
Operator's Manual

Do not remove this manual
from the truck.



ECS 17 THRU 30

CLARK

Book No. 2770148
OM - 548



Record the following information pertaining to your truck.

Model No. _____

Serial No. _____

Customer Truck Identification No. _____

Truck Weight, Empty _____

Truck Rated Capacity _____

Truck Gross Weight, Loaded w / Rated Load _____

Special Equipment _____

IMPORTANT

Do not expose this manual to hot water or steam.

Operator's Manual

You must be trained and authorized to operate a lift truck

YOU can prevent accidents!

First: Learn safe operating rules and your company rules.

Next: Read and understand your Operator's Manual

Learn about the unit you operate



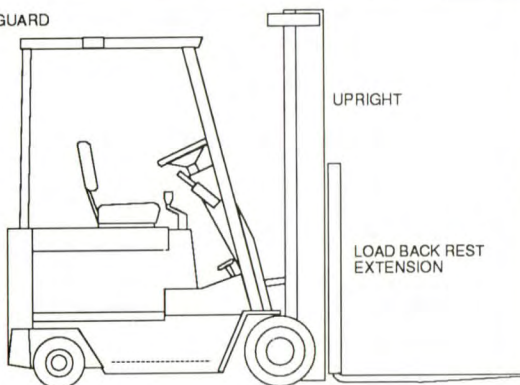
KNOW YOUR TRUCK

OVERHEAD GUARD

UPRIGHT

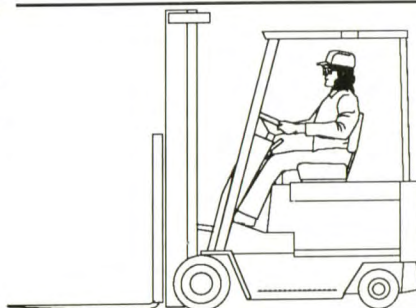
LOAD BACK REST
EXTENSION

COUNTERWEIGHT



Then: Practice operating your truck safely.

And: Keep your truck in safe operating condition with correct and timely maintenance.



Breaking these rules will cause serious or fatal injury to yourself and others.

A Message To CLARK Lift Truck Operators

Lift trucks are specialized machines with unique operating characteristics designed to perform specific jobs. Their function and operation is not like a car or ordinary truck. They require specific instructions and rules for safe operation and maintenance.

Safe operation of lift trucks is of primary importance to CLARK. Our experience with lift truck accidents has shown that when accidents happen and people are killed or injured, the causes are:

- OPERATOR NOT PROPERLY TRAINED
- OPERATOR NOT EXPERIENCED WITH LIFT TRUCK OPERATION
- BASIC SAFETY RULES NOT FOLLOWED
- LIFT TRUCK NOT MAINTAINED IN SAFE OPERATING CONDITION

For these reasons, CLARK wants you to know about the safe operation and correct maintenance of your lift truck.

This manual is designed to help you operate your lift truck safely. This manual shows and tells you about safety inspections and the important general safety rules and hazards of lift truck operation. It describes the special components and features of the truck and their function. The correct operating procedures are shown and explained. Illustrations and important safety messages are included for clear understanding. And, a section on maintenance and lubrication is included for the lift truck mechanic.

The operator's manual is not a training manual. It is a guide to help trained and authorized operators safely operate their lift truck by emphasizing and illustrating the correct procedures. But, it cannot cover every possible situation which may result in an accident. You must watch for hazards in your work areas and avoid or correct them. It is important that you know and understand the information in this manual as well as to know and follow your company safety rules! Be sure that your equipment is maintained in a safe condition. Do not operate a damaged truck. And practice safe operation every time you use your lift truck. Let's join together to set new standards in safety.

Remember, before you start operating this lift truck, be sure that you understand all driving procedures. It is your responsibility, and it is important to you and your family, to operate your lift truck safely and efficiently. And be aware that the Federal Occupational Safety and Health Act (OSHA) and state laws require that operators be completely trained in the safe operation of lift trucks.

CLARK lift trucks are built to take hard work, but not abuse. They are built to be dependable, but they are only as safe and efficient as the operator and the persons responsible for maintaining them. Do not make any repairs to this truck unless you have been trained in lift truck repair procedures and authorized by your employer.

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Introduction

Clark Equipment Company welcomes you to the growing group of professional people who own, operate and maintain Clark lift trucks. We take pride in the long tradition of quality products and superior value that the Clark name represents. This manual will familiarize you with safety, operating, and maintenance information about your new lift truck. It has been especially prepared to help you use and maintain your Clark lift truck in a safe and correct manner.

Your Clark lift truck has been designed and built to be as safe and efficient as today's technology can make it. As manufactured, it meets all the applicable mandatory requirements of ANSI B56.1--1969-1975 Safety Standard for Powered Industrial Trucks. In addition, all standard trucks conform to Underwriters Laboratories requirements for the Type Designation shown on the truck capacity plate. Each truck is also furnished with certain safety devices, e.g., horn, driver's overhead guard, and load backrest extension, as standard equipment.

Safe, productive operation of a lift truck requires both skill and knowledge on the part of the operator. The operator must know, understand and practice the safety rules and safe driving and load handling techniques described in this manual. To develop the skill required, the operator must become familiar with the construction and features of the lift truck and how they function. The operator must understand its capabilities and limitations, and see that it is kept in a safe condition.

Routine Servicing and Maintenance

Regular maintenance and care of your lift truck is not only important for economy and utilization reasons; it is essential for your safety. A faulty lift truck is a potential source of danger to the operator, and to other personnel working near it. As with all quality equipment, keep your lift truck in good operating condition by following the recommended schedule of maintenance.

User Daily Inspection -- Safety and Operating Checks

A lift truck should always be examined by the user before driving to be sure it is safe to operate. The importance of this procedure is emphasized in this manual with a brief illustrated review and later with more detailed instructions.

Planned Maintenance Program

In addition to the daily user inspection, Clark recommends that a planned maintenance and safety inspection program (PM) be performed by a trained and authorized mechanic on a regular basis. The PM will provide an opportunity to make a thorough inspection of the safety and operating condition of your lift truck. Necessary adjustments and repairs can be done during the PM , which will increase the life of components and reduce unscheduled downtime. The PM can be scheduled to meet your particular application and lift truck usage.

The procedures for a periodic planned maintenance program which covers inspections, operational checks, cleaning, lubrication and minor adjustments, are outlined in this manual. Your Clark dealer is prepared to help you with a Planned Maintenance Program with trained service personnel who know your lift truck and can keep it operating safely and efficiently. For additional information, see the Service Manual.

About This Manual

The purpose of this manual is to provide a digest of essential information about the safe operation of your lift truck and to acquaint you with its features and how they function and are maintained. This manual is organized into 9 major parts for easy reference:

Part 1 General Safety Rules and Practices... reviews and illustrates accepted practices for safe operation of a lift truck.

Part 2 Operating Hazards... illustrates and describes the hazards that you might encounter most often when operating your lift truck.

Part 3 Know Your Truck... describes the major operating components, systems, controls and other features of your truck and how they function.

Part 4 Operator Care and Maintenance... outlines details on how to perform the daily safety inspection.

Part 5 Operating Procedures... discusses more specific instructions on the safe, efficient operation of your lift truck.

Part 6 Emergency Towing... gives instructions for towing your truck when necessary.

Part 7 Planned Maintenance and Lubrication... describes a PM program for your truck.

Part 8 Specifications... provides reference information and data on features, components, and maintenance items for your lift truck.

Index... provides help for locating information about various topics.

Safety Signs and Messages

Throughout this manual, you will find safety signs and safety messages, as well as other notes and informational instructions. These messages are given to remind you of either essential procedures or to prevent you from making an error which could damage the truck and possibly cause personal injury. Please refer to page v i i for further definition and explanation of these messages.

NOTICE --- The descriptions and specifications included in this manual were in effect at the time of printing. Clark Equipment Company reserves the right to make improvements and changes in specifications or design, without notice and without incurring obligation. Please check with your authorized CLARK dealer for information on possible updates or revisions.

How To Use This Manual

The examples, illustrations and explanations in this manual will help you improve your skill and knowledge as a professional lift truck operator while taking full advantage of the capabilities and safety features of your new lift truck.

The first section of the manual is devoted to a review, with illustrations and brief messages, of general safety rules and the major operating hazards you can encounter while operating a lift truck. Next, you will find descriptions of the components of your specific lift truck model and how the instruments, gauges and controls operate. Then, you will find a discussion of typical operating procedures with more specific instructions for safe and efficient operation of your lift truck. There are instructions for towing a disabled lift truck. The later sections of the manual are devoted to maintenance and truck specifications.

Take time to carefully read the "Know Your Truck" section. By acquiring a good basic understanding of the features of your truck and how they function, you will be better prepared to operate it both efficiently and safely.

In the "Planned Maintenance and Lubrication" section, you will find essential information for correct servicing and periodic maintenance of your truck, including charts with recommended maintenance intervals and component capacities. Carefully follow these instructions and procedures.

Each part has its own Table of Contents, so that you can find the various topics within more easily. If you cannot find a topic in the Table of Contents, check the Index at the back of the manual.

We urge you to first carefully read the manual from cover to cover. Take time to read and understand the information on general safety rules and operating hazards. Acquaint yourself with the various procedures in this manual. Understand how all gauges, instruments and controls function. Please contact your authorized CLARK dealer for the answer to any questions you may have about your lift truck's features, operation or the manual.

Operate your lift truck safely; careful driving is your responsibility. Drive defensively and always wear your seat belt. Know your truck's capabilities and limitations. Follow all instructions in this manual, including all **IMPORTANT**, **CAUTION**, and **WARNING** messages to avoid damage to your lift truck or the possibility of any harm to yourself or others.

This manual is intended to be a permanently-attached part of your lift truck. Keep it on the truck as a ready reference for anyone who may drive or service it. If the truck you operate is not equipped with this manual, ask your supervisor to obtain one and have it attached to the truck. And, remember, your CLARK dealer is pleased to answer any questions about the operation and maintenance of your lift truck and will provide you with additional information should you require it. He is glad to help you.

Safety Signs and Safety Messages

Improper or careless techniques cause accidents. Don't take chances with incorrect or damaged equipment. READ and UNDERSTAND the procedures for safe driving and maintenance outlined in this manual.

STAY ALERT! Follow safety rules, regulations and procedures. Accidents can be avoided by recognizing dangerous procedures or situations before they occur.

DRIVE AND WORK SAFELY and follow the safety signs and their messages displayed on the truck and in this manual.

SAFETY SIGNS and MESSAGES are placed in this manual and also on the lift truck to provide instructions and to identify specific areas where potential hazards exist and special precautions should be taken. Be sure you know and understand the meaning of these instructions, signs and messages. Damage to the truck or death or serious injury to you or other persons may result if these messages are not followed.

NOTICE --- This message is used when special information, instructions or identification is required relating to procedures, equipment, tools, pressures, capacities and other special data.

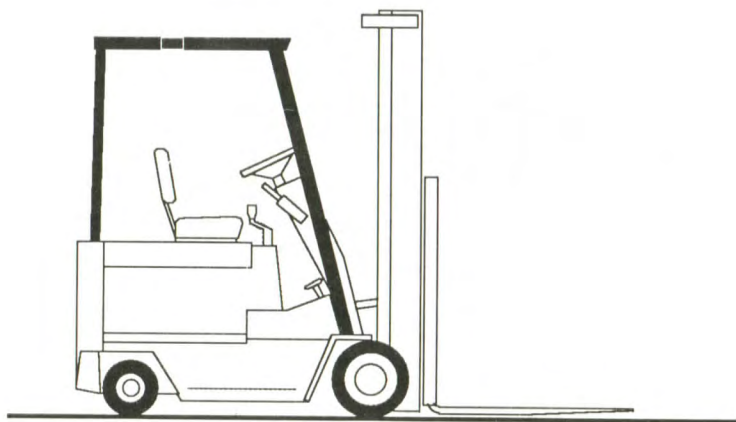
IMPORTANT --- This message is used when special precautions should be taken to ensure a correct action or to avoid damage to or malfunction of the truck or a component.

CAUTION --- This message is used as a reminder of safety practices which can result in personal injury if proper precautions are not taken.

WARNING --- This message is used when a hazard exists which can result in injury or death, if proper precautions are not taken.

DANGER --- This message is used when an extreme hazard exists which will result in death or serious injury if proper precautions are not taken.

Truck Application



Each truck is designed for a specific application. Make sure you are using the correct truck for the job.

CUSHION (solid) tire trucks are designed for use inside on smooth dry surfaces.

1 General Safety Rules

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Daily Inspection	1.2
Do's and Don'ts	1.3
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General Safety Rules Daily Inspection



At the beginning of each shift inspect your truck and fill out a daily inspection sheet

Check for damage and maintenance problems.

Have repairs made before you operate the truck.



Do not make repairs yourself. Lift truck mechanics are trained professionals. They know how to make repairs safely.

General Safety Rules Do's And Don'ts



DON'T MIX DRUGS AND
ALCOHOL WITH YOUR JOB.



DO WATCH FOR
PEDESTRIANS.



DON'T BLOCK SAFETY OR
EMERGENCY EQUIPMENT

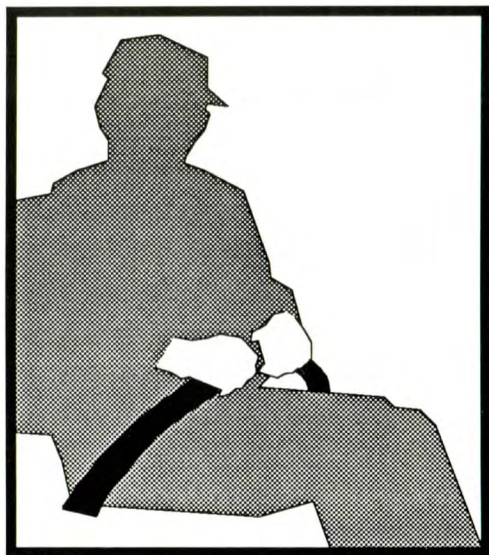


DO WEAR SAFETY
EQUIPMENT
WHEN
REQUIRED

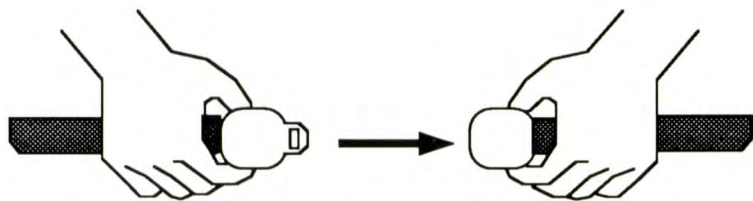


DON'T SMOKE IN
"NO SMOKING "
AREAS

General Safety Rules
Seat belts

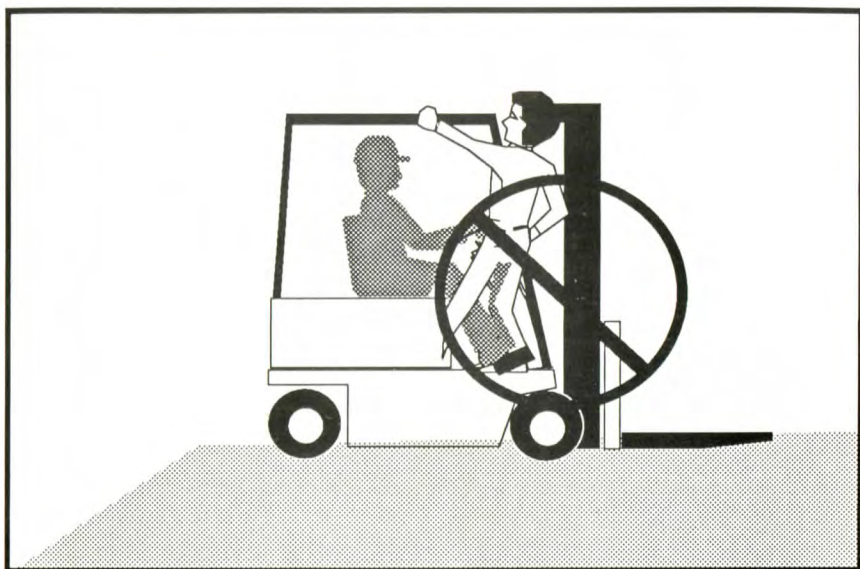


ALWAYS BUCKLE UP

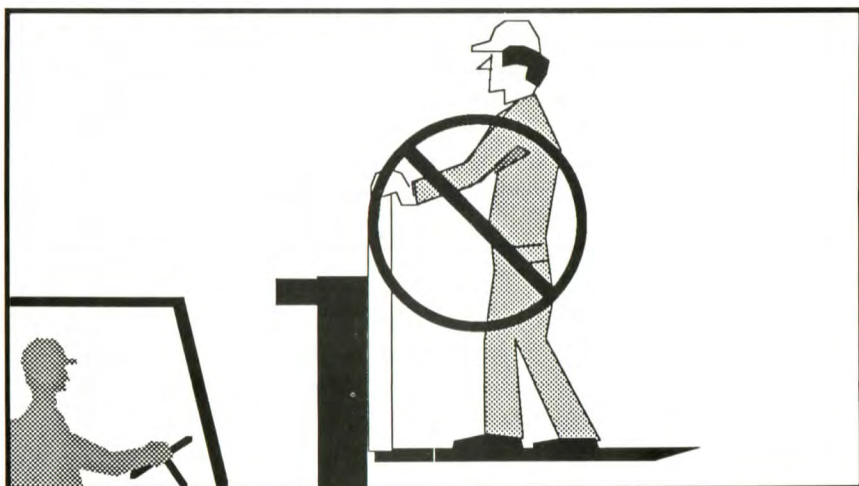


Seat belts can reduce injuries

General Safety Rules No Riders



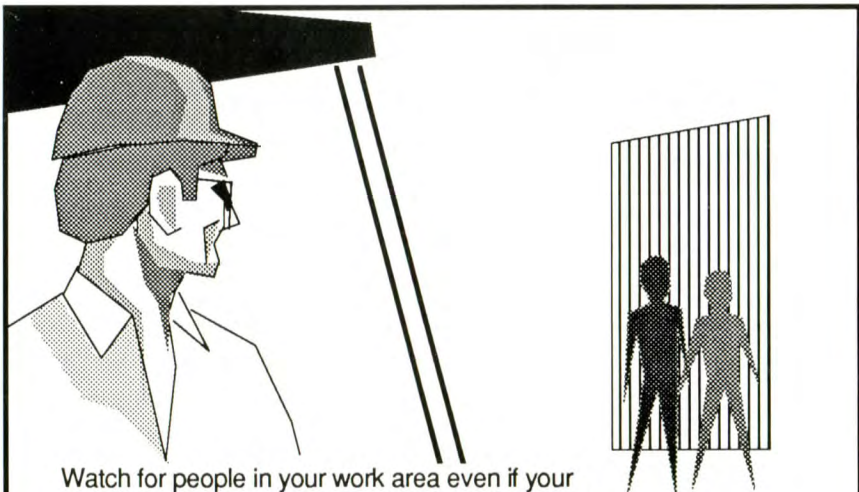
The operator is the only one who should be on a truck.



Never transport personnel on the forks of a lift truck.

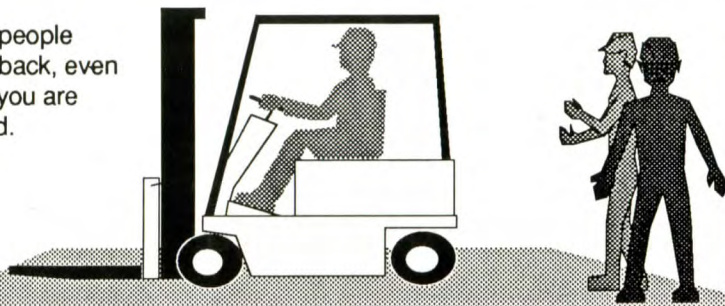
General Safety Rules Pedestrians

Watch where you are going, look in the direction of travel. Pedestrians may use the same roadway you do. Sound your horn at all intersections or blind spots.



Watch for people in your work area even if your truck has warning lights or alarms. They may not watch for you.

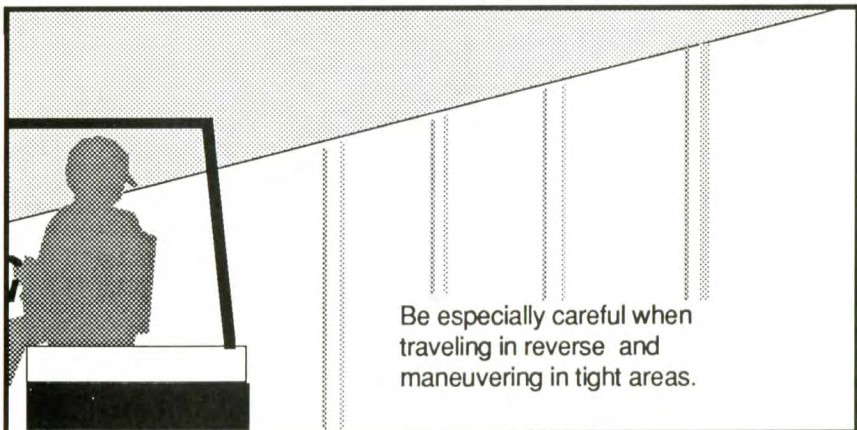
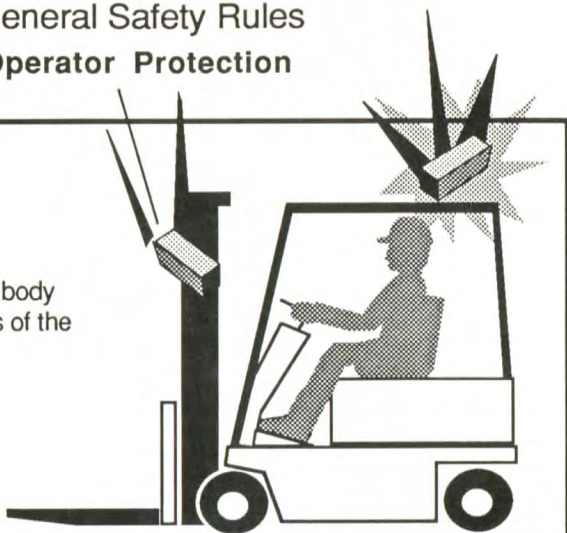
Make people stand back, even when you are parked.



General Safety Rules Operator Protection

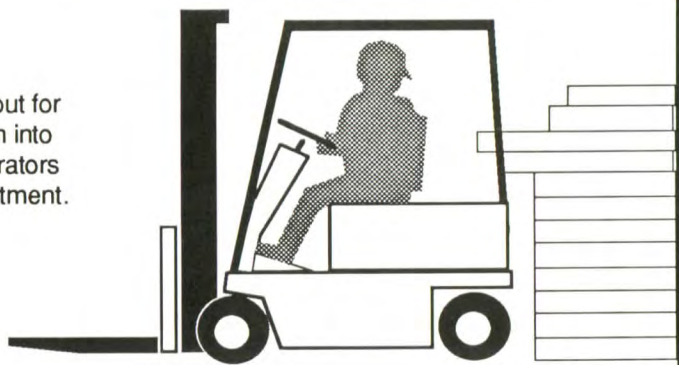
Keep under the
overhead guard.

Always keep your body
within the confines of the
truck.



Be especially careful when
traveling in reverse and
maneuvering in tight areas.

Watch out for
intrusion into
the operators
compartment.

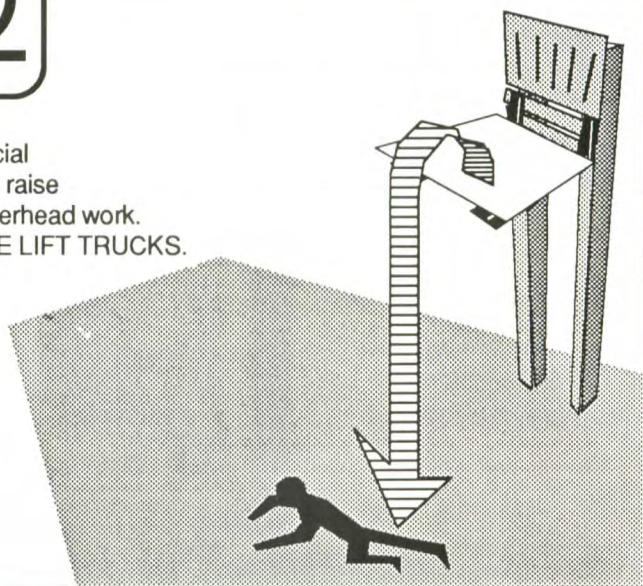


General Safety Rules Fork Safety

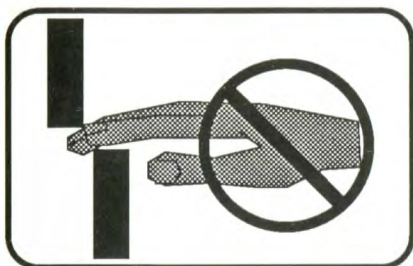
Never allow anyone to walk under raised forks.



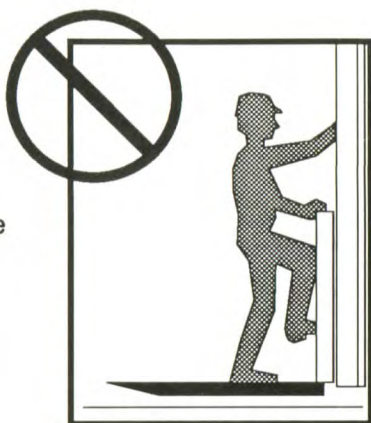
There is special equipment to raise people for overhead work.
DO NOT USE LIFT TRUCKS.



General Safety Rules Pinch Points



Keep hands, feet
and legs out of the
upright.



Don't use the
upright for a
ladder.

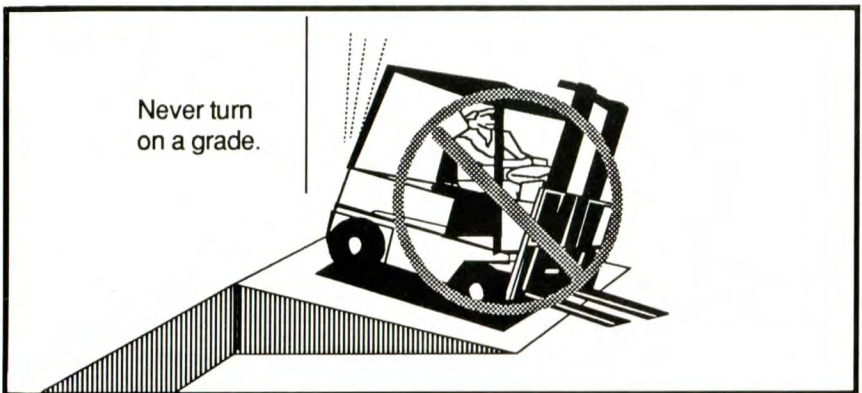
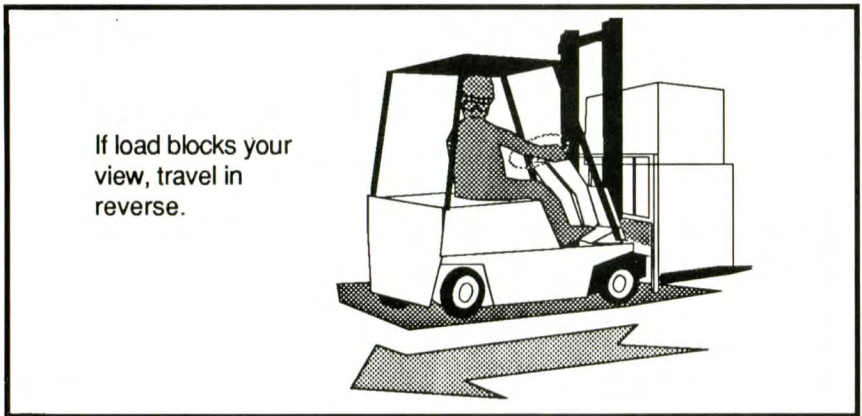
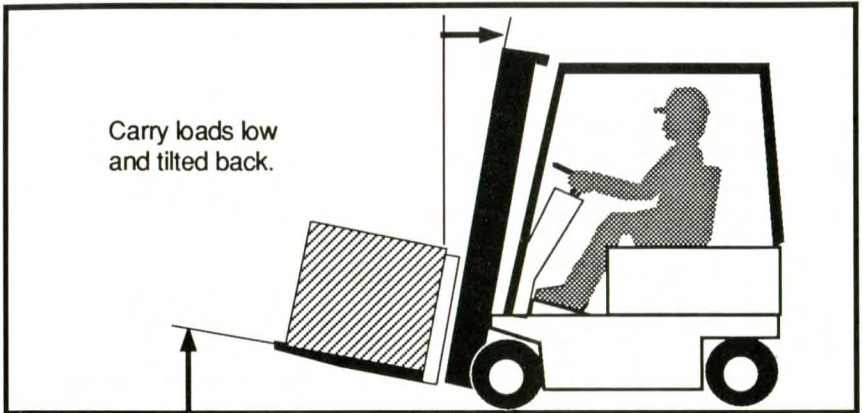
Never try to repair the
upright, carriage, chain
or attachment yourself---



Always get a trained
mechanic.

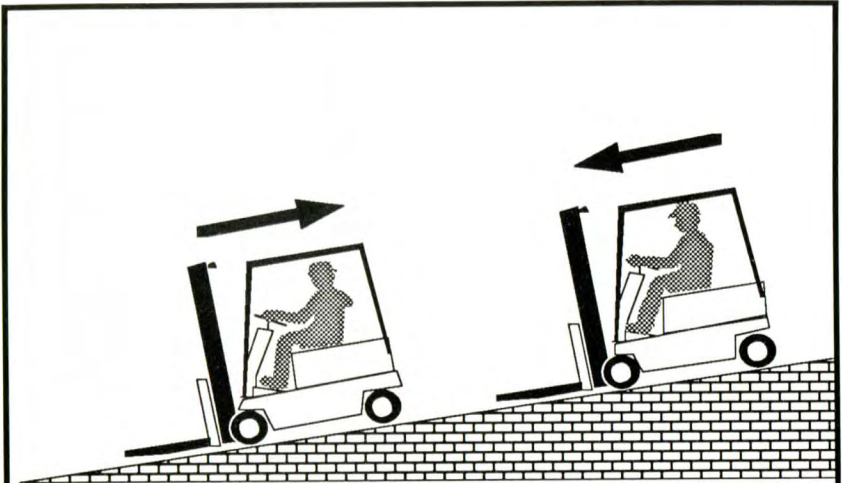


General Safety Rules Travel

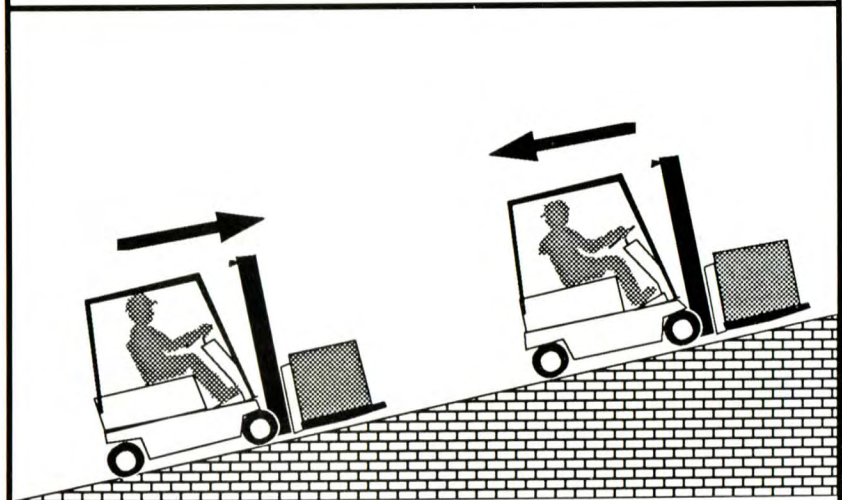


General Safety Rules

Grades, Ramps, Slopes and Inclines

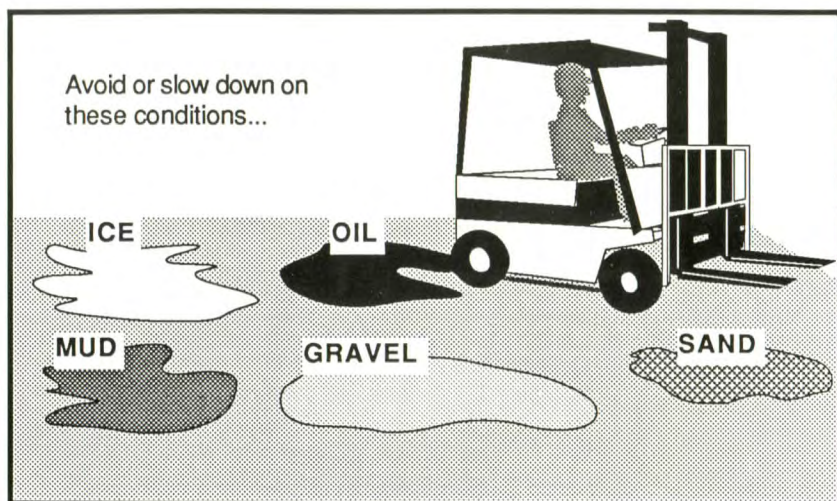


Unloaded - Forks Downgrade



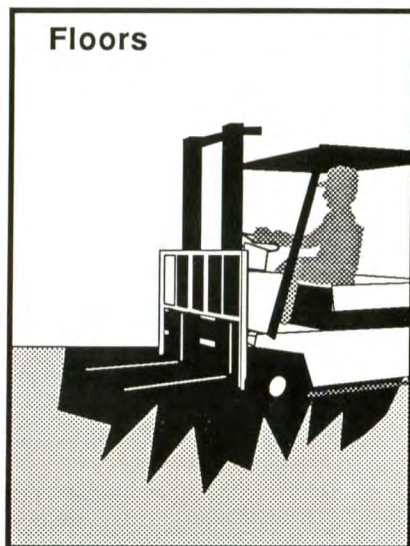
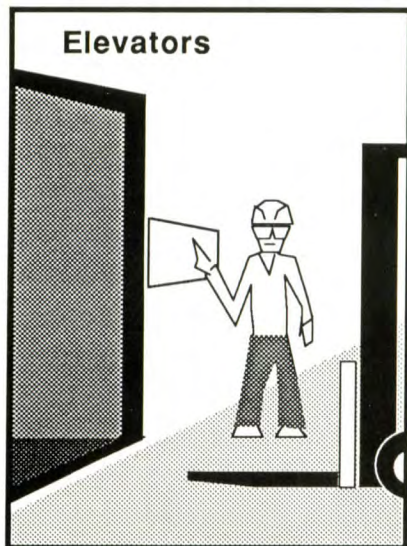
Loaded - Forks Upgrade

General Safety Rules Surface and Capacity

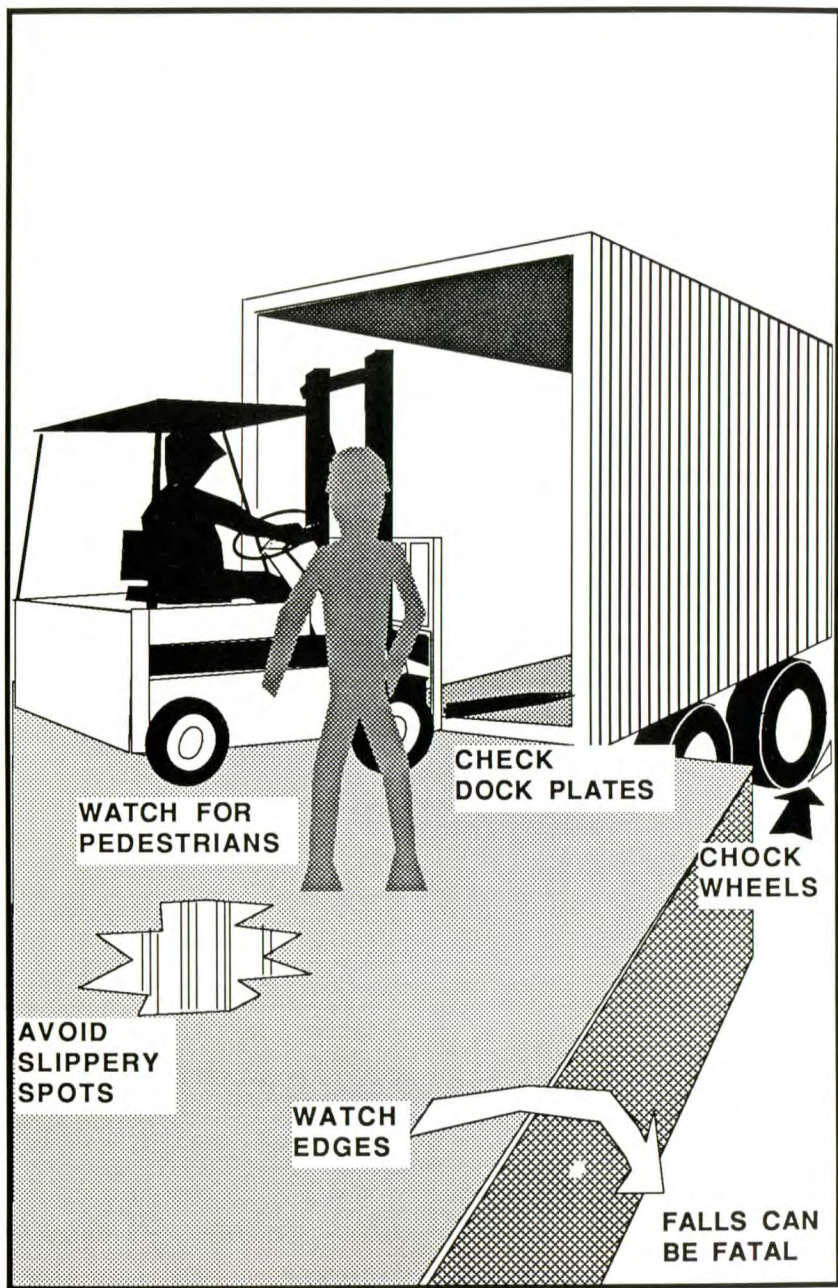


They can cause a truck to tip over.

Know the weight of your truck and load. Check capacities:



General Safety Rules Loading Docks



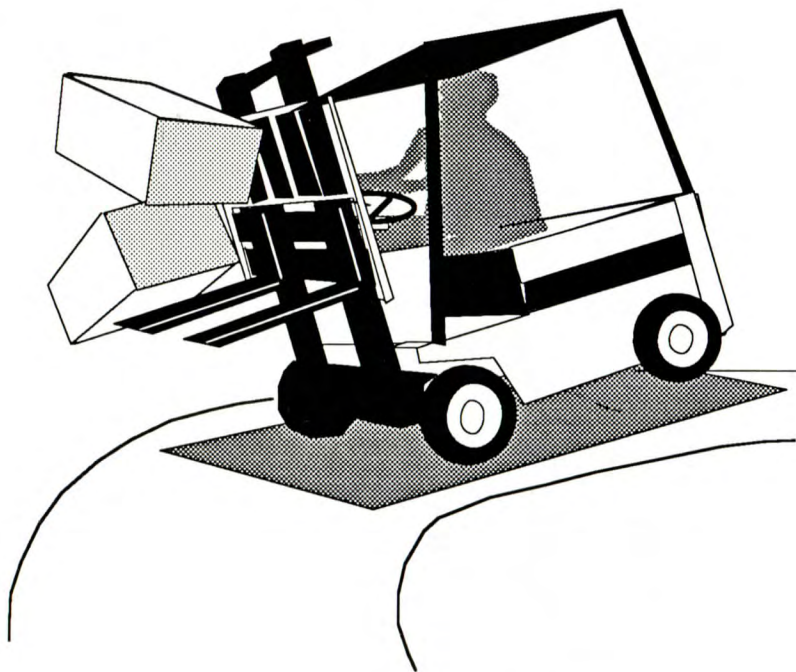
General Safety Rules

TIPOVER



WARNING:

Lift trucks can be tipped over
if operated improperly.



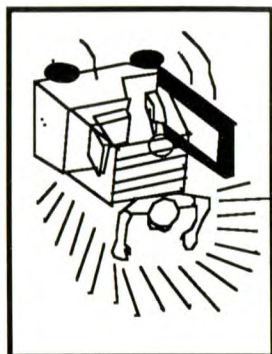
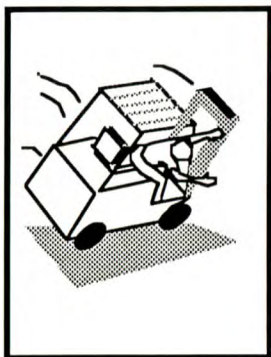
**A lift truck can tip over if you
break operating rules.**

General Safety Rules

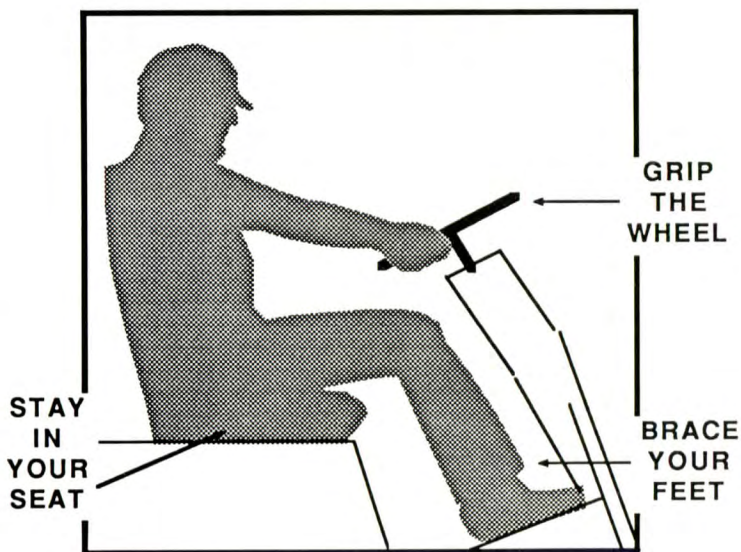
Don't jump

Your chances of survival in a tipover are better if you

stay with the truck, in your seat.



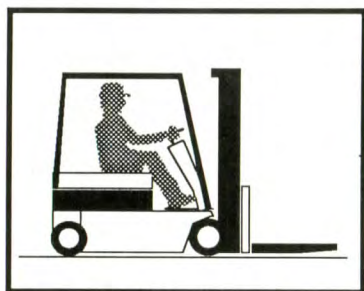
TIP WITH THE TRUCK



General Safety Rules

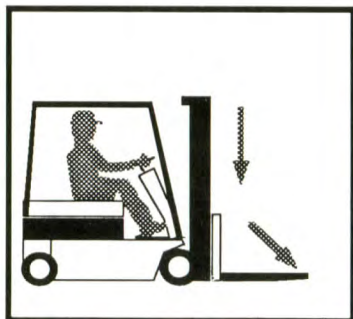
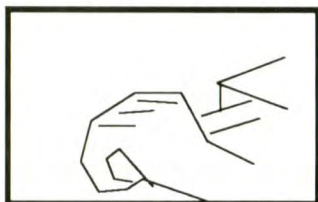
Parking

Never park on a grade.

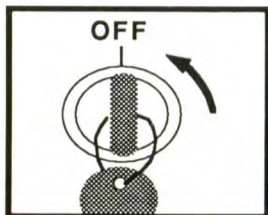


Always come to a complete stop before leaving truck.

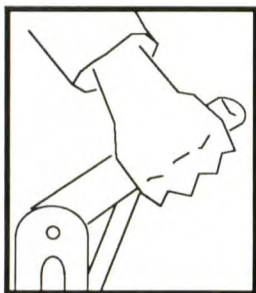
Be sure travel control is in neutral.



Lower forks fully to floor and tilt forward.



Turn key to "off" position.



Set parking brake.

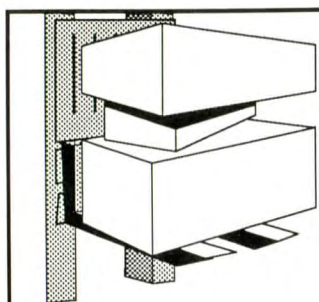
2 Operating Hazards Index

- Loose Loads 2.2
- Long and Wide Loads 2.3
- Rear Swing 2.4
- Low Overhead Clearance 2.5
- Fast Turns and High Loads 2.6
- Drop-offs 2.7
- Right-Angle Stacking 2.8
- Chain Slack 2.9
- Pallets and Skids 2.10
- U.L. Construction Type 2.11



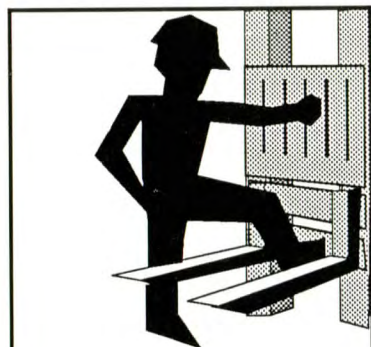
This section shows hazards that may cause you, or someone around you, to be killed or badly hurt. As the operator, you must look for other hazards. Get your boss to help you identify and avoid those hazards.

Operating Hazards Loose Loads

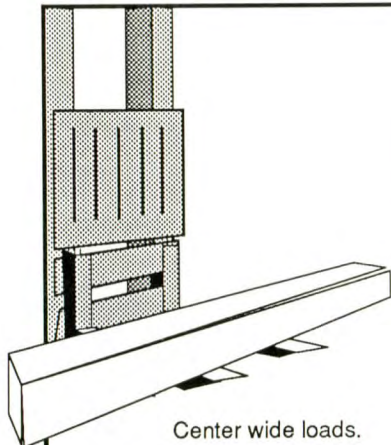


WARNING: Loose Loads

Never carry loose
or uneven material.

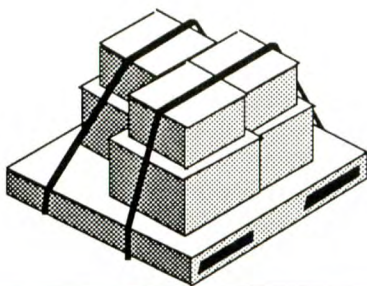


Spread the forks
to fit the load.



Center wide loads.

Stack and band
loose material.

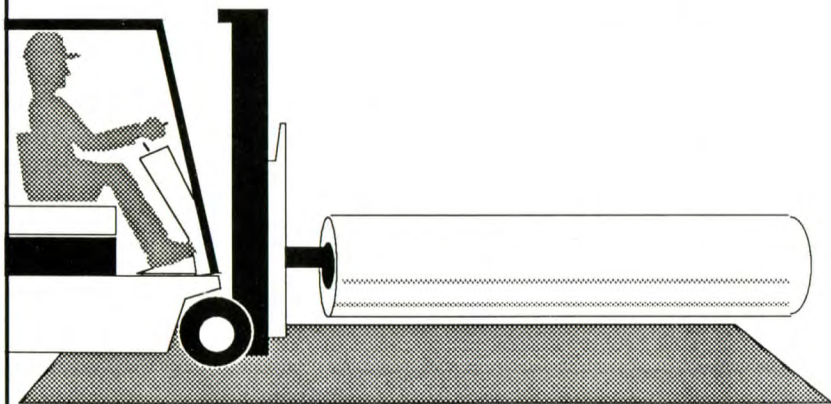


Operating Hazards Long and Wide Loads

WARNING: Long and Wide Loads

With long or wide loads you need more room---so---slow down and watch your clearance.

Keep wide loads low and watch your balance.
Do not let the load rest on the outrigger.

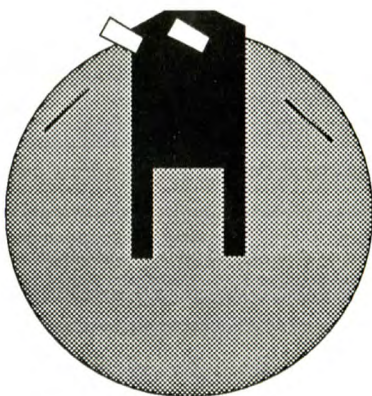


Remember, a long load will reduce the capacity of the truck.
KNOW AND UNDERSTAND YOUR TRUCK LOAD RATING.

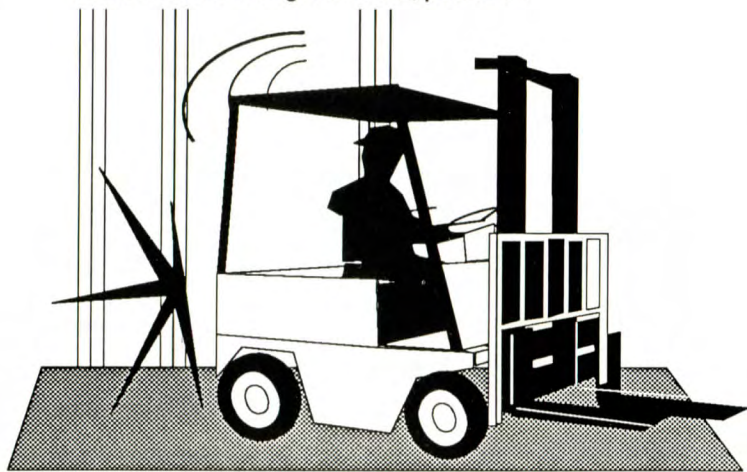
Operating Hazards

Rear Swing

 **WARNING:**
Rear Steering



When turning, be sure the rear of the truck does not swing into racks, posts etc.

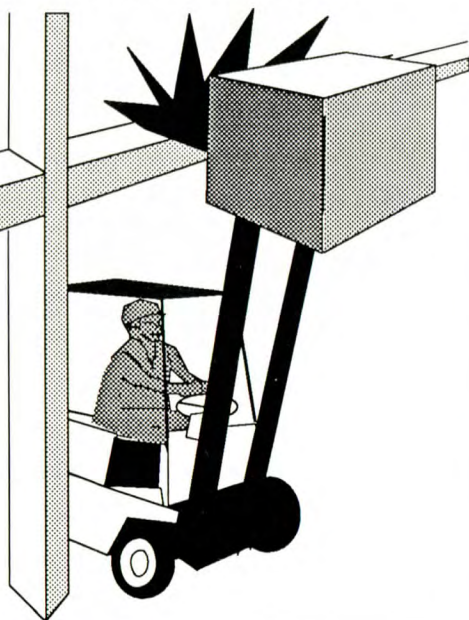


Operating Hazards Low Overhead Clearance

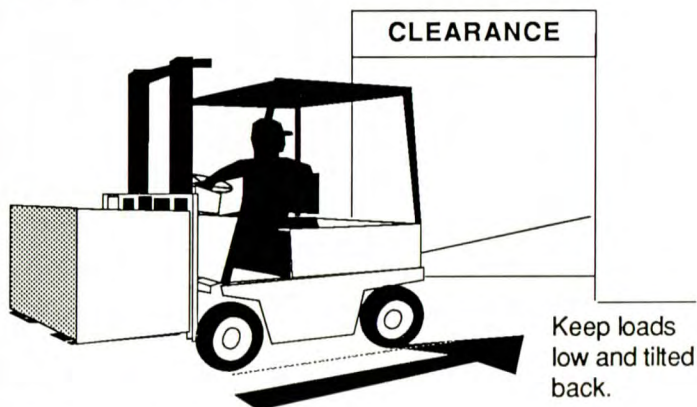


WARNING: Low Overhead Clearance

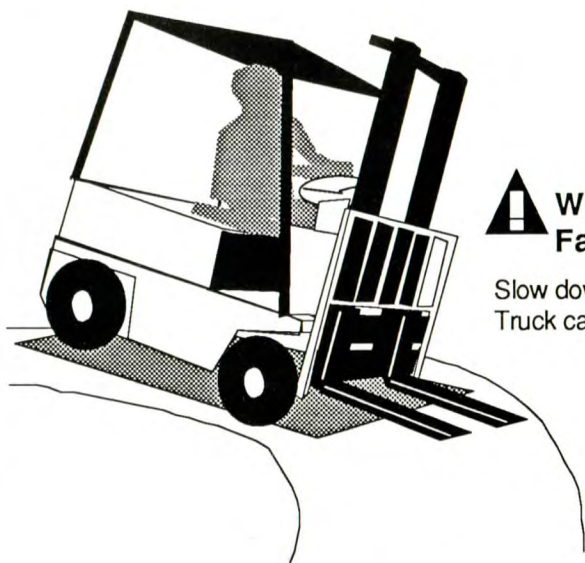
Watch overhead:
moving into
overhead struc-
tures can tip a
truck over.



Know the height of your truck.
Check your clearance.



Operating Hazards Fast Turns and High Loads



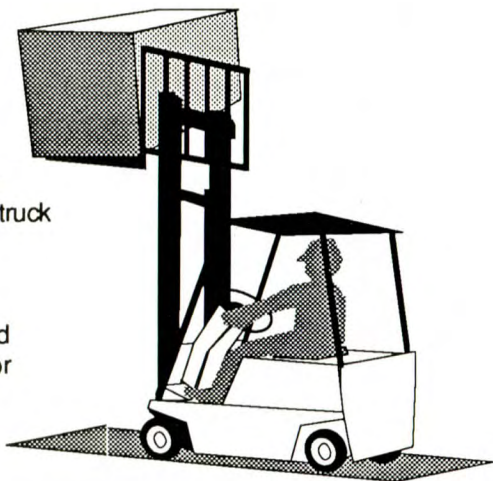
⚠ WARNING:
Fast Turns

Slow down before turning.
Truck can tip over.

⚠ WARNING:
High Loads

Turn too sharp with a raised load and your truck can tip even at slow speeds.

Travel with load raised only when removing or depositing a load.



Operating Hazards Drop-offs

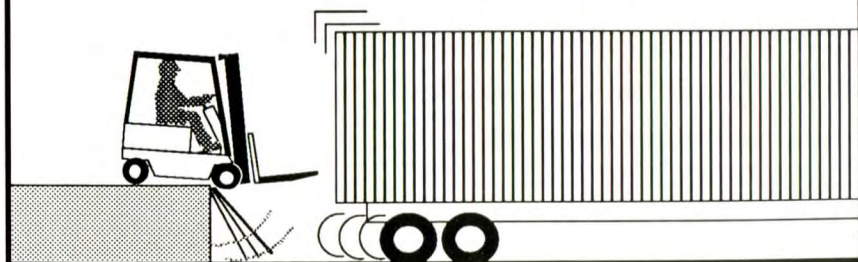
 **Warning: Dock or trailer drop-offs**



TO AVOID THESE HAZARDS YOU MUST:

- Talk to the truck driver yourself, make sure he does not move the trailer until you are done!
- Apply trailer brakes.
- Use wheel chocks.
- Use trailer-to-dock locking systems, if available.

 **Warning: Trailer creep**

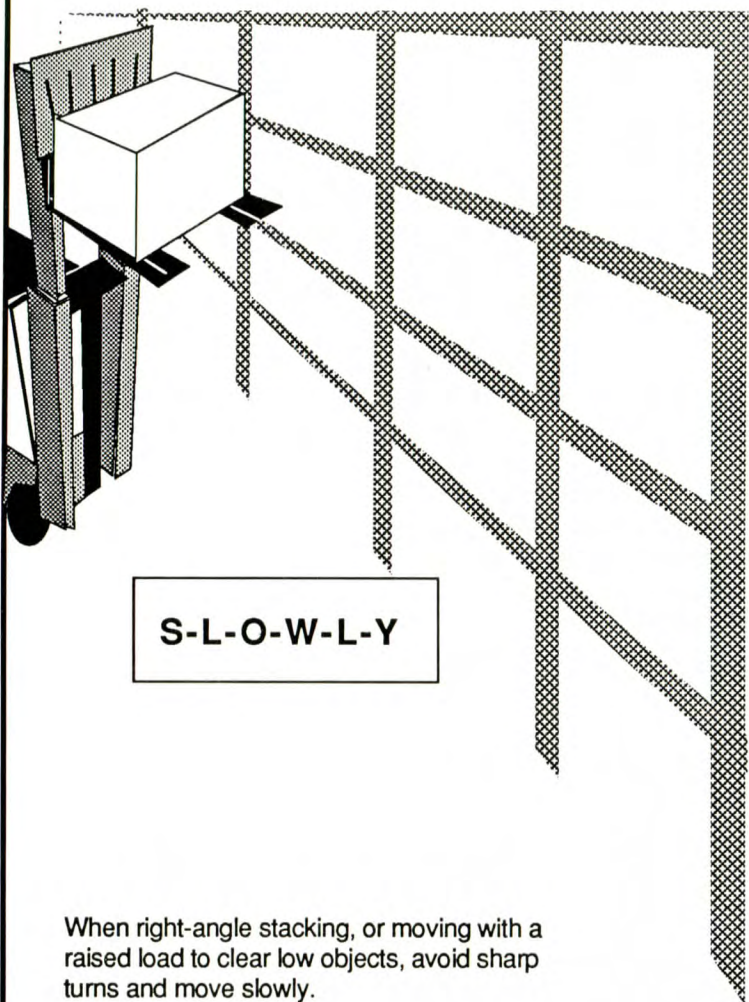


The impact of moving in and out of a trailer may cause the trailer to move.

Operating Hazards Right-Angle Stacking



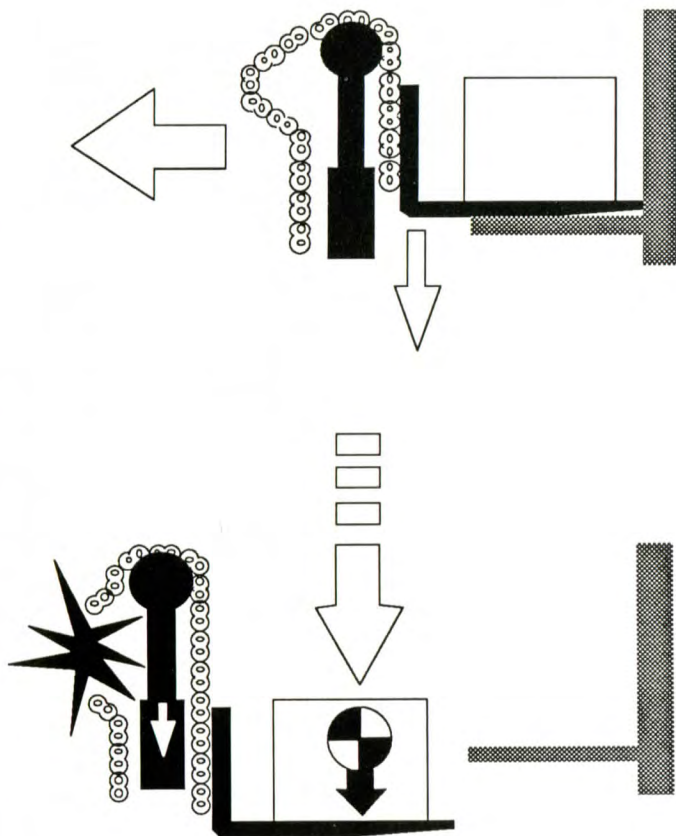
Warning: Right-angle stacking



Operating Hazards Chain Slack

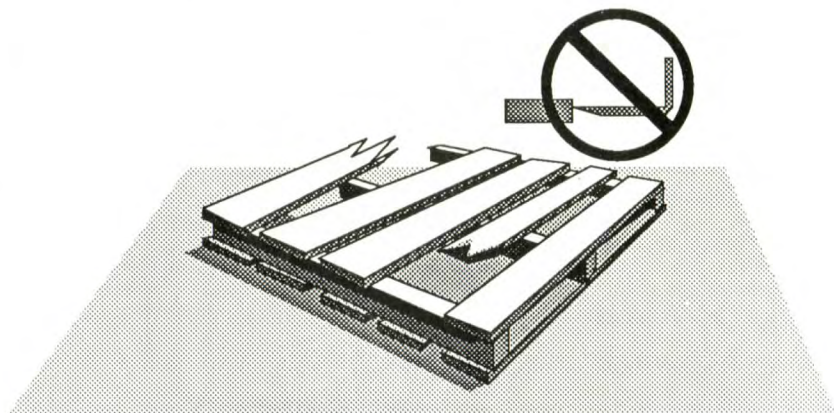
 **WARNING:**
Chain Slack

Slack chains mean rail or carriage hang-up. Raise the forks before you move.



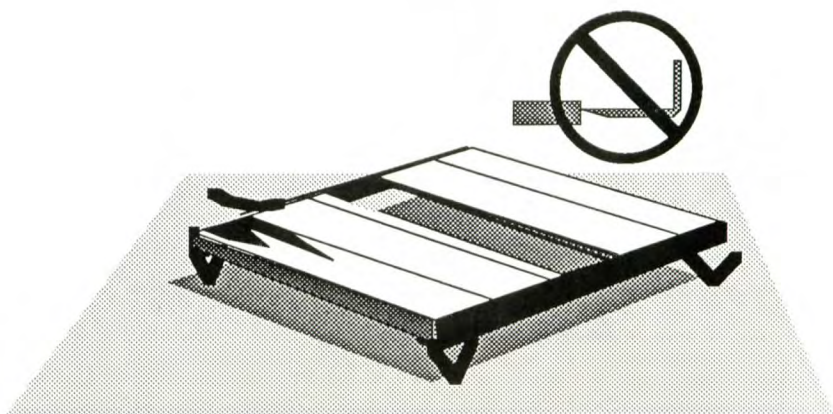
Operating Hazards Pallets and Skids

 **WARNING:**
Poorly maintained and/or
damaged pallets and skids



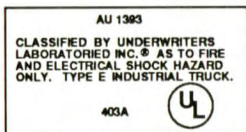
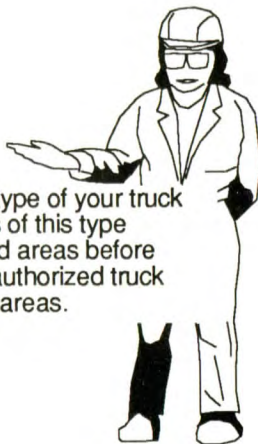
Do not move or store materials on damaged pallets or skids. Items can fall through them causing severe injury or death.

Be sure the pallet or skid you are using is in good condition and does not have defective or missing components and fasteners.



Operating Hazards U.L. Construction Type

Know the U.L. construction type of your truck and make certain that trucks of this type may be operated in restricted areas before entering. Never take an unauthorized truck into restricted or hazardous areas.





3 Know Your Truck

Truck Model Description 3.2

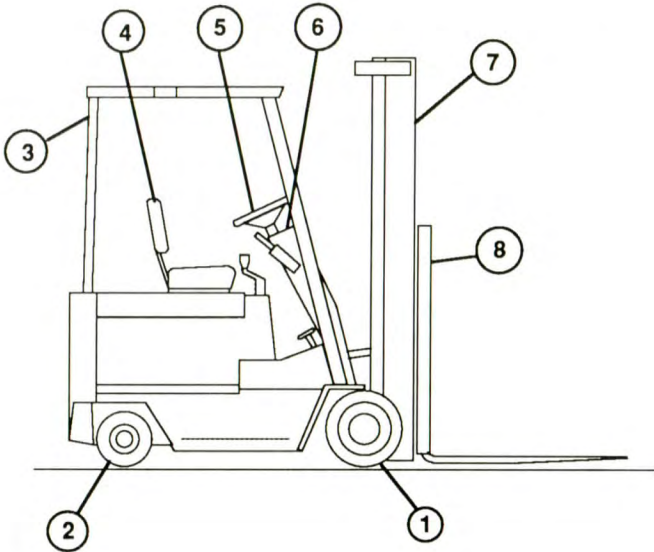
Truck Data and Safety Plates 3.3– 3.5

Safety and Warning Decals 3.6– 3.8

Operator's Compartment & Controls 3.9

How Your Lift Truck Operates 3.10– 3.16

Know Your Truck
Truck Model Description

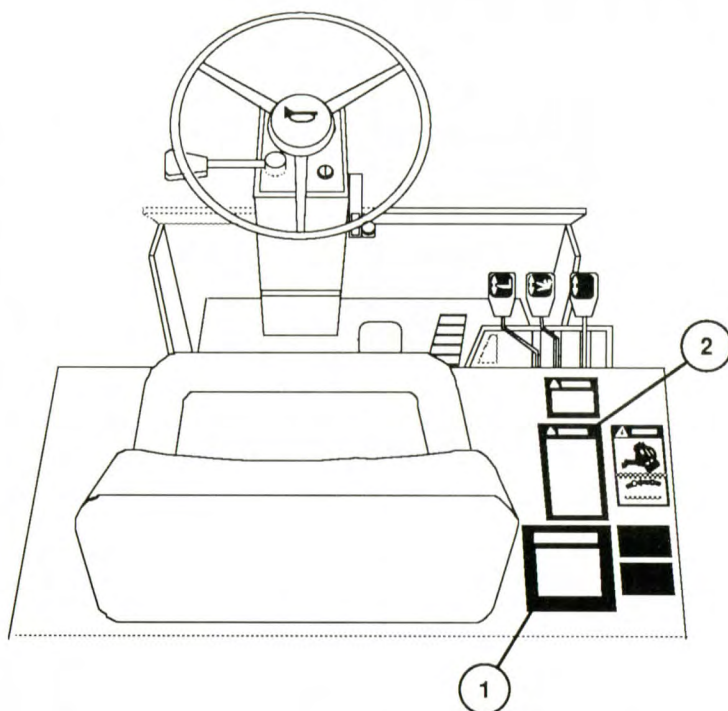


CLARK
ECS 17-20-22-25-27-30

**TRUCK TYPE -- Electric Sit-Down Rider, 36/48 Volt
Cushion Tire, 3500# thru 6000# Capacity**

1. Cushion Drive Axle and Wheels
2. Cushion Steer Axle and Wheels
3. Overhead Guard
4. Seat and Seat belt
5. Steering Control Handwheel
6. Directional Control Lever
7. Upright
8. Load Back Rest Extension

Know Your Truck Truck Data and Safety Plates



1. Truck Data and Capacity Plate
(Truck Nameplate)

2. Operator Safety Warning Decal

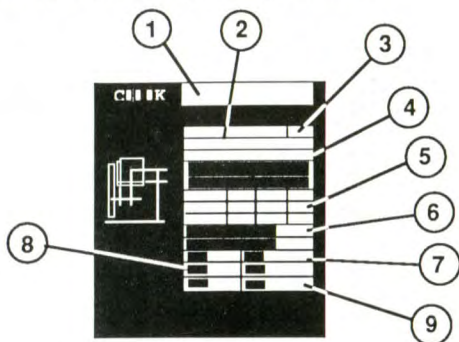
NOTICE

NAMEPLATES & DECALS

DO NOT OPERATE A LIFT TRUCK
WITH DAMAGED OR LOST DECALS
AND NAMEPLATES. REPLACE THEM
IMMEDIATELY. THEY CONTAIN
IMPORTANT INFORMATION.

Know Your Truck Truck Data and Safety Plates

Truck Data and Capacity Plate



KNOW AND UNDERSTAND THE MEANING OF THE DATA ON YOUR TRUCK'S NAMEPLATE

1. Truck registered name.
2. Truck model number and serial number. These are identification numbers assigned to this particular truck and should be used when requesting any information or when ordering service parts for this truck from your authorized CLARK dealer. The serial number is also stamped in the frame.
3. Type Designation. The code letters signify the type of construction with safeguards against fire, explosion or electrical shock hazards for operation in nonclassified and classified areas. Check with proper authority before entering areas where flammable or explosive material may be present.
4. Attachment description (if any installed). The user must see that the truck is marked to identify the attachment(s), including the weight of the truck/attachment combination and truck capacity with the attachment.
5. Capacity rating, load center, and lifting height data. This shows the maximum load capacity of this truck with relation to load centers and fork heights (see diagram on plate). Personal injury and damage to the truck can occur if these capacities are exceeded. **DO NOT EXCEED MAXIMUM SPECIFIED.**
6. Truck weight, less load.
7. Battery weight.
8. Battery ampere-hour rating.
9. System voltage.

IMPORTANT - When attachments are added or if the truck is modified, the capacity of the truck may be affected. Contact your authorized Clark dealer for new nameplate showing the revised capacity.

Know Your Truck Truck Data and Safety Plates

Operator Safety Warning Decal



The operator's warning decal describes basic instructions for safe operation of a lift truck. Read and understand these instructions and the other safety messages in this manual and on the lift truck.

- Do not operate this lift truck unless you are trained and authorized. Read and understand operator's manual before starting lift trucks.
- Do not operate damaged or faulty lift truck. Do not attempt repairs unless you are trained and authorized.
- Look where you drive. Watch out for people, obstructions (especially overhead), and drop-offs. If load blocks your view, drive backward, except up slopes.
- Lift trucks will tip over if not properly operated. Slow down before turning. Do not turn on slopes. Drive with forks or attachments fully lowered and tilted back. Check tires for correct pressure.
- Forks or attachments can fall rapidly if not properly controlled or maintained. Do not use this lift truck to raise people.
- Protect against falling objects. Overhead guard and load backrest extension must be in place.
- Do not load lift truck over capacity on nameplate. Move long, high, or wide loads carefully. Do not move unstable loads.
- Before getting off lift truck, lower forks or attachments all the way, put drive in neutral, turn off key, and set parking brake.

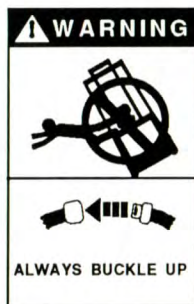
Know Your Truck

Safety and Warning Decals

Safety and warning decals are placed in conspicuous locations on the truck. These decals are provided to remind you of either essential procedures or to prevent you from making an error which could damage the truck or possibly cause personal injury. It is important that you know, understand and follow these instructions. These safety and warning decals should be replaced immediately if missing or defaced (damaged or illegible). Refer the Service Manual for location of all decals.

Seat Belt Warning Decal

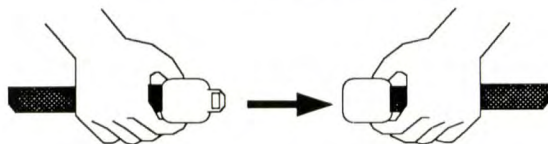
This safety decal is placed on the seat deck to remind you to always wear your seat belt when driving a lift truck. To help in calling your attention to this important safety item, a seat belt warning light and a buzzer alarm are connected with the key switch.



Lift trucks can be tipped over if operated improperly. Experience with lift truck accidents has shown that the driver cannot react quickly enough to jump clear of the truck and overhead guard as the truck tips. To protect operators from severe injury or death in the event of a tip-over, it is best to be held securely in the seat.

So, please, always buckle up when driving your lift truck.

ALWAYS BUCKLE UP



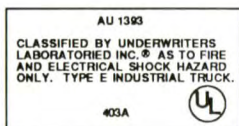
Seat belts can reduce injuries

Know Your Truck

Safety and Warning Decals

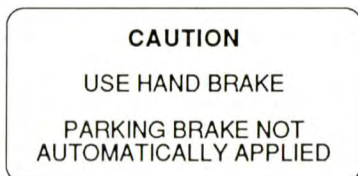
Type Designation UL Classification Label

Type designation is a system for identifying types of powered industrial trucks for operation in nonclassified and classified areas. The code letters (E, ES, EE) signify the type of construction with safeguards against fire, explosion or electrical shock hazards in conformance with the requirements as prescribed by Underwriters Laboratories, Inc.



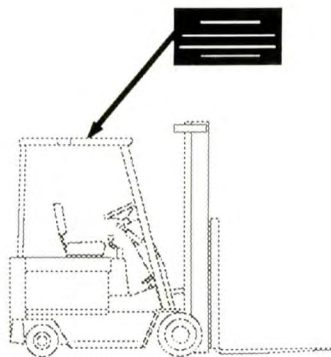
Know the U.L. construction type of your truck and be certain that trucks of this type may be operated in restricted areas before entering. Never take an unauthorized truck into restricted or hazardous areas.

Parking Brake Caution Decal



Overhead Guard Conformance Plate

This plate is permanently attached to the overhead guard top to confirm that the overhead guard assembly design has been tested and conforms to the requirements of ANSI B56.1 safety standards.



Know Your Truck Safety and Warning Decals

Upright Warning Decal

This safety decal is placed on the upright to warn of the danger of injury from movement between rails, chains, sheaves, fork carriage and other parts of the upright assembly. Do not climb on or reach into the upright. Personal injury will result if any part of your body is put between moving parts of the upright.

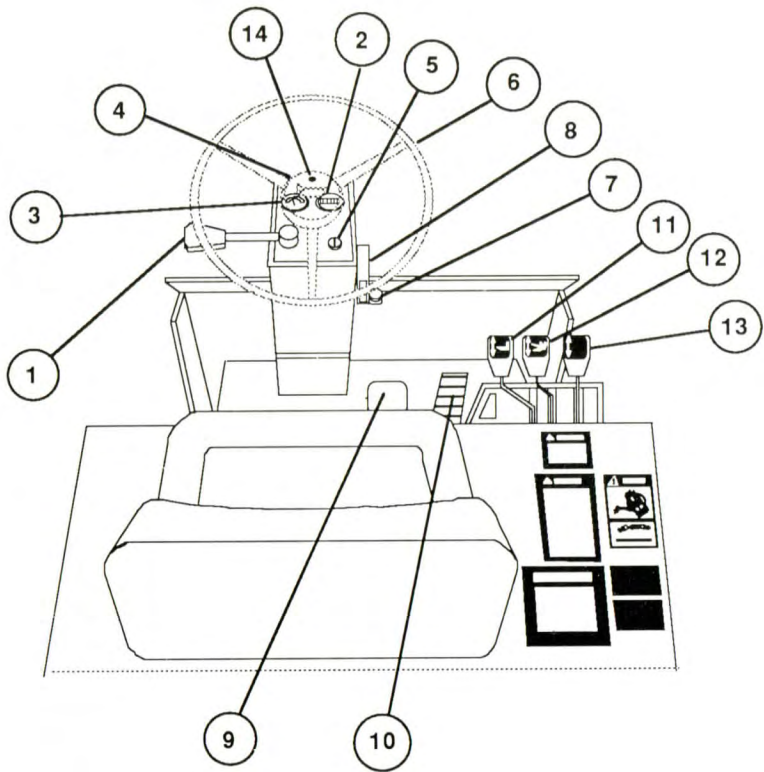


Keep Away From Forks Decal

This safety decal is placed on the upright to warn of the danger of injury from forks when they are in the raised position. Do not ride on or stand under forks or attachments. The forks can fall and cause injury or death. Always make sure that the forks are in the fully lowered position when they are not being used to handle a load.



Know Your Truck Operator's Compartment & Controls



1. Directional Control Lever
2. Hourmeter
3. Battery Discharge Indicator
4. Horn Button
5. Key Switch
6. Steering Handwheel
7. Parking Brake Lever
8. Pylon Release Lever

9. Brake Pedal
10. Accelerator Pedal
11. Lift Control Lever
12. Tilt Control Lever
13. Aux Valve Control Lever
14. Brush Wear Indicator
(if equipped)

Familiarize
yourself with the controls
and follow
safe operating rules.

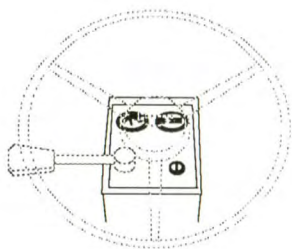
Know Your Truck

How Your Lift Truck Operates

Instrument Panel

The Instrument Panel includes the

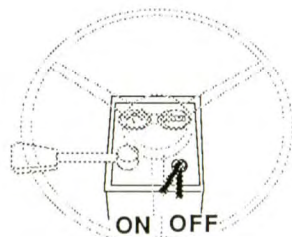
- key switch
- hourmeter
- battery discharge indicator



The key switch

- connects the battery with all truck operating systems (drive, lift, and steer electrical circuits), except the horn
- connects the hourmeter and battery discharge indicator.

The key switch must always be turned to the ON position to operate the truck. When the key is in the vertical OFF position, all instrument, drive, and pump motor electrical circuits are disconnected (shut off), and the key can be removed.

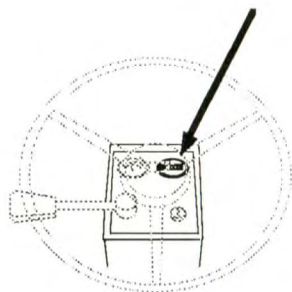


The horn should operate at all times that a adequately charged battery is connected at the truck receptacle.

Hourmeter

This is a solid-state digital meter that indicates, in hours and tenths of an hour, operating time of the truck. Its function is to record total operating time on the truck, and which is used to determine maintenance intervals.

The hourmeter operates only when the lift pump and/or the steer pump is operating. Operation of the hourmeter can be checked by watching for movement of the indicator as it rotates.

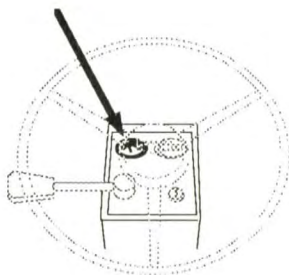


Know Your Truck

How Your Lift Truck Operates

Battery Discharge Indicator

The battery discharge indicator shows battery charge condition. It operates continuously when the key switch is ON. The indicator shows in the green area when the truck battery has an adequate charge level to operate the truck. As the battery discharges during truck operation, the indicator falls into the red area, indicating the need for battery service (re-charging).



Electrical Circuit

The electrical circuit includes

Drive motor control switches:

- 1 When the parking brake is applied, power to the drive motor is turned off.
- 2 When the brake pedal is pushed, power to the drive motor is turned off.

Power steering control switches:

- 1 The steer pump operates only when the parking brake is released and directional control lever is in FORWARD or REVERSE position, with key switch ON.

Lift pump control switches:

- The lift pump operates only when
- 1 Lift control lever is moved to the "raise" position.
 - 2 Tilt control lever is moved from the "neutral" position, either forward or backward.
 - 3 Aux control lever (optional) is moved from the neutral position.

A Static Return to Off (SRO) circuit in the SCR control shuts the SCR control off whenever the parking brake (or optional seat brake) switch or key switch is opened. When one of these switches is opened, the SCR control will shut off and cannot be restarted until the directional control lever is returned to neutral. A time delay (1 second) is built into the control to allow momentary opening of the seat switch if a bump is encountered.

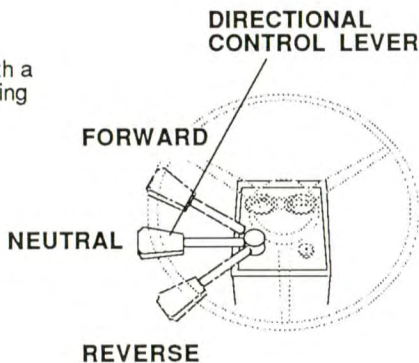
Know Your Truck How Your Lift Truck Operates

Directional Control --- "Forward" or "Reverse"

Direction-of-travel motion is selected with a control on the left-hand side of the steering column. The control lever has three positions

- FORWARD
- NEUTRAL
- REVERSE

The control lever is held positively in each position by spring detents in the lever assembly. Selection of travel direction may be noted by visual check of the lever position.



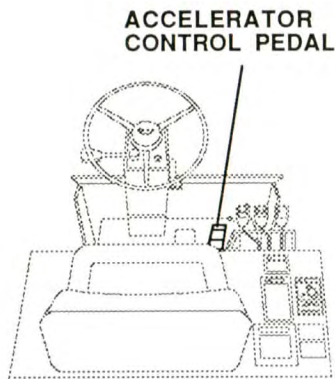
Accelerator Control Pedal

With the accelerator pedal you control the required truck travel speed and power. The accelerator pedal operates the accelerator control, mounted directly beneath the floorboard.

Plugging

The accelerator control applied together with the direction control can be used for "plugging". Plugging, when the truck is moving (traveling), consists of moving the direction control lever to the position opposite the direction of travel while your foot is still depressing the accelerator pedal. The truck should slow to a smooth, controlled stop and accelerate in the opposite direction.

NOTE - The static return to off (SRO) circuit places the travel control in "electrical neutral" if the driver leaves the seat (with optional seat brake) or if the parking brake or key switch is opened. To restart, the directional control lever must be placed in neutral and a travel direction reselected, thus helping to prevent accidental start-up.



Know Your Truck

How Your Lift Truck Operates

Hydraulic Service Brakes

Your truck has a manual service brake system, with a single pedal which actuates the master cylinder.

The brake master cylinder reservoir is supplied with oil from the steering return circuit. The fluid in the brake circuit is hydraulic fluid.

The service brakes are hydraulically-actuated, multiple-disc wet (brake discs run in oil) brakes inside the drive axle, with a brake disc pack for each drive wheel. The brake disc packs are placed on the axle shafts ahead of the wheel reduction gearing. The brakes are self-adjusting and mechanically-actuated for parking.

CAUTION -- Never operate your lift truck if the service and parking brakes are not working correctly.

Parking Brake

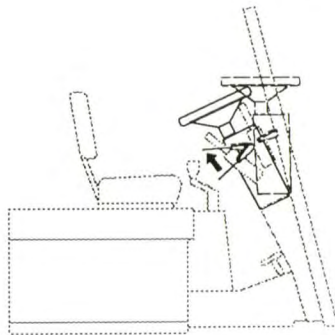
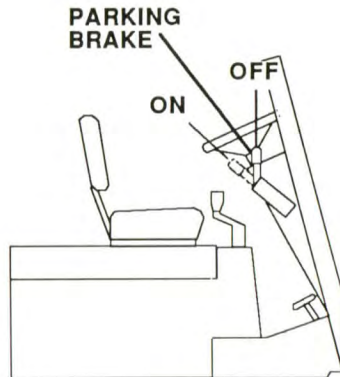
The parking brake lever mounted at the right on the steering pylon mechanically actuates the service brakes. The lever is connected by cable to an actuating mechanism on the drive axle.

Pull the lever (towards the operator) fully to the vertical overcenter upright position to apply the parking brake. The lever should snap-lock easily into the over-center applied position, when correctly adjusted. Push the lever forward (away from the operator) to release the parking brake.

To adjust the parking brake cable tension, turn the adjustment screw in the end of the lever handle clockwise to tighten and counterclockwise to loosen the cable.

Steering Column (Pylon)

The pylon is hinged and designed to be released and moved forward to provide clearance at the steering handwheel when removing the truck battery. Pull the latch handle upwards to release. Pylon moves forward by spring action. Pull the pylon backwards to the operating position where it will lock automatically. The steering pylon is adjustable for any intermediate position.



Know Your Truck

How Your Lift Truck Operates

Power Steering System

All ECS 17-30 trucks are equipped with a hydrostatic power steering system. Full-time power steering is provided by oil pressure from a separate electric motor and pump. Oil for the power steering system is drawn from the main hydraulic sump and circulated back to the sump through the return-line filter.

The steering handwheel operates a steering control valve which directs oil flow to the 2-way steering cylinder on the steering axle. The steering control valve can also act as a pump to provide manual steering if the steer motor (steer pump flow) stops.

CAUTION -- Never operate a lift truck which has a steering system fault.

Horn Button

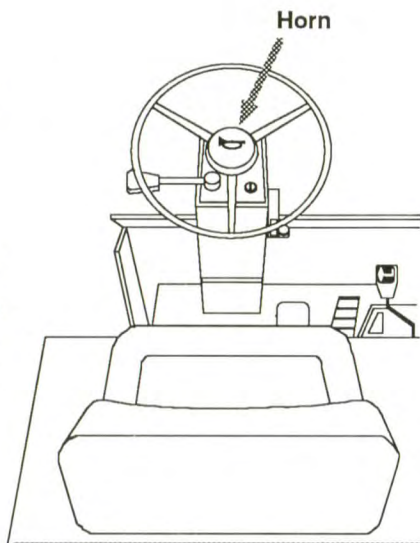
The horn button is located in the center hub of the steering handwheel, and is electrically connected by contacts and wiring to the horn assembly installed in the dash of the truck.

Main Hydraulic System

The parts of the main hydraulic system are the hydraulic sump tank, main hydraulic pump and motor, main control valve, and associated hydraulic lines and hoses.

The hydraulic sump is a separate, removable tank in the right-hand side compartment of the truck frame. The sump breather is a standard Clark part.

Oil from the hydraulic sump tank is fed by a gear pump to the main control valve. From the main control valve the oil is directed to either the lift cylinders or the tilt cylinders. Filtration of the main hydraulic system oil is provided through a spin-on, full-flow return-line filter in the steering circuit.



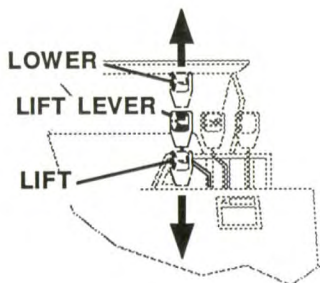
Know Your Truck

How Your Lift Truck Operates

Lift Control Lever

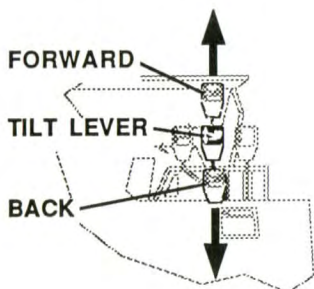
With the lift control lever, you are able to raise and lower the fork carriage on the upright. The lifting speed is controlled through the main hydraulic control valve by varying the lever position (amount of movement from the center or neutral position).

When the lift control lever is pushed forwards, the fork carriage is lowered. By varying the amount of movement of the lever from the center or neutral position, you determine the lowering speed. You can also lower the fork carriage when the lift motor is stopped.



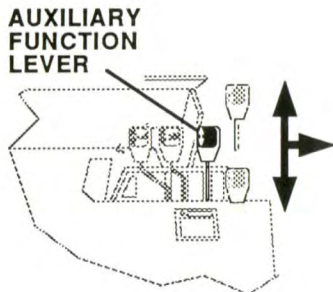
Tilt Control Lever

With the tilt control lever, you are able to control the tilting or vertical positioning of the upright and the angle of the forks. When the lever is pulled back, the upright and forks tilt backwards. Push the lever forward to tilt the upright and forks forward.



Auxiliary Function Control Lever (Optional)

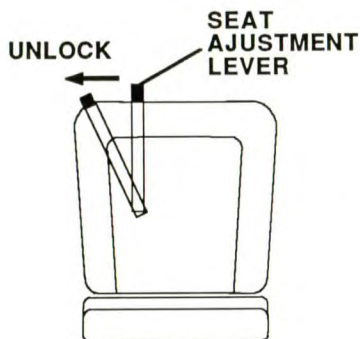
If your lift truck is equipped with an optional attachment, an additional control lever will be mounted to the right of the tilt control lever. With the optional aux control lever, you are able to control the flow of hydraulic oil to a material-handling attachment connected to the fork carriage according to the requirements of the attachment.



Know Your Truck How Your Lift Truck Operates

Seat Adjustment

The seat adjustment lever is located on the left side under the seat. To unlock, push the lever to the left and adjust the seat so that all controls may be comfortably reached. Then release the lever. Be sure that the seat locking mechanism is engaged. The seat mounting base allows a six-inch fore-and-aft adjustment of its slide mechanism.



Battery Compartment Access

The combination seat deck/battery compartment cover is hinged and assisted in opening by a gas spring which also supports it in the open position. The cover is held closed by a spring latch located at the front edge. Pull the latch handle upwards to unlatch and open the cover.



4 Operator Care and Maintenance

Daily Safety Inspection 4.2- 4.4

NOTICE

The Occupational Safety and Health Act (OSHA) requires that the user examine his trucks before each shift to be sure they are in safe working order. Defects when found shall be immediately reported and corrected. The truck shall be taken out of service until it has been restored to safe operating condition.

Operator Care and Maintenance Daily Safety Inspection

Before using a lift truck, it is the operator's responsibility to check its condition and be sure it is safe to operate.

Check for damage and maintenance problems, and have repairs made before you operate the truck. Unusual noises or problems should be reported immediately to the user's supervisor or other designated authority.

Do not make repairs yourself unless you have been trained in lift truck repair procedures and authorized by your employer. Have a qualified mechanic correct all discrepancies using genuine CLARK or CLARK-approved parts.

Do not operate a truck if it is in need of repair. If it is in an unsafe condition, remove the key and report the condition to the proper authority. If the truck becomes unsafe in any way while you are operating it, STOP operating the truck and report the problem immediately and have it corrected.

Lift trucks should be inspected every 8 hours, or at the start of each shift. This daily inspection should include a visual check for leaks and any obvious damage which may have been caused by operation during the last shift. Be sure that the overhead guard is in good condition. Look the upright and lift chains over. Check the forks and load backrest extension. Look for loose bolts and fittings. Check the tires, wheels and wheel mounting bolts. Check the hydraulic sump oil level. Check all of the controls. Operate the truck briefly to be sure that all systems are operating correctly, and that all instruments, warning lights and the horn are functioning.

As an aid in carrying out this inspection, CLARK has prepared a form called "Driver's Daily Checklist". We recommend that you use this form to make a daily record of your inspections and truck condition.

Copies of this form may be obtained from your CLARK dealer.

Operator Care and Maintenance

Daily Safety Inspection

HOW TO PERFORM THE DAILY SAFETY AND OPERATING CHECKS

Visual Checks

First, perform a visual inspection of the truck and its major components.

Walk around your lift truck and take note of obvious damage which may have been caused by operation during the last shift.

Check that all capacity, safety, and warning plates or decals are attached and legible.

Check that battery is installed and secured in position correctly. Check battery connector for safe condition. Look for any external leakage around drive axle.

Check, before and after starting engine, for any signs of external leakage: fuel, engine coolant, transmission fluid, etc.

Check for hydraulic oil leaks and loose fittings. **WARNING -- DO NOT USE BARE HANDS TO CHECK.** Oil may be hot or under pressure.

Be sure that the driver's overhead guard, load backrest extension and any other safety devices are in place, undamaged and attached securely.

Then, check all of the critical components that handle or carry the load.

Look the upright and lift chains over. Check for obvious wear and maintenance problems such as damaged or missing parts, leaks, slack or broken chains, bent parts, etc. Check all attachments, chains, cables, and limit switches.

Carefully inspect the load forks for cracks, breaks, bending, twists, and wear. Be sure that the forks are correctly installed and locked in their proper position.

Inspect the wheels and tires for safe mounting and wear condition

Check fluid levels.

Functional Checks

Test warning devices, horn, lights, and other safety equipment and accessories.

Start the engine and be sure all controls and systems are functioning correctly. Check the hourmeter for operation. Operate the service and parking brakes, all hydraulic controls: lift, tilt and aux functions, accelerator, directional control, and steering system. Be sure all controls operate freely and return to neutral properly. Operate the lift mechanism and auxiliary function (if installed).

Operator Care and Maintenance

Daily Safety Inspection

WHEN FUNCTIONAL CHECKS ARE COMPLETED:

- Bring truck to a complete stop.
- Put directional control lever in the "N" (neutral) position.
- Apply the parking brake.
- Turn the key switch to the OFF position.
- Lower the lifting mechanism: fork carriage and forks or attachments, fully to the floor.

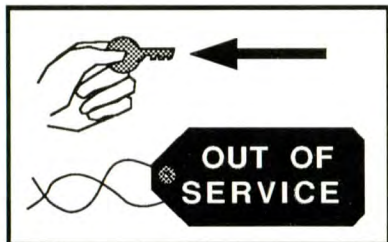
Standard Shut Down Procedure

When parking and leaving truck unattended, lift mechanism shall be fully lowered, controls placed in neutral, brakes set, and key removed. Block the wheels if truck is parked on an incline or has possibility of moving.

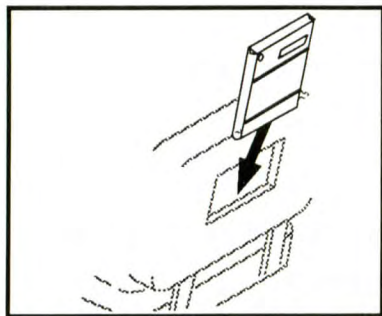
Make a record on the "Driver's Daily Checklist" of all the operating and truck problems that you find. Review the checklist to be sure it has been completed and turn it in to the person responsible for lift truck maintenance. Be sure any unusual noises or problems are investigated immediately.

Do not operate a lift truck that has a maintenance problem, or is not safe to operate.

Remove the key from the key switch and put an "Out of Service" tag on the truck.



Be sure to put this Operator's Manual back in the holder behind the seat. Read the manual again if you are not sure of all lift truck operating procedures.



If all of the "Before Operation" checks were normal or satisfactory, the truck can be operated.

5 Operating Procedures

Before Operation 5.2

How To Operate Your Truck 5.3– 5.13

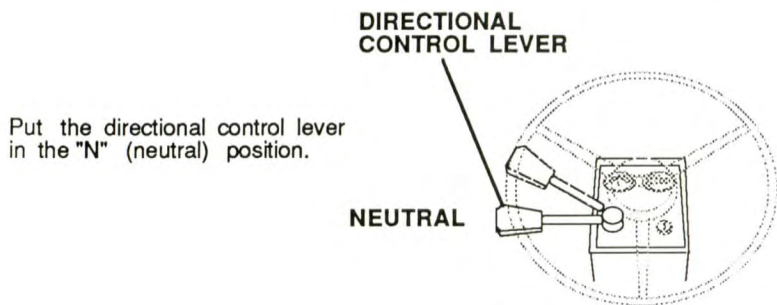
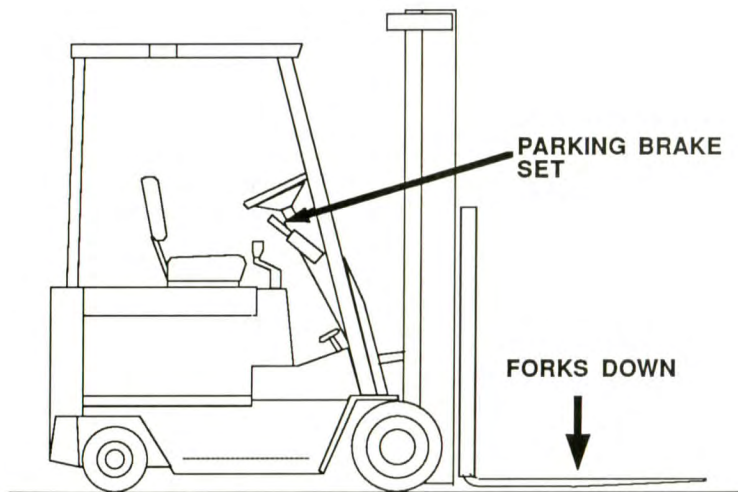
After Operation 5.14

Operating Procedures Before Operation

WARNING -- Inspect your lift truck before operating at the start of the day or shift. Before putting your truck to use, check the operation of the controls and all systems.

Before operating a lift truck check to see that:

1. Parking brake is applied
2. Forks are fully lowered to the floor
3. You are familiar with how all the controls function
4. All controls are in neutral or other correct position
5. Truck has been checked and is ready to operate

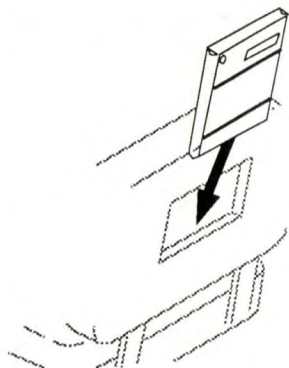


Operating Procedures

How To Operate Your Truck

Be sure that you read and understand the information in the Operator's Manual before operating a lift truck.

The Operator's Manual is designed to be attached to the truck and stored in a holder in the back of the driver's seat. It is placed there for ready reference by the operator. Refer to it often; whenever you have questions about an operating procedure.



Before using a lift truck, the operator must check the truck and complete the "Driver's Daily Checklist".

CAUTION

PROTECT YOURSELF -- Do not operate truck without an overhead guard or load backrest extension, unless conditions prevent their use. Do not remove overhead guard or load backrest extension unless specifically authorized. Use special care if operation without these safety devices is required.

Remember, before operating a lift truck it is good practice to always start from a safe condition. Check to see that:

- Parking brake is applied
- Forks are fully lowered
- You are familiar with how all the controls function
- All controls are in neutral or other correct position
- Truck has been checked and is ready to operate

NOTICE

THIS EQUIPMENT CAN BE DANGEROUS IF NOT USED PROPERLY. SAFE OPERATION IS THE RESPONSIBILITY OF THE OPERATOR.

DO NOT OPERATE THE TRUCK, ANY OF ITS FUNCTIONS OR ATTACHMENTS, FROM ANY PLACE OTHER THAN FROM THE DESIGNATED OPERATOR'S POSITION.

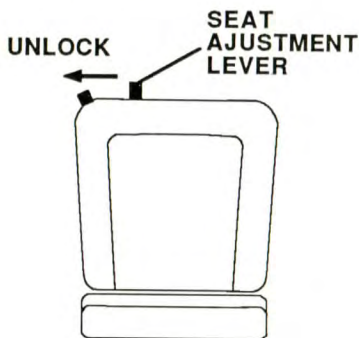
Operating Procedures

How to Operate Your Truck

RECOMMENDED OPERATING AND DRIVING PROCEDURES

Sequence of Operation

This is a good time to adjust the seat to a comfortable position for you. Adjust the seat by moving and holding the release lever at the front edge of the seat. Put the seat in a position which will provide easy reach to all controls. Release the seat lever. Make sure that the seat locking mechanism is engaged.



CAUTION -- Never adjust the driver's seat while the truck is moving to avoid the possibility of loss of control and of personal injury.

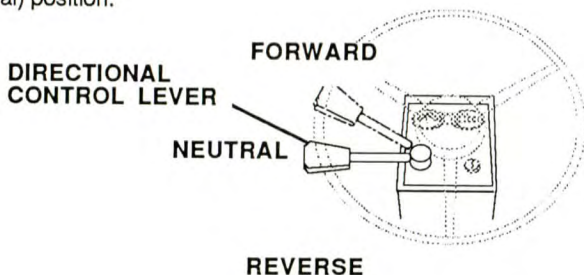
Buckle up. Be sure that you put on the seat belt. Connect and adjust the seat belt strap to a snug, comfortable position.

WARNING

Always wear your seat belt when operating a lift truck.



Be sure that the directional control lever is in the "N" (neutral) position.



Operating Procedures

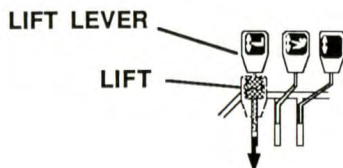
How To Operate Your Truck

NOTE -- When driving, with or without a load, it is good practice to always raise the forks slightly and tilt the upright (forks) backward. Raising the forks and tilting them back prevents the fork tips from catching on possible obstructions and reduces the wear on the fork blades from striking or dragging on the floor. See NOTICE and CAUTION below.

Pull back on the lift control lever and raise the forks [152 - 203 mm] 6 - 8 inches above the floor.

Then, using the tilt control, tilt the upright back slightly to raise the fork tips

NOTE - Users should give consideration to special operating conditions. The amount of forward and rearward tilt to be used is governed by the application.



Stability

NOTICE -- When the upright (carriage and/or load) is raised into a high (elevated) position, the stability of the truck is reduced.

Some of the other conditions which may affect stability are: ground and floor conditions, grade, speed, loading, battery weight (electric trucks), dynamic and static forces, and the judgment exercised by the operator. Trucks equipped with attachments behave as partially loaded trucks even when operated without a load on the attachment. Also, improper operation, faulty maintenance, or poor housekeeping may contribute to a condition of instability.

CAUTION

For stability reasons, do not travel with the load or carriage in a highly elevated position. Travel with the lift mechanism raised only enough to clear the floor or obstacles.

Operating Procedures

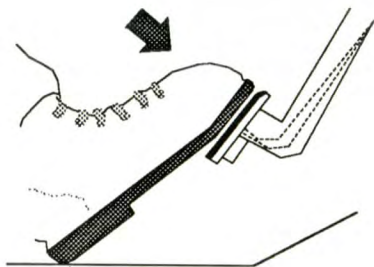
How To Operate Your Truck

Put your foot on the accelerator pedal and push down smoothly until the truck is moving at the desired speed.

Be careful when plugging...Any sudden change in direction can cause the load being carried to move or fall off the forks.

To stop the truck, lift your foot from the accelerator pedal and put it on the brake pedal. Push down on the brake pedal in a smooth, firm motion until the truck is stopped.

IMPORTANT— Stop a lift truck as gradually as practicable. Hard braking and wheel sliding are dangerous and can increase wear and be harmful to the lift truck.



Operating Procedures

How To Operate Your Truck

SAFE OPERATION IS THE RESPONSIBILITY OF THE OPERATOR.

**Watch where you are going...
Don't go if you can't see.**

Before driving, check all around to be sure that your intended path of travel is clear of obstructions and pedestrians.

While driving, be alert for pedestrians, other vehicles or obstructions in your path of travel. Watch people. Do not allow anyone to stand or pass under the load or raised forks. Watch for people in your work area even if your truck has warning lights or alarms. They may not watch for you. Sound horn at intersections and wherever vision is obstructed. Do not drive a truck up to anyone standing in front of an object.

Travel in reverse if necessary for vision. Watch clearances, especially overhead and tail swing.



Operate your truck safely...

Operate truck only from the designated operator's position. Stay within the confines of the lift truck profile dimensions. Keep arms, legs, and hands inside the operator's compartment and away from the danger of passing obstructions. Keep under the overhead guard. NOTICE -- An overhead guard is intended to offer protection to the operator from falling objects, but cannot protect against every possible impact. Therefore, it should not be considered a substitute for good judgment and care in loading, handling, storage, etc.

Keep clear of the upright and lift mechanism. NEVER reach into or put hands, arms, legs, or head into or through the upright structure or near the carriage or lift chains. Never put any part of your body between the upright and the truck. Don't use the upright as a ladder.

Keep all other persons clear of the load and upright mechanism while attempting to handle a load.

No riders...

Do not carry passengers. The operator is the only one who should be on the truck.

Operating Procedures

How To Operate Your Truck

Always be in full control of your lift truck...

Never operate a lift truck or its attachments to perform any of its functions if you are not in the designated operator's position.

Never operate a lift truck when your hands are wet or greasy.

Always pick the smoothest travel route for your lift truck. Avoid bumps, holes, slick spots, and loose objects or debris in your path that may cause the truck to swerve or tip. If these conditions are unavoidable, slow down and carefully drive past them. Slow down for wet or slippery floors.

Avoid any sudden movement. Start, stop, travel, steer, and brake smoothly.

Operate your lift truck under all conditions at a speed that will permit it to be brought safely to a stop.

WARNING -- Travel slowly when turning. Use special care when traveling without a load because the risk of tipping over is greater with an empty truck, especially at high speed and when cornering.

Travel with the fork carriage tilted back and raised only enough to fully clear the floor or obstacles. When the carriage (load) is in an elevated position the stability of the truck is reduced. Do not elevate the load except during stacking.

Grades, ramps, and Inclines...

Use special care when operating on ramps, inclines and uneven areas. Travel slowly. Normally travel straight up and down. Do not turn or drive at an angle across an incline or a ramp. Do not attempt to operate on grades in excess of those specified and/or recommended by the manufacturer.

When truck is loaded, travel with load up grade. When truck is empty, travel with lifting mechanism (upright) down grade.

CAUTION

Operate your lift truck only in areas that have been approved for your lift truck type designation. Certain areas contain flammable gases, liquids, dust, fibers or other hazardous materials. Lift truck operation in these areas must have special approval. These areas must be designated to show the type of lift truck approval required for operation in the area. Be aware that changes to special equipment or poor maintenance can cause the lift truck to lose its special approval.

Be sure that your truck is the correct fire safety type for the area in which you are working. The proper type designation for this truck is listed on the nameplate. In areas classified as hazardous, use only trucks approved for use in those areas. If you are unsure of the classification of the area you wish to enter, check before entering.

Operating Procedures

How To Operate Your Truck

SAFE OPERATION IS THE RESPONSIBILITY OF THE OPERATOR.
Practice safe operation every time you use your truck...

Careful driving and operation is your responsibility. Be completely familiar with all the safe driving and load handling techniques in this operator's manual. Use common sense. Drive carefully; do not indulge in stunt driving or horseplay. Observe traffic rules. Watch for people and hazards. Slow down. Be in full control of your lift truck at all times.

Follow the instructions in this manual to avoid damage to your truck or the possibility of injury to yourself.

During your work, observe all functions of your lift truck. This will allow you to immediately recognize a problem or irregularity that could affect the safe operation of your truck.

Periodically check the instrument panel to be sure conditions are normal. If an abnormal condition appears, shut off the truck immediately and report the problem.

Do not continue to operate a truck that has a malfunction. Stop and have it fixed.



**ALWAYS WEAR YOUR SEAT BELT
WHEN OPERATING YOUR LIFT
TRUCK.**



Operating Procedures

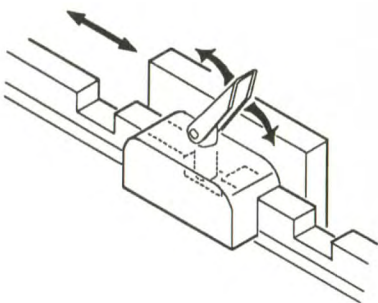
How To Operate Your Truck

Load Forks Adjustment

The load forks are adjustable on the fork carriage. Forks should be spaced as far apart as the load being carried will allow. Both forks should always be the same distance from the center of the fork carriage.

To adjust the forks, raise them a few inches off the floor, lift up on the fork lock lever and slide the forks along the fork bar of the lift carriage. When the forks are set at the correct width for the load, be sure the fork lock pin fits securely into a locking notch on the top of the fork carriage.

Lower the fork lock lever to lock the forks in the correct position.



LOAD HANDLING

Handle only loads that are within the truck rated capacity as shown on the nameplate. This rating specifies the maximum load that should be lifted. However, other factors such as special load handling attachments, loads having a high center of gravity, uneven terrain or inadequate floors may dictate that the safe working load be less than the rated capacity. Under these conditions the operator must reduce the load carried so that the lift truck remains stable.

Handle only stable or safely arranged loads. Do not handle loads made up of loose, unevenly stacked, or unstable items that can easily shift and fall. Take the time to correctly stack and band loose items. Center the load on the forks.

Do not lift anything that might fall on the operator or a bystander.

Do not handle loads which are higher than the load backrest or load backrest extension, unless load is secured so that no part of it can fall backward.

Keep the load back against the carriage. Loads placed out on the ends of the forks can make the lift truck less stable and more likely to tip up.

Lift and lower with the upright mast vertical or tilted slightly back...NEVER FORWARD.

Operate lift and tilt controls slowly and smoothly. NEVER tilt forward when carriage (load) is raised, except to pick up or deposit a load over a rack or stack.

WARNING -- Slack chains mean rail or carriage hang-up. Raise the upright before you move. If the upright malfunctions in any way or becomes stuck in a raised position, operate the lift control to eliminate any slack chains. DO NOT go under a raised upright or forks to attempt repairs.

Operating Procedures

How To Operate Your Truck

Remember -- Your lift truck is designed to carry loads forward of the front wheels, so that the weight of the load is counter-balanced by the weight of the truck.

The farther the load is carried from the pivot point (center of front wheels) the greater will be the uplift at the rear of the truck. Therefore, always carry the load as close to the front wheels as possible (back and flush against the face of the forks).

The capacity load shown on the nameplate is represented by a cube in which the weight is evenly distributed, with the center of gravity located a standard distance from the front face of the forks. If the weight of the actual load to be handled is not evenly distributed, put the heaviest part closest to the carriage.

Traveling

Travel with load or carriage as low as possible and tilted back. Never travel with the load or carriage raised (elevated) in a high position. Do not elevate the load except during stacking.

Observe all traffic regulations and watch for other traffic, pedestrians, and safe clearances. Always look in the direction of travel. Keep a clear view of the path of travel, and when load blocks your visibility, travel in reverse with load trailing (except when climbing an incline).

Avoid sudden movements when carrying a load -- start, stop, travel, steer, and brake smoothly. Steer clear of bumps, holes, and loose materials or debris on the floor. Lift and tilt slowly and smoothly. Go slowly when turning. Cross railroad tracks at an angle wherever possible.

Use special care when handling and traveling with long, high, or wide loads, to avoid losing the load, striking bystanders or obstructions, or tipping the truck.

Watch clearances around the truck and load as you travel. Raise the forks or attachment only to pick up or stack a load. Look out for obstructions, especially overhead.

Be aware that exaggerated tail swing when turning while traveling forward is a characteristic of lift trucks that are steered by the rear wheels. Accordingly, an operator needs to become accustomed to tail swing and always check the tail swing area of the counterweight to be sure it is clear before turning.

Always be concerned about the stability of your lift truck. When attachments are used, extra care should be taken in securing, manipulating, positioning, and transporting the load. Because they generally add extra weight and complexity to the truck, operate trucks equipped with attachments as partially-loaded trucks when not handling a load.

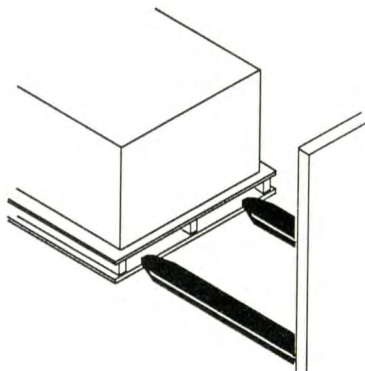
Operating Procedures

How To Operate Your Truck

Picking up and moving loads

When picking up a load from the floor, approach the load slowly, and carefully align the truck square with the load.

The forks should be adjusted to fit the load or pallet being handled and spread as wide as possible to provide good stability and balance. Before lifting, be sure load is centered and forks are fully under and supporting the load. Fork length should be at least $\frac{2}{3}$ of load length.



With the lift and tilt controls, adjust the forks to the correct height and angle for freely engaging the load pallet.

Move (inch) forward until the forks are squarely and completely under the load.

NOTE -- Be sure that the forks do not extend beyond the load, causing damage or tipping of other adjacent loads or materials behind the load being moved.

If the forks are longer than the load, move the tips partially under the load without extending beyond the load. Raise the load to clear the floor. Back out several inches, or distance as necessary, then set the load down and inch forward until load is positioned against the carriage.

Raise the load from the floor or stack by tilting the upright back just enough to lift the load from the surface. When stacking or tiering, use only enough backward tilt to stabilize the load.

Then, raise the load to traveling height and tilt fully back (except loads that must be transported as level as possible).

Unloading

To deposit a load on the floor after being moved into the correct position, tilt the upright forward to a vertical position and lower the load.

Adjust the fork height and tilt the upright forward slightly, as necessary, for smooth removal of the forks from the load (pallet).

Carefully back away to clear the forks from load.

Raise the forks to traveling height and tilt fully back.

Operating Procedures

How To Operate Your Truck

Stacking

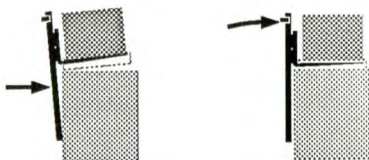
To put a load on a stack...

Approach slowly and align the lift truck and load squarely with the stack. Raise (elevate) the load as the lift truck is nearing the stack. Move forward, slowly, until the load is almost touching the stack. The leading edge and sides of the load pallet should be lined up exactly with the near edge and sides of the load or rack on which you are stacking.

Stop close to the stack, and further lift (raise) the load high enough to clear the top surface of the stack. Inch the load into position. Be careful not to damage or move adjacent loads.

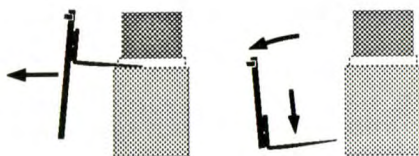


When the load is aligned with the stack beneath it, tilt the upright to the vertical position, and carefully lower the load onto the top surface of the stack. Lower (drop) the forks slightly to clear (disengage) the load pallet. Tilt the forks forward slightly, if necessary.



Check your travel path, then carefully back until the forks are clear of the stack.

Stop and lower the forks to the travel position (6 to 8 inches above the floor), then tilt back for travel.



Moving a load from a stack...

Approach the stack carefully, with truck lined up squarely with the load. With upright mast vertical, raise the forks to the correct height for freely engaging the load pallet. Adjust fork angle, as necessary, to fit squarely under the load. Move (inch) forward until the forks are under the load.

NOTE -- Be sure that the forks do not extend beyond the load, causing damage or tipping of other adjacent loads or materials behind the load being moved. If the forks are longer than the load, move the tips partially under the load without extending beyond the load. Raise the load to clear the undersurface. Back out several inches, then set the load down and inch forward until the front face of the forks contacts the load.

Raise the load from the stack by tilting the upright back just enough to lift the load from the surface. Or, alternately, with the mast still vertical, raise the forks until they begin to lift the load. At this point, apply the minimum back tilt which will stabilize the load.

Check your travel path, slowly back off until clear of the stack, stop, and then lower the load to the travel position (6 to 8 inches off the floor). Tilt full back to travel (*see note). Be sure load is back flush against the carriage or front face of the forks.

NOTE -- Certain loads may have to be transported as level as possible.

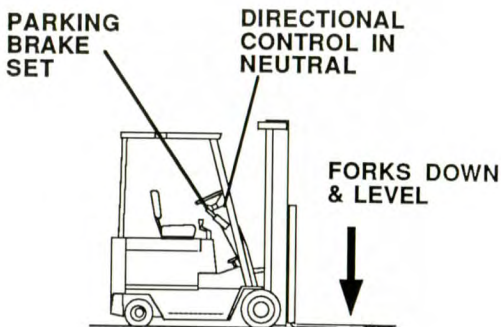
Operating Procedures After Operation

When You Have Finished Using Your Truck

**Always leave your lift truck
in a safe condition...**

When you leave your truck, or park it,
follow these safety rules:

- Park in a safe area away from normal traffic.
- Never park on a grade.
- Never park in areas which block emergency routes or equipment, or access to fire aisles, stairways, and fire equipment.



Before leaving the operator's position...

1. Bring truck to a complete stop.
2. Put the directional control lever in the "N" (neutral) position.
3. Apply the parking brake.
4. Lower the lifting mechanism: fork carriage and forks or attachment, fully to the floor.

In addition, when leaving the truck unattended...

5. Tilt the upright forward until the forks are level and flat to the floor.
6. Stop the engine or turn off the controls.
7. Block the wheels, if the truck must be left on an incline or you have any doubt about the truck moving from a safe position.

6 Emergency Towing How To Tow a Disabled Truck

If your lift truck becomes disabled but can be moved freely on its own wheels without further damage, use the following procedures to tow it safely to a repair area.

It is important for your safety and to the care of your lift truck to use the proper equipment and carefully follow these recommendations for safe towing.

WARNING

DO NOT tow a lift truck if there is a problem with the brakes or tires, or the steering cannot be operated.

DO NOT tow up or down ramps and steep inclines.

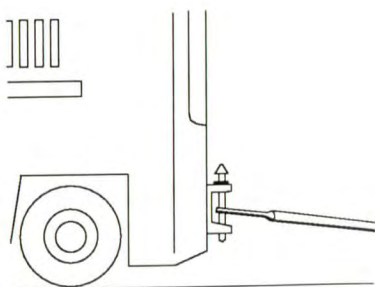
DO NOT attempt to tow a lift truck if traction or weather conditions are poor.

DO NOT lift or transport the disabled lift truck with another lift truck.

Towing Procedures

1. Be sure to apply the parking brake and block the drive wheels on the disabled truck while working around it.
2. When possible, raise the carriage (forks) on the disabled truck about [300 mm] 12 inches from the floor. Secure the carriage with a chain.
3. Tow with another lift truck of equal or larger size carrying a partial load for traction.
4. Tow the disabled truck backwards.
5. Use an approved solid metal tow bar with towing couplers that connect to the towing pin in the counterweight or that connect to the frame or chassis through the counterweight of each truck.

NOTE -- Optional towing equipment is available from your Clark dealer.



Emergency Towing How To Tow a Disabled Truck

6. The towed truck must have an operator.

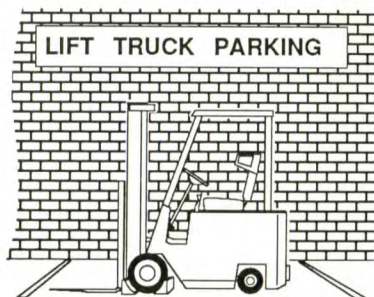
7. Tow the truck slowly. Careful towing is necessary to prevent injury to personnel or damage to the truck. The truck should be towed at a speed of less than [8 kph] 5 mph with a driver in the seat. Do not lift the truck or any wheels off the floor while the truck is being towed.



CAUTION

The power steering will not operate on the disabled truck. The steering handwheel will be difficult to turn.

8. Park the disabled truck in authorized areas only. Fully lower the forks to the floor, put directional control lever in "N" (neutral) position and turn the key switch to the OFF position. Engage the parking brake. Remove the key and, when necessary, block the wheels to prevent the truck from rolling.



CAUTION

Always engage the parking brake when parking a lift truck. The truck can move and cause injury or death to personnel near it.

7 Planned Maintenance and Lubrication

- Lift Truck Maintenance 7.2**
- Planned Maintenance Intervals 7.3**
- Pictorial Index 7.4**
- Safety and Operational Checks 7.5**
- Recommended Planned Maintenance and
Lubrication Schedule 7.6**
- Maintenance Procedures 7.7**
- User Safe Maintenance Practices 7.8, 7.9**
- PM- Planned Maintenance Program 7.10**
- PM Program 7.11- 7.23**
- Lift Chain Maintenance 7.24, 7.25**
- Battery Maintenance 7.26, 7.30**
- Cold Storage 7.31**
- SCR Control 7.32**

Planned Maintenance and Lubrication

Lift Truck Maintenance

Regular maintenance and care of your lift truck is not only important for full and efficient truck life; it is essential for your safety. The importance of maintaining your lift truck in a safe operating condition by servicing it regularly and, when necessary, repairing it promptly cannot be emphasized too strongly. Experience has shown that powered industrial trucks can cause injury if improperly used or maintained. In the interest of promoting safety, several current industry and government safety standards specify that any powered industrial truck not in safe operating condition be removed from service, and that all repairs be made by trained and authorized persons. To assist you in keeping your lift truck in service in good operating condition, this section outlines maintenance procedures to be done at regular intervals and that are considered essential to the life and safe performance of your truck. It is your responsibility to be alert for any indication that your truck may need service and have it attended to promptly. You play an important part in maintenance. Only you can make sure that your lift truck regularly receives the care it needs.

Powered Industrial Trucks May Become Hazardous If Maintenance Is Neglected

PLANNED MAINTENANCE

As outlined previously, a safety inspection of your lift truck should always be made before operating it. The purpose of this daily examination is to check for any obvious damage and maintenance problems, and to have minor adjustments and repairs made to correct any unsafe condition.

In addition to the daily inspection, Clark recommends that you set up and follow a periodic planned maintenance and inspection program. Performed on a regular basis, the program will provide the opportunity to make thorough inspections and checks on the safe operating condition of your lift truck. The need for major adjustments, repairs, or replacements is found and corrections made as required; not after failure has occurred. The specific schedule (frequency) for these PM inspections will depend on the conditions of your particular application and lift truck usage. The recommended planned maintenance and lubrication schedule lists those items considered essential to the safety, life, and performance of your truck with typical recommended service intervals. Brief procedures for inspections, operational checks, cleaning, lubrication, and minor adjustments are included for your reference. Your local Clark dealer is prepared to help you with your Planned Maintenance Program if you want assistance. He has specially trained service personnel who are authorized to check your lift truck according to the respective safety regulations.

In the Specifications section, you will find a listing of useful specifications for selected components, fuel and lubricants, critical bolt torques, refill capacities, and settings for your truck.

If you have the need for more information on the care and repair of your truck, see your Clark dealer.

Planned Maintenance and Lubrication

Planned Maintenance Intervals

Typical Operating Conditions

Time intervals between maintenances are largely determined by operating conditions. For example, operation in sandy, dusty locations requires shorter maintenance intervals than operation in clean warehouses. The indicated intervals are intended for normal operation. To allow better understanding of this aspect, the following clarification should be made:

NORMAL OPERATION

Basically, eight-hour material handling, mostly in buildings or in clean, open air.

SEVERE OPERATION

Prolonged operating hours or constant usage.

EXTREME OPERATION

1. In sandy or dusty locations, e.g., cement plant, lumber or flour mills, coal dust, or stone crushing sites.
2. High-temperature locations, e.g., steel mills, foundries, etc.
3. Sudden temperature changes (constant trips from buildings into the open air), e.g., refrigeration plant.

If your fork lift truck is used in severe or extreme operating conditions, you must shorten the maintenance intervals accordingly.

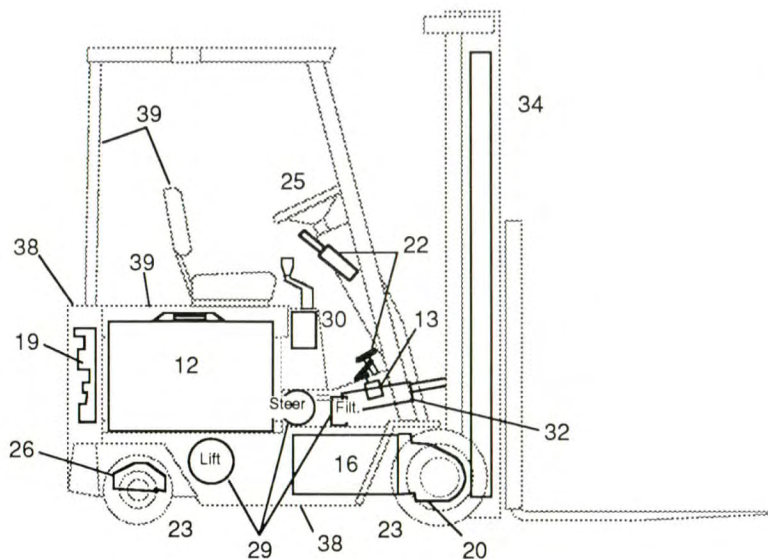
NOTE -- Since the operating environment of lift trucks varies widely, the above descriptions are highly generalized and should be applied as actual conditions dictate.

Recommended P M Intervals

The maintenance time intervals referred to in this manual relate to truck operating hours as recorded on the hourmeter and based on experience which Clark has found to be convenient and suitable under typical (normal or average) operating conditions, as follows:

- A = 8 - 10 hours, or daily
- B = 50 - 250 hours, or every month (Typical PM interval)
- C = 450 - 500 hours, or every 3 months
- D = 900 - 1000 hours, or every 6 months
- E = 2000 hours, or every year

Planned Maintenance and Lubrication Pictorial Index



- 12-Battery
- 13-Accelerator Control Assembly
- 14-Wiring
- 16-Drive Motor
- 19-Traction Control
- 20-Drive Axle
- 22-Brakes
- 23-Wheel & Tires
- 25-Steering Column
- 26-Steer Axle
- 29-Tilt & Lift Motor
- 29-Steer Motor
- 29-Hydraulic Filter
- 30-Hydraulic Valve
- 32-Tilt Cylinder
- 38-Frame & Counterweight
- 39-Sheet Metal, Seat, Overhead Guard
- 34-Upright & Carriage

Planned Maintenance and Lubrication Safety And Operational Checks

PM Interval:

A = 8 - 10 hours, or daily

B = 50 - 250 hours, or every month

C = 450 - 500 hours, or every 3 months

D = 900 - 1000 hours, or every 6 months

E = 2000 hours, or every year

DAILY MAINTENANCE CHECKS	A	B	C	D	E
Check truck for obvious damage and leaks.	•				
Check / clean battery terminals	•				
Check electrolyte level.	•				
Check capacity, warning plates, decals	•				
Check condition of tires and wheels. Remove embedded objects.	•				
Check wheel lug nuts.	•				
Check hydraulic sump oil level.	•				
Check gauges and instruments.	•				
Check warning lights and hourmeter.	•				
Check overhead guard condition and bolts.	•				
Check horn operation and other warning devices.	•				
Check steering operation.	•				
Check service brake operation.	•				
Check parking brake operation.	•				
Check directional and speed controls operation.	•				
Check accelerator	•				
Check lift, tilt, and aux operation.	•				
Check upright, lift chains, and fasteners.	•				
Check load backrest extension and forks.	•				

Planned Maintenance and Lubrication Recommended Planned Maintenance And Lubrication Schedule

PM Interval:

- A = 8 - 10 hours, or daily
 B = 50 - 250 hours, or every month
 C = 450 - 500 hours, or every 3 months
 D = 900 - 1000 hours, or every 6 months
 E = 2000 hours, or every year

Notes:

*Replace As Required

Nominal
Maintenance Interval

PERIODIC CHECKS AND PLANNED MAINTENANCE (PM)	A	B	C	D	E
Check truck visually and inspect components		•			
Test drive truck -- Check functional performance		•			
Air clean truck		•			
Check torque on critical fasteners		•			
Lubricate truck (See component)		•			
Clean/check battery terminals, electrolyte level		•			
Check battery cables/ truck receptacle		•			
Perform battery load test		•			
Check drive motor brushes*		•			
Check lift motor brushes*		•			
Check steer motor brushes*		•			
Test ground		•			
Clean drive axle air vent		•			
Check drive axle fluid level		•			
Drain and replace drive axle fluid					•
Check brake condition and wear		•			
Check drive axle mounting and fasteners		•			
Lubricate steer axle linkage		•			
Check/lubricate steer axle wheel bearings					•
Replace hydraulic sump fluid and filter					•
Clean/replace hydraulic sump breather				•	
Lubricate tilt cylinder rod ends		•			
Lubricate upright fittings		•			
Check lift chain adjustment and wear		•			
Check/lubricate lift chains		•			
Lubricate upright rollers		•			

Planned Maintenance and Lubrication Maintenance Procedures

USER SAFE MAINTENANCE PRACTICES

The following instructions have been prepared from current industry and government safety standards applicable to industrial truck operations and maintenance. These recommended procedures specify conditions, methods, and accepted practices that aid in the safe maintenance of industrial trucks. They are listed here for the reference and safety of all workers during maintenance operations. Carefully read and understand these instructions and the specific maintenance procedures before attempting to do any repair work. When in doubt of any maintenance procedure, please contact your local CLARK dealer.

1. Powered industrial trucks can become hazardous if maintenance is neglected. Therefore, suitable maintenance facilities, trained personnel, and procedures shall be provided.
2. Maintenance and inspection of all powered industrial trucks shall be done in conformance with the manufacturer's recommendations.
3. A scheduled planned maintenance, lubrication, and inspection system shall be followed.
4. Only trained and authorized personnel shall be permitted to maintain, repair, adjust, and inspect industrial trucks, and in accordance with the manufacturer's specifications.
5. Properly ventilate work area, vent exhaust fumes, and keep shop clean and floor dry.
6. Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check for level, or leakage of fuel, electrolyte, or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.
7. Before Starting Work On Truck:
 - a) Raise drive wheels free of floor or disconnect power source and use blocks or other positive truck-positioning devices.
 - b) Put blocks under the load-engaging means, innermast(s), or chassis before working on them.
 - c) Disconnect battery before working on the electrical system.
8. Before working on engine fuel system of LP-gas powered trucks, close LP-gas cylinder valve and run engine until there is no more fuel in the system and engine stops running. If engine will not run, close LP-tank valve and vent fuel slowly in a safe area.
9. Operation of the truck to check performance must be conducted in an authorized, safe, clear area.
10. Before Starting To Drive Truck:
 - a) Be in operating position.
 - b) Disengage clutch on manual transmissions, or apply brake on trucks with powershift transmission and electric trucks.
 - c) Put directional control in neutral.
 - d) Start engine or turn on power.
 - e) Check functioning of lift and tilt systems, directional and speed controls, steering, brakes, warning devices, and any load handling attachments.
11. Before Leaving The Truck:
 - a) Stop truck.
 - b) Fully lower the load-engaging means: upright, carriage, forks, or attachments.
 - c) Put directional control in neutral.
 - d) Apply the parking brake.
 - e) Stop the engine or turn off power.
 - f) Turn off the control or ignition circuit.
 - g) Put blocks at the wheels, if truck must be left on an incline.
12. Handle LP-gas cylinders with care. Damage such as dents, scrapes, or gouges may dangerously weaken the tank and make it unsafe for use.

Planned Maintenance and Lubrication User Safe Maintenance Practices

13. Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, lift overload devices, guards and safety devices, lift and tilt mechanisms, articulating axle stops, and frame members must be carefully and regularly inspected and maintained in a safe operating condition.

14. Special trucks or devices designed and approved for hazardous area operation must receive special attention to ensure that maintenance preserves the original, approved safe operating features.

15. Fuel systems must be checked for leaks and condition of parts. Extra special consideration must be given in the case of a leak in the fuel system. Action must be taken to prevent the use of the truck until the leak has been corrected.

16. All hydraulic systems must be regularly inspected and maintained in conformance with good practice. Tilt and lift cylinders, valves, and other similar parts must be checked to assure that "drift" or leakage has not developed to the extent that it would create a hazard.

17. When working on hydraulic system, be sure the engine is turned off or battery disconnected on electric trucks, upright is in its fully-lowered position, and hydraulic pressure relieved in hoses and tubing. **WARNING** -- Always put blocks under the carriage and upright rails when necessary to work with upright in an elevated position.

18. The truck manufacturer's capacity, operation, and maintenance instruction plates, tags, or decals must be maintained in legible condition.

19. Batteries, motors, controllers, limit switches, protective devices, electrical conductors, and connections must be inspected and maintained in conformance with good practice. Special attention must be paid to the condition

of electrical insulation.

20. To avoid injury to personnel or damage to the equipment, consult the manufacturer's procedures in replacing contacts on any battery connection.

21. Industrial trucks must be kept in a clean condition to minimize fire hazards and help in the detection of loose or defective parts.

22. Modifications and additions that affect capacity and safe truck operation must not be done without the manufacturer's prior written approval. Capacity, operation and maintenance instruction plates, tags, or decals must be changed accordingly.

23. Care must be taken to assure that all replacement parts, including tires, are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment. Parts, including tires, are to be installed per the manufacturer's procedures. Always use genuine CLARK or CLARK-approved parts.

24. When removing tires, follow industry safety practices. Most important, deflate pneumatic tires completely prior to removal. Following assembly of tires on multi-piece rims, use a safety cage or restraining device while inflating.

25. Use special care when removing heavy components from the truck, such as counterweight, upright, etc. Be sure that lifting and handling equipment is of the correct capacity and in good condition.

Planned Maintenance and Lubrication User Safe Maintenance Practices (Cont'd)

NOTICE --- You should also be familiar with additional operating and maintenance safety instructions contained in the following publications:

ANSI/ASME B56.1 - 1983: Safety Standard for Low Lift and High Lift Trucks (Safety Code For Powered Industrial Trucks). Published by: Society of Mechanical Engineers, United Engineering Center, 345 E. 47th Street, New York, N.Y. 10017.

NFPA 505-1982: Fire Safety Standard for Powered Industrial Trucks: Type Designations, Areas of Use, Maintenance and Operation. Available from: National Fire Protection Assoc., Inc., Batterymarch Park, Quincy, MA 02269.

General Industry Standards, OSHA 2206: OSHA Safety and Health Standards (29 CFR 1910), Subpart N-Materials Handling and Storage, Section 1910.178 Powered Industrial Trucks. For sale by: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

IMPORTANT

Your new CLARK lift truck has been built to meet all applicable mandatory requirements of ANSI B56.1--1969-1975 Safety Standard for Powered Industrial Trucks. All standard trucks also conform to UL requirements for the fire safety Type Designation shown on the truck data and capacity plate. Each truck also includes certain safety devices, e.g., horn, load backrest extension and overhead guard, as standard equipment.

No additions, omissions or modifications should be made that will affect compliance to the above requirements or in any way minimize the effectiveness of the safety devices.

Planned Maintenance and Lubrication

PM- Planned Maintenance Program

A planned maintenance program of regular, routine inspections and lubrication is important for long life and trouble-free operation of your lift truck. Make and keep records of your inspections. Use these records to help establish the correct PM intervals for your application and to indicate maintenance required to prevent major problems from occurring during operation.

As an aid in performing and documenting your PM inspections, Clark has prepared an "ELECTRIC TRUCK PLANNED MAINTENANCE REPORT" form. Copies of this form may be obtained from your authorized CLARK dealer. We recommend that you use this form as a checklist and to make a record of your inspection and truck condition.

The maintenance procedures outlined in this manual are intended to be used in conjunction with the PM report form. They are arranged in groupings of maintenance work that are done in a logical and efficient sequence.

PM Report Form

A check mark or entry is made on the PM Report Form when the PM is performed. Please note the special coding system for indicating the importance of needed repairs and/or adjustments.

When you have finished the PM inspections, be sure to give a copy of the report to the designated authority or the person responsible for lift truck maintenance.

Do not make repairs or adjustments unless authorized to do so.

For safety, it is good practice to:

Remove all jewelry (watch, rings, bracelets, etc.) before working on the truck.

Disconnect battery from truck receptacle before working on electrical components.

Always wear safety glasses. Wear a safety (hard) hat in industrial plants and in special work areas where protection is necessary or required.

Planned Maintenance and Lubrication PM Program

HOW TO PERFORM THE PM PERIODIC INSPECTIONS AND MAINTENANCE

Visual Inspection

First, perform a visual inspection of the lift truck and its components. Walk around the truck and take note of any obvious damage and maintenance problems. Check for loose fasteners and fittings.

Check to be sure all capacity, safety, and warning plates or decals are attached and legible.



NOTICE

NAMEPLATES & DECALS

DO NOT OPERATE A LIFT TRUCK WITH DAMAGED OR LOST DECALS AND NAMEPLATES. REPLACE THEM IMMEDIATELY. THEY CONTAIN IMPORTANT INFORMATION.

Inspect the truck for any signs of external leakage: transmission fluid, etc.

Check for hydraulic oil leaks and loose fittings.

CAUTION

HYDRAULIC FLUID PRESSURE

DO NOT USE YOUR HANDS TO CHECK FOR HYDRAULIC LEAKAGE. FLUID UNDER PRESSURE CAN PENETRATE YOUR SKIN AND CAUSE SERIOUS INJURY.

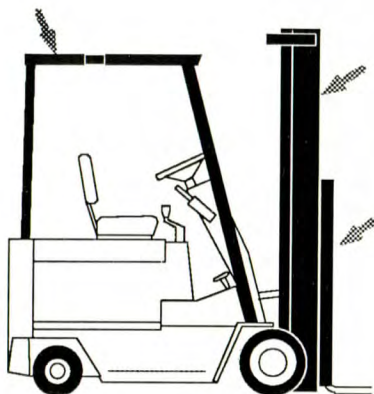
Be sure that the driver's overhead guard, load backrest extension, and safety devices are in place, undamaged, and attached securely.

Planned Maintenance and Lubrication PM Program

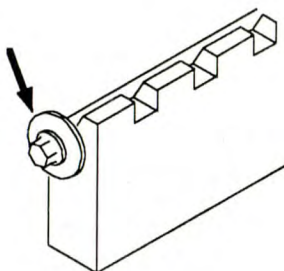
Then, check all of the critical components that handle or carry the load.

Check the overhead guard for damage. Be sure that it is properly positioned and all mounting fasteners are in place and tight.

Check the load back rest for damage. Inspect the welds on the carriage and load backrest for cracks. Be sure that the mounting fasteners are all in place and tight.



If load backrest extension has been removed, a bolt and washer must be in place on each end of the top fork bar to act as a fork stop.



Inspect the upright assembly: rails, carriage rollers, lift chains, lift and tilt cylinders. Look for obvious wear and maintenance problems, damaged or missing parts. Check for any loose parts or fittings. Check for leaks, any damaged or loose rollers, and rail wear (metal flaking). Carefully check the lift chains for wear, rust and corrosion, cracked or broken links, stretching, etc. Check that the lift and carriage chains are correctly adjusted to have equal tension. Check that the lift chain anchor fasteners and locking means are in place and tight.

Inspect all lift line hydraulic connections for leaks.

IMPORTANT

Uprights and lift chains require special attention and maintenance to maintain them in safe operating condition. Refer to Lift Chain Maintenance section for additional information.

WARNING

Uprights can drop suddenly. Look at the upright, but keep hands out.

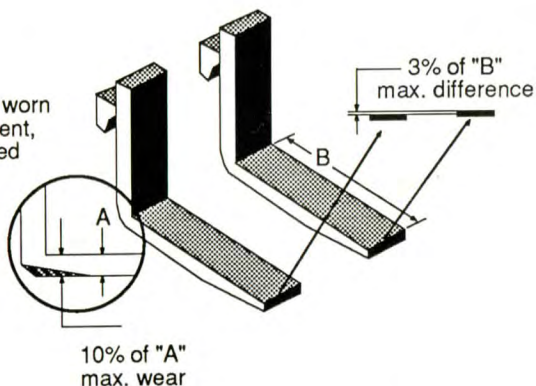
Planned Maintenance and Lubrication PM Program

Forks

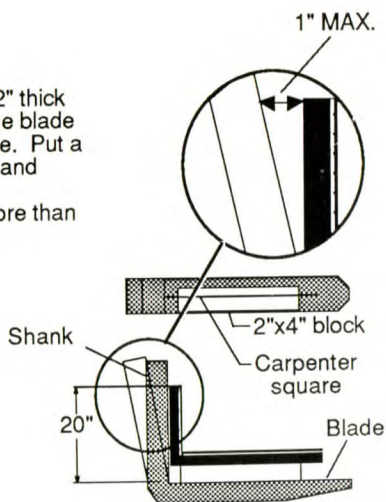
Inspect the load forks for cracks, breaks, bending and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips should be no more than 3% of the fork length.

WARNING

If the fork blade at the heel is worn down by more than 10 per cent, the load capacity is reduced and the fork must be replaced.



Inspect the forks for twists and bends. Put a 2" thick metal block, at least 4" wide by 24" long on the blade of the fork with the 4" surface against the blade. Put a 24" carpenter's square on the top of the block and against the shank. Check the fork 20" above the blade to make sure it is not bent more than 1 inch maximum.



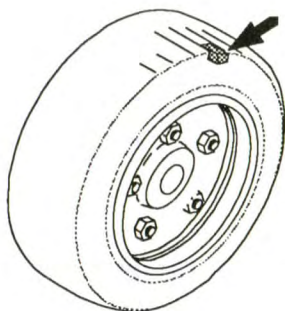
If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person before operating the truck.

Inspect the fork latches. Be sure they are not damaged or broken and operate freely and lock correctly. Check the fork stop pins for secure condition.

Planned Maintenance and Lubrication PM Program

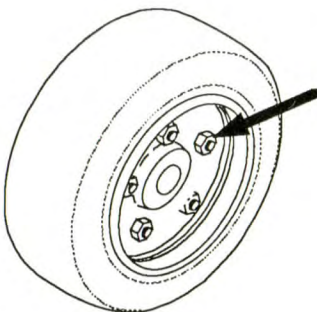
Wheels and tires

Check the condition of the drive and steer wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear and breaks or "chunking out", and bond failure between the tire and rim.



Check all wheel lug nuts or bolts to be sure none are loose or missing.

Have missing bolts replaced and loose bolts tightened to the correct torque before operating the truck.

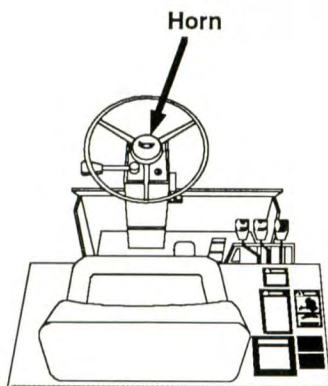


Functional Tests

Now, be sure that all controls and systems are functioning correctly...

Test horn, lights, and all other safety equipment and accessories. Be sure they are properly mounted and working correctly.

Press the horn button to check horn function. If the horn or any other part does not operate, report the failure and have it repaired before the truck is put into operation.



Planned Maintenance and Lubrication PM Program

Functional Tests (continued)

Turn key switch to the ON position.

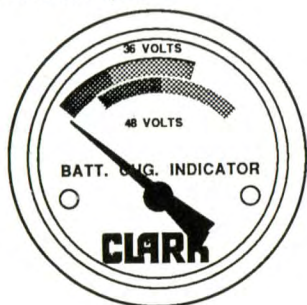
Check hourmeter operation.

With key switch ON, release parking brake. Move direction control lever to FWD or REV position. The steer pump and hourmeter should begin operating. Watch for movement of the indicator in the right-hand dial opening. Report any malfunction or damage.

Write the hourmeter reading on the PM report form.

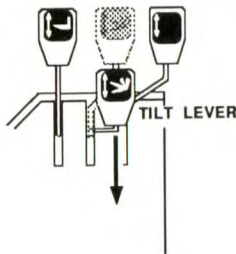
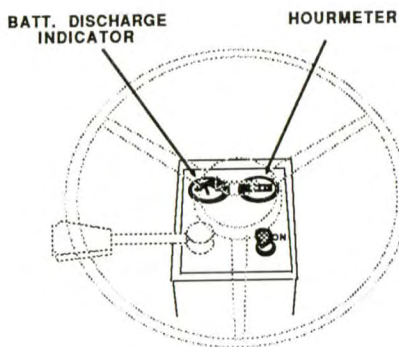
Apply the parking brake.

Check battery discharge indicator. The indicator should register in the green area when key switch is ON. Also, check function of battery discharge indicator when making a battery load test.



Battery Load Test

Check the battery condition by holding the tilt lever in full back tilt position, allowing main pump to run against loading of bypass relief pressure for a few seconds. Watch the battery discharge indicator. The needle should stay in the green area. If needle falls into the red area, the battery is faulty or charge level is low and battery must be charged before completing other electrical tests and performance parts of the PM.



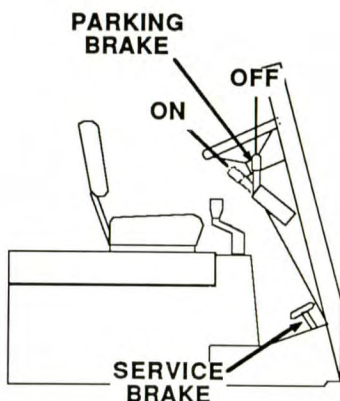
Planned Maintenance and Lubrication PM Program

Operate service and parking brakes, all hydraulic controls: lift, tilt, and auxiliary (if installed), accelerator, directional controls, and steering system. Be sure all controls operate freely and return to neutral properly.

Check the service brake system.

Push the brake pedal fully down and hold. The brakes should be applied before the pedal reaches the floorplate. Check for a feeling of solid resistance when the pedal stops. The pedal must feel firm and not move down farther after it stops. If the pedal continues to creep downwards, report the failure immediately. **DO NOT OPERATE THE TRUCK UNTIL THE BRAKES ARE REPAIRED.**

Check the function of the parking brake. Release, then apply the parking brake with the lever. When correctly adjusted, the lever should snap-lock easily into the over-center applied position.



To check parking brake holding capability and adjustment, park the lift truck on a grade and apply the parking brake. The parking brake should hold a lift truck with rated load on a 15% grade. When the lever is released, the brakes should not drag.

**CAUTION -- Do not operate a lift truck
if the service or parking brakes
are not operating properly.**

Planned Maintenance and Lubrication PM Program

Lift mechanism and controls...

Check the function of the lift system and controls with the hydraulic pump (engine) running.

Pull back on the tilt control lever and hold until the upright reaches the full back tilt position. Push forward on the lever to return the upright to the vertical position. Release the lever.

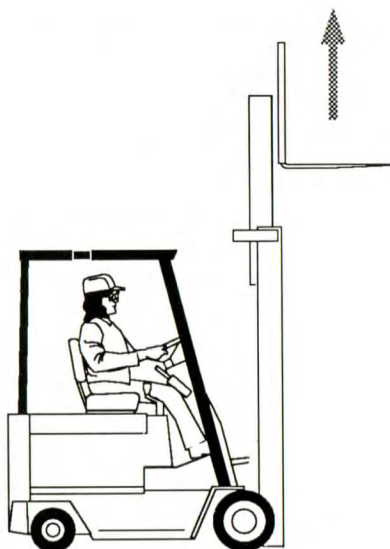
CAUTION

BE SURE THAT THERE IS ADEQUATE OVERHEAD CLEARANCE BEFORE RAISING THE UPRIGHT.

Pull back on the lift control lever and raise the fork carriage to full height. Watch the upright assembly as it rises. All movements of the upright, fork carriage and lift chains must be even and smooth, without binding or jerking motion. Watch for chain wobble or looseness; the chains should have equal tension and move smoothly without noticeable wobble. Release the lever.

If the maximum fork height is not reached, this indicates there is an inadequate (low) oil level in the hydraulic sump tank, or severe binding within the upright.

Push forward on the lift control lever. Watch the upright as it lowers. When the forks reach the floor, release the lever.



Auxiliary controls...

If your lift truck is equipped with an attachment, test the control lever for correct function and briefly operate the attachment.



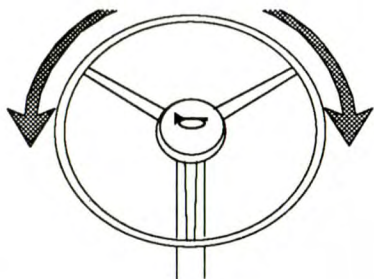
Planned Maintenance and Lubrication PM Program

Steering system...

NOTICE -- The steering system, steer axle and steering linkage on your truck should be inspected periodically for abnormal looseness and damage, leaking seals, etc. Also, be alert for any changes in steering action. Hard steering, excessive freeplay (looseness) or unusual sounds when turning or maneuvering indicates a need for inspection or servicing.

Check the steering system by moving the steering handwheel in a full right turn, and then in a full left turn. Return the handwheel (steer wheels) to the straight-ahead position. The steering system components should operate smoothly when the steering wheel is turned.

Never operate a truck which has a steering system fault.



WARNING

Fasten your seat belt before driving the truck.

Shift control and brakes...

Check and make sure that the travel area is clear in front of the truck.

Push firmly on brake pedal. Release the parking brake. Move the directional control lever from "N" (neutral) to FORWARD travel position.

Remove your right foot from the brake pedal and put it on the accelerator pedal. Push down until the truck moves slowly forward. Remove your foot from the accelerator pedal and push down on the brake pedal to stop the truck. The brakes should apply smoothly and equally.

Be sure that the travel area is clear behind the truck.

Put the directional control lever in the REVERSE travel position. Push down on the accelerator pedal until the truck moves slowly in the reverse direction. Remove your foot from the accelerator pedal and push down on the brake pedal to stop the truck. The brakes should apply smoothly and equally.

When you have completed the operational tests, park and leave truck according to standard shut down procedures.

Be sure to make a record of all maintenance and operating problems you find.

Planned Maintenance and Lubrication PM Program

SCR Traction Control...

Test for correct function of the traction control.

Check CREEP SPEED, 1A RANGE, and PLUGGING.

1. Check CREEP SPEED and 1A RANGE while driving the truck in a straight line in both FORWARD and REVERSE directions. All speed changes should be smooth while increasing and decreasing speed. Listen for any unusual drive train noises or actions of the controls and drive train components.

Stop truck with the service brakes. Note any unusual reactions in driving or braking performance, and need for adjustment.

2. Check PLUGGING function first at a slow speed. If operating correctly, then test at full speed.

First, drive truck in the FORWARD direction. Push the accelerator pedal and allow the truck to accelerate to the desired travel speed. Then, move the direction control to REVERSE position while your foot is still depressing the accelerator pedal. The truck should slow to a smooth, controlled stop and accelerate in the opposite direction.

Repeat test by moving direction control back to FORWARD position.

Check the accelerator control while conducting the speed range tests. It must move easily and smoothly throughout the acceleration stroke, and return without binding.

Test the service brake (drive motor cut-off) switch.

Drive the truck FORWARD (or in REVERSE) at creep speed. While holding the accelerator pedal steady, push on the brake pedal with left foot. The braking action should interrupt power to the drive motor and stop the truck. Release the brake pedal. The drive motor should start again moving the truck.

When you have completed the operational tests, park and leave truck according to standard shut down procedures.

Be sure to make a record of all maintenance and operating problems you find.

Planned Maintenance and Lubrication PM Program

Hydraulic Sump Tank

Check the hydraulic sump tank fluid level. Correct fluid level is important for proper hydraulic system operation. Low fluid level can cause pump damage.

Hydraulic fluid expands as its temperature rises. Therefore, it is preferable to check the fluid level at operating temperature (after approximately 30 minutes of truck operation). To check the fluid level, first park the truck on a level surface and set the parking brake fully. Put the upright in a vertical position and lower the fork carriage fully down. Pull the dipstick out, wipe it with a clean wiper and reinsert it fully into the dipstick tube. Remove the dipstick and check the oil level. Keep the oil level above the LOW mark on the dipstick by adding recommended hydraulic fluid only, as required. DO NOT OVERFILL.

Check the condition of the hydraulic fluid (age, color or clarity, contamination). Change (replace) the oil, as necessary.

Hydraulic Fluid and Filter Change

Drain and replace the hydraulic sump fluid every 2000 operating hours. Replace the hydraulic oil filter at every oil change. Replace the hydraulic sump tank breather/fill cap every 1000 operating hours. There is no drain plug in the hydraulic sump tank. The hydraulic fluid can be changed by one of the following methods:

A- Pumping the fluid out by suction using a separate pump and hose.

B - Pumping the fluid out by using the truck hydraulic system. This method may be used most easily and satisfactorily for routine changes of the fluid.

Hydraulic Oil Filter

Remove and replace the hydraulic system fluid filter per recommended PM schedule, or as may be required by truck operating conditions and usage. Install a new oil filter. Be sure to follow the installation instructions printed on the filter. Check for leaks after installation of the filter. Also, check that the hydraulic line connections at the filter adapter are tightened correctly.

Planned Maintenance and Lubrication PM Program

Access to The Drive Axle

The best method to use for reaching the drive axle check points (oil level/filler plug and drain plug) is dependent upon the style of upright, carriage and attachments on your truck. One method is to raise the upright carriage to provide easy access to the drive axle.

Apply the parking brake and block the wheels.

Be sure to put blocking under the carriage and upright rails.

WARNING

AN UPRIGHT OR CARRIAGE CAN MOVE UNEXPECTEDLY.

Chain or block the carriage and rails.

**FAILURE TO FOLLOW THIS WARNING CAN
RESULT IN SERIOUS INJURY.**

Refer to Machine Jacking and Blocking, for additional information.

Drive Axle Fluid Level Check

Check the drive axle fluid level with the truck on a level surface, oil at operating temperature.

Remove the fluid level inspection plug located in the front surface of the drive axle center housing.

The oil level is correct (full) when the oil reaches the lower edge of the plug opening, or can be measured on the dipstick portion of the plug.

Add recommended fluid only, as required refer to "Specifications" for drive axle recommended oil specifications. After adding oil to the transaxle, wait a few minutes until the oil has distributed evenly throughout the unit and check for correct oil level. **DO NOT OVERFILL.**

Inspect the fill plug for damage. Install and tighten the plug.

NOTICE

Check the planned maintenance interval (operating hours), or the condition of the oil to determine if the drive axle fluid needs to be changed.

Planned Maintenance and Lubrication

PM Program

Drive Axle Fluid Change

Drain and replace the drive axle fluid every 1000 operating hours.

The oil should be drained when it is warmed to operating temperature. Put the truck in a level position. Apply the parking brake and block the wheels to prevent the truck from moving. Turn key switch OFF and disconnect battery from truck receptacle.

The drive axle oil must be drained from the drain plug opening located in the bottom center of the drive axle.

Place a low, flat drain pan beneath the axle. The pan capacity should be more than 8 pints.

Remove the drain plug, and fill plug from front of drive axle housing.

After drive axle has drained, install the drain plug.

Fill the drive axle to the bottom edge of the fill plug opening with recommended fluid.

Check the breather vent to be sure it is open and not damaged.

Truck Chassis Inspection and Lubrication

Lubrication and inspection of truck chassis components, including steer wheels, steer axle linkage, steering cylinder and wheel bearings will be easier if the truck is raised and blocked up under the frame. Refer to the Service Manual for additional information on machine jacking and blocking.

Inspect the steering cylinder piston rod, seals, and fasteners for damage, leaks, and looseness.

Lubricate the steer axle linkage: rod ends and linkage pivot points. Be sure to clean the grease fittings before lubricating and remove the excess grease from all points after lubricating.

Lubricate miscellaneous linkage, as needed.

WARNING

DO NOT RAISE TRUCK BY LIFTING UNDER THE COUNTERWEIGHT.

Planned Maintenance and Lubrication PM Program

Air Cleaning

Always maintain a lift truck in a clean condition. Do not allow dirt, dust, lint, or other contaminants to accumulate on the truck. Keep the truck free from leaking oil and grease. Wipe up all oil spills. Keep the controls and floorboards clean, dry, and safe. A clean truck makes it easier to see leakage, loose, missing or damaged parts, and will help prevent fires. A clean truck will run cooler.

The environment in which a lift truck operates will determine how often and to what extent cleaning is necessary. For example, trucks operating in manufacturing plants which have a high level of dirt or lint (e.g., cotton fibers, paper dust, etc.) in the air or on the floor, will require more frequent cleaning. If air pressure does not remove heavy deposits of grease, oil, etc., it may be necessary to use steam or liquid spray cleaner.

LIFT TRUCKS SHOULD BE AIR CLEANED, AS NECESSARY, AT EVERY PM INTERVAL, AND OTHERWISE AS OFTEN AS REQUIRED.

Air cleaning should be done using an air hose with special adapter or extension having a control valve and nozzle to direct the air properly. Use clean, dry, low-pressure compressed air. Restrict air pressure to [207 kPa] 30 psi, maximum. **CAUTION** -- Wear suitable eye protection and protective clothing.

Air clean the: Upright assembly - Drive axle - Battery, cables, switches and wiring harness- SCR controls and wiring- Drive, lift and steer motors- Steer axle, steer cylinder and steer linkage.

Critical Fastener Torque Checks

Fasteners in highly loaded (critical) components can quickly fail if they become loosened; also, loose fasteners can cause damage or failure of the component. For safety, it is important that the correct torque be maintained on all critical fasteners of components which directly support, handle or control the load, and protect the operator.

Check torque of critical items, including:

Drive axle mounting	Overhead guard
Drive & steer wheel mounting	Tilt cylinder mounting & yokes
Counterweight mounting	Upright mounting & components
Load backrest extension	

Upright and Tilt Cylinder Lubrication

Clean the fittings and lubricate the tilt cylinder rod end bushings (forward end).

Clean the fittings and lubricate the tilt cylinder base rod end bushings (rear end).

Clean the fittings and lubricate the upright trunnion (mounting pin) bushings (on top of mounting pin).

Lift Chains

Lubricate the entire length of the upright rail lift and carriage chains with Clark Chain and Cable Lube.

NOTE -- Do not lubricate the carriage roller rails.

Planned Maintenance and Lubrication

Lift Chain Maintenance

Lift chains are very important components of fork lift trucks. The chain system on your upright was designed for safe, efficient, and reliable transmission of lifting force from hydraulic cylinder to the forks. Safe use of your truck with minimum down-time depends on the correct care and maintenance of the lift chains. Most complaints of unacceptable chain performance are a result of poor maintenance. Chains need periodic maintenance to give maximum service life.

Lift Chain Adjustment Check

The lift chains are correctly adjusted if the lower fork carriage rollers reach their end (lowest) position approximately [13 mm] 0.50 inch from the lower edge of the inner rail. This also positions the bottom of the forks the same (equal) distance above the floor. To check this dimension, raise the carriage to a height that exposes several inches of the inner rail at the roller path. Apply a layer of grease to the roller path on the inner rail. Lower the carriage and pick up a rated capacity load, [tilt the upright back slightly] and raise the load until the carriage rollers have passed over the greased area. Lower the load completely and remove the load from the forks. Raise the carriage again to expose the inner rail. You can now check the roller path pattern in the grease and determine the correct adjustment of the chains.

The lift chains can be adjusted by loosening or tightening of the chain anchor nuts.

NOTICE -- It is important to make the lift chain adjustment check with a rated load to make sure that the chains are stretched to their maximum length.

WARNING

**DO NOT ATTEMPT TO REPAIR A WORN CHAIN.
REPLACE WORN OR DAMAGED CHAIN.**

Lift Chain Inspection and Measurement

Inspect and lubricate the lift chains every truck PM (50-250 hours). When operating in corrosive environments, inspect the chains every 50 hours. During the inspection, check for the following chain conditions:

Rust and corrosion - Cracked plates - Raised or turned pins - Tight joints - Wear , worn pins or holes.

When the pins or holes become worn, the chain becomes longer. When a section of chain is 3% longer than a section of new chain, the chain is worn and must be discarded.

Chain wear can be measured by using a chain scale or a steel tape measure. When checking chain wear, be sure to measure a segment of chain that moves over a sheave. Do not repair chains by cutting out the worn section and joining in a new piece. If part of a chain is worn, replace all the chains on a truck.

Lift Chain Lubrication

Lift chain lubrication is an important part of your maintenance program. The lift chains operate under heavy loadings and will function more safely and have longer life if they are regularly and correctly lubricated. Clark chain lubricant is recommended; it is easily sprayed on and provides superior lubrication. Heavy motor oil may also be used as a lubricant and corrosion inhibitor.

Planned Maintenance and Lubrication

Lift Chain Maintenance

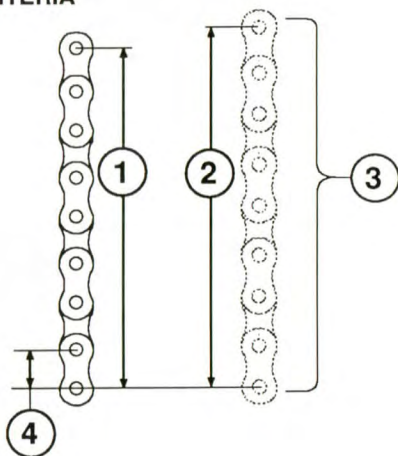
LIFT CHAIN INSPECTION AND WEAR CRITERIA

1 - (NEW CHAIN LENGTH) The distance from the first pin counted to the last pin counted in a span while the chains are lifting a small load.

2 - (WORN CHAIN LENGTH) The distance from the first pin counted to the last pin counted in a span while the chains are lifting a small load.

3 - (SPAN) The number of pins in the length (segment) of chain to be measured.

4 - (PITCH) The distance from the center of one pin to the center of the next pin.



Lift Chain Replacement

All chains must be replaced if any strand has wear of 3% or more, or if any of the damaged conditions noted above are found during inspection.

Order replacement chains from your CLARK dealer.

Replace all chains as a set.

Do not remove factory lubrication or paint new chains.

Replace anchor pins and worn or broken anchors when installing new chains.

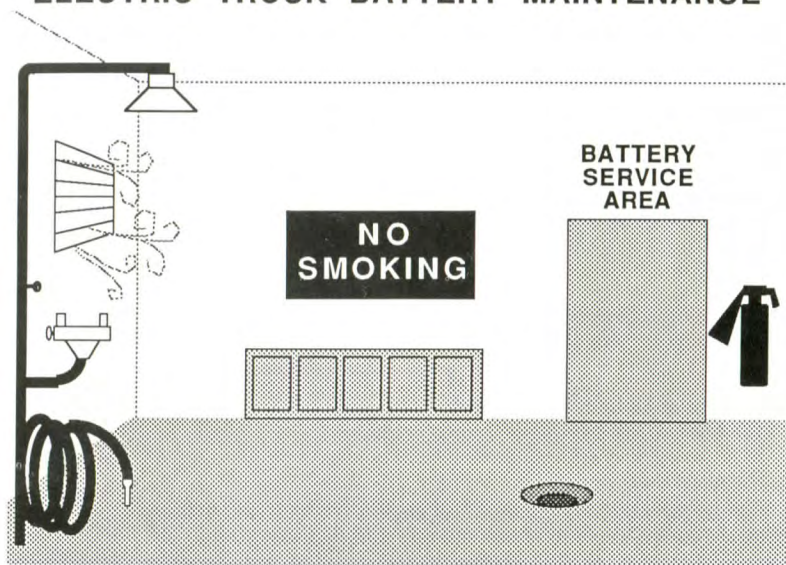
Adjust tension on new chains.

Lubricate chains when they are installed on the upright.

NOTE -- Please refer to the Service Manual for additional information on lift chain measurement and maintenance.

Planned Maintenance and Lubrication Battery Maintenance

ELECTRIC TRUCK BATTERY MAINTENANCE



Battery charging installations must be located in areas designated for that purpose. These areas must be kept free of all non-essential combustible materials.

Facilities must be provided for:

- flushing spilled electrolyte
- fire protection
- protecting charging apparatus from damage by trucks
- adequate ventilation for dispersal of fumes from gassing batteries.

When handling acid concentrates greater than 50 percent acid (above 1.400 specific gravity) an eye wash fountain must be provided.

A conveyor, overhead hoist, or equivalent material handling equipment must be provided for handling batteries.

Changing and Charging Electric Truck Storage Batteries

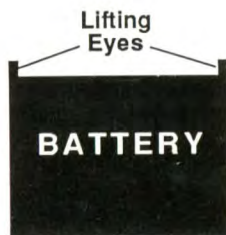
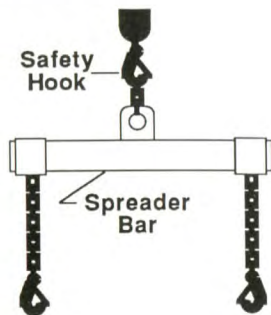
IMPORTANT

Electric truck batteries are heavy and awkward to handle. They are filled with a very hazardous chemical solution. On charge, they give off hydrogen and oxygen which, in certain concentrations, are explosive. And they are costly. Before you remove, service, or install a truck battery, carefully read the following recommendations and instructions.

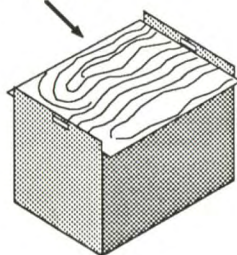
Planned Maintenance and Lubrication Battery Maintenance

Battery Handling

- 1 Change (remove) or service storage batteries only in an area designated for this purpose.
- 2 Be sure this area has provisions to flush and neutralize spillage, to ventilate fumes from gassing batteries, and for fire protection.
- 3 This area should be equipped with material-handling tools designed for removing and replacing batteries, including a conveyor or overhead hoist. Use lift hooks that have safety latches.
- 4 Always use a special lifting device such as an insulated spreader bar to attach the hoist to the battery. The width of the spreader bar hooks must be the same as the lifting eyes of the battery, to prevent damage to the battery. If the spreader bar hooks are movable, carefully adjust the position (width) of the hooks so that the pull is directly upward (vertical) and no side load or force (pressure) is exerted on the battery case. Be sure the lift hooks are the correct size to fit the lifting eyes of the battery.
- 5 If the battery does not have a cover of its own or has exposed terminals and connectors, cover the top with a non-conductive (insulating) material, e.g., a sheet of plywood or heavy cardboard, prior to attaching the lifting device.
- 6 Chain hoists or power battery hoists must be equipped with load-chain containers to accumulate the excess lifting chain.
- 7 Keep all tools and other metallic objects away from the terminals.

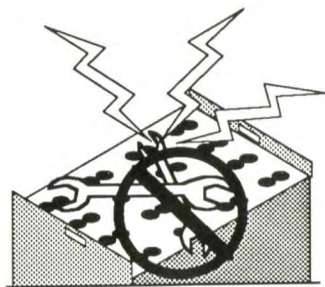
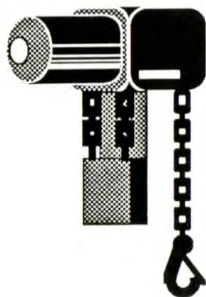


Non-conductive material



WARNING BATTERY SERVICE

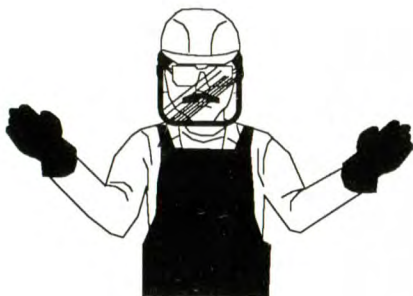
BATTERY SERVICE MUST BE DONE BY TRAINED AND AUTHORIZED PERSONNEL. BATTERY ACID CAN CAUSE SEVERE BURNS AND INJURY.



Planned Maintenance and Lubrication Battery Maintenance

Battery Charging

- 1 Persons maintaining storage batteries must wear protective clothing such as face shield, long sleeves, and gloves.
- 2 Hydrogen emissions from charging batteries are flammable. No smoking shall be allowed in the charging area. Do not check the electrolyte level with an open flame. Do not allow open flame, sparks or electric arcs in battery charging area.



WARNING SULFURIC ACID

THE BATTERY CONTAINS CORROSIVE ACID WHICH CAN CAUSE INJURY. IF ACID CONTACTS YOUR EYES OR SKIN, FLUSH IMMEDIATELY WITH WATER AND GET MEDICAL ASSISTANCE.

WARNING EXPLOSIVE GASES

DO NOT SMOKE OR HAVE OPEN FLAMES OR SPARKS IN BATTERY CHARGING AREAS OR NEAR BATTERIES. AN EXPLOSION CAN CAUSE INJURY OR DEATH.

- 3 When charging batteries, the vent caps must be kept in place to avoid electrolyte spray. Care must be taken to assure that vent caps are open (clean) and functioning. The battery (or compartment) cover(s) must be open to dissipate heat and gas.

IMPORTANT

If batteries discharge rapidly during normal operation or do not charge to the correct specifications, contact a qualified battery service technician to check the battery for you. **DO NOT ADD ELECTROLYTE OR ATTEMPT TO SERVICE THE BATTERY.**

Planned Maintenance and Lubrication

Battery Maintenance

Battery Removal From Truck

1 Check the designated service and charging area for fire protection, and be sure all sources of ignition are cleared from the area. **DO NOT SMOKE.** Be sure all previous noted equipment is in the area, in good repair, and working properly.

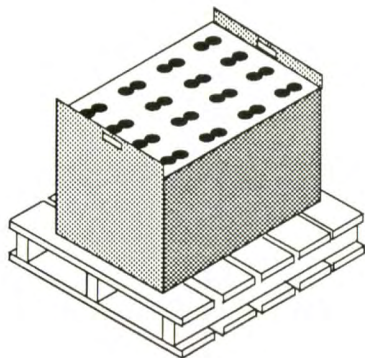
If the battery is to be serviced, be sure there are provisions to flush and neutralize spillage and to disperse (ventilate) fumes from gassing batteries on charge. And be sure there are provisions for handling electrolyte.

2 Before attempting to remove or charge a storage battery, the truck should be positioned in the designated battery service area and the parking brake applied so the truck cannot move.

3 If the battery to be handled is not equipped with its own cover, cover the battery when handling with a non-conductive (insulating) material, e.g., plywood or heavy cardboard, before attaching the lifting device. Also see "Battery Handling", Item 5.

4 Use an approved lifting device with an insulated spreader bar, to remove and transport a truck battery. Be sure the hoist and lifting chains are equipped with safety hooks.

5 Remove the battery and move it to a safe storage location. Store batteries either on an approved battery rack or on a wooden pallet.



Battery Cleaning

NEVER WASH THE BATTERY WHEN IT IS IN THE TRUCK.

The easiest and most satisfactory method of cleaning a battery is to wash it occasionally with a low-pressure cold-water spray. The top can also be washed off with a solution of baking soda and water (add a box of baking soda to a pail of water and stir until dissolved) and rinsed with clean water. It is good practice to have this solution available around a battery room at all times.

IMPORTANT

During cleaning, **THE BATTERY VENT CAPS MUST BE TIGHTLY IN PLACE.**

Battery Care and Maintenance

Refer to the **BATTERY MANUFACTURER** or **SUPPLIER** for their recommended procedures.

BATTERY SAVER and **CLEANER**, Clark Part No. 886398, may be used to clean and protect the truck battery.

New Truck Batteries:
Spray a light coat of **BATTERY SAVER** and **CLEANER** over the entire surface of the battery. Do not wipe off.

Old Truck Batteries:
Apply a light coat of **BATTERY SAVER** and **CLEANER** to entire surface of battery. Allow to set for approximately 30 seconds, then wipe thoroughly with a wiping cloth or rag. Chemical action will dissolve rust and corrosion. After cleaning, apply a second coating for protection. This will prevent the start and growth of corrosion on battery terminals and cable connections.

Planned Maintenance and Lubrication

Battery Maintenance

Battery Service Records

A record of battery service and maintenance should be kept to obtain the best service life from your battery and truck.

Select a pilot cell, take readings of specific gravity and temperature before and after charging, and make a record of readings with the date. It is best to change the location of the pilot cell occasionally to distribute any electrolyte loss over the battery when taking readings. Every 2 to 3 months, take complete battery readings (specific gravity, temperature and voltage) and make a record of them.

How To Get Maximum Life From Battery

1. Follow normal battery maintenance procedures, re-charging before 80% discharged and with periodic equalizing charges.
2. Don't add acid to a battery. Only a person trained and qualified to do battery maintenance should determine if this is necessary.
3. Lift battery only with a correctly-constructed lifting device which will not put pressure on the battery case.
4. Keep open flames, tools, and metal objects away from the top of battery to prevent short circuits and explosions.
5. Check the battery electrolyte level before each charging. Add water if the top of the separator or plates are visible.
DO NOT OVERFILL!
6. Do not overcharge.
7. **KEEP BATTERY CLEAN AND DRY.** Wash down as needed.
8. Keep battery service records.

Battery Installation

1. Use only a lead-acid battery with the voltage and ampere-hour rating specified for the truck.
2. When changing batteries on battery electric trucks, replacement batteries must be of the service weight that falls within the minimum/maximum range specified on truck nameplate.
3. Be sure truck is properly positioned and parking brake applied.
4. Handle battery only with approved lifting device as previously described.
5. Install the battery correctly in the truck and secure it in position.

NOTICE -- Some trucks are equipped with battery stops or blocks. Others do not require them. If the truck being serviced has battery stops or blocks, be sure none are missing or damaged. Replace them, as necessary. If they are an adjustable type, be sure they are correctly adjusted and tightened.

Planned Maintenance and Lubrication Cold Storage

Cold Storage Applications

High moisture-exposure operation in such as freezers or caustic atmosphere can cause premature failure of SCR control cards.

Clean the SCR control

If the SCR control is oily or greasy, use "Freon TF Degreaser", Clark Part No. 1801146.

To protect the cards, spray them all over with CONQUER Spray Coating, Clark Part No. 1801145.

CONQUER is an electrical moisture-proofing spray coating for contactors, SCR panels, solid state control cards, No.1 timer and oscillator cards.

CONQUER spray should be applied in accordance with the following recommendations:

Truck Exposure	Re-application Cycle
Indoors	Every 12 months
Outdoors	Every 4 months
Freezer or Cold Storage	Every 4 months

Also, each time the control is cleaned during a normal planned maintenance, the card should be re-sprayed.

NOTE

Encapsulated cards or potted cards are no longer available for use in problem areas and CONQUER Spray Coating must be used.

IMPORTANT

The instructions written on the spray can of CONQUER suggests that parts be cleaned with an agent called "SYNCRONATE". We do not recommend the use of this cleaning agent; it may damage the card. Any cleaning of controls should be with a mild detergent solution. Then blown dry with clean, moisture-free air at low pressure.

NOTE

ELECTRICAL SWITCHES, WIRING & TERMINALS should be sprayed with SPRAY COATING, Clark Part No. 886784.

SPRAY COATING is a clear acrylic plastic protective coating which acts as an insulator and a corrosion preventative.

Planned Maintenance and Lubrication SCR Control

General Maintenance Instructions

NOTICE

Any controls that will be used in ambients of [140 °C] 100 °F or over should be brought to the attention of the truck manufacturer (CLARK).

All external components having inductive coils must be filtered. Refer to truck manufacturer (CLARK) for specifications.

Control Maintenance Procedures

The controls should not be steam cleaned. In dusty areas, use low-pressure air to blow off the control. In oily or greasy areas, a mild solution of detergent or denatured alcohol can be used to wash off the controls and then blow completely dry with low-pressure air. The control can also be cleaned with Freon TF degreaser (Clark Part No. 1801146).

The SCR control, like all electrical apparatus, does have some thermal losses. The semiconductor junctions have finite temperature limits above which these devices may be damaged. For these reasons, normal maintenance should guard against any action which will expose the components to excessive heat, such as steam cleaning; or which will reduce the heat dissipating ability of the control, such as restricting air flow.

For the SCR panel to be most effective, it must be mounted against the counterweight or frame of the truck. The counterweight or truck frame, acting as an additional heat sink, will give improved truck performance by keeping the SCR control package cooler. The use of a heat transfer grease (e.g., Dow Corning 340) in the mounting of the control is recommended.

Terminal boards and other exposed SCR control parts should be kept free of dirt and paint that might change the effective resistance between points.

Do not hipot (or megger) the control. Unless the terminals of each semiconductor and card are connected together, the control may be damaged. Refer to control manufacturer before hipotting.

Use a lead-acid battery with the voltage and ampere-hour rating specified for the truck. Follow normal battery maintenance procedures, recharging before 80-percent discharged and with periodic equalizing charges.

IMPORTANT

The truck should not be plugged when the truck is jacked up and the drive wheels are off the floor in a free-wheeling position. The higher motor speeds can create excessive voltages that can be harmful to the control.

8 Specifications

Model Designation -- Rated Load Capacity

ECS 17 -- 3500 lbs @ 24 in	[1750 kg @ 500 mm]
ECS 20 -- 4000 lbs @ 24 in	[2000 kg @ 500 mm]
ECS 22 -- 4500 lbs @ 24 in	[2250 kg @ 500 mm]
ECS 25 -- 5000 lbs @ 24 in	[2500 kg @ 500 mm]
ECS 27 -- 5500 lbs @ 24 in	[2750 kg @ 500 mm]
ECS 30 -- 6000 lbs @ 24 in	[2730 kg @ 500 mm]

Note: Rated capacity applies when using uprights with maximum MFH up to and including: HVSTD [3855 mm] 151 in; and HVTSU [3875 mm] 152 in.

Wheels & Tires

Drive Tire Size:	Std Cushion	ECS 17 / 25	18 x 8 x 12.12
		ECS 27 / 30	18 x 9 x 12.12
Steer Tire Size:	Rubber	ECS 17 / 30	16 x 6 x 10.5

Battery Capacity Range

36 volt 18 cells, 17-29 plate, 26.2-48.6 kWh, 750-1400 amp-hr @ 6-hr rating

48 volt 24 cells, 17-21 plate, 27.9-46.3 kWh, 600-1000 amp-hr @ 6-hr rating

Battery, Fully charged: 1.275 specific gravity (1.310 Exide Load Hog)
Discharged: 1.120 specific gravity

Fill capacities -- fluid volumes:

Drive Axle [3.785 L] 8 pints

Hydraulic Sump Tank - (Useable Volume) [30.7 L] 8.1 gal

Hydraulic fluid recommendation:

Normal application - Clark Specification MS-68 Hydraulic oil
Cold Storage or low temp. - Clark Specification MS-226 Hydraulic oil

Drive axle fluid recommendation:

Use ®DEXRON II ATF automatic transmission fluid only.

Power steering fluid recommendation:

Not applicable --- Uses main hydraulic sump oil supply.

Multi-purpose grease:

Axle Ends, Wheel Bearings NLGI Grade No. 1 Lithium soap base grease,
Clark Specification MS-9B and MS-107B.

Steering linkage, Upright mast & carriage rollers, Trunnion bushings, Tilt cylinder rod ends, Brake pedal shaft NLGI Grade No. 2 Lithium soap base grease,
Clark Specification MS-107C,



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SERIAL NUMBERS:

TRUCK _____

CONTROL PANEL _____

DRIVE MOTOR _____

HYDRAULIC UNIT _____

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Company**

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