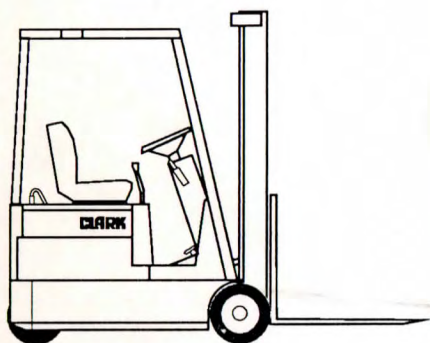

Operator's Manual

Do not remove this manual
from the truck.



TM12 - 25
36 Volt

CLARK

Book No. 2743792
OM - 540

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.

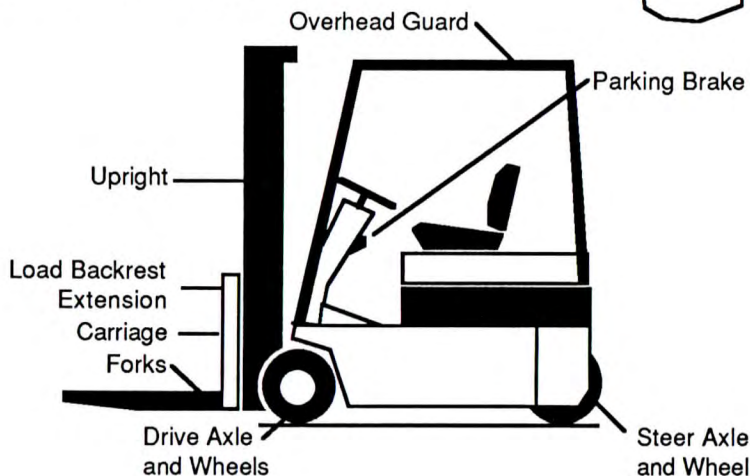
Operator's Manual

**You must be trained and authorized to
operate a lift truck**

Follow these rules:
Read and understand your
Operator's Manual.



KNOW YOUR TRUCK.



Learn safe operating rules
and understand the correct
operation of your truck.



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





CONTENTS

This manual covers trucks with capacities
from 3,000 pounds through 4,000 pounds

A MESSAGE TO CLARK LIFT TRUCK OPERATORS.....	iv
TRUCK APPLICATIONS.....	v
OPERATOR MAINTENANCE.....	1
GENERAL SAFETY RULES.....	2
OPERATING HAZARDS.....	3
KNOW YOUR TRUCK.....	4
OPERATING PROCEDURES.....	5
EMERGENCY TOWING.....	6
PLANNED MAINTENANCE AND LUBRICATION.....	7
SPECIFICATIONS.....	8

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.

Safe operation of a lift truck 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:

1. OPERATOR NOT PROPERLY TRAINED
2. OPERATOR NOT EXPERIENCED WITH LIFT TRUCK OPERATION
3. BASIC SAFETY RULES NOT FOLLOWED
4. LIFT TRUCK WAS NOT MAINTAINED IN A 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 learn how to operate your lift truck safely. This manual shows and tells you about operator maintenance 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. 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 authorized operators safely operate their lift truck by illustrating the correct procedures. It cannot cover every possible situation which may result in an accident. You must watch for hazards in your work areas and correct them. It is important that you learn the information in this manual and know your company safety rules! Be sure that your equipment is maintained in a safe condition and do not operate a damaged truck. Practice safe operation every time you use your lift truck. Let's join together to set new standards in safety.

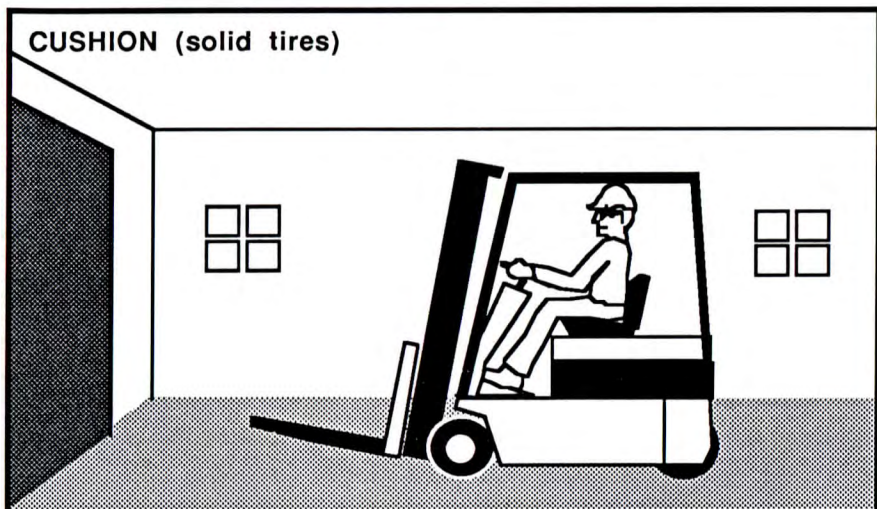
Remember, before you start operating this lift truck, be sure that you understand all driving procedures. It is your responsibility, and it is important to you and your family, to operate your lift truck safely and efficiently. And be aware that the Federal Occupational Safety and Health Act and state 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 have been authorized by your employer.

TRUCK APPLICATION

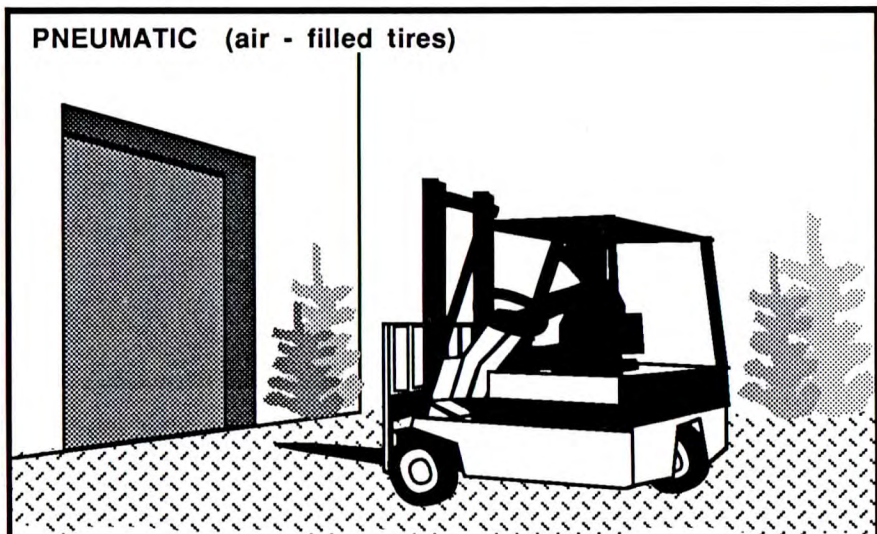
Each truck is designed for a specific application. Make sure you are using the correct truck for the job.

CUSHION (solid tires)



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

PNEUMATIC (air - filled tires)

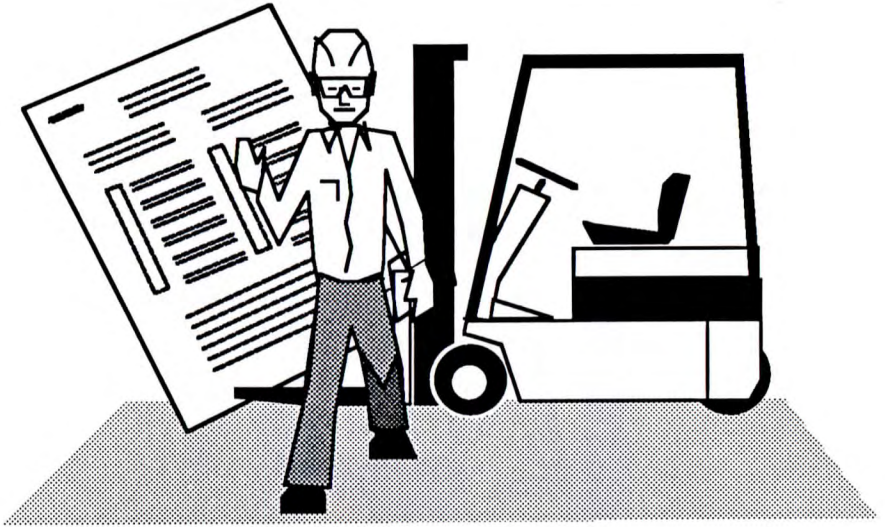


Use pneumatic (air) tire trucks on improved surface inside or outside.



Operator Maintenance

Daily Inspection



At the beginning of each shift, fill out a daily inspection sheet



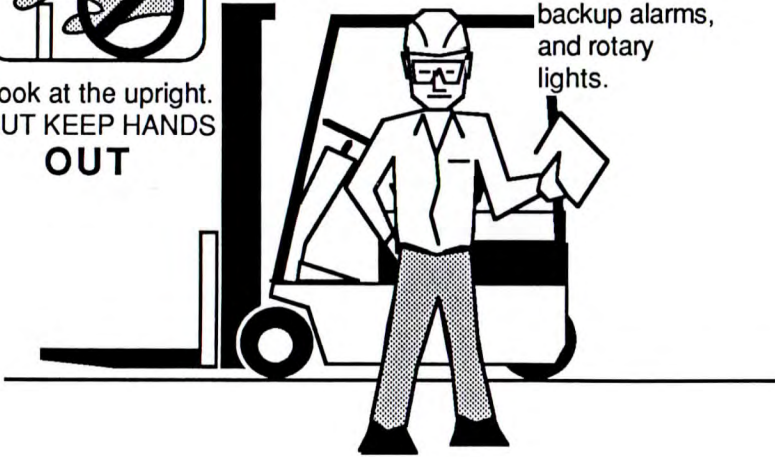
Do not make repairs yourself. Lift truck mechanics are trained professionals. They know how to make repairs safely.

Operator Maintenance Safety Inspection

Check safety equipment--the overhead guard, load backrest extension, horn, and if present, backup alarms, and rotary lights.



Look at the upright.
BUT KEEP HANDS
OUT

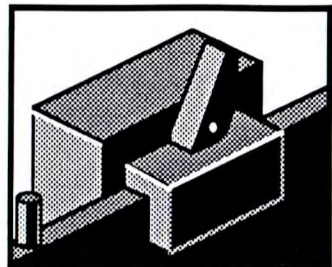


Warning Light



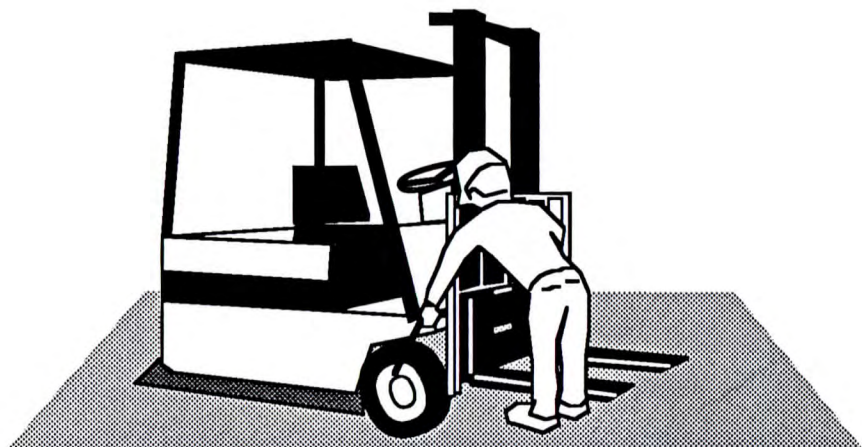
Backup Alarm

Other safety devices
are available from
your Clark dealer.

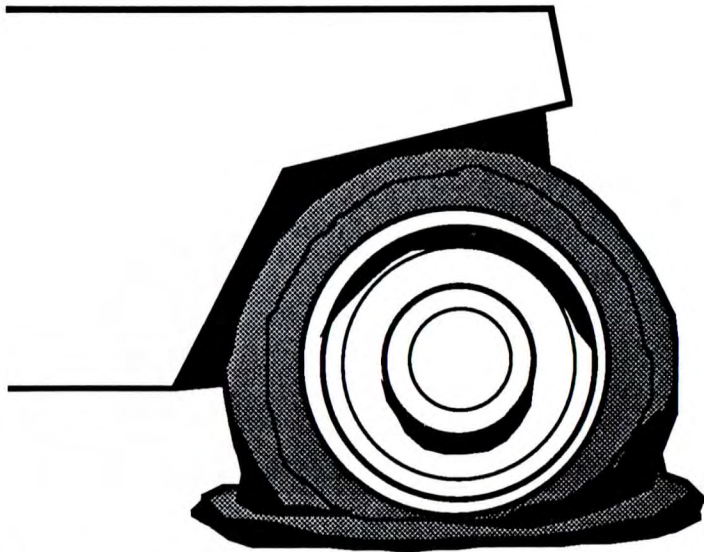


Check fork retainer
pins and locks.

Operator Maintenance Pneumatic Tire Inspection



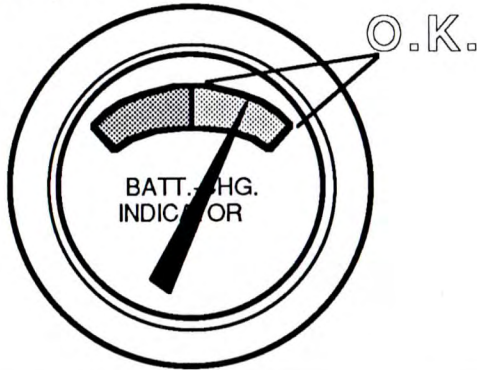
Check tire pressure from a position facing the tread of the tire, not the side. Use a long-handled gauge to keep your body away from the side.



Low tires can effect the truck's stability ... but don't just add air! A damaged or improperly installed split rim can come apart under high pressure, resulting in severe injury or death. Check with a mechanic; the tire may require removal or repair.

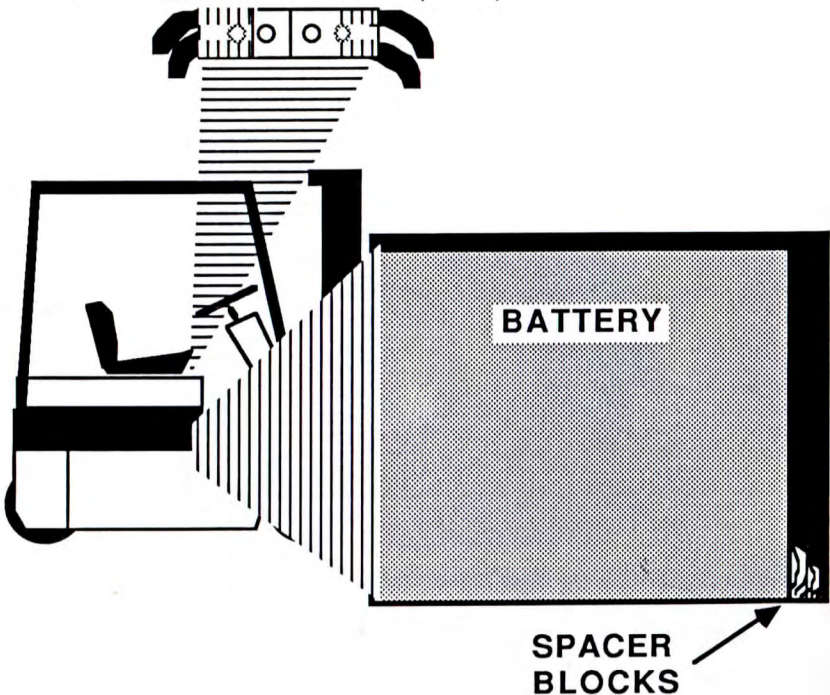
Operator Maintenance Battery

Check battery charge



Check battery retainment and battery connector

Battery Disconnect
Battery Connector (battery) Battery Connector (truck)

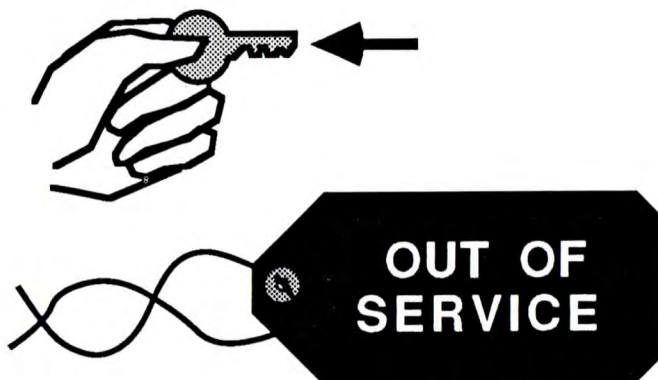


Operator Maintenance Maintenance Problem

DO NOT OPERATE A LIFT
TRUCK THAT HAS A
MAINTENANCE PROBLEM



Remove the key and put
an "out of Service" tag
on the truck.





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



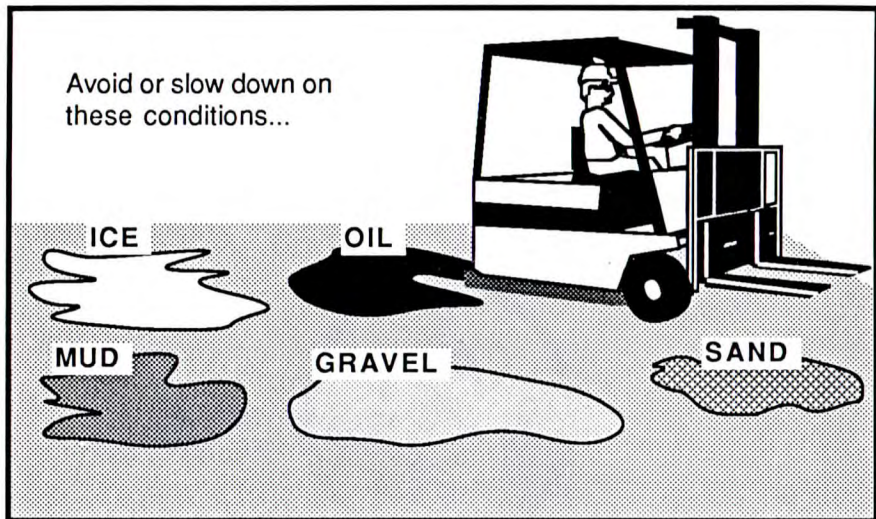
DO WEAR SAFETY
EQUIPMENT
WHEN
REQUIRED



DON'T SMOKE IN
"NO SMOKING "
AREAS

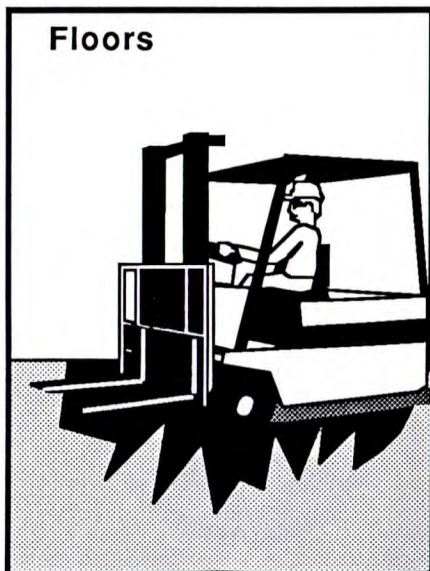
General Safety Rules

Surface and Capacity



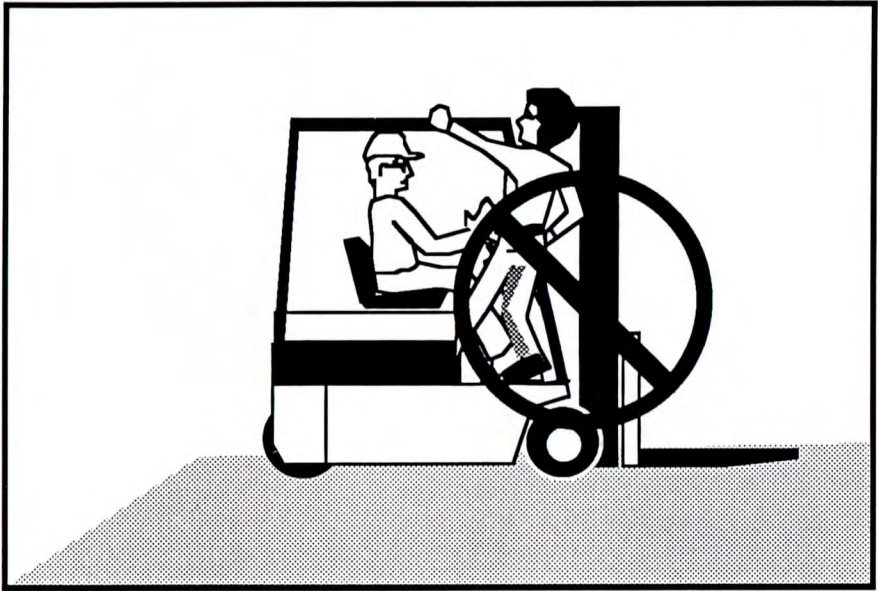
They can cause a truck to tip over.

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

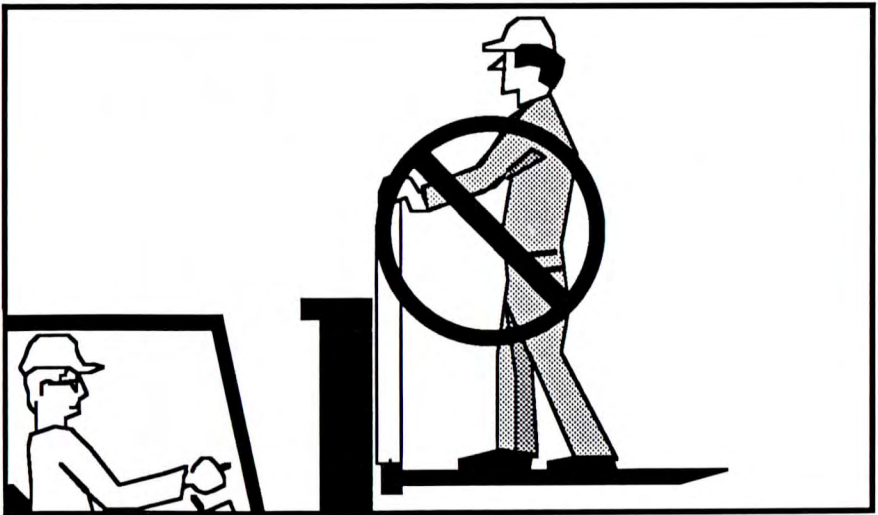


General Safety Rules

No Riders



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

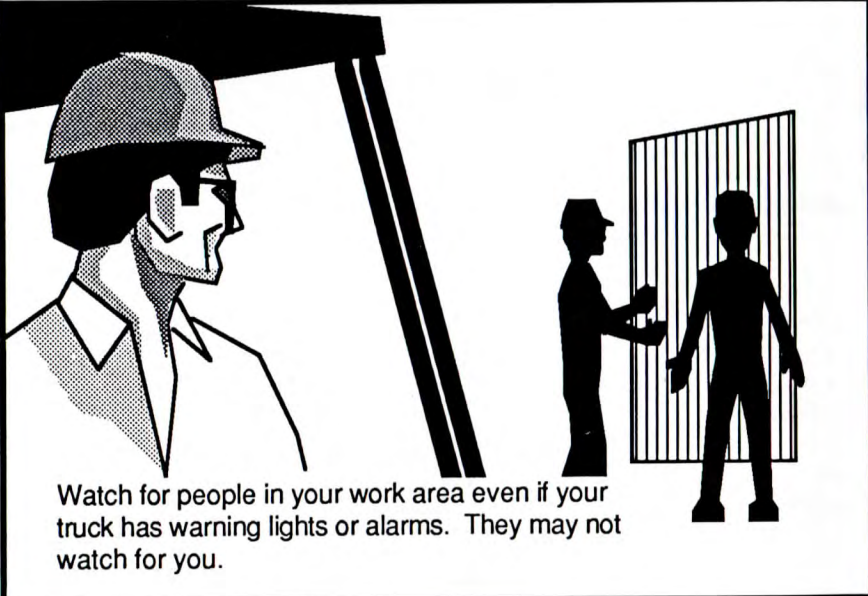


Never transport personnel on the forks of a lift truck.

General Safety Rules

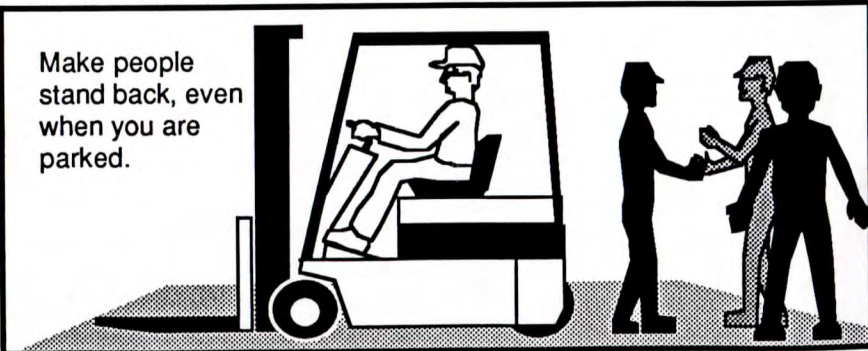
Pedestrians

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.

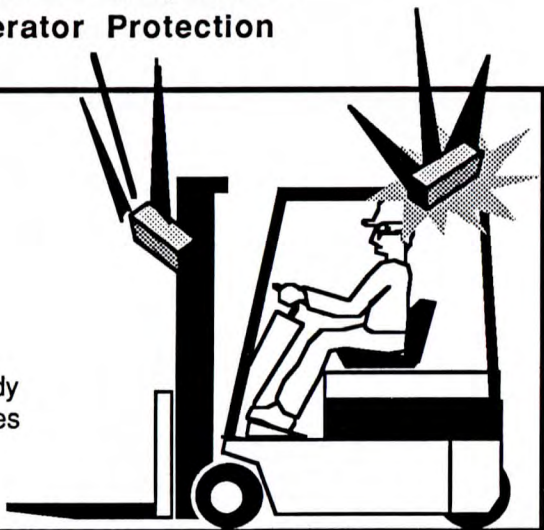


General Safety Rules

Operator Protection

Keep under the
overhead guard.

Always keep your body
within the running lines
of the truck.



Be especially careful when
traveling in reverse and
turning. Maneuvering in
tight areas can be dangerous.

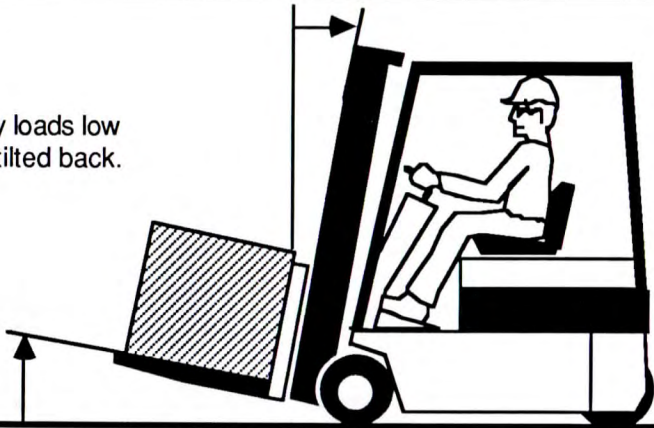
Watch out for
intrusion into
the operators
compartment.



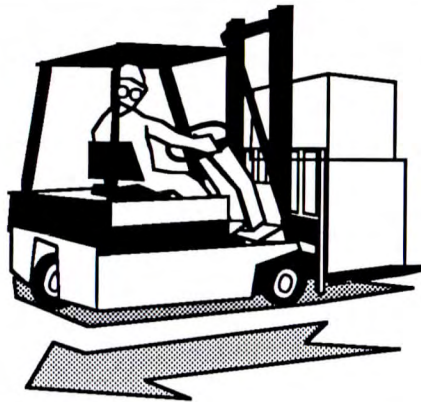
General Safety Rules

Travel

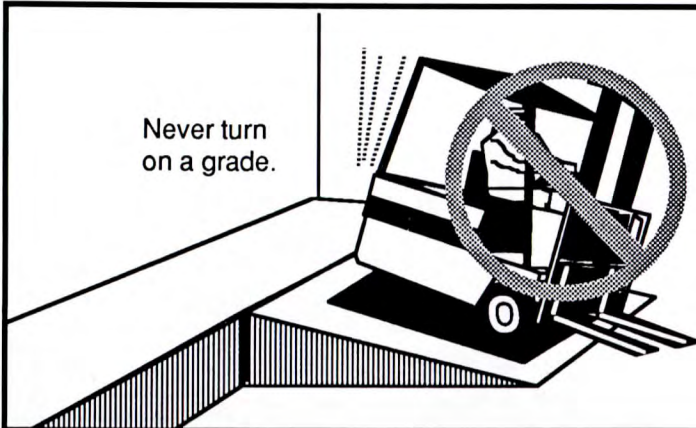
Carry loads low
and tilted back.



If load blocks your
view, travel in
reverse.

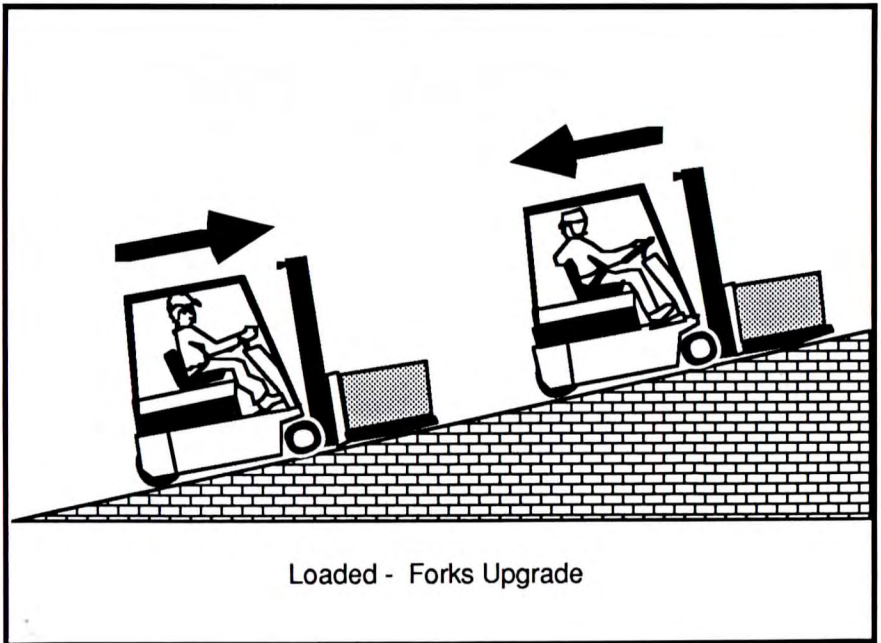
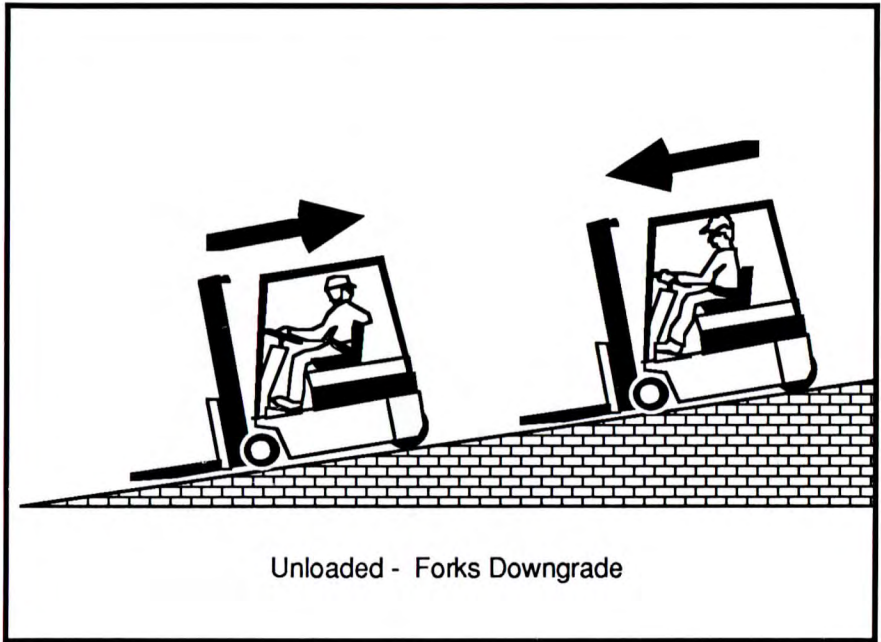


Never turn
on a grade.



General Safety Rules

Grades, ramps, slopes and inclines



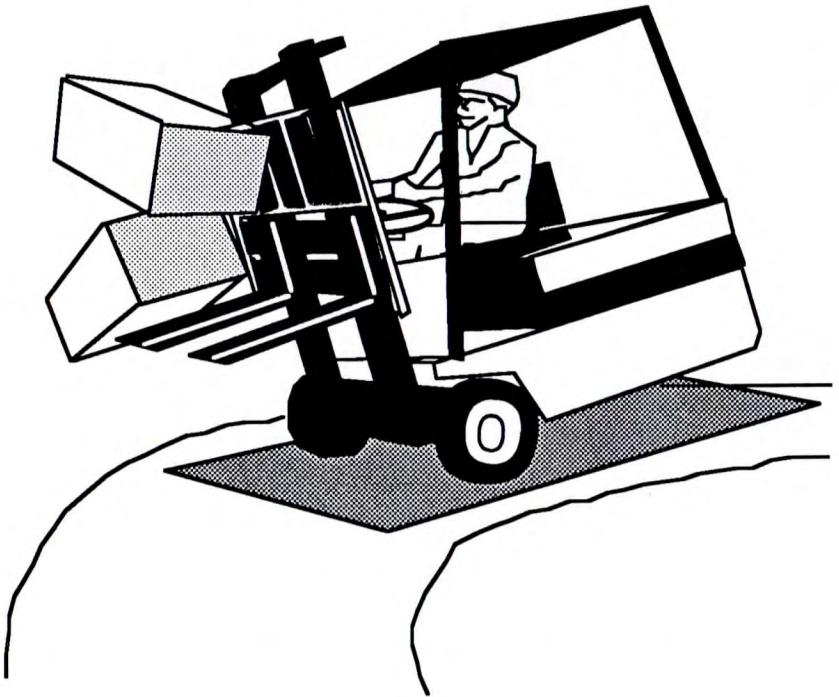
General Safety Rules

TIPOVER



WARNING:

Lift trucks can be tipped over if operated improperly.

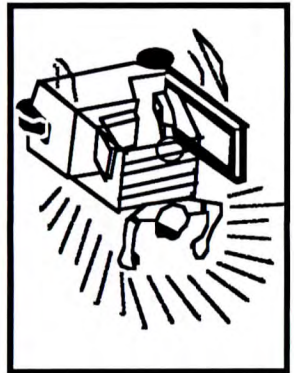


**A lift truck can tip over if you
break operating rules.**

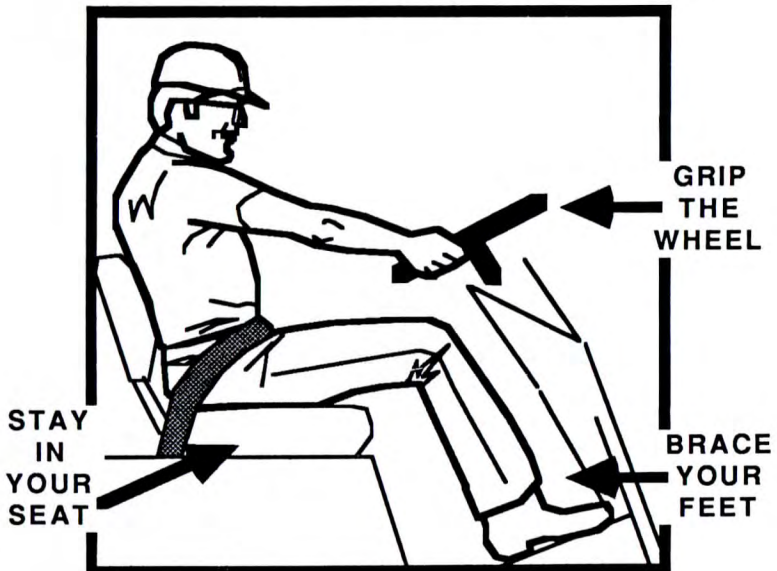
General Safety Rules

Don't jump

Your chances of survival in a tipover are better if you stay with the truck.



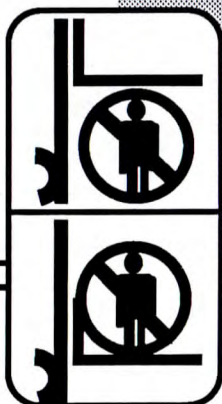
TIP WITH THE TRUCK



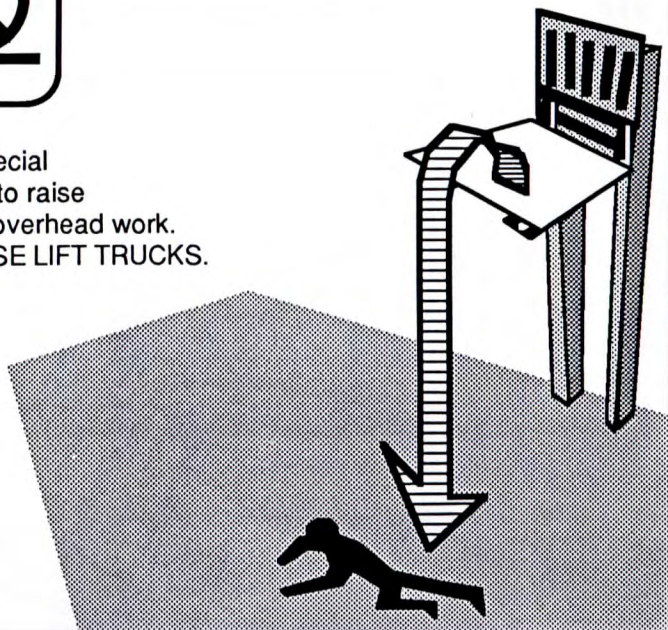
General Safety Rules

Fork Safety

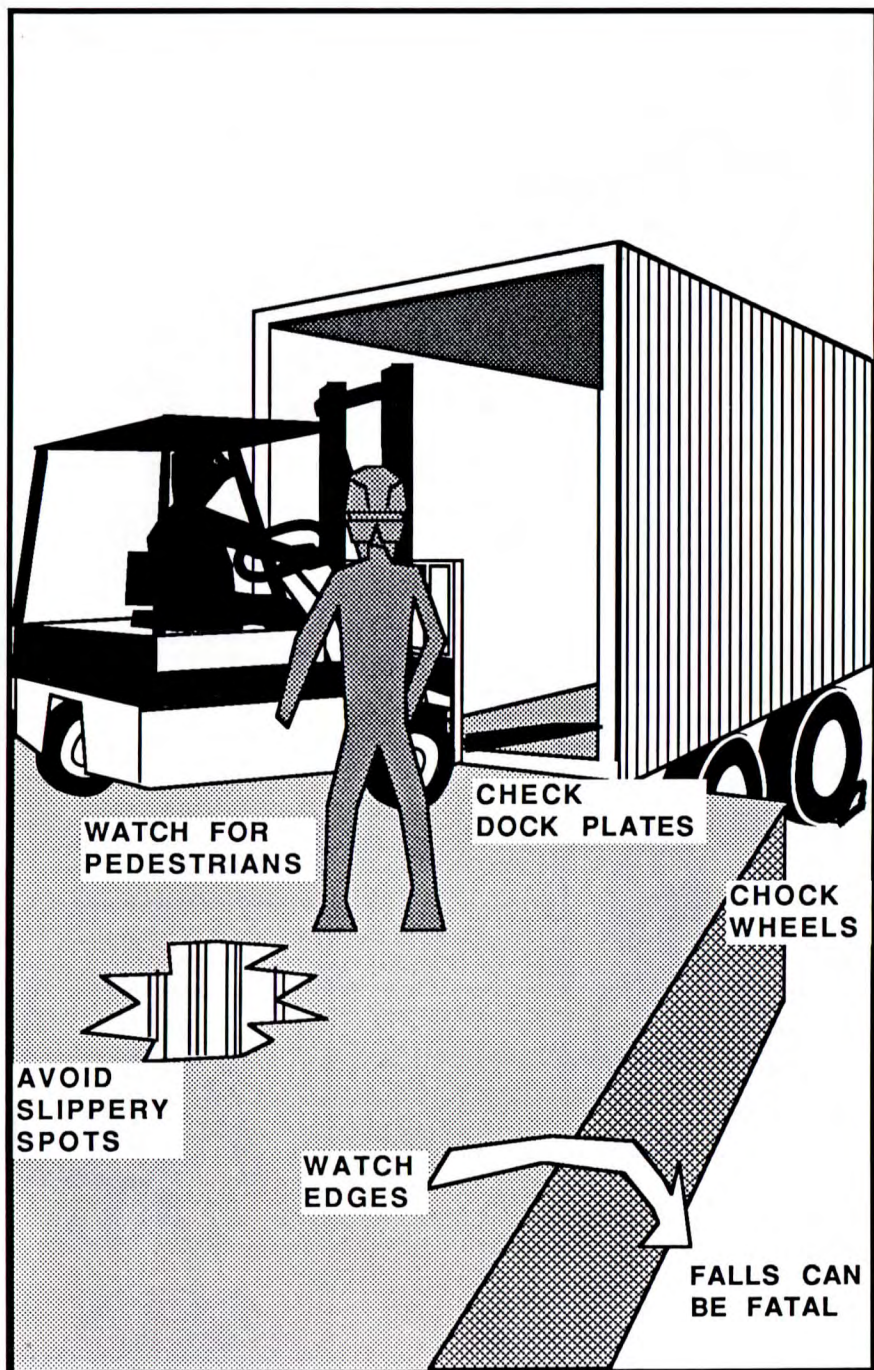
Never allow anyone to walk under raised forks.



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

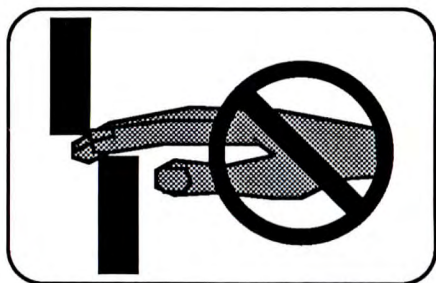


General Safety Rules Loading Docks



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---



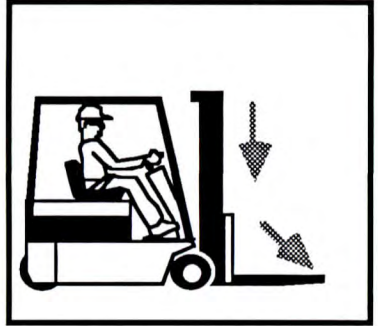
Always get a trained
mechanic.



General Safety Rules

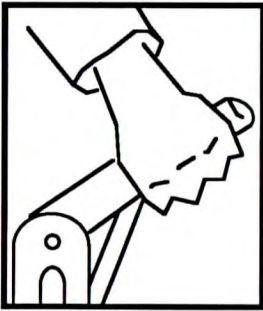
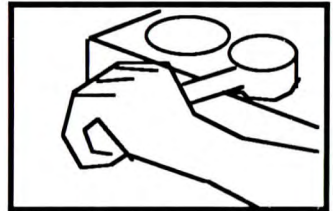
Parking

Lower forks fully to floor and tilt forward.



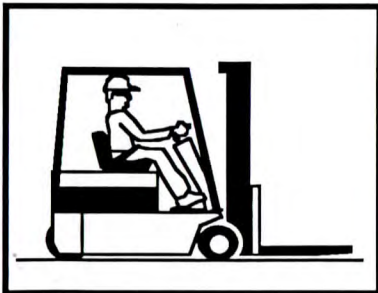
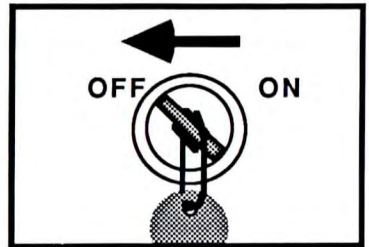
Never park on a grade.

Be sure travel control is in neutral.



Set parking brake.

Turn key to "off" position.



Always come to a complete stop before leaving truck.



Operating Hazards

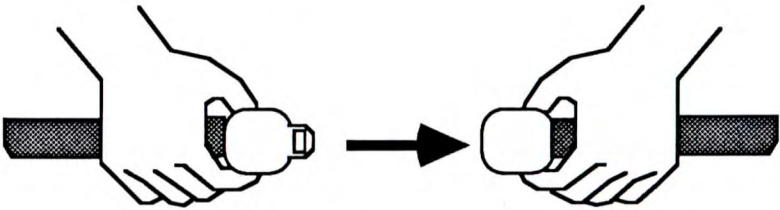


This section shows hazards that may cause you, or someone around you, to be killed or badly hurt. As the operator, you must look for other hazards. Get your boss to help you identify and avoid those hazards.

General Safety Rules
Seat belts

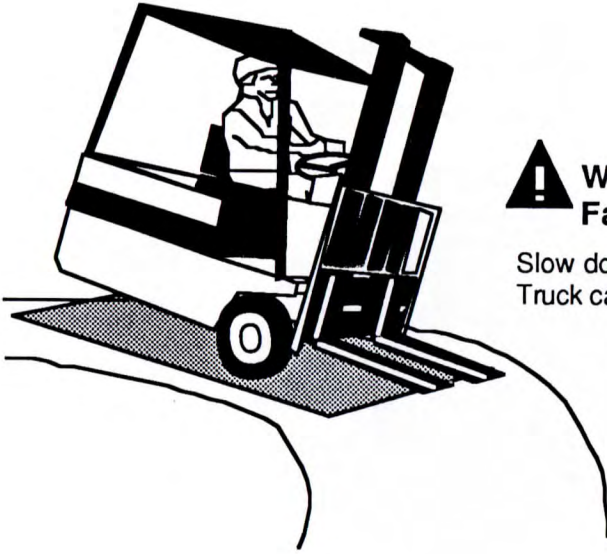


ALWAYS BUCKLE UP



Seat belts can reduce injuries

Operating Hazards Fast Turns and High Loads



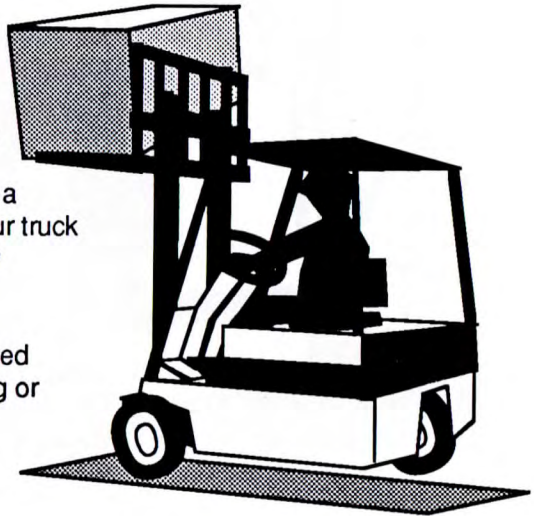
! **WARNING:**
Fast Turns

Slow down before turning.
Truck can tip over.

! **WARNING:**
High Loads

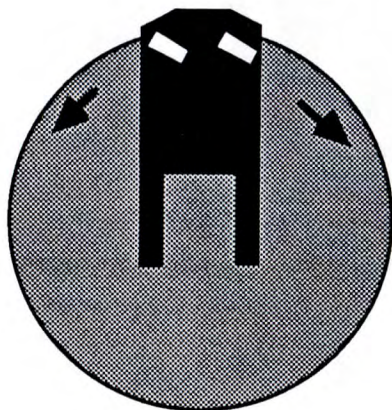
Turn too sharp with a
raised load and your truck
can tip even at slow
speeds.

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



Operating Hazards Rear Swing

! **WARNING:**
Rear Steering

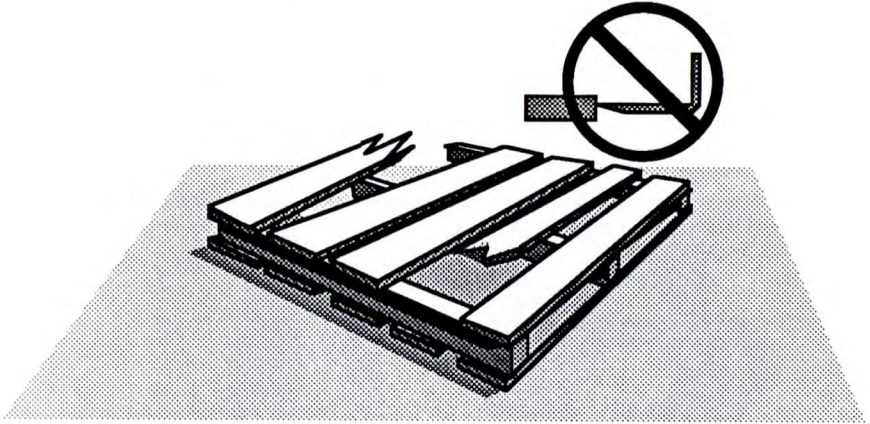


When turning, be sure the rear of the truck does not swing into racks, posts etc.



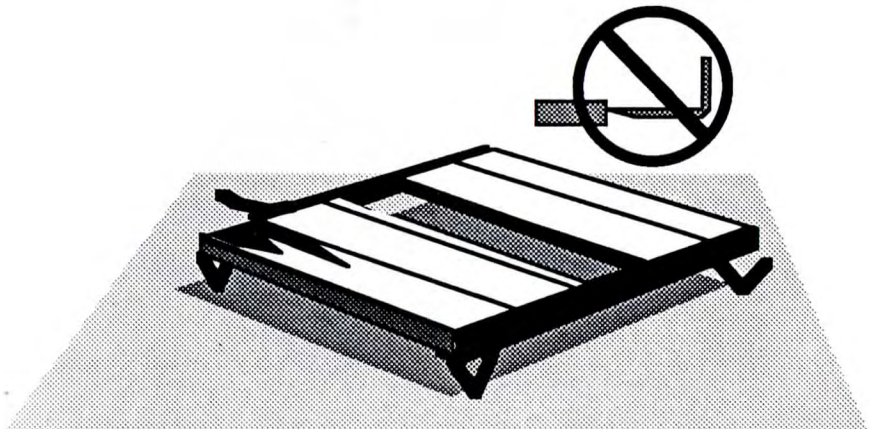
Operating Hazards Pallets and Skids

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



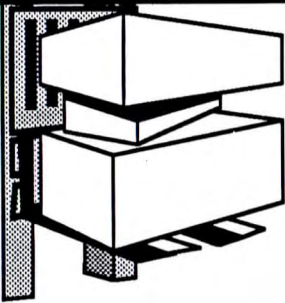
Do not move or store materials on damaged pallets or skids. Items can fall through them causing severe injury or death.

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



Operating Hazards

Loose Loads

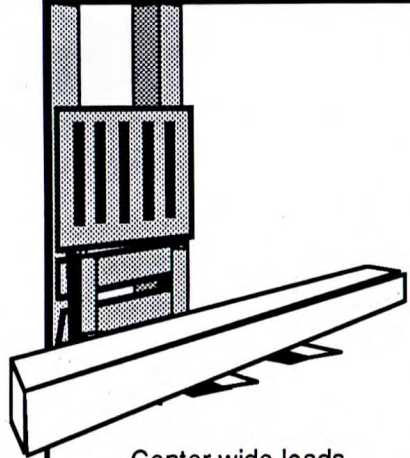


! **WARNING:**
Loose Loads

Never carry loose
or uneven material.

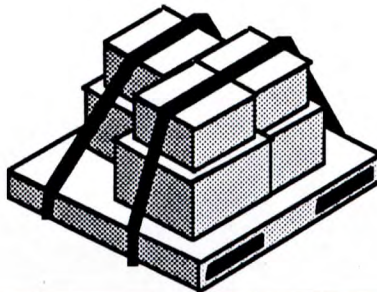


Spread the forks
to fit the load.



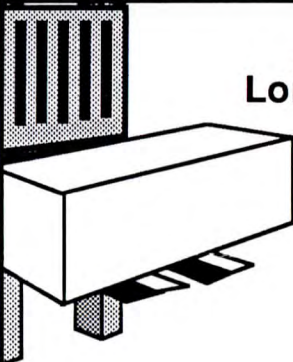
Center wide loads.

Stack and band
loose material.



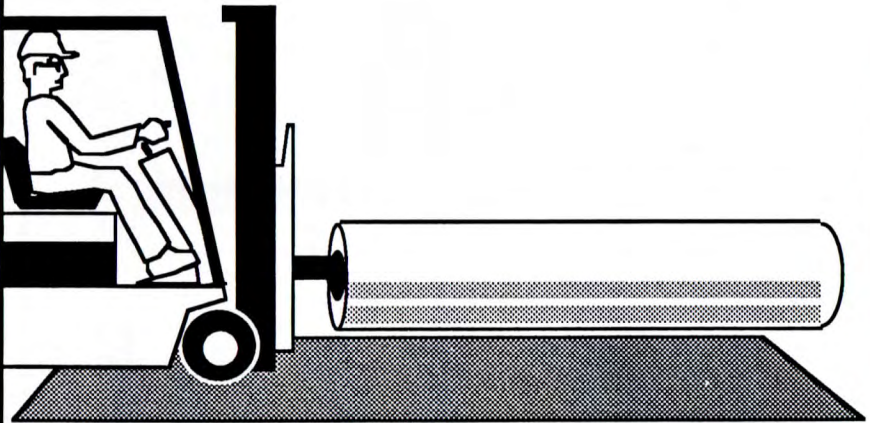
Operating Hazards Long and Wide Loads

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.



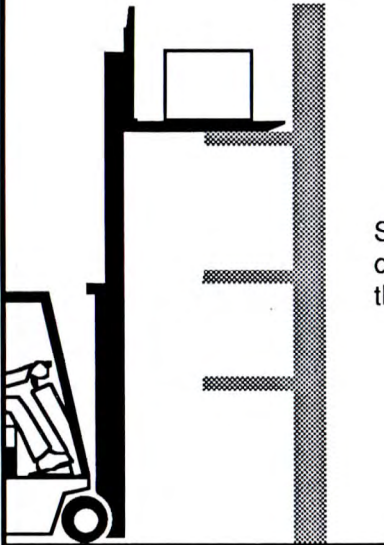
Remember, a long load will reduce the capacity of the truck.
KNOW AND UNDERSTAND YOUR TRUCK LOAD RATING.

Operating Hazards

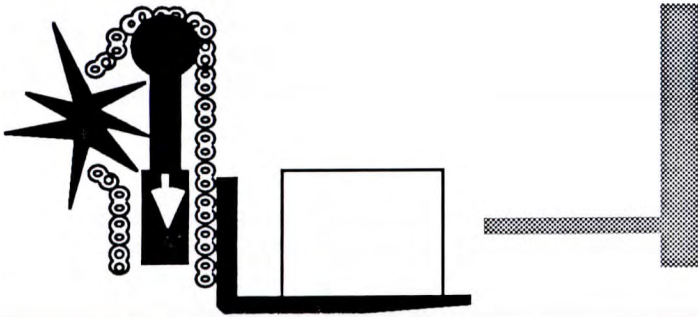
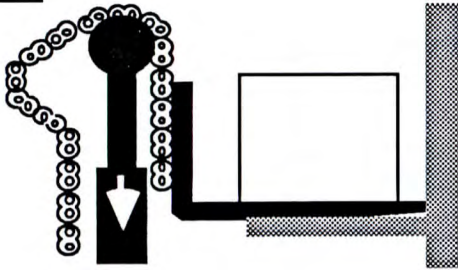
Chain Slack



WARNING:
Chain Slack



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

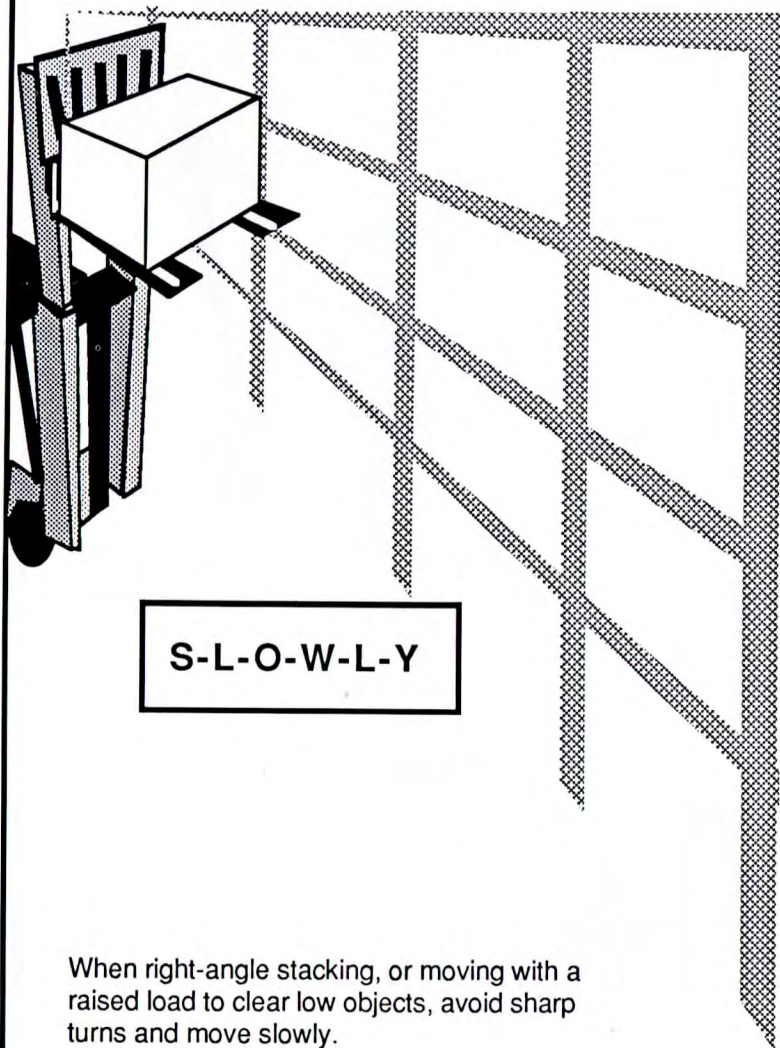


Operating Hazards

Right-Angle Stacking



Warning: Right-angle stacking



S-L-O-W-L-Y

When right-angle stacking, or moving with a raised load to clear low objects, avoid sharp turns and move slowly.

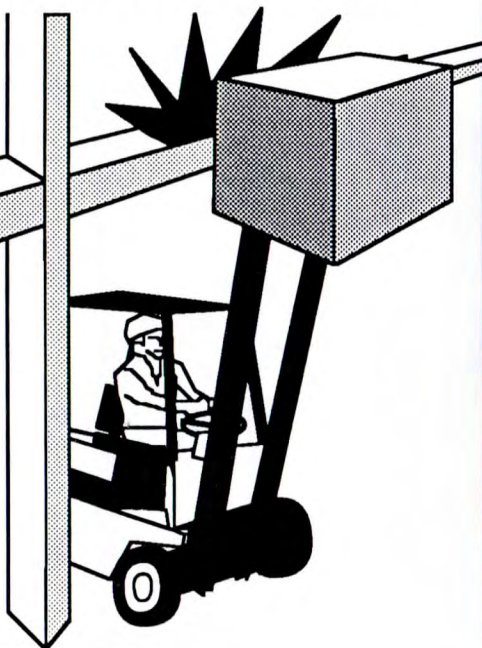
Operating Hazards

Low Overhead Clearance

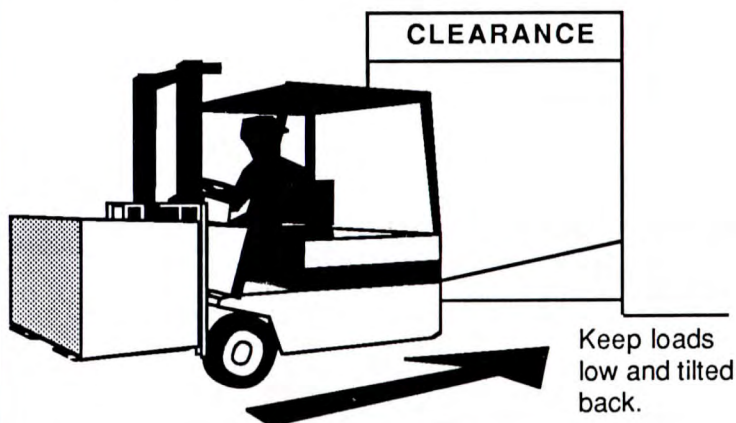


WARNING: Low Overhead Clearance

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



Know the height of your truck.
Check your clearance.

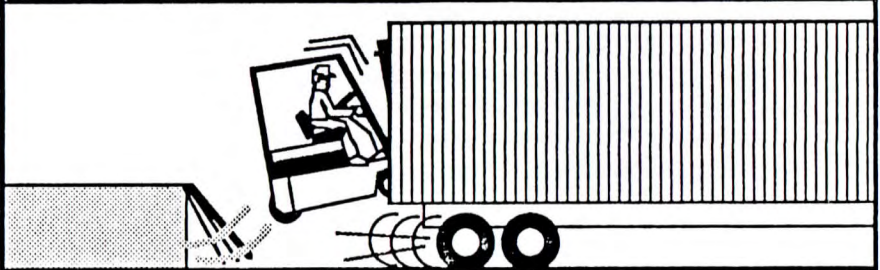
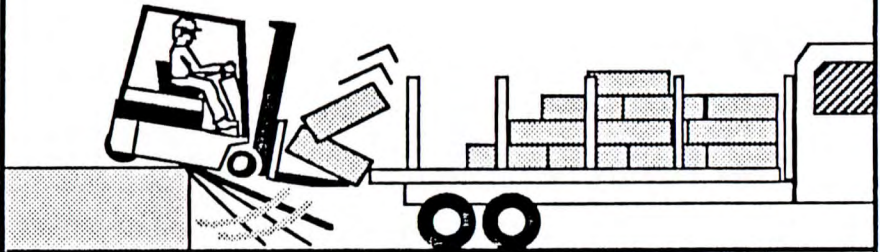


Operating Hazards

Drop-offs



Warning: Dock or trailer drop-offs

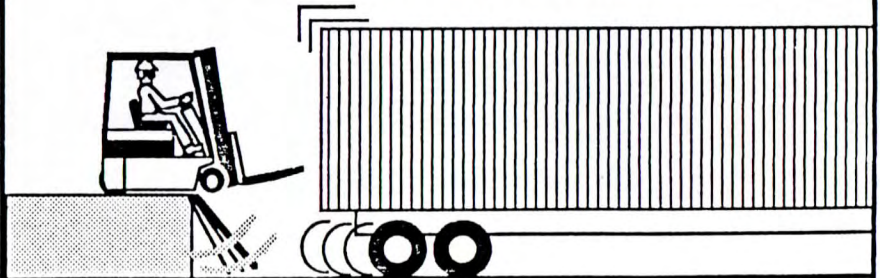


TO AVOID THESE HAZARDS YOU MUST:

- Talk to the truck driver yourself, make sure he dose 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 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. Refer to page 4.8 for location of U.L. construction type.

AU. 1516

**CLASSIFIED BY UNDERWRITERS
LABORATORIES, INC. AS TO FIRE
AND ELECTRICAL SHOCK HAZARDS
ONLY. TYPE EE INDUSTRIAL
TRUCK. SEE UL INDEX OF
CLASSIFIED PRODUCTS.**

148800

**UNDERWRITERS
LABORATORIES, INC.
AS TO FIRE**

**SEE UL
INDEX OF CLASSIFIED PRODUCTS.**

149639

4 Know Your Truck

Truck Model Illustrations

Truck Components & Features

Operator's Compartment & Controls

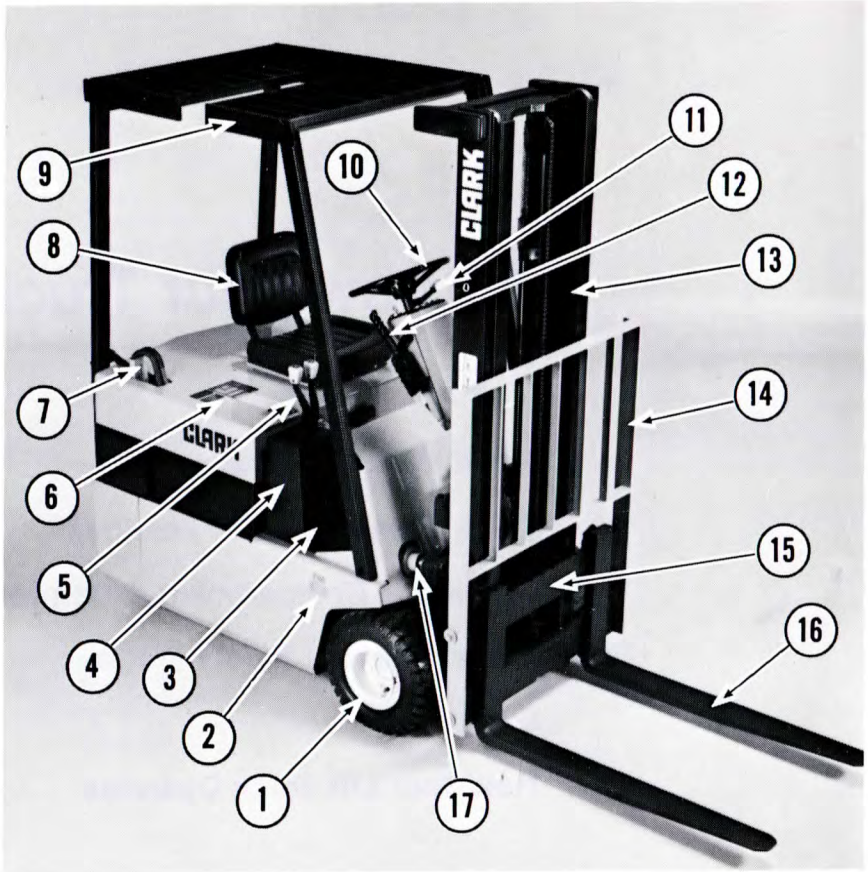
Truck Data and Safety Plates

Safety Decals

How Your Lift Truck Operates

Know Your Truck

Truck Model Illustrations



CLARK TM 15-17-20

- | | |
|---------------------------------|-------------------------------|
| 1. Drive Axle and Wheels | 10. Steering Handwheel |
| 2. Model Designation Decal | 11. Directional Control Lever |
| 3. Hydraulic Sump and Dipstick | 12. Parking Brake Hand Lever |
| 4. Hydraulic Valve Cover | 13. Upright |
| 5. Valve Control Levers | 14. Load Back Rest |
| 6. Data Plate and Safety Decals | 15. Fork Carriage |
| 7. Battery Connector | 16. Load Forks |
| 8. Drivers Seat | 17. Tilt Cylinder |
| 9. Overhead Guard | |

Know Your Truck
Truck Model Illustrations



CLARK
TM 15-17-20

- 18. Machine Serial Number
- 19. Counterweight
- 20. Steer Axle and Wheel
- 21. Hood (Seat Deck/Battery Compartment Cover)

... See following pages for
general description of
truck components & features

Know Your Truck

Things You May Need or Want To Know About The TM 15/17/20 Series 36-Volt Lift Trucks

Model Designation/Rated Load Capacity

*TM 15 [1500 kg @ 500 mm] 3000 lbs @ 24 in
TM 17 [1750 kg @ 500 mm] 3500 lbs @ 24 in
TM 20 [1814 kg @ 500 mm] 4000 lbs @ 24 in

*Available in cushion or pneumatic tire model

Note: Rated capacity applies when using uprights with maximum MFH up to and including:

HVSTD [3835 mm] 151 in and HVTSU [3875 mm] 152 in

TRUCK COMPONENTS & FEATURES

Frame & Chassis

- Formed steel, welded construction, [10 mm] 0.39 in thickness
- Separate, removable hydraulic sump tank.
- One battery compartment size.
- Hinged front battery plate for improved service accessibility.
- Components and hardware dimensions are combination metric and US inch.

Traction Drive Motors (Dual)

Two, [169 mm] 6.64 in diameter, Series Wound with Class H insulation, ventilated with integral cooling fan.

Drive Axle

The drive axle is formed of two symmetrical right-angle wheel drive units bolted together into a solid assembly. Drive units have spur and helical gearing providing 23.386:1 overall reduction.

Service Brakes

Hydraulically-actuated dual disc brakes mounted on intermediate drive axle shafts, 4.4:1 reduction to drive wheel. Brakes are self-adjusting.

Parking Brake

Mechanically actuated with separate, dual calipers on service brake discs. Hand lever mounted on steering column pylon.

Know Your Truck

Truck Components & Features

Drive Wheels & Tire Sizes

	TM 15	TM 17, 20
Cushion	18 × 7 × 12.12	18 × 8 × 12.12
Pneumatic	18 × 7 - 8 16 ply	

Steer Wheels & Tires

Cushion — All Models	18 × 7 × 12.12
Pneumatic	18 × 7 - 8 16 ply

Steer Axle

Trunnion type with forged center-mounted spindle.

Power Steering System

Full hydrostatic power steering control valve operated by the steering hand-wheel. Double-acting steering cylinder attached to steer axle. Steer pump, driven by separate electric motor, has integral pressure relief valve. Oil for the power steering system is drawn from the main hydraulic sump and circulated back to the sump through the return-line filter.

Hydraulic System

Main hydraulic (lift & tilt) pump is driven by separate electric motor.

The main hydraulic control valve of open-center design features adjustable system pressure relief valve and counterbalance valve in the tilt circuit with pressure-compensated flow control to regulate tilt speeds. All ports and connecting lines are on the bottom surface of the valve.

When lift attachments are used, single or double auxiliary sections may be added to the outer (RH) side of the main valve. The optional aux sections also have an adjustable relief valve and can be assembled with optional flow controls for 2.5, 4.0, 5.5, 7.0 or 10.0 gpm flow.

The lift system includes a flow control (lowering) valve for control of upright lowering speed. Maximum main hydraulic system relief pressure is [20,700 kPa] 3000 psi. 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

Truck Components & Features

Traction Control

EV-100 SCR control (GE) with solid-state accelerator control. Control system includes plugging and static return to off (SRO). The static-return-to-off (SRO) circuit 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 (.75 second) is built into the seat switch to allow momentary opening of the seat switch if a bump is encountered.

Operator Controls

- 15-inch steering handwheel
- Directional lever on steering column for L.H. operation
- Speed control and brake pedal for R.H. foot operation
- Hand operated parking brake (seat brake optional)
- Tilt steering column for battery removal
- Seat mounting base allows 6-inch fore-and-aft adjustment

Instruments

- Key switch
- Hourmeter
- Battery discharge indicator

Electrical Components

- Main Hydraulic Pump (Lift) Motor: [181.6 mm] 7.15 in Series Wound with Class H insulation
- Steer Motor: [165 mm] 6.5 in Permanent-Magnet with Class H insulation
- Battery Connector: Anderson 350A
- Horn: Operates at all times battery is connected.

Parking Brake Switch

A microswitch operated by the parking brake controls power flow to the traction drive and power steering systems. When the parking brake is applied (by either hand brake lever or the optional seat-operated brake) power to the drive (traction) control, accelerator, drive motors and steer pump motor is cut off.

Service Brake Switch

A microswitch operated by the service brake pedal controls power flow to the drive motors. When the brake pedal is pushed to stop the truck, power to the accelerator control and drive motors is cut off.

Know Your Truck

Truck Components & Features

Steer Axle Trunnion Drive Motor Cut-Off Switches

Microswitches actuated by a cam at the top of the steer axle trunnion shaft disconnect (cut off) power to the motor on the inside of the turn, when the truck is steered into a tight or hard turn.

Power Steering Pump Motor Microswitch

Operation of the steer pump is controlled by the directional control lever. With key switch turned "ON" and parking brake released, the steer pump starts to run only when the directional control is moved to select a direction of travel, either **FORWARD** or **REVERSE** position. The steer pump runs continuously whenever the directional control lever is in either of these positions. When the direction lever is moved to **NEUTRAL** position, the steer pump continues to run for approximately 5 seconds, then stops.

Main Hydraulic Pump Motor Switches

Microswitches operated by the lift, tilt and/or aux control levers start operation of the main hydraulic pump whenever a control lever is moved slightly from the neutral position. Key switch must be "ON".

Filters

- Return-line hydraulic filter, spin-on replacement 25 micron
- Hydraulic sump breather 10 micron

Steering Column (Pylon)

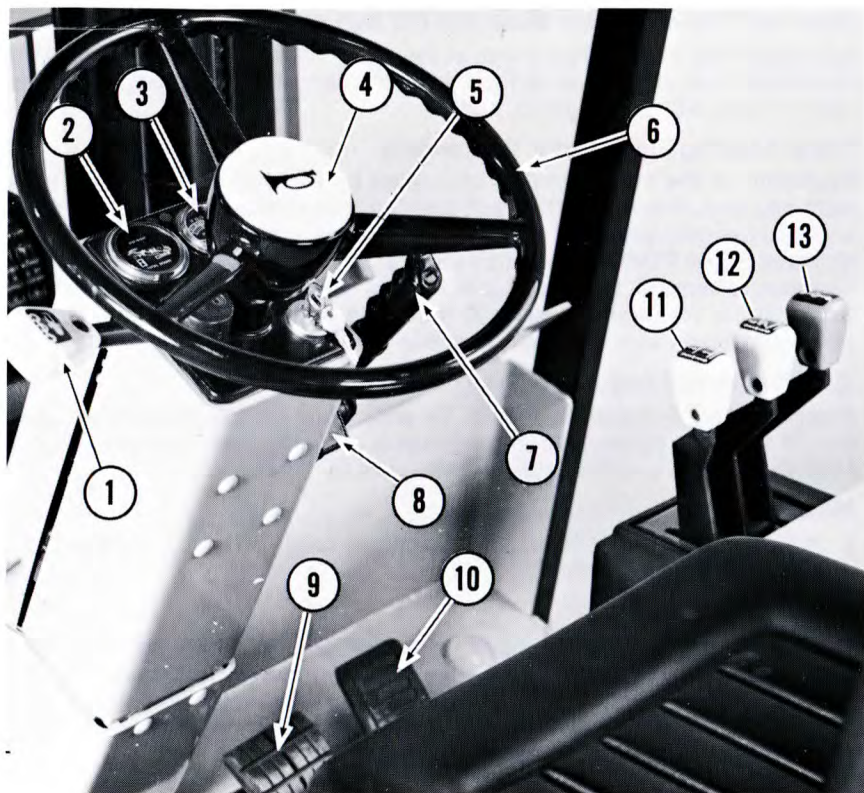
The steering column is hinged to allow pivoting forward to provide clearance at the handwheel for ease of battery removal. It is controlled by a release lever on the right hand side of the pylon. The steering column is not adjustable for intermediate positions. It must be latched into the down or rearmost position at all times when driving the truck.

Hydraulic Control Lever Lock

The hydraulic control levers are provided with a lock to hold them in the forward position out of the way when removing and installing the battery. The lock is operated with a hand lever at the left-hand side of the main hydraulic control valve. Pull lever up to lock.

Know Your Truck

Operator's Compartment & Controls



85M772

- | | |
|--------------------------------|-----------------------------|
| 1. Directional Control Lever | 9. Brake Pedal |
| 2. Hourmeter | 10. Accelerator Pedal |
| 3. Battery Discharge Indicator | 11. Lift Control Lever |
| 4. Horn Button | 12. Tilt Control Lever |
| 5. Key Switch | 13. Auxiliary Control Lever |
| 6. Steering Handwheel | |
| 7. Parking Brake Lever | |
| 8. Pylon Release Lever | |

**Familiarize
yourself with the controls
and follow
safe operating rules.**

Know Your Truck Operator's Compartment and Controls



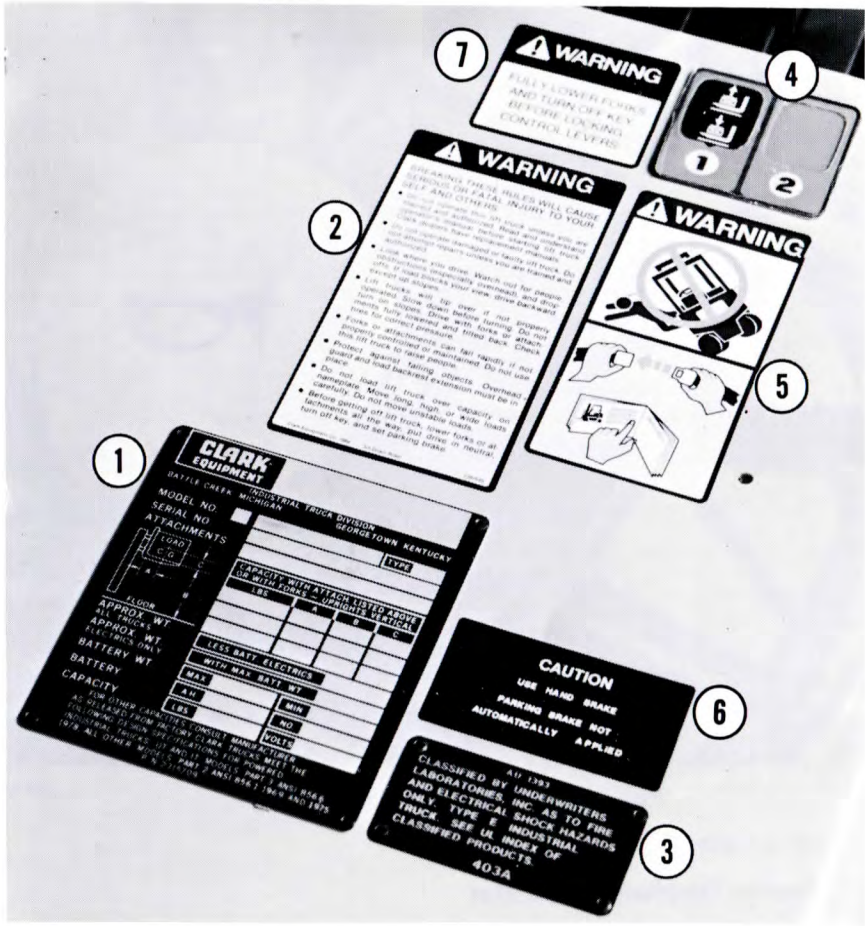
85M469

2. Hourmeter

3. Battery Discharge Indicator

Know Your Truck

Truck Data and Safety Plates



1. Truck Data and Capacity Plate (Truck Nameplate)
2. Operator Safety Warning Plate
3. UL Label (Underwriters Lab Classification)
4. Auxiliary Control Labels
5. Seat Belt Warning Decal
6. Parking Brake Caution Decal
7. Control Lever Locking Warning Decal

⚠ WARNING

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 the data on the nameplate

1. Truck registered name.
2. Truck model number and serial number.
3. **Type of construction.** The code letter signifies the type of protection. Check with proper authority before entering areas where flammable or explosive material may be present.
4. **Attachment description (if any).**
5. **Capacity.** Capacity, load center, and lifting height data. **DO NOT EXCEED MAXIMUM SPECIFIED.**
6. **Truck weight less load.**
7. **Battery weight.**
8. **Battery ampere — hour rating.**
9. **System voltage.**

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.

Operator Safety Warning Plate

The operator's warning plate 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.

CLARK		①
INDUSTRIAL TRUCK DIVISION		
BATTLE CREEK, MICHIGAN		GEORGETOWN, KENTUCKY
MODEL NO.		TYPE ③
SERIAL NO.		
ATTACHMENTS	④	
	CAPACITY WITH ATTACH LISTED ABOVE OR WITH FORKS UPRIGHTS VERTICAL	
	LBS	A B C
	⑤	
APPROX. WT ALL TRUCKS	LESS BATT. ELECTRONIC	⑥
APPROX. WT ELECTRICS ONLY	WITH MAX BATT. WT	
BATTERY WT	MAX ⑦	MIN
BATTERY	AH ⑧	NO
CAPACITY	LBS	VOLTS ⑨
FOR OTHER CAPACITIES CONSULT MANUFACTURER AS RELEASED FROM FACTORY THIS TRUCK MEETS THE DESIGN SPECIFICATIONS ESTABLISHED IN AMERICAN NATIONAL STANDARD FOR POWERED INDUSTRIAL TRUCKS. PART II ANSI B 56.1-1969 AND 1975. PT. NO. 2315709		

18616



WARNING

BREAKING THESE RULES WILL CAUSE SERIOUS OR FATAL INJURY TO YOURSELF AND OTHERS.

- Do not operate this lift truck unless you are trained and authorized. Read and understand operator's manual before starting lift truck. Clark dealers have replacement manuals.
- 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.

© Clark Equipment Co. 1984 Sit-Down Rider

2387649

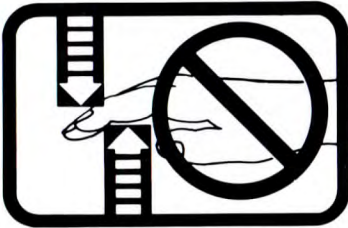
25458

Know Your Truck

Safety Decals

Upright Warning Decal

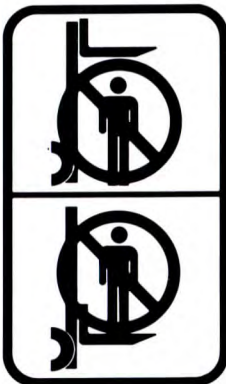
This safety decal is placed on the upright to warn of the danger of injury from movement between rails, chains, sheaves, fork carriage and other parts of the upright assembly. Do not climb on or reach into the upright. Personal injury will result if any part of your body is put between moving parts of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



19341

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.



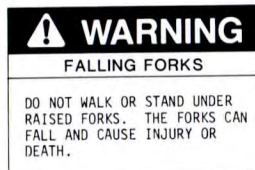
19340



83M408



83M407



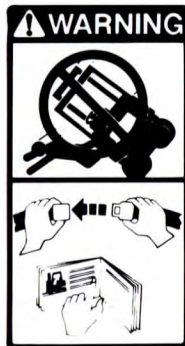
Know Your Truck Safety Decals

Seat Belt Warning Decal

This safety decal is placed on the hood to remind you to always wear your seat belt when driving a lift truck.

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.

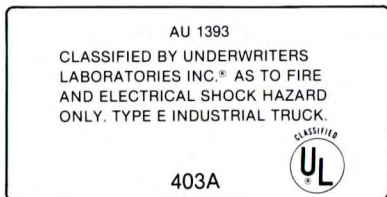
So, please, **always buckle up** when driving your lift truck.



24972

UL Label

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.



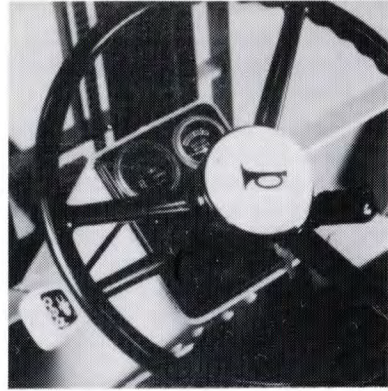
25474

Know Your Truck

How Your Lift Truck Operates

The **Instrument Panel** includes the

- 1 key switch
- 2 hourmeter
- 3 battery discharge indicator



85M469

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.

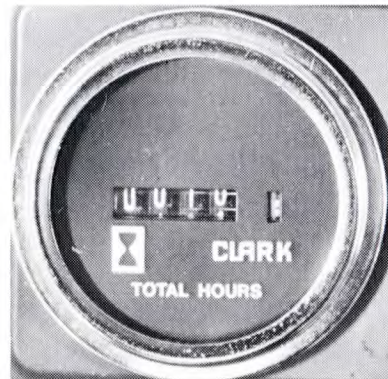


85M482

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 correctly-charged battery is connected at the truck receptacle.

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



19516

Know Your Truck

How Your Lift Truck Operates

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 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).

The **electrical circuit** includes

- Drive motor control switches:
 - 1 When the **parking brake** is applied, power to both drive motors is turned off.
 - 2 When the **brake pedal** is pushed, power to both drive motors is turned off.
 - 3 When truck (steer wheel) is steered at a sharp (tight turn) turning angle, power to the drive motor at the inside of the turn only 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 "**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.



13179

- 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 re-started until the directional control lever is returned to neutral. A time delay (.75 second) is built into the seat switch to allow momentary opening of the seat switch if a bump is encountered.

Know Your Truck

How Your Lift Truck Operates

With the **directional control lever** you are able to select the direction-of-travel motion of your truck. It has three positions

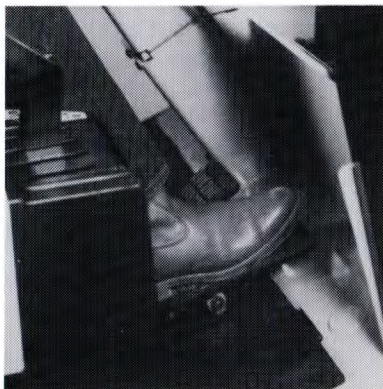
- **FORWARD** (push up or forward)
- **NEUTRAL**
- **REVERSE** (pull down or rearward)

This lever is held positively in each position by spring detents.



85M498

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.



85M479

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.



85M497

Know Your Truck

How Your Lift Truck Operates

The **steering handwheel** is connected with a hydrostatic steering gear (control valve) mounted in the steering column pylon. Full-time power steering is provided by oil pressure from the steer hydraulic pump which flows to the steering gear to be used in the amount required for movement of the steering cylinder connected to the steer axle.

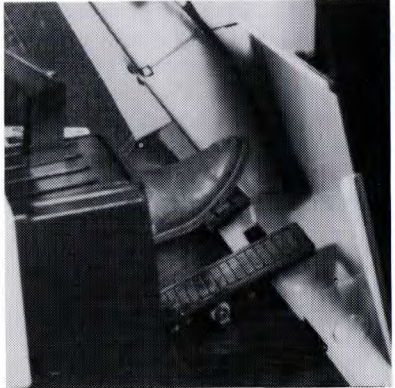
CAUTION — Never operate a lift truck which has a steering system fault.



85M507

The hydraulic **service brakes** can be applied by pushing the brake pedal.

CAUTION — Never operate your lift truck if the service brakes are not working correctly.



85M480

The **parking brake hand lever** mounted to the right on the steering pylon mechanically applies separate brake pads on the service brake discs. Pull the lever fully to the vertical, upright position to apply the brake. The lever should snap over center and lock in the applied position when adjusted correctly. Push the lever forward to release the parking brake.



85M481

Know Your Truck

How Your Lift Truck Operates

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).



85M490

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 pump is stopped and key switch is "**off**".



85M486

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 also tilt backwards. If the lever is pushed forwards, the upright is tilted forward.

With the optional **aux control lever**, you are able to control a material-handling attachment connected to the fork carriage according to the requirements of the attachment.



85M489

Know Your Truck

How Your Lift Truck Operates

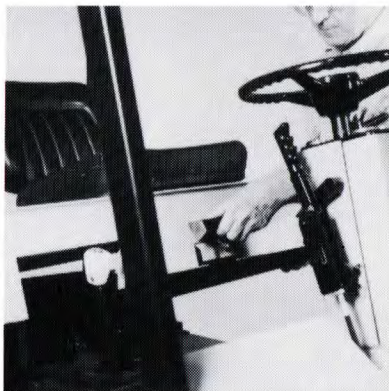
The seat adjustment lever is located on the left-hand side under the seat. To unlock, push the lever to the right and adjust the seat so that all controls may be comfortably reached. Then release the lever. Always be sure that the seat locking mechanism is engaged before operating the truck.



85M485

Access to the Battery & Controls

The combination seat deck/battery compartment cover is hinged and assisted in opening by two gas springs which also support 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.



85M476

Steering Column (Pylon) Release

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 column is not adjustable for intermediate positions. It must be latched into the operating position at all times when operating the truck.



85M503



5 Operating Procedures

Before Operation

How To Perform The Daily Inspection

Operation

How To Operate Your Truck

After Operation

When You Have Finished Using Your Truck

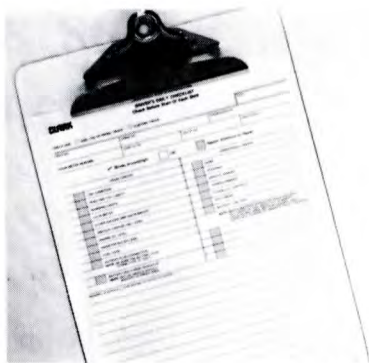
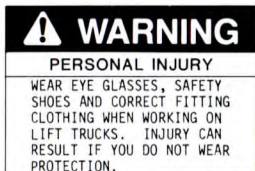
Before Operation

How To Perform The Daily Inspection

Before operating your lift truck you should check its condition. Be sure that your truck is safe to operate.

Lift trucks should always be inspected daily, or at the start of each shift. The following pages point out important areas to check during the daily inspection.

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



84M285

First, perform a visual inspection of the truck and its components. Walk around your lift truck and take note of obvious damage which may have been caused by operation during the last shift. Check for leaks and loose fittings.

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

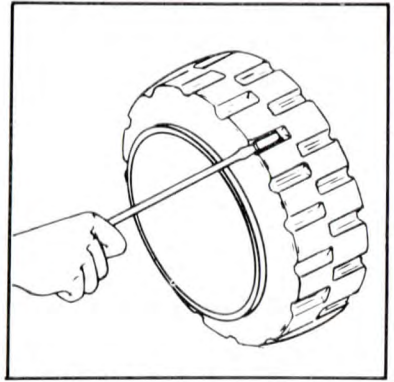


85M549

Before Operation

How To Perform The Daily Inspection

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..

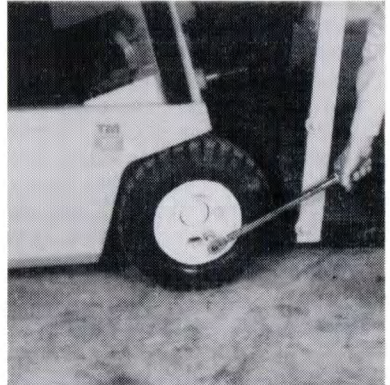


12917

Check to be sure that all wheel lug nuts or bolts are tight.

Please refer to "Specifications" for torque and tire pressure values.

If you find looseness of wheel mounting bolts, have them tightened to the correct torque before operating the truck.



85M614

Check for the correct air pressure on trucks with pneumatic tires.

CAUTION

Check tire pressure from a position facing the tread of the tire, not the side. Use a long-handled gauge to keep your body away from the side. If tires are low, don't add air. Check with a mechanic. The tire may require removal and repair. Incorrect (low) tire pressure can reduce the stability of your lift truck and cause it to tip over.



24964

Before Operation

How To Perform The Daily Inspection

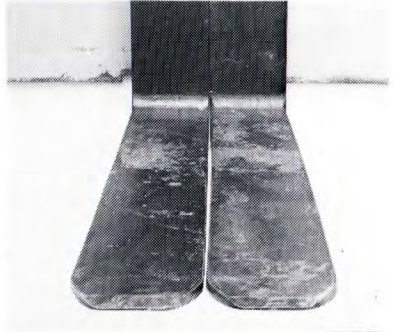
Inspect the upright assembly, rails, rollers, lift chains, and lift cylinders. Look for any loose parts or fittings. The lift and carriage chains must have equal tension. Check the lift chain anchor fasteners.



85M502

WARNING

Inspect the lift forks for cracks, breaks, bending and wear. The fork surfaces should be level and even with each other. The height difference between both fork tips should be no more than [6 mm] 0.25 inch maximum. If the fork blade at the heel of the fork is worn down by more than 10 per cent, the load capacity of the forks is reduced and they must be replaced.



18046

The fork blades should not be twisted. The blades should be level and square with the vertical shank. If the fork blades are obviously bent or damaged have them inspected by a trained maintenance person before operating the truck. Refer to Section 7, for fork maintenance information.



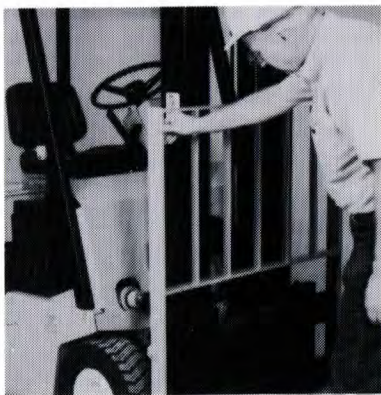
84M252

Inspect the fork latches. Make sure that they are not damaged or broken and they operate freely and lock correctly.

Before Operation

How To Perform The Daily Inspection

Check the load back rest for damage. Make sure that the mounting fasteners are all in place and tight.



85M474

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



85M473

Unlatch and raise the hood (seat deck/battery compartment cover) for access to the battery and controls installation.

Inspect all components within the battery and controls compartment. Look for any obvious damage or incorrect condition of the parts, and loose or broken connections and wires. Check for contamination and corrosion on battery and control terminals.



85M616

	WARNING
ELECTRICAL BURNS	
DISCONNECT THE BATTERY BEFORE YOU REMOVE THIS PART FROM THE TRUCK. SEVERE BURNS CAN RESULT FROM CONTACT WITH ELECTRICAL SYSTEMS.	

Before Operation

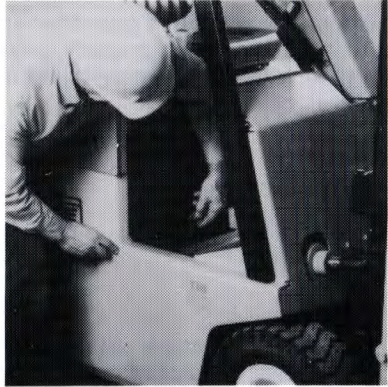
How To Perform The Daily Inspection

When you know that the battery and controls components are in satisfactory condition, lower and latch the seat deck.



85M475

Check hydraulic sump tank fluid level.



85M504

Now, make sure that all operator controls and systems are functioning correctly. If you are unfamiliar with the function of each control or system, please refer to previous descriptions titled under "Know Your Truck", **Truck Components and Features**, and **How Your Lift Truck Operates**.

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



85M484

Before Operation

How To Perform The Daily Inspection

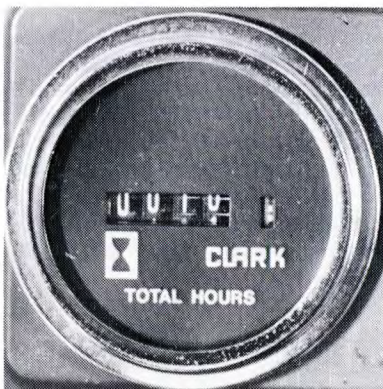
Turn key switch to "on" position.



85M511

Check hourmeter for operation. With key switch "on", release the parking brake. Move direction control lever to either FWD or REV position. The steer pump and hourmeter should begin operating. Watch for movement of the indicator in the right-hand dial opening.

Return control lever to "neutral" and apply the parking brake.



19516

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

Make a Battery Load Test.

Check the battery charge condition by holding the tilt lever in the 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 of gauge, the battery charge level is low and battery must be charged before placing the truck in operation.



13179

Before Operation

How To Perform The Daily Inspection

Turn key switch "on", and release parking brake. Move direction control lever from neutral to FWD or REV position. Steer pump should begin operating.

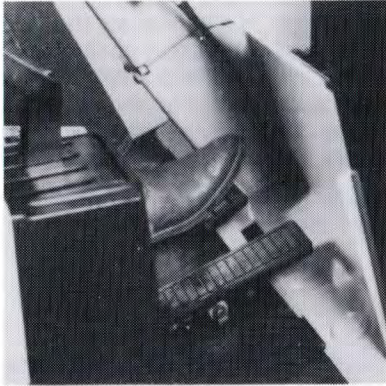
Move the steering handwheel in a full right turn, and then in a full left turn to check the steering. Return the handwheel (steer wheel) to the straight-ahead position.

Move direction control lever to neutral and apply parking brake.



85M507

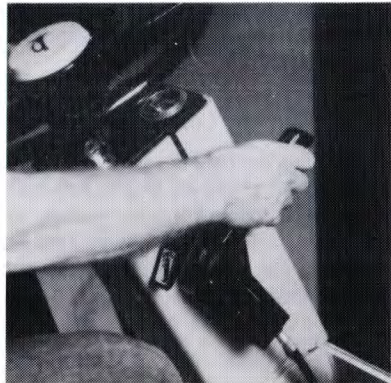
Check the service brake system. Push down on the brake pedal and hold. Check for a feeling of solid resistance when the pedal stops. The pedal must feel firm and not move down farther after it stops. If the pedal continues to move downwards, report the failure immediately. **DO NOT OPERATE THE TRUCK UNTIL THE BRAKES ARE REPAIRED.**



85M480

Check the function of the parking brake. Release the parking brake with the lever.

Release the brake pedal and push on accelerator pedal to move the truck slowly forward. Then, apply the parking brake. The parking brake should turn the drive motors off and stop and hold the truck from further movement.



85M519

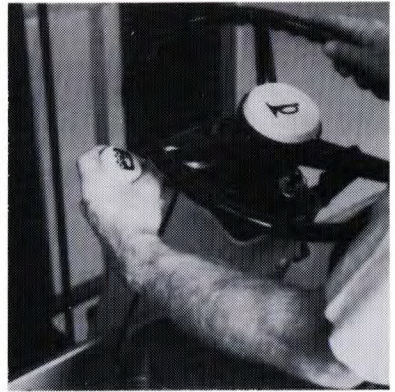
Before Operation

How To Perform The Daily Inspection

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.



85M495

Make 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.



85M497

Put the directional control lever in the “N” (neutral) position.

Apply the parking brake.



85M496

Before Operation

How To Perform The Daily Inspection

Check the function of the hydraulic system.

Turn key switch "on". 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

MAKE 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 and fork carriage must be even and smooth, without binding or jerking motion. Release the lever.

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

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

Note — If your truck is equipped with an attachment, test its operation.

- Park truck safely.
- Apply parking brake.
- Turn key switch "off".



85M489



85M628



85M486

Before Operation How To Perform The Daily Inspection

Make a record on the **“Driver’s Daily Checklist”** of all the operating and truck problems that you find. Review the checklist to make sure it has been completed. Give the checklist to the person responsible for lift truck maintenance.

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



85M548

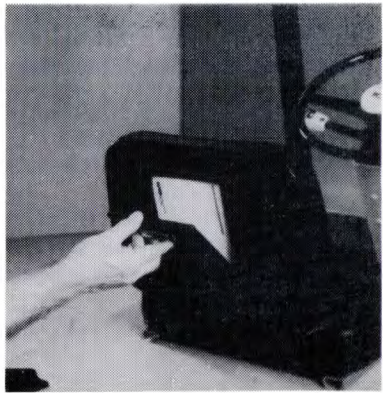
Do not operate a lift truck that has a maintenance problem, or is not safe to operate.

Remove the key from key switch and put an **“Out of Service”** tag on the truck.



25454

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



85M492

Operation

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 stored in a holder in the back of the driver's seat.



85M493

Before operating a lift truck each operator must check his truck and complete the "Driver's Daily Checklist". Please refer to the previous section "Before Operation" for information on "How To Perform The Daily Inspection".



15197

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



85M472

Operation

How To Operate Your Truck

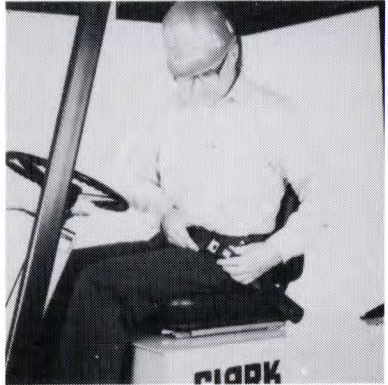
This is a good time to adjust the seat to a comfortable position for you. Adjust the seat by moving and holding the release lever at the left front edge of the seat. Put the seat in a position which will provide easy reach to all controls. Release the seat lever. Make sure that the seat locking mechanism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



85M485

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

Always wear your seat belt when operating a lift truck.



85M854

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

Turn key switch to "on" position.



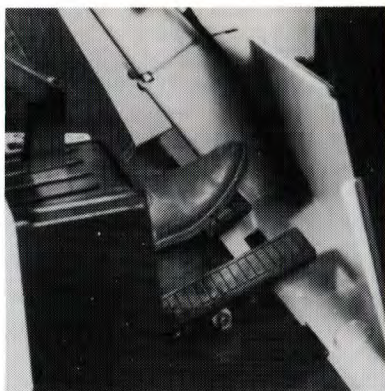
85

Operation

How To Operate Your Truck

Be sure that your truck won't move unexpectedly before you are ready to drive.

Put your foot on the brake pedal and push down to apply the service brakes.



85M480

Release the parking brake.



85M481

Put the directional control lever in the correct position for the desired direction of travel.



85M495

Operation

How To Operate Your Truck

Check all around to be sure that your intended path of travel is clear of obstructions and pedestrians.



85M471

Pull back on the lift control lever and raise the forks approximately [50 mm] 2 inches above the floor.



85M487

Using the tilt control, tilt the upright back slightly to raise the fork tips above the floor.

Raising the forks and tilting them back prevents the forks from catching on possible obstructions and reduces the wear on the fork blades if they strike or drag on the floor.

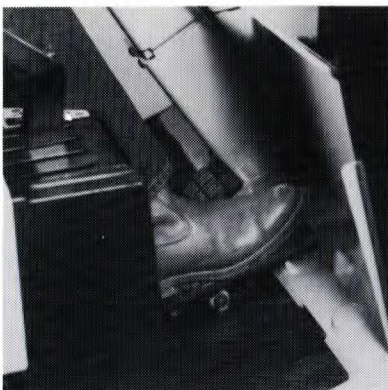


85M489

Operation

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.



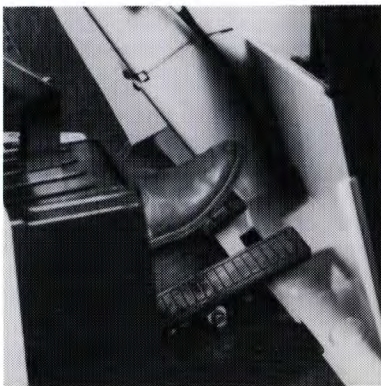
85M479

Be alert for pedestrians, other vehicles or obstructions in your path of travel.



85M470

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.



85M480

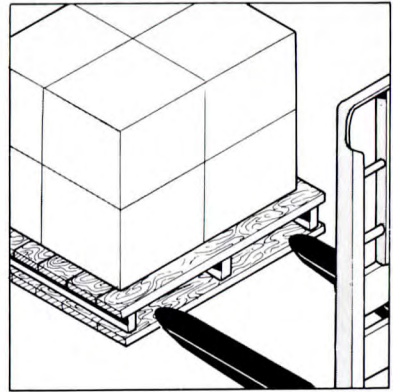
Operation

How To Operate Your Truck

When picking up a load, enter the load carefully. The forks must be fully under the load and spread as wide as possible to provide good stability and balance.

CAUTION

LOAD MUST NOT EXCEED RATED LOAD CAPACITY OF TRUCK AT LOAD CENTER. REFER TO TRUCK DATA & CAPACITY PLATE.



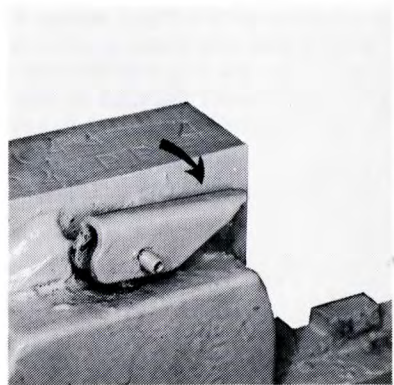
13203

If the forks need adjusting, lift the fork lock lever. Slide the forks on the fork bar of the lift carriage to get the correct width for the load. Make sure the fork lock pin fits into a locking notch on the fork carriage.



85M252

Lower the lever to lock the forks after they are in the correct position.



10759

Operation

How To Operate Your Truck

When driving, always raise the forks slightly [50 - 100 mm] 2-4 inches above the floor and tilt the upright (forks) backward slightly.



85M487

Practice safe operation every time you use your lift truck.

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



85M523

Operate your lift truck safely. Careful driving and operation is your responsibility. Follow the instructions in this manual to avoid damage to your truck or the possibility of injury to yourself.

Please refer to "**General Safety Rules**" and "**Operating Hazards**" section.



85M639

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.



85M468

- Put the directional control lever in the "N" (neutral) position.



85M496

- Lower the forks or attachment to the floor.



85M486

After Operation

When You Have Finished Using Your Truck

- Tilt the upright forward until the forks are level or flat on the floor.



85M488

- Apply the parking brake.

Block the wheels if you have any doubt about the truck moving from a safe position.



85M520

- Turn the key switch to the "off" position and remove the key.



85M482

6 Emergency Towing

Emergency Towing

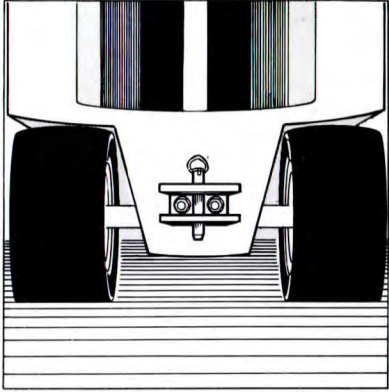
How To Tow a Disabled Truck

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.

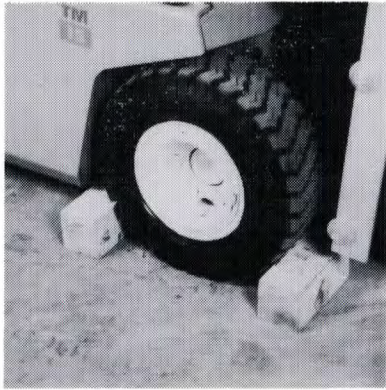
Use an approved towing coupler that bolts to the axle through the counterweight.

Towing equipment is **optional equipment** available from your Clark dealer.



24172

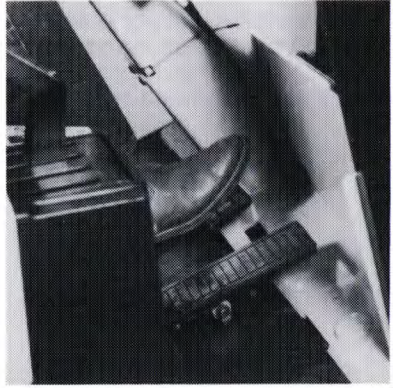
1. Engage the parking brake.
2. Put blocks against the drive wheels.



85M626

Emergency Towing How To Tow a Disabled Truck

Connect an approved solid metal tow bar to the tow vehicle and to the truck to be towed. With a driver in the seat, push down on the foot brake pedal to prevent the truck from moving. Have the blocks removed from the drive wheels.



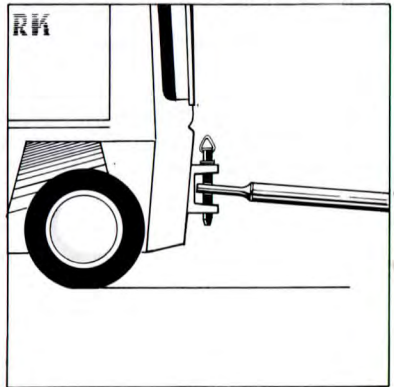
85M480

Push forward on the parking brake handle to release the brake.



85M519

Correct towing is necessary to prevent injury to personnel or damage to the truck. The truck is to 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.**

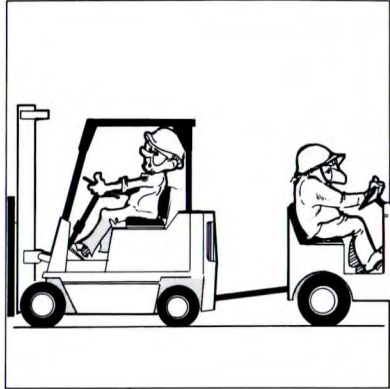


24174

Emergency Towing

How To Tow a Disabled Truck

Power steering will not operate on the disabled truck when the power steering pump and motor will not run. The hand-wheel will be difficult to turn.



24175

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 put blocks behind the wheels to prevent the truck from rolling.



24176

▲ 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

 WARNING
LIFT TRUCK MAINTENANCE
DO NOT WORK ON THIS TRUCK UNLESS YOU ARE TRAINED AND AUTHORIZED AND KNOW THE CORRECT MAINTENANCE PROCE- DURES.

Planned Maintenance and Lubrication

Regular maintenance and care of your lift truck is essential for economy and utilization reasons, but most important for your safety. A faulty lift truck is a potential source of danger to the operator, and to other personnel working near it.

Lift trucks should be inspected daily, 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. Check the tires and wheel bolts. Look the upright and lift chains over. Check the forks and load backrest extension. Look for loose bolts and fittings. Make sure that the overhead guard is in good condition. Check all of the controls. Make sure that all systems are functioning correctly. Check the hydraulic sump oil level. And make sure that all instruments, warning lights and the horn are operating correctly and that your truck is safe to operate. Use the daily inspection sheet as a check list and record of your findings.

In addition, Clark recommends that you set up and follow a 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. Necessary adjustments and repairs are made as needed. The schedule for these planned maintenance (PM) inspections will depend on the conditions of your particular application and lift truck use. Recommended periodic inspection and maintenance items are listed in the Maintenance and Lubrication section. Also shown is the PM inspection and report form which may be obtained from your local Clark dealer. He is also prepared to help you with your Planned Maintenance and Inspection 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.

Also, in the Maintenance and Lubrication section, you will find a listing of useful specifications for 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

Recommended Planned Maintenance Intervals

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 open clean air.

SEVERE OPERATION:

Prolonged operating hours or constant usage.

EXTREME OPERATION:

1. In sandy or dusty locations, i.e. cement plant, lumber or flour mills, coal dust or stone crushing sites.
2. High-temperature locations, i.e. 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 extreme operating conditions, you must shorten the maintenance intervals accordingly.

**Ensure
operational
safety**

Planned Maintenance and Lubrication

Recommended Planned Maintenance and Lubrication Schedule

For: TM

PM Interval Code:

- 8 = 8 - 10 hours
- 50-250 = 50 - 250 hours or each PM
- 500 = 500 hours
- 1 = 1000 hours or every 6 months
- 2 = 2000 hours or every 12 months
- A/R = As required

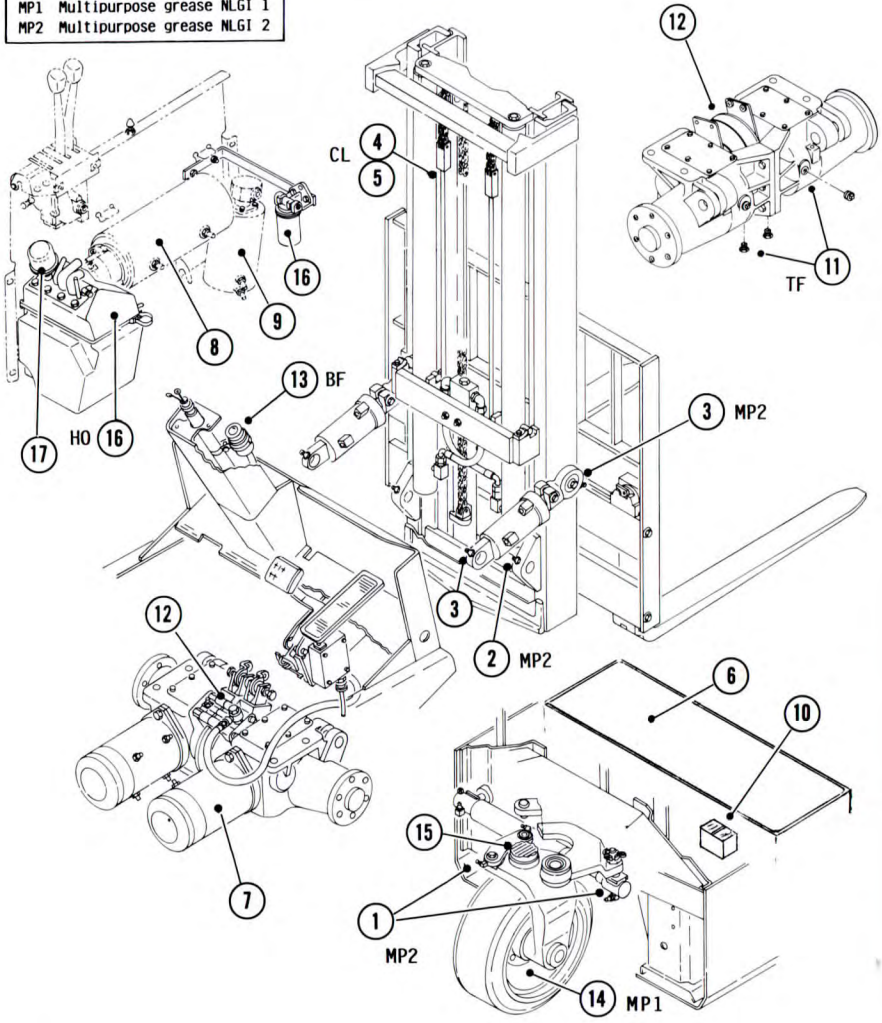
	Chart No.	Nominal Maintenance Interval				
		8	50-250	500	1	2
01 LUBRICATION						
Air Clean Truck						
Steer axle linkages (4) fittings	1		•			
Upright trunnion bushings (2) fittings	2		•			
Tilt cylinder rod ends (4) fittings	3		•			
Lift chains	4		•			
Carriage chains	5		•			
12 BATTERY						
Clean/check terminals, electrolyte level	6	•	•			
Check battery cables/truck receptacle	6		•			
Load Test			•			
16 MOTORS						
Drive: Check brushes, replace A/R	7		•			
Lift: Check brushes, replace A/R	8		•			
Steer: Check brushes, replace A/R	9		•			
19 ELECTRICAL TESTS						
Ground test	10		•			
20 DRIVE AXLE						
Check fluid level/condition	11		•			
Drain and replace fluid	11					•
Check brake wear	12		•			
Check/clean breather air vent	11		•			
23 BRAKES						
Check brake fluid level	13		•			
Change (replace) brake fluid	13					•
26 STEER AXLE						
Lubricate wheel bearings	14					•
Check/adjust wheel bearings	14		•			
Lubricate trunnion bearings	15					•
29 HYDRAULIC SUMP & FILTER						
Check fluid level/condition	16	•	•			
Change fluid	16					•
Replace fluid filter	16					•
Replace sump breather/fill cap	17					•

Planned Maintenance and Lubrication

Planned Maintenance and Lubrication Chart

TM 15-17-20 36-Volt

LEGEND	
E0	Engine Oil
TF	Transmission fluid
BF	Hydraulic brake fluid
HO	Hydraulic oil
CL	Chain lubricant
DL	Dry-film lubricant
MP1	Multipurpose grease NLGI 1
MP2	Multipurpose grease NLGI 2



Planned Maintenance and Lubrication

Lubricant Specifications

Engine crankcase oil Upright latch, Control rods, Miscellaneous linkage	API "CC", MIL-L-2104B, MIL-L-46152
Transmission fluid Drive axle	DEXRON II ATF Automatic Transmission Fluid
Hydraulic fluid Hydraulic sump Normal temp application Cold storage	Clark Specification MS-68 Hydraulic oil Clark Specification MS-226 Hydraulic oil
Multi-purpose grease Axle ends, Wheel bearings Steering linkage, Upright mast & carriage rollers, Trunnion bushings, Tilt cylinder rod ends, Brake pedal shaft	NLGI Grade No. 1 Lithium soap base grease Clark Spec MS-9B and MS-107B, or equivalent. NLGI Grade No. 2 Lithium soap base grease, Clark Spec MS-9C and MS-107C, or equivalent.
Chain lube Upright lift chains	Clark No. 886399 Chain and Cable Lube, or equivalent
Dry-film lubricant Side shifter, Attachments, Clamp slides	Dow Corning Molykote 321 Bonded Lubricant, Graph-O-Kote No. 220, Molub-Alloy No. 369 Dry Lube, or equivalent
Low temperature grease Cold storage general purpose grease	Low temperature grease, MIL-G-23827A, or equivalent
Protective spray coating Wiring, terminals, switches after assembly	Clark No. 886784 Spray Coating
Moistureproofing spray coating Contactor panels, SCR cards	Clark No. 1801145 Spray Coating
Battery	Distilled water

NOTICE — Refer to PMA-540, GROUP 40, Section 4, Lubricant Specifications and Recommendations for further information.

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 as it may damage the card. Any cleaning of controls should be with a mild detergent solution. Then blown dry with clean, moisture-free compressed air at low pressure.

NOTE

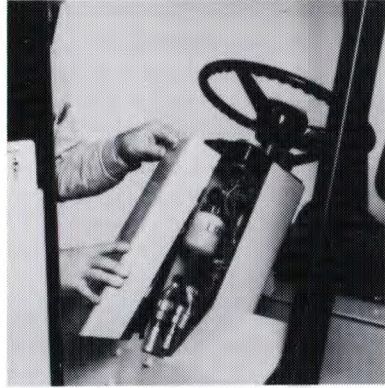
ELECTRICAL SWITCHES, WIRING & TERMINALS should be sprayed with **SPRAY COATING**, CLARK Part No. 886784.

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

Planned Maintenance and Lubrication

Brake System Reservoir Fluid Level Check

1. Remove access cover from the front of the pylon. Use a screwdriver to rotate the 1/4-turn fastener.
2. Release the latch lever and move the pylon to the forward (near-vertical) position.



85M510

3. Check **service brake system reservoir** for correct amount of hydraulic brake fluid. The "**FULL**" level is at the top ring on reservoir. Clean dirt from reservoir and cap, as needed.

The reservoir may be temporarily removed from its retaining clip and held vertically to facilitate checking fluid level position. Refer to Section 8, Specifications, for fluid specification.



85M645

IMPORTANT

USE SAE AUTOMOTIVE HYDRAULIC BRAKE FLUID ONLY.

4. When inspection is completed, install access cover back on pylon. Be sure to fit the indexing notches at the bottom of the cover over the matching tabs on pylon base. Then, move cover into the closed position and lock.



85M644

Planned Maintenance and Lubrication

Hydraulic Fluid Check

1. Check the hydraulic sump tank oil level with:

- Truck on a level surface.
- Upright in the vertical position.
- Fork carriage fully down.
- Oil at operating temperature.

Pull the dipstick out, wipe it with a clean wiper, push it back into the dipstick tube. Pull the dipstick out again and check the oil level.



85M504

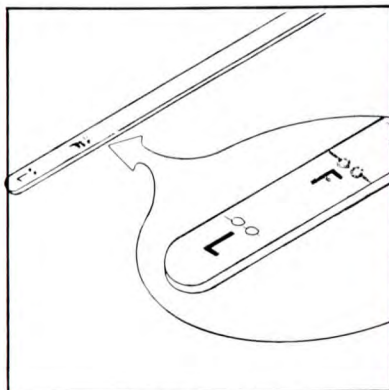
2. The hydraulic sump tank oil level should be up to the "F" (full) mark on the dipstick.

Approximately [2.8L] .75 gal. of hydraulic oil is required to fill the hydraulic tank from the "L" (low) mark to the "F" (full) mark. **Do not overfill.**

3. Check the condition of the hydraulic fluid (age, color or clarity, contamination), to determine if it should be replaced.

Refer to PM records for operating time since last oil change.

Refer to next page (Page 7.10) if fluid needs to be changed.



24917

IMPORTANT

4. Add recommended fluid only, as required.

NOTICE — Remove or pull dipstick part way out to vent air from tank while filling.

When adding fluid, check the fluid level with the dipstick after operation of the truck including operation of the upright through several lift cycles. See Section 8 for hydraulic oil specifications.



85M619

Planned Maintenance and Lubrication

Hydraulic Fluid & Filter Change

It is recommended to:

- Drain and replace the hydraulic 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.

IMPORTANT

Use recommended fluid only
Use genuine Clark parts

NOTE — It is suggested that these procedures be scheduled with other routine maintenance when the: 1) battery is removed, and 2) front battery plate is adjusted for service access. Refer to PMA-540, Planned Maintenance and Adjustment Procedures, for additional information.

There is no drain plug in the hydraulic sump tank. Unless the sump tank is to be removed for other repair or maintenance, the hydraulic fluid can be changed by one of the following methods:

- A. Removal of the hydraulic sump cover assembly and 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.
 1. Remove the floorboard for access to the hydraulic sump and filter.
 2. Remove the cover enclosing the main hydraulic valve for access to the hydraulic system pressure diagnostic check port located on outer right-hand side of valve.



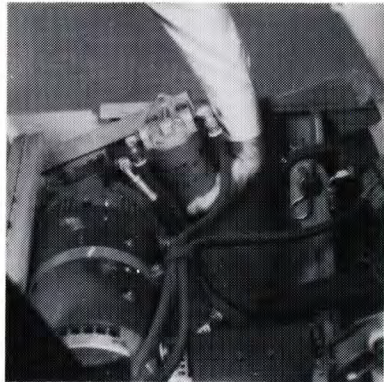
85M509

NOTICE — Servicing of the hydraulic fluid filter is more easily done when the battery is removed and battery plate adjusted to the maintenance position. This action moves the filter up where it is more readily accessible.

Planned Maintenance and Lubrication

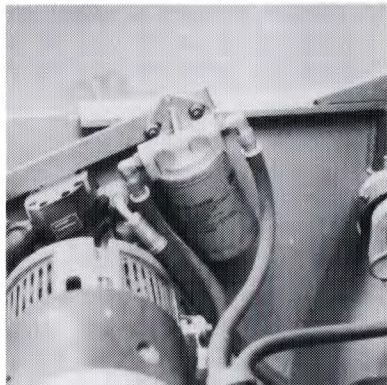
Oil Filter Change

1. Remove and replace the hydraulic system fluid filter per recommended planned maintenance schedule, or as may be required by truck operating conditions and usage. (Replacement of the filter may be more easily done when the front battery plate is adjusted for maintenance access, noted above.)



85M641

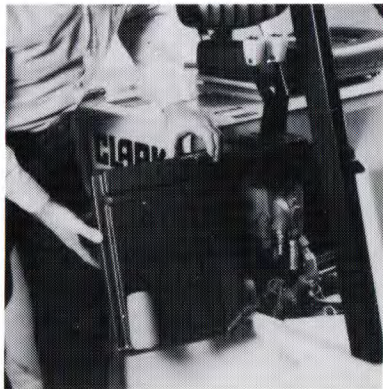
2. Install a new oil filter. Be sure to follow the installation instructions printed on the filter.
3. Check for leaks after installation of the filter. Also, check that the hydraulic line connections at the filter adapter are tightened correctly.



85M642

Sump Tank Breather Maintenance/Inspection

1. Remove floorboard first, if not removed previously.
2. Then, remove the cover enclosing the main hydraulic valve.



85M617

Planned Maintenance and Lubrication

3. Remove the hydraulic sump tank fill cap/breather and inspect for contamination and damage.



85M509

4. Clean or replace the fill cap/breather, per recommended planned maintenance schedule, or as required by operating conditions.



85M508

Planned Maintenance and Lubrication

Drive Axle Maintenance/Inspection

Access to the Drive Axle

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

1. One method is to raise and block the upright carriage to provide easier access to the drive axle.
 - Apply the parking brake and block the wheels.
 - Be sure to put blocking under the carriage and upright rails.

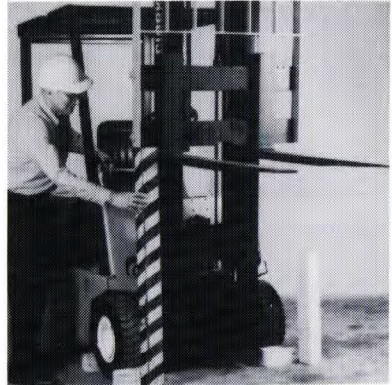
Refer to PMA-540, GROUP 38, Section 3 Machine Jacking and Blocking.



See reference at right above.



85M626



85M630

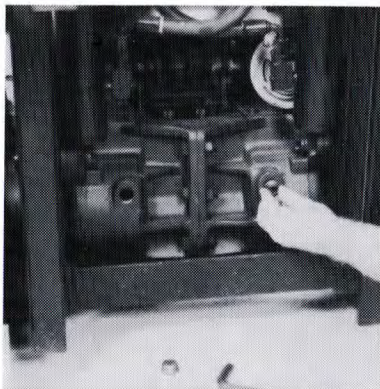
Planned Maintenance and Lubrication

Drive Axle Fluid Level Check

Check the drive axle fluid level with:

- Truck on a level surface.
- Oil at operating temperature.

1. Remove the fluid level inspection/fill plug located in the front surface of each drive unit housing (two places).
2. The oil level is correct (FULL) when the oil reaches the lower edge of the inspection plug opening.



85M876

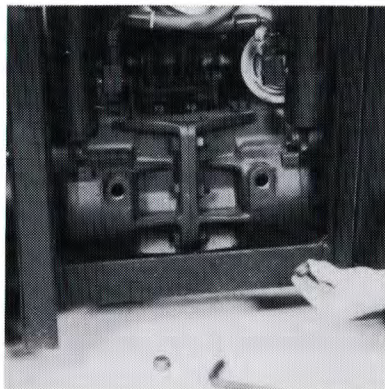
IMPORTANT

3. *Add recommended fluid only*, as required.

Refer to PMA-540, GROUP 40, Sections 4 & 5, for drive axle recommended oil specifications.

After adding oil to the drive axle, wait several minutes until the oil has distributed evenly throughout the unit and check for correct oil level. **DO NOT OVERFILL.**

4. Inspect each fill plug for damage. Replace as necessary.
5. Install and tighten the plugs.



85M875

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.

Drive Axle Fluid Change

It is recommended to:

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

To change oil in the drive axle:

- 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.

NOTICE: When suitable equipment is available, the truck may be raised or hoisted up and placed in a level position on wheel cradles to allow access under the axle. Otherwise, raise the fork carriage only high enough to provide access to the axle. Please refer to procedure described previously in "**Access to the Drive Axle**".

NOTICE

Frequent changes of lubricant is an inexpensive way to protect and prolong the safe operating life of an essential and relatively costly major component such as the drive axle.

Extending the recommended intervals at which drive axle fluid is changed should be considered only after careful evaluation of your operating conditions and/or analysis of the condition of the oil.

Refer to PMA-540, GROUP 20, Section 1, Drive Axle Maintenance, for information on draining and replacing drive axle fluid.

Refer to PMA-540, GROUP 38, Section 3, Machine Jacking and Blocking.

Planned Maintenance and Lubrication

Drive Axle Fluid Change

The drive axle oil must be drained from two places, one drain plug located in the bottom of each drive unit housing.

1. Place a low, flat drain pan beneath the drive units. The pan capacity should be more than [6.6 L] 14 pints (drive axle total capacity).
2. Remove drain plugs (two) from bottom of drive units, and fill plugs (two) from front of drive units.

IMPORTANT

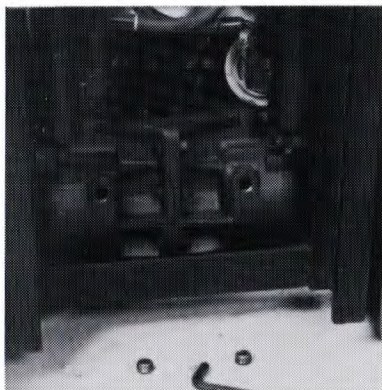
Use recommended fluid only.

3. After drive units have drained, install drain plugs. Fill each drive unit to the bottom edge of fill plug opening with recommended fluid.
4. Remove drain pan. Remove blocking and lower carriage.

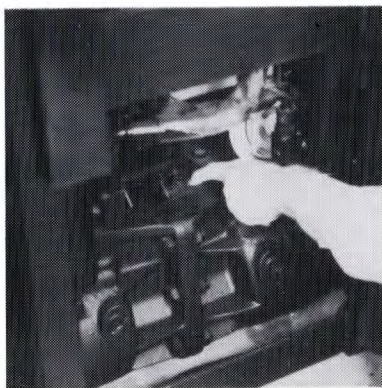
5. Check the breather vents (two) to be sure they are open and not damaged. Vents are located in the top front corners of the drive units.



85M629



85M874



85M633

Planned Maintenance and Lubrication

Truck Chassis Inspection and Lubrication

NOTICE — Lubrication and inspection of truck chassis components, including steer wheel, steer axle linkage, steering cylinder and wheel bearings will be easier if the truck is raised and blocked up under the frame.

Refer to PMA-540, GROUP 38, Section 3, Machine Jacking and Blocking.

WARNING

- **DO NOT RAISE TRUCK BY LIFTING UNDER THE COUNTERWEIGHT.**
- **BE SURE TO PUT BLOCKING UNDER THE FRAME TO KEEP THE TRUCK SECURE.**

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

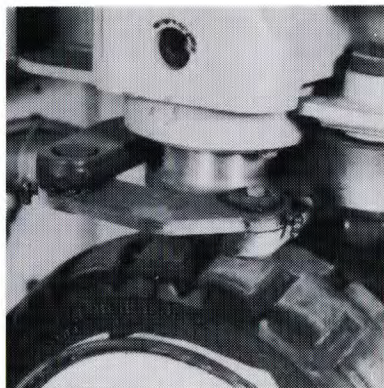
Lubricate the steer axle linkage: rod ends and linkage pivot points. Be sure to clean the grease fittings before lubricating and remove the excess grease from all points after lubricating.

Miscellaneous Linkage

Lubricate miscellaneous linkage, as needed.



85M774

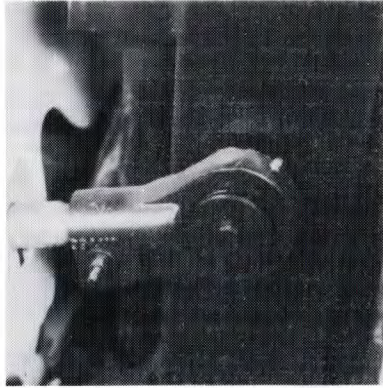


85M801

Planned Maintenance and Lubrication

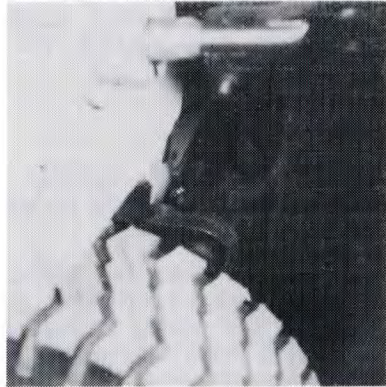
Upright and Tilt Cylinder Lubrication

1. Clean the fittings and lubricate the tilt cylinder rod end bushings (forward end, at the upright).
2. Clean the fittings and lubricate the tilt cylinder base rod end bushings (at the anchor end, under floorboard).



85M624

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

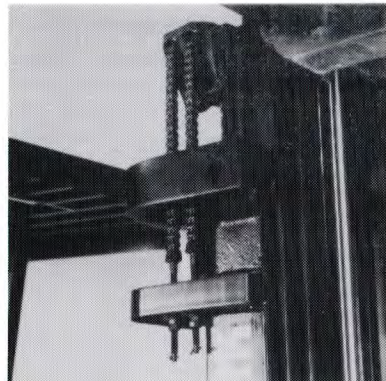


85M637

4. Lubricate the upright rail lift and carriage chains with Clark Chain and Cable Lube.

Lubricate the free-lift guides by wiping with multipurpose grease, Grade 2.

NOTE — Do not lubricate the carriage roller rails.



85M769

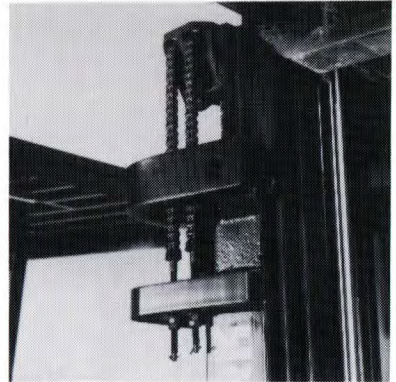
Lift Chain Lubrication

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 correctly lubricated. Clark chain lubricant is recommended. It is easily sprayed on and provides superior lubrication.

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.



85M769



17643

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.

If the chains show slack due to an increase in length they should be measured for wear. When chains have stretched by wear more than 3% of their original length they are not safe and must be replaced.



Your **CLARK** Dealer
keeps all lubricant
available for you


Planned Maintenance and Lubrication

Wheel and Tire Inspection

Federal and State laws require persons to be fully trained and qualified before doing maintenance on wheels and tires. Injury or death can result from the explosive separation of rim components if service procedures are not done correctly.

Check tire pressure from a position facing the tread of the tire, not the side. Use a long handled gauge to keep your body away from the trajectory path of multi-piece rims and wheels.

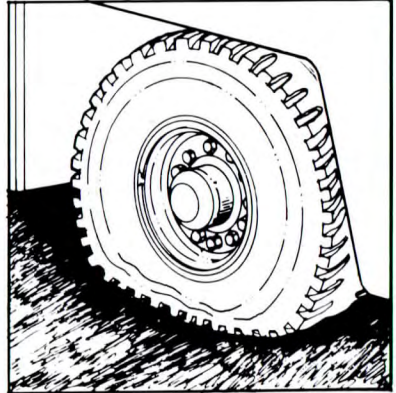
If tires are low, do not add air. Check with a mechanic. The tire may need to be removed and repaired.

 DANGER
RIM SEPARATION
REMOVE THE AIR FROM TIRES BEFORE DOING ANY WORK ON TIRES OR RIMS. MULTI-PIECE RIMS CAN SEPARATE WITH ENOUGH FORCE TO CAUSE INJURY OR DEATH.

24988



24964

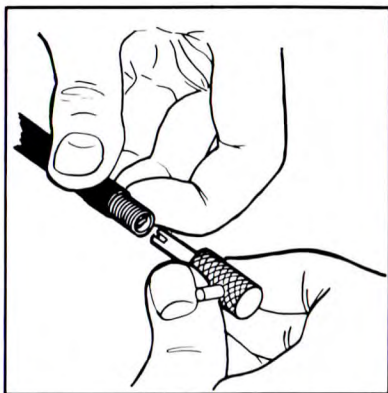


24308

Planned Maintenance and Lubrication

Wheel and Tire Inspection

Remove air from the tire before removing wheel clamping nuts (two piece wheels) or rim locking rings on multi-piece rims.



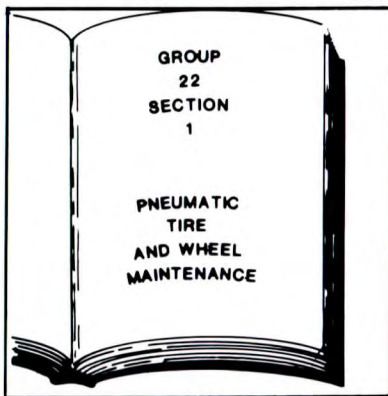
18631

Always use a safety cage to inflate tires after servicing.



24306

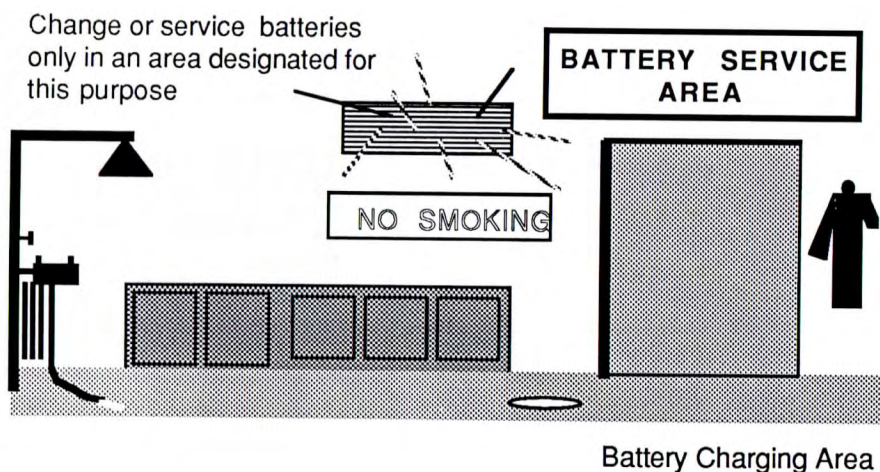
Trained and qualified mechanics should refer to information in the Planned Maintenance Manual before working on pneumatic tires and rims.



24309

Planned Maintenance and Lubrication

Electric Truck Battery Maintenance



Planned Maintenance and Lubrication

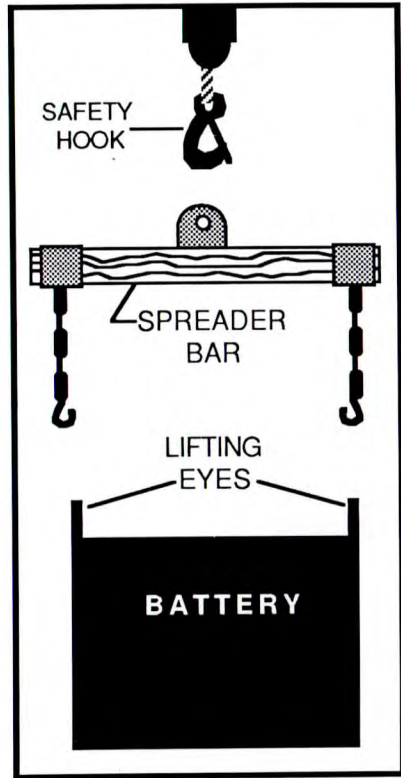
Battery Maintenance

IMPORTANT

Electric truck batteries are heavy and awkward to handle. They are filled with a very hazardous chemical solution. And they are costly. Before you remove, service or install a truck battery, carefully read the following recommendations and instructions.

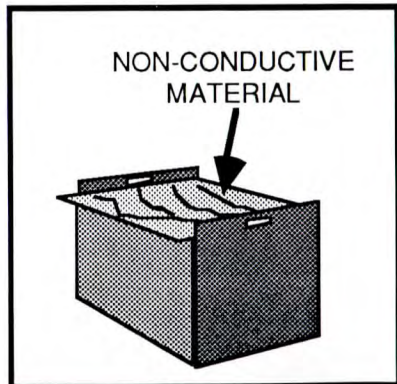
Battery Handling

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
 - for fire protection.
3. Be sure the area is equipped with material-handling equipment designated for the purpose of removing and replacing batteries, such as a conveyor or overhead hoist equipped with hooks having safety latches.
4. When using an overhead hoist 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, so that the lift is directly upward. 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. Also, be sure the lifting hooks are the correct size to fit the lifting eyes of the battery.



25459

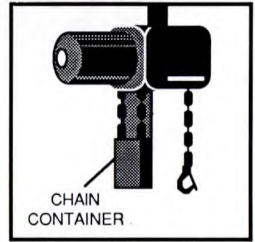
5. If the battery does not have a cover of its own or has exposed terminals and connectors, cover the top with a non-conductive (insulating) material, e.g., a sheet of plywood or heavy cardboard, prior to attaching the lifting device.



Planned Maintenance and Lubrication

Battery Maintenance

- When using a power battery hoist, be sure the hoist is equipped with a chain container to accumulate the excess lifting chain.



25461

- Keep all tools and other metallic objects away from the terminals.



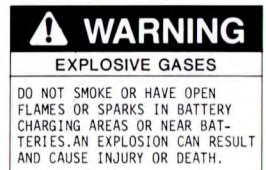
25462

- Personnel maintaining storage batteries must wear protective clothing, such as face shield, long sleeves and gauntlet gloves.



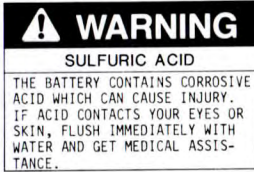
25463

- 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 the battery charging area.



Planned Maintenance and Lubrication

Battery Maintenance



12. When charging batteries, the cell caps must be kept in place to avoid electrolyte spray. Care must be taken to assure that cap vents are open (clean) and functioning. The vent holes must be open to allow the battery to breathe. The battery, or battery compartment cover(s), must be open to dissipate heat.

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.**

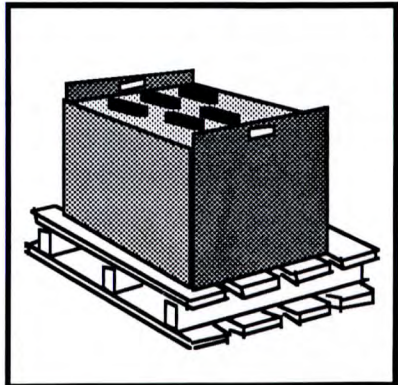
Battery Removal From Truck

Also refer to Battery Removal section.

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 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 brake applied so the truck cannot move.
3. If the battery to be handled is not equipped with a 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 chains are equipped with safety hooks.
5. Remove the battery and move it to a safe storage position. Store batteries either on an approved battery rack or on a wooden pallet.



Planned Maintenance and Lubrication

Battery Maintenance

Battery Cleaning

NEVER WASH THE BATTERY WHEN IT IS IN THE TRUCK.

The easiest (and 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 clear water. It is good practice to have this solution available around a battery room at all times.

IMPORTANT

During cleaning, THE BATTERY CELL 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 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 corrosion and rust. After cleaning, apply a second coating for protection. This will prevent the start and growth of corrosion on battery terminals and cable connections.

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 top of battery to prevent short circuits and explosions.
5. Check the battery electrolyte level before each charging. The correct electrolyte level should be just below the lower edge of the filler cap opening. Add water, if needed, before charging. **DO NOT OVERFILL!**
6. Do not overcharge.
7. KEEP BATTERY CLEAN AND DRY. Wash down as needed.
8. Keep battery service records.

Planned Maintenance and Lubrication

Battery Maintenance

Battery Installation

1. Use only a lead-acid battery with the voltage and ampere-hour rating specified for the truck.
2. Handle battery only with approved lifting device as previously described.
3. 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

Battery Removal

Battery Removal

Refer to Section 8, Specifications, for battery weights.

CAUTION

To perform this service procedure, it is recommended that you first:

- Park the truck on a level surface and fully lower the upright.
- Return all controls to neutral and turn key switch to the “OFF” position.
- Apply the parking brake.
- Block the drive wheels.



85M512

IMPORTANT

Before you remove, service or install a truck battery, carefully read the previous recommendations and instructions noted in Electric Truck Battery Maintenance section.

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

Planned Maintenance and Lubrication

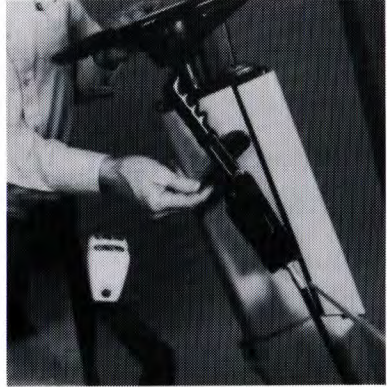
Battery Removal

1. Push the control valve levers forward (all together) and pull up on the lock lever handle to lock the control levers in the forward position.



85M521

2. Release the pylon latch and move the steering column to the raised (forward) position.



85M660

3. Unlatch and open the hood (seat deck/battery compartment cover).



85M616

Planned Maintenance and Lubrication

Battery Removal

4. Disconnect battery at truck receptacle.



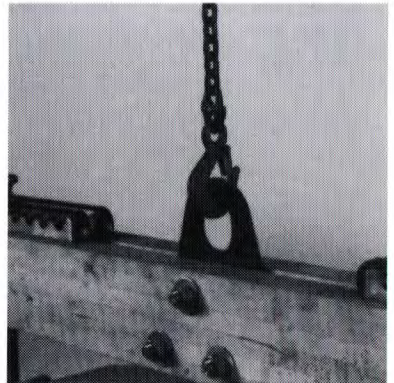
85M541

5. **NOTICE** — If the battery to be handled is uncovered, and has exposed terminals and cell connectors, cover the battery with a non-conducting (insulating) material, e.g., plywood or heavy cardboard, before attaching the lifting device, to prevent shorting across the battery terminals while handling.



85M753

6. The overhead hoist should be equipped with a safety hook. Be sure the hoist, chains, and spreader bar are in good condition and have correct capacity to safely lift and carry the battery.

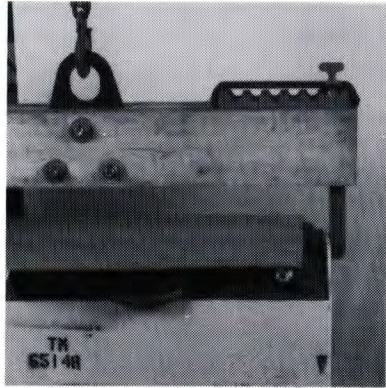


85M758

Planned Maintenance and Lubrication

Battery Removal

7. Use an insulated spreader bar to lift and remove the battery. Adjust the hooks of the spreader bar so that the lifting force is directly vertical to avoid side forces from damaging the battery or case.



85M757

8. Raise the battery carefully. Check that all cables are out of the way, and the steering pylon and control levers are locked in the forward position.



85M752

9. When the battery is raised above the frame side, move the battery away from truck.

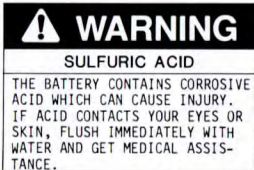


85M755

Planned Maintenance and Lubrication

Battery Installation

10. Store the battery in a safe position on a pallet or in the battery service area.



85M756

IMPORTANT

- USE ONLY A LEAD-ACID BATTERY WITH THE VOLTAGE AND AMPERE-HOUR RATING SPECIFIED FOR YOUR TRUCK.
- FOLLOW NORMAL BATTERY MAINTENANCE PROCEDURES, RECHARGING BEFORE 80-PERCENT DISCHARGED AND WITH PERIODIC EQUALIZING CHARGES.

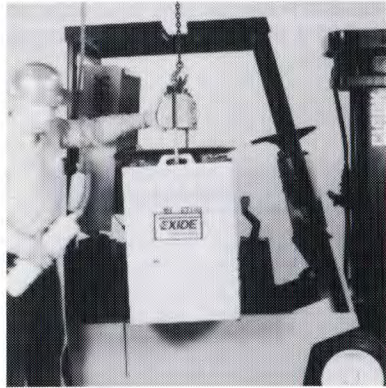
Battery Installation

1. Refer to removal and equipment recommendations noted previously for lifting and handling the battery.
2. Be sure that front battery plate bolts are tightened correctly.
3. Be sure no tools or other materials are left in the battery compartment.
4. Be sure steering pylon and control levers are locked in the forward position.

Planned Maintenance and Lubrication

Battery Installation

5. Lift and move battery slowly to the truck. Do not bump battery on frame side while installing. Be careful not to strike the control levers, or hood stop brackets at the rear of compartment.



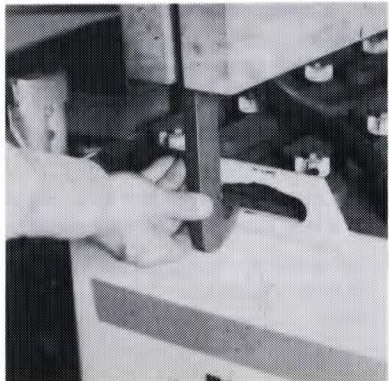
85M754

6. Lower the battery into battery compartment.



85M751

7. Remove the lifting hooks and spreader bar.
8. Remove the temporary insulating cover from top of battery, if it was required.

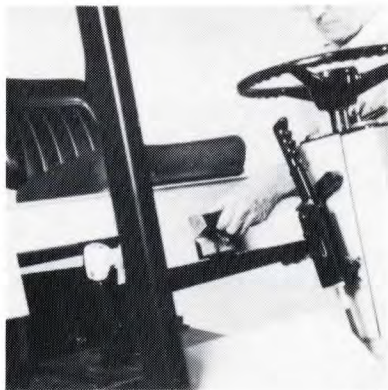


85M759

Planned Maintenance and Lubrication

Battery Installation

8. Connect battery at truck receptacle. See figure 85M541, page 7.31.
9. Close the battery compartment cover.



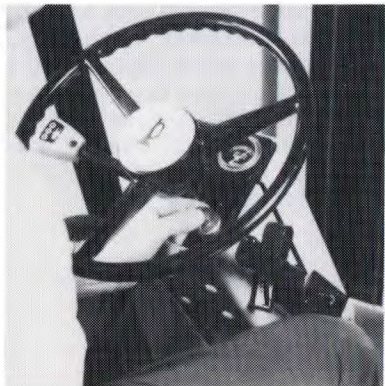
85M476

10. Release the valve control levers from the locked position.
11. Move and lock the steering column pylon into the rear or down position.



85M660

12. Check battery charge condition:
 - Turn key switch to **"ON"** position.
 - Check battery charge indicator.
 - Do a battery load test.
 - Turn key switch to **"OFF"** position.



85M511

Planned Maintenance and Lubrication

EV-100 SCR Control General Maintenance Instructions

NOTICE

— Any controls that will be used in ambients of [40 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 control 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 (Dow Corning 340) 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 vehicle. 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.

Planned Maintenance and Lubrication

Troubleshooting

Symptom	Possible Cause	Remedies
No tilt (motor does not run)	Valve switch misadjusted or defective. Valve not operating. Control wiring open (pump contactor does not energize). Power wiring open (pump contactor does not energize).	Adjust or replace valve switch. Check linkage. See Service Reference (SDM-542) See Service Reference (SDM-542)
Noisy pump caused by cavitation	Oil supply low. Oil too heavy. Oil filter plugged. Suction line plugged or too small.	Fill reservoir. Change to proper viscosity Clean filters. Clean line and check for size.
Oil heating	Oil supply low. Contaminated oil. Setting of relief valve too high or too low. Oil system is too light.	Fill reservoir. Drain reservoir-fill with clean oil. Set to correct pressure Drain reservoir-fill with correct viscosity oil.
Shaft seal leakage	Worn shaft seal. Broken diaphragm seal or back-up gasket. Bearings out of position. Excessive internal wear.	Replace shaft seal. If replacing shaft seal does not stop leakage disassemble and check gasket and seal for proper fit.
Foaming oil	Low oil level. Air leaking into suction line. Wrong kind of oil.	Fill reservoir. Tighten fittings. Drain reservoir. Fill with non foaming oil.
Slow or erratic tilt	Orifices plugged. Damaged rod.	Clean orifices in tilt cylinder.
Hydraulic system leaks oil	Defective hose. Loose fittings.	Replace. Tighten.

Planned Maintenance and Lubrication

Troubleshooting

Symptom	Possible Cause	Remedies
Lift or tilt cyl. leaking.	Seal or wiper damaged Rod damaged	Replace Inspect and replace
Transmission leaks oil	Worn seal	Replace
Steers hard.	Steer pressure is low Linkage is binding Linkage is bent Steer pump is worn	Test and repair pump regulator Lubricate Repair or replace Repair or replace
Too much or not enough brake	Improper adjustment	See service manual
No operation.	Truck does not run, key or brake switch closed Bad control fuse Bad power fuse Open circuit	Battery disconnected or discharged Replace fuse Replace fuse Repair
No directional travel.	Open circuit PMT tripped	Repair Turn key off & on
Sluggish performance, erratic switch, slow lift	Battery discharged or defective Loose connection (power wiring) Motor brushes worn Brakes dragging Defective SCR control	Charge and inspect Tighten connections Replace brushes Adjust SCR misadjusted (See SDM-542)

Planned Maintenance and Lubrication Troubleshooting

Symptom	Possible Cause	Remedies
No lift (motor runs) direction control OK	Excessive load Possible low oil supply causing airlock Plugged suction screen Low pressure Pump defective	Check load Add oil and bleed hydraulic cylinder Clean the screen - flush and refill reservoir Check relief valve pressure Check oil pressure
No lift (motor does not run) direction control OK	Valve switch misad- justed or defective Valve not operating Control wiring open (pump contactor does not energize)	Adjust or replace valve switch Check linkage See service reference (SDM-542)
Slow lift	Battery discharged Excessive load Air in hydraulic system Leak in lift cylinder Plugged suction screen Worn pump/motor unit	Charge battery Check load Bleed hydraulic cylinder Check oil flow Clean the screen - flush and refill reservoir Check oil pressure (rebuild or replace)
No lower	Control valve linkage broken Mechanical binding Flow valve on mast defective	Inspect and repair Inspect mast Replace
Lower excessively slow	Flow valve on mast defective	Replace valve
No tilt (motor runs)	Excessive load Plugged orifice	Check load Inspect orifice in tilt cylinder

Planned Maintenance and Lubrication

Fork Maintenance

WARNING

FORKS ARE AN IMPORTANT SAFETY ELEMENT OF THE LIFT TRUCK. THEY MUST BE CAREFULLY INSPECTED AT EACH PM INTERVAL AND ALWAYS MAINTAINED IN A SAFE CONDITION.

FORKS THAT ARE BENT OR TWISTED WILL CAUSE THE LOAD TO SHIFT OR SLIDE OFF AND BE DROPPED. FORKS THAT ARE CRACKED OR WORN EXCESSIVELY CAN BREAK SUDDENLY AND CAUSE SEVERE INJURY OR DEATH.

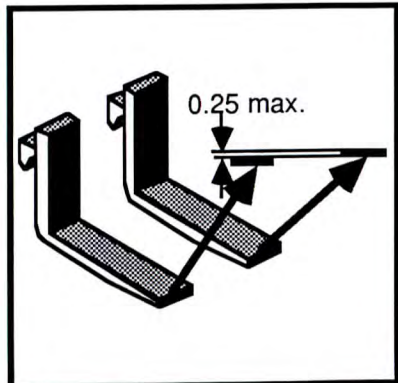
1. Inspect the lift forks for cracks, breaks, bending, and wear. Check for cracks and wear all around the fork heel area.

Move the fork blades together (side-by-side). Check the fork blades for bent or twisted condition, with respect to each other and also to the fork shank.



18046

2. The fork surfaces should be level and even with each other. The height difference between both fork tips should be no more than [6mm] 0.25 inch maximum.

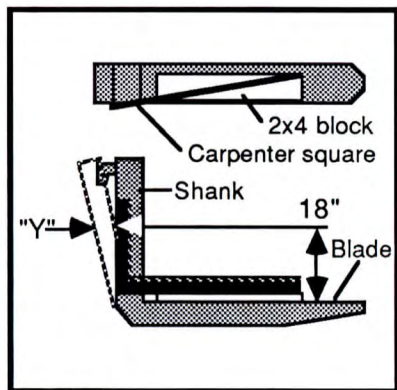


25455

Planned Maintenance and Lubrication

Fork Maintenance

- Inspect the forks carefully for twists and bends. Put a 2" x 4" x 24" metal block on the blade of the fork with the 4" surface against the blade. Put a carpenter's square on the top of the block and against the shank of the fork. Check the fork 18" above the blade to be sure it is not bent more than specified in the chart below.



25456

Fork Blade Bending Chart

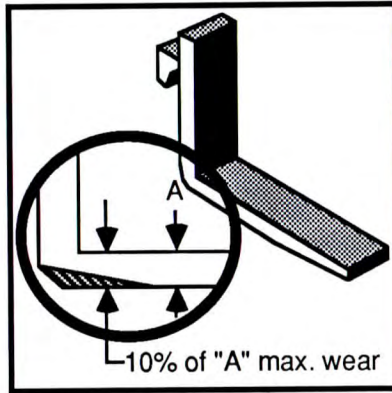
Fork Size Cross-section	Allowable "Y" value (inches) for fork blade lengths			
	42" blade	48" blade	54" blade	60" blade
1-1/2x4	15/16	1-1/4	1-9/16	1-15/16
1-3/4x5	1/2	5/8	25/32	31/32

Planned Maintenance and Lubrication

Fork Maintenance

Fork Wear Inspection

NOTICE — At each planned maintenance interval, an inspection and measurement of the forks must be made to check for wear. REFER TO FIGURE 25457 BELOW.



25457

1. **Allowable wear** of fork thickness at the heel of the fork is as follows:

10% WEAR (90% thickness remaining): Forks must be scheduled for replacement. With 10% wear, the forks are adequate for only 80% of rated capacity. Forks may be used only until replacements are available.

20% WEAR (80% thickness remaining): Forks are unsafe and must be removed from service immediately.

WEAR FACTOR CHART

NEW Standard Fork Thickness, inches	**REPLACE** Nominal 10% Wear Thickness, inches	***SAFETY HAZARD*** Nominal 20% Wear Thickness, inches
1.25	1.12	1.00
1.50	1.38	1.19
1.75	1.56	1.38
2.00	1.81	1.62
2.25	2.00	1.81
2.50	2.25	2.00

NOTE — The percent capacity reductions are based upon wear only. Other factors such as cracks, cuts, holes, etc., may further reduce fork capacity.

8 Specifications

NOTICE

Clark products and specifications are subject to improvements and changes without notice or obligation.

Specifications

Truck Specifications

12 Power Supply — Battery Max Size & Rating

36 volt 18 cell, 17 plate, 38.9 kWh, 1120 amp-hr @ 6 Hour rating

Battery, Full Charged: 1.275 specific gravity (1.310 Exide Load Hog)

Discharged: 1.120 specific gravity

Recommended Battery Fluid: Distilled water only

16 Motors:

DRIVE

36v 6.64 in. diameter Series Wound. Weight: [24.5 kg] 54 lb

Open Rating (60 Min.): 34.8 v, 2160 rpm, 5.5 hp, 143 amps

Brush Grade: Morganite H100 No. per Holder: 1

No. per Motor: 4

Brushes: L [35 mm] 1.38 in, W [32 mm] 1.26 in, T [12,65 mm] .498 in

Worn Length: [14,5 mm] .57 inch on longest side

Brush spring tension (force per brush) NEW: [935-1077 g] 33-38 oz

WORN: [453 g] 16 oz

LIFT

36v 7.15 in. diameter Series Wound. Weight: [42.2 kg] 93 lb

Open Rating (15% Time): 33.18 v, 1170 rpm, 11.8 hp, 360 amps

Brush Grade: Morganite H100 No. per Holder: 2

No. per Motor: 8

Brushes: L [35 mm] 1.38 in, W [25,3 mm] .997 in, T [13,9 mm] .548 in

Brush Worn Length: [14,5 mm] .57 inch on longest side

Brush spring tension (force per brush) NEW: [935-1077 g] 33-38 oz

WORN: [453 g] 16 oz

STEER

36v 6.5 in. diameter Permanent Magnet. Weight: [19.3 kg] 43 lb

Enclosed Rating (Continuous): 36 v, 1351 rpm, 0.95 hp, 28.1 amps

Brush Grade: Stackpole 2192 No. per Holder: 1

No. per Motor: 4

Brushes: L [28,7 mm] 1.13 in, W [20,6 mm] .812 in, T [9,35 mm] .368 in

Worn Length: [10,65 mm] .420 inch on longest side

Brush spring tension (force per brush) NEW: [782-870 g] 27.6-30.7oz

WORN: [326-357 g] 11.5-12.6 oz

Specifications

Truck Specifications

19 Electrical Component/Test Specifications

GROUND TEST: (Minimum resistance)

New Truck: 50,000 ohms.

Used Truck: *30,000 ohms.

*Used truck resistance values may range from 20,000 to 30,000 ohms, w/o problem. When below 20,000 ohms, further testing must be conducted.

CURRENT DRAW VALUES: (+/- 15% Tolerance, Warm Truck, 36-volt battery)

1) Drive Motor — (1A Freewheeling, Less Pump Mtr Idle Curr.)

@ Battery: 75 amps

2) Lift Motor — Idle Current @ Battery: 8 amps

SCR CURRENT LIMIT: (+/- 15% Tolerance, Cold Truck)

1) Drive Motor — 250 amps motor current

CREEP SPEED: 1.6 volts to 3.6 volts @ motor

1A PICKUP TIME DELAY: 1.5 (+/- .5) seconds

POWER STEERING TIME DELAY: 5.0 (+/- .5) seconds

FUSES:

	Rating	Function
1FU	500 amp	Drive, Pump
2FU	50 amp	Power Steer
3FU	15 amp	Control

Specifications

Truck Specifications

20 Drive Units (Two)

Recommended oil specification. DEXRON II ATF
Drive unit capacity (each). [3.81 L] 8 pints
Overall ratio. 23.386:1 reduction

23 Wheels & Tires (Tire sizes are common to all models, except as noted)

Drive tire size: Cushion 18x7x12.12 (TM12, 15S, 15)
18x8x12.12 (TM17, 20)
18x9x12.12 (TM22, 25)
Pneumatic 18x7x8 16 ply (TM12, 15, 15S)
18x9x8 16 ply (TM17, 20)
Tire pressure: [970 kPa] 140 psi
Steer tire size: Cushion 18x7x12.12 (TM12, 15S, 15, 17, 20)
18x6x12.12 (TM22, 25)
Pneumatic 18x8x8 16 ply (TM 12, 15S, 15)
Tire pressure: [970 kPa] 140 psi

23 Brakes

Recommended brake fluid. SAE J1703b specification,
or Type DOT, Grade DOT 3
Master cylinder. 0.75 inch dia. x 0.787 inch stroke

26 Steering System

Recommended power steering fluid. Uses main hydraulic sump oil supply
Power steering system relief pressure setting. [8620 kPa] 1250 psi
Steer cylinder diameter. 2.00 inch
Steer handwheel turns, lock-to-lock. 5 (CCW), 4 (CW)

29/30 Hydraulic System

Recommended hydraulic fluid
Normal temperature. Clark Specification MS-68 w/ anti-wear additives
Cold storage. Clark Specification MS-226 w/ anti-wear additives
Sump tank capacity
Usable volume. [9.84 L] 2.6 gallons
Total volume. [13.6 L] 3.6 gallons
Main relief valve pressure settings
TM12, 15S. [14479 - 15169 kPa] 2100 - 2200 psi (Hilo)
TM12, 15S, 15. [16890 - 17580 kPa] 2450 - 2550 psi
TM17. [18620 - 19306 kPa] 2700 - 2800 psi
TM20. [20340 - 21030 kPa] 2950 - 3050 psi
TM22, 25. [20684 - 21374 kPa] 3000 - 3100 psi
Equipped with Cascade upright. [15856 kPa] 2300 psi
Aux valve relief pressure setting. Adjustable, refer to attachment specs.

32 Tilt Cylinders

Tilt cylinder diameter. [76.2 mm] 3.00 inch
Tilt speed, nominal
thru 151 inch MFH. 3.2° - 3.9° / second
above 151 inch MFH. 2.4° - 2.8° / second

Specifications

Truck Specifications

32 Tilt Cylinders (Cont'd)

Tilt drift (in 5 minutes, w/ rated load, new truck)

<u>Temperature</u>	<u>Drift</u>
[26.7 ° C] 80° F	[6.5 mm] 0.256 inch
[37.8 ° C] 100° F	[11mm] 0.433 inch
[48.9 ° C] 120° F	[16.5 mm] 0.650 inch

34 Uprights

Upright speeds (nominal performance for upright at cut-off MFH)

		HI-VIS STD ft/minute		HI-VIS TSU ft/minute	
		<u>Lifting</u>	<u>Lowering</u>	<u>Lifting</u>	<u>Lowering</u>
TM12,15S, 15	Loaded	63	95	60	85
	Empty	101	80	93	80
TM17	Loaded	59	95	56	85
	Empty	101	80	93	80
TM20	Loaded	55	95	52	85
	Empty	101	80	92	80
TM22	Loaded	41	63	42	60
	Empty	85	60	75	60
TM25	Loaded	38	66	38	63
	Empty	80	65	80	65

Specifications

Truck Specifications

40 Rated Load Capacity @ Load Center

TM12.....	[1250 kg @ 500mm]	2500 lbs @24 inches
TM15S.....	[1500 kg @ 500mm]	3000 lbs @24 inches
TM15.....	[1500 kg @ 500mm]	3000 lbs @24 inches
TM17.....	[1750 kg @ 500mm]	3500 lbs @24 inches
TM20.....	[1815 kg @ 500mm]	4000 lbs @24 inches
TM22.....	[2250 kg @ 500mm]	4500 lbs @24 inches
TM25.....	[2500 kg @ 500mm]	5000 lbs @24 inches

Note: Rated capacity applies when using uprights with maximum MFH up to and including HV STD [3835 mm] 151 in. & HV TSU [3875 mm] 152 inches

40 Battery Compartment Size

Length.....	13.75 inches (TM12,15S) 20.5 inches (TM15 - 25)
Width.....	38.8 inches
Height.....	31.0 inches

40 Truck Weights (pounds) - Approximate, with typical upright

	<u>TM12</u>	<u>15S</u>	<u>15</u>	<u>17</u>	<u>20</u>	<u>22</u>	<u>25</u>
Service weight							
w/o load	6627	7158	7205	7774	8305	8810	9305
Axle loading (front)							
w/o load	3445	3359	4083	4079	4072	4335	4350
w/ load	8035	8867	9224	10097	10948	12114	12993
Axle loading (rear)							
w/o load	3182	3799	3122	3695	4233	4715	5200
w/ load	1092	1291	981	1177	1387	1436	1557

Specifications

Truck Specifications

40 Torque Chart

Critical fastener torque specifications (Dry)

<u>Group</u>	<u>N·m</u>	<u>lb·in / lb·ft</u>
16 Steer motor mounting nuts	[20 - 25]	14.8 - 18.4 lb·ft
19 Motor cable connections	[10 - 12]	90 - 100 lb·ft
19 Control panel cable connections	[11 - 14]	100 - 120 lb·ft
20 Drive axle to frame mounting bolts	[550 - 600]	406 - 443 lb·ft
20 Drive motor mounting bolts	[70 - 80]	52 - 59 lb·ft
23 Drive wheel mounting bolts	[255 - 275]	188 - 203 lb·ft
26 Steer wheel mounting bolts	[255 - 275]	188 - 203 lb·ft
26 Steer handwheel retaining nut	[48 - 54]	35 - 40 lb·ft
26 Steer wheel spindle (bearing) nut	[230 - 244]	170 - 180 lb·ft
26 Steer axle trunnion retaining nut	[15 - 20]	11 - 15 lb·ft
29 Main hyd. valve mounting bolts	[40 - 45]	30 - 33 lb·ft
29 Control lever knob mounting bolt	[8 - 10]	71 - 88 lb·in
32 Tilt cylinder yoke clamp bolts	[20 - 25]	177 - 221 lb·in
32 Tilt cylinder pin retainer bolts	[20 - 25]	177 - 221 lb·in
34 Upright cylinder retaining bolts	[170 - 190]	125 - 140 lb·ft
34 Load backrest extension mtg. bolts	[240 - 270]	177 - 199 lb·ft
38 Seat mounting bolts	[20 - 25]	177 - 221 lb·in
38 Counterweight mounting bolt	[340 - 380]	251 - 280 lb·ft
39 Overhead guard mounting bolts	[70 - 80]	52 - 59 lb·ft

Note: When checking tightness of major fasteners on new trucks, the values may be less than the recommended specification due to metal deformation and fastener stretch. This is a normal occurrence and does not indicate that the fasteners were not correctly tightened during assembly. Tighten fasteners to recommended specifications.

Specifications

Lubricant Specifications

Engine crankcase oil

Upright latch,
Control rods

API "CC", MIL-L-2104B,
MIL-L-46152

Transmission fluid

Drive Axle

DEXRON II ATF
Automatic Transmission Fluid

Hydraulic fluid

Hydraulic Sump
Normal temp application
Cold storage

Clark Specification
MS-68 Hydraulic oil
Clark Specification
MS-226 Hydraulic oil

Multi-purpose grease

Axle ends, Wheel bearings,

NLGI Grade No. 1
Lithium soap base grease,
Clark Spec MS-9B and
MS-107B, or equivalent.

Steering linkage,
Upright mast & carriage
rollers, Trunnion bushings,
Tilt cylinder rod ends,
Brake pedal shaft

NLGI Grade No. 2
Lithium soap base grease,
Clark Spec MS-9C and
MS-107C, or equivalent.

Chain lube

Upright Lift Chains

Clark #886399 Chain and
Cable Lube, or equivalent.

Dry-film lubricant

Side Shifter, Attachments
Clamp Slides

Dow Corning Molykote 321
Bonded Lubricant, Graph-O-Kote
#220, Molub-Alloy #369 Dry
Lube, or equivalent

Low temperature grease

Cold storage general
purpose grease

Low temperature grease,
MIL-G-23827A, or equivalent

Protective spray coating

Wiring, terminals, switches
after assembly

Clark #886784 Spray Coating

Moistureproofing spray coating

Contacter panels, SCR cards

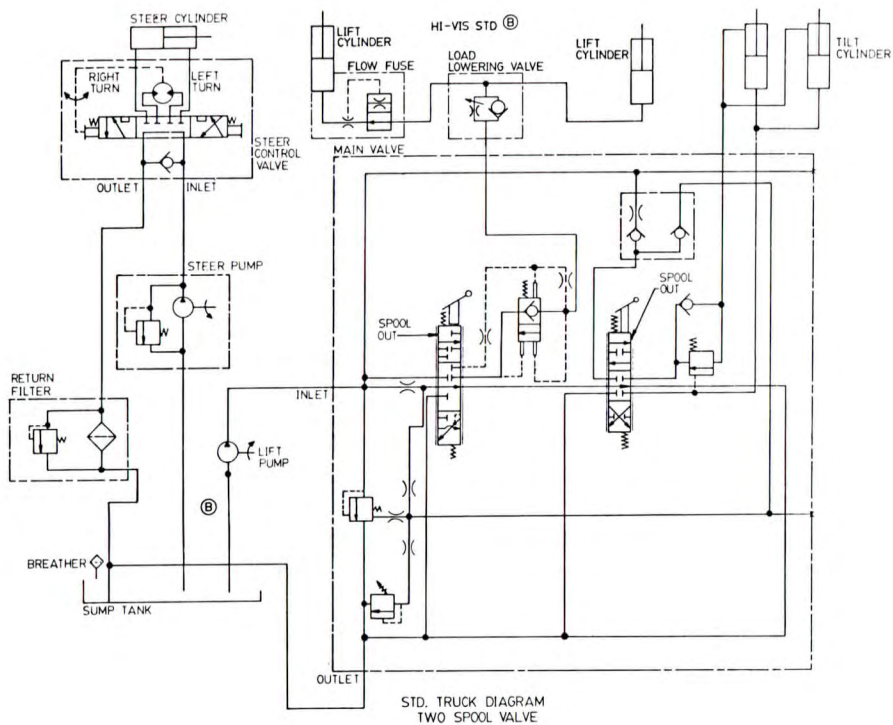
Clark #1801145 Spray Coating

Battery

Distilled Water.

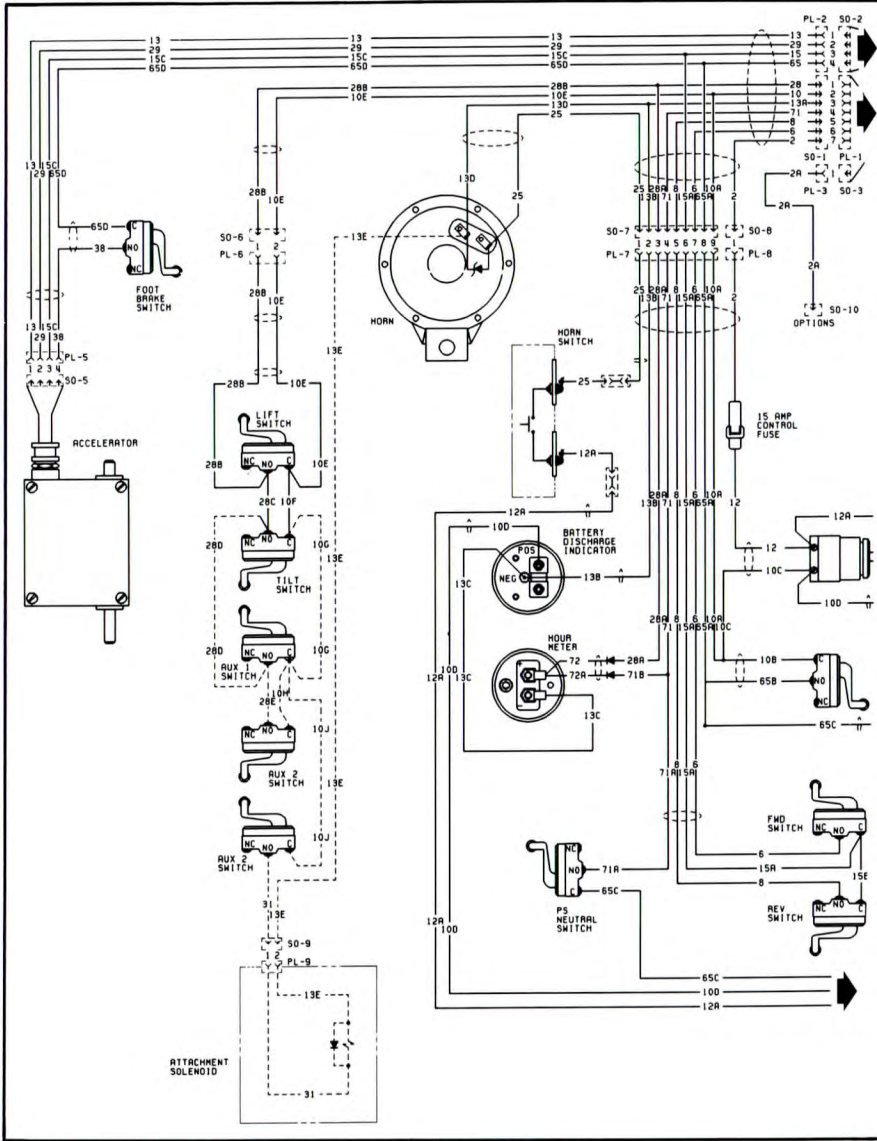
NOTICE — Refer to PMA-540, GROUP 40, Section 4, Lubricant Specifications and Recommendations for further information.

Specifications Hydraulic System Schematic



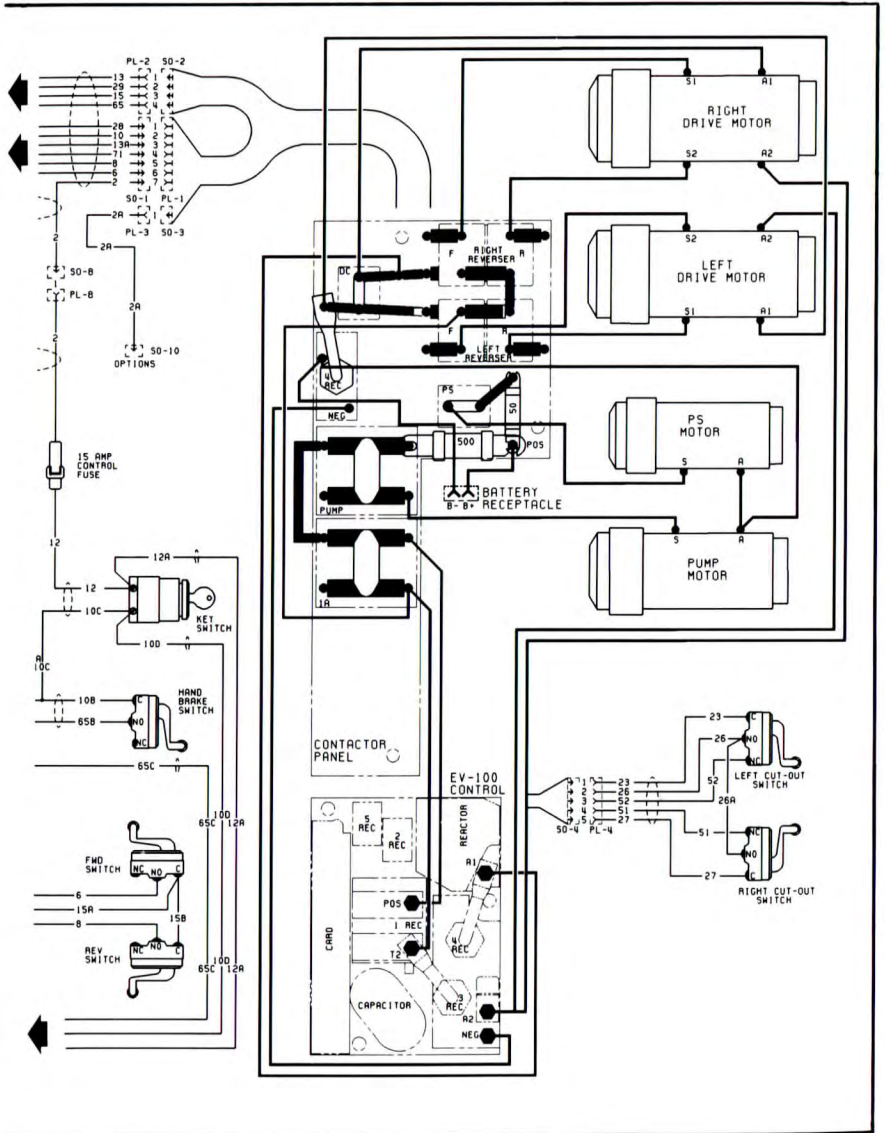
IN-21706E

Specifications Wiring Diagram



IN-21706E

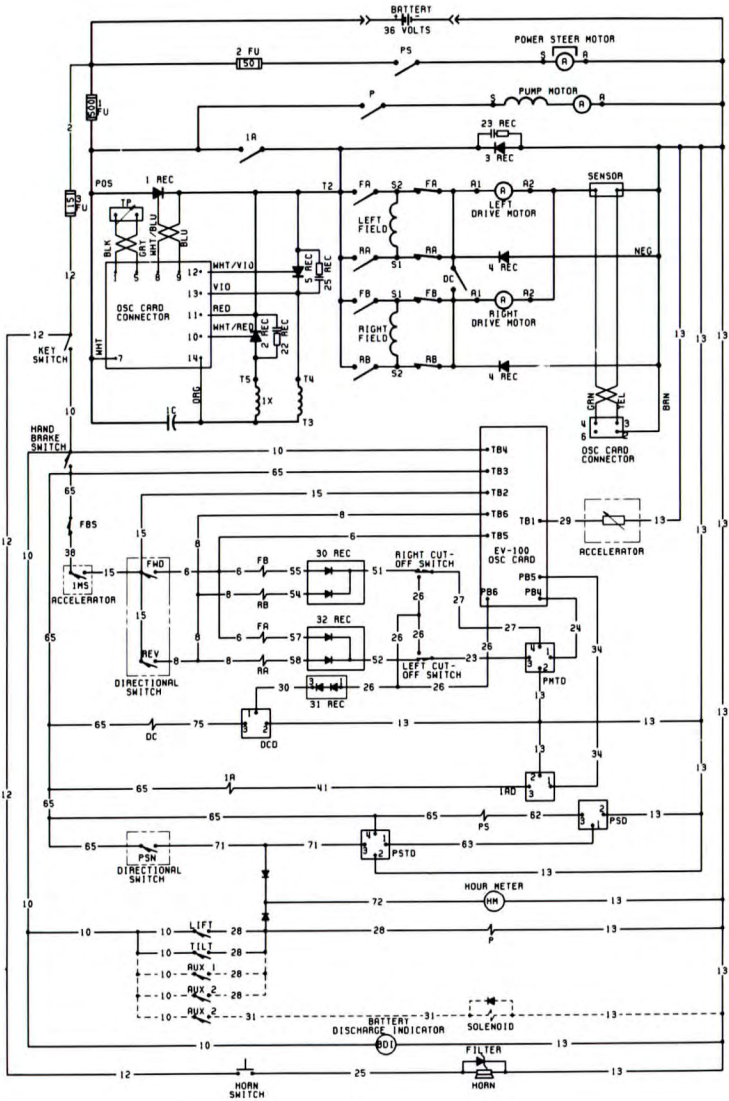
Specifications Wiring Diagram



IN-21706E

Specifications

Electrical Circuit Diagram




SERIAL NUMBERS:

TRUCK _____

CONTROL PANEL _____

DRIVE MOTOR _____

HYDRAULIC UNIT _____



Additional copies of this manual may be purchased from
YOUR AUTHORIZED CLARK DEALER.

CLARK

Lexington, KY 40507-1640

Printed in U.S.A.