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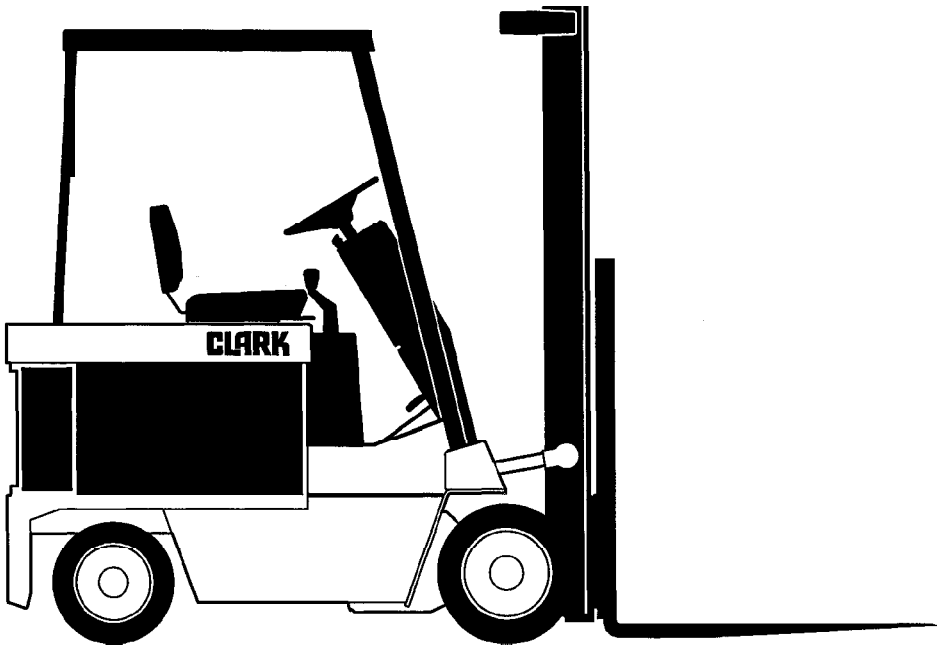
SM 646
EC 90/120
Service Manual



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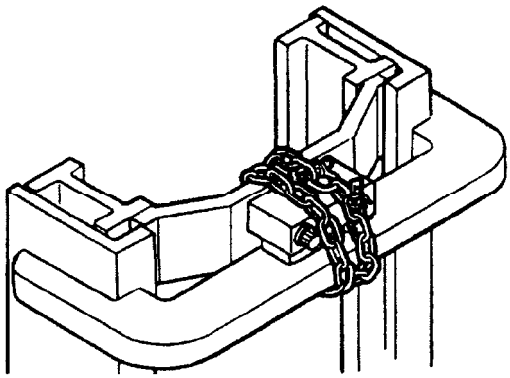
CLARK Technical Publications
Lexington, KY
40508

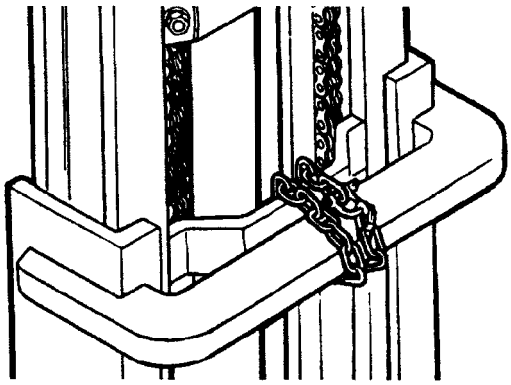
Chaining the Upright in Raised Position

This procedure is used to safely provide clearance for access from the front of truck to components on or near the drive axle.

1. Park truck safely.
2. Put blocks at front of and rear of drive wheels.
3. Raise upright carriage.
4. Chain the center inner rail tie bar to the top outer rail tie bar as shown.



Triple Stage Uprights: Chain the center intermediate rail tie bar and the lower inner rail tie bar to the top outer rail tie bar.



5. Reverse the procedure to remove the chains.

Raising Rear of Truck

The truck may be raised at the rear by jacking and blocking under the center of the frame member at either the front or rear steer axle mounting, or under the center section of the steer axle.

Refer to truck data plate for truck weights.

A WARNING

An incorrectly installed counterweight can move or fall unexpectedly. Never lift or block a truck using the counterweight. Failure to follow procedures outlined in this manual can result in injury or death.

1. Park truck safely.
2. Put blocks at front and rear of drive wheels.

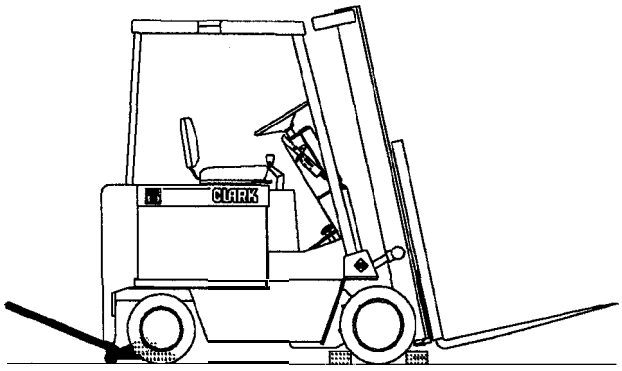
A CAUTION

If possible, remove the battery from truck to reduce weight for added safety and ease of jacking.

3. Put a floor jack under the steer axle mounting frame member, **centered** between the two wheels.

A WARNING

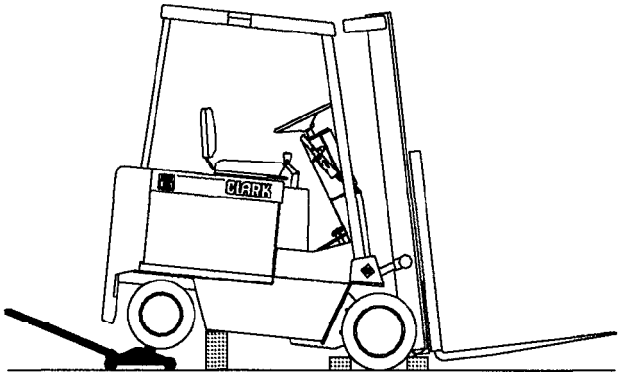
Never lift the truck by the counterweight.



NOTE

If there is insufficient clearance under frame for your jack, the truck may first be driven onto shims, such as 25 x 150 x 300 mm (1 x 6 x 12 in) pieces of board, to increase the truck frame underclearance.

4. Raise the truck only as high as necessary to perform the maintenance work.
5. Put blocks at both sides of the truck, fully under the frame main side structure. Put the blocks in front of but close to the counterweight and steer wheels for best truck stability.



Put an equal number of blocks under each side of the truck to provide a level working position.

6. Lower the truck onto the blocks and remove the jack.

A CAUTION

Before performing any maintenance work, check the truck for stable condition on the blocking.

7. When maintenance work is completed, lower the rear of truck to the floor by reversing the above procedure and lowering each side of the truck 50 mm (2 in) at a time:
   - Put jack under frame and raise truck.
   - Carefully remove blocks and lower truck.
   - Remove jack and blocks from drive wheels.

Raising Entire Truck

Refer to truck data plate for truck weights.

1. Park truck safely. Lower upright fully.
2. If necessary, drive truck onto boards to increase underclearance.

A WARNING

SIDE-TO-SIDE TIPOVER. When jacking side of truck, be sure upright is lowered fully. Do not raise one side of the truck more than about 50 mm (2 in) higher than the other, to avoid tipping truck over laterally.

END-TO-END TIPOVER. If the upright and transaxle are removed while the truck is blocked up, the truck will tip backward due to the heavy counterweight. Upright and counterweight must both be removed before attempting to raise the truck for transaxle removal. The back of the truck must be supported by blocking under the steer axle to prevent movement.

If the counterweight is removed while the truck is up on blocks, the weight of the upright and transaxle will cause the truck to fall forward.

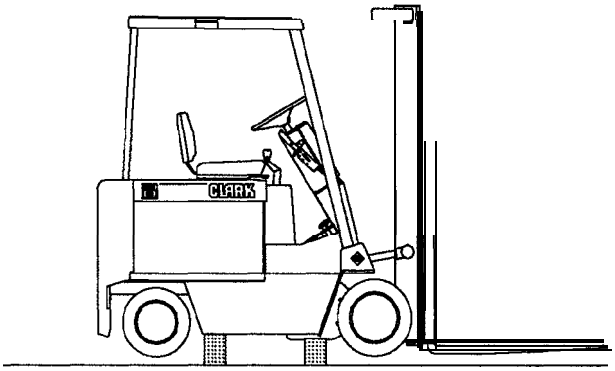
3. Put the jack under side frame, near the center of the truck.

IMPORTANT

Be sure to put the jack squarely and fully under the main side structure of the frame. Do not put the jack under the outer covers which enclose the hydraulic pump and controls.

4. Carefully raise the truck one side at a time, only as high as necessary to do the maintenance work, and not more than 150 mm (6 in) total.

5. Put blocks under the side frame, at each side of the jack. Spread the blocks close to the steer and drive wheels for maximum stability.
6. If using one jack, lower the truck onto the blocks and move the jack to the opposite side. Repeat the lifting procedure.
7. Put the same size blocks under each side of the truck so it will be leveled.



A CAUTION

Before performing any maintenance work, check the truck for stable condition on the blocking.

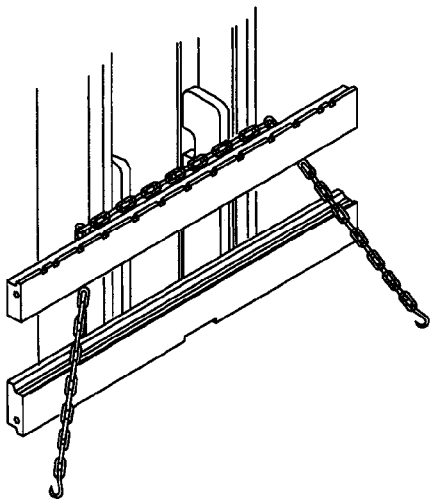
8. When maintenance work is completed, lower the entire truck to the floor by reversing this procedure. Lower the truck one side at a time, while carefully removing the blocks. Be sure no tools or equipment are under the truck or wheels.

NOTE

Depending on jack height, shims under the tires may be needed for clearance to allow removal of jack.

Shipping Tie-Down Instructions

1. Front of Truck
   a. With Upright and Carriage Installed
   - Lower the carriage fully.
   - Put a tie-down (e.g., chain) between the carriage fork bars.



b. Without Upright and Carriage Installed
   - Put a chain across the truck floor plate. Protect truck from chain damage by using covered chain or protective material under the chain at contact points.

2. Rear of Truck
   - Attach the tie-down to pocket in bottom of counterweight.

GROUP PS

PERIODIC SERVICE

Section 1.
Maintenance Schedule

"Periodic Service" and "Planned Maintenance"

The term "periodic service" includes all maintenance tasks that should be performed on a regularly scheduled basis.

The term "Planned Maintenance" indicates a formalized program of basic inspections, adjustments, and lubrications that the Clark service organization provides customers at a prescribed interval, usually 50-250 hours. The recommended basic "Planned Maintenance" procedure is given in Section 2 of this Group.

The current Section, "Maintenance Schedules," specifies all maintenance tasks-including Planned Maintenance tasks-that should be performed periodically, and suggests intervals at which they should be performed.

Determining Maintenance Intervals

Time intervals on the charts on the next four pages and elsewhere in this manual relate to truck operating hours as recorded on the hourmeter, and are based on experience Clark has found to be convenient and suitable under **normal** operation. Standard operating condition classifications are:

Normal Operation: Eight-hour material handling, mostly in buildings or in clean, open air on clean, paved surfaces.

Severe Operation: Prolonged operating hours or constant usage.

Extreme Operation:

- In sandy or dusty locations, such as cement plants, lumber mills, and coal dust or stone crushing sites.
- High-temperature locations, such as steel mills and foundries.
- Sudden temperature changes, such as constant trips from buildings into the open air, or in refrigeration plants.

If the lift truck is used in Severe or *extreme* operating conditions, the maintenance intervals should be shortened accordingly.

IMPORTANT

MAINTENANCE INTERVALS. If the lift truck is used in severe or extreme operating conditions, the maintenance intervals should he shortened accordingly.

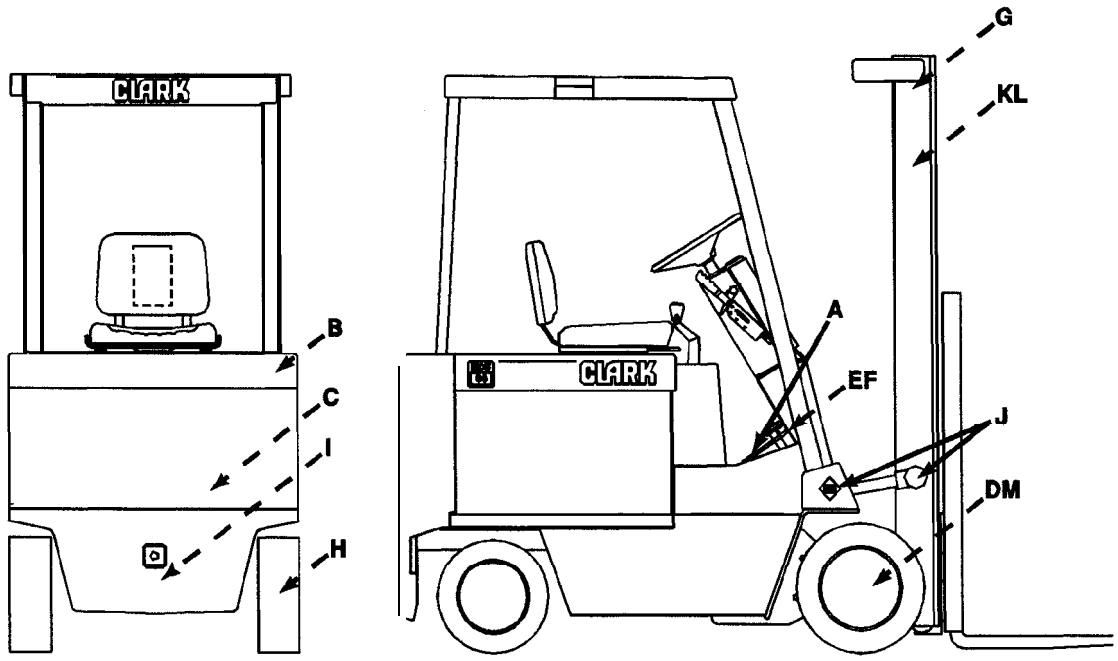
Since the operating environments of lift trucks vary widely, the above descriptions are highly generalized and should be applied as actual conditions dictate.

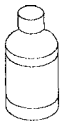
Lubrication Points

Lubrication Points	No. of Lube Points	Lubrication Chart Key	Operation Hours 250	500	1000	2000
(A) Brake Reservoir	1	L6	X			
(B) Battery Condition and Specific Gravity			X			
(C) Steering Cylinder End *	1	L1	L			
(D) Drive Unit – Oil Level	1	L3		X	X	C
(E) Hydraulic Breather Cap	1	—			C	
(F) Hydraulic Reservoir	1	L5	X			C
(G) Lift Cylinder Head Guide Rollers	2	L1	L			
(H) Steer Wheel Bearings	2	L1	PP			
(I) Steer Trunnion Bearings	2	L1	PP			
(J) Tilt Cylinder Rod Ends	4	L1	L			
(K) Upright Lift Chains	4	L4	X			
(L) Upright Channels	1	L1	X			
(M) Upright Trunnions	2	L1	L			

*** Remove battery to access.**

C = Change **X = Check**
L = Lubricate **PP = Pack every time component is replaced**



Lubrication Chart Key			
L1		General Purpose Grease with EP Additive	**Use NLGI #1 Grade** A multi-purpose grease of refined mineral oil, blended with a lithium soap thickener or equal, containing anti-wear, anti-rust, and anti-oxidants with EP additives.
L2		General Purpose Grease with EP Additive and Moly Additive	**Use NLGI #2 Grade** A multi-purpose grease of refined mineral oil, blended with a lithium soap thickener or equal, containing anti-wear, anti-rust, and anti-oxidants with EP additives and 3 to 5% moly additives.
L3		80W90	**Clark Part No. 2777708** Gear Oil.
L4		Chain Lube	**Clark Part No. 886399** Roller and Leaf Chain Lube. One case of 12 one-pint cans.
L5		Hydraulic Fluid	**Clark MS-68 Hydraulic Fluid:** **Part No. 885385 1 case of 24 one-quart cans** **Part No. 885382 1 case of 6 one-gallon cans** Use only high-quality hydraulic fluid with zinc or equivalent anti-wear additive, which meets the requirements of ASTM D-2882 pump wear test, with 50 mg total weight loss maximum, per Clark MS-68.
L6		Brake Fluid "Dot 3"	**Clark Part No. 884677** Use only heavy-duty Hydraulic Brake Fluid which meets or exceeds the requirements of SAE 51703 Specification, or alternatively, Type DOT Brake Fluid, Grade DOT 3, as specified by Federal Motor Vehicle Safety Standard No. 116 (FMVSS 116). Non-petroleum type.

Linkage

Any good grade of motor oil in SAE 10, 20 or 30 weight, as the temperature and conditions dictate.

Corrosion Protection

Apply to electrical connections any time they are disconnected. Reapply before making the connection.

Mechanical Lubricant Clark Part No. 280235 1. Use on:

- PL and DP plug connections
- Solenoid coil connections
- Reverse alarm terminals (if applicable)
- Push-on terminals
- Light terminals (headlights, strobe, etc.) (if applicable)
- Thermostat terminals (if applicable)
- Heater connection terminals (if applicable)

Mechanical Paste Lubricant Clark Part No. 2802205 Use on:

- All power cable connections
  - All motor cable connections
  - Brake switch
  - Lift pump ground strap, both ends
  - Steer interlock switch
  - Reverse alarm (if applicable)
- All screw-on type wire terminals
  - Card retainer screws
  - All cable connection points on the control panel

Recommended Periodic Service Schedule

This chart lists maintenance tasks that should be done periodically, the suggested time intervals, and the service manual Group in which the task is covered. Refer to Operator's Manual for **Daily Checks.**

TASKS	1st 50 Hours	Every 50-250 Hours	Every 450-500 Hours (or 3 months)	Every 900-1000 Hours (or 6 months)	Every 2000 Hours (or 1 year)
Group PS -Periodic Maintenance					
Perform Planned Maintenance inspections, lubrications, and adjustments	I	I	I		
Group 12 - Battery					
Battery electrolyte level - check/add		I	I	I	I
Battery load voltage test		•			
Battery terminals/cables - clean/tighten	I	I	I	I	
Group 13 -Wiring and Instruments					
Hourmeter - check	I	I	I	I	
Lamp check - at start-up					
Wiring harness - inspect					
Instruments/accessories					
Group 16 - Electric Motors					
Drive motor brushes - check/air clean		•			
Lift pump motor brushes - check/air clean		•			
Steer pump motor brushes - check/air clean		•			
Group 17 - Contactors					
Contactor tips - check/air clean					
Group 19 - Motor Controls					
Display - check display for error codes		•			
Controller - air clean		•			
Controller connectors - check and lubricate		•			
Group 20 - Drive Axle					
Air vent - inspect, clean or replace		•			
Axle mounting bolts - inspect/tighten				•	
Pressure checks					•
Fluid change - drain/fill					•
Fluid filter - replace	•				•
Fluid level/condition - check/sample	•	•			
Group 22 - Wheels And Tires					
Wheel mounting bolts - tighten	•	•			
Tire pressure/condition - check	•	•			
Group 23 - Brakes					
Operation - check		•			
Service brake - check wear					•
Brake lines - check	•	•			
Parking brake - check/adjust	•	•			

TASKS	1st 50 Hours	Every 50-250 Hours	Every 450-500 Hours (or 3 months)	Every 900-1000 Hours (or 6 months)	Every 2000 Hours (or 1 year)
Group 25/26 - Steer Axle and Lines					
Operation - check		•			
Power steering relief pressure - check					•
Steer axle mounting - inspect		•			
Steer wheel and trunnion bearings - check		•			
Steer wheel and trunnion bearings - lubricate/adjust					•
Steering cylinder seals - check leakage		•			
Steering linkage - lubricate		•			
Group 29/30 - Hydraulic Lift System					
Hydraulic fluid level/condition - check/sample		•			
Hydraulic fluid change - drain/fill					•
Hydraulic filler screen - clean					•
Hydraulic fluid filter - replace	•				•
Hydraulic tank breather - clean/replace	•	•			•
Control valve linkage - check/clean					
Hydraulic system relief pressure - test/adjust					•
Group 32 - Tilt Cylinders					
Tilt cylinder adjustment - check/adjust		•			
Tilt cylinder drift - test		•			
Tilt cylinder mounting - check/tighten		•			
Tilt cylinder rod ends - check/tighten/lubricate		•			
Tilt cylinder rod/seals - check for leaks		•			
Group 34 - Upright, Lift Cylinders, Carriage, Forks					
Operation - check		•			
Carriage and lift chain - lubricate		•			
Carriage chain condition - inspect/adjust		•			
Forks, latches, stop pin - inspect/check wear		•			
Lift chain condition - inspect/adjust		•			
Load backrest		•			
Upright cylinder/mounting - inspect/tighten		•			
Upright lift cylinder downdrift - test		•			
Upright rollers - check		•			
Upright trunnion bolts - tighten		•			