COMBiLiFT
LiFTING INNOVATION

Dear Customer,

Thank you for choosing Combilift and showing your faith in our range of material handling products. By choosing Combilift you now own a high quality 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.

In order to familiarise yourself with your truck in a quick comprehensive manner please read this manual attentively. In addition to the information regarding safety and operation, this manual also contains important maintenance checks and instructions for ensuring continuous safe and reliable operation of your truck. Should you have any questions or problems relating to your truck, please contact your local Combilift partner who will be happy to respond to your questions, suggestions and/or comments. We are confident that you will be wholly satisfied with your Combilift truck.

Preface

This manual describes how to operate and maintain the Combilift - CB truck safely and efficiently. It is essential that this manual remain with the truck at all times. It is essential that the operator and all persons involved in work with the truck read this manual before attempting to operate or service the truck.

Follow all local laws and regulations with regard to the operation of lift trucks where they apply at the place of use.

Follow all instructions, prohibitive or otherwise, found in this manual. They are there to protect the life of the operator and the lives of others working in the vicinity of the truck.

Always perform the Pre-Use Inspection as indicated in this manual and follow the guidelines on service intervals. Ensure that the truck is in good mechanical condition at all times. Report any fault and have it corrected immediately otherwise even minor faults may result in major failures and dangerous operating conditions.

About This Manual

The descriptions and illustrations contained in this manual are not in any way binding. Combilift must reserve the right to make changes without prior notice in the interest of the enhancement of the product.

Some trucks may be customised to suit the needs of individual customers. Therefore these trucks may deviate slightly from the descriptions contained within this manual.

Every effort has been made to ensure that the information contained herein is accurate at the time of writing. However it cannot be guaranteed that all of the statements in this manual are completely correct.

Whenever the terms front, rear, right and left are used throughout this manual, it is from the point of view of the operator sitting on the seat in the operating enclosure looking forward.

This manual is not designed for the purpose of extensive maintenance work. Such work must be performed by approved professionals.

The table of contents on the following pages outlines the structure of the information contained within this manual and makes for easier location of information.

Warning

Operating, servicing and maintaining a passenger vehicle or off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle.

For more information go to www.P65Warnings.ca.gov/passenger-vehicle**.**

Contents

Section 1: Safety Information

1.1 Safety Statements

To ensure safe operation and maintenance of the truck, it is necessary to follow all the instructions in this manual.

The following symbols and signal words **WARNING**, **CAUTION** and **NOTE**, and the adjacent text, indicate hazards and instructions.

This is the Environmental Hazard Symbol. It is used to alert the reader to potential damage to the environment.

This is the Safety Alert Symbol. It is used to alert the reader to potential safety hazards.

Warning

Warning indicates a hazardous situation which if not avoided could result in serious injury or death.

Caution

Caution indicates an unsafe practice which if not avoided could result in serious injury or property damage.

Note

Used without the safety symbol indicates a situation that if not avoided could result in damage to the equipment and/or property.

Also indicates important information regarding the operation and servicing of the truck.

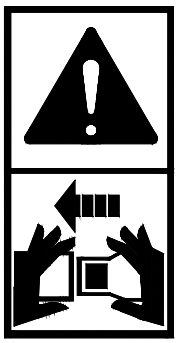
1.2 Operator Safety

Before commencing use of the Combilift forklift operators must become familiar with its capabilities and thoroughly read and understand the material contained in this Manual along with the meanings of the various machine signs (decals) found on the truck.
Whether you are a new operator or have used forklift trucks for many years, read through this manual thoroughly. It provides instructions to help operate the Combilift forklift in a safe and efficient manner.

1.3 Safety Decals

Maintain all safety decals on the machine in a legible manner. If a safety decal becomes damaged or illegible, replace it with a new decal - available from your local Combilift partner.

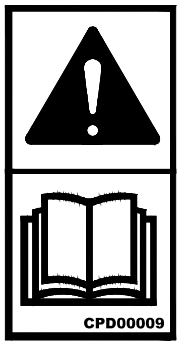
The machine safety decals are illustrated below and are accompanied by a description of the meaning of each decal. The part number of each decal is also shown for reordering.



Warning

Personal injury hazard. Always wear the seat belt while sitting in the truck.

Part No. CPD00009



Warning

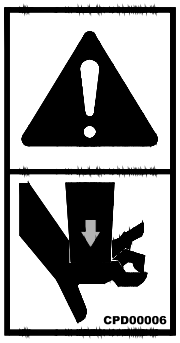
Read the operators manual before operating or working with the truck.

Part No. CPD00009

Warning

Shearing hazard from rotating fan. Stop the engine before approaching.

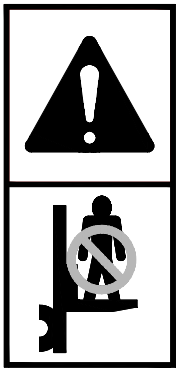
Part No. CPD00004



Warning

Crushing hazard from moving parts. Stop the truck and isolate the battery before approaching.

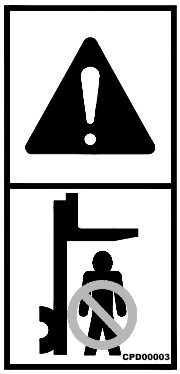
Part No. CPD00006



Warning

Personal injury hazard. Do not stand on the forks.

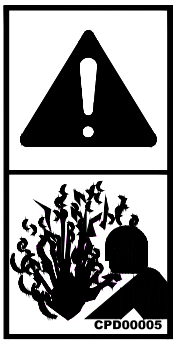
Part No. CPD00003



Warning

Personal injury hazard. Do not stand under the forks.

Part No. CPD00003



Warning

Scalding hazard. Only remove the cap from the radiator when cool.

Part No. CPD00005

1.4 Safety Devices

The following safety devices are fitted to the truck as standard:

Overhead Guard/Cabin

- Replace the Overhead Guard/Cabin in any of the following instances:
  - If it has permanently deflected.
  - If a member is deformed.
  - If it has become corroded.
  - If it has been modified.
  - If the mounting structure, base, or mounting hardware is damaged.
- Do not attempt to repair, straighten or reuse a damaged Overhead Guard/Cabin.

Warning

Never use the truck without the Overhead Guard/Cabin properly installed. Do NOT drill, weld, straighten or bend the Overhead Guard/Cabin. Allow only trained authorised personnel to install a new Overhead Guard/Cabin.

Seat Belt

- Adjust the seat belt to contact the body firmly when fastened.
- Inspect the seat belt webbing for damage and replace if necessary.
- Test the buckle and retractor and repair or replace if necessary.

Seat Switch

- The truck will not operate unless the seat is occupied. When the seat is unoccupied the drive and the hydraulic functions are disabled.

Seat Belt Switch (If fitted)

- The optional seat belt switch disables the hydrostatic drive if the seat belt is unbuckled.

Park Brake

- The park brake prevents inadvertent movement of the truck.

Brake/Inch Pedal Brake Switch

- The brake/inch pedal brake switch applies the park brake when the brake/inch pedal is depressed and held in for 3 seconds or more.

Battery Isolator Key Switch

- The battery isolator key switch allows the battery to be disconnected from the electrical system.

The following safety devices may be fitted as optional extras:

Mast Up Drive Cut-out (If Fitted)

- When the mast is raised above a predetermined height the drive is disabled.
- To enable the drive, lower the mast below the drive cut-out height or press the drive cut-out override button.

Mast Lift Cut-out (If Fitted)

- When the mast is raised to a predetermined height it will stop automatically.
- To continue raising the mast press the lift cut-out override button.

Caution

The warning and safety devices are installed to protect the life of the operator and those working in the vicinity of the truck. Do not remove or bypass any of the safety devices.

Combilift Ltd will not assume liability for injuries or damages arising from or caused by the removal or bypassing of any the trucks safety or warning devices.

1.5 Warning Devices

The following warning devices are fitted to the truck as standard:

Horn

- The horn is activated by pressing in the horn push button.
- Sound the horn at intersections.
- Stop and look for pedestrians or other traffic and proceed with caution.

Reversing Alarm

- The reversing alarm is activated when the engine is running and reverse drive is selected.
- The reversing alarm may be wired as a motion alarm if required, in this instance the alarm is activated in more than one direction.

Flashing Beacon

- The flashing beacon is activated when the key switch is turned to the ON position.

The following optional warning devices may be fitted to the truck if required:

Blue Safety Lights (if fitted)

- Blue safety lights may be fitted that activate when a direction of travel is selected.

1.6 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. If fitted, the cabin door the cabin door must 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 the trucks 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 the ignition if for any reason, the truck becomes unsafe or defective. Remove the key and place an ‘out of order’ sign in a prominent place on the truck.
- Prohibit unauthorised and untrained people from accessing the starting key and operating of the truck.
- The operator is responsible for visually monitoring the work area of the truck and preventing anyone from entering the area without permission. If a person enters the area while the truck is in operation, the operator shall stop the truck and instruct the person to leave the work area until the truck has been stopped. The person may then approach the machine in full view of the operator.

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

Warning

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

1.7 Work Place Operating Conditions

Warning

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

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

- Contractors doing maintenance
- Wet areas
- Overhead repair work

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

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

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

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

Ground Surface

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

Aisle Dimensions

Aisles should be arranged to eliminate corners, angles, inclines, steep ramps, narrow passages and low ceilings.

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.
- 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, low 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. Except in emergencies, do not turn the truck on gradients. Correct gradient procedure – covered in section 5.18 on page 67 - should be followed at all times. Do not park on a gradient. In an emergency apply the park brake and chock the wheels, but do not leave the truck unattended.

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.

Noise/Hearing Protection

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 objectionable or uncomfortably loud noises.

Exhaust Emissions

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

Section 2: Basic Information

2.1 Intended Use

Warning

Unintended use can endanger the lives of operating personnel or other persons in the vicinity of the truck.
Unintended use can cause extensive damage to the truck and/or to property or materials being handled.

Operation by inexperienced persons, or in an unintended manner, can result in hazards that can lead to personal risk and subsequent harm to the operator and persons in the operating area of the truck. Improper use can damage the truck as well as the product being handled and property in the vicinity of operation.

Read and understand the operating instructions in this manual before operating the truck. Before performing production work, the operator should find a remote, open site to become familiar with the controls and the trucks response. The truck must be in serviceable condition before attempting to use it as described in the operating instructions. If it is determined that the truck is not in a fit condition for operating, notify the relevant supervisor to have it repaired before use.

The Combilift forklift has been designed to lift loads, transport them and place them in another location, taking into account the safety instructions listed in this manual and any other local laws and regulations where applicable. One work cycle consists of lifting, transporting and placing a load. Similar uses of the truck with alternative attachments which do not change the safety requirements for the truck but modify the way in which it is used are only acceptable when attachments that have been approved by Combilift are used. The intended operation is described in this Manual. The instructions describe how to operate, inspect and maintain the truck.

The truck must not be used for any of the following activities:

- lifting people without an approved work platform securely fitted
- transporting people
- pushing or pulling loads

The truck must not be used if:

- it has received unauthorised repairs
- it has received unauthorised modifications

2.2 General

This truck is 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. For operation outside these temperatures, please consult the manufacturer as special modifications and lubricants are required.

Standard trucks must not be operated in flammable areas, corrosive atmospheres, or in areas containing a high degree of dust contamination. Only trucks specifically designed or modified to suit these conditions can enter such areas.

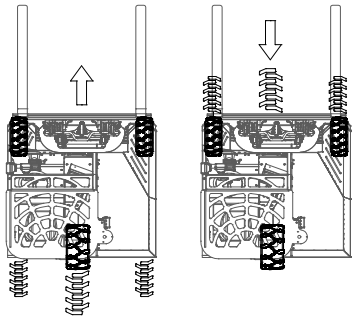
The safe maximum load capacities of the truck with relation to the load centre and fork height, which MUST NOT BE EXCEEDED, are stated on the capacity plate.

The truck must be operated strictly in accordance with the operating instructions provided in this manual in conjunction with the safety regulations of the country in which the forklift truck is being operated.

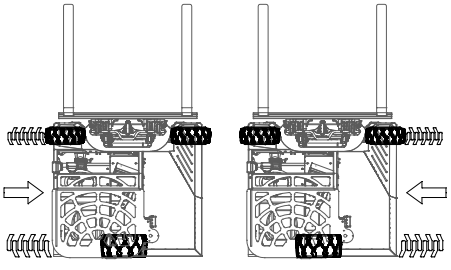
2.3 Vehicle Description

The Combilift is a multifunctional, multidirectional forklift with four directions of travel – Forward, Reverse, Left & Right. In order for these travel directions to be possible the Combilift has 2 modes of travel, standard mode and sideward mode.

Standard Mode – In Standard Mode all wheels are aligned parallel to the forks. In this mode the rear wheel steers the truck. It is in this mode that forward travel and reverse travel can take place. **Forward Travel** is traveling with the forks leading. **Reverse Travel** is traveling with the forks trailing.



Sideward Mode – In sideward mode all wheels are aligned perpendicular to the forks. Steering is accomplished by the two front wheels. In this mode Left Travel and Right Travel can take place. **Left Travel** refers to travel with the operators compartment leading. **Right Travel** refers to travel with operators compartment trailing.



Having the ability to drive forward, back, left and right makes the Combilift truck capable of performing like a standard counterbalance forklift truck, a reach truck and a side loading truck safely and efficiently. Thus it is ideal for handling palletised loads and also long loads such as pipes or timber.

The principle of this type of truck is that the weight of the load, which is lifted on the forks in front of the load wheels, is offset by the combined weight of the truck chassis and components.

2.4 Principle of Operation

Drive is achieved by means of a hydrostatic drive pump coupled to an internal combustion (IC) engine. The drive pump pumps hydraulic oil through hydraulic hoses to wheels motors on which each of the three wheels are mounted. The wheel motors turn the wheels to drive the truck. The speed of the drive is controlled by a throttle pedal located in the operating enclosure.

Steering is achieved by means of a hydraulic gear pump coupled to an internal combustion (IC) engine. The gear pump pumps hydraulic oil through a steering orbital unit. When the steering wheel is turned pressurised oil is fed via the steering orbital to hydraulic steering cylinders to steer the truck. Hydraulic valves in the steering system allow the wheels to be aligned parallel to the truck or perpendicular to the truck as desired.

Lift, tilt and side shift along with other optional auxiliary mast functions are achieved by means of a hydraulic gear pump coupled to an internal combustion (IC) engine. The gear pump pumps hydraulic oil through a block of valves. The valves are operated by levers (or a joystick if fitted) and are used to direct the pressurised oil to hydraulic cylinders to operate each of the mast functions.

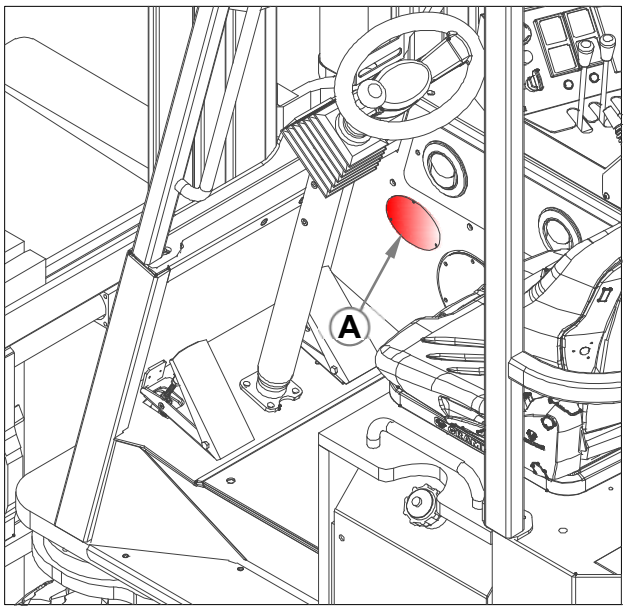
Forward, reverse, left or right travel may be selected by a direction control lever mounted inside the operating enclosure. Selecting a direction of travel sends electrical signals to a set of solenoid actuated hydraulic valves. The solenoid actuated valves direct the flow of hydraulic oil to the steering cylinders to steer the wheels to the appropriate position to achieve the desired mode of travel. The direction control valve directs the flow of oil out of the drive pump to achieve the desired direction of drive.

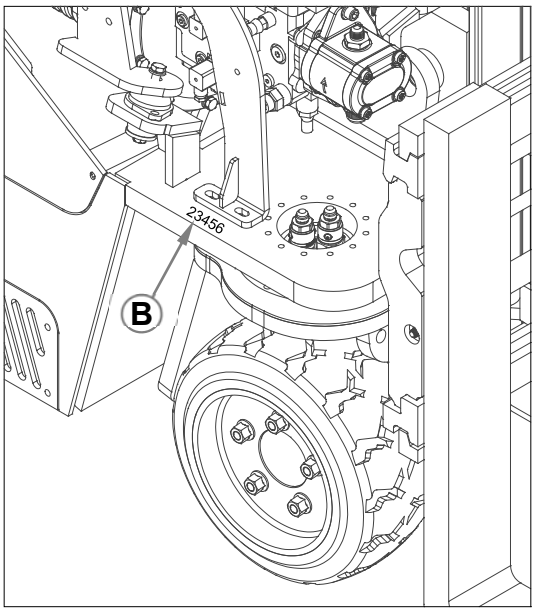
The truck is equipped with analogue dash clusters that display information regarding the trucks operating condition such as the engine coolant temperature, the engine oil pressure, low fuel, steering mode etc.

A brake/inch pedal slows the truck down when partially pressed and brings the truck to a complete stop when fully pressed and held down. The park brake is applied by a push button located inside the operating enclosure.

2.5 Serial Number and Serial Plate

The serial plate (**A**) is affixed inside the trucks operating enclosure and the serial number (**B**) is stamped on the trucks chassis above the front right hand swivel. Open the bonnet to view the serial number.





The Serial Plate is engraved with the following details:

a. **Model:** The model type of the truck is engraved in this box.
b. **Serial No:** The trucks serial number is engraved in this box.
c. **Rated Capacity:** The trucks maximum rated capacity is engraved in this box and is given for the load centre engraved in the following box.
d. **Load Centre:** The distance from the front face of the forks to the centre of gravity of the load for which the maximum rated capacity is given is engraved in this box.
e. **Unladen Weight:** The weight of the truck only is engraved in this box
f. **Manufactured On:** The date the truck was manufactured on is engraved in this box
g. **The manufacturers name, address and contact details are displayed on the bottom of serial plate**

The serial plate must not be removed. If lost order a replacement from Combilift immediately.

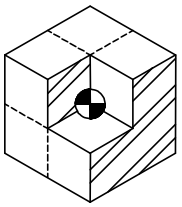
Note

Ensure that the serial number on the chassis corresponds with the serial number on the serial plate before putting the truck into operation.

2.6 Rated Capacity, Centre of Gravity and Stability

The rated capacity is the maximum weight that a truck is designed to lift at a specified load height to a specific load centre distance under safe operating conditions. To understand the rated capacity it is necessary to be familiar with the term centre of gravity.

The centre of gravity is an imaginary point in a body where the total weight of the body may be considered to be concentrated. Every object has a centre of gravity. When a load is supported on the forks the truck and load may be considered as a single entity with a **combined centre of gravity**.

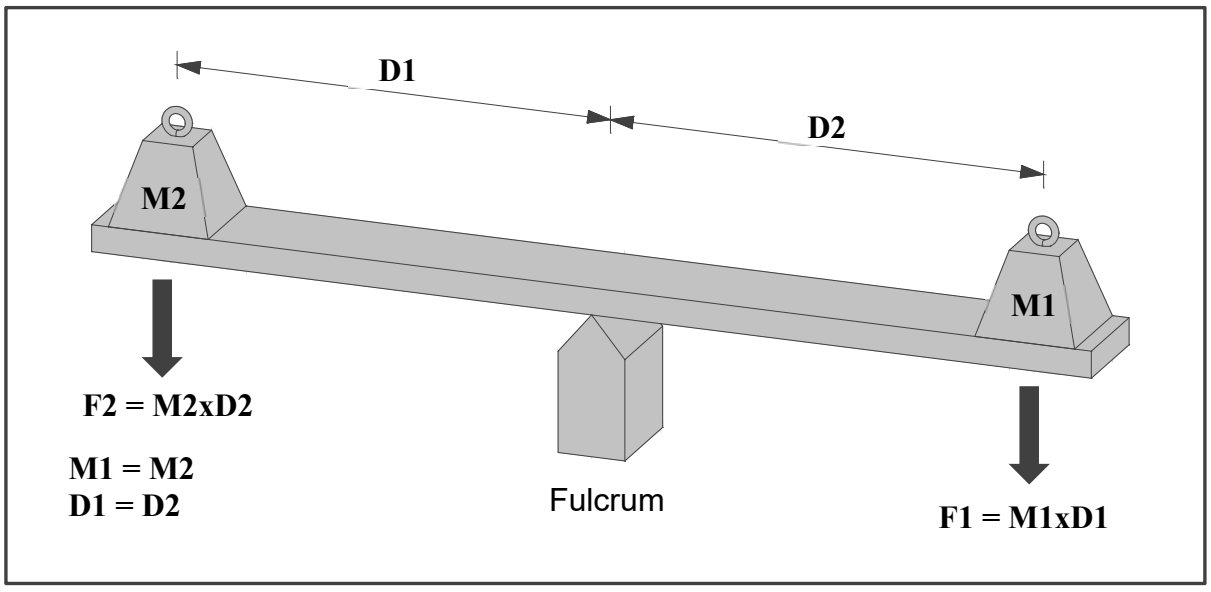


The truck has moving parts that alter the position of the centre of gravity. The centre of gravity moves back and forth as the mast is tilted backward and forward. The centre of gravity also moves up and down as the mast is raised and lowered.

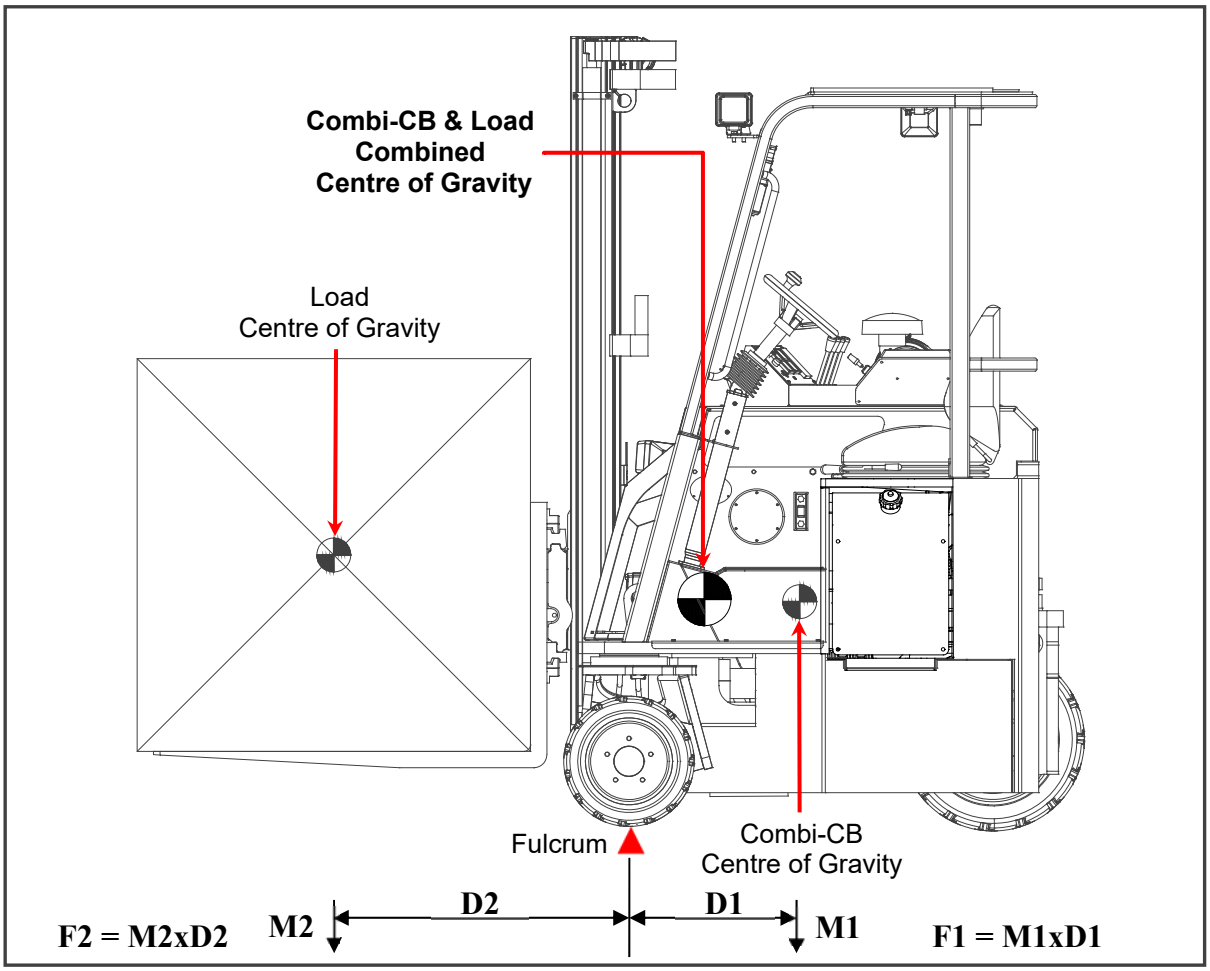
The position of the **combined centre of gravity** is affected by the size, weight, shape and position of the load; the height to which the forks are raised; the mast tilt angle and the side shift position.

To understand the stability of the truck it is useful to use the analogy of a see saw where two objects are placed on opposite sides of a beam and the beam is supported at a single point halfway along its length. For the see saw to balance, the two objects must be equal in mass and placed at an equal and opposite distance from the support point, also known as the fulcrum. If the mass on one side is increased the see saw will tip to the side of the heavier mass. This can be corrected by moving the heavier mass in towards the centre or fulcrum. **This principle is the most important factor that must be taken into account when considering the stability of the truck.**

If we look at the diagram below what this translates to is that as long as F1 is equal to F2 then the system will balance.



The very same principle applies to the Combi-CB truck where the front wheels act as the fulcrum, M1 represents the mass of the trucks heavy chassis and components on one side of the fulcrum and D1 represents the distance from the fulcrum to the centre of gravity of the truck. M2 represents the mass of the load on the forks on the opposite side of the fulcrum and D2 represents the distance from the fulcrum to the centre of gravity of the load. In the case of the truck F2 must always be less than F1 otherwise the truck will become unstable.

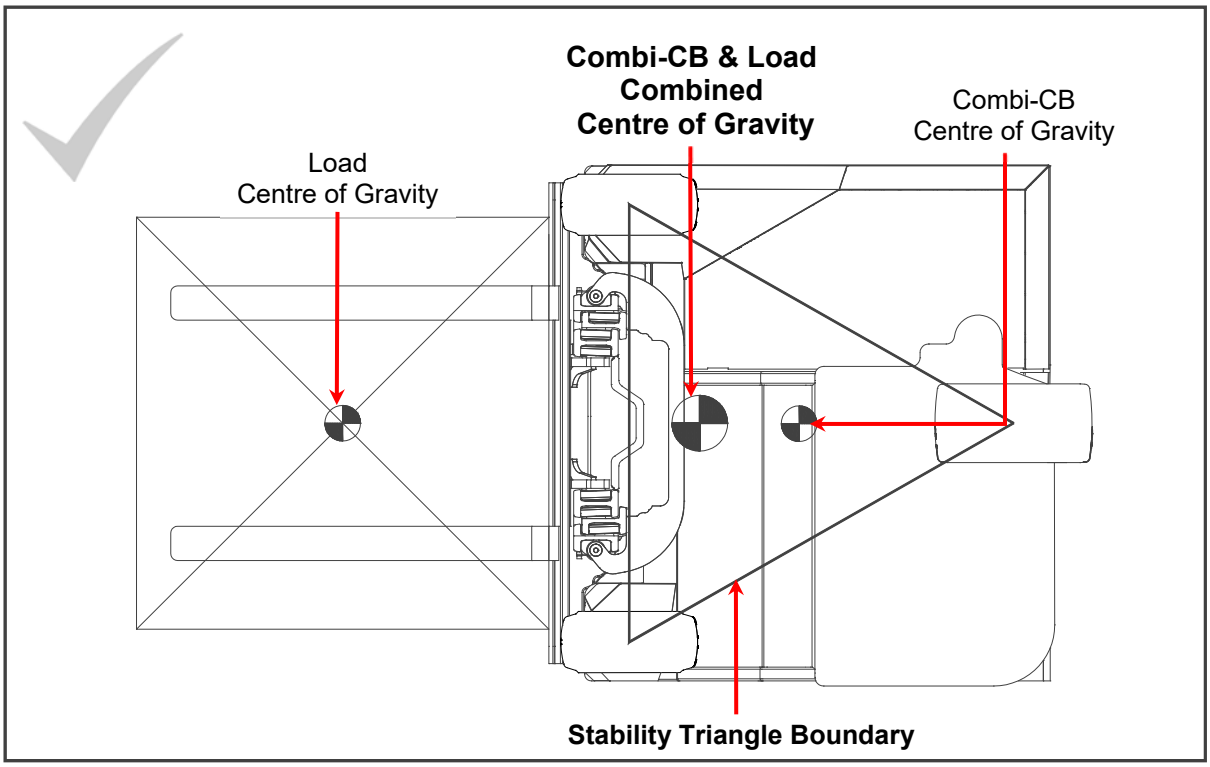


If the mass of the load (M2) is increased or the distance from the fulcrum to the centre of gravity of the load (D2) is increased such that F2 becomes greater than F1 then the truck will tip forward about the fulcrum.

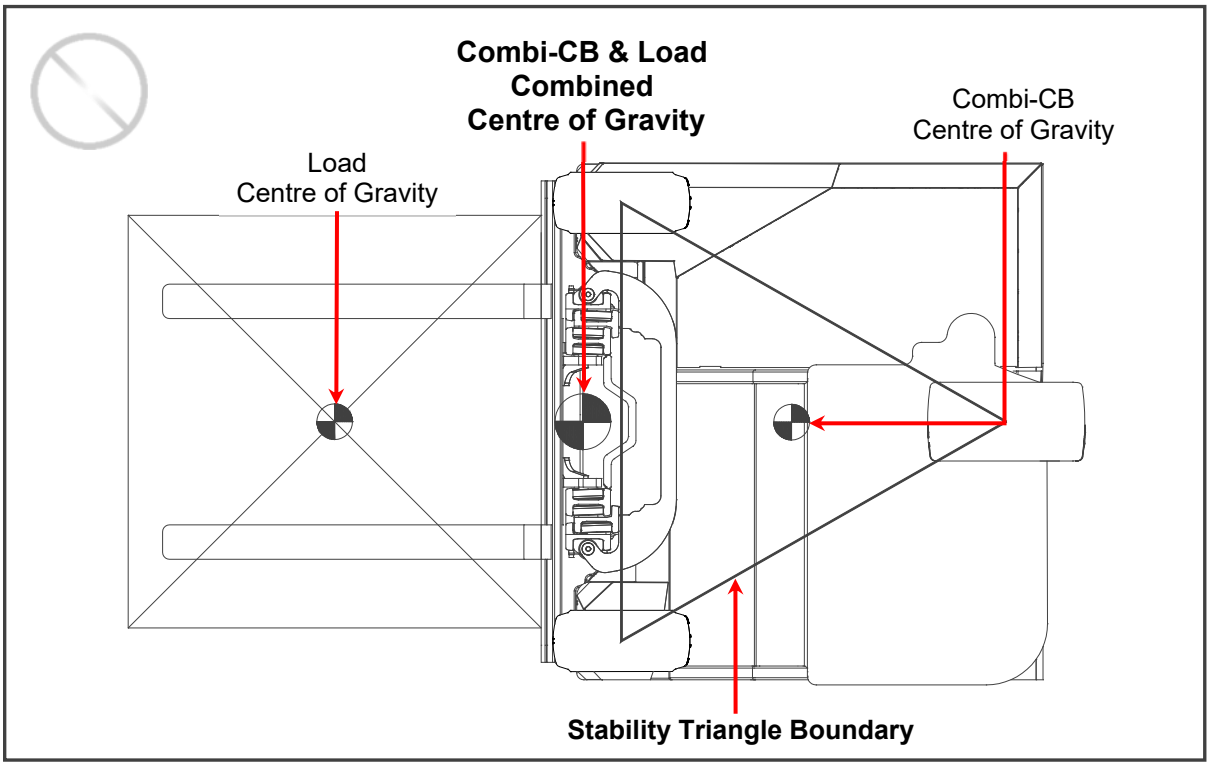
Other factors that influence the stability of the truck to a lesser degree include sudden acceleration, harsh braking, unbalanced loads, driving on sloped or uneven terrain, or turning with elevated loads. Any of these factors alone or in combination can result in the combined centre of gravity moving outside the boundary of the stability triangle thus causing the truck to tip over.

For the truck to remain stable both laterally and longitudinally, the combined centre of gravity of the truck and the load must stay within an area known as the stability triangle. To visualise the stability triangle, imagine three lines connecting each of the trucks three wheels. The area inside these three lines forms the stability triangle. If the combined centre of gravity moves outside the boundary of the stability triangle the truck will tip over.

The diagram below illustrates the truck with a uniform load less than the maximum rated capacity resting on the forks. In this case the combined centre of gravity lies inside the boundary of the stability triangle, therefore the truck and load will remain stable.



The diagram below illustrates the truck with a uniform load greater than the maximum rated capacity resting on the forks. In this case the combined centre of gravity lies outside the boundary of the stability triangle, therefore the truck and load will be unstable and a tip-over is likely to occur.



2.7 Load Centre & Load Chart

Warning

The maximum load that can be lifted by the truck decreases as the load centre of the load increases and as the load is raised.
Refer to the rated capacity at various heights and load centres listed on the load chart. Failure to heed these guidelines can cause damage to the truck and property or lead to a tip over causing serious injury or death.

Warning

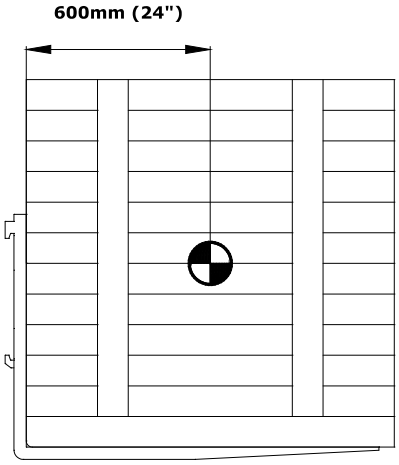
Make sure that the load is centred and the forks are fully engaged. Failure to do so can cause the load to fall or the truck to tip over, resulting in serious injury or death.

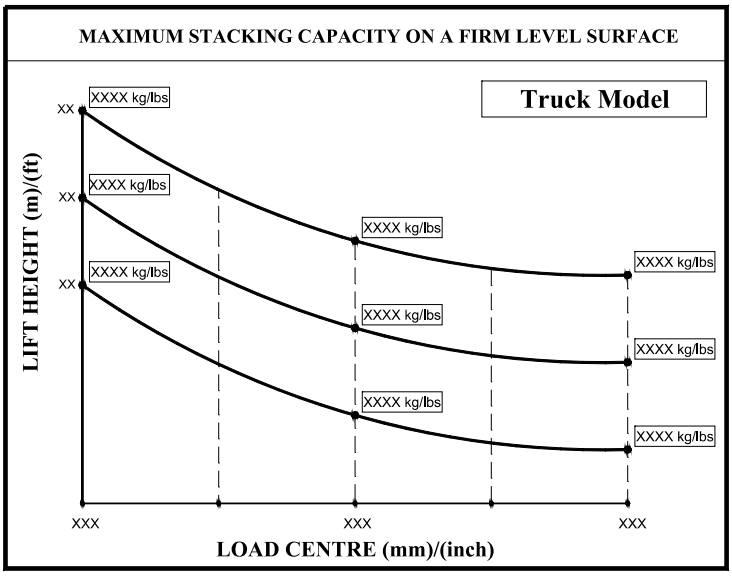
The term “Load Centre” is used to describe the distance from the face of the forks to the Centre of Gravity of the load when the forks are fully engaged with the load. The maximum rated capacity of the Combi-CB is based on a load in the form of a cube measuring 1200mm (48”) in length, depth and height where the centre of gravity lies exactly in the centre of the cube i.e. 600mm (24″) from all sides.

If the size or shape of the load changes such that the position of its centre of gravity moves away from the forks the truck will have less capacity to lift the load.

Raising a load also causes the truck to loose capacity due to mast tilt and deflection. Therefore as the load centre and/or lift height increases the maximum weight that can be safely lifted reduces.

The trucks capacities at various heights and load centres are displayed on a load chart located inside the operating enclosure. A sample load chart is shown below.





To read the load chart the weight of the load (in kilograms or pounds) and the load centre (in millimetres or inches) must be ascertained. These values can then be compared to the values on the load chart to determine if it is safe to lift the load and to what height it can be lifted.

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 on the trucks load chart.

Methods of determining the weight of the load:

- Weight is listed on pallet wrapper
- Weight is listed on bill of lading
- Weight is determined by multiplying the weight of each small container/bag by the number of small containers/bags on a pallet. Each small container should be marked with its weight.
- Ask the relevant supervisor when in doubt.

Always make sure the load is flush against the front vertical face of the forks and that loads that are unbalanced horizontally are loaded with the heaviest side of the load nearest to the truck.

Always make sure that loads that are unbalanced vertically are loaded with the heaviest side of the load nearest to the ground where possible.

2.8 Attachments

Warning

Never make any modifications to the truck that may affect the capacity rating. Only options and attachments approved by Combilift Ltd. may be installed on the truck. Other modifications will void the warranty and can cause situations to arise that may lead to serious injury or death.

Fixed attachments to the forks or fork carriage affect the trucks capacity rating. When the factory, dealer, or distributor installs a fixed attachment approved by Combilift a modified load chart shall be attached inside the operating enclosure. The modified load chart identifies the type of attachment and the capacity ratings on the load chart will be modified accordingly.

Removable attachments to the forks or fork carriage affect the trucks capacity rating. When the factory, dealer, or distributor supplies a removable attachment approved by, Combilift Ltd. an additional load chart shall be attached inside the operating enclosure. The additional load chart identifies the type of attachment and the changes to the rated capacity when the attachment is in use.

2.9 Tilting

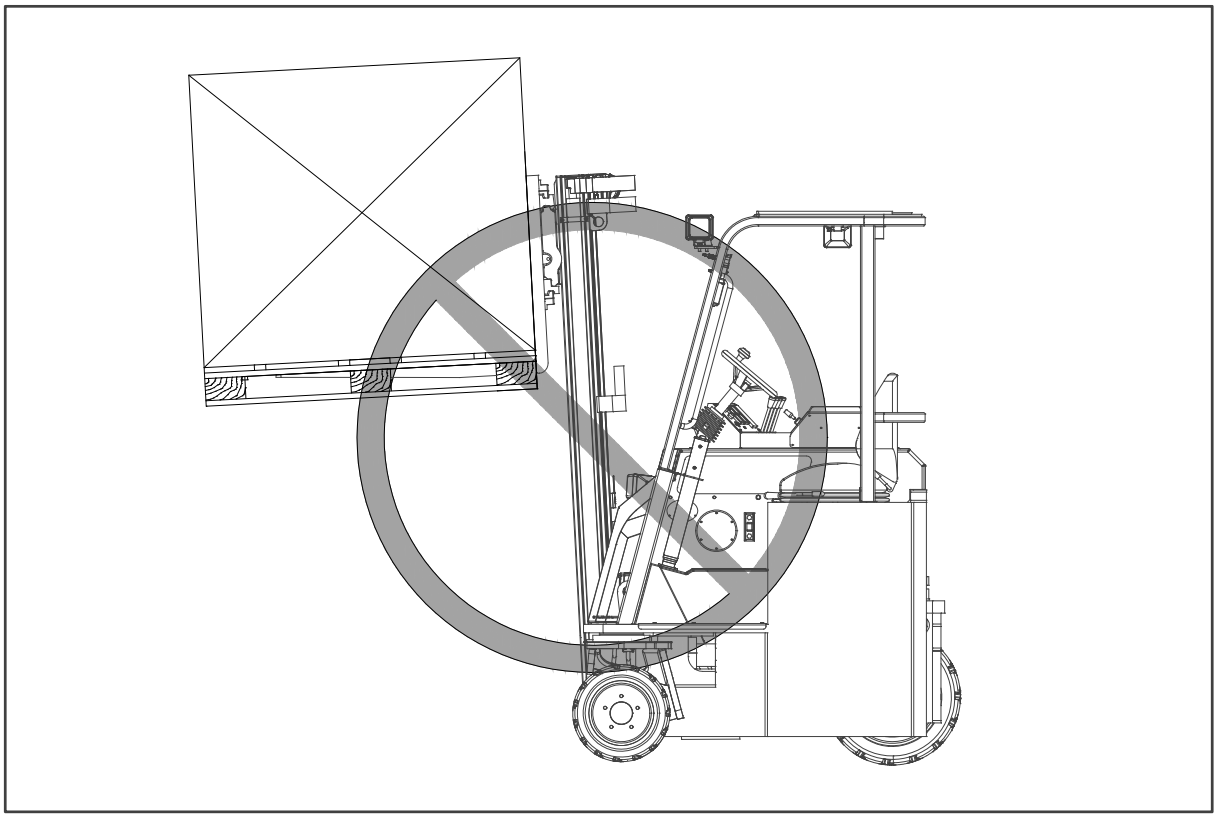
Warning

DO NOT tilt the forks forward past horizontal with a load on the forks.
Use tilt with caution when the mast is in a raised position.
DO NOT use forward and backward tilt in quick succession.

The degree of forward and backward tilt that may be used is governed by the application.

Tilting Guidelines

- When travelling with the truck loaded tilt the mast back and keep the load low. This will help stabilize loads with an uneven weight distribution.
- When loading at high elevations, only tilt the load back far enough to seat it against the front vertical face of the forks.
- When unloading at high elevations, make sure to only use enough tilt to level the load for placing onto the rack or stack.
- Forward tilt past horizontal is only provided to assist the operator in withdrawing the forks from a load after the load has been placed.



Section 3: Components & Controls

All operators must be familiar with the Combilift trucks main components and controls, their function and where they are located before commencing operation of the truck. The major components are labelled in figure 3.1 below.

3.1 Machine Overview and Components

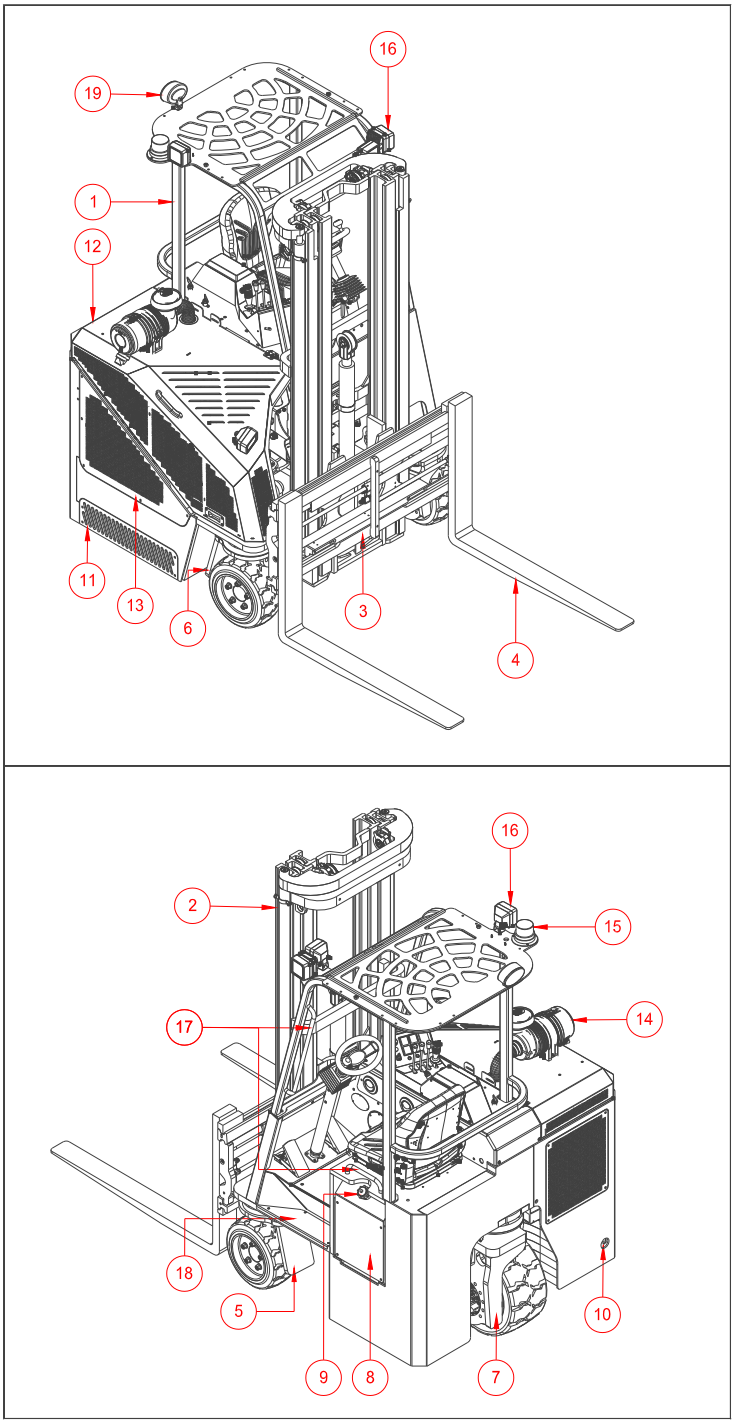


Figure 3.1 Machine Components Layout

Components

1. Overhead Guard
2. Mast
3. Side Shifting Fork Carriage
4. Forks
5. Front Left Hand Swivel
6. Front Right Hand Swivel
7. Rear Swivel
8. Diesel Tank or LPG Bottle
9. Diesel Tank Cap (If Applicable)
10. Exhaust Outlet
11. Exhaust Silencer Access Panel
12. Bonnet
13. Right Hand Side Access Panel
14. Engine Intake Air Filter
15. Flashing Beacon
16. Work Lights
17. Grab Handles
18. Step
19. Optional Forewarning Lights

3.2 Operating Components & Controls

The operating components and controls located inside the trucks operating enclosure are labelled in figure 3.2 below.

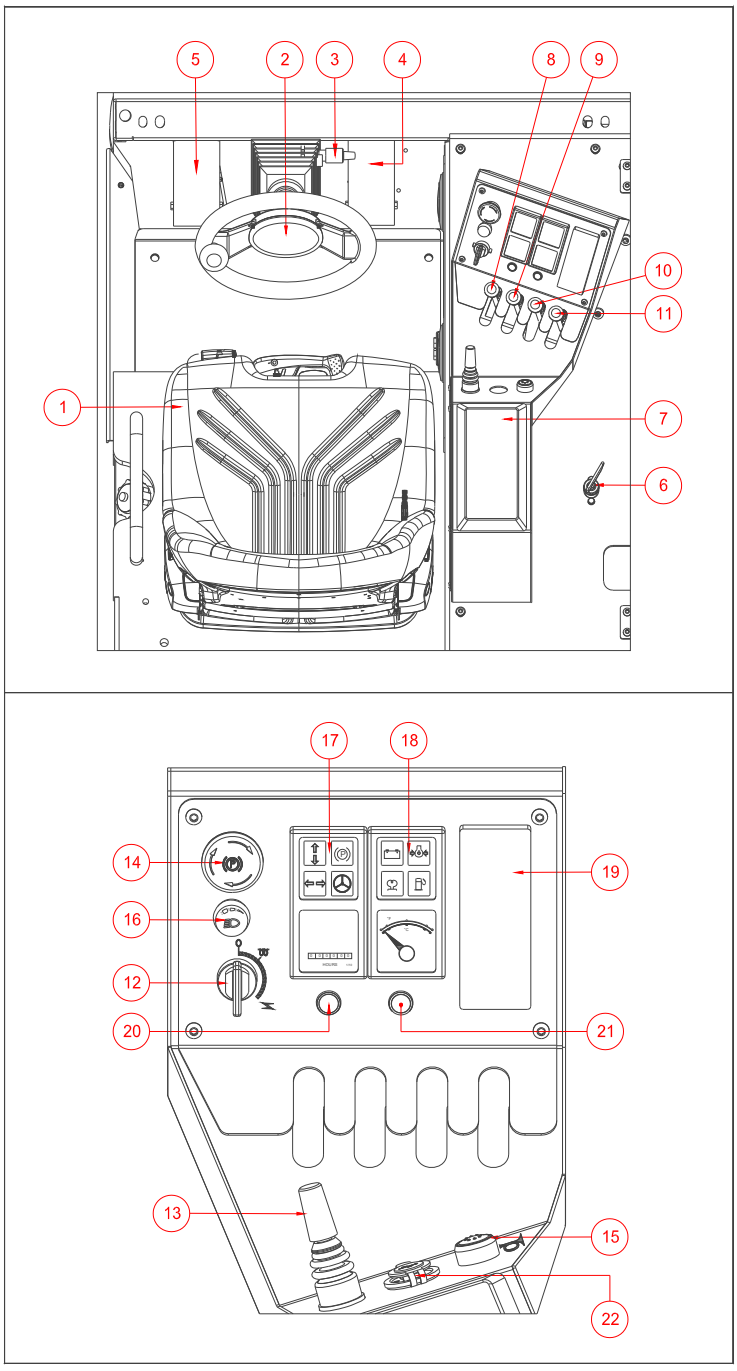


Figure 3.2 Controls Layout

Controls List

1. Adjustable Seat
2. Steering Wheel
3. Steering Column Angle Adjuster
4. Accelerator Pedal
5. Brake/Inch Pedal
6. Battery Isolator Key Switch
7. Armrest
8. Mast Lift/Lower Lever
9. Mast Tilt Lever
10. Fork Carriage Side Shift Lever
11. Fork Positioning Lever
12. Ignition Key Switch
13. 4-Way Direction Lever
14. Park Brake Switch
15. Horn Push Button
16. Work Lights Switch
17. Temperature Gauge Dash Cluster
18. Hour Metre Dash Cluster
19. Fuse Box
20. Light e.g. Green 90° Indicator
21. Light e.g. ECU Fault, Low Gas
22. Extra e.g. Override Button, 12v Socket

Note

The layout of the controls displayed above applies only to a standard truck. The actual layout may vary depending on individual customer requirements.

Refer to the decals in the cabin of the individual truck if the layout is not standard.

Operator's Seat

A correctly functioning seat that has been adjusted to suit the height, weight and posture of each individual operator is essential to the operator's health.

The seat must be correctly adjusted before use and before each change of operator so that the steering wheel, pedals and hydraulic controls can be comfortably reached while the operator has their back resting against the seat backrest.

The angle of the steering column should be adjusted when the seat is being adjusted to achieve optimum comfort. See 'Adjusting the Steering Column'.

Warning

DO NOT adjust the seat when the truck is in operation. Stop the truck and apply the park brake before making any adjustments to the seat.

Report any malfunction of the seat immediately. Maintenance may only be carried out by a competent authorised person.

DO NOT place or allow any objects to fall within the moving area of the seat.

Check that all setting stops are correctly engaged before starting the truck.

Loads – other than the operators weight – must not be placed on the seat.

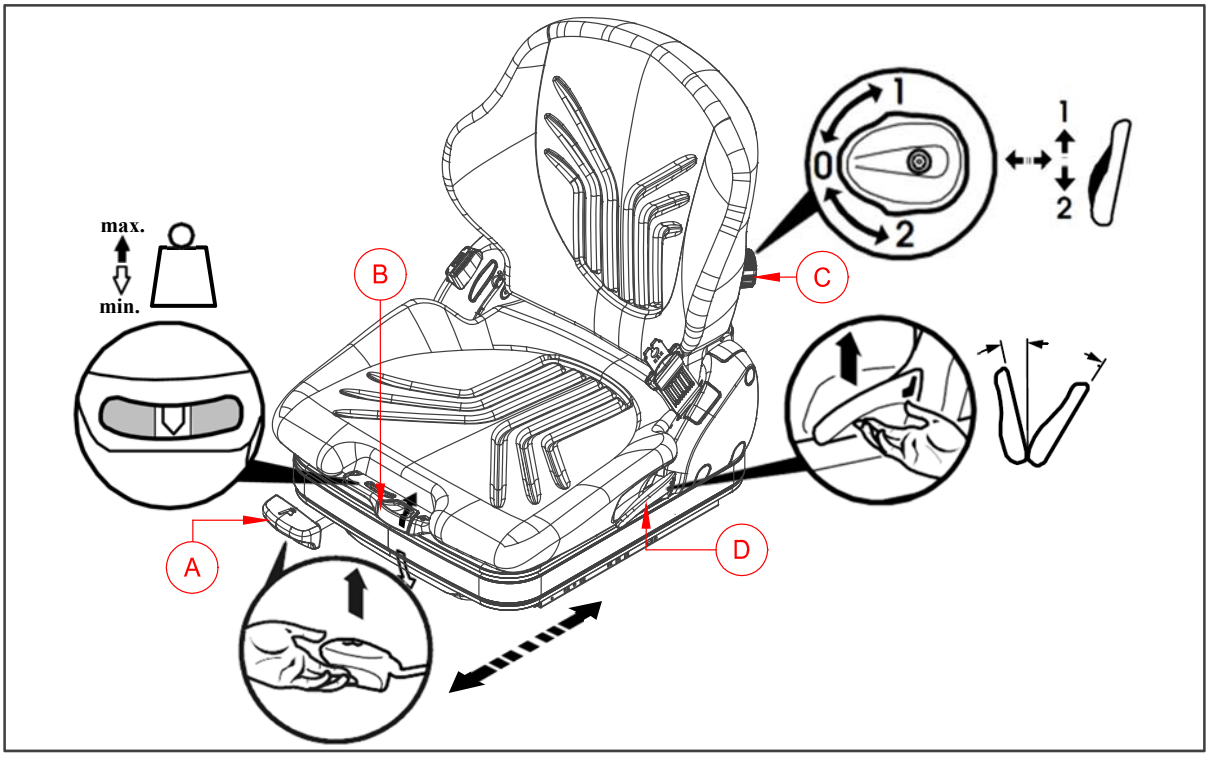
Warning

Not wearing the seatbelt or operating with a damaged seatbelt can result in injury to the operator.
DO NOT operate the truck unless the seatbelt is fastened across the top of the lap.

Note

If the truck has the seat belt switch option fitted the drive is disabled if the seatbelt tongue is not properly fastened in the seatbelt buckle.

Seat Adjustments (Grammer MSG65)



A. Fore/Aft Adjustment

B. Weight Adjustment

C. Lumbar Support Adjustment

D. Backrest Angle Adjustment

A. Fore/Aft Adjustment

- To slide the seat forward or back lift the seat slide lever (**A**) to release the catch then slide the seat to the desired position.
- After the adjustment, the locking lever must latch into the desired position with an audible click. It should not be possible to move the seat when it is locked.
- Do not lift the locking lever with any part of the leg.

Warning

Risk of crushing! Only touch the lever at the indented grip, do not reach back under the lever.

B. Weight Adjustment

- To adjusted the seat for the operator's weight pull or press the weight adjustment lever (**B**) when sitting on the seat.
- The weight is adjusted correctly when the arrow is in the middle of the viewing window.
- Within the viewing area, the individual height can be adjusted to a minimum spring movement.
- When the minimum/maximum weight adjustment has been reached, you can hear it reaching the upper or lower end stop.

C. Lumbar Support Adjustment

- The lumbar support increases the seat comfort.
- To adjust the curvature in the upper part of the backrest cushion turn the adjustment knob (**C**) clockwise.
- To adjust the curvature in the lower part of the backrest cushion turn the adjustment knob (**C**) anticlockwise.

D. Backrest Adjustment

- To adjust the angle of the backrest pull up the locking lever (**D**) to release the backrest catch. Do not press back against the backrest when releasing the backrest catch.
- Lean forward or back at the waist to adjust the angle of the backrest. Release the locking lever when the backrest is at the desired angle.
- It should not be possible to move the backrest after it has been locked.

Seat Switch

The seat has a switch in the pan that senses when the operator is sitting in the seat. The traction and hydraulic functions are disabled if the operator is not sitting in the seat.

Steering Wheel / Column

- The Combi-CB truck has both front and rear-end steering.
- In standard mode the front wheels are fixed and the rear wheel steers the truck.
- In sideward mode, the rear wheel is fixed and the front wheels steer the truck.
- The steering wheel is equipped with a spinner knob for easier steering.
- The angle of the steering column is adjustable to increase driver comfort.

Steering In Standard (0°) Mode

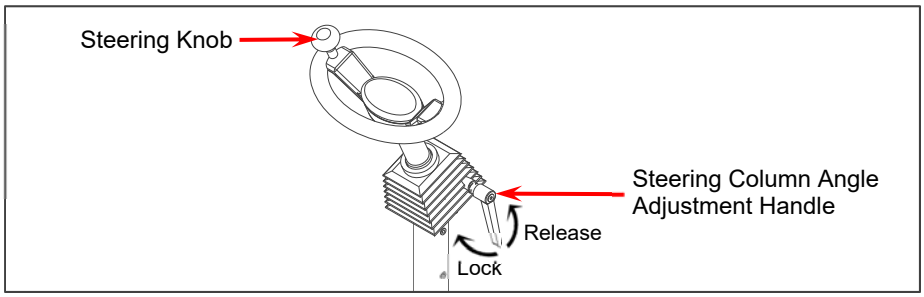
- When the truck is in standard mode the front wheels are fixed and the rear wheel steers the truck.
- When driving forwards, turn the steering wheel clockwise to turn the truck clockwise, turn the steering wheel anti clockwise to turn the truck anticlockwise.
- When driving in reverse, turn the steering wheel clockwise to turn the truck anticlockwise, turn the steering anticlockwise to turn the truck clockwise.

Steering In Sideward (90°) Mode

- When in sideward mode, the rear wheel is fixed and the front wheels steer the truck.
- When driving in sideward mode, turn the steering wheel clockwise to turn the truck clockwise. Turn the steering wheel anticlockwise to turn the truck anticlockwise.
- The same holds true for either left or right travel in sideward mode.

Adjusting the Steering Column

- To adjust the angle of the steering column, loosen the angle adjustment handle on the right hand side of the column by turning the handle anticlockwise.
- Adjust the steering column so that the wheel can be reached comfortably when sitting in the seat with your back against the seat backrest. See 'Seat Adjustments'.
- Lock the steering column in position by turning the handle clockwise until tight.

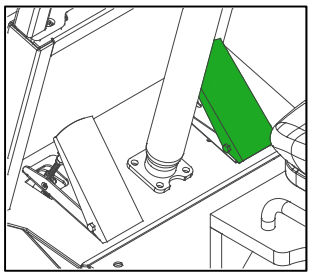


Warning

Do not adjust the steering column when the truck is in operation. Stop the truck and apply the park brake before adjusting.

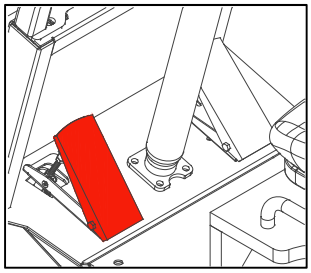
Accelerator Pedal

- The accelerator pedal is mounted on the floor of the operating enclosure to the right hand side of the steering column as shown highlighted in green in the adjacent diagram.
- The accelerator pedal provides control of the engine speed (RPM) and therefore of the trucks travel speed.
- To increase travel speed press down on the pedal.

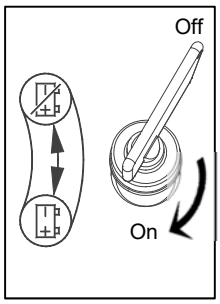


Inch/Brake Pedal

- The inch/brake pedal is mounted on the floor of the operating enclosure to the left hand side of the steering column as shown highlighted in red in the adjacent diagram.
- The inch/brake pedal allows precise control of the travel speed which is invaluable when positioning the truck to lift or place a load or when operating in confined areas.
- When fully pressed down it blocks the flow of oil through the hydrostatic drive system bringing the truck to a smooth controlled halt.
- When partially pressed down it restricts the flow of oil through the hydrostatic drive system thus reducing the travel speed.
- Press the pedal down gradually to reduce the travel speed gradually.
- Release the pedal gradually to increase the travel speed gradually.

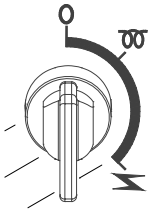


Battery Isolator Key Switch



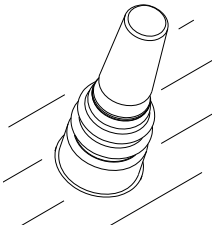
- This switch is used to disconnect power from the battery.
- It is located inside the operating enclosure to the right hand side of the control panel.
- When the truck is not in use turn the switch to the 'OFF' position, by turning it ANTI-CLOCKWISE.
- The truck will not start unless the switch is returned to the 'ON' position, by turning the key CLOCKWISE

Ignition Key Switch



- This is a three-position key switch located on the control panel to the right hand side of the operators seat.
- It is used to power up the trucks electrical system and to start and switch off the engine.

4-Way Direction Lever

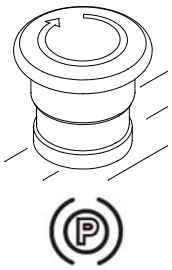


- The 4-way direction control lever is a 5-position lever located on the control panel. It can be set to forward, reverse, left, right, or neutral.
- In order to select a direction of travel, push the lever in the desired direction.
- Always return the lever to the neutral position when the truck is not moving

Note

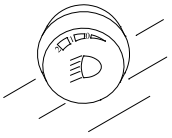
The truck will NOT start unless the direction control lever is in neutral.

Park Brake Switch



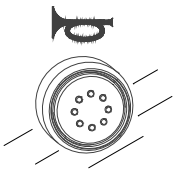
- The park brake switch is a red push button located on the control panel.
- To APPLY the park brake, press the button down until it locks into position with an audible click. The park brake light will illuminate on the dash cluster to alert the operator that the park brake is applied.
- To RELEASE the park brake, rotate the button clockwise – as indicated by the arrow - until it pops up.
- The Machine will NOT drive with the park brake on.

Work Lights Switch



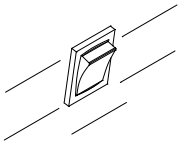
- This is a three position rotary switch located on the control panel.
- In position 0 – All work lights are switched off.
- Turn the switch clockwise to position 1 to illuminate the forward facing work lights only.
- Turn the switch clockwise to position 2 to illuminate all work lights.

Horn Button



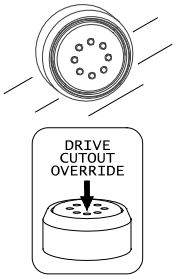
- The horn button is a push button located on the control panel.
- A decal depicting a horn is fixed above the button to identify it.
- Press the button to sound the horn.
- Release the button to silence the horn.

Wiper Switch (If Fitted)



- The wiper switch is mounted on the wiper motor (if fitted) located in front if the steering column inside the operating enclosure.
- Flip the switch to the 'ON' position to activate the wiper.

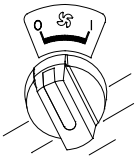
Mast Height Drive cut-out Override Button (If Fitted)



- The drive cut-out feature prevents the truck from driving if the mast is raised above a set height. It is identified by a decal fixed beside the button.
- To re-commence driving the operator must either:
  - Lower the forks below the set cut-out height using the lift control lever.

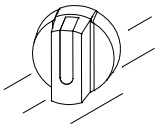
    OR
  - Press and hold the drive cut-out override button (if fitted) located on the control panel.

Operating Enclosure Cooling Fan Switch (If Fitted)



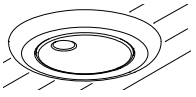
- This is a 2 position rotary switch located on the control panel (if fitted).
- Turn the switch to the on position to activate the cooling fan (if fitted) in the operating enclosure.

Direction Indicator Lights Switch (IF Fitted)



- This is a three position rotary switch located on the control panel. It is only used on trucks that have road lights fitted.
- In the centre position the indicator lights are off.
- When turning left rotate the switch anticlockwise to operate the left hand side indicator lights (if fitted).
- When turning right rotate the switch clockwise to operate the right hand side indicator lights.

Operating Enclosure LED Light (If Fitted)

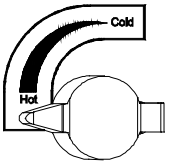


- The operating enclosure light illuminates the interior of the operating enclosure.
- Press on the small circular recess on the bottom face of the light housing to illuminate the light.
- Press in the same place a second time to extinguish the light.

Heater Fan Switch (If Fitted)

- This is a four position rotary switch located on the control panel (if fitted).
- It is used to switch the heater fan on and to control the fan speed.

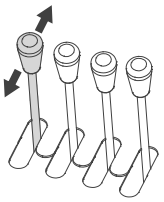
Heater Air Temperature Control (If Fitted)



- The heater air temperature control is located beside the seat belt to the right hand side of the operators seat.
- To increase the temperature of the air expelled from the air vents (if fitted) turn the knob anti-clockwise.
- To decrease the temperature of the air expelled from the air vents (if fitted) turn the knob clockwise.

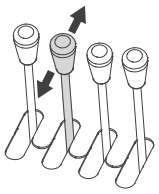
3.3 Hydraulic Lever Operation

Lift/Lower Lever (on left)



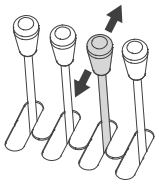
- The lift/lower lever controls the upward and downward movement of the mast and forks.
- To raise the forks, PULL the lever BACK
- To lower the forks, PUSH the lever FORWARD

Tilt Lever (2nd from left)



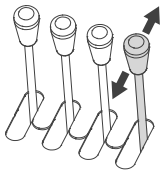
- The mast tilt lever controls the tilt angle of the mast and forks.
- To tilt the mast back, PULL the lever BACK.
- To tilt the mast forward, PUSH the lever FORWARD

Side Shift Lever (3rd from left)



- The side shift lever controls the lateral movement of the forks.
- To move the forks to the right, PULL the lever BACK.
- To move the forks to the left, PUSH the lever FORWARD.

Optional Auxiliary Function Lever (4th from left)

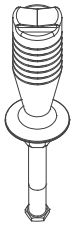


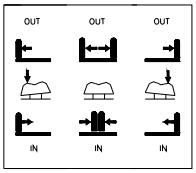
- The auxiliary function lever controls auxiliary hydraulic functions.
- Trucks with more than one auxiliary function may have a push button fitted on the fourth lever.
- Operators must acquaint themselves with the operation of any auxiliary functions before using the truck.
- The most common auxiliary function fitted is hydraulic fork positioning.

Fork Positioning Control

- The fork positioning lever controls the inward and outward movement of the forks along the fork carriage.
- If standard fork positioning is fitted both forks are controlled simultaneously with a standard lever.
- To bring the forks together, PULL the lever BACK.
- To spread the forks apart, PUSH the lever FORWARD.
- If individual fork positioning is fitted the position of each fork can be controlled independently of the other. A lever with an integrated rocker switch will be fitted in this instance.
- Press and hold the left side of the rocker switch on top of the lever to position the left fork only. Push the lever forward to move the left fork outward. Pull the lever back to move the left fork inward.
- Press and hold the right side of the rocker switch on top of the lever to position the right fork only. Push the lever forward to move the right fork outward. Pull the lever back to move the right fork inward.

Independent Fork Positioning Lever





Additional auxiliary functions may include telescopic forks and lift/drop forks. Control of additional auxiliary functions is provided by a push button mounted on top of one of the standard function levers. The button must be pressed and held while the lever is being pushed/pulled to operating the auxiliary function.

Refer to the lever decal affixed to the control panel for the operation of any auxiliary functions that have been fitted.

Operators <u>MUST</u> take time to familiarise themselves with the all functions and how they are operated.

Note

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

Note

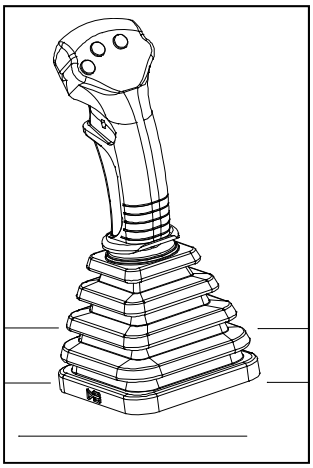
The layout of the hydraulic levers is subject to change due to individual customer requirements. Please refer to the decal on the individual truck.

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

3.4 Hydraulic Joystick Operation (If Fitted)

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

Joystick Functions (Standard Setup)



Lift/Lower

- To raise the forks, PULL the joystick BACK.
- To lower the forks, PUSH the joystick FORWARD.

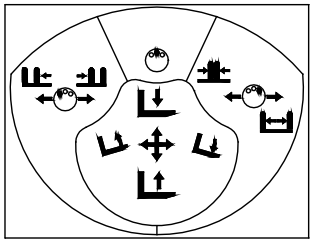
Tilt

- To tilt the mast back, PULL the joystick to the LEFT.
- To tilt the mast forward, PUSH the joystick to the RIGHT.

Side Shift

- To move the forks to the left, PULL the joystick to the LEFT whilst pressing and holding the left hand button on the handle.
- To move the forks to the right, PUSH the joystick to the RIGHT whilst pressing and holding the left hand button on the handle.

Fork Positioning



- To bring the forks together, PULL the joystick to the LEFT whilst pressing and holding the right hand button on the handle.
- To spread the forks apart, PUSH the joystick to the RIGHT whilst pressing and holding the right hand button on the handle.

Optional Auxiliary Functions

- Auxiliary hydraulic functions are controlled by moving the joystick whilst pressing the middle button on the handle.

Refer to the joystick decal for the operation of any auxiliary functions that have been fitted.
Operators <u>MUST</u> Take time to familiarise themselves with the operation of any auxiliary functions on the truck.

Note

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

The layout of the joystick functions may be subject to change due to individual customer requirements. Please refer to the decal on the individual truck.

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

Section 4: Operation Monitoring

In order to show measured values, indicators and warnings, two display clusters are provided. The display clusters are fitted into the display cover on the control panel.

4.1 Display Clusters

The display clusters convey information regarding the trucks operating condition through the use of gauges, metres and warning/indicator icons that are inactive until illuminated by a back light when certain conditions are met.

The two instrument clusters are illustrated in figure 4.1 below with all of the possible symbols visible.

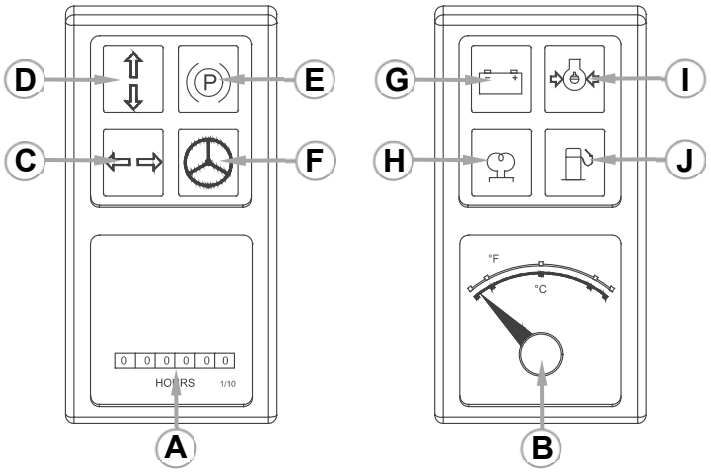


Figure 4.1

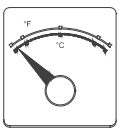
4.2.1. Display Cluster Instruments and Indicators

A. Hour Meter

- The hour meter records the trucks total running time.
- It is used to determine when maintenance is due.

B. Temperature Gauge

- The temperature gauge monitors the temperature of the engines cooling system.
- During operation the temperature should stabilise at a safe normal level.



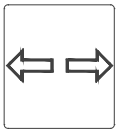
Note

If the needle on the temperature gauge moves into the red area the engine must be switched off promptly to prevent damage due to overheating.

The engine must be allowed to cool before recommencing operation.

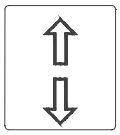
The cause of the overheating should be investigated and rectified.

C. Sideward Mode Indicator



- The sideward mode indicator illuminates when the wheels are aligned perpendicular to the forks.
- When this indicator is illuminated the wheels are aligned to drive the truck to the left or right.

D. Standard Mode Indicator



- The standard mode indicator illuminates when the wheels are aligned parallel to the forks.
- When this indicator is illuminated the wheels are aligned to drive the truck forward or to reverse.

E. Park Brake Indicator

- The park brake indicator is illuminated when the park brake is applied.
- The truck will not drive if the park brake is applied.
- Release the park brake by pulling the top of the switch up.

F. Carousel Mode Indicator

- When left or right drive is selected and the front wheels are steered in to the position where carousel mode is activated the carousel mode indicator will illuminate.
- When this indicator is illuminated the truck turns in a very small arc.

G. Battery Charge Indicator

- When the key switch is turned to the ‘ON’ position, with the engine at rest, the battery charge indicator should illuminate to verify the light is working.
- If it is illuminated when the engine is ‘running’ it indicates that the alternator is not providing enough voltage to power the electrics and charge the battery or the wiring is faulty. The engine should be stopped and the cause determined.

H. Glow Indicator (diesel engines only)

- When the key switch is turned to the ‘ON’ position, with the engine at rest, the glow indicator should illuminate.
- The glow indicator remains illuminated for 10 seconds after the key has been turned to the ‘ON’ position.
- If the ambient temperature is below 10°C (50°F) wait for the glow indictor light to go off before turning the key to the start position.

I. Engine Oil Pressure Indicator

- When the key switch is turned to the 'ON' position, with the engine at rest, the engine oil pressure indicator should illuminate to verify the light is working.
- This indicator illuminates as a warning that the oil pressure has dropped below a critical level.
- If it illuminates during operation or when the engine is accelerated above 1000rpm after starting, stop the engine immediately and check the oil level. *See 5.3 Checking Engine Oil Level on page 47.*

Note

Do NOT run the engine if the oil pressure indicator is illuminated. Check the oil level on the dipstick. Check for engine oil leaks. Check the engine oil for contamination. Check for faulty wiring.

J. Low Fuel Indicator

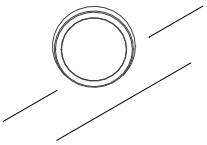
- The low fuel indicator is illuminated when the fuel in the tank falls to a certain level.
- When this indicator is illuminated the truck should be driven to a refuelling point to be refuelled immediately.
- *See 5.2 Fuel Handling & Storage on page 43.*

Note

ALWAYS adhere to all safety precautions for refuelling the truck.

4.2.2. Control Panel Instruments and Indicators

Malfunction Indicator – MIL (If Fitted)



- The MIL light (if fitted) is an amber coloured light located on the control panel below the dash clusters.
- It is only fitted to emissions certified LPG trucks.
- It serves to notify the operator of a problem related to the emission control system.
- When the key switch is turned to the 'ON' position, with the engine at rest, the MIL should illuminate to verify that it is working.
- If the MIL is illuminated when the engine is running arrange for a service as soon as possible.

Fuel Gauge (Diesel Engines Only – If Fitted))

- The fuel gauge displays how much diesel remains in the diesel tank.
- When the tank is full the needle points to 1.
- As the fuel is consumed the needle moves anticlockwise from 1 to 0.

Section 5: Operation

Many people are under the impression that driving a lift truck is like driving any other vehicle. This is not the case. Lift trucks are designed for the purpose of lifting, and moving heavy loads in confined spaces. For this reason it is essential that operators are trained to:

- Thoroughly inspect the machine to confirm it is safe to use before commencing each shift.
- Operate the machine correctly.
- Always operate the machine in a safe and controlled manner.

Warning

Check all systems before operating the truck. Report unsafe conditions and have them corrected before commencing operation.

5.1 Pre-Use Checks

The truck must be maintained in a condition that is safe and without risk to safety and health. Pre-Use checks play a vital role in ensuring the truck is in safe working condition. Contact the local authorities in order to find out what regulations are in place regarding Pre-Use checks of industrial equipment of this nature.

Warning

Before performing the pre-use checks:

- **Park in a suitable area on level ground with adequate space and headroom around the truck to perform all tests and checks safely.**
- **Release any residual pressure in the hydraulic system i.e. lower the mast fully and tilt the mast fully forward.**
- **Isolate the battery and remove the key – unless performing operational checks.**
- **Smoking and naked lights are prohibited.**
- **Ensure the relevant personal protective equipment (PPE) is worn i.e. gloves, safety boots, eye protection, clothing.**

Caution

Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid hazards by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure. Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids. In the event of oil penetrating the skin, seek medical attention immediately.

- Employers must ensure that the Pre-Use checks are performed and that records are kept.
- Operators must perform the checks and report any defects to the relevant supervisor.
- Never operate a truck that has not been checked or that has failed on any of the checks.
- If a truck becomes unsafe during a shift, stop operating the truck and report the problem immediately.
- If a truck has failed on any of the checks place an 'out of order' notice on the steering wheel until the problem has been resolved.

The pre-use checks must be carried out at the start of the working day before the machine commences operation. Alternatively if a multi shift system is being operated the checks should be carried out at the beginning of each shift.

The following visual checks must be performed prior to using the truck:

- **Overall Condition** – Look for scrapes, dents, and other signs of damage. Watch for missing or loose nuts and bolts. Check underneath the machine for signs of leaking fuel, engine coolant, engine oil, hydraulic oil and battery electrolyte.

- **Mast** – Check for twisting and distortion in the channels. Look for signs of cracking and check that there are no missing or loose bolts. Check the mast chains for wear, missing links and pins. Make sure that the chains are of equal tension and are adequately lubricated. **DO NOT place your hands inside the mast at any stage to check the chains tension.** Press on the chains with a long stick or screwdriver. Check around the lift and tilt cylinders for signs of leakage. Also check all the hoses attached to the mast for signs of leaking oil.

- **Fork Carriage** – Check for excessive wear, damage, deformation and cracks.

- **Forks** – Check the forks for excessive wear, cracks, fractures and deformation. Check that both locating pins are in place and operational.

- **Tyres and Wheels** – Check that all the wheel nuts are present and secure. Look for cuts in the tyres or foreign objects in the rubber. Also look for plastic straps,

wire, and other debris caught between the wheel and the wheel motor. **Always wear gloves when checking the tyres to avoid injury on sharp pieces of debris.**

- **Access** – Check that all steps and grab handles are secure, clean and in good condition.
- **Load Backrest (if fitted)** – Check for deformation or cracks. Ensure it is fixed securely.
- **Hydraulics** - Inspect the hydraulic hoses for kinks, routing and wear. Check all seals and couplings for damage, wear and leaks. Use a piece of card when checking for pinhole leaks.
- **Hydraulic Oil Cooler** – Look for a build-up or dust or debris on or around the hydraulic oil cooler. Check around the fan and in the fins.
- **Operating Enclosure** – Look for signs of damage and cracking to the overhead guard. Ensure it is securely fixed. Report any signs of damage immediately to the relevant supervisor.
- **Front Wheel Alignment** – Check that the front wheels are aligned parallel to the sides of the truck and to each other when standard mode is selected. *See section 5.6 on page 50 if the front wheels are out of alignment.*
- **Safety Sign Decals** – Check that all safety decals are present and legible.
- **Hydraulic Tank** – Check for damage or leaks. Check the hydraulic oil level with the mast fully lowered. *See section 5.5 on page 49.*
- **Battery** - Check the battery connections are secure. Check the cells for damage and leaks. Check the terminals for corrosion.
- **Serial Plate and Capacity Chart** – Check they are present and securely attached and check the rated capacity.
- **Electrical Connections/Terminals** – Check they are securely connected and undamaged. Check leads for loose or bare wires.
- **Rear View Mirror (If Fitted)** – Check it is clean and in good condition.

The following engine and fuel system checks must be performed prior to using the truck:

- **Oil Level** – Check the engine oil level on the dipstick. It must be between the upper and lower level marks. Top up oil if necessary.
- **Coolant Level –** Check the coolant level in the coolant header tank by looking through the sight glass
- **Radiator** – Check for build-up of leaves, dust or other debris on or around the radiator.

- **Check all the Belts and Hoses** – Check that all of the belts and hoses are in good condition. Look for visible signs of wear and fraying.

- **Diesel Tank and Hoses (if applicable)** – Check the diesel tank for damage or corrosion. Check for signs of leaking fuel. Check the fuel cap is present and secure. Check the diesel hoses for damage or deterioration.

- **LPG Tank and Hoses (if applicable)**
  - Check the LPG bottle/tank for scrapes, dents and other damage.
  - Check that the bottle is located on the locator pin.
  - Ensure the bottle is clamped securely in place.
  - Check the LPG hoses and connections for leaks – **Use a soapy water solution. NOT your hands. LP Gas can cause severe burns.**
  - Check that the tank fits inside the profile of the machine.

Warning

Always wear appropriate protective clothing, gloves and face shield when checking LPG tanks and fittings. LPG can cause frostbite when released, due to its very low temperature.

- **Exhaust** - Check for excessive noise or smoke.

- **Engine Compartment** – Check the engine compartment for a build-up of combustible fluids and materials.

The following operational checks must be performed prior to using the truck:

- **Check the Seat Belt** – Enter the cabin using the three point contact method. Make sure that the seat belt functions correctly. Check for any cuts or fraying along the belt. Ensure that it buckles securely. **Always wear the seat belt provided when driving the Combilift.**

- **Check the Seat** – Check it is anchored securely and that the runners and sliders operate freely. Check for objects under the seat that may interfere with the seat switch. The operator must ensure that the seat is correctly adjusted to suit their individual height and weight. Instructions on how to adjust the seat are presented in an earlier section.

- **Turn on the Machine –** Insert the key into the ignition and turn the key to the 'ON' position. Several lights should illuminate in the dash.

- **Test the Horn** – the horn button is located on the control panel to the right hand side of the seat. The Truck should not be operated if the horn is not functioning. Press the button to test the horn.

- **Test the Reversing Alarm** – Select reverse drive. The reverse alarm should sound continuously while in reverse. The truck should not be operated if the reverse alarm is not functioning.

- **Start the Engine** - Ensure that the park brake is applied by pressing the large red button on the control panel. Also ensure that the directional control lever is in the neutral position. *See section 5.8 Starting the Engine on page 51.*

- **Sounds** – Listen to the engine for a few seconds before driving off. If any strange sounds are heard stop the machine immediately and investigate the problem.

- **Smells** - Check for any strange odours that may indicate a problem such as a very strong smell of gas, fumes or burning. If anything abnormal is detected, stop the machine immediately and investigate the problem.

- **Check the Dash** – Look at the warning indicator symbols and lights on the control panel. If any of the lights are illuminated whilst the engine is running stop the engine and report the fault. Fix an 'out of order' sign to the steering wheel. A full list of all the indicators on the control panel can be found in Section 4: Operation Monitoring.

- **Check the Work Lights** – Turn the work lights switch to position 2 and check that all work lights are working properly.

- **Check the Mast Functions** – Before checking the mast functions ensure that there is adequate space and headroom to perform all of the checks. Raise and lower the mast fully. Tilt the mast fully forward and fully back. Shift the fork carriage fully to the left then fully to the right. Making sure that the operation of each function is smooth and controlled through the full extent of travel. Watch for any signs of sticking. Test any auxiliary function(s) that may be fitted e.g. hydraulic fork positioning.

- **Check the Brakes** – With the park brake applied, select forward on the 4-way direction control lever. Keeping both feet away from the pedals, sound the horn, and release the park brake. The machine should start to move slowly forward. Press the inch pedal. The machine will stop. Release the pedal and the machine will move off again. Re-apply the park brake and the machine will stop. If either brake is not working do not operate the machine and report the fault to the relevant supervisor. In the highly unlikely event of neither brake working, the machine can be stopped by switching off the engine. Make sure there is adequate space around the truck to perform this test. Only perform the brake test on a level surface.

- **Check the 4-Way Direction Control Lever** – With the engine running and the park brake applied, select forward mode. Release the park brake. The machine should move forward. Press the inch pedal to stop the machine. Select reverse and release the inch pedal. The machine should now travel backwards. Press the

inch pedal to stop the machine then apply the parking brake. Select left, the wheels will start to realign for sideward (90°) mode. When the wheels have finished realigning, sound the horn and release the park brake. The machine should now travel to the left. Press the inch pedal to stop the machine, select right travel with the direction control lever, sound the horn and release the inch pedal. The machine should now travel to the right.

- **Check the Steering** – Set the steering wheel to the most comfortable position for driving by use of the adjustment lever on the right hand side of the column. With the engine running and the park brake applied, turn the steering wheel fully clockwise and counter-clockwise. The steering should move easily in either direction, and not seem excessively stiff or loose. Perform this check in both standard (0°) mode and sideward (90°) mode.

On completion of the inspection the operator should report any defects immediately to the relevant supervisor.

- Never operate a lift truck that is in need of repair
- Repairs should only be performed by authorised personnel

The details of the checks should be recorded on a copy of the Pre-Use check sheet provided at the back of this manual (see 8.4 Pre-Use Check Sheet on page 126). A record of the checks and any defects or repairs should be kept on file in order to keep track of the trucks service history.

Note

Remember in many countries it is a legal requirement to perform these checks and to keep a record of the findings.

5.2 Fuel Handling & Storage

The facilities for storing and handling fuel MUST be strictly in accordance with all current regulations.

Diesel fuel is hazardous to the environment. Do not allow diesel or LPG to leak into the environment. Clean up any diesel spillage immediately using binding material and dispose of it in accordance with environmental regulations.

Wear appropriate gloves when working with diesel or LPG. DO NOT allow diesel or LPG to come into contact with skin.

- Refuel at a well ventilated and open place.
- When fuel and/or lubricants are spilled, refuel after letting the engine cool down.
- DO NOT mix gasoline or alcohol with diesel fuel.

Warning

No smoking, naked flames 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 refuelling area.

Warning

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

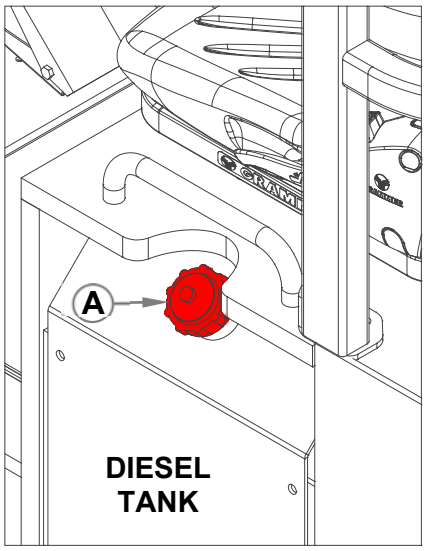
5.2.1 Refuelling - Diesel

The diesel tank is located on the left hand side of the truck under the operators seat.

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 neck to prevent the accumulation of a hazardous charge of static electricity.
Clean up any spillage using non-combustible absorbent material before restarting the engine.

To Refuel:

- Park the truck in accordance with the recommended parking procedure in a well ventilated area.
- Switch off the engine.
- Remove the cap (**A**) from the diesel tank by turning anticlockwise.
- Add diesel fuel. (Use a strainer to prevent any contaminating particles from entering the tank)
- Take care to avoid overfilling or spillage.
- Replace the cap, ensuring that it is securely fitted.



Diesel tank capacity: 46 litres / 48.5 quarts

Note

Diesel fuel specification and sulphur content must be compliant with all applicable emission regulations for the location in which the engine is to be operated.
Ultra-low sulphur fuel is mandatory, when operating in US EPA regulated areas.
If high-sulphur diesel (sulphur content 0.50 % (5000 ppm) to 1.0 % (10000 ppm)) is used change the engine oil and oil filter at shorter intervals. (approximately half).
DO NOT USE Fuels that have sulphur content greater than 1.0 % (10000 ppm).

The following fuel specifications / standards are highly recommended:

Diesel Fuels - EN 590 (Sulphur 10 ppm maximum)
- ASTM D 975 Grade 1-D S15 (Sulphur 15 ppm maximum)
- ASTM D 975 Grade 2-D S15 (Sulphur 15 ppm maximum)

Below 0°C (32°F) ambient temperature use winter diesel (down to -20°C (-4°F)
Refer to the operating manual for the Kubota diesel engine for further information.

5.2.2 Refuelling - LP Gas

LPG Emergency Procedures

Action in Case of LPG Fire

- **Raise the alarm. The Fire Brigade should be notified immediately.**
- **Fires should normally be controlled but not extinguished until any source of gas escape can be cut off.**
- **If it is safe to do so, close tank valves in circumstances where a leak in pipework has ignited.**
- **Isolate all valves upstream and downstream to starve the fire of gas.**
- **A small fire can be dealt with using a dry powder fire extinguisher. Do not use water to extinguish LPG fires.**
- **Vessels should be cooled with water to prevent a pressure build-up.**

Action in case of LPG Leak

- **Raise the alarm. The Fire Brigade should be notified immediately.**
- **Evacuate all persons, except those necessary to deal with the emergency.**
- **Whenever possible, and if it is safe to do so, turn off all isolation valves necessary to cut off or reduce the source or sources of escaping gas.**

Caution

LP Gas bottles are heavy and must be handled with care to avoid injury.

Full bottles can weigh up to 40kg (90lbs)

Caution

Park the truck on level ground before releasing the antiluce fastener on the sliding gas bottle carrier.

LP gas can cause frostbite when released, due to its very low temperature.

When working with LP Gas the following Personal Protective Equipment (PPE) must be worn:

- **Goggles and neoprene gloves or gauntlets**
- **Long sleeve cotton overalls or jacket**
- **Safety shoes/boots**

The LPG container is located on the left hand side of the truck under the operators seat.

Trained and authorised personnel should carry out refilling and changing LPG containers at designated points only.
LPG should not be refuelled or stored near underground entrances, lift shafts or any other place where leakage could collect in a potentially dangerous gas pocket.
When changing gas bottles ALWAYS ensure that the service valve on the bottle is closed and all gas in the connecting hoses has been used BEFORE disconnecting the quick release coupling.
Damage such as dents, scrapes or gouges in the container may materially weaken the structure of the container and render it unsafe for use.
All containers should be checked regularly for dents, scrapes and gouges in the pressure vessel section.

Check LPG bottles for:

- Damage to the valves and the liquid level gauge.
- Debris in the relief valve.
- Deterioration, damage or loss of flexible seals in the filling or servicing connections.
- Indications of leakage at valves or threaded connections i.e. Signs of frost on fittings and hoses usually signify a leak.
- Any defective or damaged container should be removed from service immediately.

- Any leaking container should be moved immediately to a safe distance from the truck to an area free from all sources of ignition.

To Refuel:

- Park the truck according to the proper parking procedure in a well ventilated area.
- Switch off the engine.
- Refer to the gas bottle/tank suppliers instructions for filling the bottle/tank.

5.3 Checking Engine Oil Level

The engine oil level is monitored via the dipstick (**A**) on the front of the engine.

Caution

Switch off the engine before checking the oil level.

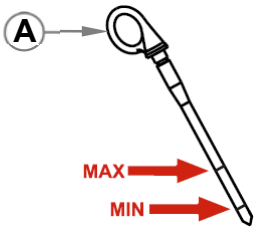
The engine will be hot after operation. Wear appropriate heat protection gloves and avoid contact with the engine.

Note

Oil level below the Min mark or above the Max mark leads to engine damage.

Mixing of engine oils should be avoided because the worst properties of the mixture are always dominant.

Check the engine oil level before starting or wait at least 5 minutes after stopping the engine for the oil to drain into the oil pan.



1. Stop the truck on level ground, apply the park brake and switch off the engine.
2. Raise the bonnet from the right hand side of the truck to gain access to the engine.
3. The oil level dipstick (**A**) is located on the left hand side of the engine (for all engines). Wait until it is cool enough to touch before proceeding or wear appropriate heat protection gloves.
4. Pull out the dipstick and wipe the oil off with a clean lint free cloth.
5. Reinsert the dipstick as far as it will go then pull it out again.
6. Check that the oil level lies between the upper and lower level marks.
7. If the oil level is below the Min mark, add oil *(see Engine Oil System on page 75)* of the permissible class and suitable viscosity but do not exceed the Max level.

5.4 Checking Coolant Level

Caution

Switch off the engine before working on the cooling system.

Explosive release of fluids from 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.

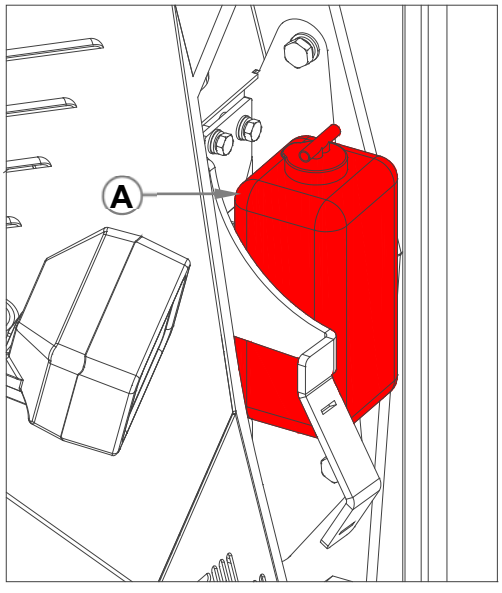
Coolant is harmful if swallow. Seek immediate medical attention if swallowed.

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

Coolant is hazardous to the environment. Do not allow coolant to leak into the environment. Clean up any spillage using binding material and dispose of it in accordance with environmental regulations.

The coolant level is monitored via the transparent coolant bottle located at the front of the truck to the right hand side of the operating enclosure.

To Check/Top Up The Coolant Level:



1. Park the truck in accordance with the recommended parking procedure.
2. Go to the front right hand corner of the truck. *The coolant bottle is visible from this position.*
3. Look in at the coolant bottle (**A**). The coolant level should be visible between the low and full level marks.
4. If the coolant is low it must be topped up to half way between the low and full level marks.
5. If the coolant is not visible in the bottle the radiator must also be topped up.
6. The radiator cap must be cool enough to touch before removing.
7. Turn the cap anticlockwise gradually to release any pressure before removing fully.
8. Top up the coolant and replace the cap(s) securely. *(See section 6.9 on page 86 for coolant and water quality details)*

Note: When the coolant level drops due to evaporation, add water only.

5.5 Checking Hydraulic Oil Level

The hydraulic oil level is monitored via a sight glass on the hydraulic tank.

Caution

Switch off the engine before working on the hydraulic system.

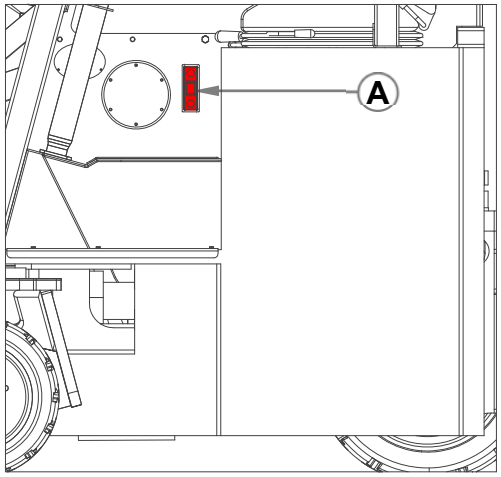
Protective gloves and goggles must be worn when handling hydraulic oil.

Do not swallow. Ensure sufficient ventilation. Ensure cleanliness.

Note

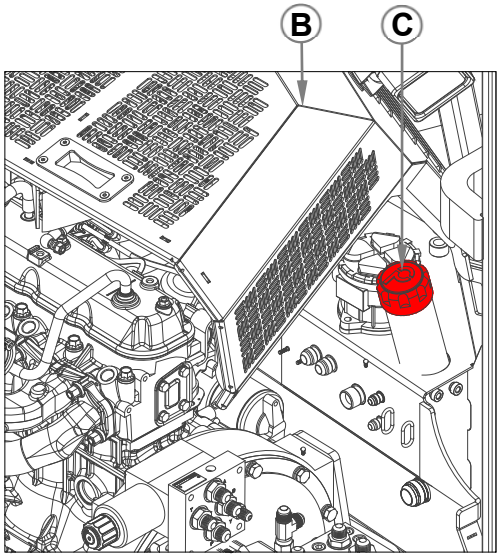
Hydraulic oil is harmful to the environment. Do not allow hydraulic oil to be released into the ground, down a drain or into a stream, pond or lake.

To Check the Hydraulic Oil Level:



1. Park the truck in accordance with the recommended parking procedure.
2. Lower the forks fully, tilt the mast forward fully and retract all cylinders on any attachments.
3. Check the oil level on the sight glass (**A**) – located inside the operating enclosure on the right hand side.
4. The oil level should be approximately half way between the top and bottom of the window.
5. If necessary top up with oil of the same grade and quality as that in the tank.
   See section 6.13 on page 96.

To Add Hydraulic Oil:

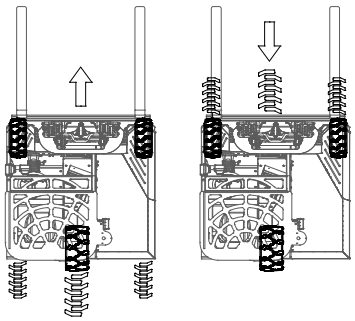


1. Park the truck in accordance with the recommended parking procedure.
2. Lower the forks fully, tilt the mast forward fully and retract all cylinders on any attachments.
3. Raise the bonnet (**B**) from the right hand side of the truck to gain access to the hydraulic tank filler.
4. Unscrew the filler cap (**C**).
5. Add hydraulic oil through the filler until the oil level is half way between the top and bottom of the sight glass (**A**).
6. Refit the filler cap securely.
7. Close the bonnet (**B**).

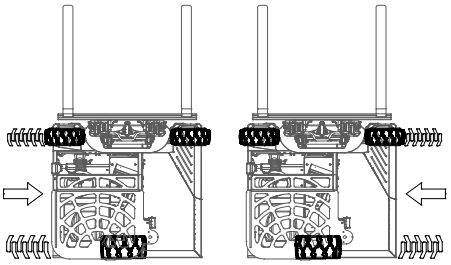
5.6 Front Wheel Alignment

Note

Do not attempt to correct the wheel alignment by adjusting the front master steering cylinder rod end before trying the procedure outlined below.



Wheels At Standard (0°) Mode



Wheels At Sideward (90°) Mode

- Drive the truck in standard (0°) mode (i.e. forward or reverse) to an open area where the ground is firm and level.
- Stop and apply the park brake.
- Check the alignment of the front wheels. Both front wheels should be aligned parallel to each other and to the sides of the truck.
- If the wheels are out of alignment, select sideward (90°) mode for **right** travel by moving the direction control joystick to the **right**.
- Wait for the wheels to finish repositioning.
- Press the accelerator pedal to increase the engine speed and turn the steering wheel anticlockwise to fully extend both front steering cylinders.
- When the cylinders are fully extended continue to turn the steering wheel against the resistance for 5-10 seconds (keep the engine speed up throughout).
- Turn the steering wheel clockwise to fully retract both front steering cylinders. When the cylinders are fully retracted continue to turn the steering wheel against the resistance for 5-10 seconds (keep the engine speed up throughout).
- Select standard mode for forward travel by moving the direction control joystick forward.
- Wait for the wheels to finish repositioning.
- Release the park brake and drive the truck forward at least 1 metre.
- Stop and apply the park brake.
- Check the alignment of the front wheels.
- Both front wheels should now be aligned parallel to each other and to the sides of the truck.

5.7 Entering and Exiting the Operator Cabin

Warning

The 'Basic Information' section of this manual contains crucial information on topics such as 'centre of gravity' and 'rated capacity' that must be read and understood prior to operating the truck.

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

Remember:

- Check that the handgrips and footsteps are clean and in good condition before using.
- Always face in towards the machine and use the handgrips and footsteps provided.
- Mount and dismount only when the truck is stopped.
- Break three-point contact only when you reach the ground or cab.
- Take extra care in wet, snowy or icy weather.
- Avoid wearing loose or torn clothing that can catch on the truck.
- NEVER JUMP!

5.8 Starting the Engine

Note

The truck will NOT start unless:

- **The 4-way direction control lever is in the neutral position**
- **The battery isolator switch is in the 'ON' position**
- **The operator is sitting on the seat**
- **The seat belt is fastened ***

**** only if optional seat belt switch is fitted***

Warning

Before starting the engine ensure that there are no bystanders in the immediate vicinity of the truck.

Note

The starter must not be operated continuously for more than 20 seconds. seconds.
Do not run up the engine immediately to high idling speed / full load operation from cold. Warm up the engine at medium speed without load. An insufficiently warmed up engine can shorten its service life.

Note

When the machine is started the wheels will remain in whatever position they were in when the machine was stopped until the operator selects a direction of travel on the 4-way direction control lever.

Diesel engine starting procedure:

- Ensure the park brake is applied and the 4-way direction control lever is in the neutral position.
- Ensure the accelerator pedal is not being pressed.
- Insert the key into the ignition switch and turn clockwise to position 1 – operating voltage.
- If the ambient temperature is below 10°C (50°F) wait until the glow indicator light goes off before proceeding.
- Turn the ignition key further clockwise against spring pressure to position 2 - start. Release the ignition key as soon as the engine starts. The key will return automatically to position 1.
- Ensure the engine oil pressure indicator and battery charge indicator are not illuminated. If either of these indicators are illuminated stop the engine immediately and determine the cause.
- If the engine fails to start after 10 seconds turn the key to the off position for 10 seconds then repeat the starting procedure.

LPG engine starting procedure:

- Ensure the valve on the LPG bottle is open.
- Ensure the park brake is applied and the 4-way direction control lever is in the neutral position.
- Ensure the accelerator pedal is not being pressed.
- Insert the key into the ignition switch and turn clockwise to position 1 – operating voltage.
- Turn the ignition key further clockwise against spring pressure to position 2 - start. Release the ignition key as soon as the engine starts. The key will return automatically to position 1.
- Ensure the engine oil pressure indicator and battery charge indicators are not illuminated. If either of these indicators are illuminated stop the engine immediately and determine the cause.
- If the engine fails to start after 10 seconds turn the key to the off position for 10 seconds then repeat the starting procedure.

5.9 Switching Off the Engine

Note

Allow the diesel engine to idle for 5 minutes before shutting it off after a full load operation. Failure to do so may lead to turbocharger trouble.

- Ensure the park brake is applied and the 4-way direction control lever is in the neutral position.
- Ensure the accelerator pedal is not being pressed.
- Turn the key anticlockwise to position 0.

5.10 Moving Off

It is important to be aware of how the Combilift truck moves and how to drive it in a safe and efficient manner. The Combilift can be driven forward, backward, left or right by selecting the desired direction of travel with the 4-way direction control lever.

Warning

Only operate the truck from the operator's seat with the seat belt buckled. If a door is fitted to the operating enclosure it must be closed and latched securely. Do not place any part of the 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.

Caution

Moving the 4-way direction control lever when the truck is moving may cause the truck to change direction abruptly and carries a risk of personal injury and machine damage.
Do not move the 4-way direction lever when the truck is moving.
After changing direction with the truck stopped, confirm that the direction indicator icon on the dash cluster is in agreement with the intended direction selected.
If the direction control does not respond or the correct mode indicator does not illuminate park the truck in a safe location and inform the relevant supervisor.

To Move Off:

- Start the engine as described in section 5.8
- Raise the forks to approximately 100mm (4″) off the ground and tilt the mast back. This is the recommended travelling position.
- Select the desired direction with the 4-way direction control lever.
- Wait for the wheels to reposition if necessary.
- Press the brake/inch pedal fully.
- Look all around carefully to make sure the way is clear.
- Release the park brake and hold the steering knob with the left hand.
- Sound the horn.
- Look in the intended direction of travel.
- Press the accelerator pedal lightly to increase the engine speed a little.
- Slowly release the brake/inch pedal.
- As the truck starts to move, gradually press the accelerator pedal until the truck is moving at the desired speed.
- Release the accelerator pedal fully then press the brake/inch pedal fully to stop travelling.
- Apply the park brake when the truck has stopped.

Note

The Combi-CB has a maximum ground speed of 14km/h (8.7mph). Always adhere to all speed limits for the area in which the truck is operating.

5.11 Turning

Warning

A lateral tip-over can occur if the truck is improperly operated. Slow down before turning! Failure to slow down can cause serious injury or death.

- Slow down. Even if the forklift is not carrying a load it can tip-over if you turn at high speed.
- Sound the horn as you reach an intersection to warn pedestrians and other equipment operators you are approaching the intersection.
- Always follow the rules of the road and yield to other equipment operators and pedestrians as required.

5.12 Stopping

Warning

When stopping, stay inside the operating enclosure until the truck comes to a complete stop. Failure to stay inside the operating enclosure can result in serious injury or death.

Warning

DO NOT stop the truck abruptly. Stopping abruptly may dislodge the load causing serious injury or death.

Release the accelerator pedal to slow the truck down then gradually apply pressure to the brake/inch pedal to bring the truck to a smooth controlled stop.

To perform an emergency stop release the accelerator pedal and press the brake/inch pedal down fully. Keep the brake/inch pedal fully depressed until the truck comes to a halt.

Stopping distances change depending on operating conditions such as inclines and the quality of the ground surface.

To make sure the truck can be brought to a stop within an acceptable safe distance it is important to operate in a manner that is appropriate for the conditions. It may be necessary to:

- Reduce speed
- Reduce load size
- Allow adequate distance between the truck and any other vehicle, object or person.

Note

Be careful when traveling in snowy and icy conditions.

Reduce travel speed considerably in the event of bad weather.

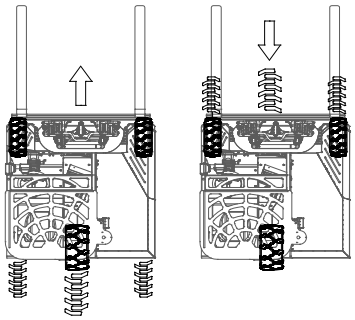
5.13 Changing Direction

The procedure for changing drive direction differs depending on whether a change of mode - from standard (0°) mode to sideward (90°) mode or vice versa – is required or not.

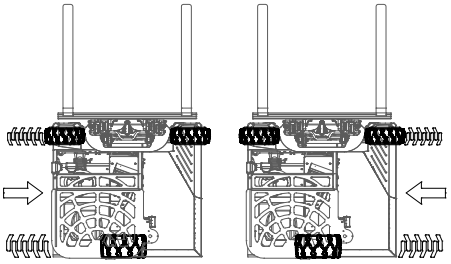
Direction Change Without Mode Change

This procedure applies when a change of direction is required that does not necessitate a change to the alignment of the wheels i.e. when changing from forward to reverse or from right to left.

- Bring the truck to a stop.
- Select the desired change of direction with the 4-way direction control lever
- Follow the instructions for moving.



Wheels At Standard (0°) Mode



Wheels At Sideward (90°) Mode

Direction Change With Mode Change

This procedure applies when a change of direction is required that necessitates a change to the alignment of the wheels e.g. when changing from forward to right or from reverse to left.

- Bring the truck to a stop.
- Apply the park brake.
- Select the desired change of direction with the 4-way direction control lever.
- As the wheels start to reposition press the accelerator pedal lightly to speed up the operation.
- Wait until the wheels have finished repositioning and the appropriate mode indicator has illuminated on the dash cluster.
- Follow the instructions for moving.

5.14 Parking

Warning

Before exiting the vehicle, place controls in neutral and apply the park brake. Never leave the seat without applying the park brake.

Park in a safe area on level ground. Never park on an incline/slope.

If the truck breaks down on an incline, securely chock the wheels, remove the key and place an 'out of order sign' on the windscreen.

Warning

If the truck is to be left unattended, fully lower the mast, tilt the mast fully forward, turn the key to the 'Off' position and remove the key.

Ensure the parked truck does not cause an obstruction or safety hazard.

When parking the Combilift always ensure that one of the two recommended parking methods is followed. This is to ensure the safety of the operator and others in the vicinity of the truck. The attended parking method is for cases where the operator needs to exit the machine but will be no more than 25 feet (7 metres) away. The unattended parking method is for cases where the operator must exit the machine but will be further than 25 feet away.

Attended parking method

- Bring the truck to a complete stop on level ground.
- Once stopped, apply the park brake and set the 4-way direction lever to the neutral position.
- Lower the forks fully and tilt the mast fully forward.
- Leave the engine running.
- Remove the seatbelt from its buckle and exit the Combilift using the three point contact method as discussed earlier.
- Stay within 25 feet (7 metres) of the truck at all times.

Unattended parking method

- Bring the truck to a complete stop on level ground.
- Once stopped, apply the park brake and set the 4-way direction lever to the neutral position.
- Lower the forks fully and tilt the mast fully forward.
- Turn the key switch to the 'OFF' position and remove the key to prevent unauthorised use of the truck.
- Remove the seatbelt from its buckle and exit the Combilift using the three point contact method as discussed earlier.

5.15 Loading & Unloading the Truck

This section provides information on the correct way to pick up a load and set down a load.

Warning

Travel with the mast raised must be kept to a minimum.

Extreme care must be taken to avoid jerky movements when using the tilt function, especially when the mast is raised.

Never tilt a raised load forward past the horizontal.

There are a number of safety guidelines that should be adhered to at all times when lifting or placing loads.

- Read and understand the 'Basic Information' and 'Safety Information' sections of this manual before commencing operation.
- Assess the load before lifting. Check the weight, size, load centre and security. NEVER try to lift a load if its weight is unknown.
- Do not handle unstable or loosely stacked loads.
- Before picking up a load adjust the forks to ensure that they are equally spaced about the centre line of the fork carriage and spaced apart suitably to support the load evenly.
- Make sure the forks are fully inserted into the pallet or under the load.
- Check that the forks are of sufficient length. The fork length should be at least two thirds of the depth (front to back) of the load.
- Forks must not protrude beyond the pallet/load.
- Use suitable attachments for lifting unusual loads.
- Make sure that pallets are in good condition.
- Observe floor loading limits.
- Check safe working load (SWL) of racking before placing a load onto it.
- ALWAYS consult the capacity chart in the cabin of the truck before lifting a load and never exceed the rated capacity of the truck.
- When manoeuvring to pick up a load, avoid erratic movements that could result in damage to the load and/or truck.
- Use caution when handling long, high or deep loads.
- If the load obstructs view, drive in reverse, left or right. Always look in the direction of travel.
- Make sure there is adequate clearance for the truck and load including overhead.
- Do not allow anyone to stand beneath or pass under the mast or forks.
- Never use the forklift to elevate anyone without the use of an approved man up cage.
- Be aware of rear end swing when turning.

- Never carry passengers on the truck.
- Obey site rules and take particular care when there are pedestrians who should be given priority.
- Use banks men if operating in congested or busy areas.
- Operate controls smoothly.
- Stop the truck, apply the park brake and select neutral before lifting a load.

4-Way Drive Loading/Unloading Advantages

- The 4-way travel capability of the Combilift truck allows for much easier alignment of the forks/load with the picking/placing area than with any other conventional type of forklift truck.
- To position the forks/load precisely with the placing/picking location select the required drive direction with the 4-Way direction lever.
- Fully press the brake/inch pedal, look all around to make sure the way is clear, then release the park brake.
- Press the accelerator pedal to increase the engine speed then gradually release the brake/inch pedal until the truck starts to move slowly.
- Make small steering corrections as necessary to position the forks/load precisely.
- When the desired position is achieved, fully press the brake/inch pedal, apply the park brake, release the accelerator pedal and select neutral.

Undercutting a Load

Warning

The load centre is increased and therefore the lifting capacity is reduced when the front face of the forks is not touching the load.
Ensure the truck has sufficient capacity to cope with the increase in load centre.

This is when the forks are not fully inserted into the pallet or under a load. It may be necessary to do this when it is not possible to get close enough to the pallet/load to insert the forks fully.

Picking up an undercut load:

- Drive forward to insert the forks as far as possible into the pallet or under the load. The forks must be inserted by at least two thirds the depth of the pallet/load.
- Gradually lift the load just enough to check that it is stable.
- If the load is unstable lower it back to its original position and report the problem to the relevant supervisor.
- If the load is stable, slowly reverse the truck just enough to clear the racking/stack.
- Lower the pallet/load onto the ground.

- Insert the forks fully into the pallet/load.
- The load is now ready to be lifted as usual.

Setting down an undercut load:

- After transporting the pallet/load, lower it onto on the ground.
- Reposition the forks the required distance back from the load. The forks must be inserted by at least two thirds the depth of the pallet/load.
- Gradually lift the load just enough to check that it is stable.
- If the load is unstable lower it back onto the ground and report the problem to the relevant supervisor.
- If the load is stable proceed to stack it in the usual fashion. See ‘Stacking Long & Palletised Loads’.

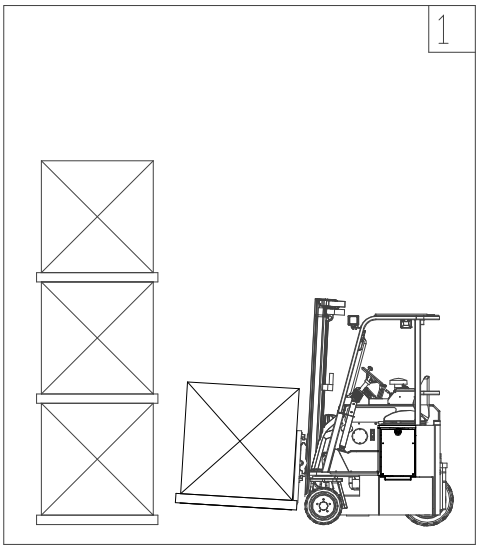
Picking up a Load

- Manoeuvre the truck so that the forks are aligned centrally with the load and approximately 50mm (2″) from the front of the load.
- Use the 4-Way drive to get the truck into position if necessary.
- Apply the park brake and select neutral.
- Level the forks then adjust the space between the forks (see section 5.16 on page 65) to suit the load.
- Use tilt to level the forks then adjust the height of the forks to enable them to enter the load without fouling.
- Select forward drive.
- Drive forward slowly until the front face of the forks gently touch the load. Undercut the load if necessary.
- Lift the load 100mm (4″)off the ground and tilt the mast back to secure the load.

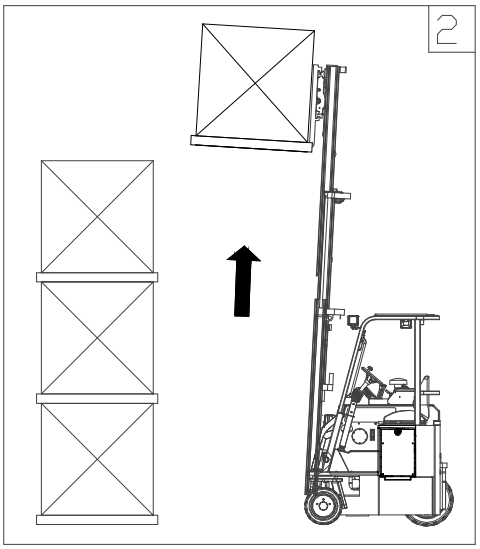
Placing a Load

- Manoeuvre the truck so that the load is as close to the placing area as possible.
- Use the 4-Way drive to get the truck into position if necessary.
- Apply the park brake and select neutral.
- Level the load using the tilt function.
- Gently lower the load onto the placing surface.
- Position the forks to clear the load without fouling on withdrawal.
- Select reverse and check that the area behind the truck is clear.
- Reverse the truck slowly whilst looking in the direction of travel. Make occasional checks and any necessary adjustments to prevent the forks from fouling on withdrawal.
- Stop when the forks are clear of the load.
- Tilt the mast back and raise/lower the forks to 100mm (4″) off the ground.

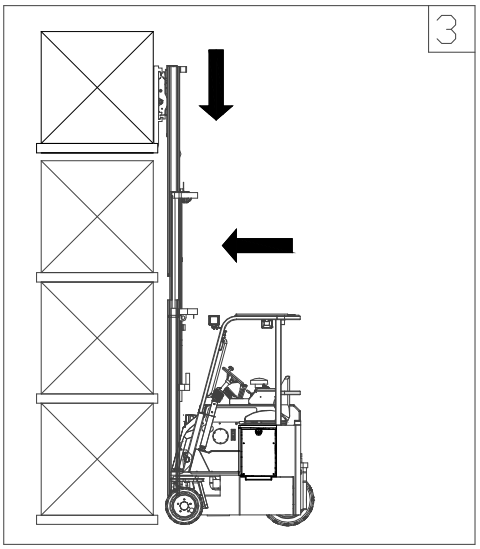
Stacking a Load



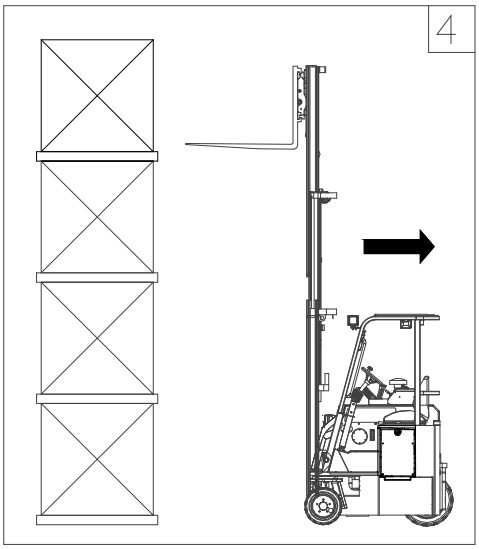
- Slowly approach the placing location with the load in the safe travel position.
- The truck may be driven in sideward mode and side shift may be used to align the load perfectly with the placing location if necessary.
- Apply the park brake and select neutral.
- Level the load using the tilt function – or if the load is not secure keep it tilted back.
- Check overhead to make sure there is adequate headroom before lifting. Pay attention to the highest point (this may be on a load backrest if fitted).

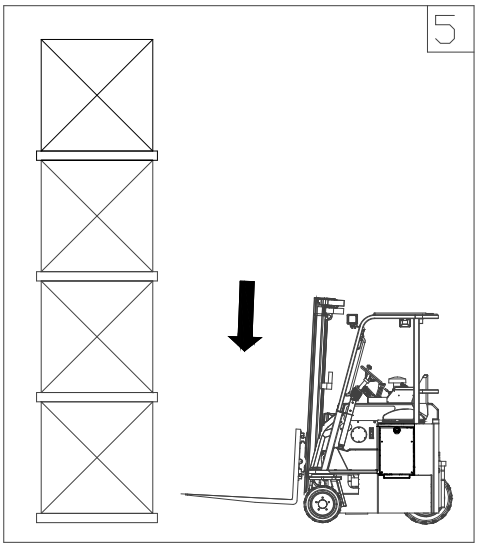


- Lift the load until the bottom of the pallet/load is 50-75mm (2-3″) clear of the racking or the top of the load beneath if bulk stacking.
- Gradually operate the accelerator pedal to give the required lift speed.
- Ensure that the load is perfectly aligned and it is not going to foul the racking or adjacent loads on entry. Side shift can be used to make small adjustments.
- Fully press the brake/inch pedal, select forward and release the park brake.
- Press the accelerator pedal lightly to increase the engine speed then gradually release the brake/inch pedal until the truck begins to move forward slowly.
- Make small steering corrections and/or use side shift as required to position the load precisely in its intended location.
- If placing in racking, position the load with a 50-75mm (2-3″) gap each side and allow pallets to overhang the front of the racking by 25-50mm (1-2″).
- If bulk stacking, position the load exactly on top of the load beneath, keeping the stack perfectly upright and level.

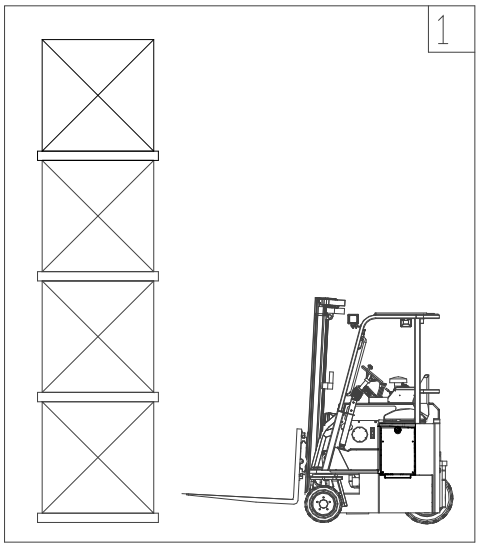


- When in position, fully press the brake/inch pedal then apply the park brake and release the accelerator pedal.
- Use the tilt to level the load then lower the load gently onto the racking or stack.
- Position the forks at a height to clear the pallet/load without fouling on withdrawal.
- Fully press the brake/inch pedal, select reverse and check that the area behind the truck is clear.
- Press the accelerator pedal lightly to increase the engine speed then gradually release the brake/inch pedal until the truck begins to move slowly in reverse.
- Reverse, looking in the direction of travel. Make occasional checks to prevent the forks from fouling on withdrawal. Make any necessary adjustments (always apply the park brake and select neutral before operating the hydraulic controls).
- Stop and apply the park brake when the fork tips are clear of the racking or stack.
- Lower the forks to 100mm (4″) above the ground and tilt the mast back before moving off.

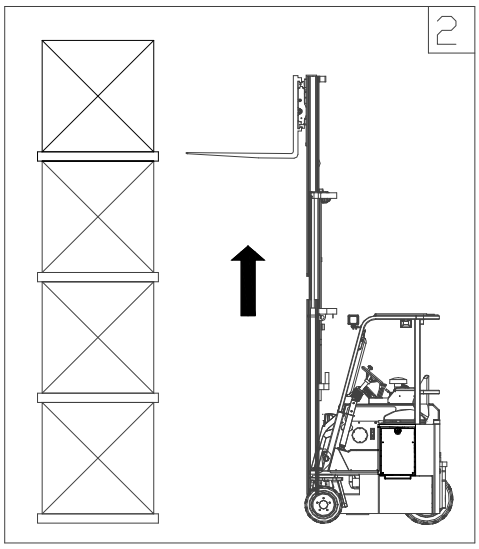




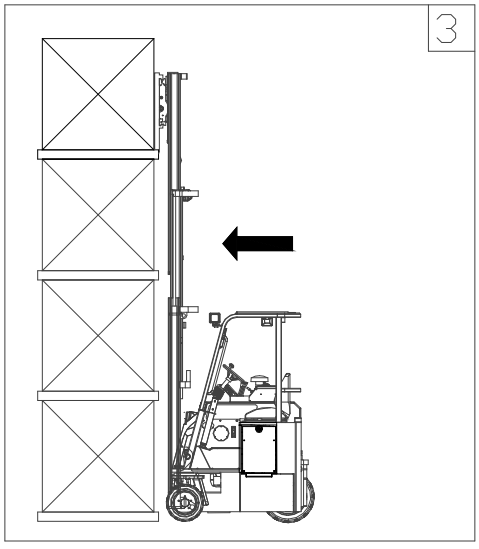
De-stacking a Load



- Slowly approach the load with the mast in the safe travel position.
- The truck may be driven in sideward mode and side shift may be used to align the forks perfectly with the load if necessary.
- Apply the park brake and select neutral.
- Level the forks using the tilt function.
- Check overhead to make sure there is adequate headroom before lifting. Pay attention to the highest point (this may be on a load backrest if fitted).

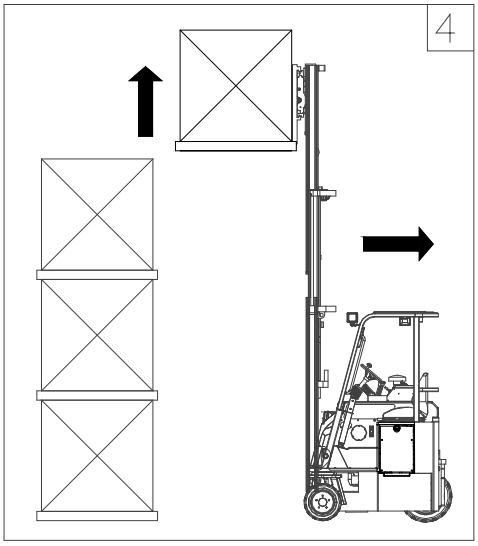


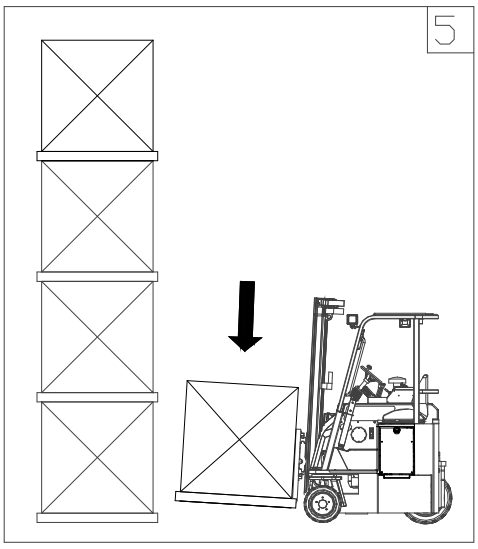
- Lift the forks to the required height to enter the pallet/load cleanly.
- Gradually operate the accelerator pedal to give the required lift speed.
- Fully press the brake/inch pedal, select forward and release the park brake.
- Press the accelerator pedal lightly to increase the engine speed then gradually release the brake/inch pedal until the truck begins to move forward slowly.
- Make small steering corrections and/or use side shift as required to position the forks precisely (always apply the park brake and select neutral before operating the hydraulic controls).



- Fully press the brake/inch pedal when the fork heels gently touch the pallet/load. If it looks like the forks are going to make contact during entry stop and make the necessary adjustments (always apply the park brake and select neutral before operating the hydraulic controls).
- Apply the park brake and select neutral.
- Check overhead to make sure there is adequate headroom before lifting the load. Pay attention to the highest point (this may be on a load backrest if fitted).

- Lift the pallet/load approximately 50-75mm (2-3″). If the load dips use the tilt function to level the load before attempting to withdraw it.
- If the load is unstable use backward tilt to secure it if appropriate.
- Fully press the brake/inch pedal, select reverse and check that the area behind the truck is clear.
- Press the accelerator pedal lightly to increase the engine speed then gradually release the brake/inch pedal until the truck begins to move slowly in reverse.
- Reverse, looking in the direction of travel. Make occasional checks to prevent the load from fouling on the racking or adjacent loads on withdrawal. Make any necessary adjustments (always apply the park brake and select neutral before operating the hydraulic controls).
- Stop and apply the park brake when the load is clear of the racking or stack.
- Lower the load under control until the forks are 100mm (4″) above the ground.
- Tilt the mast back before moving off.

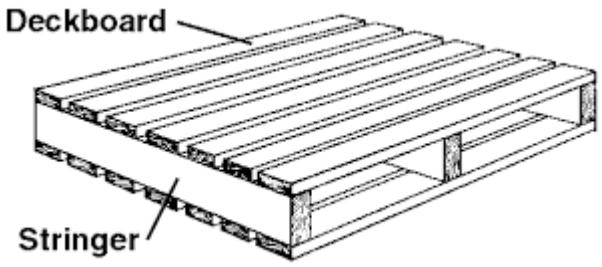




5.16 Adjusting the Forks

Adjusting the Forks for Palletised Loads:

- Measure the opening between the end stringers on the pallet.
- Raise the forks approximately 25mm (1″) off the ground.
- Apply the park brake and switch off the engine.
- Release the fork keeper pins *.
- Move the forks until the spacing between them is equal to one-half the opening between the end stringers on the pallet.
- Position the forks equidistant from the ends of the fork carriage and engage the fork keeper pins in one of the notches in the top fork bar *.
- If the truck has hydraulic fork positioning fitted, use the fork positioning lever to adjust the spacing between the forks.



Adjusting the Forks for Long Loads:
Factors such as the length and rigidity of the load must be considered when positioning the forks. Forks on opposite sides of the truck must always be positioned equidistant from the centre of the fork carriage.

To adjust:

- Raise the forks approximately 25mm (1″) off the ground.
- Apply the park brake and switch off the engine.
- Release the fork keeper pins. *
- Move the forks to the desired position.
- If a wide fork positioner or spreader bar is fitted, position the outer forks to best suit the load. Factors such as the length and rigidity of the load must be considered when positioning the outer forks.
- Position the forks equidistant from the ends of the fork carriage and engage the fork keeper pins in one of the notches in the top fork bar. *
- If the truck has hydraulic fork positioning fitted, use the fork positioning lever to adjust the forks.

**** Trucks fitted with hydraulic fork positioning do not have keeper pins in the forks or notches in the top fork bar.***

5.17 Travelling Safely with a Load

- When travelling with a load always keep the load as low as possible.
- Keep the load tilted back.
- Secure the load if necessary to prevent movement during travel.
- Try to avoid sudden and erratic movements with the truck. Accelerate and brake as smoothly as possible.
- When approaching a junction or corner, slow down, sound the horn. Proceed only when the way ahead is unobstructed.
- When approaching crossings and areas where visibility 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. Avoid bumps and kerbs.
- Be conscious of height and width restrictions and watch for the 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 or load backrest (if fitted).
- 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.
- Follow the correct procedure when travelling on sloped ground. *See section 5.18 on page 67.*
- Take great care when travelling with a swinging load. If the load swings the centre of gravity of the truck is also moving.
- Ensure the load is spread evenly on the forks.
- Always look in the direction of travel and avoid obstacles such as sudden dips or potholes.
- If the view forward is blocked by the load travel in reverse, left or right.
- Turn slowly and in the event of a tip over follow the procedure illustrated in figure 5.17 below.
- Warn anyone in the vicinity of the truck to stay clear if the trucks starts to become unstable or to tip over.

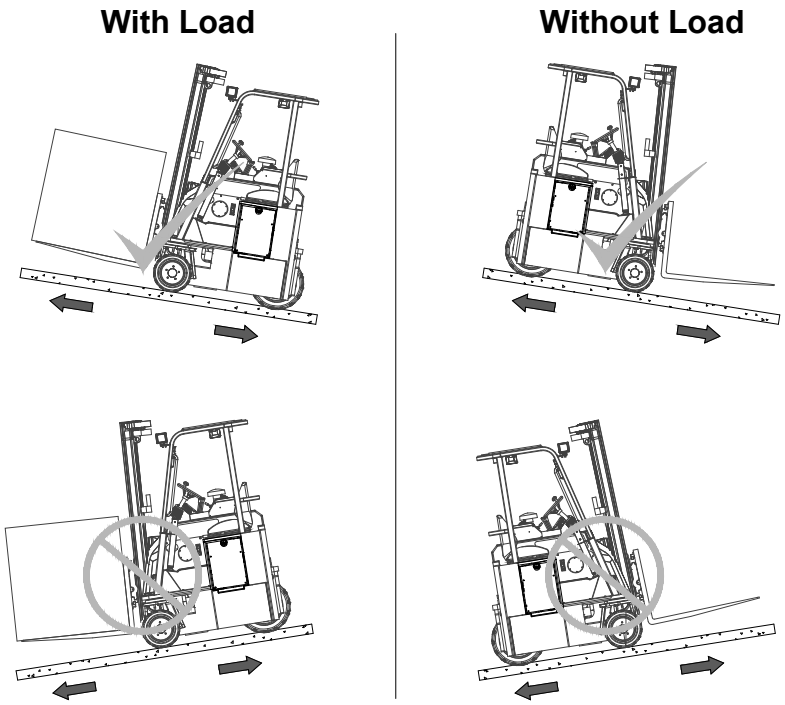
Figure 5.17

5.18 Driving on Slopes

Always take great care when driving on a slope as the risk of an accident is increased. If a slope is greater than 5% the following guidelines must be followed.

Do:

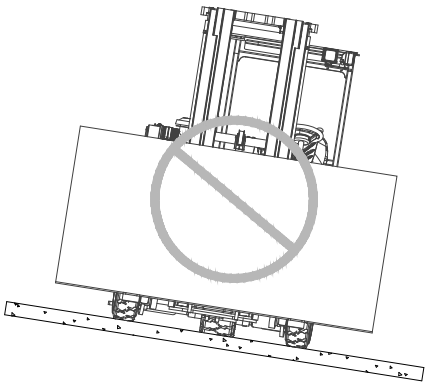
- ✓ Drive slowly and use the brakes gently.
- ✓ Drive directly up or down the slope in standard mode.
- ✓ Ensure the **forks face uphill** when driving up or down a slope **with a load**.
- ✓ Ideally the **forks should face downhill** when driving up or down a slope **without a load**.
- ✓ Keep the mast tilted back and the forks approximately 100mm (4″) off the ground.
- ✓ Raise the forks at the bottom of a slope to prevent them from fouling the ground if necessary.



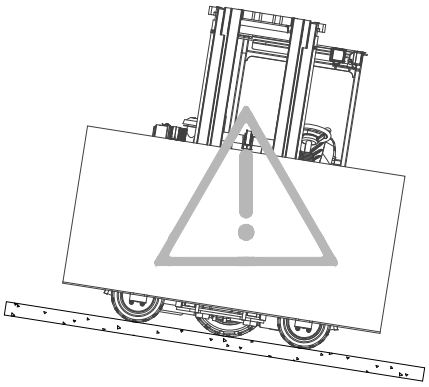
Driving in this way aids stability, traction and adhesion (meaning the truck is less likely to tip over or skid). If it is not possible to drive up and down the incline with the forks positioned as above then take great care and use additional means to secure the load such as ratchet straps if necessary.

Don't:

- × Drive diagonally on a slope.
- × Turn the truck around on or travel across a ramp or a slope.
- × Leave the truck on a slope, except in an emergency. In case of emergency always chock the wheels.



If it is necessary to drive in sideward mode on a slope with a load the situation must be fully assessed and a safe work procedure determined before proceeding.
It may be necessary to secure the load to prevent it from sliding off the forks. Forks with non-slip surfaces or covers may be require to prevent the load from sliding or it may be necessary to secure the load with ratchet straps or chains.



5.19 Towing

Should the need arise to Tow the truck it is necessary to first apply the bypass condition on the hydrostatic pump in order to prevent it from being damaged. It is also necessary to mechanically release the park brake on each of the wheel motors. The truck should only be towed if it has broken down in a location where it is deemed to be a safety hazard.

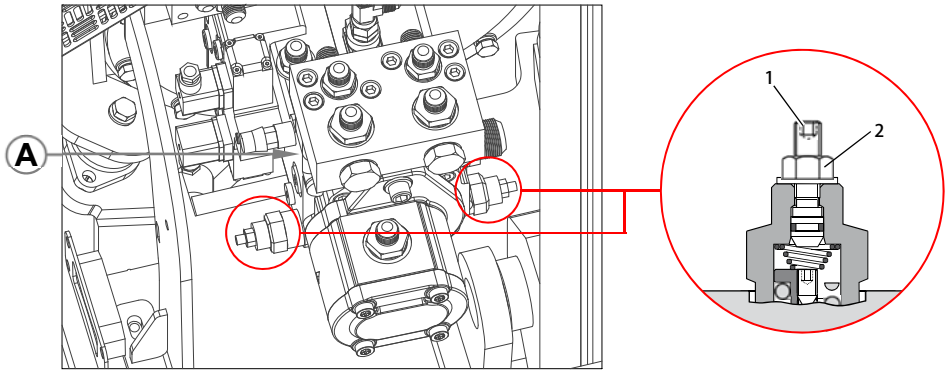
Caution

Only tow the truck out of the immediate danger zone. Longer towing distances and high towing speeds will damage the drive pump.

The maximum permissible towing speed of 2 km/h should not be exceeded.

During and after towing the drive pump will be hot. Wear protective clothing.

Hydrostatic Drive Bypass Function



To activate the bypass function:

1. Switch off the engine.
2. Raise the bonnet from the right hand side of the truck to gain access to the high-pressure relief valves – circled in red – on the drive pump (**A**).
3. Loosen the lock nut (**2**) by turning it counter-clockwise one half rotation with a 13mm spanner.
4. Use a 4mm Allen key to turn the screw (**1**) clockwise until it is against the spring disc. This is apparent by the increased resistance. Then turn the screw (**1**) one half turn into the spring disc.
5. Tighten the lock nut (**2**) clockwise with a torque of 22 Nm (16 ft.lb).
6. Repeat steps 3 to 5 on the opposite side.

Note

Switch off the bypass function immediately after towing.

To deactivate the bypass function:

1. Loosen the lock nut (**2**) with a 13mm spanner, then turn the screw (**1**) counter-clockwise with a 4mm Allen key to the stop.
2. Retighten the lock nut (**2**), turning clockwise with a torque of 22 Nm (16 ft.lb).
3. Repeat steps 1 and 2 on the opposite side.

5.20 Mechanical Release of Park Brake

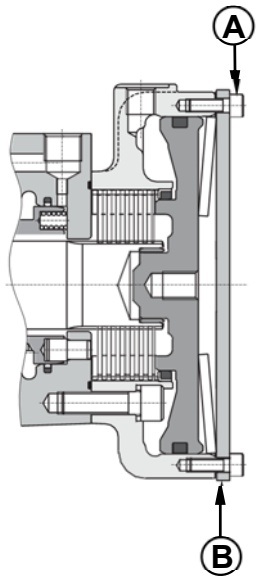
Caution

The truck must be secured to prevent it from rolling off before releasing the park brake.

Re-engage the park brake as soon as the towing operation is complete.

To release the park brake:

1. Loosen off the screws (**A**) holding the end cover (**B**) in place on one of the front wheel motors.
2. Repeat step 1 on the opposite front wheel motor.



To re-engage the park brake:

1. Retighten the screws (**A**) on one of the front wheel motors (ensure the screws are retightened in a diametrically opposite manner to the torque setting specified below).
2. Repeat step 1 on the opposite front wheel motor.

Brake end cover screw torque: 14-16 Nm (10.3-11.8 ft.lb)

5.21 Diesel Particulate Filter (DPF)

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

Note

Where Diesel Particulate Filters (DPF) are fitted Diesel Fuels with a maximum sulphur content of 15ppm (parts per million) MUST be used.
Diesel Fuels specified to EN 590 or ASTM D975 S15 are Strongly Recommended.

Note

If a diesel particulate filter (DPF) is fitted to the truck then API CJ-4 engine oil MUST be used.

Section 6: Maintenance

Combilift trucks are thoroughly examined, tested and lubricated before leaving the factory; however, regular maintenance and lubrication are necessary to ensure smooth running and maximum life of components.

The recommended maintenance periods in the maintenance schedule are for trucks operating in normal, clean conditions when the specified fluids are used. For abnormal temperatures, dust contamination areas or moist conditions, etc., more frequent maintenance will be required. Maintenance periods should be halved when the truck is operating in a harsh environment.

When carrying out maintenance work, the use of original parts is highly recommended. These are specially designed for the truck and engine and ensure optimum performance. Non-compliance may result in voidance of the warranty!

Caution

The information contained in this section is provided for trained and authorised service personnel only. The specialist skills and knowledge can be obtained through training with Combilift Service.

Some maintenance tasks could result in serious injury or property damage if performed incorrectly

Note

Maintenance, replacement, or repair of the emission control devices and systems may be performed by any non-road engine repair establishment or individual.

6.1 Basic Safety Instructions for Servicing and Inspection

- Perform servicing and inspection work only if you have read and understood the operator's manual for the truck and the operator's manual for the engine.
- Observe the basic safety instructions and all the warning signs attached to the truck.
- The descriptions of work processes contained within this manual are provided only for fully trained and competent maintenance staff with the necessary skills, knowledge and experience to carry out the work safely.
- Keep the operator's manual with the truck at all times.
- Perform servicing and inspection work only with suitable work clothing and personal protective equipment.
- Always wear safety glasses when performing servicing and inspection work.

- Always wear appropriate protective clothing, hats, gloves and safety shoes as warranted by the circumstances.
- Wear hearing protection should there be noise exceeding 90 dbA.
- All work must be carried out in a pre-designated safe working area on firm level ground with adequate space and headroom to perform all maintenance tasks safely.
- Take the necessary precautions to ensure the safety of others who may be affected by the work, e.g. other employees working nearby.
- Fire protection equipment must be present in the work area.
- Lower the forks fully and tilt the mast forward fully before commencing maintenance tasks.
- Confirm that the hydraulic system pressure has been relieved before working on the hydraulic system.
- Pressurised jets of fluid can penetrate the skin causing serious injury. Use a piece of cardboard or paper to check for leaks. In the event that oil penetrates the skin, seek medical attention immediately.
- Remove the key from the ignition switch to prevent anyone from starting the engine while maintenance is underway.
- Ensure there is no residual load in the system.
- Always isolate the power source from the drive or equipment.
- Hot surfaces and fluids can cause severe burns. Wait until surfaces and fluids have cooled and are comfortable to touch.
- Avoid skin and eye contact with oils and greases.
- Do not allow any fluids from the truck to spill on the ground or get into bodies of water. Clean up any spills immediately.
- Always ensure tools are in good working condition and are used in the proper manner.
- Extract exhaust fumes using an extraction system and ensure the area is well ventilated.
- Perform a functional test after any maintenance work.

Cleaning

- Clean the truck thoroughly before performing any diagnosis or maintenance tasks. Pay particular attention to the areas of the truck where work is to be carried out e.g. around the filters.
- Do not use flammable solvents or cleaning agents that create harmful vapours.
- Do not pressure wash near electrical components or inside the operating enclosure.
- Wear appropriate protective clothing such as goggles and gloves.
- Blow dirt off or out. Always blow out the oil cooler and radiator cooling fins from the inside to the outside.
- When using a high pressure water or steam jet observe the following rules:
    - Maximum spray pressure 60 bar
    - Maximum steam temperature 90°C
    - Minimum distance 1 metre
- Warm up the engine

Caution

Only carry out cleaning work on the engine when it is not running!
Cover all electrical/electronic parts and connections. (e.g. control units, generator, solenoid valves etc.).
Do not aim the water/steam jet directly at electrical components.
Allow the engine to warm up.

Batteries

- Wear protective clothing and safety glasses when working on the battery.
- If acid contacts the skin wash immediately with clean water.
- If acid contacts the eyes wash immediately with clean water and seek immediate medical attention.
- Keep sources of ignition away from batteries.
- Do not place metal objects on or near the battery terminals.
- Isolate the battery when working on the electrical system.
- Always disconnect the battery before welding.
- Follow the correct procedure when connecting and disconnecting the battery.

    - Disconnecting: First negative and then positive
    - Connecting: First positive and then negative

6.2 First Inspection After 100 Operating Hours

The descriptions of work processes contained within this manual are provided only for fully trained and competent maintenance staff with the necessary skills, knowledge and experience to carry out the work safely. Follow the operator's manual for the engine for more details regarding engine servicing procedures.

To assure proper functioning of the truck, it is required that the first inspection be performed after 100 operating hours or 3 months (depending on which comes first), after initial start-up.

Tasks to be performed after 100 operating hours or 3 months

- Check tension and condition of the engine v-belt(s).
- Change the hydraulic suction filter element.
- Change the hydraulic return filter element.
- Change the engine oil.
- Change the engine oil filter element.
- Diesel engine – Change the fuel pre-filter and main fuel filter.
- LP gas engine – Change the LP gas inline filter (if fitted).
- Check the hydraulic oil level.
- Check the coolant level.
- Check the machine for hydraulic, coolant and fuel leaks.
- Check the engine air intake filter and clean or replace if necessary.
- Check all bolts, nuts and fittings are present and secure.
- Check the routing of hydraulic hoses, pipes and wires.
- Check the chrome rods on all hydraulic cylinders are clean and undamaged.
- Check the cleanliness of the radiator and hydraulic oil cooler(s).
- Check instruments and warning devices.
- Check the electrical system, ensure all connections are secure.
- Check the brakes, steering and operation of hydraulic functions.
- Check all lights.
- Check the overhead guard.
- Check the engine idle speed.
- Check the condition of the tyres.
- Torque all wheel nuts (see note below).
- Check mast chains; lubricate and adjust if required.

Note

All grease points indicated on the grease point chart MUST be greased every 100 operating hours / 2 months using EP2 Grease.

Note

Torque all wheel nuts to 210Nm / 155 ft. lbs every 250 hours.

The wheel nut torque setting is for clean dry threads. If the threads are lubricated the setting must be reduced.

6.3 Maintenance Schedule

Maintenance Task	Interval - Every		✓	Page
Grease All Points Marked on the Grease Point Chart	100 OH	2 Months		*109*
Check All Electrical Connections/Terminals	250 Operating Hours (OH)			
Check All Nuts And Bolts Are Present & Secure				
Check All Instruments & Warning Devices				
Check Operation of Brakes, Steering & Hydraulic Functions		6 Months		
Check the Lights		6 Months		
Check the Tyres		6 Months		
Check all Hydraulic Cylinder Chrome Rods for Dirt & Damage		6 Months		
Check the Routing of all Hoses, Pipes & Wires				
Check Battery Electrolyte Levels		6 Months		*93*
Change Engine Oil & Filter Element		6 Months		*47*
Check Dry Air Filter – Clean or Replace Element If Required		6 Months		*91*
LPG Engine - Check Spark Plugs – Clean/Adjust If Required				
Check Engine V-belt(s) For Wear & Tension		6 Months		*90*
Inspect & Lubricate Mast Chains, Measure Chain Stretch		6 Months		*103*
Grease Mast Channels		6 Months		*101*
Drain LPG Pressure Regulator/Vaporiser Oil Build-up				*84*
Torque All Wheel Nuts				*74*
Check Hydraulic Oil Level	500 Operating Hours (OH)			*49*
Check Engine Coolant Level and Concentration				*86*
Check Air Intake Hoses & Connections		2 Years		*91*
Check Engine Idle Speed		2 Years		
Check Hydraulic Pump Mounting Bolts				
Check Radiator & Fan – Clean Fins If Necessary		1 Year		
Check Hydraulic Oil Cooler – Clean Fins If Necessary		1 Year		
Check the Mast Bearings				*106*
Check the Mast Bearing Wear Pads and Adjust (If Applicable)				*106*
Check the Forks		1 Year		*107*
Check Swivel Slew Ring Bearings				
Check the Overhead Guard		1 Year		
Diesel Engine - Change Both Fuel Filters		1 Year		*80*
Change Hydraulic Suction Filter Element		1 Year		*97*
Change Hydraulic Return Filter Insert		1 Year		*98*
Change the LP Gas Inline Filter (If Fitted)		1 Year		*82*
Check Cold Starting Device(s) (If Applicable)	1000 OH			
Check Engine Mounts and Mounting Bolts (tighten or replace)				
Check Hydraulic System for Damage, Wear and Leaks		2 Years		
Service the LP Gas Delivery System	2000 OH			
Change Hydraulic Oil & Strainer Filter (In-Tank)		3-4 Years		*99*
Change the Hydraulic Tank Breather				*100*
Change the Coolant	2 Years			*86*

Perform the tasks in the maintenance schedule after the period of operating hours or the calendar period as they first arise to keep the truck in optimum working condition.

Perform all checks on the pre-use check sheet in conjunction with the maintenance schedule tasks (see page 126).

Note

Perform additional maintenance on the engine and fuel system as described in the relevant engine maintenance manual. Contact your local Combilift partner for assistance if required.

Note

The recommended maintenance intervals in the maintenance schedule are for maintaining trucks operating in normal conditions.

Trucks operating under harsh conditions or in harsh environments will require more frequent maintenance.

Local laws and regulations governing the maintenance of forklift trucks and their engines may stipulate more frequent and more comprehensive maintenance than that recommended in the maintenance schedule in this manual.

Strictly follow all local laws and regulations regarding maintenance of the truck and engine where applicable.

6.4 Engine Oil System

Caution

Switch off the engine before working on the lubricating system.
Wait until the engine and exhaust system are cool enough to touch before commencing work.

The lubricating oil quality has a considerable influence on the life, performance and thus also on the cost effectiveness of the engine.

Recommended Engine Oil Specification

Diesel Engine: API – CI-4 / SAE 10W30 *

LP Gas Engine: API – SN / SAE 10W30

* ***Use API CJ-4 engine oil if the truck is fitted with a diesel particle filter (DPF).***

Lubricating oil change intervals

- The intervals depend on:
  - lubricating oil quality
  - sulphur content in the diesel fuel
  - type of application of engine

- The lubricating oil change interval must be halved if at least one of the following conditions applies:
  - Constant ambient temperature below -10 °C (14 °F) or lube oil temperature below 60 °C (84 °F).
  - Sulphur content in diesel fuel of >0.5 weight %.
- If the lubricating oil change intervals are not reached within a year, the oil should be changed at least once a year.

Note

See Appendix A for 'California Engine Emission Control Warranty Statement' regarding owners 'Warranty Rights and Obligations'.

See Appendix B for General Engine Warranty Statement.

Changing Engine Oil & Filter

The engine oil and filter must be replaced at regular intervals in accordance with the maintenance schedule. When changing the oil always change the oil filter and vice versa.

Note

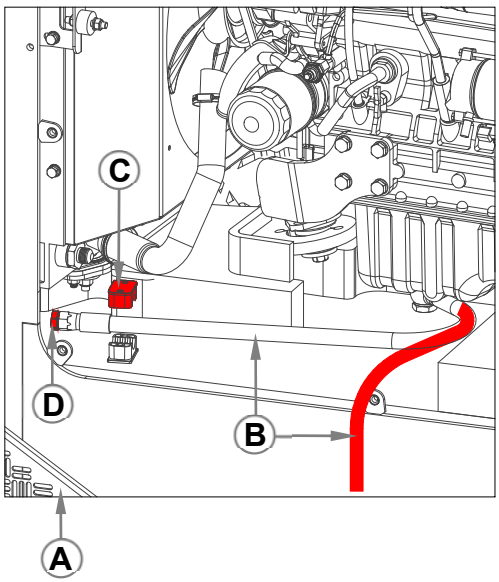
Clean and dry the area around all components concerned thoroughly before commencing work.

Observe safety regulations when handling oils and avoid skin contact.

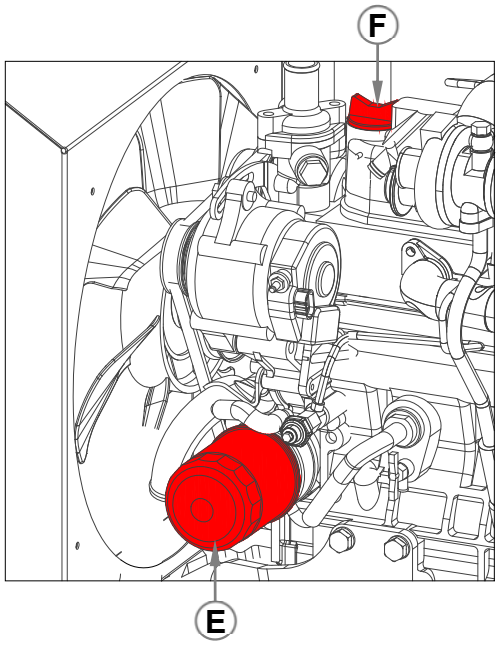
Do not pour fluids into the ground, down a drain or into a stream, pond or lake. Observe relevant environmental protection regulations when disposing of used oil and filters.

Diesel Engine Oil & Filter Change Procedure

1. Park the truck in a designated service area (ground must be level).
2. Lower the mast fully and tilt the mast fully forward.
3. Switch off the engine and wait until all parts are cool enough to touch.
4. If the engine is cold run it for 5 minutes to warm the oil. This will help it to flow.
5. Open the bonnet from the right hand side of the truck.
6. Remove the access panel (**A**) from the right hand side of the truck.



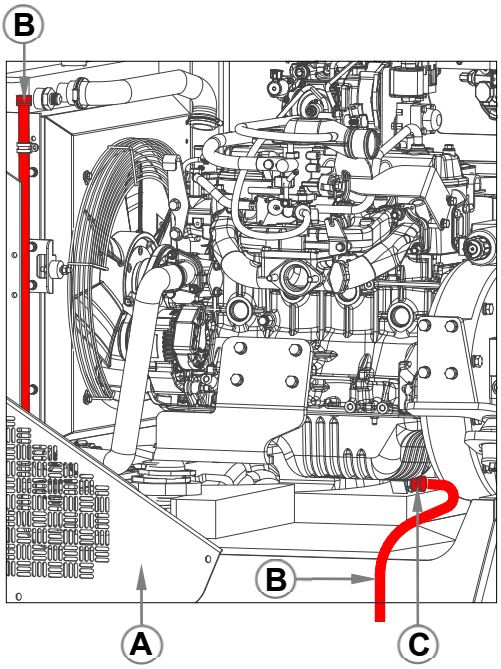
7. Position a suitable waste oil collection container (see point 18 for the volume of oil in the engine) on the ground to the right hand side of the engine.
8. Unclamp the end of the sump oil drain hose (**B**) from the pipe clamp (**C**) on the chassis.
9. Direct the free end of the oil drain hose over the collection container and remove the plug (**D**) from the end of the hose.
10. Allow the oil to drain completely.
11. Refit the plug to the end of the oil drain hose and tighten.
    - Torque to 50 Nm (37 ft. lbs)
12. Re-clamp the end of the sump oil drain hose in the pipe clamp on the chassis.
13. Unscrew and remove the used engine oil filter (**E**) (dispose of the used filter in accordance with local environmental regulations) from the right hand side of the engine. Use a filter wrench if required.
14. Collect the draining oil from the filter.
15. Clean the sealing surface of the filter support with a clean lint free cloth.
16. Lightly coat the seal on a new original filter element with clean engine oil.
17. Screw on the new engine oil filter element by hand - ensuring that the seal is correctly placed – until the gasket is touching the sealing surface then tighten.
    - Torque to 10-12 Nm (7.5-9 ft. lbs)



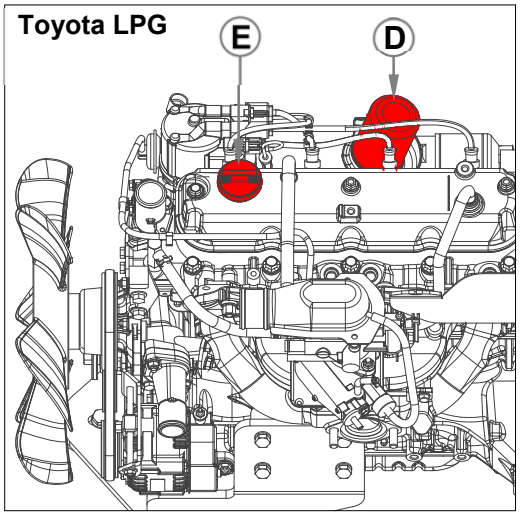
18. Unscrew and remove the oil filler cap (**F**) from the top of the engine and pour in clean new engine oil with suitable viscosity that meets the recommended specification *(see on page 75).*

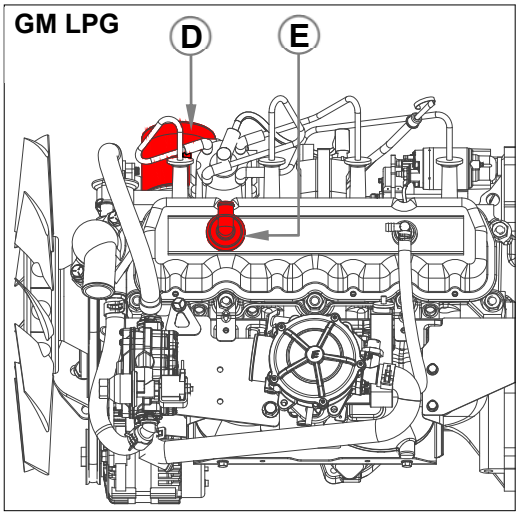
    Engine sump & drain hose oil volume: 6.8 litres / 7.2 quarts
19. Clean up any oil spills immediately.
20. Refit the oil filler cap and run the engine to warm up the oil. Check around the filter for leaks.
21. Stop the engine wait for approximately 5 minutes until the oil has drained back into the sump.
22. Check the oil level on the dipstick *(see 5.3 on page 47)* and top-up if necessary.
23. Refit the access panel (**A**) to the right hand side of the truck and close the bonnet.

LPG Engine Oil & Filter Change Procedure



1. Park the truck in a designated service area (ground must be level).
2. Lower the mast fully and tilt fully forward.
3. Switch off the engine and wait until all parts are cool enough to touch.
4. If the engine is cold run it for 5 minutes to warm the oil. This will help it to flow.
5. Open the bonnet from the right hand side of the truck.
6. Remove the access panel (**A**) from the right hand side of the truck.
7. Position a suitable waste oil collection container (see point 18 for the volume of oil in the engine) on the ground to the right hand side of the engine.
8. Unclip the drain hose (**B**) from the right hand side of the radiator/oil cooler.
9. Unscrew the cap (**C**) from the oil drain fitting on the bottom of the engine and screw the threaded end of oil drain hose on. Oil will only start to flow when the hose is fully screwed on.
10. Direct the free end of the oil drain hose over the collection container.
11. Allow the oil to drain completely.
12. Unscrew the drain hose from the drain fitting, then screw on the cap and tighten.
    - Torque to 50 Nm (37 ft. lbs)
13. Clean down the drain hose the clip it securely in the p-clip on the side of the radiator.
14. Unscrew and remove the used engine oil filter (**D**) (dispose of the used filter in accordance with local environmental regulations) from the left hand side of the engine. Use a filter wrench if required.





15. Collect the draining oil from the filter.
16. Clean the sealing surface of the filter support with a clean lint free cloth.
17. Lightly coat the seal on a new original filter element with clean engine oil.
18. Screw on the new engine oil filter element by hand - ensuring that the seal is correctly placed – until the gasket is touching the sealing surface then tighten.
    - Torque to 10-12 Nm (7.5-9 ft. lbs)
19. Remove the oil filler cap (**E**) from the top of the engine and pour in clean new engine oil with suitable viscosity that meets the recommended specification *(see on page 75).*

    Toyota engine sump oil volume: 4 litres / 4.2 quarts

    GM engine sump oil volume: 4.7 litres / 5 quarts
20. Clean up any oil spills immediately.
21. Refit the oil filler cap and run the engine to warm up the oil. Check around the filter for leaks.
22. Stop the engine wait for approximately 5 minutes until the oil has drained back into the sump.
23. Check the oil level on the dipstick *(see 5.3 on page 47)* and top-up if necessary.
24. Refit the access panel (**A**) to the right hand side of the truck and close the bonnet.

6.5 Diesel Fuel System (If Applicable)

Caution

Switch off the engine before working on the fuel system.

Smoking and naked flames are prohibited when working on the fuel system.

Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel lines. Tighten all connections before applying pressure. Use a piece of card to search for fuel leaks.

If any fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result.

Note

Work on the fuel system may only be performed in a clean environment. Clean and dry the area around all components concerned thoroughly. Contamination must be avoided.

Replace filter elements immediately if they get plugged.

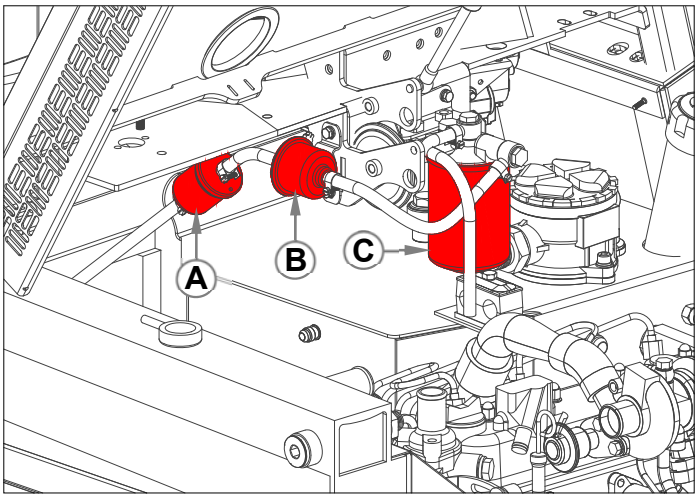
Note

Observe safety regulations when handling fuels and avoid skin contact.

Observe relevant environmental protection regulations when disposing of waste fuel and used filter elements. DO NOT allow fuel to leak on the ground.

The fuel passes from the tank through a pre-filter and is then conveyed by an electric feed pump through the main filter to the fuel injection pump.

The filters and the feed pump are located inside the engine compartment to the left hand side of the engine (see figure 6.5 below) and can be accessed by opening the bonnet from the right hand side of the truck. Replace the filters in accordance with the maintenance schedule.



A. Fuel Pre-Filter
B. Electric Fuel Pump
C. Main Fuel Filter

Figure 6.5

Changing the diesel fuel pre-filter:

1. Park the truck in a designated service area with the forks lowered fully and the mast tilted fully forward.
2. Switch off the engine and wait until all parts are cool enough to touch.
3. Open the bonnet from the right hand side of the truck.
4. Place a suitable container underneath the pre-filter (**A**) to collect any draining fuel.
5. Disconnect the fuel lines from the used pre-filter.
6. Reconnect the fuel lines to a new pre-filter.

Changing the main diesel fuel filter element:

1. Place a suitable container underneath the main fuel filter (**C**) to collect any draining fuel.
2. Unscrew and remove the used element.
3. Clean the sealing surfaces of the new element and filter head with a clean lint free cloth.

4. Apply a thin film of diesel to the gasket on the new filter element and screw onto the filter head (torque to: 10-12Nm).
5. Vent the fuel system.

Diesel Fuel System Venting Procedure:

1) Turn the ignition key switch to the “ON” position to activate the electric fuel pump.
2) Wait approximately 15 seconds for the pressure to build up in the system.

6.6 LP Gas System (If Applicable)

Caution

DO NOT use Teflon tape to seal any LP gas fuel system fittings. Failure to follow this warning may cause leaks possibly resulting in serious injury, death, and/or property damage and may void any warranty coverage.

Caution

LP gas can cause frostbite when released, due to its very low temperature.

When working with LP Gas the following Personal Protective Equipment (PPE) must be worn:

- **Goggles and neoprene gloves or gauntlets**
- **Long sleeve cotton overalls or jacket**
- **Safety shoes/boots**

Caution

LP gas bottles are heavy and must be handled with care to avoid injury. Always assume that LP gas bottles are full for manual handling purposes. Check the weight of the bottle before lifting. Get an assistant to help lift the bottle or use suitable lifting equipment if necessary.

Note

Due to the inherent danger of gaseous fuels, LP gas system maintenance should only be performed by persons knowledgeable of the hazards associated with the use of gaseous fuels. Any maintenance, service or repair should be performed by trained and experienced service technicians.

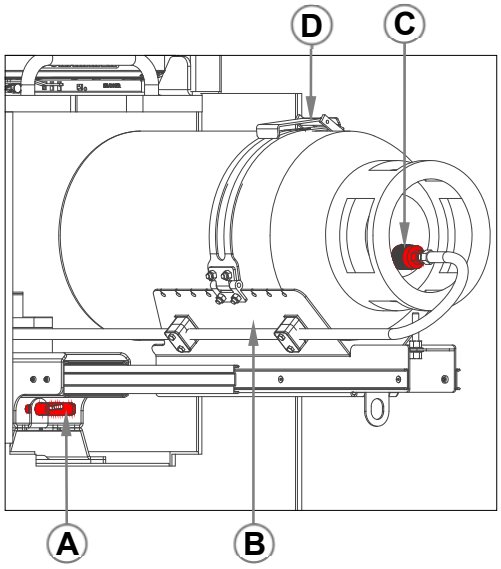
Perform maintenance on the LP gas system as described in the relevant engine maintenance manual in conjunction with the procedures described in sections ***6.7 LP Gas Inline Filter (If Fitted)*** and ***6.8 LP Gas Pressure Regulator***. Contact your local Combilift partner for assistance if required.

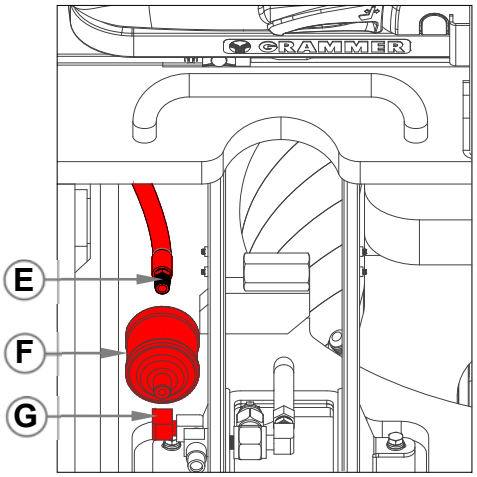
6.7 LP Gas Inline Filter (If Fitted)

The LP gas inline filter is mounted on the sliding LP gas bottle carrier, which is located below the seat on the left hand side of the truck.

Changing the LP Gas In-line Filter:

1. Park the truck on level ground in a well ventilated area and ensure no external ignition sources are present.
2. Lower the mast fully and tilt the mast fully forward.
3. Close the valve on the LPG bottle fully by turning it clockwise.
4. Run the engine until it cuts out (to burn off any remaining fuel in the lines).
5. Turn the ignition key switch to the '0' (off) position and remove the key.
6. Isolate the battery by turning the battery isolator key switch anticlockwise.
7. Open the anti-luce fastener (**A**) on the LPG bottle carrier.
8. Slide the LPG bottle carrier tray (**B**) out fully.
9. Unscrew the hose coupling (**C**) from the LPG bottle. Place the hose coupling carefully in a safe position.
10. Open the LPG bottle latch (**D**) (or ratchet strap – if fitted), then remove the bottle from the carrier and place carefully in a safe location.
11. Unscrew the hose (**E**) from the used filter element (**F**).
12. Unscrew and remove the used filter element (**F**).
13. Clean the threads on the hose (**E**) and the fitting (**G**).
14. Take a new filter. Ensure the threads are clean, dry and free from oil and grease. **Apply B577 pipe seal to the threads of the new filter immediately before fitting.**
15. Fit the new filter. Allow at least 20 minutes for the B577 pipe seal to cure.
16. Slowly open the valve on the LP gas cylinder.





17. Check around the new filter for leaks. Use a soapy water solution or an electronic leak detector. Repair any leaks.
18. Slide the LPG bottle carrier in and secure in place by closing the anti-luce fastener **(A)**.

6.8 LP Gas Pressure Regulator/Vaporiser

During the course of normal operation oil or “heavy ends” may build up inside the secondary chamber of the LPG pressure regulator/vaporiser. The oil and heavy ends may be a result of poor fuel quality, contamination of the fuel, or regional variation of the fuel make up. A significant build-up of oil can affect the performance of the pressure regulator/vaporiser.

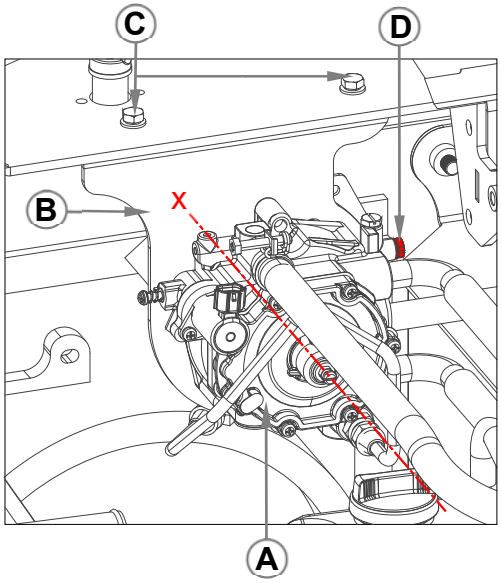
The oil should be drained from the LPG pressure regulator/vaporiser periodically in accordance with the maintenance schedule. More frequent draining of the LPG pressure regulator/vaporiser is recommended if substandard fuel is used.

6.8.1 Toyota Engine LP Gas Pressure Regulator Oil Build-Up

The Toyota LP gas pressure regulator/vaporiser is mounted under the bonnet to the left hand side of the engine.

Draining Oil Build-up from the Toyota Engine LP Gas Pressure Regulator:

1. Park the truck in a well ventilated area and ensure no external ignition sources are present.
2. Lower the mast fully and tilt the mast fully forward.
3. Start the engine and wait until it has reached its stable operating temperature. This will help the oil to flow from the regulator.
4. When the engine is warm, close the valve on the LPG bottle fully.The engine will continue to run until it has used up all the fuel in the fuel lines.
5. When the engine stops, turn the ignition key switch to the ‘0’ (off) position and remove the key.
6. Isolate the battery by turning the battery isolator key switch anticlockwise.
7. Open the bonnet from the right hand side of the truck to gain access to the LPG pressure regulator (**A**).
8. Ensure all parts concerned are cool enough to touch, otherwise wear heat resistant gloves before proceeding.
9. Unbolt the regulator bracket (**B**) by removing the two bolts (**C**).
10. Turn the regulator and bracket assembly clockwise 90° about the x-axis.
11. Open the drain plug (**E**) which should be at the bottom of the regulator after performing the previous step.



12. Allow the oil to drain from the regulator into a suitable receptacle.
13. When all the oil has drained completely, remove the receptacle and refit the drain plug.
14. Remount the regulator and bracket assembly securely using the fasteners that were removed at step 10.
15. Slowly open the valve on the LPG bottle.
16. Start the engine and check for leaks at the regulator and the LP gas inlet and outlet fittings. Use a soapy water solution or an electronic leak detector. Repair any leaks.
17. Check coolant line connections to ensure no leaks are present.
18. Close the bonnet.
19. Dispose of drained material in compliance with statutory legislation.

6.8.2 GM Engine LP Gas Pressure Regulator Oil Build-Up

The GM LP gas regulator is mounted on the engine.

Draining Oil Build-up from the GM Engine LP Gas Pressure Regulator:

1. Park the truck in a well ventilated area and ensure no external ignition sources are present.
2. Lower the mast fully and tilt the mast fully forward.
3. Start the engine and wait until it has reached its stable operating temperature. This will help the oil to flow from the regulator.
4. When the engine is warm, close the valve on the LPG bottle fully.The engine will continue to run until it has used up all the fuel in the fuel lines.
5. When the engine stops, turn the ignition key switch to the ‘0’ (off) position and remove the key.
6. Isolate the battery by turning the battery isolator key switch anticlockwise.
7. Open the bonnet from the right hand side of the truck to gain access to the LPG pressure regulator.
8. Ensure all parts concerned are cool enough to touch, otherwise wear heat resistant gloves before proceeding.
9. Loosen the hose clamp on the LP gas outlet hose and remove the hose.
10. Unbolt the regulator by removing the two bolts from underneath.
11. Turn the regulator so that the LP gas outlet fitting is pointing straight down.
12. Allow the oil to drain from the regulator into a suitable receptacle.
13. Inspect the regulator outlet for any large dried particles and remove.
14. When all the oil has drained completely, remove the receptacle and refit the drain plug securely.
15. Remount the regulator securely using the bolts that were removed at step 10.
16. Reconnect the hose to the LP gas outlet.

17. Reconnect any other hoses removed during this procedure.
18. Slowly open the valve on the LPG bottle.
19. Start the engine and check for leaks at the regulator and the LP gas inlet and outlet fittings. Use a soapy water solution or an electronic leak detector. Repair any leaks.
20. Check coolant line connections to ensure no leaks are present.
21. Start the engine and check for leaks at the regulator.
22. Close the bonnet.
23. Dispose of drained material in compliance with statutory legislation.

6.9 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 (***Glysantin® G64®)*** 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 or antifreeze that contains sealing additives.

Do not mix ethylene glycol and propylene glycol based coolants.

Do not use coolants that contain nitrites.

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 coolant to water. The concentration of coolant concentrate to water must never be allowed fall below 40% as the protective effects fall away rapidly below this concentration.

Coolant 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 must be clean and clear and 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

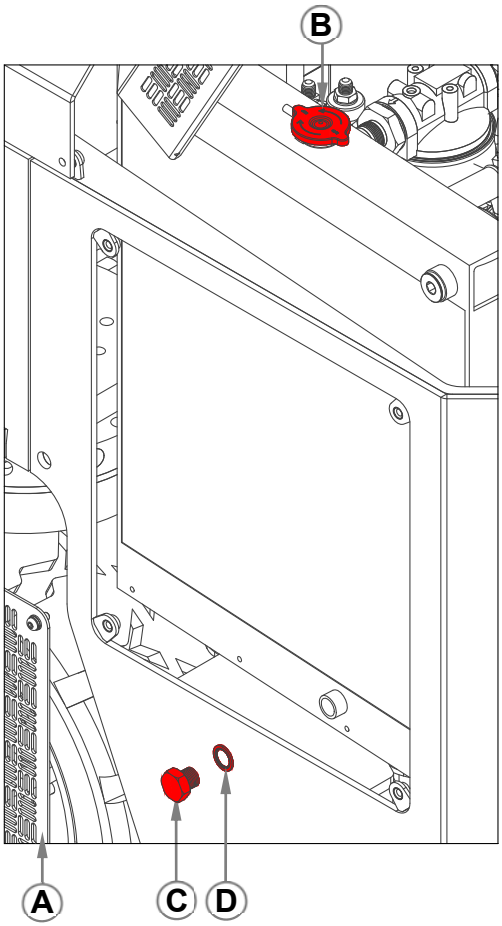
Water that deviates from the values in the table must be conditioned.

Note

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

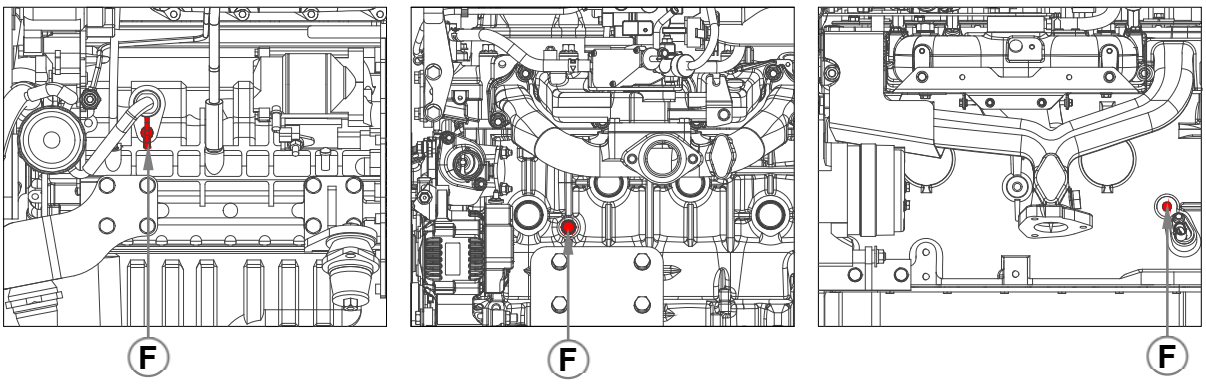
Draining the Cooling System:

1. Park the truck in a designated service area with the forks lowered fully and the mast tilted fully forward.
2. Switch off the engine and wait until the radiator is cool enough to touch.
3. Open the bonnet from the right hand side of the truck.
4. Remove the access panel from the right hand side of the truck.
5. Remove the radiator cover panel (**A**) from the rear of the truck.
6. Remove the cap (**B**) from the top of the radiator.
7. Turn the cap anticlockwise gradually to release any pressure before removing.
8. Place a suitable container behind the truck under the drain plug (**C**) to collect the used coolant.
9. Unscrew the drain plug and allow time for the coolant to drain completely from the radiator. Use a funnel or hose to channel the used coolant into the collection container



10. Empty the coolant bottle.
11. Open the coolant drain (**F**) on the right hand side of the engine. Use a funnel or pipe to channel the used coolant into the collection container.
12. Allow time for the coolant to drain completely from the engine.
13. Close the drain on the engine. ***(On the PSI GM LPG engine use a suitable high temperature thread sealant when refitting the drain plug)***
14. Refit the radiator drain plug with a new seal (**D**) and tighten into the radiator.
    - Torque to 94-98 Nm (70-72 ft. lbs)

Kubota Diesel **Toyota LPG** **PSI GM LPG**



Flushing the Cooling System:

1. Drain the system as described under ‘Draining the Cooling System’.
2. Fill the radiator with clean clear water then refit the radiator cap securely.
3. Run the engine for 5 minutes.
4. Wait until the radiator is cool enough to touch.
5. Remove the radiator cap, top the radiator up to full again then refit the radiator cap securely.
6. If the truck has a cabin heater fitted, turn the temperature control knob to hot.
7. Run the engine for 15 minutes.
8. Watch the temperature gauge while the engine is running. If the needle moves into the red area, switch the engine off immediately.
9. Wait until the radiator is cool enough to touch then drain the system as described under ‘Draining the Cooling System’.
10. Repeat steps 2-7 using a solution of clean clear water (85%) mixed with the new coolant concentrate (15%) that is going to be used.
11. Flush out the coolant bottle.

A coolant system flushing solution may be used to remove scale and other deposits if required.

Filling the Cooling System:

1. Drain and flush the system as described under ‘Draining the Cooling System’ and ‘Flushing the Cooling System’.
2. Remove the cap from the top of the radiator. The radiator must be cool enough to touch before removing the cap.
3. Turn the cap anticlockwise gradually to release any pressure before removing.
4. Fill with the specified coolant concentrate mixed with clean clear water (50% coolant concentrate to 50% water) up to the bottom of the radiator filler neck.
5. Fill the coolant bottle to half way between the full and low level marks with the same mixture.
6. If the truck has a cabin heater fitted, turn the temperature control knob to hot.
7. Run the engine for 5 minutes.
8. Wait until the radiator is cool enough to touch.
9. Remove the radiator cap, top the radiator up to full again then refit the radiator cap securely.
10. Run the engine up to operating temperature then switch off the engine and wait until the radiator is cool enough to touch.
11. Check the coolant level in the radiator and top up to the bottom of the filler neck if necessary. Top up the coolant bottle also if required.

Approximate Coolant System Capacity = 14 litres/14.8 quarts

6.10 Belt Drive System

Caution

Switch off the engine and remove the key from the ignition before working on the belt drives.

When work on the belt drives has been completed, check that all guards have been replaced and that all tools have been removed from the engine.

The engine uses a v-belt to drive the water pump, fan and alternator. It is important to note that the v-belt is an integral part of the cooling and charging system and should be inspected in accordance with the maintenance schedule.

Checking the Belt Drive:

- Check the entire belt drive i.e. the belt(s) associated pulleys, bearings etc. visually for signs of damage and wear and replace any damaged parts.
- Check the tension on the belt.
- Tension loose belts and replace belts showing signs of damage or wear.
- **Do Not** over tension the belt(s) as this will shorten the life of pulleys and bearings.

When inspecting the belt check for:

- Cracks
- Chunking of the belt
- Splits
- Material hanging loose from the belt
- Glazing, hardening

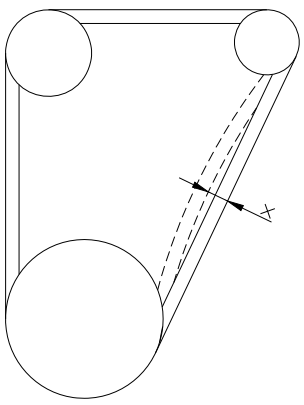
If any of these conditions exist the belt should be replaced with a genuine OEM belt.

To Check the Belt Tension:

Perform this check when the engine IS NOT running. Open the bonnet from the right hand side of the truck and remove the access panel from the right hand side of the truck to access the belt. Apply a force of 98Nm to the belt.

- Diesel - Apply force half way between the alternator pulley and the crankshaft pulley. The belt should deflect by between 7mm and 9mm.
- Toyota LPG - Apply force half way between the alternator pulley and the water pump pulley. The belt should deflect by between 9mm and 11mm.
- GM LPG - Apply force half way between the alternator pulley and the water pump pulley. The belt should deflect by between 12mm and 14mm.

If the belt deflects by more or less than the permissible amount the tension must be adjusted.



Belt Deflection x

V-belt Tension Adjustment Procedure:

- Loosen the alternator mounting bolts and adjust the alternator position.
- Tighten the mounting bolts and recheck the belt tension.
- Adjust until the specified deflection is achieved.

6.11 Air Filter System

Caution

Switch off the engine before working on the air filter system.

Do not touch the engine, exhaust system, or cooling system immediately after stopping the engine.

Wait until the engine has cooled to the point that the exhaust system, engine, and cooling system are comfortable to touch.

The truck is equipped with a dry air filter for filtering the engine intake air. The dry air filter consists of a single main filter element. An optional safety filter element may be fitted if required.

The dry air filter should be maintained in accordance with the maintenance schedule, however more frequent maintenance will be required if the truck is operating in high dust applications.

Note

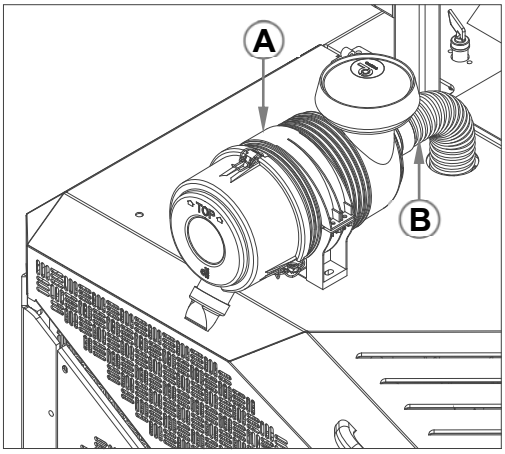
Clean and dry the area around the filter housing thoroughly. Contamination must be avoided. Block off the engine air intake if necessary.

Air contaminated with dust entering the engine will cause damage and reduce performance.

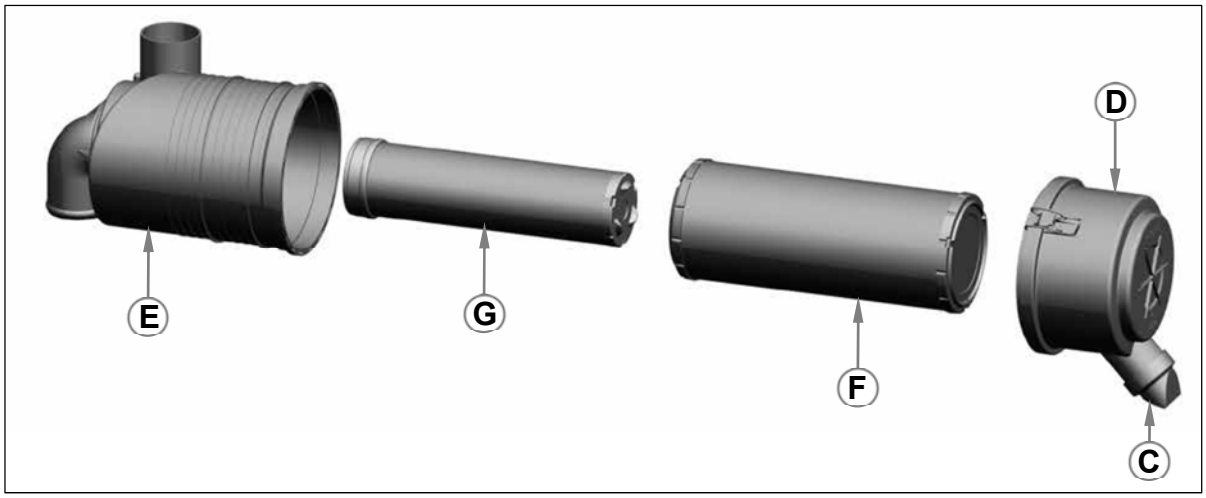
Never run the engine if parts of the air intake system are removed. Replace damaged air filter system parts immediately.

To Service the Air Filter

1. Park the truck in accordance with the recommended parking procedure.
2. The air filter (**A**) is mounted on top of the bonnet to the right hand side of the truck.
3. Inspect the air intake hose (**B**) for cracks or other damage and repair or replace as necessary. Inspect all connections and clamps and ensure they are tightly sealed. Any leaks here will admit dust directly to the engine.



4. Check the outlet slot on the dust valve (**C**) for dust build up. Remove dust by pinching the valve. Make sure the dust valve is flexible and not inverted, damaged or plugged. Replace the dust valve if necessary.



5. Unlatch the filter cover (**D**) and remove from the filter housing (**E**).
6. Remove the primary filter element (**F**) – gently move the end of the filter back and forth to break the seal, then rotate while pulling it straight out. Avoid knocking it off the housing while removing.
7. If the optional safety filter element (**G**) has been fitted, visually check it in place for damage and check that it is properly seated.
   - Do not remove the safety filter unless it is due for replacement.
   - Change the safety filter every three primary filter changes.
   - DO NOT attempt to clean or reuse the safety filter.
   - When changing the safety filter use a clean damp cloth to wipe the filter sealing surface and the inside of the outlet tube.
8. Avoid leaving the outlet to the engine exposed for any period of time. Keep the outlet covered to avoid admitting dust to the engine.
9. Inspect the primary filter element. Clean if lightly soiled or replace if heavily soiled. If there is a streak of dust on the clean side of the filter it must be replaced.

   To clean the filter :
   - Lightly knock off as much dust as possible.
   - Blow out with dry compressed air (maximum 5 bar pressure) from the inside to the outside.
10. If fitting a the new primary filter element inspect the new element for damage. Never install a damaged filter. **Do not wipe the sealing area on the primary filter.**
11. Insert the new filter. If changing the safety filter at this service, seat it properly before installing the primary filter. Insert new filters carefully. Make sure filters are inserted completely into the housing. Press in by hand along the rim of the filter, not the flexible centre..
12. Reinstall the filter housing cover ensuring that the dust valve is pointing down towards the ground. The cover should not come into contact with the filter element before it is fully in place. If there is contact before the cover is fully in place the filter must be pushed in further before latching the cover.

6.12 Battery Maintenance

The battery is located inside the chassis of the truck. It can be accessed by removing the operating enclosure floor plate.

The truck is supplied with a **12V 105Ah 735A** battery.

Caution

Protective clothing and goggles should be worn and particular care taken not to come into contact with or spill battery electrolyte.

Batteries contain sulphuric acid which may leak for various reasons. Sulphuric acid is a corrosive and poisonous liquid that will cause burns and irritation to the skin and eyes.

Batteries generate explosive gases when being charged. Charge in a well-ventilated area and follow the instructions for the charger being used.

Never connect the positive terminal to the negative terminal on the same battery with a conductive object such as a metal tool.

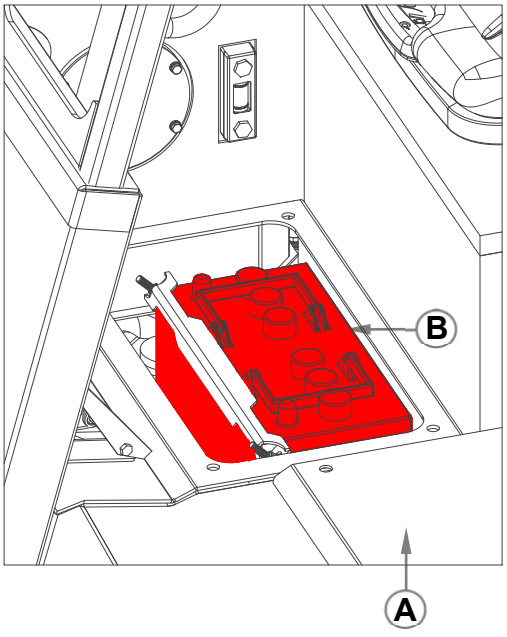
The temperature of the battery must not exceed of 50° C (122° F) during charging.

Smoking and the use of naked flames in the charging area is prohibited.

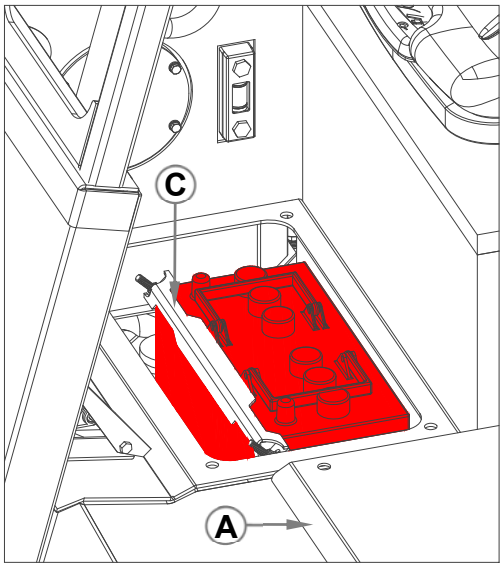
Clean the battery and terminals with a damp cloth. Using a dry cloth can lead to a build-up of static electricity that may discharge and cause an explosion.

Checking the Battery Electrolyte Level

1. Park the truck in accordance with the recommended parking procedure then switch off the engine and all electrical components.
2. Isolate the electrical system by turning the isolator key anticlockwise.
3. Remove the floor plate (**A**) from the operating enclosure to gain access to the battery (**B**).
4. Check the electrolyte level in each cell by removing each of the caps and inspecting inside (clean the top of the battery before removing the caps).
5. The electrolyte should be just above the tops of the separators.
6. If required top up each cell with distilled or deionised water and refit the cap securely.



Removing the Battery



1. Park the truck in accordance with the recommended parking procedure then switch off the engine and all electrical components.
2. Remove the floor plate (**A**) from the operating enclosure to gain access to the battery (**B**).
3. Isolate the electrical system by turning the isolator key anticlockwise.
4. Remove the connector from the negative black (**-**) battery terminal first, then remove the connector from the positive red (**+**) battery terminal.
5. Remove the battery bar (**C**) by first unscrewing the two M8 locknuts from the battery rods. DO NOT allow the battery bar to come into contact with the battery terminals.
6. Use the handles on top of the battery to lift it out.

   CAUTION the battery weights 27.6kg.

Installing a new Battery

1. Compare the new battery with the used battery and ensure the new battery has the same polarity and performance characteristics as the old battery
2. Check that the new battery is clean and dry and that the caps are secure.
3. Check that the new battery has a voltage above 12.40V. If not, charge the battery or use another that has a voltage above 12.40V.
4. Ensure the 2 terminal caps are still fitted at this stage.
5. Ensure the battery tray is clean and dry, then insert the new battery.
6. Ensure the connectors are clean and corrosion free. Remove corrosion with fine emery paper if required. Coat lightly with acid free grease.
7. Refit the battery bar then remove the terminal caps and place them on the spent battery.
8. Connect the positive (**+**) red battery terminal first then connect the negative (**-**) black terminal.
9. Turn the battery isolator key clockwise, then start the engine.

Note

DO NOT over tighten the battery bar or terminal clamps.
Dispose of used batteries at a battery collection point.

Battery Charging

Charging the battery on the vehicle is not recommended. Follow steps described under ***'Removing the Battery'*** to remove the battery from the truck. Follow the instructions for the battery charger being used.

Charging of the battery is required when the:

- Storage period is more than 6 months without charging.
- Battery operating current voltage (OCV) is less than 12.4V.

Steps Prior to Charging:

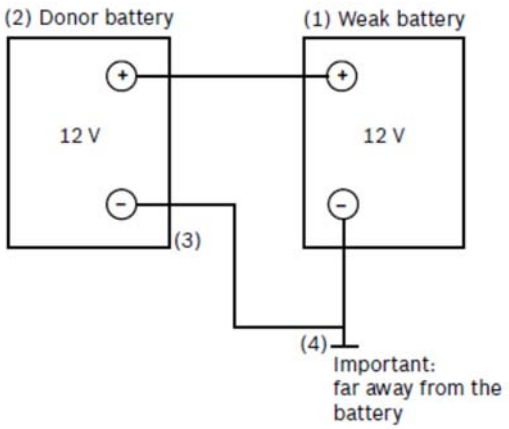
- Wear protective glasses whilst handling the battery.
- Do not carry out charging near any source of ignition e.g. flames or sparks.
- Do not charge a damaged or frozen battery.
- Boost charging is not recommended.

Jumpstarting:

When performing a jump start using jumper cables, there can be bursts of high voltage of hundreds of volts when connecting the cables. Isolate the battery when connecting the jumper cables. Only use standardised battery jumper cables. Only connect batteries of the same nominal voltage. Before giving starting aid, try to figure out the reason for the battery weakness. If the reason is a failure in the vehicle electrical system, starting aid should not be given. The battery or the electric system of the vehicle giving starting aid might become damaged. Always protect your eyes and hands from the battery.

Performing a Jumpstart:

1. Switch off the ignition in both vehicles.
2. Connect the red jumper cable to the positive pole of the weak battery.
3. Connect the red jumper cable to the positive pole of the donor battery.
4. Connect the black jumper to the negative pole of the donor battery.
5. Connect the black jumper cable to a bare metal earth point (away from the battery) on the vehicle with the weak battery.



6. Start the engine in the vehicle providing assistance, followed by the vehicle requiring assistance.
7. If the engine does not start after a maximum of 15 seconds, wait one minute before trying again.
8. Once the engine has started, let both engines idle for approximately 2 minutes then remove the cables.
9. Reverse the sequence of steps 1 to 5 sequence when disconnecting the cables.

6.13 Hydraulic Oil System

Note

Use of hydraulic oil that does not meet the required grade or temperature range may cause poor operation, reduced efficiency and/or damage to hydraulic components.

Combilift trucks are supplied with ISO Grade 46 hydraulic fluid unless otherwise stated. Refer to the decal on the hydraulic tank. Please check if the hydraulic fluid is suitable for the trucks operating temperature range.

Caution

Switch off the engine before working on the hydraulic system.
Wait until the engine and hydraulic tank are cool enough to touch before commencing work.

Note

Clean and dry the area around all components concerned thoroughly.

Observe safety regulations when handling oils and avoid skin contact.

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

Hydraulic Oil

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

The hydraulic oil used in the trucks hydraulic system must conform to **ISO 3448** viscosity classification grade and include additives for improved:

- Viscosity index
- Wear prevention
- Corrosion protection
- Stability against oxidation
- Deaerating and foam suppressing
- Compatibility with seals and gaskets
- Low pour point

The oil must also have the correct temperature range for the operating temperature of the truck. If the operating temperature is outside the range of the standard grade 46 oil, the standard oil should be replaced with the appropriate grade of oil.

The correct grade of oil for the relevant operating temperature range can be determined using the following table:

HYDRAULIC OIL TABLE				
FLUID OPERATING TEMPERATURE RANGE		-11°C to 66°C 12°F to 150°F	-4°C to 74°C 24°F to 166°F	4°C to 89°C 39°F to 193°F
RECOMMENDED FLUIDS	Maxol Multivis	ISO GRADE 32	ISO GRADE 46	ISO GRADE 68
	Castrol Hyspin AWH			
	BP Bartran HV			
	Mobil Univis N			
	Mobil DTE 10 Excel			
	Shell Tellus Oil T			
	Chevron Rando HDZ			

Hydraulic Oil Filters

There are three oil filters in the hydraulic system. These are the:

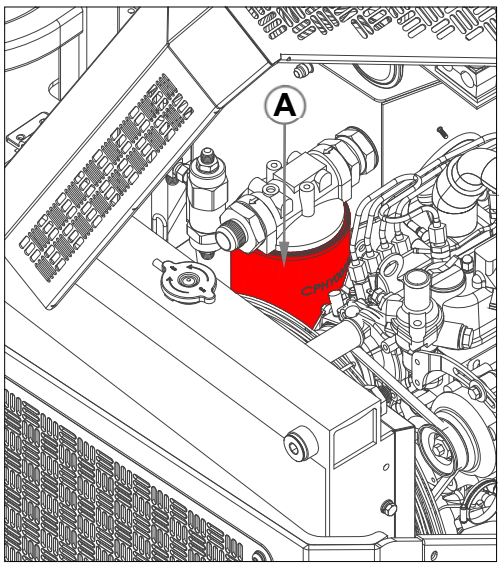
- Suction Filter
- Return Filter
- Strainer Filter

The hydraulic oil filters must be changed at regular intervals in accordance with the maintenance schedule. The tank breather must also be changed at regular intervals.

Suction Filter

The suction filter element must be replaced after the first 100 hours of operation and then at regular intervals in accordance with the maintenance schedule.

To change the suction filter element:



1. Park the truck in a designated service area in accordance with the recommended parking procedure.
2. Lower the mast fully and tilt the mast fully forward.
3. Switch off the engine and remove the key from the ignition.
4. Open the bonnet from the right hand side of the truck to gain access to the suction filter (**A**).
5. Wait until the suction filter, hydraulic tank and engine are cool enough to touch before proceeding.
6. Clean the area around the suction filter thoroughly before removing the used element to prevent any contamination from entering the hydraulic system.
7. Position a suitable container under the used filter element to collect any escaping oil.
8. Unscrew and remove the used filter element. Use a filter wrench if required.

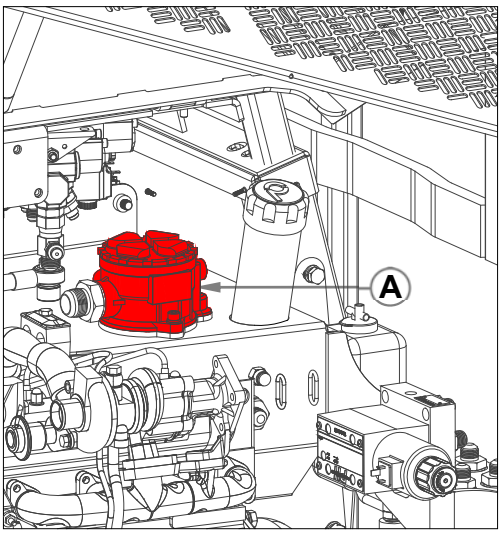
9. Check the sealing surfaces and threads on the filter mount and the new filter element and clean if necessary.
10. Apply a thin film of clean hydraulic oil to the O-ring on a new suction filter element.
11. Screw the new filter element on to the filter mount until it is hand tight only. DO NOT over tighten the filter. Use a genuine OEM component.
12. Start the truck and check around the filter for leaks. Repeat the check when the hydraulic oil has reached operating temperature.
13. Top up the hydraulic oil if necessary (see section 5.5 Checking Hydraulic Oil Level on page 49).
14. Dispose of waste oil and used filter elements in compliance with statutory legislation.

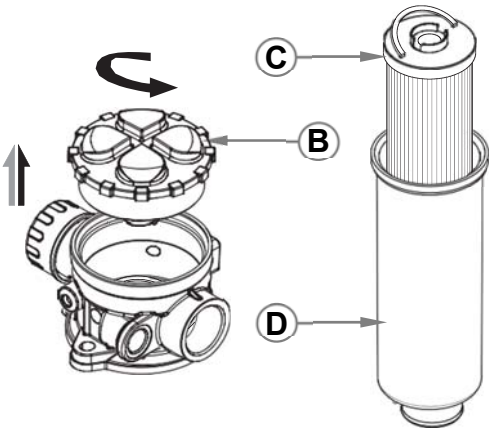
Return Filter

The return filter element must be replaced after the first 100 hours of operation and then at regular intervals in accordance with the maintenance schedule.

To change the return filter element:

1. Park the truck in a designated service area in accordance with the recommended parking procedure.
2. Lower the mast fully and tilt the mast fully forward.
3. Switch off the engine and remove the key from the ignition.
4. Open the bonnet from the right hand side of the truck to gain access to the return filter (**A**).
5. Clean and dry the area around the return filter thoroughly to prevent any contamination from entering the hydraulic system.
6. Unscrewing the return filter cover (**B**).
7. Lift out the filter element (**C**) and bowl (**D**) using the handle on the element.
8. Remove the used filter element (**C**) from the bowl (**D**). Collect the used element and any escaping oil in a suitable container and dispose of in compliance with statutory legislation.
9. Apply a thin film of clean hydraulic oil to the O-ring on the bottom of a new filter element and fit into the bowl.





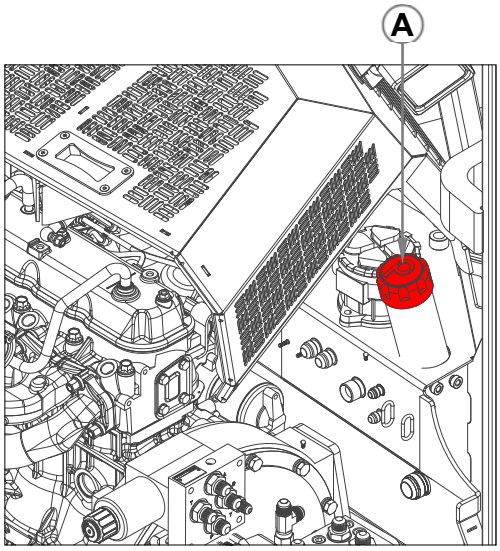
10. Check the condition of the bowl seal and replace if necessary (apply a thin film of clean hydraulic oil to a new seal before fitting).
11. Insert the bowl into the housing.
12. Check the condition of the cover seal and replace if necessary (apply a thin film of clean hydraulic oil to a new seal before fitting).
13. Clean the filter cover if necessary then refit. Ensure that the spring is in place between the cover and the element.
14. Start the truck and check around the filter for leaks. Repeat the check when the truck has reached operating temperature.
15. Top up the hydraulic oil if necessary (see section 5.5 Checking Hydraulic Oil Level on page 49).

Hydraulic Oil & Strainer Filter

The hydraulic oil and the strainer filter located inside the hydraulic tank must be changed at regular intervals in accordance with the maintenance schedule.

To change the hydraulic oil and strainer filter:

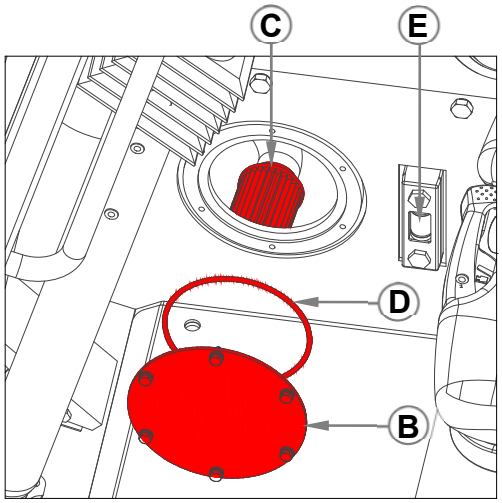
1. Operate the mast continuously to warm up the hydraulic oil. This will help the oil to flow.
2. Park the truck in a designated service area.
3. Lower the mast fully and tilt the mast fully forward.
4. Switch off the engine, remove the key from the ignition and wait until the hydraulic tank is cool enough to touch before proceeding.
5. Open the bonnet from the right hand side of the truck to gain access to the hydraulic tank filler.



6. Unscrew and remove the filler cap (**A**).
7. Position suitable containers for collecting the used oil next to the truck.

   Hydraulic Tank Capacity: 35L / 37qt
8. Use a fluid extractor to transfer the used oil from the hydraulic tank into the collection container(s). Remove the strainer from the filer neck and feed the suction pipe of the fluid extractor into the tank through the filler neck until it reaches the bottom of the tank.
9. Unbolt and remove the panel (**B**) from the left hand side of the hydraulic tank.
10. Reach inside the tank then unscrew and remove the used strainer filter (**C**) (dispose of the used filter in accordance with local environmental regulations).
11. Extract any remaining oil and clean the bottom of the hydraulic tank through the opening.

12. Apply a little hydraulic sealant to the thread of a new strainer filter and fit the new filter correctly inside the tank. Use a genuine OEM component.
13. Inspect the O-ring seal (**D**) and replace with a new seal if necessary.
14. Refit the panel (**B**) correctly with the O-ring seal (**D**).
15. Add hydraulic oil through the filler neck until the oil level is half way between the top and bottom of the sight glass (**E**).
10. Refit the filler cap securely then close the bonnet.



11. Check the hydraulic oil level again after a short period of operation.

    Hydraulic Tank Capacity: 35 litres / 37 quarts

16. Dispose of waste oil and used filter elements in compliance with statutory legislation.

Note

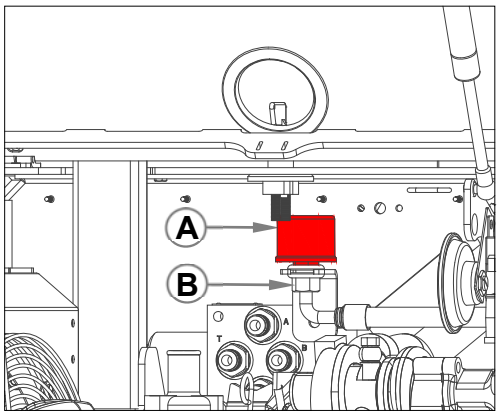
Before adding hydraulic oil, ensure that all cylinders are retracted fully then fill to half way up the sight glass on the hydraulic oil gauge. Otherwise the tank may be overfilled.

Hydraulic Tank Breather

The hydraulic tank breather should be replaced at regular intervals in accordance with the maintenance schedule.

To change the hydraulic tank breather:

1. Park the truck in a designated service area in accordance with the recommended parking procedure.
2. Lower the mast fully and tilt the mast fully forward.
3. Switch off the engine, remove the key from the ignition and wait until the engine is cool enough to touch before proceeding.



4. Open the bonnet from the right hand side of the truck to gain access to the hydraulic tank breather (**A**).
5. Clean the used breather (**A**) and the surrounding area thoroughly before removing the used breather.
6. Unscrew and remove the used breather from the end of the breather hose (**B**).
7. Fit a new breather.

6.14 Mast Maintenance

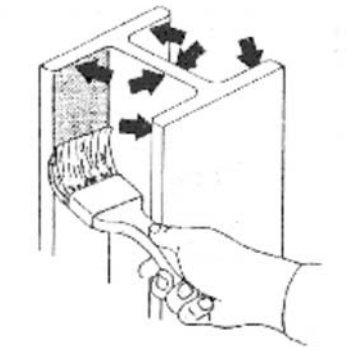
Perform checks on the mast as required by the Pre-Use checks and maintenance as required by the first 100 operating hours service and in accordance with the maintenance schedule. Details on how to perform the mast checks and maintenance are provided in this section.

Warning

Never work on the mast with the forks in a raised position unless adequate supports are in place.
Block access to the lift truck control handles when working on the mast.

Mast Channel Maintenance

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



Fork Carriage With Hydraulic Fork Positioning Maintenance (If Fitted)

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

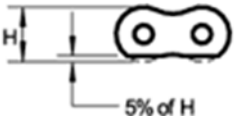
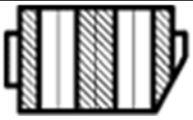
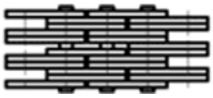
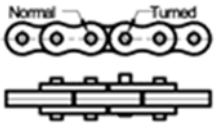
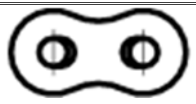
Mast Chain Maintenance

Regular inspection and lubrication of the chains will vastly increase their service life and reduce downtime. When performing chain maintenance, make sure to follow the guidelines in ‘Chain Inspection’, ‘Measuring Chain Stretch’, ‘Chain Lubrication’ and ‘Chain Adjustment’.

It is recommended that trucks used in arduous, harsh or aggressive environments such as cold stores, marine, corrosive chemical, metal manufacturing or processing, cement/aggregate processing and brine processes (this list is not exhaustive) should have their mast chains and mast chain anchor pins replaced after a period not exceeding 4000 operating hours or two years, whichever is the shorter. Additionally where the lifting mechanism uses a single leaf chain (e.g. free lift section), the leaf chain anchor bolts should also be replaced at the same time.

Chain Inspection

Inspect the chains for the following damage and defects:

Symptom	Appearance	Probable cause	Correction
Worn contour		Normal wear on sheave Abnormal wear rubbing on guides	Replace leaf chain when 5% worn Check Leaf chain alignment or increase clearance
Worn surfaces on outer plates or pin heads		Misalignment, rubbing on side flanges	Check leaf chain alignment and correct clearance as necessary
Tight joints		Dirt or foreign substance packed in joints or corrosion or rust or bent pins	Clean & re-lubricate leaf chain Replace leaf chain Replace leaf chain
Missing parts		Missing at original assembly	Replace leaf chain
Abnormal protrusion or turned pins		Excessive internal friction caused by high loading and inadequate lubrication	Replace leaf chain, improve lubrication and eliminate overload conditions
Cracked plates (fatigue)	 Crack from aperture towards edge of linkplate at 90º to line of pull. Note there is no linkplate distortion.	Loading beyond chain's dynamic capacity (above fatigue endurance limit)	Replace chain with leaf chain of larger dynamic capacity or eliminate high load condition or dynamic (impulse) overloading
Fractured plates (tension mode)	 Note material distortion	High overload	Replace leaf chain and correct cause of overload
Arc like cracked plates (stress corrosion)		Severe rusting or exposure to acidic or caustic medium, plus static pressure at press fit (between pin and pin linkplate). No cyclic stress is necessary for this phenomenon to occur.	Replace leaf chain and protect from hostile environment.
Enlarged holes		High overload	Replace leaf chain and correct cause of overload
Corrosion pitting		Exposure to corrosive environment	Replace leaf chain and protect from hostile environment.
Worn leaf chain anchor bolt connecting pin		Normal wear	Replace worn leaf chain components and always when fitting new leaf chains

Chain Lubrication

Caution

The chains must be kept lubricated at all times.

Running the chain dry will substantially shorten its life. Oil must be reapplied on a regular basis to ensure the chains maximum life is achieved.

The frequency of this operation is at the discretion of the user and essentially depends upon the working conditions and the workplace environment.

Ensure that the chain is slack during the lubrication process so that the lubricant can flow between the chain link plates and pins.

It is recommended that the lubricant used on the chains has the following properties:

- Satisfactory corrosion protection and lubrication
- Ability to penetrate through / under water
- Continuously viscous after application
- Good adhesion properties
- Layer thickness and protective film able to withstand later aggression (rain / hail etc.)

The following lubricants (available in an aerosol can) are recommended:

Fuchs anticorit bw366
Molykote mkl-n
Kluber structovis bhd 75s

Where chains are encased in dirt and dust the lubricant will be prevented from flowing to the vital load bearing contact areas of the chain between the link plates and pins.

It is essential with leaf chains that all dirt and debris is removed prior to lubrication.

Recommended jet equipment cleaning method for leaf chain:

The following method is recommended when the use of jet cleaning equipment cannot be avoided in **leaf chain maintenance**:

1. **Cleaning** - Clean the **leaf chain** using steam or hot water only. Absolutely no additives should be used.
2. **Compressed Air** - Immediately after cleaning the **leaf chain**, all water should be removed both from the surface and from inside the **chain** joints using high pressure compressed air. The articulating links of the **chain** should be moved several times during this process.
3. **Re-lubricating** – Make sure that the **chain** is slack and then spray with a preservative and lubricant. Articulate the **chain** several times so that the lubricant penetrates the **chain** joints.

Measuring Chain Stretch

Leaf chain failure is usually a result of gradual elongation as the chain wears. Measure the chain elongation with a chain wear gauge that displays the elongation of the chain as a percentage value. Follow the chain wear gauge instructions.

Chains should ideally be cleaned and measured in situ while placed under load. It is acceptable for the **chain** to be tensioned by the weight of the carriage and forks.

When checking a **chain** for wear it is vital that the section that passes over the pulley is measured as this section experiences the most wear during normal operation.

Warning

If a chain has reached a level of 2% elongation, a safe time limit must be set for the chains to be replaced. If a chain has reached 3% elongation, it must be taken out of service immediately.

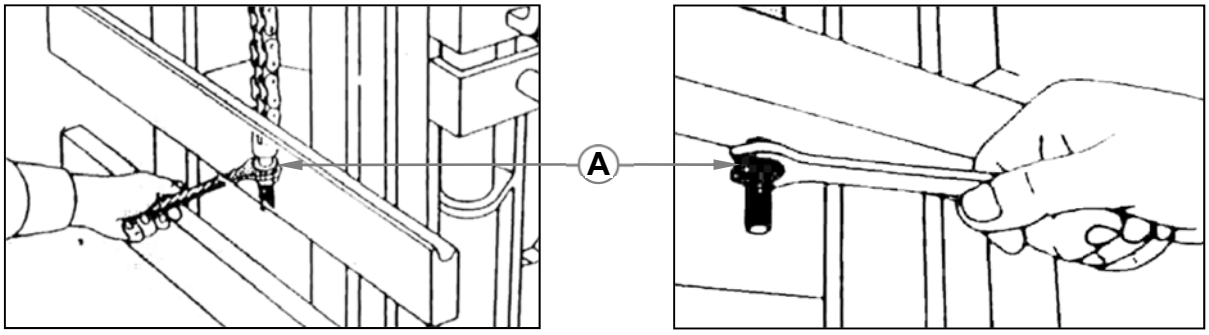
To check the free lift chains, raise the carriage 1ft (30 cm) off the ground to put tension on the chains.

To check the main lift chains, raise the mast until the inner upright starts to rise putting tension on the chains.

Adjusting for Chain Stretch

Chain elongation due to stretch (see 'Measuring Chain Stretch') can be compensated for by adjusting the chain anchors (**A**). However if the full length of the chain anchor is used up it will be necessary to remove a link.

The chain anchors are located on the fork carriage and also on the mast stages.

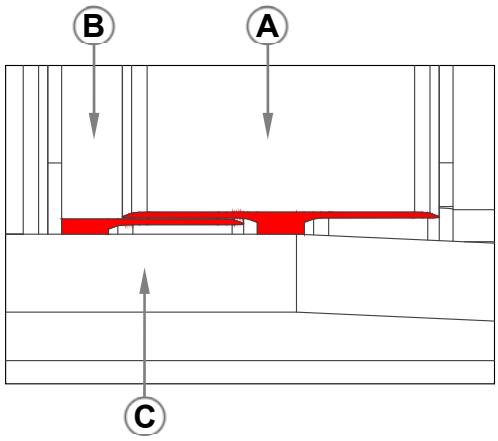


Note

The truck must be parked on smooth level ground when adjusting the chains.

Mast Chain Adjustment

The chains connecting the mast stages must be adjusted in such a way as that the inner vertical mast channel (**A**) and the middle vertical mast channel (**B**) are approximately flush with each other at the bottom and not in contact with the bottom plate (**C**) when the mast is loaded and fully lowered.



To adjust a mast stage, tighten or loosen the adjusting nut on one of the chain anchors to achieve the desired dimension. Adjust the opposite chain of the pair to achieve equal tension in the chains.

Fork Carriage Chain Adjustment

The chains connecting the fork carriage to the inner mast stage must be adjusted so that the lowest point on the bottom of the forks is approximately 1mm off the ground when the truck is parked on a smooth level surface with the mast fully lowered and tilted forward fully.

To adjust the fork carriage height, tighten or loosen the adjusting nut on one of the chain anchors to achieve the desired dimension.

Chain Tension Adjustment

The chains on the mast must be adjusted so that each chain acting as one of a pair is under equal tension to the opposite chain in the pair for proper load distribution and mast operation.

Checking and Setting the Chain Tension

1. With the mast unloaded raise the sections to put the chains under tension.
2. Press the centre of a strand of chain with a suitable rod and then press at the same place on the opposite chain of the pair.
3. Each chain in a pair should have equal “give”.
4. If the tension is not equal, tighten the bolt on the anchor of the slack chain.
5. Test the tension again. Adjust until the tension is equal.

Caution

Never place hands inside the mast to check chain tension.

Mast Bearings

The bearings on the mast do not require periodic greasing. Check the mast bearings for cracks or flat areas on the surface and also check for restrictions to rolling. Replace if any of these are detected and try to eliminate the cause(s) of the failure.

Principle Causes of Bearing Failure

Shocks
Violent frontal collisions during loading can cause bearings to fail.
The external surface will show cracks that cut the surface parallel to the rolling axis.

Large Load Centre
Another possible cause of breakage is the mounting of special equipment to handle loads with a very large load centre e.g. carpets, even if their weight is lower than the rated capacity.

This condition creates oscillations that cause the detachment of the external hardened surface of the bearing. In this case circumferential cracks will appear and will run completely around the roller.

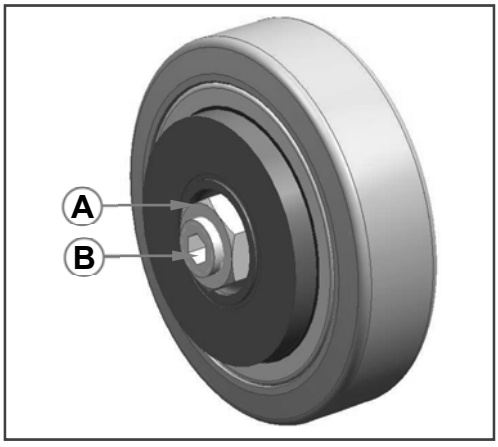
Mast Bearing Wear Pads (If applicable)

If the mast bearings are the type with integrated wear pads the wear pads must be checked every 500 hours and adjusted if necessary. Raise and lower the mast fully. Be on the lookout for kicking or sticking.

Note

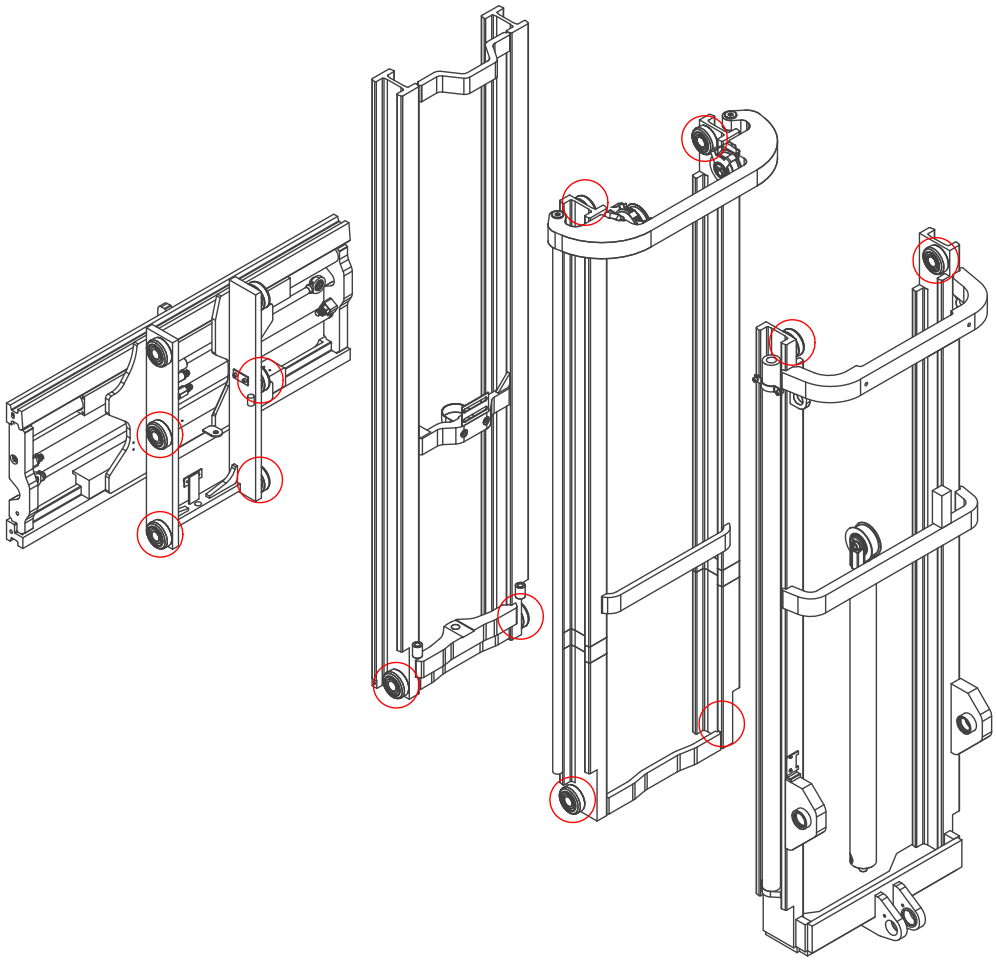
The truck must be parked on smooth level ground when checking and adjusting the mast bearing wear pads.

To adjust the mast bearing wear pads:



1. Turn the locking nut (**A**) anticlockwise a couple of turns to loosen.
2. Turn the adjusting screw (**B**) clockwise until the wear pad comes into contact with the adjacent mast channel.
3. Repeat steps 1 and 2 on the bearing directly opposite.
4. Turn the adjusting screw ¼ turn anticlockwise then tighten the locking nut.
5. Repeat step 4 on the bearing directly opposite.
6. Repeat steps 1-5 until the wear pads have been adjusted on all mast bearings

The locations of the mast bearings with wear pads that require periodic checking and adjustment are identified below.



6.15 Fork Maintenance

Warning

Never operate the truck if the forks are damaged. If a defect is found in the forks or mounting components take the truck out of service until the fork is repaired or replaced. Report any fork damage to the relevant supervisor immediately. Failure to follow this warning can cause serious injury or death.

This section provides details on how to perform a complete fork inspection. The forks must be inspected at regular intervals - in accordance with the maintenance schedule – with the aim of detecting any damage, failure, deformation, etc., that may impair safe use. Any fork that bears such a defect must be removed from service.

Straightness of Blade and Shank

Check the straightness of the upper face of each blade and the front face of each shank. If the deviation from straightness exceeds 0.5% of the length of the blade and/or the height of the shank, respectively withdraw the fork from service.

Cracks

Visually examine the forks for surface cracks. Pay special attention to:

- Fork heel
- Welds that attach mounting components to the fork blank

Forks with surface cracks should not be returned to service.

Fork Angle

Check the angle between the front vertical face of each fork and the load face of each shank. If the deviation exceeds 3° from the original specification withdraw the fork from service.

Difference in Height between Fork Tips

Check the difference in height between tips of the forks with the forks mounted on the fork carriage. If the difference in tip heights exceeds 3% of the length of the blade, the forks should be removed from service.

Positioning Lock (If Applicable)

Check the positioning lock on each fork to make sure it functions properly. If any problems are noted, repair or replace the fork.

Forks on truck with optional hydraulic fork positioning

Wear

Two different areas of the fork and fork attachment should be checked for wear.

- **Fork Blade and Shank** – Check each fork blade and shank for wear, pay special attention to the area surrounding the heel of the fork. If the thickness is reduced to 90% of the original thickness, remove the fork from service.
- **Fork Hooks** – Check the support face of the top hook and the retaining faces of both hooks for wear, crushing, and other local deformations. If any of these deficiencies cause excessive clearance between the fork and the fork carriage, remove the fork from service.

Fork Marking

If the fork marking is not clearly legible, the fork manufacturer, or their representative should remark it.

Repairing Forks

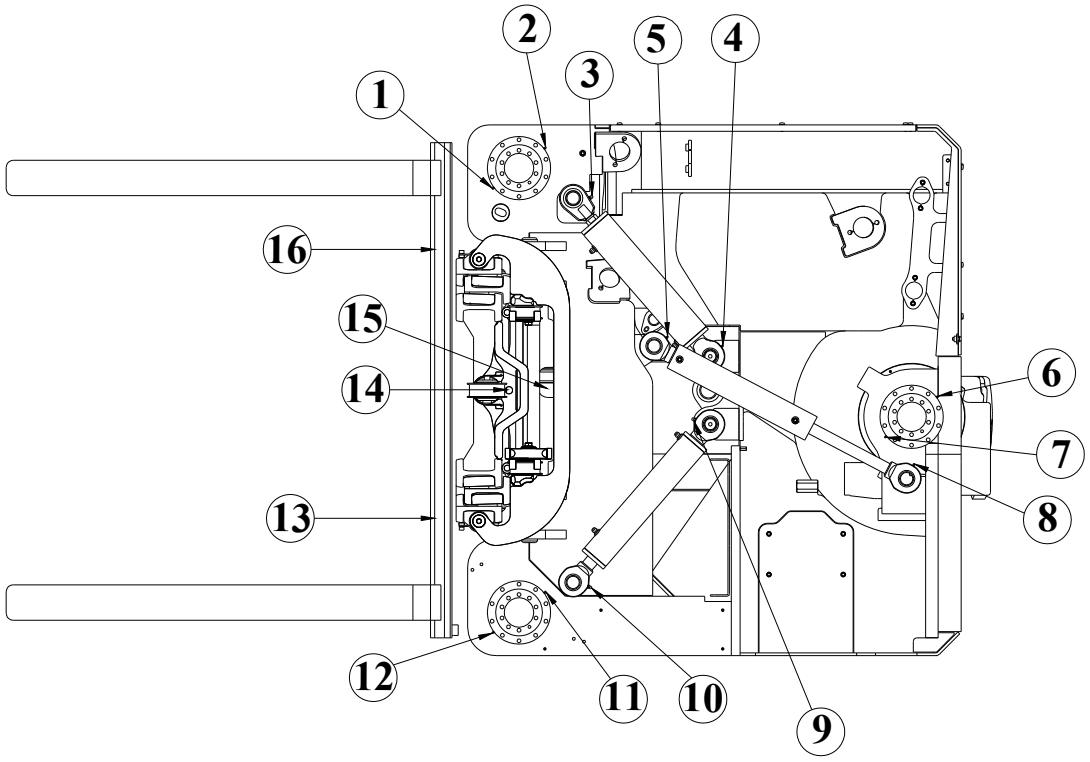
If a fork needs to be repaired or replaced, return it to the manufacturer or other expert of equal competence who shall decide if it may be repaired or if it must be replaced with a new fork. Never try to repair surface cracks or wear by welding the fork. If you need to reset a fork, make sure it is subjected to an appropriate heat-treatment before it is returned to service.

Load Testing Forks

A fork that has undergone repairs - other than repair or replacement of the positioning lock or marking - must be load tested before it is returned to service. The test load must correspond to 2.5 times the rated capacity marked on the fork.

6.16 Grease Point Chart

The diagram below indicates all of the points on the Combilift that must be greased regularly. A copy of this diagram is located in the operator compartment in the form of a decal / Information sticker. All Points must be greased every **100 HOURS / 2 months** with EP2 grease.



1. RH Swivel Slew 1
2. RH Swivel Slew 2
3. RH Steering Cylinder Front
4. RH Steering Cylinder Back
5. Rear Steering Cylinder Back
6. Rear Swivel Slew 1
7. Rear Swivel Slew 2
8. Rear Steering Cylinder Front
9. LH Steering Cylinder Back
10. LH Steering Cylinder Front
11. LH Swivel Slew 1
12. LH Swivel Slew 2
13. LH Fork Positioning Cylinder *
14. Tilt Cylinder Front
15. Tilt Cylinder Back
16. RH Fork Positioning Cylinder *

* If fitted

Note

Optional attachments with moving parts may have additional grease points that have not been indicated on the above chart.

Grease points on attachments must be located and greased every 100 HOURS using EP2 grease.

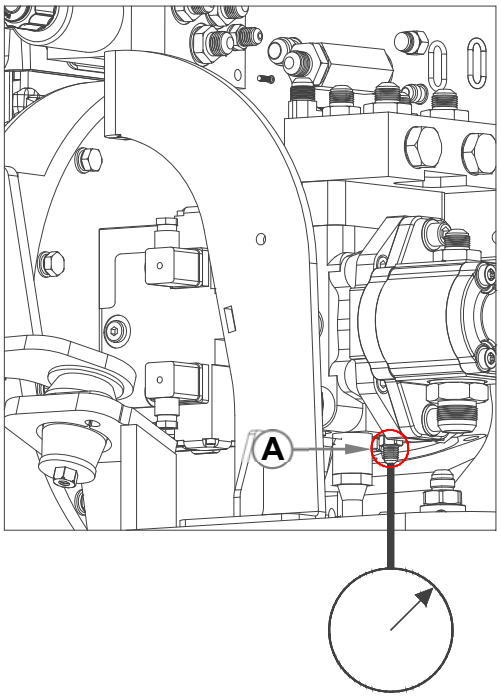
Section 7: Technical

7.1 Checking the Charge Pressure

Warning

Ensure that the engine is switched off until the pressure gauge has been attached securely.

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



1. Park the truck in a designated service area in accordance with the recommended parking procedure.
2. Lower the mast fully and tilt the mast fully forward.
3. Switch off the engine and remove the key from the ignition.
4. Open the bonnet from the right hand side of the truck to gain access to port 'G' (**A**) on the drive pump.
5. Wait until the hydraulic pumps are cool enough to touch before proceeding.
6. Clean and dry the area around port 'G' thoroughly to prevent any contamination from entering the hydraulic system.
7. Unscrew and remove the hose end from port "G" on the bottom of the pump and seal the open end with a 9/16" JIC male plug. **DO NOT** permit any contamination to enter the hydraulic system.
8. Unscrew the hydraulic adapter from port 'G' and screw in a manometer test point adapter. Attach a pressure gauge - ***capable of reading pressure up to 40 bar (580 PSI)*** – to the test point adapter.
9. Start the engine.
10. The pressure should read between **22 - 25 bar (320 - 362 PSI)** when the engine is idling.
11. Contact your local service representative or Combilift service if the charge pressure is outside the specified range.
12. Remove the gauge and refit the hydraulic adapter and hose. Apply a suitable thread sealant to the threads on the adapter before refitting.
13. Clean up any oil spills immediately.

Note

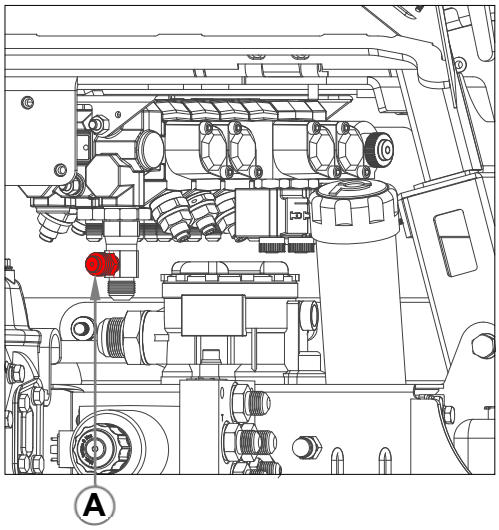
Port 'G' Dimensions - M12x1.5, 12mm deep. Max tightening torque 50Nm

7.2 Valve Chest Pressure Settings

Warning

Ensure that the engine is switched off until the pressure gauge has been attached.
Ensure there is adequate space and headroom to operate each of the hydraulic mast functions through the full extent of their range.

In order to check the valve chest pressure settings, the following steps should be taken:



1. Park the truck in an area with adequate space and headroom to operate all mast functions through the full extent of their range.
2. Lower the mast fully and tilt the mast fully forward.
3. Switch off the engine and remove the key from the ignition.
4. Open the bonnet from the right hand side of the truck to gain access to the valve chest pressure test point (**A**).
5. Wait until all components in the vicinity of the test point are cool enough to touch before proceeding.
6. Clean and dry the area around the test point thoroughly.
7. Unscrew and remove the cap from the test point and attach a pressure gauge - ***capable of reading pressure up to 300 bar (4400 PSI)***.
8. 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.
9. Press the accelerator pedal down fully and push/pull the lever on the section to be tested (in the example of testing the tilt back pressure the lever will be pulled back).
10. The reading on the gauge indicates the pressure setting on one particular port on the valve chest.

Example: To check the lift pressure raise the mast to full height. Press the accelerator pedal down fully and pull the lift lever (joystick if fitted) back. The pressure gauge will display the setting on the lift port.

Note

The main relief pressure is set at: 262 Bar / 3800 PSI

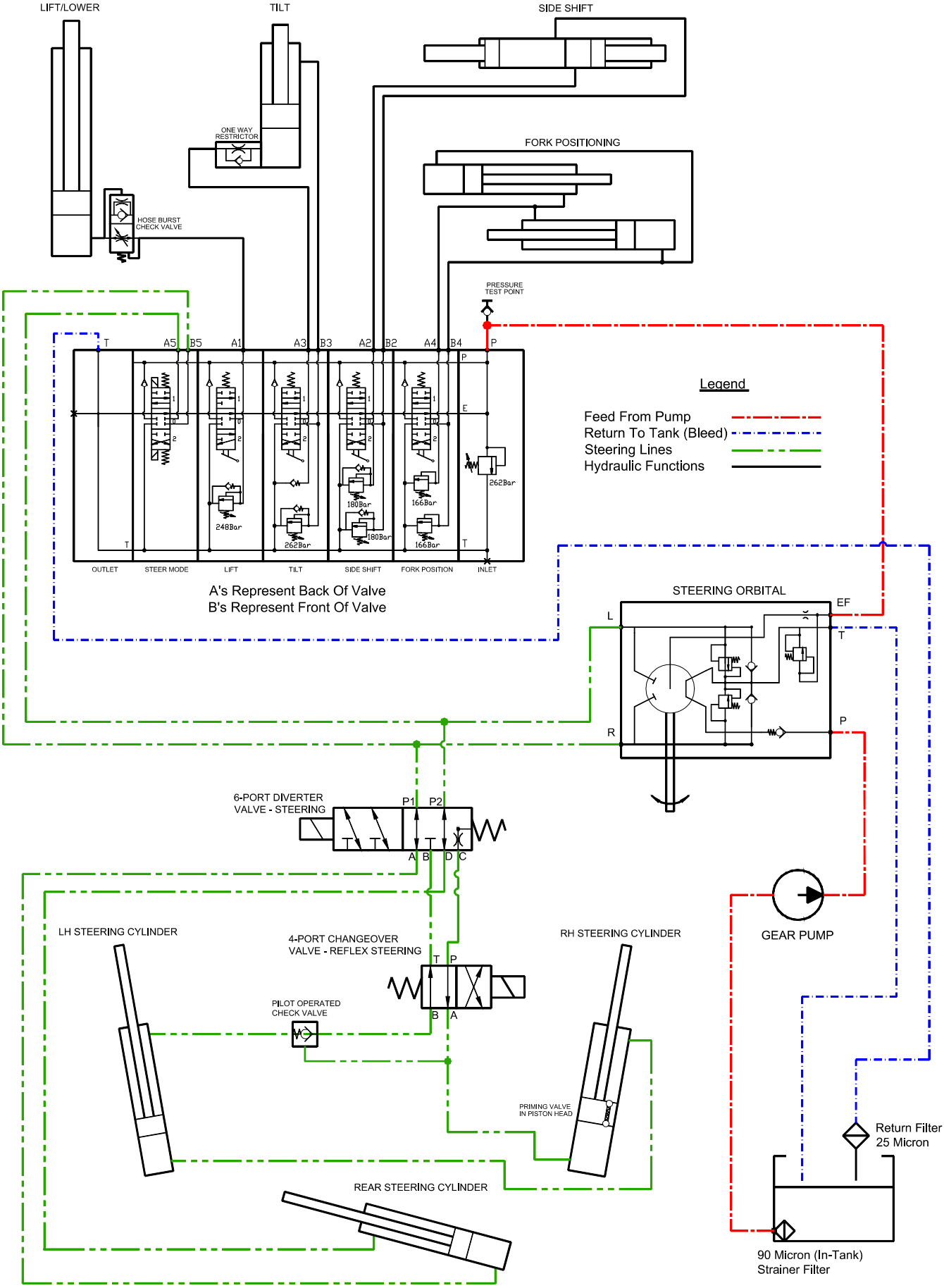
The valve chest pressure readings should be in line with those given in the following table.

Valve Chest Pressure Settings Table			
		Bar	PSI
Main Relief		262	3800
Lift		248	3600
Tilt	Forward	N/A	N/A
	Back	262	3800
Side Shift		180	2600
Fork Positioning		166	2400
Reach Forks		166	2400
Lift/Drop Forks	Up	166	2400
	Down	166	2400

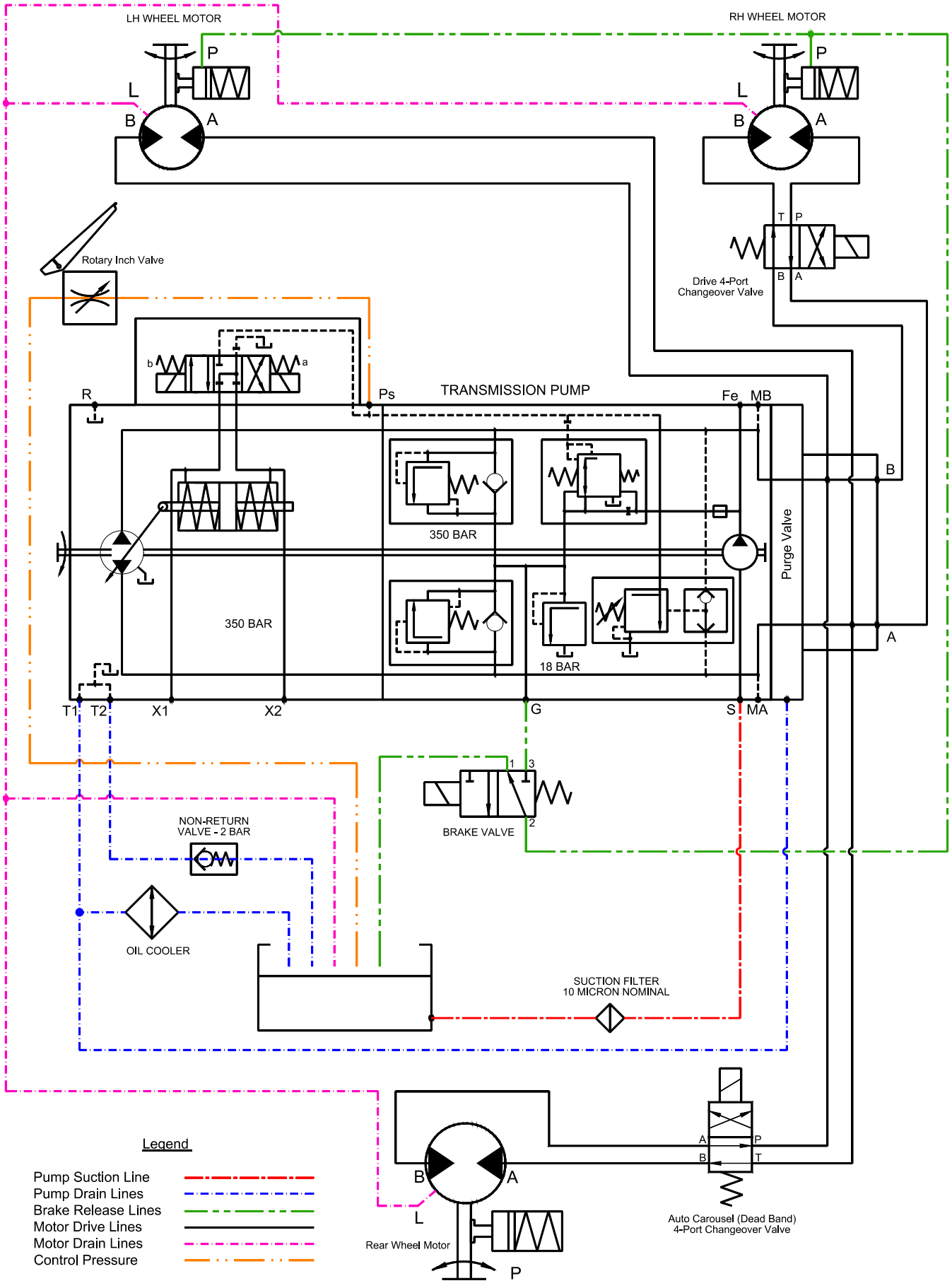
Note

The pressure values given in the tables 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.

7.3 Steering & Hydraulic Functions Circuit



7.4 Hydraulic Drive Circuit



7.5 Fuses

The 14-way fuse box is mounted on the control panel inside the operating enclosure. The fuses are midi blade type fuse. They are arranged in the order shown in the table to the right.

The rating of each fuse and the function relating to each fuse is given in the table below.

Fuse 5		Fuse 10
	Fuse 14	
Fuse 4		Fuse 9
	Fuse 13	
Fuse 3		Fuse 8
	Fuse 12	
Fuse 2		Fuse 7
	Fuse 11	
Fuse 1		Fuse 6

14-Way Midi Blade Fuse Box Table		
Fuse	Amps	Circuit
1 - Diesel	7.5	Mast Above Set Height Drive Cut-Out Override, Mast Height Override, Dash Display Lights, Glow Plug Light, Glow Plug Relay, PLC Supply
1- Toyota LPG	7.5	Mast Height Override, Dash Display Lights, PLC Supply, LPG Relay, Engine Plugs
1 – GM LPG	7.5	Mast Height Override, Dash Display Lights, PLC Supply
2	7.5	Joystick Supply, Neutral Relay, Reverse Bleeper, PLC X3, (Alternator Plug Pin 3 – Toyota Only)
3 - Diesel	7.5	Pull Hold Solenoid, Fuel Pump
3 – Toyota LPG	10	Engine Cut-Off, Distributor Plug J Pin 1
3 – GM LPG	7.5	Ignition Coil, Anti-Backfire
4	20	Steering Solenoid Supply, PLC Output Supply
5	7.5	Push Button Brake Switch, Inch Pedal Brake Switch, Brake Light, Brake Solenoid Supply
6	7.5	Wiper Motor (If Fitted)
7	15	Front Work Lights, Dash Cluster Lights
8	15	Side Work Lights, Cabin Interior Light (If Fitted)
9	7.5	Cabin Heater (If Fitted), Cabin Cooling Fan (If Fitted), Radio (If Fitted)
10	7.5	Horn
11	7.5	Independent Fork Positioning Solenoids (If Fitted)
12	7.5	Proximity Switches Supply, Seat Switch, Seat Belt Switch (If Fitted)
13	7.5	Flashing Beacon
14	10	Optional Extras - 12v Power Socket, Air Seat, Extra Oil Cooler

The main fuse is mounted in the engine compartment under the bonnet and can be accessed by opening the bonnet from the right hand side of the truck. The fuse is located below the bonnet gas strut.

The valve chest solenoid lockout valve fuse is mounted in the engine compartment under the bonnet and can be accessed by opening the bonnet from the right hand side of the truck. The fuse is located below the bonnet gas strut.

Engine Compartment Fuse Table		
Fuse	Amps	Function
Maxi Blade	80	Main Fuse
Midi Blade	10	Valve Chest Lockout Valves

7.6 Relays

The relays are mounted inside the control panel and can be accessed by removing the cover plates.

The following table gives the function related to each of the relays fitted as standard.

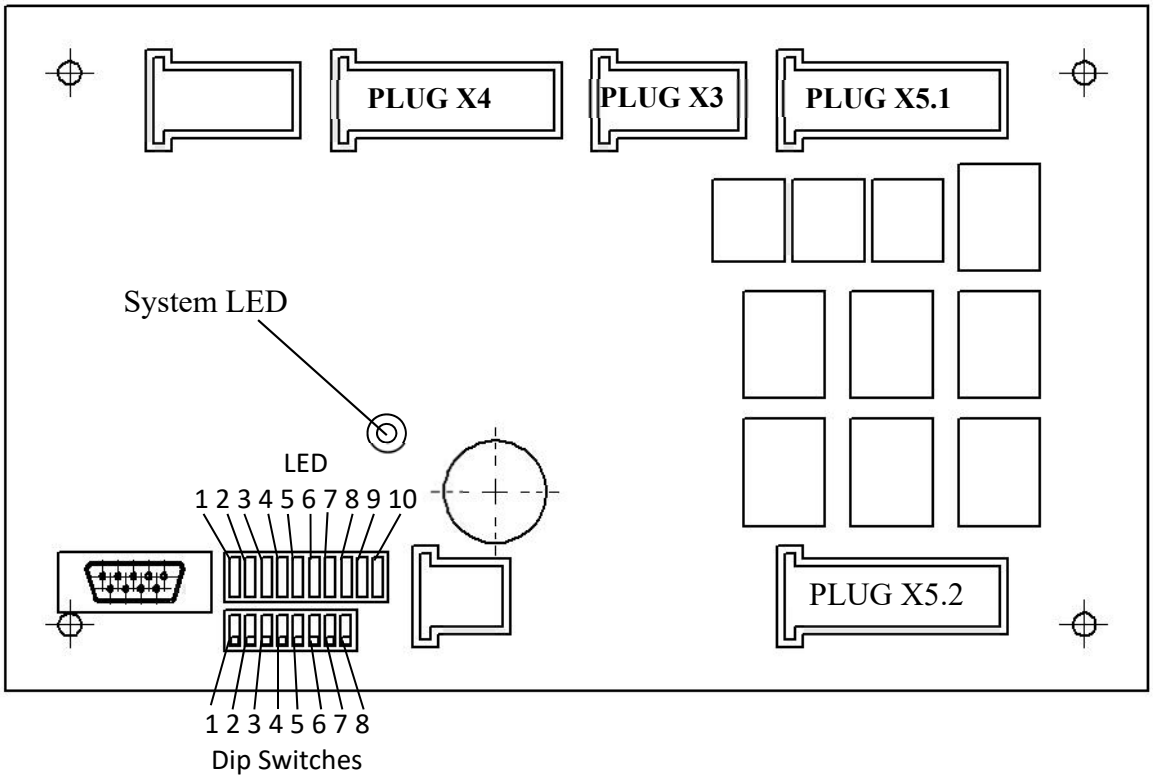
Relay	Function
1	Starter Solenoid
2	Glow Plug Timer (Diesel Only)
9	6-Port Steering Valve Solenoid
15	Neutral
22	Work Lights
LV	Valve Chest Lock Valve Solenoids
LPG	LP Gas System Relay (Toyota LPG Only)
C/O	Engine Cut-Off Relay

Note

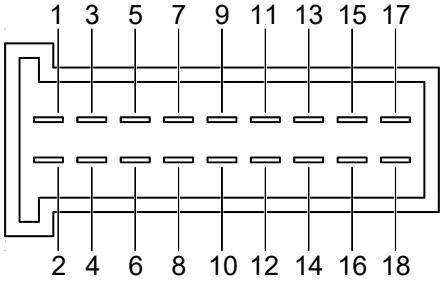
Some trucks may have additional relays that are not listed above. These relays are for non-standard optional extras. Please Contact Combilift and quote the truck serial number for information on the function related to these relays.

7.7 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 @ Zero Degree Proximity Switch	Black
X4	02	Front Wheel @ Zero Degree Proximity Switch	Black
X4	03	Rear Wheel @ Ninety Degree Proximity Switch	Black
X4	04	Front Wheel @ Ninety Degree Proximity Switch	Black
X4	05	Carousel Steering Proximity Switch (DB Proxy)	Black
X4	06	Park Brake Switch Signal	Orange
X4	07	Inching Pedal Brake Switch Signal (Optional)	Orange
X4	08	Forward Signal Fron Direction Lever	White
X4	09	Power Supply to Board (Supplied From Fuse 1)	Red
X4	10	Negative for Board power Supply	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	Optional Extra	*n/a*
X4	17	Optional Extra	*n/a*
X4	18	Seat Switch Signal	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	Ninety degree Indicator Light	Green
X3	09	Zero Degree Indicator Light	White
X3	10	Common Supply to pins 06-09 (From Fuse 4)	Brown

Outputs (continued)

Plug	Pin	Function	Wire Colour
X5.1	01	*Not Used*	*n/a*
X5.1	**02**	**Common Supply for Output 08 (From fuse 4)**	**Brown**
X5.1	**03**	**Steering Solenoid (Six Port) Relay Switching**	**Brown**
X5.1	04	*Not Used*	*n/a*
X5.1	05	*Not Used*	*n/a*
X5.1	**06**	**Common Supply for Output 09 (From fuse 4)**	**Brown**
X5.1	**07**	**Reflex Steering Solenoid**	**Red**
X5.1	08	*Not Used*	*n/a*
X5.1	09	**Dash Park Brake Light**	**Orange**
X5.1	**10**	**Common Supply for Output 10 (From fuse 5)**	**Orange**
X5.1	**11**	**Brake Solenoid**	**Orange**
X5.1	12	*Not Used*	*n/a*
X5.1	13	*Not Used*	*n/a*
X5.1	**14**	**Common Supply for Output 11 (From fuse 4)**	**Brown**
X5.1	**15**	**Zero Degree Solenoid 01**	**Grey**
X5.1	**16**	**Common Supply for Output 12 (From fuse 4)**	**Brown**
X5.1	17	*Not Used*	*n/a*
X5.1	**18**	**Zero Degree Solenoid 02**	**Grey**

Plug	Pin	Function	Wire Colour
X5.2	01	*Not Used*	*n/a*
X5.2	**02**	**Common Supply for Output 13 (From fuse 4)**	**Brown**
X5.2	**03**	**Ninety Degree Solenoid 01**	**Green**
X5.2	04	*Not Used*	*n/a*
X5.2	05	*Not Used*	*n/a*
X5.2	**06**	**Common Supply for Output 14 (From fuse 4)**	**Brown**
X5.2	**07**	**Ninety Degree Solenoid 02**	**Green**
X5.2	08	*Not Used*	*n/a*
X5.2	09	*Not Used*	*n/a*
X5.2	**10**	**Common Supply for Output 15 (From fuse 4)**	**Brown**
X5.2	**11**	**Carousel Indicator Light**	**Red**
X5.2	12	*Not Used*	*n/a*
X5.2	13	*Not Used*	*n/a*
X5.2	**14**	**Common Supply for Output 16 (From fuse 4)**	**Brown**
X5.2	**15**	**Dead Band (Carousel Steering) Solenoid 01**	**Grey**
X5.2	**16**	**Common Supply for Output 17 (From fuse 4)**	**Brown**
X5.2	17	*Not Used*	*n/a*
X5.2	**18**	**Dead Band (Carousel Steering) Solenoid 02**	**Grey**

7.8 PLC Diagnostics

The diagnostics function can be used to make sure all components are working correctly.

Mode 1 – Joystick Function

Move Switch '1' to the 'ON' position

- **Neutral Position – No LED**
- **Forward Position – LED 1**
- **Reverse Position – LED 2**
- **Left Position – LED 3**
- **Right Position – LED 4**

FORWARD

LEFT

NEUTRAL

RIGHT

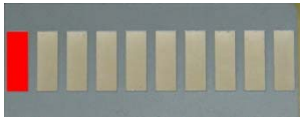
REVERSE

- If the joystick is working correctly each LED will only light with the joystick in the corresponding position.
- If the joystick is malfunctioning the LED corresponding to the position will not light up.

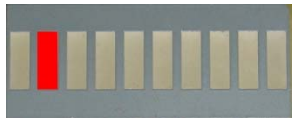
Mode 2 – Proximity Sensor Function

Move Switch '2' to the 'ON' Position

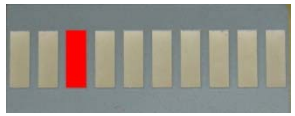
Front Wheel 0 Degree Sensor – LED 1



Rear Wheel 0 Degree Sensor – LED 2

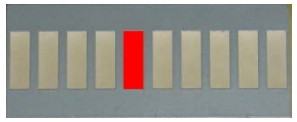


Carousel Sensor – LED 3



Front Wheel 90 Degree Sensor – LED 4

Rear Wheel 90 Degree Sensor – LED 5



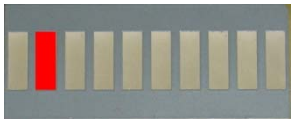
- Proximity Sensors can be energised by switching from Forward Mode to Sideward mode.
- If a LED does not light it should be energised manually to rule out the failure of the corresponding proximity sensor.
- Once activated the LEDs will remain lit until the switch is reset to the OFF position.

Mode 3 – Switch Mode

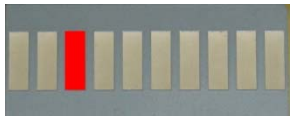
Move Switch ‘3’ to the ‘ON’ Position

Park Brake – LED 1

Mast Height Override Switch – LED 2



Mast Height Proximity Sensor – LED 3



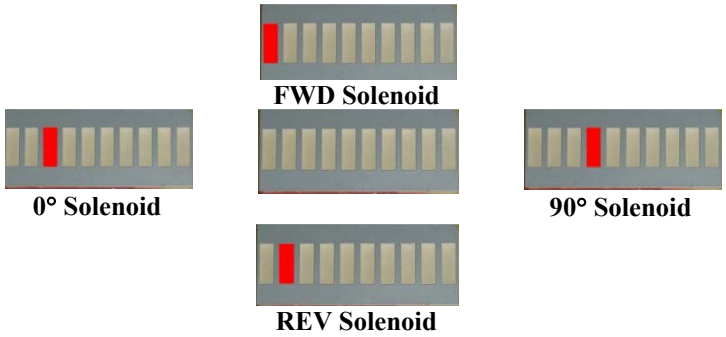
- The Park Brake will only remain lit while the park brake is engaged.
- LED 2 will be ON constantly on all machines that do not have the Mast Height Override Function.
- To energise the mast height proximity sensor lift the forks to the height of the proximity sensor.

Mode 4 – Solenoid Mode

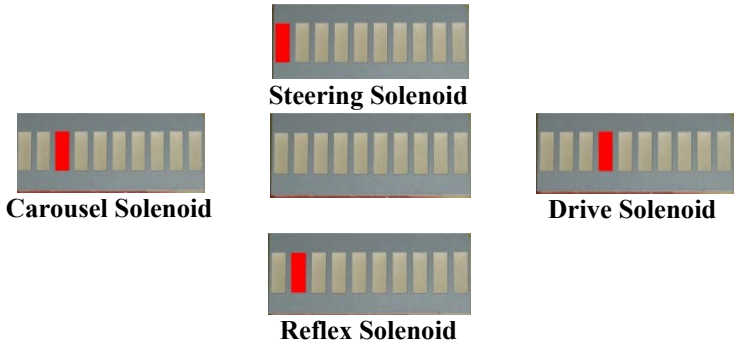
NOTE: This mode must only be used with the key turned on, **NOT** with the engine running.

Forward, Reverse, 0° and 90° Solenoids
Move Switch ‘4’ to the ‘ON’ Position to test.

Use the directional joystick to energise the solenoids as below



Steering, Reflex, Carousel and Drive Solenoids
Move Switch ‘5’ to the ‘ON’ Position to test.



- The LED on each solenoid should be lit along with the LED on the board.
- If the solenoid LED does not light, a wiring problem may be present.
- If the solenoid LED is lit but a problem remains the solenoid and/or the valve should be checked for malfunction.

Section 8: Appendices

8.1: Certified LPG Engine Emission Control Warranty

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT YOUR WARRANTY RIGHTS AND OBLIGATIONS

The California Air Resources Board and the Environmental Protection Agency are pleased to explain the emission control system warranty on your Model Year (*2013 - 2014)*[5] off-road Large Spark-Ignition (LSI) engine. New off-road LSI engines must be designed, built and equipped to meet the State's stringent anti-smog standards in all
50 states. *Combilift* must warrant the emission-control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel-injection system, regulator, ignition system, engine computer unit (ECM), catalytic converter and air induction system. Also included may be sensors, hoses, belts, connectors and other emission-related assemblies. Where a warrantable condition exists, *Combilift* will repair your LSI engine at no cost to you including diagnosis, parts and labor.

MANUFACTURER'S WARRANTY COVERAGE: The Model Year *(2013-2014)*[5] off-road LSI engines are warranted for 3 years or 2,500 hours, whichever occurs first, unless indicated otherwise. If any emission-related part on your engine is defective, the part will be repaired or replaced by *Combilift*.

Fuel Metering System ***Catalyst*** ***Air Induction System***
Intake Manifold or Air Intake System ***Fuel Injection System*** ***Catalytic Converter*** ****Air/Fuel Ratio Feedback and Control System*** ***Exhaust Manifold*** ***Air Mass Sensor Assembly***
Positive Crankcase Ventilation System (PCV) ***Ignition Control System*** ***Ignition Module(s)***
PCV Valve ***Oil Filler Cap*** ***Engine Control Module ****

Miscellaneous Items Used In Above Systems: vacuum, temperature, and time-sensitive valves and switches; sensors used for electronic controls; hoses, belts, connectors, assemblies, clamps, fittings, tubing, wiring, sealing gaskets or devices, and mounting hardware; pulleys, belts and idlers

* Covered for 5 years or 3,500 hours of operation whichever occurs first.

OWNER'S WARRANTY RESPONSIBILITIES:

- As the off-road LSI engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. *Combilift* recommends that you retain all receipts covering maintenance on your off-road engine, but *Combilift* cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.
- As the off-road LSI engine owner, you should however be aware that *Combilift* may deny you warranty coverage if your off-road LSI engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.
- Your engine is designed to operate on propane, gasoline, or compressed natural gas. Use of any other fuel may result in your engine no longer operating in compliance with California's emissions requirements. To confirm the fuel(s) this engine is capable of operating on, see the Emission Control Information label located under hood. LPG engines and fuel systems are designed to operate on HD–5 or HD–10 specification LPG fuel.
- You are responsible for initiating the warranty process. The ARB and EPA suggest that you present your off-road LSI engine to a Combilift dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact *Combilift* at: *1-877-COMBI56*

8.2: General Engine Warranty

Combilift warrants to the ultimate purchaser and each subsequent purchaser that this engine is designed, built and equipped so as to conform at the time of sale with the applicable regulations under section 213 of the Clean Air Act, and that this engine is free from defects in materials and workmanship which may cause such engine to fail to conform with the applicable regulations for the first two years from the date of sale to the first ultimate purchaser.

As the engine owner, you are responsible for the proper maintenance of the engine as stated in the maintenance instructions. Proper maintenance generally includes replacement and service, at the owner's expense, of such items as spark plugs, points, condensers, and any other part, item, or device related to emission control.

For engines located within 100 miles** of an authorized service center, warranty repairs must be made only at authorized service centers. For engines located more than 100 miles** from an authorized service center, Combilift will provide for a service technician to come to the owner to make the warranty repair.

** Under either circumstance for information on how to make arrangements for authorized warranty repairs first contact Combilift at:

service.usa@combilift.com or 1-877-COMBI56

8.2 WARRANTY REGISTRATION FORM

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

DEALER DETAILS: (Supplier)

Dealer Name:_____ Tel: _____

First Name: _____ Last Name:_____

E-mail: _____ Position/Role: _____

Street: _____ Address Line 2: _____

City: _____ Zip/Postal Code:_____

County/State:_____ Country: _____

MACHINE DETAILS

MODEL: _____ **SERIAL NO**. ☐☐☐☐☐

Delivery / installation date: _ _ / _ _ _ / _ _ _ _

CUSTOMER DETAILS (please state address where truck is located)

Customer Business Name: _____ Tel: _____

First Name: _____ Last Name:_____

E-mail: _____ Position/Role: _____

Street: _____ Address Line 2: _____

City: _____ Zip/Postal Code:_____

County/State:_____ Country: _____

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

*Customer's Signature: _____ Date: _____

WHEN COMPLETED PLEASE RETURN TO:

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

BY EMAIL TO: warranty@combilift.com

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

8.4 Pre-Use Check Sheet

Model:_____ **Serial Number:**_____

CHECK ITEMS		✓ OK X DEFECTIVE	
Visual Checks			
General:		No damage, No loose or missing nuts or bolts, No leaking fluids, No excessive dirt or rust. Previous defects repaired.	☐
Mast	**Channels:**	No damage or distortion. No excessive wear, scoring, dirt or foreign bodies in the channels. End stops secure.	☐
	Chains:	No damage, excessive wear or stretching. All links and pins in place. Equal tension, adequate lubrication.	☐
	Rollers:	No uneven wear or incorrect tracking.	☐
Fork Carriage:		No damage, excessive wear, deformation or cracks. Square to mast and lubricated. End stop bolts present and secure.	☐
Forks:		Correctly positioned. Not damaged, cracked, bent or excessively worn. Pins secure, not worn, loose or bent.	☐
Tyres:		No damage, no excessive wear, cracks or cuts. No embedded foreign objects. No separation from rims.	☐
Wheels:		No damage, excessive rust, cracks or debris. All nuts present and secure.	☐
Access:		Steps and grab handles secure, clean and in good condition.	☐
Hydraulic Hoses:		Routed correctly. No kinks or wear. Check all seals and couplings for damage, wear and leaks.	☐
Oil Cooler:		No build-up of dust or debris around the fan or on the fins.	☐
Hydraulic Tank:		No damage or leaks. Oil level (lower forks fully before checking).	☐
Operators Cabin:		Secure, clean, undamaged, no loose items.	☐
Battery:		All connections secure, no damage, leaks or corrosion.	☐
Front Wheel Alignment:		In standard drive mode check the front wheels are aligned parallel to the platforms and to each other.	☐
Lights, Windows, Mirrors:		Clean and in good condition.	☐
Fire Extinguisher (if fitted):		Secure and charged.	☐
Electrical Connections/Terminals:		All connections secure and undamaged, no melting or blackening, no loose or bare wires.	☐
Serial Plate, Capacity Chart & Safety Decals:		Present, secure and easily legible.	☐
Engine Related Checks			
Fluids:		Oil, fuel and coolant levels within normal range.	☐
Radiator:		No build-up of dust or debris around the fan or on the fins.	☐
Belts:		In good condition, no damage, wear or fraying.	☐
Exhaust:		No damage or corrosion. No excessive smoke or noise. No sparks or flames.	☐
Engine Compartment:		No build-up of debris or fluids, no combustible materials near engine.	☐
Fuel Tank & Hoses:		No damage, wear, deterioration or corrosion, no leaking fuel. Tank cap present and secure.	☐
Operational Checks			
Seat & Seat Belt:		In good condition, secure, properly adjusted, in good working order.	☐
Ignition & Electrical System:		All buttons and controls working correctly. All warning lights working. Display screen working.	☐
Horn & Reversing Alarm:		Working properly. Sufficiently audible.	☐
Work Lights:		In good working order.	☐
Engine:		Starts easily and runs smoothly. No unusual sounds or smells.	☐
Hydraulic Functions:		Working smoothly through the full range of movement.	☐
Brakes (Inch & Park):		Working correctly.	☐
Mode Change:		Wheels align correctly and change direction smoothly.	☐
Steering:		Working correctly with no excessive play or restriction in either travel mode.	☐

Defect Details:

Operator's Signature: _____ Date: _____

Manager's / Supervisor's Signature: _____ Date: _____