rotate the turntable 90°.
2. Locate the connecting bolts between the turntable and slewing bearing.
3. As indicated by the arrow ***Fig 5-12 , page 5-16***, insert a 0.04mm feeler gauge between the bolt and washer.
4. Ensure the feeler gauge won't go through the outside of bolt head to the bolt shank.
5. Lower the main boom to be horizontal and fully extend it.
6. As indicated by the arrow ***Fig 5-12 , page 5-16***, insert a 0.04mm feeler gauge between the bolt and washer.
7. Ensure the feeler gauge won't go through the outside of bolt head to the bolt shank.

B-14 Lubricate Slewing Bearing

Regularly remote lubrication of the slewing bearing is critical to the proper operation of the machine. The lubricating frequency and the amount of lubricant should be increased if the machine operates in successive work shifts or in hostile environment.

- Lube point: 1 grease nipple (see the following figure)

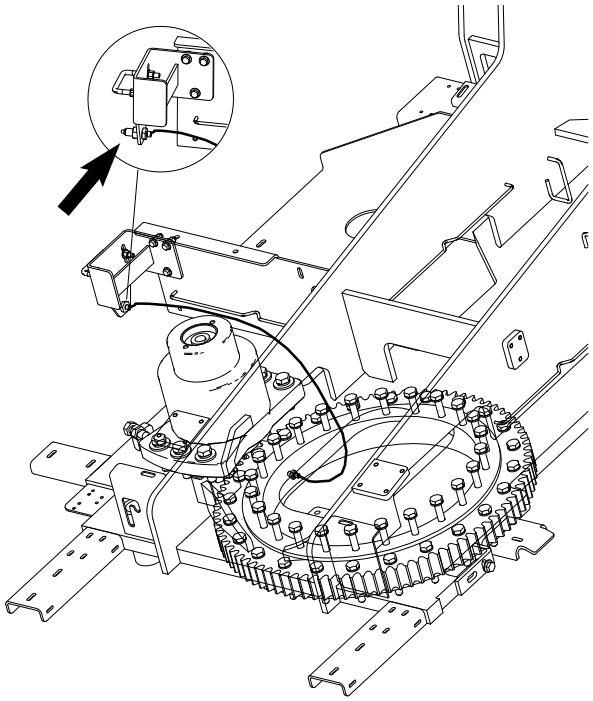


Figure 5-16

- Amount: as needed
- Lubricant: ZL-3 lithium-based grease

B-15 Inspect Platform Oscillating Cylinder Fasteners

Regularly inspecting the platform oscillating cylinder fasteners is vital to the proper and safe operation of the machine.

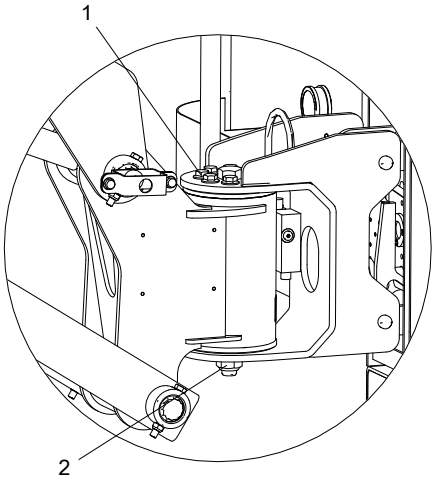


Figure 5-17

1. Place the machine in stowed position.
2. Locate the platform oscillating motor.
3. Check whether the bolt #1 as indicated in the above figure is tightened with specified torque (70Nm [52ft-lb]).
4. If necessary, replace the bolt, tighten it with specified torque, and apply threadlocker Loctite 272.
5. Check whether the bolt #2 as indicated in the above figure is tightened with specified torque (630Nm [465ft-lb]).
6. If necessary, replace the bolt, and tighten it with specified torque.

B-16 Test Cylinder Drift

Platform drift

Measuring the drift from platform to ground: with rated load on platform and power off, fully extend the main boom. The maximum allowable drift in 10 minutes is 50mm (1.97 in). If the test result exceeds this value, please proceed as below.

Cylinder drift

Table 5-10

Cylinder Bore Diameter (mm/in)	Maximum Allowable Drift in 10 Minutes (mm/in)
63/2.48	0.96/0.037
80/3.15	0.63/0.025
100/3.94	0.39/0.015
125/4.92	0.23/0.009
160/6.30	0.14/0.006
180/7.09	0.13/0.005
200/7.87	0.10/0.0038
220/8.66	0.08/0.0030

- Measure drift at cylinder rod with a calibrated dial indicator.
- The oil in cylinder must be at ambient temperature and consistent.
- The cylinder must be applied with normal load from the platform.
- The cylinder is acceptable if it passes this test.

NOTE: This information is based on 6 drops per minute cylinder leakage. Since the hydraulic oil expands or contracts due to thermal effect, thus the test value of cylinder drift may have a tolerance of 7/10000 for each temperature change of 1℃.

B-17 Test Counterbalance Valve Locking

NOTICE

After exhausting the oscillate cylinders, test the counterbalance valve locking, thereafter test the oscillate system quarterly, or after replacing any system component, or when any system malfuction is discovered.

1. Place a 120mm (4.7 in)wooden block with bevel side in front of the front left wheel of the machine.
2. Extend the boom by at least 1.2m to place the machine in operating position.
3. Drive the machine to rest the front left wheel on the wooden block.
4. Slowly rotate the turntble to the right by 90 degrees.
5. The rear detection indicator light will illuminates, move the function switches to keep the boom horizontal and fully extended.
6. Inspect the oscillate cylinder, ensure the oscillate cylinder on the side with load applied is without any evidence of retracting, and then retract the boom.
7. Move the reverse drive switch to drive the machine off the wooden block.

8. The assistant on the ground should inspect whether the wheel on the front left or rear right still remains off the ground, and keept it elevated.
9. Slowly rotate the turntable to allow the turntable back to the center position (at the center between the two drive wheels).
10. Drive the machine forward or reverse, the oscillate cylinder on the front left wheel should be released to lower the wheel to come in close contact with the ground.
11. Perform the same procedure to test the oscillate cylinder on the front right side.
12. If the oscillate cylinder malfunctions, the malfuction must be cleared by qualified service technician before proceeding to next step.

B-18 Test Oscillate Outriggers

⚠ WARNING

TIPPING HAZARD

To perform this test, the machine must be in stowed position.

1. Inspect the tie rod of multi-way valve is properly secured before machine startup.
2. Start the machine at the platform controller.
3. Drive the machine to allow the right steer wheel upon the kerb or a block with thickness of 120mm (4.7 in).
4. The other 3 wheels of the machine should come in close contact with the ground.
5. Drive the machine to allow the left steer wheel upon the kerb or a block with thickness of 120mm (4.7 in).
6. The other 3 wheels of the machine should come in close contact with the ground.
7. Drive the machine to allow the both steer wheels upon the kerb or a block with thickness of 120mm (4.7 in).
8. The non-steer wheels of the machine should come in close contact with the ground.

B-19 Inspect Battery

The condition of battery could affect the performance of machine. Improper level of battery electrolyte or damaged cable and wiring may damage battery parts and pose dangerous conditions.

⚠ WARNING

ELECTROCUTION HAZARD

- **Contact with live circuit may cause serious injury or death. Be sure to wear goggles, gloves and protective clothing.**

- **Remove all rings, watches and other jewelry.**

⚠ WARNING

CHEMICAL BURN HAZARD

- **Avoid the battery acid escaping out and contact with skin, if does, wash the skin with plenty of clear water and seek medical assistance.**
- **If battery acid spills, use water mixed with bicarbonate (baking soda) to neutralize the acid.**

Note: Before performing this procedure, fully charge the battery, and hold it still for 24 hours to equalize the battery cells.

1. Ensure the battery cells are wired reliably with the locking nuts torqued to the specifications as below:

Nut type	Torque
M8	9 ~ 11Nm (6.6 ~ 8.1ft-lb)
M10	18 ~ 23Nm (13.2 ~ 17ft-lb)

NOTICE

Improper connection may cause reduced performance, damaged terminals, fusions and even fires.

2. Ensure the battery negative and positive are correctly connected.
3. Ensure the battery cable connections are not corroded.

   Note: Adding a terminal protector and anti-corrosion sealant will prevent the terminals and cables from corrosion.

   The instructions below are applied only for batteries requiring maintenance：

4. Wear goggles, gloves and protective clothing.
5. Remove the ventilation cover.
6. Top up the liquid gravity meter and drain it for two or three times, then take a sample from the battery electrolyte.
7. Measure the specific gravity of all battery cells in sequence and note down the readings.
8. If the ambient temperature is above 27℃ (80°F), add 0.004 to calibrate the specific gravity reading for every 5℃ (40°F) higher; if the ambient temperature is below 27℃ (80°F), subtract 0.004 to calibrate the specific gravity reading for every 5℃ (40°F) lower.
   - Result 1: if the specific gravity reading of each battery cell is 1.250 or higher, and the difference in the specific gravity readings is less than 0.050, proceed with the next step.
   - Result 2: if the specific gravity reading of one or more battery cells is below 1.250, it indicates the battery is running low and needs charging. After charging, measure the specific gravity, and if the Result 1 is obtained, proceed with the next step.
   - Result 3: if the difference in the specific gravity readings of any battery cells is greater than 0.050, equalize the battery pack and hold it still for 6 hours before re-measurement of the specific gravity. If the Result 1 is obtained, proceed with the next step.

   Note: if the Result 1 cannot be obtained even after many attempts, the battery may have malfunctions.
9. Check the battery electrolyte level, and add distilled water to the required level if needed.
10. Install the ventilation cover to the battery.

B-20 Test Braking Distance

The brake device must be kept in good condition and work smoothly to ensure the normal and safe operation of the machine.

1. Depress the foot switch.
2. Slowly deflect the drive/steer proportional control joystick to full drive speed position.
3. Push upward the drive high/low speed select switch on the platform controller to switch the drive speed to high speed.
4. Quickly release the drive/steer proportional control joystick after the machine runs stably.
5. Measure the braking distance of the machine.

   Result: the braking distance should be: s≤2m (6.56 ft).

NOTICE
The brake must be able to hold the machine on any slope it is able to climb.

CHECKLIST C PROCEDURES

C-1 Replace Air Filter of Hydraulic Tank

Keeping the breather cap of hydraulic tank in well-ventilated condition is vital to normal operation of hydraulic pump and extending service life. An unclean or blocked air filter of hydraulic tank may cause the hydraulic pump to suction improperly, and continued operation may result in component damage. The air filter of hydraulic tank should be inspected more often in hostile operating environment.

1. Remove the air filter of hydraulic tank (located as shown in ***B-6 Inspect Air Filter of Hydraulic Tank, page 5-13*** with a wrench).
2. Install a new air filter and tighten it.

C-2 Inspect Weighing System

Before the test, fully luff the boom up and down and telescope the boom in and out twice to ensure the pulley and track are adequately lubricated. With the boom fully retracted and positioned less than 15° above the horizontal plane and with the boom raised to be more than 15° above the horizontal plane separately, gradually apply loads on the platform. The test results shall be as follows:

Table 5-11

Mode	Test results
KG mode	When the load on the platform exceeds 454kg (1000 lb), the buzzer on the platform and turntable will sound, the overload indicator light will flash, and all functions will be disabled. After the overloaded object is removed, all functions will be resumed.
Non-KG mode	When the load on the platform exceeds 454kg (1000 lb), the buzzer on the platform and turntable will sound, the overload indicator light will flash, and certain functions will be disabled. But the telescoping boom will be allowed to retract. After the telescoping boom is fully retracted, main boom and articulated boom lowering as well as turntable rotation will be allowed. After the overloaded object is removed, all functions will be resumed.

⚠ WARNING

TIPPING HAZARD

While performing override operation on the machine, please avoid operation in a dangerous direction.

For overseas models, with the machine in the KG mode, if activating any function switch while flipping the emergency power switch after an overload alarm, the override operation should be performed, and the corresponding action can be performed. The time of the override operation and the actual weight on the platform are recorded on the display.

NOTICE

Override operation is an emergency operation in an emergency state. Before conducting any override operation, please make sure the surrounding area and the whole machine are in a safe state, try to avoid operation in a dangerous direction and ensure personal safety.

CHECKLIST D PROCEDURES

D-1 Replace Drive Reducer Gear Oil

Regularly replacing drive reducer gear oil is vital to good machine performance and extending service life of the reducer.

1. Drive the machine to rotate the reducer to the position with one bolt at the bottom, as shown in the figure below.

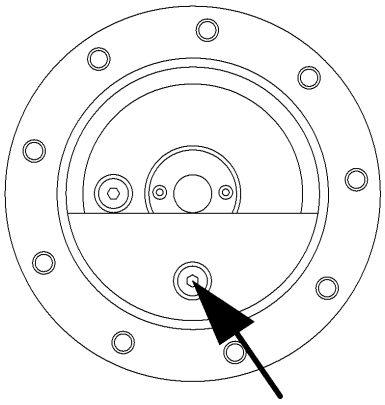


Figure 5-18

2. Place a suitable vessel under the bolt as indicated by the arrow in the figure.
3. Remove the bolt as indicated.
4. Fully drain the drive reducer gear oil to the vessel.
5. Mount back the loosened bolt.
6. Drive the machine to rotate the reducer until one bolt is at top and the other is at 90 degrees.

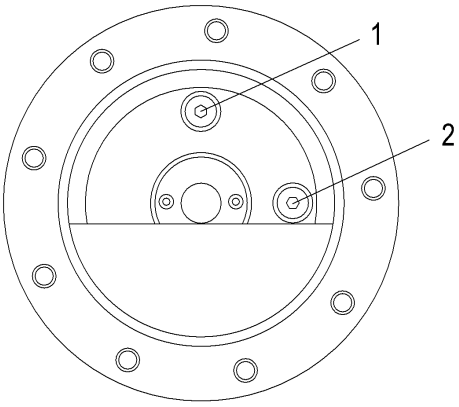


Figure 5-19

7. Remove the #1 and #2 bolts as indicated.
8. Add new gear oil to the port #1 until the oil level is even with that of the port #2.

9. Mount back the bolts.
10. Clean up the oil spills in performing the inspection procedure.
11. Perform the same procedure on all drive reducers of the machine.

D-2 Replace Slewing Reducer Gear Oil

Regularly replacing slewing reducer gear oil is vital to good machine performance and extending reducer service life.

1. Open the left side cover of turntable, and locate the slewing reducer.
2. Place a suitable vessel under the drain plug of the slewing reducer.
3. Remove the drain plug.
4. Fully drain the slewing reducer gear oil to the vessel.
5. Mount back the drain plug.
6. Remove the fill plug (for the location, reference ***B-12 Inspect Slewing Reducer Oil Level, page 5-16***), add new gear oil to the fill port until the oil level is even with the bottom of the fill plug.
7. Mount back the fill plug.
8. Clean up the gear oil spills in performing the inspection procedure.

D-3 Replace Hydraulic Oil

Regularly replacing hydraulic oil is vital to good machine performance and extending service life. Unclean hydraulic oil may cause the machine to operate poorly and continued use may result in hydraulic component damage. It is recommended to change the hydraulic oil every year or every 1,000 hours. Particularly harsh working environment requires oil change to be performed more frequently.

⚠ WARNING

BURN HAZARD

Before servicing the hydraulic system, allow the hydraulic oil to cool down to room temperature.

NOTICE

The inspection must be performed with the machine off.
Before re-installing the removed hoses and fittings, check whether the seals on the hoses and fittings are broken or missing; if any seal is damaged or missing, replace the seal with a new one, or replace the hose assembly and fittings directly. When installing hoses and fittings, tighten them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 2-7****.*

1. Open the left turntable cover, and locate the hydraulic tank.
2. Close the hydraulic shutoff valve located on the side of hydraulic tank.
3. Remove the drain plug at the bottom of the tank, and completely drain the oil into a suitable vessel. For the capacity of hydraulic tank, please refere to ***Performance Parameters, page 2-1***. After the oil is completely drained, re-install the drain plug.

⚠ WARNING

HIGH PRESSURE HAZARD

Slowly remove the hydraulic elements to release oil pressure. Hydraulic oil under high pressure may penetrate the skin. Should any injury occur, go to a doctor at once.

4. Disconnect and plug the suction hoses.
5. Disconnect and plug the return hoses.
6. Remove the retaining bolts from the hydraulic tank cover, and remove the hydraulic tank cover.
7. Clean the inside of the tank with mild solvents, and remove the drain plug to empty the solvent.
8. After the hydraulic tank has been dried up, re-install the hydraulic tank cover, and re-attach the suction hoses and return hoses onto the hydraulic tank.
9. Add new hydraulic oil as needed.

D-4 Replace Hydraulic Tank Suction Filter

Regularly replacing hydraulic tank suction filter is vital to good machine performance and extending service life. Dirty hydraulic oil may cause the machine to function improperly and continued use may result in hydraulic component damage. Extremely dirty working environment requires the oil change to be performed more frequently.

When performing the procedure ***D-3 Replace Hydraulic Oil, page 5-23***, the hydraulic tank suction filter must also be replaced.

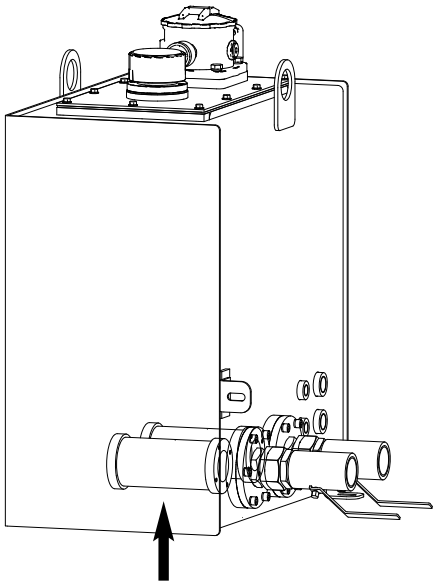


Figure 5-20

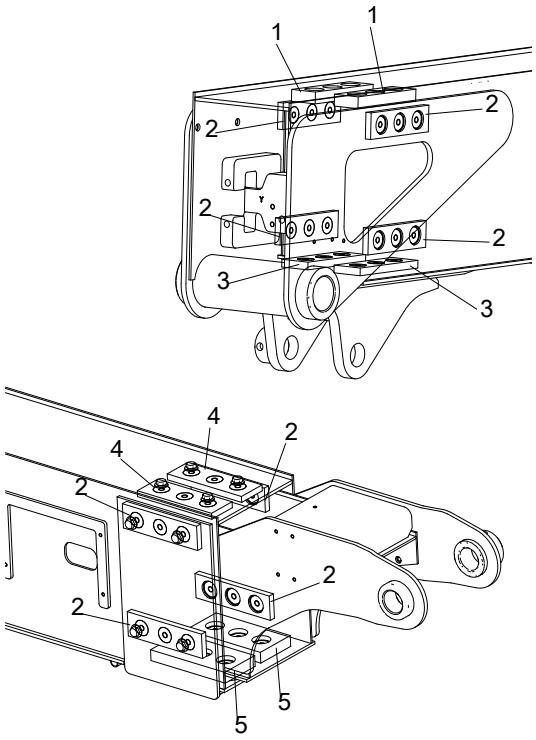


Figure 5-21

D-5 Inspect Boom Wear Pads

Regularly inspecting the boom wear pads is vital to safe machine operation. As friction pair will develop between each wear pad and the telescopic boom surface, improperly shimmed wear pads or continued use of extremely worn wear pads may lead to component damage and unsafe operating conditions.

1. Remove the covers or nylon brushes from both ends of the boom.
2. Measure the thickness of each wear pad as indicated in the above figure. The wear pad thickness specifications are listed in the table below.

Table 5-12

NO.	Thickness Specifications
1	20mm (0.79in)
2	11mm (0.43in)
3	13mm (0.51in)
4	11mm (0.43in)
5	20mm (0.79in)

3. When the wear extent of the wear pad is greater than or equal to 3mm (0.118in.), the wear pad assembly should be replaced immediately.

NOTICE

The wear pad disassembled from the boom should never be reused. Make sure to replace it with a new wear pad assembly.

6 REPAIR PROCEDURES

⚠ WARNING

Repair procedures shall be completed by a person trained and qualified on the repair of this machine.

Immediately tag and remove from service a damaged or malfunctioning machine.

Repair any machine damage or malfunction before operating the machine.

Before machine startup :

- **Read, understand and obey the safety rules and operating instructions contained in operation manual.**
- **Read all procedures and rules.**
- **Unless otherwise specified, perform each repair procedure with the machine in the following configuration:**
  - **Machine parked on a firm, level surface.**
  - **Platform in the stowed position.**
  - **Key switch in the OFF position with the key removed.**
  - **All wheels choked.**

BOOM AND PLATFORM COMPONENTS

Boom and Platform System

Platform Control Enable System

The platform control system employs time-dependent enable circuits to limit the time availability of “live” or enabled controls. After the footswitch is depressed, the controls will be enabled and the operator has 7 seconds to operate any function. The controls will remain enabled as long as the operator continues to perform any function, and will remain enabled 7 seconds after the last function is stopped. While the controls is “active”, the enabled light on the platform display panel will be illuminated. After the time limit, the enabled light will turn off and the controls will be “dead” or disabled. To continue using the machine, the controls must be re-enabled to start the timer system again. This can be realized by releasing all control buttons handles and footswitch, and then re-depressing the footswitch.

Transport Position Sensing System

The transport position sensing system depends on two angle sensors mounted on the upper connecting frame and a travel switch installed on the main boom. The system will identify the machine as in operating position when the angle sensor detects that the angle of the raised main boom is more than 0° above the horizontal plane or the angle of the raised articulated boom is more than -5° above the horizontal plane, or the travel sensor detects that the telescopic boom is not fully retracted, otherwise the system identify the machine as in the non-operating position. The position of the jib boom is not taken into account.

This system is used to control the following systems:

- Drive Speed Reduction System

Drive Speed Reduction System

When the boom is positioned in operating position, the drive speed is automatically restricted to operating speed mode.

Platform Controller

⚠ WARNING

ELECTROCUTION HAZARD

Before performing this procedure, be sure to disconnect the battery and the charger on AC outlet. Contact with live conductors may result in death or serious injury.

NOTICE

Perform this procedure with the machine in stowed position.

1. Disconnect external power supply, and push in the emergency stop buttons on the platform and ground controllers to OFF position.

2. Locate the cable connected to the bottom of the platform controller.
3. Disconnect and tag the cable from the bottom of the pltaform controller.
4. Remove the retaining bolts from the platform controller.
5. Remove the platfrom controller from the machine.

Platform

1. Remove the platform controller from the platform. For the specific procedure, please refer to ***Platform Controller, page 6-1***.
2. Remove the footswitch.
3. Tie up the platform with slings of an appropriate lifting device.
4. Remove the platform mounting bolts.

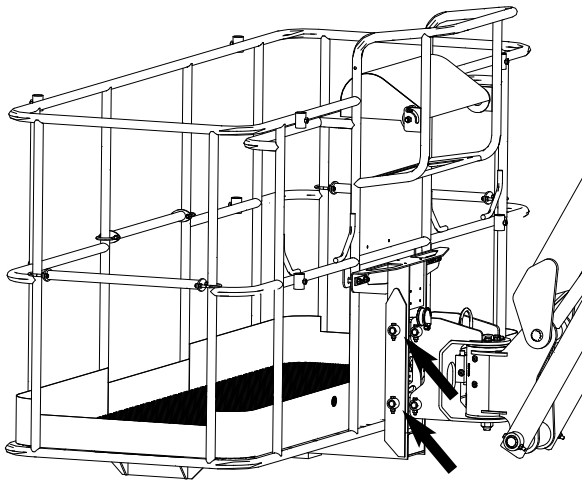


Figure 6-1

5. Use a brass drift and wooden hammer to tap the connecting pin out.
6. Slowly move the platform away with the lifting device.

Platform Oscillating Motor

NOTICE

Perform this procedure with the machine in stowed position.

NOTICE

Before re-installing the removed hoses and fittings, check whether the seals on the hoses and fittings are broken or missing; if any seal is damaged or missing, replace the seal with a new one, or replace the hose assembly and fittings directly. When installing hoses and fittings, tighten them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 2-7***.

The oscillating cylinder serves to drive the platform to rotate within 160°.

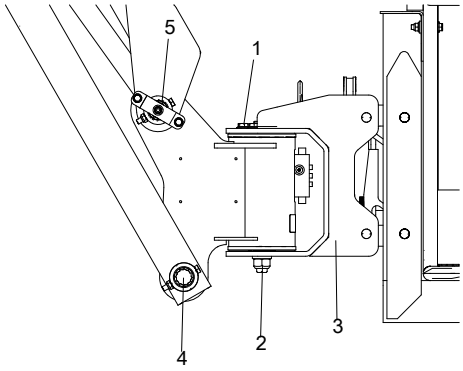


Figure 6-2

1. Remove the platform.
2. Tag, disconnect and plug the hydraulic hoses on the two ports of oscillating cylinder, and cap the fittings on the manifold.
3. Use a suitable device to support the bracket 3# of platform oscillating motor.
4. Remove the retaining bolt 1# and pivot pin 2#, and then remove the bracket 3# of oscillating motor.
5. Use a suitable device to support the platform oscillating motor.
6. Remove the retaining bolts and nuts securing the pivot pin 4# to the platform oscillating motor and the retaining bolts, nuts and folded plate securing the pivot pin #5 to the platform oscillating motor.
7. Remove the platform oscillating motor.

Jib Boom Assembly

⚠ WARNING

MOVING OBJECT HAZARD

Wear eye protection when tapping the brass drift with a wooden hammer.

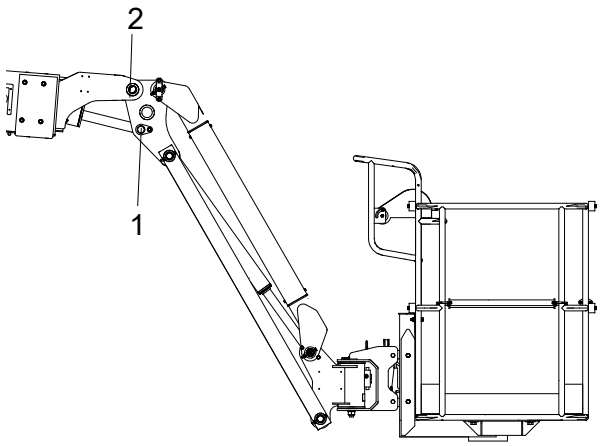


Figure 6-3

Removing the jib boom assembly

NOTICE

Before re-installing the removed hoses and fittings, check whether the seals on the hoses and fittings are broken or missing; if any seal is damaged or missing, replace the seal with a new one, or replace the hose assembly and fittings directly. When installing hoses and fittings, tighten them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 2-7****.*

1. Position the main boom horizontal, and attach the jib boom assembly to a suitable crane.
2. Use a suitable device to support the upper leveling cylinder and the lower linkage of jib boom.
3. Remove the bolt and nut at the pivot pin 1# connecting the lower linkage of jib boom, and tap the pivot pin 1# out with a brass drift and wooden hammer.
4. Remove the bolt at the pivot pin 2# connecting the telescopic boom of main boom, and tap the pivot pin 2# out with a brass drift and wooden hammer.
5. Slowly lift the jib boom assembly off the main boom with the crane.

Inspecting the jib boom assembly

NOTICE

When inspecting the pins and bearings, please see ***Pins and composite bearing, page 4-5****.*

- Check the pivot pin for wear, scratch, deformation or other damage, and replace the pivot pin if needed.
- Check the inside of bearing for wear, scratch, deformation or other damage, and replace the bearings if needed.
- Check the luffing cylinder connecting pin for wear, scratch, deformation or other damage. Before installation, ensure the pin surface is subject to protective treatment. Replace the pin if needed.
- Check the inside of the bearing connecting the platform oscillating motor for wear, scratch, deformation or other damage, and replace the bearing if needed.
- Check all threaded parts for elongation, thread deformation, torsion or other damage, and replace the parts if needed.
- Check all structures of jib boom assembly for deformation, cracks, weld detachment or other damage, and replace the jib boom if needed.

Platform Leveling Cylinder

⚠ WARNING

MOVING OBJECT HAZARD

Wear eye protection when tapping the brass drift with a wooden hammer.

NOTICE

When removing the cylinder, special care should be taken to avoid the fall of the cylinder and component damage.

The platform leveling cylinder can ensure that the platform remains level relative to the turntable throughout the entire working envelope of the boom.

1. Extend the boom until the pivot pin at the rear of the platform leveling cylinder is accessible.
2. Slightly raise the boom and place a support under the platform.
3. Lower the boom until the platform sits on the support. Take special care not to put the entire weight of boom on the support.
4. Tag, disconnect and plug the hydraulic hoses in the boom and cylinder, and plug the fittings.
5. Remove the retaining bolt at the rod-end pivot pin #1 of the platform leveling cylinder, and do not move the pivot pin.

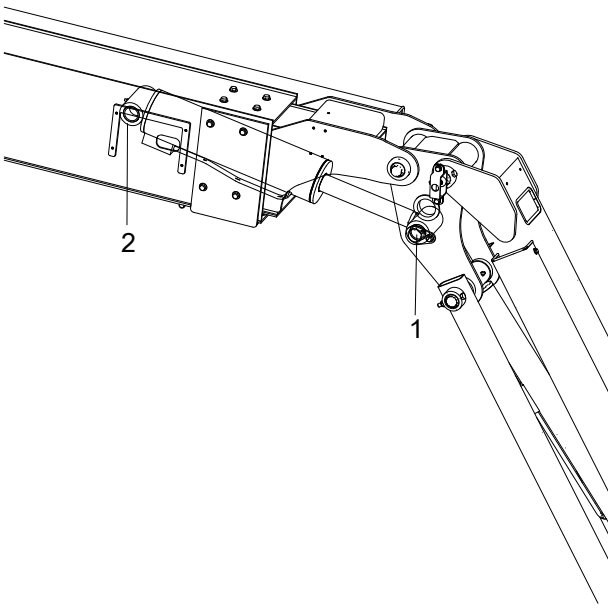


Figure 6-4

6. Remove the retaining ring at the pivot pin #2, and do not move the pivot pin.
7. Support the platform leveling cylinder with an appropriate supporting device to protect the piston rod from damage.
8. Use a brass drift and wooden hammer to tap the pivot pin #1 out.
9. Use a brass drift and wooden hammer to tap the pivot pin #2 out.
10. Carefully remove the cylinder from the boom.

Cable Track Assembly

NOTICE

Before re-installing the removed hoses and fittings, check whether the seals on the hoses and fittings are broken or missing; if any seal is damaged or missing, replace the seal with a new one, or replace the hose assembly and fittings directly. When installing hoses and fittings, tighten them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 2-7****.*

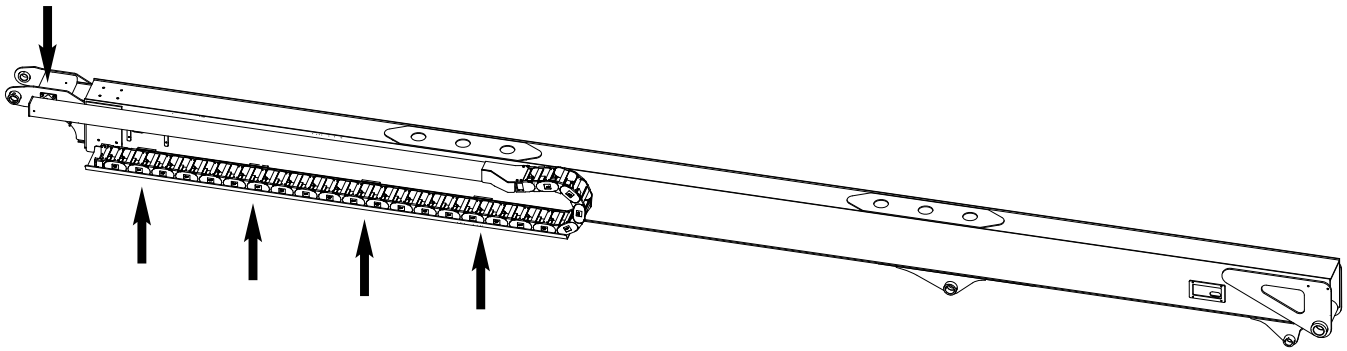


Figure 6-5

1. Tag, disconnect and plug all hydraulic hoses and cables from cable track guide of the boom to the platform.
2. Remove the hydraulic hoses and cables from the cable track guide.
3. Using a suitable lifting device, fully support the cable track along the entire length.
4. Remove the bolts as indicated by the arrows in the above figure.
5. Using the lifting device, slowly move the cable track away from the boom.

Main Boom Assembly

⚠ WARNING

MOVING OBJECT HAZARD

Wear eye protection when tapping the brass drift with a wooden hammer.

NOTICE

Before re-installing the removed hoses and fittings, check whether the seals on the hoses and fittings are broken or missing; if any seal is damaged or missing, replace the seal with a new one, or replace the hose assembly and fittings directly. When installing hoses and fittings, tighten them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 2-7****.*

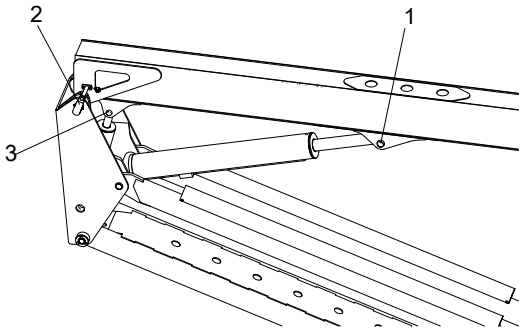


Figure 6-6

1. Place the machine on flat, firm ground.
2. Slightly raise the boom until the main boom luffing cylinder and lower platform leveling cylinder are accessible.
3. Tag and remove the hydraulic hoses and cables to the chassis/turntable.
4. Using a suitable lifting device (capacity not less than 2t), secure the lifting straps to the main boom end.
5. Remove the bolt and nut at the pivot pin #1 connecting the piston rod end of main boom luffing cylinder with the main boom.

⚠ WARNING

UNSAFE OPERATION HAZARD

Throughout the process, use a suitable supporting device to support the main boom luffing cylinder to prevent injury or damage due to the unintended movement of cylinder.

6. Using a brass drift and wooden hammer, tap the pivot pin #1 out.
7. Remove the bolt and nut at the pivot pin #3 connecting the piston rod end of lower platform leveling cylinder with the main boom.

⚠ WARNING

UNSAFE OPERATION HAZARD

Throughout the process, use a suitable supporting device to support the lower platform leveling cylinder to prevent injury or damage due to the unintended movement of cylinder.

8. Using a suitable lifting device (capacity not less than 2t), secure the lifting straps to the lower end of the main boom.
9. Remove the bolt and nut at the pivot pin #2 connecting the boom assembly with the upper connecting frame.
10. Using a brass drift and wooden hammer, tap the pivot pins #2 and #3 out.
11. Using a lifting device, slowly move the boom assembly away from the turntable.

Telescopic Boom Assembly

NOTICE

Before re-installing the removed hoses and fittings, check whether the seals on the hoses and fittings are broken or missing; if any seal is damaged or missing, replace the seal with a new one, or replace the hose assembly and fittings directly. When installing hoses and fittings, tighten them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 2-7****.*

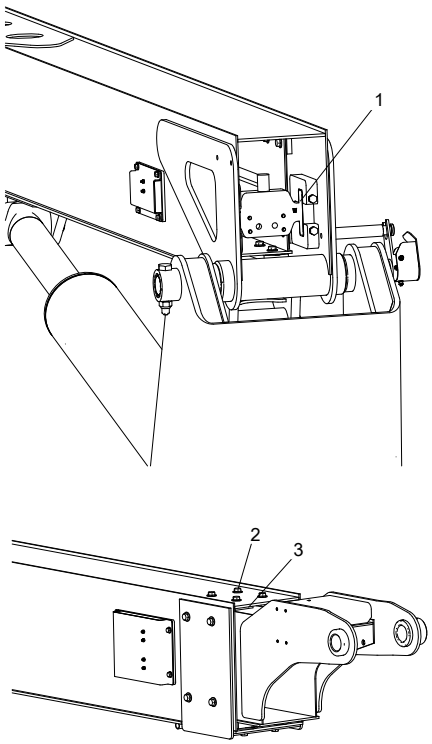


Figure 6-7

1. Remove the retaining bolts and gaskets at the stopper #1 of the piston rod end of main boom telescopic cylinder and remove the stopper.
2. Remove the screws and gaskets at the upper surface and both sides #2 and the sliding blocks and gaskets at position #3 of the boom tail-end.
3. Pull out the telescopic boom together with the main boom telescopic cylinder from the main boom tail-end, and place it on a suitable support.

⚠ WARNING

UNSAFE OPERATION HAZARD

Take care not to rotate the telescopic cylinder.

4. Remove the bolts securing the telescopic cylinder end, and pull out the telescopic cylinder from the telescopic boom head.
5. Place the telescopic cylinder on a suitable support.

Articulated Boom Assembly

⚠ WARNING

MOVING OBJECT HAZARD

Wear eye protection when tapping the brass drift with a wooden hammer.

NOTICE

Before re-installing the removed hoses and fittings, check whether the seals on the hoses and fittings are broken or missing; if any seal is damaged or missing, replace the seal with a new one, or replace the hose assembly and fittings directly. When installing hoses and fittings, tighten them according to the specified torque. See ***Hydraulic Hose and Fitting Specifications, page 2-7****.*

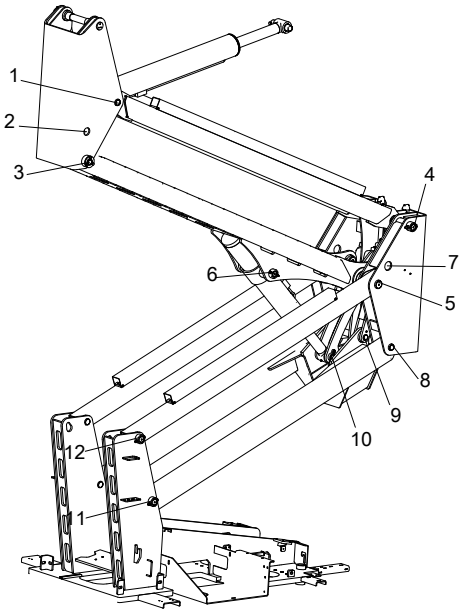


Figure 6-8

1. Remove the main boom assembly.
2. Support the articulated boom head, lower platform leveling cylinder, main boom luffing cylinder and upper linkage with a proper lifting device.
3. Remove the bolt and nut at the pivot pin #1 connecting the main boom luffing cylinder end with the upper connecting frame, and remove the bolt and nut at the pivot pin #2 connecting the upper leveling cylinder end with the upper connecting frame.

4. Using a brass drift and wooden hammer, tap the pivot pins #1 and #2 out.
5. Lift the main boom luffing cylinder and lower platform leveling cylinder in turn with the lifting device.
6. Support the upper connecting frame with a proper lifting device.
7. Remove the bolt and nut at the pivot pin #3 connecting the upper connecting frame with the upper articulated boom.
8. Using a brass drift and wooden hammer, tap the pivot pin #3 out.
9. Using the lifting device, slowly move the upper connecting frame away.
10. Remove the bolt and gasket at the shaft assembly #4 connecting the upper linkage with the lower connecting frame, and remove the shaft assembly #4.
11. Using the lifting device, slowly move the upper linkage away.
12. Support the lower linkage with a proper lifting device.
13. Remove the bolt, gasket and snap-in plate at the pivot pin #5 connecting the lower linkage with the lower connecting frame.
14. Remove the bolt and nut at the pivot pin #12 connecting the lower linkage with the turntable.
15. Using a brass drift and wooden hammer, tap the pivot pins #5 and #12 out in turn.
16. Using a lifting device, slowly move the lower linkage away.
17. Support the upper articulated boom, articulated boom luffing cylinder, lower connecting frame and lower articulated boom with a proper lifting device.
18. Remove the bolt and nut at the pivot pin #6 connecting the upper articulated boom with articulated boom luffing cylinder.
19. Using a brass drift and wooden hammer, tap the pivot pin #6 out.
20. Remove the bolt and gasket at the shaft assembly #7 connecting the upper articulated boom with the lower connecting frame, and remove the shaft assembly #7.
21. Using the lifting device, slowly move the upper articulated boom away.
22. Remove the bolt and stop pin at the pivot pin #10 connecting the lower articulated boom luffing cylinder and lower connecting frame.
23. Using a brass drift and wooden hammer, tap the pivot pin #10 out.
24. Using the lifting device, slowly move the articulated boom luffing cylinder away.
25. Remove the bolt, gasket and snap-in plate at the pivot pin #8 connecting the lower connecting frame with the lower articulated boom.
26. Using a brass drift and wooden hammer, tap the pivot pin #8 out.
27. Using the lifting device, slowly move the lower connecting frame away.
28. Remove the bolt, gasket and snap-in plate at the pivot pin #9 connecting the linkage with the lower articulated boom.
29. Using a brass drift and wooden hammer, tap the pivot pin #9 out.
30. Using the lifting device, slowly move the linkage away.
31. Remove the bolt and nut at the pivot pin #11 connecting the lower articulated boom with the turntable.
32. Using a brass drift and wooden hammer, tap the pivot pin #11 out.
33. Using the lifting device, slowly move the lower articulated boom away.

CHASSIS AND TURNTABLE COMPONENTS

Tires and Rims

Replacing tires and rims

Hunan Sinoboom Intelligent Equipment Co., Ltd. recommends the replacement tires be of the same size, ply rating and brand as the original tires. For the part number of a specific machine model, please reference the Part Manual. If the replacement tires are not as Hunan Sinoboom Intelligent Equipment Co., Ltd. recommends, the following requirements of tires should be met:

1. Ply rating/rated load and dimension equal to or greater than original.
2. Tire tread contact width equal to or greater than original.
3. Wheel diameter, width and offset dimensions equal to the original.
4. Approved for the application by the tire manufacturer (including intended purposes, maximum drive speed and maximum tire load).
5. Due to size variations between different tire brands, both tires on the same axle should be of the same brand.

⚠ WARNING

UNSAFE OPERATION HAZARD

The tires and rims installed on each product model have been designed for overall performance and stability requirements. Size changes such as rim width, center piece location, diameter, etc., without written factory recommendations, may result in an unsafe condition regarding stability.

Installing tires and rims

The pre-tightening torque of rim bolts must meets the requirements.

⚠ WARNING

UNSAFE OPERATION HAZARD

- **Make sure to use special tire nuts that match the rim bolts. The tire nuts must be installed and maintained at the proper torque to prevent loose tires, broken studs and possible dangerous separation of tires from the axle. Be sure to only use nuts that match the cone angle of the wheel.**
- **Tighten the lug nuts to the proper torque to prevent wheels from coming loose. Use a torque wrench to tighten the fasteners. If you do not have a torque wrench, tighten the fasteners with a socket wrench, then immediately have a service garage or dealer tighten the lug nuts to the proper torque. Over-tightening will result in breaking the studs or permanently deforming the mounting stud holes in the wheels.**

The correct steps to tighten the tire nuts are as follows:

1. First apply the threadlocker Loctite 272 to the nuts, then hand tighten all nuts to prevent loosening. Do not use lubricants on threads or nuts.
2. Tighten the nuts in the sequence as shown below.

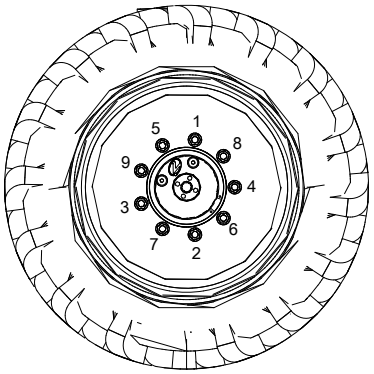


Figure 6-9

3. The nuts should be tightened in stages. Following the recommended sequence, tighten nuts with the torque as listed in the table below.

Table 6-1

1st Stage	2nd Stage	3rd Stage
150Nm (111ft-lb)	240Nm (177ft-lb)	300Nm (221ft-lb)

NOTICE

Tire nuts should be tightened prior to first use of machine and after each wheel removal. Check and adjust the torque every 3 months or 150 hours of operation.

Reducer and Drive Motor

The reducer and drive motor serve for driving and securing tires, so before removing the drive motor and reducer, the machine should be fixed on a suitable frame or a jack with sufficient capacity should be placed under the chassis.

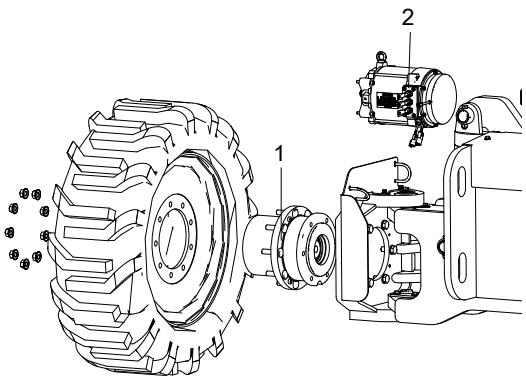


Figure 6-10

No.	Description
1	Reducer
2	Drive motor

Removal of reducer and drive motor

1. Place the machine on a solid, level surface.
2. Place a jack of sufficient capacity under the side of chassis to be removed. Lift the jack to make the wheels off the ground.
3. Remove the bolts and washers securing the wheels to the reducer. Use a suitable lifting device to remove the wheels.
4. Tag, disconnect and plug the cables connecting to the drive motor.
5. Remove the bolts and washers securing the flange of the drive reducer to the outriggers, then remove the flange, and lift the flange and the drive reducer away from the chassis.
6. Remove the motor mounting flange of the drive reducer. Take care not to damage the O-ring.
7. Remove the bolts securing the flange with the drive reducer.
8. Remove the bolts securing the flange with the drive motor.

Installation of reducer and drive motor

1. Use a lifting device with sufficient capacity to support the outriggers.
2. Install the drive motor, and tighten the bolts diagonally with a torque wrench.
3. Align the reducer brake oil port with the notch of support.
4. Fit the washer face with the mounting surface, apply threadlocker Loctite 272 to the bolts, and install the bolts in turns.
5. Tighten the bolts with a torque wrench.
6. After all bolts are installed, add appropriate amount of gear oil.
7. Clean the mounting surface, lift the motor, and align the motor with the reducer: mesh the spline shaft of the motor with the inner gear of the reducer and slowly rotate the motor housing until the motor mounting hole aligns with the reducer mounting screw.
8. Apply the threadlocker Loctite 272 to the bolts and torque the bolts after pre-tightening.
9. Attach the hydraulic hoses.
10. Install the wheels.

Turntable Slewing Mechanism

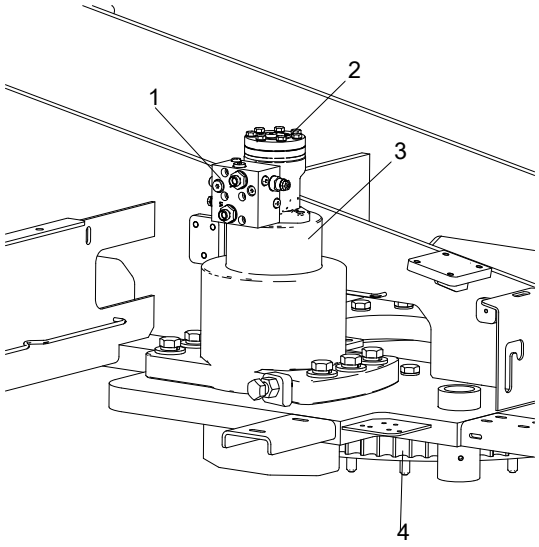


Figure 6-11

Table 6-2

No.	DESCRIPTION
1	Slewing buffering valve
2	Slewing motor
3	Slewing reducer
4	Slewing bearing

Removal of slewing drive device

1. Tag, disconnect and plug the hydraulic hoses of slewing buffering valve and slewing reducer.
2. Remove the bolt and washer connecting the slewing buffering valve, and then remove the slewing buffering valve from the slewing motor.
3. Remove the bolts securing the slewing reducer to the turntable, and then remove the slewing reducer.

Installation of slewing drive device

1. Clear the foreign matters and burrs on the mounting surface and gears of slewing reducer.
2. Place the slewing reducer on the turntable mounting surface, and use a feeler gauge to measure the gear backlash relative to the slewing bearing. Make sure the gear backlash falls within 0.15-0.25mm (0.006–0.01in).

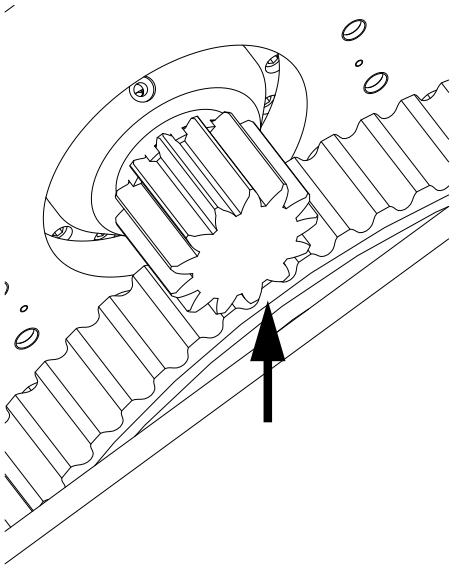


Figure 6-12

3. If the gear backlash exceeds the specified value, adjust the backlash to specified value with lock nuts.
4. With the washer on the bolt, apply threadlocker Loctite 272. Install the mounting bolts to secure the slewing reducer to the turntable, and then pre-tighten the bolts in diagonal order.
5. Ensure the slewing reducer fits in well with the turntable mounting surface.
6. Use a wrench to tighten the bolts in diagonal order.
7. Add gear oil to the slewing reducer until the gear surface is covered.
8. Clean the mounting surface of slewing reducer, and match the clevis pin of slewing motor with the reducer pin hole.
9. Rotate the motor housing to align the slewing motor bolt hole with the reducer bolt hole. Apply threadlocker Loctite 272 to the bolt with washer on, and install and tighten the bolts.

Installation of slewing bearing

1. Use a lifting device with sufficient capacity to lift the slewing bearing on the mounting surface of chassis.
2. Use a feeler gauge to measure the clearance between the mounting surface of the slewing bearing and that of the chassis, and ensure the clearance ≤0.2mm (0.008in).
3. Using the special washer for the high-strength bolt, match the washer face with the mounting surface, apply threadlocker Loctite 272 to the bolts, and install the bolts one by one.
4. Tighten the bolts in the sequence as shown in the figure below.

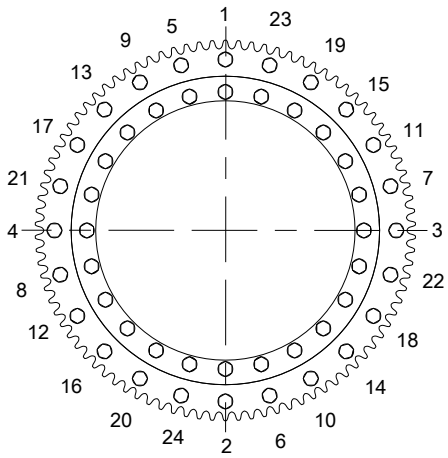


Figure 6-13

5. The bolts should be tightened in stages. Follow the stages and the recommended torques as listed in the table below to tighten the bolts.

Table 6-3

1st Stage	2nd Stage	3rd Stage
90Nm (66ft-lb)	180Nm (133ft-lb)	300Nm (221ft-lb)

6. Hand turn the inner ring of the slewing bearing, ensure it moves smoothly.
7. Detach the lifting device from the slewing bearing.
8. Rotate the inner ring of the slewing bearing until the soft strap area on the inner ring and that on the outer ring are symmetrically arranged around the center of the slewing bearing.
9. Using a lifting device, lift the turntable to the mounting surface of the slewing bearing.
10. Using the special washer for the high-strength bolt, match the washer face with the mounting surface, apply threadlocker Loctite 272 to the bolts, and install the bolts one by one.
11. Refer to ***Fig 6-12 , page 6-10***, and tighten the retaining bolts in the sequence as indicated.
12. Refer to ***Table 6-3 , page 6-10***, and tighten the bolts as per the recommended torques and sequence.

Battery Box

⚠ WARNING

Electrocution Hazard

- **Before removing the battery box, the charger power supply and the working power source of the whole machine must be cut off.**
- **Contact with live circuits may result in death or serious injury, so be sure to wear goggles, protective gloves and protective clothing.**
- **Remove all rings, watches and other accessories.**

This machine is equipped with two battery boxes, located on the left and right sides of the chassis.

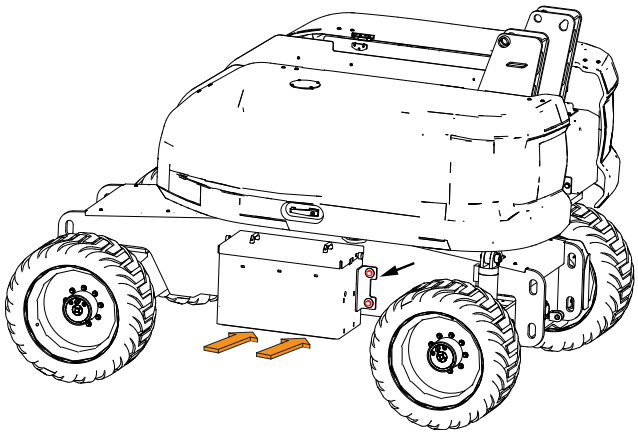


Figure 6-14

1. Locate the battery box on one side of the chassis.
2. Mark and disconnect the wires on the battery.
3. Place the forklift fork at the bottom of the battery box to be removed (as indicated by the arrow in ***Fig 6-13 , page 6-11***) to support the battery box.
4. Remove the mounting bolts on the left and right sides of the battery box.
5. Slowly lower the fork to remove the battery box from the chassis.

Battery

⚠ WARNING

Electrocution Hazard

- **Before removing the battery box, the charger power supply and the working power source of the whole machine must be cut off.**
- **Contact with live circuits may result in death or serious injury, so be sure to wear goggles, protective gloves and protective clothing.**
- **Remove all rings, watches and other accessories.**

Batteries are mounted in the battery boxes on both sides of the chassis and in the right turntable cover.

To remove batteries in the right turntable cover:

1. Open the right turntable cover to locate the batteries.
2. Mark and disconnect the wires on the battery.
3. Remove the battery (hoisting equipment is recommended).

To remove batteries in the battery boxes on both sides of the chassis:

1. Remove the battery box following the steps in ***Battery Box, page 6-11***.
2. Remove the battery (hoisting equipment is recommended).

HYDRAULIC SYSTEM

Layout of Hydraulic Elements

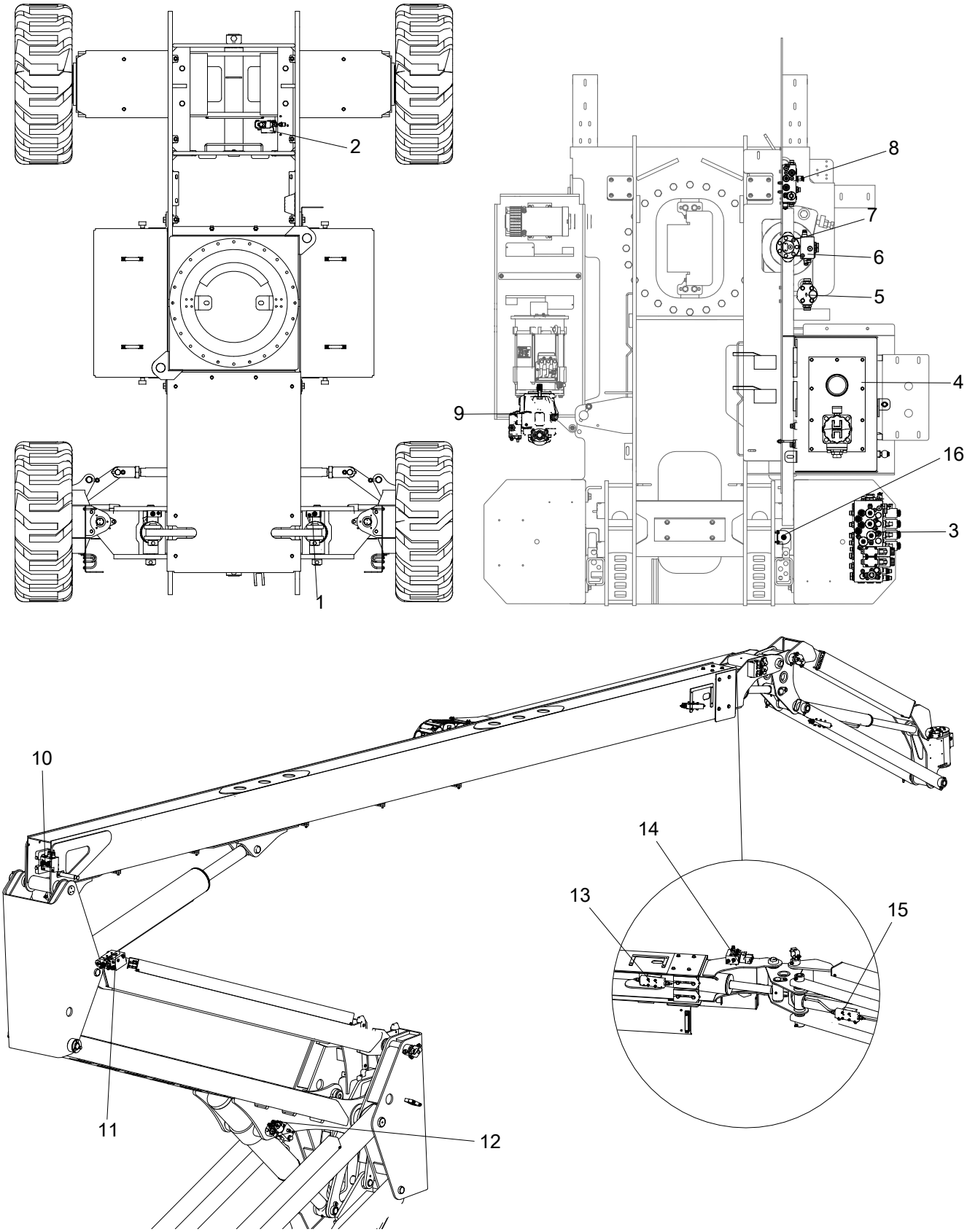


Figure 6-15

Table 6-4

1. Oscillating counterbalance valve	**7.** Cycloid motor	**13.** Leveling counterbalance valve
2. Oscillating multi-way valve	**8.** Oscillating control valve	**14.** Duplex platform valve
3. Boom function manifolds	**9.** Open-circuit variable displacement pump	**15.** Leveling counterbalance valve
4. Hydraulic oil tank	**10.** Telescoping counterbalance valve	**16.** Piston accumulator
5. High-pressure filter	**11.** Luffing control valve	
6. Slewing buffering valve	**12.** Luffing control valve	

Function Valves

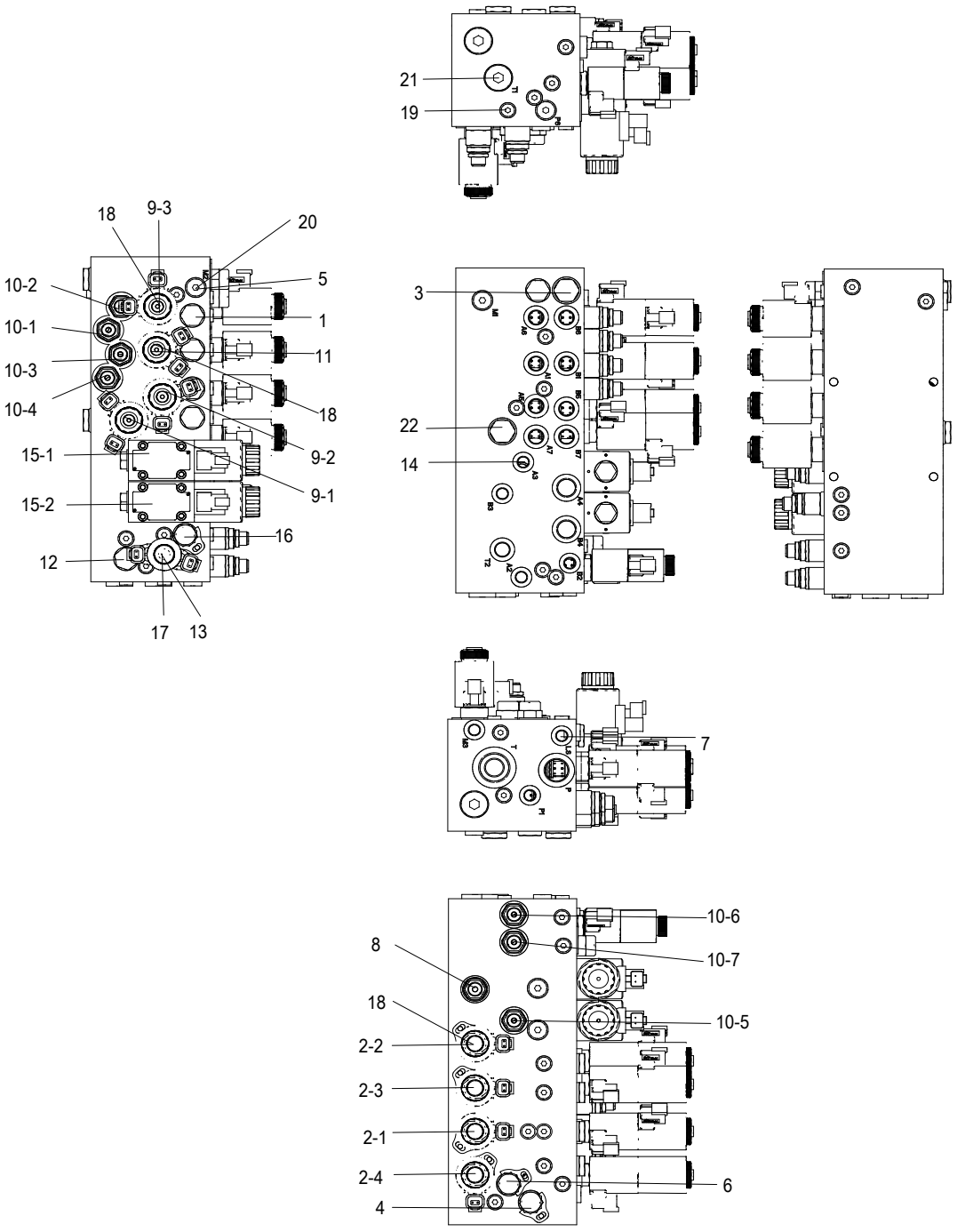


Figure 6-16 Boom function manifolds (PN.202040003308)

Table 6-5 Boom function manifolds (PN.202040003308)

NO.	NAME	TORQUE	FUNCTION
1	Check valve	40–45Nm (30–33ft-lb)	Keep fluid flowing in one way
2–1	Proportional valve	60Nm (44ft-lb)	Control the speed of main boom extending/retracting

NO.	NAME	TORQUE	FUNCTION
2–2	Proportional valve	60Nm (44ft-lb)	Control the speed of articulated boom luffing
2–3	Proportional valve	60Nm (44ft-lb)	Control the speed of main boom luffing
2–4	Proportional valve	60Nm (44ft-lb)	Control the speed of turntable rotation
3	Check valve	55–65Nm (41–48ft-lb)	Keep fluid flowing in one way
4	Compensator valve	24.4–27.1Nm (18–20ft-lb)	Release power unit pressure and adjust the speed of emergency operation
5	Damper	5Nm (9ft-lb)	\
6	Flow valve	30Nm (22ft-lb)	Release LS feedback pressure
7	Damper	5Nm (9ft-lb)	\
8	Relief valve	55–65Nm (41–48ft-lb)	Release system pressure to prevent overloading
9–1	Solenoid valve	40Nm (30ft-lb)	Control the direction of articulated boom lifting/lowering
9–2	Solenoid valve	40Nm (30ft-lb)	Control the direction of main boom lifting/lowering
9–3	Solenoid valve	40Nm (30ft-lb)	Control the direction of turntable rotation
10–1	Relief valve	40–45Nm (30–33ft-lb)	Limit left/right rotating pressure
10–2	Relief valve	40–45Nm (30–33ft-lb)	Limit left/right rotating pressure
10–3	Relief valve	40–45Nm (30–33ft-lb)	Control left/right steering pressure
10–4	Relief valve	40–45Nm (30–33ft-lb)	Control left/right steering pressure
10–5	Relief valve	40–45Nm (30–33ft-lb)	Limit the pressure of main boom extending/retracting
10–6	Relief valve	40–45Nm (30–33ft-lb)	Limit the pressure of leveling up/down
10–7	Relief valve	40–45Nm (30–33ft-lb)	Limit the pressure of leveling up/down
11	Solenoid valve	40Nm (30ft-lb)	Control steering direction
12	Hydraulic lock	43–47Nm (32–35ft-lb)	Maintain leveling pressure
13	Solenoid valve	30Nm (22ft-lb)	Control the direction of leveling up/down
14	Damper	5Nm (9ft-lb)	\
15–1	6-way solenoid valve	8Nm (6ft-lb)	Control the extension of main boom
15–2	6-way solenoid valve	8Nm (6ft-lb)	Control the retraction of main boom
16	Flow valve	30Nm (22ft-lb)	Maintain the stability of leveling movement
17	Coil	14Nm (10ft-lb)	\
18	Coil	14Nm (10ft-lb)	\
19	Choke plug	11–12Nm (8–9ft-lb)	\
20	Choke plug	25–28Nm (18–21ft-lb)	\

NO.	NAME	TORQUE	FUNCTION
21	Choke plug	72–82Nm (51–61ft-lb)	\
22	Check valve	67.8Nm (50ft-lb)	Keep fluid flowing in one way

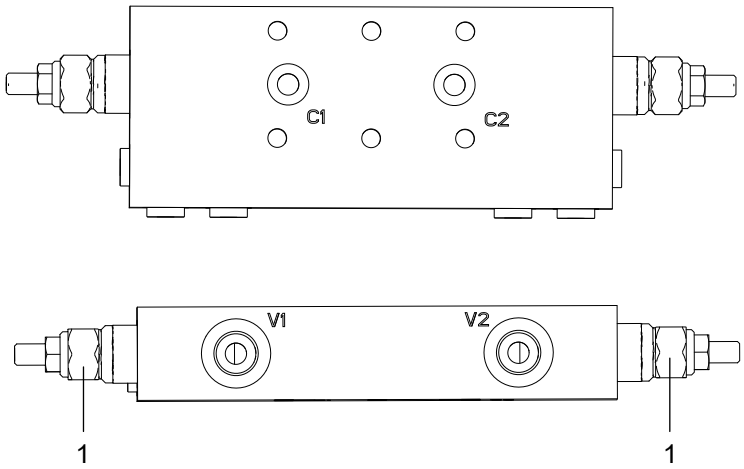


Figure 6-17 Oscillating counterbalance valve (PN.202040003032)

Table 6-6 Oscillating counterbalance valve (PN.202040003032)

NO.	NAME	TORQUE	FUNCTION
1	Counterbalance valve	40 ~ 45Nm (30 ~ 33ft-lb)	Maintain balanced load

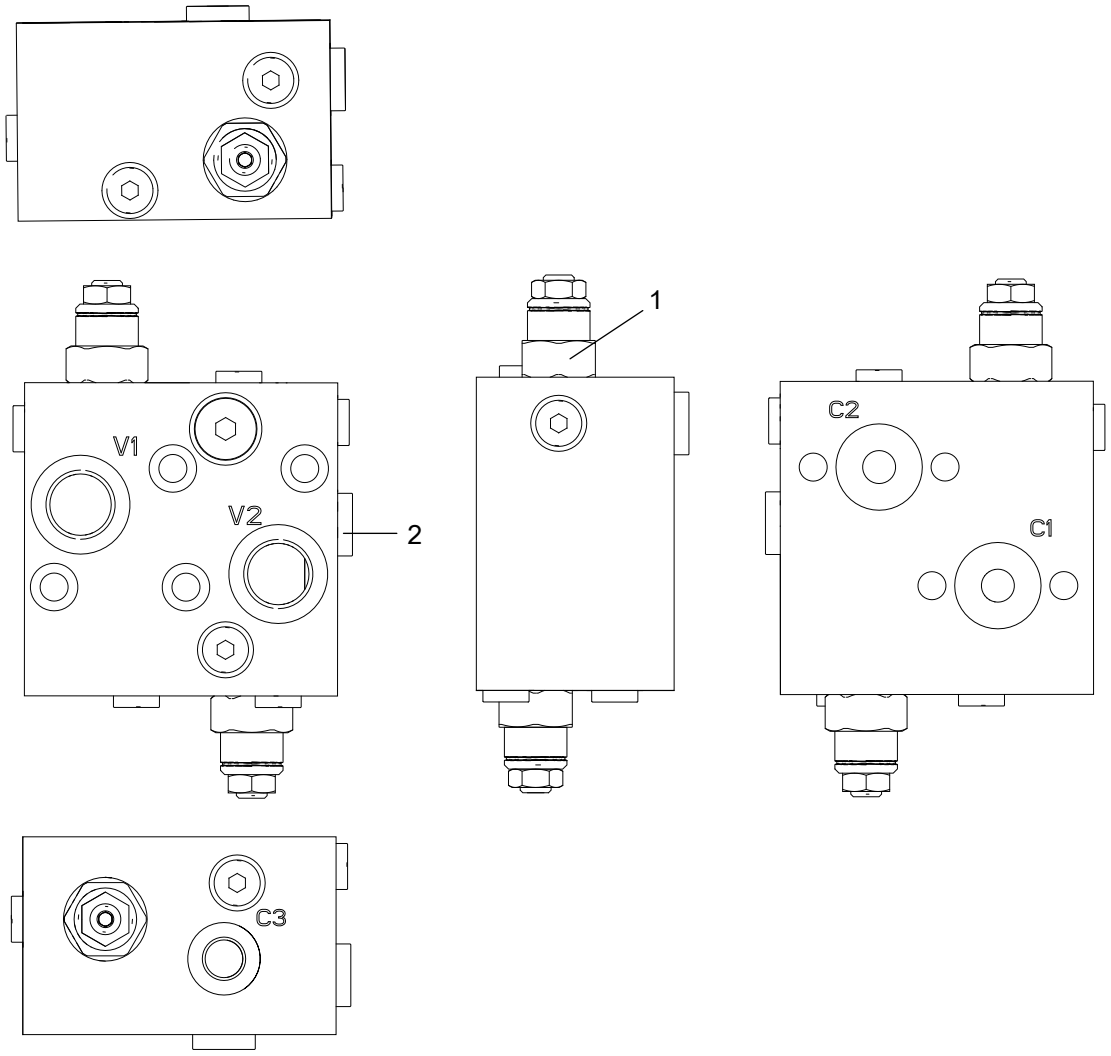


Figure 6-18 Slewing buffering valve (PN.202040003061)

Table 6-7 Slewing buffering valve (PN.202040003061)

NO.	NAME	TORQUE	FUNCTION
1	Counterbalance valve	40 ~ 45Nm (30 ~ 33ft-lb)	Maintain balanced load
2	Shuttle valve	\	Switch oil lines

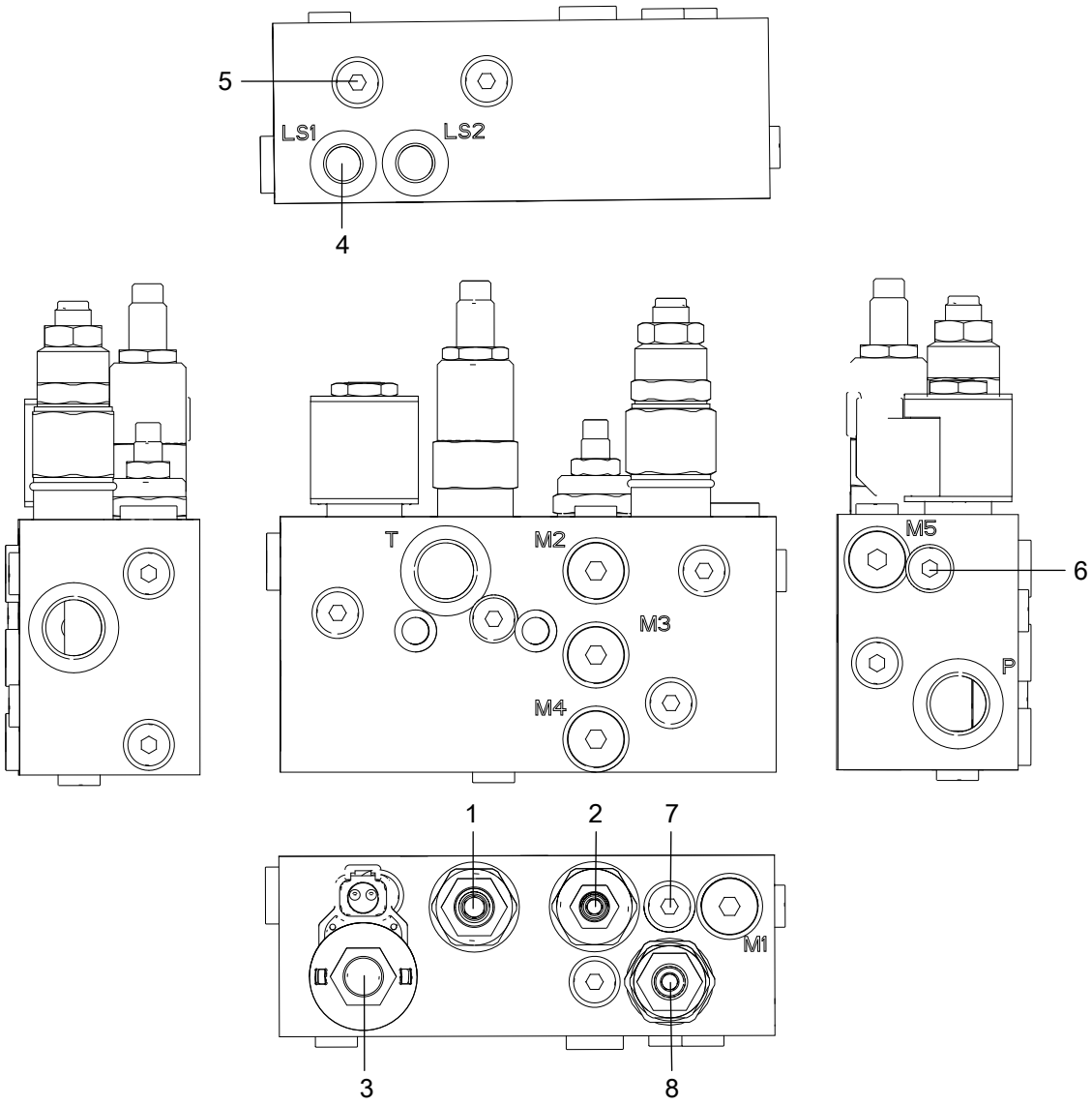


Figure 6-19 Oscillating control valve (PN.202040003039)

Table 6-8 Oscillating control valve (PN.202040003039)

NO.	NAME	TORQUE	FUNCTION
1	Pressure reducing valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control oscillating pressure
2	Flow valve	33.9Nm (25ft-lb)	Control the flow of oil pipes
3	Solenoid valve	40Nm (30ft-lb)	Control oscillating operation
4	Shuttle valve	12 ~ 15Nm (9 ~ 11ft-lb)	Switch oil lines
5	Damper	5Nm (9ft-lb)	\
6	Damper	5Nm (9ft-lb)	\

NO.	NAME	TORQUE	FUNCTION
7	Damper	5Nm (9ft-lb)	\
8	Hydraulic controlled valve	45 ~ 50Nm (33 ~ 37ft-lb)	Keep fluid flowing in one way

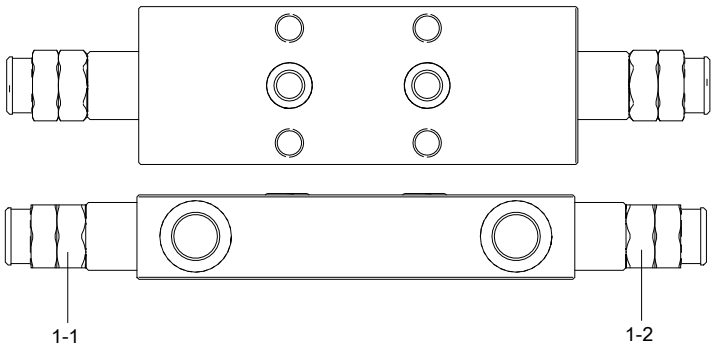


Figure 6-20 Leveling counterbalance valve (PN.202040000011)

Table 6-9 Leveling counterbalance valve (PN.202040000011)

NO.	NAME	TORQUE	FUNCTION
1	Counterbalance valve	70 ~ 75Nm (52 ~ 55ft-lb)	Maintain balanced load

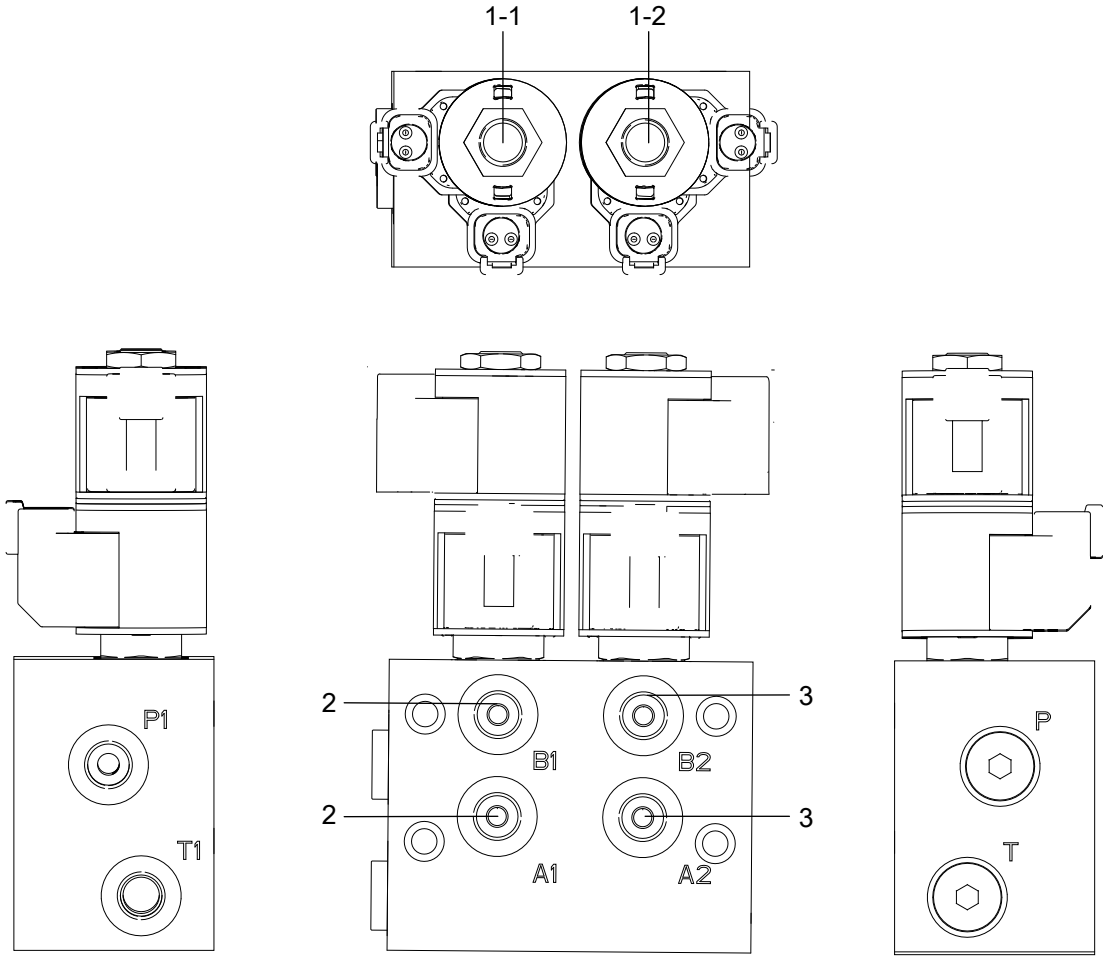


Figure 6-21 Duplex platform valve (PN.202040000329)

Table 6-10 Duplex platform valve (PN.202040000329)

NO.	NAME	TORQUE	FUNCTION
1–1	Solenoid valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control the direction of jib boom luffing
1–2	Solenoid valve	40 ~ 45Nm (30 ~ 33ft-lb)	Control the direction of platform rotation
2	Damper	5Nm (9ft-lb)	\
3	Damper	5Nm (9ft-lb)	\

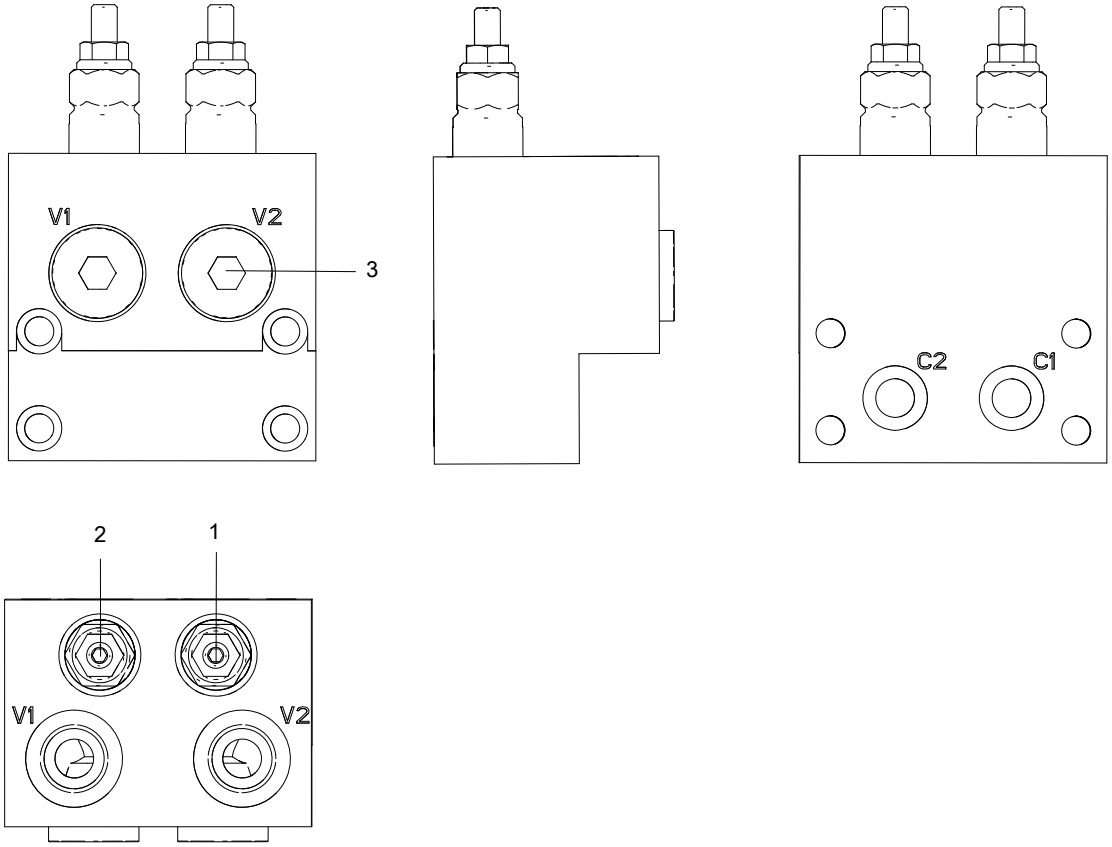


Figure 6-22 Telescoping counterbalance valve (PN.202040003016)

Table 6-11 Telescoping counterbalance valve (PN.202040003016)

NO.	NAME	TORQUE	FUNCTION
1	Counterbalance valve	45–50Nm (33–37ft-lb)	Maintain balanced load
2	Counterbalance valve	45–50Nm (33–37ft-lb)	Maintain balanced load
3	Choke plug	72–82Nm (51–61ft-lb)	\

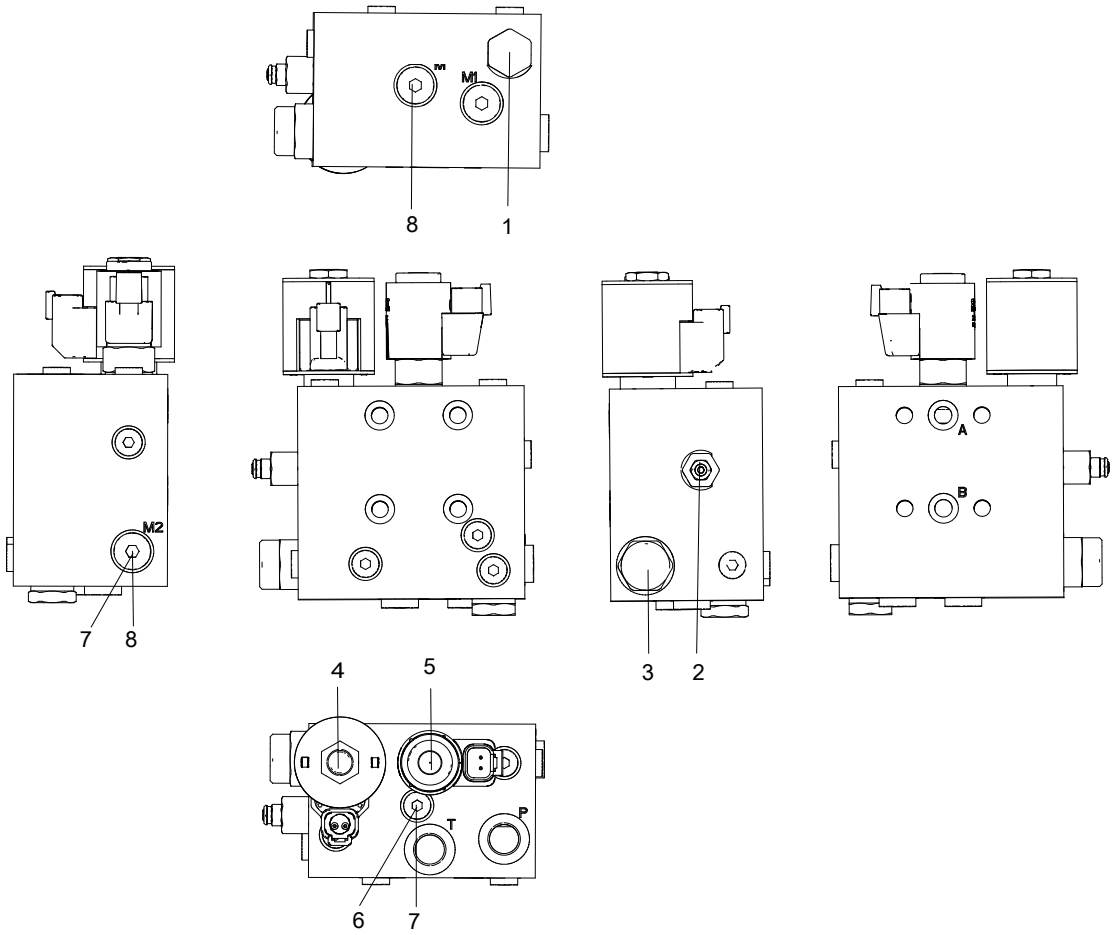


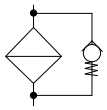
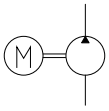
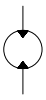
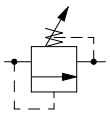
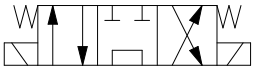
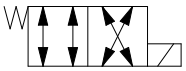
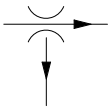
Table 6-12 Luffing control valve (PN.202040003309)

NO.	NAME	TORQUE	FUNCTION
1	Check valve	40 ~ 45Nm (30 ~ 33ft-lb)	Keep fluid flowing in one way
2	Relief valve	35 ~ 40Nm (26 ~ 30ft-lb)	Release system pressure to prevent overloading
3	Compensator valve	33.9Nm (25ft-lb)	Provide pressure compensation
4	Solenoid valve	44.9 ~ 50.3Nm (33.1 ~ 37.1ft-lb)	Adjust the speed of lowering caused by dead weight
5	Solenoid valve	40Nm (29.5ft-lb)	Control lowering caused by dead weight
6	Choke plug	11–12Nm (8–9ft-lb)	\
7	Damper	5Nm (9ft-lb)	\
8	Choke plug	25–28Nm (18–21ft-lb)	\

Figure 6-23 Luffing control valve (PN.202040003309)

Hydraulic Symbols

Table 6-13

Symbol	Description
	Filter
	Brake
	Emergency power
	Hydraulic motor
	Overflow valve
	3–position 4–way solenoid directional vavle
	2–position 4–way solenoid directional valve
	Pressure gradient control valve
	Check valve

Hydraulic Schematic Diagram

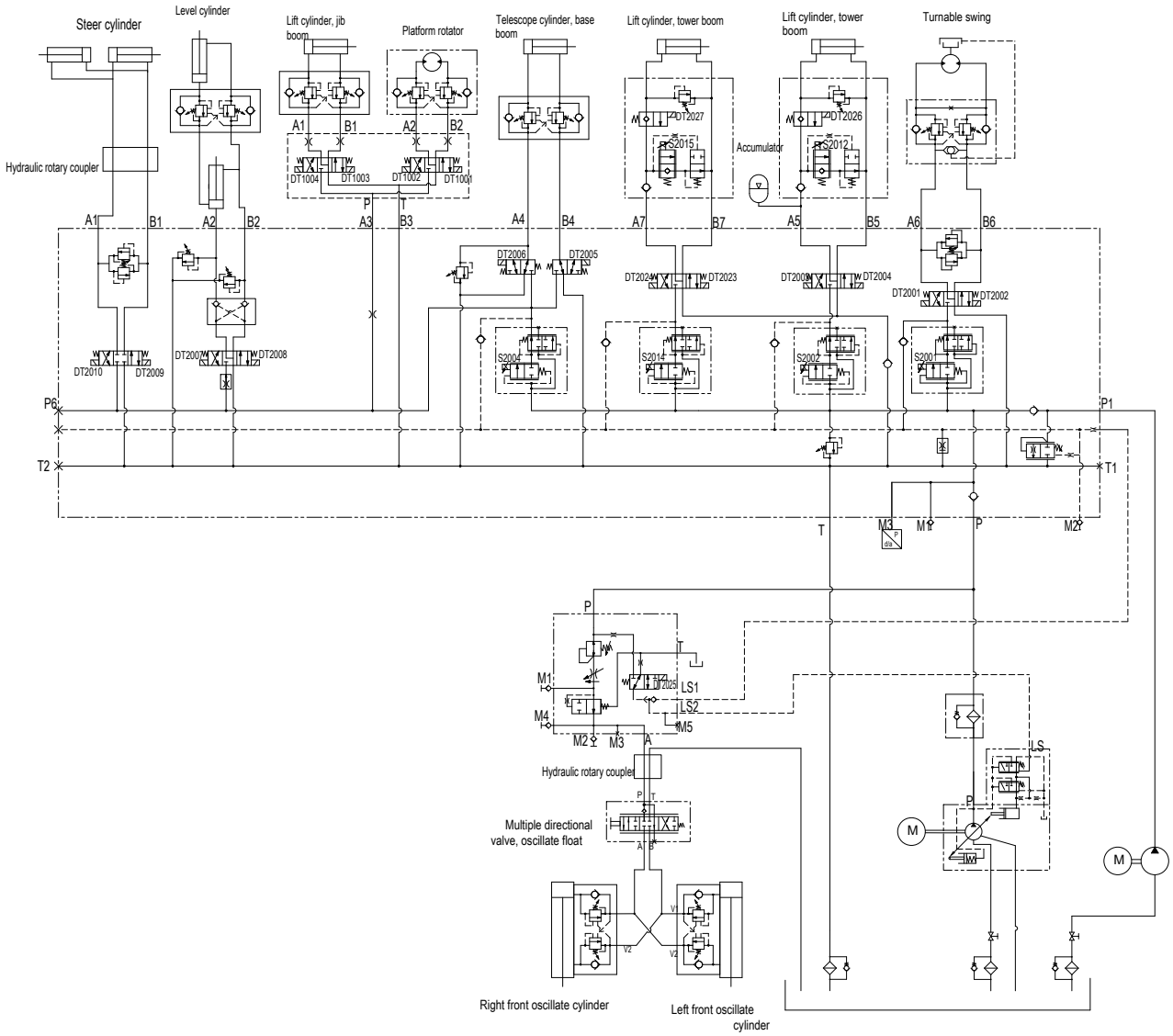


Figure 6-24 Hydraulic schematic diagram

ELECTRICAL SYSTEM

Fault Code Description

In case of machine malfunctions, please enter the fault display interface on the ground controller to check the fault codes.

Table 6-14 Machine fault code description

Fault Code	Description	Cause	Solution
01	Platform communication fault	Abnormal communication between platform and ground controllers	Check the signal lines between platform and ground controllers, and ensure the power supply is normal.
02	Drive controller communication fault	Abnormal communication between driver and ground controllers	Check the signal lines between ground and drive controllers, and ensure the power supply is normal.
03	Turntable tilt alarm	Turntable tilt alarm	Check whether the machine tilts exceeding 5°or the level switch becomes disconnected
04	Overload alarm	Overload alarm	Check whether the platform load exceeds the rating.
05	Weighing sensor fault	Weighing sensor fault	Check whether the Weighing sensor functions properly.
06	Drive joystick error	Drive joystick data error	Check the drive joystick data
07	Steer joystick error	Steer joystick data error	Check the steer joystick data
08	Main boom luffing joystick error	Main boom luffing joystick data error	Check the Main boom luffing joystick data
09	Slewing joystick error	Slewing joystick data error	Check the slewing joystick data
10	Telescoping joystick error	Telescoping joystick data error	Check the Telescoping joystick data
11	Jib rotation joystick error	Jib rotation joystick data error	Check the jib rotation joystick data
12	Hydraulic system pressure sensor error	Hydraulic system pressure sensor error	Check whether the hydraulic system pressure sensor functions properly
13	Level switch fault	Level swtich fault	Check whether the level switch functions properly
14	Lift controller communication fault	Lift controller communication fault	Check the signal lines between platform and drive controllers, and ensure the power supply is normal.
15	Footswitch or Enable switch 7-second limit alarm	Footswitch or Enable switch 7-second limit alarm	Check whether the footswitch or enable switch function properly
16	Obstacle detection alarm	Obstacle detection alarm	Check whether the obstacle detection switch functions properly
17	Drive controller error alarm	Drive controller error alarm	Check the associated error of drive controller

Fault Code	Description	Cause	Solution
18	Lift controller error alarm	Lift controller error alarm	Check the associated error of lift controller
19	Heavy load alarm	Heavy load alarm	Check the platform load and the actual measurement of sensor AD value
20	Envelope alarm	Envelope alarm	Check the boom position and the actual measurement of sensor AD value
21	Broken rope alarm	Broken rope alarm	Check the wire ropes of boom and the wiring of proximity switch
22	Weighing sensor comparison error	Weighing sensor comparison error	Check the weighing sensor actual values and AD value, and check the wiring
23	Platform tilt alarm	Platform tilt alarm	Check whether the platform tilt angle out of range
24	Solenoid clutch fault	Solenoid clutch fault	Check whether the solenoid clutch functions properly or the wiring harness is disconnected
25	Turntable slewing left solenoid valve error	Turntable slewing left solenoid valve error	Check the wiring of turntable slewing left solenoid valve
26	Turntable slewing right solenoid valve fault	Turntable slewing right solenoid valve fault	Check the wiring of turntable slewing right solenoid valve
27	Main boom extending solenoid valve fault	Main boom extending solenoid valve fault	Check the wiring of main boom extending solenoid valve
28	Main boom retracting solenoid valve fault	Main boom retracting solenoid valve fault	Check the wiring of main boom retracting solenoid valve
29	Main boom lifting solenoid valve fault	Main boom lifting solenoid valve fault	Check the wiring of main boom lifting solenoid valve
30	Main boom lowering solenoid valve error	Main boom lowering solenoid valve error	Check the wiring of main boom lowering solenoid valve
31	Articulated boom lifting solenoid valve fault	Articulated boom lifting solenoid valve fault	Check the wiring of articulated boom lifting solenoid valve
32	Articulated boom lowering solenoid valve fault	Articulated boom lowering solenoid valve fault	Check the wiring of articulated boom lowering solenoid valve
33	Steer left solenoid valve fault	Steer left solenoid valve fault	Check the wiring of steer left solenoid valve
34	Steer right solenoid valve fault	Steer right solenoid valve fault	Check the wiring of steer right solenoid valve
35	Platform swing left solenoid valve fault	Platform swing left solenoid valve fault	Check the wiring of platform swing left solenoid valve
36	Platform swing right solenoid valve fault	Platform swing right solenoid valve fault	Check the wiring of platform swing right solenoid valve
37	Platform leveling up solenoid valve fault	Platform leveling up solenoid valve fault	Check the wiring of platform leveling up solenoid valve

Fault Code	Description	Cause	Solution
38	Platform leveling down solenoid valve fault	Platform leveling down solenoid valve fault	Check the wiring of platform leveling down solenoid valve
39	Jib up solenoid valve fault	Jib up solenoid valve fault	Check the wiring of jib up solenoid valve
40	Jib down solenoid valve fault	Jib down solenoid valve fault	Check the wiring of jib down solenoid valve
41	Function enable valve fault	Function enable valve fault	Check the wiring of function enable valve
42	Main boom anti-fall valve fault	Main boom anti-fall valve fault	Check the wiring of main boom anti-fall valve
43	Drive enable valve fault	Drive enable valve fault	Check the wiring of drive enable valve
44	Brake valve fault	Brake valve fault	Check the wiring of brake valve
45	Slewing enable valve fault	Slewing enable valve fault	Check the wiring of slewing enable valve
46	Front pump unloading valve fault	Front pump unloading valve fault	Check the wiring of front pump unloading valve
47	Rear pump unloading valve fault	Rear pump unloading valve fault	Check the wiring of rear pump unloading valve
48	Electrically proportional relief valve fault	Electrically proportional relief valve fault	Check the wiring of electrically proportional relief valve
49	Articulated boom angle sensor comparison error	Articulated boom angle sensor comparison error	Check whether the articulated boom angle sensor is correctly installed
50	Articulated boom angle sensor fault	Articulated boom angle sensor fault	Check the wiring of articulated boom angle sensor
51	Main boom angle sensor comparison error	Main boom angle sensor comparison error	Check whether the main boom angle sensor is correctly installed
52	Main boom angle sensor fault	Main boom angle sensor fault	Check the wiring of main boom angle sensor
53	Articulated boom relative angle sensor comparison error	Articulated boom relative angle sensor comparison error	Check whether the articulated boom relative angle sensor is correctly installed
54	Articulated boom relative angle sensor fault	Articulated boom relative angle sensor fault	Check the wiring of articulated boom relative angle sensor
55	Main boom relative angle sensor comparison error	Main boom relative angle sensor comparison error	Check whether the main boom relative angle sensor is correctly installed
56	Main boom relative angle sensor fault	Main boom relative angle sensor fault	Check the wiring of main boom relative angle sensor

Fault Code	Description	Cause	Solution
57	Low battery level alarm	Low battery level alarm	Check whether the battery voltage is too low
58	Front right steer sensor fault	Front right steer sensor fault	Check the wiring of front right steer sensor
59	Clutch fault	Clutch fault	Check whether the clutch can be properly engaged or the sensor is correctly wired.
60	Low fuel level fault	Low fuel level fault	Check whether the fuel level is too low or the sensor is correctly wired.

Table 6-15 General fault code description for electric motor controller

Fault code	Description	Cause	Solution
0012	Overcurrent of pump motor	1. Encoder fault or circuit interference; 2. Motor UVW short-circuited; 3. Mismatched motor parameters; 4. Controller fault.	1. Check the encoder surface for stains, replace it if necessary; 2. Check whether the 3–phase of motor UVW is shorted or damaged, check the controller UVW 3–phase for damage using a multimeter; 3. Monitor the controller current when fully loaded, re-match the motor if necessary; 4. If no problem is found in the above inspections, replace the controller.
0112	Overcurrent of FL motor controller		
0212	Overcurrent of FR motor controller		
0312	Overcurrent of RL motor controller		
0412	Overcurrent of RR motor controller		
0013	Current sensor fault of pump motor controller	1. Motor UVW short-circuited; 2. Current sensor of the controller faulted.	1. Check the 3–phase cable of UVW for short circuit or current leakage; 2. If no problem is found in the above inspections, replace the controller.
0113	Current sensor fault of FL motor controller		
0213	Current sensor fault of FR motor controller		
0313	Current sensor fault of RL motor controller		
0413	Current sensor fault of RR motor controller		
0014	Pre-charging fault of pump motor controller	1. The voltage is lowered due to loads connected to B+ circuit; 2. Controller damage.	1. Check whether the controller B+ circuit is linked to high-power load; 2. Check the KSI wiring, and measure the voltage using a multimeter to check if it is normal; 3. If no problem is found in the above inspections, replace the controller.
0114	Pre-charging fault of FL motor controller		
0214	Pre-charging fault of FR motor controller		
0314	Pre-charging fault of RL motor controller		
0414	Pre-charging fault of RR motor controller		

Fault code	Description	Cause	Solution
0015	Low temperature of pump motor controller	The controller operates at ambient temperatures below -40 ℃.	1. 1. Raise the ambient temperature above -40 ℃, restart the key switch and interlock switch; 2. If no problem is found in the above inspection, replace the controller.
0115	Low temperature of FL motor controller		
0215	Low temperature of FR motor controller		
0315	Low temperature of RL motor controller		
0415	Low temperature of RR motor controller		
0016	High temperature of pump motor controller	1. Controller temperature over 95℃; 2. Machine overload and motor mismatch; 3. Controller damage.	1. Check the cooling measures of controller; 2. Monitor the operating current of controller, re-match the motor if the current is too large, reset the turning point and slip value, properly restrict the current if needed. 3. If no problem is found in the above inspections, replace the controller.
0116	High temperature of FL motor controller		
0216	High temperature of FR motor controller		
0316	High temperature of RL motor controller		
0416	High temperature of RR motor controller		
0017	Severe undervoltage of pump motor controller	1. Battery data setup error; 2. Excessive battery resistance; 3. Damaged fuse; 4. Damaged main contactor.	1. Measure the battery voltage and KSI and B+ circuits voltage with a multimeter; 2. Check the fuse and contactor; 3. Check the battery setup, system voltage and undervoltage setting. 4. If the drive controller fails, main contactor not engaged, the pump controller will report the fault 1.7.
0117	Severe undervoltage of FL motor controller		
0217	Severe undervoltage of FR motor controller		
0317	Severe undervoltage of RL motor controller		
0417	Severe undervoltage of RR motor controller		
0018	Severe overvoltage of pump motor controller	1. Battery setup error; 2. Excessive battery resistance; 3. Battery is disconnected when regenerative brake engages.	1. Check the battery with a multimeter for proper voltage; 2. Check the fuse and contactor; 3. Check the battery setup, system voltage and undervoltage setting. 4. Check the regenerative brake setup and current limit.
0118	Severe overvoltage of FL motor controller		
0218	Severe overvoltage of FR motor controller		
0318	Severe overvoltage of RL motor controller		
0418	Severe overvoltage of RR motor controller		
0021	Declined battery current of pump motor controller	Activated battery current attenuation	The power generation current limit value sent by the host computer is less than the actual value.
0121	Declined battery current of FL motor controller		

Fault code	Description	Cause	Solution
0221	Declined battery current of FR motor controller		
0321	Declined battery current of RL motor controller		
0421	Declined battery current of RR motor controller		
0022	Reduced over-temperature performance of pump motor controller	The controller operates at hostile environment with the radiator blade temperature higher than 85℃	1. Use the machine under normal operating conditions to increase the cooling effect of controller. 2. If the ambient temperature is normal, check the controller current which may cause an abrupt rise in temperature if too large.
0122	Reduced over-temperature performance of FL motor controller		
0222	Reduced over-temperature performance of FR motor controller		
0322	Reduced over-temperature performance of RL motor controller		
0422	Reduced over-temperature performance of RR motor controller		
0023	Reduced undervoltage performance of pump motor controller	1. Low battery level; 2. Battery setup error; 3. Battery aging	1. Check the battery with a multimeter for proper voltage; 2. Check the fuse and contactor; 3. Check the battery setup, system voltage and undervoltage setting.
0123	Reduced undervoltage performance of FL motor controller		
0223	Reduced undervoltage performance of FR motor controller		
0323	Reduced undervoltage performance of RL motor controller		
0423	Reduced undervoltage performance of RR motor controller		
0024	Reduced overvoltage performance of pump motor controller	1. Battery setup error; 2. Regenerative brake current results in voltage increase.	1. Check the battery with a multimeter for proper voltage; 2. Check the fuse and contactor; 3. Check the battery setup, system voltage and undervoltage setting. 4. Check the regenerative brake setup and current limit.
0124	Reduced overvoltage performance of FL motor controller		
0224	Reduced overvoltage performance of FR motor controller		
0324	Reduced overvoltage performance of RL motor controller		

Fault code	Description	Cause	Solution
0424	Reduced overvoltage performance of RR motor controller		
0025	Invalid 5V internal power supply of pump motor controller	Externally connected device fault	1. Check the externally connected device for damage; 2. Using handhold unit check monitor/outputs menu/5 Volts; 3. Disconnect externally connected 5V devices, if the fault still exists, replace the external devices. Note: The pin #26 of the 35-pin controller connector is for 5V output.
0125	Invalid 5V internal power supply of FL motor controller		
0225	Invalid 5V internal power supply of FR motor controller		
0325	Invalid 5V internal power supply of RL motor controller		
0425	Invalid 5V internal power supply of RR motor controller		
0026	Driver 6 output error of pump motor controller	Externally connected device fault	1. Using handhold unit, check monitor/digital out6 to find out the driver 6 signal output percentage; 2. Check the drive device of driver 6 for malfunctions, correct wiring, and current not exceeding 1A. Note: The pin #19 of the 35-pin controller connector is for drive 6 output.
0126	Driver 6 output error of FL motor controller		
0226	Driver 6 output error of FR motor controller		
0326	Driver 6 output error of RL motor controller		
0426	Driver 6 output error of RR motor controller		
0027	Driver 7 output overcurrent of pump motor controller	Externally connected device fault	1. Using handhold unit check monitor/digital out7, to inspect the driver 7 signal output percentage; 2. Check the drive device of driver 7 for malfunctions, correct wiring, and current not exceeding 1A. Note: The pin #20 of the 35-pin controller connector is for driver 7 output.
0127	Driver 7 output overcurrent of FL motor controller		
0227	Driver 7 output overcurrent of FR motor controller		
0327	Driver 7 output overcurrent of RL motor controller		
0427	Driver 7 output overcurrent of RR motor controller		
0028	Reduced overheat performance of pump motor controller	1. Motor temperature reaching the preset limit; 2. Improper set up motor temperature.	1. Check the motor temperature sensor for damage; 2. Check the motor temperature setup of controller for error; and check programme/ motor menu/temperature control temperature hot for overheat performance deceleration value setup; 3. Monitor the machine operating current to determine whether the overheat results
0128	Reduced overheat performance of FL motor controller		
0228	Reduced overheat performance of FR motor controller		

Fault code	Description	Cause	Solution
0328	Reduced overheat performance of RL motor controller		from an excessively high current, re-match the motor if necessary. Note: The pins #7 and #8 of the 35-pin controller connector are for motor temperature sensor.
0428	Reduced overheat performance of RR motor controller		
0029	Temperature sensor fault of pump motor controller	1. Motor temperature sensor fault; 2. Setup error of motor temperature sensor type.	1. Check the wiring of motor temperature sensor; 2. Check the setup of motor temperature sensor via programme/motor menu/ temperature control sensor type. 3. Replace the motor temperature sensor. Note: The pins #7 and #8 of the 35-pin controller connector are for motor temperature sensor.
0129	Temperature sensor fault of FL motor controller		
0229	Temperature sensor fault of FR motor controller		
0329	Temperature sensor fault of RL motor controller		
0429	Temperature sensor fault of RR motor controller		
0031	Open/short-circuited drive 1 output/main contactor of pump motor controller	1. Driver 1 wiring fault; 2. Loading device fault; 3. Contactor fault.	1. Check if the wiring is correct and pins are stained or damaged; 2. Monitor output signal via monitor menu/ outputs menu/Driver 1 PWM to check whether there is output control signal; 3. Check the coil of contactor; 4. Replace the contactor. Note: The pins #6 of the 35-pin controller connector is for driver 1 output.
0131	Open/short-circuited driver 1 output/main contactor of FL motor controller		
0231	Open/short-circuited driver 1 output/main contactor of FR motor controller		
0331	Open/short-circuited driver 1 output/main contactor of RL motor controller		
0431	Open/short-circuited driver 1 output/main contactor of RR motor controller		
0032	Open/short-circuited driver 2 of pump motor controller	1. Drive 2 wiring fault; 2. Loading device fault; 3. Contactor fault.	1. Check if the wiring is correct and pins are stained or damaged; 2. Monitor output signal via monitor menu/ outputs menu/Driver 2PWM to check whether there is output control signal; 3. Check the coil of contactor; 4. Replace the contactor. Note: The pins #5 of the 35-pin controller connector is for driver 2 output.
0132	Open/short-circuited driver 2 of FL motor controller		
0232	Open/short-circuited driver 2 of FR motor controller		
0332	Open/short-circuited driver 2 of RL motor controller		
0432	Open/short-circuited driver 2 of RR motor controller		
0033	Open/short-circuited solenoid brake/coil 3 output of pump motor controller	1. Open/short circuited coil of solenoid brake; 2. Stained/damaged/ broken wiring.	1. Check if the wiring is correct and pins are stained or damaged; 2. Monitor output signal via monitor menu/ outputs menu/Driver 3 PWM to check whether there is output control signal; 3. Check the coil of contactor;
0133	Open/short-circuited solenoid brake/coil 3		

Fault code	Description	Cause	Solution
	output of FL motor controller		4. Replace the solenoid brake. Note: The pins #4 of the 35-pin controller connector is for driver 3 output.
0233	Open/short-circuited solenoid brake/coil 3 output of FR motor controller		
0333	Open/short-circuited solenoid brake/coil 3 output of RL motor controller		
0433	Open/short-circuited solenoid brake/coil 3 output of RR motor controller		
0034	Open/short-circuited coil 4 output of pump motor controller	1. Open/short-circuited coil 4; 2. Stained/damaged/ broken wiring.	1. Check if the wiring is correct and pins are stained or damaged; 2. Monitor output signal via monitor menu/ outputs menu/Driver 4PWM to check whether there is output control signal; 3. Check the driver coil.
0134	Open/short-circuited coil 4 output of FL motor controller		
0234	Open/short-circuited coil 4 output of FR motor controller		
0334	Open/short-circuited coil 4 output of RL motor controller		
0434	Open/short-circuited coil 4 output of RR motor controller		
0035	Proportional drive error of pump motor controller	1. Open/short-circuited loading device; 2. Stained/damaged/ broken wiring; 3. Improper wiring.	1. Check if the wiring is correct and pins are stained or damaged; 2. Monitor output signal via monitor menu/ outputs menu/PD PWM to check whether there is output control signal; 3. Check the loading devices, such as the driver coil, for damage.
0135	Proportional drive error of FL motor controller		
0235	Proportional drive error of FR motor controller		
0335	Proportional drive error of RL motor controller		
0435	Proportional drive error of RR motor controller		
0036	Encoder error of pump motor controller	1. Failed power supply of encoder; 2. Damaged encoder; 3. Improper wiring.	1. Check the encoder power supply; 2. Check the encoder setup via programme/ motor menu/ encoder steps for the pulse count; 3. Check the encoder feedback speed signals via monitor/motor menu/motor speed A/B; 4. If the checks above fail to discover the problem, replace the encoder.
0136	Encoder error of FL motor controller		
0236	Encoder error of FR motor controller		
0336	Encoder error of RL motor controller		

Fault code	Description	Cause	Solution
0436	Encoder error of RR motor controller		Note: The pins #31 and #32 of the 35-pin controller connector are for encoder AB phase output signals.
0037	Open-circuited pump motor controller	1. Missing phase in motor; 2. Improper wiring; 3. Damaged controller.	1. Ensure the 3-phase wiring of UVW free of open circuit; 2. Use a multimeter to check the UVW power module works properly; 3. If the inspections above fail to discover the problem, replace the motor.
0137	Open-circuited FL motor controller		
0237	Open-circuited FR motor controller		
0337	Open-circuited RL motor controller		
0437	Open-circuited RR motor controller		
0038	Fused main contactor of pump motor controller	1. Fused contact of main contactor; 2. Improper wiring.	1. Check the main contactor for fused contact; 2. Measure the coil voltage to ensure it is normal; 3. Check for correct wiring; 4. If the motor has missed phase, check the UV phase for unlinked cable.
0138	Fused main contactor of FL motor controller		
0238	Fused main contactor of FR motor controller		
0338	Fused main contactor of RL motor controller		
0438	Fused main contactor of RR motor controller		
0039	Main contactor engaging failure of pump motor con troller	1. Large voltage drop in KSI voltage and battery voltage; 2. An element with high power is connected in series in the KSI circuit, which brings the voltage down; 3. Contactor damage.	1. Use a handhold to monitor the KSI, ensure the difference between the capacitor voltage (monitor/outputs menu capacitor Voltage) and the key switch voltage is less than the threshold (programme/main contactor/main DNC). 2. Check whether an element with high power is connected in the KSI circuit, which brings the voltage down; 3. Replace the contactor to find out if it is damaged.
0139	Main contactor engaging failure of FL motor controller		
0239	Main contactor engaging failure of FR motor controller		
0339	Main contactor engaging failure of RL motor controller		
0439	Main contactor engaging failure of RR motor controller		
0041	High voltage at slider end of accelerator of pump motor controller	1. Accelerator wiring disconnected; 2. Excessively high output voltage at slider end of accelerator.	Measure the output voltage at the slider end of accelerator to check if it is too high, replace the accelerator if necessary. Note: The pins #16 of the 35-pin controller connector is for accelerator slider end input.
0141	High voltage at slider end of accelerator of FL motor controller		
0241	High voltage at slider end of accelerator of FR motor controller		

Fault code	Description	Cause	Solution
0341	High voltage at slider end of accelerator of RL motor controller		
0441	High voltage at slider end of accelerator of RR motor controller		
0042	Low voltage at slide end of accelerator of pump motor controller	Excessively low output voltage at slider end of accelerator.	Measure the output voltage at the slider end of accelerator to check if it is too low, replace the accelerator if necessary. Note: The pins #16 of the 35-pin controller connector is for accelerator slider end input.
0142	Low voltage at slider end of accelerator of FL motor controller		
0242	Low voltage at slider end of accelerator of FR motor controller		
0342	Low voltage at slider end of accelerator of RL motor controller		
0442	Low voltage at slider end of accelerator of RR motor controller		
0043	High voltage at slider end of pot2 of pump motor controller	Excessively high output voltage at slider end of pot2.	Measure the voltage at the slider end of pot2, replace it if necessary. Note: The pins #17 of the 35-pin controller connector is for pot2 slider end input.
0143	High voltage at slider end of pot2 of FL motor controller		
0243	High voltage at slider end of pot2 of FR motor controller		
0343	High voltage at slider end of pot2 of RL motor controller		
0443	High voltage at slider end of pot2 of RR motor controller		
0044	Low voltage at slider end of pot2 of pump motor controller	Excessively low output voltage at slider end of pot2.	Measure the voltage at the slider end of pot2, replace it if necessary. Note: The pins #17 of the 35-pin controller connector is for pot2 slider end input.
0144	Low voltage at slider end of pot2 of FL motor controller		
0244	Low voltage at slider end of pot2 of FR motor controller		
0344	Low voltage at slider end of pot2 of RL motor controller		
0444	Low voltage at slider end of pot2 of RR motor controller		

Fault code	Description	Cause	Solution
0045	Pot-low overcurrent of pump motor controller	Excessively low resistance of potentiometer.	Overcurrent at potentiometer low end, replace it if necessary
0145	Pot-low overcurrent of FL motor controller		
0245	Pot-low overcurrent of FR motor controller		
0345	Pot-low overcurrent of RL motor controller		
0445	Pot-low overcurrent of RR motor controller		
0046	Invalid EEPROM of pump motor controller	1. Software error; 2. Controller failure.	1. Download the correct software version; 2. Replace the controller.
0146	Invalid EEPROM of FL motor controller		
0246	Invalid EEPROM of FR motor controller		
0346	Invalid EEPROM of RL motor controller		
0446	Invalid EEPROM of RR motor controller		
0047	Operation sequence error of pump motor controller	1. Input sequence error of key switch, interlock switch, directional switch and accelerator; 2. Failure of key switch, interlock switch, directional switch and accelerator; 3. Improper wiring.	1. Check the input sequence of switches to exclude the operation-induced cause; 2. Use a handhold unit to check each switch condition; 3. Use a handhold unit ot check the accelerator signal; 4. Replace the failed switches.
0147	Operation sequence error of FL motor controller		
0247	Operation sequence error of FR motor controller		
0347	Operation sequence error of RL motor controller		
0447	Operation sequence error of RR motor controller		
0049	Setup change of pump motor controller	The key switch must be restarted after setup change of some parameters.	Restart the key switch to eliminate the fault.
0149	Setup change of FL motor controller		
0249	Setup change of FR motor controller		
0349	Setup change of RL motor controller		
0449	Setup change of RR motor controller		
0068	VCL run error of pump motor controller	Software problem	1. Update the software to the correct version; 2. Replace the controller.
0168	VCL run error of FL motor controller		

Fault code	Description	Cause	Solution
0268	VCL run error of FR motor controller		
0368	VCL run error of RL motor controller		
0468	VCL run error of RR motor controller		
0069	Power supply of pump motor controller exceeding the range	1. Excessively high/low current of external loads; 2. Check the setup.	1. Check the external loads of 5V and 10V loading devices for short circuit or damage; 2. Check the setup (external supply max and external supply min); 3. Replace the failed devices.
0169	Power supply of FL motor controller exceeding the range		
0269	Power supply of FR motor controller exceeding the range		
0369	Power supply of RL motor controller exceeding the range		
0469	Power supply of RR motor controller exceeding the range		
0071	Operation software fault of pump motor controller	1. Software problem; 2. Controller failure.	1. Update the software to the correct version; 2. Replace the controller.
0171	Operation software fault of FL motor controller		
0271	Operation software fault of FR motor controller		
0371	Operation software fault of RL motor controller		
0471	Operation software fault of RR motor controller		
0072	PDO timeout of pump motor controller	1. Software problem; 2. CAN bus communication error.	1. Update the software to the correct version, and ensure the bus free of interference; 2. Ensure the bus terminal resistance is 60 ohm, the bus voltage approx. 2.5V; 3. Ensure the devices on the bus are correctly connected; 4. Check the on-bus devices are correctly programmed; 5. Use the exclusion method to replace the failed devices.
0172	PDO timeout of FL motor controller		
0272	PDO timeout of FR motor controller		
0372	PDO timeout of RL motor controller		
0472	PDO timeout of RR motor controller		
0073	Motor stalling of pump motor controller	1. Motor stalling; 2. Encoder fault; 3. Improper wiring or motor damage	1. Check the power supply and wiring of motor encoder to ensure the speed signal can be properly delivered; 2. Ensure the brake is fully disengaged;
0173	Motor stalling of FL motor controller		

Fault code	Description	Cause	Solution
0273	Motor stalling of FR motor controller		3. Check the motor and controller.
0373	Motor stalling of RL motor controller		
0473	Motor stalling of RR motor controller		
0077	System distress of pump motor controller	1. The processor discovers illegal and redundant data; 2. The processor inside the controller fails; 3. The processor discovers the switching value signal exceeds the threshold by 100ms (if the fault occurs repeatedly, please check if the switch gets wet or damaged).	1. Check the internal micro-processor for damage; 2. Check input signals of all switches, and ensure the switches free of wetting or damage.
0177	System distress of FL motor controller		
0277	System distress of FR motor controller		
0377	System distress of RL motor controller		
0477	System distress of RR motor controller		
0078	Incompatible system of pump motor controller	Incompatible operation system	Check the software for compatibility.
0178	Incompatible system of FL motor controller		
0278	Incompatible system of FR motor controller		
0378	Incompatible system of RL motor controller		
0478	Incompatible system of RR motor controller		
0082	Calibration error in pump motor controller	Internal controller fault	Check the internal controller for fault.
0182	Calibration error in FL motor controller		
0282	Calibration error in FR motor controller		
0382	Calibration error in RL motor controller		
0482	Calibration error in RR motor controller		
0083	Power supply fault of pump motor controller	1. Internal voltage failure of controller; 2. Power supply failure of drive circuit.	Check the internal controller for fault.
0183	Power supply fault of FL motor controller		
0283	Power supply fault of FR motor controller		

Fault code	Description	Cause	Solution
0383	Power supply fault of RL motor controller		
0483	Power supply fault of RR motor controller		
0087	Motor matching failure of pump motor controller	Description of motor matching failure codes: 0=Normal; 1=Encoder signal received, pseudo not identified, manual setup of the encoder pulse required; 2=Motor temp sensor failure; 3=Motor high-temp response failure; 4=Motor overheat response failure; 5=Motor low-temmp response failure; 6=Low-volts response failure; 7=High-volts response failure; 8=Controller fails to detect the encoder signal; 9=Motor setup exceeding the range	Check the encoder and motor for correct wiring.
0187	Motor matching failure of FL motor controller		
0287	Motor matching failure of FR motor controller		
0387	Motor matching failure of RL motor controller		
0487	Motor matching failure of RR motor controller		
0088	Encoder pulse fault of pump motor controller	The encoder parameters do not match the actual motor encoder.	Check the encoder parameters.
0188	Encoder pulse fault of FL motor controller		
0288	Encoder pulse fault of FR motor controller		
0388	Encoder pulse fault of RL motor controller		
0488	Encoder pulse fault of RR motor controller		
0089	Motor type error of pump motor controller	Motor type data setup out of range	Modify the motor type data.
0189	Motor type error of FL motor controller		
0289	Motor type error of FR motor controller		
0389	Motor type error of RL motor controller		
0489	Motor type error of RR motor controller		
0091	VCL/OS mismatch of pump motor controller	Controller program error	Update the program to the correct version.

Fault code	Description	Cause	Solution
0191	VCL/OS mismatch of FL motor controller		
0291	VCL/OS mismatch of FR motor controller		
0391	VCL/OS mismatch of RL motor controller		
0491	VCL/OS mismatch of RR motor controller		
0092	Invalid solenoid brake setup of pump motor controller	1. The machine moves freely after solenoid brake is triggered; 2. The holding force of solenoid brake is too weak	1. Ensure the correct setup of solenoid brake and accelerator; 2. Check the brake disc of solenoid brake to determine whether it needs adjusting.
0192	Invalid solenoid brake setup of FL motor controller		
0292	Invalid solenoid brake setup of FR motor controller		
0392	Invalid solenoid brake setup of RL motor controller		
0492	Invalid solenoid brake setup of RR motor controller		
0093	Restricted encoder operation of pump motor controller	1. Motor stalling or encoder fault causes the restricted operational position of encoder to be activated; 2. Improper wiring; 3. Machine stalling.	1. Check the encoder power supply and ensure correct wiring; 2. Check the encoder setup for pulse count (programme/motor menu/ encoder steps); 3. Check the encoder feedback speed signals via monitor/motor menu/motor speed A/B; 4. Replace the encoder.
0193	Restricted encoder operation of FL motor controller		
0293	Restricted encoder operation of FR motor controller		
0393	Restricted encoder operation of RL motor controller		
0493	Restricted encoder operation of RR motor controller		
0094	Emergency reverse response timeout of pump motor controller	1. Emergency reverse switch always in closed position; 2. EmerTimer expires, which leads to the activation of emergency reverse timeout.	1. Use handhold unit to monitor (monitor /-inputs menu/emer Rev), if it keeps in the ON position, check the emergency reverse switch; 2. Check the wiring of emergency reverse switch; 3. Check the programming of emergency reverse.
0194	Emergency reverse response timeout of FL motor controller		
0294	Emergency reverse response timeout of FR motor controller		

Fault code	Description	Cause	Solution
0394	Emergency reverse response timeout of RL motor controller		
0494	Emergency reverse response timeout of RR motor controller		
0098	Model error of pump motor controller	1. Controller model unidentifiable; 2. Controller software error; 3. Controller damage.	1. Check the controller model; 2. Check the software version; 3. Replace the controller.
0198	Model error of FL motor controller		
0298	Model error of FR motor controller		
0398	Model error of RL motor controller		
0498	Model error of RR motor controller		
0099	2WD machine motor setup mismatch of pump motor controller	When the dual-motor is on, the control mode is not set as 0 or 1.	When the dual-motor is on, the control mode shall be set as 0 or 1. Check the parameter setting.
0199	2WD machine motor setup mismatch of FL motor controller		
0299	2WD machine motor setup mismatch of FR motor controller		
0399	2WD machine motor setup mismatch of RL motor controller		
0499	2WD machine motor setup mismatch of RR motor controller		

Table 6-16 Special fault code description for electric motor controller

Fault Code	Description	Cause	Check
0052	CAN communication timeout of pump motor controller	Communication timeout 1s between motor controller and machine main controller	Check CAN3 signal lines between pump motor controller and machine main controller.
0053	Charging voltage overload of pump motor controller	Pump motor controller voltage 59V and timeout 3s	Check CAN3 signal lines between pump motor controller and machine main controller.
0152	CAN communication timeout of FL motor controller	Communication timeout 1s between FL motor controller and machine main controller.	Check CAN3 signal lines between FL motor controller and machine main controller.

Fault Code	Description	Cause	Check
0153	Communication timeout between FL and FR motor controllers	Communication timeout 1s between FL and FR motor controllers	Check CAN3 signal lines between FL and FR motor controllers.
0154	Communication timeout between FL and RL motor controllers	Communication timeout 1s between FL and RL motor controllers	Check CAN3 signal lines between FL and RL motor controllers.
0155	Communication timeout between FL and RR motor controllers	Communication timeout 1s between FL and RR motor controllers	Check CAN3 signal lines between FL and RR motor controllers.
0252	CAN communication timeout of FR motor controller	Communication timeout 1s between FR motor controller and machine main controller.	Check CAN3 signal lines between FR motor controller and machine main controller.
0257	Communication timeout between FR motor and main control (FL)	FR motor controller timeout 1s to receive signal from FL motor controller	Check CAN3 signal lines between FR and FL motor controllers.
0352	CAN communication timeout of RL motor controller	Communication timeout 1s between RL motor controller and machine main controller.	Check CAN3 signal lines between RL motor controller and machine main controller.
0356	Communication timeout between RL motor and main control (FL)	RL motor controller timeout 1s to receive signal from FL motor controller	Check CAN3 signal lines between RL and FL motor controllers.
0452	CAN communication timeout of RR motor controller	Communication timeout 1s between RR motor controller and machine main controller.	Check CAN3 signal lines between RR motor controller and machine main controller.
0458	Communication timeout between RR motor and main control (FL)	RR motor controller timeout 1s to receive signal from FL motor controller	Check CAN3 signal lines between RR and FL motor controllers.

Table 6-17 Lithium battery BMS fault code description

Fault Code	Description	Fault Code	Description
0x101	Total Voltage Overvoltage-First Level	0x208	Discharge at High Temperature-Second Level
0x201	Total Voltage Overvoltage-Second Level	0x308	Discharge at High Temperature-Third Level
0x301	Total Voltage Overvoltage-Third Level	0x109	Charging at High Temperature-First Level
0x102	Total Voltage Undervoltage-First Level	0x209	Charging at High Temperature-Second Level
0x202	Total Voltage Undervoltage-Second Level	0x309	Charging at High Temperature-Third Level

Fault Code	Description	Fault Code	Description
0x302	Total Voltage Undervoltage-Third Level	0x10A	Large Temperature Difference-First Level
0x103	Battery Cell Overvoltage Threshold-First Level	0x20A	Large Temperature Difference-Second Level
0x203	Battery Cell Overvoltage Threshold-Second Level	0x30A	Large Temperature Difference-Third Level
0x303	Battery Cell Overvoltage Threshold-Third Level	0x10B	Charging Overcurrent Threshold-First Level
0x104	Battery Cell Undervoltage Threshold-First Level	0x20B	Charging Overcurrent Threshold-Second Level
0x204	Battery Cell Undervoltage Threshold-Second Level	0x30B	Charging Overcurrent Threshold-Third Level
0x304	Battery Cell Undervoltage Threshold-Third Level	0x10C	Discharge Overcurrent Threshold-First Level
0x105	Battery Cell Voltage Difference-First Level	0x20C	Discharge Overcurrent Threshold-Second Level
0x205	Battery Cell Voltage Difference-Second Level	0x30C	Discharge Overcurrent Threshold-Third Level
0x305	Battery Cell Voltage Difference-Third Level	0x10D	Low SOC-First Level
0x106	Discharge of Low Temperature-First Level	0x20D	Low SOC-Second Level
0x206	Discharge of Low Temperature-Second Level	0x30D	Low SOC-Third Level
0x306	Discharge of Low Temperature-Third Level	0x10E	High SOC-First Level
0x107	Charging at Low Temperature-First Level	0x20E	High SOC-Second Level
0x207	Charging at Low Temperature-Second Level	0x30E	High SOC-Third Level
0x307	Charging at Low Temperature-Third Level	0x20F	BMS Communication Fault-Second Level
0x108	Discharge at High Temperature-First Level	0x210	Abnormal Communication with Charger-Second Level

Notes: In case of any fault alarm, please contact Sinoboom after-sales personnel.

Use and Maintenance of Battery

The battery falls into 3 types: lead acid, lead acid maintenance-free and lithium batteries. The lithium battery and lead acid maintenance-free battery are free of maintenance.

⚠ WARNING

FIRE AND EXPLOSION HAZARD

- **Batteries contain sulfuric acid and generate explosive mixtures of hydrogen and oxygen gases. Keep any device that may produce sparks or flames (- including cigarettes/smoking materials) away from the battery to prevent explosion.**
- **Do not touch the battery terminals or cable clips with tools that may produce sparks.**

⚠ WARNING

ELECTROCUTION HAZARD

- **Contact with hot circuits may cause serious injury or death. Be sure to wear goggles, gloves and protective clothing.**
- **Remove all rings, watches and other accessories.**

⚠ WARNING

CHEMICAL BURN HAZARD

- **Avoid spilling battery acid on unprotected skin or unprotected skin in contact with battery acid. Seek medical attention immediately if the skin comes in contact with battery acid .**
- **If the battery acid escapes, please use baking soda to neutralize the acid.**

⚠ WARNING

UNSAFE OPERATION HAZARD

- **Strictly follow the manufacturer's recommendations on how to properly use and maintain the battery.**
- **Cut off the battery main switch if the battery is not to be used for an extended period.**
- **The waste battery may pose danger, so do not discard batteries at will. If it needs to be scrapped, contact a battery recycling company.**
- **Except for the professionals, do not perform a systematic maintenance or service to the battery, otherwise it may cause bodily injuries or damage to the battery system.**
- **Except for the professionals, do not tamper with the settings or service a signal light, otherwise it may cause bodily injuries or damage to the battery system.**
- **Except for the professionals, do not remove the battery housing, otherwise it may cause damage to the battery system.**

NOTICE

It will not be covered by the warranty if the battery attenuates or fails due to customer's overuse (- continued use after battery level less than 10%) or battery out of charge for a long time (not timely charged for 3 days or longer when the battery level less than 10%).

Inspection

See the ***Inspect the Battery*** section in this manual.

Cleaning

1. Clean the top, terminals and connections of the battery with a cloth or brush and mixed solution of sodium bicarbonate and water. Do not let the cleaning solution enter the battery.
2. Clean the top, terminals and connections with water and wipe them dry with a cloth. Apply a thin layer of petroleum jelly to the terminals or use terminal protector.
3. Keep the area around the battery clean and dry.

Charging

See the ***Charging the Battery*** section of Operation Manual.

Equalizing

Equalization is the deliberate process of overcharging the flooded/wet battery after it has been fully charged. Equalize the battery only when the specific gravity of battery is low (less than 1.25) or the scope (0.030) of the specific gravity is wide after the battery is fully charged.

Note：

- Verify whether the battery is flooded/wet battery.
- To prevent battery damage, the battery must be equalized within a maximum of 3 months storage after delivery.

1. Inspect the electrolyte level height to ensure a proper electrolyte level.
2. Verify all vent caps are properly secured to the battery.
3. Set the charger to equalization mode.
4. Charge the battery in equalization mode.

   The battery will bleed air in the equalization process (forming bubbles).
5. Remove the vent cap every hour to measure the gravity of all battery cells, if the gravity doesn't increase, stop the charging in equalization mode.

Storage

- Fully charge the battery before storage.
- The battery should be stored in cool and dry environment (temperature 10℃~25℃, RH less than 90%), and charge the battery every 3 months using the charger provided by the manufacturer.
- Disconnect the power-off plug to prevent potential parasitic loading, which may cause electrical leakage of the battery.
- The battery will self-discharge gradually during storage. Monitor the specific gravity or the voltage every 4 ~ 6 weeks. The comparison of the charging state with specific gravity and open-circuit voltage is shown in the following table.

Table 6-18

Percentage Charging (%)	Specific Gravity	Open-Circuit Voltage (V)		
		Battery Cell	6V	12V
100	1.277	2.122	6.37	12.73
90	1.258	2.103	6.31	12.62
80	1.238	2.083	6.25	12.50
70	1.217	2.062	6.19	12.37
60	1.195	2.040	6.12	12.24
50	1.172	2.017	6.05	12.10
40	1.148	1.993	5.98	11.96
30	1.124	1.969	5.91	11.81
20	1.098	1.943	5.83	11.66
10	1.073	1.918	5.75	11.51

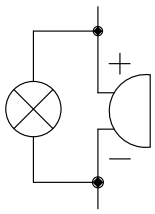
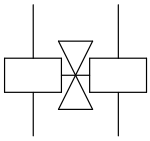
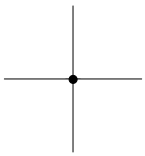
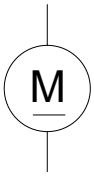
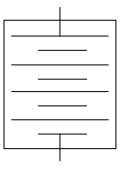
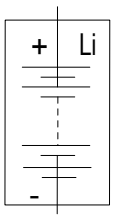
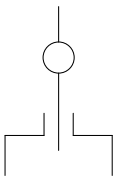
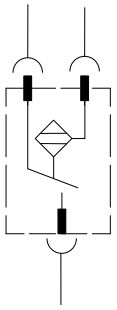
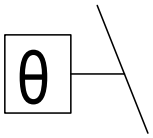
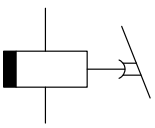
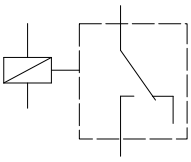
- Recharge the battery in quick mode when the battery level is 70% or lower.
- Recharge the battery before use after removing it from storage.
- Storage in hot environments (above 32°C [90°F]): During storage, do not expose the battery directly to the heat source. The self-discharge process will accelerate in warmer temperatures. If storing the battery in hot temperatures or during hot weather, monitor the specific gravity or the voltage more frequently (about every 2 - 4 weeks).
- Storage in cold environments (below 0°C [32°F]): During storage, do not store the battery in a place with an estimated temperature reaching the freezing point; if the battery has not been fully charged, it may freeze in cold temperatures. If storing the battery in cold temperatures or during cold weather, **fully charge** the battery. This point is very important.

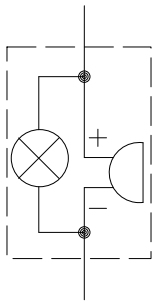
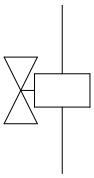
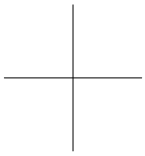
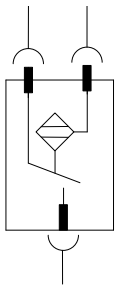
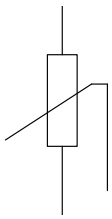
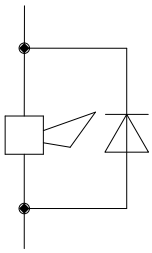
NOTICE

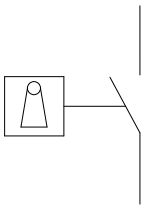
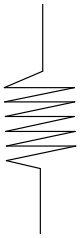
- *Do not store more than 6 months in hot or cold environment.*
- *It will not be covered by the warranty if the battery attenuates or fails due to customer's overuse (-continued use after battery level less than 10%) or battery out of charge for a long time (not timely charged for 3 days or longer when the battery level less than 10%).*

Electrical Symbols

Table 6-19

Symbol	Description
	Buzzer
	Valve
	Two lines connected
	Motor
	Storage battery
	Lithium battery
	Toggle switch
	Level switch
	Oil temperature switch
	Delay relay
	Power-off switch
	Relay

Symbol	Description
	Warning lamp
	Valve
	Two lines non-connected
	Proximity switch/ Pressure sensor
	Fuel level sensor
	Horn

Symbol	Description
	Key switch
	Preheating wire

Electrical Schematic Diagram

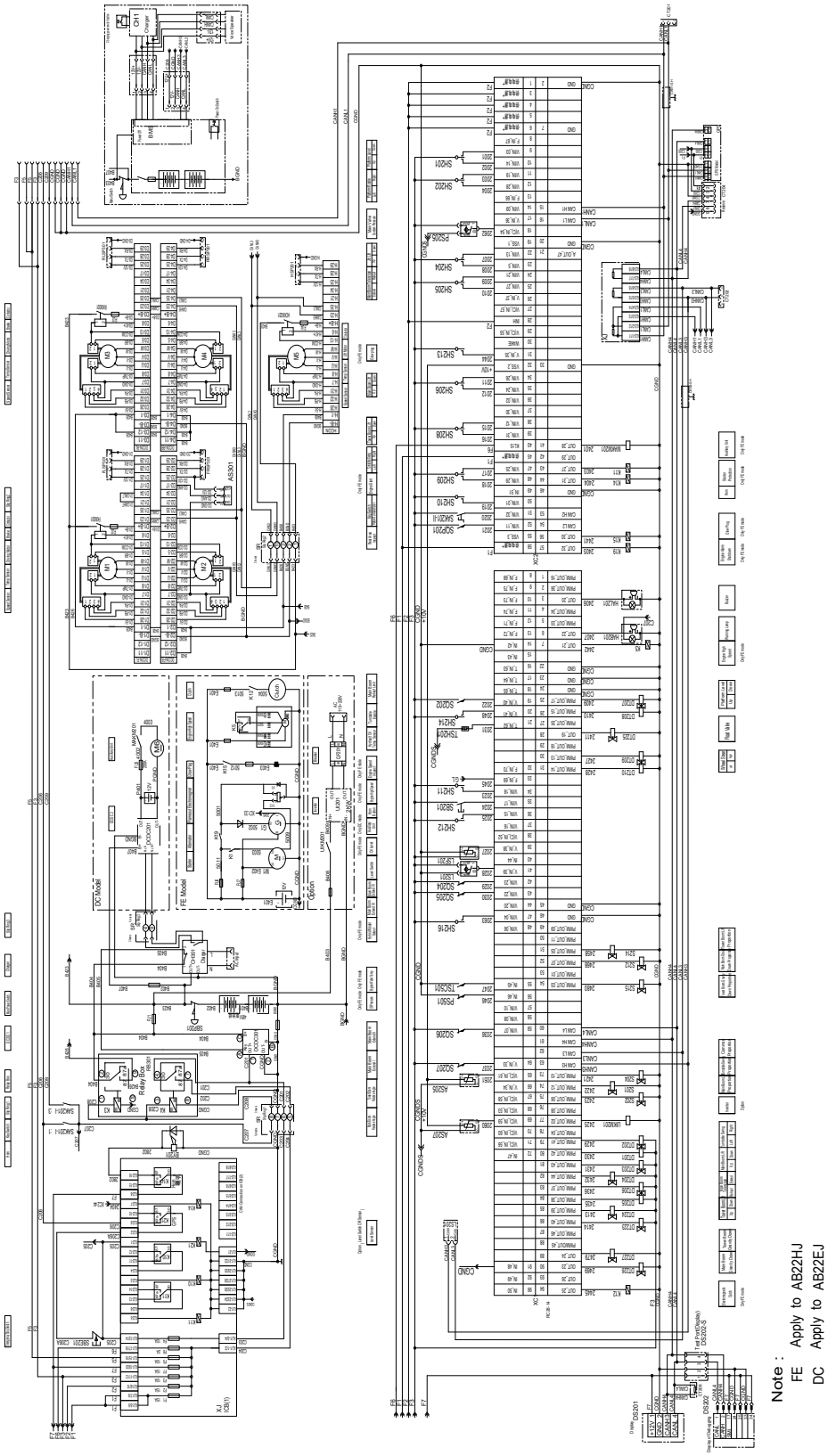


Figure 6-25 Electrical schematic diagram of turntable

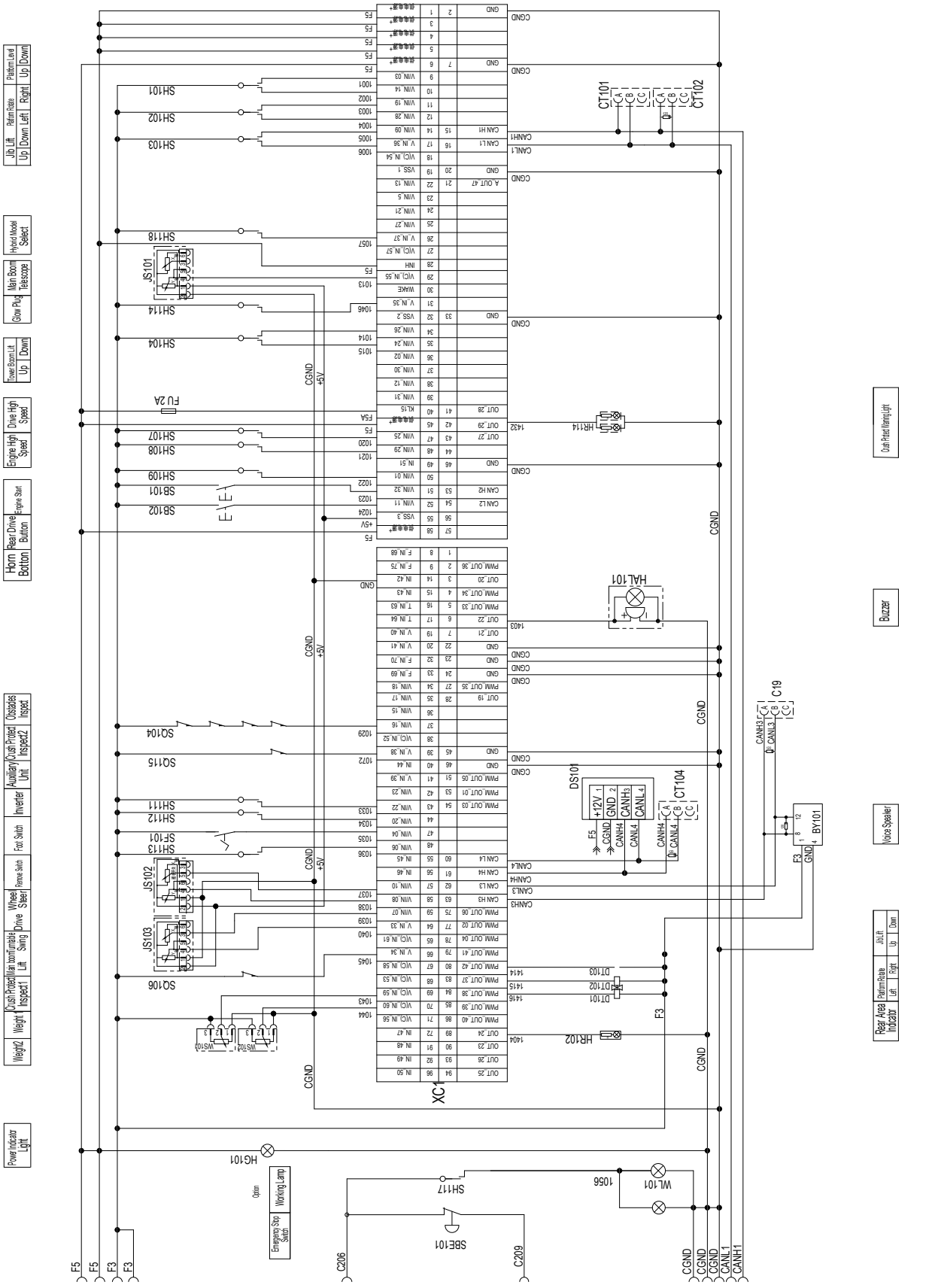


Figure 6-26 Electrical schematic diagram of platform

7 REXROTH CONTROL SYSTEM

⚠ DANGER

All operations in this section must be performed by qualified personnel who have been professionally trained and authorized by Sinoboom, otherwise the consequences will be at your own risk.

⚠ WARNING

UNSAFE OPERATION HAZARD

- **The machine has been commissioned before delivery. It's forbidden to modify the system settings and update the program without authorization from Sinoboom.**

  Due to different machine configurations, certain descriptions below may be inapplicable to your machine. In case of any operational questions when operating the machine as per the manual, please stop operation and contact Sinoboom after-sales personnel in time.
- **Incorrect operation may result in death, serious injury or machine damage.**

NOTICE

PCU, ECU, sensors, etc. are precisely adjusted and protectively treated before delivery. Therefore, personnel who have not been professionally trained and authorized by Sinoboom cannot disassemble their housings, otherwise moisture and dust will enter the internal mechanism and normal operation will not be guaranteed.

This section is applicable to Rexroth control system.

DISPLAY INTERFACE

The system interface is described in the figure below:

Note: some interfaces can only be accessed with a password (the password can only be provided to personnel professionally trained and authorized by Sinoboom).

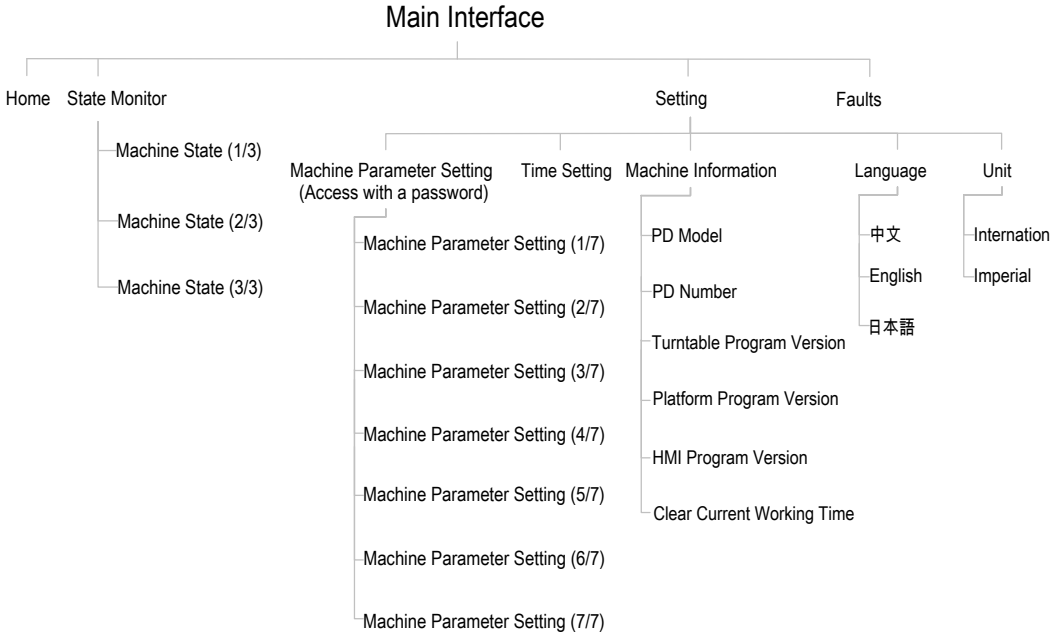


Figure 7-1 Display interface navigation diagram

HOME INTERFACE AFTER BOOTING

Turn the ground/platform select switch on the ground controller to the ground control position, pull out the emergency stop button to the ON position, and turn the key switch to the ON position, the system will be powered on.

Figure 7-2 Home interface after booting

Table 7-1

1. Home	**4.** OK button	**7.** Right shift key/next page
2. State monitor/next page	**5.** Down shift key	**8.** Setting
3. Left shift key	**6.** Up shift key	**9.** Faults

STATE MONITOR

1. On the Home interface, press the corresponding button of “State Monitor” to enter the Machine State (1/3) interface.

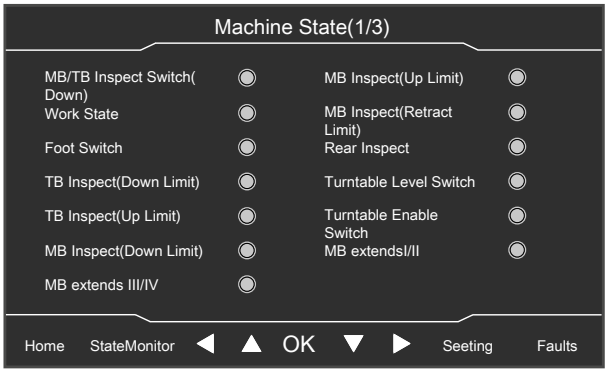


Figure 7-3 Machine State (1/3) interface

- The Machine State (1/3) interface is mainly used to query the signal detection status of the detection switches (such as travel switches and proximity switches) configured on the machine, to determine whether the detection switches are working normally and whether the working status of the machine meets the requirements. When the indicator light corresponding to one option lights up with the symbol  , it means that the switch has detected a signal; when the indicator light is off, it means the switch has not detected a signal.
- The configuration of switches is subject to the actual machine configurations.

2. On the Machine State (1/3) interface, press the right shift key to enter the Machine State (2/3) interface.

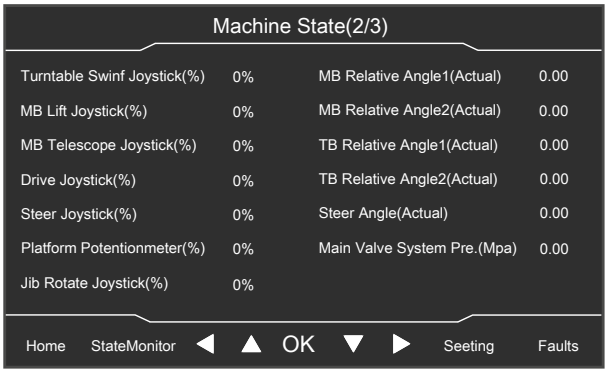


Figure 7-4 Machine state (2/3) interface

- This interface is mainly used to query the current actual value of each joystick/ potentiometer and the actual value of the sensors configured on the machine, to check whether the position status of each joystick/ potentiometer is normal, and to determine whether each sensor is working normally.
- The configuration of switches is subject to the actual machine configurations.

3. On the Machine State (2/3) interface, press the right shift key to enter the Machine State (3/3) interface.

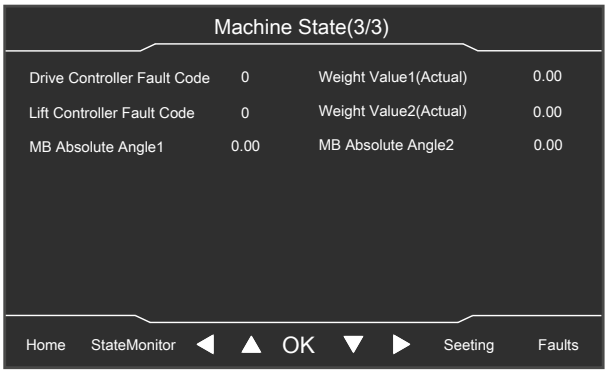


Figure 7-5 Machine state (3/3) interface

- This interface is mainly used to query the current fault codes of each motor controller and the actual value of the sensors configured on the machine, to check whether the status of each motor controller is normal, and to determine whether each sensor is working normally.

4. Press the corresponding button of Home interface to return to the Home interface, and power off the machine as needed.

FAULT INQUIRY

1. On the Home interface, press the corresponding key of “Faults” to enter the “Current Faults (1/1)” interface, which is mainly used to query the current faults of the machine. For detailed fault descriptions, see the “***Fault Code Description***” section in the Maintenance Manual.

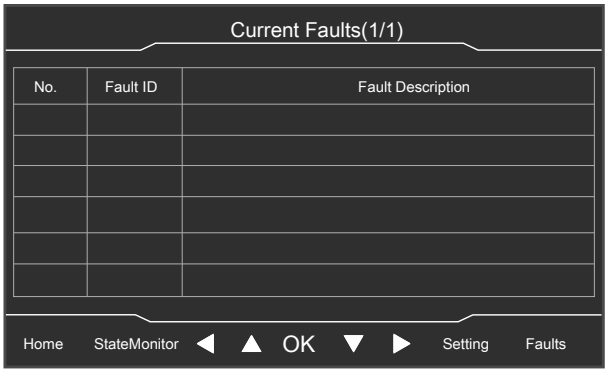


Figure 7-6 Current Faults interface

2. Press the corresponding key of Home interface to return to the Home interface, and power off the machine as needed.

PARAMETER SETTING

DANGER

Personnel who have not been professionally trained and authorized by Sinoboom are not allowed to modify the options in parameter setting (including joystick calibration, sensor calibration, standardization setting, overload limit setting, travel limit setting, interlock unlocking and position parameter setting); otherwise they will be responsible for the consequences.

On the Home interface, press the corresponding key of “Setting” to enter the System Setting interface.

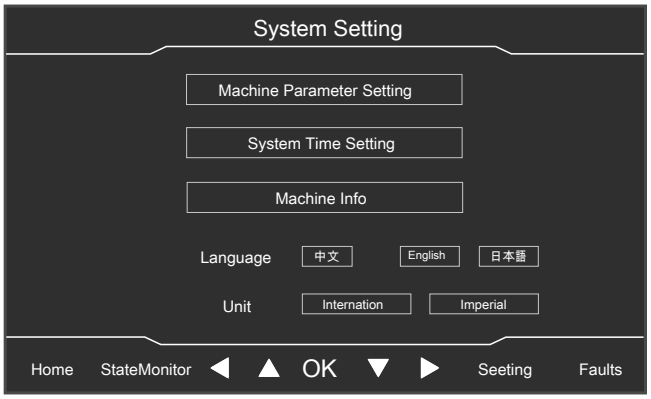


Figure 7-7 System Setting interface

Machine Parameter Setting

1. On the System Setting interface, select Machine Parameter Setting through the up shift key and down shift key, and press OK button to enter Machine Parameter Setting (1/7) interface.

   Note: A password is required to enter this interface. Use the left shift key and right shift key to change the selected item, and use the up shift key and down shift key to adjust the value of the selected item.

Figure 7-8 Password interface

2. The Machine Parameter Setting (1/7) interface is mainly used for joystick calibration.

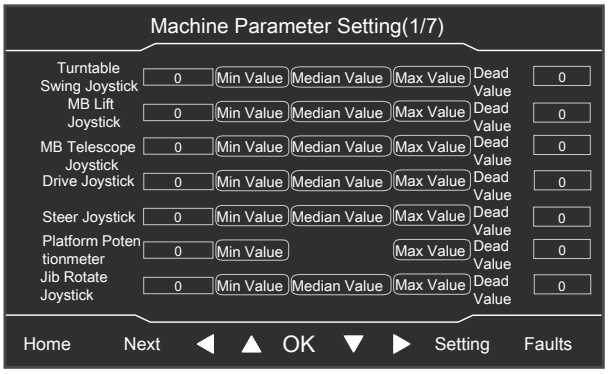


Figure 7-9 Machine Parameter Setting (1/7) interface

1) Select the calibration item by the up shift key, down shift key, left shift key and right shift key, push the joystick to the corresponding position, and press and hold the OK button for 3 seconds to save and complete the calibration.
2) If the parameters of the item need to be re-calibrated, press the corresponding button of Setting to return to the System Setting interface, then re-enter the Machine Parameter Setting (1/7) interface, and repeat the previous steps.
3) Press the corresponding button of Home interface to return to the Home interface, and power off the machine as needed.

3. On the Machine Parameter Setting (1/7) interface, press the corresponding button of next page to enter Machine Parameter Setting (2/7) interface, which is mainly used for sensor calibration.

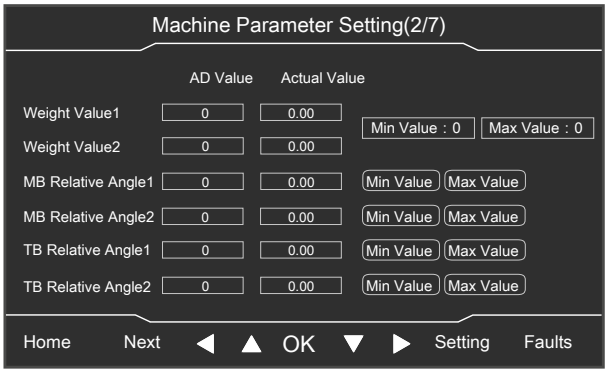


Figure 7-10 Machine Parameter Setting (2/7) interface

- **Weight calibration**

NOTICE

If the machine is equipped with a dual-channel sensor, when pressing and holding OK button for no-load and heavy-load calibration, the weight of two channels will be calibrated at the same time.

1) Make sure that no heavy objects are placed on the platform and that the platform is stable without shaking.
2) Enter the Machine Parameter Setting (2/7) interface, select the “Min Value” through the up shift key, down shift key, left shift key and right shift key, adjust the value to 0 through the up shift key and down shift key, press and hold the OK button for 3 seconds to complete the no-load calibration.
3) Place a heavy object with the weight equal to the rated load of the machine on the platform, and ensure that the platform is stable without shaking.
4) Select the “Max Value” through the left shift key and right shift key, adjust the value to the weight value of the heavy object on the platform through the up shift key and down shift key, press and hold the OK button for 3 seconds to complete the full-load calibration (the actual value corresponding to the weight value on the left side of the display screen is equal to the weight value of loads on the platform).
5) If re-calibration is required, press the corresponding button of Setting to return to the System Setting interface, then re-enter the Machine Parameter Setting (2/7) interface, and repeat the previous steps.
6) Press the corresponding button of Home interface to return to the Home interface, and power off the machine as needed.

- **Sensor calibration**

NOTICE

If the machine is equipped with a dual-channel sensor, only 1 channel is needed to be selected for maximum and minimum value calibration.

1) Enter the Machine Parameter Setting (2/7) interface, select the position to be calibrated through the up shift key, down shift key, left shift key and right shift key, press and hold the OK button for 3 seconds to complete the calibration (after successful calibration, the corresponding actual value will be changed).

2) If re-calibration is required, press the corresponding button of Setting to return to the System Setting interface, then re-enter the Machine Parameter Setting (2/7) interface, and repeat the previous steps.

3) Press the corresponding button of Home interface to return to the Home interface, and power off the machine as needed.

4. On the Machine Parameter Setting (2/7) interface, press the corresponding button of next page to enter Machine Parameter Setting (3/7) interface, which is mainly used for sensor calibration. Perform calibration referring to the above steps.

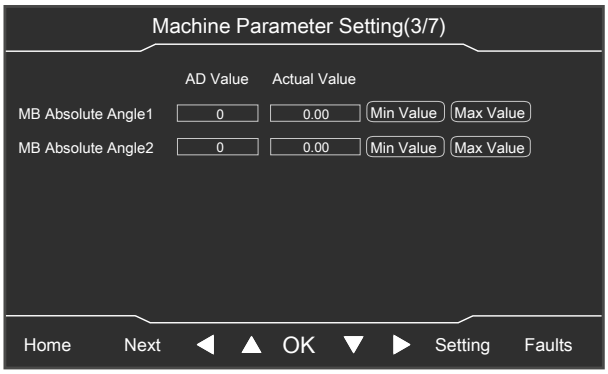


Figure 7-11 Machine Parameter Setting (3/7) interface

5. On the Machine Parameter Setting (3/7) interface, press the corresponding button of next page to enter Machine Parameter Setting (4/7) interface.

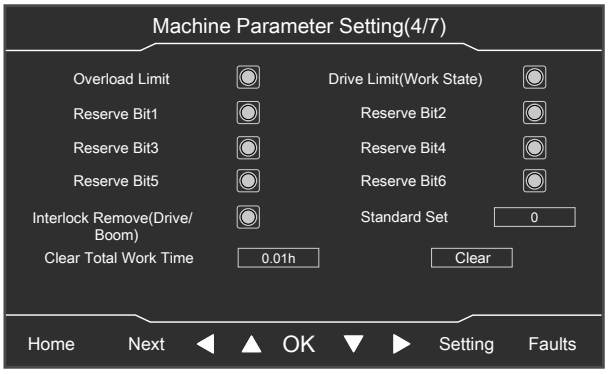


Figure 7-12 Machine Parameter Setting (4/7) interface

1) On the interface, select the required standard or function through the up shift key, down shift key, left shift key and right shift key.

2) **Overload limit setting:** Select the Overload Limit option, and press and hold the OK button for 3s to confirm the setting. The corresponding indicator light will be light up with ● after successful setting，and the KG icon (KG) will be displayed in the upper right corner of the Home interface.

3) **Drive Limit (work state) setting:** Select the Drive Limit option, and press and hold the OK button for 3s to confirm the setting. The corresponding indicator light will be light up with ● after successful setting, and the DR icon (DR) will be displayed in the upper right corner of the Home interface.

4) **Interlock Remove (Drive/Boom) setting:** Select the Interlock Remove (Drive/Boom) option, and press and hold the OK button for 3s to confirm the setting. The corresponding indicator light will be light up with ● after successful setting, and the D/B icon (D/B) will be displayed in the upper right corner of the Home interface.

5) **Standard setting:** Select the Standard Set option, change the value through the up shift key and down shift key, and press and hold the OK button for 3s to confirm the setting. The corresponding indicator light will be light up with ● after successful setting.

- After changing the value to “0” and confirming the setting, the program will not implement any standard restrictions.
- After changing the value to “1” and confirming the setting, the program will implement the restrictions of CE standard, and the icon of CE standard (CE) will be displayed in the upper right corner of the Home interface.
- After changing the value to “2” and confirming the setting, the program will implement the restrictions of ANSI standard, and the icon of ANSI standard (ANSI) will be displayed in the upper right corner of the Home interface.
- After changing the value to “3” and confirming the setting, the program will implement the restrictions of CSA standard, and the icon of CSA standard (CSA) will be displayed in the upper right corner of the Home interface.
- After changing the value to “4” and confirming the setting, the program will implement the restrictions of AS standard, and the icon of AS standard (AS) will be displayed in the upper right corner of the Home interface.
- After changing the value to “5” and confirming the setting, the program will implement the restrictions of KCS standard, and the icon of KCS standard (KCS) will be

displayed in the upper right corner of the Home interface.

- After changing the value to “6” and confirming the setting, the program will implement the restrictions of JIS standard, and the icon of JIS standard (JIS) will be displayed in the upper right corner of the main interface.
- After changing the value to “7” and confirming the setting, the program will implement the restrictions of EAC standard, and the icon of EAC standard (EAC) will be displayed in the upper right corner of the main interface.
- After changing the value to “8” and confirming the setting, the program will implement the restrictions of UKC standard, and the icon of UKC standard (UKC) will be displayed in the upper right corner of the main interface.

6) **Reserve Bit setting:** the reserve bit is reserved for later use. Select the Reserve Bit option, and press and hold the OK button for 3s to confirm the setting. The corresponding indicator light will be light up with after successful setting.

7) Clear Total Work Time setting: Select the Clear option, and press and hold the OK button for 3s to complete the clearing. The total work time can only be cleared once (after clearing, the total work time is about 36.5h), so please use the function with caution.

8) If re-selection is required, press the corresponding button of Setting to return to the System Setting interface, then enter the Machine Parameter Setting (4/7) again and repeat the previous steps to select the required option.

9) Press the corresponding button of Home interface to return to the Home interface, and power off the machine as needed.

Note:

- Under the KG mode, all motions of the machine in operating position will be restricted when the platform is overloaded. For the differences between the KG mode and non-KG mode, refer to the ***Test Weighing System*** section in the maintenance procedures of this manual.
- Under the DR mode, the drive function will be restricted when the machine is in operating position.
- Under the D/B mode, the drive function and boom movement can be performed at the same time.

6. On the Machine Parameter Setting (4/7) interface, press the corresponding button of next page to enter Machine Parameter Setting (5/7) interface.

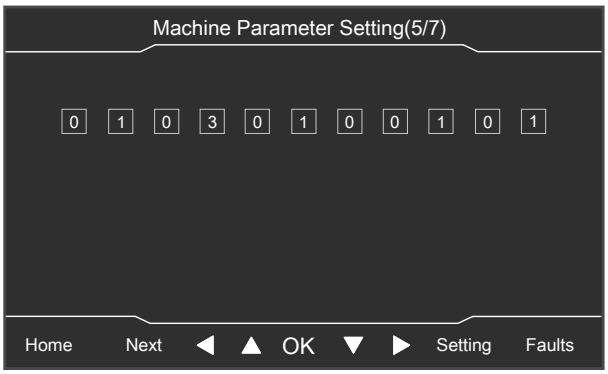


Figure 7-13 Machine Parameter Setting (5/7) interface

1) On the interface, the machine number can be set. Change the selected option through the left shift key and right shift key, and adjust the value through the up shift key and down shift key, press the OK button to confirm and save the setting.

2) If re-setting is required, press the corresponding button of Setting to return to the System Setting interface, then enter the Machine Parameter Setting (5/7) again and repeat the previous steps.

3) Press the corresponding button of Home interface to return to the Home interface, and power off the machine as needed.

7. On the Machine Parameter Setting (6/7) interface, press the corresponding button of next page to enter Machine Parameter Setting (7/7) interface. On the interface, select the “Restore Total Hour” option, then press the OK button, and 6 minutes later, the total work time of the machine can be restored.

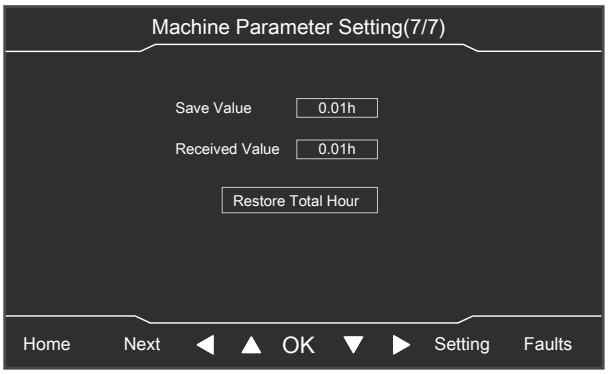


Figure 7-14 Machine Parameter Setting (7/7) interface

Note:

- The controller collects the working time of the machine and sends data to the display screen every 6 minutes. The Received Value is the data received by the display screen; the Save Value is the data saved by the display screen. The Received Value and Save Value are the same normally.
- If a new controller is installed after the machine operates for a period of time, the Received Value will be 0, and the Save Value is the total working hour of the machine. Select the “Restore Total Hour” option, then press the OK button, and 6 minutes later, the Received Value can be restored to the total working hour of the machine.

Time setting

1. On the System Setting interface, select Time Setting through the up shift key and down shift key, and press the OK button to enter Time Setting interface.

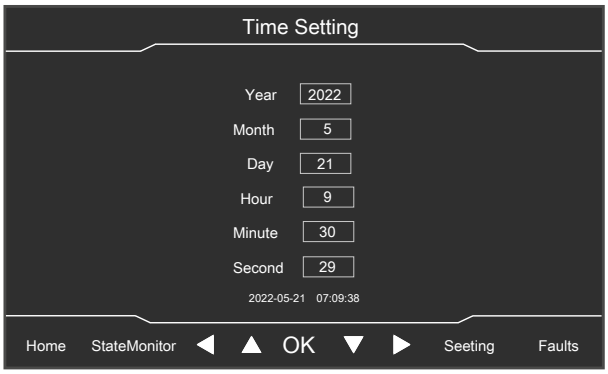


Figure 7-15 Time Setting interface

2. On the interface, change the selected item through the left shift key and right shift key, adjust the value through the up shift key and down shift key, and press the OK button to confirm and save the setting.
3. If resetting is required, press the corresponding button of Setting to return to the System Setting interface, then enter Time Setting interface, and repeat the above steps.
4. Press the corresponding button of Home interface to return to the Home interface, and power off the machine as needed.

Machine information

1. On the System Setting interface, select the “Machine Info” through the up shift key and down shift key to enter the Machine Information interface.

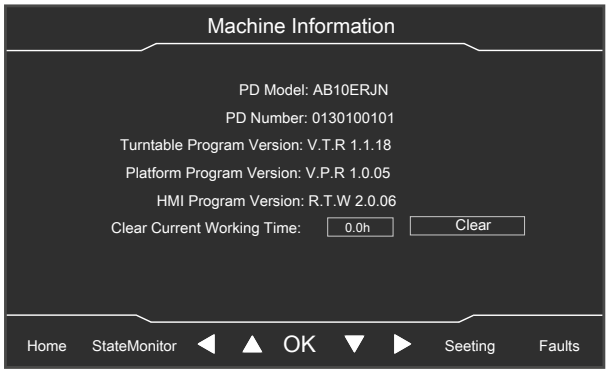


Figure 7-16 Machine Information interface

2. This interface is mainly used to query the detailed information of the current software program version of the machine and to clear the current working time.
3. Select the “Clear” option, press and hold the OK button for 3 seconds to complete the clearing of the current working time.
4. Press the corresponding button of Home interface to return to the Home interface, and power off the machine as needed.

Language setting

1. On the Home interface, press the corresponding button of “Setting” to enter the System Setting interface.

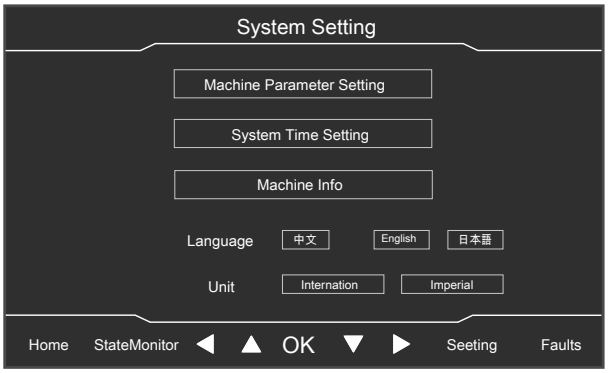


Figure 7-17 System Setting interface

2. Change the selected item through the up shift key, down shift key, left shift key and right shift key, and press the OK button to complete language setting.

Unit setting

1. On the Home interface, press the corresponding button of “Setting” to enter the System Setting interface.

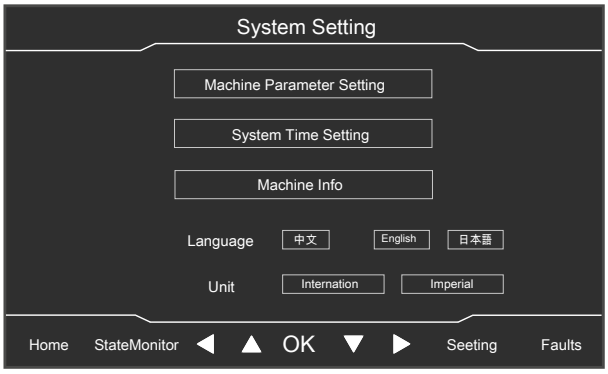


Figure 7-18 System Setting interface

2. Change the selected item through the up shift key, down shift key, left shift key and right shift key, and press the OK button to complete unit setting.

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APPENDIX 1: PREPARE THE WORK RECORD BEFORE DELIVERY

PREPARE THE WORK RECORD BEFORE DELIVERY			
Model			
Serial No.			
Inspection Item	**YES/Machine is in Good Condition**	**NO/Machine Has Damage or Malfunction**	**REPAIRED/Machine Has Been Repaired**
Pre-operational Inspection			
Maintenance Procedure			
Functional Inspection			
Machine Buyer/ Renter			
Inspector Signature			
Inspector Title			
Inspector Company			

NOTE:

1. Prepare the machine before delivery, which includes performing a pre-delivery inspection, following maintenance procedures and performing functional inspections.
2. Use the table to record the results. After each section is complete, mark the appropriate box.
3. Record the inspection results. If any inspection result is “NO”, the machine must be stopped, and then re-inspected after repair is completed, and the box marked “REPAIRED” shall be checked.

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APPENDIX 2: REPAIR & INSPECTION REPORT

Repair & Inspection Report				
Model				
Serial No.				
Checklist A Procedures				
Items	YES/Good Machine	NO/Damaged or Faulted Machine	REPAIRED/ Repaired Machine	Problem Description
A-1 Inspect All Manuals				
A-2 Inspect All Decals				
A-3 Check for Damaged, Loose or Lost Parts				
A-4 Inspect Hydraulic Oil Level				
A-5 Check for Hydraulic Oil Leakage				
A-6 Perform Functional Test				
A-7 Perform Maintenance after 30 Days				
A-8 Test Oscillating Cylinder Exhausting				
A-9 Check Battery Level				
Checklist B Procedures				
Items	YES/Good Machine	NO/Damaged or Faulted Machine	REPAIRED/ Repaired Machine	Problem Description
B-1 Inspect and Replace Hydraulic Oil Tank Return Filter Element				
B-2 Inspect Rim, Tire and Fasteners				
B-3 Check Hydraulic Oil				
B-4 Inspect Electrical Wiring				
B-5 Inspect Emergency Lowering				
B-6 Inspect Air Filter of Hydraulic Tank				

Repair & Inspection Report				
B-7 Replace High-Pressure Filter Element				
B-8 Test Drive Speed				
B-9 Inspect Boom Envelope Limit Travel Switch				
B-10 Inspect Tilt Protection				
B-11 Check Drive Reducer Oil Level				
B-12 Check Slewing Reducer Oil Level				
B-13 Inspect Slewing Bearing Bolts				
B-14 Lubricate Slewing Bearing				
B-15 Inspect Platform Oscillating Cylinder Fasteners				
B-16 Test Cylinder Drift				
B-17 Test Counterbalance Valve Locking				
B-18 Test Oscillating Outrigger				
B-19 Inspect Battery				
B-20 Test Braking Distance				
Checklist C Procedures				
Items	YES/Good Machine	NO/Damaged or Faulted Machine	REPAIRED/ Repaired Machine	Problem Description
C-1 Replace Air Filter of Hydraulic Tank				
C-2 Inspect Weighing System				
Checklist D Procedures				
Items	YES/Good Machine	NO/Damaged or Faulted Machine	REPAIRED/ Repaired Machine	Problem Description
D-1 Replace Drive Reducer Gear Oil				
D-2 Replace Slewing Reducer Gear Oil				
D-3 Replace Hydraulic Oil				

Repair & Inspection Report				
D-4 Replace Hydraulic Tank Suction Filter				
D-5 Inspect Boom Wear Pads				

User	
Inspector Signature	
Inspection Date	
Inspector Title	
Inspector Company	

NOTES:

1. The Repair & Inspection Report shall include the inspection form of all regular inspections.
2. Duplicate the Repair & Inspection Report template for each inspection. Store the completed forms for 10 years or until the machine is no longer in use or as required by machine owner/companycustodian.
3. Record inspection results in the above form. After one item is complete, check the corresponding box.
4. If any item is marked as “NO” based on the inspection result, the machine must be stopped, and then re-inspected after repair is completed, and the box “REPAIRED” should be checked.

Select appropriate inspection procedure based on the inspection type.

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APPENDIX 3: MAJOR MODIFICATION AND REPAIR RECORD

Major Modification and Repair Record					
Model					
Serial No.					
Date	**Problem Description**	**Modification/Repair Item**	**Machine Status af-ter Change**	**Repairman's Company and Position**	**Repair-man Signature**

Note:

1. A major modification/repair is a modification/repair made to all or part of a machine that affects the stability, strength or performance of the machine.
2. Use this form to record major modifications/repairs made to the machine. Keep the form properly until the machine is taken out of service, or as requested by the machine owner/company.
3. The machine must be inspected and verified after major modifications/repairs, with the inspection items including but not limited to all items in the maintenance and inspection report.
4. If the inspection result of each item in the Maintenance and Inspection Report is "YES", the "Machine Status after Modification/Repair" in the form will be "Good" and the machine can be used. If either inspection result is "NO", the machine must be re-inspected after the repair is completed until the machine is in "Good" condition before continuing to use the machine.

Always for Better Access Solutions

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