

COMBiLiFT

LIFTING INNOVATION

Dear Customer,

Thank you for choosing us and showing your faith in the Combilift range of products. With this Combilift Product you now own a machine designed by our team of experienced engineers using the most up to date design techniques and technology with the sole aim of producing a machine that is efficient, reliable, safe and the right tool for your businesses material handling needs. The Combilift product possesses a vast range of multi functional application possibilities that makes it one of the leading products in the material handling industry.

Combilift Ltd

The Purpose of this operators Manual

This Manual contains all of the information you will require to operate your Combilift product safely and efficiently. It is essential that this manual remain with the machine at all times. It is essential that the operator read this manual before attempting to operate the Combilift.

Always follow all safety instructions laid out in this manual

All instructions, prohibitive or otherwise, found in this manual should be adhered to at all times. They are there to protect your life and the lives of others.

Always perform the Daily Inspection as indicated in this manual and follow the guidelines on service intervals.

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Preface:

This manual has been written to provide the operator of the Combilift product with information in order to ensure that the Combilift is operated in a safe and efficient manner. It does not take precedence over any local or nationally applicable laws or regulations with regard to the operation of lift trucks. If you are unsure, contact your local authorities in order to determine what tests and training courses must be completed in order to be fully qualified in the operation of this type of material handling equipment.

The information within has been arranged in a manner to ensure the safe operation of the machine. As can be seen the general principles of safe operation are presented before how the machine actually operates. It is essential that the operators spend time familiarising themselves not only with the machine, but with the information contained in this manual also.

Throughout this manual there are a number of instructions that have been highlighted in a number of ways. These instructions must be followed at all times as they indicate warnings and advice, that if not heeded can result in damage to the truck, product, or property. In the worst case failure to adhere to the warnings and advice can result in serious injury and even death.

The table of contents overleaf shows the structure of the information contained in this manual and makes for easier location of information.

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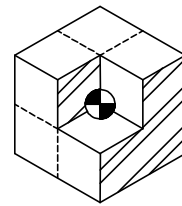
Section 1: Operating Instructions & Conditions

1.1: Understand the Capacity of your Lift-Truck

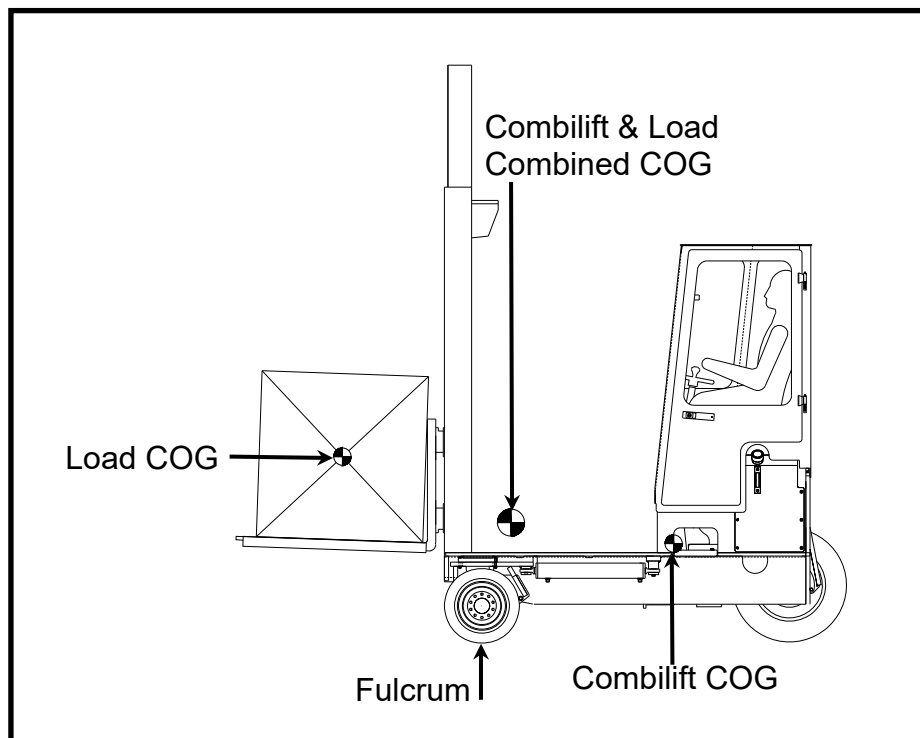
The basic function of a lift truck is to lift, move and place materials. It operates on the seesaw principle - two weights on opposite sides of a fulcrum. In this case, the load on the forks must be balanced by the weight of the Combilift. The location of the centre of gravity of both the Combilift and the load is a major factor.

1.2: Centre of Gravity (COG)

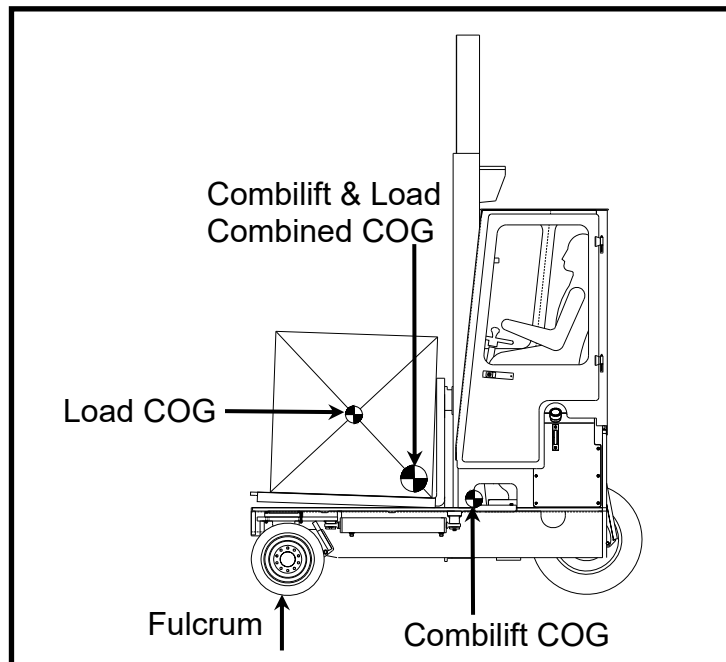
The centre of gravity of any object is the single point about which the object is balanced in all directions. Every object has a centre of gravity. When the lift truck picks up a load, the truck and load have a new, combined centre of gravity.



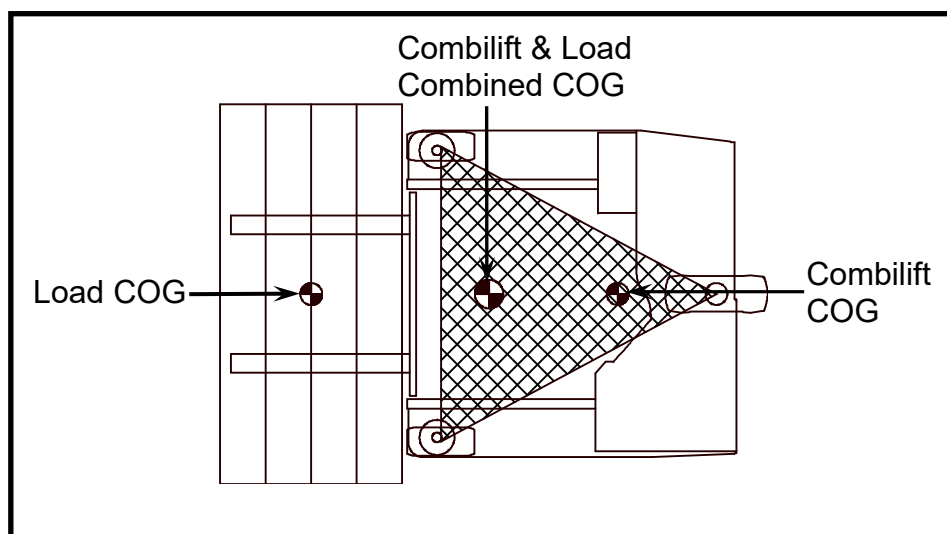
The Combilift has moving parts that change its centre of gravity. The centre of gravity moves forward and back as the mast is extended and retracted and also as the mast is tilted backwards and forwards. The centre of gravity also moves up and down as the mast moves up and down.



The centre of gravity and therefore stability is also affected by the size, weight, shape and position of the load; the height to which it is raised; extension of mast forward and backward; tilt and side shift. Truck movement such as acceleration, braking, turning and uneven surfaces will also affect truck stability.

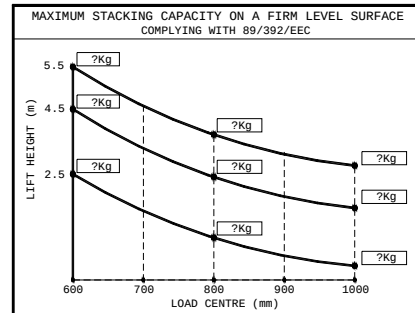


To keep the lift truck stable, the centre of gravity must stay within the area of the lift truck represented by a triangle drawn between the three wheels. If the centre of gravity moves forward of the triangle front, the lift truck will tip forwards. If it moves outside the right or left of the triangle the truck will tip to the side.



1.3: Load Chart

The rated capacity of the truck is illustrated on a load chart located inside the cabin. The load centre is determined by its centre of gravity and is measured from the front face of the forks to the centre of gravity of the load. It is assumed that the centre of gravity in the vertical direction is no greater than the specified horizontal load centre.



It is the responsibility of the operator to determine that the weight of the load to be handled is not greater than the capacity shown on the load chart. The operator **must not** handle any load that is greater than the capacity shown.

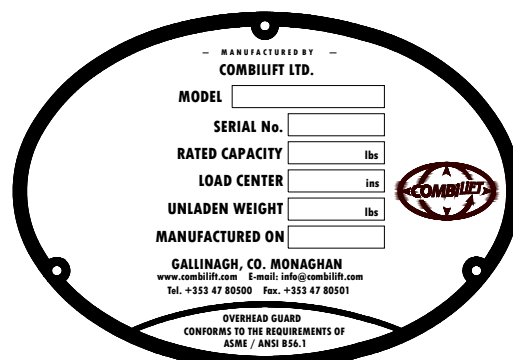
1.4: Serial Plate

The Serial Plate is located inside the operator's cabin on every Combilift truck. Please ensure that you are aware of the location of the serial plate on your truck. It is engraved with a number of details, which are required by law. These are:

- The model of the truck
- The serial number of the truck
- The trucks rated Capacity
- It's unladen weight
- It's date of manufacture
- The manufacturers name and address.



Metric Serial Plate



Imperial Serial Plate

This plate should not be removed by anyone. If lost order a replacement from Combilift immediately.

1.5: Operator Qualification

- The operator of the Combilift must be qualified to operate the truck through successful completion of a training program delivered by Combilift Driver training personnel or a Combilift authorised training organisation.
- Operators shall be aware of all local authority regulations and laws regarding the qualification of material handling equipment operators.
- No one shall operate the truck if impaired due to intoxication or drug reaction.
- Always ensure that the truck is in good working order before commencing work. This is achieved by performing the pre-use inspection. The inspection is to be carried out at the beginning of the working day or at the start of each shift.
- It is the operators responsibility to perform the pre-use inspection before each shift. The Inspection and how it should be conducted is covered later in this publication.
- Operation of the truck controls is only permitted when the operator is sitting on the operators seat in the cabin with the seatbelt buckled and the cabin door closed and latched securely.
- Never place any part of the body outside the confines of the cabin when operating the truck.
- Diagnosis and repair of the truck shall be performed by trained competent technicians unimpaired by intoxication or drug reaction.
- Unless authorised and trained to do so, the operator must not attempt any repairs, but report defects immediately. When authorised to perform maintenance work and/or repairs, ALWAYS ensure that the appropriate Health and Safety regulations are strictly adhered to.
- Report any operational problems that may develop, (damaged pallets, ground surface breaking up etc.) which could not only reduce safety but also cause damage to the truck.
- Never attempt to exceed your truck's handling capacity and take all precautions to ensure the safety of others as well as yourself. In no circumstances should counterweights be added to increase capacity.
- Stop working and switch off if for any reason, the truck becomes unsafe or defective. Remove the key and place an 'out of order' sign in a prominent place on the truck.
- Prohibit unauthorised and untrained people from accessing the starting key and operating of the truck.
- The operator is responsible for visually monitoring the work area of the truck and preventing anyone from entering the area without permission. If a person enters the area while the truck is in operation, the operator shall stop the truck and instruct the person to leave the work area until the truck has been stopped. The person may then approach the machine in full view of the operator.

- Personnel being trained, educated, instructed or participating in a general training program may only work on or with the machine under constant supervision of an experienced supervisor.
- Work on the machine's electrical equipment may only be carried out by an electrician or by trained persons under the direction and supervision of an electrician.
- Work on the chassis, brakes and steering system may only be performed by trained, specialised personnel.
- Only trained, specialised personnel with specific knowledge of and experience in hydraulics may work on hydraulic units.
- If the mast mechanism malfunctions or becomes stuck in a raised position, operate the mast control lever to eliminate any slack in the chains. DO NOT go under the elevated parts of the truck to attempt to carry out repairs.



Warning



Every forklift operator must be trained in accordance with the rules provided by the relevant local Health and Safety Authority (HSA). Employers must ensure that each powered industrial truck operator is competent to operate a powered industrial truck safely, as demonstrated by the successful completion of the relevant training as specified by the relevant local authority. Operating a powered industrial truck without the proper training can cause serious injury or death.

1.6: Warning Decals

There are a number of different decals located around the Combilift. These decals have different functions. Some indicate warnings - such as nip points or moving parts, and some provide important information to the operator, such as grease point locations. It is important to study what each one means and where they are located.

1.7: Work Place Operating Conditions



Warning



Workplace situations are constantly changing. Check the work area before beginning each shift. If in doubt, consult with the relevant supervisor. Failure to observe new workplace conditions can lead to serious injury or death.

Operators must be aware of special situations in their workplace in order to avoid forklift accidents. Even if an operator works in the same area every day, there could be changes that affect safety, such as:

- Contractors doing maintenance
- Wet areas
- Overhead repair work

Be on the lookout for anything that might present a hazard such as:

- Potholes
- Pedestrian traffic
- Very narrow aisle ways
- Overhead obstructions
- Poor lighting making it hard to see hazards
- Wet, oily, or rough terrain
- Other equipment or vehicles operating in the area

Remember: Do not block any of the following safety critical items/areas with the truck or the materials being handled:

- Electrical panels
- Fire exits
- Emergency stop buttons
- Aisle ways
- Fire extinguishers/hoses

Ground Surface:

Floor, road and yard surfaces should be of adequate load capacity, firm, smooth and level. Approaches to kerbs, railway crossings etc. should also be firm, smooth and adequately ramped to prevent possible displacement.

Aisle Dimensions:

Aisles should be arranged to eliminate corners, angles, inclines, steep ramps, narrow passages and low ceilings. When operating in guided aisles ensure that the mast is retracted fully before entering the aisle. Enter the aisle slowly to reduce the impact on rollers and guide rails.

Headroom:

Structures over aisles, which may be potential obstacles should be defined and marked with a conspicuous colour. Low doorways should be marked with their clearance limits.

Power Lines:**Warning**

Always be aware of overhead electrical power cables. Always remain a safe distance from overhead power lines as an electric arc can occur even when approaching an electric line. This poses a high risk, not only for the operator but for other personnel nearby.

If contact with a live electric source occurs:

- Do not leave the truck until the electricity has been disconnected and a qualified technician directs the operator to leave the machine.
- If possible, drive the truck away from the danger area.
- Warn any people around the truck not to get any closer and not to touch the truck.
- Arrange to have the power turned off.

The following table outlines the minimum clearance distance that must be observed when working in the vicinity of power lines.

Nominal Voltage	Clearance Distance
Up to 1000 V	1 metre (1.1 yards)
Over 1 kV up to 110 kV	3 metres (3.3 yards)
Over 110 kV up to 220 kV	4 metres (4.4 yards)
Over 220 kV up to 380 kV	5 metres (5.5 yards)
Unknown nominal voltage	5 metres (5.5 yards)

Operating in Hazardous Areas:

Standard trucks are not equipped to operate in cold stores, flammable or explosive areas, corrosive atmospheres or areas containing a high degree of dust contamination. Sparks from the electrical system or hot parts can ignite explosions and fires.

- Do not attempt to lift or place a load in a poorly lit area where vision is obscured or reduced.
- Do not work in enclosed spaces where flammable materials, explosive vapours, or combustible dust are found.
- Stay clear of flammable materials such as hay, straw, paper and cardboard.
- Park the truck only in areas free of flammable materials.
- Wear appropriate personal protective equipment (breathing filter, protective suit) for protection against specific dangers, e.g. poisonous gases, corrosive steam, poisonous surroundings, etc.

Gradients:

- When differences in levels exist, gradient ramps should be provided, having smooth, gradual level changes at the top and bottom to prevent shocks to the load or fouling of the forks.
- Do not drive across, turn or stack on gradients.
- Correct gradient procedure should be followed at all times.
- Do not park on a gradient. In an emergency apply the parking brake and chock the wheels - but do not leave the truck unattended.
- Always approach an incline straight on, and keep forks and /or load facing uphill at all times.

Adverse Weather Conditions:

There are a number of weather conditions for which extra care must be taken.

- High Winds: Do not raise the mast in winds that are greater in speed than 50km/hr as this can have serious effects on the stability of the machine.
- Electrical Storms: Always discontinue operation of the truck in the event of an approaching electrical storm due to the associated risks of lightning.
- Extreme Temperatures: These forklift trucks are designed for use in ambient temperatures ranging from -35°C (-31°F) to +45°C (+113°F) if the correct hydraulic oils and greases are used. If the temperature falls below or rises above this range discontinue operation of the machine in order to prevent damage to various components. For operation outside these temperatures, please consult your Combilift partner as special modifications and lubricants are required.

**Oil, Electrolyte and Coolant:**

Any leaking or spilled oil, electrolyte or coolant must be cleaned up immediately and the source of the leak repaired to avoid:

- Environmental hazards
- Fire hazards
- Slip hazards
- Personal injury hazards

Do not attempt to perform repairs to the hydraulic system until any residual hydraulic pressure has been relieved.

Observe the valid safety and environmental regulations for the respective product when handling oil, grease and other chemical substances. Do not service the truck immediately after operation. Wait until hot surfaces have cooled and can be touched comfortably. Smoking and open flames are prohibited during battery charging.

Dock Boards (Bridge Plates)

Dock boards are designed and maintained so that one end contacts the dock (or loading platform) and the other end contacts the transport vessel. When you load or unload the transport vessel the dock board must be locked in place to prevent it from rocking or sliding. Dock boards must have a high friction surface designed to reduce the possibility of people or trucks slipping.

If using dock boards on loading docks:

- Never exceed the carrying capacity marked on portable or powered dock boards.
- Portable dock boards must be secured in position, using anchors or other devices that prevent slipping.

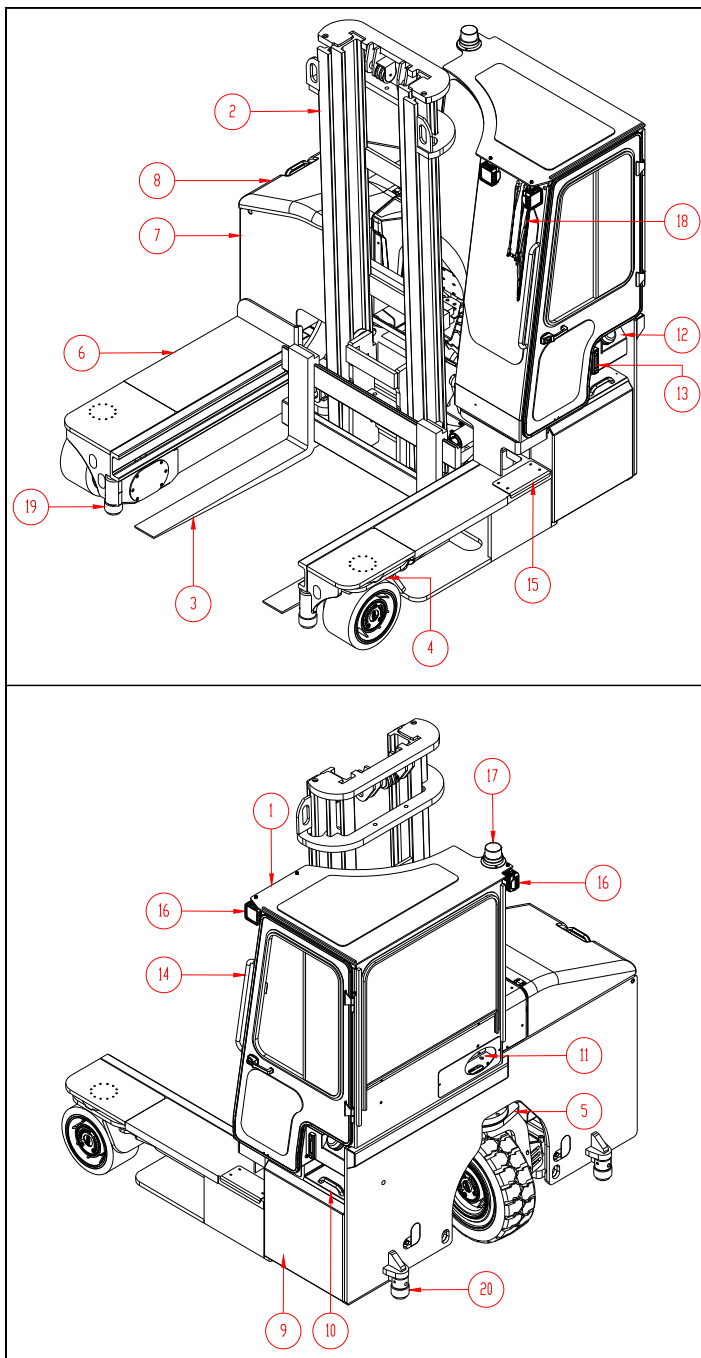
Trailers and Rail Cars

1. Before you load or unload a trailer, or rail car, make sure it does not move unintentionally:
 - Set the brakes
 - Chock the wheels
2. In addition to setting the brakes and chocking the wheels, if a semi-trailer is not coupled to a tractor, make sure that all four corners are supported to prevent upending or corner dipping.
3. Maintain a safe distance from the edge of ramps, platforms, or other similar working surfaces.
4. Never attempt to move a trailer with the Combilift truck.

Section 2: Machine Layout & Operator Controls

It is essential before you start operating the Combilift to be familiar with the main components and controls of the machine, their function and where they are located. Figure 2.1 below indicates all of the major components of the Combilift and figure 2.2 on the following page indicate all of the operator controls.

2.1: Machine Overview and Components

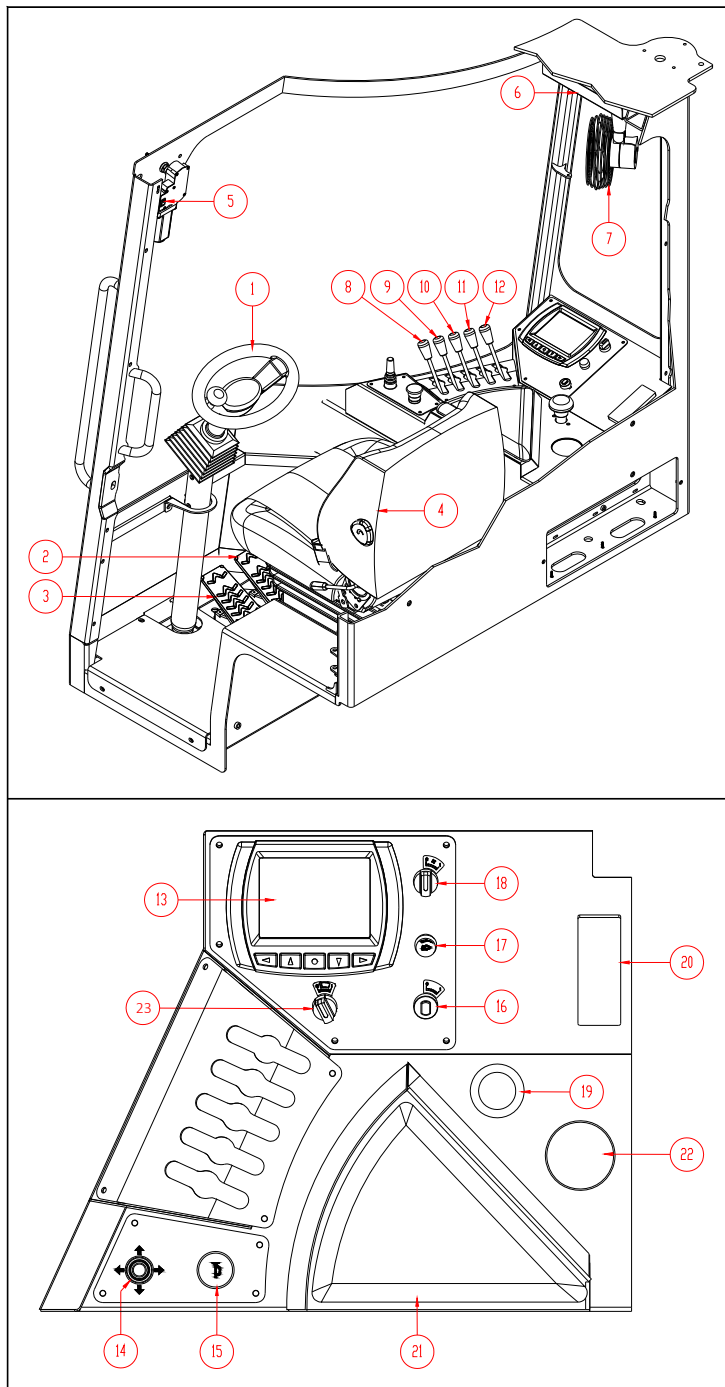


Component List

1. Operator Cabin
2. Mast
3. Forks
4. Front Swivels
5. Rear Swivel
6. Platforms
7. Right Hand Battery Box
8. Right Hand Battery Cover
9. Left Hand Battery Box
10. Left Hand Battery Cover
11. Battery Charge Access Point
12. Hydraulic Tank
13. Hydraulic Oil Level Gauge
14. Grab Handle
15. Cabin Access Step
16. Work Lights
17. Flashing Beacon
18. Window Wiper
19. Front Guide Rollers
20. Rear Guide Rollers

Figure 2.1: Machine Components Layout

2.2: Operator Controls & Display Layout



Controls List

1. Steering Wheel
2. Accelerator Pedal
3. Brake Pedal
4. Adjustable Suspension Seat
5. Wiper Switch
6. Cabin Light
7. Cabin Cooling Fan
8. Lift Control Lever
9. Reach Control Lever
10. Tilt Control Lever
11. Fork Positioning Lever (If Fitted)
12. Aux. Function Lever (e.g. Side Shift)
13. Graphical User Interface (GUI)
14. Direction Selection Switch
15. Horn Button
16. Key Switch
17. Work Lights Switch
18. Cabin Cooling Fan Switch
19. Battery Isolator Switch
20. Fuse Box
21. Arm Rest
22. Cup Holder
23. Front RH Wiper Switch

Figure 2.2: Machine Controls Layout

Note

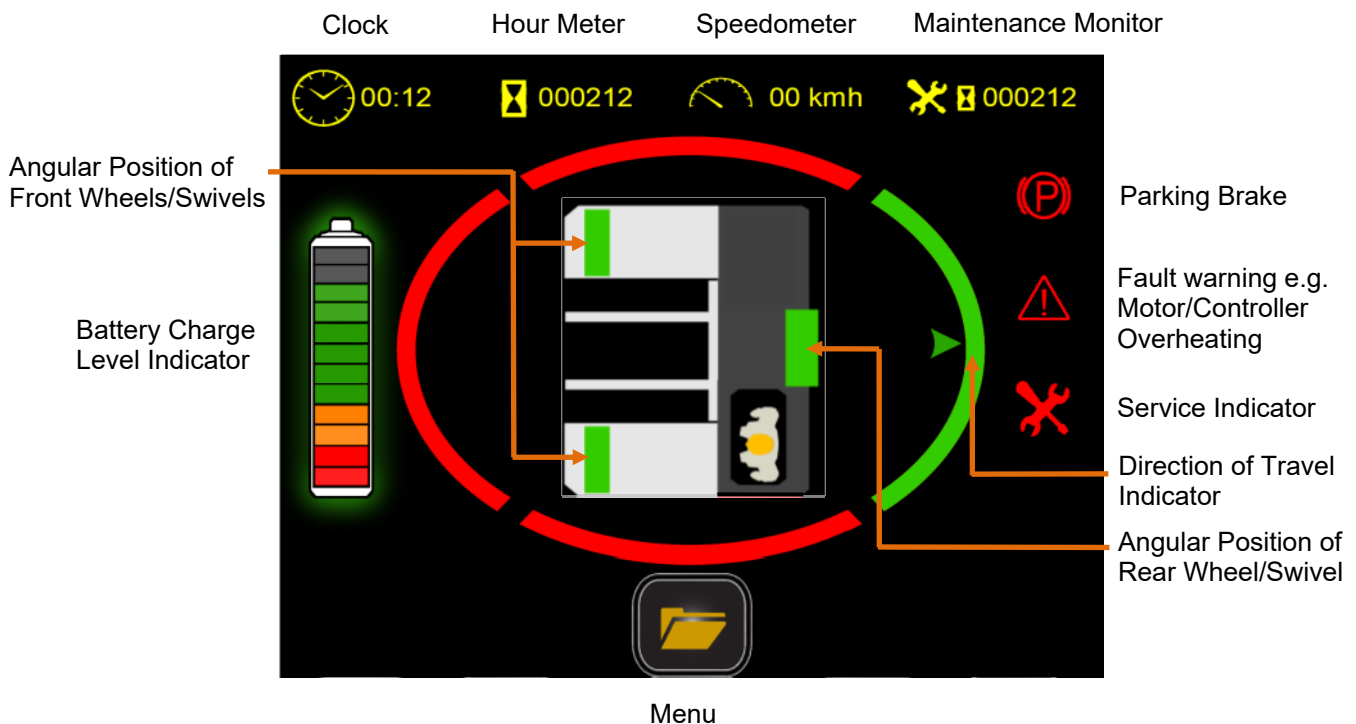
The component layout detailed above is that of a standard truck. This layout may vary. Refer to the decals in the cabin of the individual truck.

2.3: Operator Controls & Display Descriptions

Now that the layout of the operator controls has been identified, the next step is to detail how the controls function.

Graphical User Interface (GUI)

The illustration below shows the GUI with all of the indicators illuminated. Descriptions are also given for each of the indicators.



Clock

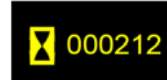
- The clock displays the day and time in analogue and digital format.
- To set the clock press the menu/select button on the dash console, now using the arrow buttons choose "User Functions" then "Time/Date". The following list will appear:
 - Set Hour
 - Set Minutes
 - Set Year
 - Set Month
 - Set Day
 - Set Weekday
 - Save & Exit
 - Cancel



- Use the arrow buttons to change the desired item.
- To set “Hour”, use the up or down arrow buttons to highlight “Set Hour”, then press right arrow button to highlight number. Then press up or down arrows to reach desired value. To move on to setting additional items, press left arrow button once and follow similar procedure to change other items.
- When finished setting all desired values, choose “Save & Exit”.

Hour Meter

- The hour meter records the total number of hours the truck has been operating for in hours and tenths of an hour.



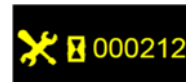
Speedometer

- The speedometer is used to determine the velocity of the truck in kilometres per hour.



Maintenance Monitor

- The maintenance monitor is used to determine the time since the last service. The time is displayed in hours and tenths of an hour.
- This can only be reset using the handheld programmer or laptop and should be reset by the service technician after each service.



Note

The maintenance monitor can only be reset by connecting a handheld programmer or a computer with the relevant software installed.

Service Indicator

- The service indicator is displayed on the screen 1 hour before the truck is due to be serviced. Initially it will be displayed after 99 hours to indicate that the initial 100 hour service is due.
- After the initial service the technician should set the service indicator to be displayed after every 249 hours in accordance with the maintenance schedule.



Note

The service indicator can only be reset by connecting a handheld programmer or a computer with the relevant software installed.

Battery Charge Indicator

- The battery charge indicator displays the level of charge remaining in the batteries.
- The image opposite shows that the battery has over 80% charge remaining.

**Fault Warning Indicator**

- The fault warning indicator is displayed when a fault has been detected in the electrical control system. A fault message will also flash on the screen.
- The truck must not be operated while this icon is displayed as damage to the electrical components may occur.
- Certain faults will cause the machine to shut down automatically. Other less serious faults will allow the machine to be driven to a safe place.
- Refer to Appendix 1 – Motor Controllers Diagnostics & Troubleshooting on page 62.

**Note**

The fault warning indicator will reset automatically when faults have been resolved.

Parking Brake

- The parking brake is automatically applied as soon as the truck comes to a halt.
- This prevents the truck from rolling back if it is stopped while travelling up an incline.
- It is automatically released when the throttle switch is pressed.

**Direction of Travel Indicator**

- When a direction of travel has been selected a green arrow will show on the display screen pointing in the direction of travel and a section of the ellipse will turn green.
- The screen shot of the GUI below shows that reverse direction has been selected.

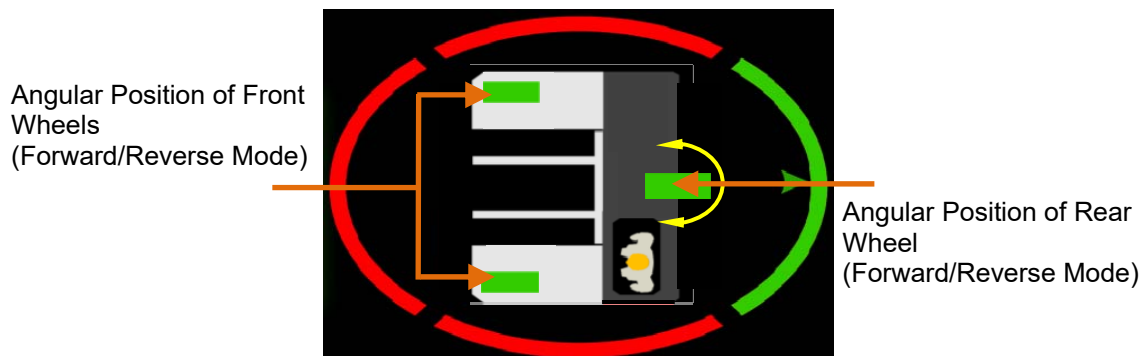


Angular Position of Wheels Indicator

The green rectangles on the truck in the display screen represent the wheels. They let the driver know what direction the wheels are pointing in at any time.

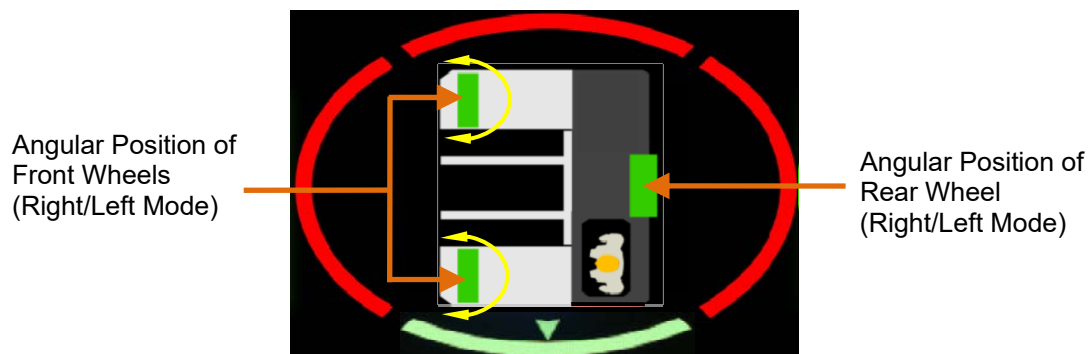
Forward/Reverse Mode

- When Forward/Reverse mode is selected the rectangles representing the wheels will align parallel to the side of the truck.
- When steering in Forward/Reverse mode the rectangles representing the front wheels will remain fixed parallel to the side of the truck and the rectangle representing the back wheel will rotate as the steering wheel is turned.



Right/Left Mode

- When Right/Left mode is selected the rectangles representing the wheels will align parallel to the front of the truck as seen in the screen shot below.
- When steering in Right/Left mode the rectangle representing the rear wheel will remain fixed parallel to the front of the truck and the rectangles representing the front wheels rotate as the steering wheel is turned.

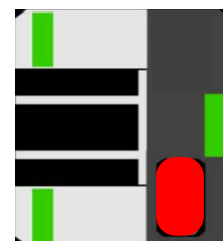


Seat Indicator

- The driver position on the display screen flashes red when the operator is not sitting properly on the seat.

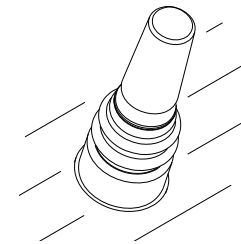
Note

The truck will NOT operate if the driver is not sitting properly on the seat.



Direction Control Lever

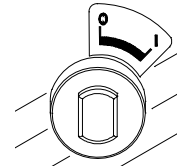
- The directional control lever is the 5-position lever located on the dash. It can be set to forward, reverse, left, right, or neutral.
- In order to select a direction of travel, push the lever in the desired direction.
- Always return the lever to the neutral position when the truck is not moving.
- The drive direction selected is indicated by a green arrow on the GUI and a section of the ellipse turning green.

**Note**

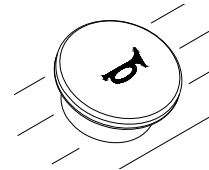
The truck will NOT drive unless the direction control lever is in the neutral position before selecting a drive direction.

Key Switch

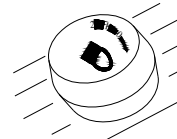
- This is a two-position key switch located on the dash, which isolates the electrical system when in the 'OFF' position.

**Horn Button**

- The horn Button is the push button located on the dash next to the directional control lever.
- To operate the horn, depress the button.

**Work Lights Switch**

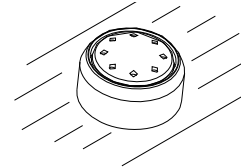
- This is a three position rotary switch located on the dash
- Position 0 – Lights Off
- Position 1 – Front Lights On
- Position 2 – Front & Side Work Lights On

**Drive Cut-out Override Button (Optional)**

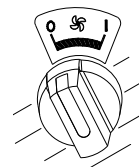
- This optional feature uses a push button switch, which is connected to a sensor on high-lift Triplex masts.
- When the mast is above 3.5m (138") high, the machine will not drive.
- To re-commence driving the operator must either:
 - Lower the forks of the machine using the lift control lever

OR

 - Press the drive cut-out override button located on the dash.

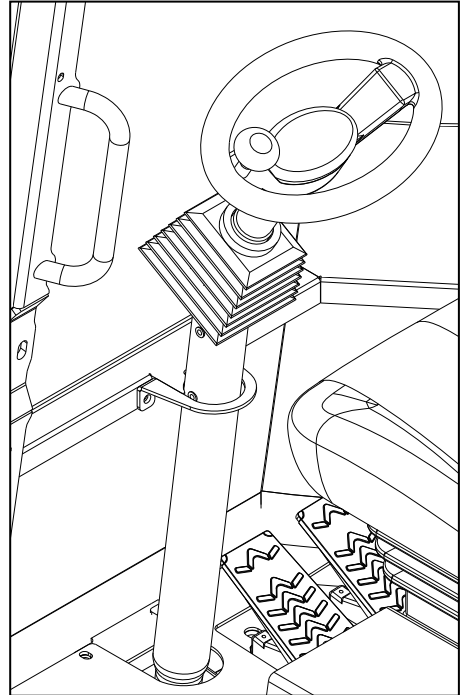
**Cooling Fan Switch**

- This is a 2 position rotary switch located on the dash.
- Turning it to the on position activates the cooling fan located in the top right hand side of the cabin.



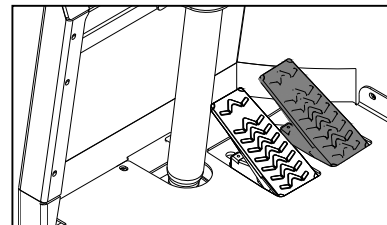
Steering Wheel / Column

- All models have both front and rear-end steering.
- When in forward mode the front wheels are fixed and the rear wheel steers the truck.
- Rear-end steering allows sharper turns in confined areas but demands greater driver care when turning.
- When in sideward mode, the rear wheel is fixed and the front wheels steer the truck.
- When driving forwards, turn steering wheel clockwise to turn truck clockwise, turn steering wheel anticlockwise to turn truck anti clockwise.
- When driving in reverse, turn steering wheel clockwise to turn truck anticlockwise, turn steering anti clockwise to turn truck clockwise.
- When driving in sideward mode, turning the steering wheel clockwise will turn truck clockwise. Turning the steering wheel anticlockwise will turn truck anticlockwise.
- The same is true for travel in either direction when in sideward mode.
- The steering wheel is also equipped with a spinner knob for easier steering.
- The angle of the steering column is adjustable to increase driver comfort.
- To adjust the angle of the steering column, loosen the locking lever on the side of the column by turning it clockwise.
- Adjust the steering column to the desired angle.
- To lock the steering column, turn the locking lever anticlockwise until tight.



Accelerator Pedal

- The accelerator pedal is located on the floor on the right hand side of the cabin as shown shaded in grey in the diagram opposite.
- The accelerator pedal provides the operator control of the truck speed.
- To INCREASE truck speed, PRESS pedal.

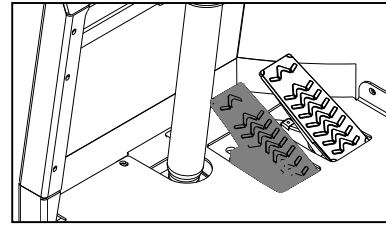


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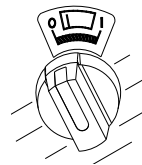
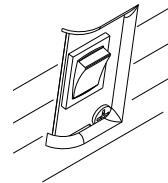
When the truck is in neutral pressing the accelerator pedal will increase the working speed of the hydraulic functions.

Brake Pedal

- The Brake Pedal is the pedal on the floor nearest the steering Column as shown shaded on grey in the diagram opposite.
- When the Brake Pedal is pressed deceleration is achieved by means of counter current in the drive motors.

**Wiper Switches**

- There are 2 wiper switches on the machine.
- The front left hand wiper switch shown opposite is located in the top left hand corner of the cabin. See Item 8 in figure 2 on page 2-2.
- This rocker switch activates the wiper by flipping it to the on position.
- The front right hand wiper switch shown opposite is located on the dash. See Item 23 in figure 2.2 on page 7.
- This ON/OFF rotary switch activates the wiper when turned to the on position.

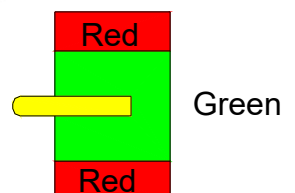
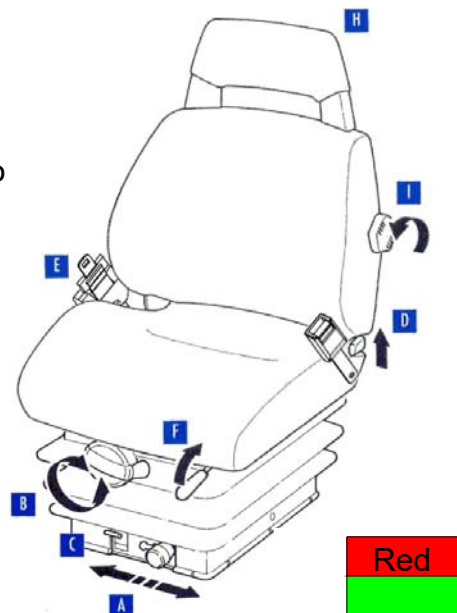
**Seat Adjustment**

- It is the responsibility of the Operator to ensure that the seat is adjusted according to operator weight, height etc before operating the truck.
- ALWAYS report any malfunctioning of the seat adjustments immediately.
- ALWAYS wear the seat belt provided.
- DO NOT adjust the seat when vehicle is in operation.
- Keep clear of moving parts.
- Authorised & competent personnel should carry out Installation & Maintenance only

A. Up-stop Adjustment

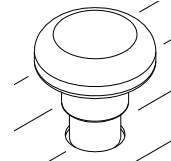
- B. Height Adjustment** – Depending on operator weight, rotate knob clockwise, to increase, and anti-clockwise to reduce suspension stiffness.

- C. Using the height adjustment knob 'B', adjust the yellow ride indicator 'C' to the middle of the green area when seated.**

D. Backrest angle adjustment**E. Seat belt****F. Horizontal Adjustment (Slide rails)****H. Backrest Extension****I. Lumbar Support adjustment (5 positions)**

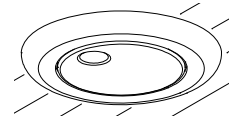
Battery Isolator Switch

- This switch is used to disconnect power from the battery in the event of an emergency.
- The switch is located on the dash beside the arm rest. See Item 19 in figure 2.2 on page 7.
- When the Combilift is not in use turn the switch to 'OFF' by pressing it down until it clicks into the closed position.
- The Combilift will not power-up unless the switch is returned to the 'ON' position by pulling the switch up.



Cabin Interior LED Light

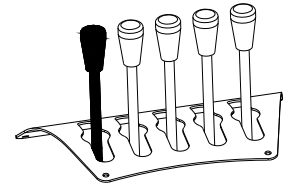
- This light illuminates the interior of the cabin.
- Press on the small circular recess on the bottom face of the light housing to illuminate the light.
- Press in the same place a second time to extinguish the light.



2.4: Hydraulic Lever Functions (Standard)

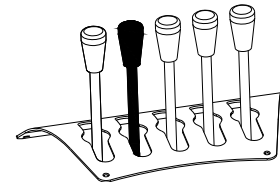
Lift Control Lever (Lever Closest To Operator)

- The lift control lever controls the lift function of the Mast.
- To raise the forks, PULL the lever BACK
- To lower the forks, PUSH the lever FORWARD



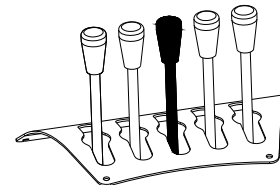
Reach Control Lever (2nd Lever from Operator)

- The reach control lever controls the movement function of the mast carriage.
- To extend the mast carriage forward, PUSH the lever FORWARD
- To retract the mast carriage backwards, PULL the lever BACKWARDS



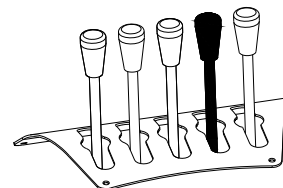
Mast Tilt Lever (3rd Lever from Operator)

- Allows the operator to tilt the Mast forward and backward
- To tilt the mast forward, PUSH the lever FORWARD
- To tilt the mast backward, PULL the lever BACKWARDS

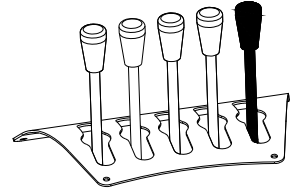


Fork Position Lever - Optional (4th Lever from Operator if fitted) If not fitted see Auxiliary lever description below)

- The fork position lever moves the forks in closer together and out further apart.
- To move the forks out/apart, PUSH the lever FORWARD
- To move the forks in/together, PULL the lever BACKWARDS



Auxiliary Function Lever (4th or 5th Lever from Operator Depending on Fork Position Option)



- This lever controls the flow of oil to an attachment when fitted.
- On trucks fitted with attachments providing more than one function, the truck may be fitted with a button on the fourth function lever. Operators must acquaint themselves with the operation of these special provisions before using the truck.
- Combilift have a number of standard functions that can be fitted to the truck and operated via the auxiliary function lever. These include:
 - Fork Positioner / Side shift / Telescopic Forks / Lift Drop Forks
- Take time to familiarise yourself with the auxiliary functions on the Combilift and how they are operated by the auxiliary lever.

Note

When the truck is in neutral pressing the accelerator pedal will increase the working speed of the hydraulic functions.

Note

The layout of the valve chest levers and positioning of controls and switches may be subject to change due to individual customer requirements. Please refer to the decals on the individual truck.

Operators must acquaint themselves with the layout of all controls before operating the truck.



Warning



Adding an attachment to a Combilift will alter the rated capacity of the machine. A load chart must be obtained from Combilift Ltd for any attachment that is fitted to indicate this change in capacity



Warning



ONLY attachments that have been approved by Combilift engineers may be fitted to Combilift Trucks

2.5: Hydraulic Functions Joystick (If Fitted)

This is a four-way joystick with three push buttons on the handle. It is used to control the mast functions.

Joystick Functions (Standard Setup)

Lift

- To raise the forks, pull the joystick back.
- To lower the forks, push the joystick forward.

Reach

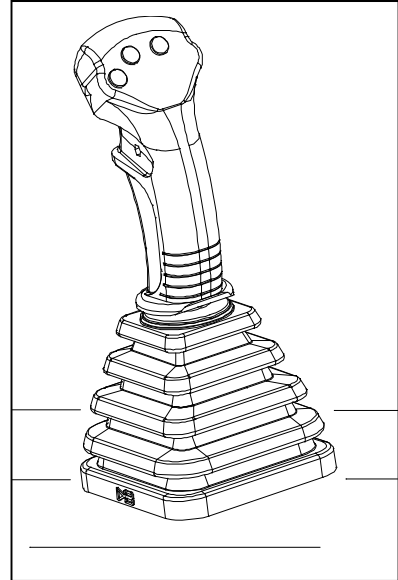
- To extend the mast, push the joystick right.
- To retract the mast, pull the joystick left.

Tilt

- To tilt the mast forward, push the joystick right while pressing the left hand button on the handle.
- To tilt the mast back, pull joystick left while pressing the left hand button on the handle.

Fork Positioning

- To move the forks in/together, PULL the joystick BACK while pressing the right hand button on the handle.
- To move the forks out/apart, push the joystick FORWARD while pressing the right hand button on the handle.



Note

The layout of the joystick functions and positioning of controls and switches may be subject to change due to individual customer requirements. Please refer to the decals on the individual truck.

Operators must acquaint themselves with the layout of all controls before operating the truck.



Warning



Adding an attachment to a Combilift will alter the rated capacity of the machine. A load chart must be obtained from Combilift Ltd for any attachment that is fitted to indicate this change in capacity.



Warning



ONLY attachments that have been approved by Combilift engineers may be fitted to Combilift Trucks.

Section 3: Safe Operation

Many people are under the impression that driving a lift truck is like driving any other vehicle. This is not the case. Lift trucks are designed for the purpose of lifting and moving heavy loads in confined spaces. For this reason it is essential that operators are trained to operate the machines correctly and to ensure that they always operate the machine in a safe and controlled manner. Combilift trucks are equipped with certain safety mechanisms that must not be removed or bypassed. Combilift will not assume liability for accidents caused by the removal or bypassing of any inbuilt safety mechanisms. This section looks at how the machine should be operated.



Warning



Only operate the truck from the operator's seat with the seat belt buckled and the cabin door closed and latched securely. Do not place any part of your body outside the operating enclosure. Do not carry passengers. Failure to follow these guidelines can result in serious injury or death.



Warning



Remain in the seat with the seat belt fastened while the truck is moving. The seatbelt will help you remain inside the cabin should the truck tip over. Never jump from the truck if it begins to tip over. Keep all body parts inside the operating enclosure.

3.1: Entering and Exiting the Operator Cabin

When mounting or dismounting the truck three points must be kept in constant contact with the truck. That means one hand and two feet, or two hands and one foot – at all times. Anything less and the risk of a fall is increased. Handgrips and footsteps have been provided to allow easy and safe access to the operator cabin. DO NOT use the steering wheel as a handgrip.

Remember:

- Check that the handgrips and footsteps are clean and in good condition before using.
- Always face in towards the machine and use the handgrips and footsteps provided.
- Do not use the steering wheel as a handgrip.
- Mount and dismount only when the truck is stopped.
- Break three-point contact only when you reach the ground or cab.
- Take extra care in wet, snowy or icy weather.
- Avoid wearing loose or torn clothing that can catch on the truck.
- NEVER JUMP!



3.2: Starting Procedure

In order to start the combilift insert the key into the key switch on the dash and turn the key to the on position.

Note

The Combilift will not power up if any of the following conditions exist:

- The operator is not sitting in the seat.
- The battery isolator switch is in the closed or 'Off' position.
- The directional control switch is not in the neutral position.
- The operator presses the acceleration pedal whilst switching on the key switch

3.3: Moving Off

Because the Combilift is capable of multi directional travel it is important to be aware of how the truck moves and how to drive it in a safe manner.

- Ensure that the forks are as low as possible (approx 6" from the ground). If loaded, rest the load on the platforms where possible.
- Select the desired direction drive in on the direction control joystick.
- Look around and when all is clear apply light pressure to the accelerator pedal until the truck begins to move.
- Increase pressure on the pedal to increase truck speed.

3.4: Stopping

- Release the accelerator pedal to bring the machine to a controlled stop.
- The parking brake is applied automatically when the truck stops moving.
- After stopping return the direction control lever to the neutral position and remove the key to prevent unauthorised use.

Note

The Combilift has a maximum ground speed of 11km/h (7mph). Always adhere to all speed limits in the area which the truck is operating.

The brake pedal can be used to stop the machine over a shorter distance if necessary such as in the event of an emergency.

3.5: Changing Directions & Modes

Changing Direction without Changing Modes

- Remove foot from the accelerator pedal.
- Gradually press the brake pedal to halt the truck.
- Select change of direction and gradually press on the accelerator until truck is travelling at desired speed.

Changing Into Sideward Mode

- Bring the truck slowly to a halt by gradually pressing the brake pedal in.
- Ensure that all observers stand clear of the truck.
- Move the direction control switch from forward/reverse into the required right/left direction. The wheels will automatically align themselves at right angles to the forks.
- Wait until wheels are locked and the sideward mode dash light is illuminated before moving off.

Note

When in sideward mode the front wheels steer the truck while the back wheel remains fixed

Note

When in sideward mode, turn the steering completely anti-clockwise at least once. **This ensures correct alignment of the front wheels in forward mode.**

To Change Back to Forward/Reverse Mode

- Bring the truck slowly to a halt by gradually pressing in the brake pedal in.
- Ensure all observers stand clear of truck.
- Move the direction control switch from left/right into the required forward/reverse direction.
- Wheels will automatically align themselves parallel with the forks.
- Wait until wheels are locked and dash light is illuminated before moving.

NOTE

When in forward mode the back wheel steers the truck, while the front wheels remain fixed.

3.6: Parking

When parking the Combilift always ensure that one of the two recommended parking methods are used to ensure the safety of the operator and others. Park clear of aisles, doorways, stairways, fire exits and fire points and ensure that the truck will not obstruct other traffic.

One parking method is the Attended parking method, for cases where the operator needs to exit the machine but will be no more than 25 feet (7 metres) away. The other is the Unattended parking method, for cases where the operator must exit the machine but will be further than 25 feet away.

The Attended Parking Procedure

- Bring machine to a complete stop. The parking brake is automatically applied.
- Lower the forks until they are on the ground and tilt the mast forward.
- If loaded, retract the mast and rest the load on the platforms of the machine.
- Exit the Combilift by using the three – point contact method as previously mentioned
- Stay within 25 feet (7 metres) of the machine at all times.

The Unattended parking method

- Bring machine to a complete stop. The parking brake is automatically applied.
- Lower the forks until they are on the ground and tilt the mast forward.
- If loaded, retract the mast and rest the load on the platforms of the machine.
- Turn off the machine.
- Exit the Combilift by using the three – point contact method as previously mentioned
- Chock wheels if on an incline
- Turn the battery isolator switch to the off position

3.7: Loading & Unloading the Truck

This section provides information on the correct way to pick up a load and set down a load. There are a number of safety guidelines that should be adhered to at all times when lifting or placing loads.

- NEVER try to lift a load of which the weight is unknown.
- ALWAYS consult the capacity chart for your truck before lifting a load and never exceed the rated capacity of the truck.
- Before picking up a load adjust the forks to ensure that they are equally spaced about the centre line of the fork carriage and as widely spaced as possible to take the weight of the load evenly.
- Check that the forks are of sufficient length. The length should be at least two thirds of the depth (front to back) of the load.
- When manoeuvring to pick up a load, avoid erratic movements that could result in damage to the load and/or truck.

When Loading in Sideward Mode

- Retract the mast fully.
- Drive the front of the machine as close to the load as possible.
- Drive until the machine is at the centre of the load.
- Apply parking brake.
- Lower/raise the forks to the required height.
- Extend mast.

- Lift load.
- Double fork load if necessary until load is tight against face of forks. (See section 3.9: on double forking)
- Tilt rearward to secure the load.
- Raise load above platform height.
- Retract mast fully.
- Lower forks until load is just above platform height. Rest the load on the platforms where possible

When Loading in Forward Mode

- Lower/raise forks to the required height.
- Enter the centre of the load.
- Drive as close to the load as possible.
- Extend mast to secure load if not already extended
- Apply parking brake.
- Lift load.
- Tilt rearward to secure load.
- Raise load above platform height.
- Retract mast fully
- Double fork load if necessary until load is tight against face of forks.
- Lower forks until load is just above platform height. Rest the load on the platforms where possible.

Placing a Load When In Sideward Mode

- Drive the front of the machine as close to the placing area as possible.
- Apply parking brake.
- Lower/raise the forks to the required height.
- Extend mast.
- Lower load.
- Tilt forward.
- Retract mast fully.
- Release parking brake.
- Continue to drive in the sideward direction

Note

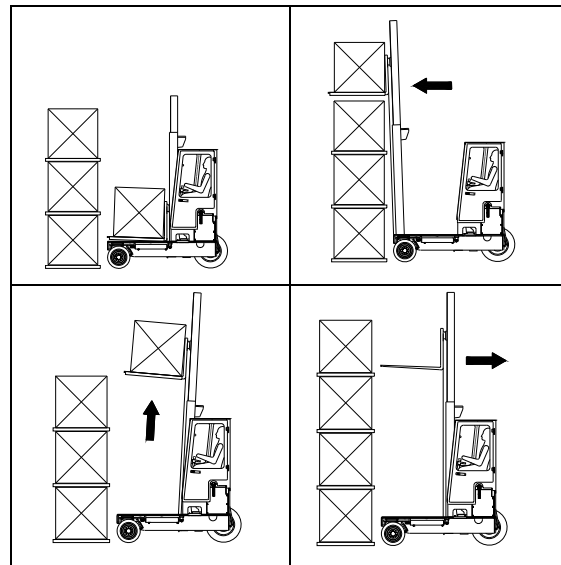
When carrying long loads drive in sideways modes as much as possible.
Tilt elevated loads forwards, only when directly over load destination.

Placing a Load When In Forward Mode

- Drive the front of the machine as close to the placing area as possible.
- Apply parking brake.
- Lower/raise the forks to the required height.
- Extend mast.
- Lower load.
- Tilt forward.
- Retract mast if operating in confined spaces.
- Drive rearward until machine is clear of load

Stacking

- Slowly approach stack with load retracted and tilted backwards.
- Stop at the face of the stack and put the truck in neutral
- Elevate load until clear of stack top. Operate the accelerator pedal to increase the lifting speed.
- Extend mast until load is above the stack.
- Tilt mast to vertical position and lower load onto stack.
- Retract mast fully and lower forks to 150mm (6") above ground before moving off.



De-Stacking

- Approach stack with mast retracted and in vertical position.
- Stop at face of stack and put the truck in neutral.
- Elevate forks to permit entry into pallet.
- Extend mast and enter the pallet with the forks.
- Elevate load until clear of stack and tilt mast backwards to stabilise load.
- Retract mast fully and lower load to 150mm (6") above ground, or where possible on to the platforms.

3.8: Adjusting the Load Forks

Forks should be spaced as far apart as the load being moved will allow. Both forks should always be the same distance from the centre of the fork carriage.

To adjust:

- Raise forks approximately 25mm (1") off the floor.
- Switch the truck off.
- Lift up the keeper pin and slide the forks along the carriage.
- When the forks are set to the desired position ensure that the keeper pin is engaged in a slot on the top of the fork carriage bar.

3.9: Double Forking a Load

If it is not possible to engage forks fully when lifting a load it will be necessary to move the load closer to the front of the machine before lifting.

Note

The lift capacity of the Combilift is reduced if the forks are not fully engaged

To Double Fork a Load:

- Raise the load slightly and retract the mast sufficiently to bring the load closer to the machine.
- Lower the load ensuring that it is still properly supported.
- Extend the mast again until the load is against the fork face.
- The load is now ready to be lifted.

3.10: Travelling Safely with a Load

- When travelling with a load always keep the load as low as possible.
- Ensure load is tight against face of forks. (See figure 3-2 on following page).
- Have the load resting on the platforms of the Combilift whenever possible.
- Try to avoid sudden and erratic movements with the machine. Accelerate and decelerate as smoothly as possible.
- When approaching a junction or corner, slow down, sound the horn and proceed only when you are sure that your path is unobstructed.
- When approaching crossings and areas where driving vision is restricted or obscured, reduce speed to a minimum and sound the horn - a series of short blasts is more effective than one long blast.
- Cross railway lines slowly, only at authorised points and diagonally whenever possible.
- Be conscious of height and width restrictions and watch for sudden appearance of pedestrians from behind obstacles.
- Do not carry unsafe or insecure loads. Never carry loads stacked higher than the top of the fork carriage or backrest.

- Operators' arms, hands, head or legs must not overhang the running lines when the truck is in motion. Take care when indicating a turn or other manoeuvre.

! Caution !

Take special care when travelling without a load as the risk of tip-over may be greater when cornering at high speed. In the event of a tip-over, hold tightly to steering wheel. Do not leave overhead guard.

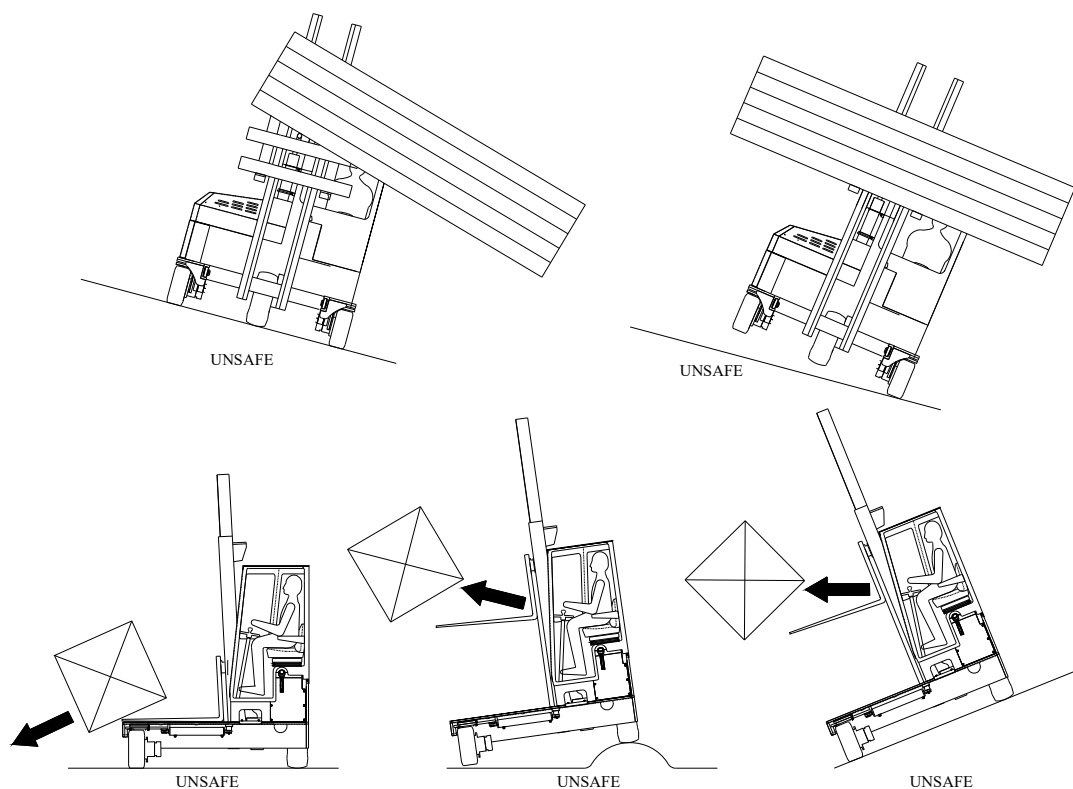


Figure 3-1: Driving hazards

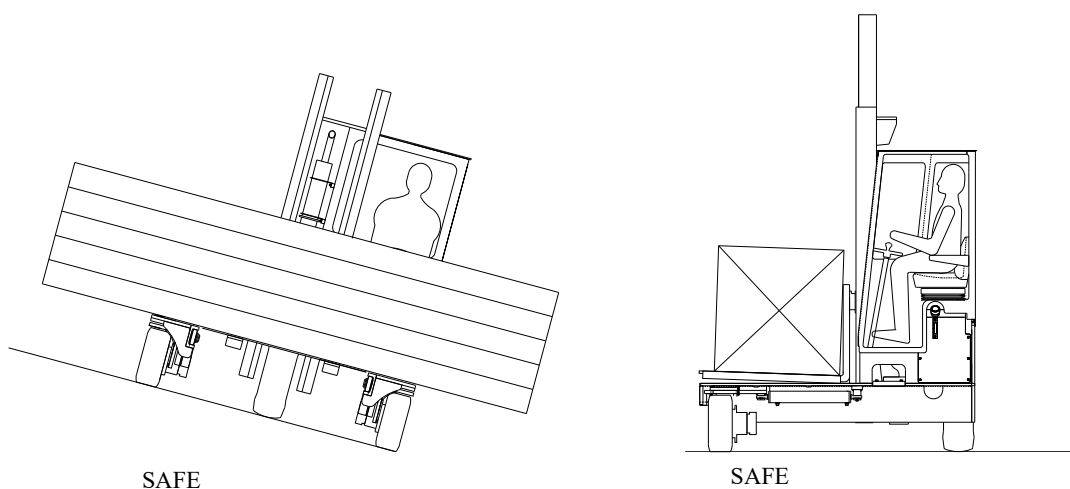


Figure 3-2: Correct Procedure

3.11: Driving Position

- Only operate controls from the correct driving position and do not operate any control until you are certain of its function.

3.12: Seat Switch

- A seat switch controls the safety return to off feature of the motor controller. When you get on the Combilift seat and the direction lever is not in the neutral position, this feature will prevent the Combilift from moving.

Never place items under the seat; they could prevent the seat switch from operating properly.

3.13: Bridge Plates and Dock Boards

- Bridge plates and dock boards must have an adequate safety factor to support a loaded truck and be secured when in use to prevent accidental movement.
- Do not exceed the maximum permissible load, which must be clearly marked on all bridge plates and dock boards.
- The sides of bridge plates, and where possible dock boards, must be raised to minimise the possibility of the truck being driven over the edge.
- The surface of the above equipment must be of a slip resistant substance.
- Drive slowly when crossing bridge plates and dock boards.

3.14: Lifting the Machine

- Lift the machine only when necessary.
- Check machine weight before lifting
- Use only the two lifting points on the mast and ensure that the mast is fully retracted and tilted back before lifting.

Section 4: Maintenance & Service Information

4.1: Maintenance Schedule

In order to keep the Combilift in optimum working condition it is necessary to service the truck at regular intervals. The Chart below details the intervals (in hours of machine operation) at which maintenance tasks should be performed.

Item	Service Interval (Hrs)			
	Daily	250	500	2000
Check Pump Motor	•			
Check Electric Wheel Motors & Transmission	•			
Check All Electrical Connections/Terminals	•			
Check All Nuts And Bolts Are Present & Secure	•			
Change Transmission Oil				•
Check Motor Mounts & Mounting Bolts			•	
Check Pump Mounting Bolts			•	
Check Cooling Fan	•			
Check Hydraulic Oil Level	•			
Change Hydraulic Oil				•
Change Hydraulic Return Filter Cartridge			•	
Change Hydraulic In-Tank Strainer Filter				•
Check Battery Electrolyte levels	•			
Check Swivel Bearings (Slew Rings)			•	
Check Mast Carriage Bearings			•	
Check Mast Carriage Wear Pads & Alignment			•	
Check Mast Bearings	•			
Check Mast Chains	•			
Lubricate & Adjust Mast Chains		•		
Grease Mast Channels		•		
Grease Mast Carriage Channels		•		
Check Wheel Nuts	•			
Torque Wheel Nuts		•		
Check Hydraulic Hoses for Leaks	•			
Check Hydraulic Hoses for Signs of Wear	•			
250 hours = 4 months / 500 hours = 8 months / 2000 hours = 24 months				

Grease All Points Indicated on the Grease Point Chart Weekly

4.2: Daily/Preoperational Inspection

There are a number of items indicated on the maintenance chart that must be performed on a daily basis. These checks are essential in keeping the truck in optimum working condition. These and a number of other checks form what is known as the daily inspection or preoperational inspection of the lift truck.

In many countries, it is required by law for the operator to perform the daily inspection and for the company to have a written record of these checks. Contact your local authorities in order to find out what regulations are in place regarding daily inspections of industrial equipment of this nature.

The daily inspection must be carried out at the start of the working day before the machine commences operation. Alternatively if your company operates a multi shift system the checks should be carried out at the beginning of each shift. The inspection can be broken into 3 sections:

- **The Visual Checks**
- **The Electric Drive System Checks**
- **The Operational Checks**

The details of the Inspection should be recorded on a Checklist like the one provided (page 36) and a record of these inspections should be kept on file within your company's records.

The Visual Checks

The visual checks are performed by walking around the truck and visually inspecting each of the following items:



Warning



Before attempting any checks ensure that you are wearing the correct safety equipment, i.e. gloves, safety boots, eye protection in form of safety glasses or a full-face shield.

- **Overall condition** – Look for scrapes, dents, and other signs of damage. Watch for missing or loose nuts and bolts. Check underneath the machine for signs of leaking oil or battery electrolyte.
- **Tyres and wheels** – Check that all the wheel nuts are present and tight. Look for cuts in the tyres or foreign objects in the rubber. Also look for Plastic straps, wire, and other debris caught between the wheel and the wheel motor. **Note: Always wear gloves when checking the tyres to avoid injury on sharp pieces of debris.**

- **Forks** – Check that the Forks have no signs of excessive wear or cracking. Check that both locating pins are in place and operational.
- **Mast** – Check for twisting and distortion in the channels. Look for signs of cracking and check that there are no missing or loose bolts. Check the mast chains for wear, missing links and pins. Make sure that the chains are of equal tension and are adequately lubricated. **DO NOT place your hands inside the mast at any stage to check the chains tension.** Press on the chains with a long stick or screwdriver. Check around the lift and tilt cylinders for signs of leakage. Also check all the hoses attached to the mast for signs of leaking oil.
- **Operator Cabin / Overhead Guard** – look for signs of damage and cracking to the overhead guard. Report any signs of damage immediately to your supervisor.

The Electric Drive System Checks

These checks are performed in order to ensure that the electric drive system is in good working order and fit to perform in a safe manner. The checks are performed as follows:

- **Check all electrical connections** – Check for loose or missing nuts or bolts on all electrical terminals. Ensure that all plugs are securely connected and free from damage.
- **Check the pump motor** – Listen for any strange or excessive noises; be observant of any strange smells such as a burning smell. Remove any dust or debris such as leaves from the motor casing.
- **Check the drive motors** – Listen for any strange or excessive noises, be observant of any strange smells such as a burning smell. Remove any dust or debris such as leaves from the motor casing.
- **Check the batteries** – Ensure all connections are sound and that no damage has been done to the cells i.e. the cells are not cracked or leaking. Check for loose or bare wires on all battery connections.
- **Check battery electrolyte level** – Ensure that the electrolyte in the battery cells has not fallen below an acceptable level

The Operational Checks

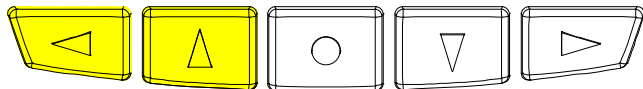
These checks are performed in order to ensure that every part of the Combilift functions correctly and in a safe manner. The checks are performed as follows:

- **Check the seat belt** – Enter the cabin using the three point contact method. Make sure that the seat belt functions correctly. Check for any cuts or fraying along the belt and that it secures correctly into the retainer. **Always wear the seat belt provided when you are driving the Combilift.**
- **Check the seat** – All Combilift machines come with adjustable air suspension seats. The operator must ensure that the seat is correctly adjusted for their individual height and weight. Instructions on how to set the seat can be found on page 12 of this manual.
- **Turn on the Machine** – Insert the key into the ignition and turn the key to the “On” position. This will allow power to flow through the electrical system. The dash display should power up.
- **Test the horn** – Depress the horn button to test the horn.
- **Listen** – Listen to the motor for a few seconds before driving off. Be alert to any strange sounds, noises or odours from the motor that may indicate a problem such as a smell of burning. If you detect anything, which is not normal, stop the machine immediately and investigate the problem.
- **Check the Dash** – look at the dash display and make sure that the warning symbols are all off. The only warning symbol that should be visible after the motor is started is the parking brake. Should any other warning symbols be visible, report the fault to your supervisor. A full list of all the gauges, indicators and controls along with each function can be found in section 2 of this manual.
- **Check the mast functions** – After checking that there is adequate space and headroom, perform the checks on the mast functions. Raise and lower the mast making sure that the operation is smooth and controlled. Extend the mast forward and then retract it. Again watch for any signs of sticking. Tilt the mast fully forwards and backwards. Then test any auxiliary functions that may be fitted to **your** Combilift.
- **Check the Brakes** – The parking brake is applied and released automatically. Move the direction control joystick in the desired direction of travel and apply light pressure to the accelerator pedal. The machine should start to move slowly in the selected direction. Increase pressure on the pedal to increase speed. Release the accelerator pedal and apply pressure to the brake pedal. The machine should slow down and stop. As soon as the motors stop turning the parking brake will be engaged.

If either brake is not working do not operate the machine and report the fault to your supervisor. Make sure that you have adequate space to perform this test and that it is performed on a level surface.

- **Check the Directional Control Lever** – With the machine switched on, select forward mode. Press the accelerator pedal to drive the machine forward. Release the accelerator pedal to stop the machine. Select reverse on the directional control stick and press the accelerator pedal. The machine should now travel backwards. Release the accelerator pedal to stop the machine. Select left on the directional control lever. The wheels will start to realign for sideward mode. When the wheels are fully in position, press the accelerator pedal. The machine should now travel to the left. Release the accelerator pedal to stop the machine, select right travel on the directional control lever and press the accelerator pedal. The machine should now travel to the right.
- **Check the steering** –With the machine switched on, turn the steering wheel fully clockwise and counter-clockwise. The steering should move easily in both directions, and not seem excessively stiff or loose.
- **Check the wheel alignment** – With the machine switched on, select Forward/Reverse mode. The wheels should align parallel to the sides of the truck. If the wheels are out of alignment activate the purge sequence by pressing both buttons highlighted below on the display console simultaneously and holding for approximately 3 seconds. Ensure all observers stand clear of the truck before activating the purge sequence. The operation will take approximately 15 seconds to complete. If the wheels are still out of alignment after the steering has been purged, report the matter to the appropriate person.

Press both buttons highlighted simultaneously and hold for 3 seconds to commence purge sequence.



On completion of the inspection the operator should:

- Report any defect immediately to the supervisor / appropriate person.
- Never operate a lift truck that is in need of repair.
- Repairs should only be performed by authorised personnel.

In order to keep a record of these daily inspections it is advised that a daily inspection checklist like the one provided on the next page should be used when performing the checks. A copy of this checklist should be kept on file at all times in order to keep track of the machines service history as well as any faults that occur.

Note

Remember, in some countries, it is against the law NOT to perform these checks or keep a record of the inspections.



Customised Handling Solutions

Operators Daily Inspection Sheet

Model: _____ Serial No: _____

Date: _____ Shift No: _____

Inspect the Combilift before each shift. Should the Combilift be found to require servicing or if during the operation the Combilift malfunctions or becomes unsafe, stop the truck and report the situation immediately to the designated authority. DO NOT operate the Combilift or attempt to service it. Servicing is only to be conducted by a qualified technician.

Mark the Appropriate Box with X ☐ OK ☐ Machine OK ☐ Service Required

		Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Visual Checks	Damage <i>Bent, Dented or Broken Parts</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Leaks <i>Tank, Valves, Fittings, Hoses</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Tyres <i>Chunks missing, Loose wheel nuts</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Forks <i>Bent, Damaged or Worn</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Mast (inc. Chains) <i>Damage, Signs of bending, loose chains</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Overhead Guard <i>Damage, Cracking</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Electric Motor <i>Smell, Belts tight and in good condition</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Battery <i>Signs of damage or leaking, Electrolyte level</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Electrical Connections/Terminals <i>Nuts & Bolts Present & Secure, Plugs Secure</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Hydraulic Oil Level <i>Acceptable Range</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Controller & Motor Cooling Fans <i>Build up of leaves, dust or debris</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Hoses <i>Good Condition, No signs of wear</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
Operational Checks	Safety Equipment <i>Horn, Operator Restraint, Reversing Bleeper</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Electric Motor <i>Starts and runs OK, no unusual noise</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Mode change <i>Wheels realign smoothly, no sticking</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Travel <i>No unusual Noise, Smooth changes</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Steering (Purge Before Checking) <i>No excessive play or restriction in either mode</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Brake Pedal <i>Stops travel, smooth deceleration</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Parking Brake <i>Functions and releases</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
	Hydraulic Controls <i>Forks-Lift/lower, mast-in/out, tilt, Aux functions</i>	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK	☐ OK
Hour Meter Reading								
Operator Initials								
Supervisors Initials								

Notes (regarding repair, etc): _____

4.4: Initial Service – Conducted at 100 hours of Operation

The initial service is conducted at this interval to ensure that the truck is in optimum working condition upon leaving the factory. In order to complete the initial service the following tasks must be completed.

- Check battery electrolyte levels
- Change torque hub transmission oil
- Replace hydraulic return filter (located on top of the hydraulic tank)
- Check all electrical connections/terminals
- Check that all bolts and fittings are tight
- Check that all mast carriage bearing lock nuts are tight
- Grease all points indicated on Grease Point Chart
- Check mast chains. Lubricate and adjust as necessary.
- Check machine for hydraulic leaks
- Check hydraulic oil level.
- Torque all wheel nuts (see note below for torque settings).

Note

All wheel nuts should be checked daily.
Torque all wheel nuts every 250 hours:
5/8" Thread - 245 Nm (180 ft-lb)
M18 Thread - 305 Nm (225 ft-lb)

Note

All grease points indicated on the grease point chart **MUST** be greased weekly using EP2 Grease

4.5: Transmission Oil (Service Interval = 2000 Hrs)

The Torque Hub transmission units should be half filled with approximately 680cc (0.72 US quarts) of EP90 gear oil. The oil filler and level plugs in the front cover of the units should be used to ensure the correct (half full) oil level.

An initial oil change should be made after the first 100 hours of running and subsequent changes should be made at 2000 hour intervals or every 24 months depending whichever comes first.

Recommended Transmission Oil Specification:

EP90 Gear Oil

4.6: Hydraulic Oil and Filters

The hydraulic oil used in the Combilift should conform to the International Standard ISO G344 HV grade oils with improved viscosity / temperature characteristics. It should also have the correct temperature range for the ambient temperature in which the machine is being operated. If the operating temperature is outside the standard range, the standard oil should be replaced with the correct grade.

Ensure that the correct type of oil is used in the relevant ambient temperature. The table below indicates a number of commercially available oils and the temperature ranges that they are suitable for:

AMBIENT OPERATING TEMPERATURE	Low Range -20°C to 25°C -4°F to 77°F	Standard Range -10°C to 35°C 14°F to 77°F	High Range 0°C to 45°C 32°F to 113°F
Castrol: Hyspin	AWH 32	AWH 46	AWH 68
B.P. Bartran	HV 32	HV 46	HV 68
Esso: Univis	N 32	N 46	N 68
Mobil	13 M	15 M	16 M
Shell: Tellus oil	T32	T46	T68
Texaco	HDZ 32	HDZ 46	HDZ 68
Maxol Multivis	ISO 32	ISO 46	ISO 68

Note

The Sequence in which the brand names are listed does not signify any grading as to their quality or preference.

Note

The machine is supplied with an ISO 46 hydraulic fluid when leaving the factory. Please check if this is suitable for the ambient temperature in which the machine is to be operated.

Note

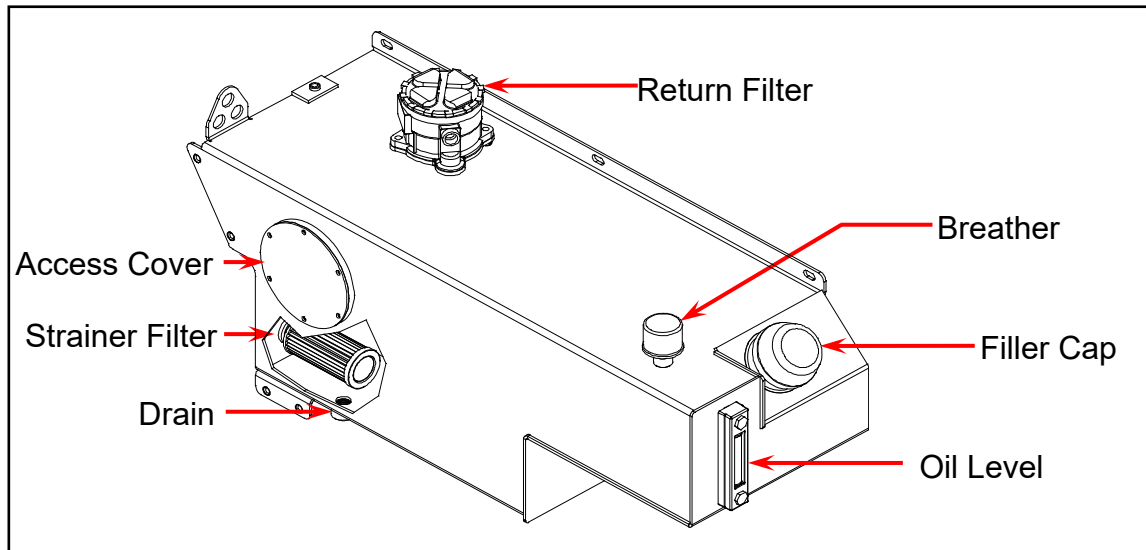
Before adding hydraulic oil, ensure that all cylinders are retracted and fill to upper level on the hydraulic oil level gauge

Hydraulic Filters

There are 2 separate hydraulic filters in the hydraulic system that must be replaced at certain intervals. These filters are:

1. The Return Filter Element
2. The In-Tank Strainer Filter

The locations of these filters are shown on the following page.

**Return Filter Element:** (Service Interval = 500 Hours)

The return filter element - located inside the return filter housing on the top of the hydraulic tank - must be replaced at intervals of every 500 hours (or 8 months depending on which occurs first).

To replace the Return Filter element:

1. Loosen the lid on the filter housing by turning it anticlockwise.
2. Remove the lid to gain access to the filter element.
3. Remove the retaining spring from the top of the filter element
4. Remove the old filter element and replace with the new filter element. Only use a genuine Combilift component.
5. Fit the retaining spring to the top of the new filter element and refit the housing lid.
6. Tighten the lid onto the filter housing by turning it clockwise.

In-Tank Strainer Filter: (Service Interval = 2000 Hours)

The In-Tank Strainer Filter, located inside the tank as shown above, must be replaced at intervals of every 2000 hours (or 24 months depending on which occurs first). The strainer filter can only be accessed when the hydraulic tank has been drained.

To replace the In-Tank Strainer Filter:

1. Drain the hydraulic oil tank by removing the bung on the bottom right hand corner of the tank.
2. Remove the access panel on the side of the tank
3. Insert your hand into the tank and remove the filter by rotating it anti-clockwise.
4. Fit the new strainer filter. Only use a genuine Combilift component.
5. Replace the access panel in the side of the tank, remembering to correctly fit the access panel O-ring seal.

Changing Hydraulic Oil (Service Interval = 2000 Hours)

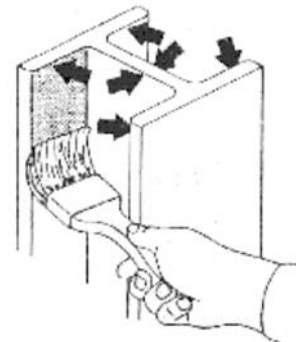
- Drain Hydraulic system including tank. Once completed fill system to the appropriate level with Hydraulic oil of the same grade as that, which was already in the tank.
- Capacity of Hydraulic oil in the Hydraulic system = 65 litres approx.

4.7: Mast Maintenance (Service Interval = 250Hours)

Mast chains should be checked for elongation periodically and adjusted as required. The chains must be adjusted so that the upper mast stops never come into contact with each other and the lower mast stops never come into contact with each other. Adjust all chains evenly. An interval of 250 hours can be taken as a typical value, under normal working conditions.

Periodic lubrication of the mast chains is required to ensure maximum life span is achieved. Use SAE 20 oil in cold conditions and SAE 40 oil in warm conditions. Frequency of lubrication depends largely on operating conditions. A lubrication interval of 250 hours can be taken as a typical value, under normal working conditions.

Periodic lubrication of the mast channels is required to ensure maximum life span is achieved. All roller surfaces must be greased periodically where the fork carriage bearings and mast section bearings run. The frequency of this operation is at the discretion of the user and essentially depends upon the working conditions. A lubrication interval of 250 hours can be taken as a typical value, under normal working conditions. For this purpose use graphite grease, avoid spray greases.

**Additional Mast Maintenance** (Contact Combilift for further information)

- Replacement of hydraulic cylinder seals.
- Replacement of chains.
- Replacement of bearings.

4.8: Cleaning & Greasing Mast Carriage Channels

The mast carriage channels must be cleaned (if necessary) and greased (**only on the vertical (side) surfaces**) periodically where the wear pads run. The frequency of this operation is at the discretion of the user and essentially depends upon the working conditions and the workplace. A lubrication interval of about 250 hours can be taken as a typical value, under normal working conditions. For this purpose use EP2 grease.

4.9: Mast Carriage Alignment / Wear Pad Adjustment Procedure

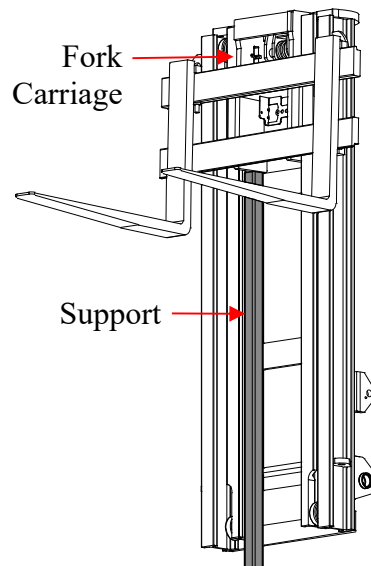
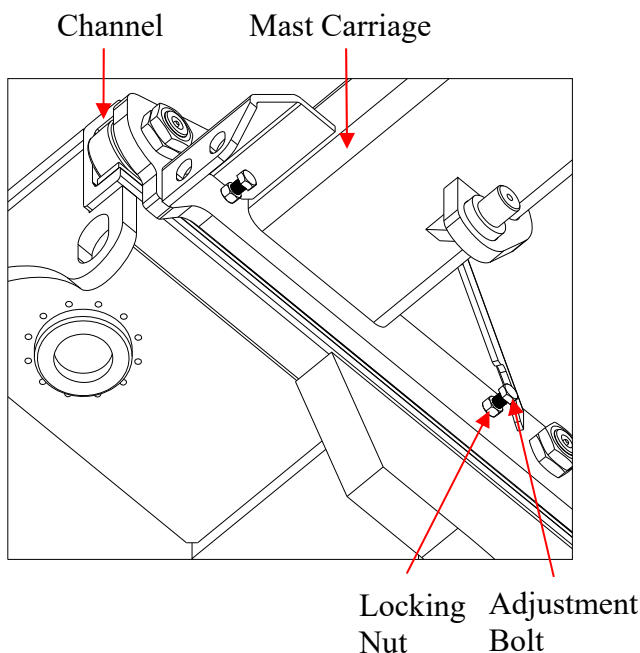
1. Check that the mast carriage cylinders are securely fastened. Check that the M24 castle nuts on the carriage cylinders are tight before commencing the mast carriage alignment/wear pad adjustment procedure.
2. Fully extend the mast carriage then bring it back in by approximately 50mm. Raise the mast until the bottoms of forks are approximately 0.5m above head height. This allows access to the mast carriage wear pad locking nuts and adjustment bolts. Prop up the fork carriage using a suitable support to prevent it from dropping. Do not allow access to the machine controls while working under on the mast.



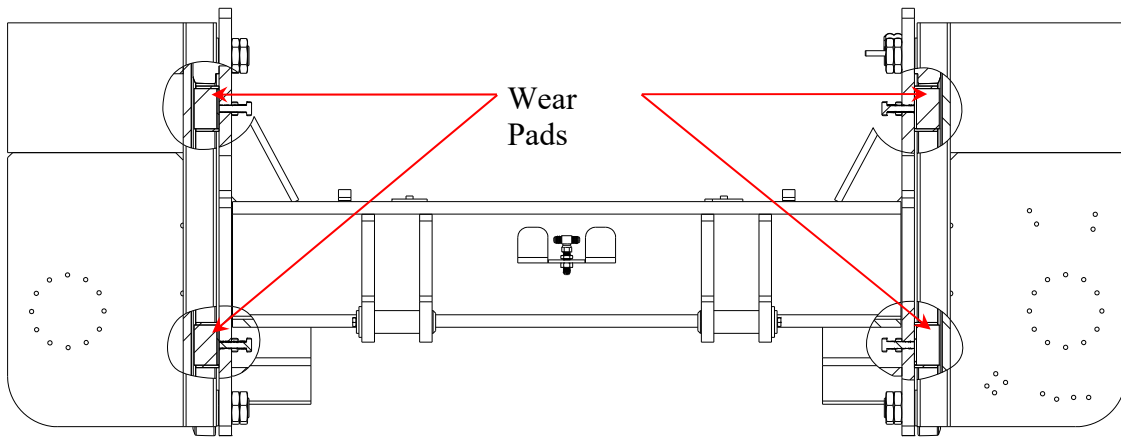
Warning



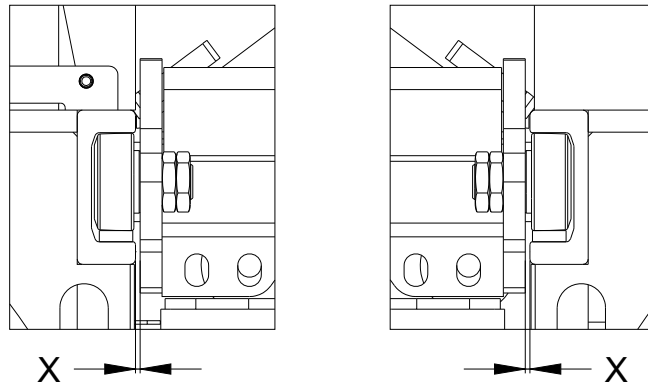
Failure to support the fork carriage and block access to the fork controls while working under the mast could result in serious injury or death.



3. Loosen the locking nuts a couple of turns, then loosen the adjustment bolts a couple of turns. There are 4 wear pads on the mast carriage, 2 at the front and 2 at the back. Ensure that the nuts and bolts are loosened off at all 4 wear pads.



4. Measure the distance (**x**) between the mast carriage side plate and the channel at the front of the machine on both sides of the truck. The distance (**x**) must be equal on both sides. Turn the front wear pad adjustment bolts clockwise to push the wear pads up against the channels. Adjust the wear pads until the distance (**x**) is equal on both sides.



Note

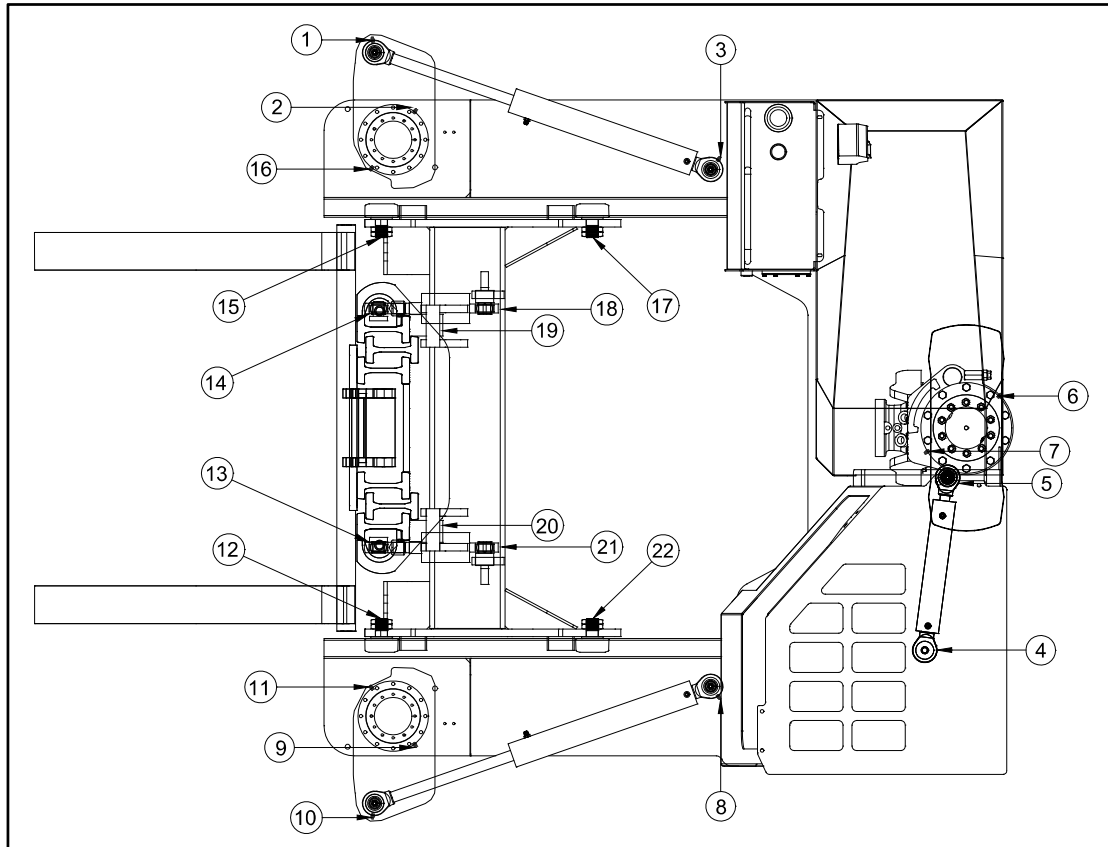
The wear pads must only be in light contact with the channels to allow the carriage to travel freely. Do not over tighten the adjustment bolts as the force between the wear pads and the channel will cause the carriage to stick.

Maximum torque of the bolts should not exceed 25Nm (18.5ft.lb).

5. Adjust the wear pads on the rear as described in point 4.
6. Check that the vertical faces of the channels where the wear pads run are clean and adequately lubricated. Operate the reach function to move the mast in and out several times through the full extent of its travel.
7. Check the torque of all the adjustment bolts. The torque must not exceed 25Nm (18.5ft.lb).
8. Tighten all the locking nuts up against the mast carriage side plates to lock the adjustment bolts in place. Use a spanner to prevent the adjustment bolts from turning while the locking nuts are being tightened.

4.10: Grease Point Chart

The diagram below indicates most but not all of the points on the Combilift that must be greased regularly. The bearings on the mast must also be greased regularly. A copy of this diagram is located in the operator compartment in the form of a decal / Information sticker. All Points should be greased weekly with an appropriate EP2 grease.



- | | | |
|------------------------|-----------------------|----------------------|
| 1. LH Steering Front | 9. RH Swivel Back | 17. Carriage Bearing |
| 2. LH Swivel Back | 10. RH Steering Front | 18. Rear Tilt |
| 3. LH Steering Back | 11. RH Swivel Front | 19. Mast Bushing |
| 4. Rear Steering Back | 12. Carriage Bearing | 20. Mast Bushing |
| 5. Rear Steering Front | 13. Front tilt | 21. Rear Tilt |
| 6. Rear Swivel Back | 14. Front tilt | 22. Carriage Bearing |
| 7. Rear Swivel Front | 15. Carriage Bearing | |
| 8. RH Steering Back | 16. LH Swivel Front | |

Note

There may be additional grease points that have not been indicated on the above chart. These may include bearings on the mast, optional guide rollers and any additional options or attachments on the machine e.g. fork positioner cylinders, side shift attachments, telescopic attachments etc. Grease points on additional equipment must be located and greased weekly using EP2 grease.

4.11: Battery Safety Guidelines

It is important to note that there are a number of safety guidelines that **MUST** be adhered to when working with the batteries of the Combilift electric lift truck in order to ensure operator safety.



Warning



Lead Acid Batteries contain Sulphuric acid, which can damage skin or eyes on contact. Always wear the correct protective clothing when topping up batteries, including a face shield to protect the eyes and rubber gloves to protect the skin. Should acid come into contact with the eyes or skin flush out / wash immediately with water and seek medical attention



Warning



Lead Acid Batteries produce flammable and explosive gases. Keep all arcs, sparks, flames and lighted tobacco away from the batteries never smoke in or near to the battery charging area



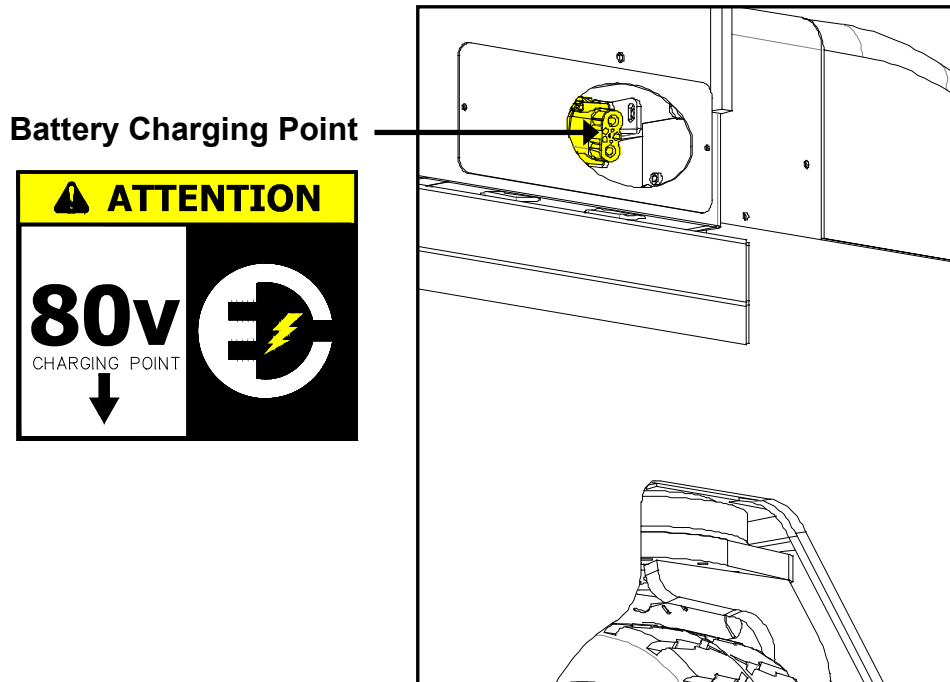
Caution

Always read the instruction manual before using the charger and only use either the charger that is supplied with the machine or one that is certified by Combilift for use with the machine.

4.12: Battery Charging

When charging the batteries on your Combilift, always adhere to the recommended charging procedure as detailed below.

- Park the Combilift in a designated charging area.
- Disconnect the truck plug from the battery plug.
- Check the charger cable for damage such as frayed leads or broken connectors.
- Check that the charger is switched on and the ammeter is working.
- If the cable is free from damage attach the charger plug to the battery plug highlighted in yellow in the diagram below. Charging will start automatically.
- When the batteries are fully charged, they should be left connected to the charger until required.
- The charger must be paused by pressing the pause button before disconnecting the charger cable from the battery plug.
- Reconnect the truck plug to the battery plug.



Caution

Connect the charger to the battery charging point highlighted above only.
Never connect the charger to any other plug on the machine.
Never connect the charger directly to the machine via the plug terminals.



Caution

Ensure that the charger is in the pause mode before disconnecting the charger cable from the battery plug.

4.13: Battery Maintenance

It is essential that the Batteries in the Combilift be well maintained in order to ensure truck efficiency and prolong the working life of the batteries. In order to ensure the batteries are in their best working condition, take the following steps.

- Ensure the Battery cover is always closed when the truck is not being charged. This helps to keep unwanted dirt and moisture off the tops of the batteries
- Ensure that the electrolyte levels in the cells are within the acceptable range



Caution



Always check the electrolyte levels and top off with distilled water as is required, **only after the batteries are completely charged.**



Caution



Always replace old batteries with new batteries that are of the same size and weight as the originals. Lighter batteries will affect the capacity of the truck. Heavier batteries will cause damage to other components.



Caution



Ensure that the equipment that is being used to lift the batteries has sufficient capacity to lift the batteries.

4.14: Battery Removal/Installation

Removal

1. Park the Combilift in the designated battery bay.
2. Open the RH bonnet and remove the LH battery cover.
3. Open the latches holding the battery boxes in place and lock them in the open position.
4. Disconnect the battery plugs from the machine.
5. Close the RH bonnet.
6. Position the forks of a forklift truck under the RH battery in the spaces provided.
7. Raise the battery (approximately 20mm), ensuring that all personnel remain at a safe distance from the raised battery.
8. Slowly and carefully reverse the forklift perpendicularly to the machine until the battery is clear of the machine.
9. As soon as the battery has been manoeuvred away from the machine lower it onto a pallet.
10. Repeat steps 6 to 8 for the LH battery.
11. As soon as the battery has been manoeuvred away from the machine lower it onto skids or a suitable frame.

Installation

12. Position the forks of a forklift truck under the LH battery to be installed in the spaces provided.
13. Line the battery up with the LH battery compartment just above the battery supports (approximately 20mm).
14. Slowly and carefully drive forward until the battery latch is aligned with the latch hole in the back plate and lower onto the chassis.
15. Lock the battery latch in the closed position and fit the LH battery cover to the battery.
16. Repeat steps 12 to 14 for the RH battery.
17. Open the RH battery cover and lock the battery latch in the closed position.
18. Reconnect the battery plugs.

Note

Careless disposal of batteries will harm the environment. Observe relevant environmental protection regulations when disposing of used batteries and battery electrolyte.

Section 5: Technical Information & Circuit Diagrams

5.1: Towing

In the event of a breakdown if - hydraulic pressure to the parking brake is lost
- the truck must be towed to a safe location, it is necessary to manually release the park brake on each of the three wheel hubs.



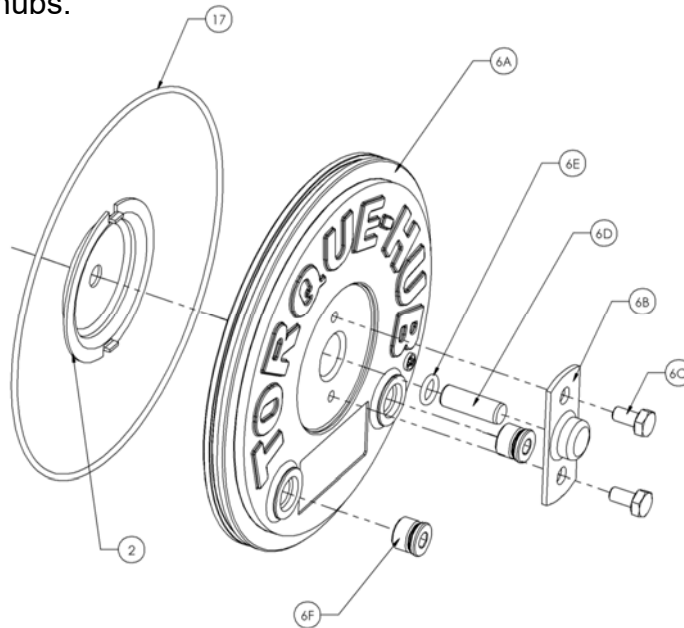
Warning



Do not attempt to tow the truck before the park brake has been released on each of the three wheel hubs as this will cause serious damage to the transmission.

5.2: Manual Park Brake Release Procedure

In order to release the park brake, follow the steps laid out below for each of the three wheel hubs.

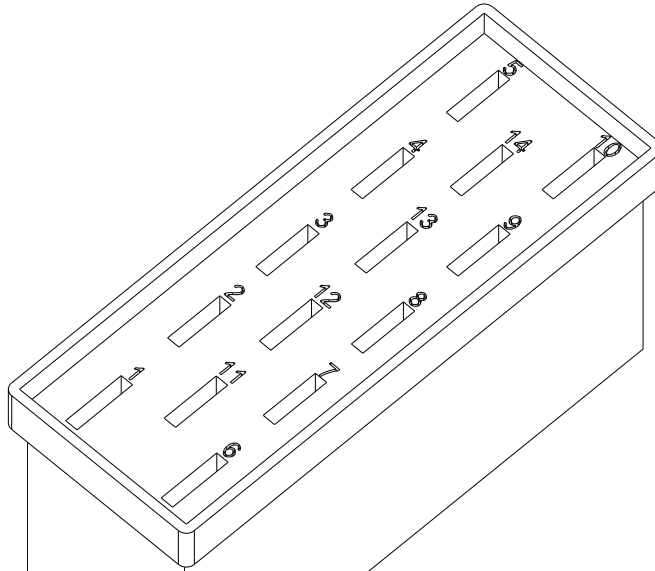


1. Unscrew the two hex head bolts (6C) and remove disengage cap (6B) from cover (6A).
2. Flip the disengage cap (6B) over so that the protruding boss is facing in towards the hub and replace back into cover (6A).
3. Screw the two hex head bolts (6C) back into cover (6A) to fix the disengage cap in this position. The park brake will be released and the hub can turn freely.
4. To reapply the park brake, repeat the steps above in reverse order. Torque the two hex head bolts (6C) to 9 Nm (80 in-lbs).

5.3: Fuse Box

The diagram and table below show the layout of the fuse box, the rating of each fuse and the function related to each fuse.

(See the accompanying spare parts manual for part numbers when ordering fuses from Combilift)



14 WAY FUSEBOX (On Dash) FUSE TABLE		
Fuse No.	Rating (Amps)	Function
1	7.5	High Mast Proximity Switch, High Mast Drive Cut-out Override Switch, Seat Switch
2	7.5	Reversing Bleeper
3	Spare	
4	20	0° Solenoid, Steering Solenoid (6-Port Valve), 90° Solenoid, Reflex Steering Solenoid (4-Port Valve), Valve Chest Lockout Solenoids
5	7.5	Brake Solenoid
6	20	Wipers (If Fitted)
7	15	Forward 0° LED Work Lights, Cabin Interior Light, Work Lights Switch
8	15	Sideward 90° LED Work Lights
9	20	Rear Drive Motor Cooling Fans, Controller Cooling Fan, Cabin Cooling Fan
10	7.5	Horn
11	Spare	
12	Spare	
13	7.5	Flashing Beacon
14	7.5	6-Port Valve for Optional Extra Functions, Optional Valve Chest Lever Switch

INLINE FUSES FUSE TABLE			
Fuse No.	Rating (Amps)	Function	Location
1	7.5	Key Switch Supply	Controller Enclosure
2	7.5	Supply To Controllers & Contactors	Controller Enclosure
3	20	Supply To DC/DC Converter	Controller Enclosure
4	1	Supply To Display Console	Dash Box

5.4: Relay Layout

There are a number of relays involved in the electrical control system of the truck. These relays are located inside the dash in the cabin of the Combilift. To access the relays remove the dash top plate by removing the four M6x10 dome head bolts in the corners of the plate.

The relays have the following functions:

Relay	Function
5	Brake Solenoid
7	0° Solenoid (On Valve Chest)
9	Steering Solenoid (6-Port Diverter Valve)
11	90° Solenoid (On Valve Chest)
13	Drive Cut-Out
14	Reflex Steering Solenoid (4-Port Changeover Valve)
22	Forward 0° LED Work Lights
22a	Sideward 90° LED Work Lights
26	Road Brake Lights (Optional)
CF	Master Motor Cooling Fan
32	6-Port Valve for Optional Extra Functions
LV	Valve Chest Lockout Valves

5.5: Controller Monitor

The GUI has a controller monitor feature that allows the state of each of the components in the electrical system to be monitored. This can be used to assist with fault finding and troubleshooting and can be especially useful in the absence of a handheld programmer or compatible computer.

To enter the controller monitor:

- Press the menu/select button on the dash console.
- Scroll down to user functions and press the menu/select button.
- Scroll down to controller monitor and press the menu/select button.

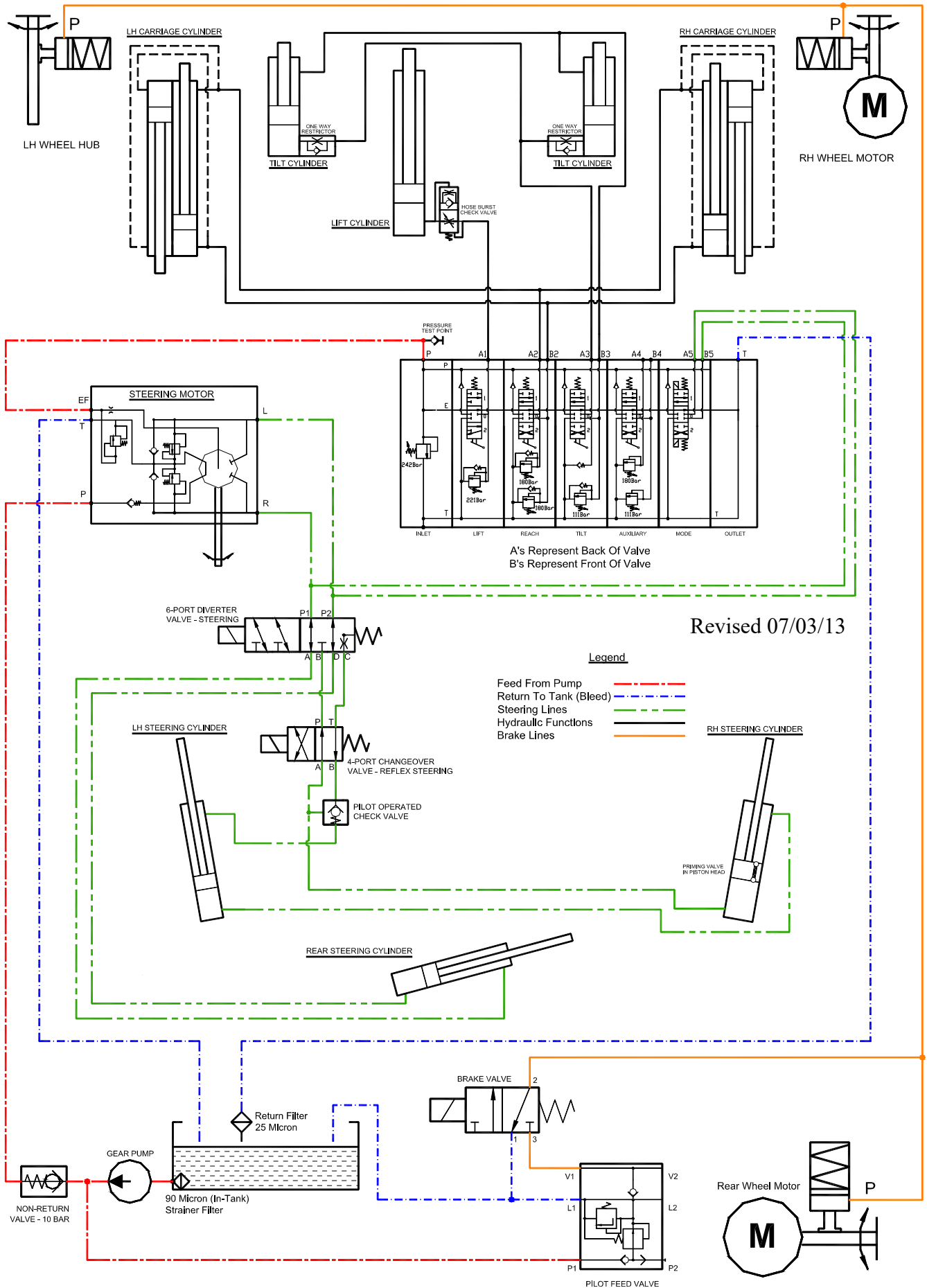
There are two pages of data within the controller monitor as shown below. Toggle between the two pages using the right and left arrow buttons.

Controller Monitor				Controller Monitor			
Exit				Exit			
Throttle Command	0%	Master Controller Temp	22.0C	Mast Up Sw	ON	Main Contactor	ON
Battery Voltage	78.49V	Slave Controller Temp	0.0C	Floor Mat Sw	ON	0 Deg Solenoid	OFF
Steer Angle A	-2	Pump Controller Temp	22.9C	Battery sw	OFF	90 Deg Solenoid	OFF
Steer Angle B	-86	Master Motor Temp	16.4C	Forward sw	OFF	Steer Solenoid	OFF
		Slave Motor Temp	0.0C	Reverse sw	OFF	Reflex Valve	OFF
		Pump Motor Temp	27.1C	Pump Min Speed sw	ON	Mast Valve	OFF
				Side Lights	OFF	Flow Valve	ON
				Main Lights	OFF	Brake Light	OFF
						Beeper	OFF
						Cooling FAN	OFF
Page 1				Page 2			

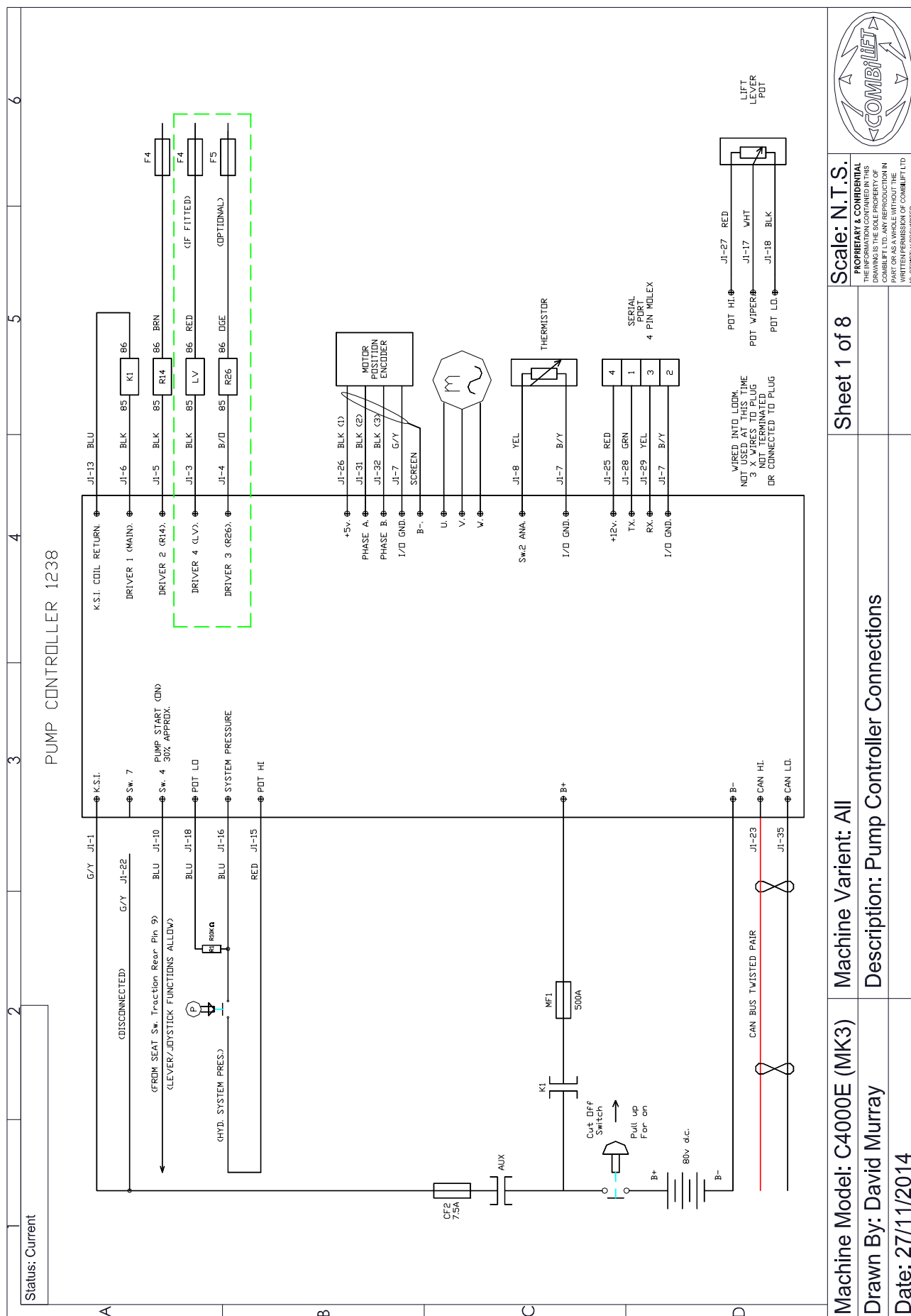
To exit the controller monitor and return to the main screen:

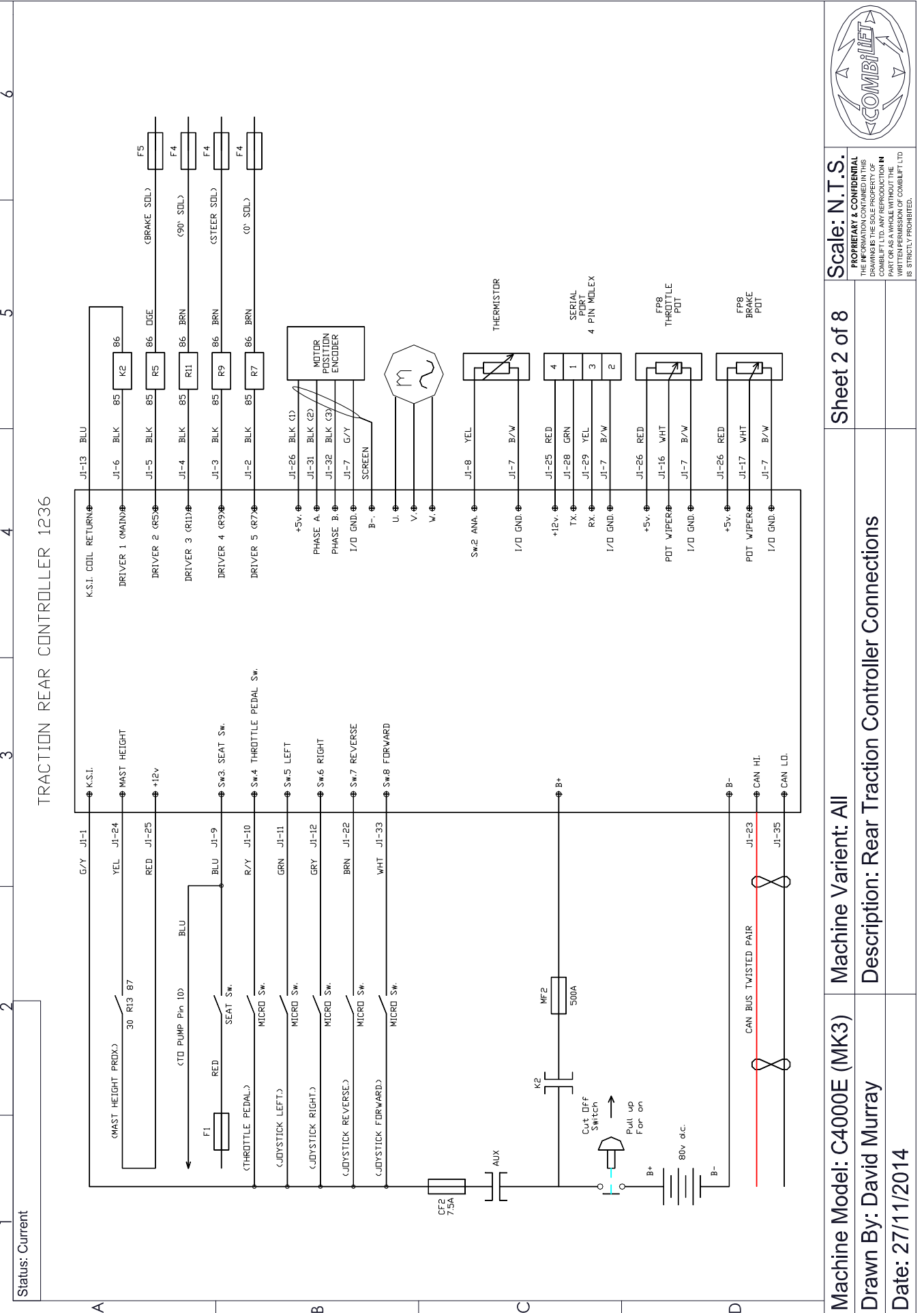
- Scroll down to exit using the down arrow button and press the menu/select button.
- To return to the main screen scroll to exit using the up and down arrow buttons and press the menu/select button.
- Repeat the step above.

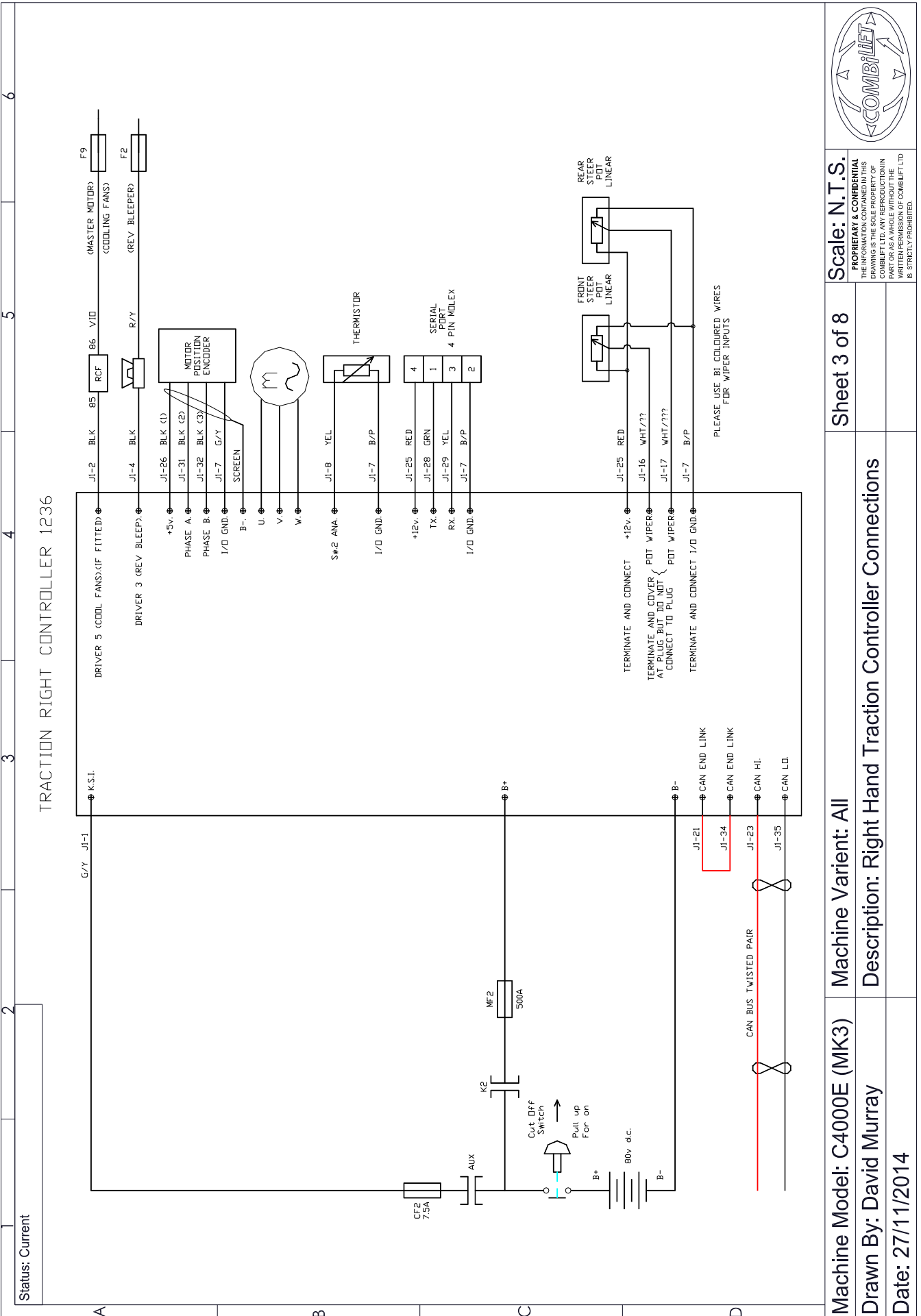
5.6: Hydraulic Circuit Diagram

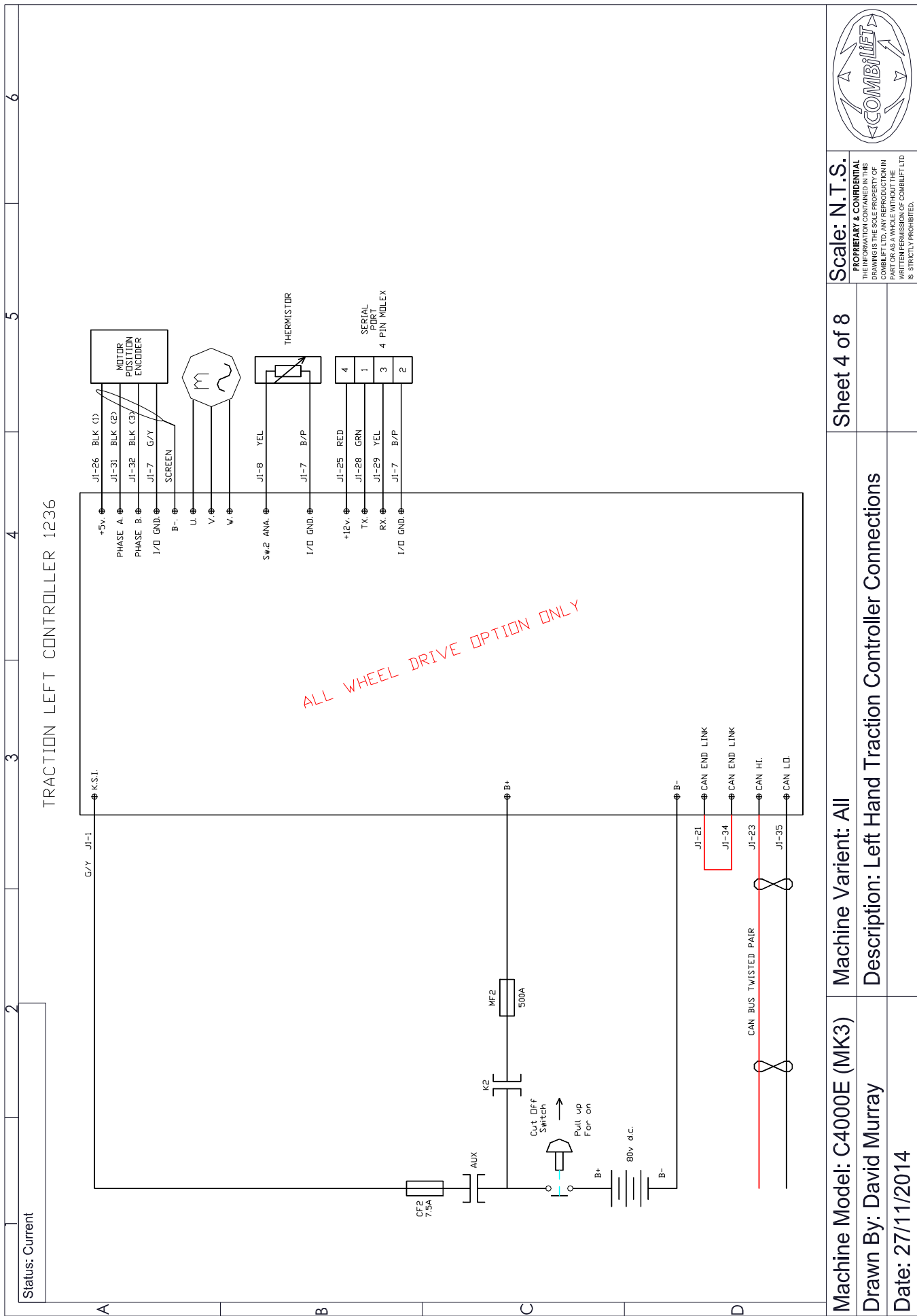


5.7: Electric Circuit Diagram











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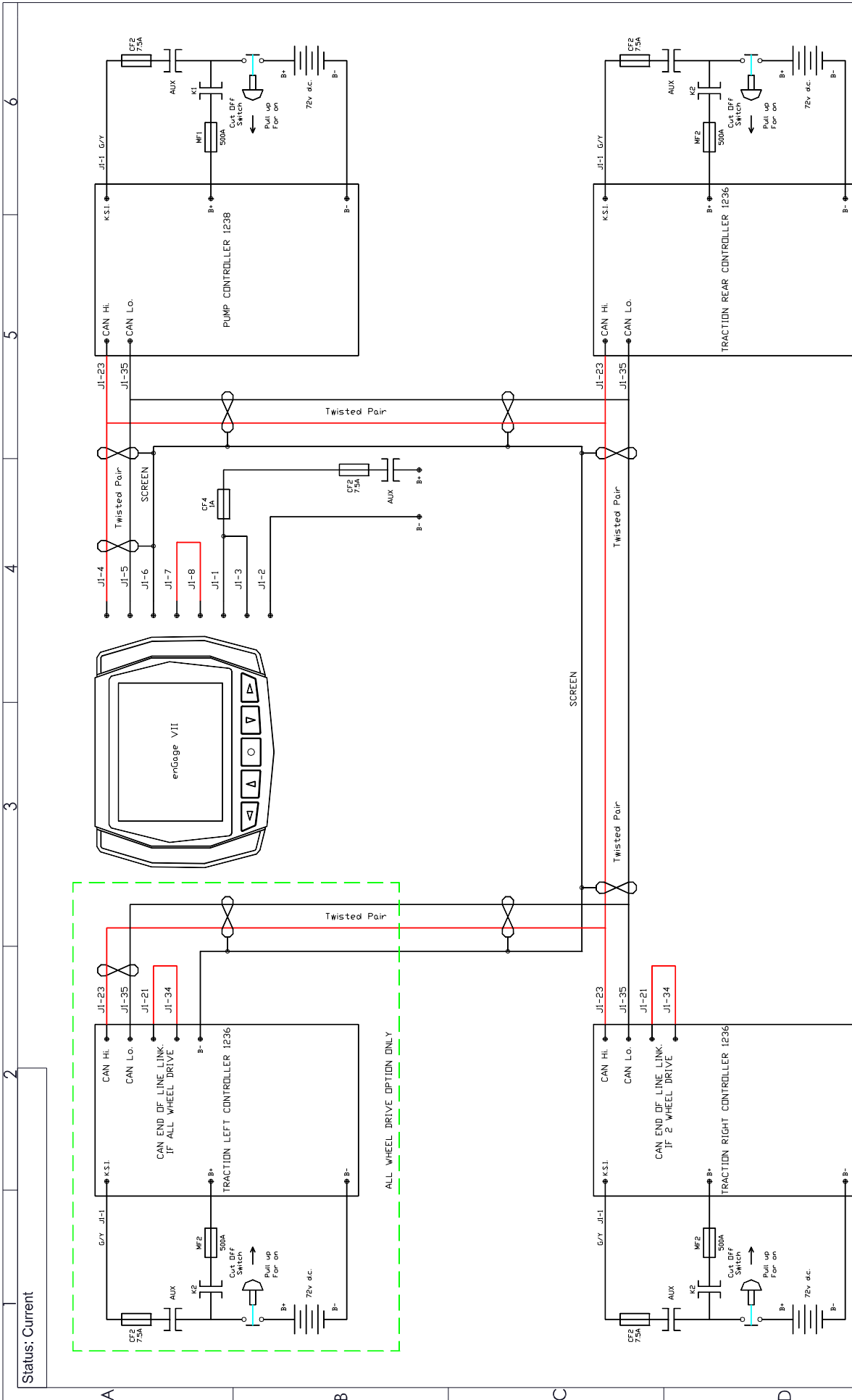
Machine Variant: All

Description: CAN BUS Circuit

Machine Model: C4000E (MK3)

Drawn By: David Murray

Date: 27/11/2014





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Section 6: Appendices

6.1: Appendix 1 – Motor Controllers Diagnostics & Troubleshooting

Extract from Curtis Controllers Manual.

Traction & Pump Motor Controllers Diagnostics & Troubleshooting

The motor controllers detect a wide variety of faults or error conditions. Faults can be detected by the operating system or by the VCL (Vehicle Control Language) code. This section describes the faults detected by the operating system.

Diagnostics

There are two methods of obtaining diagnostics information:

1. By reading the display on a 1313 handheld or 1314 PC programmer.
2. By observing the fault codes issued by the status LEDs.

See Table 1 for a summary of LED display formats.

The 1313/1314 programmer will display all faults that are currently set as well as a history of the faults that have been set since the history log was last cleared. The programmer displays the faults by name.

The pair of LEDs built into the controller (one red, one yellow) produce flash codes displaying all the currently set faults in a repeating cycle. Each code consists of two digits. The red LED flashes once to indicate that the first digit of the code will follow; the yellow LED then flashes the appropriate number of times for the first digit. The red LED flashes twice to indicate that the second digit of the code will follow; the yellow LED flashes the appropriate number of times for the second digit.

Example: Battery Under voltage (code 23).

In the Fault menu of the 1313/1314 programmer, the words **Under voltage Cutback** will be displayed; the real-time battery voltage is displayed in the Monitor menu (“Key switch Voltage”).

The controller’s two LEDs will display this repeating pattern:

red	yellow	red	yellow
*	* *	* *	* * *
(first digit)	(2)	(second digit)	(3)

The numerical codes used by the yellow LED are listed in the troubleshooting chart (Table 6.2), which also lists possible fault causes and describes the conditions that set and clear each fault.

Summary of LED display formats

The two LEDs have four different display modes, indicating the type of information they are providing.

Table 1 TYPES OF LED DISPLAY	
DISPLAY	STATUS
Neither LED illuminated	Controller is not powered on; or vehicle has dead battery; or severe damage.
Yellow LED flashing	Controller is operating normally.
Yellow and red LEDs both on solid	Controller is in Flash program mode.
Red LED on solid	No software loaded, or an internal hardware fault detected by the Supervisor or Primary microprocessor. Cycle KSI to clear. Reload software or replace controller if necessary.
Red LED and yellow LED flashing alternately	Controller has detected a fault. 2-digit code flashed by yellow LED identifies the specific fault; one or two flashes by red LED indicate whether first or second code digit will follow.

Troubleshooting

The troubleshooting chart, Table 2, provides the following information on all the controller faults:

- fault code
- fault name as displayed on the programmer's LCD
- the effect of the fault
- possible causes of the fault
- fault set conditions
- fault clear conditions.

Whenever a fault is encountered and no wiring or vehicle fault can be found, turn the Key switch (KSI) to the 'OFF' position then back to the 'ON' position to see if the fault clears. If it does not, turn off the KSI and remove the 35-pin connector from the motor. Check the connector for corrosion or damage, clean it if necessary, and re-insert it.

Table 2 Troubleshooting Chart

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
12	Controller Overcurrent <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. External short of phase U,V, or W motor connections. 2. Motor parameters are mis-tuned. 3. Controller defective. 4. Speed encoder noise problems.	<i>Set:</i> Phase current exceeded the current measurement limit. <i>Clear:</i> Cycle KSI.
13	Current Sensor Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. Leakage to vehicle frame from phase U, V, or W (short in motor stator). 2. Controller defective.	<i>Set:</i> Controller current sensors have invalid offset reading. <i>Clear:</i> Cycle KSI.
14	Precharge Failed <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. See Monitor menu» Battery: Capacitor Voltage. 2. External load on capacitor bank (B+ connection terminal) that prevents the capacitor bank from charging.	<i>Set:</i> Precharge failed to charge the capacitor bank to the KSI voltage. <i>Clear:</i> Cycle Interlock input or use VCL function <i>Enable_Precharge()</i> .
15	Controller Severe Undertemp <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. See Monitor menu» Controller: Temperature. 2. Controller is operating in an extreme environment.	<i>Set:</i> Heatsink temperature below -40°C. <i>Clear:</i> Bring heatsink temperature above -40°C, and cycle interlock or KSI.
16	Controller Severe Overtemp <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. See Monitor menu» Controller: Temperature. 2. Controller is operating in an extreme environment. 3. Excessive load on vehicle.	<i>Set:</i> Heatsink temperature above +95°C. <i>Clear:</i> Bring heatsink temperature below +95°C, and cycle interlock or KSI.
17	Severe B+ Undervoltage <i>Reduced drive torque.</i>	1. Battery Menu parameters are misadjusted. 2. Non-controller system drain on battery. 3. Battery resistance too high. 4. Battery disconnected while driving. 5. See Monitor menu» Battery: Capacitor Voltage. 6. Blown B+ fuse or main contactor did not close.	<i>Set:</i> Capacitor bank voltage dropped below the Severe Undervoltage limit (see page 58) with FET bridge enabled. <i>Clear:</i> Bring capacitor voltage above Severe Undervoltage limit.
18	Severe B+ Overvoltage <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. See Monitor menu» Battery: Capacitor Voltage. 2. Battery menu parameters are misadjusted. 3. Battery resistance too high for given 4. Battery disconnected while regen braking.	<i>Set:</i> Capacitor bank voltage exceeded the Severe Overvoltage limit with FET bridge enabled. <i>Clear:</i> Bring capacitor voltage below Severe Overvoltage limit, and then

Table 2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
22	Controller Overtemp Cutback <i>Reduced drive and brake torque.</i>	1. See Monitor menu» Controller: Temperature. 2. Controller is performance-limited at this temperature. 3. Controller is operating in an extreme environment. 4. Excessive load on vehicle. 5. Improper mounting of controller.	<i>Set:</i> Heatsink temperature exceeded 85°C. <i>Clear:</i> Bring heatsink temperature below 85°C.
23	Undervoltage Cutback <i>Reduced drive torque.</i>	1. Normal operation. Fault shows that the batteries need recharging. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Non-controller system drain on battery. 4. Battery resistance too high. 5. Battery disconnected while driving. 6. See Monitor menu» Battery: Capacitor Voltage. 7. Blown B+ fuse or main contactor did not close.	<i>Set:</i> Capacitor bank voltage dropped below the Undervoltage limit (see page 58) with the FET bridge enabled. <i>Clear:</i> Bring capacitor voltage above the Undervoltage limit.
24	Overvoltage Cutback <i>Reduced brake torque.</i> <i>Note: This fault is declared only when the controller is running in regen.</i>	1. Normal operation. Fault shows that regen braking currents elevated the battery voltage during regen braking. Controller is performance limited at this voltage. 2. Battery parameters are misadjusted. 3. Battery resistance too high for given regen current. 4. Battery disconnected while regen braking. 5. See Monitor menu» Battery: Capacitor Voltage.	<i>Set:</i> Capacitor bank voltage exceeded the Overvoltage limit (see page 58) with the FET bridge enabled. <i>Clear:</i> Bring capacitor voltage below the Overvoltage limit.
25	+5V Supply Failure <i>None, unless a fault action is programmed in VCL.</i>	1. External load impedance on the +5V supply (pin 26) is too low. 2. See Monitor menu» outputs: 5 Volts and Ext Supply Current.	<i>Set:</i> +5V supply (pin 26) outside the +5V±10% range. <i>Clear:</i> Bring voltage within range.
26	Digital Out 6 Open/Short <i>Digital Output 6 driver will not turn on.</i>	1. External load impedance on Digital Output 6 driver (pin 19) is too low.	<i>Set:</i> Digital Output 6 (pin 19) current exceeded 15 mA. <i>Clear:</i> Remedy the overcurrent cause and use the VCL function <i>Set_DigOut()</i> to turn the driver on again.
27	Digital Out 7 Open/Short <i>Digital Output 7 driver will not turn on.</i>	1. External load impedance on Digital Output 7 driver (pin 20) is too low.	<i>Set:</i> Digital Output 7 (pin 20) current exceeded 15 mA. <i>Clear:</i> Remedy the overcurrent cause and use the VCL function <i>Set_DigOut()</i> to turn the driver on again.

Table 2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
28	Motor Temp Hot Cutback <i>Reduced drive torque.</i>	1. Motor temperature is at or above the programmed Temperature Hot setting, and the current is being cut back. 2. Motor Temperature Control Menu parameters are mis-tuned. 3. See Monitor menu » Motor: Temperature and » Inputs: Analog2. 4. If the application doesn't use a motor thermistor, Temp Compensation and Temp Cutback should be programmed Off.	<i>Set:</i> Motor temperature is at or above the Temperature Hot parametersetting. <i>Clear:</i> Bring the motor temperature within range.
29	Motor Temp Sensor Fault <i>MaxSpeed reduced (LOS, Limited Operating Strategy), and motor temperature cutback disabled.</i>	1. Motor thermistor is not connected properly. 2. If the application doesn't use a motor thermistor, Motor Temp Sensor Enable should be programmed Off. 3. See Monitor menu » Motor: Temperature and » Inputs: Analog2.	<i>Set:</i> Motor thermistor input (pin 8) is at the voltage rail (0 or 10V). <i>Clear:</i> Bring the motor thermistor input voltage within range.
31	Coil1 Driver Open/Short <i>ShutdownDriver1.</i>	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	<i>Set:</i> Driver 1 (pin 6) is either open or shorted. This fault can be set only when Main Enable=Off. <i>Clear:</i> Correct open or short, and cycle driver.
31	Main Open/Short <i>ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; FullBrake.</i>	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	<i>Set:</i> Main contactor driver (pin 6) is either open or shorted. This fault can be set only when Main Enable=On. <i>Clear:</i> Correct open or short, and cycle driver
32	Coil2 Driver Open/Short <i>ShutdownDriver2.</i>	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	<i>Set:</i> Driver 2 (pin 5) is either open or shorted. This fault can be set only when EM Brake Type=0. <i>Clear:</i> Correct open or short, and cycle driver.
32	EMBrake Open/Short <i>ShutdownEMBrake; ShutdownThrottle; FullBrake.</i>	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	<i>Set:</i> Electromagnetic brake driver (pin 5) is either open or shorted. This fault can be set only when EM Brake Type>0. <i>Clear:</i> Correct open or short, and cycle driver.
33	Coil3 Driver Open/Short <i>ShutdownDriver3.</i>	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	<i>Set:</i> Driver 3 (pin 4) is either open or shorted. <i>Clear:</i> Correct open or short, and cycle driver.
34	Coil4 Driver Open/Short <i>ShutdownDriver4.</i>	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	<i>Set:</i> Driver 4 (pin 3) is either open or shorted. <i>Clear:</i> Correct open or short, and cycle driver.
35	PD Open/Short <i>ShutdownPD.</i>	1. Open or short on driver load. 2. Dirty connector pins. 3. Bad crimps or faulty wiring.	<i>Set:</i> Proportional driver (pin 2) is either open or shorted. <i>Clear:</i> Correct open or short, and cycle driver.

Table 2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITION
36	Encoder Fault <i>ShutdownEMBrake;</i> <i>ShutdownThrottle.</i>	1. Motor encoder failure. 2. Bad crimps or faulty wiring. 3. See Monitor menu» Motor: Motor RPM.	<i>Set:</i> Motor encoder phase failure detected. <i>Clear:</i> Cycle KSI.
37	Motor Open <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. Motor phase is open. 2. Bad crimps or faulty wiring.	<i>Set:</i> Motor phase U, V, or W detected open. <i>Clear:</i> Cycle KSI.
38	Main Contactor Welded <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. Main contactor tips are welded closed. 2. Motor phase U or V is 'disconnected or open. 3. An alternate voltage path (such as an external precharge resistor) is providing a current to the capacitor bank (B+ connection terminal).	<i>Set:</i> Just prior to the main contactor closing, the capacitor bank voltage (B+ connection terminal) was loaded for a short time and the voltage did not discharge. <i>Clear:</i> Cycle KSI
39	Main Contactor Did Not Close <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. Main contactor did not close. 2. Main contactor tips are oxidized, burned, or not making good contact. 3. External load on capacitor bank (B+ connection terminal) that prevents capacitor bank from charging. 4. Blown B+ fuse.	<i>Set:</i> With the main contactor commanded closed, the capacitor bank voltage (B+ connection terminal) did not charge to B+. <i>Clear:</i> Cycle KSI.
41	Throttle Wiper High <i>ShutdownThrottle.</i>	1. See Monitor menu» Inputs: Throttle Pot. 2. Throttle pot wiper voltage too high.	<i>Set:</i> Throttle pot wiper (pin 16) voltage is higher than the high fault threshold (can be changed with the VCL function <i>Setup_Pot_Faults()</i>). <i>Clear:</i> Bring throttle pot wiper voltage below the fault threshold.
42	Throttle Wiper Low <i>ShutdownThrottle.</i>	1. See Monitor menu» Inputs: Throttle Pot. 2. Throttle pot wiper voltage too low.	<i>Set:</i> Throttle pot wiper (pin 16) voltage is lower than the low fault threshold (can be changed with the VCL function <i>Setup_Pot_Faults()</i>). <i>Clear:</i> Bring throttle pot wiper voltage above the fault threshold.
43	Pot2 Wiper High <i>FullBrake.</i>	1. See Monitor menu» Inputs: Pot2 Raw. 2. Pot2 wiper voltage too high.	<i>Set:</i> Pot2 wiper (pin 17) voltage is higher than the high fault threshold (can be changed with the VCL function <i>Setup_Pot_Faults()</i>). <i>Clear:</i> Bring Pot2 wiper voltage below the fault threshold.
44	Pot2 Wiper Low <i>FullBrake.</i>	1. See Monitor menu» Inputs: Pot2 Raw. 2. Pot2 wiper voltage too low.	<i>Set:</i> Pot2 wiper (pin 17) voltage is lower than the low fault threshold (can be changed with the VCL function <i>Setup_Pot_Faults()</i>). <i>Clear:</i> Bring Pot2 wiper voltage above the fault threshold.

Table 2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
45	Pot Low Overcurrent <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. See Monitor menu» Outputs: Pot Low. 2. Combined pot resistance connected to pot low is too low.	<i>Set:</i> Pot low (pin 18) current exceeds 10mA. <i>Clear:</i> Clear pot low overcurrent condition and cycle KSI.
46	EEPROM Failure <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>ShutdownInterlock;</i> <i>ShutdownDriver1;</i> <i>ShutdownDriver2;</i> <i>ShutdownDriver3;</i> <i>ShutdownDriver4;</i> <i>ShutdownPD;</i> <i>FullBrake.</i>	1. Failure to write to EEPROM memory. This can be caused by EEPROM memory writes initiated by VCL, by the CAN bus, by adjusting parameters with the programmer, or by loading new software into the controller.	<i>Set:</i> Controller operating system tried to write to EEPROM memory and failed. <i>Clear:</i> Download the correct software (OS) and matching parameter default settings into the controller and cycle KSI.
47	HPD/Sequencing Fault <i>ShutdownThrottle.</i>	1. KSI, interlock, direction, and throttle inputs applied in incorrect sequence. 2. Faulty wiring, crimps, or switches at KSI, interlock, direction, or throttle inputs.	<i>Set:</i> HPD (High Pedal Disable) or sequencing fault caused by incorrect sequence of KSI, interlock, direction, and throttle inputs. <i>Clear:</i> Reapply inputs in correct sequence.
47	Emer Rev HPD <i>ShutdownThrottle;</i> <i>ShutdownEMBrake.</i>	1. Emergency Reverse operation has concluded, but the throttle, forward and reverse inputs, and interlock have not been returned to neutral.	<i>Set:</i> At the conclusion of Emergency Reverse, the fault was set because various inputs were not returned to neutral. <i>Clear:</i> If EMR_Interlock = On, clear the interlock, throttle, and direction inputs. If EMR_Interlock = Off, clear the throttle and direction inputs.
49	Parameter Change Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. This is a safety fault caused by a change in certain parameter settings so that the vehicle will not operate until KSI is cycled. For example, if a user changes the Throttle Type this fault will appear and require cycling KSI before the vehicle can operate.	<i>Set:</i> Adjustment of a parameter setting that requires cycling of KSI. <i>Clear:</i> Cycle KSI.
51	Pump Controller Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>ShutdownInterlock;</i> <i>ShutdownDriver1;</i> <i>ShutdownDriver2;</i> <i>ShutdownDriver3;</i> <i>ShutdownDriver4;</i> <i>ShutdownPD;</i> <i>FullBrake.</i>	1. Check the pump controller fault codes.	<i>Clear:</i> Clear pump controller fault codes. Cycle KSI

Table 2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
52	Pump Communication Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>ShutdownInterlock;</i> <i>ShutdownDriver1;</i> <i>ShutdownDriver2;</i> <i>ShutdownDriver3;</i> <i>ShutdownDriver4;</i> <i>ShutdownPD;</i> <i>FullBrake.</i>	1. Broken CAN bus wires. 2. Poor connections between the master controller and the pump controller.	<i>Clear:</i> Repair the fault. Cycle KSI
53	Screen Communication Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>ShutdownInterlock;</i> <i>ShutdownDriver1;</i> <i>ShutdownDriver2;</i> <i>ShutdownDriver3;</i> <i>ShutdownDriver4;</i> <i>ShutdownPD;</i> <i>FullBrake.</i>	1. Broken CAN bus wires. 2. Poor connections between the master controller and the screen.	<i>Clear:</i> Repair the fault. Cycle KSI

Table 6.2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
68	VCL Run Time Error <i>ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.</i>	1. VCL code encountered a runtime VCL error 2. Controller is performance-limited See Monitor menu » Controller: VCL Error Module and VCL Error. This error can then be compared to the runtime VCL module ID and error code definitions found in the specific OS system information file.	<i>Set:</i> Runtime VCL code error condition <i>Clear:</i> Edit VCL application software to fix this error condition; flash the new compiled software and matching parameter defaults; cycle KSI.
69	External Supply Out of Range <i>None, unless a fault action is programmed in VCL</i>	1. External load on the 5V and 12V supplies draws either too much or too little current. 2. Fault Checking Menu parameters Ext Supply Max and Ext Supply Min are mistuned. 3. See Monitor menu » Outputs: Ext Supply Current.	<i>Set:</i> The external supply current (combined current used by the 5V supply [pin 26] and 12V supply [pin 25]) is either greater than the upper current threshold or lower than the lower current threshold. The two thresholds are defined by the External Supply Max and External Supply Min parameter settings (page 53). <i>Clear:</i> Bring the external supply current within range.
71	OS General <i>ShutdownMotor; ShutdownMainContactor; ShutdownEMBrake; ShutdownThrottle; ShutdownInterlock; ShutdownDriver1; ShutdownDriver2; ShutdownDriver3; ShutdownDriver4; ShutdownPD; FullBrake.</i>	1. Internal controller fault.	<i>Set:</i> Internal controller fault detected. <i>Clear:</i> Cycle KSI.
72	PDO Timeout <i>ShutdownThrottle; CAN NMT State set to Pre-operational.</i>	1. Time between CAN PDO messages received exceeded the PDO Timeout Period.	<i>Set:</i> Time between CAN PDO messages received exceeded the PDO Timeout Period. <i>Clear:</i> Cycle KSI or receive CAN NMT message.
73	Stall Detected <i>ShutdownEMBrake; ShutdownThrottle; Control Mode changed to LOS (Limited Operating Strategy).</i>	1. Stalled motor. 2. Motor encoder failure. 3. Bad crimps or faulty wiring. 4. Problems with power supply for the motor encoder. 5. See Monitor menu » Motor: Motor RPM.	<i>Set:</i> No motor encoder movement detected. <i>Clear:</i> Either cycle KSI, or detect valid motor encoder signals while operating in LOS mode and return Throttle Command = 0 and Motor RPM = 0.

Table 6.2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
74	Fault On Other Traction Controller	Dual Drive fault: see Dual Drive manual.	
75	Dual Severe Fault	Dual Drive fault: see Dual Drive manual.	
77	Supervisor Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>ShutdownInterlock;</i> <i>ShutdownDriver1;</i> <i>ShutdownDriver2;</i> <i>ShutdownDriver3;</i> <i>ShutdownDriver4;</i> <i>ShutdownPD;</i> <i>FullBrake.</i>	1. The Supervisor has detected a mismatch in redundant readings. 2. Internal damage to Supervisor microprocessor. 3. Switch inputs allowed to be within upper and lower thresholds for over over 100 milliseconds.	<i>Set:</i> Mismatched redundant readings; damaged Supervisor; illegal switch inputs. <i>Clear:</i> Check for noise or voltage drift in all switch inputs; check connections; cycle KSI.
78	Supervisor Incompatible <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>ShutdownInterlock;</i> <i>ShutdownDriver1;</i> <i>ShutdownDriver2;</i> <i>ShutdownDriver3;</i> <i>ShutdownDriver4;</i> <i>ShutdownPD;</i> <i>FullBrake.</i>	1. The main OS is not compatible with the Supervisor OS.	<i>Set:</i> Incompatible software. <i>Clear:</i> Load properly matched OS code or update the Supervisor code; cycle KSI.
82	Bad Calibrations <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. Internal controller fault.	<i>Set:</i> Internal controller fault detection. <i>Clear:</i> Cycle KSI.
83	Driver Supply Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. Internal controller fault in the voltage supply for the driver circuits.	<i>Set:</i> Internal controller fault detection. <i>Clear:</i> Cycle KSI.

Table 6.2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
87	Motor Characterization Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. Motor characterization failed during characterization process. See Monitor menu » Controller: Motor Characterization Error for cause: 0 = none 1 = encoder signal seen, but step size not determined; set Encoder Step Size manually. 2 = motor temp sensor fault. 3 = motor temp hot cutback fault. 4 = controller overtemp cutback fault. 5 = controller undertemp cutback fault. 6 = undervoltage cutback fault. 7 = severe overvoltage fault. 8 = encoder signal not seen, or one or both channels missing. 9 = motor parameters out of characterization range.	<i>Set:</i> Motor characterization failed during the motor characterization process. <i>Clear:</i> Correct fault; cycle KSI.
88	Encoder Pulse Error <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>ShutdownInterlock;</i> <i>ShutdownDriver1;</i> <i>ShutdownDriver2;</i> <i>ShutdownDriver3;</i> <i>ShutdownDriver4;</i> <i>ShutdownPD;</i> <i>FullBrake.</i>	1. Encoder Steps parameter does not match the actual motor encoder.	<i>Set:</i> Motor lost IFO control and accelerated without throttle command. <i>Clear:</i> Ensure the Encoder Steps parameter matches the actual encoder; cycle KSI.
89	Motor Type Fault <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	1. The Motor_Type parameter value is out of range.	<i>Set:</i> Motor_Type parameter is set to an illegal value. <i>Clear:</i> Set Motor_Type to correct value and cycle KSI.
91	VCL/OS Mismatch <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>ShutdownInterlock;</i> <i>ShutdownDriver1;</i> <i>ShutdownDriver2;</i> <i>ShutdownDriver3;</i> <i>ShutdownDriver4;</i> <i>ShutdownPD;</i> <i>FullBrake.</i>	1. The VCL software in the controller does not match the OS software in the controller.	<i>Set:</i> VCL and OS software do not match; when KSI cycles, a check is made to verify that they match and a fault is issued when they do not. <i>Clear:</i> Download the correct VCL and OS software into the controller.

Table 6.2 Troubleshooting Chart continued

CODE	PROGRAMMER LCD DISPLAY EFFECT OF FAULT	POSSIBLE CAUSE	SET/CLEAR CONDITIONS
92	EM Brake Failed to Set <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>Position Hold is engaged when Interlock=On.</i>	- Vehicle movement sensed after the EM Brake has been commanded to set. - EM Brake will not hold the motor from rotating.	<i>Set:</i> After the EM Brake was commanded to set and time has elapsed to allow the brake to fully engage, vehicle movement has been sensed. <i>Clear:</i> Activate the throttle.
93	Encoder LOS (Limited Operating Strategy) <i>Enter LOS control mode</i>	- Limited Operating Strategy (LOS) control mode has been activated, as a result of either an Encoder Fault (Code 36) or a Stall Detect Fault (Code 73). - Motor encoder failure. - Bad crimps of faulty wiring. - Vehicle is stalled.	<i>Set:</i> Encoder Fault (Code 36) or Stall Detect Fault (Code 73) was activated and Brake or Interlock has been applied to activate LOS control mode, allowing limited motor control. <i>Clear:</i> Cycle KSI or, if LOS mode was activated by the Stall Fault, clear by ensuring encoder senses proper operation, Motor RPM = 0 and Throttle Command = 0
94	EMR Rev Timeout <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i>	- Emergency Reverse was activated and concluded because the EMR Timeout timer has expired. - The emergency reverse input is stuck On.	<i>Set:</i> Emergency Reverse was activated and ran until the EMR Timeout timer expired. <i>Clear:</i> Turn the emergency reverse input Off.
98	Illegal Model Number <i>ShutdownMotor;</i> <i>ShutdownMainContactor;</i> <i>ShutdownEMBrake;</i> <i>ShutdownThrottle;</i> <i>FullBrake.</i>	- Model_Number variable contains illegal value. - Software and hardware do not match. - Controller defective.	<i>Set:</i> Illegal Model_Number variable; when KSI cycles, a check is made to confirm a legal Model_Number and a fault is issued if one is not found. <i>Clear:</i> Download appropriate software for your controller model.
99	Dualmotor Parameter Mismatch	Dual Drive fault: see Dual Drive manual.	

6.2: Warranty Registration

The warranty registration form can be filled and submitted online at:

www.combilift.com/warranty

Please complete the warranty registration online within 30 days of receipt of the truck.

Alternatively the warranty registration form on the following page can be filled out and posted to the following address:

*Combilift Ltd.
Gallinagh
Co. Monaghan
Ireland*



WARRANTY REGISTRATION FORM

Please complete the form below and return this to us within 30 days of delivery to Customer.
Form can be submitted online @ www.combilift.com/warranty

DEALER DETAILS: (Supplier)

Dealer Name: _____ Tel: _____

First Name: _____ Last Name: _____

E-mail: _____ Position/Role: _____

Street: _____ Address Line 2: _____

City: _____ Zip/Postal Code: _____

County/State: _____ Country: _____

MACHINE DETAILS

MODEL: _____ SERIAL NO.

Delivery / installation date: __ / __ / __

CUSTOMER DETAILS (please state address where truck is located)

Customer Business Name: _____ Tel: _____

First Name: _____ Last Name: _____

E-mail: _____ Position/Role: _____

Street: _____ Address Line 2: _____

City: _____ Zip/Postal Code: _____

County/State: _____ Country: _____

I have received my Aisle-Master/Combilift forklift and read the Operators Manual and am satisfied with both.

*Customer's Signature: _____ Date: _____

WHEN COMPLETED PLEASE RETURN TO:

BY POST TO: Combilift, Gallinagh, Monaghan, County Monaghan, Ireland.

BY EMAIL TO: warranty@combilift.com

Failure to complete Warranty Registration Form may impact the Warranty Claim Process.