

# Self-Propelled Rough-Terrain Scissor Lifts

## Operation and Safety Manual

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**ZOOMLION**

ZS1623RT  
Operation and Safety Manual

April 2020 Version A



## **Foreword**

Zoomlion appreciates your choice of our machine for your application. The Operation and Safety Manual must be read and understood in its entirety before operating the machine.

This manual introduces you safety information, significant technical specs, safety operation in detail for working efficiency improving. Keep this manual properly at all times for looking up.

Do not operate the machine if there is any doubt in operation, please consult local service team for troubleshooting. Zoomlion AWP Machinery Company does not take the consequence of wrong operation.

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

The content is under intellectual property protection, permission is required for a copy or other application.

There might be some tiny differences in details between your machine and the upgraded one due to the continuous improving. For clarification, questions, or additional information regarding any portions of this manual, Contact Zoomlion AWP Machinery.

Our company reserves the right to modify this manual as technical improvement without notice.

Thank you for your trust and support for Zoomlion products!

Zoomlion Aerial Work Platform Machinery Company

## Safety Precaution Icons

This manual has the following safety precaution icons:

### **⚠ DANGER**

Failure to comply with the safety precautions listed in this manual could result in personal injury or death.

### **⚠ WARNING**

Failure to comply with the safety precautions listed in this manual could result in potential personal injury or death.

### **⚠ CAUTION**

Failure to comply with the safety precautions listed in this manual could result in potential mild personal injury.

### **NOTICE**

Indicates risks unrelated with personal injury (such as property damage).

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# **ZOOMLION**

Operator's Manual

**SECTION 1 SAFETY**

**PRECAUTIONS**





## SECTION 1 SAFETY PRECAUTIONS

### 1.1 General

To Owners/Users/Operators:

Zoomlion appreciates your choice of our machine for your application. Our number one priority is user safety, which is best achieved by our joint efforts. The following requirements need to be adhere to for the purpose of safety operating:

- a) Obey all user rules, job site regulations and governmental regulations.
- b) Read, understand and obey all operating instructions on the machine and in this manual.
- c) Keep good safety operating convention.
- d) Allow only those authorized and qualified personnel to operate the machine under the supervision of an experienced and qualified operator.
- e) An operator must not operate the machine if he has any doubts.

Zoomlion appreciates your choice of our machine for your application.

### 1.2 Pre-operation

#### **⚠ DANGER**

FAILURE TO COMPLY WITH THE SAFETY PRECAUTIONS LISTED IN THIS MANUAL COULD RESULT IN PERSONAL INJURY OR DEATH.

An operator must not operate the machine, only if:

- a) He has learned and practiced the principles of safe machine operation contained in this operational manual.
  - 1) Avoid hazardous situations.
  - 2) Be aware of safety rules before further operation.
  - 3) Perform a pre-operation inspection at all times.
  - 4) Implement functional test before operating the machine at all times.
  - 5) Inspect job site. The unit must work on a solid and level ground.
  - 6) Only use the machine as it was intended.
- b) Read, understand and obey the manufacturer's instructions and safety rules—safety and operator's manuals and machine decals.
- c) Read, understand and obey employer's safety rules and worksite regulations.
- d) Read, understand and obey all applicable governmental regulations.
- e) The operator is properly trained to safely operate the machine.

### 1.3 Hazard Classification

Decals on this machine use symbols, color coding, and signal words to identify the following:



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

#### **⚠ DANGER**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury. This decal will have a red background.

#### **⚠ WARNING**

Indicates a hazardous situation which, if not avoided, could result in death or serious injury. This decal will have an orange background.

#### **⚠ CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. This decal will have a yellow background.

#### **NOTICE**

Indicates a property damage message. This decal will have a blue background.

### 1.4 Intended Use

This machine is intended to be used only to lift personnel, along with their tools, and materials to an aerial work site.

### 1.5 Safety Alert Symbols and Maintenance

Replace any missing or damaged safety signs. Keep operator safety in mind at all times. Use mild soap and water to clean safety signs. Do not use solvent-based cleaners because they may damage the safety sign material.












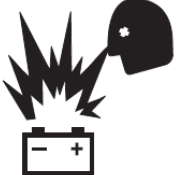




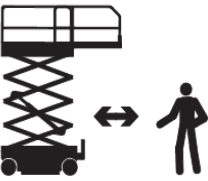





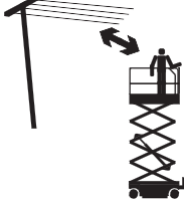

				
Read operational manual	Read service manual	Crushing hazard	Crushing hazard	Collision hazard
				
Tip-over hazard	Tip-over hazard	Tip-over hazard	Tip-over hazard	Electrocution hazard
				
Electrocution hazard	Explosion hazard	Fire hazard	Burn hazard	Dermohemia hazard
				
Engage safety arm	Keep away from moving parts	Keep clear of outriggers and tires	Move machine to level ground	Close chassis tray
				
Lower the platform	Do not set up where it cannot be leveled with outriggers	Maintain required clearance	Compartment maintenance implement by trained and authorized personnel only	Use a piece of cardboard or paper to search for leaks

Figure 1-1 Symbol and Hazard Pictorials Definitions

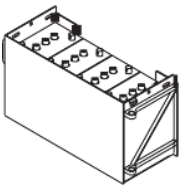


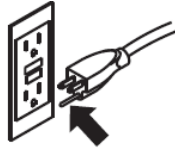


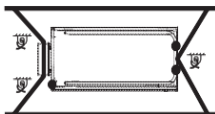






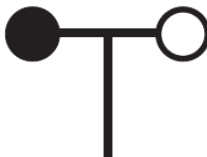






				
Batteries used as counterweights	Chock the wheels	Release brakes	3-wire grounded AC power supply only	Replace damaged wire and cable
				
Wheel load	Transporting diagram	Tie-down points	Lanyard anchorage points	No smoking
				
Voltage rating for power to platform	Pressure rating for air line to platform	Manual force	Wind speed	
				
Maximum capacity	Outdoor	Indoor		
				
砸压的危险	降低时握住栏杆	支腿负载		

Figure 1-1 Symbol and Hazard Pictorials Definitions

## 1.6 Safety Operation

### 1.6.1 Operator safety

Personal fall protection equipment (PFPE) is required when operating this machine. If PFPE is required in job site or in operator's manual, following rules should be complied with:

all PFPE must comply with applicable governmental regulations, and must be inspected and used in accordance with the PFPE manufacturer's instructions.

### 1.6.2 Workplace safety

#### 1.6.2.1 Electric shock hazard

##### **⚠ DANGER**

This machine is not electrically insulated and will not provide protection from contact with or proximity to electrical current.

- a) Obey all local and governmental regulations regarding required clearance from electrical power lines. Keep required clearance listed in Table 1-1.



**Table 1-1 Required Clearance**

No.	Voltage	Required clearance
1	0 to 50KV	3.05 m/10ft
2	50 to 200KV	4.60 m/15ft
3	200 to 350KV	6.10 m/20ft
4	350 to 500KV	7.62 m/25ft
5	500 to 750KV	10.67m/35ft
6	750 to 1000KV	13.72m/45ft



- b) Allow for platform movement, electrical line sway or sag, and beware of strong or gusty winds.
- c) Keep away from the machine if it contacts energized power lines. Personnel on the ground or in the platform must not touch or operate the machine until energized power lines are shut off.



Do not operate the machine during lightning or storms.

Do not use the machine as a ground for welding.

### 1.6.2.2 Tip-over hazard

#### **⚠ DANGER**

- a) Occupants, equipment and materials shall not exceed the maximum platform capacity.

**Table 1-2 Rated Load**

Model	Maximum Capacity	Capacity on Platform Extended
ZS1623RT	680kg/1500lbs	230kg/510 lbs

- b) Do not elevate the platform unless the machine is on firm level ground.



- c) Do not depend on the tilt alarm as a level indicator. The tilt alarm sounds on the chassis only when the machine is on a severe slope.

If the tilt alarm sounds: use extreme caution to lower the platform with the emergency lowering pull rod. Move the machine to a firm, level surface before lifting.

- d) Do not drive over 1.1km/h with the platform raised.

Outdoor use: do not raise the platform when wind speeds may exceed 12.5 m/s(28 mph ).Lower the platform and stop operating the machine if the wind speed exceeds 12.5 m/s(28 mph ).

Indoor use: do not exceed the rated values of allowable manual force and maximum occupants listed in Table 1-3.

**Table 1-3 Maximum allowable manual force**

Model	Manual force	Maximum occupants
ZS1623RT	400N/90 lbs force	4

- e) Do not operate the machine in strong or gusty winds. Do not increase the surface area of the platform or the load. Increasing the area exposed to the wind will decrease machine stability.



- f) Use extreme care and slow speeds while driving the machine in the stowed position across uneven terrain, debris, unstable or slippery surfaces and nearholes and drop-offs.



- g) Do not drive the machine on or near uneven terrain, unstable surfaces or other hazardous conditions with the platform raised or extended.
- h) The following operations are prohibited at any circumstances:
- 1) Push the machine or other objects with the platform.
  - 2) Contact adjacent structures with the platform.
  - 3) Tie the platform to adjacent structures.
  - 4) Place loads outside the platform perimeter.
  - 5) Operate the machine with the engine trays open.
  - 6) Push off or pull toward any object outside of the platform.



- i) Do not modify or alter an aerial work platform without prior written permission from the manufacture.
  - 1) Do not alter or disable the limit switches.
  - 2) Do not alter or disable machine components that in any way affect safety and stability.
  - 3) Do not replace items critical to machine stability with items of different weight or specification.
  - 4) Mounting attachments for holding tools or other materials onto the platform, toeboards, or guard rail system can increase the weight in the platform and the surface area of the platform or the load.
- j) Do not use lead acid or lithium-ion batteries that weigh less than the original equipment. Batteries are used as counterweight and are critical to machine stability.
- k) Do not place or attach fixed or overhanging loads to any part of this machine.
- l) Do not place ladders or scaffolds in the platform or against any part of this machine.



- m) Do not transport tools and materials unless they are evenly distributed and can be safely handled by person(s) in the platform.
- n) Do not use the machine on a moving or mobile surface or vehicle. Be sure the tires are in good condition and the lug nuts tightened, besides the opening pin installed in the right position.

#### 1.6.2.3 Crush hazard

##### **⚠ DANGER**

- a) Keep hands and limbs out of scissors.
- b) Do not work under the platform or in the scissor links without the safety arm in place.
- c) Use common sense and planning when operating the machine with the controller from the ground.  
Maintain safe distances between the operator, the machine and fixed objects.

#### 1.6.2.4 Danger of operation on the slope

##### **⚠ DANGER**

Do not drive the machine on a slope that exceeds the slope and side slope rating of the machine. Slope rating applies to machines in the stowed position.

Table 1-4 Rated slope in stowed position

Model	Maximum Slope Rating in Stowed Position	Maximum Side Slope Rating in Stowed Position
ZS1623RT	40% (22 °)	40% (22 °)

### 1.6.2.5 Fall off hazard

#### **⚠ DANGER**

The guard rails system provides fall protection. If occupant(s) of the platform are required to wear personal fall protection equipment (PFPE) due to job site or employer rules, PFPE and its use shall be in accordance with the PFPE manufacturer's instructions and applicable governmental requirements. Use approved lanyard attachment point provided.

- a) Do not sit, stand or climb on the platform guard rails. Maintain a firm footing on the platform floor at all times.
- b) Do not climb down from the platform when raised.



- c) Keep the platform floor clear of debris.
- d) Do not enter or exit the platform unless the machine is in the stowed position.
- e) Attach the platform entry chain or close the entry gate before operating.
- f) Do not operate the machine unless the guard rails are properly installed and the entry is secured for operation.

### 1.6.2.6 Collision hazard

#### **⚠ DANGER**

No stunt driving or horseplay while operating a machine.

- a) Be aware of limited sight distance and blind spots when driving and operating.



- b) Be aware of extended platform position when moving the machine.
- c) Be sure the machine is on a level surface or secured before releasing the brake.
- d) Operators must comply with employer, job site, and governmental rules regarding use of personal protective equipment.
- e) Check the work area for overhead obstructions or other possible hazards.



- f) Be aware of crushing hazards when grasping the platform guard rail.



- g) Observe and use the color-coded direction arrows on the platform controls and the platform decal plate for drive and steer functions.
- h) Do not lower the platform unless the area below is clear of personnel and obstructions.

起  
重  
机  
说  
明

- i) Limit travel speed according to the condition of the ground surface, congestion, slope, location of personnel, and any other factors which may cause collision.



- j) Do not operate a machine in the path of any crane or moving overhead machinery unless the controls of the crane have been locked out and/or precautions have been taken to prevent any potential collision.

#### 1.6.2.7 Burn hazard

##### **⚠ DANGER**

- a) Liquid or gas burn hazard.
- 1) Do not operate a machine with a hydraulic oil or air leak. An air leak or hydraulic leak can penetrate and/or burn skin.
  - 2) Batteries contain acid. Always wear protective clothing and eye wear when working with batteries.



- 3) Avoid spilling or contacting battery acid. Neutralize battery acid spills with baking soda and water.
- 4) Do not expose the battery or charger in water or rain while charging.



### **⚠ DANGER**

- b) Electric shock or burn hazard.
  - 1) Conduct daily check with wires and cables.



- 2) Change damaged items prior to operation. Avoid contact with battery terminals. Remove all rings, watches and jewelry.
- 3) Connect the battery charger to a grounded, AC 3-wire electrical outlet only.

### 1.6.2.8 Explosion and fire hazard

### **⚠ DANGER**

- a) Do not operate the machine or charge the battery in hazardous locations or locations where potentially flammable or explosive gases or particles may be present.
- b) Keep sparks, flames, and lighted tobacco away from batteries. Batteries emit explosive gas.



- c) Swing out the charger tray when charging indoor for cooling.
- d) Do not use tools which could produce flames to contact battery terminals or cable clamp.
- e) Keep lithium-ion battery away from heat.
- f) Do not over charge or over discharge the lithium-ion battery.
- g) If there is heat, deformation, liquid leakage, odor or smoke when charging, stop using the lithium-ion battery and place the battery in an open place away from the crowd.
- h) It is strictly forbidden to immerse the lithium-ion battery in water, acid, alkaline and salt solution. Avoid rain.

### 1.6.2.9 Machine damage hazard

#### **⚠ DANGER**

- a) Do not use a damaged or malfunctioning machine. Conduct a thorough pre-operation inspection of the machine and test all functions before each work shift.
- b) Immediately tag and remove from service a damaged or malfunctioning machine.
- c) Be sure all maintenance has been performed as specified in this manual and the appropriate Zoomlion service manual.
- d) Be sure all decals are in place and legible.
- e) Be sure operator's, safety, and responsibilities manuals are complete, legible, and in the storage container located on the machine.

### 1.6.2.10 Component damage hazard

#### **⚠ DANGER**

- a) Do not use a charger other than the ZOOMLION charger.
- b) Do not use the unit as a ground wire when welding;
- c) Do not use the unit in places with strong magnetic.



# **ZOOMLION**

Operator's Manual

**SECTION 2 MACHINE**

**COMPONENTS AND CONTROLS**





## SECTION 2 MACHINE COMPONENTS AND CONTROLS

### 2.1 Machine Components

a) ZS1623RT

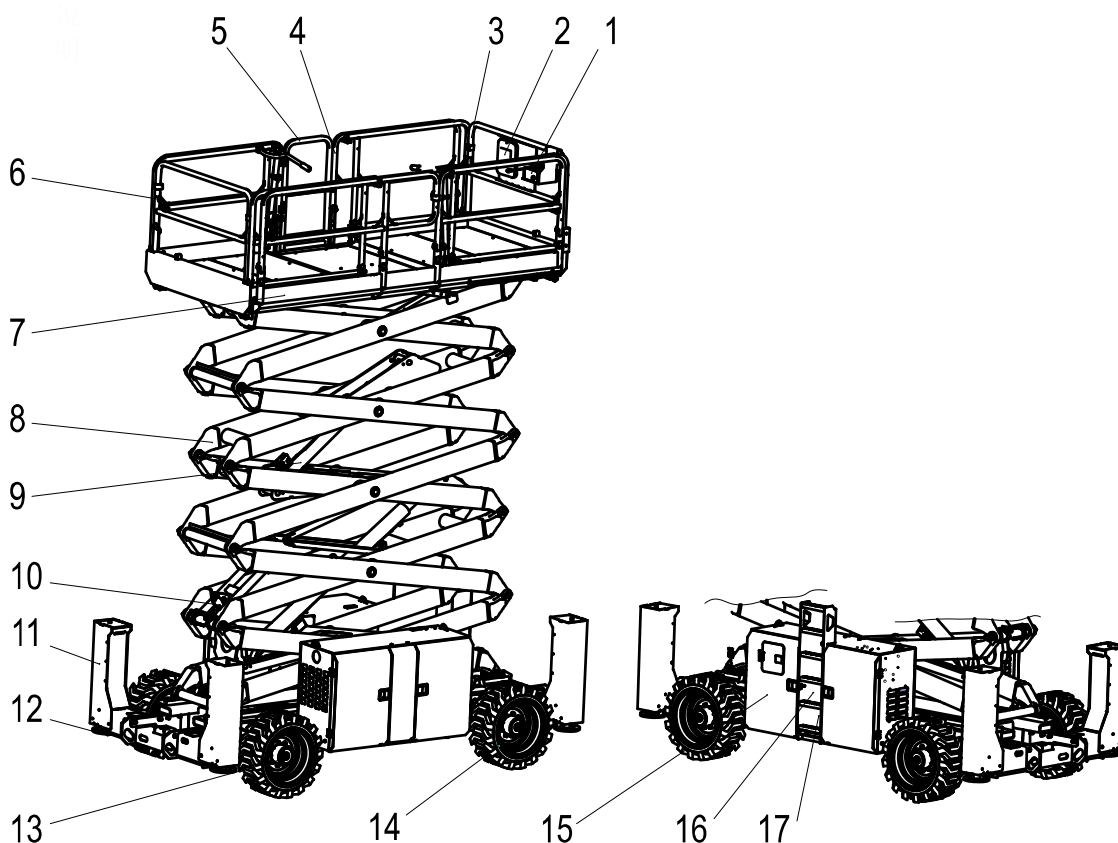


Figure 2-1 Components 1

Table 2-1 Component Instruction 1

No.	Item	No.	Item	No.	Item
1	Platform Console	7	Fixed platform	13	Non-steering tire
2	Manual Storage Container	8	Scissor arm	14	Steering tire
3	Platform extension	9	Lifting cylinder	15	Fuel tank (behind the top cover)
4	Platform guard rails	10	Safety arm	16	Entry ladder
5	Lanyard anchorage points	11	Outrigger rack	17	Steering wheel
6	Platform entry gate	12	Outrigger foot pad	18	Hydraulic tank (behind the top cover)

## 2.2 Machine Controller

### CAUTION

The manufacturer has no direct control over machine application and operation. The user and operator are responsible for conforming with good safety practices.

### 2.2.1 Ground controller

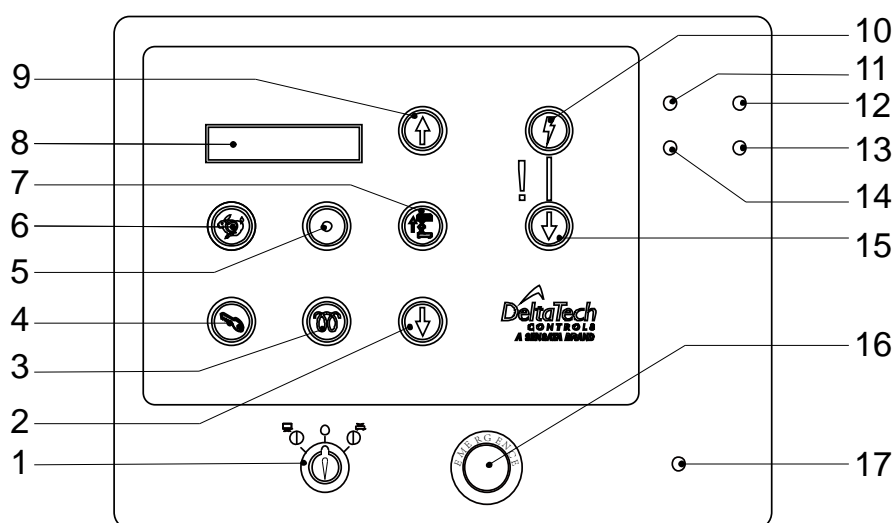


Figure 2-2 Ground Control Panel

Table 2-2 Ground Control Panel Instruction

No.	Item	No.	Item
1	Key select switch	10	Auxiliary function enable button
2	Platform down button	11	Breaker
3	Engine preheat button	12	Breaker
4	Engine start button	13	Breaker
5	Overload indicator	14	Breaker
6	Engine idle speed select button with indicator	15	Auxiliary power-lowering button
7	Lifting enable button	16	Red Emergency Stop button
8	LCD diagnostic readout	17	Breaker
9	Platform up button		

- a) LCD diagnostic readout
- b) Engine idle speed select button with indicator

Press this button to set engine idle speed. The light is on to indicate that high idle is selected. The light goes out to indicate that low idle is selected.

## c) Overload indicator

When the platform is overloaded, indicator lights up.

## d) Engine start button

Press this button to start engine.

## e) Engine preheat button

Press this button to active engine glow plug to help start the engine in cold conditions.

## f) Key switch.

Turn the switch to the platform position and the platform controls will operate. Turn the key switch to the off position and the machine will be off. Turn the key switch to the ground position and the electronic controls will operate.

## g) Emergency stop switch.

Push in the Red Emergency Button to the off position to stop all functions. Pull out the Red Emergency Button to the on position to operate the machine.

## h) Breaker

If overload or short circuit occur, the breaker of responding circuit will disconnect for protection. After troubleshooting, press the breaker button to reconnect the line.

## i) Auxiliary function enable button

Press this button to activate emergency lowering.

## j) Platform up button

Press this button to lift platform.

## k) Auxiliary lowering button

Press this button to activate emergency lowering function.

## l) Lift enable button

Press this button to activate lift function.

## m) Platform down button

Press this button to lower the platform.



### 2.2.2 Platform control unit (PCU)

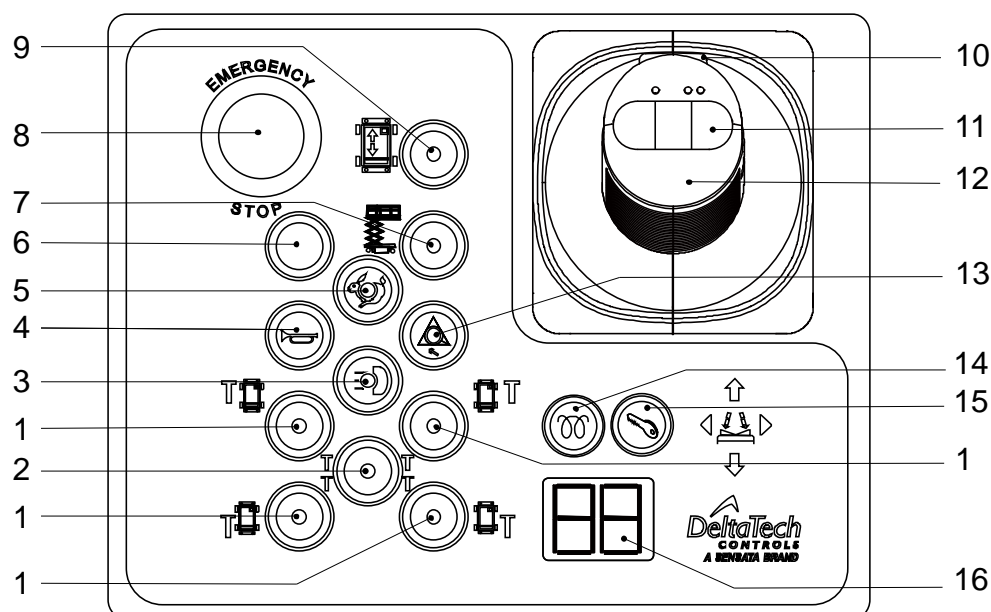


Figure 2-5 Platform Control Panel

Table 2-5 Platform control panel instruction

No.	Item	No.	Item
1	Outrigger enable button with indicator	9	Drive function switch
2	Outrigger automatic leveling button	10	Function enable switch
3	Light	11	Thumb rocker type switch for steering
4	Horn button	12	Proportional control handle
5	Engine idle speed select button with indicator	13	Tilt button with indicator
6	Reserved	14	Engine preheat button
7	Lift enable button with indicator	15	Engine enable button
8	Emergency stop switch	16	LED diagnostic readout

a) Emergency stop switch.

Push in the Red Emergency Button to the off position to stop all functions. Pull out the Red Emergency Button to the on position to operate the machine.

b) Engine idle speed select button with indicator

Press this button to activate high speed drive function. Indicator will light up in high drive speed. Select this function in drive mode.



- c) Horn button.

Press the horn button and the horn will sound. Release the horn button and the horn will not sound.



- d) Outrigger enable button with indicator

Press the button to activate outrigger up/down function.

- e) Outrigger automatic leveling button

Press the button to start engine.

- f) Engine start button

Press the button to start engine.

- g) Engine preheat button

Press the button to activate engine glow plug to help start the engine in cold conditions.

- h) Tilt button with indicator

Press the button to select low speed when tilting.

Press this button to activate slow speed function. Indicator will light up when driving in slow speed. Select this function in drive mode.



- i) Thumb rocker type switch for steering

Press the drive function, then press the left side of the thumb rocker, the unit will move towards the the blue triangle direction; press the right side of the thumb rocker, the unit will move towards the direction of the yellow triangle.



- j) Proportional control handle and function enable switch for drive, steer and lift functions.

Lift function: press and hold the function enable switch to enable the lift function on the platform control handle. Move the control handle in the direction indicated by the blue arrow and the platform will raise. Move the control handle in the direction indicated by the yellow arrow and the platform will lower. The descent alarm should sound while the platform is lowering.

Drive function: press and hold the function enable switch to enable the drive function on the platform control handle. Move the control handle in the direction indicated by the blue arrow on the control

panel and the machine will move in the direction that the blue arrow points. Move the control handle in the direction indicated by the yellow arrow on the control panel and the machine will move in the direction that the yellow arrow points.

k) Function enable switch

Lift function: press and hold the function enable switch to enable the lift function on the platform control handle.

Drive function: press and hold the function enable switch to enable the drive function on the platform control handle.

l) Drive function button.

Push this button to activate the drive function. If the control handle is not moved within seven seconds, press the lift function button again.



m) Lift enable button with indicator

Press this button to activate the slow drive mode. The indicator light will illuminate when the slow drive mode is activated. Select this function in drive mode.



# **ZOOMLION**

Operator's Manual

**SECTION 3 MACHINE**

**INSPECTION**





## SECTION 3 MACHINE INSPECTION

### 3.1 General

#### **⚠ DANGER**

An operator must not operate the machine, only if:

He has learned and practiced the principles of safe machine operation contained in this operational manual.

- a) Avoid hazardous situation.
- b) Perform a pre-operation inspection at all times.

Know and understand the pre-operation inspection before going on to the next section.

- c) Conduct functional test before usage.
- d) Inspect job site.
- e) Only use the machine as it was intended.

#### 3.1.1 Pre-operation inspection fundamentals

- a) It is the responsibility of the operator to perform a pre-operation inspection and routine maintenance.
- b) The pre-operation inspection is a visual inspection performed by the operator prior to each work shift. The inspection is designed to discover if anything is apparently wrong with a machine before the operator performs the function tests.
- c) The pre-operation inspection also serves to determine if routine maintenance procedures are required. Only routine maintenance specified in this manual may be performed by the operator.
- d) Refer to the list on the next page and check each of the items.
- e) If damage or any unauthorized variation from factory delivered condition is discovered, the machine must be tagged and removed from service.
- f) Repairs to the machine may only be made by a qualified service technician, according to the manufacturer's specifications. After repairs are completed, the operator must perform a pre-operation inspection again before going on to the function tests.
- g) Scheduled maintenance inspections shall be performed by qualified service technicians, according to the manufacturer's specifications and the requirements listed in the responsibilities manual.

#### 3.1.2 Pre-operation inspection

- a) Be sure operation, safety, and responsibilities manuals are complete, legible, and in the storage container located on the machine.
- b) Be sure all decals are in place and legible. See Inspection section.
- c) Check for hydraulic oil leaks and proper oil level. Add oil if needed. See Maintenance section.
- d) Check for engine oil leaks and proper oil level. Add oil if needed. See Maintenance section.
- e) Check for battery liquid leak and proper liquid level. Add distilled water if needed. See Maintenance section.

- f) Check for engine coolant leak and proper liquid level. Add coolant if needed. See Maintenance section.
- g) Check the following components or areas for damage, improperly installed, or missing parts and unauthorized modification:
  - 1) Electrical components, wiring, and electrical cables.
  - 2) Hydraulic hoses, fittings, cylinders, manifolds.
  - 3) Drive motors.
  - 4) Wearing pads.
  - 5) Tires and wheels.
  - 6) Engine and related components.
  - 7) Alarm and indicator (if equipped).
  - 8) Nuts, bolts and other fasteners.
  - 9) Brake release components.
  - 10) Safety arm.
  - 11) Platform extension.
  - 12) Scissor pin and retaining fasteners.
  - 13) Platform joystick.
  - 14) Outrigger hosing and foot pad (if equipped).
  - 15) Battery pack and connections.
  - 16) Ground strap.
  - 17) Platform entry chain or gate.
  - 18) Platform overload components.
  - 19) Lanyard anchorage points.
  - 20) Fuel and hydraulic oil tank.
  - 21) Check the machine for:
    - Cracks in welds or structural components.
    - Dents or damage.
    - Rust, corrosion, or oxidation.
- h) Be sure that all structural and other critical components are present and all associated fasteners and pins are in place and properly tightened.
- i) Be sure that the engine trays are closed and latched and the batteries are properly connected.
- j) Be sure that the hood is in place and locked after inspection.

### **CAUTION**

If the platform must be raised to inspect the machine, make sure the safety arm is in place. See Operating Instruction section.

## 3.2 Function Test

### 3.2.1 Function test fundamentals

- a) The function tests are designed to discover any malfunctions before the machine is put into service. The operator must follow the step-by-step instructions to test all machine functions.
- b) A malfunctioning machine must never be used. If malfunctions are discovered, the machine must be tagged and removed from service. Repair to the machine may only be made by a qualified service technician, according to the manufacturer's specifications.
- c) After repairs are completed, the operator must perform a pre-operation inspection again before putting the machine into service.

#### **⚠ DANGER**

An operator must not operate the machine, only if:

He has learned and practiced the principles of safe machine operation contained in this operational manual.

- a) Avoid hazardous situations.
- b) Perform a pre-operation inspection at all times.
- c) Conduct functional test before usage.

Know and understand the pre-operation inspection before going on to the next section.

- d) Inspect job site.
- e) Only use the machine as it was intended.

### 3.2.2 Turn on the Power Switch

Pull out the red main power switch to on position which located on the side of battery container.



### 3.2.3 Ground function test

- 1) Select a test area that is firm, level and free of obstruction.
- 2) Pull out the platform and ground red Emergency Stop Button to the on position.
- 3) Turn the key switch to ground control.

Result: LCD screen lights up showing SYSTEM READY.

Note: LCD readout display need preheating in cold conditions.



4) Start engine. See Operation Instruction section.

a) Test emergency stop

1) Push in the ground red Emergency Stop Button to off position.

Result: engine turns off. No function should operate.

2) Pull out the red Emergency Stop Button to the on position, and restart engine..

b) Test the Up/Down functions.

This machine uses flashlights and buzzer warning.

Descent alarm: the flashlight illuminates 60 times per minute. The descent alarm sounds at 60 beeps per minute.

Descent delay alarm: the flashlight illuminates 120 times per minute. The descent alarm sounds at 120 beeps per minute.

When the machine is not level: the flashlight illuminates 120 times per minute. The descent alarm sounds at 120 beeps per minute.

1) Do not press the lift function enable button.

2) Press the platform up or down button.

Result: the lift function should not operate.

3) Do not press the platform up or down button.

4) Press the lift function enable button.

Result: the list function should not operate.

5) Press and hold the lift function enable button and the platform up button.

Result: the platform should raise.

6) Press and hold the lift function enable button and platform down button.

Result: the platform should lower.

The minimum distance between platform and ground should reach 3.2m/10ft 5in. Descent delay light will illuminate and alarm will sound. Be sure there is no personnel or obstructions under the platform when lowering. Release function enable button and press lift enable button to continue the lowering operation.

c) Test emergency lowering.

1) Activate the up function by pressing the lift enable button and platform up button, and raise the platform approximately 60cm/2ft.

2) Push in the red emergency stop button to off position and turn off the engine.

3) Pull out the red emergency stop button to on position.

4) Press the emergency lowering button and the platform lowering button.

Result: platform should lower. Descent alarm will not sound.

5) Turn the key switch to platform control, and restart the engine.

### 3.2.4 At the platform controls

- a) Test emergency stop.
  - 1) Push in the platform red Emergency Stop Button to the off position.  
Result: no function should operate.
  - 2) Result: no function should operate. Pull out the Red Emergency Stop button to on position.
- b) Test the horn.
  - 1) Press the horn button.  
Result: the horn should sound.
- c) Test the Function Enable Switch and Up/Down function.
  - 1) Start the engine.
  - 2) Do not hold the function enable switch on the control handle.
  - 3) Slowly move the control handle in the direction indicated by the blue arrow, then in the direction indicated by the yellow arrow.  
Result: no function should operate.
  - 4) Press the lift function enable button.
  - 5) Wait seven seconds for the lift function to time out.
  - 6) Slowly move the control handle in the direction indicated by the blue arrow, then in the direction indicated by the yellow arrow.  
Result: the lift function should not operate.
  - 7) Press the lift function enable button.
  - 8) Press and hold the function enable switch on the control handle, and slowly move the control handle in the direction indicated by the blue arrow.  
Result: the platform should raise.
  - 9) Release the control handle.  
Result: the platform should stop raising.
  - 10) Press and hold the function enable switch on the control handle, and slowly move the control handle in the direction indicated by the yellow arrow.  
Result: the platform should lower, and lowering alarm will sound.
- d) Test drive function button.
  - 1) Press the drive function button.



- 2) Wait seven seconds for the drive function to time out.

- 3) Slowly move the control handle in the direction indicated by the blue arrow, then in the direction indicated by the yellow arrow.
- 4) Result: no function should operate.

e) Test the steering.

Caution:

When performing the steer and drive function tests, stand in the platform facing the steer end of the machine.

- 1) Press the drive function button.



- 2) Press and hold the functional enable switch on the control handle.
- 3) Press the thumb rocker switch on top of control handle in the direction indicated by the blue triangle on the control panel.

Result: the steer wheels should turn in the direction indicated by the blue triangle.

- 4) Press the thumb rocker switch on top of the control handle in the direction indicated by the yellow triangle on control panel.

Result: the steer wheels move towards the direction indicated by the yellow triangle.

f) Test driving and braking.

- 1) Press the drive function button.



- 2) Press the function enable switch on the control handle.
- 3) Slowly move the control handle in the direction indicated by the blue arrow on the control panel until the machine begins to move, then return the control handle to the center position.

Result: the machine should move in the direction that the blue arrow points on the control panel, then come to an abrupt stop when the control handle is returned to the center position.

- 4) Slowly move the control handle in the direction indicated by the yellow arrow on the control panel until the machine begins to move, then return the control handle to the center position.

Result: the machine should move in the direction that the yellow arrow points on the control panel, then come to an abrupt stop when the control handle is returned to the center position.

Note: The brakes must be able to stop the machine on any slope that the machine can climb.

## g) Test the tilt sensor operation.

Note: Perform this test with the platform controller on the ground. Don't stand inside the platform.

- 1) Fully lower the platform.
- 2) Move the machine to an inclined surface that exceeds the maximum tilt angle allowed by the level sensor (see the nameplate), but the inclined angle does not exceed  $5^{\circ}$
- 3) The operator stands on the slope and presses the lifting function button on the ground controller to lift the machine to a height of about 3.2m/10ft 5in meters on the inclined ground.

Result: the platform should stop raising. The tilt alarm will sound and the light will illuminate. Platform controller LED readout displays LL, ground controller LCD displays LL: Machine Tilted.

## h) Test elevated drive speed.

- 1) Raise the platform approximately 3.2m/10ft 5in from the ground.
- 2) Press the drive function button.



- 3) Press and hold the functional enable switch on the control handle. Slowly move the control handle to full drive position.

Result: the maximum achievable drive speed with the platform raised should not exceeds 0.3mph.

If the drive speed with the platform raised exceeds 0.3mph, immediately tag and remove the machine from service.

## i) Test the up limit switch and outrigger (if equipped)

- 1) Press the lift enable button to raise the platform.

Result: Platform should be lifted to the height of 9.15m/29ft 6in. The platform should not exceed the height of 9.15m/29ft 6in unless the outrigger is lowered.

- 2) Drive forward.

Result: The unit moves slowly.

- 3) Lower the platform if the platform height exceeded 3.2m/10ft 5in.

Result: Outrigger should not extend (leveling).

- 4) Lower the platform when the platform height is smaller than 3.2m/10ft 5in.

- 5) Press the automatic leveling button.

Result: Outrigger should extend to level the unit. Alarm will sound when leveling.

- 6) Raise the platform.

Result: Platform should reach the highest position.

- 7) Lower the platform.

## j) Test emergency lowering

- 1) Press the lift enable button to raise the platform by about 0.6m/2ft.
- 2) Push in the red Emergency Stop button to off position to turn off the engine.

- 3) Pull out the red Emergency Stop button to on position.
- 4) Press the function enable switch on control handle. Slowly move the handle in the direction indicated by the yellow arrow.

Result: Platform should lower.

k) Test the swinging system

Caution: Implement this test on ground with platform controller. Do not stand in the platform.

- 1) Start the engine with platform controller.
- 2) Select engine idle speed button indicating high idle speed. The indicator lights up to indicate high idle speed.

Test the swinging system (stowed)

- 3) Drive the left steering wheel to the slope of 0.1m/4in.

Result: All four tires should be in close contact with the ground.

- 4) Drive the right steering wheel to the slope of 0.1m/4in.

Result: All four tires should be in close contact with the ground.

Note: Check if there is a fault code on ground control display.

l) Test the swinging system (raised)

- 1) Press the lift enable button to raise the platform by about 2m/6ft 6in.

- 2) Drive the left steering wheel into a 0.1m/4in deep hole.

Result: All four tires should be in close contact with the ground.

- 3) Drive the right steering wheel into a 0.1m/4in deep hole.

Result: All four tires should be in close contact with the ground.

Note: Check if there is a fault code on ground control display.

### 3.2.5 Turn off the main power switch

When the machine has not been used for a long time, press the red Main Power Switch on the side of the battery box to the off position to turn off the main power.



### 3.3 Workplace Inspection

#### **⚠ DANGER**

An operator must not operate the machine, only if:

He has learned and practiced the principles of safe machine operation contained in this operational manual.

- a) Avoid hazardous situations.
- b) Perform a pre-operation inspection at all times.
- c) Implement functional test before operation the machine at all times.
- d) Inspect job site.

Know and understand the workplace inspection before going on to the next section.

- e) Only use the machine as it was intended.

#### 3.3.1 Workplace inspection fundamentals

Workplace inspection helps the operator determine if the workplace is suitable for safe machine operation. It should be performed by the operator prior to moving the machine to the workplace.

It is operator's responsibility to read and remember the workplace hazards, then watch for and avoid them while moving, setting up, and operating the machine.

#### 3.3.2 Workplace inspection

Be aware of and avoid the following hazards:

- a) Drop-offs or holes.
- b) Bumps, floor obstructions or debris.
- c) Sloped surfaces.
- d) Unstable or smooth surfaces.
- e) Overhead obstructions and electric lines.
- f) Hazardous locations
- g) Inadequate surface support to withstand all load forces imposed by the machine.
- h) Wind and weather conditions.
- i) Unauthorized personnel.
- j) Other possible unsafe conditions.

### 3.4 Decals Inspection

Use the lists and pictures below to verify that all decals are legible and in place.

**Table 3-1 Decal 1 (ZS1621RT)**

NO.	Code	Item	Qty
1	00775607000401090	Danger- Crushing Hazard	2
2	00775807000201120	Label- ZOOMLION Logo	2
3	00773407000201430	Label- Lifting	4
4	00775807000201080	Label- Forward	2
5	00775807000201030	Label- Outrigger Load	4
6	00775807000201040	Label- Away from outrigger	4
7	00775807000401010	Label- Wheel load	4
8	00771407000401150	Label- Fuel Tank	1
9	00773407000201060	Label- Fill in According to the Operation Manual	1
10	00771407000401160	Label- Hydraulic Tank	1
11	00775807000201020	Label- ZS1623RTJ Model	2
12	00775807000401050	Label- Maintenance Compartment	1
13	00775807000201110	Nameplate	2
14	00771407000401170	Label- Environmental Information	1
15	00775607000401030	Danger- Tip-over Hazard	1
16	00773407000201030	Label- ZOOMLION_100 Logo	2
17	00775807000201010	Label- ZS1623RTJ Model	2
18	00775807000401040	Danger- Crushing Hazard (Guard rail)	4

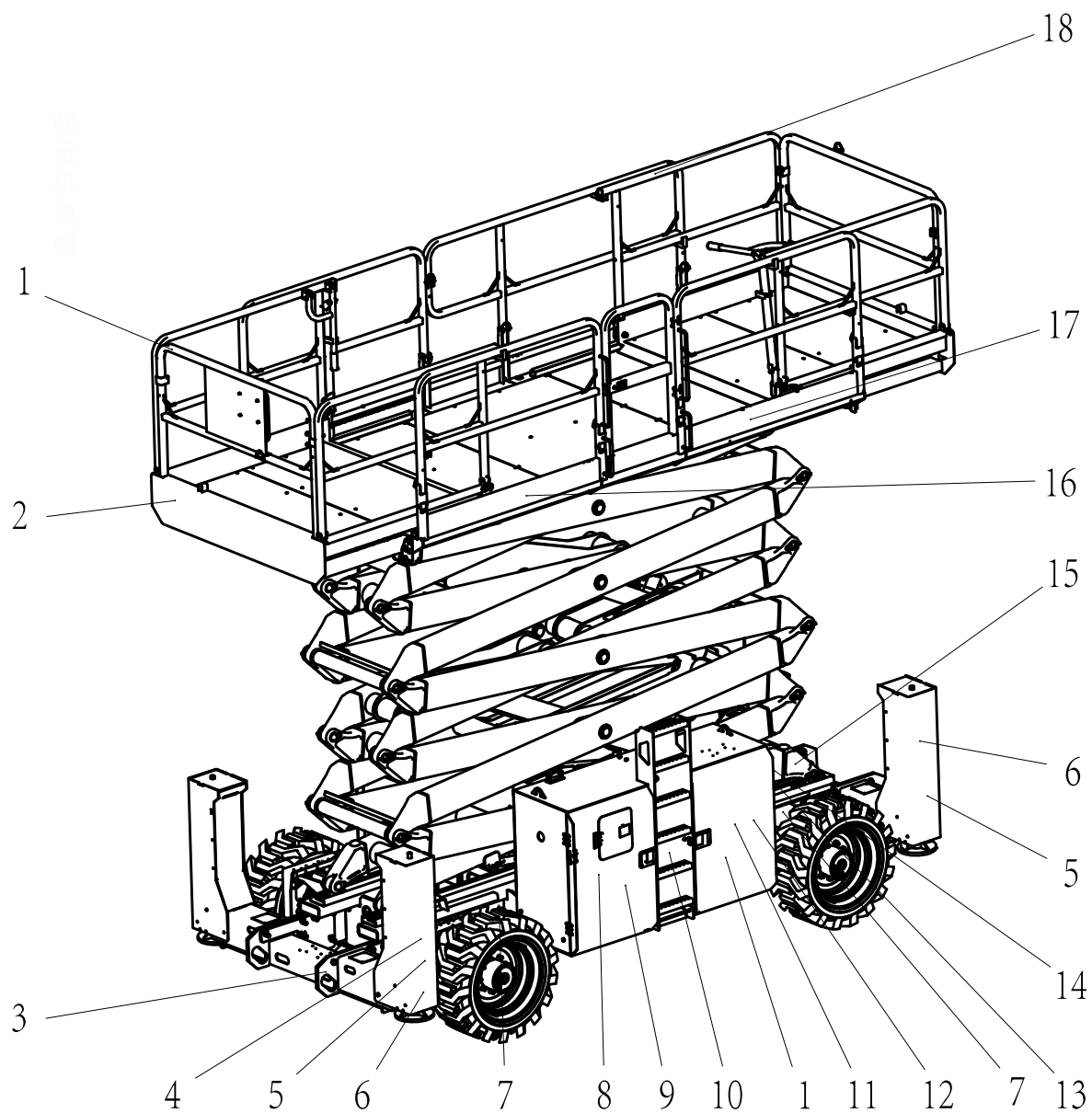


Figure 3-1 Decal Position 1 (ZS1623RT)



**Table 3-2 Decal 2 (ZS1623RT)**

NO.	Code	Item	Qty
1	00775607000401090	Danger- Crushing Hazard	2
2	00775807000201120	Label- ZOOMLION LOGO	2
3	00775607000401080	Label- Safety Arm	1
4	00773407000201420	Label- Tie Down	2
5	00773407000201430	Label- Lifting	4
6	00775807000201030	Label- Outrigger Load	4
7	00775807000201040	Label- Away from Outrigger	4
8	00775807000401010	Label- Wheel Load	4
9	00773407000201010	Label- ZOOMLION_70Logo	1
10	00775807000201050	Label- 4×4	1
11	00773407000401150	Label- Disconnect Battery	1
12	00775807000401050	Label- Inspect Compartment	2
13	00773407000401440	Label- Main Power Switch Instruction	1
14	00775807000201080	Label- Forward	2
15	00773407000201030	Label- ZOOMLION_100Logo	2
16	00775807000201010	Label- ZS1623RTJ Model	2
17	00773407000401390	Label- Store the Operation and Safety Manual	1
18	00773407000401400	Label- Read the Instructions Carefully	1
19	00775807000201090	Label- Rated Load	1
20	00775607000401170	Danger- Tip-over Hazard	1
21	00773407000401450	Label- Inspection before Operation	1
22	00773407000201410	Label- Lanyard Point	4
23	00775807000401040	Danger- Crushing Hazard (Guard rail)	4

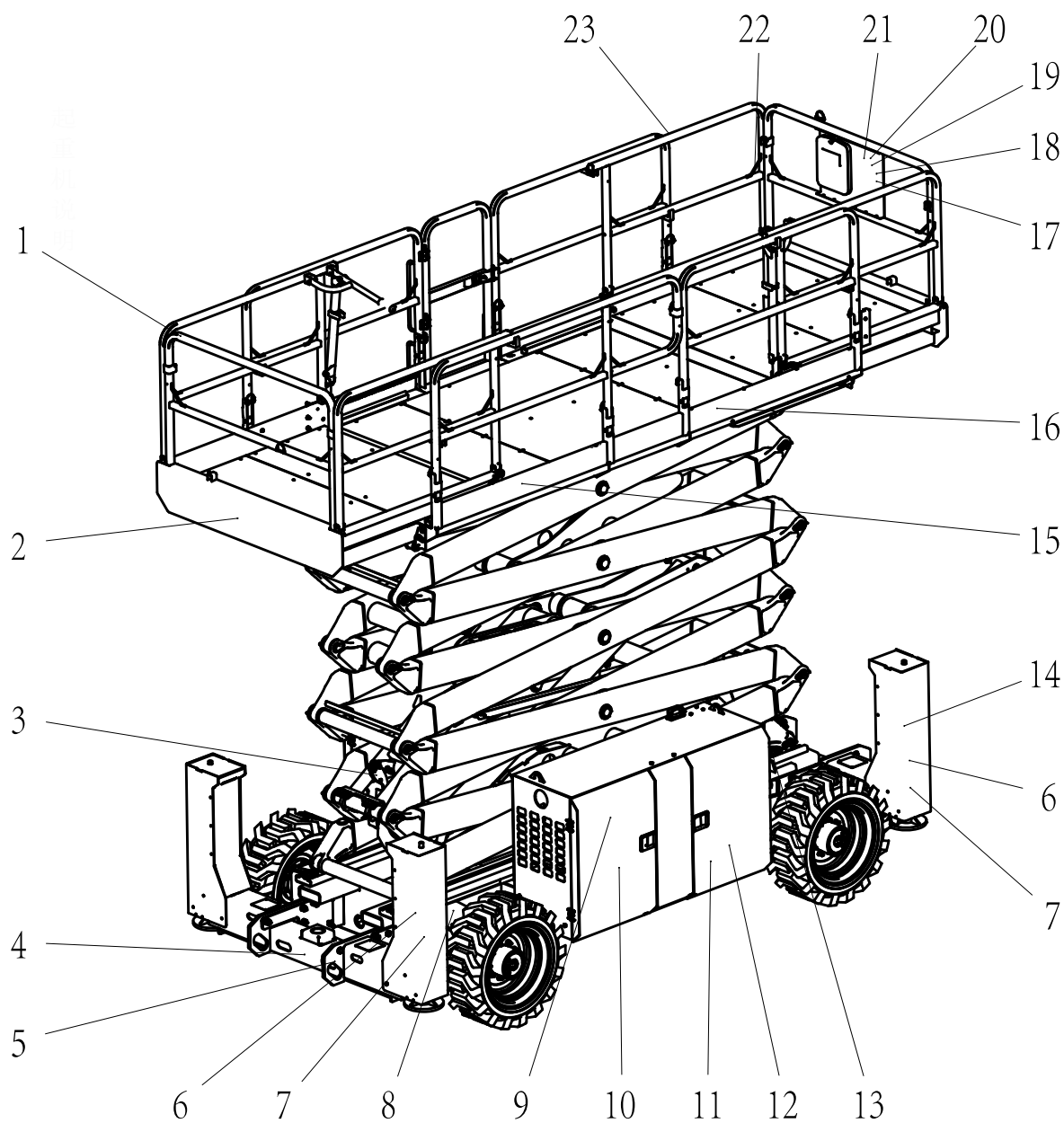


Figure 3-2 Decal Position 2 (ZS1623RT)



# **ZOOMLION**

Operator's Manual

**SECTION 4 OPERATION**

**INSTRUCTION**





## SECTION 4 OPERATION INSTRUCTION

### 4.1 General

#### **⚠ DANGER**

An operator must not operate the machine, only if:  
He has learned and practiced the principles of safe machine operation contained in this operational manual.

- a) Avoid hazardous situations.
- b) Perform a pre-operation inspection at all times.
- c) Implement functional test before operating the machine at all times.
- d) Inspect job site.
- e) Only use the machine as it was intended.

Fundamentals:

The Operating Instructions section provides instructions for each aspect of machine operation. It is the operator's responsibility to follow all the safety rules and instructions in the operator's safety and responsibilities manuals.

Using the machine for anything other than lifting personnel, along with their tools and materials, to an aerial work site is unsafe and dangerous.

Only trained and authorized personnel should be permitted to operate a machine. If more than one operator is expected to use a machine at different times in the same work shift, they must all be qualified operators and are all expected to follow all safety rules and instructions in the operator's, safety and responsibilities manuals. That means every new operator should perform a pre-operation inspection, function tests, and a workplace inspection before using the machine.

### 4.2 Machine Operation

#### 4.2.1 Turn on/off main power switch

- a) Push in the red Power Switch to the off position at the battery box side to shut off machine power.
- b) Pull out the red Power Switch to on position to operate the machine.

If the machine is out of service for a long time or in maintenance, turn off the Power Switch.



### 4.2.2 Emergency stop

- a) Push in the red Emergency Stop button to the off position at the electronic controls or the platform controls to stop all functions, and turn off the engine.
- b) Repair any function that operates when Power Switch and red Emergency Stop button are pushed in.

### 4.2.3 Start engine

- a) Turn the key switch to proper position on ground controller.
- b) Pull out both the ground and platform red Emergency Stop button to on position.

Diesel type

- c) Press the engine start button.

Note: Engine preheat for 5-10 seconds before starting engine in low temperature conditions of 10°C/50°F or below.

The first starting time should be less than 5-10 seconds ( the continuous working time of motor starting should not exceed 15 seconds). If restart is required, the interval time should be greater than 1 minutes. If engine starting fails three times, please confirm the fault cause. Wait 60 seconds before trying to start again.

Engine should be idling for 5 minutes before operation in the low temperature conditions of  $-18^{\circ}\text{C}/-0.4^{\circ}\text{F}$  or below. Lubricate the unit sufficiently to prevent hydraulic system damage.

The unit should be equipped with option of low temperature kit in the extremely low temperature conditions of  $-18^{\circ}\text{C}/-0.4^{\circ}\text{F}$  or below, it might need battery in such condition.

### 4.2.4 Operation from Ground

- a) Turn the key switch to ground controller
- b) Pull out both the ground and platform red Emergency Stop button to on position.
- c) Start the engine.

#### Adjust platform position

- d) Press and hold both lifting enable button.
- e) Enable platform up/down function.

Drive and steer functions are not available from the ground control.

#### Engine idle speed select

Press idle speed select button to select engine idle speed. There are two kinds of engine idle speed settings:

Indicator goes out: low idle speed

Indicator lights up: high idle speed

### 4.2.5 Operation from Platform

- a) Turn the key switch to platform controller
- b) Pull out both the ground and platform red Emergency Stop button to on position.
- c) Start the engine.

### Adjust platform position

- a) Press the lift function enable button.

On the LCD screen, a circle below the lift function symbol will turn on.

If the control handle is not moved within seven seconds of pushing the lift button, the circle below the lift function symbol will turn off and lift function will not operate. Press the lift function button again.



- b) Press and hold function enable switch on handle.
- c) Move the control handle according to markings on the control panel.

### Steering

- a) Press the drive function button.

On the LCD screen, a circle below the drive function symbol will turn on.

If the control handle is not moved within seven seconds of pushing the drive function button, the circle below the drive function symbol will turn off and drive function will not operate. Press the drive function button again.

- b) Press and hold steering thumb button on the top of handle for steering according to the symbols on control panel.



### Drive

- a) Press the drive function button. On the LCD screen, a circle below the drive function symbol will turn on.

If the control handle is not moved within seven seconds of pushing the drive function button, the circle below the drive function symbol will turn off and drive function will not operate. Press the drive function button again.





- b) Press and hold function enable switch on handle.
- c) Increase speed: slowly move the control handle off center.  
Decrease speed: slowly move the control handle toward center.  
Stop: return the control handle to center or release the function enable switch.  
Use the color-coded direction arrows on the platform controls and on the platform to identify the direction the machine will travel.  
Machine travel speed is restricted when the platform is raised.

### Drive selection switch

Symbol of driving on a slope: drive in a low speed when tilting.



Indicator lights up in red

If the indicator lights up, pull out the red Emergency Stop button to reset the system.

If the indicator is still red, stop operation and mark the unit.

### Drive speed selection

Select the desired drive speed by control handle, usually, the machine is in the normal drive speed. Press the slow drive speed mode button, the circle below the button will turn on, slow drive speed mode is activated, the drive speed will be restricted even if the control handle moves to the max speed position.



## 4.3 Operation on Slope

### 4.3.1 Driving on a slope

#### **⚠ DANGER**

- a) Determine the slope and side slope ratings and slope grade for the machine when stowed.

Table 4-1 Slope rating



Maximum side slope rating, stowed position			
	ZS1623RT	40%	22 °

Table 4-2 Side slope rating

Maximum side slope rating, stowed position			
	ZS1623RT	40%	22 °

Slope rating is limited by ground conditions and traction. Press the drive speed button to the fast drive speed mode.

b) Measure the slope with a digital inclinometer OR use the following procedure.

You will need: carpenter's rule, straight block (minimum length 1m), tape measure.

- 1) Lay the piece of wood on the slope.
- 2) At the downhill end, lay the level on the top of edge of the piece of wood and lift the end until the piece of wood is level.
- 3) While holding the piece of wood level, measure the vertical distance from the bottom of the piece of wood to the ground. Divide the tape measure distance (rise) by the length of the piece of wood (run) and multiply by 100.

Example:

Block = 3.6m /12ft (144in),

Stroke=3.6m /12ft,

Rise = 0.3m /12in,

Grade  $0.3\text{m} / 12\text{in} \div 3.6\text{m} / 144\text{in} = 0.083 \times 100 = 8.3\%$ .



If the slope exceeds the maximum slope or side slope rating, then the machine must be winched or transported up or down the slope. See Transport and Lifting section.

### 4.3.2 Operating on a slope

#### **⚠ DANGER**

Determine the slope and side slope ratings for the machine and determine the slope grade.

**Table 4-3 Rating slope**

Model	Max slope rated rating	Max side slope rated rating
ZS1623RT	3 °	2 °

If the slope exceeds the maximum slope or side slope rating, tilt alarm will sound, then the platform must be lowered carefully. Move the machine to a firm, level surface before lifting.

### 4.4 Extending and retracting platform

Lift the platform extending lock handle to leveling position.

Push the platform extending lock handle, and extend the platform to expected position.

Do not stand on the extension deck while extending.

Lower the platform extending lock handle and ensure the extension deck has locked.

### 4.5 Emergency lowering

#### 4.5.1 On ground controller

Press and hold the lift enable button, and start lowering function.

If power failure occurs, press emergency lowering function enable button and emergency lowering button.

#### 4.5.2 On platform controller

Press and hold lift enable button, and activate the up/down rocker switch in the lowering direction.

### 4.6 Operation from ground controller

- Keep a safe distance between operator, the unit and fixed objects.
- Pay attention to the driving direction when using the controller.

### 4.7 Outrigger operation

- Place the unit under the intended work range. Note: Run the engine to operate outrigger.
- Press automatic leveling button.
- Activate up/down rocker switch in lowering direction. Outrigger will extend and level the unit. A beep will sound when the machine is level.

When a single outrigger is lowered, the indicator of lift enable button will turn red. All driving and lifting functions will be disabled.

When all outriggers land on the ground, the indicators of lift enable function button and single outrigger button will turn green.

Driving function will be disabled when outrigger is lowered.

#### 4.7.1 Control a single outrigger

Press and hold one or more outrigger buttons.

Activate up/down rocker switch on outrigger to level the unit according in the intended direction.

#### 4.7.2 After each use

- a) Choose a safe parking location, which is solid, level, free from obstacles, and avoiding heavy transportation.
- b) Lower the platform.
- c) Turn the key switch to off position and remove the key to prevent unauthorized use.

### 4.8 Operation Code

#### 4.8.1 Operation Indicator code

If the platform controls LED or electronic controls LCD diagnostic readout displays an operational indicator code such as LL, the fault condition must repaired or removed before resuming machine operation. Push in and pull out the red Emergency Stop button to reset the system.

- a) LED Readout.



- b) LCD Readout.

**LL: MACHINE TILTED**

- c) Operation Indicator Code:
  - 1) LL Off-Level.
  - 2) OL Overload.
  - 3) CH Chassis Mode Operation.
  - 4) 18 Pothole Guard Fault.
  - 5) 37 Battery Exhausted.

Refer to Zoomlion Maintenance manual for further information.

A code and a description of a code can also be viewed at the electronic controls LCD display.

## 4.8.2 Platform overload

If the platform controller LED diagnostic readout displays OL, and the electronic controller LCD diagnostic readout displays OL as well, it indicates platform overloaded, all functions will stop. Alarm will sound.

- a) Press the red Emergency Stop button to off position.
- b) Remove load from platform.
- c) Pull out the Red Emergency Button to the on position to operate the machine.



- d) The reading device shows normal.

**OL: PLATFORM  
OVERLOAD**

## 4.9 Safety Arm and Guard Operation

### 4.9.1 How to use the safety arm

- a) Attempt to raise the platform to approximately 4m/13 ft 1 in.
- b) Rotate the safety arm away from the machine and let it hang up.
- c) Lower the platform until the safety arm rests securely on the link. Keep clear of the safety arm when lowering the platform.

### 4.9.2 How to fold guard

The platform railing system consists of three fold down rail sections for the extension deck and three sections for the main deck. All six sections are held in place by four wire lock pins.

- a) Fully lower the platform and retract the platform extension.
- b) Remove the platform controls.
- c) From inside the platform, remove the two extension deck lock pins.
- d) Fold the front rail components. Keep hands free of pinch points.
- e) Replace the two moved pins back into each side rail bracket.
- f) Fold the rail components of each side. Keep hands free of pinch points.
- g) At the rear of the main deck, remove the two main deck lock pins.
- h) Carefully open the gate and exit the platform.
- i) Fold down the rear gate and entry side rails as one unit. Keep hands free of pinch points.
- j) Fold down the left and right side rails. Keep hands free of pinch points.
- k) Replace the two moved pins back into each side rail bracket.

### 4.9.3 How to raise guard

Follow the fold down instructions but in reverse order, ensuring all lock pins are in place and installed properly.

#### 4.9.4 Operation after usage

- a) Select a safe parking location-firm level surface, clear of obstruction and traffic.
- b) Lower the platform.
- c) Turn the key switch to the off position and remove the key to secure from unauthorized use.
- d) Charge the batteries.

### 4.10 Transport and Lift

#### 4.10.1 Observe and obey

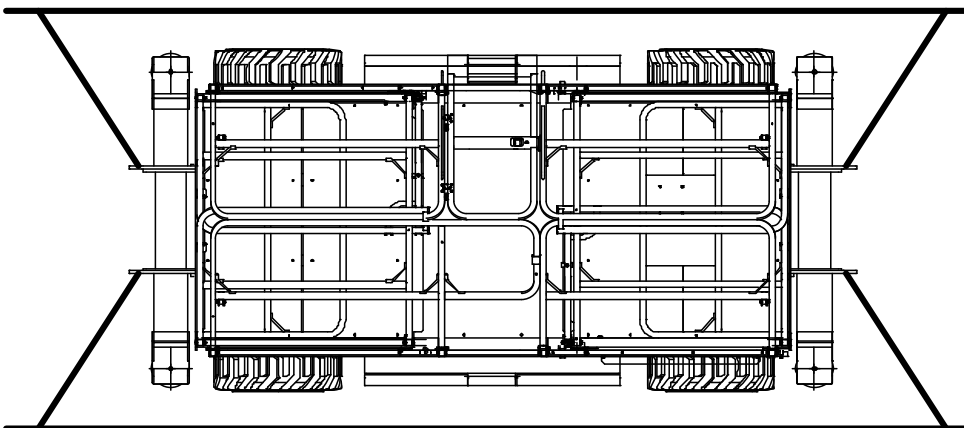
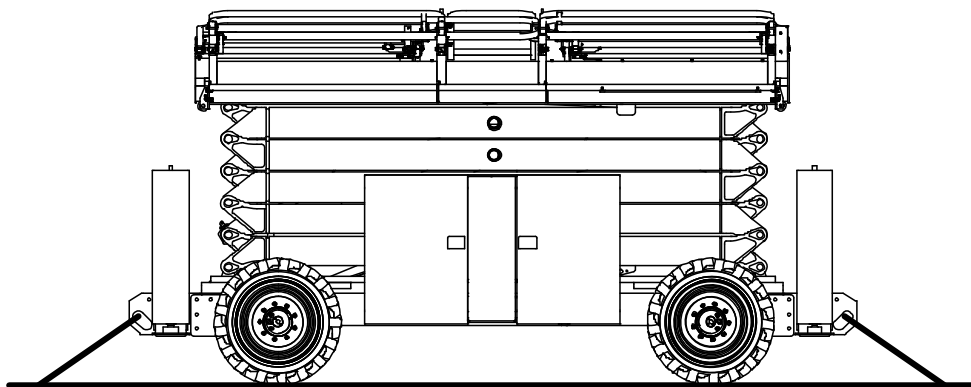
- a) ZOOMLION provides this securement information as a recommendation. The driver is solely responsible for ensuring that the machine is properly secured and the correct trailer is selected pursuant to CHINA Department of Transportation regulations, other localized regulations, and their company policy.
- b) ZOOMLION customers needing to containerize any lift or ZOOMLION product should source a qualified freight forwarder with expertise in preparing, loading and securing construction and lifting equipment for international shipment.
- c) Only qualified aerial lift operators should move the machine on or off the truck.
- d) The transport vehicle must be parked on a level surface.
- e) The transport vehicle must be secured to prevent rolling while the machine is being loaded.
- f) Be sure the vehicle capacity, loading surfaces and chains or straps are sufficient to withstand the machine weight. ZOOMLION lifts are very heavy relative to their size. See the serial label for the machine weight.
- g) Be sure the machine is on a level surface or secured before releasing the brake.
- h) Do not allow the rails to fall when the snap pins are removed. Maintain a firm grasp on the rails when the rails are lowered.
- i) Do not drive the machine on a slope that exceeds the uphill, downhill or side slope rating. See Driving on a Slope in the Operating Instructions section.
- j) If the slope of the transport vehicle bed exceeds the maximum slope rating, the machine must be loaded and unloaded using a winch as described in the brake release operation.

#### 4.10.2 Transport

- a) After loaded:
  - 1) Chock the wheels to prevent the machine from rolling.
  - 2) Be sure the winch line is properly secured to the drive chassis tie points and the path is clear of all obstructions.



- 3) Pull out the red Emergency Button at both the ground and platform controls to the on position.
  - 4) Press and hold the drive/steer function enable switch on the control handle. Move the control handle off center and immediately release it to reset the brakes.
  - 5) Push the red Emergency Stop button at both ground and platform controls to the off position.
- b) Towing the machine is not recommended.
- c) Securing to Truck or Trailer for Transit:
- 1) Always use the extension deck lock when the machine is transported. Turn the key switch to the off position and remove the key before transporting.
  - 2) Inspect the entire machine for loose or unsecured items. Use chains or straps of ample load capacity.
- Use a minimum of 2 chains or straps. Adjust the rigging to prevent damage to the chains.



**Figure 4-1 Tie down points**

### 4.10.3 Lift

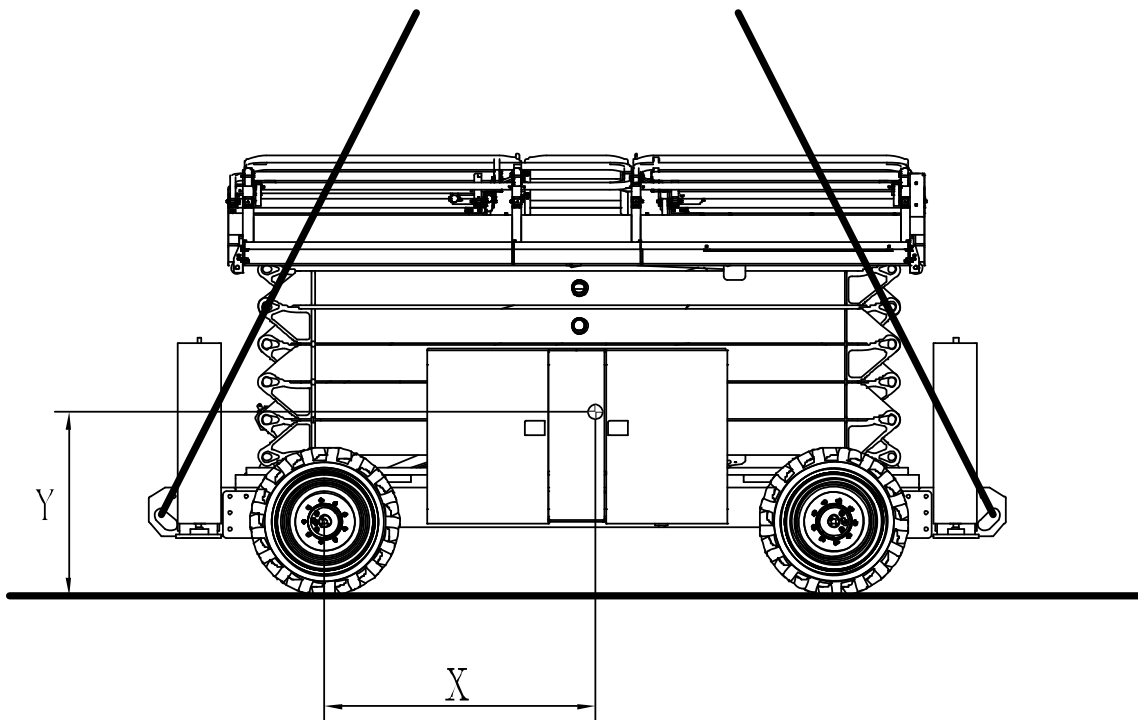
#### **⚠WARNING**

- a) Observe and Obey:
  - 1) Only qualified riggers should rig and lift the machine.
  - 2) Only qualified forklift operators should lift the machine with a forklift.
  - 3) Be sure the crane capacity, loading surfaces and straps or lines are sufficient to withstand the machine weight. See the serial label for the machine weight.
- b) Lifting the machine with a Forklift:
  - 1) Be sure the extension deck, controls and component trays are secured. Remove all loosen parts.
  - 2) The platform must remain lowered during all loading and transport procedures.
  - 3) Use the forklift pockets located on both sides of the ladder.
  - 4) Align the forklift fork with the position of the forklift pockets and drive forward until the fork is fully inserted.
  - 5) Raise the machine 0.4m/1 ft 4in and then tilt the forks back slightly to keep the machine secure.
  - 6) Be sure the machine is level when lowering the forks.
- c) Lifting Instruction:
  - 1) Fully lowering the platform. Be sure the extension deck, controls and component trays are secured. Remove all loose items on the machine.
  - 2) Use Table 4-4 and Figure 4-4 to determine the center of gravity of the machine.
  - 3) Attach the rigging only to the designated lifting points on the machine.
  - 4) Adjust the rigging to prevent damage to the machine and to keep the machine level.



**Table 4-4 Center of gravity**

Model	X Axis	Y Axis
ZS1623RT	1.5m/4ft 10in	0.95 m/3ft 1in



**Figure 4-2 Center of gravity**

# **ZOOMLION**

Operator's Manual

**SECTION 5 MAINTENANCE**





## SECTION 5 MAINTENANCE

### 5.1 General



Observe and Obey:

- a) Only routine maintenance items specified in this manual shall be performed by the operator.
- b) Scheduled maintenance inspections shall be performed by qualified service technicians, according to the manufacturer's specifications and the requirements listed in the responsibilities manual.
- c) Disposal of materials should be according to the regulations of government and relevant environmental protection administration.
- d) Use only ZOOMLION approved replacement parts. ZOOMLION assumes no responsibility for hazards occurred to equipment and personnel caused by the use of unauthorized parts.

#### 5.1.1 Maintenance symbols legend

The following symbols have been used in this manual to help communicate the intent of the instructions. When one or more of the symbols appear at the beginning of a maintenance procedure, it conveys the meaning below.



Indicates that tools will be required to perform this procedure.



Indicates that new parts will be required to perform this procedure.

#### 5.1.2 Pre-Start Inspection

- a) Be sure operator's, safety, and responsibilities manuals are complete, legible, and in the storage container located on the machine.
- b) Be sure all decals are in place and legible.
- c) Check for hydraulic oil leaks and proper oil level. Add oil if needed. See Maintenance section.
- d) Check for battery fluid leaks and proper fluid level. Add distilled water if needed after battery charged. Check the following components or areas for damage, improperly installed, or missing parts and unauthorized modifications:
  - 1) Electrical components, wiring, and electrical cables.
  - 2) Hydraulic hoses, fittings, cylinders, and manifolds.
  - 3) Drive motor/motor.
  - 4) Wear pads.
  - 5) Tires and wheels.

- 6) Limit switches and horn.
- 7) Alarm and indicator (if equipped).
- 8) Nuts, bolts and other fasteners.
- 9) Brake release unit.

### 5.1.3 Maintenance Hazard

- a) Shut off power to all controls and ensure that all moving parts are secured from inadvertent motion prior to performing any adjustments or repairs.
- b) Never work under an elevated platform until it has been fully lowered to stowed position, if possible, or otherwise supported and restrained from movement with appropriate safety props, blocking, or overhead supports.
- c) DO NOT attempt to repair or tighten any hydraulic holes or fittings while the machine is powered on or when the hydraulic system is under pressure.
- d) Always relieve hydraulic pressure from all hydraulic circuits before loosening or removing hydraulic components.
- e) DO NOT use your hand to check for leaks. Use a piece of card- board or paper to search for leaks. Wear gloves to help protect hands from spraying fluid.



### 5.1.4 Body Injury Hazard

Do not operate a machine with a hydraulic oil or air leak. An air leak or hydraulic leak can penetrate and/or burn skin. During or after a period of running of the hydraulic system, the parts may produce high surface temperature, and improper contact will cause burn to skin. Overhauling or adjusting any part of hydraulic system can cause serious injuries. Only trained maintenance personnel are allowed to repair or adjust the hydraulic system.

Access by the operator is only advised when performing a pre-operation inspection. All compartments must remain closed and secured during operation.

## 5.2 Power System Maintenance



### 5.2.1 Engine oil level

Maintaining the engine oil at the proper level is essential to machine operation. Improper oil levels can damage engine components.

Note: Check engine oil level after engine turns off. Check oil level indicator, and add oil as needed. Do not overfill.

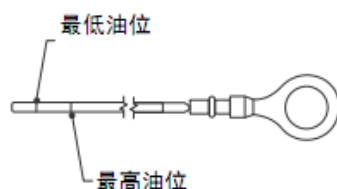


Figure 5-1 Oil level indicator

Table 5-1 Oil feeding conditions

Kubota V2403-M-DI Engine	
Oil type	Environmental temperature
CI-4 20W-40	Above -15°C/5°F
CI-4 15W-40	(-20 ~ -15) °C / (-4 ~ 5) °F
CI-4 10W-40	(-25 ~ -20) °C / (-13 ~ -4) °F
CI-4 5W-40	(-30 ~ -25) °C / (-22 ~ -13) °F
CI-4 0W-40	(-35 ~ -30) °C / (-31 ~ -22) °F

### 5.2.2 Diesel requirements

Good engine performance depends on high-quality fuel, which will bring great benefits, such as longer lifespan and acceptable emission level.

The minimum diesel requirements for engine are shown in the table below.

Table 5-2 Fuel requirement

Kubota V2403-M-DI Engine	
Fuel type	Environmental temperature
-50# State IV Standard-diesel	(-44 ~ -29) °C / (-47.2 ~ -20.2) °F
-35# State IV Standard-diesel	(-29 ~ -14) °C / (-20.2 ~ 6.8) °F
-20# State IV Standard-diesel	(-14 ~ -5) °C / (6.8 ~ 23) °F
-10# State IV Standard-diesel	(-5 ~ 4) °C / (23 ~ 39.2) °F
0# State IV Standard-diesel	(4 ~ 8) °C / (39.2 ~ 46.4) °F
5# State IV Standard-diesel	Above 8 °C/46.4°F

### 5.2.3 Engine coolant level inspection

Maintain the engine coolant at the proper level is essential to engine lifespan. Improper coolant level can damage the engine cooling ability and engine components. Daily checks allow the inspector to identify changes in oil level that might indicate the presence of cooling system problems.

#### **⚠ CAUTION**

Burn Hazard

Mind hot engine components and coolant. Contact with hot engine components or coolant may result in severe burns.

#### **⚠ CAUTION**

Burn Hazard. Do not remove radiator cover while engine is running. Contact with pressuring coolant will cause severe burns. Remove the radiator cover after engine cooling.

Check the coolant level. Add coolant as needed. The level should be visible at the MAX mark or in level gauge. Do not overfill.

## 5.3 Battery Maintenance

Battery inspection



Proper battery condition is essential to good machine performance and operational safety. Improper fluid levels or damaged cables and connections can result in component damage and hazardous conditions.

This inspection is not required for machines with sealed or non-maintainable batteries.

Check electrolyte level of the battery every two weeks. Fully charge the battery before adding water. If the electrolyte level is much higher than the plate, then no need to add water.

### **CAUTION**

Electric shock hazard:

Contact with hot or live circuits may result in death or serious injury. Remove all rings, watches and jewelry.

### **CAUTION**

Body Injury Hazard:

Batteries contain acid. Avoid spilling or contacting battery acid. Neutralize battery acid spills with baking soda and water.

The battery should be fully charged before this inspection.

- a) Only qualified riggers should rig the machine.
- b) Only certified crane operators should lift the machine and only in accordance with the applicable crane regulations.
- c) Be sure that the battery hold-down brackets are in place and secure.

Adding terminal protectors and a corrosion preventative sealant will help eliminate the corrosion on the battery terminals and cables.

## 5.4 Regular Maintenance

Maintenance performed quarterly, annually and every two years must be completed by a person trained and qualified to perform maintenance on this machine according to the procedures found in the service manual for this machine.

Machines that have been out of service for more than three months must receive the quarterly inspection before they are put back into service.

Note: Lubricating intervals is subject to the machine practice under normal conditions. For equipment used in multiple shifts or operating in harsh environments or conditions, the frequency of lubrication must be increased accordingly.



### 5.4.1 Hydraulic reservoir

Capacity- 65-80L/17-21 us gal

Interval- Check level daily; change every year or 2000 hours of operation.

Note: On machines which are new, those recently overhauled, or after changing hydraulic oil, operate all system a minimum of two complete cycles and recheck oil level in reservoir.

#### A. Hydraulic return oil filter



Figure 5-4 Hydraulic return oil filter

Maintenance point - Replaceable element

Interval - Replace after 50 hours operation, and change it every 3 months of 250 hrs afterwards.

#### B. Hydraulic reservoir breather



Figure 5-5 Hydraulic reservoir breather

Maintenance point - Tank breather

Interval - Replace after 50 hours operation, and change it every 3 months of 250 hrs afterwards.

Note - Remove wing nut and cover to replace. Under certain conditions, it may be necessary to replace on a more frequent basis.

### 5.4.2 Travel reducer

Lube point - Level/Fill plug

Capacity - 1L/0.26 us gal

Type - SAE80W/90 Industrial gear oil for close motor

Interval - Check level every 3 months or 150 hrs of operation. Change every 2 years or 1,200 hrs of operation.



R R



Omni

### 5.4.3 Replace engine oil - Deutz 2.9 L4/ Cummins QSF 2.8/ Kohler KDI2504



Kubota

Figure 5-7 Engine oil port

Maintenance point - Oil adding port/rotary fixed element

Capacity - 10L/2.6 us gal

Lubricating oil - Engine oil

Interval - Every half a year or 500 hrs of operation

Note - Check oil level everyday/replace it according to engine manual

### 5.4.4 Fuel filter - Kubota V2403-M-DI

A. First class fuel filter



Figure 5-8 First class fuel filter

Maintenance point - Replaceable filter

Interval - Check drain off water everyday, and change it every half a year or 500 hrs of operation

B.Second class fuel filter



Kubota

Figure 5-9 Second class fuel filter

Maintenance point - Replaceable filter

Interval - Every half a year or 500 hrs of operation

Maintenance point - Replaceable filter

Interval - Check drain off water everyday, and change it every half a year or 300 hrs of operation

### 5.4.5 High pressure filter



Figure 5-11 High pressure filter

Maintenance point - Replaceable element

Interval - Change every 2 years or 1,200 hrs of operation

### 5.4.6 Air filter



Figure 5-12 Air filter

Maintenance point - Replaceable element

Interval - Change every half a year or 500 hrs of operation or as indicated by the condition indicator

Note - Check dustproof valve everyday

#### 5.4.7 Engine coolant



Figure 5-13 Engine coolant

Maintenance point - Add/replace anti-freezing solution

Capacity - 4L/1.05 us gal

Interval - Check oil level, change every 2,000 hrs of every two years (whichever come first)

## 5.5 Tire and Wheel

### 5.5.1 Tire replacement

ZOOMLION recommends a replacement tire be the same size, ply and brand as originally installed on the machine. Please refer to the ZOOMLION Parts Manual for the part number of the approved tires for a particular machine model. If not using a ZOOMLION approved replacement tire, we recommend that replacement tires have the following characteristics:

- Equal or greater ply/load rating and size of original;
- Tire tread contact width equal or greater than original;
- Wheel diameter, width, and offset dimensions equal to the original;
- Approved for the application by the tire manufacturer (including inflation pressure and maximum tire load).

Unless specifically approved by ZOOMLION, do not replace a foam filled tire assembly with a pneumatic tire. When selecting and installing a replacement tire, ensure that all tires are inflated to the pressure recommended by ZOOMLION. Due to size variations between tire brands, both tires on the same axle should be the same.

### 5.5.2 Wheel and tire requirements

The rims installed on each product model have been designed for stability requirements which consist of track width, tire pressure, and load capacity. Size changes such as rim width, center piece location, larger or smaller diameter, etc., without written factory recommendations, may result in an unsafe condition

regarding stability.

### 5.5.3 Wheel installation

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



Wheel nuts must be installed and maintained at the proper torque to prevent loose wheels, broken studs, and possible dangerous separation of wheel from the axle. Be sure to use only the nuts matched to 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 lug 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 proper procedure for attaching wheels is as follows:

- a) Start all nuts by hand to prevent cross threading. DO NOT use lubricant on threads or nuts.
- b) Tighten nuts in the following sequence.

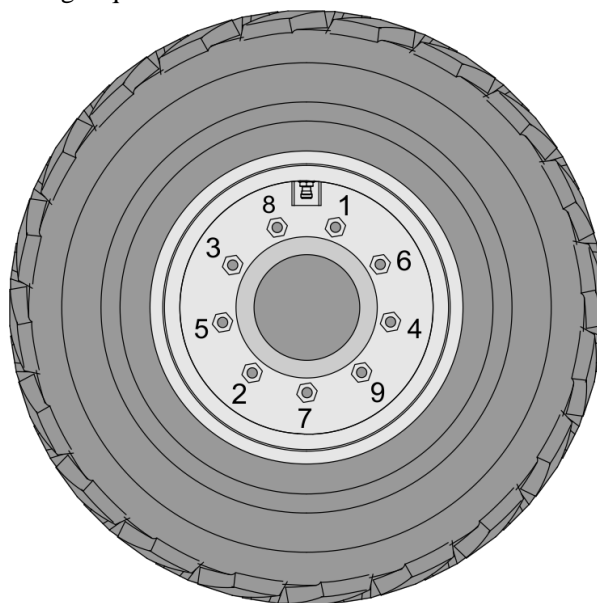


Figure 5-14 Hub bolts

- c) The tightening of the nuts should be done in stages. Following the recommended sequence, tighten nuts per wheel torque.

Table 5-5 Wheel torque table

Tightening sequence		
First stage	Second stage	Third stage
95 Nm/68ft lb	170 Nm/123ft lb	295 Nm/217ft lb

- d) Wheel nuts should be torqued after first 50 hrs of operation and after each wheel removal. Check

and tighten every 3 months or 150 hrs of operation.

## 5.6 Hydraulic System Maintenance



### 5.6.1 Hydraulic oil level

Maintaining the hydraulic oil at the proper level is essential to machine operation. Improper hydraulic oil levels can damage hydraulic components. Daily checks allow the inspector to identify changes in oil level that might indicate the presence of hydraulic system problems.

- a) Be sure the machine is on a firm and level surface and in stowed position.
- b) By observing oil level in hydraulic oil tank, the hydraulic oil level after excluding air in the hydraulic system should reach the maximum scale mark on the hydraulic oil tank, and not be higher than bottom of the oil tank cap (different models have different maximum scale).
- c) Add oil as needed. Do not overfill.

### 5.6.2 Hydraulic oil capacity

Table 5-3 Capacity

Model	Hydraulic tank	Hydraulic system (including tank)
ZS1623RT	105L/27.7us gal	110L/29us gal

### 5.6.3 Hydraulic oil specification

Please refer to the Table 5-4 for the recommended type and model of hydraulic oil (Table 5-7 is not used to specify the model and parameters of hydraulic oil). Please select proper hydraulic oil according to the specific application environment of the equipment. For special environment or special requirements of users, please contact ZOOMLION or the hydraulic oil manufacturer.

#### **CAUTION**

DO NOT mix oils of different brands or types, as they contain different additives which may cause negative effects. If mixing of hydraulic oils is unavoidable, permission must be obtained from the hydraulic oil manufacturer. After-sales service of ZOOMLION does not cover machine malfunction caused by hydraulic oil mixing.

Table 5-4 Technical Parameters of Hydraulic Oil

Technical Parameters Type	ISO Viscosity Grade	Pour Point °C/°F	Flash Point °C/°F	kinematic viscosity cSt(40°C /104°F)	Viscosity index
Great Wall 4632 grease non-flammable hydraulic oil N32 (Eco-Friendly)	32	-20	270	28.8-35.2	180
Great Wall Ground NO.10 aviation hydraulic fluid	—	-55	107	10.53(50°C /122°F)	120
Great Wall Zhuoli L-HS 15 Ultralow temperature oil	15	-57	164	15.35	172
Great Wall Zhuoli L-HS 32 Ultralow temperature oil	32	-48	224	31.35	166
Great Wall Zhuoli L-HS 46 Ultralow temperature oil	46	-43	238	45.81	170
Great Wall Zhuoli L-HV 15 Low temperature oil	15	-45	173	15.51	140
Great Wall Zhuoli L-HV 32 Low temperature oil	32	-39	231	33.4	150
Great Wall Zhuoli L-HV 46 Low temperature oil	46	-37	240	48.7	150
Great Wall Zhuoli L-HV 68 Low temperature oil	68	-35	238	70.47	150

Table 5-4 Technical parameter of hydraulic oil (continuous)

Technical Parameters Type	ISO Viscosity Grade	Pour Point °C/°F	Flash Point °C/°F	kinematic viscosity cSt(40°C /104°F)	Viscosity index
Great Wall Zhuoli L-HM 46 Antiwear hydraulic oil (High pressure)	46	15/5	240/464	45.8	97
Great Wall Zhuoli L-HM 68 Antiwear hydraulic oil (High pressure)	68	13/9	245/473	67.4	98

<b>Mobil SHC Aware H 32 ( Eco-Friendly)</b>	32	30/-22	185/365	32	140
<b>Clarity Synthetic EA Hydraulic Oil</b>	46	44/-47	221/430	46	180
<b>Mobil DTE 10 Ultra 22</b>	22	54/-65	224/435	22.4	164
<b>Mobil DTE 10 Ultra 32</b>	32	54/-65	250/482	32.7	164
<b>Mobil DTE 10 Ultra 46</b>	46	45/-49	232/450	45.6	164
<b>Chevron/CaltexRando Rando HDZ 15</b>	15	60/-76	150/302	15.7	144
<b>Chevron/CaltexRando Rando HDZ 32</b>	32	49/-56	204/399	33	150
<b>Chevron/CaltexRando Rando HDZ 46</b>	46	47/-53	216/421	46.7	153
<b>Chevron/CaltexRando Rando MV 15</b>	15	42/-44	154/309	15.8	155
<b>Chevron/CaltexRando Rando MV 32</b>	32	36/-33	210/410	33.5	154
<b>Chevron/CaltexRando Rando MV 46</b>	46	33/-27	214/417	44	154

#### 5.6.4 Hydraulic Oil Viscosity and Temperature Limit

Proper use of hydraulic oil: please note the corresponding oil viscosity and temperature limit. Under normal conditions, the recommended oil temperature should be controlled at 30°C/86°F to 60°C/140°F, this highest temperature should be no more than 90°C/194°F. The oil temperature affects the oil viscosity and the thickness of the oil film. Excessive oil temperatures can also damage or shorten the life of the oil seal and other rubber components, which can cause oil leakage in the hydraulic system, while high temperatures can exacerbate the evaporation and oxidation of the oil.

Pre-delivery of the machine, specific model of hydraulic oil shall be added as required by customer. If machine operating environment temperature is beyond the temperature limit of the hydraulic oil, different hydraulic oil suited to the actual conditions shall be used in time. On account of the safety of machine components and work efficiency, it is advisable that the starting temperature should be 25°C/77°F higher than the pour point of hydraulic oil.

If the altitude is higher than 4,000 meters/13,100ft., please use a lower viscosity grade hydraulic oil based on the above requirements for the use of hydraulic oil for hydraulic pump normally operation.



### 5.6.5 Hydraulic oil replacement

We suggest that changing time of the hydraulic oil is as follows:

- a) First changing: operating for 500 hrs after commissioning.
- b) Second and subsequent changing: every 2,000 hrs of operation or once a year.

The above recommended intervals are suitable for most applications. Higher temperatures and pressures will shorten the oil's service life, so the hydraulic oil should be changed sooner than the recommended. For small load work, the oil change time can be extended.

Cleanliness of the hydraulic oil upon delivery is NAS9 (ISO4406 18/15), and for normal operation, the cleanliness should not be lower than NAS10 (ISO4406 19/16). We suggest that the hydraulic oil should be checked every 6 months, and the oil should be sampled at least once upon the time for oil changing. The oil sample can be sent to the hydraulic oil manufacturer or qualified third-party testing agency for analysis and to determine whether it is still usable.

## 5.7 Starting Steps

### 5.7.1 Drive pump oiling

Machine without cooling device:

Adding oil all the way to the top of tank to produce sufficient outlet pressure to fill the housing that drives the pump. Superfluous hydraulic oil will be adding to individual cylinder during start-up. Failure to do this may result in dry start of hydraulic pump, reducing the efficiency of the pump and possibly causing premature damage.

Machine with cooling device:

Remove the drain line on the port outside the pump case, and plug the oil pipe. Fill the drive pump with hydraulic oil, and reinstall the drain line. Then adding hydraulic oil all the way to the top of tank. The hydraulic oil will be filled to each individual cylinder during start-up. Failure to do this will result in dry start of drive pump, reducing pump efficiency and possibly causing premature damage.

### 5.7.2 Exhaust air from the pump's inlet oil line

Exhaust a large amount of air in the pipeline under low pressure condition. There are two methods to exhaust air from the pipe line.

- a) On main control valve, remove inlet tube from port P, and outlet tube from port T. Use 15-22 connector to connect two tubes together. Start the machine, and run for 10 seconds. Shut down and remove 15-22 converter, and reconnect the pipeline to the valve block,
- b) Remove the tube from port P, and place it in a bucket of 15L capacity, then start the machine. Air should be exhausted quickly (several seconds). Turn off the machine and reconnect the tubing.



- a) If installation of new function pump is required, step a and b should be conducted.
- b) If the oil does not drain off from the pipeline, the installation of new function pump which is connected to the inlet pipeline will generate a large amount of vacuum, as such, there is no need to implement step b.
- c) The functional pump will generate a lot of noise when the platform is lifting. If the lifting move stops, there is a presence of cavitation phenomenon, and the air will pass the functional pump under high pressure, which will damage the functional pump in a short time and pollute the whole system. Ensure all the inlet pipeline are tight, and no leak from tank and pump.



# **ZOOMLION**

Operator's Manual

**SECTION 6 STORAGE AND**

**EX-FACTORY TEST**





## SECTION 6 STORAGE AND EX-FACTORY TEST

### 6.1 Storage Conditions

Ambient temperature for machine storage and transportation should be between -20°C/-4°F and 40°C /104°F, with relative humidity not greater than 85% and 100% only for short-term.

### 6.2 Ex-factory Test Items

Machine must complete testing items in the following table before delivery:

**Table 6-1 Ex-factory test item (ZS1623RT)**

Tests Items	Load Testing		Testing Movement
Overload Test	125%	850kg/1873 lbs	Platform Lifting
Functional Test	110%	748kg/1649 lbs	Traveling & Platform Lifting
Braking Test	100%	680kg/1500 lbs	Max Speed of Forward & Reverse Traveling



# **ZOOMLION**

**Operation and Safety Manual**

**Section 7 Technical Parameter**







## SECTION 7 TECHNICAL PARAMETER

Table 7-1 ZS1623RT Technical Parameter

Model	ZS1623RT	Parameters	
<b>Dimension</b>	Work Height	16 m	52ft 6in
	Platform Length	3.98 m	13ft 1in
	Platform Width	1.83 m	6ft
	Extension deck	Front/rear 1.3m	Front/rear 4ft 3in
	Max Height (Stowed position)	3.15m	10ft 4in
	Max Height (Stowed, rails folded)	2.47m	8ft 1in
	Overall Length (Stowed)	4.88m	16ft
	Overall Width	2.3m	7ft 7in
	Wheelbase	2.9m	9ft 6in
	Ground Clearance	260mm	11in
<b>Working Performance</b>	Platform Capacity	680kg	1500lbs
	Capacity on Deck Extension	230kg	510lbs
	Max. Number of Workers	4	
	Gradeability	40%	
	Turning Radius (Inside)	2.75m	9ft
	Turning Radius (Outside)	5.8m	19ft
	Engine	Kubota v2403-M-DI-E3B-ZML-2 36kw/2600rpm	
	Drive Speed (Stowed)	6.5 km/h	4mph
	Drive Speed (Elevated)	0.5 km/h	0.3mph
	Up/Down Time	60/65s	
	Hydraulic reservoir	105L	27.7 (us gal)
	Fuel tank	103L	26.4 (us gal)
	Travel height-lifted	9m	29ft 6in
	Drive	4	

**Table 7-1 ZS1623RT Technical Parameter**

Model	ZS1623RT	Parameters	
<b>Working Environment</b>	Max wind speed	12.5m/s (grade 6)	28 mph
	Lowest Operating Temperature	-25 °C	-13°F
	Highest Ambient Temperature	40 °C	104°F
	Guaranteed Sound Power Level	100dBA	
<b>Others</b>	Gross	8650 kg	19070lbs
	Power	Batteries,12 V 90Ah	
	Voltage	12V	
	Hydraulic (Function)	250 bar	
	Tire specifications	315/55 D20 Foam-filled Tires	
	Tire Capacity	2420kg	5335 lbs
	Outrigger Capacity	2560kg	5643 lbs

## Appendix: Inspection and Maintenance Records

[illegible]

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[illegible]