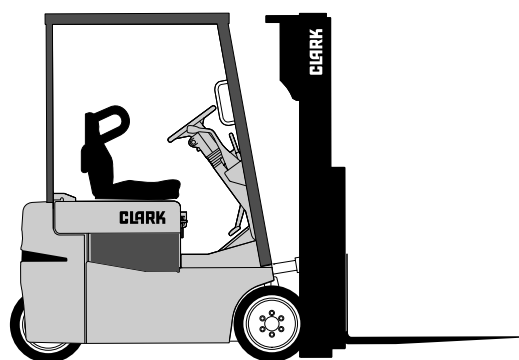


TMX 12-25 EPX 16-20s

SERVICE MANUAL

RATED CAPACITY : 1250~2270kg



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Pages not marked are not currently revised, but are included for page numbering continuity.

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NOTE :

Truck Models Covered by this Manual

This manual consists of “base” module that pertains to all TMX12-25, ECX16-18 models and other modules that pertain only to specific models. Manuals shipped with the truck contain the base module and the modules specific to the purchased truck.

You may, however, purchase specific modules and expand your manual to fully cover multiple models. To do so, order the desired modules as you would any other Clark part.

Arrangement and Use of this Manual

Clark arranges parts and service procedures by standardized *Groups*. In this manual, Groups are similar to “chapters”. Groups are listed in the indexes on the next page.

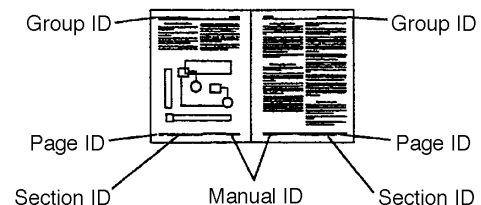
Each Group begins with a table of contents that shows the *Sections* contained within the Group. Lengthy Sections also begin with a table of contents.

Each Group and Section has an identifying name and number, or “ID”.

Each page also has a unique ID. The page ID consists of three numbers separated by hyphens. The three numbers represent the Group number, the Section number, and the page number. For example, “00-1-2” on the lower corner of the page indicates Group 00, Section 1, page 2.

The Group number sometimes has a letter or letters added to it in parentheses if one or more variations of the Group exist. For example, if the truck has a standard transaxle, Group 06 is expressed as “06(S)”; if the truck has a hydrostatic transmission, Group 06 is expressed as “06(H)”.

You can quickly locate a specific point in the manual by using the headers and footers that appear on every Section page. The following illustration points out these areas.



This manual is intended for the use of trained service personnel. Please read Group SA, “Safe Maintenance”, and the *Operator’s Manual* before working on or operating the truck.

NOTE :

Contents by Group and Section

(Alphabetical listing of contents appears on next page.)

Contents are listed here by Group number and name followed by Section number and name:

SA	SAFE MAINTENANCE		
	1. Safety		
	2. Lifting, Jacking, and Blocking the Truck		
	3. Towing		
		5. Parking Brake Removal, Replacement, and Adjustment	
		6. Brake Overhaul	
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	1. Maintenance Schedules		1. Steering System Specifications and Description.
	2. Planned Maintenance Program		2. Steering System Troubleshooting
	3. PM Inspection Form		3. Steering Column and Component Removal and Replacement
12	BATTERY		4. Steering System Relief Pressure Check and Adjustment
	1. Battery Service		5. Steering Gear Overhaul(TMXX)
13	WIRING, SWITCHES, AND INSTRUMENTS		6. Steer Axle Service (TMXX)
	1. Schematic Electric Circuit Diagrams		7. Steer Cylinder Overhaul (TMXX)
	2. General Electrical Service Tips		8. Steering Axle Wheel Bearing Maintenance and Adjustment (EPX)
	3. Wiring and Cables		9. Steering Axle Removal and Replacement (EPX)
	4. Switches and Sensors		10. Steer Cylinder Removal and Replacement (EPX)
	5. Instrument Panel		11. Steering Gear Overhaul(EPX)
16	ELECTRIC MOTORS		12. Steer Cylinder Overhaul (EPX)
	1. Motor Specifications And Descriptions	29	HYDRAULIC SYSTEM
	2. Drive Motors Overhaul		1. Main Hydraulic System Specifications and Description
	3. Pump Motor Overhaul		2. Fluids and Filters
17	CONTACTORS		3. Hydraulic System Troubleshooting Troubleshooting
	1. Contactors		4. Hydraulic System Pressure Checks and Adjustments
19	MOTOR CONTROLS		5. Hydraulic System Removal and Overhaul
	1. Description	30	HYDRAULIC SYSTEM
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	3. Control troubleshooting		2. Main Hydraulic Control Valve Removal and Overhaul
	4. TMX Factory Control Settings		
20	DRIVE AXLE	32	TILT CYLINDERS
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	4. Drive Axle Removal and Installation		4. Tilt Cylinder Overhaul
	5. Drive Axle Overhaul		
22	WHEELS AND TIRES	34	UPRIGHTS
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	2. Wheels & Tires Mounting and Maintenance		2. Trouble shooting
23	BRAKE SYSTEM		3. Upright Inspection
	1. Brake Specifications		4. Carriage and Upright Roller Clearance Checks and Shim Adjustment
	2. Brake System Fluid Check, Fill, and Bleed Specifications and Description		5. Cylinder Removal, Shimming, Overhaul and Replacement
	3. Brake Pedal and Master Cylinder Removal, Replacement, and Adjustment		6. Upright Chain Inspection, Adjustment and Replacement
	4. Brake Caliper Removal and Replacement		7. Fork and Carriage Removal and Replacement

CONTENTS

8. Upright Removal and Replacement

38 COUNTERWEIGHT AND CHASSIS

1. Counterweight Specifications and Description
2. Counterweight Removal and Installation
3. Overhead Guard Removal and Installation
4. Floor Plate, Seat, and Seat Deck Removal and Installation

40 SPECIFICATIONS

1. Nameplate and Decals
2. General Specifications
3. Hydraulic Fitting Tightening Procedure

Alphabetical Listing of Topics

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Contents are listed here by topic followed by the Group#-Section# the topic appears in:

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NOTE :

**GROUP SA
SAFE MAINTENANCE**

Safety Section 1

Lifting, Jacking, and Blocking the Truck..... Section 2

Towing Section 3

NOTE :

Section 1. Safety

Safety Signs and Messages

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

NOTE

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

IMPORTANT

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



CAUTION

This message is used as a reminder of safety hazards that can result in personal injury if proper precautions are not taken.



WARNING

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



DANGER

This message is used when an extreme hazard exists that can result in injury or death or serious injury if proper precautions are not taken.

The above terms have been adopted by Clark Material Handling Company. The same terms may be used in different context in service literature supplied directly or indirectly by vendors of truck components..

Safe Maintenance Practices

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

When in doubt of any maintenance procedure, please contact your local Clark dealer.

1. Powered industrial trucks can become hazardous if maintenance is neglected. Therefore, suitable maintenance facilities, trained personnel, and procedures must be provided.
2. Maintenance and inspection of all powered industrial trucks shall be done in conformance with the manufacturer's recommendations.
3. A scheduled planned maintenance, lubrication, and inspection program shall be followed.
4. Only trained and authorized personnel shall be permitted to maintain, repair, adjust, and inspect industrial trucks. Work should be performed in accordance with the manufacturer's specifications.
5. Properly ventilate work area, vent exhaust fumes, and keep shop clean and floor dry.
6. Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check for level or leakage of fuel, electrolyte, oil, or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.
7. Before starting work on truck:
 - a. Raise drive wheels off of floor and use blocks or other positive truck positioning devices.
 - b. Disconnect battery before working on the electrical system.
8. Before working on engine fuel system of gasoline- or diesel-powered trucks, be sure the fuel shut-off valve is closed.

9. Operation of the truck to check performance must be conducted in an authorized, safe, clear area.
10. Before starting to drive truck:
 - a. Be in operating position with seat belt fastened.
 - b. Be sure parking brake is engaged.
 - c. Put direction control in neutral.
 - d. Start engine.
 - e. Check functioning of direction and speed controls, steering, brakes, warning devices, and any load handling attachments.
11. Before leaving truck
 - a. Stop truck.
 - b. Put directional control in neutral.
 - c. Apply the parking brake.
 - d. Stop the engine by turning off the key switch.
 - e. Put upright in vertical position and fully lower the forks or attachment.
 - f. Put blocks at the wheels if truck is on an incline.
12. Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, guards, safety devices, and frame members must be carefully and regularly inspected and maintained in a safe operating condition.
13. Special trucks or devices designed and approved for hazardous area operation must receive special attention to ensure that maintenance preserves the original, approved, safe-operating features.
14. Fuel systems must be checked for leaks and condition of parts. Extra special consideration must be given in the case of a leak in the fuel system. Action must be taken to prevent the use of the truck until the leak has been corrected.
15. The truck manufacturer's capacity, operation, and maintenance instruction plates, tags, or decals must be maintained in legible condition.
16. Batteries, motors, controllers, limit switches, protective devices, electrical conductors, and connections must be inspected and maintained in conformance with good practice. Special attention must be paid to the condition of electrical insulation.
17. To avoid injury to personnel or damage to the equipment, consult the manufacturer's procedures in replacing contacts on any battery connection.
18. Industrial trucks must be kept in a clean condition to minimize fire hazards and help in the detection of loose or defective parts.
19. Modifications and additions that affect capacity and safe truck operation must not be done without the

manufacturer's prior written approval. Capacity, operation and maintenance instruction plates, tags, or decals must be changed accordingly. This is an OSHA requirement.

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

21. Use special care when removing heavy components from the truck, such as counterweight, seat deck, upright, etc. Be sure that lifting and handling equipment is of the correct capacity and in good condition. Also, this removal may upset the stability of the truck. The frame must always be safely blocked for major component removal.

NOTE

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

ASME B56.1 - 1988: Operator Control-Industrial Tow Tractors (Safety Standard For Powered Industrial Trucks). Published by: American Society of Mechanical Engineers, Three Park Avenue, New York, NY10016.

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

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

Section 2

Lifting, Jacking, and Blocking

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**WARNING**

Lifting or jacking any large piece of equipment such as a fork truck presents obvious hazards. It must be done with great care and forethought. Consult the truck weight information in Group 40, Specifications, to ensure that your lifting equipment is of adequate capacity.

! CAUTION

To perform these service procedures, first:

- . Park truck on a level surface.
- . Put the upright in a vertical position and lower the carriage fully down.
- . Return control handle to neutral and turn key switch OFF.

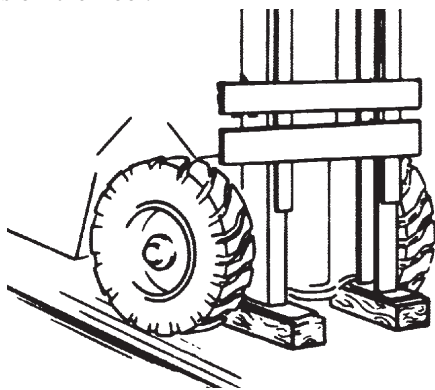
! WARNING

Defective equipment can cause accidents. All tools and lifting equipment must be in good condition, meet the load capacity requirements and have OSHA labels when required. Tools with defects can fail, causing severe injury or death.

Raising Drive Wheels

This procedure uses the upright to lift the drive wheels off the floor.

1. Park the truck safely.
2. Turn key switch ON. Tilt the upright fully back.
3. Put a solid 100 x 100 mm (4 x 4 inch) hardwood block under the front section of each upright rail. Put a 3.6 mm (0.125-0.250 inch) steel plate on top of each block.
4. Tilt the upright fully forward. This will raise the drive wheels off the floor.



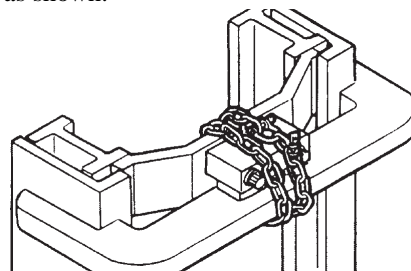
5. Block the truck under the frame behind the drive wheels with solid blocking.
6. Turn key switch OFF.
7. Check for safe clearance between drive wheels, block and floor.
8. Check the stability of the truck. Be sure that the blocks are located securely under the frame before operating the drive motor or working on truck.

9. Lower the drive wheels to the floor by reversing this procedure.
 - . Turn key switch ON.
 - . Tilt upright fully back.
 - . Turn key switch OFF.
10. Remove the blocks from under the frame and upright rails.

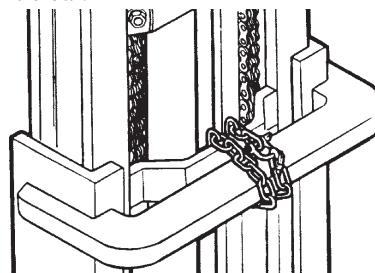
Chaining the Upright in Raised Position

This procedure provides safe 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.

! WARNING

Keep hands, tools, etc. out of upright.

Raising Rear of Truck

The truck may be raised at the rear by jacking and blocking under the frame just beyond the counterweight.

Refer to truck data plate for truck weights.

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.

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 frame just beyond the counterweight.

WARNING

Never lift the truck by the counterweight.



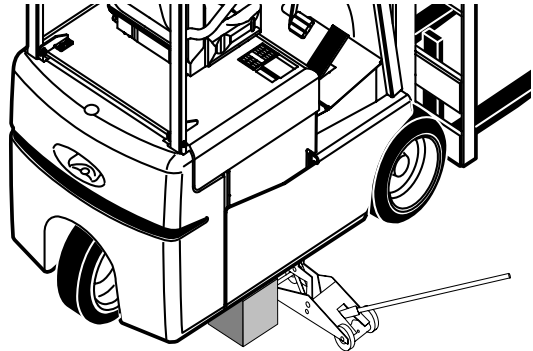
NOTE

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 under-clearance.

4. Jack up one side of the truck about 50 mm (2 in) and put a block under the frame to hold that elevation. Then move the jack to the other side and jack and block it. Continue to alternate the procedure from

side to side, increasing elevation not more than 50 mm (2 in) each time. Raise the truck no higher than necessary to perform the maintenance work.

Make sure the left and right sides of the truck are finally blocked in a level working position.



CAUTION

Before performing any maintenance work, check the truck for stable condition on the blocking by determining that it will not rock on blocks.

5. 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.

Group SA, Safe Maintenance

CLARK

Raising Entire Truck

Refer to truck data plate for truck weights.

1. Park truck safely. Lower upright fully. If necessary, drive truck onto boards to increase under-clearance.

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 drive axle 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 drive axle removal. The back of the truck must be supported by blocking under the steer axle to prevent movement.

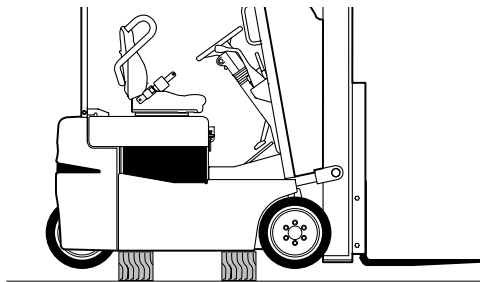
If the counterweight is removed while the truck is up on blocks, the weight of the upright and drive axle will cause the truck to fall forward.

2. 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.

3. 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.
4. 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.
5. If using one jack, lower the truck onto the blocks and move the jack to the opposite side. Repeat the lifting procedure.
6. Put the same size blocks under each side of the truck so it will be leveled.



CAUTION

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

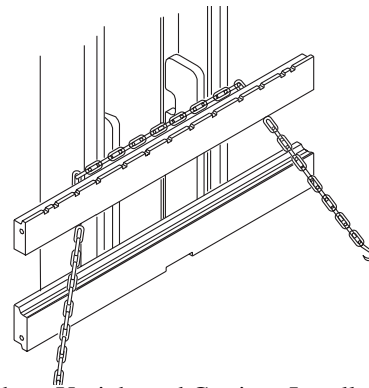
7. When maintenance work is completed, lower the entire truck to the floor by reversing this procedure. Lower the truck one side at a time, while carefully removing the blocks. Be sure no tools or equipment are under the truck or wheels.

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 the toe-pin in top of counterweight.