



Maintenance Manual

Scissors Mobile Elevating Work Platform

**S0607E II / S0608E II / S0808E II / S0812E II
S1012E II / S1212E II / S1413E II**



WARNING

Before operation and maintenance, the drivers and service personnel shall always read and thoroughly understand all information in this manual. Failure to do so may result in, fatal accidents or personal injury.

This manual must be kept with this machine at all times.

Scissors Mobile Elevating Work Platform Maintenance Manual

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Foreword

Thank you for choosing to use this Mobile Elevating Work Platform from LGMG. This machine is designed according to AS/NZS 1418.10:2011. The information specified in this manual is intended for the safe and proper operation of this machine for its' intended purpose.

For maximum performance and utilization of this machine, thoroughly read and understand all the information in this manual before starting, operating, or performing maintenance on this machine.

Due to continuous product improvements, LGMG reserves the right to make specification changes without any prior notifications. For any updated information, contact LGMG.

Ensure all preventive maintenance to the machine is performed according to the interval specified in the maintenance schedule.

Keep this manual with this machine for reference at all times. When the ownership of this machine is transferred, this manual shall be transferred with this machine. This manual must be replaced immediately if it is lost, damaged, or becomes illegible.

This manual is copyrighted material. The reproduction or copy of this manual is not allowed without the written approval of LGMG.

The information, technical specifications and drawings in this manual are the latest available when this manual is issued. Due to continuous improvement, LGMG reserves the right to change the technical specifications and machine design without notice. If any specifications and information in the manual are not consistent with your machine, please contact the service department of LGMG.

WARNING

Only personnel who have been properly trained and qualified to operate or maintain this machine can operate, repair and maintain this machine.

Improper operation, maintenance, and repair are dangerous and can cause personal injury and death.

Before any operation or maintenance, the operator shall thoroughly read this manual. Do not operate, perform any maintenance or make any repairs on this machine before reading and understanding this manual.

The user shall load the platform strictly according to the load rating of the platform. Do not overload the platform or make any modifications to the platform without permission from LGMG.

The operation regulations and preventions in this manual are only applicable for the specified use of this machine.

Safety Precautions

The operator of this machine shall understand and follow the existing safety regulations of state and local governments. If these are unavailable, the safety instructions in this manual shall be followed.

To help prevent accidents, read and understand all warnings and precautions in this manual before operation or performing maintenance.

It is impossible to foresee every possible hazard and the safety instructions in this manual may not cover all safety prevention measures. Always ensure the safety of all personnel and protect the machine against any damage. If unable to confirm the safety of some operations, contact LGMG.

The operation & maintenance prevention measures listed in this manual are only applicable to the specified uses of this machine. LGMG assumes no responsibility if this machine is used beyond the range of this manual. The user and the operator shall be responsible for the safety of such operations.

Do not perform any operation forbidden in this manual in any situation.

The following signal words are applicable for identifying the level of safety information in this manual.



An imminent situation, that if not avoided, will result in severe injuries or death. This is also applicable to situations that will cause serious machine damage, if not avoided.



A potentially dangerous situation, that if not avoided, may result in severe injuries or death. This is also applicable to situations that may cause serious machine damage, if not avoided.



A situation, that if not avoided, may result in minor or intermediate injury. This is also applicable to situations that may cause machine damage or shorten machine service life.

Contents

Chapter 1 Maintenance	1
1.1 Battery Inspection.....	1
1.2 Battery Maintenance Schedule	1
1.3 Hydraulic Oil Level.....	1
1.4 Pre-Delivery Preparation Report.....	2
1.5 Maintenance Schedule	2
1.6 Maintenance and Inspection Report	2
1.6.1 General Information	2
1.6.2 Description.....	3
1.7 Pre-Delivery Preparation Report.....	3
1.7.1 General Information	3
1.7.2 Description.....	3
1.8 Checklist A	4
1.8.1 A-1 Inspection of Manual and Decals.....	4
1.8.2 A-2 Pre-Operation Inspection.....	4
1.8.3 A-3 Function Test.....	4
1.8.4 A-4 30-Day Maintenance	4
1.9 Checklist B	5
1.9.1 B-1 Battery Inspection.....	5
1.9.2 B-2 Wiring Inspection	6
1.9.3 B-3 Inspection of Electrical Contactor	8
1.9.4 B-4 Inspection of Tire and Wheel	8
1.9.5 B-5 Testing the Emergency Stop Switches	9
1.9.6 B-6 Testing the Key Switch	9
1.9.7 B-7 Testing the Horn.....	10



1.9.8 B-8 Testing the Driving and Braking Functions.....	10
1.9.9 B-9 Testing Drive Speed from the Platform Stowed Position.....	10
1.9.10 B-10 Testing Drive Speed from the Platform Elevated Position.....	11
1.9.11 B-11 Low Speed Drive Test	12
1.9.12 B-12 Visual Inspection of the Hydraulic Oil.....	12
1.9.13 B-13 Hydraulic Oil Tank Ventilation Inspection.....	13
1.9.14 B-14 Inspection of the Chassis Tray Locking Mechanism.....	13
1.9.15 B-15 Inspection of the Down Limit and Pothole Limit Switches.....	13
1.9.16 B-16 Inspection of the Upper Limit Switch	16
1.9.17 B-17 Inspection of Steering Knuckle	17
1.9.18 B-18 Check and Replacement of Electric Brush (If Equipped).....	18
1.10 Checklist C	19
1.10.1 C-1 Testing the Platform Overload System (If Equipped)	19
1.10.2 C-2 Replacement of the Hydraulic Tank Breather Cap.....	21
1.11 Checklist D	21
1.11.1 D-1 Inspection of the Scissor Arm Slide Blocks.....	21
1.11.2 D-2 Replacement of Oil Return Filter in the Hydraulic Tank	22
1.12 Checklist E	23
1.12.1 E-1 Test and replacement of Hydraulic Oil	23
Chapter 2 Maintenance Schedules	25
2.1 Battery Maintenance Schedule	25
2.2 Maintenance Schedule	26
2.2.1 Routine Inspection and Maintenance Intervals	26
2.2.2 Hydraulic Oil Selection and Specifications	29
Chapter 3 Error Codes and Troubleshooting.....	31
3.1 Error Codes.....	31
3.2 Troubleshooting Guide	33

Chapter 4 Control System.....	37
4.1. ECU Introduction	37
4.2. ECU Parameter Setting	37
4.2.1 Parameter Adjustment	37
4.2.2 Function Configuration	40
4.2.3 Calibration Function	41
4.2.4 Historical fault information	44
4.2.5 About this Unit.....	44
4.2.6 Status Monitoring	45
4.3 Introduction to Thermal Management Strategy of Lithium-Ion Battery.....	46
4.3.1 Introduction	46
4.3.2 Thermal Management Strategy	46
Chapter 5 Schematics	49

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Chapter 1 Maintenance



Observe and Obey:

Only qualified technicians shall perform maintenance on components specified in this manual.

Regular maintenance and inspection shall only be made by trained maintenance technicians as per the requirements of LGMG.

1.1 Battery Inspection

Maintaining the battery in good condition is essential to performance and safe operation of this machine. Improper electrolyte level or damaged cables or wiring may cause component damage or a hazardous condition.



Electrocution Hazard

Take measures to prevent electric shock due to touching the battery terminals or connectors. When working on the batteries or electrical circuits, remove all jewelry and metallic objects.



Personal Injury Hazard

Battery electrolyte is corrosive. Do not expose hands or body parts to overflowed or spilled electrolyte, due to risk of personal injury. Neutralize the overflowed or spilled electrolyte with the sodium bicarbonate solution.

1.2 Battery Maintenance Schedule

Refer to the Maintenance Schedule for the maintenance plan of the batteries.

1.3 Hydraulic Oil Level

Maintaining proper hydraulic oil level is essential to efficient and reliable machine operation. If the proper hydraulic oil level is not maintained, hydraulic components may be damaged and/or cease functioning. Changes in hydraulic oil level can be determined by the inspector when performing the daily inspection. Changes in the hydraulic oil level may indicate a leak or other problem in the hydraulic system.



To fill the hydraulic oil, it is a requirement to use the proper hydraulic oil in accordance with the work site

environment and ambient temperature with reference to the following:

Grade	Brand
Rando MV32	Chevron



CAUTION: Do not top off with

incompatible hydraulic fluids. Hydraulic fluids may be incompatible due to the differences in base additive chemistry. When incompatible fluids are mixed, insoluble materials may form and deposit in the hydraulic system, plugging hydraulic lines, filters, control valves and may result in component damage.

1.4 Pre-Delivery Preparation Report

- 1) The pre-delivery preparation report shall cover the inspection items of each type.
- 2) The pre-delivery preparation report shall be prepared for each inspection. Such report shall be saved as required after being completed.

1.5 Maintenance Schedule

The daily, quarterly, semi-annual, annual and once-per-two-year maintenance must be done as per the schedule. The product maintenance program and the pre-delivery preparation report can be divided into A, B, C, D, E and F sub items. The steps of each inspection are as shown in the table below.

Table 1 Inspection Checklists

Inspection Cycle	Inspection item
Every day or every 2 hours	A
Every month or every 25 hours	A+B
Every season or every 50 hours	A+B+C
Each half a year or every 100 hours	A+B+C+D
Each year or every 200 hours	A+B+C+D+E
Every two years or every 400 hours	A+B+C+D+E+F

Table 2 Inspection Report

Legend description			
Y=Yes, completed			
N=No, un-completed			
R=Repaired			
Evaluation			
Pre-delivery preparation	Y	N	R
Operation inspection completed			
Maintenance item completed			
Function test completed			
Model			
Serial number			
Date			
Owner			
Inspector (printed)			
Signature of inspector			
Title of inspector			
Inspection company			

1.6 Maintenance and Inspection Report

1.6.1 General Information

- 1) The maintenance and inspection report shall cover each type of inspection item.
- 2) The maintenance and inspection report shall

be prepared for each inspection.

- 3) Keep the report for at least 4 years after inspection or as specified by local government laws and regulations.

1.6.2 Description

- One report is applicable for each inspection.
- Choose the appropriate checklist according to the items to be checked.
- Place a check mark on the corresponding box on the inspection form after each item is inspected.
- Learn how to make step-by-step inspections.
- If the item's inspection results in an "N" result, tag out the machine's controls until it is repaired and checked again. Mark an "R" in the appropriate box on the inspection form after the repair has been made;
 - ① Before delivery.
 - ② Completion of operation check.
 - ③ Project maintenance completion.
 - ④ Functional test completion.

1.7 Pre-Delivery Preparation Report

1.7.1 General Information

- 1) The distributor shall be responsible for Pre-Delivery Preparation.
- 2) Priority shall be given to pre-delivery preparation for each individual product delivery. The purpose of this inspection is to find any problems with the equipment prior to

use.

- 3) Using damaged or modified equipment is strictly forbidden. If any damage or inconformity is found during equipment delivery, tag out the machine controls at once and do not use the machine until it is repaired.
- 4) The machine must be repaired by an authorized technician per the specification of the manufacturer and the requirements of this manual.

1.7.2 Description

- 1) Thoroughly read, understand, and adhere to the instructions in the Operation Manual with this machine.
- 2) The pre-delivery preparation composed of the operation check, maintenance item and function test.
- 3) Record the result with a table. Complete each completed item in corresponding table according to the description in the operation manual. Refer to Table 2 – Inspection Report.
- 4) If any inspection results in an "N" (No, Uncompleted) rating, stop using the machine immediately. Repair and check the equipment again. Mark the item "R" (Repaired) after the item has passed inspection.

1.8 Checklist A

1.8.1 A-1 Inspection of Manual and Decals

Each machine is supplied with an Operation Manual in the manual storage box on the platform. An illegible, damaged, or missing manual must be replaced immediately.

Keep all decals and signs clean and in good condition. The decals can inform the operator of potential operational hazards of the machine. The decals also provide operation and maintenance information to the operator.

- 1) Ensure the operation and maintenance manual is kept in the manual box in the platform.
- 2) Check the legibility or any damaged or missing pages. Make sure the model of the manual is matched with the model of the machine.
- 3) If the manual is missing, not matched with the model of the machine, or is illegible or damaged, cease using the machine until the manual is replaced.
- 4) Refer to the decal diagram and check if each decal is illegible or damaged. All labels should be legible and undamaged. If any decals are missing, illegible, or damaged, stop using the machine until any missing or damaged decals have been replaced.
- 5) Make sure the Operation Manual is always returned to the manual storage box in the platform after each use.
- 6) Contact LGMG for manual or decal

replacements.

1.8.2 A-2 Pre-Operation Inspection

The pre-operation inspection is essential to ensure the proper operation of the machine. The pre-operation inspection is made in the form of visual inspection before machine operation. This inspection is used for discovering significant problems before the function test and for determining if routine maintenance is necessary. For all inspection procedures, please refer to “Pre-Operation Inspection” in this manual.

1.8.3 A-3 Function Test

The function test is essential for the proper operation of machine. The function test is used to discover any functional defects the machine may have prior to operation. A machine with any operating defects cannot be put into service. If any functional defects are found, please tag out the machine controls immediately and discontinue operation.

For all inspection procedures, please refer to Function Test in this manual.

1.8.4 A-4 30-Day Maintenance

The 30-day maintenance check is made after the first 30 days or the first 25 hours of machine operation. After this step, continue to check the maintenance items on the check list.

Maintenance items on the list are:

- 1) B-3 Inspection of tire and Wheel.

1.9 Checklist B

1.9.1 B-1 Battery Inspection

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

Keeping the batteries in good condition is essential to machine performance and proper operation. Incorrect electrolyte level or damaged cables or connectors may cause the machine damage and hazardous working conditions.



Electrocution Hazard

Coming in contact with live electricity during operation may cause severe personal injury or death. Take off all jewelry and metallic objects while operating the machine.



Personal Injury Hazard

Battery electrolyte is corrosive. Do not expose hands or any body parts to electrolyte to prevent injury. Neutralize any overflowed electrolyte with a sodium bicarbonate solution.

- 1) When working on or around the batteries, wear protective clothing and safety goggles
- 2) Release the battery tray lock on the chassis side and rotate the chassis battery tray outward.

- 3) Ensure the battery cables, connectors, and battery terminals are firmly attached.
- 4) Protect the battery cable connector against corrosion. Add a wiring end protector and coat the battery terminals with an anti-corrosion product to protect the battery connector cables and terminals against corrosion.
- 5) Fully charge the batteries and maintain the charge for at least 24 hours.



Steps 6 thru 12 do not apply to sealed or maintenance free batteries.

- 6) Open the battery cell cover(s), check the specific weight with a specific gravity hydrometer and record the value.
- 7) Check ambient temperature and adjust the specific liquid gravity of each battery according to the instructions in the following steps.

Increase the specific liquid gravity by 0.004 per 5°C, if the temperature is higher than 27°C.

Decrease the specific liquid gravity by 0.004 per 5°C, if the temperature is lower than 27°C.

Result: The specific liquid gravity of each battery is greater than 1.277 after the adjustment. Fully charge the battery and turn to Step 11.

Result: If the specific liquid gravity of each

battery is lower than 1.250, turn to Step 8.

- 8) Charge the battery in a balanced way or fully charge the battery and maintain the charge for at least 6 hours (preferably 24 hours).
- 9) Open the battery cell cover(s), check the specific weight with a specific gravity hydrometer and record the value.
- 10) Check ambient temperature and adjust the specific liquid gravity of each battery according to the instructions in the following steps.

Increase the specific liquid gravity by 0.004 per 5°C, if the temperature is higher than 27°C.

Decrease the specific liquid gravity by 0.004 per 5°C, if the temperature is lower than 27°C.

Result: the specific liquid gravity of each battery is greater than 1.277 after the adjustment. Fully charge the battery and turn to Step 11.

Result: the specific liquid gravity difference between the battery cells is greater than 0.1 or the specific liquid gravity of more than one battery cell is less than 1.217. In such case, please replace the battery.

- 11) Check the battery acid level. If needed, replenish with distilled water to 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.



The following checks are suitable for batteries of any type.

- 13) Ensure the battery cells in each battery pack are correctly connected.
- 14) Check for excessive abrasion or damage to the battery charger plug and wire insulation. If the plug or wire are damaged, replace them immediately.
- 15) Connect the battery charger to a 100-240V, 50/60HZ AC power supply.

Result: the charger is running and charging the battery.

Result: The charger alarm sounds and the indicator flashes. Please check and correct the connection of charger.

Ensure the charger is operating properly and charge the battery.



For best results, ensure the total length of the charger cord is less than 50 ft. (15m).

For more information on charger operation, please contact the after-sales service department of LGMG.

1.9.2 B-2 Wiring Inspection

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

Keeping the wiring in good condition is essential to proper operation and machine performance. If any wiring is found to be burnt, damaged,

corroded or bent is found, it must be repaired or replaced immediately. If the machine is operated with damaged wiring, the machine may be damaged.



Electrocution/Explosion Danger

Contact with electrical components may cause serious injury or death. Take off all jewelry and metallic objects while performing inspection or maintenance of electrical components.

- 1) Check to see if the ground wire below the chassis is missing or damaged.
- 2) Check if there is any burnt, damaged, corroded, bent or loose wiring in the areas below:
 - ① Inside the ground controller box
 - ② Wiring of hydraulic control valves
 - ③ Wiring in the battery area of the battery tray
 - ④ Inside the platform controller box
- 3) Position the key switch to the platform controller and pull out the emergency stop switches on the ground and platform controllers.
- 4) Elevate the platform to the height given in the following table:

Table 3 - Safety Prop Deployment Height

Model	Height
S0607E II	2.4m
S0808E II	3.2m
S0812E II	
S1012E II	
S1212E II	4m
S1413E II	

- 5) Lift the safety arm, move it to the center of the scissor cross tube and rotate it upward until it is vertical.
- 6) Slowly lower the platform until the safety arm completely contacts the scissor cross tube.



Crushing Hazard

Be sure to put your hand on correct position of the safety arm when lowering the platform.

- 7) Check for any burnt, damaged, corroded, bent, or loose wiring in chassis and scissor area.
- 8) Check if there is any burnt, damaged, corroded, bent, or loose wiring in the areas below:
 - Wiring running through the scissor arms
 - ECU to the platform
 - Harness connector on the platform
- 9) Check the dielectric grease on the positions below:

- Harness connector connected between ECU and platform controller
- All harness connectors connected to the level sensor

- 10) Raise the platform and return the safety arm to the stowed position.
- 11) Lower the platform to the stowed position and shut down the machine.

1.9.3 B-3 Inspection of Electrical Contactor

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

Keeping the electrical contactor in good condition is essential to proper operation and machine performance. Failure to locate a worn or damaged contactor could result in an unsafe working condition and component damage.

- 1) At the ground controls, turn the key switch to the off position.
- 2) Push in the red emergency stop switch at the ground controls to the off position.
- 3) Press the DC power switch to disconnect the Power of whole machine.
- 4) Open the battery tray and find the electrical contactor.
- 5) Visually inspect the contact points of the contactor for the following items:
 - Excessive burns
 - Excessive arcs
 - Excessive pitting
- 6) If damaged, replace it.



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

1.9.4 B-4 Inspection of Tire and Wheel

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

Keeping the tire and wheel in good conditions is essential to proper operation and good performance. The failure of tire and wheel could potentially cause the machine to tip over causing damage to the machine and personal injury. If defective tires and wheels are found, they must be replaced immediately.

- 1) Check if the tread and sides of the tire show any damage, cracks, holes or other abnormal wear.
- 2) Check if the rim is damaged, bent, or cracked.
- 3) Remove the cotter pin and check the wheel nut torque on each wheel lug. Torque should be 410-540N on hydraulic drive machines, and 90N on electric drive machines.



A new cotter pin must be used when reinstalling the tire and wheel.

- 4) Install and secure a new cotter pin.
- 5) Lubricate the steering spindles.

1.9.5 B-5 Testing the Emergency Stop Switches



The emergency stop button of the ground controller can stop all operations of the machine, even if the key switch is switched to the platform controller.

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) The normal emergency stop function is essential for the proper operation of the machine. If it does not cut off the power supply and stop all functions of the machine a hazardous working condition can be the result.
- 2) Besides the emergency stop button on the platform, the selection and operation of the ground controller shall be a priority to those of the platform controller.
- 3) Turn the key switch to the ground controller position and pull out the emergency stop switch on both the ground and platform controllers.
- 4) Press the emergency stop button on the ground controller to the OFF position. Result: No action is enabled by the machine.
- 5) Press the emergency stop button on the platform controller to the OFF position. Result: No action is enabled by the machine.

1.9.6 B-6 Testing the Key Switch

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) The correct action and response of the key switch is essential to the proper operation of the machine. The machine can be operated via the ground controller or the platform controller. The key switch is used for switching between the two controllers. A failed switch may cause the dangerous or improper operation.



No personnel shall occupy the platform while the following steps are carried out from the ground using the platform controller.

- 2) Pull out the emergency stop switches from the ground and platform controllers.
- 3) Turn the key switch to the platform controller position.
- 4) Check the lifting and lowering functions from the ground controller. Result: No action is enabled by the machine.
- 5) Turn the key switch to the ground controller position.
- 6) Check the lifting and lowering functions from the platform controller. Result: No action is enabled by the machine.
- 7) Turn the key switch to the OFF position. Result: No action is enabled by the machine.

1.9.7 B-7 Testing the Horn

These check items shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) The horn is used for giving a warning to personnel on the ground by the operator in the platform. If the horn is not functioning properly, the operator would be unable to alert ground personnel of any hazards or unsafe conditions.
- 2) Switch the key switch to the platform controller position and pull out the emergency stop switch on both the ground and platform controllers.
- 3) Press the horn button on the platform controller. Result: The horn should sound.

1.9.8 B-8 Testing the Driving and Braking Functions

These check items shall be made once every 25 hours of operation or every month, whichever interval is shorter.



The brake must be capable of stopping and holding the machine within the allowable gradeability range of the machine. If it does not, replace the brake and repeat the test process the beginning.

- 1) Normal braking and brake release function is essential to proper operation. The brake must be stable and free of delay, vibration, and

abnormal sounds.

- 2) Ensure the machine is stowed and the extending platform is completely retracted. Complete the braking function inspection on solid and level ground without any barriers.
- 3) Make a reference test line on the ground.
- 4) Turn the key switch to the platform controller position and pull out the emergency stop switches on both the ground and platform controllers.
- 5) Press the drive function button.
- 6) Select one point (such as the contact patch of a tire) from the machine as the visual inspection reference of the test line.
- 7) Drive the machine at the maximum speed and release the handle at the moment when the reference point passes the ground test line.
- 8) Measure the distance between the reference point and the test line. Result: The machine has stopped within the specified braking distance. No action is required. Result: The machine has not stopped within the specified braking distance. Repair or replace the brake and repeat the testing process beginning at Step 1.

1.9.9 B-9 Testing Drive Speed from the Platform Stowed Position

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) The normal driving function is essential for

proper operation of the machine. The drive function should respond quickly and smoothly to operator control. No delay, vibration and abnormal sound should occur during the normal operation and driving function.

- 2) Complete the driving test on firm and level ground without any barriers.
- 3) Draw two lines, spaced by 10m on the ground, as the starting line and the finishing line.
- 4) Turn the key switch to the platform controller position and pull out the emergency stop switches from both the ground and platform controllers.
- 5) Lower the platform to the stowed position.
- 6) Press the drive function selector button.
- 7) Select one point on the machine as the visual inspection reference point for both the starting line and the finishing line.
- 8) Drive the machine at maximum speed and start to count when the reference point passes the starting line.
- 9) Keep driving at the full speed and record the time when the reference point passes the finishing line. Refer to the specification.

1.9.10 B-10 Testing Drive Speed from the Platform Elevated Position

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) The normal driving function is essential for

proper operation of the machine. The operator should experience a rapid and stable response. No delay, vibration and abnormal sound should occur during the normal operation and driving function.

- 2) Complete the driving test on firm and level ground without any barriers.
- 3) Draw two lines, spaced by 10m on the ground, as the starting line and the finishing line.
- 4) Turn the key switch to the platform controller position and pull out the emergency stop switches from both the ground and platform controls.
- 5) Press the lifting function selector button.
- 6) Press and hold the enable switch on the control handle.
- 7) Lift the platform for a given height above the ground as shown in the following table.

Table 4 - Lifting Height for Drive Test

Model	Height
S0607E II	1.21m
S0808E II	1.31m
S0812E II	1.32m
S1012E II	1.81m
S1212E II	1.94m
S1413E II	2m

- 8) Press the drive function selector button.
- 9) Select one point (such as the contact patch of a tire) on the machine as the visual inspection reference for the starting line and the finishing line.

- 10) Drive the machine at maximum speed and start to count when the reference point passes the starting line.
- 11) Keep driving at the full speed and record the time when the reference point passes the finishing line. Refer to the specification.

1.9.11 B-11 Low Speed Drive Test

This check shall be made once per 25h or per month, whichever interval is shorter.

1. Normal drive function is essential to the proper operation and usage of the machine. With the drive function, a rapid and stable response shall be given to the operator. No delay, vibration and abnormal sound shall occur during normal operation and drive process.
2. Complete the driving test on a solid and level ground without any barriers.
3. Draw two lines 10m apart, as the starting line and the ending line on the ground.
4. Switch the key switch to the platform controller position and pull out the red emergency stop buttons from the ground and platform controllers.
5. Lower the platform to the stowed position.
6. Press the drive speed selector button.
7. Select one point (such as the contact patch of a tire) from the machine as the visual inspection reference for the starting line and the ending line.
8. Drive the machine at maximum speed and

start to count when the reference point passes the starting line.

9. Keep driving at the full speed and record the time when the reference point passes the finishing line. Refer to the specification.

1.9.12 B-12 Visual Inspection of the Hydraulic Oil

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

Collect a sample of hydraulic oil and place in a clear container. Visually inspect the hydraulic oil for the following:

- 1) Color: Oil should be a clear, light-honey colored.
- 2) Appearance: Oil should be clear and not cloudy or visibly distorts the view through the sight glass or container.
- 3) Contains no particles, foreign objects, or other contamination.
- 4) The hydraulic oil can be inspected by smell (can smell "hot" but not "burnt") or rubbing between fingers (should feel viscous and free of any rough feel due to particles) If the hydraulic oil passes all of the above inspections, continue the scheduled maintenance intervals. If the hydraulic oil fails any of the above inspections, the hydraulic oil must be tested by an oil distributor or replaced.

Note: If the hydraulic oil has not been replaced for two years, the oil must be tested every quarter by an oil distributor until the oil fails the test and is replaced. After the oil has been replaced, continue the scheduled monthly maintenance inspection.

Note: When replacing the hydraulic oil, it is recommended that all hydraulic filters be replaced at the same time.

For test and replacement of hydraulic oil, please refer to E-1.

1.9.13 B-13 Hydraulic Oil Tank Ventilation Inspection

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) The well-ventilated hydraulic oil tank cover is essential to maintain components in good condition and service life of the hydraulic oil. A dirty or blocked exhaust cover may degrade machine performance. Even more frequent inspection is required when operating in a harsh or hostile work environment.
- 2) Remove the exhaust cover from the hydraulic oil tank cover.
- 3) Check ventilation. Result: The air can pass through the exhaust cover. Result: If the air is unable to pass through the exhaust cover, clean or replace the exhaust cover immediately. Continue with Step 4



Air shall freely pass through the oil tank cover when checking the ventilation.

- 4) Carefully wash the oil tank exhaust cover with mild solvent and dry it with low-pressure

compressed air. Check for proper ventilation again.

- 5) Install the exhaust cover onto the hydraulic oil tank

1.9.14 B-14 Inspection of the Chassis Tray Locking Mechanism

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) The condition of chassis tray locking mechanism is essential to equipment performance and service life. If the tray unexpectedly opened, a hazardous condition can occur. Check each chassis tray locking mechanism for damage or loose parts.

1.9.15 B-15 Inspection of the Down Limit and Pothole Limit Switches

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) Good condition of the limit switches is essential for proper machine operation and performance. The operation of the machine with a defective limit switch will degrade the machine performance and cause a potential unsafe working environment.
- 2) Perform this inspection on solid and level ground without any barriers.

Down Limit Switch

- 1) Remove the platform controller to operate from the ground.
- 2) Lift the platform a predetermined height

above the ground. The lifting height of every model is given in the following table.

Table 5 - Safety Prop Deployment Height

Model	Height
S0607E II	2.4m
S0808E II	3.2m
S0812E II	
S1012E II	
S1212E II	4m
S1413E II	

- 3) Lift the safety arm, move it to the center of the scissor cross tube and rotate it upward until it is vertical.
- 4) Carefully lower the platform height until the safety arm completely contacts the cross tube.
- 5) Turn the key switch to the OFF position.
- 6) Tag and disconnect the platform control box from the platform control harness.
- 7) Tag and disconnect the platform control harness from the main harness.
- 8) Connect the platform control box and chassis main harness together with an adapter harness.
- 9) Open the down limit switch base cover and unplug the connector to the down limit switch.
- 10) Turn the key switch to the platform controller position.
- 11) Slightly raise the platform and return the safety prop to the stowed position.
- 12) From the ground, press the lifting function selector button on the platform controller and lower the platform until it is stowed. Result: The diagnosis screen displays Code 18, the alarm sounds, and the lifting function response is normal. The function of machine is normal. Result: The diagnosis screen does not display Code 18, no alarm sounds, and the lifting function gives no response. In this instance, the limit switch must be replaced
- 13) Press the drive function selector button and try to run the machine. Result: The diagnosis screen displays Code 18, the alarm sounds, and the turning function and the driving function are disabled. The function of machine is normal. Result: The diagnosis screen does not display the code 18, no alarm sounds, and the turning and driving functions are enabled. In this instance, the limit switch shall be replaced.
- 14) Press the lifting function selector button to raise the platform by approximately 1ft (0.3m). Result: The diagnosis screen displays Code 18, the alarm sounds and the lifting function is enabled. The function of machine is normal. Result: The diagnosis screen dose not display Code 18 and no alarm sounds. In this instance, the limit switch must be replaced.
- 15) Raise the platform until the pothole guards are deployed. Result: The diagnosis screen



Be sure to handle the safety prop properly when lowering the platform.

does not display Code 18 and no alarm sounds. The function of machine is normal.
Result: The diagnosis screen displays Code 18 and the alarm sounds. In this instance, the limit switch must be replaced.

- 16) Lift the platform a predetermined height above the ground. The lifting height of every model is given in the following table.

Table 6 - Safety Prop Deployment Height

Model	Height
S0607E II	2.4m
S0808E II	3.2m
S0812E II	
S1012E II	
S1212E II	4m
S1413E II	

- 17) Lift the safety arm move it to the center of the scissor cross tube and rotate it upward until it is vertical.
- 18) Carefully lower the platform height until the safety arm completely contacts the cross tube.



WARNING

Crushing Hazard

- 19) Turn the key switch to the OFF position.
- 20) Disconnect the platform control box and chassis main harness and adapter harness.
- 21) Restore the connection between the platform control harness and the chassis main harness.

- 22) Securely install the platform control box into the platform control harness.
- 23) Properly reconnect the down limit switch connector.
- 24) Reinstall the down limit switch box.
- 25) Turn the key switch to the platform controller position.
- 26) Slightly raise the platform and return the safety prop to the stowed position.
- 27) Lower the platform to the stowed position.

Inclination Switch

- 1) Move the machine to the maximum allowable inclination angle of the level sensor. For the maximum allowable inclination angle, refer to the nameplate on the machine.
- 2) Press the lift button to lift the machine for a predetermined height on a slope. The lifting height of every model is given in the following table.

Table 7 - Activation Height for Tilt Alarm

Model	Height
S0607E II	1.1m
S0808E II	1m
S0812E II	1.3m
S1012E II	1.8m
S1212E II	1.9m
S1413E II	2m

Result: The diagnosis screen displays the code LL, the alarm sounds, the function of machine is normal.

Result: The diagnosis screen does not display the code LL, no alarm sounds, please check or

replace the inclination switch.

- 3) Press the drive function selector button and try to drive the machine on a slope. Result: The diagnosis screen displays Code LL, the alarm sounds, and the turning function and the driving function are disabled. The function of machine is normal. Result: the diagnosis screen dose not display the code LL, no alarm sounds, and the driving and turning function of machine are normal. Check or replace the inclination switch.

Pothole Limit Switch

- 1) Lower the platform to the stowed position and drive the machine to firm and level ground.
- 2) Place a wood block about 5cm high under the right pothole guard
- 3) Press the lifting button to lift the machine to a predetermined height. The lifting height of every model is given in the following table.

Model	Height
S0607E	2.18m
S0808E	4.9m
S0812E	3.3m
S1012E	3m
S1212E	3.66m
S1413E	3.22

Result: The pothole guard contacts the block and fails to be completely stretched. The diagnosis screen displays Code 18, alarm sounds and the machine will lift to a certain height. Machine function is normal. Result: The pothole guard contacts the block and fails to be completely deployed. The diagnosis screen does not display

Code 18, no alarm sounds, and the platform can still be elevated. In this instance, the pothole guard limit switch must be adjusted or replaced.

- 4) Press the drive function selector button and try to drive and steer the machine. Result: The diagnosis screen displays Code 18, the alarm sounds, and the steering and drive functions are disabled. The function of machine is normal. Result: The diagnosis screen does not display Code 18, no alarm sounds and drive and steering functions of machine are normal. In this instance, the pothole limit switch must be adjusted or replaced.
- 5) Lower the platform until it is stowed and remove the wood block under the right pothole guard.
- 6) Repeat Step 3-5 for the left pothole guard
- 7) Lower the platform until it is stowed and then remove the wood block under the left pothole guard.
- 8) Turn off the machine.

1.9.16 B-16 Inspection of the Upper Limit Switch

This check item shall be made once every 25 hours of operation or every month, whichever interval is shorter.

- 1) Good condition of the limit switches is essential for proper machine operation and performance. The operation of the machine with a defective limit switch will degrade the machine performance and cause a potential unsafe working environment.

- 2) Perform this inspection on solid and level ground without any barriers.
- 3) Turn the key switch to the ground controller position. Elevate the platform for a predetermined height above the ground as shown in the following table.

Table 8 - Safety Prop Deployment Height

Model	Height
S0607E II	2.4m
S0808E II	3.2m
S0812E II	
S1012E II	
S1212E II	4m
S1413E II	

- 4) Lift the safety arm, move it to the center of the scissor cross tube and rotate it upward until it is vertical.
- 5) Carefully lower the platform until the safety prop completely contacts the cross tube.



WARNING

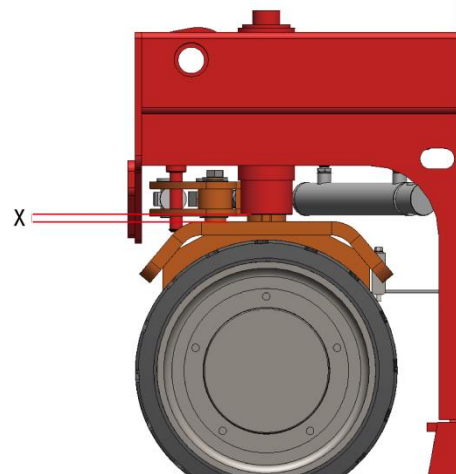
Crushing Hazard

- 6) Be sure to put your hand in the proper position on the safety prop when lowering the platform.
- 7) Open the limit switch base cover on the chassis.
- 8) Slightly raise the platform and restore the safety prop to the stowed position.
- 9) Using the ground controller, elevate the

platform while pressing the upper limit switch arm to initialize the upper limit switch. Result: The platform stops elevating and the function of machine is normal. Result: The platform continues to raise. Adjust or replace the upper limit switch.

1.9.17 B-17 Inspection of Steering Knuckle

- 1) This check item shall be made once per 25h or per month, whichever is shorter.
- 2) The condition of nylon gasket of steering system is vital for the safe operation of the machine. The use of worn nylon gasket may result in damage to component and unsafe work risk.
- 3) Please check the nylon gasket when the platform is folded.
- 4) Measure the distance between the chassis bushing and the upper cover plate of steering knuckle.



- a) Result:
If the measured result of S0607E II /S0808E II

/S0812E II /S1012E II /S1212E II /S1413E II is not greater than 9mm, replace the nylon gasket.

b) Result:

If the measured result of S0607E II /S0808E II /S0812E II /S1012E II /S1212E II /S1413E II is greater than 9mm, not replace the nylon gasket.

! NOTICE: Please contact LGMG for nylon gasket, if necessary.

1.9.18 B-18 Check and Replacement of Electric Brush (If Equipped)

! WARNING: Be careful when checking brushes; first disconnect battery.

Periodic Check

Check the motor at least once semiannually in the following method:

- 1) Conduct external check, keep the outer surface of the motor clean.
- 2) Open the protective cover and clean carbon deposit.
- 3) Check or replace the bearing, and during running, carefully listen whether or not there is any abnormal noise in the bearing.
- 4) Check the wear of the electric brush, and where appropriate, replace the electric brush.

Table 9 - Fault Analysis and Troubleshooting

Fault	Cause	Troubleshooting
Blackening of commutator, excessive wear of electric brush or large spark	Overload	Reduce loads and operating frequency
	Reduction in pressure caused by seize of electric brush or annealing of spring	Clean carbon deposit, check the cause and replace the spring.
	Inappropriate to electric brush	Replace as per the designation and size of the original electric brush for the motor.
	Serious carbon deposit in the motor	Clean carbon deposit

Replacement of Electric Brush

1. Remove the window cover plate
- 1) Unscrew the cover plate screw with the T-wrench, and take the cover plate down.



2. Remove the old electric brush.
 - 1) Unscrew the fastening screw from the tail of the electric brush with the Phillips screwdriver or the socket wrench.
 - 2) Pull the spring, take the old electric brush out of the brush box, and clean carbon dust accumulated on the brush box and the surface of the electric brush.



3. Install the new electric brush
 - 1) Put the new electric brush into the brush box, and hold down the electric brush with the spring.



- 2) Fix the tail to the wiring board of the brush box with the Phillips screwdriver or the T-wrench, and screw with the torque wrench.



4. Install the window cover plate
 - 1) Insert the cover plate into the card fastener of the window, screw the fastening screw (trimming washer and spring washer), and screw with the torque wrench.



NOTICE: Upon the installation of the electric brush, the motor should idle, for the purpose of the wear-in of the arc surface of the electric brush and increase in contact surface between the electric brush and the commutator.



NOTICE: Do not run the motor under overload and undervoltage, or else, heavy current is easy to cause due to underrun, resulting in wear of electric brush.

1.10 Checklist C

1.10.1 C-1 Testing the Platform Overload System (If Equipped)

This check item shall be made once every 50 hours of operation or every quarter, whichever interval is shorter. This test and recalibration of

the system must be performed immediately when overload failure occurs.

- 1) Testing the platform overload system regularly is essential to the proper operation of the machine. Continuous improper operation of the platform can cause failure of the overload system. Stability of machine will be affected and the possibility of it being tipped over will increase.
- 2) The platform overload system is used for preventing operation of the machine in cases of overload. The system is composed of two electric elements, an overload pressure switch, and an angle sensor.
- 3) The angle sensor in the scissor arm is used for measuring the inclination angle of the scissor and further determining the platform operating height.
- 4) Turn the key switch to the ground controller position. Elevate the platform for a predetermined height above the ground as shown in the following table.

Table 10 - Safety Prop Deployment Height

Model	Height
S0607E II	2.4m
S0808E II	3.2m
S0812E II	
S1012E II	
S1212E II	4m
S1413E II	

- 5) Lift the safety arm, move it to the center of

the scissor cross tube and rotate it upward until it is vertical.

- 6) Carefully lower the platform until the safety prop completely contacts the cross tube.



Crushing Hazard

- 7) Be sure to put your hand in the proper position on the safety prop when lowering the platform.
- 8) Open the limit switch base cover on the chassis.
- 9) Remove the limit switch cover.
- 10) Short circuit the upper limit switch with wires.
- 11) Turn the key switch to the ground controller position and pull out the emergency stop buttons on both the ground and platform controllers.
- 12) Slightly raise the platform and return the safety prop to the stowed position.
- 13) Raise the platform to the highest location and continue to press the lifting function selector button. Result: The alarm sounds. System function is normal. Result: No alarm sounds. Calibrate the platform overload system.
- 14) Lower the platform using the manual lowering knob until the platform is stowed.
- 15) Carefully remove the wires from the upper limit switch.
- 16) Raise the platform to the highest location and continue to press the lifting function selector

button. Result: No alarm sounds. System function is normal. Result: The sounds and the platform overload system is malfunctioning. Repair or replace the limit switch, its wiring, installation bracket, or calibrate the overload system.

- 17) Lower the platform to a given height above the ground. The height of every model is given in the following table.

Table 11 - Safety Prop Deployment Height

Model	Height
S0607E II	2.4m
S0808E II	3.2m
S0812E II	
S1012E II	
S1212E II	4m
S1413E II	

- 18) Lift the safety prop and move it to the center of the scissor cross tube and rotate it upward until it is vertical.
- 19) Carefully lower the platform height until the safety arm completely contacts the cross tube.



Crushing Hazard

Be sure to put your hand on the proper position of the safety prop when lowering the platform.

- 20) Restore the limit switch to its original state.
- 21) Slightly raise the platform and restore the

safety prop to the stowed position.

- 22) Lower the platform to the stowed position.

1.10.2 C-2 Replacement of the Hydraulic Tank Breather Cap

This check item shall be made once every 50 hours of operation or every quarter, whichever interval is shorter.

- 1) The hydraulic oil tank is a ventilated oil tank. An air filter is provided inside the breather cap, which can be blocked over time. If the breather cap is faulty or improperly installed, impurities can enter the hydraulic system which can cause component damage. More frequent inspection is required for hostile or dirty working environment.
- 2) Take off the Hydraulic Tank Breather Cap.
- 3) Replace a new breather cap.

1.11 Checklist D

1.11.1 D-1 Inspection of the Scissor Arm Slide Blocks

This check item shall be made once every 100 hours of operation or every six months, whichever interval is shorter.

- The condition of slide blocks on the scissor arm is essential for the proper operation of the machine. The use of worn slide blocks may result in component damage and unsafe work conditions.
 - Check the slide blocks when the platform is stowed.
- 1) Measure the distance between the inner arm

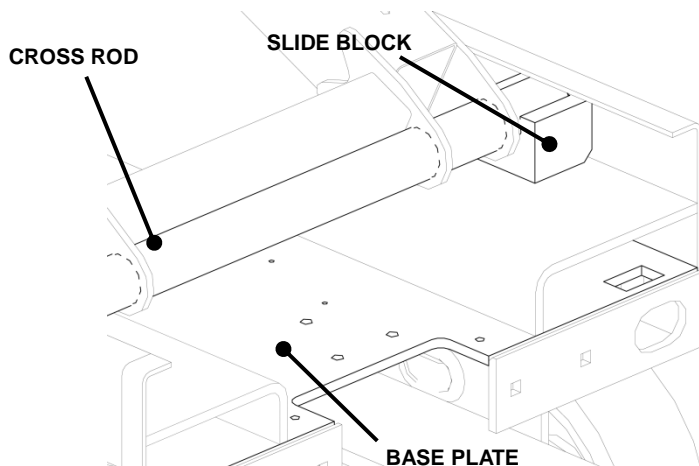
cross rod and the base plate on the battery side of the non-steer end of the machine.

Result:

- If the measured result of S0607E II is not less than 26.5mm, do Step 2.
- If the measured result of S0808E II / S0812E II / S1012E II / S1212E II is not less than 40mm, do step 2.
- If the measured result of S1413E II is not less than 55mm, do Step 2.

Result:

- If the measured result of S0607E II is less than 26.5mm, replace the slide block.
- If the measured result of S0808E II / S0812E II / S1012E II / S1212E II is less than 40mm, replace the slide block.
- If the measured result of S1413E II is less than 55mm, replace the slide block.



- 2) Apply lubricant between the chassis sliding rail and the slide block.

1.11.2 D-2 Replacement of Oil Return Filter in the Hydraulic Tank

This check item shall be made once every 100 hours of operation or every six months, whichever interval is shorter.



Replacement of the oil return filter is essential to proper performance and service life of the machine. A dirty or blocked filter will affect machine performance and continued use with a dirty filter will cause component damage. The filter must be frequently replaced in hostile or dirty working environments.



Scalding Hazard

Be aware of hot hydraulic oil. Exposure to hot oil may cause severe burns.



The oil return filter is installed at the center of the machine between the control valve block and the hydraulic power unit.

- 1) Clean all dirt and debris from the area around the filter and then remove the filter with a spanner wrench.
- 2) Apply a coating of hydraulic oil to the filter seal ring.

- 3) Remove the filter and replace it with a new filter element and tight the filter by hand.
- 4) Record the time and date of replacement on the filter replacement table.
- 5) Turn the key switch to the ground controller position and pull out the emergency stop buttons from both the ground and platform controllers.
- 6) Raise the platform.
- 7) Check the filter for oil leakage.
- 8) Clean up any spilled hydraulic oil.

1.12 Checklist E

1.12.1 E-1 Test and replacement of Hydraulic Oil

This check item shall be made once every 200 hours of operation or every year, whichever interval is shorter.

- 1) The replacement or test of hydraulic oil is essential to proper equipment performance and service life. Contaminated hydraulic oil or a clogged filter can affect the machine performance and potentially damage components. More frequent inspections are required when operating in hostile or dirty working conditions.
- 2) Use an oil separator to check if it is necessary to replace the hydraulic oil.
- 3) If the hydraulic oil has not been replaced for two years, check it once per quarter. Replace the hydraulic oil, if the inspection fails.



Hydraulic oil under pressure can pierce skin. Slowly unscrew the hydraulic connector to gradually reduce any oil pressure. Do not allow the oil to spray.



This operation shall be performed with the machine stowed.

- 4) Tag and disconnect the oil return pipe running from the hydraulic filter to the hydraulic oil tank. Remove the pipeline from the oil tank. Cover the pipe joint to keep dirt or debris out.
- 5) Make and disconnected the hydraulic pump and the oil suction pipe of oil tank and take out the oil pipe. Cover the pipe joint to keep away the dust.
- 6) Remove the hydraulic oil tank retaining hardware and remove the hydraulic oil tank.
- 7) Remove the hydraulic oil fill cover and pour the oil in a proper container.
- 8) Clean up any spilled hydraulic oil and properly discard the used hydraulic oil.
- 9) Clean the hydraulic oil tank with mild solvent and allow it to completely dry.
- 10) Install the hydraulic oil tank and secure it in place with the retaining hardware. Torque the retaining bolts to 25 ± 2 N.

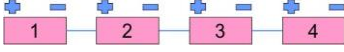
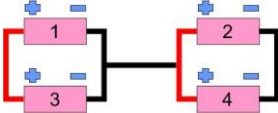
- 11) Connect the oil inlet of the hydraulic pump to the oil tank.
- 12) Connect the oil return pipe of the oil return filter to the hydraulic oil tank.
- 13) Fill the oil tank with hydraulic oil. Do not overfill. Install the tank filler cap
- 14) Start the oil pump to fill the entire hydraulic system with hydraulic oil and bleed the air.

 **WARNING**

Component Damage Hazard
Operation with no hydraulic oil may damage the hydraulic pump. Take measures to prevent the hydraulic pump from cavitating.

Chapter 2 Maintenance Schedules

2.1 Battery Maintenance Schedule

Battery Interchange Maintenance Schedule								
1	Battery Position Anode 1-2-3-4 Cathode Series 							
2	Battery Position Anode 1=3 Cathode 2+4 Series Parallel 							
Purpose	For solving the problem when the No. 1 and No. 4 battery capacities discharge quickly, causing the No. 3 and No. 2 battery performance to be reduced.					Matching Principle	None	
Battery Change Operation Instruction	1	0-25 weeks	26-50 weeks	51-75 weeks	76-100 weeks	101-50 weeks	Calculate the battery performance in the condition of every connection mode, the worse should be put in No. 2 and No. 3 positions. The better batteries should be put in the No. 1 and No. 4 positions.	The interchange principle of the other batteries in Series-Parallel mode is similar.
		1-2-3-4	3-4-1-2	4-2-3-1	2-1-4-3	3-4-2-1		
		Performance Trend (Good- >Bad)						
	2	0-25	26-50	51-75	76-100	101-50		
		1-2-3-4	4-1-2-3	1-2-3-4	4-1-2-3	1-2-3-4		
		Performance Trend (Good- >Bad)						

2.2 Maintenance Schedule

2.2.1 Routine Inspection and Maintenance Intervals

Routine inspection and maintenance interval table

Maintenance level	Routine inspection	Level I	Level II	Level III	Level IV	Level V
Maintenance period	Every day	25h/1m	50h/3m	100h/6m	200h/12m	400h/24m



NOTICE: Working hours are based on those shown on the hourmeter.

Maintenance items of every level are given in the following tables

Item	Description	Maintenance Level					
		Routine inspection	I	II	III	IV	V
Electric system	Check battery capacity	•	•	•	•	•	•
	Check that all buttons/switches on the PCU panel function normally	•	•	•	•	•	•
	Ensure the PCU emergency stop switch is secure	•	•	•	•	•	•
	Check if all switches operate properly	•	•	•	•	•	•
	Check if any wiring harnesses are damaged	•	•	•	•	•	•
	Ensure the PCU wiring harness connector is secure	•	•	•	•	•	•
	Check if the PCU wiring harness connector is not damaged	•	•	•	•	•	•
	Check if the PCU wiring harness is crimped or damaged	•	•	•	•	•	•
	Check if the pressure switch wiring is secure and not damaged	•	•	•	•	•	•
	Check if the lowering solenoid valve is secure and not damaged	•	•	•	•	•	•
	Check if the wirings of horizon sensor and inclination sensor are secure and not damaged	•	•	•	•	•	•
	Check the position and wiring of every limit switch rocker arm	•	•	•	•	•	•

Item	Description	Maintenance Level					
		Routine inspection	I	II	III	IV	V
	Check electric brush wear	Every 6 months(100h)					
Electric system	Ensure the emergency stop switch, key switch and plug switch on the lowering control panel and their wiring are secure and not damaged	•	•	•	•	•	•
	Ensure the warning lamp and horn function normally	•	•	•	•	•	•
	Ensure the motor, motor controller, relay and ECU wirings are secure and not damaged	•	•	•	•	•	•
	Ensure the wiring of every solenoid valve on the main valve block is secure and not damaged	•	•	•	•	•	•
	Ensure the charger wiring is secure and not corroded	•	•	•	•	•	•
	Ensure the battery posts are secure and not corroded	•	•	•	•	•	•
	Check the battery is secure and not damaged	•					
	Check machine performance and various limit switches	•					
	Check if any connector is loose, damaged or corroded	•	•	•	•	•	•
	Calibrate the load cell				•	•	•
Hydraulic System	Check if the pressure of the hydraulic system is normal	•	•	•	•	•	•
	Check if the lift system hydraulic pressure is normal	•	•	•	•	•	•
	Check if the steering system hydraulic pressure is normal	•	•	•	•	•	•
	Check if the driving system hydraulic pressure is normal	•	•	•	•	•	•
	Check if any oil line or connector is loose or damaged	•	•	•	•	•	•
	Check all hydraulic cylinders for damage or leaking	•	•	•	•	•	•
	Check every hydraulic valve for damage or leaking	•	•	•	•	•	•
	Check if the yoke oil line is securely fastened or damaged	•	•	•	•	•	•
	Check if the driving oil pipe clip is loose	•	•	•	•	•	•
	Check oil level in the hydraulic tank	•	•	•	•	•	•

Item	Description	Maintenance Level					
		Routine inspection	I	II	III	IV	V
Hydraulic System	Replace the hydraulic oil	Yearly					
	Hydraulic oil return filter element	Every 6 months					
	Check the hydraulic oil tank vent cap for leaks	•	•	•	•	•	
	Replace the hydraulic oil tank vent cap			•	•	•	
Whole machine	Check the fork sliding block for abnormal noise					•	•
	Check and replace the sliding block					•	•
	Check for loose or damaged bolts or abnormal noise	•					
	Check if any circlip or washer on fork arms are damaged, worn, or missing	•					
	Check if the emergency lowering system operates properly	•					
	Check if the platform, yoke and chassis are deformed or have broken welds	•					
	Check if the paint is excessively chips or peels off	•					
	Check if the decals and safety signs are correct and legible	•					
	Check if the manuals are with the machine	•					
	Machine performance and limit switches operate properly	•					
Lubrication	Lubricate the steering knuckle	Once a month					

2.2.2 Hydraulic Oil Selection and Specifications

Grade	Brand
Rando MV32	Chevron

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Chapter 3 Error Codes and Troubleshooting



When an error code is present, the code will flash once per second on the screens of the ECU and PCU.

3.1 Error Codes

Table 12 - Error Codes

Display	Description	Response
01	System initialization error	Stop all actions
02	System communication error	Stop all actions
03	Model error	Stop all actions
05	ECU and BMS communication failure	Lifting and travelling are prohibited.
09	Invalid pedal alarm	Stop lifting and running
10	The alarm switch is on when height limit rod is being touched	Stop lifting and running
11	Upper&Lower limit abnormality	Display alarm only
12	Chassis lifting or lowering button opening error during start	Stop all chassis controls
14	Motor controller 1 communication failure	Stop lifting and running
15	Motor controller 2 communication failure	Stop lifting and running
16	BMS fault	Stop lifting and running
18	Pothole protection error	Stop lifting and running
23	Traveling function is limited when lifting	Stop running
27	Down proportional valve fault	Stop lifting and running
31	Pressure sensor error	Stop lifting and running
32	Angle sensor error	Stop lifting and running
33	No calibration of light load	Stop lifting
34	Down after overload	Display alarm only
35	Load calibration error	Display alarm only
36	Low battery alarm	Speed reduced to low speed
38	Load calibration error	Stop lifting
40	GPS communication failure	Display alarm only

41	GPS level 1 lockout	Stop lifting
42	Platform left turn button pressing error during start	Display alarm only
43	Platform right turn button pressing error during start	Display alarm only
44	ZAPI 1 fault (AC pump motor parameter fault)	Display alarm only
45	ZAPI 2 fault (AC pump motor hardware fault)	Display alarm only
46	Platform handle enable switch button pressing error during start	Stop platform control
47	“The platform handle is not in the middle position” error during start	Display alarm only
49	AC pump motor: Motor fault detected	Display alarm only
50	AC pump motor connector fault	Display alarm only
51	Wireless collision avoidance alarm	Stop lifting
52	Forward coil error	Stop lifting and running
53	Backward coil error	Stop lifting and running
54	Lifting error of lifting coil	Stop lifting and running
55	Lifting error of lowering coil	Stop lifting and running
56	Right turn coil error	Stop lifting and running
57	Left turn coil error	Stop lifting and running
58	Brake coil error	Stop lifting and running
60	Motor controller fault	Stop lifting and running
61	Motor controller current sensor fault	Display alarm only
62	Motor controller damaged hardware fault	Display alarm only
63	Motor controller output fault	Display alarm only
64	Motor controller SRO fault	Display alarm only
67	Motor controller HPD fault	Display alarm only
68	Low voltage fault	Lifting and high speed running are prohibited
69	Motor controller	Stop lifting and running
70	Motor controller	Stop lifting and running
71	Motor controller contactor fault	Stop lifting and running
73	Motor controller overheated	Display alarm only
74	Motor controller fault	Display alarm only
75	Motor controller pump motor fault	Stop lifting and running
76	Motor controller left drive motor fault	Stop lifting and running
77	Motor controller right drive motor fault	Stop lifting and running
78	Motor controller pump motor short-circuit fault	Stop lifting and running
79	Left drive motor short-circuit fault	Stop lifting and running
80	Alarm of exceeding 80% load	Alarm only

81	Right drive motor short-circuit fault	Stop lifting and running
82	Left brake coil fault	Stop lifting and running
83	Right brake coil fault	Stop lifting and running
84	Motor POST Short Fault	Stop lifting and running
89	Motor excitation open-circuit fault	Stop lifting and running
90	Alarm of exceeding 90% load	Alarm only
91	Motor excitation short-circuit error	Stop lifting and running
92	Motor excitation short-circuit error	Stop lifting and running
93	AC pump brake fault	Display alarm only
94	AC pump drive temperature fault	Display alarm only
95	AC pump motor temperature fault	Display alarm only
96	AC pump abnormal voltage/ electric quantity	Display alarm only
97	AC pump CANBUS communication fault	Display alarm only
98	AC pump speed sensor fault	Display alarm only
99	Alarm of exceeding 99% load	Alarm only
100-114	Three-phase AC motor drive node 8 fault (100-144)	Display alarm only
115-128	Three-phase AC motor drive node 9 fault (115-128)	Display alarm only
129-142	Three-phase AC motor drive node A fault (129-142)	Display alarm only
OL	Platform overload alarm	Stop all actions
LL	"The machine tilts over the safety limit" error	Stop lifting and running

3.2 Troubleshooting Guide

Table 9 - Troubleshooting Guide

Display	Description
01	Restart device or replace ECU
02	System communication error: Check connection between the communication line and other cables. If fault still exists, please replace the PCU or the ECU
03	Invalid option setting error: Set proper options for the machine
05	Check if CAN bus are contacted well or have lithium battery replaced
09	Release the pedal switch, if it is invalid, check the connection status of pedal harness (check for short-circuit)
10	Down alarm override
11	Reset upper limit switch or outdoor limit switch
12	Check if the chassis lifting or descending button is pressed when powered on, or replace ECU

Display	Description
14	Check if CAN bus are contacted well or have electric drive type modified
15	Check if CAN bus are contacted well or have electric drive type modified
16	Check if CAN bus are contacted well or have lithium battery replaced
18	Pothole protection error: Check whether the pothole protection is activated, and check the pothole protection limit switch. Check the wiring of the switch, lower limit switch and wiring.
23	Down alarm override
27	Check or replace the down proportional valve
31	Pressure sensor error: Check the sensor wiring and the sensor. Check to confirm that the correct machine option with overload detection is selected
32	Angle sensor error: Check the sensor wiring and the sensor. Check to confirm that the correct machine option with overload detection is selected
33	Calibrate light load, or shut off double load function
34	This fault is only apply to warn the operator
35	Recalibrate no load and full load
36	When the battery power is low, charge it in time; If the battery power is normal, check the wiring or replace the ECU,
38	Recalibration
40	Check if CAN bus are contacted well or have GPS device replaced
41	Unlock or contact GPS device
42	Platform left turn button pressing error during start: Ensure that buttons on the handle are not pressed. If not, consider replacing the handle or the PCU
43	Platform right turn button pressing error during start: Ensure that buttons on the handle are not pressed. If not, consider replacing the handle or the PCU
44	Replace the motor driver or contact the motor manufacturer
45	Replace the motor driver or contact the motor manufacturer
46	Platform handle enable switch button pressing error during start: Ensure that the enable switch on the handle is not pressed. If not, consider replacing the handle or the PCU
47	“The platform handle is not in the middle position” error during start: Confirm that the handle is in the middle position, and check the middle position parameter setting. If normal, consider replacing the handle or the PCU
49	Replace the motor driver or contact the manufacturer
50	Replace the motor driver or contact the manufacturer
51	Down alarm override
52	Forward coil error: Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit
53	Backward coil error: Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit
54	Lifting error of lifting coil: Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit
55	Lifting error of lowering coil: Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit

Display	Description
56	Right turn coil error: Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit.
57	Left turn coil error: Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit.
58	Brake coil error: Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit.
60	Replace the motor driver or contact the manufacturer
61	Replace the motor driver or contact the manufacturer
62	Replace the motor driver or contact the manufacturer
63	Replace the motor driver or contact the manufacturer
64	Replace the motor driver or contact the manufacturer
67	Replace the motor driver or contact the manufacturer
68	Charge in time; when battery is working well , check the cable or replace the ECU
69	Replace the motor driver or contact the manufacturer
70	Replace the motor driver or contact the manufacturer
71	Replace the motor driver or contact the manufacturer
73	Replace the motor driver or contact the manufacturer
74	Replace the motor driver or contact the manufacturer
75	Replace the motor driver or contact the manufacturer
76	Replace the motor driver or contact the manufacturer
77	Replace the motor driver or contact the manufacturer
78	Replace the motor driver or contact the manufacturer
79	Replace the motor driver or contact the manufacturer
80	Alarm of exceeding 80% load: As the platform is close to the load limit, it is not recommended to increase the load
81	Replace the motor driver or contact the manufacturer
82	Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit.
83	Check the connection of the coil and confirm that it is normal. If normal, check the coil for short circuit or open circuit.
84	Replace the motor driver or contact the manufacturer
89	Replace the motor driver or contact the manufacturer
90	Alarm of exceeding 90% load: As the platform is close to the load limit, it is not recommended to increase the load
91	Replace the motor driver or contact the manufacturer
92	Replace the motor driver or contact the manufacturer
93	Replace the motor driver or contact the manufacturer

Display	Description
94	Replace the motor driver or contact the manufacturer
95	Replace the motor driver or contact the manufacturer
96	Replace the motor driver or contact the manufacturer
97	Replace the motor driver or contact the manufacturer
98	Replace the motor driver or contact the manufacturer
99	Alarm of exceeding 99% load: As the platform has reached the load limit, do not to increase the load
100-114	Replace the motor driver or contact the manufacturer
115-128	Replace the motor driver or contact the manufacturer
129-142	Replace the motor driver or contact the manufacturer
OL	Platform overload alarm: Remove excessive loads immediately
LL	If the machine is tilted, try to restore it to horizontal level, and if not tilted, it needs to check the level sensor wiring and the sensor itself and recalibrate.

Chapter 4 Control System

4.1. ECU Introduction

As the control center of the complete vehicle, the ECU accepts signal input from the PCU and outputs related control. The ECU itself includes a function button mask and a LCD display, which can realize the current status display, parameter setting and status monitoring of key parameters.





4.2. ECU Parameter Setting

To enter the mode:

Pull out the emergency stop button located at the platform controller and ground controller. Press and hold the OK button on the ECU, and at the same time turn the key to the lower control to enter the parameter setting mode: You need to enter the password. If necessary, please contact the service personnel of LGMG.

To exit the mode:

Turn off the power.

Return	up	down	OK
			

4.2.1 Parameter Adjustment

Secondary menu	Tertiary menu	Defaults	Descriptions
Machine mode	Large scale electric drive Large scale hydraulic drive Small scale electric drive Small scale hydraulic drive SS small scale electric drive		
Type of electric drive	General DC AC two-in-one AC Three-in-one COBO		

	AC pump motor Three-phase AC motors Crawler type		
Battery consumption alarm time	[Current value] min/[Maximum value]		Adjustment range: 0~60
Battery consumption shutdown time	[Current value] min/[Maximum value]		Adjustment range: 0~60
Upper control sleep	[Current value] sec/[Maximum value]		Adjustment range: 0~60
Sound alarm volume	[Current value]/[Maximum value]	28	Adjustment range: 0~28
Rapid travelling curves	Rapid travelling speed [current value]/[maximum value] Acceleration value [current value]/[maximum value] Deceleration value [current value]/[maximum value] Slope time [Current Value]/[Maximum Value]	Determined by model	Adjustment range: 0~100 Adjustment range: 1~255 Adjustment range: 1~255 Adjustment range: 1~100
Slow travelling curves	Slow travelling speed [current value]/[maximum value] Acceleration value [current value]/[maximum value] Deceleration value [current value]/[maximum value] Slope time [Current Value]/[Maximum Value]	Determined by model	Adjustment range: 0~100 Adjustment range: 1~255 Adjustment range: 1~255 Adjustment range: 1~100
Travelling curve after lifting	Travelling speed after lifting [current value]/[maximum value] Acceleration value [current value]/[maximum value] Deceleration value [current value]/[maximum value] Slope time [Current Value]/[Maximum Value]	Determined by model	Adjustment range: 0~45 Adjustment range: 1~255 Adjustment range: 1~255 Adjustment

			range: 1~100
Lifting curve	Lifting speed [current value]/[maximum value] Acceleration value [current value]/[maximum value] Deceleration value [current value]/[maximum value] Slope time [Current Value]/[Maximum Value]	Determined by model	Adjustment range: 0~100 Adjustment range: 1~255 Adjustment range: 1~255 Adjustment range: 1~100
Descending curve	Descending speed	Determined by model	Adjustment range: 0~100
Turn-in-place curve	[Current value]/[Maximum value]	Determined by model	Adjustment range: 0~80
Steering compensation value during travelling	[Current value]/[Maximum value]	Determined by model	Adjustment range: 0~50
Dead zone value adjustment of the handle	[Current value]/[Maximum value]	20	Adjustment range: 0~25
Descending speed after anti-pinch measures		60	Adjustment range: 0~100
Battery parameter adjustment	Voltage at 20% of battery level xx.x V Voltage at 40% of battery level xx.x V Voltage at 60% of battery level xx.x V Voltage at 80% of battery level xx.x V Voltage at 100% of battery level xx.x V Alarm value at secondary low battery xx.x V		
Rapid travelling curves	Rapid travelling speed [current value]/[maximum value] Acceleration value [current value]/[maximum value]	Determined by model	Adjustment range: 0~100 Adjustment range: 1~255 Adjustment range: 1~255

	Deceleration value [current value]/[maximum value] Slope time [Current Value]/[Maximum Value]		Adjustment range: 1~100
Slow travelling curves	Slow travelling speed [current value]/[maximum value] Acceleration value [current value]/[maximum value] Deceleration value [current value]/[maximum value] Slope time [Current Value]/[Maximum Value]	Determined by model	Adjustment range: 0~100 Adjustment range: 1~255 Adjustment range: 1~255 Adjustment range: 1~100
Descending speed after anti-pinch measures			Adjustment range: 0~100

4.2.2 Function Configuration



Secondary menu	Tertiary menu	Descriptions
18 Allow lifting after alarming	18 Allow lifting after alarming Disable/enable	Disable/enable
Action alarm function	Action alarm function Disable/enable	Disable/enable
Top control lifting reverse	Top control lifting reverse Disable/enable	Disable/enable
Start low speed	Start low speed Disable/enable	Disable/enable
High speed travelling after parallel valve is powered on	High speed travelling after parallel valve is powered on Disable/enable	Disable/enable
Type of the lowering valve	Type of the lowering valve Switching valve/proportional valve	Switching valve/proportional valve
Integrated GPS function	Integrated GPS function Disable/enable	Disable/enable
Angle analog upper limit	Angle analog upper limit Disable/enable	Disable/enable
Angle analog lower limit	Angle analog lower limit	Disable/enable

	Disable/enable	
10m limit for angle simulation	10m limit for angle simulation Disable/enable	Disable/enable
Anti-pinch deceleration descending	Anti-pinch deceleration descending Disable/enable	Disable/enable
Battery type	General battery Maintenance-free battery Lithium battery	1) General battery 2) Maintenance-free battery 3) Lithium battery
Pressure sensor type	Pressure sensor type Voltage type Single-channel current type Dual-channel current type	1) Voltage type 2) Dual-channel current type 3) Single-channel current type
Dual zone capability for height	Dual zone capability for height Disable/enable	Disable/enable
Dual load capability for weight	Dual load capability for weight Disable/enable	Disable/enable
Lifting limit function	Lifting limit function Disable/enable	Disable/enable
CAN communication baud rate	CAN communication baud rate 125K/250K	125K/250K
Wireless anti-collision function	Wireless anti-collision function Disable/enable	Disable/enable
Low battery alarm loop	Low battery alarm loop Disable/enable	Disable/enable This is a sound alarm function.
Angle sensor polarity	Angle sensor polarity Positive polarity	

4.2.3 Calibration Function

It is used for calibration of the weighing function, which is divided into no-load calibration and full-load calibration. The premise of calibration is: Select 04-calibration function in the weighing function enable menu, and open the weighing function.

Before performing this procedure, ensure that:


- The ground surface is solid and flat, without obstacles;
 - The environment in the working area allows for full lifting of the machine;
 - The maximum allowed wind speed is not greater than 12.5m/s (for S0607E II/S0812E II/S1012E II) or 0m/s (for S0808E II/S1212E II/S1413E II);
 - The battery SOC is sufficient;
 - The hydraulic oil level is between MIN and MAX marks;
 - The fork sideway between the platform and the chassis is fully lubricated;
 - No one will enter the platform during calibration;
 - The angle sensor and pressure sensor are free of damage, and the machine functions normally.
- 1) Drive the vehicle to a solid and flat area free of obstacles and suitable for this operation, and lower the platform completely.
 - 2) Wedge the two front steered wheels to prevent the machine from movement.
 - 3) Turn the ignition switch to the neutral position.
 - 4) Press the button  on the ECU, turn the ignition switch to GCU position, select the Settings menu and input the password.
 - 5) Select the Calibration menu, and press the button . Select the Weighing function, and change its status to “Enable”.



ATTENTION: Please contact the service personnel of LGMG to ask for password, if

required.

No-load calibration:

- 6) Enter the no-load calibration interface, and press and hold the button  for 5s to activate the automatic calibration process, in which the interface will display “Under no-load calibration...” Wait for the completion of the calibration.
- 7) When the platform descends to the end and the buzzer stops, it indicates that the calibration is completed.


- 8) If the calibration fails, the buzzer of machine will sound. In this case, please perform calibration again according to the procedure described above.

Full-load calibration:

- 9) Place the calibration load in the center of the platform using an appropriate lifting device, and fix the load.

See the table below for the weight of loads for different models:

Model	Rated load (kg)
S0607E II	230
S0808E II	230
S0812E II	450
S1012E II	320
S1212E II	320
S1413E II	320

- 10) Enter the full-load calibration interface, and press and hold the button  to activate the automatic calibration process, in which the interface will display “Under full-load calibration...” Wait for the completion of the calibration.
- 11) When the platform descends to the end and the buzzer stops, it indicates that the calibration is completed.
- 12) Lift the weight off the platform using an appropriate lifting device.
- 13) If the calibration fails, the buzzer of machine will sound. In this case, please perform calibration again according to the procedure described above.
- 14) If the calibration is successful, the machine will enter the normal working state.

**Risk of Rollover:**

- **The working environment shall have a maximum allowed wind speed that meets the operation requirement of the machine.**

- Be sure to place the load in the center of the platform.

 Risk of Crushing:

- Do not stretch your hands or arms to positions involving risk of cutting or crushing.
- Keep a safe distance from the machine during calibration.

4.2.4 Historical fault information



It displays the last 10 fault codes and fault names.

4.2.5 About this Unit



This function is used when controller manufacturers or OEMs debug and refresh programs.

Functions	Display	Remarks
ECU test mode		
Update ECU program	ECU upgrade in progress...	
Update PCU program	PCU upgrade in progress...	
Release the brake	Press and hold the OK button for 5 seconds, if the model is not an electric driving one, it will display: only support electric driving	Brakes released
Controller SN code	Display directly	

ECU software version	Display directly	
ECU software compiling time	Display directly	

4.2.6 Status Monitoring

Entry the mode: When the complete vehicle is powered on, long press the return button for 3s to enter the status monitoring mode of key parameters.

Exit the mode: Press the return key to enter the normal display mode.

Primary menu	Secondary menu	Remarks
Load percentage 0/100		
Height percentage 0/100		If the calibration is not completed, it will display 0.
Tilted state Tilted/Not tilted		
Overload state Overloaded/non-overloaded		
Calibration status All calibrated Full load is calibrated Unloaded is calibrated All uncalibrated		
Built-in inclination X (front and rear) [**°]		
Built-in inclination Y (left and right) [**°]		

4.3 Introduction to Thermal Management Strategy of Lithium-Ion Battery

4.3.1 Introduction

The working principle of lithium-ion battery is that, the battery electrolyte produces a potential difference between the positive and negative electrodes through the change of chemical reaction to generate current. The electrolyte moves quite slowly in a low temperature environment, which will affect the transfer activity of lithium ions between the positive and negative electrodes, and thereafter result in a decrease in the battery charging/discharging performance.

Factors restricting the low temperature performance of lithium-ion battery are as follows:

- The lithium-ion battery electrolyte incurs viscosity increase and may even solidify partially in a low temperature environment, resulting in a decrease in the conductivity of the lithium-ion battery.
- The compatibility between the electrolyte, the negative electrode and the diaphragm is degraded in a low temperature environment.
- The precipitation of lithium ions at the negative electrode will become serious in a low temperature environment, and the precipitated metal lithium will react with the electrolyte and produce deposits, causing an increase in the thickness of the solid electrolyte interface (SEI).
- The diffusion of lithium ions in the active material will decrease systematically and the

charge transfer resistance (Rct) will increase significantly in a low temperature environment.

When the temperature is low, the activity of the electrolyte will be such decreased that the transmission of lithium ions will be affected (i.e., the charging and discharging ability of the battery will be affected), and the battery capacity will be reduced. Generally speaking, the allowed working temperature of lithium-ion battery is -20-60°C, and if the battery is used in a temperature out of this range, its performance will degrade substantially.

4.3.2 Thermal Management Strategy

Working temperature: -30°C-60°C

Storage temperature: -30°C-60°C

4.3.2.1 Introduction of Heating Strategy

The running state of the vehicle will be detected, and if charging is required, the charging & heating mode will be activated; or the driving & heating mode will be activated if the vehicle is in driving (discharging) state.

4.3.2.2 Charging & Heating Mode

1. In case of T_{\min} (minimum cell temperature) $\leq -30^{\circ}\text{C}$, the heating & charging mode will be disabled, and a low temperature fault will be reported.
2. In case of $T_{\min} \geq 16^{\circ}\text{C}$, the charging will be started directly.
3. In case of $-30 < T_{\min} < 16^{\circ}\text{C}$, the heating film will be turned on for heating. In case of $T_{\min} < 2^{\circ}\text{C}$, heating-only mode will be activated, and in case of $T_{\min} \geq 2^{\circ}\text{C}$, charging & heating mode will be activated.

When T_{\min} stays $\geq 18^{\circ}\text{C}$ for 1min, the heating function will be turned off, and the charging-only mode will be activated.

4. When T_{\min} drops below 0°C , the heating-only mode will be activated again, and when T_{\min} becomes $\geq 2^{\circ}\text{C}$ after heating, the charging & heating mode will be activated.

4.3.2.3 Driving (Discharging) & Heating Mode

1. When T_{\min} stays within $-30^{\circ}\text{C} \sim 2^{\circ}\text{C}$ for 10s during driving (discharging), the heating will be activated, and will be turned off when T_{\min} stays $\geq 7^{\circ}\text{C}$ for 1min.
2. Requirement in the process of driving (discharging) & heating: When the battery SOC drops below 25%, the discharging & heating mode will be disabled.

4.3.2.4 Exception Handling and Warning

1. If T_{\max} (maximum cell temperature) stays $\geq 40^{\circ}\text{C}$ for 10s in the process of charging & heating, a high cell temperature warning will be activated, the heating will be stopped, and the charging mode will be activated.
2. If T_{\max} (maximum cell temperature) stays $\geq 40^{\circ}\text{C}$ for 10s in the process of driving & heating, a high cell temperature warning will be activated, and the heating will be stopped.

3. When the temperature rise is too slow, a heating fault will be determined and reported, and the heating will be stopped.
4. Requirement in the process of driving (discharging) & heating: When the battery SOC drops below 25%, the discharging & heating mode will be disabled.

Parameter description:

- Maximum cell temperature: T_{\max}
- Minimum cell temperature: T_{\min}
- Initial cell temperature: T_{initial}
- Total system heating time: $T(\text{min})$

Note:

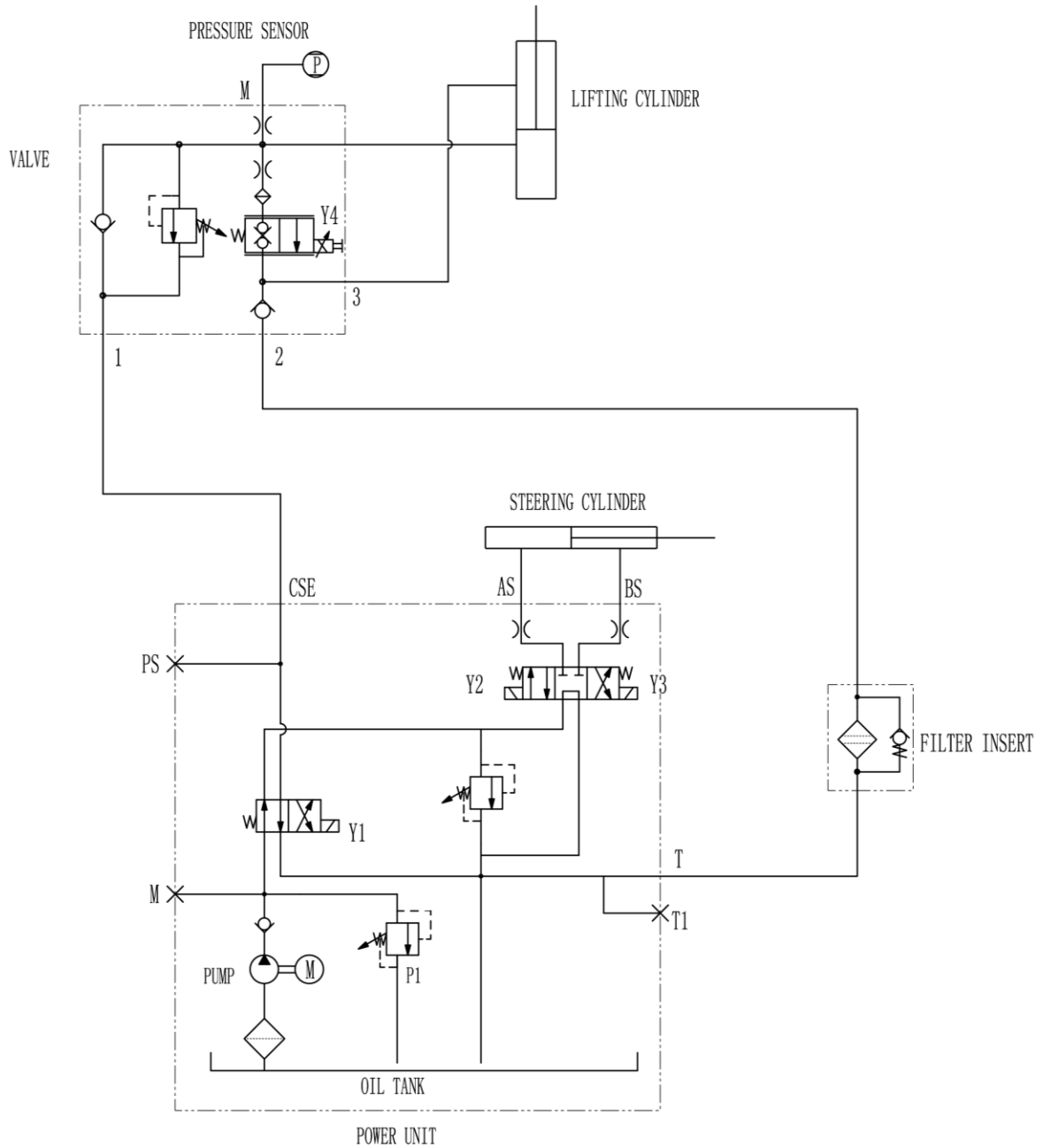
1. Start condition: The main control starts the heating test after detecting a 24V high level signal that lasts for 5s.
2. T_{initial} is the minimum cell temperature at the initial stage of heating, and in case of $t=0$, $T_{\text{initial}} = T_{\min}$.
3. If T_{\max} is $\geq 45^{\circ}\text{C}$ during the preparation for heating test, the heating test will be stopped, the heating function test will be disabled, and a high initial temperature warning will be reported.
4. If T_{\max} is $> 50^{\circ}\text{C}$ during the heating test, the test will be stopped, the heating relay will be disconnected, and a heating fault will be reported.
5. When t is > 15 min and in any battery pack, $(T_{\min} - T_{\text{initial}})$ is $< 2^{\circ}\text{C}$, the test will be

stopped, and a heating function fault will be reported.

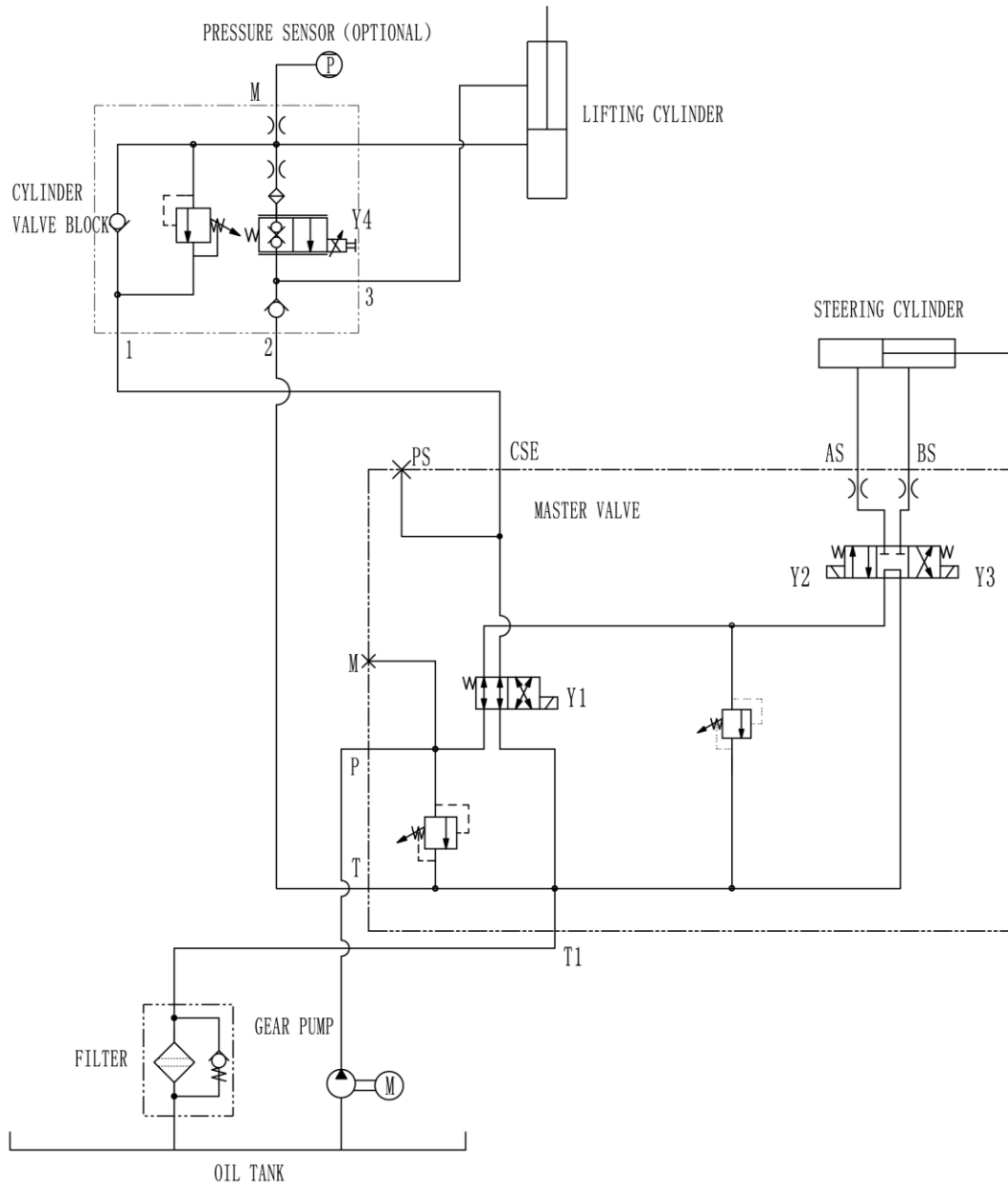
6. If for all battery packs, $(T_{\min} - T_{\text{initial}})$ is $< 2^{\circ}\text{C}$ during the heating test, the test will be stopped, and a message for normal heating function will be reported.
7. If no enable signal is detected after bms power-on, but the condition for starting low temperature heating is met, the heating process will be interrupted forcibly and the heating test process will be started when the enable signal is detected during the heating process; if low temperature heating is not started after bms power-on, the heating test process will be started when the enable signal is detected.
8. The thermal management strategy threshold of the battery pack depends on its brand and model.

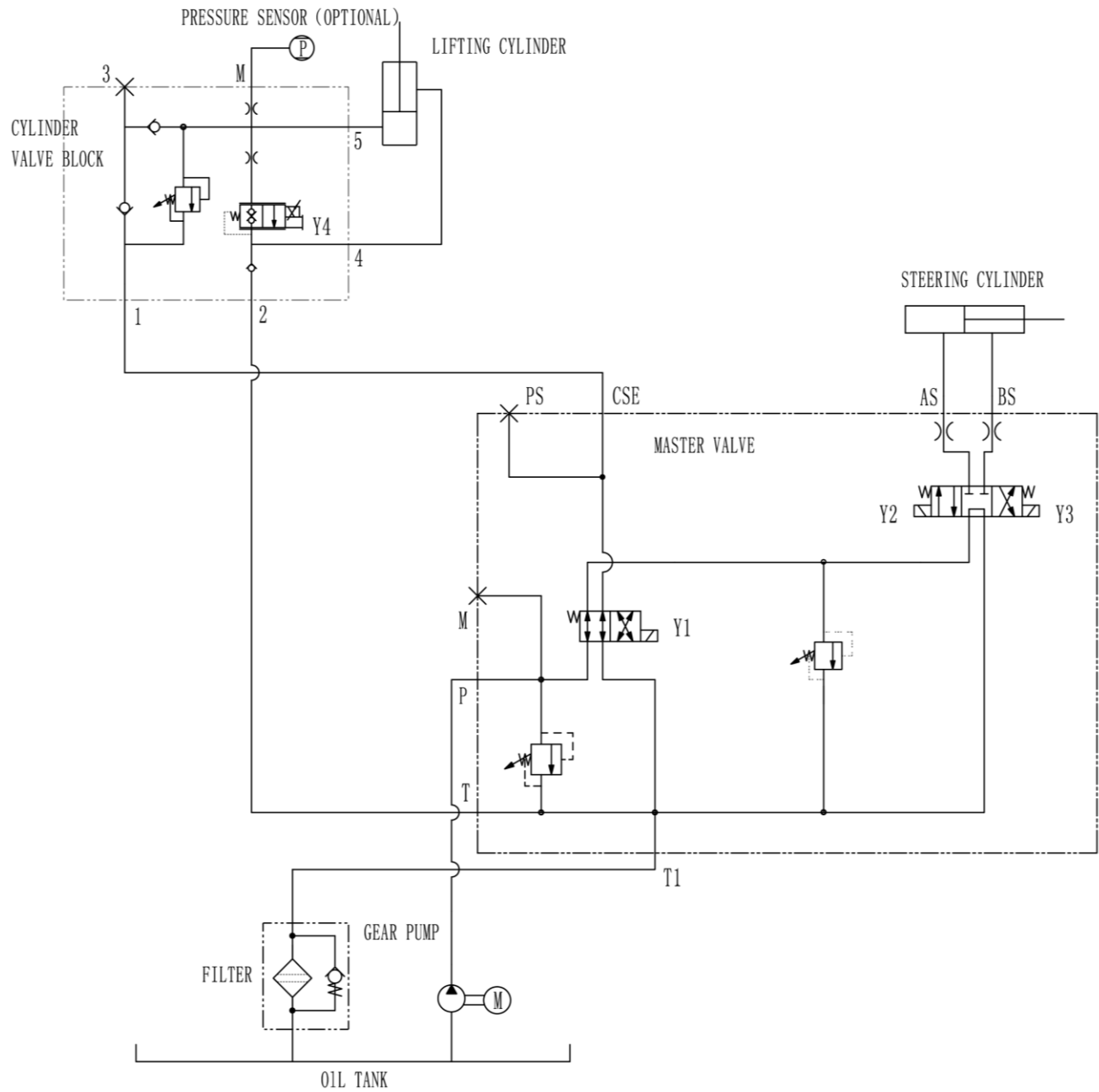
Chapter 5 Schematics

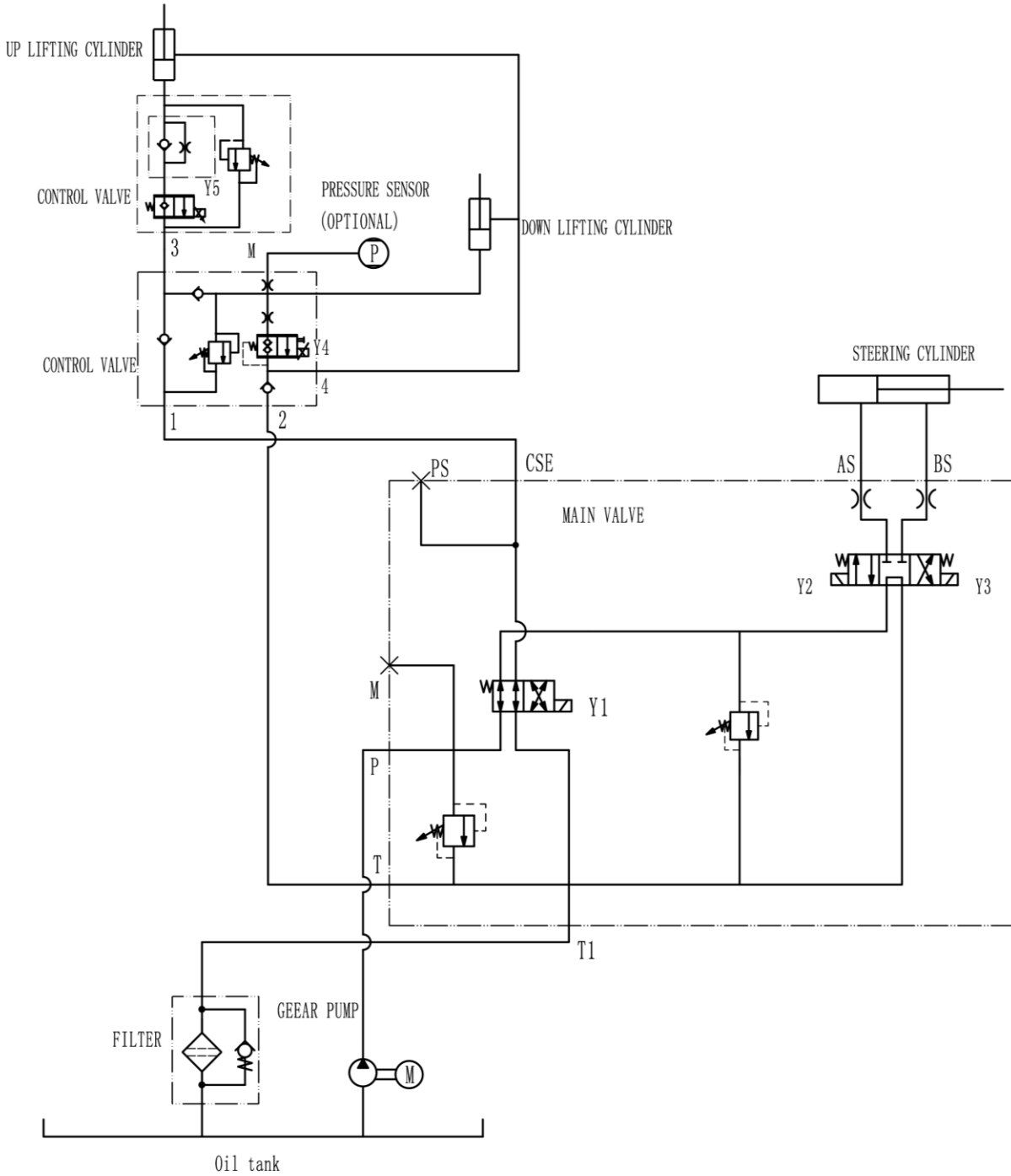
S0607E II HYDRAULIC SCHEMATIC



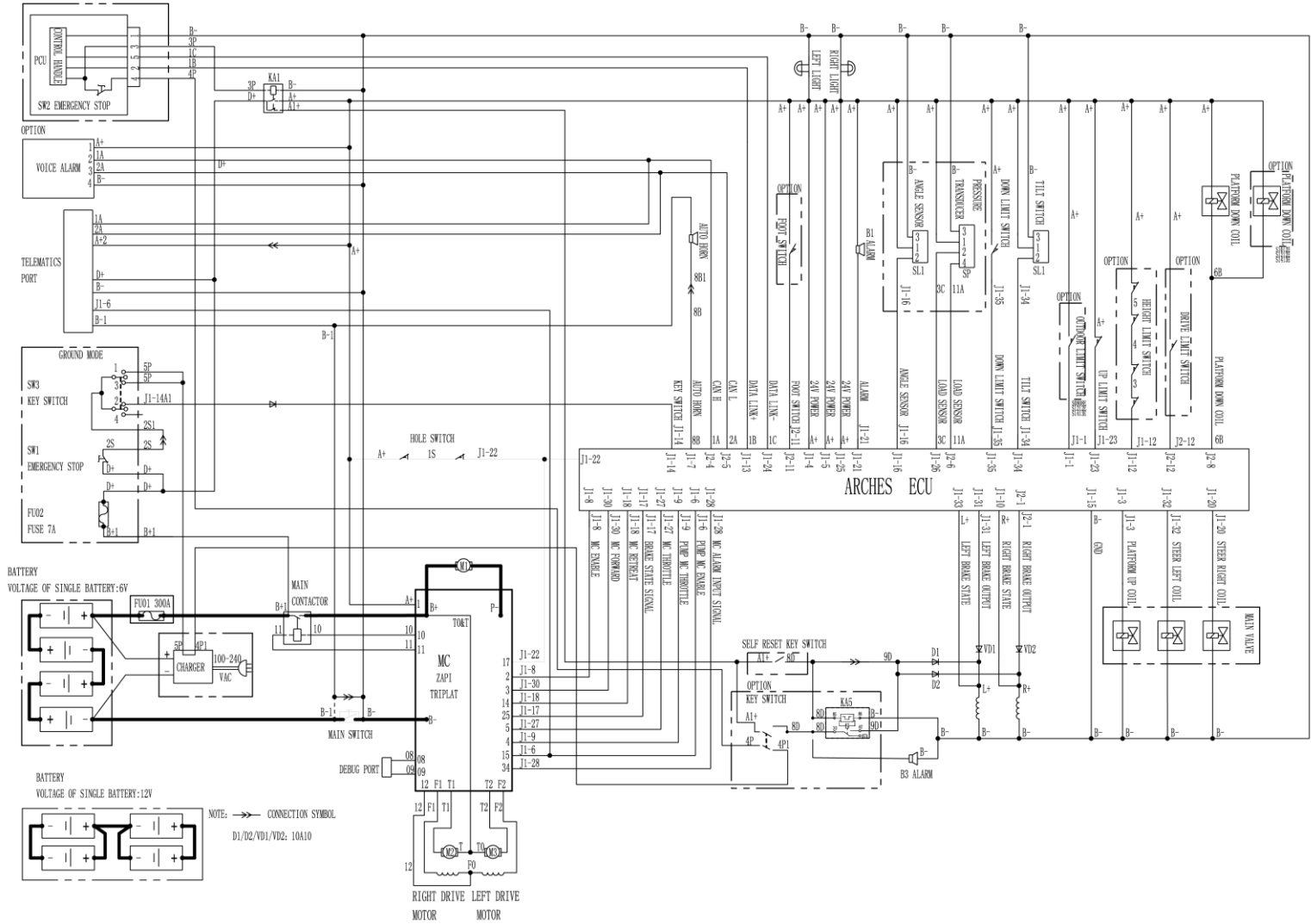
S0808E II HYDRAULIC SCHEMATIC



S0812E II HYDRAULIC SCHEMATIC


S1012E II/S1212E II/S1413E II HYDRAULIC SCHEMATIC


S0607E II/S0808E II/S0812E II/S1012E II/S1212E II/S1413E II ELECTRIC SCHEMATIC



S0607E II/S0808E II/S0812E II/S1012E II/S1212E II/S1413E II (White noise alarm) ELECTRIC SCHEMATIC

