

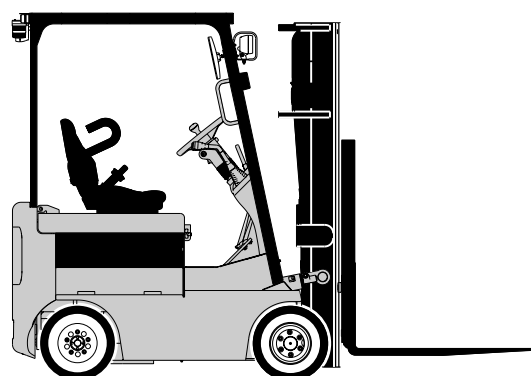
# TMG 12-25 TMG13-20X EPG 15-18

---

## SERVICE MANUAL

**TMG 12-25**  
**RATED CAPACITY : 1250 – 2270 KG**

**EPG 15-18**  
**RATED CAPACITY : 1500 – 1800 KG**



**Part No. 8026067**  
**Book No. SM-616**  
REV.2  
Dec. 2002

---

Manufactured by

**CLARK** **Material Handling**  
**Asia**

Copyrighted Material  
Intended for CLARK dealers only  
Do not sell or distribute

#40-1, Ungnam-Dong,  
Changwon-City, Kyungnam,  
Korea

Dec. 2002

When new or revised information is published to update this manual the action to be taken with the pages is indicated in the table.

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

Mark	Indication	Action required
○	Page to be newly added	Add
●	Page to be replaced	Replace
( )	Page to be deleted	Discard

Mark	Page	Revision number	Mark	Page	Revision number	Mark	Page	Revision number	Mark	Page	Revision number
	SA-1-1			12-1-8		○	13-1-37		○	13-3-26	
	SA-1-2	①				○	13-1-38		○	13-3-27	
	SA-2-1			13-1-1		○	13-1-39		○	13-3-28	
	SA-2-2		●	13-1-2	②	○	13-1-40		○	13-3-29	
	SA-2-3		●	13-1-3	②	○	13-1-41		○	13-2-30	
	SA-2-4		●	13-1-4	②	○	13-1-42		○	13-3-31	
	SA-3-1		●	13-1-5	②	○	13-1-43		○	13-3-32	
	SA-3-2		●	13-1-6	②	○	13-1-44		○	13-3-33	
			●	13-1-7	②	○	13-1-45		○	13-3-34	
	PS-1-1		●	13-1-8	②		13-2-1		○	13-3-35	
	PS-1-2		●	13-1-9	②		13-2-2		○	13-3-36	
●	PS-1-3	①	●	13-1-10	②		13-2-3		○	13-3-37	
○	PS-1-3-1		●	13-1-11	②		13-2-4		○	13-3-38	
	PS-1-4		●	13-1-12	②		13-3-1		○	13-3-39	
	PS-1-5		●	13-1-13	②	●	13-3-2	②	○	13-3-40	
	PS-1-6		●	13-1-14	②	●	13-3-3	②	○	13-3-41	
	PS-2-1		●	13-1-15	②	●	13-3-4	②	○	13-3-42	
	PS-2-2		●	13-1-16	②	●	13-3-5	②	○	13-3-43	
	PS-2-3		●	13-1-17	②	●	13-3-6	②	○	13-3-44	
	PS-2-4		●	13-1-18	②	●	13-3-7	②	○	13-3-45	
	PS-2-5		●	13-1-19	②	●	13-3-8	②	○	13-3-46	
	PS-2-6		●	13-1-20	②	●	13-3-9	②	○	13-3-47	
	PS-2-7		●	13-1-21	②	●	13-3-10	②	○	13-3-48	
	PS-2-8		●	13-1-22	②	●	13-3-11	②	○	13-3-49	
	PS-2-9		●	13-1-23	②	●	13-3-12	②	○	13-3-50	
	PS-2-10		●	13-1-24	②	●	13-3-13	②	○	13-3-51	
●	PS-2-11	①	●	13-1-25	②	●	13-3-14	②	○	13-3-52	
	PS-2-12		●	13-1-26	②	●	13-3-15	②	○	13-3-53	
	PS-3-1		○	13-1-27		●	13-3-16	②	○	13-3-54	
	PS-3-2		○	13-1-28		●	13-3-17	②	○	13-3-55	
			○	13-1-29		●	13-3-18	②	○	13-3-56	
	12-1-1		○	13-1-30		●	13-3-19	②	○	13-3-57	
	12-1-2		○	13-1-31		●	13-3-20	②	○	13-3-58	
	12-1-3		○	13-1-32		●	13-3-21	②	○	13-3-59	
	12-1-4		○	13-1-33		●	13-3-22	②	○	13-3-60	
	12-1-5		○	13-1-34		●	13-3-23	②	○	13-3-61	
	12-1-6		○	13-1-35		○	13-3-24		○	13-3-62	
	12-1-7		○	13-1-36		○	13-3-25		○	13-3-63	

# REVISION HISTORY

# CLARK

Mark	Page	Revision number	Mark	Page	Revision number	Mark	Page	Revision number	Mark	Page	Revision number
○	13-3-64			16-5-8			19-3-5			19-4-28	①
○	13-3-65						13-3-6			19-4-29	①
○	13-3-66			17-1-1			13-3-7			19-4-30	①
	13-4-1	①		17-1-2			19-3-8			19-4-31	①
	13-4-2	①		17-1-3			19-3-9			19-4-32	①
	13-4-3	①		17-1-4			19-3-10		○	19-4-33	
	13-4-4	①					19-3-11			19-5-1	
●	13-4-5	②		19-1-1			19-3-12			19-5-2	
●	13-4-6	②	●	19-1-2	①		19-3-13				
	13-5-1			19-1-3			19-3-14			20-1-1	
	13-5-2			19-1-4		○	19-3-15			20-1-2	
	13-5-3			19-1-5		○	19-3-16			20-2-1	
	13-5-4			19-1-6		○	19-3-17			20-2-2	
				19-1-7		○	19-3-18			20-3-1	
	16-1-1			19-1-8		○	19-3-19			20-3-2	
	16-1-2	①		19-2-1		○	19-3-20			20-4-1	
	16-1-3	①		19-2-2			19-4-1			20-4-2	
●	16-1-4	①		19-2-3			19-4-2	①		20-5-1	
	16-2-1			19-2-4			19-4-3	①		20-5-2	
	16-2-2			19-2-5			19-4-4	①		20-5-3	
	16-2-3			19-2-6			19-4-5	①		20-5-4	
	16-2-4			19-2-7			19-4-6	①		20-5-5	
	16-3-1			19-2-8			19-4-7	①		20-5-6	
	16-3-2			19-2-9			19-4-8	①		20-5-7	
	16-3-3			19-2-10			19-4-9	①		20-5-8	
	16-3-4			19-2-11			19-4-10	①		20-5-9	
	16-3-5			19-2-12			19-4-11	①		20-5-10	
	16-3-6			19-2-13			19-4-12	①		20-5-11	
	16-4-1			19-2-14			19-4-13	①		20-5-12	
	16-4-2			19-2-15			19-4-14	①		20-5-13	
●	16-4-3	①		19-2-16			19-4-15	①		20-5-14	
	16-4-4			19-2-17			19-4-16	①		20-5-15	
	16-4-5			19-2-18			19-4-17	①		20-5-16	
	16-4-6			19-2-19			19-4-18	①		20-5-17	
	16-4-7			19-2-20			19-4-19	①		20-5-18	
	16-4-8			19-2-21			19-4-20	①			
	16-5-1			19-2-22			19-4-21	①	●	22-1-1	②
●	16-5-2	①		19-2-23			19-4-22	①		22-1-2	
	16-5-3			19-2-24			19-4-23	①		22-2-1	
	16-5-4			19-3-1			19-4-24	①	●	22-2-2	①
	16-5-5			19-3-2			19-4-25	①		22-2-3	
	16-5-6			19-3-3			19-4-26	①	●	22-2-4	①
	16-5-7			19-3-4			19-4-27	①		22-2-5	

Mark	Page	Revision number	Mark	Page	Revision number	Mark	Page	Revision number	Mark	Page	Revision number
	22-2-6		●	25-4-2	①		25-13-3			32-3-1	
	22-2-7		●	25-5-1	①					32-3-2	
	22-2-8		●	25-5-2	①		29-1-1			32-3-3	
	22-2-9			25-5-3			29-1-2			32-3-4	
	22-2-10		●	25-5-4	①	●	29-1-3	①		32-4-1	
				25-5-5		●	29-1-4	①		32-4-2	
	23-1-1			25-5-6		●	29-1-5	①		34-4-3	
	23-1-2			25-5-7			29-1-6			34-4-4	
	23-2-1		○	25-5-8		●	29-1-7	①			
	23-2-2		○	25-5-9		○	29-1-8		●	34-1-1	②
	23-3-1		○	25-5-10		○	29-1-9		●	34-1-2	②
	23-3-2		○	25-5-11			29-2-1		●	34-1-3	②
	23-3-3		○	25-5-12			29-2-2		●	34-1-4	②
	23-3-4		○	25-5-13		●	29-2-3	①		34-1-5	
	23-3-5		○	25-5-14			29-2-4		●	34-1-6	②
	23-3-6		○	25-5-15			29-3-1			34-2-1	
	23-4-1		○	25-5-16			29-3-2		●	34-2-2	②
	23-4-2		○	25-5-17			29-3-3		●	34-2-3	②
	23-4-3		●	25-6-1	①		29-3-4			34-2-4	①
	23-4-4			25-6-2			29-4-1			34-3-1	①
	23-5-1			25-6-3			29-4-2			34-3-2	①
	23-5-2			25-6-4			29-4-3		●	34-3-3	②
	23-6-1		●	25-6-5	①		29-4-4			34-3-4	①
	23-6-2			25-6-6			29-5-1		●	34-3-5	②
	23-6-3			25-6-7		●	29-5-2	①	●	34-3-6	②
	23-6-4			25-6-8			29-5-3		●	34-3-7	②
			●	25-7-1	①		29-5-4		●	34-3-8	②
●	25-1-1	①		25-7-2			29-5-5			34-3-9	①
●	25-1-2	①		25-7-3			29-5-6		●	34-3-10	②
●	25-1-3	①		25-7-4			29-6-1		●	34-4-1	②
●	25-1-4	①	●	25-8-1	①		29-6-2		●	34-4-2	②
●	25-2-1	①		25-8-2			29-6-3		●	34-4-3	②
	25-2-2		○	25-9-1			29-6-4		●	34-4-4	②
●	25-3-1	①	○	25-9-2			29-6-5		●	34-4-5	②
	25-3-2		○	25-10-1			29-6-6		●	34-4-6	②
	25-3-3		○	25-10-2			29-6-7		●	34-4-7	②
	25-3-4		○	25-10-3			29-6-8		●	34-4-8	②
	25-3-5		○	25-11-1					●	34-4-9	②
	25-3-6		○	25-11-2			32-1-1			(34-4-10)	
	25-3-7		○	25-11-3			32-1-2		●	34-5-1	②
	25-3-8		○	25-12-1			32-2-1	①	●	34-5-2	②
	25-3-9		○	25-12-2			32-2-2		●	34-5-3	②
	25-3-10		○	25-13-1			32-2-3		●	34-5-4	②
	25-4-1		○	25-13-2			32-2-4			34-5-5	①

# REVISION HISTORY

# CLARK

Mark	Page	Revision number	Mark	Page	Revision number	Mark	Page	Revision number	Mark	Page	Revision number
●	34-5-6	②									
●	34-6-1	②									
	34-6-2	①									
	34-6-3	①									
	34-6-4	①									
●	34-6-5	②									
●	34-6-6	②									
	34-6-7	①									
●	34-6-8	②									
	34-7-1	①									
●	34-7-2	②									
	34-7-3	①									
	34-7-4	①									
	34-8-1	①									
	34-8-2	①									
	34-8-3	①									
●	34-8-4	②									
●	38-1-1	②									
	38-1-2										
●	38-2-1	①									
●	38-2-2	①									
●	38-3-1	①									
	38-3-2										
	38-4-1										
●	38-4-2	②									
	40-1-1										
●	40-1-2	②									
●	40-1-3	②									
	40-1-4	①									
	40-1-5										
	40-1-6										
	40-1-7										
	40-1-8										
	40-2-1										
●	40-2-2	②									
●	40-2-3	②									
●	40-2-4	①									
●	40-2-5	②									
	40-2-6										
	40-3-1										
	40-3-2										

---

## Arrangement and Use of this Manual

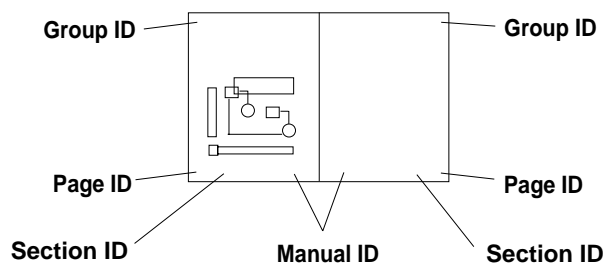
Clark arranges parts and service procedures by standardized *Groups*. In this manual, Groups are similar to “Chapter.” Groups are listed in the table of contents on the next page.

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 showing the topics contained within the Section.

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, year/month and the revision number. 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 year/month represent the issued or revised one such as April 98. The revision number indicates the revised frequency such as ①, ② .... If not depicted, the page has not been revised.

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.

## 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:

- |           |  |   |
|-----------|--|---|
| <b>SA</b> | <b>SAFE MAINTENANCE</b> <ol style="list-style-type: none"><li>1. Safety</li><li>2. Lifting, Jacking, and Blocking</li><li>3. Towing</li></ol>  | <ol style="list-style-type: none"><li>4. Brake Removal and Replacement</li><li>5. Parking Brake R&amp;R and Adjustment</li><li>6. Brake Overhaul</li></ol>  |
| <b>PS</b> | <b>PERIODIC SERVICE</b> <ol style="list-style-type: none"><li>1. Maintenance Schedules</li><li>2. Planned Maintenance</li><li>3. PM Inspection Form</li></ol>  |   |
| <b>12</b> | <b>BATTERY</b> <ol style="list-style-type: none"><li>1. Battery Service</li></ol>  |   |
| <b>13</b> | <b>WIRING, SWITCHES, AND INSTRUMENTS</b> <ol style="list-style-type: none"><li>1. Schematic Diagrams</li><li>2. General Electrical Service Tips</li><li>3. Wiring and Cables</li><li>4. Switches and Sensors</li><li>5. Instrument Panel</li></ol>       |   |
| <b>16</b> | <b>ELECTRIC MOTORS</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Troubleshooting</li><li>3. Drive Motors Overhaul</li><li>4. Lift Pump Motor Overhaul</li><li>5. Steering Pump Motor Overhaul</li></ol>         |   |
| <b>17</b> | <b>CONTACTORS</b> <ol style="list-style-type: none"><li>1. Specifications and Overhaul</li></ol>   |   |
| <b>19</b> | <b>MOTOR CONTROLS</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Sequence of Operations</li><li>3. Handset Operation</li><li>4. Diagnostic Status Codes</li><li>5. Controllers Removal and Replacement</li></ol> |   |
| <b>20</b> | <b>DRIVE AXLE</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Fluid Check and Change</li><li>3. Troubleshooting</li><li>4. Drive Axle Removal and Installation</li><li>5. Drive Axle Overhaul</li></ol>           |   |
| <b>22</b> | <b>WHEELS AND TIRES</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Wheels &amp; Tires Mounting and Maintenance</li></ol>   |   |
| <b>23</b> | <b>BRAKE SYSTEM</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Fluid Check, Fill, and Bleed</li><li>3. Pedal and Master Cylinder Removal, Replacement, and Adjustment</li></ol>                                  |   |
|           |  | <b>25/26</b> <b>STEER SYSTEM</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Troubleshooting</li><li>3. Column Removal and Replacement</li><li>4. Relief Pressure Check and Adjustment</li><li>5. Steering Gear Overhaul</li><li>6. Steer Axle Service</li><li>7. Steer Cylinder Overhaul</li><li>8. Steer Pump Overhaul</li></ol>   |
|           |  | <b>29/30</b> <b>HYDRAULIC SYSTEM</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Fluids and Filters</li><li>3. Troubleshooting</li><li>4. Pressure Checks and Adjustments</li><li>5. Main Pump Removal and Overhaul</li><li>6. Main Control Valve Removal and Overhaul</li></ol>   |
|           |  | <b>32</b> <b>TILT CYLINDERS</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Checks and Adjustments</li><li>3. Removal and Installation</li><li>4. Overhaul</li></ol>   |
|           |  | <b>34</b> <b>UPRIGHTS</b> <ol style="list-style-type: none"><li>1. Upright Specifications and Description</li><li>2. Trouble shooting</li><li>3. Upright Inspection</li><li>4. Carriage and Upright Roller Clearance Checks and Shim Adjustment</li><li>5. Cylinder Removal, Shimming, Overhaul and Replacement</li><li>6. Upright Chain Inspection, Adjustment and Installation</li><li>7. Fork and Carriage Removal and Installation</li><li>8. Upright Removal and Replacement</li></ol> |
|           |  | <b>38</b> <b>COUNTERWEIGHT AND CHASSIS</b> <ol style="list-style-type: none"><li>1. Specifications and Description</li><li>2. Counterweight Removal and Installation</li><li>3. Overhead Guard Removal and Installation</li><li>4. Floor Plate, Seat, and Seat Deck R&amp;R</li></ol>   |
|           |  | <b>40</b> <b>SPECIFICATIONS</b> <ol style="list-style-type: none"><li>1. Nameplate and Decals</li><li>2. Specifications</li><li>3. Hydraulic Fitting Tightening Procedure</li></ol>   |

---

## Alphabetical Listing of Topics

(Contents are listed by order of Group and Section numbers on previous page.)

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

Battery Service .....	12-1	Lift Pump Motor Overhaul .....	16-4
Brake Fluid Check, Fill, and Bleed .....	23-2	Maintenance Schedules .....	PM-1
Brake Overhaul .....	23-6	Motors Specifications and Description .....	16-1
Brake Removal and Replacement .....	23-4	Motors Troubleshooting .....	16-2
Brake System Specifications and Description .....	23-1	Nameplate and Decals .....	40-1
Carriage and Upright Roller Clearance Checks and Shim Adjustments .....	34-1	Overhead Guard Removal and Installation .....	38-3
Column Removal and Replacement .....	25/26-3	Parking Brake R&R and Adjustment .....	23-5
Contactors .....	17-1	Pedal and Master Cylinder R&R and Adjustment .....	23-3
Contactors Specifications and Description .....	17-1	Planned Maintenance .....	PM-2
Controllers Removal and Replacement .....	19-5	PM Inspection Form .....	PM-3
Controllers Specifications and Description .....	19-1	Safety .....	SA-1
Counterweight Removal and Installation .....	38-2	Schematic Electrical Diagrams .....	13-1
Counterweight Specifications and Description .....	38-1	Seat and Seat Deck Removal and Replacement .....	38-4
Cylinder Removal, Shimming, Overhaul, and Replacement .....	34-5	Sequence of Operations .....	19-2
Diagnostic Status Codes .....	19-4	Specifications and Description .....	25/26-1
Drive Axle Fluid Check and Change .....	20-2	Specifications for Entire Truck .....	40-2
Drive Axle Overhaul .....	20-5	Steer Axle Service .....	25/26-6
Drive Axle Removal and Installation .....	20-4	Steer Cylinder Overhaul .....	25/26-7
Drive Axle Specifications and Description .....	20-1	Steer Pump Overhaul .....	25/26-8
Drive Axle Troubleshooting .....	20-3	Steering Gear (Valve) Overhaul .....	25/26-5
Drive Motors Overhaul .....	16-3	Steering Pump Motor Overhaul .....	16-5
Electrical Service Tips .....	13-2	Steering Relief Pressure Check and Adjust .....	25/26-4
Floor Plate Removal and Replacement .....	38-4	Switches and Sensors .....	13-4
Fork and Carriage Removal and Installation .....	34-7	Tilt Cylinders Checks and Adjustments .....	32-2
Handset Operation .....	19-3	Tilt Cylinders Overhaul .....	32-4
Hydraulic Control Valve Overhaul .....	29/30-6	Tilt Cylinders Removal and Installation .....	32-3
Hydraulic Fitting Tightening Procedure .....	40-3	Tilt Cylinders Specifications and Description .....	32-1
Hydraulic Fluids and Filters .....	29/30-2	Towing .....	SA-3
Hydraulic Pressure Checks and Adjustments .....	29/30-4	Troubleshooting .....	25/26-2/34-2
Hydraulic Lift Pump Overhaul .....	29/30-5	Upright Chain Inspection, Adjustment and Installation .....	34-6
Hydraulic Specifications and Description .....	29/30-1	Upright Inspection .....	34-3
Hydraulic System Troubleshooting .....	29/30-3	Upright Removal and Replacement .....	34-8
Instrument Panel .....	13-5	Upright Specifications and Description .....	34-1
Jacking and Blocking .....	SA-2	Wheels & Tires Mounting and Maintenance .....	22-1
Lift Chain Inspection and Service Guidelines .....	34-2	Wheels & Tires Specifications and Description .....	22-1
		Wiring and Cables .....	13-3



**GROUP SA**

**SAFE MAINTENANCE**

**Safety ..... Section 1**

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

**Towing ..... Section 3**

---

NOTES:

## 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

## Group SA, Safe Maintenance

---

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, NY 10016.

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**

Raising Drive Wheels ..... 2

Chaining the Upright in Raised Position ..... 2

Raising Rear of Truck ..... 3

Raising Entire Truck ..... 4

Shipping Tie-Down Instructions ..... 4

 **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.

## Group SA, Safe Maintenance

### 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.

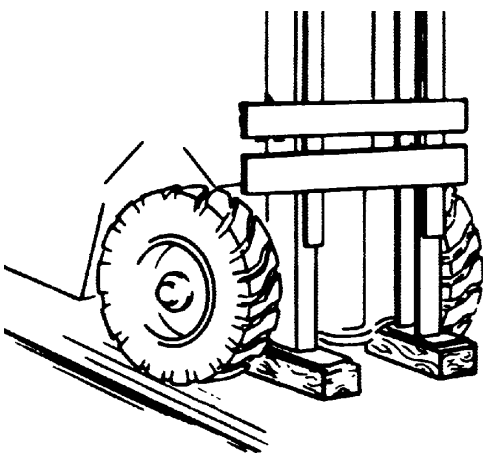
### WARNING

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.



*Blocking a Typical Upright*

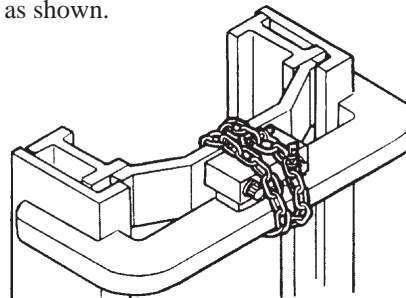
5. Block the truck under the frame behind the drive wheels with solid blocking.
6. Turn key switch OFF.

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.

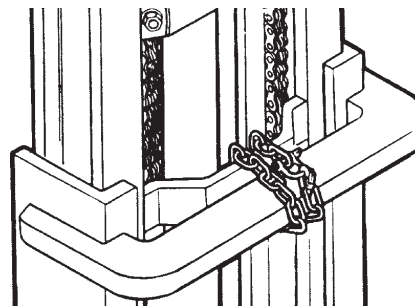
## Chaining the Upright in Raised Position

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.**

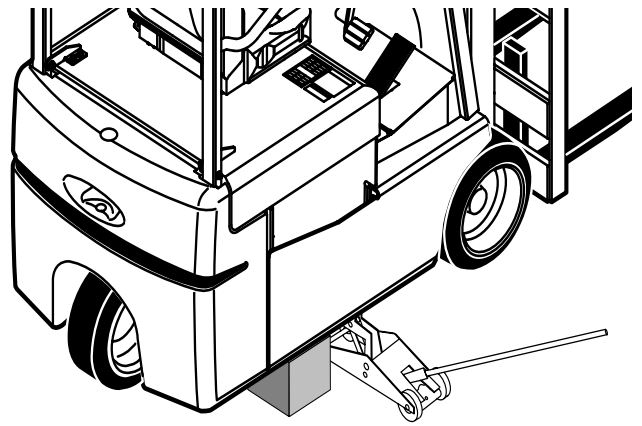


### NOTE

**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

### 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.

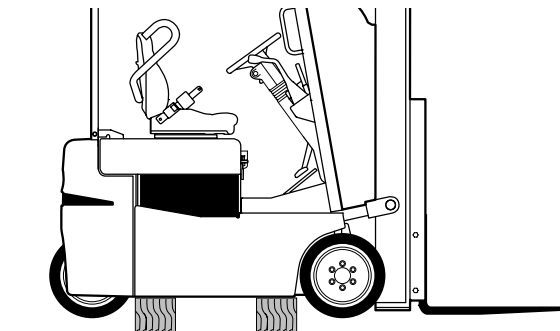
If the counterweight is removed while the truck is up on blocks, the weight of the upright and drive axle will cause the truck to fall forward.

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.

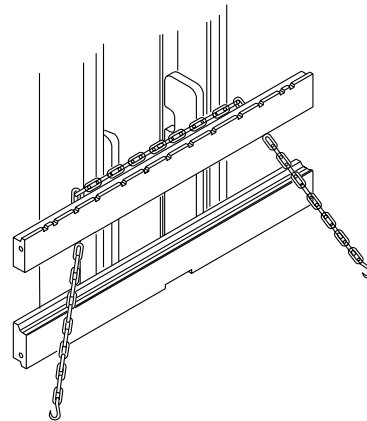
7. When maintenance work is completed, lower the entire truck to the floor by reversing this procedure. Lower the truck one side at a time, while carefully removing the blocks. Be sure no tools or equipment are under the truck or wheels.

#### **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.



## Section 3. Towing

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

### **!** WARNING

**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.**

**Do not tow a lift truck if there is a problem with the brakes or tires, or if the steering cannot be operated.**

**Do not tow the disabled truck up or down ramps or steep inclines.**

**Do not attempt to tow the disabled truck if traction or weather conditions are poor.**

1. Be sure to apply the parking brake or block the drive wheels on the disabled truck while working around it.
2. When possible, raise the carriage (forks) on the disabled truck 300 mm (12 in) from the floor or ground. Secure the carriage on the upright with a chain.
3. Use a truck for towing that is of equal or larger capacity than the disabled truck. Carry a partial load on the tow truck for improved traction.
4. Check that the counterweight bolts on both trucks are in place and properly torqued. These bolts are made of special, high-tensile steel and are not commercially available. When necessary, replace these bolts only with a genuine Clark replacement part.
5. Use an approved, solid metal tow bar with towing couplers that connect to the towing pins in the counterweights.

### NOTE

**DOT-approved towing equipment is available from your Clark dealer.**

6. Release the parking brake on the towed vehicle. Place directional control lever in neutral.
7. Tow the disabled truck backwards. An operator must be on the disabled truck.

### **!** CAUTION

**The power steering and braking will not operate on the disabled truck. The steering handwheel will be difficult to turn and the service brakes will require additional pedal force.**

8. Tow the truck slowly. Careful towing is necessary to prevent injury to personnel or damage to the disabled truck. The truck should be towed at a speed of less than 8 kph (5 mph, or a moderate walking speed) with a driver in place and steering the disabled truck.

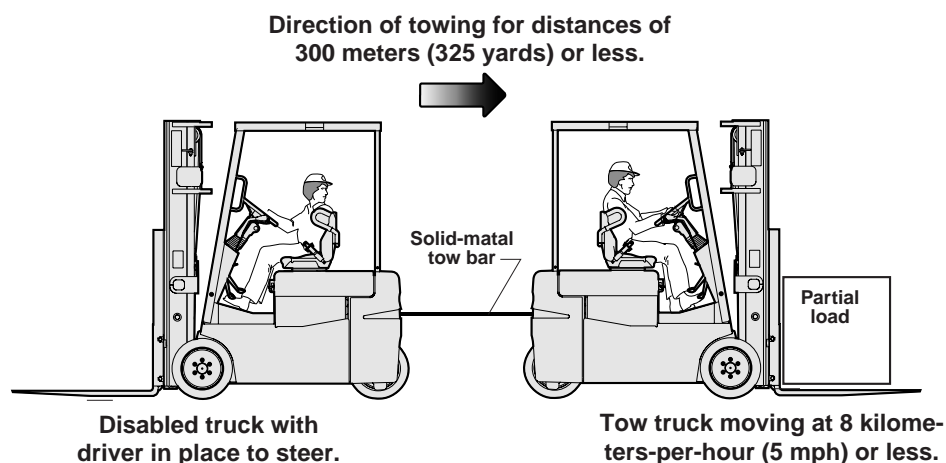
### IMPORTANT

**Do not lift the disabled truck or any wheels off the floor while the truck is being towed.**

9. Park the disabled truck in authorized areas only. Fully lower the forks on the floor, leave the directional control in neutral, turn the key switch to OFF, and engage the parking brake. Remove the key and, when necessary, block the wheels to prevent the truck from rolling.

### **!** WARNING

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





**GROUP PS**

**PERIODIC SERVICE**

**Maintenance Schedule..... Section 1**

**Planned Maintenance Program..... Section 2**

**The PM Inspection Form ..... Section 3**

## **GROUP PS**

---

NOTES: