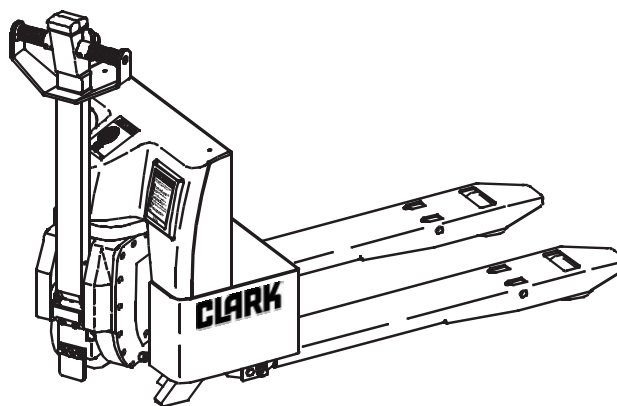

Service Manual

SM698



WP45

CLARK Material Handling
Company

2317 Alumni Park Plaza
Suite 500
Lexington, KY, 40517
USA

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

**Standard Codes**

Standard Codes

- B-Code = Business area
F-Code = Product family
T-Code = Product type
C-Code = Component function

Worksheet standard

- W-Code = Working code
R-Code = Reason code
SO-Code = Assortment

F-Code List

PT Powered Pallet Trucks

T-Code List

No. Model
390 WP45

C-Code List

No	Function Group	C-Code
0	Chassis	0000
1	Motors	1000
2	Drive Gear / Transmission	2000
3	Brake / Wheel System	3000
4	Steering System	4000
5	Electrical System	5000
6	Hydraulic / Pneumatic System	6000
7	Operating Function-lifting Cylinder	7000
8	Peripheral / Installation Equipment	8000

F-code Section C-code

Standard Codes

Version no T-code
000 **390**

9	Optionals / Attachments	9000
10	Tools	10000

Table of Contents

Standard Codes	1
Warning Symbols	11
Warning Levels	11
Prohibitory Symbols	12
Ordinance Symbols	12
Safety	13
General Safety	13
Battery Safety	17
Static Safety	22
Welding Safety	23
Introduction, Service Manual	25
Contents, Section M	27
Machine Information	27
General Product Information	29
Truck Presentation.	29
Truck Side Views	29
Intended Truck Application	30
Prohibited Truck Application	30
Truck Data	30
Truck Dimensions	31
Data Plate	32
Main Components	33
Inch and Metric (SAE) Fasteners	35
Introduction	35
Nomenclature, Threads	36
Strength Identification	37
Conversion of English and Metric Units	44
Technical Service Data	47
Ordering Spare Parts	49
Contents, Section P	51
Planned Maintenance	51
Introduction, Maintenance	53

Table of Contents

Jacking Truck Off The Floor	54
Elevate Rear of Truck	54
Elevate Either Side of Truck	54
Lubricants	55
Standard	55
Corrosion	55
Cold Storage	56
Service Schedule	59
Planned Maintenance Schedule	59
Planned Maintenance Procedures	63
Services Performed Daily or Every 8 Operating Hours	63
Battery Discharge Indicator with lift interrupt (optional)	63
Hydraulic System	63
Frame/Sheet Metal	64
Wheels/Tires	64
Functions/Operations	64
Services Performed Monthly or Every 120 Operating Hours	65
Inspection	65
Transmission	65
Brakes	65
Battery	65
Electrical Connections	66
Main Contactor	66
Motor Brushes	66
Drive Motor	66
Hydraulic Reservoir	66
Frame Lube	67
Pivot Points	67
Services Performed Every 480 or 960 Operating Hours	68
Drive Motor	68
Services Performed Annually or Every 1440 Operating Hours	69
Inspection	69
Transmission	69
Battery	69
Hydraulic System	70
Brakes	70
Lubrication Chart	71
Oil and Grease Specifications	72
Approved Oils and Grease	72
Grease Location Points	72
Contents, Section S	73
Service Instructions	73

Table of Contents

Chassis/Lift Frame	75
Pull rod	76
Removal	76
Inspection	77
Installation	78
Carrier Frame Bushings	80
Inspection Covers	81
General Information	81
Driver Controls	85
Decals	87
Decal with Protective Sheet	87
Decal without Protective Sheet	87
Motor Maintenance Schedule/Troubleshooting	89
General Information	89
Operating Conditions	89
Troubleshooting	90
Pump Motor	97
Mounting Points	97
Removal	97
Installation	97
Pump Motor Repair	98
Disassembly	99
Inspection and Troubleshooting	100
Drive End Head	100
Commutator End Head	100
Bearings	100
Brush Inspection	101
Brush Replacement Determination	101
Replacement Procedures	102
Drive Motor	105
Mounting Points	105
Drive Motor Brush	106
Drive Motor Removal	106
Drive Motor Installation	108
Component Repair	110
Motor Disassembly	112
Motor Inspection	113
External Motor	113
Brush and Commutator	113
Bearings	116

Table of Contents

Armature Electrical Check	116
Frame and Field Service Recommendation	116
Assembly/Testing	117
Transmission	119
System Description	119
Troubleshooting	119
Transmission Mounting	120
Wrap Around Bumper	121
Guards	122
Removal	123
Installation	124
Transmission Repair	125
Disassembly	126
Reassembly	127
Axle Seal	129
Removal	129
Installation	129
Parking Brake System	131
Brake Theory of Operation	132
Brake Adjustment	133
Brake Shoe Removal / Installation	134
Drive Wheel	135
Removal	135
Installation	136
Tire Pressing Procedure	137
Support/Swivel Wheel (Optional)	139
Maintenance and Adjustments	141
Caster Adjustment	141
Troubleshooting	141
Stabilizing Caster	141
Caster Replacement	141
Fork Wheels	143
Removal/Installation	143
Steering	145
Control Handle Head	146
Removal	146
Installation	146
Driver Protection (Reverser) Assembly Replacement	147
Direction Control Switches	149
Removal	149

Table of Contents

Installation	149
Raise, Lower, and Horn Switches	151
Removal	151
Installation	152
Potentiometer	153
Removal	153
Installation	154
Steering Stem	158
Removal	158
Installation	158
Electrical Functions	159
General	159
Adjustable Settings:	159
References	159
Key Switch S17 in the ON Position	159
Operating Arm in Drive Position, S10, Brake Switch Closed	160
Travel Request, Fork First	160
Travel Request, Forks Trailing	160
Reversing/Motor Brake Forks First Direction to Forks Trailing Direction	160
Reversing/Motor Brake Forks Trailing Direction to Forks First Direction	161
Reverser switch	161
Lifting Forks	161
Lowering Forks	161
Horn	162
Lift Interrupt	162
Electrical Symbols	165
Electrical Schematics	169
Battery	173
Removal	173
Installation	173
Battery Maintenance	174
Battery Inspection and Care	174
Battery Exterior Cleaning	175
Charging	175
Storage	176
Battery History Record	176
Swing Out Battery Pack	177
Battery Cable Routing Diagram	179
Charger Diagram	181
Troubleshooting	182
Electrical Testing	182

Table of Contents

Equipment required:	182
Instructions	182
Battery Connector	189
Location	189
Inspection	189
Installation	190
Battery Controller/Hourmeter/ Lift Interrupt (Optional)	191
General Information	191
Electrical	192
Voltage	192
Battery Controller (BC)	193
General Information	193
Discharge Adjustment	193
Reset	195
Key Switch	195
Hourmeter	196
Troubleshooting	196
Battery Discharge Indicator (BDI)	196
No Reset	196
Reset After Break in Power	196
No Discharge, Gauge Does Not Run Down	197
No Lockout	197
No Lift	198
Early Lockout	198
LEDs Do Not Light	198
Hourmeter	199
No Display	199
Hourmeter Glass Icon Does Not Flash	199
Hourmeter Glass Icon Always Flashes	199
Battery Discharge Indicator / Hourmeter	201
General Information	201
Electrical	202
Voltage	202
Battery Discharge Indicator (BDI)	202
General Information	202
Key Switch	202
Hourmeter	203
Troubleshooting	203
Battery Discharge Indicator (BDI)	203
No Reset	203
Reset After Break in Power	204
No Discharge, Gauge Does Not Run Down	204
LEDs Do Not Light	204

Table of Contents

Hourmeter	205
No Display	205
Hourmeter Glass Icon Does Not Flash	205
Hourmeter Glass Icon Always Flashes	205
Start/Stop Switches	207
General	207
Test/Inspection	207
Master Control On/Off Switch (S21)	209
Inspection	209
Removal	209
Installation	209
Transistor Controller	211
Basics Of Circuit Operation	211
Control Features	213
Maintenance	214
Safety	214
Cleaning	214
Motor Circuit	215
Control Circuit	216
Troubleshooting Guidelines	217
General	219
Shorts to Frame Test	220
Definitions	224
Diagnostics and Troubleshooting	225
Handset Diagnostics	225
Troubleshooting	225
Troubleshooting Chart	227
Technical Specification	232
Troubleshooting Chart Using Handset	233
Transistor Controller Troubleshooting	235
Troubleshooting Chart Index	235
Troubleshooting Charts	236
Hydraulic System	247
General	247
Troubleshooting	247
Schematic	249
Description	250
Lift	250
Lower	250
Relief Pressure	250
Maintenance	251
Lift Limit Switch	251

Table of Contents

Hydraulic Pump 253

- Removal 255
- Disassembly 256
- Inspection 257
- Reassembly 258
- Installation 260
- Adjustments 261
 - Relief valve 262
 - Solenoid Operated Valve 262

Lift Cylinder 263

- Cylinder Repair 264
 - Removal 264
 - Disassembly 265
 - Inspection 265
 - Assembly 265
 - Installation 266

Battery Charger, Optima Pack 267

Handset Operation 269

- Operating Modes 272
- Revert to Previous Settings 275
- Handset Self Test 275

Warning Symbols

Always follow the warnings given in this Service Manual and on the truck to avoid accidents and incidents from occurring.

1. Warning Levels

Warning levels

Warning text is given in four levels and provide information on the risks, describe the consequences, and instruct how to avoid accidents.

DANGER

Warns that an accident will occur if the instructions are not followed.

The consequences are serious personal injury or possibly death, and/or extremely large material damage.

WARNING

Warns that an accident can occur if the instructions are not followed.

The consequences are serious personal injury or possibly death, and/or large material damage.

CAUTION

Warns that an accident can occur if the instructions are not followed.

The consequences are personal injury and/or material damage.

NOTE!

Marks the risk of an accident or breakdown if the instructions are not followed.

Prohibitory Symbols

Prohibitory Symbols

**NO SMOKING**

If smoking occurs in situations where a restriction against smoking is stated, a serious accident can occur.

**OPEN FLAMES PROHIBITED**

If open flames are used in situations where open flames are prohibited, a serious accident can occur.

**GENERAL PROHIBITION**

If the prohibition is ignored, a serious accident can occur.

1. Ordinance Symbols

**SAFETY SHOES**

When the directive for safety shoes is given, safety shoes shall always be worn to avoid personal injury.

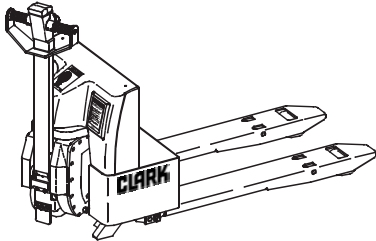
**PROTECTIVE GLASSES**

When the directive for protective glasses is given, protective glasses shall always be worn to avoid personal injury.

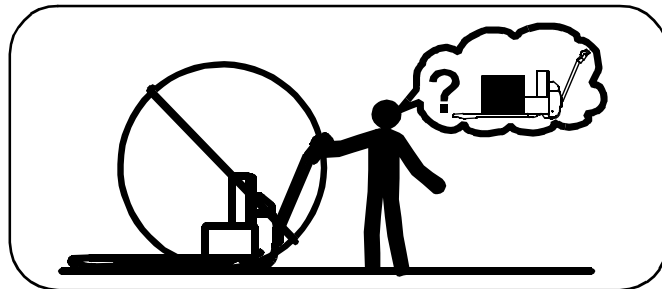
Safety

1. General Safety

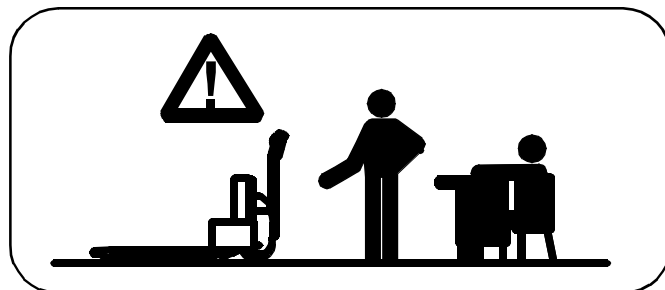
Do **NOT** operate or work on this truck unless trained, qualified, and authorized to do so and have read the Operator's Manual.



Know truck controls and what they do.

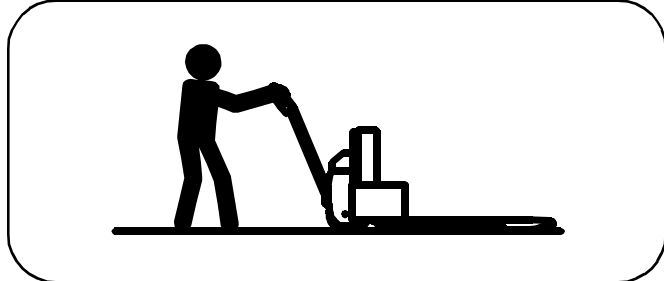


Do **NOT** operate truck if it needs repair or if it is in any way unsafe.

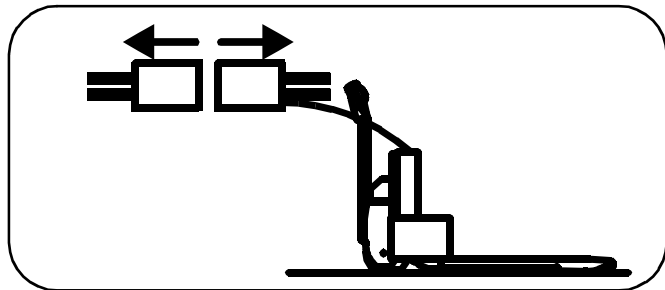


**PT
Safety**

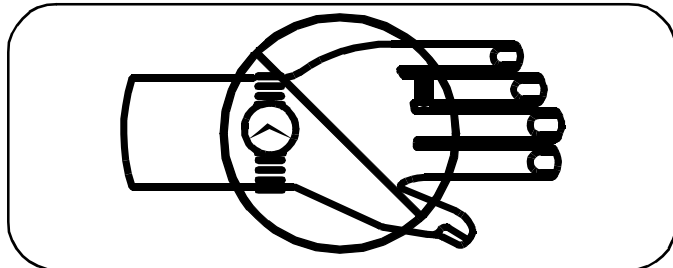
Operate truck only from the position of the Operator.



Before working on this truck always turn key switch to **OFF** and disconnect battery connector from truck (unless this manual states otherwise).



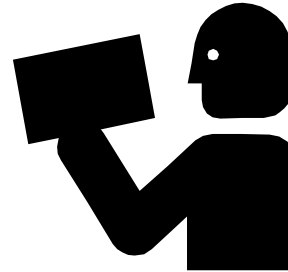
Do **NOT** wear watches, rings, or jewelry when working on truck.



Follow the scheduled lubrication, maintenance, and inspection steps.



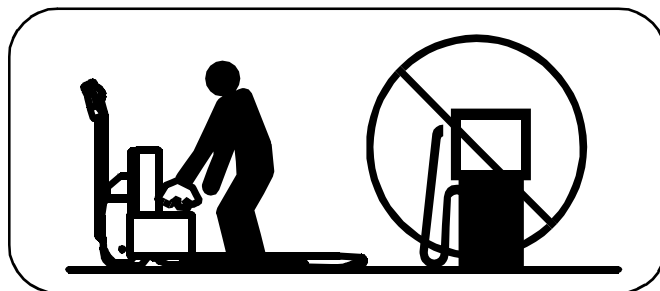
Follow exactly the safety and repair instructions in this manual. Do **NOT** take “shortcuts”.



Do **NOT** Use an open flame near the truck.



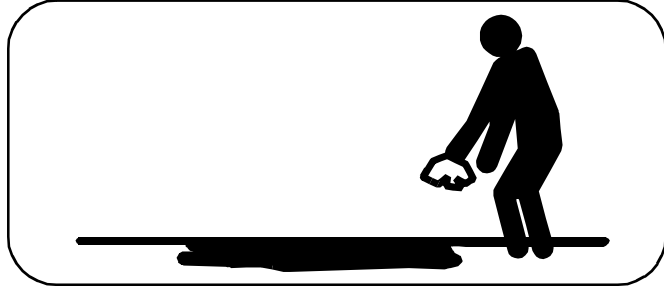
Do **NOT** use gasoline or other flammable liquids for cleaning parts.



PT
SafetyVersion no
000

T-code

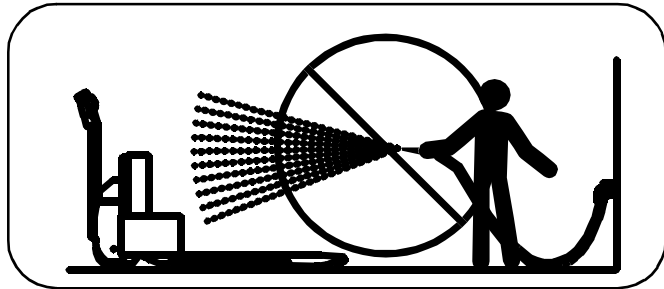
Clean up any hydraulic fluid, oil, or grease that has leaked or spilled on the floor.



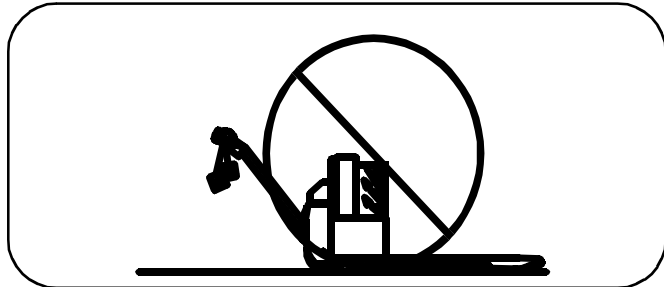
Always operate and park truck indoors.



Do **NOT** wash truck with a hose.



Do **NOT** add to or modify truck without written approval from Clark Material Handling Company.

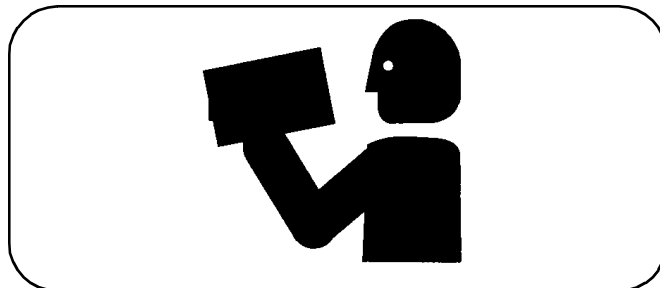


Battery Safety

⚠ WARNING As a battery is being charged, an explosive gas mixture forms within and around each cell. If the area is not properly ventilated, this explosive gas can remain in or around the battery for several hours after charging. Be sure there are no open flames or sparks in the charging area. An open flame or spark can ignite this gas, resulting in serious damage or injury.

⚠ WARNING Battery electrolyte is a solution of sulfuric acid and water. Battery acid causes burns. Should any electrolyte come in contact with clothing or skin, flush the area immediately with cold water. Should the solution get on the face or in the eyes, flush the area with cold water and receive medical attention immediately.

Read, understand and follow procedures, recommendations and specifications in the battery and battery charger manuals from the manufacturer.



F-code

Section

C-code

PT

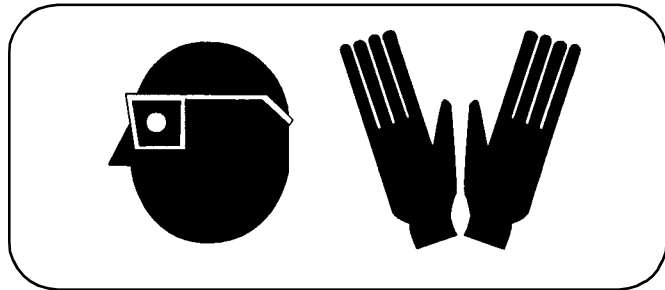
Battery Safety

Version no

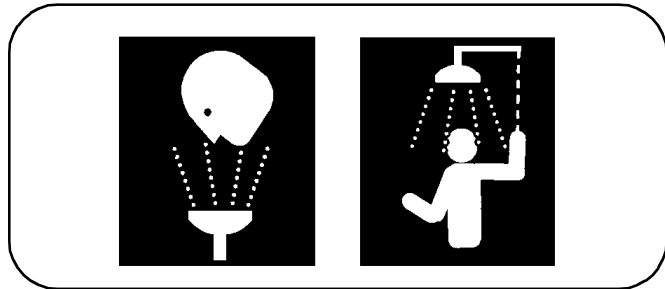
T-code

000

Wear personal protective equipment to protect eyes, face, and skin when checking, handling, or filling batteries. This equipment includes goggles or face shield, rubber gloves (with or without arm shields) and a rubber apron.



Make sure a shower and eyewash station are nearby in case there is an accident.



A battery gives off explosive gases. Never smoke, use an open flame, or use anything that gives off sparks near a battery.

