

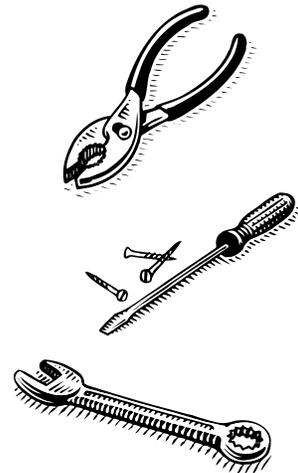
# C450/ C625

by WAVERLEY GLEN



## Technical Manual

*Troubleshooting*  
*Repairs*  
*Replacements*



# Table of Contents

## C-450/C-625 Lift

### Symptoms and Problems

Finding the Problem – Before Getting Inside	3
Pneumatic Systems	4
Electrical Systems	5
Mechanical Systems	8

### Basic Instruction Sheets

B1 - Getting Access to the <b>C-450/C-625</b>	11
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### Pneumatic Instruction Sheets

P1 - Replace Airline Tubing	13
P2 - Replace Grommet	14
P3 - Faulty Main and Auxiliary PCB Air Switches	15

### Electrical Instruction Sheets

E1 - Test and/or Replace Batteries	16
E2 - Replace Main and Auxiliary PCB (Printed Circuit Board)	17
E3 - Repair/replace <b>C-450/C-625</b> Charger and End Stop	18
E4 - Repair <b>C-450/C-625</b> Charger Contact Strips and Wire Harnesses (LED)	19
E5 - Repair <b>C-450/C-625</b> Constant Charger System	20
E6 - Adjust/Replace UP/DOWN Micro Switch Assembly	21
E7 - Repair/Replace Emergency Shut-off with Pull Cord	23

### Mechanical Instruction Sheets

M1 - Replace Lifting Strap – Frayed, Stress Streaks, Length	24
M2 - Replace Trolley Wheels	25
M3 - Replace Traversing Drive Motor, Traversing Gear and Traverse Idle Gear	26

### LCD Display & Programming Functionality

### Tool List

### Wiring Diagrams

D1 - Main PCB (Printed Circuit Board) Schematic Diagram	33
D2 - Auxiliary PCB (Printed Circuit Board) Schematic Diagram	34

### Service Parts List

# SYMPTOMS AND PROBLEMS

## Finding the Problem – Before Getting Inside

Please note that the majority of technical problems that can occur with the **C-450/C-625** occur with external system components. The following are the key components to check before removing any lift cover:

- Charger and Charge Connections
- Hand Control and Airline Problems
- Twisted Strap or Slack Tape Issues
- External Thermal Breaker
- Review Trouble Shooting Points in Owner's Manual

The ceiling lift is a pneumatically operated electro-mechanical device. To diagnose performance interruption it is useful to think of the product as three separate systems:

### 1. Pneumatic System

- Hand Control Unit
- Airline Tubing (2, 4, 6-way)
- Grommet Connectors
- Connector Pins
- Air Tubes
- Air Receiver Mechanism

### 2. Electrical System

- Charger and Charger Connections
- Main PCB – Printed Circuit Board
- Auxiliary PCB - Printed Circuit Board
- Wire Harnesses
- Microswitch Up Limit Switch
- Microswitch Down Limit switch
- Quick Disconnects
- LED Indicator & LCD Display
- Electric ON/OFF, Emergency Lowering and Emergency Shut-Off

### 3. Mechanical System

- Carry Bar or Lifting Hook
- Lifting Strap
- Tape Switch Assembly
- Motors and Gears
- Trolley Wheels and Chain Drives

## Pneumatic Systems

The pneumatically operated functions control on/off, up, down and, where applicable, the side-to-side traversing motion of the lift and/or gantry. A methodical check of the pneumatic system starts from the hand control and works forward through the pneumatic switches on the circuit board.

### 1. Hand control & Airline

- Unplug the hand control airline from the lift and check for blockage of the airlines by pressing each of the function buttons in turn. A small blast of air can be felt from the brass pins at the end of the curly cord.

### 2. Air tubes

- Re-attach the hand control airline to the lift. (The airline end plug has a cap that has a raised ridge on one face. The raised cap ridge aligns with and slides over the ridge on the grommet. Correct insertion can thus be verified by touch and by sight.) Check to see that the air tubes have been routed free and clear. If not routed properly, air tubes can get trapped by wires, other lift components or the lift cover.
- Check to see that the air tubes are correctly connected to the circuit board switches. The two air tubes attached to the main board are color coded to correspond to the colored stickers on the switches. The two air tubes attached to each of the traversing boards are connected on the principle of “nearest tube to nearest switch.”
- Next detach one air tube at a time from the circuit board. Check for leaks in an air tube by pressing the function key corresponding to that air tube (the function is indicated on the color coded stickers on the switches), *then* pinch the open end of the air tube between two fingers, *then* release the function button. The dome of the button should stay slightly compressed when the button is released. Repeat for each air tube.
- Air tubes are fragile. In detaching and re-attaching air tubes, do not press on the air tubes with fingernails and be careful not to pierce the tubes with the connector pins.

**If NO air leak is found then proceed to check the electrical system.**

## Electrical Systems

Ensure that the batteries are charged. Turn the lift on & look at the LCD reading to check the battery charge level. If the batteries are not charged, put them on charge before servicing the equipment or connect a fresh set of batteries. If the charger indicator does not give any reading, batteries can be tested “outside the system” with a load tester or, again, a fresh set of batteries should be hooked up. An occasional battery problem is acid leaks at the vents. Sometimes a leak shows up as corrosion of the battery leads.

Do a preliminary inspection of the circuit boards for burn marks or burns odours. A single or series of components may have failed. The PCB will have to be replaced.

When an electrical problem seems to be the cause of the malfunction, it is important to first check that all the wire harnesses are plugged in. Secondly it is important to check all wire harnesses for cuts and/or exposed wires. If this is found, the wire harness must be replaced.

### 1. The main board on manual and power traversing systems

The *white power plug*, second from left, connects the batteries to the circuit board. The circuit board is connected to the main motor via the *white plug* on the right most side of the board. The board and main motor plugs are shaped to prevent erroneous hook-up. The battery cables are color-coded black and red to match the battery leads. **Check to see that the board, lift motor and battery plugs are properly connected.**

The *large 2-pin white plug* on the far PCB side, connects the charger to the PCB. The *3-pin white plug*, first on the left, connects the LED indicator to the PCB. The *16-pin connector*, third from the left connects the LCD display to the PCB. The *4-pin white plug*, second from the right, connects the “slack tape” and “tape thickness” limit switches on the tape switch assembly to the circuit board. Check to see that the functionality plugs are properly connected (when connecting a plug, it is easy to miss a prong) and that the wires do not pull out of the functionality plugs (if a wire does pull out, it was either connected incompletely or connected upside down).

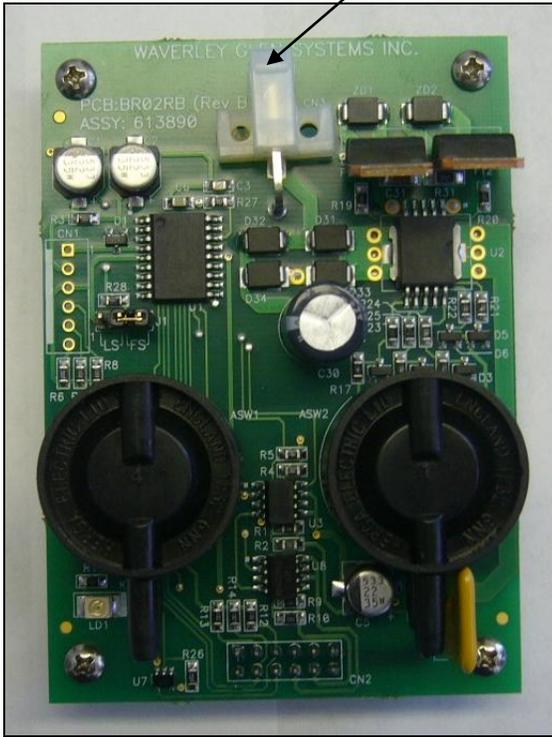
### 2. The auxiliary board(s) on power traversing systems

The auxiliary boards plug directly into the main board. The *large 2-pin white plug* connects the PCB to the auxiliary motor. Check to see that the auxiliary board and auxiliary motor plugs are properly inserted.

**NOTE: Not all lifts will come with auxiliary PCB's, C-450/C-625 Manual has no auxiliary PCB's, C-450/C-625 Power has 1 Auxiliary PCB and C-450/C-625 Power X-Y has 2 auxiliary PCB's.**

# Electrical Systems

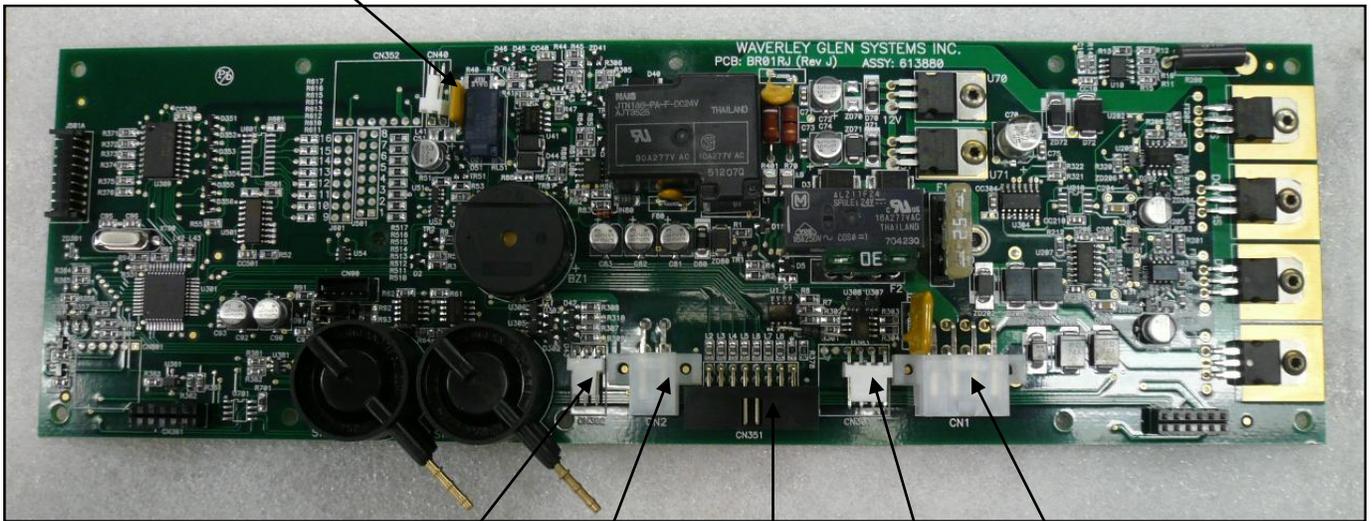
Auxiliary Traverse Motor Cable



Auxiliary PCB's on main PCB

Charger Cable

Front side of main PCB



LED

Battery Cable

Display

Limit Switch

Power Switch Cable

## Electrical Systems

3. **If the batteries and circuit boards appear in order, no air leak is found and no fault is found with the wiring**
  - Proceed to check that the lift and traversing motors are functioning by removing the motor and battery leads and running jumper cables from the motor leads to the battery leads. (Reversing polarity causes the motors run in reverse)
  
4. **If the batteries and circuit boards appear in order, no air leak is found and no fault is found with the wiring or with the motors**
  - The most likely cause of failure is a blown fuse on the circuit board. To confirm, check the fuses on the board and verify they are both operable. If a fuse is blown replace it with another fuse (25 amp or 30 amp) and test the lift. Under no circumstances should a fuse with a fuse rating other than the specified amperage be used. Using such a fuse can result in damage to the lift and /or personal injury. If the problem persists after testing, replace the circuit board. If the problem still persists contact customer service at 1-800-265-0677.
  
  - The other likely cause of failure is a circuit board failure that is not readily visible. To confirm, connect the non-functioning lift to a board from service parts or from another lift. (There is no need for a complete board installation: the replacement board used for confirmation can be hooked up provisionally outside the lift.)
  
5. **If the on/off buttons (and/or emergency lowering buttons) on both the hand control and the lift do not work**
  - Check the Emergency Shut-Off with Pull Cord. If it has been activated during an emergency, call customer service. If it has been activated accidentally push the button towards the lift until you hear a click. This will allow you to operate the lift again. If the lift still fails to operate examine the Emergency Shut-Off assembly to make sure it is not obstructed and activates and deactivates the switch, repair as required. If the problem persists, replace the Emergency Shut-Off switch.

## Mechanical Systems

### 1. If the lift goes down to the end of the strap and then goes up again with the up and down functions reversed, the “slack strap” safety feature is not working:

- Because the roller assembly inside the tape switch assembly is stuck and is therefore not activating the micro switch. Clean the inside assembly of all debris and make sure all parts are loose. Then check for the click of the switch as the roller assembly comes to the end of the slot. If there is no click, The 2 switch screws should be loosened and the switch pushed closer to the tape switch roller. Make sure that nothing is stuck or jammed in the assembly.
- Because the switch is too close to the roller assembly. The 2 switch screws should be loosened and the switch pushed farther away from the tape switch roller.
- Because of a wiring problem. Check the wiring from the tape switch assembly to the main circuit board.
- Because the micro switch is malfunctioning. Replace the switch.

### 2. The lift intermittently performs a pneumatically controlled function by itself (pneumatically controlled functions are on/off, emergency lowering, up, down and, where applicable, power traversing of lift and gantry)

- There is likely a slow leak in the pneumatic system. The first elements of the pneumatic system to be checked are the grommets (there is one on the hand control and one on the lift). For a complete check of the pneumatic system, see sections P1 to P3. Frequent detachment and re-attachment of the airline or rough usage causes wear and tear in the air holes of the grommets. Clients should NEVER use the hand control/airline to pull the lift along the track.

### 3. The strap goes all the way into the gearbox

The “thick strap” safety feature is not working:

- Because the moving roller assembly does not activate the switch. Introduce a slight bend in the metal strip (which activates the switch) such that activation takes place when a double thickness of strap is forced between moving rollers inside the tape switch assembly. Make sure that nothing is stuck or jammed in the assembly.



**Bend the limit switch strip to ensure activation**

## Mechanical Systems

- Because of a wiring problem. Check the wiring from tape switch assembly to the main circuit board.
- Because the Microswitch is malfunctioning. Replace the switch or re-align it.

### 4. The lift traverses poorly at specific points in the track system

Identify the points of blockage:

- Is the blockage at the seam of two pieces of track? Correct the vertical and/or horizontal alignment.
- Is the blockage in a curved section? Check the curve for clearance. Curve walls sometimes collapse in the bending process. Replace an improperly bent curve or try to correct it using a track bending tool.
- Is the blockage in a turntable? Check the vertical and/or horizontal alignment of turntable and track. Brackets should be used to “force” permanent proper alignment.
- Clean inside of track with alcohol.

### 5. The lift does not power traverse well anywhere along the track

Open up the lift and check the alignment of the traversing system. There should be little noise in the gears and minimal sway in the motor bracket when the motor is running. Ensuring that the motor is tightly fastened and the gears are mounted securely, aligned with each other can eliminate “Laboured noise and excessive sway”.

### 6. The lift motor seems to be running, but does not work in UP or DOWN direction.

The motor output shaft or worm wheel of the motor may have worn out. The acceleration activated the overspeed governor, which is designed to prevent further use until the lift has been repaired. (The overspeed governor is a universal, failsafe mechanical brake, which is triggered by centrifugal force and functions independently of the lift’s pneumatic electro-mechanical system.) The motor will need to be replaced.

## **Mechanical Systems**

### **7. The charger system does not work**

The C-450/C-625 lift charger system has five components: a charger, charger end stop, charger plates, wiring harness and circuit board.

- Check that power is coming into the charger: the indicator light on the charger should be green when the lift is not parked in the charging station.
- Check that the charging strips of the charging station (bent in a wave pattern with the middle section tensed and clear) make contact with the stainless steel contacts on the trolley block.
- Check the plugs along the wiring harness. The black wire from the charger should correspond to the black wire from the harness.
- Check the board by plugging the white plug into a replacement board.

### **8. The on/off buttons (and/or emergency lowering buttons) on the hand control and the lift do not work**

- Simultaneous failure of the pneumatic and electrical systems, strongly indicate a circuit board failure. Confirm this by hooking a replacement board. In the case of emergency lowering, if the replacement board does not resolve the problem, the fault is in the “slack tape” lower limit switch. (See point #1 ‘If the lift goes down to the end of the strap and then goes up again with up and down functions reversed.’)

## BASIC INSTRUCTION SHEETS

### B1 - Getting Access to the C-450/C-625

**IMPORTANT NOTE:** Service lift in a clean, dust free environment. Extreme care must be exercised when removing the cover. Electric shock may occur.

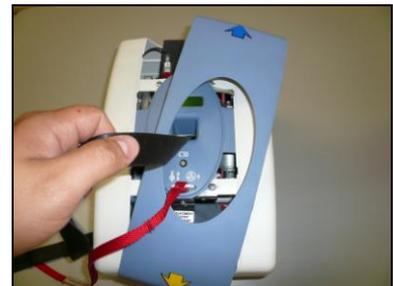
1. Use support blocks to keep the lift balanced while servicing.
2. Disconnect the hand control airline tubing from the black grommet on the lift unit.
3. Grasp the middle bottom cover at one of the short sides, pressing inwards to allow the tab to be snapped out. Repeat this on the opposite short side and then pull the cover away from the lift along its length to remove it.
4. IMMEDIATELY disconnect the RED wire lead to the batteries to prevent shock and damage.
5. Now the batteries are accessible for replacement and can be taken out once their tab brackets are removed.
6. Remove two #8-32 Philips screws from the bottom face of one of the side covers.
7. Turn the lift unit over to the opposite side and remove the two remaining #8-32 Philips screws from the top face of the same cover.
8. Use caution when handling lift. The stand-offs supporting the PCB may be damaged if the lift is not properly supported.
9. Be extremely careful and remember that the back of the PCB (Printed Circuit Board) will be exposed. Contact with metal will short and destroy the PCB. Usage of proper E.S.D. protection to prevent damage to the circuit board is highly recommended.
10. Remove this cover, detaching it from the elliptical, centre control cover. Place screws in the side cover and use it to hold all loose parts.
11. Repeat Steps 6 – 10 for the remaining side cover.



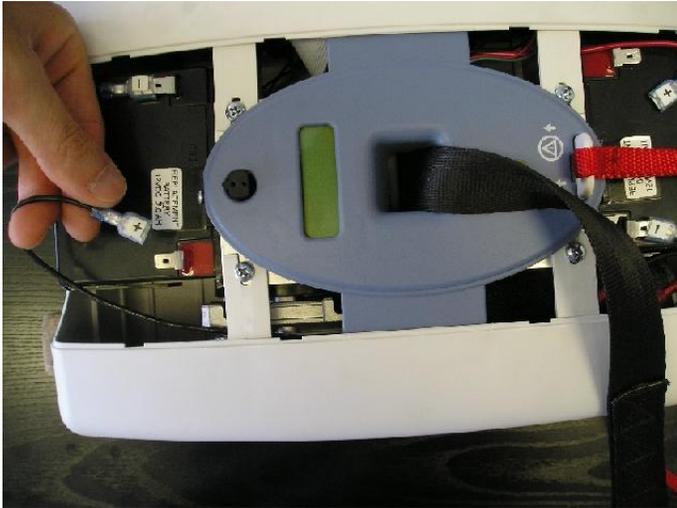
Remove airline



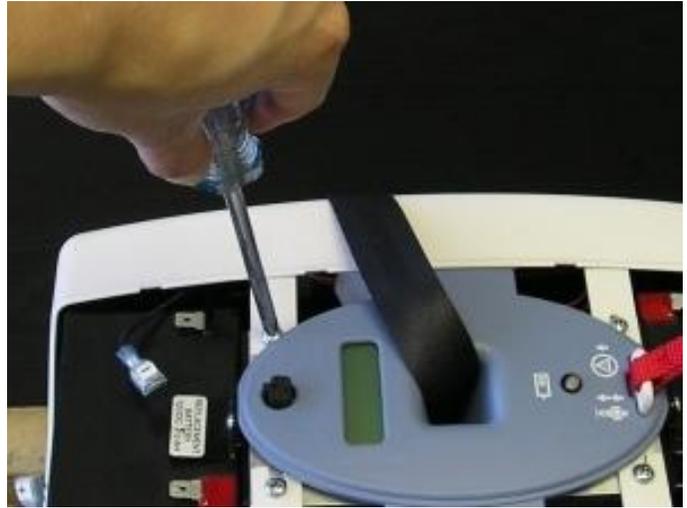
Detach bottom cover at one short side tab



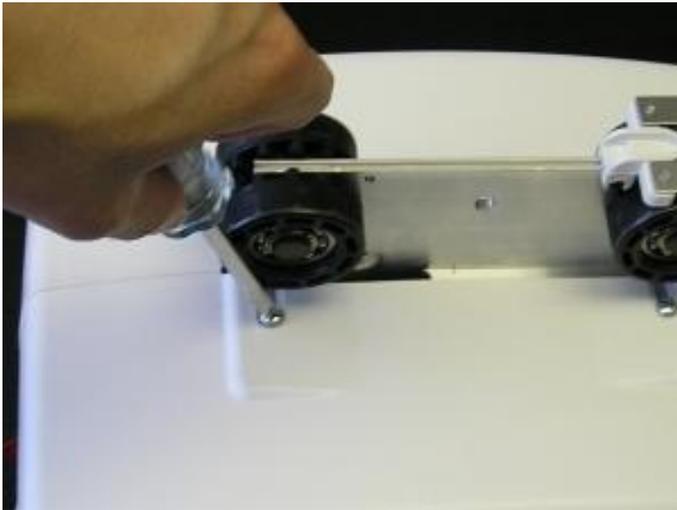
Repeat on opposite side & pull off cover along length of the lift



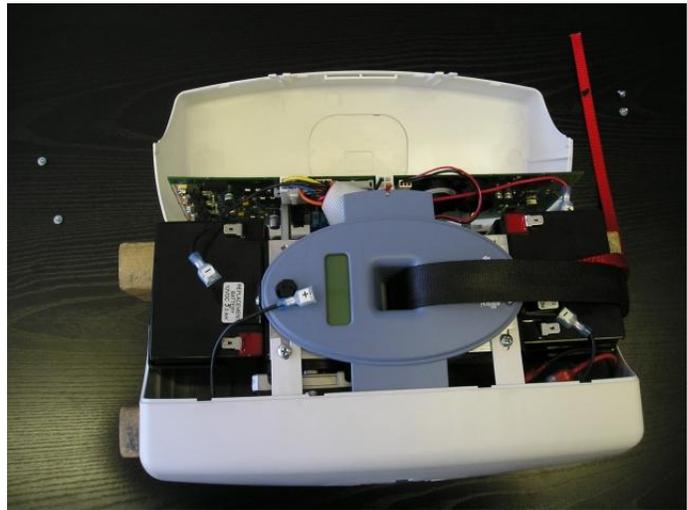
**Disconnect Batteries**



**Remove side cover bottom screws**



**Remove side cover top screws**



**Remove side covers**

## PNEUMATIC INSTRUCTION SHEETS

### P1 - Replace Airline Tubing

**IMPORTANT NOTE:** If an air leak is suspected, it is important to check the entire pneumatic system for air leaks.

1. Separate the Airline tubing from the grommet on the lift unit.
2. Take note of the force required to separate these items. The connection should be very tight. If the connection appears somewhat loose, an air leak may develop and cause a problem.
3. Air leaks occur at the grommet connections because the hand control and airline tubing are frequently used to pull the lift along the track. This results in the frequent disconnection of the airline and grommet.
4. Remember to reassemble the airline to the grommet by aligning the ribs. *If not connected correctly, operating buttons on the hand control will not function properly.*



Separate airline

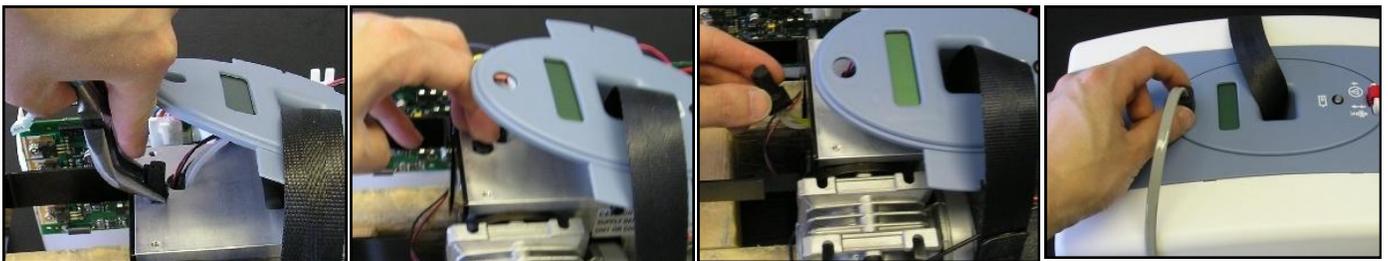


Rejoin airline

## P2 - Replace Grommet

**IMPORTANT NOTE:** There are NO serviceable parts inside the pneumatic Hand Control.

1. If an air leak is suspected but there is no detected failure, there may be an air leak at the lift grommet because the airline pins do not fit tightly. This lift grommet may be replaced using the following steps.
2. Follow steps 1 - 11 in section B1.
3. Remove the battery on the side of the lift nearest to the grommet. See section E1.
4. Before starting, take note of the positions of the individual airline tubes inside the lift unit. These should be marked in a way that they can be replaced in the exact same places. Check the wire diagrams if not sure.
5. Lift away the blue oval plate to access the damaged grommet & clasp & flatten the rubber using pliers to reduce the diameter enough to fit through the mounting hole. Then gently rock the grommet back and forth while PUSHING the grommet through the lift control panel.
6. Disconnect the airline tubing from PCB to the grommet & discard the damaged grommet.
7. Replace the new grommet by gently PULLING the grommet through the lift control panel.
8. Reattach the internal air tubes and replace covers to reattach hand control airline.
9. Retest the entire pneumatic system to ensure that all hand control buttons function.



Compress grommet

Gently push through

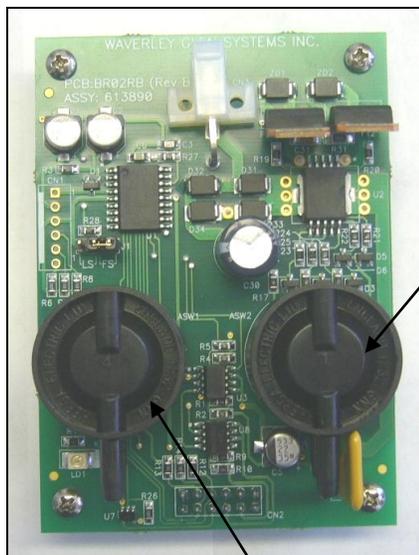
Remove air tubes

Reattach airline

## P3 – Faulty Main and Auxiliary PCB Air Switches

**IMPORTANT NOTE:** There are no serviceable parts on the Main and Auxiliary PCB. These air switches are not serviceable and the whole board must be replaced if they fail. As this is part of the pneumatic system, it is important that all connections are airtight. Please note that not all lifts will come with auxiliary PCB's, C-450/C-625 Manual has no auxiliary PCB's, C-450/C-625 Power has 1 Auxiliary PCB and C-450/C-625 Power X-Y has 2 auxiliary PCB's.

1. If there are no leaks in the hand control, airline tubing and grommets, there could be a leak in air tubes to the pressure switch or failure of air switch. Check by performing the air leak test with the hand control buttons.
2. If there is an air leak, tighten all air tubes and recheck.

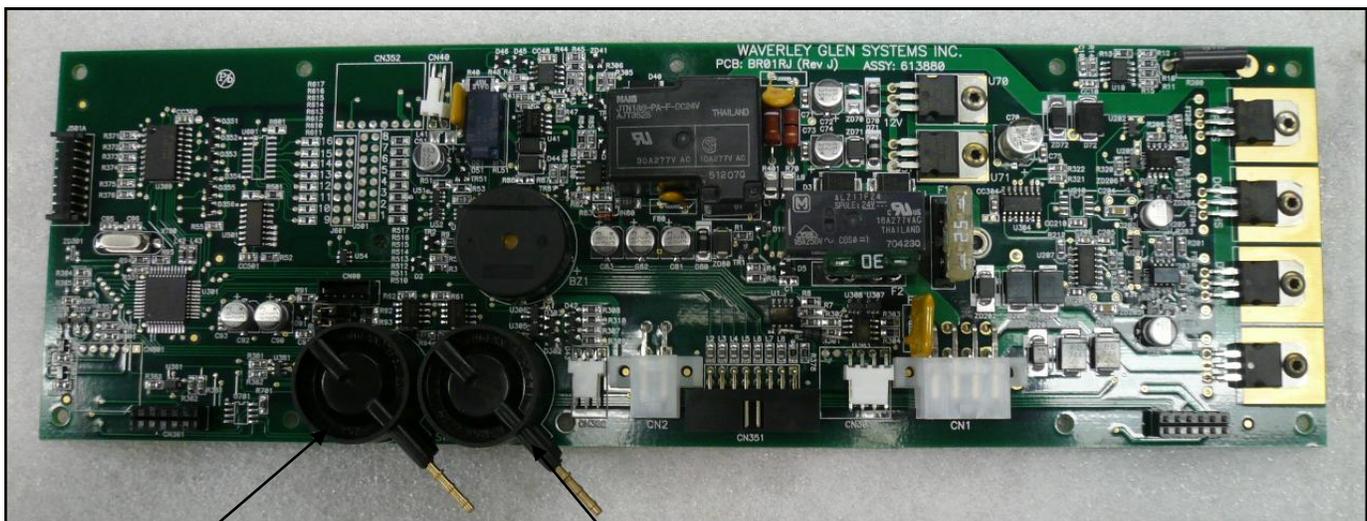


Auxiliary PCB's with air switches on main PCB

X+

X-

Front side of main PCB with air switches



Up

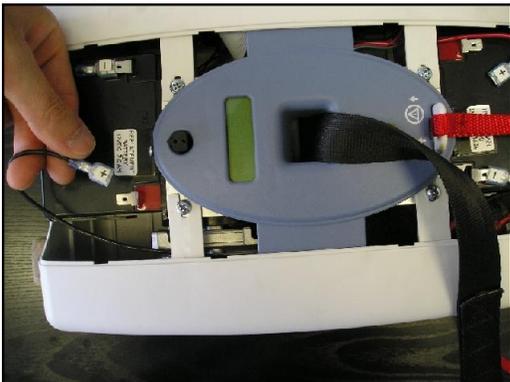
Down

# ELECTRICAL INSTRUCTION SHEETS

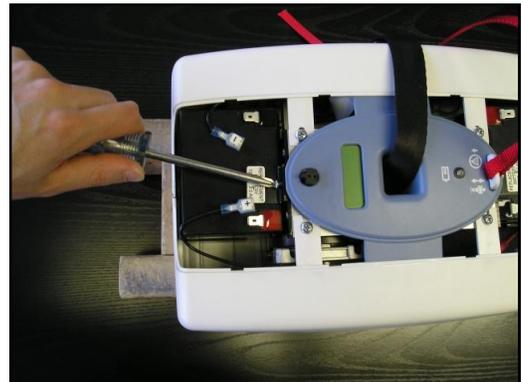
## E1 - Test and/or Replace Batteries

**IMPORTANT NOTE:** Sealed Lead Acid batteries must be handled with extreme care. Any leakage or warpage of the battery cover indicates battery failure. Replace immediately.

1. If the indicator light (LED) on the control panel turns RED and an audible alarm sounds, the batteries may not have sufficient power to operate the lift under load. Lift should be returned to charger.
2. Using a voltmeter (set for DC volts 100 scale) measure the voltage across the RED and Black wire terminals on the batteries. The reading should be greater than 27.5 VDC if fully charged.
3. With the lift on charge, measure VDC. The reading should be between 27 to 30 VDC indicating that the batteries are being charged. The lift should be left on charge for 30 minutes and retested. If the low battery indication still persists, the batteries should be replaced.
4. Disconnect all wires from the batteries.
5. Using a Philips screwdriver, unscrew both #6-32, pan head screws that fasten the battery bracket to the gearbox and remove the batteries.
6. Ensure that an equivalent battery set is used to replace the original batteries (see specifications).
7. Install the batteries. Ensure that any wire harnesses or airline tubing are loose, free of obstructions. A blockage of the airlines will cause hand control problems.
8. Connect the SEPARATE BLACK wire across the inside RED and BLACK battery terminals. Reconnect the (+) and (-) wire harness wires to the matching terminals on the batteries.



**Disconnect batteries**

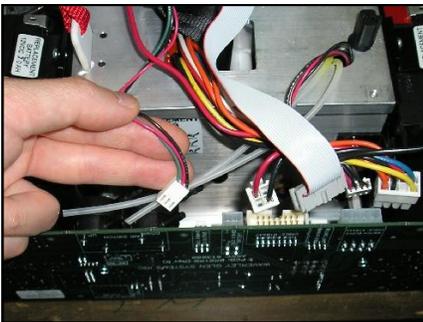


**Replace batteries**

## E2 - Replace Main and Auxiliary PCB (Printed Circuit Board)

**IMPORTANT NOTE:** Use extreme caution when servicing the lift. The PCB should be handled with care. Use of proper E.S.D. protection to prevent damage to the circuit board is highly recommended. Contact with metal objects (screw drivers, rings, etc.) will damage the PCB.

1. Before starting, disconnect the RED battery wire and all wire harnesses and all air tubes (remove off from the steel pins) from the PCB.
2. Before installation of new PCB, test the new PCB to ensure that the diagnosed problem will be solved. Attach all wire harnesses and reconnect the battery wire. Test lift unit. If lift unit still does not function, the problem is elsewhere. Contact customer service for further instructions.
3. Remove the mounting screws (2 x #4-40 Phillips Head Screws).
4. Carefully remount the PCB and tighten screws. Do not over-tighten screws.
5. Attach all wire harnesses and reconnect the battery wire. Test lift unit.
6. To replace an Auxiliary PCB, pinch the stand-offs and pull the PCB right off, this will also unplug the Auxiliary PCB from the Main PCB.



Disconnect harness



Remove harnesses



Unscrew #8 screws

## E3 - Repair/Replace Charger and End Stop

**IMPORTANT NOTE:** There are no serviceable parts in the C-450/C-625 charger. Use extreme caution when performing internal servicing on the lift. Ensure that the charger has been disconnected from the power supply before starting.

### REPAIR Charger End Stop

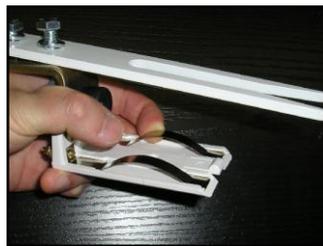
1. The C-450/C-625 charger end stop consists of the end stop components and the charging spring clips. If it has been determined that the lift is no longer charging because there is poor contact with the charge strips, an adjustment can be made.
2. Remove the charger end stop from the track.
3. While holding the end stop gently pull up on the charge strips and bend to desired tension.
4. If too much tension is generated, the lift will not be able to be driven out of the charger end stop. Adjust the tension so that lift can be driven in and out of the charger end stop.
5. With the manual traverse C-450/C-625, there is a tendency to pull the lift into the charger end stop at an angle. This can cause one of the charger strips to lose tension. Please explain to client that the lift should be placed on the charger gently.

### REPLACE Charger End Stop

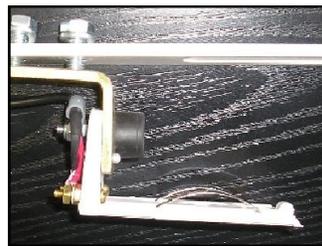
1. Should the charger strips bend and snap, a new charger end stop needs to be installed. Remove the old end stop and disconnect the charger wires.
2. Reconnect the charger wires to the new end stop. Match the Red wire to the POSITIVE marker on the charger end stop. The polarity of the RED and BLACK wires is critical.
3. Replace the end stop and tighten bolts. Adjust tension as above.



**Disconnect End stop**



**Gently bend strip**



**Correct positioning**



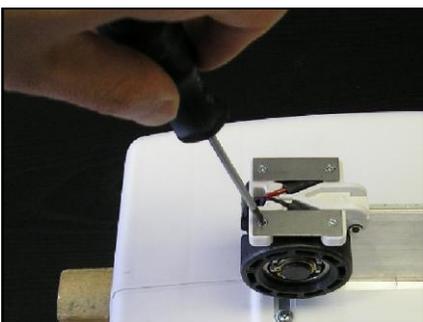
**Connector Polarity**

## E4 - Repair C-450/C-625 Charger Contact Strips and Wire Harness (LED)

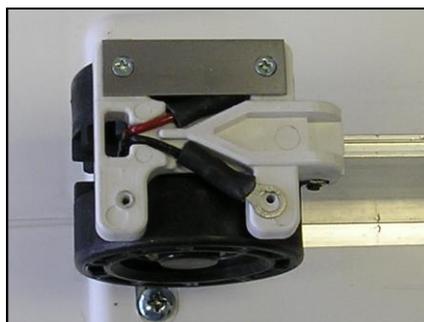
**IMPORTANT NOTE:** Use extreme caution when performing internal servicing on the lift. Ensure that the battery has been disconnected before starting.

1. The original copper charger contact strips can become corroded in very humid and acidic environments such as pools and spas. These have been replaced with stainless steel strips on the newer lift design.
2. Ensure that the RED battery lead has been disconnected.
3. Remove 4x 4-40 screws in charger block on trolley to detach the old copper strips.
4. Attach the new stainless steel strips. Ensure that the ring terminals on the wire harness are centered under the screw holes. The polarity of the RED and BLACK wires is critical.
5. If the Wire Harness requires replacement, cut cable tie and remove.
6. Disconnect the charger harness from the PCB and replace with new harness.
7. Reconnect the cable tie and ensure harness does not conflict with movement along the track.
8. Test system to ensure that charging is occurring.

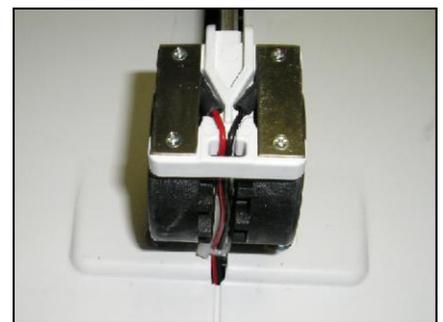
When attaching screws take care not to over tighten screws as you may strip the plastic thread.



**Unscrew #4 screws**



**Replace charger strips**



**Red wire on left**

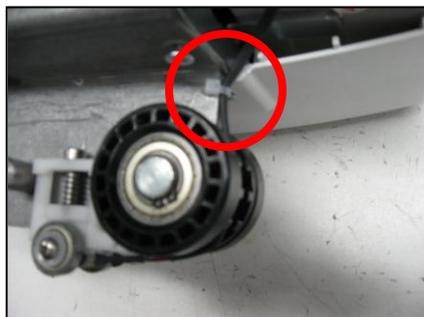
## E5 - Repair C-450/C-625 Constant Charger System

**IMPORTANT NOTE:** Use extreme caution when performing internal servicing on the lift. Ensure that the battery has been disconnected before starting.

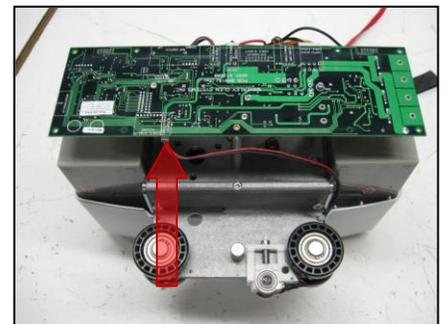
1. The bearings and contact strips can become dirty, oily, and corrode in very humid and acidic environments. The first step to repairing a faulty connection is to wipe the bearings and contact strip in the track with a clean rag. If problems persist, the following steps outline how to replace the constant charger system.
2. Ensure that the RED battery lead has been disconnected.
3. Remove the charger block screw and nut that holds the constant charger to the trolley base.
4. Cut the cable tie that holds the constant charger wire to the trolley base.
5. Unplug the constant charger cable to the circuit board.
6. Remove the constant charger unit, and replace with a new unit.
7. Reconnect the charger block screw, cable tie, and cable to the circuit board. Ensure that the wire does not conflict with the wheels or any movement along the track.
8. Test system to ensure that charging is occurring.



**Unscrew Screw**



**Cable to Circuit Board**



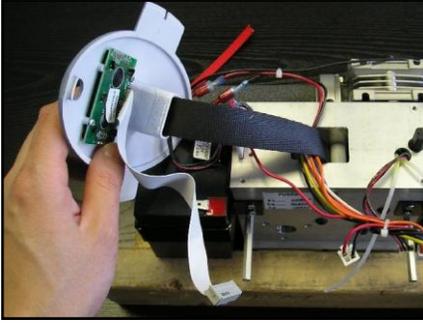
**Cable Tie Wire Holder**

## E6 - Adjust/Replace UP/DOWN Micro Switch Assembly

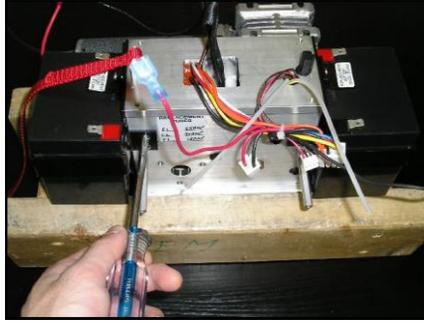
**IMPORTANT NOTE:** Use extreme caution when performing internal servicing on the lift. Ensure that the battery has been disconnected before starting.

The UP/DOWN micro switch assembly controls numerous safety functions and maintains an absolute control over the polarity logic of the entire system. The primary functions are to control the UP limit, Down limit, monitor “slack tape” condition and prevent the motor from winding the lift tape in the wrong direction.

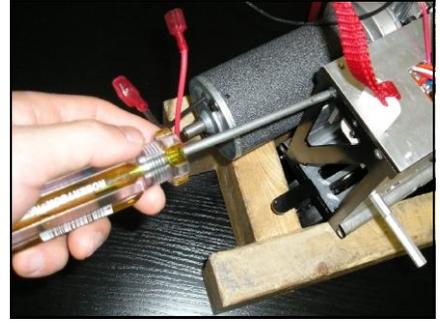
1. Have the strap extended out about 1' & remove the lift cover as per section B1, Getting Access to the **C-450/C-625**.
2. Remove the PCBs as per section E2 to gain access to the battery arm bracket.
3. Carefully lift away the centre, elliptical display panel plate.
4. Using a Philips screwdriver unfasten the two #6-40 pan head screws to remove the battery bracket of the battery that is farthest from the gearbox.
5. Remove this battery as per section E1.
6. Using a Robertson #1 screwdriver, unfasten and remove the lift sidewall frame next to location of the recently removed battery.
7. On the opposite sidewall frame, remove only the 2 screws adjacent to the side closest to the strap opening panel with the Robertson screwdriver.
8. Using an M3 Allen Key remove the M4 socket head cap screw on the lift's bottom panel (with the strap opening) holding it to the long PCB mounting panel.
9. Using an M3 Allen Key remove the M4 socket head cap screw on the lift's bottom panel (with the strap opening) holding it to the long gearbox mounting panel.
10. Carefully slide off the lift panel with the strap opening.
11. At this point make sure that nothing is jammed inside the assembly and that both rollers can rotate. Verify that the roller mechanisms are able to activate the micro switches.
12. Cut the cable tie to access the micro switch wire harness.
13. Using a Phillips screwdriver remove both micro switches and replace the whole micro switch wire harness. Be very careful when handling this part as the micro switch can be easily damaged.
14. Reassemble lift and test.



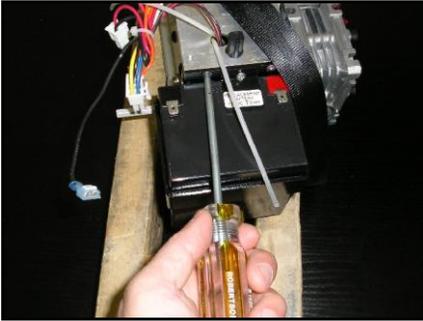
**Remove display panel**



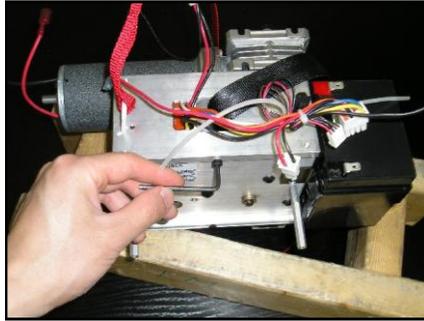
**Remove battery bracket**



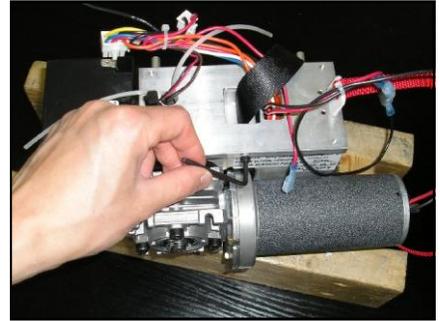
**Remove "battery sidewall" frame**



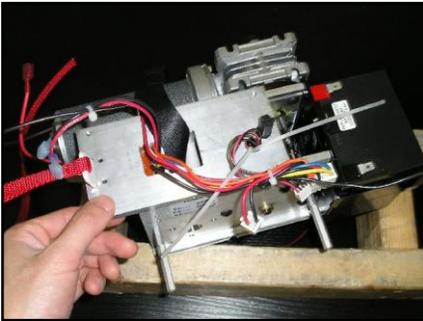
**Remove opposite "battery sidewall" frame fasteners**



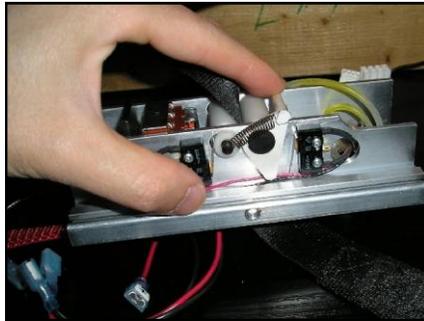
**Remove fastener on bottom panel on PCB side**



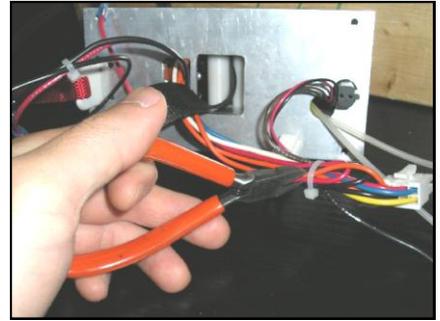
**Remove fastener on bottom panel on gearbox side**



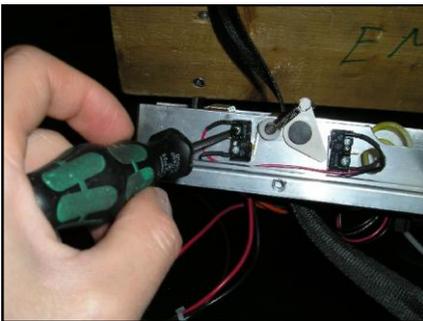
**Slide off panel with strap opening**



**Test Switches**



**Cut cable ties to free switch harnesses**



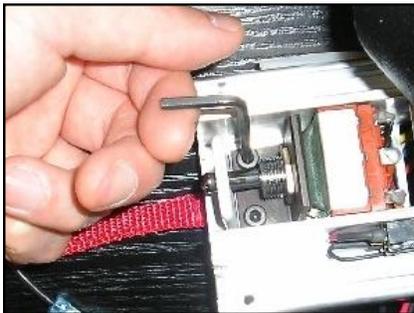
**Remove & replace switches**

## E7 – Repair/Replace Emergency Shut-Off with Pull Cord

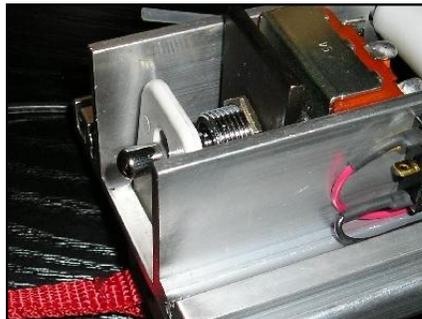
**IMPORTANT NOTE:** Use extreme caution when performing internal servicing on the lift. Ensure that the battery has been disconnected before starting.

The Emergency Shut-Off/Down with Pull Cord is a safety function that either cuts all power coming from the battery to the rest of the lift or allows the lift lower. When the cord is pulled and released the switch activates and all functions of the lift cease to operate. When the cord is pulled to full extension and held tight, the emergency lower function is activated. Because the Emergency switch is to be used only in the event of a lift malfunction, it can only be reset after a qualified technician has inspected the lift. Once the lift has been verified to work properly, the switch should be pushed in to re-activate all lift functions and restore power from the battery. If there are no problems with the lift and the Emergency Shut-Off with pull cord is either not shutting off the power to the lift and/or restoring power to the lift once pressed in, follow the below procedure to replace the switch.

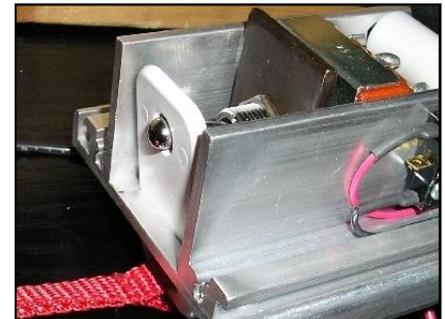
1. Remove the lift cover per section B1, Getting Access to the **C-450/C-625**.
2. Access the Emergency shutoff switch on the lift's bottom panel (with the strap opening) by following steps 1 – 10 as per section E5.
3. Verify that the plastic arm with pull cord moves freely and does move the switch lever from the open to closed, to emergency down position. Second, verify that the wires are connected. If the switch still does not operate, it must be replaced.
4. Using an M3 Allen Key remove the angle bracket that secures the switch to the bottom panel.
5. Using your fingers, unscrew the large threaded nut from the switch, to release the switch from the angle bracket.
6. Cut the cable tie of the switch harness; replace switch, re-assemble and test.



**Emergency Shut-off assembly**



**Switch in ON position**



**Switch after activation, OFF**

## MECHANICAL INSTRUCTION SHEETS

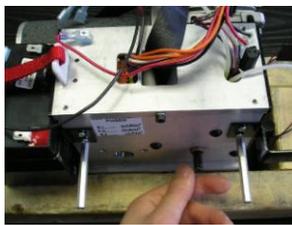
### M1 - Replace Lifting Strap – Frayed, Stress Streaks, Length

**IMPORTANT NOTE:** Use extreme caution when performing internal servicing on the lift. Ensure that the battery has been disconnected before starting.

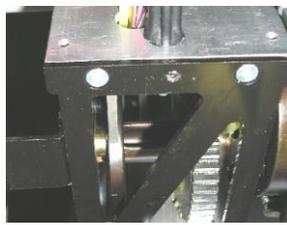
1. Using the DOWN button on the hand control release the entire strap (until the lower limit switch engages and stops the strap).
2. Remove the lift cover per section B1, Getting Access to the **C-450/C-625**. Also, remove the battery & its brackets (nearest to the strap pin) as per section E5, and remove the PCBs as per section E2.
3. Remove the C-Clip from the motor side of the main drive axle.
4. Using the large vice grips, grab hold of the free end of the shaft. Leave the C-clip attached to prevent accidental damage to the shaft. If damaged, the shaft will not fit back into gearbox. Gently rotate and pull at the same time to release shaft. Pressure may be applied to the gearbox to assist in the shaft removal.
5. Pull out and replace the old strap. It is very important that the end of the strap that is inserted into the shaft is oriented with the overlapped side facing towards the motor side of the lift & away from the gearbox side. Use two fingers to guide the strap.
6. Use a pencil or ballpoint pen to centre the strap through the gearbox.
7. Reinsert the shaft into the gearbox. DO NOT USE FORCE. If the strap has been centered properly, the shaft should move easily into position.
8. Replace the C-clip on the drive axle using needle nose pliers.
9. Operate the lift in the UP direction and the strap should start to wind into the gearbox.
10. Reassemble lift and test.



Remove C clip



Remove shaft



Place strap into slot

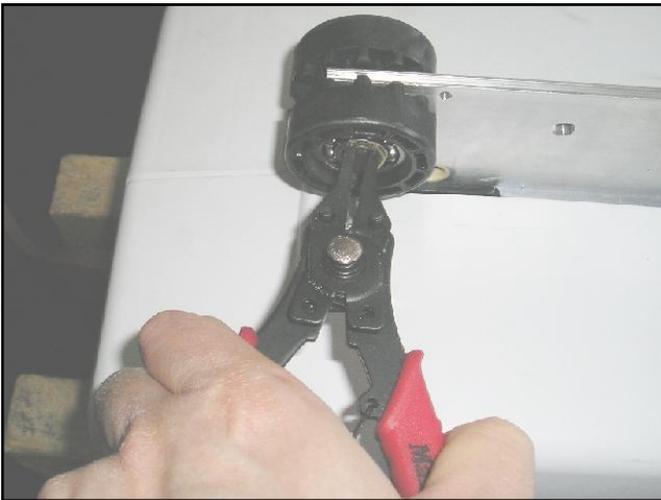


Folded strap facing motor

## M2 - Replace Trolley Wheels

**IMPORTANT NOTE:** Ensure that the lift is fully supported at all times. Take great care in protecting the PCB. There is a tendency to turn the lift over, thus damaging or breaking the aluminum standoffs that support the PCB.

1. The same procedure is used to replace any manual or charger trolley wheel assembly.
2. Insert the pin ends of the snap ring removal tool into the trolley wheel snap ring holes.
3. Slowly, firmly squeeze the handles of the snap ring removal tool together to open up the snap ring out of the trolley wheel shaft groove to remove it.
4. Carefully slide the trolley wheel free from the shaft while taking care not to lose the washer.
5. Place the new trolley wheel onto the shaft past the snap ring groove.
6. Place a new snap ring centered against the shaft and slightly pry it apart gently with the snap ring tool until it is open enough to allow it to be slipped into the groove. Ensure that trolley wheels are straight and inline with each other.



Pry off snap ring using snap ring tool



Remove & replace wheel from shaft

## M3 - Replace Traversing Drive Motor, Traversing Gear and Traverse Idle Gear

**IMPORTANT NOTE:** Ensure that the lift is fully supported at all times. Take great care in protecting the PCB. There is a tendency to turn the lift over, thus damaging or breaking the aluminum standoffs that support the PCB.

1. The traverse idle gear may be most easily removed by first removing the trolley wheels with which they mesh – follow the instructions of section M2 to remove the trolley wheels.
2. Remove the C-450/C-625 lift covers as per all of section B1 and section E5, step 2 to safely access the traverse idle gear.
3. Use a M2.5 Allen key to unfasten and remove the M3 screw & nut with the traverse idle gear.
4. The traverse idle gear can be replaced now & refastened; the trolley wheels should be now placed back into position (ref. section M2).
5. If the traversing drive motor or gear require service, follow steps 1-4 of section M1 NOTING only to remove the shaft only as much as to disengage it from the one wall of the lift motor and ensure BOTH batteries with their brackets are removed.
6. Follow steps 6 - 8 in section E5.
7. Carefully slide out the traversing motor mounting plate along with the attached gear box bottom panel until the traversing motor & gear are accessible.
8. The traversing gear can be removed by pulling it off of the traversing motor shaft by hand.
9. With the traversing gear removed, the traversing motor can be removed by unfastening the 3 #12-24 hex head screws with a ratcheting wrench and extension with a 5/16" socket.
10. Follow the previous steps in reverse to mount the new traverse motor & gear and to slide the gear box plates back into place to fasten them.
11. Reconnect the wire harnesses, airline tubes on the auxiliary board and connect the battery to test the system before re-assembly.



Unfasten idle gear



Slide out gear box panels



Remove traverse gear



Remove chain drive

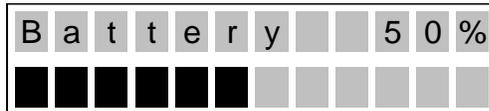
## LCD Display & Programming Functionality

- **Default Display Modes:**

- The user can set either of the following as the ‘Default’ display mode:
  - 1.– Battery Level (the factory setting for the Default Display Mode); or,
  - 2.– Number of Lifts.

- In Battery Level Mode the lift will:

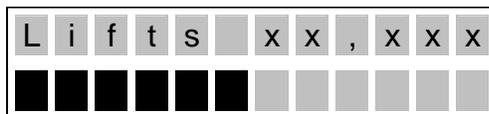
1. Display the word, “Battery”, with the percentage charged (in 10% increments) in the top row of the display (e.g., “Battery Level 60%”).
2. Display a “Bar Graph” of the battery level in the second row of the display by displaying the appropriate number of fully blackened rectangles as in the following diagram (note: as there are 12 characters, the charge percentage will be divided by 8.333 and rounded DOWN to determine how many rectangle characters are shown):



- Note: As the lift is initially switched on, the level of battery charge displayed may be incorrect. However, as soon as the lift is actually operated, the charge level will update to the correct level.

- In Number of Lifts Mode the lift will:

3. Display the word, “Lifts”, with the number of lifts completed in the top row of the display (e.g., “Lifts 500”) and a bar graph to indicate the battery level as in Battery Level Mode:

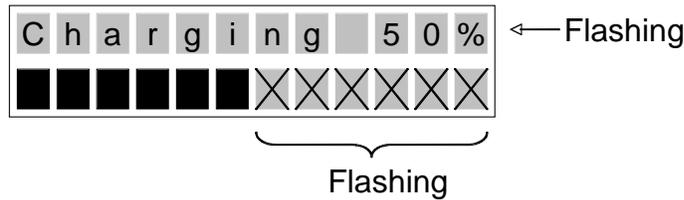


- In any ‘Default display mode’, if the battery levels fall below 25%, the lift will go into Low Battery Mode. The lift will then:

4. Make an audible beeping sound every ten (10) seconds.
5. The display should flash “Low Battery” in the first line.
6. The bars indicating charge level should flash on and off.

## LCD Display & Programming Functionality

- In any ‘Default display mode’, if the unit is in the charger the lift will go into Charging Display Mode regardless what the user has selected as ‘Default Display Mode’. Charging Display Mode should over-ride Low Battery Mode.
- The lift will then:
  7. Display a flashing “Charging” with the percentage charged (in 10% increments) in the top row of the display (e.g., “Charging 60”).
  8. Show the appropriate number of fully blackened out cells, with the remaining cells in the bottom row flashing.



- **To enter programming mode:**
  - Hold the ‘Up’ and ‘Down’ buttons simultaneously for three (3) seconds.
  - The lift will then:
    9. Beep three (3) times. Display a flashing “Entering Programming Mode” for two (2) seconds.
    10. Go to the first programming option.
  - If the user continues to hold the ‘Up’ and ‘Down’ buttons for longer than the display flashes, “Entering Programming Mode”, the unit will exit the programming mode.
- **To exit programming mode:**
  - If no buttons are pressed for ten (10) seconds the unit exits the programming mode automatically. The lift should then:
    11. Beep three (3) times. (the beep should be as loud as the existing emergency down alarm)
    12. Display a flashing “Exiting Programming Mode” for two (2) seconds.
    13. Go back to the standard display mode.
- **Programming Mode:**
  - Whenever in Programming Mode, the top line of the display should read, “PROGRAM MODE”. Depending on what is being programmed, the second line should then change:
 

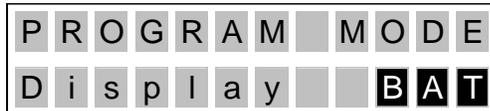
P	R	O	G	R	A	M		M	O	D	E
D	i	s	p	l	a	y			B	A	T
  - Using the ‘Up’ and ‘Down’ buttons, the user should then be able to cycle through their choices.

## LCD Display & Programming Functionality

- **Change Setting Mode:**

- To change one of the programmable settings, the user should press the ‘Up’ and ‘Down’ buttons simultaneously when a particular setting is being displayed.

14. The display will then display the setting name and the setting itself. The setting will then display as reverse-highlighted (as in the following example)



- Once in Change Setting Mode, the user can cycle through the possible settings by using the ‘Up’ and ‘Down’ buttons. The setting should remain highlighted as the user cycles through their options.

- To select the setting, the user then presses the ‘Up’ and ‘Down’ buttons simultaneously for three (3) seconds. The lift should then:

15. Beep one (1) time.

16. Go back into Programming Mode and allow the user to cycle through the other settings using the ‘Up’ and ‘Down’ buttons.

- If the user does not press any buttons for ten (10) seconds while in Change Setting Mode the lift should revert back to Programming Mode.

- **Programming Options:**

- The programming mode will offer the following choices:

1.–Display Mode (see above)

- (i) Battery Level (factory setting)
- (ii) Number of Lifts

2.–Traversing Speed:

- (i) 2
- (ii) 4
- (iii) 8 (factory setting)

3.–Preventative Maintenance Alarm:

- (i) On
- (ii) Off (factory setting)

4.–Maintenance

- (i) Total Number of lifts (display only, not programmable)
- (ii) Lifts since last maintenance (see ‘Preventative Maintenance’, below)
- (iii) Total number of lift hours (display only, not programmable).
- (iv) Total lift hours since last maintenance (see ‘Preventative Maintenance’, below)

## LCD Display & Programming Functionality

– If the lift has the return-to-charge (“RTC”) feature, the following programming choices will also be available:

1.–RTC Max. Time

- (i) 60 seconds
- (ii) 120 seconds (factory setting)
- (iii) 180 seconds
- (iv) 240 seconds

2.–RTC Drop Time

- (i) 9 seconds
- (ii) 12 seconds
- (iii) 15 seconds
- (iv) 18 seconds
- (v) 21 seconds
- (vi) 24 seconds

3.–RTC Speed

- (i) 2
- (ii) 4 (factory setting)
- (iii) 8

- **Measuring Lifts**

- The lift should add one to the lift counter if the lift has been operated under load (i.e., approx. 60 lbs. with 2’ of travel).

- **Preventative Maintenance**

- Preventative maintenance should be completed every six (6) months. The lift should recommend preventative maintenance if it hasn’t had any preventative maintenance for:

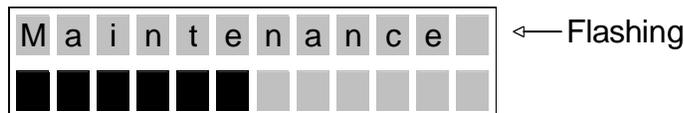
- 1.–1,000 lifts (four or five lifts a day 180 days); or,

- 2.–Five (5) hours.

- To recommend preventative maintenance, the Lift will:

- 17. Beep one (1) time every thirty (30) minutes, this can be silenced or over-ridden by the user by changing a setting, see above.

- 18. Flash “Maintenance” in the first line of the display (regardless of which default display mode the user has selected).



- To reset the counter which notifies the lift when to signal for preventative maintenance, see the following section titled, “Resetting The Lift Counter”.

## LCD Display & Programming Functionality

- **Resetting The Lift Counter**

1. The lift must be in power off state.
2. While pressing both Up/Down buttons on hand control, turn “ON” lift. A minimum of 10 seconds must pass followed by a beep to indicate completion of the reset.
3. PM lifts count will be “zero”.
4. Use lift as normal.

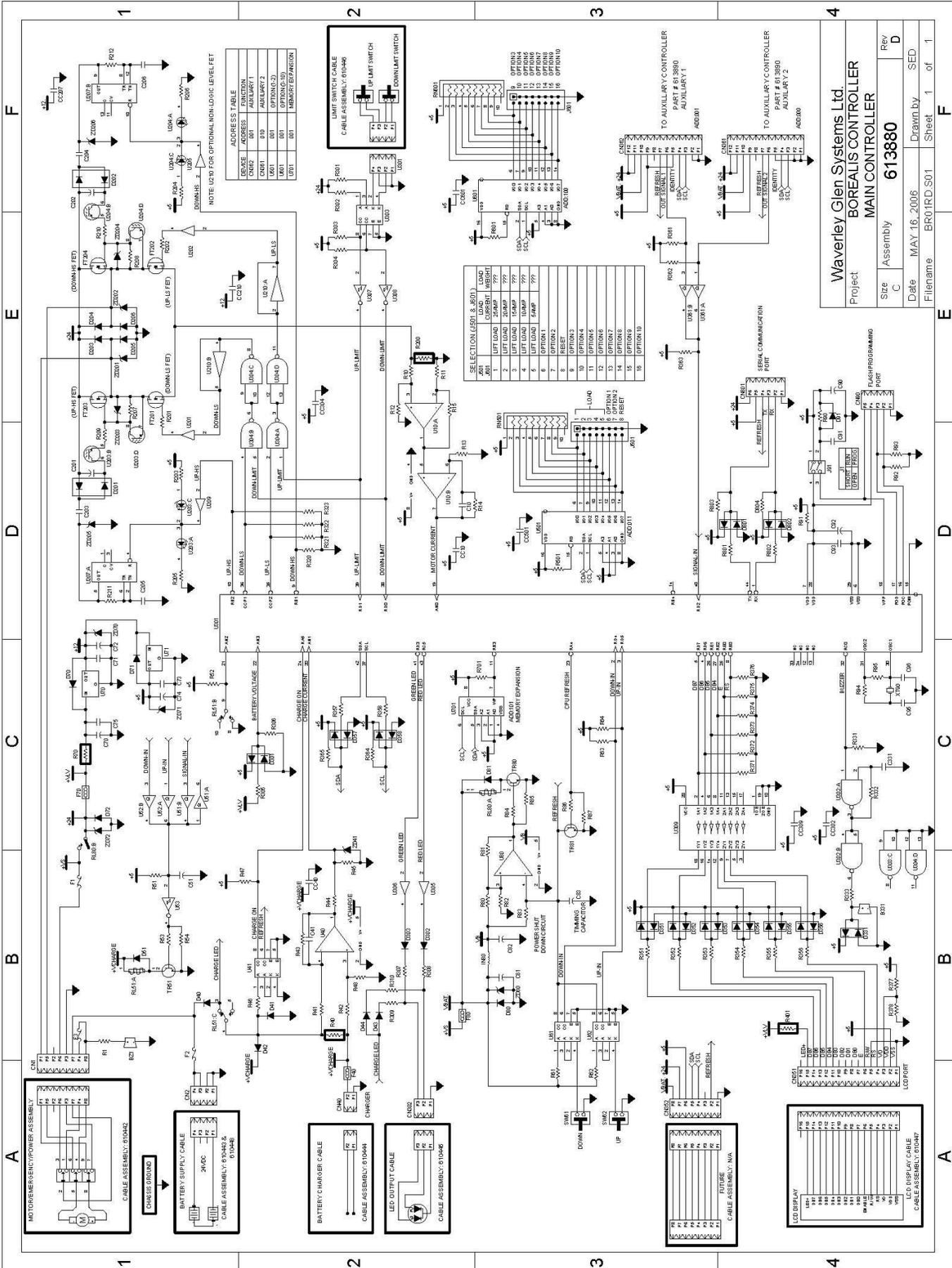
## Tool List

The lifts have been designed to minimize the tools required for servicing the lifts. Common and swappable components provides for efficient servicing.

The following is a list of tools required for basic repairs and servicing:

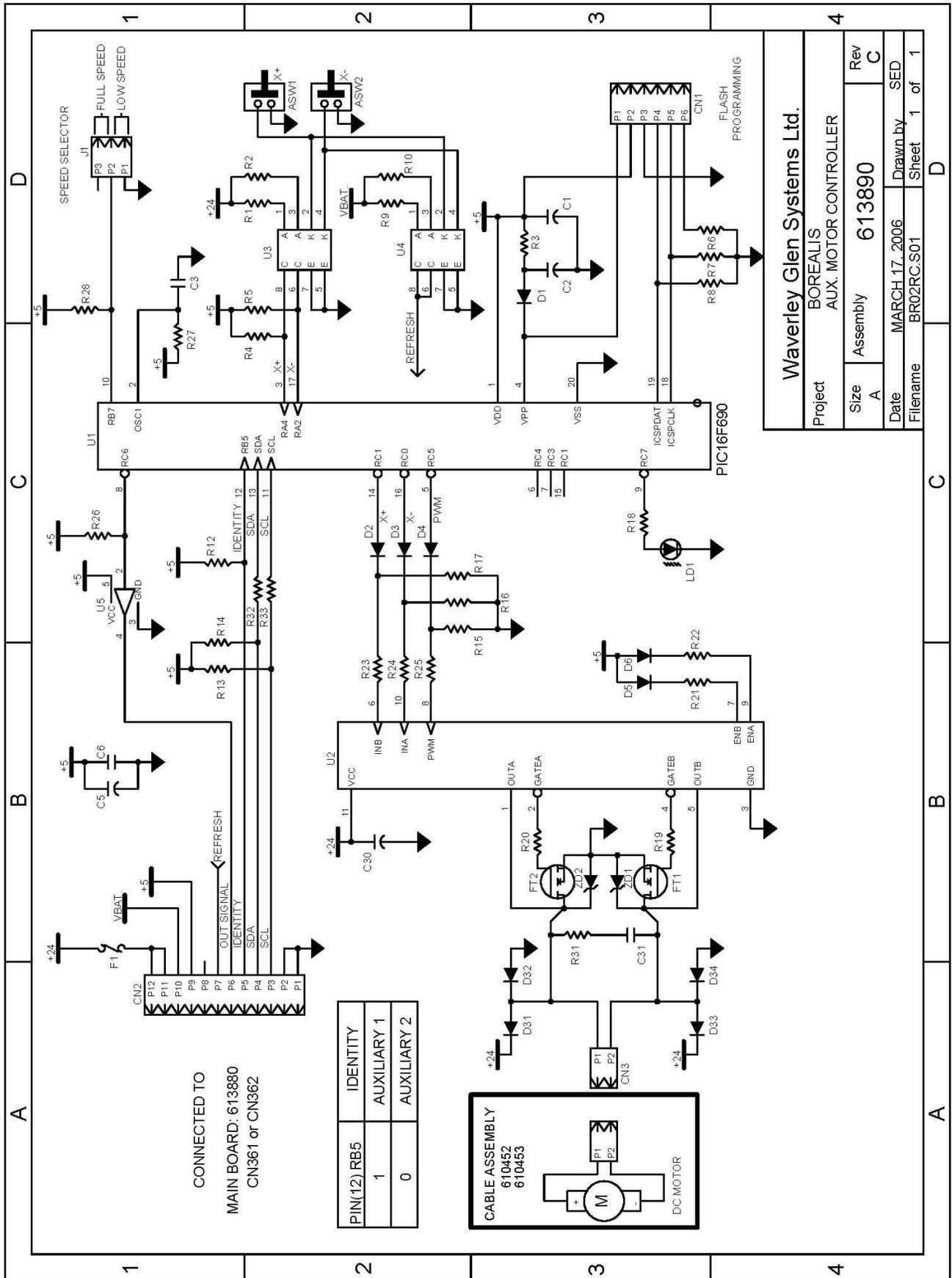
- a) Philips Screwdriver – medium
- b) Phillips Screwdriver - small
- c) Robertson Screwdriver - medium
- d) M2.5 Allen key
- e) M3 Allen Key
- f) Pliers
- g) Cutting Pliers
- h) Circlip Pliers
- i) Ratchet Wrench with 5/16” Socket & Extension





Waverley Glen Systems Ltd  
 Project BOREALIS CONTROLLER  
 MAIN CONTROLLER

Size	C	Rev	D
Assembly	613880	Drawn by	SED
Date	MAY 16, 2006	Sheet	1 of 1
Filename	BR01RD.S01		



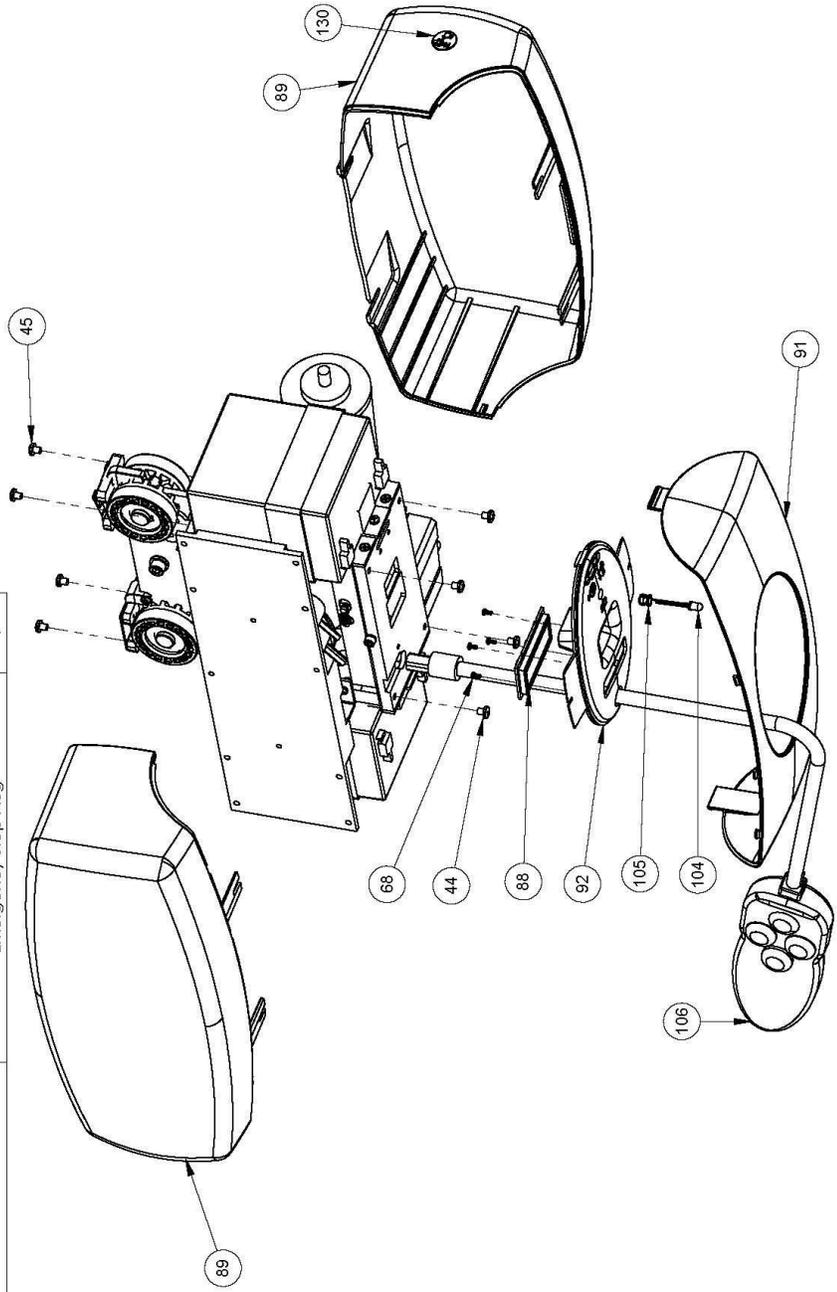
## Service Parts List (C-450/C-625)

### Circuit Boards

613890	C-450/C-625 Aux. Controller
610519	Soneil charger 24V 1.5 amps

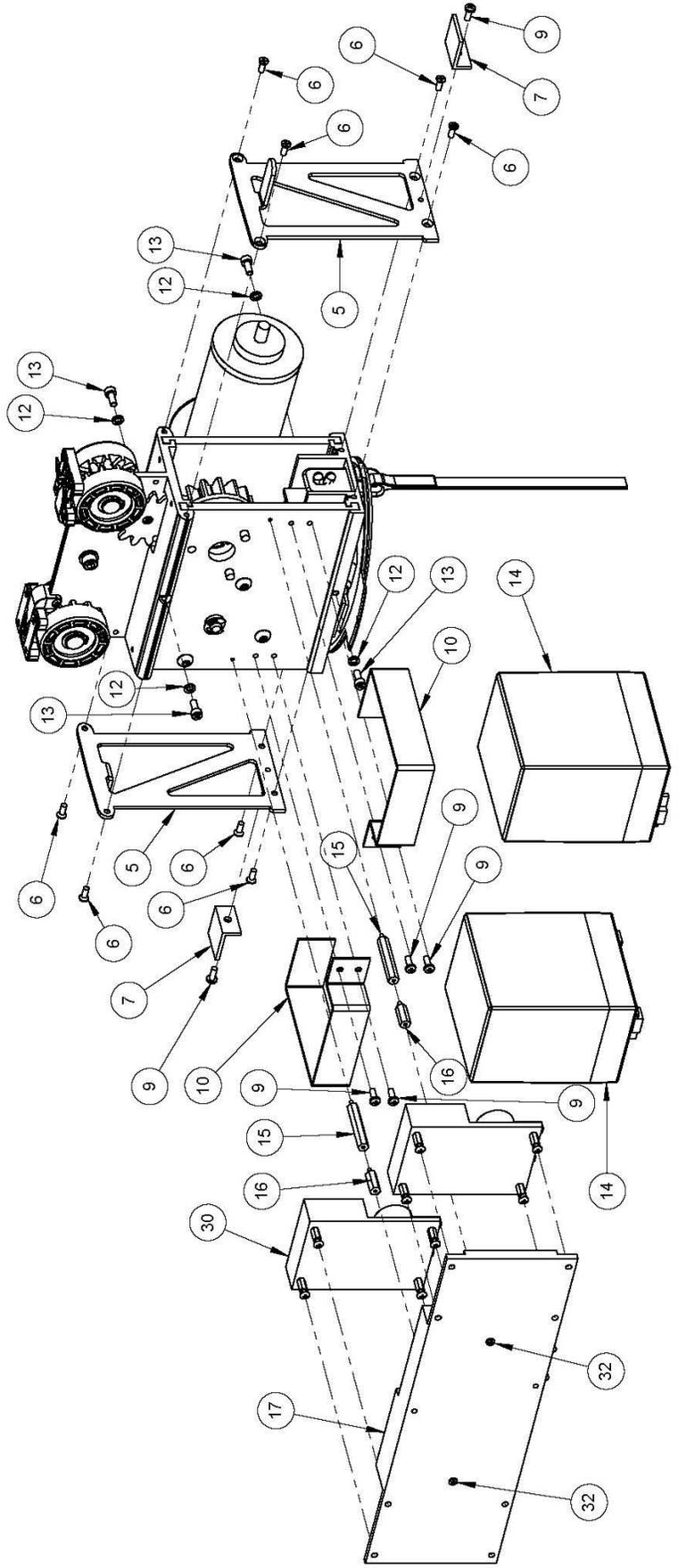
### C-SERIES COVER ASSEMBLY

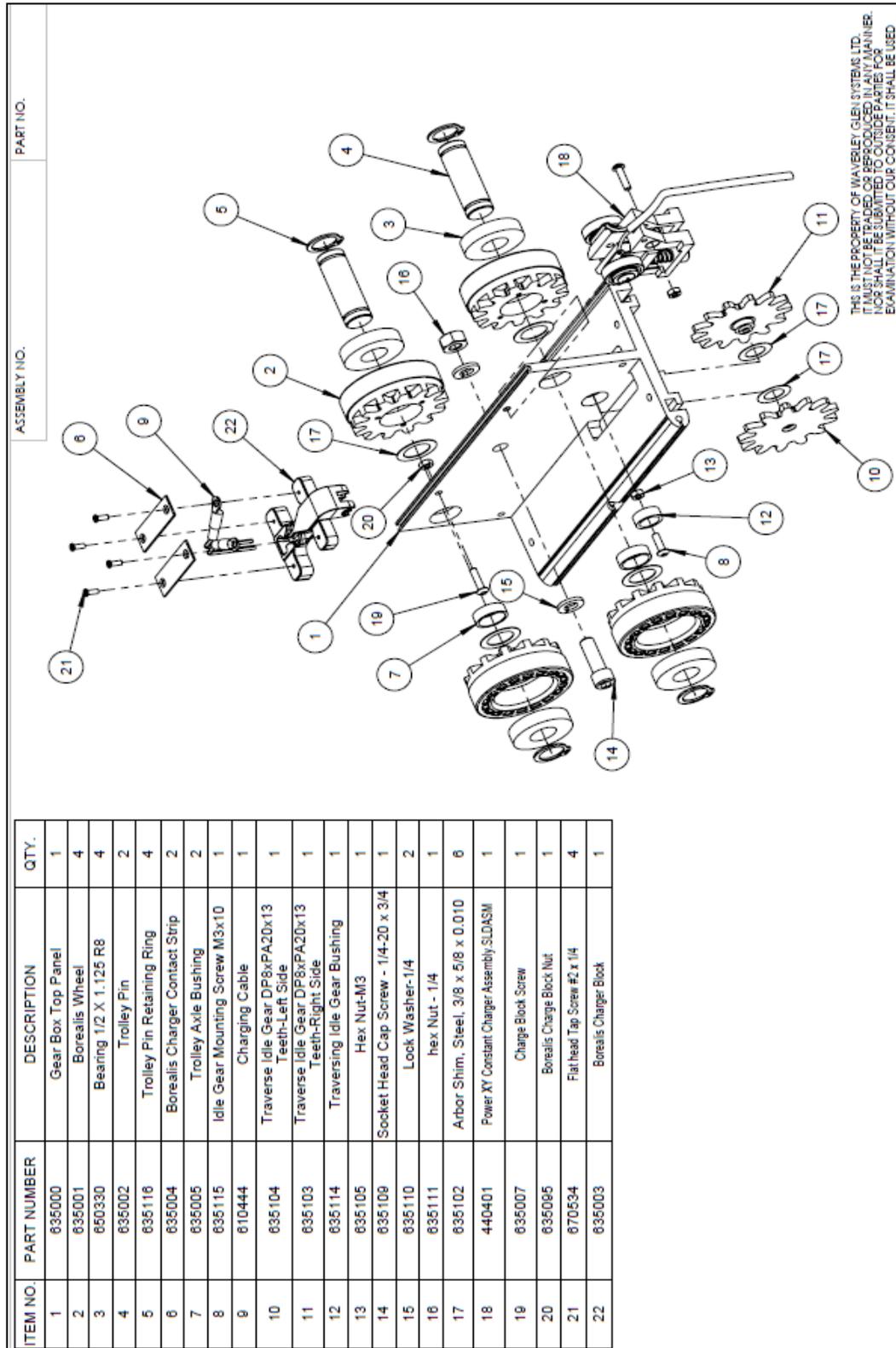
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
44	635006	Borealis Cover Screw 8-32x.188	4
45	635815	M5 X 8 Pozzi Countersunk Machine Screw BZP	4
68	635053	Pan Cross Head Machine Screw #2-56 x0.188	4
88	610447	Crystal Font Display	1
89	635096	Main Cover	2
91	635098	Middle Cover	1
92	635099	Middle Cover Insert	1
104	610440	LED, 5mm, Green	1
105	610441	LED Bushing, 5mm	1
106	635020-2 Way, 635107-4 Way, 635108-6 Way	Hand Control w/ Cord	1
107	635057	Label - Borealis SN (CSA Mcfentail)	1
108	635118	Label - WGS Logo Slicker	1
109	710600	Label - WGS Hand Control Transparency	1
130	635106	Emergency Stop Plug	1



### BOREALIS BATTERY AND BOARD ASSEMBLY

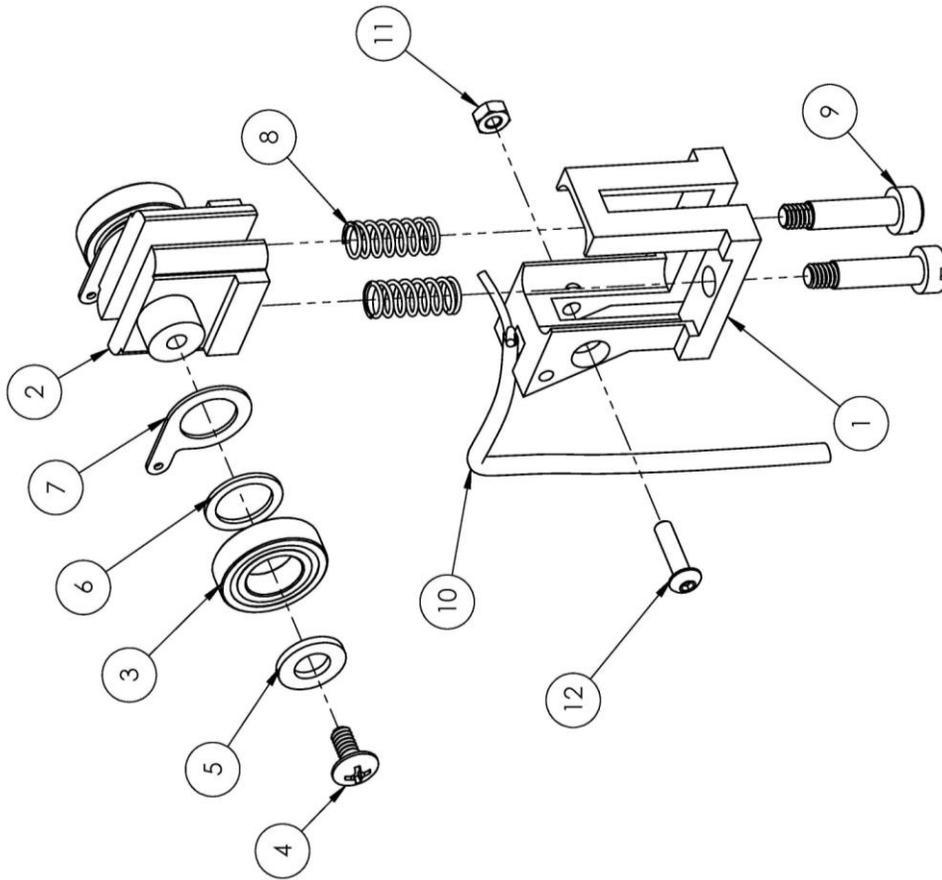
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
5	635047	Battery Bracket	2
6	635052	Battery Bracket Screw	8
7	635051	Battery Holder - Angle	2
9	630320	Pan Head Self-Tap #6 x .375 Battery Holder	6
10	635046	Battery Holder	2
12	635022	Lock Washer - M4	4
13	635023	Socket Head Cap Screw - M4 x 10	4
14	635045	Borealis Battery	2
15	430416	Standoff 1/4x4-40 x 1.5in-Alu	2
16	635050	Standoff 1/4x4-40 x .625in-Alu	2
17	613880	Borealis Main Board	1
18	635112	Label - Battery Replacement 5.0	2
19	670563	Label - Replacement Fuses	1
20	670562	Label - Caution Disconnect	1
21	610479	Motor Cable Assembly	1
22	610443	Battery Cable Assembly	1
23	610448	Battery Series Jumper Cable	1
30	613890	Borealis Aux. Controller	2
32	430420	Pan Head Screw #4-40 X .375	2





ASSEMBLY NO. PART NO. 440401

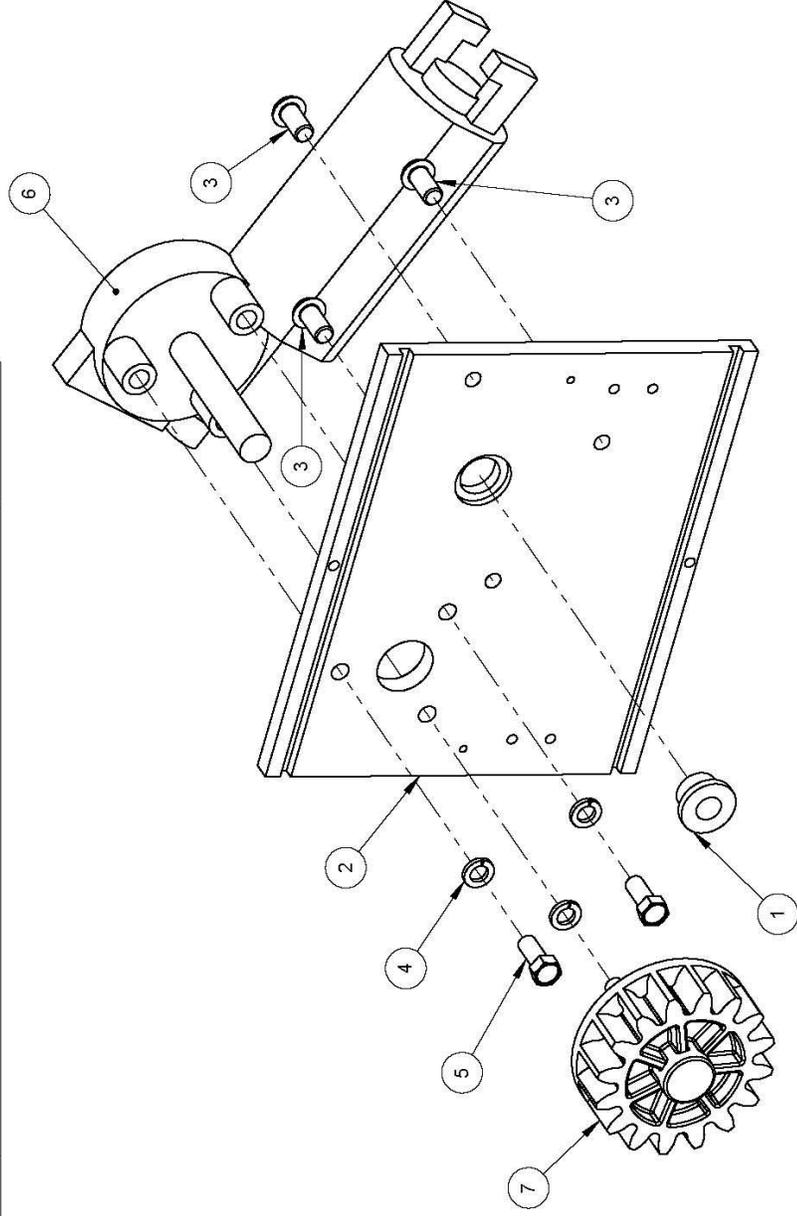
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	635165	Power Charger Base	1
2	635166	Power Charger Slider	2
3	635144	Bearing 10 mm x 5 mm, Double Shielded	2
4	635151	Phillips Head Screw SS 6-32 x 5/16	2
5	635149	Power Charger Outer Washer	2
6	635148	Power Transfer Inner Washer	2
7	635147	Power Transfer Connector	2
8	635147	Power Charger Spring	2
9	635168	Power Charger Guide Screw-MCM91829A.206	2
10	635107	Power XY Cable Assembly	1
11	635095	Charging Block Nut	1
12	635813	Charger Block Screw	1



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### BOREALIS LEFT PLATE ASSEMBLY

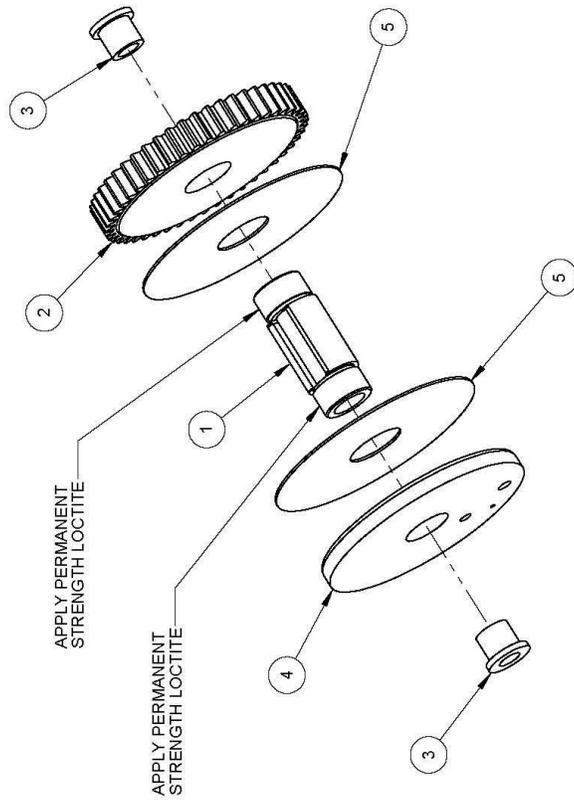
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	635033	Gear Box Bushing	1
2	635044	Gear Box Left Side	1
3	635032	Socket Button Head Cap Screw - M6 X 12	3
4	635101	Lock Washer - #12	3
5	410415	Hex Head Machine Screw #12 x 1/2	3
6	650400	Drive Motor - 24V IIT CONS	1
7	635100	Traversing Gear 8DP x 20PA x 16 Teeth	1





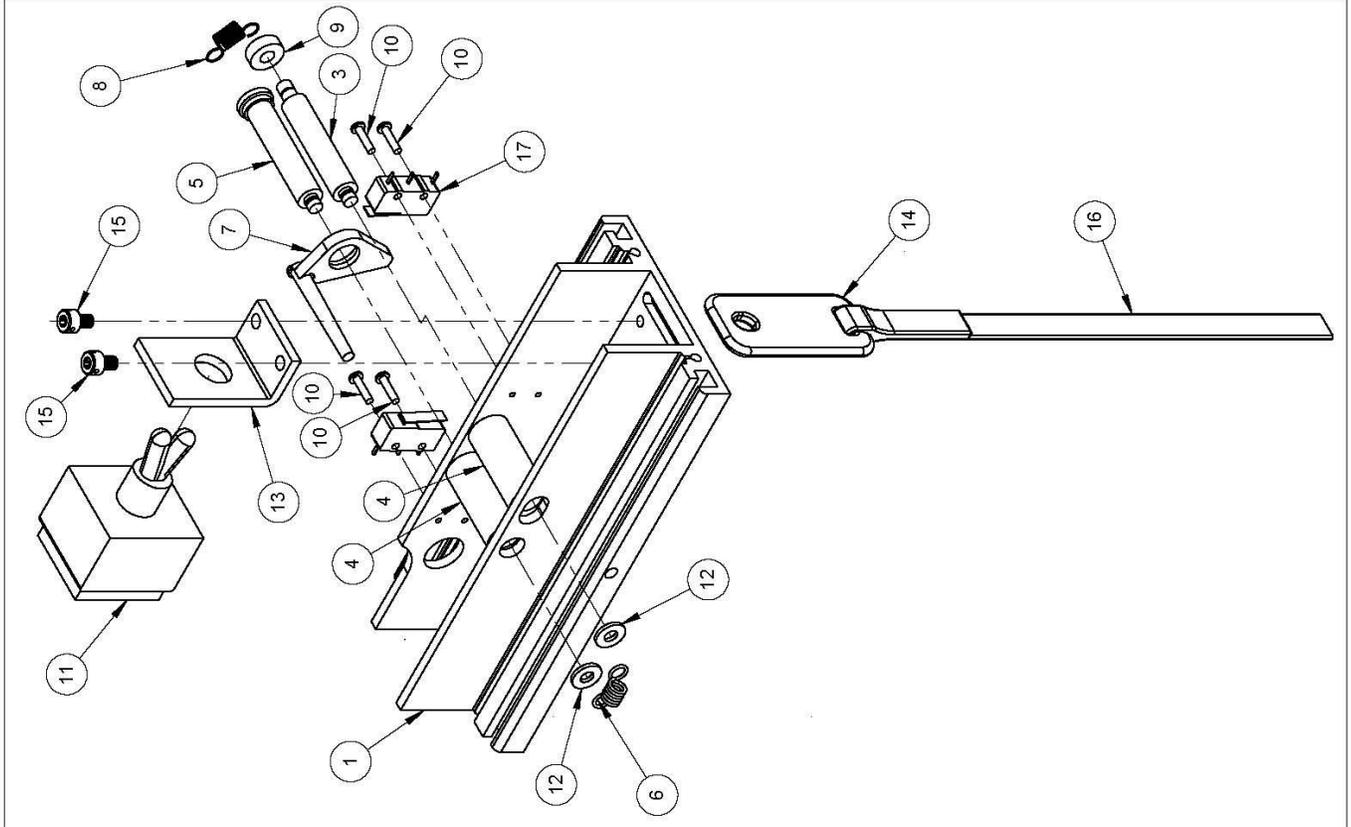
**C-SERIES TAPE GEAR ASSEMBLY**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	635026	Tape Gear Hub	1
2	635027	Tape Reel Gear - 48 Teeth	1
3	635024	Tape Gear Bushing	2
4	635025	Tape Gear Over Speed Arm Support	1
5	635125	C-Series Strap Guide	2



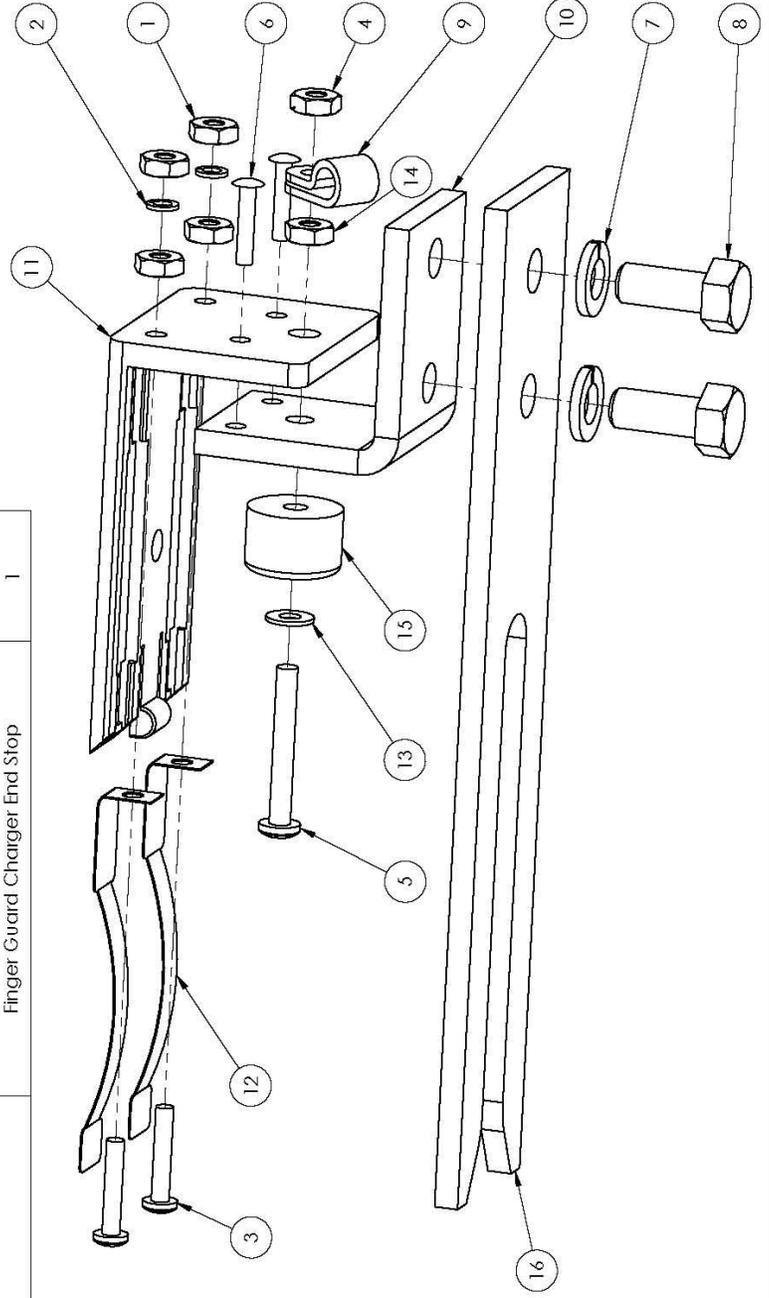
### BOREALIS BOTTOM PLATE ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	635008	Gear Box Bottom Panel	1
3	635012	Upper Limit Roller Shaft	1
4	635019	Strap Roller	2
5	635011	Slack Tape Roller Shaft	1
6	635018	Extension Spring Joining	1
7	635010	Slack Tape Activator	1
8	635014	Slack Tape Extension Spring	1
9	635013	Upper Limit Activator	1
10	610348	Tapping Screw 2-56 x 3/8 inch	4
11	610442	Emer. Stop/Lower Toggle Switch Cable	1
12	635017	Roller Shaft Washer	2
13	635009	Emerg. Stop Switch Bracket	1
14	635015	Emerg. Stop Sleeve	1
15	635016	Socket Head Cap Screw - M4 x 6	2
16	635021	Emerg. Stop Strap	1
17	610446	Limit Switch Cable Assembly	1



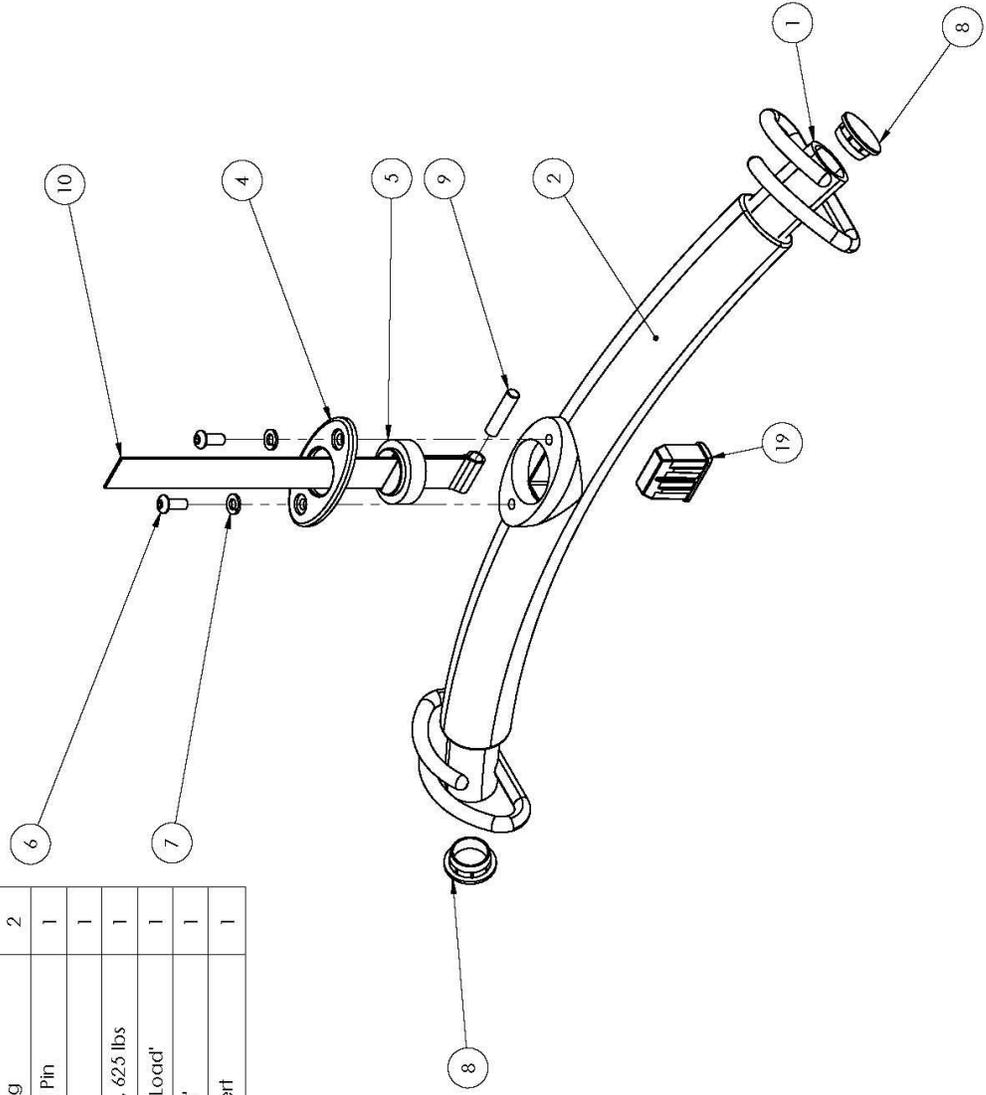
**BOREALIS CHARGER ENDSTOP ASSEMBLY**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	630335	Brass Nut 6-32	4
2	630340	Bronze Lockwasher 6 X .031	2
3	630365	Brass Pan Head Bolt 6-32 X 3/4	2
4	610345	Nylok Nut 8-32	1
5	630310	Pan Head Bolt 8-32 X 1 1/4	1
6	650136	Dome Head Open-end Pop Rivet - AD48ABS	2
7	640170	Lock Washer 5/16 X 0.078 THK	2
8	640160	Hex Head Bolt 5/16-18 X 3/4	2
9	610343	Nylon Cable Clamp - 1/4	1
10	640101	Endstop Bracket	1
11	670529	Charger Endstop Bracket	1
12	670535	Charger Endstop Spring	2
13	630215	Washer 8 X .031 THK	1
14	640135	Hex Screw Nut 8-32	1
15	640130	Rubber Bumper 3/4 X 1/2	1
16	670556	Finger Guard Charger End Stop	1



**BOREALIS LOW HEIGHT CARRY BAR ASSEMBLY**

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	635087	Low Height Carry Bar Weldment	1
2	635093	Low Height Carry Bar Foam	1
4	635088	Swivel Support Plate	1
5	635090	Swivel Insert	1
6	430715	Socket Button Head Screw 1/4-20 X 1/2	2
7	630406	Lock Washer - 1/4, Zinc Plated	2
8	635091	Low Height Carry Bar Plug	2
9	635089	Low Height Carry Bar Strap Pin	1
10	413743	Borealis Strap	1
11	635120	Label- Borealis Carry Bar Load, 625 lbs	1
12	610868	Label - "Do Not Exceed Max Load"	1
13	610869	Label - "WGS Slings Only"	1
19	635092	Low Height Carry Bar Insert	1





**PREVENTIVE MAINTENANCE CHECKLIST  
C-450 / C-625 LIFT**

Lift Serial Number:	
Serial Number:	
Installation Date:	
Customer:	
Address:	

PM Procedures are to be conducted every 6 months as follows:

**1) Pneumatic System**

- Check hand control
- Check Airline Tubing
- Check grommet connectors

**SEMI ANNUAL / ANNUAL INSPECTIONS**

	1	2	3	4	5	6	7	8	9	10

**2) Electrical System**

- Check Batteries
- Check charger and charger connections
- Check wire harnesses
- Check Up & Down Limit Switch
- Check LED Indicator & LCD Display
- Check electric On/Off, emergency lowering & emergency shut off

**SEMI ANNUAL / ANNUAL INSPECTIONS**

	1	2	3	4	5	6	7	8	9	10

**3) Mechanical System**

- Check carry bar
- Check lifting strap
- Check trolley wheels & traversing drives
- Check motor & gears

**SEMI ANNUAL / ANNUAL INSPECTIONS**

	1	2	3	4	5	6	7	8	9	10

**4) Track and Accessories**

- Check that Endstops are tight
- Check XY trolleys for smooth operation through full range
- Check set screws on ceiling bracket are tight
- Check Gate assembly for any binding and confirm operation through gate
- Check turntable for any binding and confirm operation throughout

**SEMI ANNUAL / ANNUAL INSPECTIONS**

	1	2	3	4	5	6	7	8	9	10

**Notes:**

- 1- Safe working load tests should be conducted on the lift only after 7 years of use and annually thereafter.