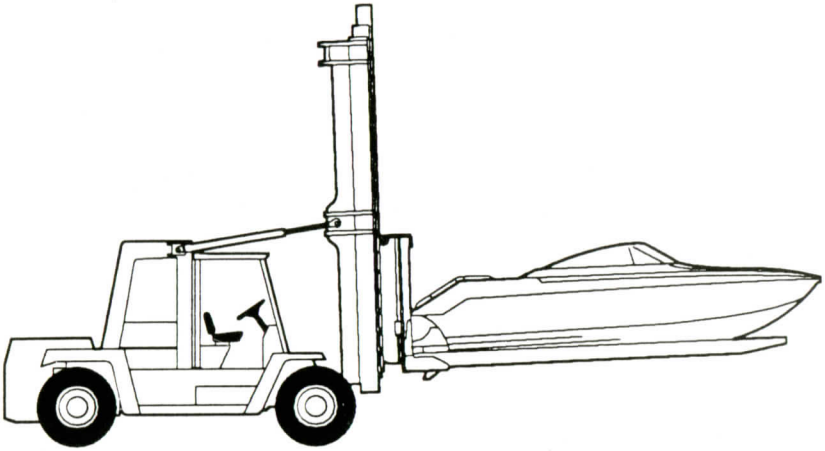
Operator's Manual

Do not remove this manual from the truck.



C500 Y 165M / 200M

Book No. 2783409
OM-579M

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 _____
Truck Gross Weight, Loaded w/ Rated Load _____
Special Equipment or Attachments _____

IMPORTANT
Do not expose this manual to hot water or steam.

The following warnings are provided pursuant to California Health & Safety Code Sections 25249.5 et. seq:

⚠ WARNING

California Proposition 65

This product contains and emits chemicals known to the State of California to cause cancer, birth defects and other reproductive harm.

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects or other reproductive harm.

⚠ WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

1 Operating Procedures
Index

1 Operating Procedures

INTRODUCTION

Unlike the standard lift truck covered in OM 575 which is attached here, your Marina truck is a specially designed vehicle whose only purpose is to remove boats from the water at a dock for maintenance or repair or to put them into storage racks and to return them to the water as required.

The primary differences between a standard lift truck and this Marina truck are as follows:

1. Load function controls.
2. Load handling.
3. Upright and fork lubrication and maintenance.
4. Special hazards.

Function control, load handling and special lubrication and maintenance will be addressed separately in this section and in the PM section. Special hazards and how to safely avoid them will be addressed in the sequence that they occur.

DANGER

Before operating this vehicle, study this manual and thoroughly understand it's functional and safe operation. It is the goal of this manual and Clark Material Handling Company for this vehicle to reliably perform it's intended function without harm to operating personnel or loads. SAFETY is worth any effort required.

NOTE: To service the Marina upright, an approved "Man Up" personnel hoist is required. In no other way can this work be performed safely.

DANGER

Never climb the upright or ride the forks up to service the Marina upright. Ignoring this warning can result in injury or death.

MODEL DESCRIPTION

Marina trucks are built in two configurations: 109 inch and 130 inch wheel base with 16,500 lbs [7 500 kg] and 20,000 lbs [9 000 kg] capacity at a 96 inch load center respectively. 360 inch [9 144 mm] and 480 inch [12 192 mm] maximum fork height uprights are available on either capacity. 18 and 20 foot [5.49 and 6.10 meter] forks are available. The truck nameplate provides the specific capacity of your truck.

The upright is of a "High Visibility" design which provides maximum load handling visibility. Note however, that it is still very difficult to see the pointed end of a long load except when it is elevated and impossible when inserting a boat into a floor level rack.

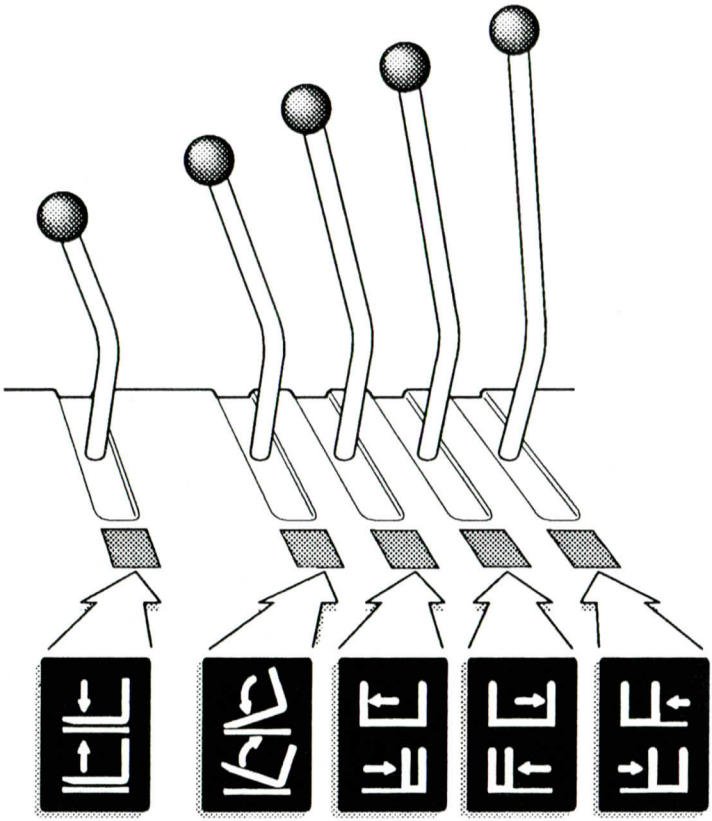
The forks, which can be pivoted individually or in tandem, can be adjusted to fit a variety of hulls. After the boat is in the water, spreading each fork outward facilitates floating it off. Moving the forks in tandem (sideshifting) facilitates positioning the boat in the rack.

The forks are covered with a tough, synthetic elastomer jacket. This protects boat hulls against scarring by the forks and provides a non-slip surface. The jacket can be rotated to obtain maximum wear life. It should be checked regularly to prevent damage occurring to boat hulls and possible load slippage.

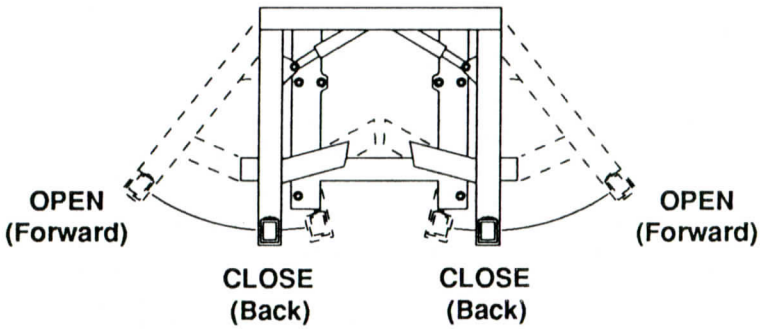
Load handling hydraulic functions, lift, tilt and fork pivot, are protected against movement in the event of a hydraulic line failure. A method is provided on page 1.13 to lower the load from this "hydraulic lock" condition if it should occur with an elevated load.

The Marina truck is equipped with "solid pneumatic" tires. These tires are very rigid. This reduces the bounce that is characteristic of standard pneumatic tires and contributes to load handling stability. The trade-off with solid tires is reduced tire foot print and increased floor loading. Be sure that all drainage grates and manhole or access covers are adequate to carry the load. Usually the worst condition will be with the steer tires when the truck is traveling empty. If there is any doubt that a grate or cover can carry the load, either do not run over it while operating or cover it with a steel plate of sufficient thickness to support the load. Approximate "worse condition" steer axle weight is 26,500 lbs [12 020 kg]. An air dryer is provided as standard equipment to prevent water accumulation in the air brake system.

LOAD HANDLING CONTROLS



FUNCTION CONTROLS



FORK FUNCTIONS

Control Lever Functions

1. The first lever on the operators right side is the "Lift" lever. Pulling it back raises the load and pushing it forward lowers the load.

2. The second lever on the operators right side is the "Tilt" lever. Pulling it back tilts the upright backward and pushing it forward causes the upright to tilt forward.

3. The third lever on the operators right side controls the left fork. Pulling it back causes it to pivot to the right and pushing it forward causes it to pivot to the left.

4. The forth lever on the operators right side controls the right fork. Pulling it back causes it to pivot to the left and pushing it forward causes it to pivot to the right.

5. The third and forth levers may be pulled together to make the forks spread in or out together. Pulling back on both levers causes the forks to come together towards the center and pushing both levers forward causes the forks to spread apart.

6. The fifth lever on the operators right side controls the side shifting function. Pulling it back causes both forks to move to the right. Pushing it forward causes both forks to move to the left.

Operational Checks

Prior to operating the truck, always operate all of the levers to ascertain that they are functioning as described above. This is particularly important after the truck has been repaired or serviced which had any effect on the hydraulic plumbing. Incorrect reinstallation of plumbing connections can result in reversal or malfunction of the fork movements.

Another potential cause of fork control malfunction is air in the hydraulic system. This can cause bouncing and inadvertent movement of the forks with possible disastrous consequences. Provision has been made to assist in bleeding of the fork control hydraulic system. (See "Bleeding Procedures" in the PM section).

Operator Daily Checks of the Marina Upright

Walk around the truck and visually check the upright assembly for the following:

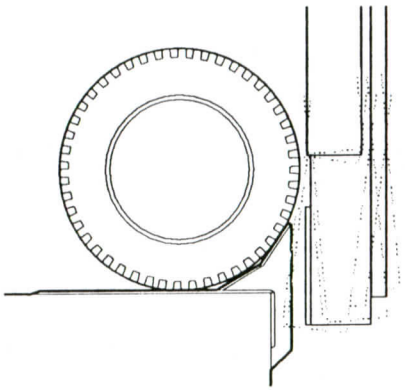
1. Examine all hoses for signs of wear or damage.
2. Check the chains to see if they are evenly tensioned.
3. Check all hydraulic connections for leaks.
4. Check the UHMW plastic fork support plates for wear or damage.
5. Check for any visible damage or corrosion on exposed portions of lift, tilt and fork hydraulic cylinders.
6. Check fork tip alignment. Must be within three inches of each other.

⚠ WARNING

Never proceed to operate a truck if any malfunction is noted until a qualified fork truck mechanic has had an opportunity to check it out.

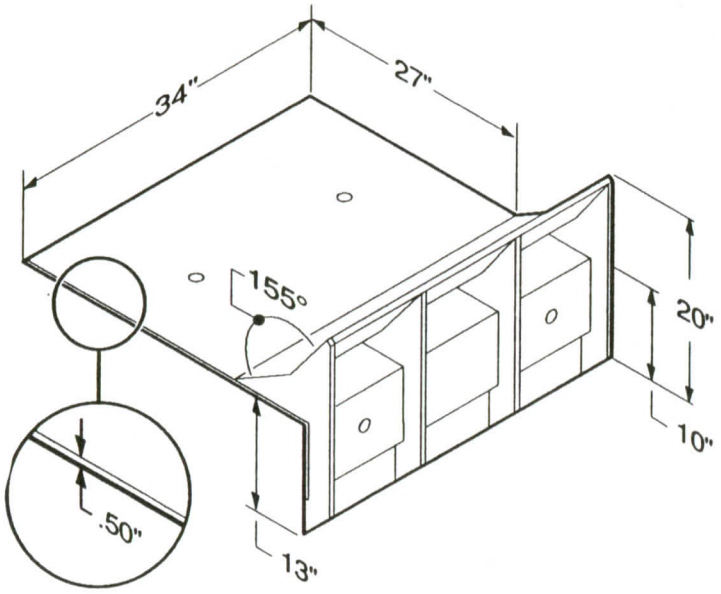
Docks

1. Docks must be equipped with stationary curbs that provide a positive stopping position for the truck and maximum clearance between the upright rail and the vertical surface of the dock.



⚠ DANGER

Never approach a dock edge with the Marina truck that is not equipped with a stationary curb.



2. The importance of dock plates to safe Marina truck operation cannot be over emphasized. Clark has studied the dock plates in use in various marinas and had determined various factors that are necessary for a safe dock plate. The drawing above illustrates these design elements which are:

a. The dock plate must be fabricated of steel of sufficient thickness to accommodate the loadings it will be subjected to.

b. Provision must be made to permanently attach the dock plate to both the vertical and horizontal surfaces of the dock.

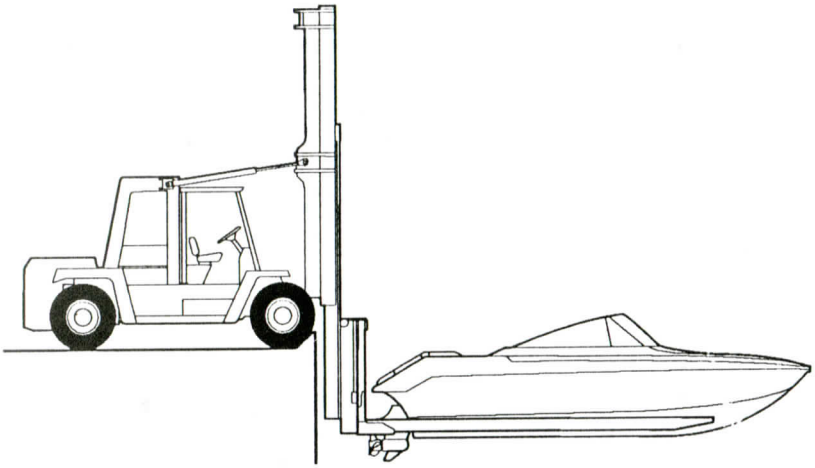
c. The dock plate should be designed so that the truck runs onto the horizontal surface so that the weight of the truck holds the dock plate down during boat lifting or lowering.

d. The thickness of that portion of the dock plate that overhangs the dock must be kept to a minimum so that it does not interfere with the upright rails as shown on page 1.6.

MARINA TRUCK OPERATION

Picking Up Boat

1. Drive truck snug against curb of dock plate and check truck alignment. Both sets of front tires must be against curb. If not, truck is not aligned at right angles to dock and clearance between upright and vertical surface of dock will be reduced. Back truck and reposition until both sets of front tires are against curb.



CAUTION

While the Clark Marina truck upright has been designed for maximum visibility, it is still inadvisable for the driver to attempt boat handling alone. A second person hereafter known as the "Observer", should be available to assist and direct the driver. The observer should never ride in the boat while it is being lifted or lowered.

Picking Up Boat (continued)

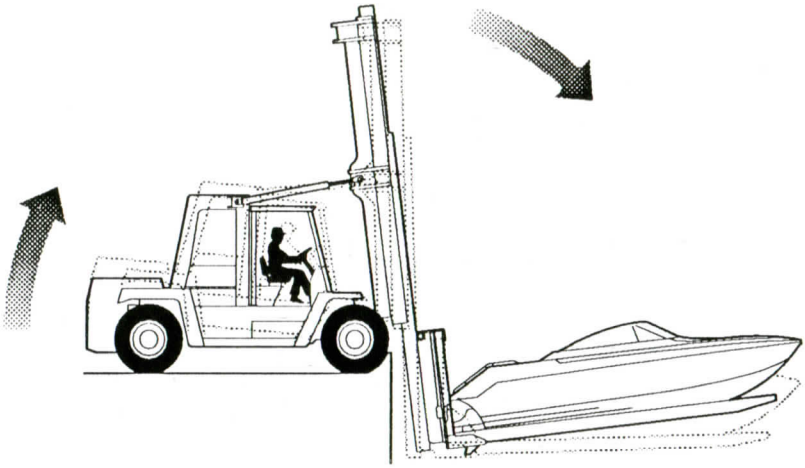
3. Never attempt to pick up a boat with the bow towards the Marina truck. The weight of the load would be near the fork tips and be unstable and the curve of the bow hull would provide a poor fit-up on the forks.

4. Boat operator now backs boat carefully over the submerged forks. For stability it is desirable to have the boat as far back on the forks as possible, leaving sufficient clearance for the engine/propeller. If position in storage rack allows, it is best to have the engine/propeller trimmed down.

5. Raise the forks until they contact the boat hull. The observer should check the contact points and determine that the boat is centered on the forks. Reposition forks as necessary until the boat is securely positioned.

6. An alternative method is to spread the forks and lower them outside of a waiting boat and then to close them under water around the hull. If this method is used, great care must be taken to insure that there is sufficient clearance between the carriage and the engine/propeller.

Picking Up Boat (continued)



7. When picking up a boat that may be near the lift capacity of the truck, back tilting the upright with the boat just above water will test the ability of the truck to safely handle the load. If the truck tips up slightly and the boat settles back into the water, it is an indication that the boat is more than the truck can safely handle.

⚠ DANGER

Only perform this back tilting test when the boat is very near the surface of the water.

Back tilting the upright with the forks below ground level increases the load center and reduces truck stability. Back tilting above ground level shortens the load center and increases truck stability.

8. When placing boats in the water the upright should be near vertical. As you approach the dock with the boat in the back tilted carry position, lower the boat as close to the ground as practical and tilt the upright to near vertical. Then dive the truck slowly forward until the boat is over the water and the truck tires gently contact the dock plate. Then lower the boat to the water.

Picking Up Boat (continued)

9. With the upright vertical or using as little back tilt as possible, raise boat until it and the forks are out of the water. Driver must now determine stability of the lift truck. If the steer tires are not still firmly seated on the ground, the boat is more than the truck can safely handle. If the hydraulic system initially raises the load but goes into bypass at a higher elevation, the load has exceeded the hydraulic system at that elevation. See tabulation of upright bypass points and lift capacities in Section 3 - Specifications in this manual.

⚠ WARNING

Movement of fuel or water in the boat can effect the center-of-gravity and truck stability.

10. Lift boat until observer can check that boat is properly cradled in the forks. If there is any doubt set boat back in water and readjust. Refer to page 1.15 for diagram of forks to hull fit-up.

11. After proper cradling of boat in forks has been achieved, lift boat above dock surface and apply full back tilt. Back truck until boat is over dock. If boat is equipped with a drain plug, place it in a safety rack before removing. Do not attempt to drain the boat while it is on the forks.

⚠ DANGER

Throughout boat handling operation, the observer should avoid going under boat. No one should ever go under any raised load.

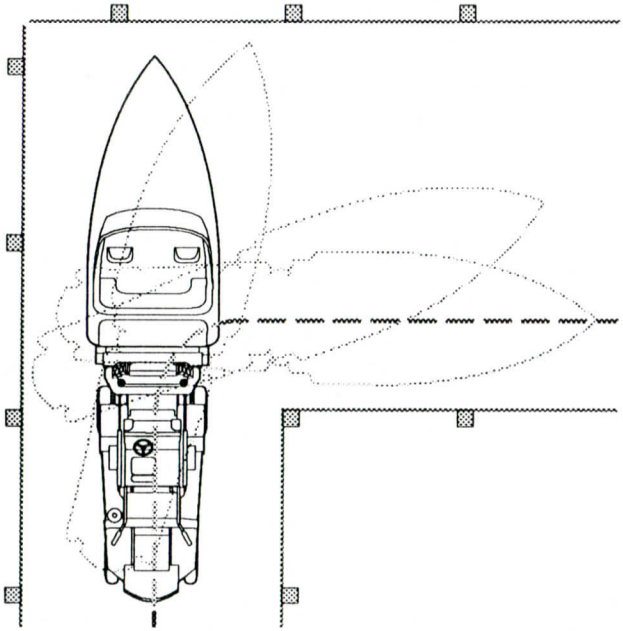
12. Proceed to transport boat to storage rack. For visibility, boat should be carried about eight feet [two and one half meters] above the ground. Watch carefully for overhead obstructions and door clearance.

Right Angle Turning

13. Your Marina truck pivots the same as an ordinary lift truck. However, because most boats make up a extra long, bulky load, some special problems are presented. Below is a representation of a right angle turn with a long wheel base truck and a 36 foot [11 meters] boat.

CAUTION

Particular care must be taken in making these turns to avoid damage to the boat



14. As the above illustration shows, the load swing is extreme and the driver would have great difficulty knowing where all parts of the load are while inserting boat into rack. The observer, whose presence is always recommended, is essential when depositing a boat in a bottom rack because the driver cannot see the bottom of the boat. The observer should direct the driver while the approach to the storage rack is made and then provide continuous signals while the load is inserted and the forks are withdrawn. The team of driver and observer must have a well understood set of signals to accomplish safe and efficient load handling.

Load Insertion

15. With truck and boat lined up at right angles to the rack, check the load width to be sure it will fit. If there is any doubt, measure it.

16. The driver now carefully elevates the load as necessary and inserts it, paying close attention to the signals of the observer.
NOTE: An observer is always recommended but very necessary for putting boats on the bottom rack where the driver cannot see the keel.

DANGER

If it is necessary for the observer to move from one side of the load to the other side to check clearance and fit-up, he should always go around the rear of the truck. Never walk under the load!!!

17. At the observers direction, the driver carefully lowers the load into the rack. After the load comes to rest in the rack, lower or tilt the forks forward until they are free of the load. The observer should now check that the boat is resting securely in the rack.

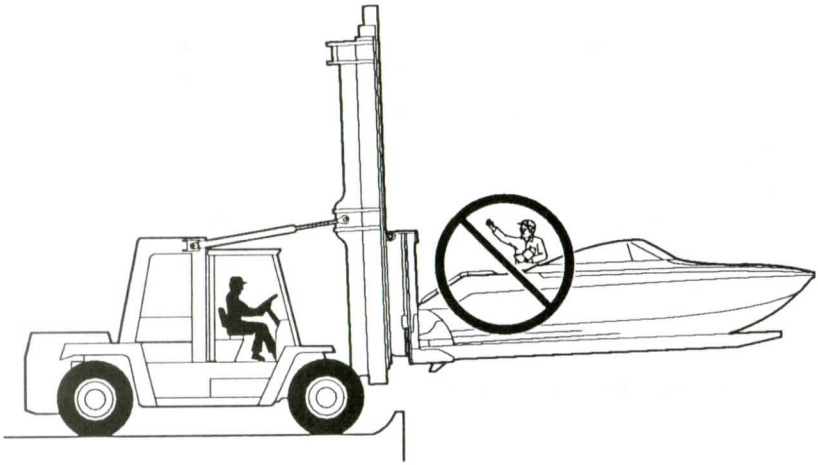
18. Carefully withdraw forks from load.

Boat Launching

1. Approach the rack at right angles with the forks elevated as needed. At the observers direction, carefully cradle the boat in the forks.

2. Back the load out of the rack. The observer should carefully watch for any interference between boat and rack. Refer to diagram of truck and load swing on page 1.12.

3. Approach the dock with boat elevated enough to clear curb. Position truck at right angles to the dock edge and carefully drive truck up to and against curb.



DANGER

No one should ever be in a boat when it is being raised, lowered or transported.

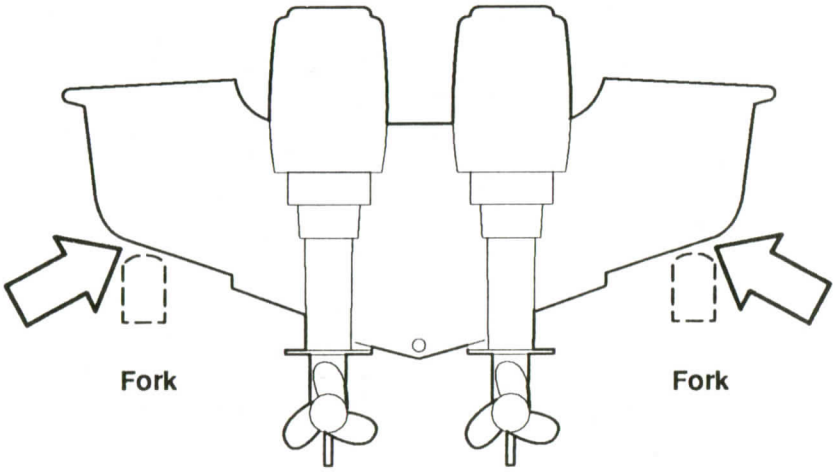
4. Lower boat slowly into water until it begins to float free. Observer boat operator should now board boat.
   NOTE: Never apply forward tilt until the boat is in the water.

5. Spread forks so that boat is free to be driven away by operator.

6. Swing forks back to vertical and raise them above the dock and back truck away.

Boat to Hull Fit-Up

The fork swing feature of the Clark Marina truck makes it possible to accommodate the various hull shapes that will be encountered in the average marina operation. In general, it is usually desirable to position the forks outboard towards the chine of the hull as far as possible as shown below.



This will provide the most stable carry position and usually provides the longest hull-to-fork contact.

CAUTION

Avoid damage to any protrusions from the hull such as transducers or trim tabs. When lifting an unfamiliar boat, consult the owner operator about the presence of any protrusions.

LIFT CAPACITIES AND RESTRICTIONS

Recommended lift capacities are listed in the Specification Section of this manual and on the truck nameplate. In addition, the Marina upright has built in hydraulic relief points that will not permit an excessively heavy load to be lifted beyond a specific fork height. If you are initially able to lift and carry a particular boat but find that the truck hydraulic system goes into bypass when reaching a certain fork height you have probably exceeded the built-in load restriction.

Emergency Lowering of Upright

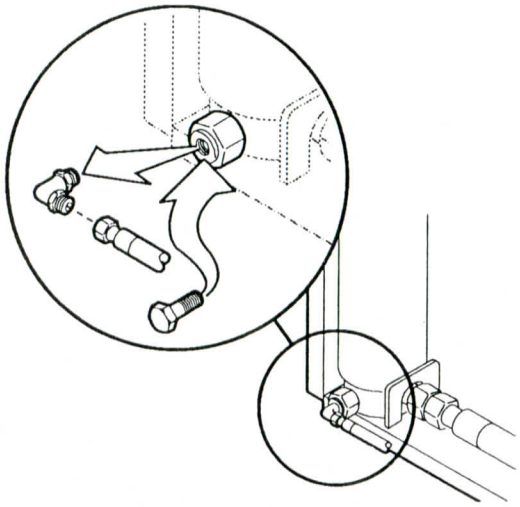
Load handling hydraulic functions, lift, tilt and fork pivot, are protected against movement in the event of a hydraulic line failure. Also, if the engine power or hydraulic pressure should not be available, the lift/lower system will not operate. If such a event occurs with a load elevated, it can be lowered in the following manner.

1. Remove the hose from the elbow in each pilot operated check valve in the base of the lift cylinders and remove the elbow from the valve.
2. Thread a 7/16-20 NF bolt into each check valve until it bottoms out. (An off-the-shelf bolt will not usually have sufficient threads. Either add threads with a hand die or reduce the bolt shank diameter so that it will screw far enough into the check valve to release it).

CAUTION

If the cause of the malfunction is a leaking lift hose, releasing the check valves will result in all the oil in the lift cylinders being available to the leak. Have means available to catch the oil and screw the bolts in only far enough to provide a slow, safe descent of the load.

3. If the hydraulic system is intact, lower the load with the lift/lower lever after inserting the bolts.



2 Planned Maintenance and Lubrication

Index

Marina Truck Maintenance

Your Marina truck is designed to operate partially in and around salt water. Because of the pervasive corrosion effects of salt water and salt air, Clark has incorporated every possible type of corrosion protection in the manufacture of this truck. These measures are as follows.

- Both upright and chassis are treated with a zinc-rich epoxy primer which is highly abrasion resistant and flexible to reduce cracking, a process superior to hot dip galvanizing for protection from salt spray. The top coat is enamel.

- Lift cylinder rods are plated with extra thick hard chrome. Fork swing cylinder rods are chrome plated stainless steel. Pivot pins are enclosed in non-metallic, greaseable bushings. UHMW plastic wear surfaces provide low friction fork movement and are virtually unaffected by salt spray.

- Fasteners used in the Marina upright are stainless steel except chain anchors and mounting bolts where specifications prevent their use. Upright hydraulic and hose fittings are stainless steel and hoses use non-metallic braid.

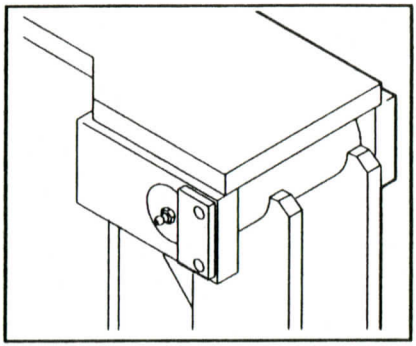
The above corrosion protection measures will greatly add to the service life of truck components subject to salt spray. However, they must be supplemented with regular preventive maintenance practices over and above those called for in the standard truck operator's manual.

Fresh water washing is the first line of defense against salt spray caused corrosion. This should be done at least daily. Hose down both upright, carriage and chassis. Pay particular attention to areas that have been in contact with salt water. Hose down internal parts of the chassis that may have been covered with salt water when boats were tilted back after being lifted from water. Extend upright to facilitate hosing internal parts of rails.

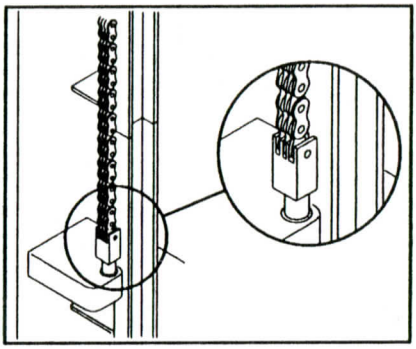
Upright Lubrication

Every 50 operating hours, lubricate the following with LUBRIPLATE-3000 grease.

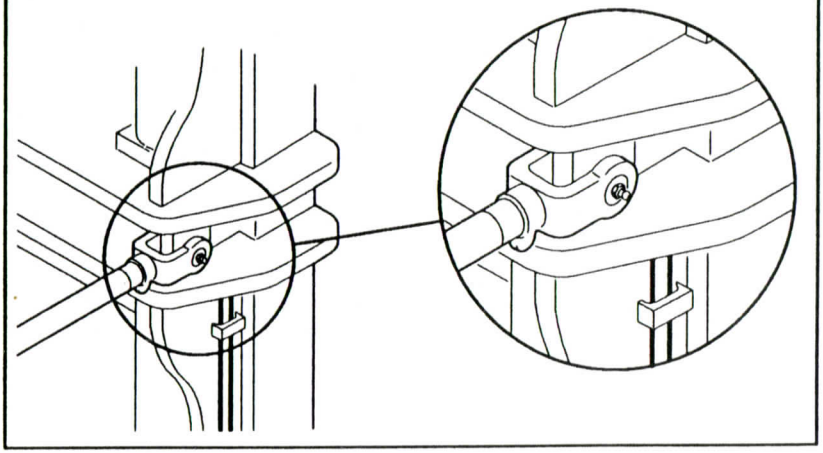
1. Fork pivot pins.



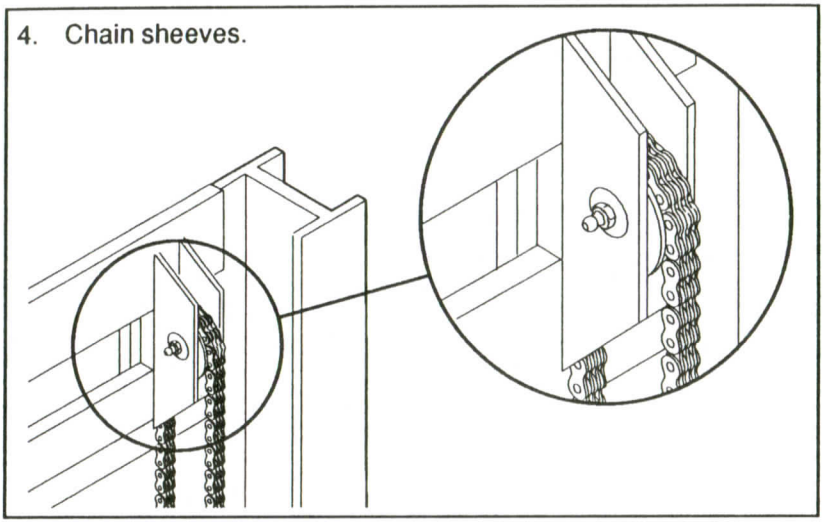
2. Fork chain anchor pivot pins.



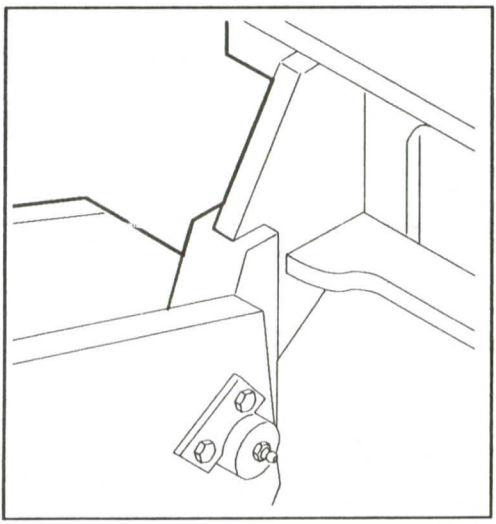
3. Tilt anchor pins.

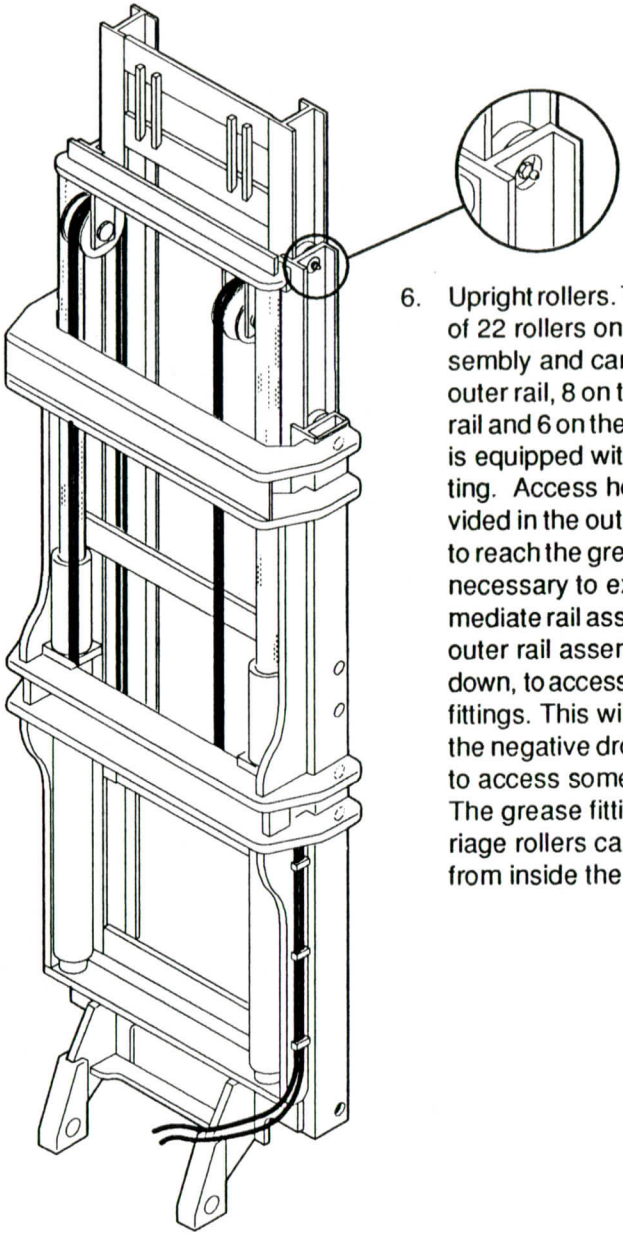


4. Chain sheeves.



5. Upright mounting pins



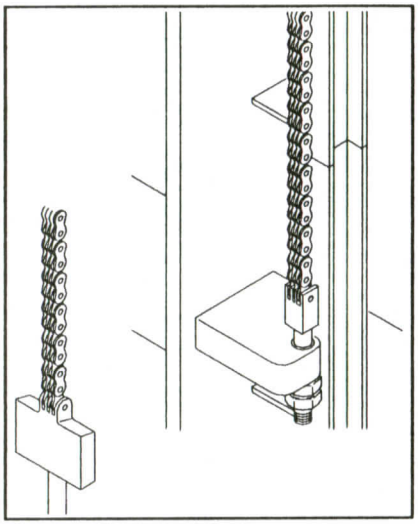


6. Upright rollers. There are a total of 22 rollers on the upright assembly and carriage; 8 on the outer rail, 8 on the intermediate rail and 6 on the carriage. Each is equipped with a grease fitting. Access holes are provided in the outer rail assembly to reach the grease fittings. It is necessary to extend the intermediate rail assembly out of the outer rail assembly, up and down, to access it's roller grease fittings. This will require using the negative drop of the upright to access some of the fittings. The grease fittings on the car riage rollers can be reached from inside the carriage.

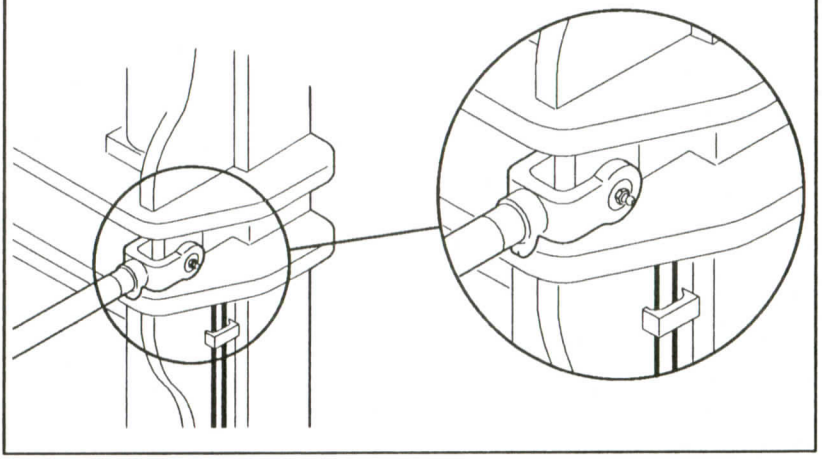
Upright Lubrication

Every 50 operating hours, when dry, thoroughly lubricate all of the following parts with LPS-3 spray lube.

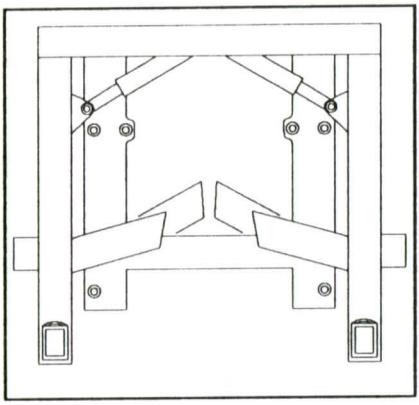
1. Exposed ends of chain adjusters.



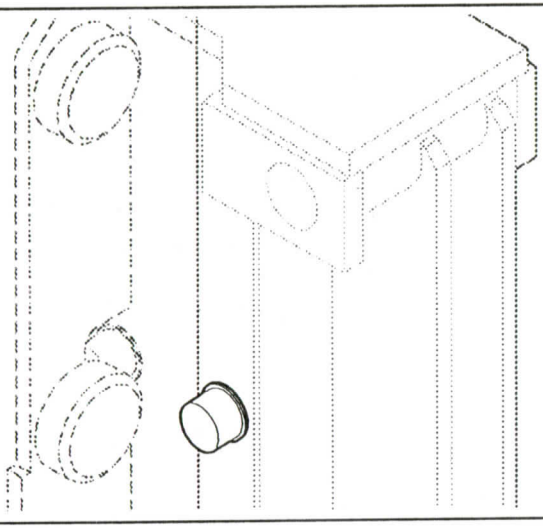
2. Tilt rod ends.



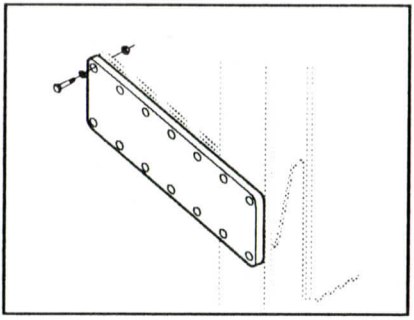
3. Carriage cylinder rod ends.



4. Rail thrust rollers.

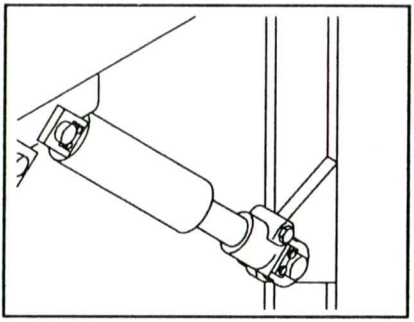


5. UHMW plastic guide plate mounting bolts.



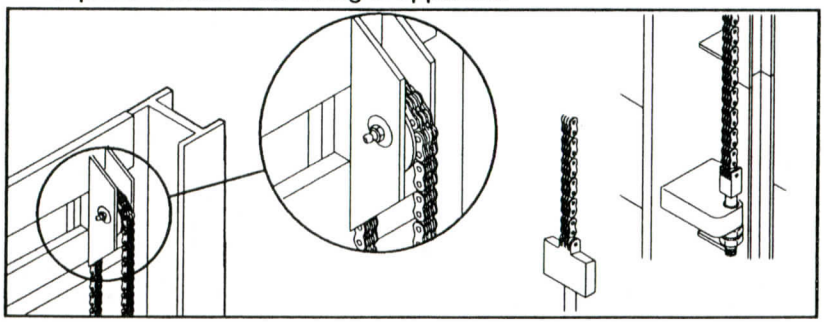
6. Carriage cylinder mounting bolts.

7. Rail rollers. There are a total of 22 rollers on the upright assembly and carriage; 8 on the outer rail, 8 on the intermedate rail and 6 on the carriage. To access some of them it will be necessary to extend the intermediate and inner rails both up and down.



8. Lift cylinder mounting bolts (top and bottom).

9. Lift chains (full lengths)
NOTE: Regular use of this spray lube, as recommended, will greatly increase the life of the chains. However, it will not protect against the corrosive effects of salt water foreve. Therfore, the chains should be inspected for the effects of corrosion regularly and replaced when weakening is apparent.



Upright Inspection and Checks

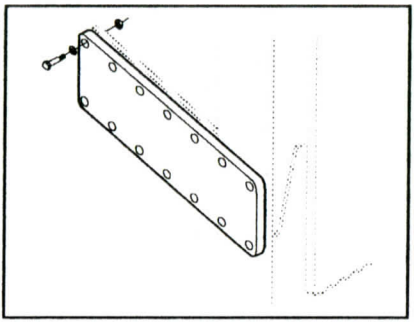
Do the following every 50 operating hours.

1. Check all hydraulic hose clearances to moving parts and sharp edges and corners.

2. Check nesting of fork hoses in the hose guide channels through full lift and lower cycle. Do not grease hose guides. Silicone spray is OK.

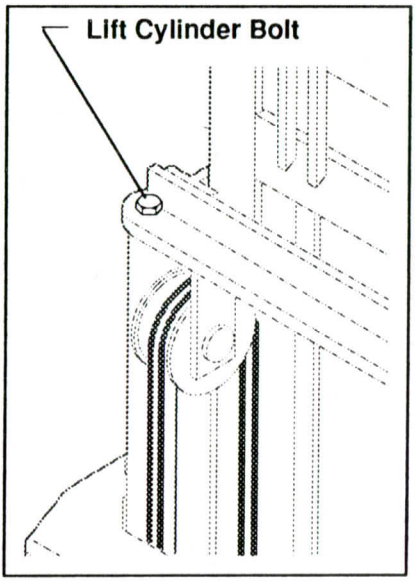
Do the following every 250 operating hours.

1. Check UHMW for guideplates for excessive wear. Guide plates not to be worn to allow their mounting bolts to contact the carriage plate.

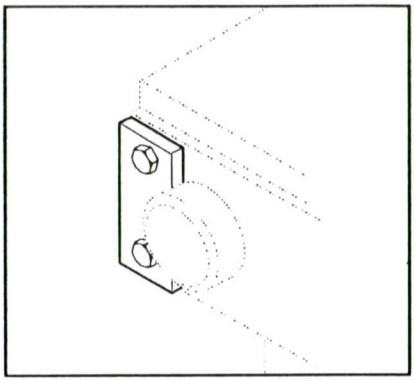


2. Check the tightness of:

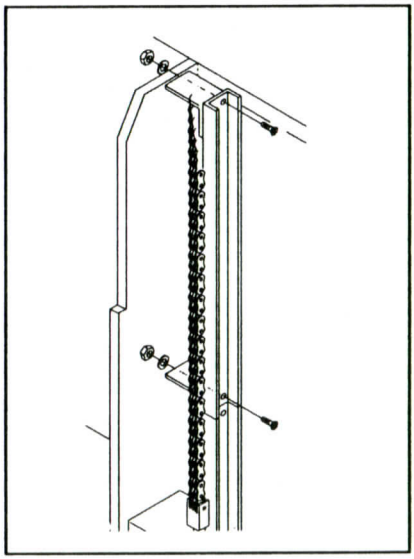
   (a)Lift cylinde bolts. Torque to 113 ft. lbs 153 (N•m).



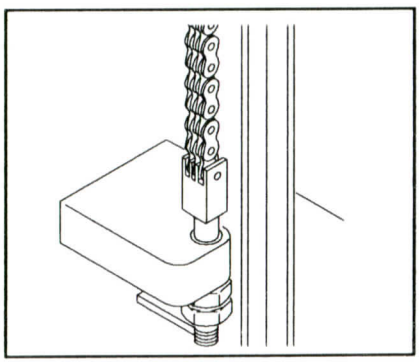
(b) Fork pivot pin lockplate bolts.
Torque to 135 ft lbs
180 (N•m).



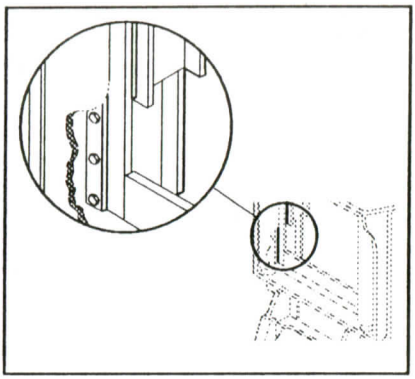
(c) Hose guide channel mounting bolts.
Torque to 100 in lbs
12 (N•m).



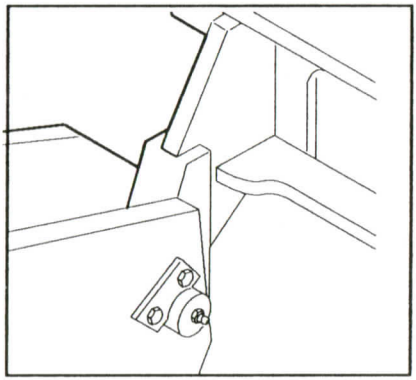
(d) Chain anchor lock nuts.
Torque to 225 ft lbs
300 (N•m).



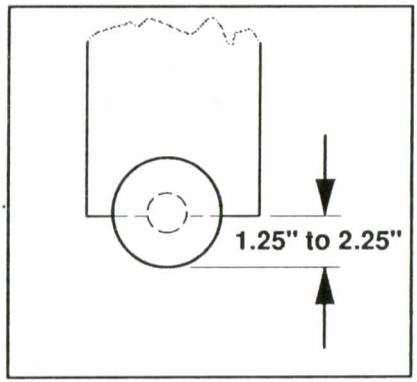
(e) Intermediate rail UHMW side thrust guide plate mounting bolts.
Torque to 16 ft. lbs
22 (N•m).



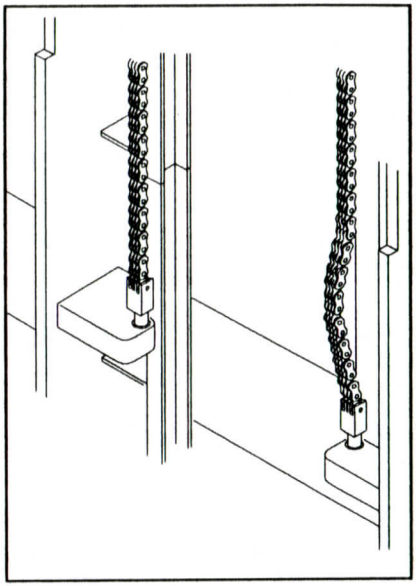
(f) Upright mounting pin retaining bolts.
Torque to 35 ft lbs
52 (N•m).



3. Check chain length adjustments at one foot or more negative drop. The bottom carriage rollers must not extend below the inner rail more than 1.25 to 2.25 inches.



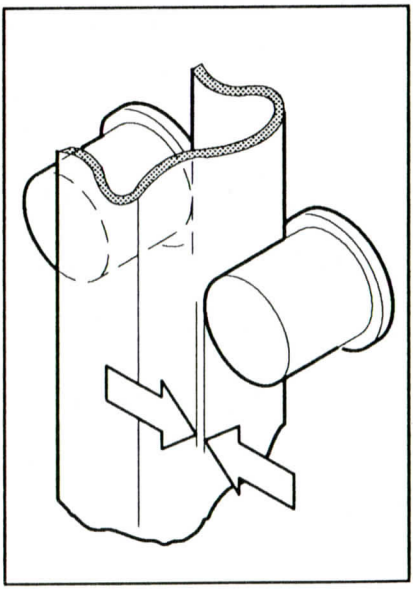
4. Check for uniform chain ten sion with truck unloaded and rails of the floor/ground.



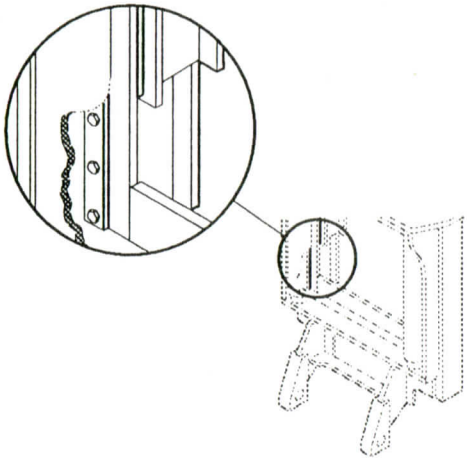
5. Check fork cylinder hoses for wear.

6. Check for leaks for full length of all hoses and at all hydraulic connections.

7. Check carriage thrust rollers for zero roller-to-rail-flange

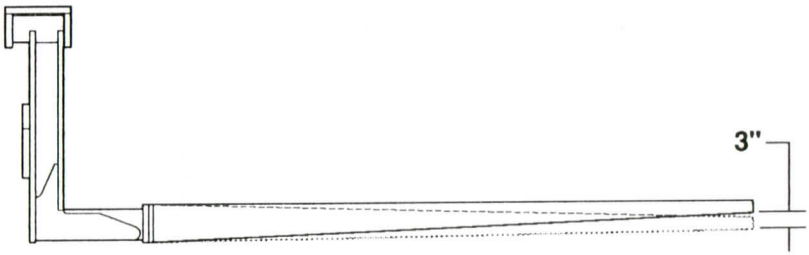


8. Check for no racking/gigging in full back tilt. Racking/gigging that can not be adjusted out is permissible in full forward tilt. Adjust in full back tilt by screwing one rod end in or out. Select the rod to adjust by determining the best thread engagement after adjustment. (Racking is a twisting of the outer rail assembly. Gigging is one or both tilt cylinders moving in jerky motion).



9. Check intermediate rail side thrust UHMW guide plates for wear or damage.

10. Check the forks for match. There must be no more than 3 inches differences at the fork tips.



11. As often as operations permit, all parts of the truck in contact to salt water should be examined for damaged finish and rust. Wire brush rusted or paint damaged areas and repaint with pressure cans when surfaces are thoroughly dry. This needs to be done on a regular basis to obtain the maximum life from the equipment.

3 Specifications

Clark products and specifications are subject to improvements and changes without notice or obligation. Only those specifications that differ between the standard lift truck and the Marina truck are listed here.

Model Designation -- Rated Load Capacity

C500 Y165M - 16,500 lbs [7500 kg] @ 96 inch [61 cm] load center
C500 Y 200M - 20,000 lbs [9072 kg] @ 96 inch [61 cm] load center
Refer to pages 3.2 and 3.3 for capacities at specific lift heights.

Wheels & Tires

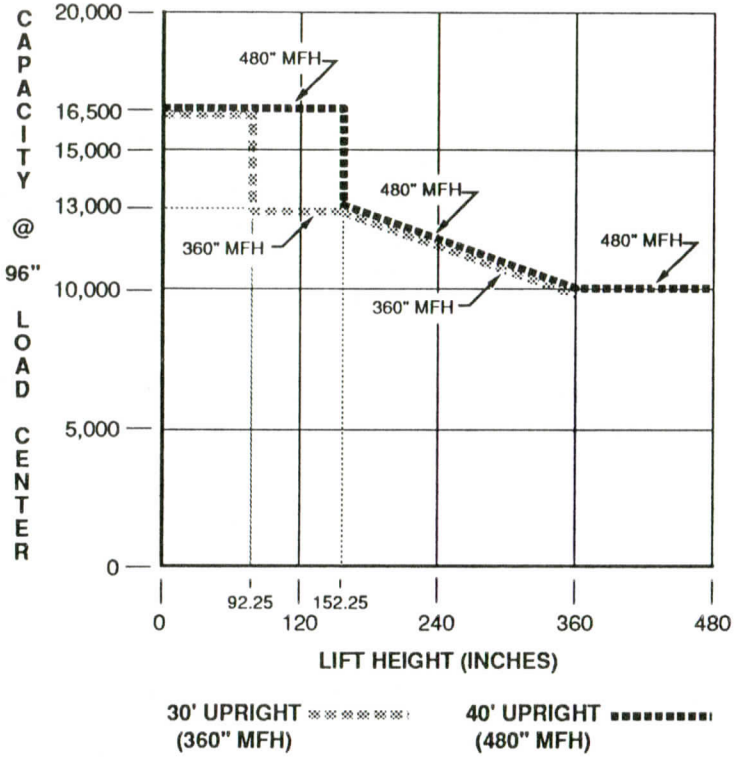
Tires: Standard - 12.00 X 20 X 8 Solid Pneumatic with Tread
Optional - 12.00 X 20 X 10 Solid, Smooth

Truck Weights (Approximate)

Model (w/o upright)	Total Weight	Drive Axle	Steer Axle
C500 Y 165M	36,100 lbs.	4,850 lbs.	31,250 lbs.
	[16 375 kg]	[2 200 kg]	[14 175 kg]
C500 Y 200M	37,050 lbs	6,300 lbs.	30,750 lbs.
	[16 806 kg]	[2 858 kg]	[13 948 kg]
30 Foot Upright	12,200 lbs. [5 534 kg]		
40 Foot Upright	14,250 lbs. [6 464 kg]		
18 Foot Forks	2,760 lbs. [1 252 kg]		
20 Foot Forks	2,780 lbs. [1 261 kg]		
Carriage	2,250 lbs. [1 021 kg]		

3 Specifications

C5Y 165 M

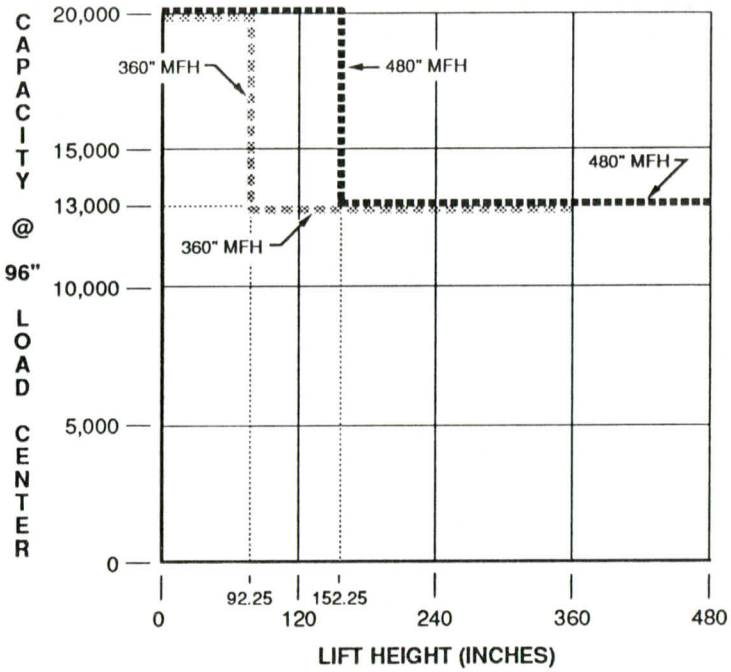


1. The charts shown in this section represent the lift capacities of the two available truck models and two available upright heights. To determine which curve represents the capacity of your specific truck, refer to the truck nameplate for capacity and maximum fork height (MFH)

2. Before operating the Marina truck, study these capacity charts and be sure to understand your truck capacities at the various fork heights. If you have any doubts, have your supervisor explain it to you.

3. Referring to the chart above, note the vertical drop in the two curves at 92.25" and 152.25". This represents the point at which the compound lift cylinders will not go into the next stage on the C5Y165M truck. The angled line of the curve represents the maximum load that should be lifted between 152.25" and 360"

C5Y 200 M



4. Referring to the chart above, note the vertical drop in the two curves at 92.25" and 152.25". This represents the point at which the compound lift cylinders will not go into the next stage on the C5Y200M truck. Note that on this truck model, both uprights can lift 13,000 lbs to their MFH. This is because of the longer truck wheel base of the C5Y200M.

WARNING

Never attempt to exceed the lift capacity of the truck by adding counterweight or having people sit on the back of the upright

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