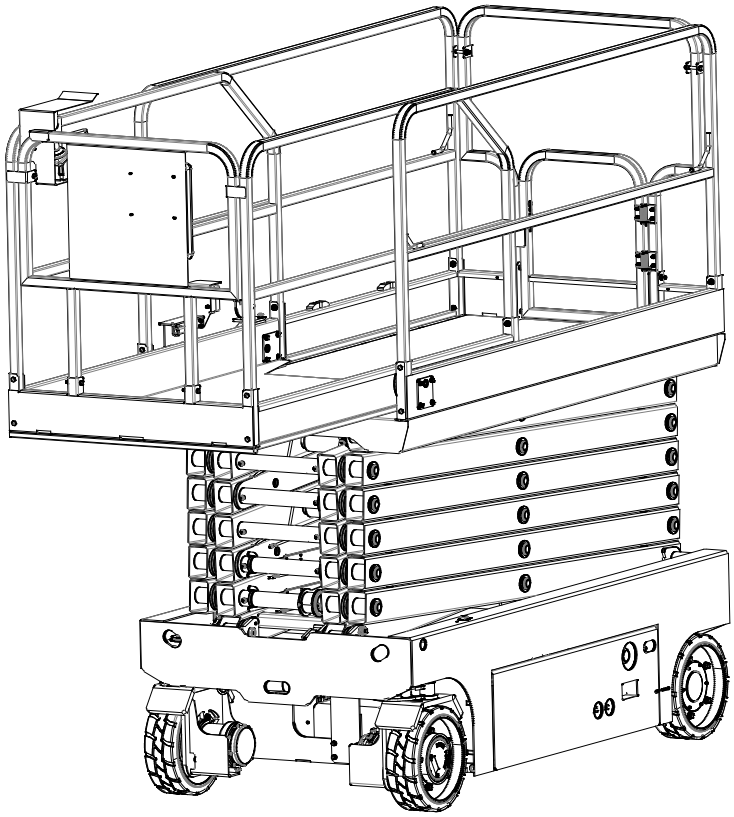
EKKO
MATERIAL HANDLING EQUIPMENT
MOVING AHEAD

Electric Scissor Lift Work Platform
Operator's and Service Manual

Applies to

ES40E/ES60E/ES80E/ES100E/ES120E



Frist Edition January 2022

Attention

You should read, understand and follow these safety rules and operating instructions before operating this machine. Only trained or allowed by authorized person can operate the machine. This manual should be remained with the machine at all time and considered a permanent part of your machine. If you have any questions please contact us

Owners Users and Operators：

Thank you for choosing our company and use our machines. Our number one priority is user safety, which is best achieved by our joint efforts. We think that as a user and operator, if you can comply with the following requirements, will be very helpful for safe use of the equipment:

1.Comply with the user rules, workplace rules and government rules.

2.Read, understand and comply with the manual and other instructions in manuals.

3.Routinel perform good safety work practices.

4.Only trained/certified operator or under the guidance of a supervisors who has the certificate can run the machine.

If there are any ambiguous in the manual or you think we should add some contents, please contact.

Contents

Danger

Failure to obey the instructions and safety rules in this manual will result in death or serious injury.

Do not operate, unless:

√ You have learned and practiced the principles of safe machine operation contained in this operator's manual.

1. Avoid hazardous situations.

Know and understand the safety rules before going on the next section.

2 Always perform a pre-operation inspection.

3 Always perform function tests prior to use.

4 Inspect all the workplace.

5 Only use the machine as it was intended.

√ You should read, understand and obey the manufacturer's instructions and safety rules —— safety manual, operator's manual and machine decals.

√ You should read, understand and obey employer's safety rules and workplace rules.

√ You should read, understand and obey all applicable governmental regulations.

√ You are properly trained to safely operate the machine.

Hazard Classification

products 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 Red Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING Orange Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION Yellow Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE Blue Indicates a property damage message.

Design intent

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

Safety Sign 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 mater

Decals

Safety Decals and Location

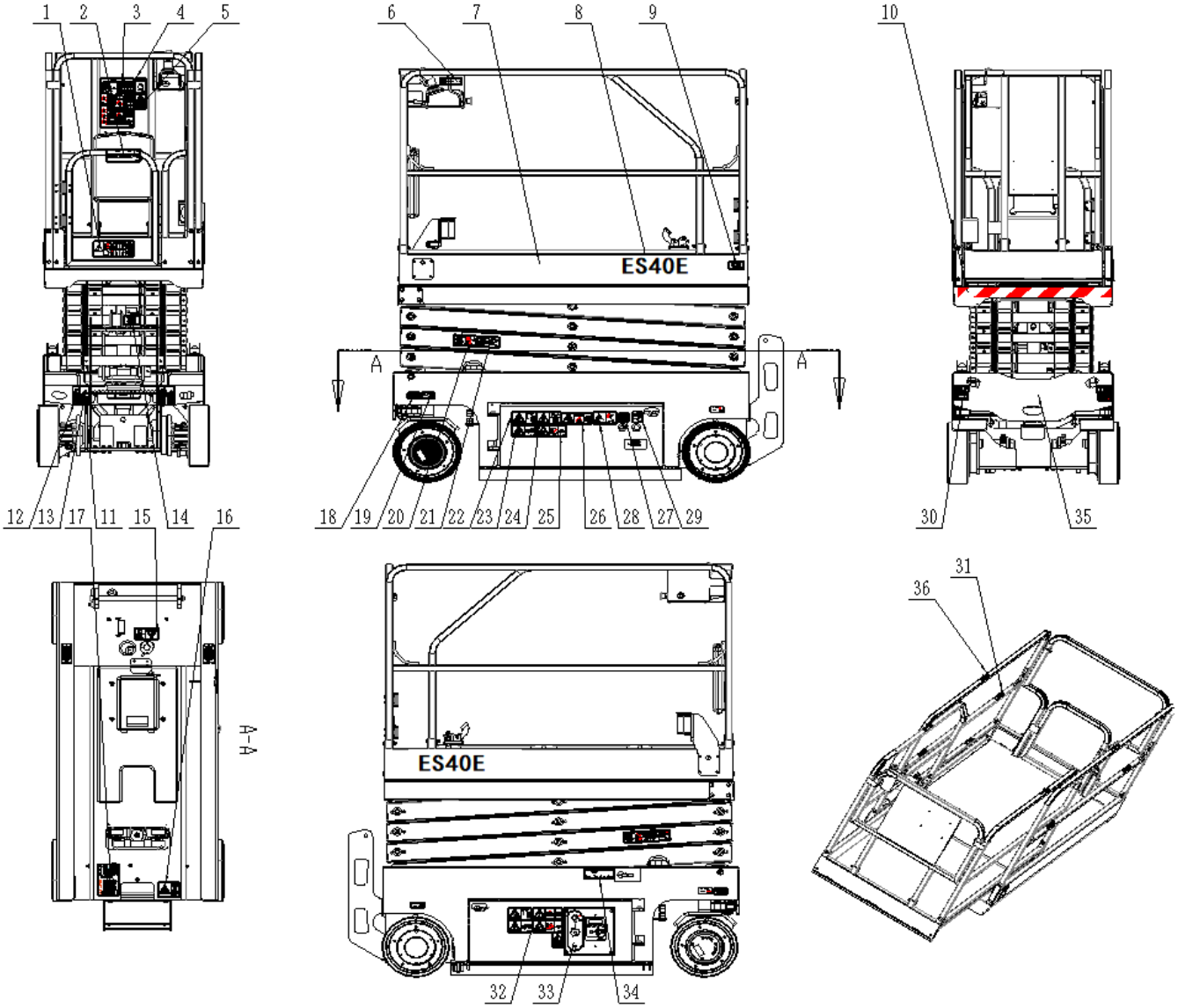
Decals inspection of Model ES40E

Ensure that there are decals with words or symbols on the machine. Using appropriate test methods to check that if all labels are easy to recognize and have a appropriate location.

There is a list containing number and description

No.	Drawing number	Description	Total
1	A11000035	Maximum Capacity	1
2	A11000001	File Box	1
3	A11000002	Brief Instructions	1
4	A11000038	Manual Force, Only Indoor 400N	1
5	A11000003	Tip-over Hazard	2
6	A11000004	Refer to Operator's Manual	1
7	A11000159	platform LOGO	2
8	A11000036	Model	2
9	A11000010	CE	1
10	A11000078	Warning Reflective Band	2
11	A11000020	Transport Tie-down	4
12	A11000021	Lifting Point	4
13	A11000032	Forklift Pocket	2
14	A11000029	Safety Arm	1
15	A11000031	Tip-over Hazard，Tilting Switch	1
16	A11000028	Brake Release Safety and Operating Instructions	1
17	A11000012	Data Plate	1
18	A11000017	Directional Arrows	2
19	A11000039	Wheel Load	4
20	A11000015	Crushing Hazard	2
21	A11000016	Crushing Hazard	2
22	A11000025	Electrocution Hazard	2
23	A11000027	Tip-over Hazard, Open Trays	2
24	A11000076	Tip-over Hazard，Batteries	1
25	A11000024	Use Safety Arm	2
26	A11000026	Batteries/Charger Safety	1
27	A11000018	Power to Charger	1
28	A11000030	Electrocution Hazard, Plug	1
29	A11000011	Power to Platform,230V	2
30	A11000033	Transport Diagram	2
31	A11000005	Lanyard Anchorage Point	4
32	A11000023	Compartment Access	1
33	A11000019	Ground Control Panel	1
34	A11000022	Emergency Lowering	1
35	A11000159	Chassis logo	1
36	A11000156	Non-Insulated	4

Decals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Decals

Safety Decals and Location

Decals inspection of Model

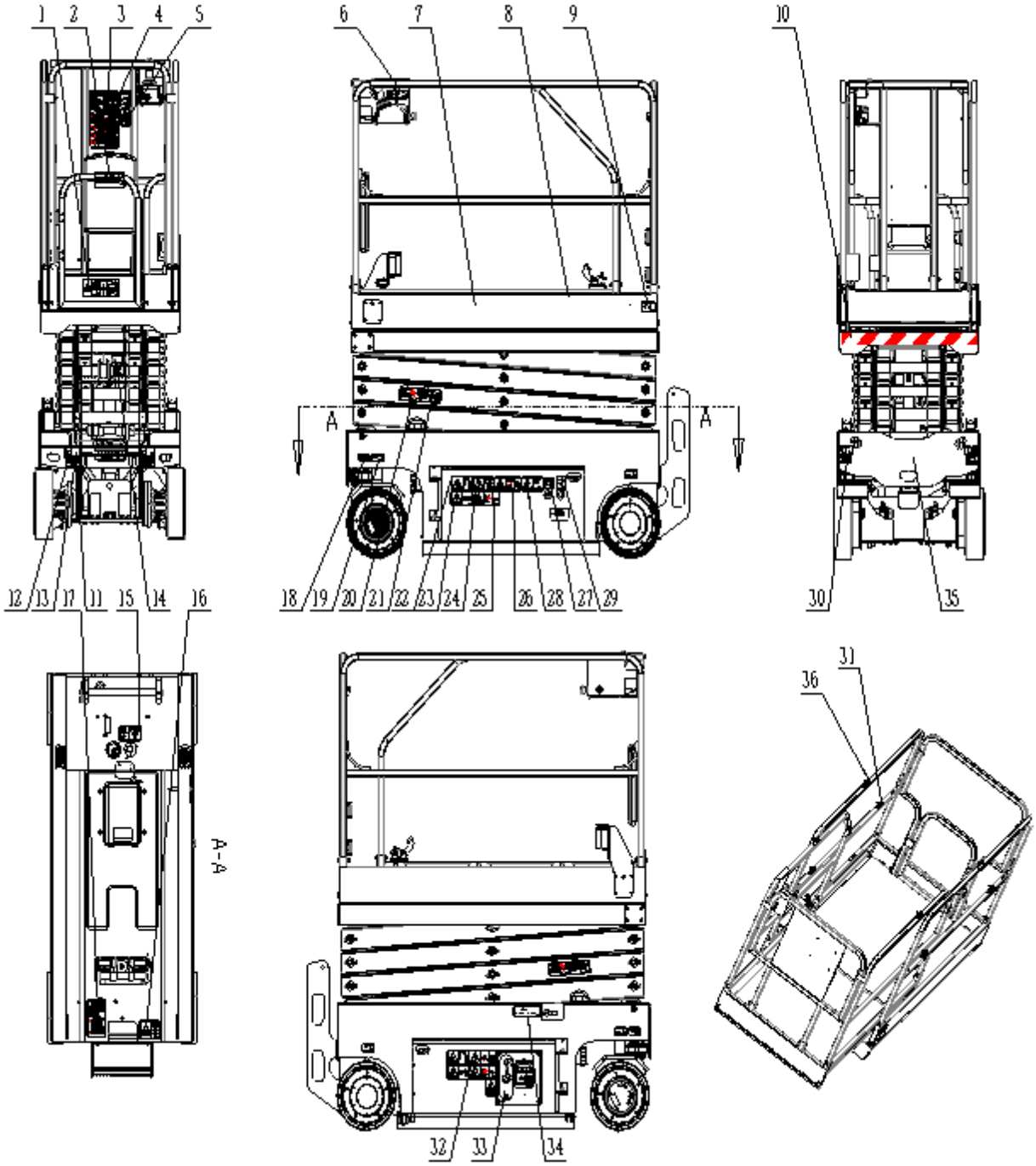
ES60E

Ensure that there are decals with words or symbols on the machine. Using appropriate test methods to check that if all labels are easy to recognize and have a appropriate location.

There is a list containing number and description:

No.	Drawing number	Description	Total
1	A11000062	Maximum Capacity，ES0607W	1
2	A11000140	File Box	1
3	A11000141	Brief Instructions	1
4	A11000143	Manual Force, Indoor 400N, Outdoor 200N（ES60）	1
5	A11000003	Tip-over Hazard	2
6	A11000142	Refer to Operator's Manual	1
7	A11000133	platform LOGO	2
8	A11000053	Model，ES0607W	2
9	A11000010	CE	1
10	A11000078	Warning Reflective Band，ES07	2
11	A11000020	Transport Tie-down	4
12	A11000021	Lifting Point	4
13	A11000032	Forklift Pocket	2
14	A11000029	Safety Arm	1
15	A11000031	Tip-over Hazard，Tilting Switch	1
16	A11000028	Brake Release Safety and Operating Instructions	1
17	A11000012	Data Plate	1
18	A11000017	Directional Arrows	2
19	A11000151	Wheel Load，ES0607W	4
20	A11000145	Crushing Hazard	2
21	A11000146	Crushing Hazard	2
22	A11000025	Electrocution Hazard	2
23	A11000027	Tip-over Hazard, Open Trays	2
24	A11000076	Tip-over Hazard，Batteries, ES07	1
25	A11000024	Use Safety Arm	2
26	A11000026	Batteries/Charger Safety	1
27	A11000018	Power to Charger	1
28	A11000030	Electrocution Hazard, Plug	1
29	A11000011	Power to Platform,230V	2
30	A11000033	Transport Diagram	2
31	A11000005	Lanyard Anchorage Point	4
32	A11000023	Compartment Access	1
33	A11000019	Ground Control Panel	1
34	A11000022	Emergency Lowering	1
35	A11000134	Chassis logo,	1
36	A11000156	Non-Insulated	4

Decals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Decals

Safety Decals and Location

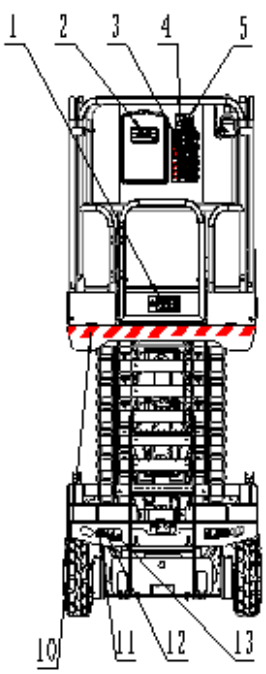
Decals inspection of Model

ES80E/ES100E/ES120E

Ensure that there are decals with words or symbols on the machine. Using appropriate test methods to check that if all labels are easy to recognize and have a appropriate location.

There is a list containing number and description:

No.	Drawing number	Description	Total
1	A11000058	Maximum Capacity，ES80E	1
	A11000006	Maximum Capacity，ES100E	1
	A11000042	Maximum Capacity，ES120E	1
2	A11000140	File Box	1
3	A11000141	Brief Instructions	1
4	A11000143	Manual Force, Indoor 400N, Outdoor 200N（ES80E/ES100E）	1
	A11000144	Manual Force, Only Indoor400N（ES120E）	1
5	A11000003	Tip-over Hazard	2
6	A11000142	Refer to Operator's Manual	1
7	A11000090	Platform logo	2
8	A11000047	Model，ES80E	2
	A11000008	Model，ES100E	2
	A11000048	Model，ES120E	2
9	A11000010	CE	1
10	A11000009	Warning Reflective Band，	2
11	A11000020	Transport Tie-down	4
12	A11000021	Lifting Point	4
13	A11000032	Forklift Pocket	2
14	A11000012	Data Plate	1
15	A11000031	Tip-over Hazard，Tilting Switch	1
16	A11000028	Brake Release Safety and Operating Instructions	1
17	A11000017	Directional Arrows	2
18	A11000152	Wheel Load，ES80E	4
	A11000148	Wheel Load，ES100E	4
	A11000149	Wheel Load，ES120E	4
19	A11000145	Crushing Hazard	2
20	A11000146	Crushing Hazard	2
21	A11000027	Tip-over Hazard, Open Trays	2
22	A11000024	Use Safety Arm	2
23	A11000025	Electrocution Hazard	2
24	A11000030	Electrocution Hazard, Plug	1
25	A11000018	Power to Charger	1
26	A11000034	Tip-over Hazard，Batteries（ES80E/ES100E）	1
	A11000044	Tip-over Hazard Batteries，（ES120E）	1
27	A11000011	Power to Platform,230V	2
28	A11000026	Batteries/Charger Safety	1
29	A11000033	Transport Diagram	2
30	A11000029	Safety Arm	1
31	A11000005	Lanyard Anchorage Point	4
32	A11000023	Compartment Access	1
33	A11000019	Ground Control Panel	1
34	A11000022	Emergency Lowering	1
35	A11000007	Chassis logo,	1
36	A11000156	Non-Insulated	4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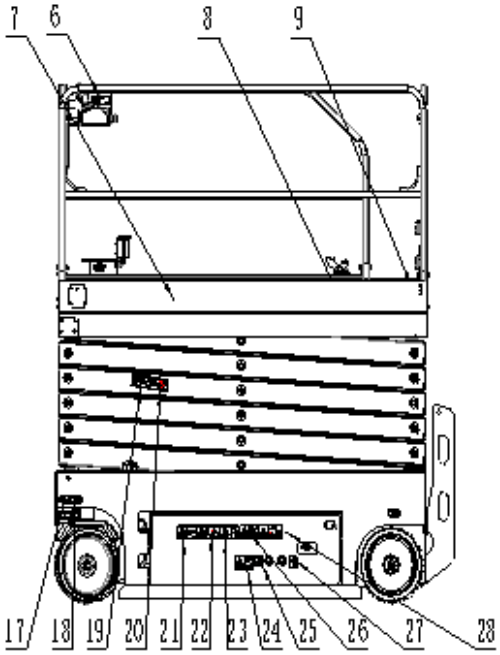
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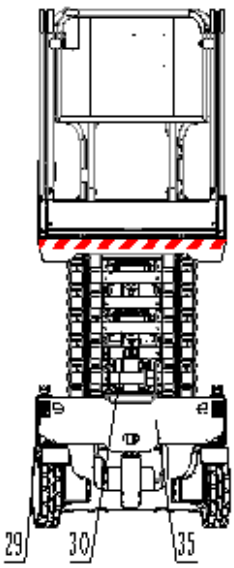
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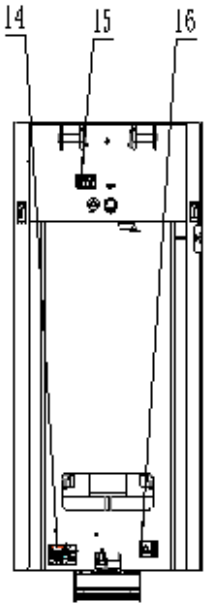
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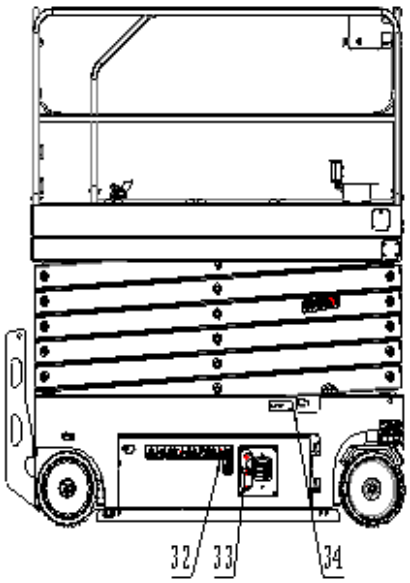
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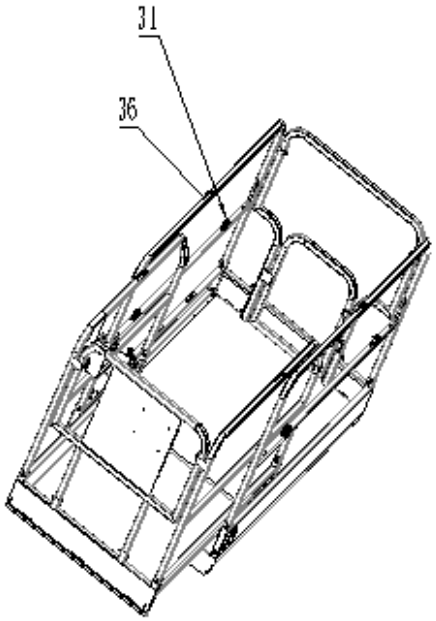
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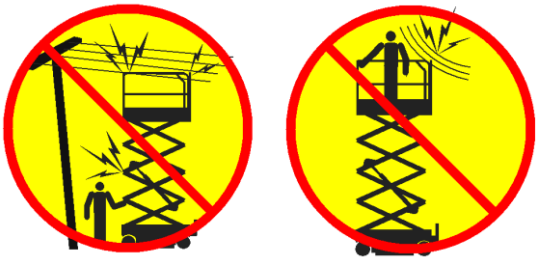
⚠ Personal Fall Protection

Personal fall protection equipment (PFPE) is not required when operating this machine. If PFPE is required by job site or employer rules, the following shall apply:

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

⚠ Electrocution Hazards

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



Obey all local and governmental regulations regarding required clearance from electrical power lines. At a minimum, the required clearance contained in the chart below must be followed.

Line Voltage	Required Clearance
0 to 300V	Don't touch
300V to 50KV	120 Inch
50KV to 200KV	181 Inch
200KV to 350KV	240 Inch
350KV to 500KV	300 Inch
500KV to 750KV	420 Inch
750KV to 1000KV	540 Inch

Allow for platform movement, electrical line sway or sag, and beware of strong or gusty winds.

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

Tip-over Hazards

Occupants, equipment and materials shall not exceed the maximum platform capacity or the maximum platform capacity of the platform extension.

Model	Platform retracted	Extension only	Maximum occupants
ES40E	500 lbs	220 lbs	Indoor−2P
ES60E	500 lbs	260 lbs	Indoor−2P Outdoor−2P
ES80E	990 lbs	260 lbs	Indoor−2P Outdoor−1P
ES100E	700 lbs	260 lbs	Indoor−2P Outdoor−1P
ES120E	700 lbs	260 lbs	Only indoor-2P

Maximum occupants Platform retracted

Platform only

Do not raise the platform unless the machine is on a firm, level surface.

Do not drive over 0.8 km/h with the platform raised.

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:

Lower the platform. Move the machine to a firm, level surface. If the tilt alarm sounds when the platform is raised, use extreme caution to lower the platform.

Outdoor Use: Do not raise the platform when wind speeds may exceed 12.5 m/s. If wind speeds exceed 12.5 m/s when the platform is raised, lower the platform and do not continue to operate the machine.

Indoor Use: When raising the platform, follow ratings for allowable side force and number of occupants on the right.

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.

Do not drive the machine on or near uneven terrain, unstable surfaces or other hazardous conditions with the platform raised.

Work Area Safety

Do not use controller to release the platform when the platform is stripped, stuck or impeded its normal movement by nearby objects. Everyone must leave away from the platform before intending to release platform by ground controller.

Use extreme care and slow speeds while driving the machine in the stowed position across uneven terrain, debris, unstable or slippery surfaces and near holes and drop-offs with the platform stated.

Do not use the machine as a crane.

Do not push the machine or other objects with the platform.

Do not contact adjacent structures with the platform.

Do not tie the platform to adjacent structures.

Do not place loads outside the platform perimeter.

Do not push off or pull toward any object outside of the platform.

Maximum allowable manual force

Model	Platform retracted	Extension only
ES40E	400N	Only indoor-2P
ES60E	400N	Indoor-2P
	200N	Outdoor-2P
ES80E	400N	Indoor-2P
	200N	Outdoor-2P
ES100E	400N	Indoor-2P
	200N	Outdoor-1P
ES120E	400N	Indoor-2P

Do not alter or disable the limit switches.

Do not alter or disable machine components that in any way affect safety and stability.

Do not replace items critical to machine stability with items of different weight or specification.

Do not modify or alter an aerial work platform without prior written permission from the manufacturer. Install additional devices for placing tools or other materials on to the platform, skirting boards and rails, it will increase the weight of platform and increase loading of the platform surface.

Do not place or attach fixed or overhanging loads to any part of this machine.

Do not place ladders or scaffolds in the platform or against any part of this machine.

Do not transport tools and materials unless they are evenly distributed and can be safely handled by person(s) in the platform.

Do not use the machine on a moving or mobile surface or vehicle.

Be sure all tires are in good condition, castle nuts are properly tightened and cotter pins are properly installed.

Crushing Hazard

Keep hands and limbs out of scissors.

Do not work under the platform or in the scissor links without the safety arm in place.

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.

Keep safety away from the operator, machine and fixed object.

Operation on Slopes Hazards

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.

Model	Maximum slope rating, stowed	Maximum side slope rating, stowed
ES40E	25%(14°)	25%(14°)
ES60E	25%(14°)	25%(14°)
ES80E	30% (17°)	30%(17°)
ES100E	25% (14°)	25% (14°)
ES120E	25% (14°)	25% (14°)

Note: Slope rating is subject to ground conditions and adequate traction.

Fall Hazards

The guard rail 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.

Do not sit, stand or climb on the platform guard rails. Maintain a firm footing on the platform floor at all times.

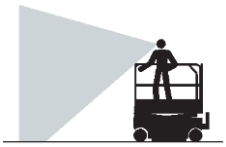
Do not climb down from the platform when raised.

Keep the platform floor clear of debris.

Do not enter or exit the platform unless the machine is in the stowed position.

Do not operate the machine unless the guard rails are properly installed and the entry is secured for operation.

Collision Hazards



Be aware of limited sight distance and blind spots when driving or operating.

Be aware of extended platform position when moving the machine.

Operators must comply with employer, job site and governmental rules regarding use of personal protective equipment.

Check the work area for overhead obstructions or other possible hazards.

Work Area Safety

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

Observe and use color-coded direction arrows on the platform controls and the platform decal plate for drive and steer functions.

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.

No stunt driving or horseplay while operating a machine.

Do not lower the platform unless the area below is clear of personnel and obstructions.

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

⚠ Component Damage Hazards

Do not use any battery charger greater than 24V to charge the batteries.

Do not use the machine as a ground for welding.

⚠ Explosion and Fire Hazards

Only in the open, ventilated and away from fire place such as sparks, flame and burned cigarettes, can charge for battery.

Do not operate the machine in hazardous locations or locations where potentially flammable or explosive gases or particles may be present.

⚠ Damaged Machine Hazards

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

Be sure all maintenance has been performed as specified in this manual and the appropriate service manual.

Be sure all decals are in place and legible.

Be sure the operator's, safety and responsibilities manuals are complete, legible and in the storage container located on the machine.

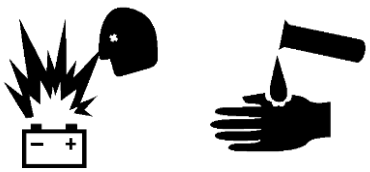
⚠ Bodily Injury Hazard

Do not operate the machine with a hydraulic oil or air leak. An air leak or hydraulic leak can penetrate and/or burn skin.

Improper contact with components under any cover will cause serious injury. Only trained maintenance personnel should access compartments. Access by the operator is only advised when performing a pre-operation inspection. All compartments must remain closed and secured during operation.

⚠ Battery Safety

⚠ Burn Hazards



Batteries contain acid. Always wear protective clothing and eye wear when working with batteries.

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

Do not expose the batteries or the charger to water or rain during charging.

⚠ Explosion Hazard

Keep sparks, flames and lighted tobacco away from batteries. Batteries emit explosive gas.

The battery tray should remain open during the entire charging cycle.

Do not contact the battery terminals or the cable clamps with tools that may cause sparks.

Component Damage Hazard

Do not use any battery charger greater than 24V to charge the batteries.

When the battery power is insufficient or excessive discharge, do not operate the machine.

⚠ Electrocution/Burn Hazards

Connect the battery charger to a grounded, AC 3-wire electrical outlet only.

Inspect daily for damaged cords, cables and wires. Replace damaged items before operating.

Avoid electrical shock from contact with battery terminals. Remove all rings, watches and other jewelry.

⚠ Tip-over Hazards

Batteries are used as counterweight and are critical to machine stability. Do not use batteries that weigh less than the original equipment. Each battery must weigh 61.5lbs（ES120 battery is 80 lbs）, Battery tray including batteries must weigh a minimum of the following requirements:

Model	Weight of tray
ES40E	170 lbs
ES60	340 lbs
ES80 ES100	400 lbs
ES120	465 lbs

⚠ Lift Hazard

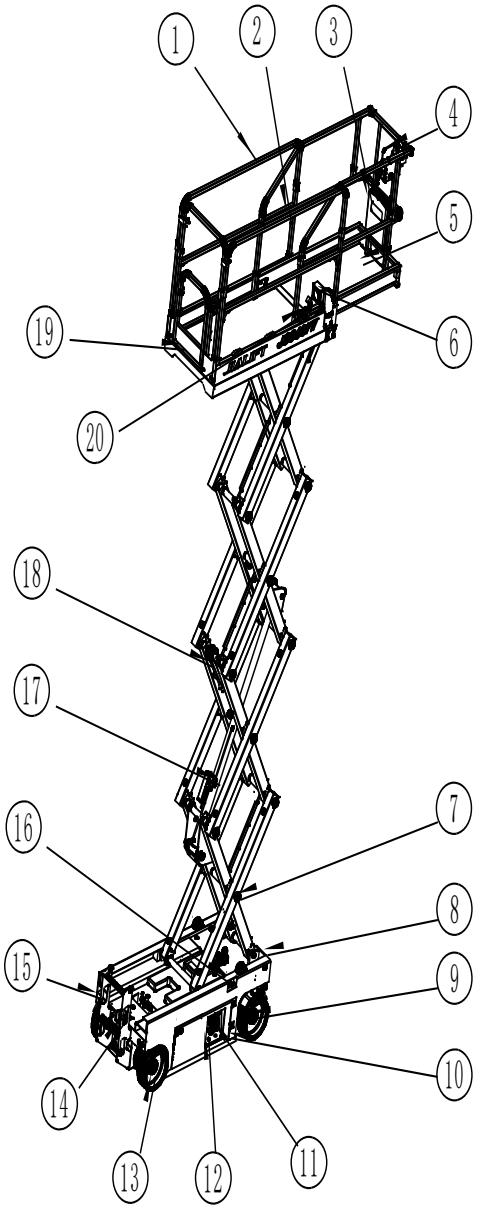
Use the appropriate number of people and proper lifting techniques when lifting batteries.

Lockout after each use

1. Select a safe parking location—firm level surface, clear of obstruction and traffic.
2. Lower the platform.
3. Turn the key switch to the off position and remove the key to secure from unauthorized use.
4. Chock the wheels.
5. Charge the batteries.

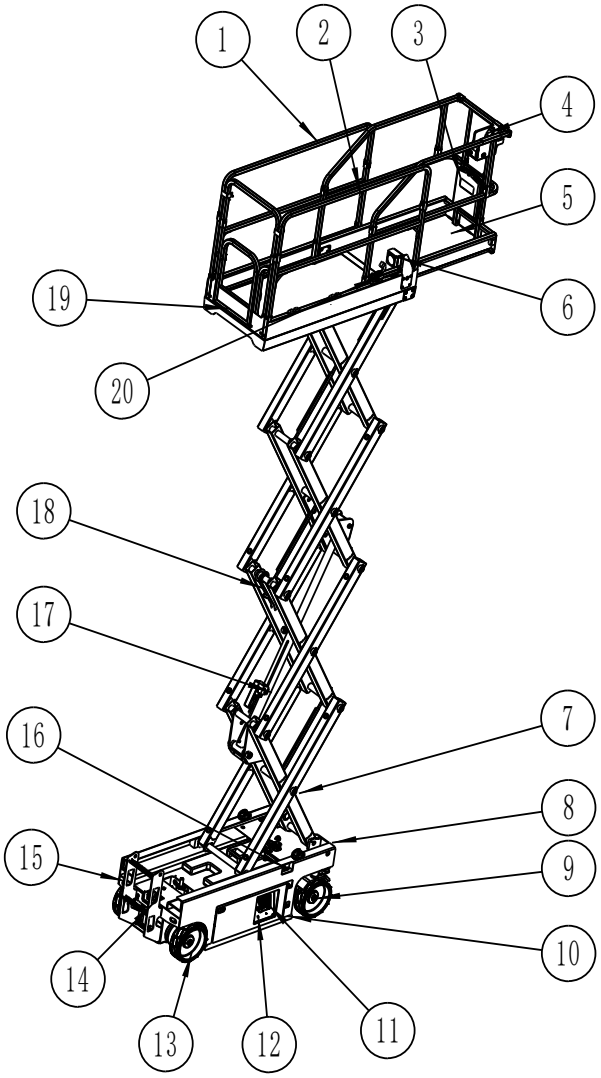
Legend

ES40E



1 Platform guard rails
2 Lanyard anchorage points
3 Manual storage container
4 Platform controls
5 Platform extension
6 Platform-socket and air pipes（optional）
7 Scissor arm
8 Transport tie-down
9 Steering wheel
10 Pothole guard
11 Ground controls
12 Timer
13 Non-steering wheel
14 Brake release pump
15 Entry ladder
16 Emergency lowering line
17 Lift cylinder
18 Safety arm
19 Platform entry chain or gate
20 Platform extension release pedal

ES60E



Legend

1 Platform guard rails

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3 Manual storage container

4 Platform controls

5 Platform extension

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7 Scissor arm

8 Transport tie-down

9 Steering wheel

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11 Ground controls

12 Timer

13 Non-steering wheel

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15 Entry ladder

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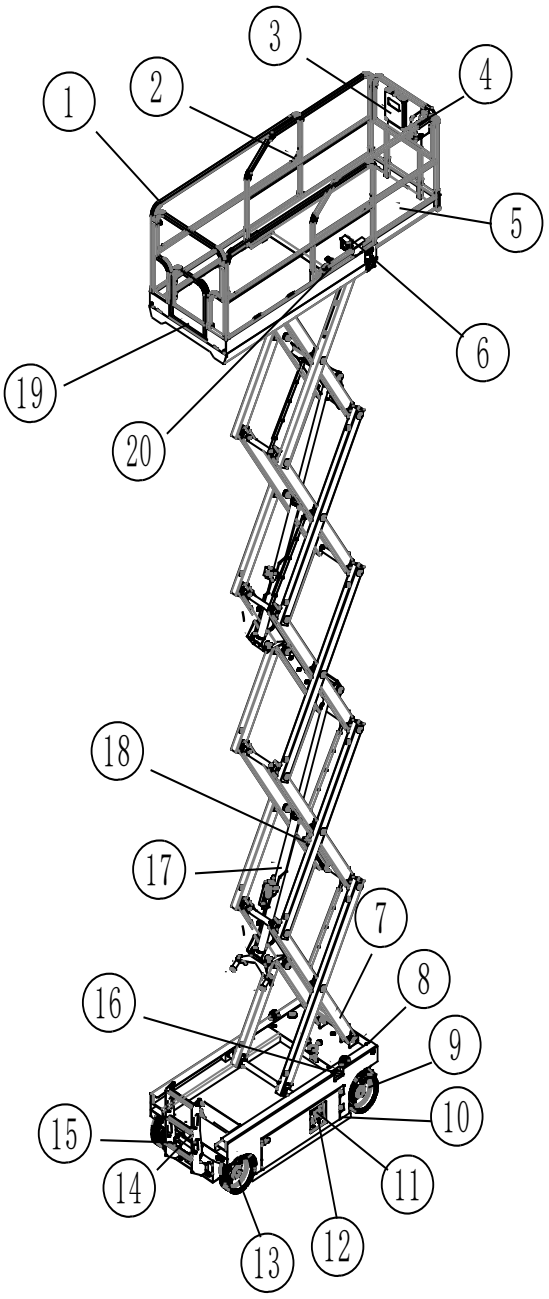
18 Safety arm

19 Platform entry chain or gate

20 Platform extension release pedal

Legend

ES80E/ES100E/ES120E



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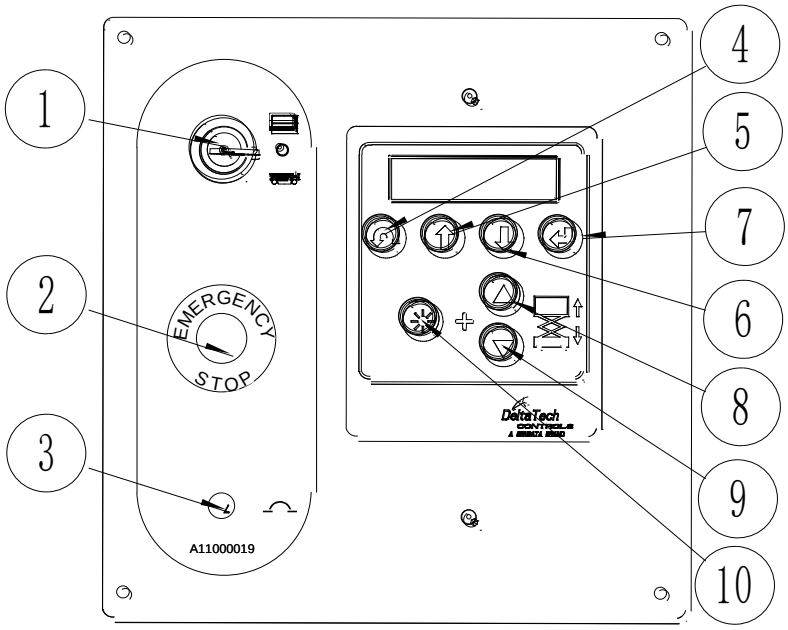
17 Lift cylinder

18 Safety arm

19 Platform entry chain or gate

20 Platform extension release pedal



Ground Control Panel

1 Key switch for platform/off/ground selection

Turn the key 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 ground controls will operate.

2 Red Emergency Stop button

Push in the red Emergency Stop button to the off position to stop all functions. Pull out the red Emergency Stop button to the on position to operate the machine.

3 A breaker for electrical circuits

4 Return key

5 Page up key

6 Page down key

7 Enter key

8 Platform rise key

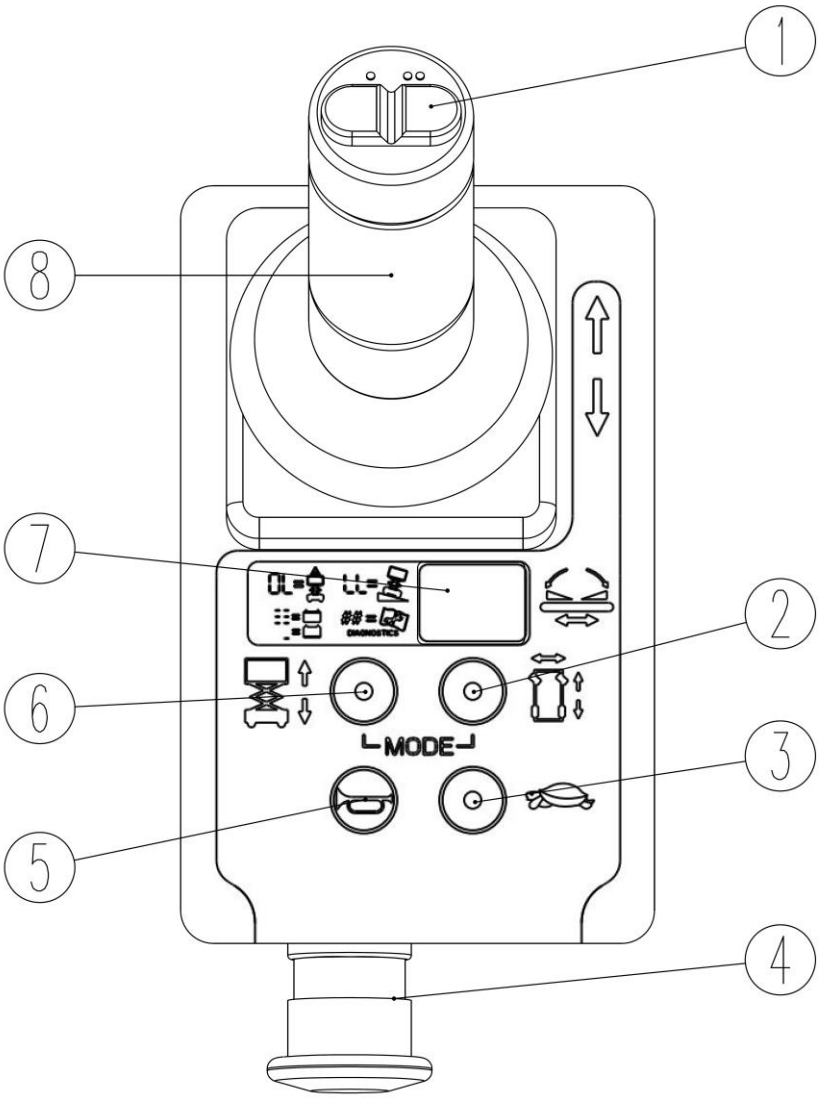
9 Platform down key

10 Lifting key

Press and hold the lifting key and the platform rising key at the same time can operate the ascending function.

Press and hold the lifting key and the platform lowering key at the same time can operate the Platform lowering function.

Platform Control panel



Platform control panel

1 Thumb rocker switch for steer function

2 Drive function button

3 Drive speed select button

4 Red Emergency Stop button

5 Horn button

6 Lift function button

7 LED

8 Proportional control handle and function enable switch for drive and lift functions

Platform control panel

1 Thumb rocker switch for steer function

Press both of the thumb rocker and the machine will turn in the direction the blue triangle points on the platform control panel.

2 Drive function button

Push this button to activate the drive function.

3 Drive speed select button

Press this button to activate the slow drive function. The indicator light will be on when slow drive is selected.

4 Red Emergency Stop button

Push in the red Emergency Stop button to the off position to stop all functions. Pull out the red Emergency Stop button to the on position to operate the machine.

5 Horn button

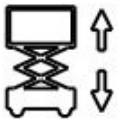
Press the horn button and the horn will sound. Release the horn button and the horn will not sound.

6 Lift function button

Push this button to activate the lift function.

7 LED

LED diagnostic readout, battery charge indicator and lift/drive mode indicator



8 Proportional control handle and function enable switch for drive 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 indic**ated by the bl**ue 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.

Note:

You will wait 10 seconds to operate the machine when you turn on key switch every time

Do Not Operate Unless:

☑ You learn and practice the principles of safe machine operation contained in this operator's manual.

1 Avoid hazardous situations.

2 Always perform a pre-operation inspection.

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

3 Always perform function tests prior to use.

4 Inspect the workplace.

5 Only use the machine as it was intended.

Pre-operation Inspection Fundamentals

It is the responsibility of the operator to perform a pre-operation inspection and routine maintenance.

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.

The pre-operation inspection also serves to determine if routine maintenance procedures are required. Only routine maintenance items specified in this manual may be performed by the operator.

Refer to the list on the next page and check each of the items.

If damage or any unauthorized variation from factory delivered condition is discovered, the machine must be tagged and removed from service.

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.

Scheduled maintenance inspections shall be performed by qualified service technicians, according to the manufacturer's specifications and the requirements listed in the responsibilities manual.

Pre-operation Inspection

● Be sure that the operator's, safety and responsibilities manuals are complete, legible and in the storage container located in the platform.

● Be sure that all decals are legible and in place. See Inspections section.

● Check for hydraulic oil leaks and proper oil level. Add oil if needed. See Maintenance section.

● Check for battery fluid leaks and proper fluid level. Add distilled water if needed. See Maintenance section.

Check the following components or areas for damage, improperly installed or missing parts and unauthorized modifications:

- Electrical components, wiring and electrical cables
- Hydraulic hoses, fittings, cylinders and manifolds
- Battery pack and connections
- Drive motors
- Wear pads
- Tires and wheels
- Limit switches, alarms and horn
- Nuts, bolts and other fasteners
- Platform entry gate
- Alarms and beacons (if equipped)
- Safety arm
- Platform extension
- Scissor pins and retaining fasteners
- Platform control joystick
- Brake release components，
- Pothole protection device

Check entire machine for:

- Cracks in welds or structural components
- Dents or damage to machine
- Be sure that all structural and other critical components are present and all associated fasteners and pins are in place and properly tightened.
- Be sure side rails are installed and bolts are fastened.
- Be sure that the chassis trays are closed and latched and the batteries are properly connected.

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

Function Test

Do Not Operate Unless:

√ You learn and practice the principles of safe machine operation contained in this operator's manual.

1 Avoid hazardous situations.

2 Always perform a pre-operation inspection.

3 Always perform function tests prior to use

Know and understand the function tests before going on to the next section.

4 Inspect the workplace.

5 Only use the machine as it was intended.

Function Test Fundamentals

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.

A malfunctioning machine must never be used. If malfunctions are discovered, the machine must be tagged and removed from service. 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 and function tests again before putting the machine into service.

At the Ground controls

1.Select a test area that is firm, level and free of obstruction.

2.Be sure the batteries are connected.

3.Pull out the platform and ground red Emergency Stop button to the on position.

4.Turn the key switch to ground control.

5.Observe the diagnostic LED readout on the platform controls.

⊙ Result: The LED should display "CH".

Test Emergency Stop

6.Push in the ground red Emergency Stop button to the off position.

⊙ Result: No functions should operate.

7.Pull out the red Emergency Stop button to the on position.

Test the Up/Down Functions

The audible warnings on this machine and the standard horn all come from the same central alarm. The horn is a constant tone. The descent alarm sounds at 60 beeps per minute. The alarm sounds at 180 beeps per minute when the pothole guards have not deployed and when the machine is not level. An optional automotive-style horn is also available.

Turn the key switch to platform control or closed.

8.Toggle platform lift switch upward.

⊙ Result: The platform should not raise.

9.Turn the key switch to the ground control.

10.Toggle platform lift switch upward.

⊙ Result: The platform should raise.

11.Toggle platform lift switch down.

⊙ Result: The platform should lower. The descent alarm should flash and sound while the platform is lowering. When the platform down to 2.1M, stop falling.

12.Pull the platform lift switch.

⊙ Result: The platform should lower to the lowest location. The descent alarm should flash and sound while the platform is lowering.

Test auxiliary lowering

13.Activate the up function by pressing the lift enable button and platform up button, and raise the platform approximately 60 cm.

14.Pull the emergency lowering knob located on the ground controls side of the machine.

⊙ Result: The platform should lower. The descent alarm will not sound.

15.Turn the key switch to platform control.

At the platform controls

Emergency stop

16.Push in the platform red Emergency Stop button to the “off” position.

⊙ Result: No functions should operate.

17.Pull out the red Emergency Stop button to the “on” position.

⊙ Result：The LED diagnostic reading device led will turn on.

Test the horn

18.Press the horn button

⊙ Result: The horn should sound.

Test the Function Enable Switch and the Up/Down Functions

19.Do not hold the function enable switch on the control handle.

20.Slowly move the control handle in the direction indicated by the blue arrow, then in the direction indicated by the yellow arrow.

⊙ Result: No functions should operate.

21.Press the lift function button.

22.Wait seven seconds for the lift function to time out.

23.Slowly move the control handle in the direction indicated by the blue arrow.

⊙Result：The platform should raise. Pothole protection device should be expanded.

24.Release the control handle.

⊙ Result：The platform should stop raising.

25.Press and hold the function enable switch on the control handle. Slowly move the control handle in the direction indicated by the white arrow.

⊙ Result：The platform should lower. The descent alarm should flash and sound while the platform is lowering.

Test the steering

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

26.Press the drive function button.

27.Press and hold the function enable switch on the control handle.

28.Press the switch on top of the control handle in the direction indicated by the left triangle on the control panel.

⊙ Result: The steer wheels should turn in the direction indicated by the left triangle.

29.Press the switch on top of the control handle in the direction indicated by the right triangle on the control panel.

⊙ Result: The steer wheels should turn in the direction indicated by the right triangle.

Test drive and brake

30.Press the drive function button.

31.Slowly move the control handle in the direction indicated by the up 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 arrow points on the control panel, then come to an abrupt stop when the control handle is returned to the center position.

32.Press and hold the function enable switch on the control handle.

33.Slowly move the control handle in the direction indicated by the down 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 down 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 hold the machine on any slope it is able to climb.

Function Test

Test elevated drive speed

34.Press the lift function. Press and hold the function enable switch on the control handle. Raise the platform approximately 2.1 m from the ground.

35.Press the drive function button.

36.Press and hold the function 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 exceed 20 cm/s.

If the drive speed with the platform raised

exceeds 20 cm/s, immediately tag and remove the machine from service.

Test the tilt sensor operation

Note: Perform this test from the ground with the platform controller. Do not stand in the platform.

37.Fully lower the platform.

38.Place a 2x4 or similar piece of wood under both wheels on one side and drive the machine up onto them.

39.Raise the platform approximately 2.1 m from the ground.

⊙ Result: The platform should stop. The tilt alarm should sound 180 times each minute.

40.Move the control handle in the direction indicated by the up arrow, then move it by the down arrow.

⊙ Result: The drive function should not work in either direction.

41.Lower the platform and remove both pieces of wood.

Test the pothole guards

Note: The pothole guards should automatically deploy when the platform is raised. The pothole guards activate limit switches that allow the machine to continue to function. If the pothole guards do not deploy, an alarm sounds and the machine will not drive or steer.

42.Raise the platform.

⊙ Result: When the platform is raised 2.1 m from the ground, the pothole guards should deploy.

43.Press on the pothole guards on one side, and then the other.

⊙ Result: The pothole guards should not move.

44.Lower the platform

⊙ Result: The pothole guards should return to the stowed position.

45.Place a 2x4 or similar piece of wood under a pothole guard.

⊙ Result: Before the platform is raised 2.1 m from the ground, the alarm should sound, the drive should not operate.

46.Lower the platform and remove the 2x4 or similar piece of wood

Do not operate, unless：

√ You learn and practice the principles of safe machine operation contained in this operator's manual.

1 Avoid hazardous situations.

2 Always perform a pre-operation inspection.

3 Always perform function tests prior to use.

4 Inspect the workplace.

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

5 Only use the machine as it was intended.

Fundamentals

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

Workplace inspection checklist

Be aware of and avoid the following hazardous situations:

- drop-offs or holes
- bumps, floor obstructions or debris
- sloped surfaces
- unstable or slippery surfaces
- overhead obstructions and high voltage conductors
- hazardous locations
- inadequate surface support to withstand all load forces imposed by the machine
- wind and weather conditions
- the presence of unauthorized personnel
- other possible unsafe conditions

Operating Instructions

Do Not Operate Unless:

√ You learn and practice the principles of safe machine operation contained in this operator's manual.

1 Avoid hazardous situations.

2 Always perform a pre-operation inspection.

3 Always perform function tests prior to use.

4 Inspect the workplace.

5 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.

Emergency Stop

Push in the red Emergency Stop button to the off position at the ground controls or the platform controls to stop all functions.

Repair any function that operates when either red Emergency Stop button is pushed in.

Emergency Lowering

1. Pull the emergency lowering knob to lower the platform.

Operation from Ground

1. Be sure the battery pack is connected before operating the machine.
2. Turn the key switch to ground control.
3. Pull out both ground and platform red Emergency Stop buttons to the on position.

To Position Platform

1. At the ground control panel, press and hold the lift toggle switch.

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

Operation from Platform

1. Turn the key switch to platform control.
2. Pull out both ground and platform red Emergency Stop buttons to the on position.
3. Be sure the battery pack is connected before operating the machine.

To Position Platform

1. Press the lift function button.
2. Press and hold the function enable switch on the control handle.
3. Move the control handle according to the markings on the control panel.

To steer

1. Press the drive function button.
2. Press and hold the unction enable switch on the control handle.
3. Turn the steer wheels with the thumb rocker switch located on the top of the control handle.

To drive

1. Press the drive function button.
2. Press and hold the function enable switch on the control handle.
3. 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 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.

Battery condition will affect machine performance.

Machine drive speed and function speed will drop when the battery level indicator is flashing.

Decrease drive speed

The drive controls can operate in two different drive speed modes while in the stowed position. When the drive speed button light is on, slow drive speed mode is active. When the drive speed button light is off, fast drive speed mode is active. Press the drive speed button to select the desired drive speed.

Note: When the platform is elevated, the drive speed button light is always on, indicating elevated drive speed.

Drive on a slope

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

Slope at Stowed Position

Side Slope at Stowed Position

ES40E,60E,ES80E,ES100E,ES120E

Max. slope rating, stowed position: 25%

Max. side slope rating, stowed position: 25%

ES80E

Max. slope rating, stowed position: 30%

Max. side slope rating, stowed position: 30%

Note: Slope rating is subject to ground conditions and adequate traction.

Press the drive speed button to the fast drive speed mode.

To determine the slope grade：

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

You will need:

carpenter's level

straight piece of wood, at least 1 m long

tape measure

Lay the piece of wood on the slope.

At the downhill end, lay the level on the top edge of the piece of wood and lift the end until the piece of wood is level.

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：

Run=3.6m

Rise=0.3m

0.3m ÷ 3.6m =
0.083 X 100 = 8.3 %

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

Operating Instructions

Operational Indicator Codes

Operator, machine and fixed objects should keep a safe distance. Pay attention to the direction when using the controller.

Battery level indicator

Full Low

LED diagnostic reading devices used to determine the battery level.

How to Use the Safety Arm

1. Raise the platform approximately 3 m from the ground.
2. Rotate the safety arm away from the machine and let it hang down.
3. Lower the platform until the safety arm rests securely on the link. Keep clear of the safety arm when lowering the platform.

DANGER There will be no load when using the safety arm.

How to Fold Down the Guardrails

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

1. Fully lower the platform and retract the platform extension.
2. Remove the platform controls.
3. From inside the platform, remove the two extension deck lock pins.
4. From the middle of the extension deck railing, fold down the extension deck rail assembly toward the rear of the unit.
5. Replace the two removed pins back into each side of bracket.
6. At the rear of the main deck, remove the two main deck lock pins。
7. Fold down the rear gate and entry side rails as one unit. Keep hands clear of pinch points.
8. Replace the two removed pins back into each side of bracket.
9. Fold down right extended platform guardrail, keep hands free of pinch points.
10. Fold down the main right guardrails form the step or the ground. Keep hands free of pinch points.
11. Fold down left extended platform guardrail, keep hands free of pinch points.
12. Fold down the main left guardrails form the step or the ground. Keep hands free of pinch points.
13. Replace the two removed pins back into each side of bracket.

How to raise the guardrails

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

Extension and indented platform

1. Foot the footplate on the extended platform.
2. Push the extended guardrails and extend the position you want.

Do not stand on the extended platform when you try to extend the platform.

Operational indicator codes

If the platform controls LED indicator code (such as LL) ,Push in and pull out the red Emergency Stop button to reset the system.

ECU Fault Code	
Code	Condition
--	Normal Conditions
01	System Initialization Fault
02	System communication error
03	Invalid Option setting Fault
09	GPS Communication failure
12	Chassis Toggle Switch ON at power-up Fault
18	Pothole Guard Fault
31	Pressure Sensor Fault
32	Angle Sensor Fault
42	Platform Left Turn Switch ON at power-up Message
43	Platform Right Turn Switch ON at power-up Message
46	Platform Joystick Enable Switch ON at power-up Fault
47	Platform Joystick not in neutral at power-up Message
52	Forward Coil Fault
53	Reverse Coil Fault
54	Lift Up Coil Fault
55	Lift Down Coil Fault
56	Right Turn Coil Fault
57	Left Turn Coil Fault
58	General Brake Coil Fault
68	Low Voltage Fault
80	Over 80% Load Warning
90	Over 90% Load Warning
99	Over 99% Load Warning
OL	Overloaded Platform Fault
LL	Machine Tilted Beyond Safe Limits Fault

If you need more details, please contact service department.

Battery and Charger Instruction

Observe and obey：

√ Do not use an external charger or booster battery.

√ Charge the battery in a well-ventilated area.

√P Use proper AC input voltage for charging as indicated on the charger.

√ Use only a authorized battery and charger.

To charger Battery

1. Be sure the batteries are connected before charging the batteries.
2. Open the battery compartment. The compartment should remain open for the entire charging cycle.

Maintenance-free batteries

1. Connect the battery charger to a grounded AC circuit.
2. The charger will indicate when the battery is fully charged.

Standard Batteries

1 Remove the battery vent caps and check the battery acid level. If necessary, add only enough distilled water to cover the plates. Do not overfill prior to the charge cycle.

2 Replace the battery vent caps.

3 Connect the battery charger to a grounded AC circuit.

4 The charger will indicate when the battery is fully charged.

5 Check the battery acid level when the charging cycle is complete. Replenish with distilled water to the bottom of the fill tube. Do not overfill.

Dry Battery Filling and Charging Instructions

1. Remove the battery vent caps and permanently remove the plastic seal from the battery vent openings.
2. Fill each cell with battery acid (electrolyte) until the level is sufficient to cover the plates. Do not fill to maximum level until the battery charge cycle is complete. Overfilling can cause the battery acid to overflow during charging. Neutralize battery acid spills with baking soda and water.
3. Install the battery vent caps.
4. Charge the battery.
5. Check the battery acid level when the charging cycle is complete. Replenish with distilled water to the bottom of the fill tube. Do not overfill.

Fall protection

Personal fall protection equipment (PFPE) is not required when operating this machine. If PFPE is required by job site or employer rules, the following shall apply:

All PFPE must comply with applicable governmental regulations and must be inspected and used in accordance with the manufacturer’s instructions.

After every using:

1. Select a security place which can be a sturdy surface, without obstacles and avoiding heavy transport.
2. Lower the platform.
3. Turn off the machine and remove the key to avoid unauthorized use.
4. Lock the wheels of the machine.

Observe and obey:

- √ While using a crane lifting machine, keep the normal judgment and planned to control the movement of the machine.
- √ The transport vehicle must be parked on a level surface.
- √ The transport vehicle must be secured to prevent rolling while the machine is being loaded.
- √ Be sure the vehicle capacity, loading surfaces and chains or straps are sufficient to withstand the machine weight. lifts are very heavy relative to their size. See the serial label for the machine weight.
- √ The machine must be on a level surface or secured before releasing the brakes.
- √ 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.
- √ 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.
- √ 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.

Brake release operation

For hydraulic drive products of ES40E,60, ES80E, ES100E, ES120E.

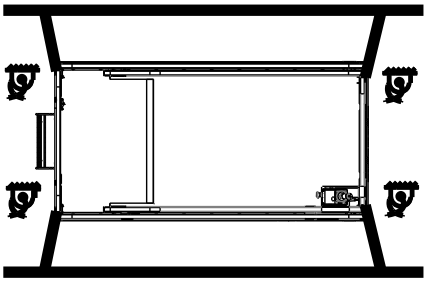
1. Chock the wheels to prevent the machine from rolling.
2. Be sure the winch line is properly secured to the drive chassis tie points and the path is clear of all obstructions.
3. Push in the black brake release knob to open the brake valve.
4. Pump the red brake release pump knob.

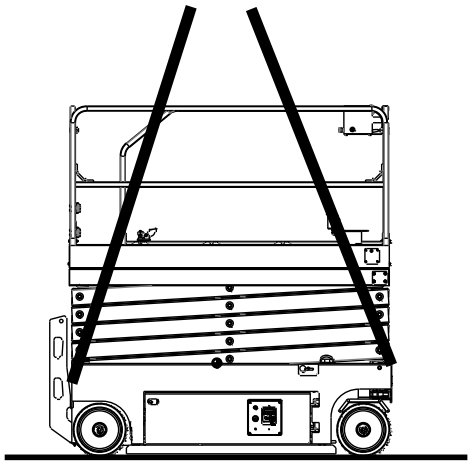
Securing to truck or trailer for transit

Always use the extension deck lock when the machine is transported.

Fixed on the chassis in the transport plane through fastening parts of machine.

Use a minimum of 4 chain or straps.





Use the chain or straps ample load capacity.

Turn the key switch to the off position and remove the key before transporting.

Inspect the entire machine for loose or unsecured items.

If the guardrails had be folded down, use the straps to fix before transport.

Observe and obey:

√ Only qualified forklift operators should lift the machine with a forklift.

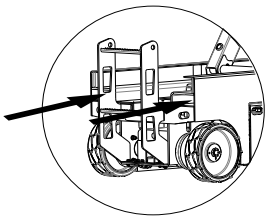
√ Be sure the crane capacity, loading surfaces and straps or lines are sufficient to withstand the machine weight. See the serial label for the machine weight.

Lifting the Machine with a Forklift

Be sure the extension deck, controls and component trays are secure. Remove all loose items on the machine.

Fully lower the platform. The platform must remain lowered during all loading and transport procedures.

Use the forklift pockets located on both sides of the ladder.



Position the forklift forks in position with the forklift pockets.

Drive forward to the full extent of the forks.

Raise the machine 0.15 m and then tilt the forks back slightly to keep the machine secure.

Be sure the machine is level when lowering the forks.

NOTICE Lifting the machine from the side can result in component damage.

Lifting instruction

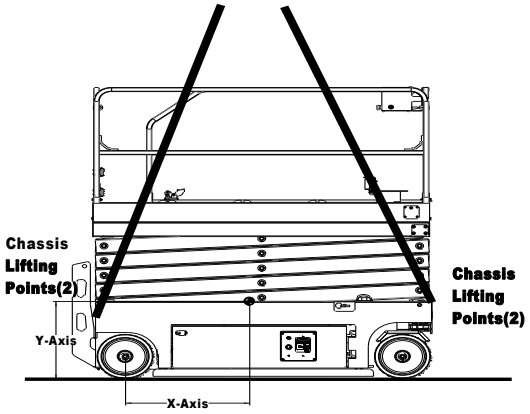
Fully lower the platform. Be sure the extension deck, controls and component trays are secure. Remove all loose items on the machine.

Determine the center of gravity of your machine using the table and the picture on this page.

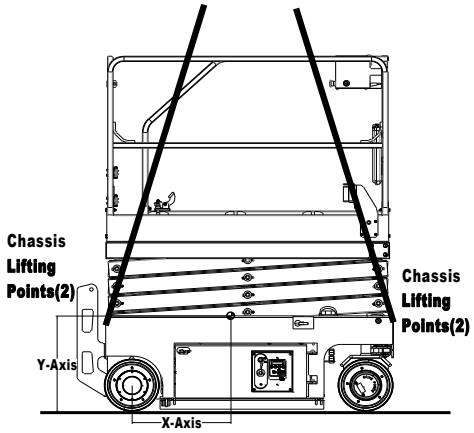
Attach the rigging only to the designated lifting points on the machine. There are two lifting holes int each end of the machine.

Adjust the rigging to prevent damage to the machine and to keep the machine level.

core	X SHAFT	YSHAFT
ES40E	19.64 Inch	18.93 Inch
ES60E	25.35 Inch	20.75 Inch
ES80E	33.66 Inch	23.54 Inch
ES100E	32.80 Inch	25.43 Inch
ES120E	33.46 Inch	28.90 Inch



ES80E,ES100E,ES120E



ES40E/ES60E

Specifications

ES40E	
Height, working maximum	244 Inch
Height, platform maximum	165 Inch
Height, stowed maximum Railing raised	80.7 Inch
Height, stowed maximum Railing lowered	67.0 Inch
Width with standard wheels	30.0 Inch
Length, stowed	57.0 Inch
Length, platform extended	59.4 Inch
Platform dimensions (length x width)	50.4 x 29.1 Inch
Platform extension length	23.6 Inch
Maximum load capacity	506 Lbs
Maximum wind speed	0m/s
Wheelbase	40.5 Inch
Turning radius (outside)	61.0 Inch
Turning radius (inside)	0m
Ground clearance	2.7 Inch
Ground clearance Pothole guards deployed	0.78 Inch
Weight	1960 Lbs
(Machine weights vary with option configurations. See serial label for specific machine weight.)	
Power source	2Batterys12V 100Ah
System voltage	24V
Controls	Proportional
AC outlet in platform	Standard

Maximum hydraulic pressure (functions)	240Bar
Tire size	Φ230×80
Sound pressure level	<70 dB
The maximum noise level normally (A level detection)	
Total vibration value is subjected does not exceed 2.5 m/s^2	
Maximum slope rating, stowed position	25%
Maximum side slope rating, stowed position	25%
Note: Slope rating is subject to ground conditions.	
Maximum working slope	3°/1.5°
Drive speed	
Stowed, maximum	4.0km/h
Platform raised, maximum	0.8km/h
Floor loading information	
Tire load maximum	836 Lbs
Tire contact pressure	641kPa
Occupied floor pressure	7.9kPa

ES60E	
Height, working maximum	307 Inch
Height, platform maximum	228.3 Inch
Height, stowed maximum Railing raised	85.4 Inch
Height, stowed maximum Railing lowered	72.4 Inch
Width with standard wheels	31.9 Inch
Length, stowed	72.4 Inch
Length, platform extended	107.9 Inch
Platform dimensions (length x width)	65 x 30 Inch
Platform extension length	35.4 Inch
Maximum load capacity	506 Lbs
Maximum wind speed	12.5 m/s
Wheelbase	53.9 Inch
Turning radius (outside)	61 Inch
Turning radius (inside)	0m
Ground clearance	2.4 Inch
Ground clearance Pothole guards deployed	0.78 Inch
Weight	3300Lbs
(Machine weights vary with option configurations. See serial label for specific machine weight.)	
Power source	4Batterys 6V 180Ah
(Lithium battery 25.6V 150Ah)	
System voltage	24V
Controls	Proportional
AC outlet in platform	Standard

Maximum hydraulic pressure (functions)	240Bar
Tire size	Φ323×100
Sound pressure level	<70 dB
The maximum noise level normally (A level detection)	
Total vibration value is subjected does not exceed 2.5 m/s^2	
Maximum slope rating, stowed position	25%
Maximum side slope rating, stowed position	25%
Note: Slope rating is subject to ground conditions.	
Maximum working slope	3°/1.5°
Drive speed	
Stowed, maximum	4.0km/h
Platform raised, maximum	0.8km/h
Floor loading information	
Tire load maximum	1430 Lbs
Tire contact pressure	1106kPa
Occupied floor pressure	13.04kPa

Note: Floor loading information is approximate and does not incorporate different option configurations. It should be used only with adequate safety factors.

Specifications

ES80E	
Height, working maximum	393.7 Inch
Height, platform maximum	315 Inch
Height, stowed maximum Railing raised	94.5 Inch
Height, stowed maximum Railing lowered	67.3 Inch
Width with standard wheels	45.3 Inch
Length, stowed	94.5 Inch
Length, platform extended	133.8 Inch
Platform dimensions (length x width)	90 x 45.3Inch
Platform extension length	39.4 Inch
Maximum load capacity	990 Lbs
Maximum wind speed	12.5 m/s
Wheelbase	72.8 Inch
Turning radius (outside)	86.6 Inch
Turning radius (inside)	0m
Ground clearance	3.7 Inch
Ground clearance Pothole guards deployed	0.78 Inch
Weight	5808 Lbs
(Machine weights vary with option configurations. See serial label for specific machine weight.)	
Power source	4Batterys 6V 180Ah
(Lithium battery 25.6V 180Ah)	
System voltage	24V
Controls	Proportional
AC outlet in platform	Standard

Maximum hydraulic pressure (functions)	240Bar
Tire size	Φ381×129
Sound pressure level	<70 dB
The maximum noise level normally (A level detection)	
Total vibration value is subjected does not exceed 2.5 m/s^2	
Maximum slope rating, stowed position	30%
Maximum side slope rating, stowed position	30%
Note: Slope rating is subject to ground conditions.	
Maximum working slope	3°/1.5°
Drive speed	
Stowed, maximum	3.5km/h
Platform raised, maximum	0.8km/h
Floor loading information	
Tire load maximum	2410 Lbs
Tire contact pressure	1132kPa
Occupied floor pressure	10.43kPa

Note: Floor loading information is approximate and does not incorporate different option configurations. It should be used only with adequate safety factors.

ES100E	
Height, working maximum	472.4 Inch
Height, platform maximum	393.7 Inch
Height, stowed maximum Railing raised	96.8 Inch
Height, stowed maximum Railing lowered	72.4 Inch
Width with standard wheels	45.3 Inch
Length, stowed	94.5 Inch
Length, platform extended	133.86 Inch
Platform dimensions (length x width)	90.1 x 45.3 Inch
Platform extension length	39.4 Inch
Maximum load capacity	704 Lbs
Maximum wind speed	12.5 m/s
Wheelbase	72.8 Inch
Turning radius (outside)	86.6 Inch
Turning radius (inside)	0m
Ground clearance	3.7 Inch
Ground clearance Pothole guards deployed	0.78 Inch
Weight	6204 Lbs
(Machine weights vary with option configurations. See serial label for specific machine weight.)	
Power source	4Batterys 6V 180Ah
(Lithium battery 25.6V 220Ah)	
System voltage	24V
Controls	Proportional
AC outlet in platform	Standard

Maximum hydraulic pressure (functions)	240Bar
Tire size	Φ381×129
Sound pressure level	<70 dB
The maximum noise level normally (A level detection)	
Total vibration value is subjected does not exceed 2.5 m/s^2	
Maximum slope rating, stowed position	25%
Maximum side slope rating, stowed position	25%
Note: Slope rating is subject to ground conditions.	
Maximum working slope	3°/1.5°
Drive speed	
Stowed, maximum	3.5km/h
Platform raised, maximum	0.8km/h
Floor loading information	
Tire load maximum	2618 Lbs
Tire contact pressure	1213kPa
Occupied floor pressure	11.68kPa

Note: Floor loading information is approximate and does not incorporate different option configurations. It should be used only with adequate safety factors.

Specifications

ES120E	
Height, working maximum	547.2 Inch
Height, platform maximum	468.5 Inch
Height, stowed maximum Railing raised	102.3 Inch
Height, stowed maximum Railing lowered	77.9 Inch
Width with standard wheels	43.7 Inch
Length, stowed	94.5 Inch
Length, platform extended	133.8 Inch
Platform dimensions (length x width)	90 x 43.7 Inch
Platform extension length	39.4 Inch
Maximum load capacity	704 Lbs
Maximum wind speed	0 m/s
Wheelbase	72.8 Inch
Turning radius (outside)	86.6 Inch
Turning radius (inside)	0m
Ground clearance	3.7 Inch
Ground clearance Pothole guards deployed	0.78 Inch
Weight	6490 Lbs
(Machine weights vary with option configurations. See serial label for specific machine weight.)	
Power source	4Batterys 6V 240Ah
(Lithium battery 25.6V 220Ah)	
System voltage	24V
Controls	Proportional
AC outlet in platform	Standard

Maximum hydraulic pressure (functions)	240Bar
Tire size	Φ381×129
Sound pressure level	<70 dB
The maximum noise level normally (A level detection)	
Total vibration value is subjected does not exceed 2.5 m/s^2	
Maximum slope rating, stowed position	25%
Maximum side slope rating, stowed position	25%
Note: Slope rating is subject to ground conditions.	
Maximum working slope	3°/1.5°
Drive speed	
Stowed, maximum	3.2km/h
Platform raised, maximum	0.8km/h
Floor loading information	
Tire load maximum	2860 Lbs
Tire contact pressure	1323kPa
Occupied floor pressure	13.22kPa

Note: Floor loading information is approximate and does not incorporate different option configurations. It should be used only with adequate safety factors.

Observe and Obey:

√ Only routine maintenance items specified in this manual shall be performed by the operator.

√ Scheduled maintenance inspections shall be completed by qualified service technicians, according to the manufacturer ' s specifications and the requirements specified in the responsibilities manual.

Maintenance symbol legend

NOTICE 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.

Indicates that dealer service will be required to perform this procedure.

Inspect the Batteries

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.

Note: Sealed battery or maintenance free batteries machine, do not need to check this matter.

WARNING Electrocution hazard

Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

WARNING Bodily injury hazard.

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

Note: Perform this test after fully charging the batteries.

1. Put on protective clothing and eye wear.
2. Be sure that the battery cable connections are free of corrosion.
3. Be sure that the battery lock bar is in place and secure.
4. Remove the battery vent caps
5. Check the battery electrolyte level. If necessary, added to distilled water from the bottom of the storage battery charging tube. Do not add too much.
6. Place the vent cap back.

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

Check the 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.

NOTICE Operate this procedure while the platform is saved.

1. Visually inspect the oil level in the hydraulic oil tank.

⊙ Result: The hydraulic oil level should be between the MAX. and MIN. marks on the tank.

2. Add oil as needed. Do not overfill.

Hydraulic oil specifications

L-HV46

Pre-delivery Preparation Report

The pre-delivery preparation report contains checklists for each type of scheduled inspection.

Make copies for each inspection. Store completed forms as required.

Maintenance Schedule

There are five types of maintenance inspections that must be performed according to a schedule—daily, quarterly, semi-annually, annually, and two years. The Scheduled Maintenance Procedures section and the Maintenance Inspection Report have been divided into five subsections—A, B, C, D, and E. Use the following chart to determine which group(s) of procedures are required to perform a scheduled inspection.

Inspection	Checklist
Daily or every 8 hours	A
Quarterly or every 250 hours	A+B
Semi-annually or every 500 hours	A+B+C
Annually or every 1000 hours	A+B+C+D
Two-year or every 2000 hours	A+B+C+D+E

Maintenance Inspection Report

The maintenance inspection report contains checklists for each type of scheduled inspection.

Make copies of the Maintenance Inspection Report to use for each inspection. Maintain completed forms for a minimum of 4 years or in compliance with your employer, jobsite and governmental regulations and requirements.

Fundamentals

It is the responsibility of the dealer to perform the Pre-delivery Preparation.

The Pre-delivery Preparation is performed prior to each delivery. The inspection is designed to discover if anything is apparently wrong with a machine before it is put into service.

A damaged or modified machine must never be used. If damage or any variation from factory delivered condition is discovered, the machine must be tagged and removed from service.

Repairs to the machine may only be made by a qualified service technician, according to the manufacturer's specifications.

Scheduled maintenance inspections shall be performed by qualified service technicians, according to the manufacturer's specifications and the requirements listed in the responsibilities manual.

Instructions

Use the operator’s manual on your machine.

The Pre-delivery Preparation consists of completing the Pre-operation Inspection, the Maintenance items and the Function Tests.

Use this form to record the results. Place a check in the appropriate box after each part is completed. Follow the instructions in the operator’s manual.

If any inspection receives an N, remove the machine from service, repair and re-inspect it. After repair, place a check in the R box.

Legend

Y = Yes, acceptable

N = No, remove from service

R = Repaired

Comments

Pre-delivery Preparation completed	Y	N	R
Operation inspection completed			
Maintenance items completed			
Function tests completed			

Model
Serial number
Date
Machine owner
Inspected by (print)
Inspector signature
Inspector title
Inspector company

Maintenance
Maintenance Inspection Report

Model
Serial number
Date
Hour meter
Machine owner
Inspected by (print)
Inspector signature
Inspector title
Inspector company

Instructions

• Make copies of this report to use for each inspection.

• Select the appropriate checklist(s) for the type of inspection(s) to perform.

	Daily or every 8 hours	A
	Quarterly or every 250 hours	A+B
	Semi-annually or every 500 hours	A+B+C
	Annually or Every 1000 hours	A+B+C+D
	Two-year or every 2000 hours	A+B+C+D+E

•Place a check in the appropriate box after each inspection procedure is completed.

•Use the step-by-step procedures in this section to learn how to perform these inspections.

•If any inspection receives an "N," tag and remove the machine from service, repair and re-inspect it. After repair, place a check in the "R" box.

Legend

Y = yes, acceptable

N = no, remove from service

R – repaired

Checklist A.	**Y**	**N**	**R**
A-1 Inspect the manuals and decals			
A-2 Pre-operation inspection			
A-3 Function tests			
After 40 hours：			
A-4 30-day service			
After 100hours：			
A-5 Grease steer yokes			

Checklist B	**Y**	**N**	**R**
B-1 Batteries			
B-2 Electrical wiring			
B-3 Electrical contactor			
B-4 Tires and wheels			
B-5 Emergency stop			
B-6 Key switch			
B-7 Horn			
B-8 Drive brakes			
B-9 Drive speed - stowed			
B-10 Drive speed - raised			
B-11 Drive speed - slow			
B-12 Hydraulic oil analysis			
B-13 Tank venting system			
B-14 Chassis tray component			
B-15 Test down limit and pothole limit			
B-16 Test up limit switch			

Checklist C	**Y**	**N**	**R**
C-1 Platform overload system			
C-2 Replace hydraulic tank breather cap			

Checklist D	**Y**	**N**	**R**
D-1 Check the scissor wear-resisting			
D-2 Replace the Hydraulic Tank Return			

Checklist E	**Y**	**N**	**R**
E-1 Hydraulic oil			

Checklist A

A-1

Inspect the Manuals and Decals

Maintaining the operator's and safety manuals in good condition is essential to safe machine operation. Manuals are included with each machine and should be stored in the container provided in the platform. An illegible or missing manual will not provide safety and operational information necessary for a safe operating condition.

In addition, maintaining all of the safety and instructional decals in good condition is mandatory for safe machine operation. Decals alert operators and personnel to the many possible hazards associated with using this machine. They also provide users with operation and maintenance information. An illegible decal will fail to alert personnel of a procedure or hazard and could result in unsafe operating conditions.

1. Check to make sure that the operator's and safety manuals are present and complete in the storage container on the platform.
2. Examine the pages of each manual to be sure that they are legible and in good condition.

⊙Result: The operator's manual is appropriate for the machine and all manuals are legible and in good condition.

⌑ Result: The operator's manual is not appropriate for the machine or all manuals are not in good condition or is illegible. Remove the machine from service until the manual is replaced.

3. Open the operator's manual to the decals inspection section. Carefully and thoroughly inspect all decals on the machine for legibility and damage.

⊙Result: The machine is equipped with all required decals, and all decals are legible and in good condition.

⌑Result: The machine is not equipped with all required decals, or one or more decals are illegible or in poor condition. Remove the machine from service until the decals are replaced.

4. Always return the manuals to the storage container after use.

Note: Contact your authorized distributor or if replacement manuals or decals are needed.

A-2

Perform Pre-operation Inspection

Completing a Pre-operation Inspection is essential to safe machine operation. 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. The Pre-operation Inspection also serves to determine if routine maintenance procedures are required.

Complete information to perform this procedure is available in the appropriate operator's manual.

A-3

Perform Function Tests

Completing the function tests is essential to safe machine operation. Function tests are designed to discover any malfunctions before the machine is put into service. A malfunctioning machine must never be used. If malfunctions are discovered, the machine must be tagged and removed from service.

Complete information to perform this procedure is available in the "function test" part of the operator's manual.

A-4

Perform 30-Day Service

The 30-day maintenance procedure is a onetime procedure to be performed after the first 30 days or 40 hours of usage. After this interval, refer to the maintenance tables for continued scheduled maintenance.

Perform the following maintenance procedures:

- B-3 Inspect the Tires, Wheels and Castle Nut Torque.

•D-2 Replace the Hydraulic Tank Return Filter Element.

A-5

Grease the Steer Yokes

This procedure be performed every 100 hours of operation.

Regular application of lubrication to the steer yokes is essential to good machine performance and service life. Continued use of an insufficiently greased steer yoke will result in component damage.

1. Open the lid of the steering yoke.
2. Find filling the hole of the grease at the top of the steering yoke.
3. Pump multipurpose grease into the steer yoke until the steer yoke is full and grease is being forced past the bearings.
4. Put back the lid
5. Repeat this step for the other steer yoke.

Grease Specification

UNI-PRESIDENT 3# Universal lithium-based grease

Checklist B

B-1

Inspect the Batteries

This procedure be performed every 250 hours or quarterly, whichever comes first.

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.

Electrocution hazard.

Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

Bodily injury hazard.

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

1. Put on protective clothing and eye wear.
2. Release the battery pack latch and rotate the battery pack out and away from the chassis.
3. Be sure that the battery cable connections are free of corrosion.

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

4. Be sure that the battery retainers and cable connections are tight.
5. Fully charge the batteries. Allow the batteries to rest 24 hours before performing this procedure to allow the battery cells to equalize.
6. Remove the battery vent caps and check the specific gravity of each battery cell with a hydrometer. Note the results.
7. Check the ambient air temperature and adjust the specific gravity reading for each cell as follows:

• Add 0.004 to the reading of each cell for every 10° / 5.5° C above 80° F / 26.7° C.

• Subtract 0.004 from the reading of each cell for every 10° / 5.5° C below 80° F / 26.7° C.

⊙Result: All battery cells display an adjusted specific gravity of 1.277 or higher.

The battery is fully charged. Proceed to step 12.

¤ Result: One or more battery cells display a specific gravity of 1.217 or below. Proceed to step 8.

8. Perform an equalizing charge OR fully charge the batteries and allow the batteries to rest at least 6 hours.
9. Remove the battery vent caps and check the specific gravity of each battery cell with a hydrometer. Note the results.
10. Check the ambient air temperature and adjust the specific gravity reading for each cell as follows:

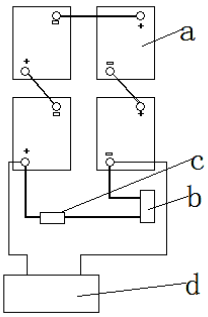
• Add 0.004 to the reading of each cell for every 10° / 5.5° C above 80° F / 26.7° C.

• Subtract 0.004 from the reading of each cell for every 10° / 5.5° C below 80° F / 26.7° C.

⊙Result: All battery cells display a specific gravity of 1.277 or greater. The battery is fully charged. Proceed to step 12.

¤ Result: The difference in specific gravity readings between cells is greater than 0.1 OR the specific gravity of one or more cells is 1.172 or less. Replace the battery.

11. Check the battery acid level. If needed, replenish with distilled water to 1/8 inch / 3 mm below the bottom of the battery fill tube. Do not overfill.
12. Install the vent caps and neutralize any electrolyte that may have spilled



a Batteries b Quick disconnect

c 300A fuse d Charger

Suitable for all models：

13. Check each battery pack and verify that the batteries are wired correctly.
14. Inspect the battery charger plug and pigtail for damage or excessive insulation wear. Replace as required.
15. Connect the battery charger to the 110-240V 50/60HZ AC power.

⊙Result: The charger should operate and begin charging the batteries.

¤ Result: the charger alarm sounds and the LEDs blink one time, correct the charger connections at the fuse and battery. Ensure that the charger operates correctly and begin charging the batteries.

Note: For best results, use an extension cord of adequate size with a length no longer than 50 feet/ 15 m.

Note: If you have any further questions regarding the battery charger operation, please contact the Scissor Service Department.

B-2

Inspect the Electrical Wiring

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Maintaining electrical wiring in good condition is essential to safe operation and good machine performance. Failure to find and replace burnt, chafed, corroded or pinched wires could result in unsafe operating conditions and may cause component damage.

Maintenance

WARNING Electrocution/explosion hazard.

Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

1. Inspect the underside of the chassis for damaged or missing ground strap(s).
2. Inspect the following areas for burnt, chafed, corroded and loose wires:
   - Inside ground control panel wires
   - Hydraulic power unit module tray wires
   - Battery tray(s) wires
   - Platform control wires
3. Turn the key switch to ground control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.
4. Raise the platform approximately 8 feet / 2.5 m from the ground.
5. Rotate the safety arm away from the machine and let it hang down.
6. Lower the platform onto the safety arm.

WARNING Crushing hazard.

Keep hands clear of the safety arm when lowering the platform.

7. Inspect the center chassis area and scissor arms for burnt, chafed and pinched cables.
8. Inspect the following areas for burnt, chafed, corroded, pinched and loose wires:
   - Scissor arms wires
   - ECU to platform controls wires
   - Power to platform wires
9. Inspect the insulating oil coating at the following position:
   - The link between the ECU and wiring harness connector of the platform controller
   - all the wiring harness connector of linking level sensor
10. Raise the platform and return the safety arm to the stowed position.
11. Lower the platform to the stowed position and turn the machine off.

B-3

Inspect the Tires and Wheels

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Maintaining the tires and wheels in good condition is essential to safe operation and good performance. Tire and/or wheel failure could result in a machine tip-over. Component damage may also result if problems are not discovered and repaired in a timely fashion.

1. Check the tire surface and sidewalls for cuts, cracks, punctures and unusual wear.
2. Check each wheel for damage, bends and cracks.
3. Remove the cotter pin and check the castle nut for proper torque.

Note: Always replace the cotter pin with a new one when removing the castle nut or when checking the torque of the castle nut.

4. Install a new cotter pin. Bend the cotter pin to lock in place.

Non-lubricated nut torque	406.7Nm
Lubricated nut torque	305Nm

B-4

Test the Emergency Stop

This procedure should be performed every 250 hours or quarterly, whichever comes first.

A properly functioning Emergency Stop button is essential for safe machine operation. An improperly operating red Emergency Stop button will fail to shut off power and stop all machine functions, resulting in a hazardous situation.

As a safety feature, selecting and operating the ground controls will override the platform controls, except the platform red Emergency Stop button.

1. Turn the key switch to ground control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.
2. Push in the red Emergency Stop button at the ground controls to the off position.

⊙ Result: No machine functions should operate.

3. Turn the key switch to platform control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.
4. Push down the red Emergency Stop button at the platform controls to the off position.

⊙Result: No machine functions should operate.

Note: The red Emergency Stop button at the ground controls will stop all machine operation, even if the key is switched to platform control.

B-5

Test the Key Switch

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Proper key switch action and response is essential to safe machine operation. The machine can be operated from the ground or platform controls and the activation of one or the other is accomplished with the key switch. Failure of the key switch to activate the appropriate control panel could cause a hazardous operating situation.

Perform this procedure from the ground using the platform controls. Do not stand in the platform.

1. Pull out the red Emergency Stop button to the on position at both the ground and platform controls.
2. Turn the key switch to platform controls.
3. Check the platform up/down function from the ground controls.

⊙ Result: The machine functions should not operate.

4. Turn the key switch to ground control.
5. Check the machine functions from the platform controls.

⊙ Result: The machine functions should not operate.

6. Turn the key switch to the off position.

⊙ Result: No function should operate.

B-6
Test the Automotive-style Horn

This procedure should be performed every 250 hours or quarterly, whichever comes first.

The horn is activated at the platform controls and sounds at the ground as a warning to ground personal. An improperly functioning horn will prevent the operator from alerting ground personal of hazards or unsafe conditions.

1. Turn the key switch to platform control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.
2. Push down the horn button at the platform controls.

⊙ Result: The horn should sound.

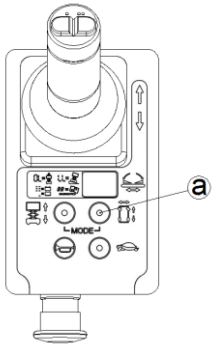
B-7
Test the Drive Brakes

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Proper brake action is essential to safe machine operation. The drive brake function should operate smoothly, free of hesitation, jerking and unusual noise. Hydraulically-released individual wheel brakes can appear to operate normally when not fully operational.

Perform this procedure with the machine on a firm, level surface that is free of obstructions. Be sure the platform deck extension deck is fully retracted and the platform is in the stowed position.

1. Mark a test line on the ground for reference.
2. Turn the key switch to platform control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.
3. Lower the platform to the stowed position.
4. Press the drive function select button.



a. Drive function select button

5. Choose a point on the machine; i.e., contact patch of a tire, as a visual reference for use when crossing the test line.
6. Move the control handle to drive at the maximum speed, and release handle while across the ground test line.
7. Measure the distance between the reference point and the test line.

⊙ Result: The machine should stop within a specified the braking distance.

¤ Result: The machine do not stop within a specified the braking distance.

Note: The brakes must be able to hold the machine on any slope it is able to climb.

8. Replace the brake, repeat the process from step1.

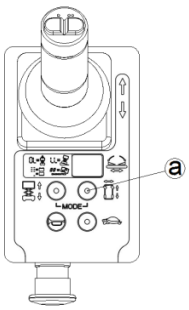
Braking distance	
Max braking distance	40cm±20cm

B-8

Test the Drive Speed-Platform Stowed

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Proper drive functions are essential to safe machine operation. The drive function should respond quickly and smoothly to operator control. Drive performance should also be free of hesitation, jerking and unusual noise over the entire proportionally controlled speed range.



Perform this procedure with the machine on a firm, level surface that is free of obstructions.

1. Create start and finish lines by marking two lines on the ground 40 feet/12.2 m apart.
2. Turn the key switch to platform control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.
3. Lower the platform to the stowed position.
4. Press the drive function select button

a. Drive function select button

5. Choose a point on the machine; i.e., contact patch of a tire, as a visual reference for use when crossing the test line.
6. Move the control handle to drive at the maximum speed. Begin timing when the reference points crosses the start line.
7. Continue at full speed and note the time when your reference point on the machine passes the finish line. Refer to specification.

B-9

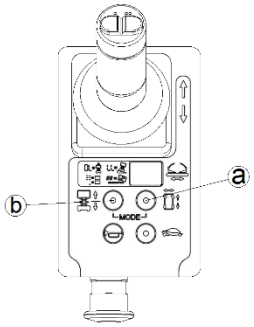
Test the Drive Speed-Platform Raised

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Proper drive functions are essential to safe machine operation. The drive function should respond quickly and smoothly to operator control. Drive performance should also be free of hesitation, jerking and unusual noise over the entire proportionally controlled speed range.

Perform this procedure with the machine on a firm, level surface that is free of obstructions.

1. Create start and finish lines by marking two lines on the ground 40 feet/12.2 m apart.
2. Turn the key switch to platform control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.
3. Press the platform up button.



a. Platform up button b. Drive function select button

4. Press function button

5. Raise the platform approximately 2 m from the ground.

6. Press drive function select button

7. Choose a point on the machine; i.e., contact patch of a tire, as a visual reference for use when crossing the start and finish lines.

8. Move the control handle to drive at the maximum speed. Begin timing when the reference points crosses the start line.

9. Continue at full speed and note the time when your reference point on the machine passes the finish line. Refer to specification.

B-10

Test the Drive Speed-Platform Stowed, Slow

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Proper drive functions are essential to safe machine operation. The drive function should respond quickly and smoothly to operator control. Drive performance should also be free of hesitation, jerking and unusual noise over the entire proportionally controlled speed range.

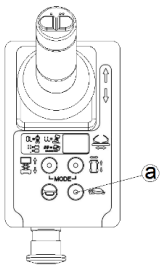
Perform this procedure with the machine on a firm, level surface that is free of obstructions.

1. Create start and finish lines by marking two lines on the ground 40 feet/12.2 m apart.

2. Turn the key switch to platform control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.

3. Lower the platform to the stowed position.

4. Press the drive speed select button



a. drive speed select button

5. Choose a point on the machine; i.e., contact patch of a tire, as a visual reference for use when crossing the test line.

6. Move the control handle to drive at the maximum speed. Begin timing when the reference points crosses the start line.

7. Continue at full speed and note the time when your reference point on the machine passes the finish line. More than 25S

B-11

Perform Hydraulic Oil Analysis

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Replacement or testing of the hydraulic oil is essential for good machine performance and service life. Dirty oil may cause the machine to perform poorly, and continued use may cause component damage. Extremely dirty conditions may require oil changes to be performed more often.

Before replacing the hydraulic oil, the oil may be tested by an oil distributor for specific levels of contamination to verify that changing the oil is necessary.

If the hydraulic oil is not replaced at the two-year inspection, test the oil quarterly. Replace the oil when it fails the test.

Refer to E-1 Test or Replace the Hydraulic oil.

B-12

Inspect the Hydraulic Tank Cap Venting System

This procedure should be performed every 250 hours or quarterly, whichever comes first.

A free-breathing hydraulic tank cap is essential for good machine performance and service life. A dirty or clogged cap may cause the machine to perform poorly. Extremely dirty conditions may require that the cap be inspected more often.

1. Remove the breather cap from the hydraulic tank.
2. Check for proper venting.

⊙ Result: Air passes through the breather cap.

⌑ Result: If air does not pass through the cap, clean or replace the cap. Proceed to step 3.

Note: When checking for positive tank cap venting, air should pass freely through the cap.

3. Using a mild solvent, carefully wash the cap venting system. Dry using low pressure compressed air. Repeat step 2.
4. Install the breather cap onto the hydraulic tank.

B-13
Check the Module Tray Latch Components


This procedure should be performed every 250 hours or quarterly, whichever comes first.

Maintaining the module tray latch components in good condition is essential to good performance and service life. Failure to detect worn out latch components may result in module trays opening unexpectedly, creating an unsafe operating condition.

1. Inspect each module tray rotary latch and related components for wear. Tighten any loose fasteners.
2. Lubricate each module tray rotary latch. Using light oil, apply a few drops to each of the springs and to the sides of the rotary latch mechanism.

B-14
Test the Down Limit Switch, Level Sensor and Pothole Limit Switches

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Maintaining the limit switches is essential to safe operation and good machine performance. Operating the machine with a faulty limit switch could result in reduced machine performance and a potentially unsafe operating condition.

Perform this procedure with the machine on a firm, level surface that is free of obstructions.

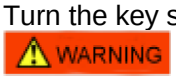
Down limit switch

1. Remove the platform controls.
2. Raise the platform about 2.5m from the ground.
3. Lift the safety arm, move it to the center of the scissor arm and rotate down to a vertical position.
4. Lower the platform onto the safety arm.

Crushing hazard.

Keep hands clear of the safety arm when lowering the platform.

5. Turn the key switch to the off position.
6. Tag and disconnect the platform control box at the platform.
7. Open the battery tray, tag and disconnect the connector from the ECU to the platform control cable.
8. Securely install the platform control box harness plug into the connector of the ECU.
9. Dismantle the cover of down limit switch, tag and open the two wires in the switch.
10. Turn the key switch to platform control.



11. Raise the platform and return the safety arm to the stowed position.

12. Working at the platform controls, press the lift function select button. Lower the platform to the stowed position.

⊙ Result: The diagnostic LCD displays "18", the alarm sounds and the lift function operates. The machine is functioning properly.

⌑ Result: The diagnostic LCD does not display "18". The alarm does not sound and the lift function does not operate. Replace the down limit switch.

13. Press and hold the drive/steer function enable switch on the control handle. Attempt to drive and steer the machine.

⊙ Result: The diagnostic LCD displays "18 ". The alarm sounds, and the drive and steer function do not operate. The machine is function properly.

⌑ Result: The diagnostic LCD does not display "18". The alarm does not sound, and the steer and drive functions operate. Replace the down limit switch.

14. Press the platform up button. Raise the platform approximately 0.3 m.

⊙Result: The diagnostic LCD displays "18". The alarm sounds. The machine is functioning properly.

⌑ Result: The diagnostic LCD does not display "18". The alarm does not sound. Replace the down limit switch.

15. Raise up the platform to the potholes protection device spread.

⊙ Result: The diagnostic LCD display "18". The alarm does not sound and the machine is function properly

⌑Result: The diagnostic LCD dose not display "18". The alarm does not sound and replace the down limit switch.

16. Press the platform up button and attempt to raise the platform to approximately 2.5m.

17. Lift the safety arm, move it to the center of the scissor arm and rotate down to a vertical position.

18. Lower the platform onto the safety arm.

Crushing hazard.

Keep hands clear of the safety arm when lowering the platform.

19. Turn the key switch to the off position.

20. Disconnect the platform controls from the ECU cable.

21. Securely install the connector of the ECU cable into the platform control cable.

22. Install the connector of the platform controls.

23. Connect the two wires in the down limit switch correctly and safely.

24. Install the cover of down limit switch.

25. Turn the key switch to platform control.

26. Raise the platform and return the safety arm to the stowed position.

27. Lower the platform to the stowed position.

Level Sensor

28. Move the machine onto a grade which exceed the rating of level sensor. Refer to the serial label on the machine.

29. Press the platform up button and attempt to raise the machine to 2m.

⊙ Result: The diagnostic LCD displays "LL". The alarm sounds and the platform stops lifting after the pothole guards are deployed. The machine is function properly.

⌑ Result: The diagnostic LCD does not display "LL". The alarm sounds and the platform continues to lift after the pothole guards are deployed. Adjust or replace the level sensor.

30. Press the drive function select button and attempt to drive the machine on the slope.

⊙Result: The diagnostic LCD display "LL". The alarm sounds. Steering and driving function cannot operation. Machine is function properly.

⌑ Result: The diagnostic LCD does not display "LL". The alarm does not sound and the steer and drive functions operate. Adjust or replace the level sensor.

31. Lower the platform to the stowed position, move the machine onto a firm, level surface.

Pothole Limit Switches

32. Place a wooden block approximately 5cm tall under the right pothole guard.

33. Press the raise function button, attempt to raise the machine 2m.

⊙ Result: The pothole guard contacts the block and does not fully deploy. The diagnostic LCD displays "18". The alarm

sounds and the platform will lift to 2m or beyond. The machine is function properly.

¤ Result: The pothole guard contacts the block and does not fully deploy. The diagnostic LCD does not display "18". The alarm does not sound and the machine will continue to lift the platform. Adjust or replace the pothole limit switch.

34. Press and hold the drive/steer function enable switch on the control handle. Attempt to drive and steer the machine.

⊙ Result: The diagnostic LCD displays "18". The alarm sounds, and the machine will not steer or drive. The machine is functioning properly.

¤Result: The diagnostic LCD does not display "18". The alarm does not sound and the steer and drive functions operate. Adjust or replace the pothole limit switch.

35. Lower the platform to the stowed position and remove the block under the right pothole guard.
36. Repeat this procedure beginning with step 31~34 for the left pothole guard.
37. Lower the platform to the stowed position, remove the block under the left pothole guard.
38. Turn off the machine.

B-15

Test the Up Limit Switch (if equipped)

This procedure should be performed every 250 hours or quarterly, whichever comes first.

Maintaining the limit switches is essential to safe operation and good machine performance. Operating the machine with a faulty limit switch could result in reduced machine performance and a potentially unsafe operating condition.

Perform this procedure with the machine on a firm, level surface that is free of obstructions.

1. Turn the key switch to ground control and raise the platform approximately 2.5 m from the ground.
2. While raising the platform from the ground controls, push the arm of the up-limit switch.

⊙ Result: The platform stop raising, and the machine is functioning properly.

¤ Result: The platform continues to rise. Adjust or replace the maximum drive height limit switch.

Checklist C

C-1

Calibrate the Platform Overload System （if equipped)

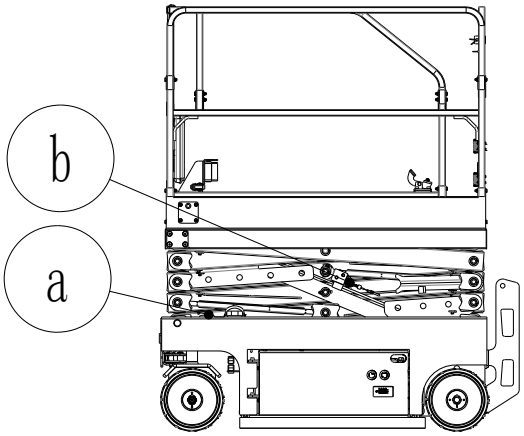

This procedure should be performed every 500 hours or six months, whichever comes first OR when the machine fails to lift the maximum rated load.

Testing the platform overload system regularly is essential to safe machine operation. Continued use of an improperly operating could result in the system not sensing an overloaded platform condition. Machine stability could be compromised resulting in the machine tipping over.

The platform overload system is designed to prevent machine operation in the event the platform is overloaded. It provided with two control components: the overload pressure transducer and the scissors angle sensor.

The overload pressure transducer is used to determine the pressure of the cylinder and feedback to the platform overload system with analog signal. When the pressure is too high, ECU will compare with the value of Angle

sensor, then stop the machine until the excess load is removed from the platform.



a. Angle Sensor

b. Pressure Transducer

The angle sensor located at scissors axis is used to measure the angle between the internal and external scissors and determine the platform level.

1. Turn the key switch to ground control and raise the platform approximately 2.5 m
2. Lift the safety arm, move it to the center of the scissor arm and rotate up to a vertical position.
3. Lower the platform onto the safety arm.

WARNING Crushing hazard

Keep hands clear of the safety arm when lowering the platform.

4. Disconnect the up-limit switch.
5. Use a wire to short circuit the up-limit switch connector from main cable.
6. Turn the key switch to the off position and push in the red Emergency Stop button to the off position.
7. Raise the platform a little to return the safety arm.
8. Raise the platform to the highest position and continue to press the up function select button.

⊙ Result: The motor does not operate. The machine is functioning properly.

¤ Result: The motor continue to operate. Calibration the platform overload system.

9. Lower the platform to the stowed position by manually drop function.
10. Lift the safety arm, move it to the center of the scissor arm and rotate up to a vertical position.
11. Lower the platform onto the safety arm.

WARNING Crushing hazard

Keep hands clear of the safety arm when lowering the platform.

12. Dismantle the short circuit wire of up limit switch carefully.
13. Connect the connector of up limit switch.
14. Raise the platform to the highest position and continue to press the up function select button.

⊙ Result: The motor does not operate. The machine is functioning properly.

¤ Result: The motor continue to operate. Platform overload system is abnormal. Exclude fault of the limit switch, limit switch wire and mounting bracket, Or the overload system needs calibration.

15. Lower the platform to the stowed position.

C-2

Replace the Hydraulic Tank Breather Cap

Maintenance

This procedure should be performed every 500 hours or six months, whichever comes first.

The hydraulic tank is a vented-type tank. The breather cap has an internal air filter that can become clogged or, over time, can deteriorate. If the breather cap is faulty or improperly installed, impurities can enter the hydraulic system which may cause component damage. Extremely dirty conditions may require that the cap be inspected more often.

1. Remove and discard the hydraulic tank breather cap.
2. Install the new cap onto the tank.

Checklist D

D-1

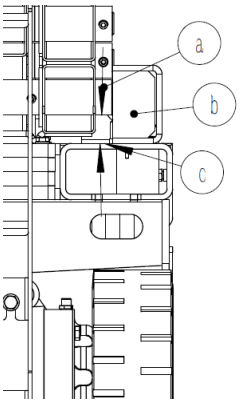
Check the Scissor Arm Wear Pads

This procedure should be performed every 1000 hours or annually, whichever comes first.

Maintaining the condition of the scissor arm wear pads is essential to safe machine operation. Continued use of worn-out wear pads may result in component damage and unsafe operating conditions.

Perform this procedure with the machine on a firm, level surface that is free of obstructions.

1. Measure the distance between the number one inner arm cross tube and the chassis deck at the ground controls side of the non-steer end of the machine.



a. inner arm cross tube

b. wear pad

c. chassis deck

⊙ Result: The measurement is not less than x mm. (ZS07：x=34.5，ZS12：x=38) Refer to Step2.

⌑ Result: The measurement is less than x mm. Replace the Scissor Arm Wear Pads

2. Measure the distance between the number one inner arm cross tube and the chassis deck at the battery pack side of the non-steer end of the machine.

⊙ Result: The measurement is not less than x mm. Refer to Step 3.

⌑Result: The measurement is less than x mm. Replace the Scissor Arm Wear Pads

3. Apply a thin layer of dry film lubricant to the area of the chassis where the scissor arm wear pads make contact.

D-2

Replace the Hydraulic Tank Return Filter Element

This procedure should be performed every 1000 hours or annually, whichever comes first.

Replacement of the hydraulic tank return filter is essential for good machine performance and service life. A dirty or clogged filter may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require that the filter be replaced more often.

⚠ CAUTION Scalding danger

Beware of hot oil Contact with hot oil may cause severe burns.

NOTICE The hydraulic tank return filter is mounted on the function manifold next to the hydraulic power unit.

1. Clean the area around the oil filter. Remove the filter with an oil filter wrench.
2. Apply a thin layer of oil to the new oil filter gasket.
3. Install the new filter and tighten it securely by hand.
4. Use a permanent ink marker to write the date and number of hours from the hour meter onto the filter
5. Turn the key switch to ground control and pull out the red Emergency Stop button to the on position at both the ground and platform controls.
6. Activate and hold the platform up toggle switch.
7. Inspect the filter and related components to be sure that there are no leaks.
8. Clean up any oil that may have spilled.

Checklist E

E-1

Test or Replace the Hydraulic Oil

This procedure should be performed every 2000 hours or every two years, whichever comes first.

Replacement or testing of the hydraulic oil is essential for good machine performance and service life. Dirty oil may cause the machine to perform poorly and continued use may cause component damage. Extremely dirty conditions may require oil changes to be performed more often.

Before replacing the hydraulic oil, the oil may be tested by an oil distributor for specific levels of contamination to verify that changing the oil is necessary.

If the hydraulic oil is not replaced at the two year inspection, test the oil quarterly. Replace the oil when it fails the test.

Note: This performed should under the state of stowed.

1. Disconnect the battery pack from the machine.

WARNING Electrocution/burn hazard.

Contact with electrically charged circuits could result in death or serious injury. Remove all rings, watches and other jewelry.

2. Open the power unit module tray.
3. Tag and disconnect the hydraulic tank return pipe from the hydraulic filter and remove the pipe from the tank. Cap the dustproof plug on the filter and pipe head.

4. Tag and disconnect the hydraulic pump inlet pipe and remove the pipe from the tank. Cap the dustproof plug on the pump and pipe head.

5. Remove the hydraulic tank retaining fasteners. Remove the hydraulic tank from the machine.
6. Remove the drain plug of the hydraulic tank.
7. Drain all of the oil into a suitable container.

WARNING Bodily injury hazard.

Spraying hydraulic oil can penetrate and burn skin. Loosen hydraulic connections very slowly to allow the oil pressure to dissipate gradually. Do not allow oil to squirt or spray.

8. Clean up any oil that may have spilled. Properly discard the used oil.
9. Clean the inside of the hydraulic tank using a mild solvent. Allow the tank to dry completely.

10. Install the hydraulic tank and install and tighten the hydraulic tank retaining fasteners. Torque to specification.

Torque specifications.

Non-lubrication drain plug	4.5 Nm
Lubrication drain plug	3.4 Nm

11. Put back the tank, install and tighten the hydraulic oil tank of the fasteners. Torque according to the following requirement:

Torque to specification.	
Non-lubrication hydraulic tank fastener	4.0 Nm
Lubrication hydraulic tank fastener	2.9 Nm

12. Link hydraulic pump inlet pipe into the tank.

13. Link hydraulic pump return pipe with the return filter.

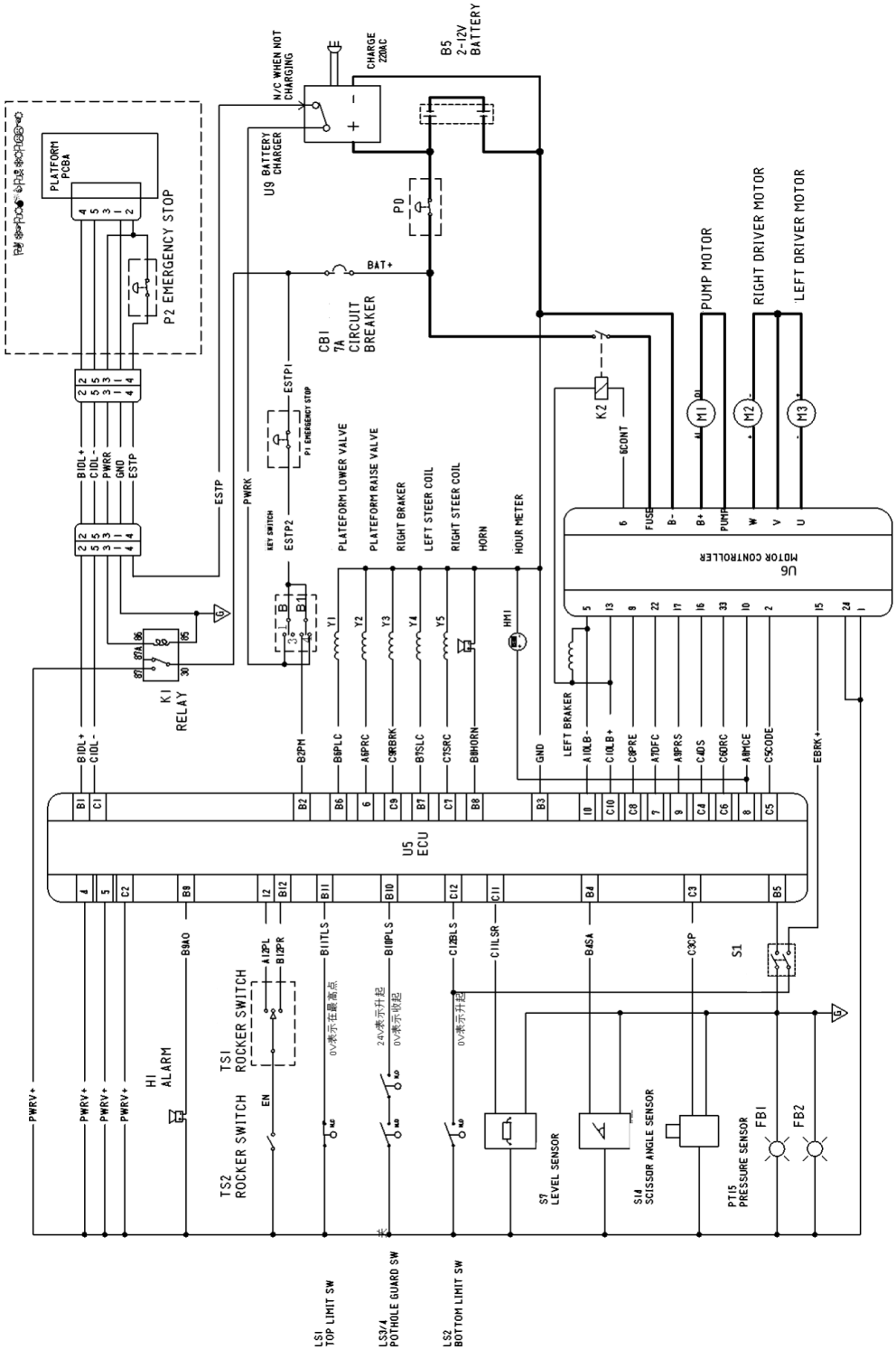
14. Fill the tank with hydraulic oil until the fluid is at Max. Indicator, Do not over fill.

15. Activate the pump to fill the hydraulic system with oil and bleed the system of air.

Component damage

Component damage hazard. The pump can be damaged if operated without oil. Be careful not to empty the hydraulic tank while in the process of filling the hydraulic system. Do not allow the pump to cavitate.

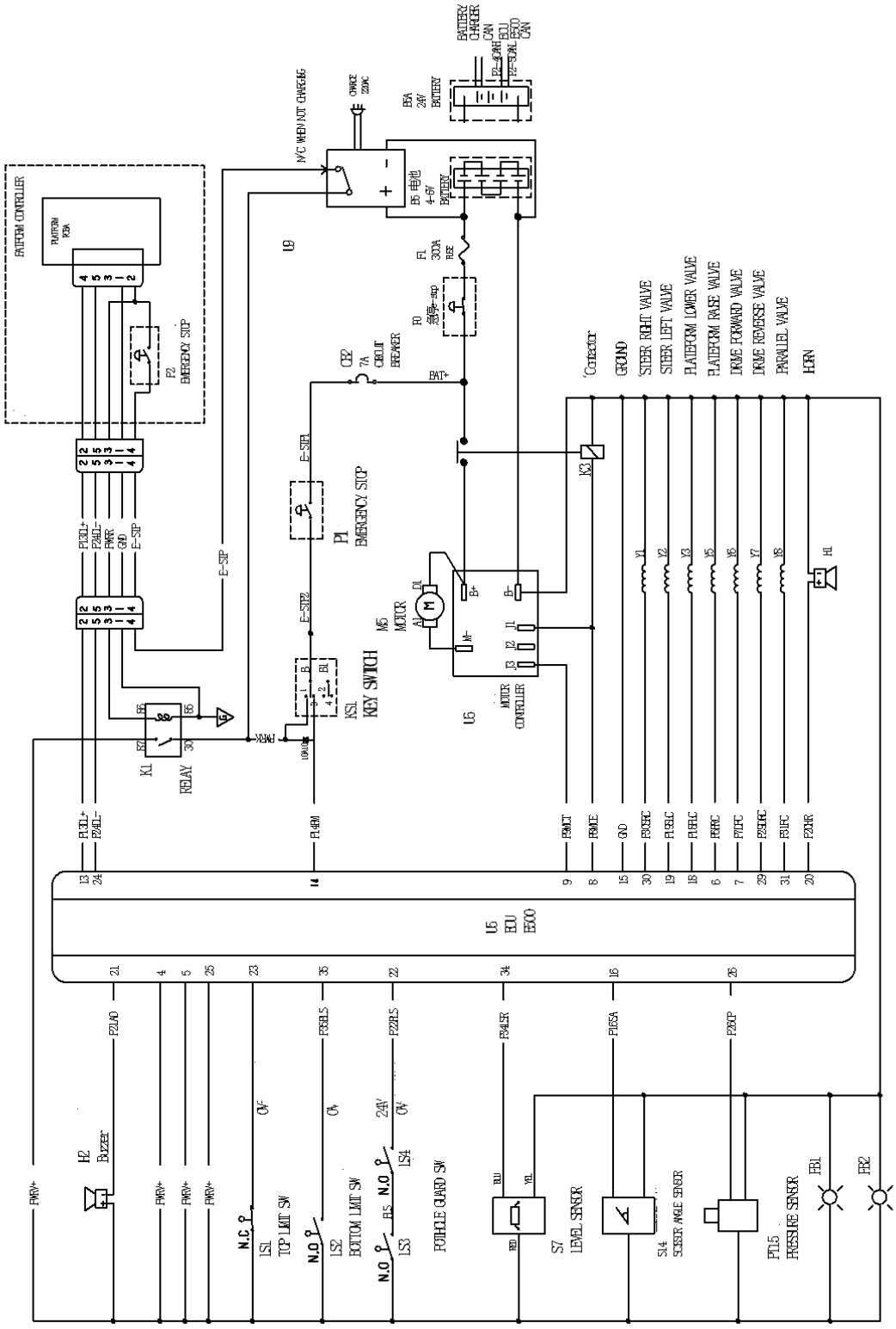
Electrical Schematic Diagram



ES40E

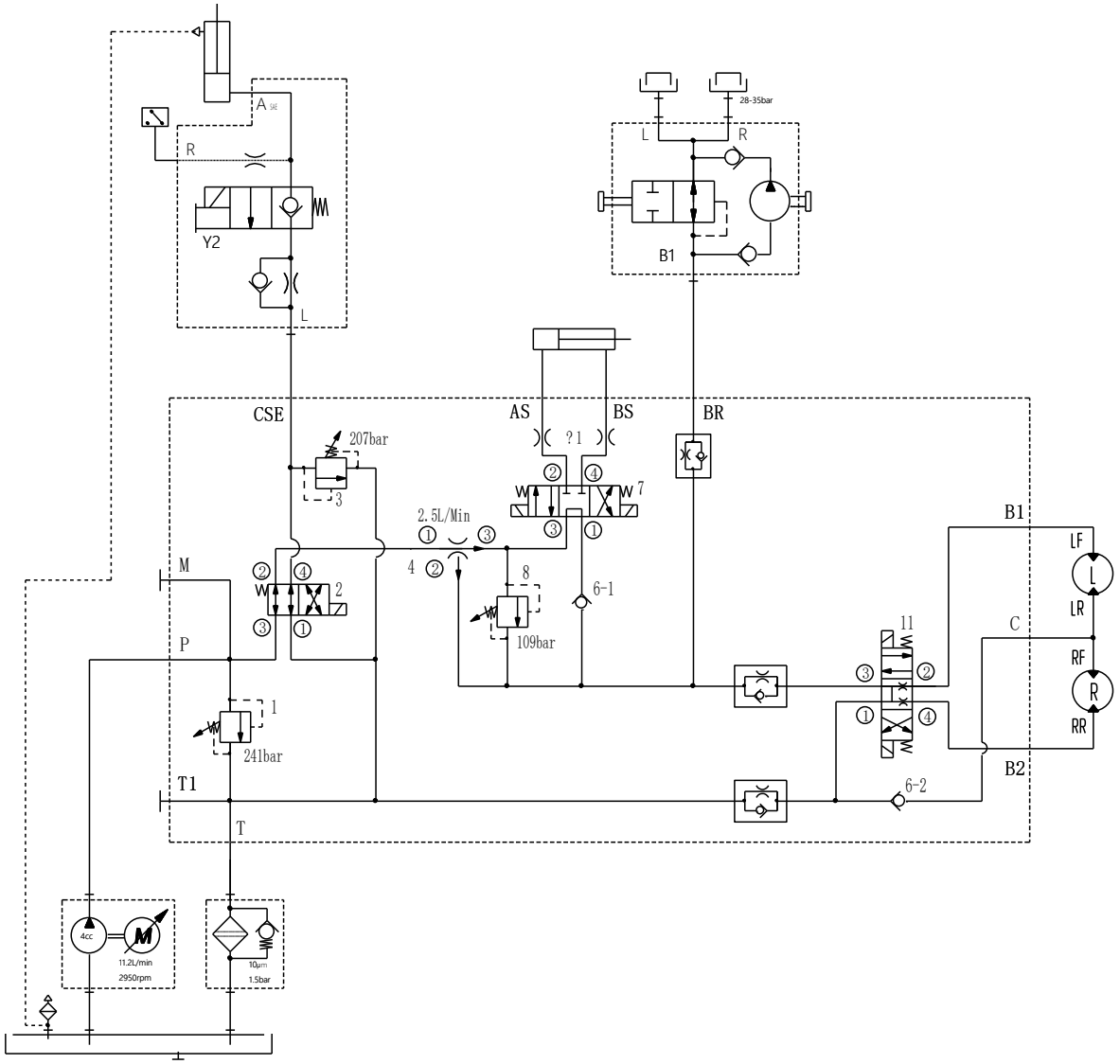
Electrical Schematic Diagram

ES60E,ES80E,ES100E,ES120E



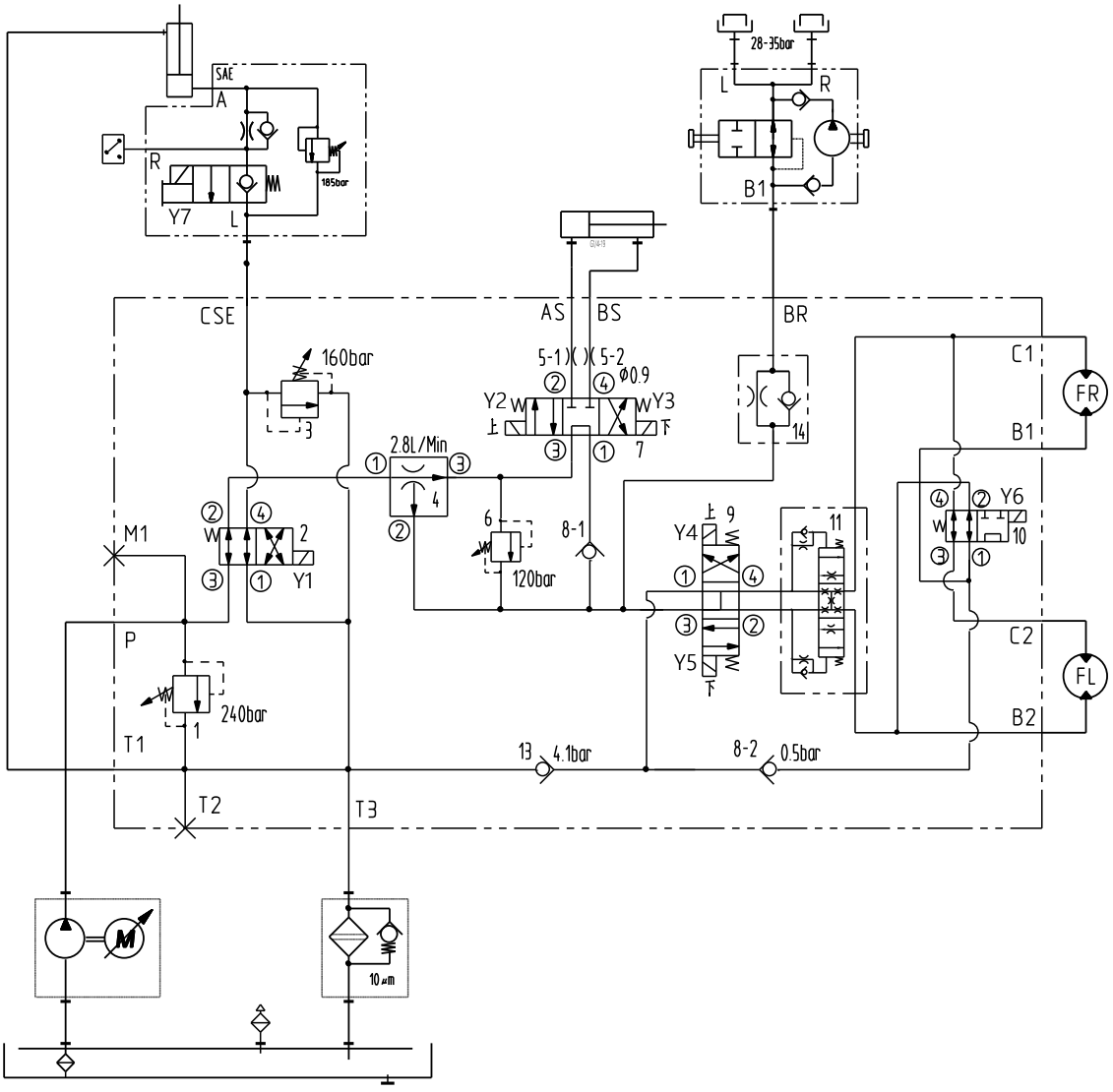
Hydraulic Schematic Diagram

ES60E

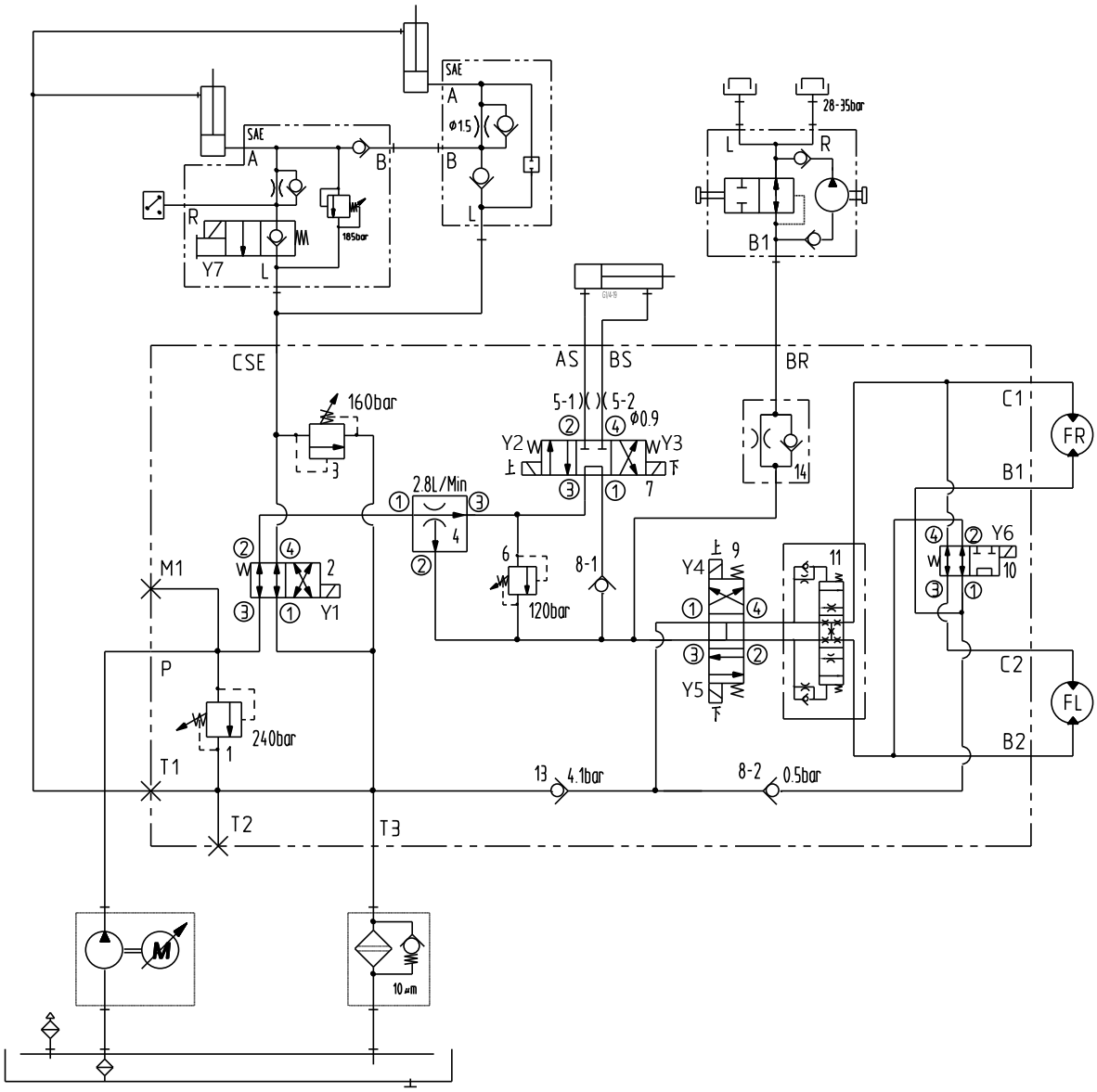


Hydraulic Schematic Diagram

ES80E



ES100E/ES120E



Hydraulic Schematic Diagram

Maintenance Record

Date	Note