

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 make it one of the leading products in the material handling industry.

Combilift Ltd

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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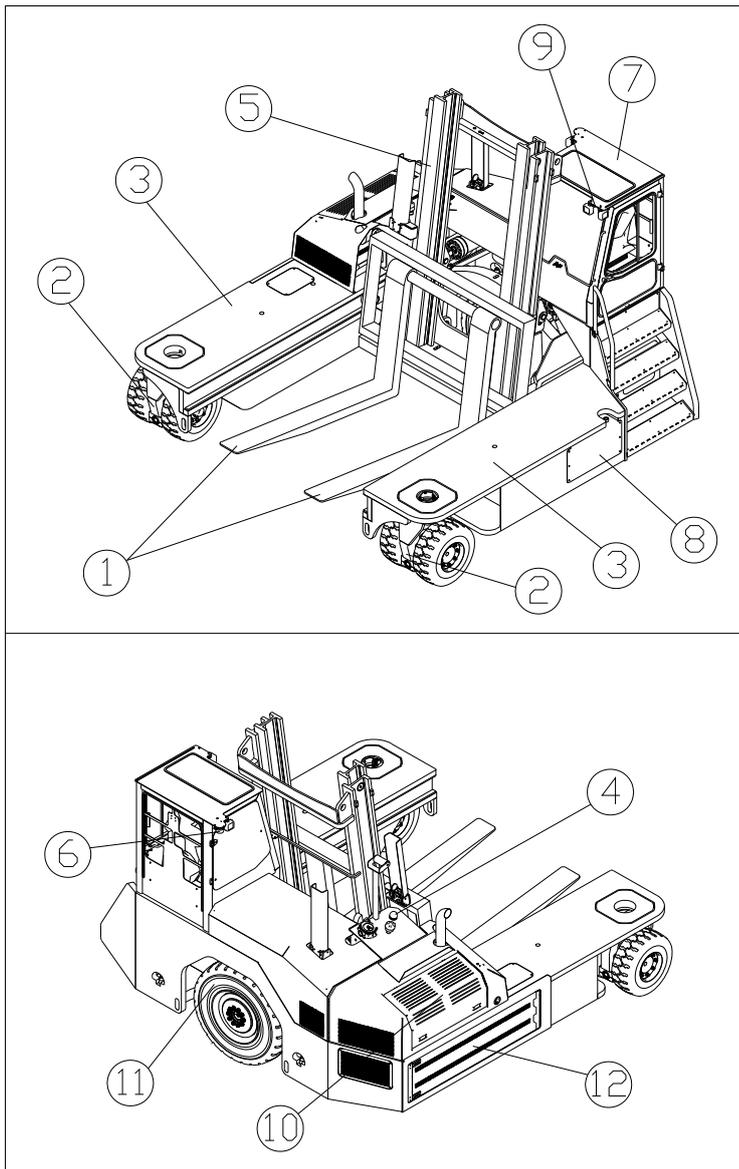
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Section 1: Machine layout and Operator Controls

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 1.1 below indicates all of the major components of the Combilift and figure 1.2 on the following page indicates all of the operator controls.

1.1: Machine Overview and Components

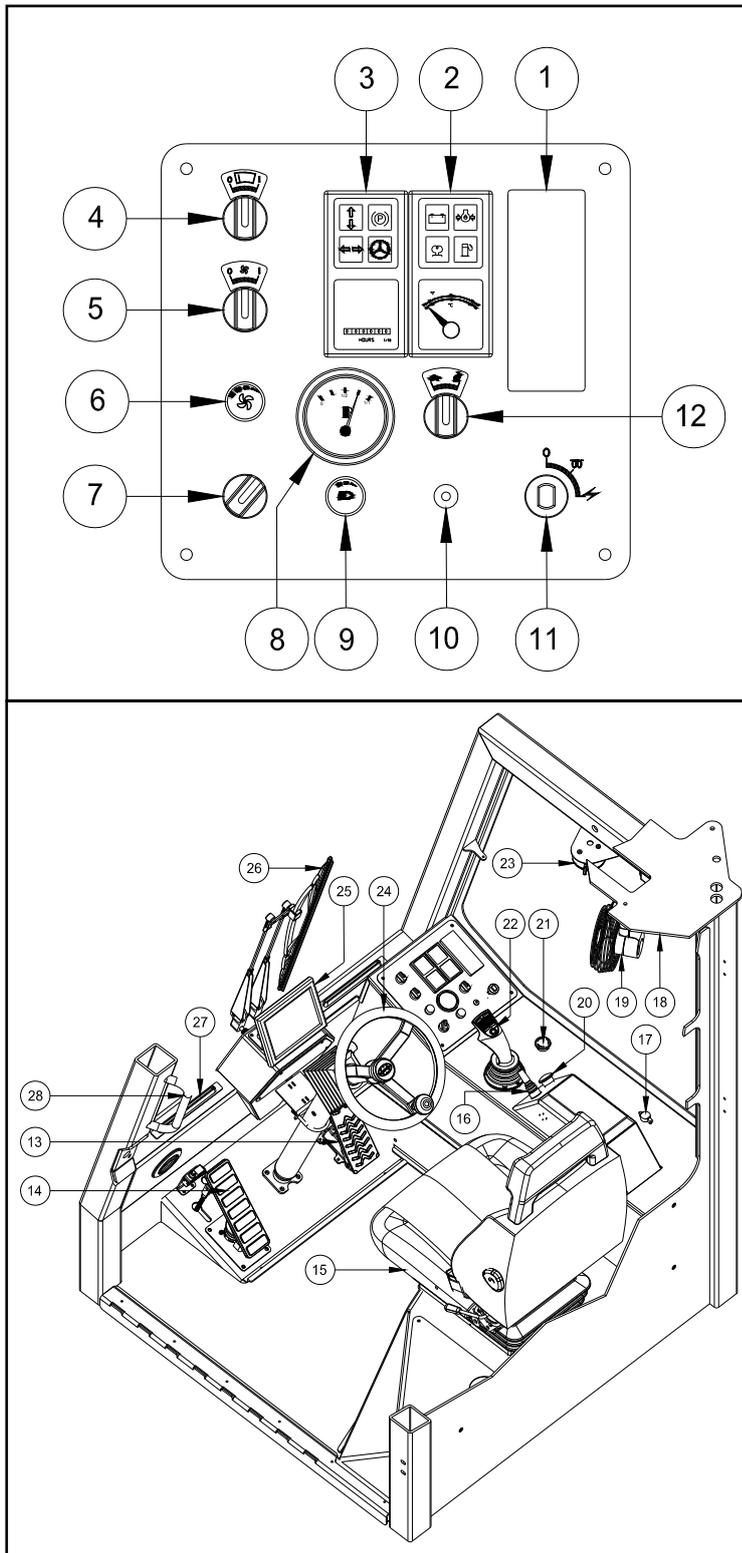


Component List

1. Forks
2. Front Swivels
3. Platforms
4. Hydraulic Tank
5. Mast
6. Flashing Beacon
7. Operator Cabin
8. Diesel Tank
9. Work Lights
10. Bonnet
11. Rear Swivel/Arm
12. Engine Access Panel

Figure 1.1: Machine Components Layout

1.2: Operator Controls & Display Layout



Control Layout

1. Fuse Box
2. Engine Temperature Gauge
3. Hour Meter
4. Windscreen Wiper Switch
5. Cabin Fan Switch (Optional)
6. Heater Fan Switch (Optional)
7. Joystick On/Off Switch (If Fitted)
8. Fuel Gauge
9. Work Lights Switch
10. Engine Malfunction Indicator
11. Ignition Switch
12. Drive Speed Switch
13. Accelerator Pedal
14. Brake / Inch Pedal
15. Adjustable Suspension Seat
16. Direction Control Joystick
17. Temperature Control Knob (Optional)
18. Side Window Wiper Switch
19. Cooling Fan (Optional)
20. Horn Button
21. Parking Brake / Stop Switch
22. Fork Control Joystick
23. Interior Light
24. Adjustable Steering Wheel / Column
25. Camera Monitor
26. Windscreen Wiper
27. Air Vent
28. Hand Grip

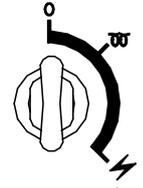
Figure 1.2: Machine Controls Layout

1.3: 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.

Ignition Switch:

- This is a three-position key switch located on the dash, which isolates the electrical system when in the off position.



Park Brake Switch

- The park brake switch is the red button located on the dash to the right hand side of the joystick.
- To APPLY the brake, depress the button. The button will lock in the depressed position.
- To RELEASE the brake, rotate the button clockwise. It should pop up into its normal position.
- The Machine will NOT drive with the park brake on.



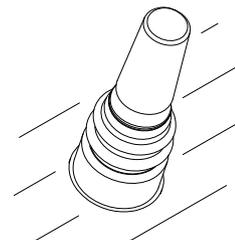
Note

The park brake is applied automatically if the operator vacates the operator's seat for more than 3 seconds.

To release the parking brake the operator must sit on the seat and depress then release the parking brake switch.

Direction Control Joystick

- 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

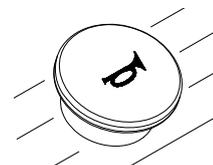


Note

The truck will NOT start unless the direction control lever is in the neutral position.

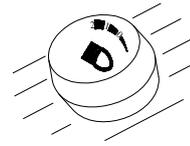
Horn Button

- The horn Button is the push button located on the dash next to the parking brake.
- To operate the horn, press the button.

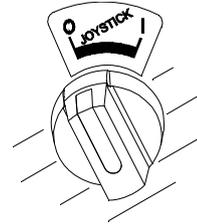


Work Lights Switch:

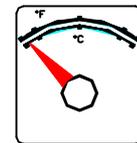
- This is a three position rotary switch located on the dash
- Position 0 – Lights Off
- Position 1 – Front Lights On
- Position 2 – Front & Side Work Lights On

**Joystick On/Off Switch (If Fitted):**

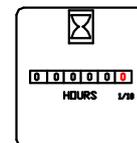
- This is a two position rotary switch located on the dash
- Position '0' or 'OFF' – The Joystick is inactive, the forks and mast cannot be moved.
- Position '1' or 'ON' – The Joystick is active, all fork and mast functions are active.

**Engine Temperature gauge**

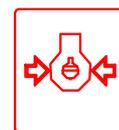
- This gauge monitors the temperature of the engine cooling system.
- The truck must not be operated if the gauge pointer moves to the red area as this indicates a fault in the cooling system.

**Hour Meter**

- The hour meter records how many hours the truck has been operating for in hours and tenths of an hour.
- Use meter to determine maintenance intervals.

**Oil Pressure Indicator Light**

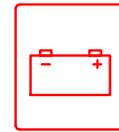
- When the key switch is in the 'ON' position, with the engine at rest, the oil pressure indicator is illuminated.
- If the indicator is illuminated when the engine is 'running' then this indicates low engine oil pressure and/or insufficient oil in the sump.

**Note**

Do **NOT** run engine if oil pressure indicator is illuminated.

Battery Charge Indicator Light

- This charging lamp indicates whether the alternator is charging the system or not. With the key switch turned ON and the engine not running, this red charge lamp should illuminate.
- If the charging lamp remains illuminated with the engine running, it indicates a malfunction of the charging system or associated components.



Pre-Heat Indicator Light – (diesel engines)

- The Pre-heat indicator is a lamp connected to the glow plugs on the diesel engine.
- When operating in cold conditions, wait until the pre-heat indicator extinguishes before attempting to start engine.



Low fuel level indicator light

- The low-level indicator light illuminates whenever the fuel level on the truck reaches a certain level.
- On LPG engines a buzzer will also sound.
- Whenever the light illuminates the truck should be refuelled immediately.

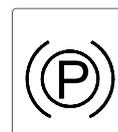


Note

ALWAYS adhere to all safety precautions for refuelling the truck.

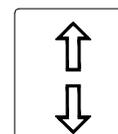
Parking Brake Indicator Light

- The Parking Brake indicator light indicates whether the brake is “ON” or “OFF”

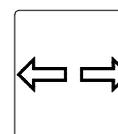


Mode Indicator Lights

- The Mode indicator lights indicate which mode of travel the machine is in.
- If the machine is in normal mode, then the normal mode indicator light will illuminate.
- If the machine is in sideward mode, then the sideward mode indicator light will illuminate.
- Note: Modes of travel are covered in more detail in section 3 of this manual.



Normal
Mode



Sideward
Mode

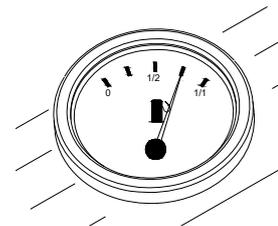
Carousel Indicator Light

- The carousel indicator light is only used when the machine is in sideward mode.
- When the front wheels are steered in to a certain position, the carousel indicator light will illuminate. It is at this point that the carousel mode is activated and the machine can turn on its own axis.
- To deactivate the carousel the operator simply steers the wheels out of the carousel position.



Fuel Gauge

- The fuel gauge displays how much diesel is in the diesel tank.
- This gauge located on the dash (see figure 1.2 item number 8)

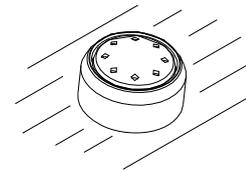


Drive Cutout Override Button (Optional)

- 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 (113") 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

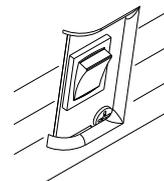
OR

 - Press the drive cutout override button located on the dash.



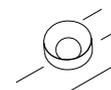
Window Wiper Switches

- There are 2 window wiper switches on the machine.
- The right hand side window wiper switch shown opposite is located in the top right hand corner of the cabin. This rocker switch activates the wiper by flipping it to the on position. See Item 18 in figure 1.2 on page 5.
- The front window wiper switch shown opposite is located on the dash. See Item 4 in figure 1.2 on page 5.
- The 2 position rotary switch activates the wiper by turning it to the on or 'I' position.



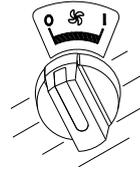
90° Light – Optional (Green Light On Dash)

- This light illuminates when the swivels are in the 90° position (sideward mode) indicating that it can be driven in a guided aisle.

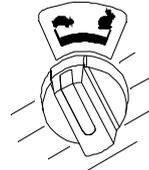


Cabin Fan (Optional) Switch

- 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 corner of the cabin. See Item 5 in figure 1.2 on page 5.

**Drive Speed Switch**

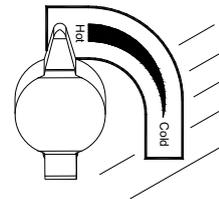
- This is a 2 position rotary switch located on the dash. Item 12 in figure 1.2 on page 5.
- Turning the switch to the 'Tortoise' symbol selects low drive speed.
- Turning the switch to the 'Hare' symbol selects high drive speed.

**Heater Fan Switch (Optional)**

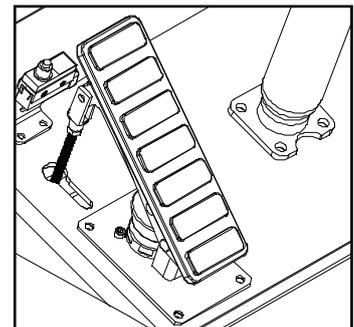
- This four position rotary switch located on the dash allows the operator to select between off, low, medium or high fan speeds. Item 6 in figure 1.2 on page 5.

**Temperature Control Knob (Optional)**

- This knob is located to the right of the armrest see item 17 in figure 1.2 on page 5.
- To increase cabin temperature, turn anti-clockwise.
- To decrease cabin temperature, turn clockwise.

**Brake / Inch Pedal**

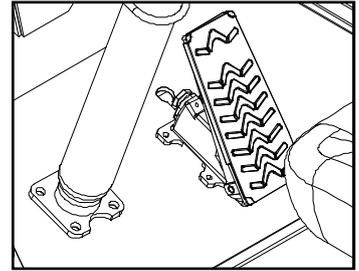
- The Brake / Inch pedal is the pedal on the floor to the left hand side of the steering Column as shown in the diagram opposite.
- The combined Brake / Inch Pedal has two functions:
 - Permits slow speed, for precise manoeuvring of the truck in confined spaces.
 - Brings the machine to a complete stop when pressure on the pedal is increased.

**Note**

When the Inch / brake pedal is fully depressed for a fixed time period the parking brake will be engaged and the machine brought to a complete stop.

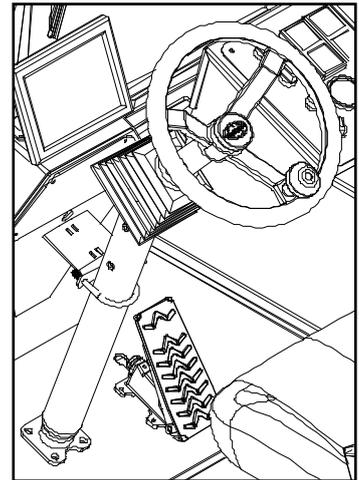
Accelerator Pedal

- The accelerator pedal is located on the floor on the right hand side of the steering column.
- The accelerator pedal provides the operator control of the truck speed.
- To INCREASE truck speed, DEPRESS pedal.



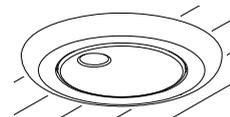
Steering Wheel / Column

- The truck has both front and rear 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 anti clockwise to turn truck anti clockwise.
- When driving in reverse, turn steering wheel clockwise to turn truck anti clockwise, 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 anti clockwise to turn truck anti clockwise.
- 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 handle on the side of the column by turning the handle clockwise.
- Adjust the steering column to the desired angle.
- To lock the steering column in position turn the locking handle anticlockwise until tight.



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.



Engine Malfunction Indicator Light (Light on Dash)

- When this light comes on, an abnormal condition exists. It is not necessary to shutdown the engine immediately, but the problem should be corrected as soon as possible.



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 Upstop 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.

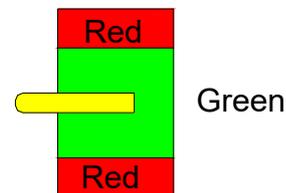
D Backrest angle adjustment

E Seat belt

F Horizontal Adjustment (Slide rails)

H Backrest Extension

I Lumbar Support adjustment (5 positions)



Seat Switch

- The seat switch is a safety mechanism intended to ensure the safety of the operator and others working in close proximity to the truck.
- The fork control joystick will be disabled if the operator is not sitting on the operator's seat.
- The park brake will be applied automatically if the operator vacates the operator's seat for more than 3 seconds.
- To release the park brake the operator must sit on the seat and depress then release the park brake switch.

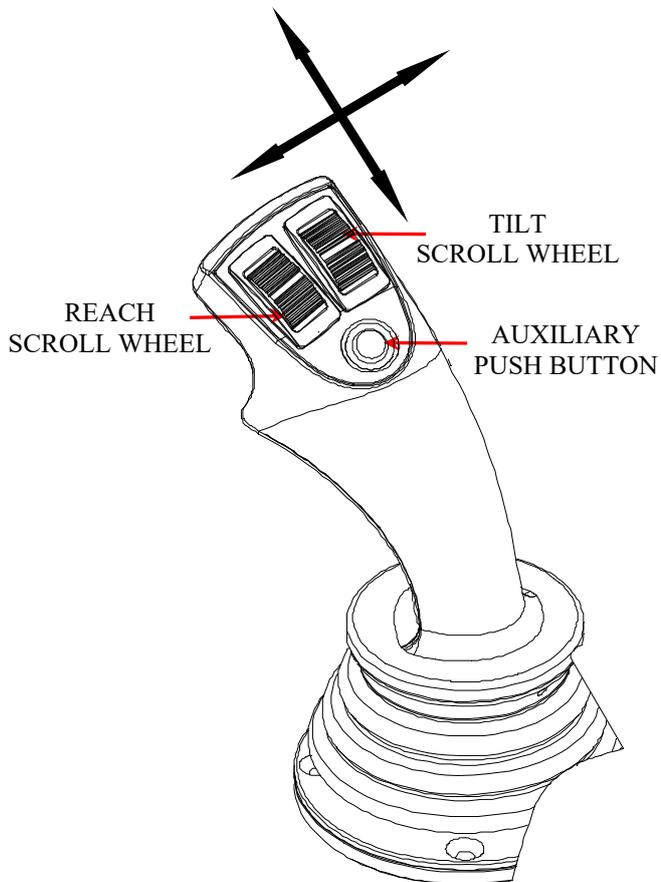


Warning



The seat switch is a critical safety feature. Do not attempt to disable or bypass the seat switch.

1.4: Fork Control Joystick



Component Layout

Lift Control

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

Mast Extension/ Retraction

- To extend mast, roll Reach scroll wheel forward.
- To retract mast back, roll Reach scroll wheel back.

Tilt Control

- To tilt forks forward, roll Tilt scroll wheel forward.
- To tilt forks back, roll Tilt scroll wheel back.

Side-shift Control

- To side-shift the forks left, pull joystick to the left.
- To side-shift the forks right, push joystick to the right.

Note

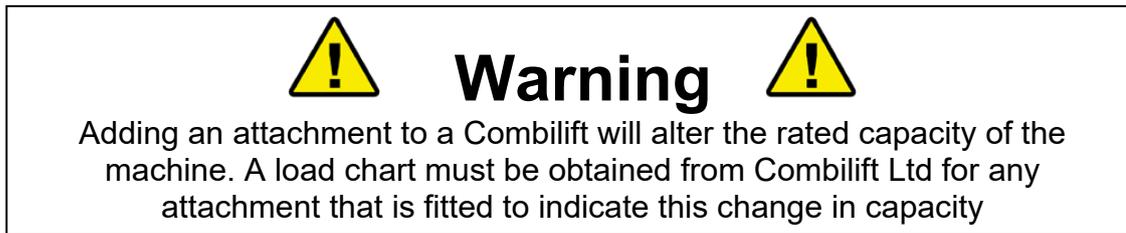
The layout of the joystick functions and positioning of controls and switches may be subject to change due to customisation. Refer to the decals on the individual truck.

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

The Joystick will only function when the operator is sitting on the operator's seat.

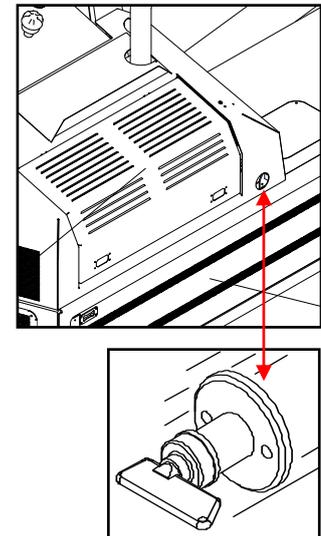
Auxiliary Function Button

- This button combined with a movement of the joystick controls the operation of any additional equipment that may be fitted to the fork carriage.
- Combilift have a number of standard functions that can be fitted to the truck and operated via the auxiliary button and joystick. 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



Battery Isolator Key Switch

- This switch is used to disconnect power from the battery in the event of an emergency.
- The switch is located above the access panel on the right hand side of the Combilift. (See diagram opposite)
- When the Combilift is not in use turn switch to the 'OFF' position, by turning the switch ANTI-CLOCKWISE.
- The Combilift will not start unless the switch is returned to the 'ON' position, by turning the switch CLOCKWISE



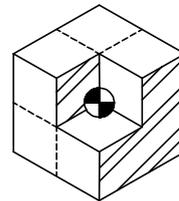
Section 2: Operating instructions and Conditions

2.1: Understand the Capacity of your Lift-Truck

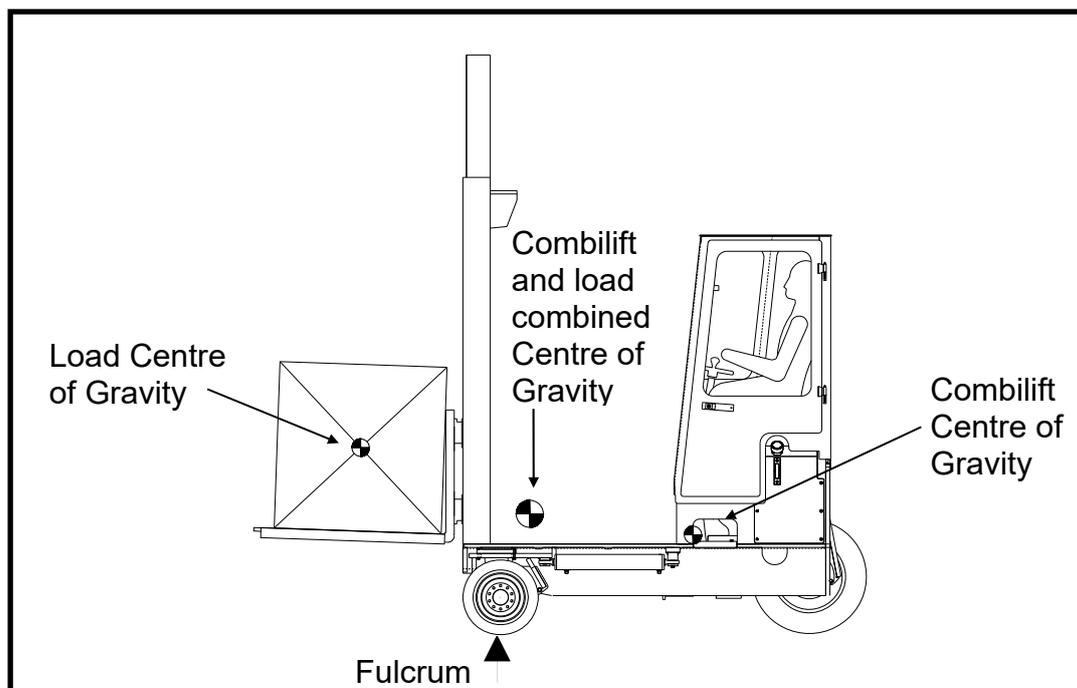
The basic function of a lift truck is to lift, move and place materials. It operates on the seesaw principle - two weights on opposite sides of a fulcrum. In this case, the load on the forks must be balanced by the weight of the Combilift. The location of the centre of gravity of both the Combilift and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

2.2: Centre of Gravity (COG)

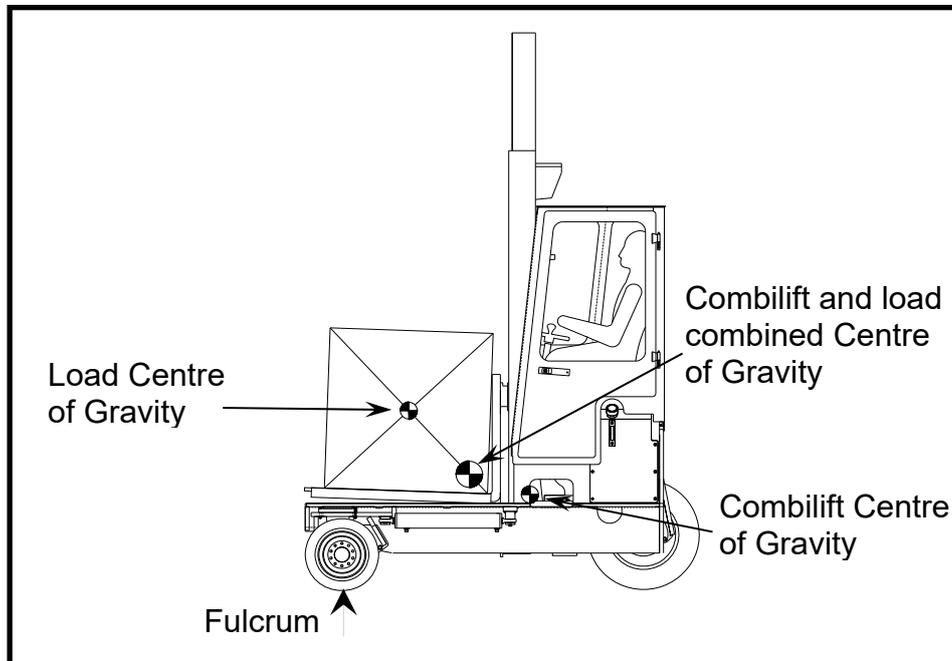
The centre of gravity of any object is the single point about which the object is balanced in all directions. Every object has a centre of gravity. When the lift truck picks up a load, the truck and load have a new, combined centre of gravity.



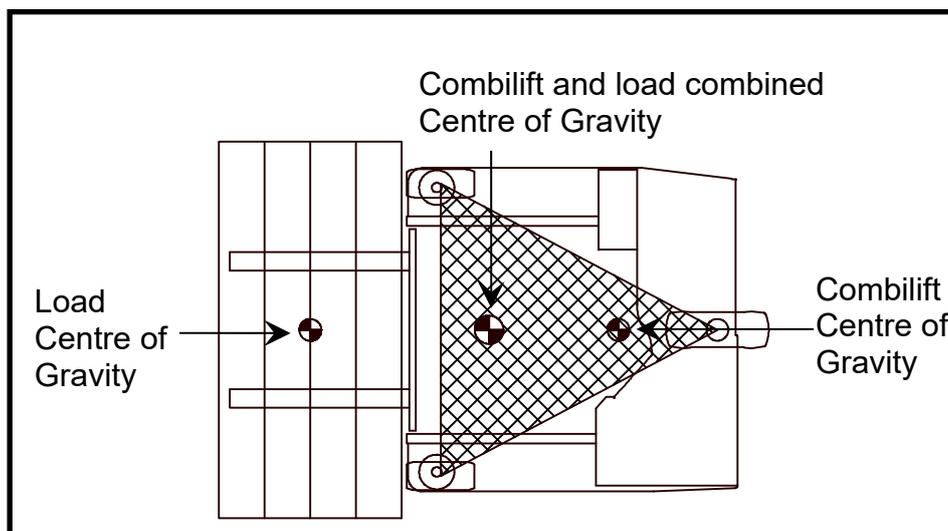
The Combilift has moving parts that change its centre of gravity. The centre of gravity moves forward and back as the mast is extended and retracted and also as the mast is tilted backwards and forwards. The centre of gravity also moves up and down as the mast moves up and down.



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.

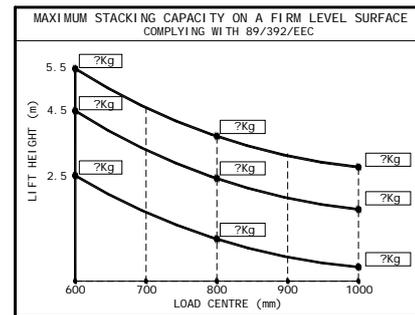


To keep the lift truck stable, the centre of gravity must stay within the area of the lift truck represented by a triangle drawn between the three wheels. If the centre of gravity moves forward of the triangle front, the lift truck will tip forwards. If it moves outside the right or left of the triangle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



2.3: 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.

2.4: Operator Qualification and Responsibilities

- 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.

2.5: Entering and exiting the operator Cabin

- When entering or exiting the Operator cabin of the Combilift, always use a three point contact method to avoid slips and falls. The three point contact method is applied by keeping 3 of the bodies 4 limbs (hands & feet) in contact with the machine.
- Always use the handles and footsteps on the machine.
- NEVER use the steering wheel as a handle.

2.6: Starting Procedure

NOTE

Engine will not start if the direction control switch is not in the neutral position.

Diesel Engine

- Move the direction control switch to neutral
- Insert the key into the ignition switch and turn clockwise to the preheat position. The charge indicator lamp must light up.
- Depress the accelerator.
- Turn the ignition key further clockwise to the "Start" position. After the engine starts, release the ignition key which will return automatically to the ON position.
- Check that all the indicator lamps are extinguished and that all gauges are registering correctly.

Cold Starting

- When the ambient temperature is cold, turn the key to the preheat position and wait about 10 seconds until the glow plug indicator lamp extinguishes before turning the engine.

WARNING

When the machine is started the wheels will remain in whatever position they were in when the machine was stopped until the user selects a direction of travel on the directional control switch

CAUTION

The starter must not be operated continuously for more than 30 seconds. If the engine does not start, return the key to the 'OFF' position and wait 10 seconds before trying again.

2.7: Moving Off

- Ensure that the forks are as low as possible. If loaded, rest the load on the platforms where possible.
- Select forward, reverse, right or left with the Direction Control Joystick.
- **Parking brake must be applied before change in mode is selected.**
- **Do not press the brake pedal while a change in mode is being selected.**
- Look around and when all is clear release parking brake and apply light pressure to the accelerator pedal until the truck begins to move.
- Increase pressure on accelerator pedal to increase truck speed.

NOTE

The truck has a maximum ground speed of 19km/h (11.8mph) in high speed mode and 9.5km/h (5.9mph) in low speed mode. Always adhere to all speed limits for the area in which the truck is operating.

2.8: Changing Direction without Changing Mode

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

2.9: Changing Into Sideward Mode

- Bring the truck slowly to a halt by depressing the brake / inch pedal fully.
- Ensure that all observers stand clear of the truck.
- **Parking brake must be applied before change in mode is selected.**
- **Do not press brake pedal while a change in mode is being selected.**
- Move the direction control switch from forward/reverse into the required sideward direction. The wheels will automatically align themselves at right angles to the platform.
- Wait until wheels are locked and dash light is illuminated before moving.

NOTE

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

2.10: To Change Back to Forward Mode

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.**

- Bring the truck slowly to a halt by depressing the brake / inch pedal fully.
- Ensure all observers stand clear of truck.

- **Parking brake must be applied before change in mode is selected.**
- **Do not press the brake pedal while a change in mode is being selected.**
- Move the direction control switch from left/right into the required forwards direction.
- Wheels will automatically align themselves parallel with the platform.
- 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.

2.11: Stopping

- Always brake evenly and smoothly. Violent braking may cause the load to slip from the forks.
- The forks must be lowered when the truck has stopped.
- After stopping the truck, return the direction control switch to neutral.
- When the operator leaves the forklift truck unattended, the parking brake must be applied and the ignition key removed to prevent unauthorised use

NOTE

The brake/inching pedal permits slow drive speed for precise manoeuvring of the truck in confined spaces. It operates independently of the accelerator pedal, if fully depressed it will bring the machine to a complete stop.

2.12: Loading

- Do not exceed rated capacity of truck. Overloading can cause truck instability. If in doubt, check with the load chart, located inside the cabin.
- 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 three quarters 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.
- Apply parking brake when loading

2.13: 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 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.

2.14: 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.

2.15: 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 handling long length loads, drive whenever possible in sideward mode.
Tilt elevated loads forwards, only when directly over load destination.

2.16: 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

2.17: Double Forking

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. This can be achieved by double forking the load.

NOTE

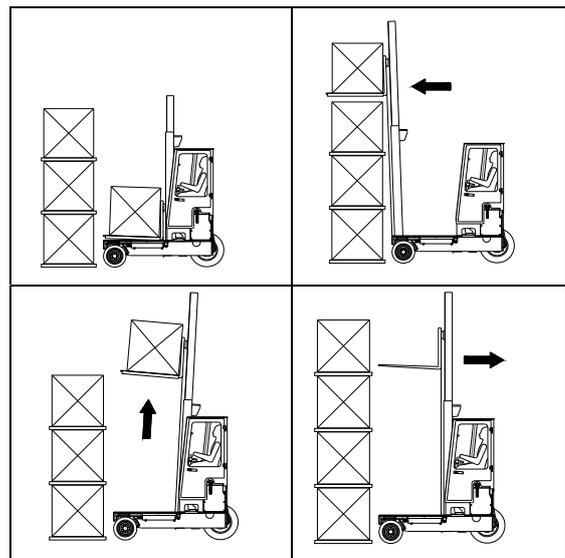
The lift capacity of the Combilift is reduced if the forks are not fully engaged.

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 and extend the mast again until the load is against the fork face.
- The load is now ready to be lifted.

2.18: Stacking

- Slowly approach stack with load retracted and tilted backwards.
- Stop at face of stack, select neutral and apply parking brake.
- Elevate load until clear of stack top. Operate accelerator pedal to ensure that engine speed is sufficient to prevent stalling and to give the required 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.



2.19: De-Stacking

- Approach stack with mast retracted and in vertical position.
- Stop at face of stack, select neutral and apply parking brake.
- 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. Operate accelerator pedal to ensure that the engine speed is sufficient to prevent stalling.
- Retract mast fully and lower load to 150mm (6") above ground, or where possible on to the platforms.

2.20: Adjusting Load Forks (Optional Fork Positioning)

- 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 100mm (4") off the floor.
- Apply parking brake.
- Move the forks to the desired position by pressing the auxiliary button on the fork control joystick and moving the joystick left of right.

2.21: 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 exhaust or 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.
- Diesel engine exhaust emissions are toxic in concentrated amounts. Do not operate the truck in enclosed spaces or inadequately ventilated spaces.
- 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 -40°C (-40°F) to +40°C (+104°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, Fuel and Coolant:**

Any leaking or spilled oil, fuel 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 fuelling.

Exhaust Emissions:

Never allow the truck to remain stationary in confined spaces with the engine running. Diesel engine exhaust fumes are harmful. Do not inhale exhaust. When performing service and inspection work in an enclosed space, vent the exhaust out of the area.

**Warning**

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

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 3: Daily Checks

Please refer to the John Deere engine manual that is supplied with Combilift truck in relation to all Engine checks and activities.

INTRODUCTION

Before commencing the daily checks, ensure that the ignition switch is turned to the 'OFF' position. Carefully examine the truck for evidence of damage. Check all hydraulic components for leaks.

3.1: Wheels and Tyres

Inspect the tyres for wear or damage. Remove stones, swarf etc. from the tyre tread.

NOTE

Torque wheel nuts every 250hrs - 600 N·m (442 ft·lb) Front
695 N·m (512.6 ft·lb) Rear

WARNING

Tyre changing can be dangerous, and should only be done by specially trained personnel using proper tools and procedures.

WARNING

When lifting wheels and tyres, due allowance for the weight MUST be made. Failure to do so could result in personal injury.

3.2: Battery

Under normal operating conditions the battery will require little or no maintenance. If, however the battery requires re-charging, the guidelines relating to battery charging in Section 3 should be noted and strictly adhered to.

NOTE

Check level of electrolyte in each battery cell and top-up if necessary, using only clean, distilled water. Bring level up to markers.



Careless disposal of batteries will harm the environment. Please ensure all batteries are disposed of appropriately. Contact Combilift for further information:

Tel: 047 80500 Email: info@combilift.com

3.3: Engine Oil Level

Remove the dipstick from the engine and check the oil level. If necessary, top-up to the correct level using the appropriate engine oil.

3.4: Coolant Level

Adding Coolant

CAUTION: Explosive release of fluids from pressurised cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.



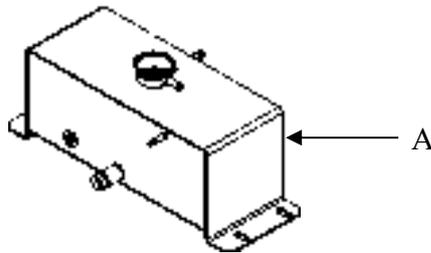
IMPORTANT: Never pour cold liquid into a hot engine, as it may crack cylinder head or block. DO NOT operate engine without coolant for even a few minutes.

Air must be expelled from cooling system when coolant is added.

Note

It is advised not to mix different coolant products.
See www.combilift.com/coolant for a list of approved coolant products.

The coolant level in the coolant header tank (A) should be maintained to approximately half full.



Do not overfill the cooling system. A pressurised system needs space for heat expansion without overflowing.

IMPORTANT: When adding coolant to the system, use the appropriate coolant solution. See section 5.4: on page 43.

3.5: Hydraulic Tank

Fully lower the mast. Check the oil level on the sight gauge. If necessary top-up to the correct level using clean hydraulic oil. (See 5.5 in Section 5 for recommended hydraulic oil)

The following checks should be made:

- Check the tank for leaks, damage, rust and other corrosion.
- Ensure that the drain plug is securely tightened.
- Report all defects, leaks and damage immediately.

3.6: Fuel Tank

The following checks should be made:

- Check the tank for leaks, damage, rust and other corrosion.
- Check that the filler cap and sender unit are leak free, secure and functioning correctly.

3.7: Automatic Fan Belt Tensioner

Belt drive systems equipped with automatic (spring) belt tensioners cannot be adjusted or repaired. The automatic belt tensioner is designed to maintain proper belt tension over the life of the belt. If tensioner spring is not within specification, replace tensioner assembly.

3.8: Load Forks

Inspect the forks for signs of cracking, bending or distortion. DO NOT use the truck if you suspect serious damage.

To determine the amount of wear of the fork blade use the fork shank as a reference. If fork blade thickness has been reduced by more than 10% anywhere, the ISO Safety Standard for used Forks requires that the fork MUST be replaced.

3.9: Controls

Check that all controls are in the NEUTRAL position.

With the engine running, check that all indicator lamps are off and that the following function satisfactorily:

- Lift and lower function
- Reach function
- Tilt function
- Auxiliary function (where fitted)
- Horn function
- Work lights
- Brake/Inching function
- Accelerator pedal
- Parking Brake
- Forward / Reverse drive function
- Steering
 - Forward mode
 - Sideward mode

Section 4: Safe Operation

4.1: Safe Operation

- Combilift will not assume any liability for injuries or damage arising from or caused by the removal of any safety devices from their vehicles by the user.
- Fully trained, qualified and authorised drivers must only operate combi-Lift forklift trucks.
- Ensure that the truck is suitable for the area in which it is to be operated.
- Before raising or lowering forks, give clear indication of your intentions to other people and ask them to stand clear.
- Do not allow anyone to walk or stand beneath elevated forks.
- Do not exceed rated load capacity of the truck. In no circumstances should counterweights be added to increase capacity.
- If the hoist mechanism malfunctions or becomes stuck in a raised position, operate the hoist 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



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.



Warning



Never lower the hoist mechanism with the load forks mechanically supported.

Failure to observe this rule will result in carriage plus load forks falling as they are pulled clear of the support causing excess shock loading and possible damage to the hoist components as the hoist chain slack is taken up.

4.2: Safe Driving

- Before moving off, look around and when clear, commence driving without causing inconvenience to other aisle users. Remember that pedestrians have right of way and must be safeguarded at all times.
- Operate truck smoothly without erratic movements avoiding fast turns.
- Regulate the speed of the truck to conform to prevailing conditions. Ensure that the truck can be brought to a halt safely.
- Maintain a safe driving distance from other vehicles. Always give clear indication of your intentions to other people.
- Do not carry passengers.
- Do not overtake at aisle intersections, in areas of limited visibility, or in dangerous locations.
- Maintain a safe distance from railway lines, ramps, platforms, dock edges etc.
- 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.
- Always travel with forks as low as possible. If loaded, rest the load on platforms where possible. (See figure 2)
- Ensure load is tight against face of forks. (See figure 2)



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.

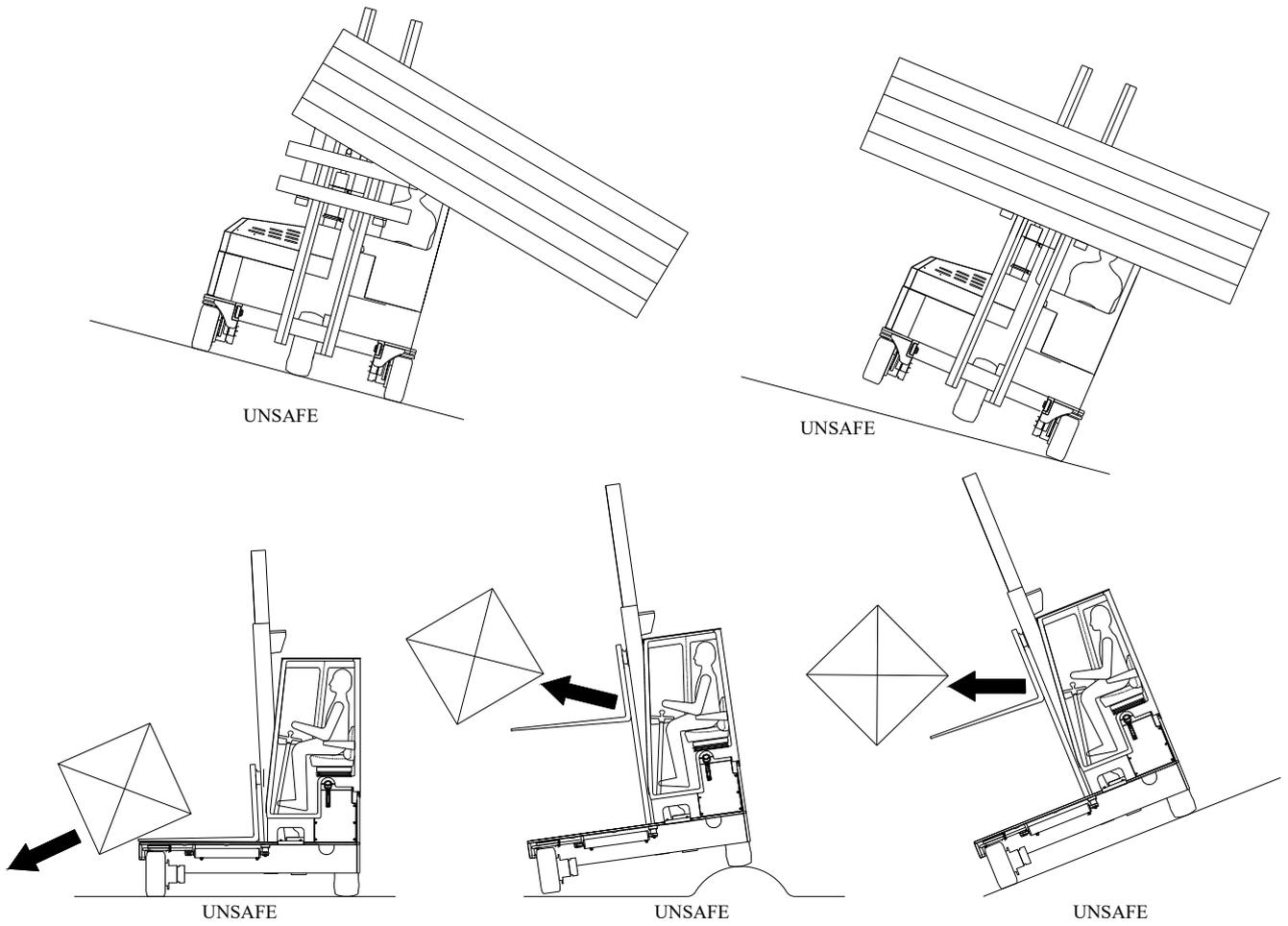


Figure 1: driving hazards

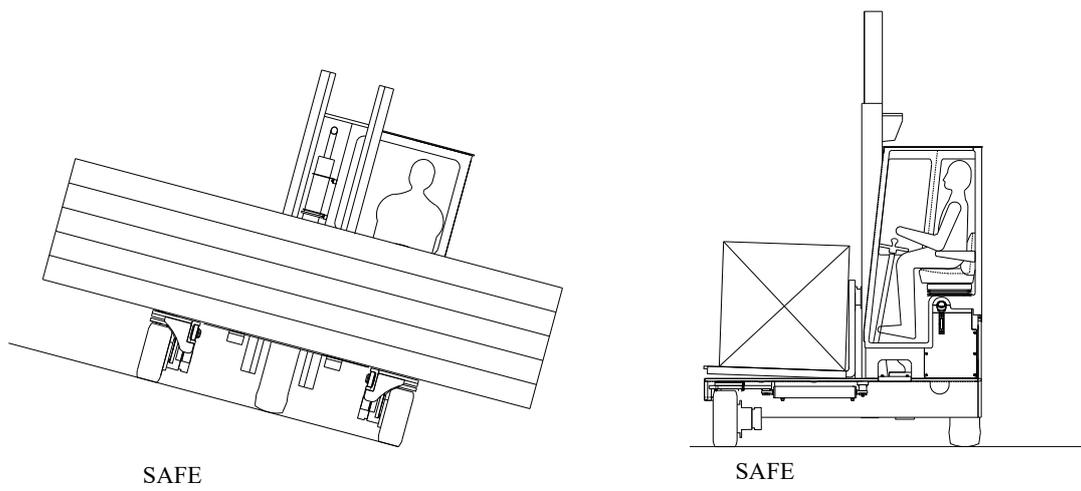


Figure 2: Correct Procedure

4.3: Fuel Handling & Storage

4.3.1 General

- The facilities for storing and handling liquid fuels of all kinds **MUST** be strictly in accordance with all current regulations.

WARNING

Adequate fire fighting equipment must be readily available in the refuelling area at all times.

SAFETY RULES

No smoking, naked lights or other sources of ignition should be permitted in the vicinity of the refuelling area and signs to this effect should be clearly posted and free from obstructions at all times. Litter and other readily ignitable materials should not be permitted to accumulate or be stored in the area.

4.3.2 Refuelling

- Trained and authorised personnel should carry out refuelling at designated points only.
- Before refuelling the truck, switch off the engine, apply brakes and vacate truck.
- If a pump appliance is not available, fuel **MUST** be stored and transported in clean, uncontaminated and approved containers. Containers **MUST** comply with current regulations and be clearly labelled.
- When refuelling the truck, always ensure that the hose nozzle or the can pourer is making good electrical contact with the tank filler tube to prevent the accumulation of a hazardous charge of static electricity. Exercise adequate care to prevent fuel spillage or over-filling.
- After refuelling the truck, replace the tank filler cap and ensure that it is securely fitted and leak free. Clean up any spillage using non-combustible absorbent material before restarting the engine.
- Fill the fuel tank at the end of each day's operation to prevent water condensation and freezing during cold weather.
- Keep all storage tanks as full as practicable to minimize condensation.
- Ensure that all fuel tank caps and covers are installed properly to prevent moisture from entering.
- Monitor water content of the fuel regularly.

4.4: Battery Charging

- Batteries contain sulphuric acid and generate explosive gases when being charged. Trained and authorised personnel only must charge them in designated, well-ventilated areas.
- In the event of an accident flush acid away from the eyes and/or skin using plain water and obtain medical attention immediately.
- Check level of electrolyte in each battery cell and top-up if necessary, using only clean distilled water. Bring level up to markers.

WARNING

Protective clothing and goggles should be worn and particular care taken not to come into contact with or spill electrolyte when checking its level. Keep the battery clean and dry, and terminals free from corrosion. Check that the ventilation holes in battery caps are clear. Temperature must not exceed of 38° C (100° F) during charging. Smoking and the use of naked lights in the charging area are strictly prohibited.

NOTE

A smear of petroleum jelly applied to clean terminals will offer protection against acid corrosion

4.5: Operating in Hazardous Areas

- No spark proofing is fitted to the truck as standard; consequently it **MUST NOT** be used in flammable or explosive areas.
- The truck **MUST NOT** be used in corrosive atmospheres or in areas containing a high degree of dust contamination.

4.6: Safe Driving on 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.

4.7: Driving Position

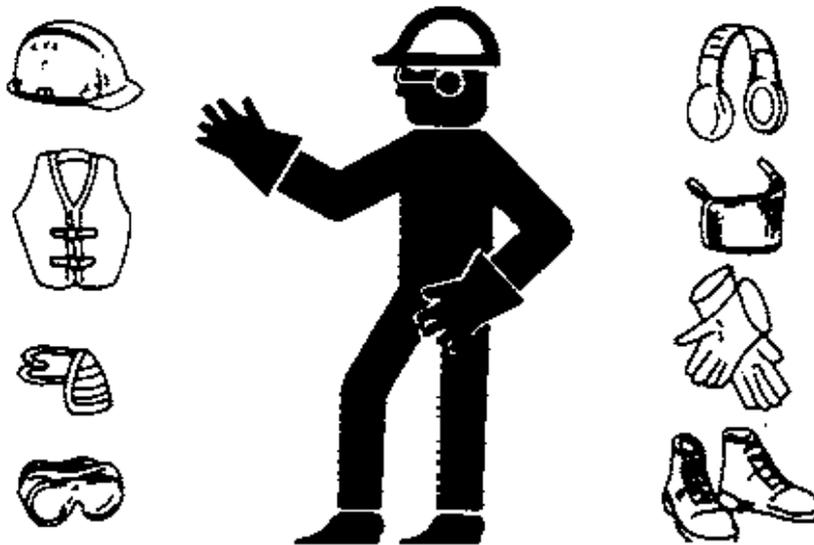
- Only operate controls from the correct driving position and do not operate any control until you are certain of its function.

4.8: Parking

- Apply parking brake by pressing the red button.
- Ensure that the direction control switch is set to neutral.
- Lower the forks fully.
- Park clear of aisles, doorways, stairways and fire points and ensure that the truck will not obstruct other traffic.

4.9: Wear Personal Protective Equipment (PPE)

- Wear close fitting clothing and safety equipment appropriate to the job.
- Prolonged exposure to loud noise can cause impairment or loss of hearing.
- Wear a suitable hearing protective device such as earmuffs or earplugs to protect against uncomfortably loud noises.
- Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.



Section 5: Service information

INTRODUCTION

Routine maintenance may be carried out by the users/operators, but only if the correct facilities and replacement parts, e.g. filters are used.

The service intervals are given in operating hours (recorded on the lift truck meter) and in calendar time.

Service the machine at the interval that occurs first. These intervals are based on normal operation of 8 hours per day. The time intervals must be decreased from the recommendations in the maintenance schedule for the following reasons: -

- If the lift truck is used more than 8 hours per day.
- If the lift truck must work in dusty operating conditions.

Combi-Lift trucks are built with quality components, the use of inferior spare parts can result in inadequate safety and poor reliability. Only use genuine approved parts.

5.1: Initial service at 100 Hours

- Change engine oil & oil filter.
- Replace fuel filter.
- Check automatic belt tensioner.
- Replace element in high pressure hydraulic inline filter – drive circuit.
- Replace element in high pressure hydraulic inline filter – steering & hydraulic functions circuit.
- Replace return filter.
- Check hydraulic oil level.
- Check coolant level.
- Check the machine for hydraulic, coolant and fuel leaks.
- Check air cleaner and replace if necessary.
- Check all mast carriage-bearing lock nuts are tight.
- Check all bolts and fittings are tight.
- Check radiator, and if necessary, clean fins
- Grease all points indicated on grease point chart
- Check all wheel nuts for tightness.
- Check mast chains; lubricate and adjust if required.

NOTE: Lubricate all grease points weekly. (See 5.12: grease point chart).

NOTE: Inspect the hydraulic functions circuit high pressure filter visual indicator weekly. (See 5.3: changing hydraulic oil filters).

Note

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

5.2: Engine Oil

The engine oil used in the Combi-Lift should have the correct temperature range for the ambient temperature in which the machine is to be operating. Temperature affects the viscosity of the oil and therefore it's lubricating properties.

Engine Break in Service

The engine is ready for normal operation. However, extra care during the first 100 hours of operation will result in more satisfactory long-term engine performance and life.

DO NOT exceed 100 hours of operation with break in oil.

The engine is factory filled with John Deere ENGINE BREAK IN OIL (SAE10W30).

Operate the engine at heavy loads with minimal idling during the break in period.

If the engine has significant operating time at idle, constant speeds, and/or light load usage, or makeup oil is required in the first 100 hour period, a longer break in period may be required. In these situations, an additional 100 hour break in period is recommended using a new change of John Deere ENGINE BREAKIN OIL and a new John Deere oil filter. For further details please see engine manual that was supplied with this truck.

Diesel Engine Oil

Use oil viscosity based on the expected air temperature range during the period between oil changes.

John Deere PLUS50™ oil is preferred.

Oils meeting one of the following specifications are also recommended:

- ACEA Oil Sequence E7
- ACEA Oil Sequence E6

Extended service intervals may apply when John Deere PLUS50

™, ACEA E7, or ACEA E6 engine oils are used.

Consult your John Deere dealer for more information Other oils may be used if they meet one or more of the following:

- John Deere TORQGARD SUPREME™
- API Service Category CJ4
- API Service Category CI4 PLUS
- API Service Category CI4
- ACEA Oil Sequence E5
- ACEA Oil Sequence E4

Multiviscosity diesel engine oils are preferred.

Recommended Engine Oil Specification:

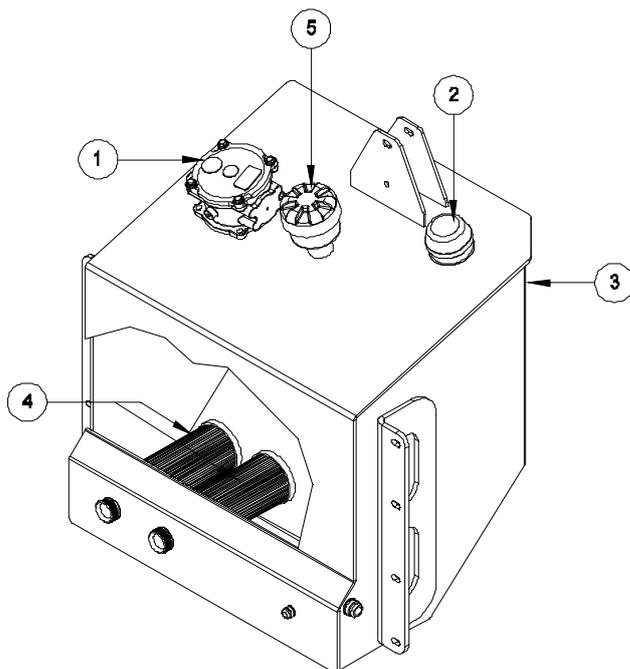
Diesel: API – CF (See notes at 5.13: if a diesel particulate filter is fitted)
 SAE 15W40 – All Temperatures
 SAE 10W30 – All Temperatures

5.3: Changing Hydraulic Oil & Filters

There are five hydraulic oil filters used on the trucks hydraulic system that must be replaced at certain intervals. These filters are as follows:

1. One return filter located on top of the hydraulic tank.
2. Two strainer filters located inside the hydraulic tank.
3. One high pressure inline filter located inside the engine compartment.
4. One high pressure inline filter located at the back of the truck over the rear swivel.

The return filter located on top of the hydraulic tank and the two strainer filters located inside the hydraulic tank are shown below.



Component Layout

1. Return Filter
2. Filler Cap
3. Hydraulic Oil Level Gauge
4. In-tank Strainer Filter
5. Tank Breather



Caution



Park the truck on level ground, chock the wheels and depressurise the hydraulic system before performing maintenance operations on the hydraulic filters.

Fully lower the mast, shut the engine down and remove the battery isolator key switch.

If the truck is hot allow time for it to cool sufficiently before attempting to carry out any work.

Note

Do not pour spent fluids into the ground, down a drain or into a stream, pond or lake. Observe relevant environmental protection regulations when disposing of oil, coolant, fuel, electrolyte and other harmful waste.



Return Filter: (service Interval = 500 Hours)

The return filter, located on the top of the tank, must be replaced at intervals of every 500 hours.

To replace the Return Filter:

1. Depressurise the system and clean the filter housing.
2. Loosen but do not remove the four bolts on the cover of the filter housing.
3. Push down on the cover and turn clockwise to remove.
4. Remove the old filter element from the bowl using the handle on top of the filter element.
5. Lubricate the seal on the new filter element with the operating fluid and push the new filter element into the bowl. Only use a genuine Combilift component.
6. Refit the housing lid by pushing onto the filter housing and turning anticlockwise up to bolts.
7. Tighten the four bolts onto the housing lid.

Hydraulic Oil & In-Tank Strainer Filters: (Service Interval = 2000 Hours)

The hydraulic oil and strainer filters located inside the hydraulic tank, must be replaced at intervals of every 2000 hours (or 24 months depending on which occurs first). The strainer filters can only be accessed when the hydraulic tank has been drained.

To replace the Hydraulic Oil & In-Tank Strainer Filters:

1. Drain the hydraulic oil tank through the drain plug in the bottom of the tank. Collect the oil in a suitable container.
2. Clean the tank then remove the access panel on the back of the tank.
3. Insert your hand into the tank and remove the filters by rotating anti-clockwise.
4. Fit the new strainer filters. Only use a genuine Combilift components.
5. Refit the access panel to the front of the tank, remembering to correctly fit a new O-ring seal.
6. Fill the tank to half way up the sight glass on the hydraulic oil gauge with hydraulic oil of the same grade as the oil that was drained from the tank.
7. Operate the truck for a short period the check the oil level. Top up the tank to half way up the sight glass if necessary.

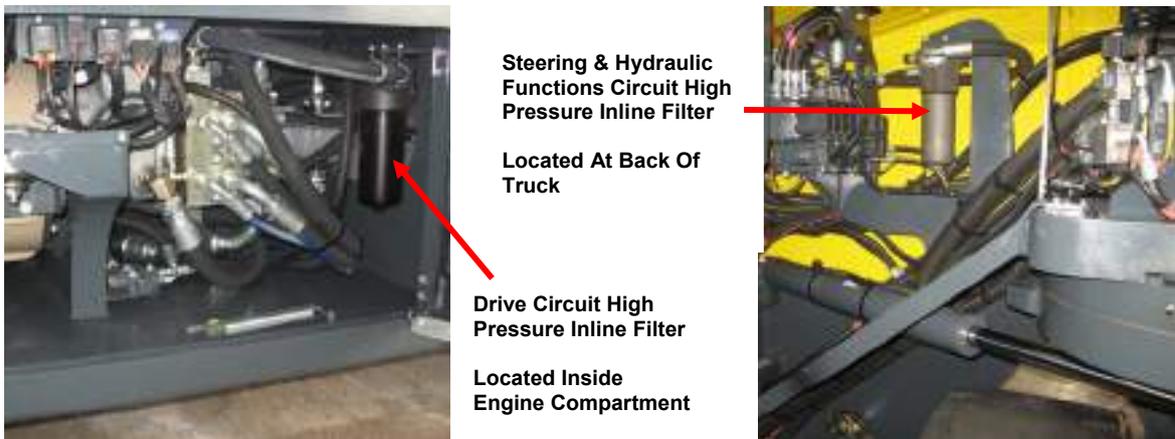
**Volume of oil required to fill tank to half way up the gauge sight glass:
200 litres / 211 quarts**

Hydraulic Tank Breather: (Service Interval = 2000 Hours)

The breather located on the top of the hydraulic tank, must be replaced at intervals of every 2000 hours (or 24 months depending on which occurs first).

To replace the Tank Breather:

1. Clean the area around the breather then unscrew and remove the used breather.
2. Fit a new breather with a new seal and screw into the tank breather port. Hand tighten only.

High Pressure Inline Filters:

The high-pressure inline filter on the drive circuit - located inside the engine compartment - must be replaced at intervals of every 500 hours.

The high-pressure inline filter on the steering & hydraulic functions circuit - located at the back of the truck above the rear swivel – includes a visual indicator that changes from green to red when the filter element gets clogged. The visual indicator must be inspected weekly. If the colour inside the window changes from green to red the filter element must be replaced.



One of the hydraulic functions must be in use while inspecting the visual indicator as the indicator will return to green in the absence of hydraulic pressure.

Two people are required to inspect the visual indicator, one to operate the joystick in the cabin and another to visually inspect the indicator.

In order to inspect the visual indicator:

1. Fully retract and raise the mast to allow a clear view of the visual indicator from the front of the truck.
2. Operate the tilt back function while inspecting the colour inside the window of the visual indicator.
3. If the colour is green the filter is operating correctly.
4. If the colour is red the filter is clogged and must be replaced.

5. If the visual indicator is dirty it can be cleaned by extending the mast and entering the frame of the machine.
6. Take care when entering and exiting the frame of the machine as surfaces may be slippery.



DO NOT DRIVE THE TRUCK OR OPERATE THE STEERING OR ANY OF THE HYDRAULIC FUNCTIONS WHILE ANYONE IS INSIDE THE FRAME. i.e. IN THE SPACE BETWEEN THE BACK OF THE MAST AND THE BACK OF THE TRUCK.

To replace the High Pressure Inline Filters:

1. Depressurise the hydraulic system and clean the filter body.
2. Unscrew the filter housing using the appropriate tools and extract the spent filter cartridge.
3. Collect the spent oil and cartridge in a suitable container and dispose of them in accordance with environmental protection regulations.
4. Check the thread on the filter housing and the thread and seal on the filter head for cleanliness and clean if necessary.
5. Check the condition of all seals and change if necessary. Lubricate new seals with operating fluid prior to installation.
6. Lubricate the seal on the new filter element with the operating fluid and place the new filter element into the filter housing. Only use a genuine Combilift component.
7. Screw the housing back onto the head using an appropriate tool.

Note

Screw the housing fully home onto the head.
DO NOT TIGHTEN THE HOUSING EXCESSIVELY.

8. Start the truck and check the filter for leaks. Repeat this check when the truck has reached its normal operating temperature.

5.4: Engine Cooling System



Caution



Switch off the engine before working on the cooling system.

Never operate the engine without coolant.

Explosive release of hot fluids from the pressurised cooling system can cause serious burns.

The engine and cooling system must be cool to the touch before working on the cooling system.

Only remove the filler cap when cool enough to touch with bare hands. Slowly loosen the cap to relieve pressure before removing completely.

Coolant is harmful if ingested. Seek immediate medical attention if ingested.

Avoid contact with skin and eyes. Wear protective gloves and goggles when handling coolant.

Note

Do not pour coolant into the ground, down a drain or into a stream, pond or lake. Observe relevant local environmental protection regulations when disposing of used coolant.

Coolant

All Combilift IC engine powered trucks leave the factory with a mixture of 50% water to 50% coolant concentrate (*Glystantin® G64® from 02/2018*) in the cooling system. This protects the engine against:

- Freezing down to -37°C (-34.6°F)
- Corrosion
- Cavitation
- Overheating

If greater protection against freezing is required the proportion of coolant concentrate can be increased to a maximum of 60%. This will provide protection against freezing down to -52°C (-62°F).

Note

It is advised not to mix different coolant products.
See www.combilift.com/coolant for a list of approved coolant products.

Coolant must be completely replaced when repairs are performed on the cooling system. Rinse out the cooling system before filling with new coolant. A mixture of clean water with 15% of the new coolant is recommended for rinsing.

Note

When mixing coolant concentrate with water, do not use less than 40% or greater than 60% concentration of coolant. Less than 40% gives inadequate additives for corrosion protection. Greater than 60% can result in coolant gelation and cooling system problems.

Do not use cooling system sealing additives.

The coolant must be changed at regular intervals in accordance with the maintenance schedule.

The cooling system must be monitored regularly. This includes checking the concentration of the antifreeze. The concentration of antifreeze to water must never be allowed fall below 35% as the protective effects fall away rapidly below this concentration.

Water quality:

Water quality is important to the performance of the cooling system. Distilled, deionized, or demineralized water is recommended for mixing with antifreeze. The water used in the cooling system should meet the following minimum specifications for quality:

pH	5.5 - 9.0
Chlorides	<40mg/l
Sulphates	<100mg/l
Total Solids	<340mg/l
Total Dissolved Solids	<170mg/l

Water that deviates from the values in the table must be conditioned.

Note

Do not use bottled drinking water because it often contains higher concentrations of total dissolved solids.

5.5: Hydraulic Oil

The hydraulic oil used in the Combi-Lift should conform to the International Standard I.S.O. 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. The following table shows examples of commercially available oils. Ensure that the correct type is used in the relevant ambient temperature.

AMBIENT TEMPERATURE	Low Range -20°C to 25°C -4°C to 77°F	Standard Range -10°C to 35°C +14°C to 95°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	N46	N 68
Mobil:	13 M	15 M	16 M
Shell: Tellus Oil	T32	T46	T68
Texaco:	HDZ 32	HDZ 46	HDZ 60

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 AWH46 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 upper level on the hydraulic oil level gauge.

5.6: Chain Maintenance

Mast chains should be checked for elongation and adjusted as required. The chains must be adjusted so that the upper and lower stops on the mast never collide. Adjust all chains evenly. Every 250 hours is recommended as a guideline.

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. Every 250 hours is recommended as a guideline.

5.7: Fuel Filter Element

Engines are equipped with a primary fuel filter and a final fuel filter. Both filters are replaced at the same 500hour interval. Please refer to engine manual for full instructions on how to correctly replace fuel filter elements.

5.8: Air Filter Elements

The air filter unit is located in the engine compartment on the right hand side of the truck. The air filter primary element must be cleaned after every 100 hours of use and replaced at intervals of 500 hours of use (or 8 months depending on which occurs first). The safety filter only needs to be cleaned if the primary filter has been damaged.

In order to clean/replace the air filter elements take the following steps:

1. Shut off the engine. Open the bonnet on the right hand side of the machine and locate the air filter unit to the right of the engine.
2. Unlatch and remove the housing service cover.
3. Remove the primary filter. Push down on the filter using the handle - this will tilt the filter to approximately 5° - to loosen the filter gasket seal. Use the handle to pull the filter out of the housing.
4. Remove the safety filter. **Note:** The safety filter only needs to be replaced at every third primary filter change. Using the plastic handle on the face of the safety filter, pull the filter toward the centre of the housing and remove.
5. Inspect the new filter before installing. Visually check for cuts, tears, or indentations on the sealing surfaces before installation. If any damage is visible do not install.
6. If replacing the safety filter slide the filter into the housing outlet side at an angle and insert the safety filter tab into the positioning slot. Push the filter into place until it seats firmly and evenly within the housing.



7. Insert the primary filter. Slide the filter down at approximately a 5° angle until it hits the end of the housing. Rotate the filter towards the outlet section to complete the seal.
8. Replace the service cover. Place the service cover in position and fasten the latches. Note: If the cover doesn't seat, remove and recheck the filter position.
9. Visually inspect the inlet and outlet connections including the vacuator valve. Replace if any signs of wear or damage are visible.

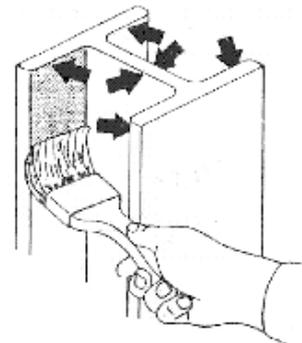


5.9: Checking Belt Tensioner Spring Tension

A belt tension gauge will not give an accurate measure of the belt tension when automatic spring tensioner is used. Measure tensioner spring tension using a torque wrench and procedure outlined in the engine manual that was issued with this truck. For full guidelines and instructions on working on Automatic Fan Belt Tensioner please also refer to engine manual.

5.10: Greasing Mast Channels

All roller surfaces must be greased periodically where the fork carriage and mast sections 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 graphite grease, avoid spray greases.

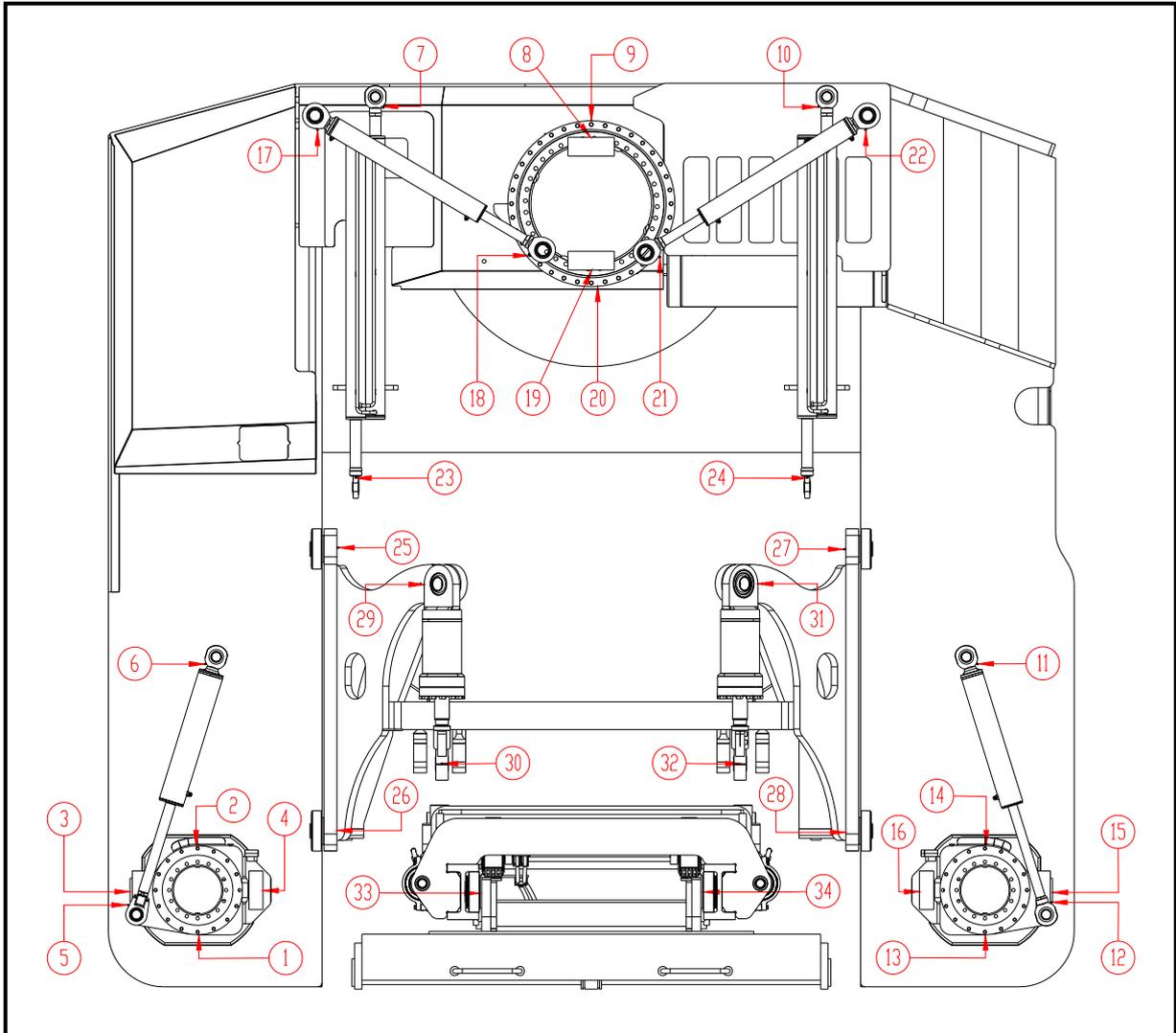


5.11: Greasing Mast Carriage Channels

The mast carriage channels must be greased periodically **only on the vertical (side) surfaces** 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.

5.12: Grease Point Chart

Lubricate all points weekly using EP2 grease. Also lubricate all grease points on the mast, and attachments where fitted.



- | | | |
|-----------------------|----------------------------|--------------------------|
| 1. RH Swivel Front | 13. LH Swivel Front | 25. Carriage Rear RH |
| 2. RH Swivel Back | 14. LH Swivel Back | 26. Carriage Front RH |
| 3. RH Cradle Outer | 15. LH Cradle Outer | 27. Carriage Rear LH |
| 4. RH Cradle Inner | 16. LH Cradle Inner | 28. Carriage Front LH |
| 5. RH Steering Front | 17. Rear RH Steering Back | 29. RH Tilt Rear |
| 6. RH Steering Back | 18. Rear RH Steering Front | 30. RH Tilt Front |
| 7. RH Carriage Back | 19. Rear Cradle Front | 31. LH Tilt Rear |
| 8. Rear Cradle Back | 20. Rear Swivel Front | 32. LH Tilt Front |
| 9. Rear Swivel Back | 21. Rear LH Steering Front | 33. RH Mast Bearings x 4 |
| 10. LH Carriage Back | 22. Rear LH Steering Back | 34. LH Mast Bearings x 4 |
| 11. LH Steering Back | 23. RH Carriage Front | |
| 12. LH Steering Front | 24. LH Carriage Front | |

5.13: Diesel Particulate Filter (DPF)

Refer to the accompanying diesel particulate filter manual (only supplied if a DPF has been fitted) for further details.

5.14: Diesel Fuel

Diesel fuels specified to EN 590 or ASTM D975 are recommended. Renewable diesel that meets EN 590 or ASTM D975 is acceptable for use at all percentage mixture levels.

Required Fuel Properties

In all cases, the fuel shall meet the following properties:

Cetane number 45 minimum. Cetane number greater than 50 is preferred, especially for temperatures below -20°C (-4°F) or elevations above 1500 m (5000 ft).

Cold Filter Plugging Point (CFPP) should be at least 5°C (9°F) below the expected lowest temperature or **Cloud Point** below the expected lowest ambient temperature.

Fuel lubricity should pass a maximum scar diameter of 0.45 mm as measured by ASTM D6079 or ISO 121561.

Sulphur Content for Interim Tier 4 and EU Stage IIIB Engines

- Diesel fuel quality and fuel sulphur content must comply with all existing emissions regulations for the area in which the engine operates.
- Use ONLY ultra low sulphur diesel (ULSD) fuel with a maximum of 0.0015% (15 ppm) sulphur content.

5.15: Maintenance Chart

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.

Action	Service Interval (Hrs)			
	Daily	250	500	2000
Check engine oil & coolant level	•			
Check fuel filter / water bowl	•			
Check air cleaner dust un-loader valve & restriction indicator gauge	•			
Visual walk around inspection	•			
Check engine mounts & bolts			•	
Change engine oil & filter			•	
Check crankcase vent system			•	
Check air intake hoses, connections & systems			•	
Replace fuel filter elements			•	
Check automatic Belt tensioner			•	
Check for belt wear	•			
Check engine electrical ground connections			•	
Check cooling fan	•			
Check cooling system			•	
Coolant solution analysis-Add SCAs as required			•	
Pressure test cooling system			•	
Check engine speeds			•	
Check crankshaft & vibration damper				•
Flush & refill cooling system				•
Test thermostats				•
Check & adjust engine valve clearance				•
Change air filter element			•	
Test glow plugs				•
Check oil cooler	•			
Check hydraulic oil level	•			
Change hydraulic oil				•
Change hydraulic filter cartridges (high pressure & return)			•	
Change hydraulic in-tank strainer filters				•
Change hydraulic tank breather				•
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 & Mast Carriage Channels		•		
Check wheel nuts	•			
Torque wheel nuts		•		
Check hydraulic hoses for wear & leaks	•			

Lubricate All Grease Points & Inspect Visual Indicator On Rear Inline Hydraulic Filter Weekly



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

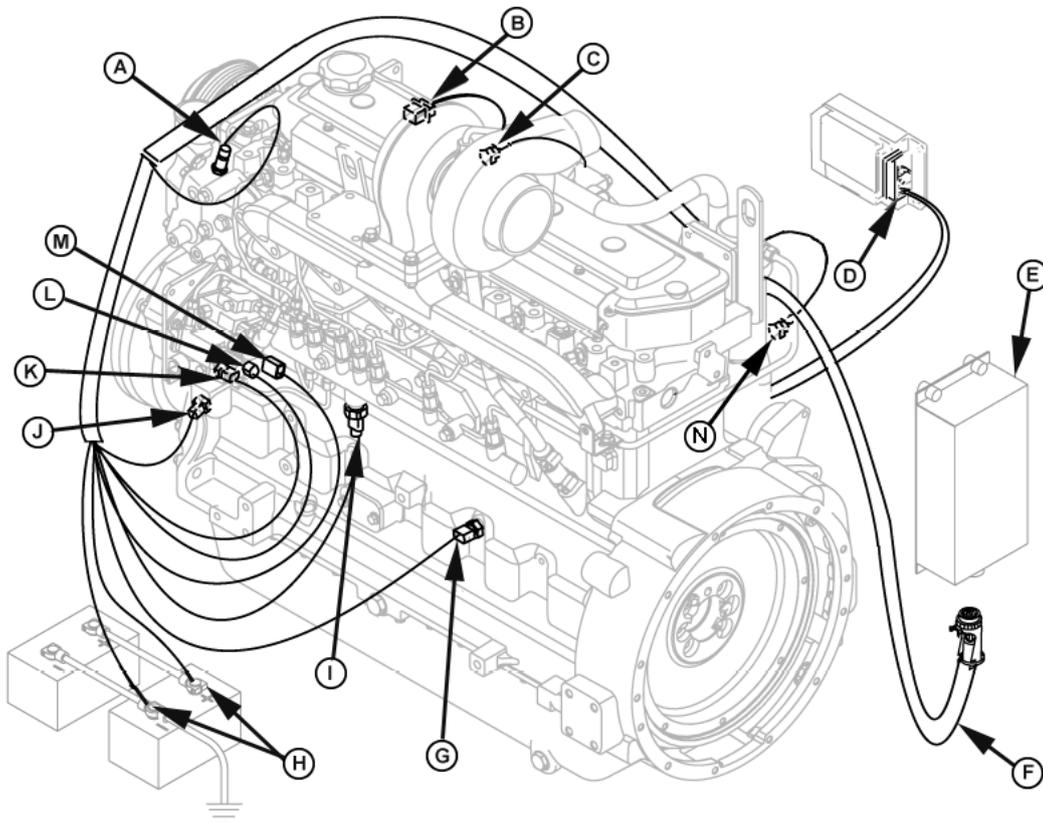
Service Required

		Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Visual Checks	Damage <i>Bent, Dented or Broken Parts</i>	<input type="checkbox"/>						
	Leaks <i>Tank, Valves, Fittings, Hoses</i>	<input type="checkbox"/>						
	Tires <i>Chunks missing, Loose wheel nuts</i>	<input type="checkbox"/>						
	Forks <i>Bent, Damaged or Worn</i>	<input type="checkbox"/>						
	Mast (inc. Chains) <i>Damage, Signs of bending, loose chains</i>	<input type="checkbox"/>						
	Overhead Guard <i>Damage, Cracking</i>	<input type="checkbox"/>						
	Engine <i>Smell, Belts tight and in good condition</i>	<input type="checkbox"/>						
	Engine Oil level <i>Signs of damage or leaking</i>	<input type="checkbox"/>						
	Coolant Level <i>Acceptable Range</i>	<input type="checkbox"/>						
	Hydraulic Oil Level <i>Acceptable Range</i>	<input type="checkbox"/>						
	Radiator & Oil Cooler <i>Build up of leaves, dust or debris</i>	<input type="checkbox"/>						
	Hoses <i>Good Condition, No signs of wear</i>	<input type="checkbox"/>						
Fuel Tank / LPG Cylinder <i>Signs of damage or leaking</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Operational Checks	Safety Equipment <i>Horn, Operator Restraint, Reversing Bleeper</i>	<input type="checkbox"/>						
	Engine <i>Starts and runs OK, no unusual noise</i>	<input type="checkbox"/>						
	Mode change <i>Wheels realign smoothly, no sticking</i>	<input type="checkbox"/>						
	Travel <i>No unusual Noise, Smooth changes</i>	<input type="checkbox"/>						
	Steering <i>No excessive play or restriction in either mode</i>	<input type="checkbox"/>						
	Inching Pedal <i>Stops travel, smooth deceleration</i>	<input type="checkbox"/>						
	Parking Brake <i>Functions and releases</i>	<input type="checkbox"/>						
Hydraulic Controls <i>Forks-Lift/lower, mast-in/out, tilt, Aux functions</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Hour Meter Reading								
Operator Initials								
Supervisors Initials								

Notes (regarding repair, etc): _____

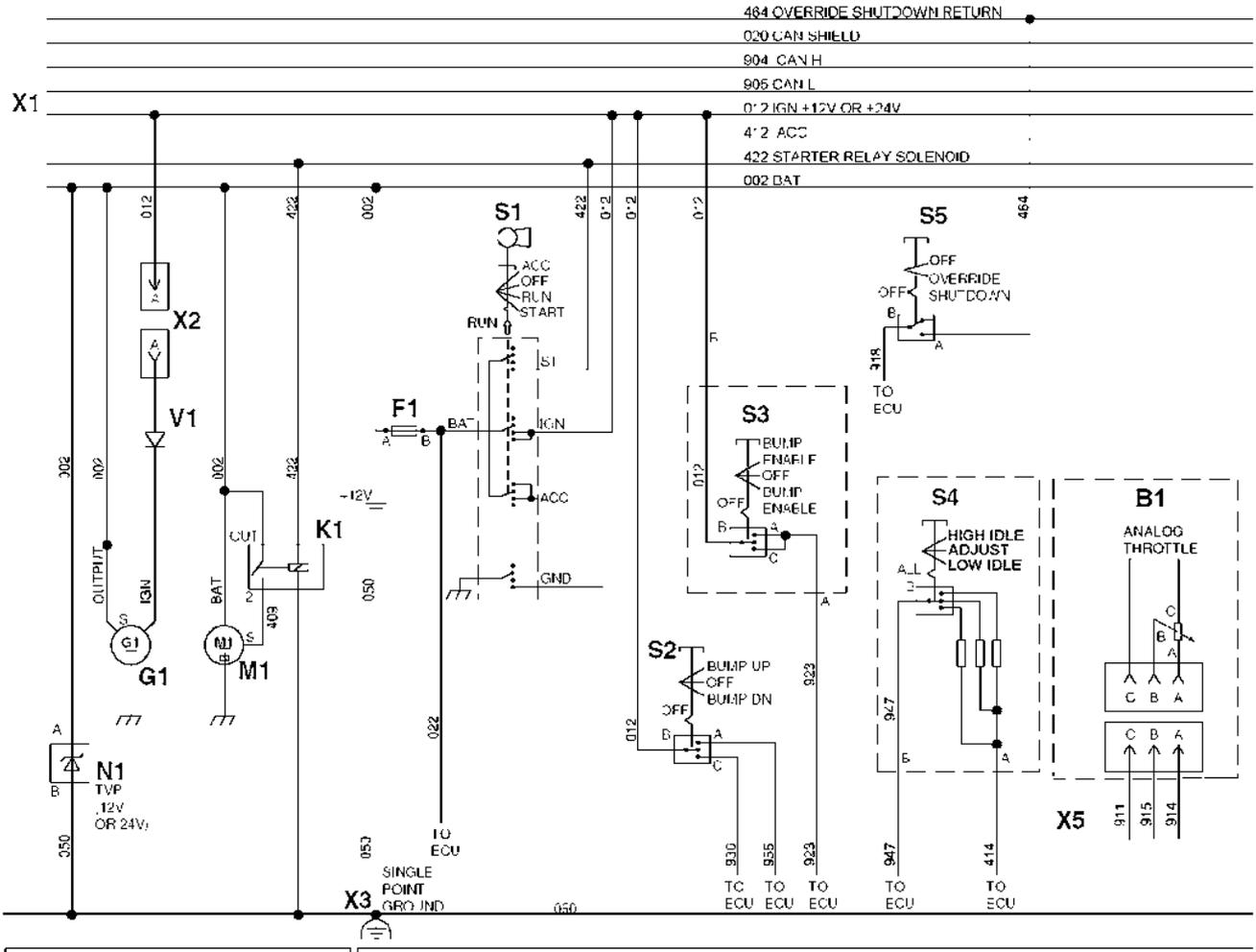
Section 6: Technical Information & Circuit Diagrams

6.1: Engine Wiring Diagram



- A—Engine Coolant Temperature (ECT) Sensor
- B—Electronic Injector Connector
- C—Manifold Air Temperature (MAT) Sensor
- D—(ECU) Connector
- E—Optional Instrument Panel
- F— Engine Wiring Harness
- G—Engine Oil Pressure Sensor Connector
- H—Power and Ground Battery Connections
- I— Fuel Rail Pressure Sensor
- J— Crankshaft Position Sensor
- K—Pump Position Sensor
- L— Pump Control Valve Solenoid
- M—Fuel Temperature Sensor
- N—Water in Fuel Sensor

Engine Wiring Diagram



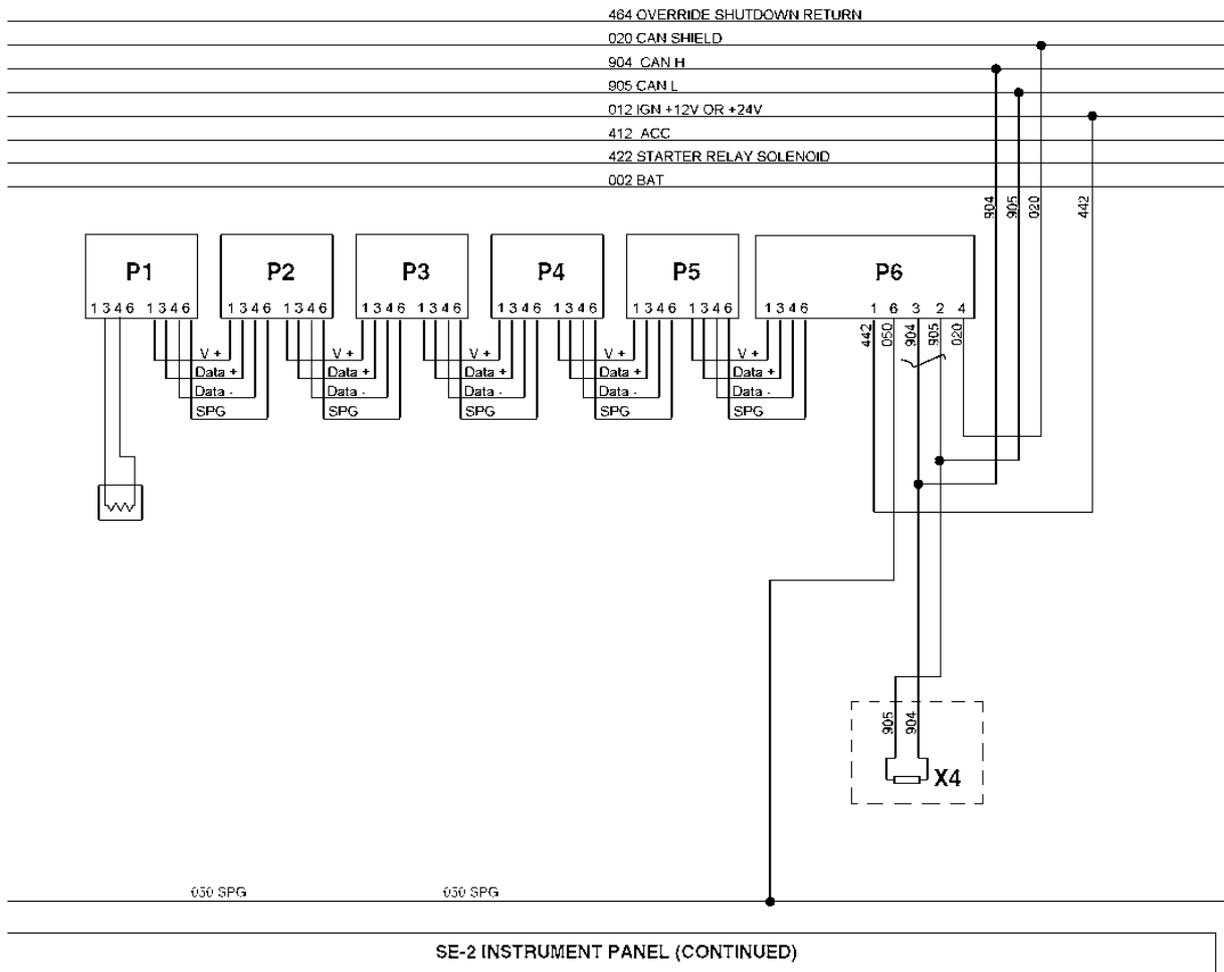
SE-1 ENGINE START COMPONENTS

SE-2 INSTRUMENT PANEL (CONTINUED NEXT PAGE)

- B1—Analog Throttle
- F1— Fuse (20 Amp) (Harness)
- G1—Alternator
- K1—Starter Relay
- M1—Starter Motor
- N1—Transient Voltage Protector
- P1— Optional Gauge
- P2— Optional Gauge
- P3— Oil Pressure Gauge
- P4— Coolant Temperature Gauge
- P5— Tachometer Display
- P6— Hour Meter/Diagnostic Gauge
- S1— Ignition Key Switch

- S2— Speed Select Switch (Momentary)
- S3— Bump Enable Switch (Momentary)
- S4— High/Low Speed Select Switch
- S5— Override Shutdown Switch (Momentary)
- V1— Diode
- X1— Vehicle Harness Connector
- X2— Alternator Harness Connector
- X4— CAN Terminator
- X5— Analog Throttle Connector

Engine Wiring Diagram - Continued



- B1—Analog Throttle
- F1— Fuse (20 Amp) (Harness)
- G1—Alternator
- K1—Starter Relay
- M1—Starter Motor
- N1—Transient Voltage Protector
- P1— Optional Gauge
- P2— Optional Gauge
- P3— Oil Pressure Gauge
- P4— Coolant Temperature Gauge
- P5— Tachometer Display
- P6— Hour Meter/Diagnostic Gauge
- S1— Ignition Key Switch

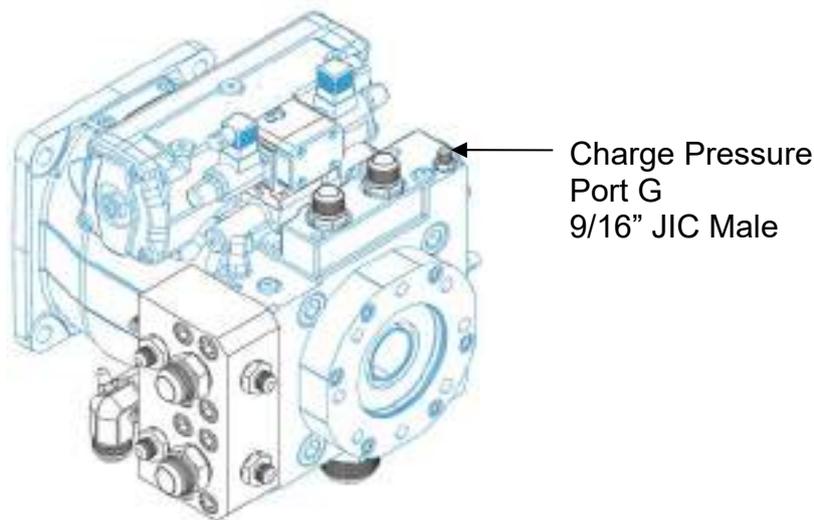
- S2— Speed Select Switch (Momentary)
- S3— Bump Enable Switch (Momentary)
- S4— High Low Speed Select Switch
- S5— Override Shutdown Switch (Momentary)
- V1— Diode
- X1— Vehicle Harness Connector
- X2— Alternator Harness Connector
- X3— Single Point Ground
- X4— CAN Terminator
- X5— Analog Throttle Connector

6.2: Checking the Charge Pressure

In order to check the charge pressure, the following steps should be taken:

- Ensure that the engine is switched off.
- Remove the hose connecting the pump to the brake valve at the pump end (port G) as indicated in the diagram below, and seal with a 9/16" JIC male bung.
- Attach a pressure gauge to port G on pump.
- Start the engine and depress the accelerator pedal half way.
- Read the pressure displayed on the gauge.

The charge pressure should measure between 20 - 28 bar (290 – 406 PSI).



Warning



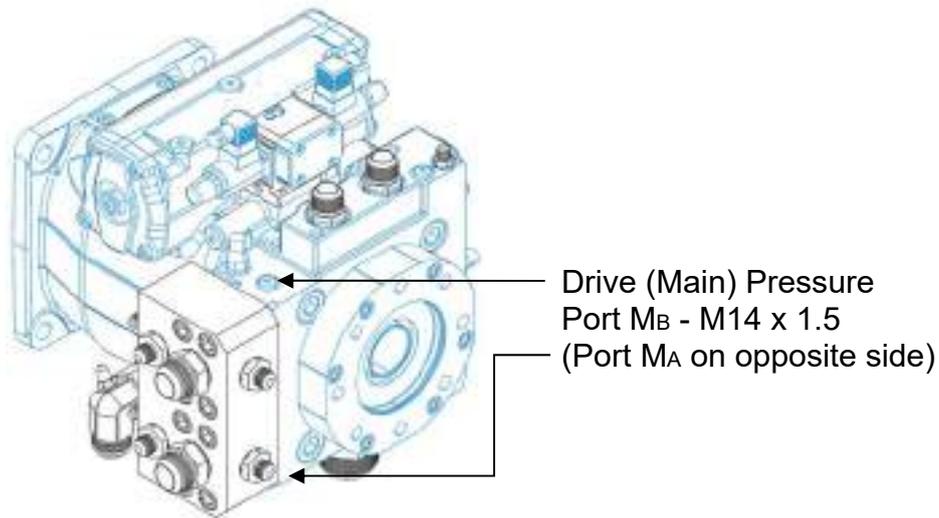
Ensure that the Machine is switched off until the pressure gauge has been attached and the hose bunged before trying to read the charge pressure.

6.3: Checking the Drive Pressure

In order to check the drive (main) pressure, the following steps should be taken:

- Ensure that the engine is switched off and the park brake applied.
- Attach a pressure gauge to port M_B or port M_A on the pump as indicated in the diagram on the following page.
- Start the engine and fully depress the accelerator pedal.
- Read the pressure displayed on the gauge.

The drive pressure should measure approximately 400 bar (5800 PSI) nominal.



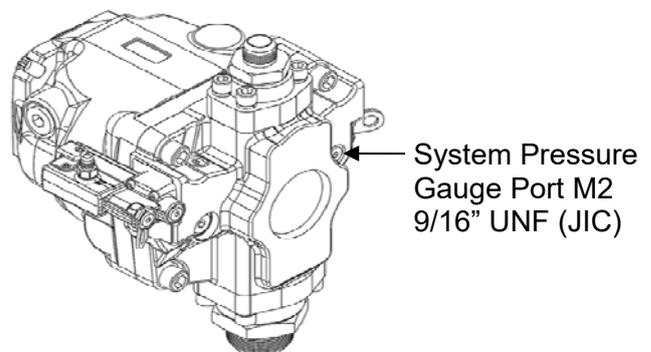
6.4: Hydraulic Functions Pressure Settings

In order to check the hydraulic functions pressure settings, the following steps should be taken:

- Ensure the engine is switched off and the park brake applied.
- Attach a pressure gauge to the gauge port on the steering and hydraulic functions pump as indicated in the diagram below.
- Start the engine.
- Using the joystick in the cab fully extend or retract the cylinder(s) of the function to be tested. For example when checking the tilt-back pressure the mast must be tilted back as far as it will go.
- Fully depress the accelerator pedal and use the joystick to operate the function being tested (in the example of testing the tilt back pressure scroll the tilt scroll wheel back).
- The reading on the gauge indicates the pressure setting on one particular port on the valve chest.
- Example: To check the tilt forward pressure tilt the mast forward as far as it will go. Fully depress the accelerator pedal and scroll the tilt scroll wheel forward. The pressure gauge will display the setting on the tilt forward port.
-

Pressure Settings

Main Relief	230 bar (3336 PSI)
Lift	230 bar (3335 PSI)
Mast Carriage Out	140 bar (2030 PSI)
Mast Carriage In	140 bar (2030 PSI)
Tilt Back	220 bar (3190 PSI)
Tilt Forward	170 bar (2465 PSI)

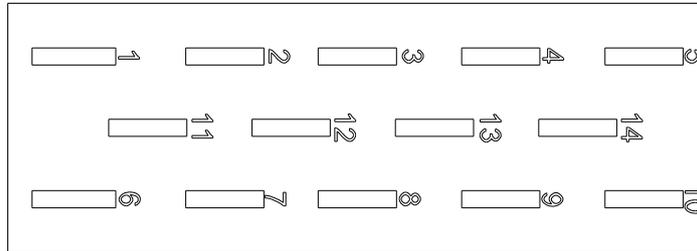


Note:

The pressure values given above are to be used as a guideline only. The pressures may be set differently in the factory on occasion to suit different equipment and attachments.

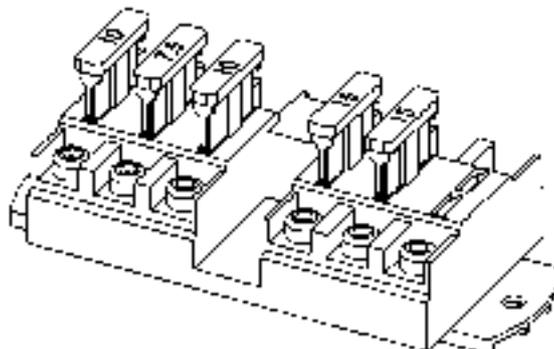
6.5: Fuses

The diagram below shows the layout of the main 14 way fuse box located on the dash (see item 1 in figure 1.2 on page 5). The table gives the rating of each fuse and the function related to each fuse. See the accompanying spare parts manual for part numbers if ordering fuses from Combilift.



14-Way Main Fuse Box Table		
Fuse	Rating (Amps)	Functions
1	7.5	Mast Height Override, PLC Supply, Dash Display Lights, Gauges, Hour Meter
2	7.5	Joystick Supply, Neutral Relay, Reverse Bleeper, Forward Solenoid, Reverse Solenoid,
3	7.5	Air Conditioning
4	20	Steering Solenoid, Reflex Steering Solenoid, Dead Band (Carousel) Solenoid, PLC Supply, Reversing Bleeper, Carousel Alarm & Dash Light, 0° & 90° Dash Lights
5	7.5	Brakes (Park Brake, Foot Brake Switch, Rear Brake Relay, Brake Solenoids, Brake Light on Dash
6	10	Wipers
7	10	Front LED Work Lights, Optional Mast LED Work Lights
8	7.5	Cabin Interior Light
9	10	Cabin Heater (Optional)
10	7.5	Horn
11	7.5	Proximity Switches
12	7.5	Fork Control Joystick Supply, Optional Auxiliary Functions
13	7.5	Flashing Beacons
14	7.5	Oil Cooler Relay, Optional Camera

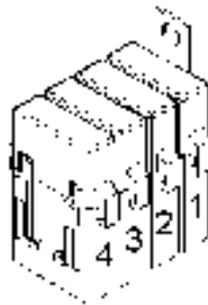
The diagram below shows the layout of the 6-way fuse block located inside the electrical enclosure in the dash and the table on the following page shows the rating of each fuse and the function related to each fuse. To access this fuse block remove the dash plate by unscrewing the four M6x10 dome head bolts in the corners of the dash plate to reveal the electrical enclosure. Remove the electrical enclosure lid to reveal the 6-way fuse block.



6-Way Auxiliary Fuse Box Table		
Fuse	Rating (Amps)	Functions
1	10	Side & Rear LED Work Lights
2	7.5	High Speed Solenoid
3	10	Dead End Solenoid (Optional)
4	15	12v Supply
5	10	Optional Auxiliary Function On Mast 6-Port Valve
6	-	Spare

There are four Maxi fuses located in the engine compartment. The table and diagram below give details of the Maxi fuses. Open the engine access panel to access these fuses. See the accompanying spare parts manual for part numbers if ordering fuses from Combilift.

Fuse	Rating (Amps)	Functions
1	80	Main Fuse (Ignition Switch)
2	50	Auxiliary Fuse Box
3	30	Oil Cooler
4	30	Air Conditioning

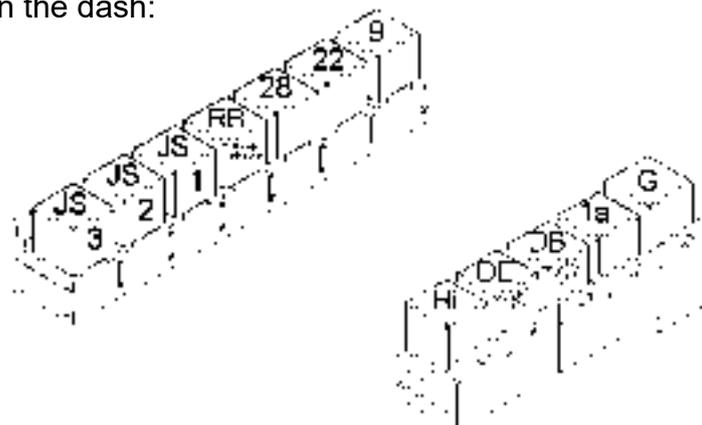


6.6: Relay Layout

There are a number of relays involved in the electrical control system of the truck. Most are located in the electrical enclosure in the dash and the others are in the engine compartment

To access the relays in the dash remove the dash plate by unscrewing the four M6x10 dome head bolts in the corners of the dash plate to reveal the electrical enclosure. Remove the electrical enclosure lid to reveal the relays.

The diagram below and the table on the following page give details of the relays located in the dash:

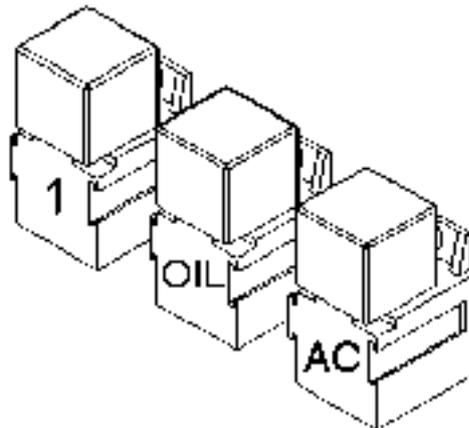


Relay	Function
JS3	Optional Auxiliary Proportional Valve Solenoid (Optional)
JS2	Optional Auxiliary Proportional Valve Solenoid (Optional)
JS1	Optional Auxiliary Proportional Valve Solenoid (Optional)
RB	Rear Brake Solenoid
28	Reverse Alarm, Carousel Alarm (Optional)
22	Side & Rear LED Work Lights (Spot Lights)
9	Steering Solenoid
G	Engine Plug G (Power To ECU)
1A	Neutral Cut Off
DB	Dead Band Solenoid (Carousel Valve)
DE	Dead End Solenoid (Optional)
Hi	Hi-Low Speed Solenoid

Open the engine access panel to gain access to the relays located in the engine compartment.

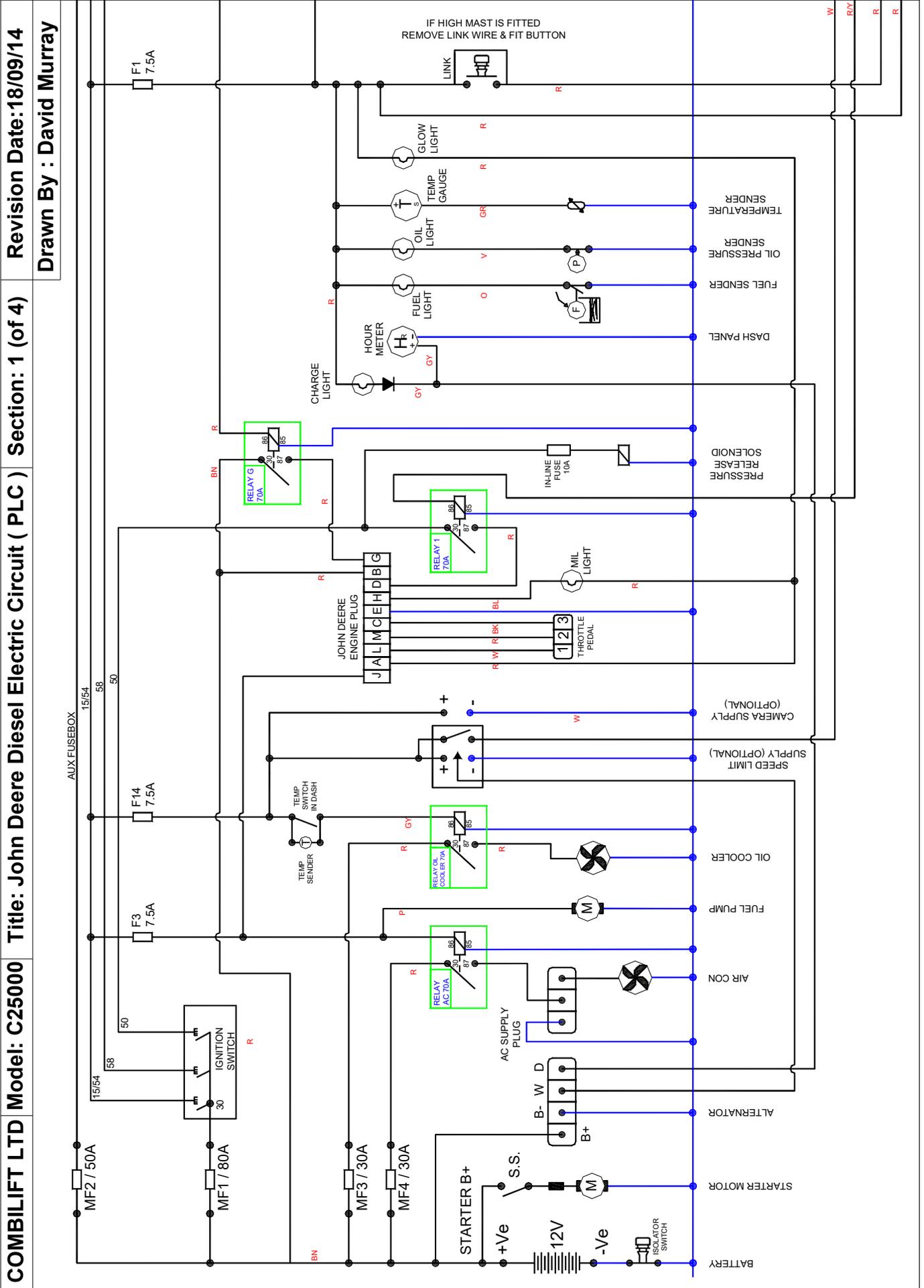
The following table and diagram give details of the relays located in the engine compartment:

Relay	Function
1	Start Allow
OIL	Electric Oil Cooler
AC	Air Conditioning



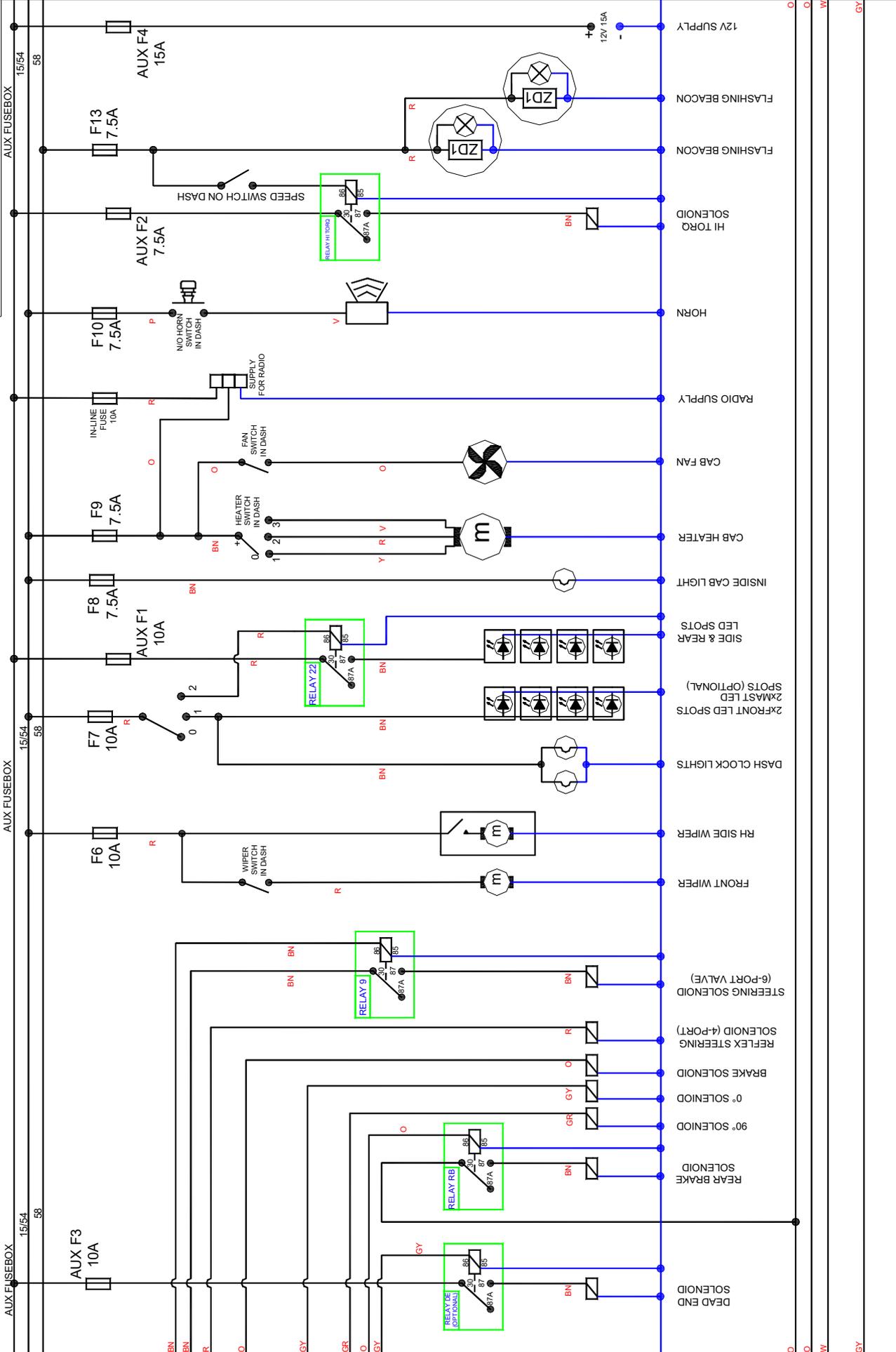
6.7: Combilift Electric Circuit

COMBILIFT LTD	Title: Combilift Electric Circuit Colour Codes
Model: C25000	
<p><u>CODE - COLOUR</u></p> <p>BK - BLACK BN - BROWN BL - BLUE R - RED O - ORANGE Y - YELLOW GR - GREEN V - VIOLET P - PINK GY - GREY W - WHITE G/Y - GREEN / YELLOW R/Y - RED / YELLOW O/W - ORANGE / WHITE</p> <p>NEGATIVE WIRES ARE NORMALLY BLUE OR BLACK, DEPENDING ON WHAT UNIT IS BEING INVESTIGATED. TAKE ALL NEGATIVES TO BE BLACK UNLESS STATED OTHERWISE.</p>	



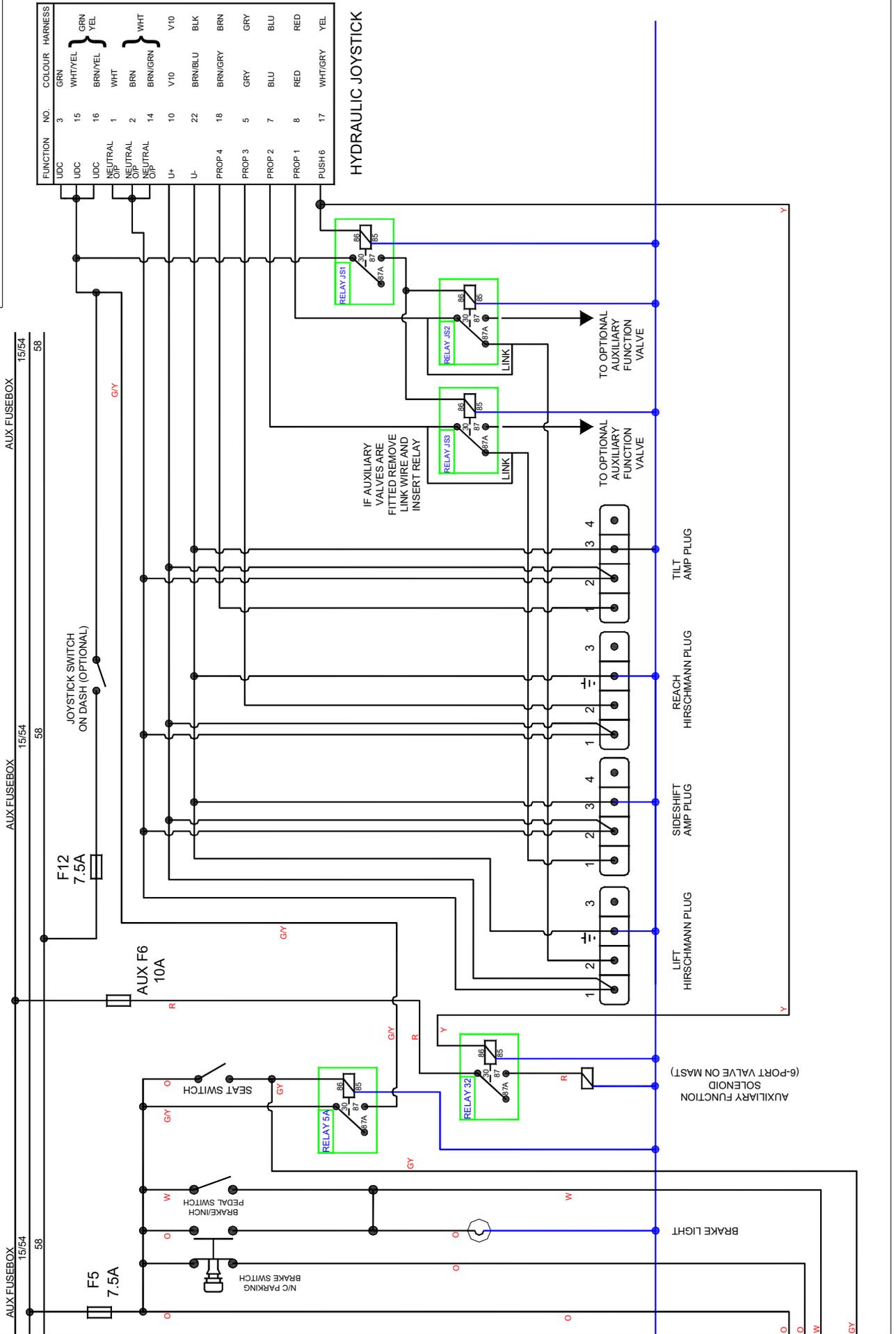
COMBILIFT LTD Model: C25000 Title: John Deere Diesel Electric Circuit (PLC) Section: 3 (of 4) Revision Date:18/09/14

Drawn By : David Murray

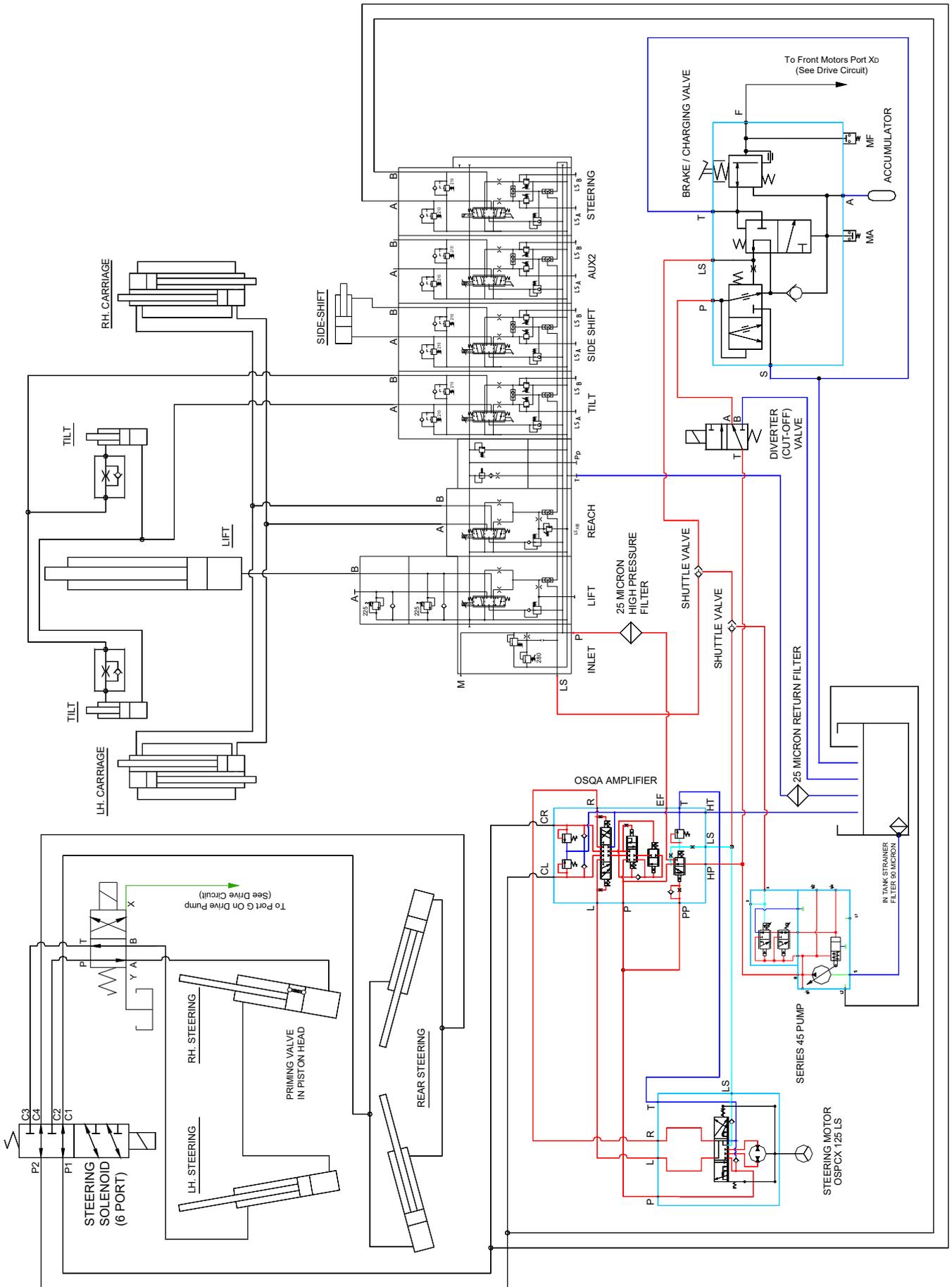


COMBILIFT LTD Model: C25000 Title: John Deere Diesel Electric Circuit (PLC) Section: 4 (of 4) Revision Date: 18/09/14

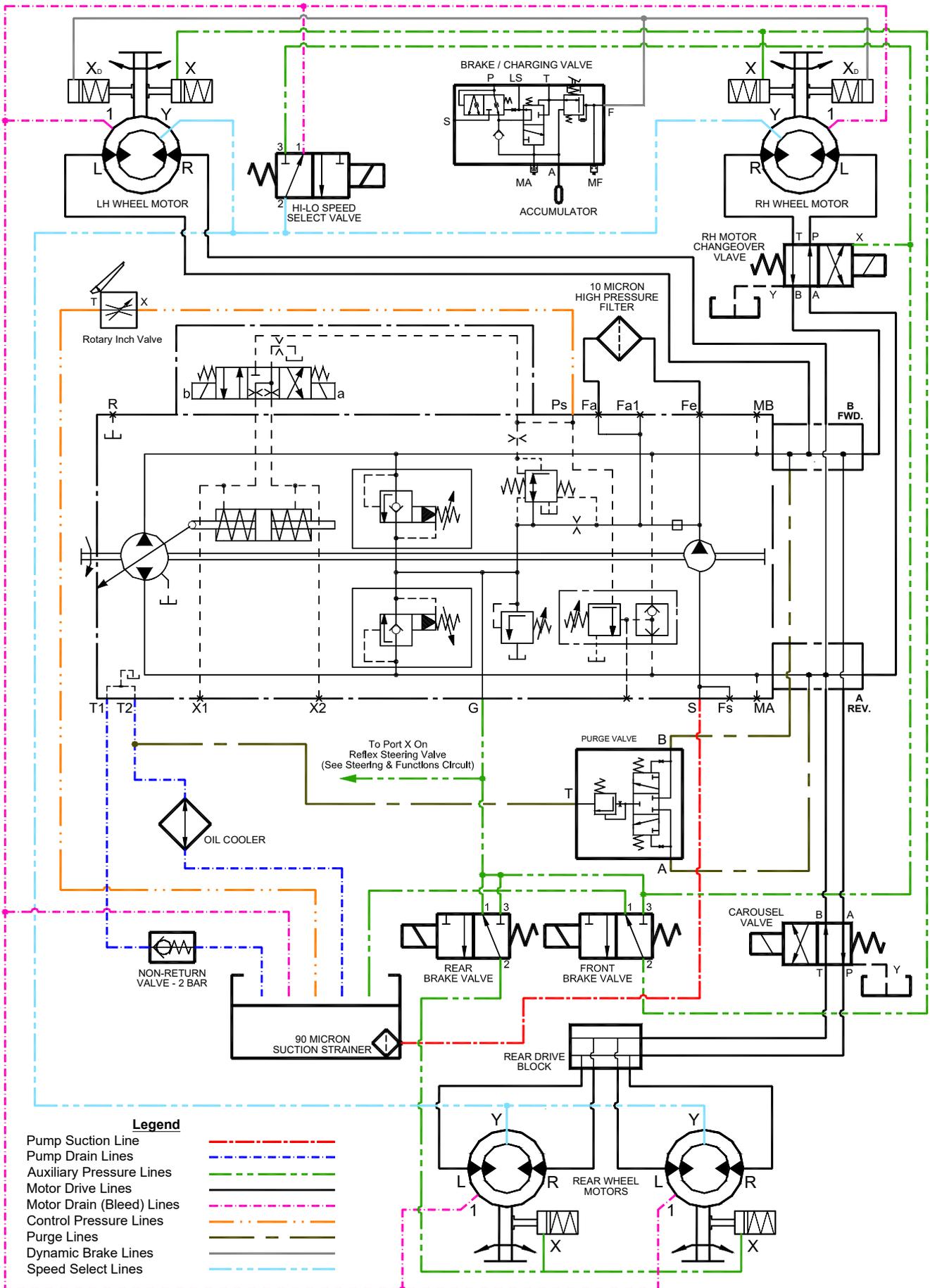
Drawn By : David Murray



6.8: Hydraulic Functions Circuit

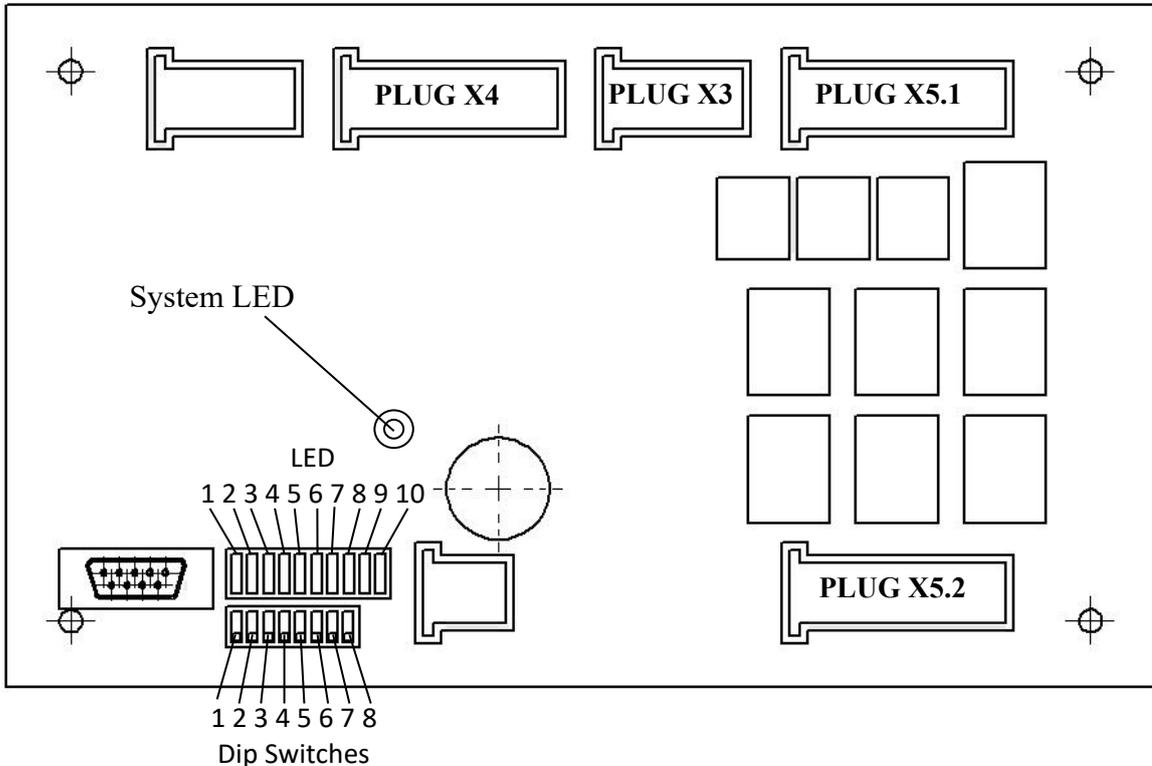


6.9: Hydraulic Drive Circuit

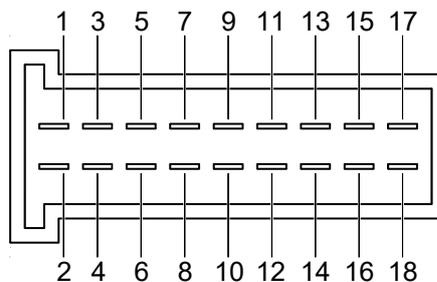


6.10: PLC Details

The diagram below shows the layout of the major components of the PLC board that need to be known in order to correctly find and repair faults.



The pins in each of the plugs on the board are laid out as follows.



The System LED tells the operator what the PLC is doing. The following table gives an explanation of what the System LED is indicating.

System LED Status	Meaning
No LED	No power Supply to PLC
Flashing Green (Fast)	PLC is not Programmed
Flashing Green (Slow)	PLC is Programmed & Running Normally
Static Green	PLC is Programmed but not Running
Static Red	PLC has Failed (Replace PLC)

Each of the plugs has a specific function as do the pins on each plug. The tables on the following pages give details of the functions on each of the plugs and the pin associated with each function.

INPUTS

Plug	Pin	Function	Wire Colour
X4	01	Rear Wheel @ 0° Proximity Switch	Black
X4	02	Front Wheel @ 0° Proximity Switch	Grey
X4	03	Rear Wheel @ 90° Proximity Switch	Black
X4	04	Front Wheel @ 90° Proximity Switch	Green
X4	05	Carousel 35° Proximity Switch (DB Proxy)	Red
X4	06	Park Brake Switch Signal	Orange
X4	07	Brake / Inch Pedal Switch Signal	White
X4	08	Forward Signal From Direction Lever	White
X4	09	+12v PLC Power Supply (From Fuse 1)	Red
X4	10	-12v PLC Power Supply (B-)	Blue / Black
X4	11	Reverse Signal From Direction Lever	Brown
X4	12	Left Signal From Direction Lever	Grey
X4	13	Right Signal From Direction Lever	Green
X4	14	Mast Height Proximity Switch Signal	Yellow
X4	15	Mast Height Over Ride Button	Red
X4	16	Speed Control (Optional)	White
X4	17	Optional Extra	-
X4	18	Seat Switch	Grey

OUTPUTS

Plug	Pin	Function	Wire Colour
X3	01	Forward Solenoid 01	White
X3	02	Forward Solenoid 02	White
X3	03	Reverse Solenoid 01	Brown
X3	04	Reverse Solenoid 02	Brown
X3	05	Common Supply for Pins 01-04 (From Fuse 2)	Red
X3	06	Drive Solenoid 01	Red
X3	07	Drive Solenoid 02	Red
X3	08	90° Indicator Light	White
X3	09	0° Indicator Light	Green
X3	10	Common Supply to pins 06-09 (From Fuse 4)	Brown

Outputs (continued)

Plug	Pin	Function	Wire Colour
X5.1	01	<i>Not Used</i>	<i>n/a</i>
X5.1	02	Supply for Steering Solenoid Relay (from fuse 4)	Brown
X5.1	03	Steering Solenoid (6-Port) Relay	Brown
X5.1	04	<i>Not Used</i>	<i>n/a</i>
X5.1	05	<i>Not Used</i>	<i>n/a</i>
X5.1	06	Supply for Reflex Steering Solenoid (from fuse 4)	Brown
X5.1	07	Reflex Steering Solenoid (Front RH 4-Port)	Red
X5.1	08	<i>Not Used</i>	<i>n/a</i>
X5.1	09	<i>Not Used</i>	<i>n/a</i>
X5.1	10	Supply for Front Brake Solenoid (from fuse 5)	Orange
X5.1	11	Front Brake Solenoid	Orange
X5.1	12	<i>Not Used</i>	<i>n/a</i>
X5.1	13	<i>Not Used</i>	<i>n/a</i>
X5.1	14	Supply for 0° Solenoid (1of2) (from fuse 4)	Brown
X5.1	15	0° Solenoid (1of2)	Grey
X5.1	16	Supply for 0° Solenoid (2of2) (from fuse 4)	Brown
X5.1	17	<i>Not Used</i>	<i>n/a</i>
X5.1	18	0° Solenoid (2of2)	Grey

Plug	Pin	Function	Wire Colour
X5.2	01	<i>Not Used</i>	<i>n/a</i>
X5.2	02	Supply for 90° Solenoid (1of2) (from fuse 4)	Brown
X5.2	03	90° Solenoid (1of2)	Green
X5.2	04	<i>Not Used</i>	<i>n/a</i>
X5.2	05	<i>Not Used</i>	<i>n/a</i>
X5.2	06	Supply for 90° Solenoid (2of2) (from fuse 4)	Brown
X5.2	07	90° Solenoid (2of2)	Green
X5.2	08	<i>Not Used</i>	<i>n/a</i>
X5.2	09	<i>Not Used</i>	<i>n/a</i>
X5.2	10	Supply for Rear Brake Relay (from fuse 5)	Orange
X5.2	11	Rear Brake Relay	Orange
X5.2	12	<i>Not Used</i>	<i>n/a</i>
X5.2	13	<i>Not Used</i>	<i>n/a</i>
X5.2	14	Supply for Dead End (DE) Solenoid Relay (Optional) (from fuse 14)	Brown
X5.2	15	Dead End (DE) Relay (Optional)	Grey
X5.2	16	Supply for Dead Band (DB) (Carousel 4-Port) Solenoid Relay (from fuse 4)	Brown
X5.2	17	<i>Not Used</i>	<i>n/a</i>
X5.2	18	Dead Band (DB) Relay	Grey

6.11: John Deere Engine Plug

Plug	Pin	Function	Wire Colour
JD Main	A	Glow Lamp (To Fuse 1)	Green
JD Main	B	Permanent Supply (To B+ Starter)	Red
JD Main	C	Electronic Accelerator Pedal (Low Pin A)	Black
JD Main	D	Start Allow Relay (Relay 1 Pin 87)	Red
JD Main	E	Negative Supply (To B-)	Blue
JD Main	G	Ignition On (Relay G Pin 87)	Red
JD Main	H	Malfunction Indicator Light (MIL) (To Fuse 1)	Blue
JD Main	J	Alternator Excitor (To Fuse 3)	Red
JD Main	L	Electronic Accelerator Pedal (Analog Input Pin B)	White
JD Main	M	Electronic Accelerator Pedal (High Pin C)	Red

Section 7: Appendices

7.1: Appendix A: 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.
Annahagh
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.

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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, Annahagh, Monaghan, County Monaghan, Ireland.

BY EMAIL TO: warranty@combilift.com

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