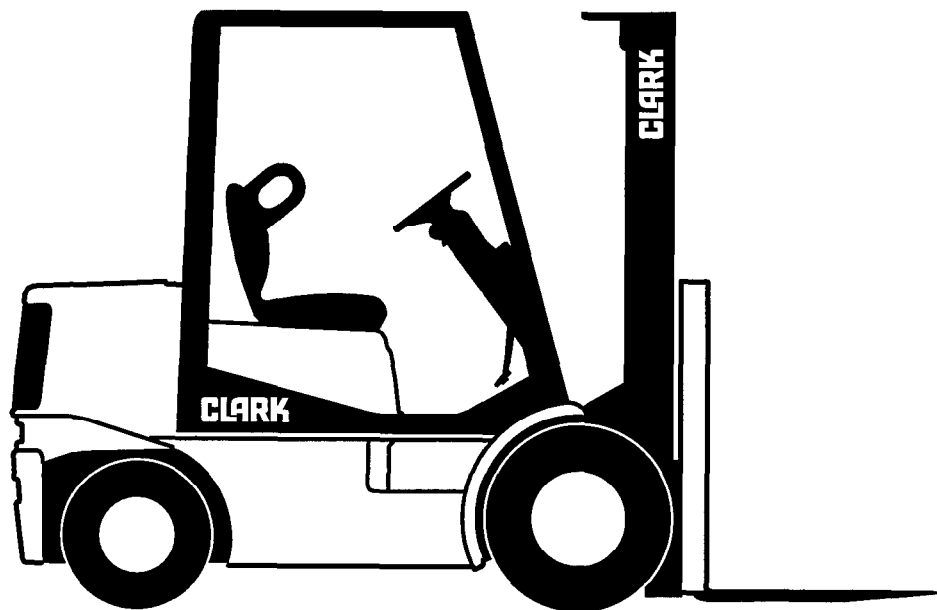


SM-581 E357 SERVICE MANUAL



CLARK

Technical
Publications
Lexington, KY
40508

Copyrighted Material
Intended for CLARK dealers only

Do not sell or distribute

This is the cut pages sample. Download all 297 page(s) at: ManualPlace.com

SM548 SERVICE MANUAL

ECS17-30

CONTENTS

GROUP	PAGE
FOREWORD	ii
HOW TO USE THIS MANUAL	iii
PICTORIAL INDEX	iv
SAFETY AND OPERATIONAL CHECKS	v
RECOMMENDED PLANNED MAINTENANCE AND LUBRICATION SCHEDULE	vi
SAFETY SIGNS AND MESSAGES	vii
USER SAFE MAINTENANCE PRACTICES	viii
GROUP	PAGE
PM Planned Maintenance Program	PM-1
12 Battery Maintenance, Battery Removal	12-01-1
13 Accelerator Control	13-01-1
16 Electric Motor Maintenance	16-01-1
16 Drive Motor	16-02-1
16 Lift Pump Motor	16-03-1
16 Steer Pump Motor	16-04-1
19 SCR Panel Sequence of Operation & Troubleshooting	19-01-1
19 SCR Panel Tests and Procedures	19-02-1
19 SCR Panel Symptom Chart	19-03-1
19 Control Panel	19-04-1
20 Drive Axle	20-01-1
22 Wheels and Tires	22-01-1
23 Brake Bleeding Procedure	23-01-1
25 Steering Gear	25-01-1
26 Power Steering System, Steer Axle	26-01-1
26 Power Steering Pump	26-02-1
29 Hydraulic System, Main Lift Pump	29-01-1
30 Main Hydraulic Valve	30-01-1
32 Tilt Cylinder	32-01-1
34 Upright	34-01-1
38 Counterweight	38-01-1
38 Machine Jacking & Blocking	38-02-1
40 Truck Data Plate and Decals	40-01-1
40 Truck Specifications	40-02-1
40 Hydraulic and Electric Schematics	40-03-1

FOREWORD

Clark Equipment Company welcomes you to the growing group of professional people who own, operate and maintain Clark lift trucks. This manual will familiarize you with service maintenance and overhaul information about your new truck. It has been especially prepared to help you maintain your Clark lift truck in an efficient and safe operating condition.

Regular, correct maintenance and care of your lift truck is not only important for full and efficient truck life; it is essential for your safety. A faulty lift truck is a potential source of danger to the operator, and to other personnel working near it. The importance of maintaining your lift truck in a safe operating condition by servicing it regularly and, when necessary, repairing it promptly cannot be emphasized too strongly.

To assist you in keeping your lift truck in good operating condition, this manual includes an outline of planned maintenance (PM) procedures that are considered essential to the life and safe performance of your truck. Brief procedures for inspections, operational checks, cleaning, lubrication, and adjustments are included for your reference.

Clark recommends that a planned maintenance and safety inspection program (PM) be performed by a trained and authorized mechanic on a regular basis. The PM program provides the opportunity to make thorough inspections and checks on the safe condition of your truck. Necessary adjustments and repairs can be done during the PM, which will increase the life of components and reduce unscheduled downtime. The need for major adjustments, repairs, or replacements is found and corrections made as required; not after failure has occurred.

HOW TO USE THIS MANUAL

This manual is intended to be used by persons who are trained and authorized to do lift truck maintenance. The recommended procedures for routine servicing and adjustments as well as for removal and overhaul of major components of the truck are outlined. It is written to show and describe the adjustment, removal, disassembly, inspection, repair, and assembly steps that are normally required to service these components.

The detailed procedures are arranged in sequence by numbered GROUP and Section. The GROUP numbers are the same as the component group in the Master Parts Book. Each GROUP has its own Table of Contents, so that you can find the various topics within more easily. If you cannot find a topic in the Table of Contents, check the Index at the back of the manual.

Component specifications, information notes and safety messages are included at the proper step of each procedure. To be better prepared to do the necessary service work, please take time to read the entire procedure, including any special instructions, before doing any work.

Specifications of selected truck components are included at the back of the manual for easy reference.

Also refer to the Operator's Manual, located on the truck, for additional information and instructions on the operation and maintenance of your truck.

If you have need for more information on the care and repair of your truck, please contact your authorized Clark dealer.

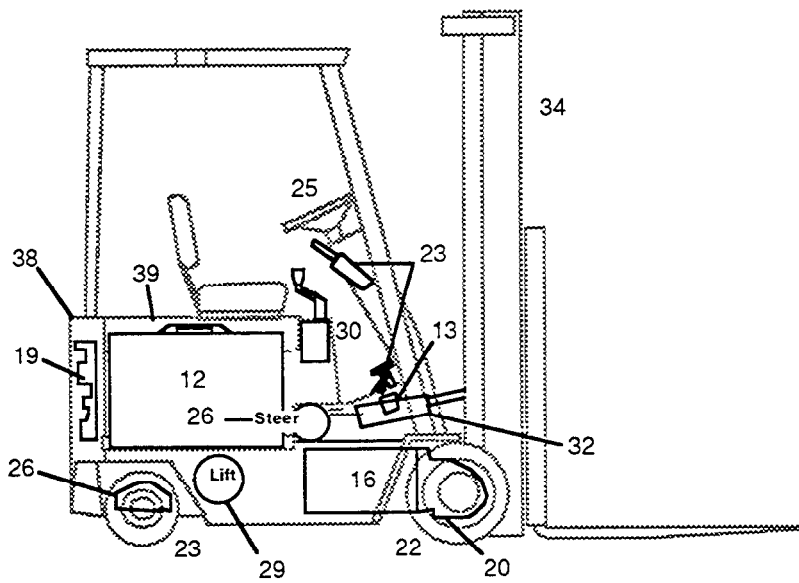
NOTICE - The descriptions and specifications included in this manual were in effect at the time of printing. Clark Equipment Company reserves the right to make improvements and changes in specifications or design, without notice and without incurring obligation. Please check with your authorized CLARK dealer for information on possible updates or revisions.

© Clark Equipment Company 1987

SM548 iii

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

PICTORIAL INDEX



- 12-Battery
- 13-Accelerator Control Assembly
- 16-Motors
- 19-SCR Control
- 20-Drive Axle
- 22-Wheel & Tires
- 23-Brakes
- 25-Power Steering System
- 26-Steer Axle
- 29-Lift Pump
- 30-Hydraulic Valve
- 32-Tilt Cylinder
- 34-Upright & Carriage
- 38-Counterweight

SAFETY AND OPERATIONAL CHECKS

PM Interval:

A = 8 - 10 hours, or daily

B = 50 - 250 hours, or every month

C = 450 - 500 hours, or every 3 months

D = 900 - 1000 hours, or every 6 months

E = 2000 hours, or every year

DAILY MAINTENANCE CHECKS	A	B	C	D	E
Check truck for obvious damage and leaks.	•				
Check / clean battery terminals	•				
Check electrolyte level.	•				
Check capacity, warning plates, decals	•				
Check condition of tires and wheels. Remove embedded objects.	•				
Check wheel lug nuts.	•				
Check hydraulic sump oil level.	•				
Check gauges and instruments.	•				
Check warning lights and hourmeter.	•				
Check overhead guard condition and bolts.	•				
Check horn operation and other warning devices.	•				
Check steering operation.	•				
Check service brake operation.	•				
Check parking brake operation.	•				
Check directional and speed controls operation.	•				
Check accelerator	•				
Check lift, tilt, and aux operation.	•				
Check upright, lift chains, and fasteners.	•				
Check load, backrest, extension, and forks	•				

RECOMMENDED PLANNED MAINTENANCE AND LUBRICATION SCHEDULE

PM Interval:

- A = 8 - 10 hours, or daily
- B = 50 - 250 hours, or every month
- C = 450 - 500 hours, or every 3 months
- D = 900 - 1000 hours, or every 6 months
- E = 2000 hours, or every year

Notes:

*Replace As Required

Nominal
Maintenance Interval

PERIODIC CHECKS AND PLANNED MAINTENANCE (PM)	A	B	C	D	E
Check truck visually and inspect components		•			
Test drive truck -- Check functional performance		•			
Air clean truck		•			
Check torque on critical fasteners		•			
Lubricate truck (See component)		•			
Clean/check battery terminals, electrolyte level		•			
Check battery cables/ truck receptacle		•			
Perform battery load test		•			
Check drive motor brushes*		•			
Check lift motor brushes*		•			
Check steer motor brushes*		•			
Test ground		•			
Clean drive axle air vent		•			
Check drive axle fluid level		•			
Drain and replace drive axle fluid					•
Check brake condition and wear		•			
Check drive axle mounting and fasteners		•			
Lubricate steer axle linkage		•			
Check/lubricate steer axle wheel bearings					•
Replace hydraulic sump fluid and filter					•
Clean/replace hydraulic sump breather				•	
Lubricate tilt cylinder rod ends		•			
Lubricate upright fittings		•			
Check lift chain adjustment and wear		•			
Check/lubricate lift chains		•			
Lubricate upright rollers		•			

SAFETY SIGNS AND SAFETY MESSAGES

Improper or careless techniques cause accidents. Don't take chances with incorrect or damaged equipment. Read and understand the procedures for safe operation and maintenance outlined in this manual.

STAY ALERT! Follow safety rules, regulations and procedures. Accidents can be avoided by recognizing dangerous procedures or situations before they occur.

DRIVE AND WORK SAFELY and follow the safety signs and their messages displayed on the truck and in this manual.

SAFETY SIGNS and **MESSAGES** are placed in this manual and also on the lift truck to provide instructions and to 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 or death or serious injury to you or other persons may result if these messages are not followed.

NOTICE 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 which can result in personal injury if proper precautions are not taken.

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

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

USER SAFE MAINTENANCE PRACTICES

The following instructions have been prepared from current industry and government safety standards applicable to industrial truck operations 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, and 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, 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 or disconnect power source and use blocks or other positive truck-positioning devices.
 - b) Put blocks under the load engaging means, innermast(s), or chassis before working on them.
 - c) Disconnect battery before working on the electrical system.
8. Before working on engine fuel system of gasoline powered trucks with gravity-feed fuel systems, be sure fuel shutoff valve is closed.

9. Before working on engine fuel system of LP-gas powered trucks, close LP-gas cylinder valve and run engine until there is no more fuel in the system and engine stops running. If engine will not run, close LP-tank valve and vent fuel slowly in a safe area.

10. Operation of the truck to check performance must be conducted in an authorized, safe, clear area.

11. Before Starting To Drive Truck:

- a) Be in operating position.
- b) Disengage clutch on manual transmissions, or apply brake on trucks with powershift transmission and electric trucks.
- c) Put directional control in neutral.
- d) Start engine or turn on power.
- e) Check functioning of lift and tilt systems, directional and speed controls, steering, brakes, warning devices, and any load handling attachments.

12. Before Leaving The Truck:

- a) Stop truck.
- b) Fully lower the load engaging means: upright, carriage, forks, or attachments.
- c) Put directional control in neutral.
- d) Apply the parking brake.
- e) Stop the engine or turn off power.
- f) Turn off the control or ignition circuit.
- g) Put blocks at the wheels, if truck is on an incline.

13. Handle LP-gas cylinders with care. Damage such as dents, scrapes, or gouges may dangerously weaken the tank and make it unsafe for use.

14. Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, lift overload devices, guards and safety devices, lift and tilt mechanisms, articulating axle stops, and frame members must be carefully and regularly inspected and maintained in a safe operating condition.

USER SAFE MAINTENANCE PRACTICES

15. 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.
16. 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.
17. All hydraulic systems must be regularly inspected and maintained in conformance with good practice. Tilt and lift cylinders, valves, and other similar parts must be checked to assure that "drift" or leakage has not developed to the extent that it would create a hazard.
18. When working on hydraulic system, be sure the engine is turned off or battery disconnected on electric trucks, upright is in its fully-lowered position, and hydraulic pressure relieved in hoses and tubing. **WARNING** -- Always put blocks under the carriage and upright rails when necessary to work with upright in an elevated position.
19. The truck manufacturer's capacity, operation and maintenance instruction plates, tags, or decals must be maintained in legible condition.
20. 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.
21. To avoid injury to personnel or damage to the equipment, consult the manufacturer's procedures in replacing contacts on any battery connection.
22. Industrial trucks must be kept in a clean condition to minimize fire hazards and help in the detection of loose or defective parts.
23. 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.
24. 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.
25. When removing tires, follow industry safety practices. Most important, deflate pneumatic tires completely prior to removal. Following assembly of tires on multi-piece rims, use a safety cage or restraining device while inflating.
26. Use special care when removing heavy components from the truck, such as counterweight, upright, etc. Be sure that lifting and handling equipment is of the correct capacity and in good condition.

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

ANSI/ASME B56.1 - 1983: Safety Standard for Low Lift and High Lift Trucks (Safety Code For Powered Industrial Trucks). Published by: Society of Mechanical Engineers, United Engineering Center, 345 E. 47th Street, New York, N.Y. 10017.

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 Industry 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, D.C. 20402.

PM - PLANNED MAINTENANCE PROGRAM

CONTENTS	PG
Visual Inspection	1
Functional Tests	5
Test Drive The Truck	8
Air Cleaning	11
Critical Fastener Torque Checks	11
Lubrication, Fluids and Filters	12

A planned maintenance program of regular, routine inspections and lubrication is important for long life and trouble-free operation of your lift truck. Make and keep records of your inspections. Use these records to help establish the correct PM intervals for your application and to indicate maintenance required to prevent major problems from occurring during operation.

PM Report Form

As an aid in performing and documenting your PM inspections, Clark has prepared an "ELECTRIC TRUCK PLANNED MAINTENANCE REPORT" form. Copies of this form may be obtained from your authorized CLARK dealer. We recommend that you use this form as a checklist and to make a record of your inspection and truck condition.

The periodic maintenance procedures outlined in this manual are intended to be used with the PM report form. They are arranged in groupings of maintenance work that are done in a logical and efficient sequence.

A check mark or entry is made on the PM Report Form when the PM is performed. Please note the special coding system for indicating the importance of needed repairs and/or adjustments.

When you have finished the PM inspections, be sure to give a copy of the report to the designated authority or the person responsible for lift truck maintenance.

Do not make repairs or adjustments unless authorized to do so.

For safety, it is good practice to:

Remove all jewelry (watch, rings, bracelets, etc.) before working on the truck.

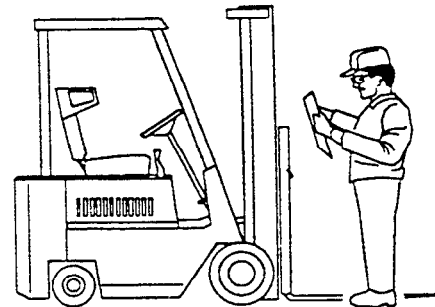
Disconnect battery from truck receptacle before working on electrical components.

Always wear safety glasses. Wear a safety (hard) hat in industrial plants and in special work areas where protection is necessary or required.

HOW TO PERFORM THE PM PERIODIC INSPECTIONS AND MAINTENANCE

Visual Inspection

First, perform a visual inspection of the lift truck and its components. Walk around the truck and take note of any obvious damage and maintenance problems. Check for loose fasteners and fittings.



Check to be sure all capacity, safety, and warning plates or decals are attached and legible.

NOTICE

NAMEPLATES & DECALS

Do not operate a lift truck with damaged or missing decals and nameplates. Replace them immediately. They contain important information.

Inspect the truck for any signs of external leakage: transmission fluid, etc. Check for hydraulic oil leaks and loose fittings. **DO NOT USE BARE HANDS TO CHECK.** Oil may be hot or under pressure.

SAFETY NOTE

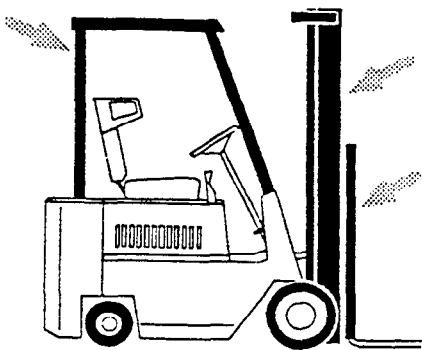
HYDRAULIC FLUID PRESSURE

Do not use your hands to check for hydraulic leakage. Fluid under pressure can penetrate your skin and cause serious injury.

Be sure that the driver's overhead guard, load backrest extension, finger guards, and any other safety devices are in place, undamaged, and attached securely. Check the operator's seat and seat slide mechanism for secure mounting and damage that could affect safety.

NOTICE - For trucks equipped with spark-enclosed construction (EE), or with polyurethane tires: Check ground strap for security of attachment and wear damage.

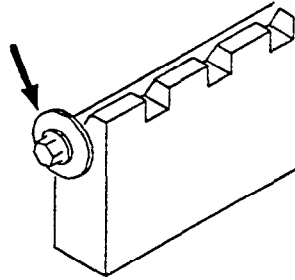
Then, check all of the critical components that handle or carry the load.



Check the overhead guard for damage. Be sure that it is properly positioned and all mounting fasteners are in place and tight.

Check the load backrest for damage. Inspect the welds on the carriage and load backrest for cracks. Be sure that the mounting fasteners are all in place and tight.

NOTE - If load backrest has been removed, a bolt and washer must be in place on each end of the top fork bar to act as a fork stop.



SAFETY NOTE

Uprights can drop suddenly. Look at the upright, but keep hands out.

Inspect the upright assembly: rails, carriage rollers, lift chains, lift and tilt cylinders. Look for obvious wear and maintenance problems, damaged or missing parts. Check for any loose parts or fittings. Check for leaks, any damaged or loose rollers, and rail wear (metal flaking). Carefully check the lift chains for wear, rust and corrosion, cracked or broken links, stretching, etc. Check that the lift and carriage chains are correctly adjusted to have equal tension. Check that the lift chain anchor fasteners and locking means are in place and tight.

Be sure all safety guards and chain retainers are in place and not damaged. Inspect the carriage stops and cylinder retainer bolts. Check all welded connections.

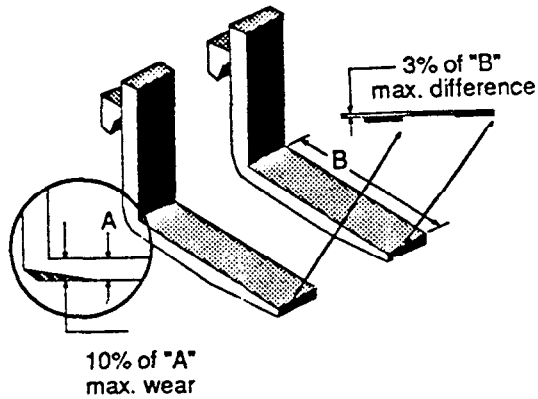
Inspect all lift line hydraulic connections for leaks. Check the lift cylinder rods for wear marks, grooves, and scratches. Check the cylinder seals for leaks.

IMPORTANT

Uprights and lift chains require special attention and maintenance to maintain them in safe operating condition. Refer to Lift Chain Maintenance section for additional information.

Forks

Inspect the load forks for cracks, breaks, bending and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips should be no more than 3% of the fork length.

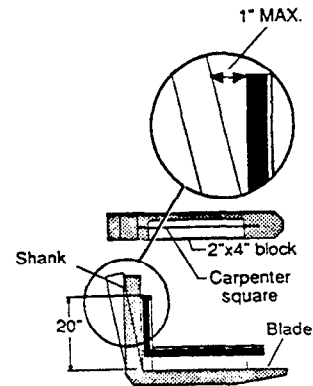


Check the amount of wear at the heel of the fork.

WARNING

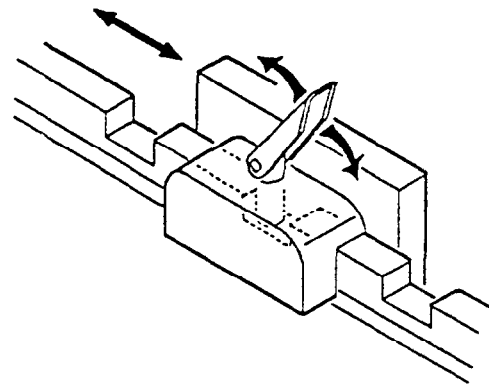
If the fork blade at the heel is worn down by more than 10%, the load capacity is reduced and the fork must be replaced.

Inspect the forks for twists and bends. To check, put a 2" thick metal block, at least 4" wide by 24" long on the blade of the fork with the 4" surface against the blade. Put a 24" carpenter square on the top of the block and against the shank. Check the fork 20" above the blade to be sure it is not bent more than 1 inch maximum.



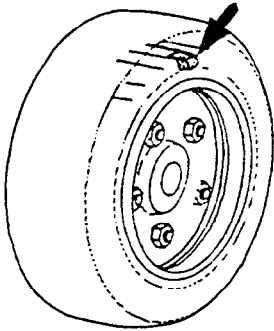
If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person.

Inspect the fork latches. Be sure they are not damaged or broken and operate freely and lock correctly. Check the fork stop pins (or bolt and washer) for secure condition.



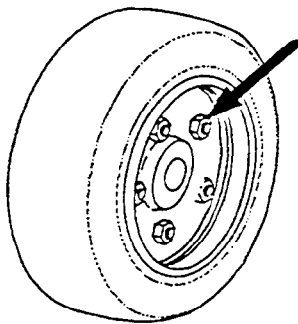
Wheels and Tires

Check the condition of the drive and steer wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear and breaks or "chunking out"; and bond failure between the tire and rim.



Check all wheel lug nuts or bolts to be sure none are loose or missing.

Have missing bolts replaced and loose bolts tightened to the correct torque before operating the truck.



SAFETY NOTE

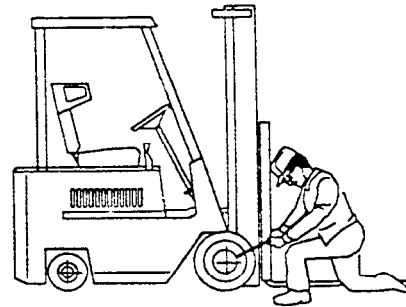
Personnel working on wheels and tires must be trained and qualified to do wheel and tire maintenance.

Pneumatic tires

Check for the correct air pressure on trucks with pneumatic tires.

CAUTION

Check tire pressure from a position facing the tread of the tire, not the side. Use a long-handled gauge to keep your body away from the side. If tires are low, don't add air. The tire may require removal and repair. Have the tire and wheel inspected by a person trained and authorized to do tire and wheel maintenance. Incorrect (low) tire pressure can reduce the stability of your lift truck and cause it to tip over.



Inspect pneumatic tires and wheels carefully for:

- Damaged tire.
- Damaged wheels or loosening of the locking rings on multi-piece rims.
- Loosening of the clamping bolts and nuts on two-piece, split-rim wheels.
- Low inflation pressure.

DANGER

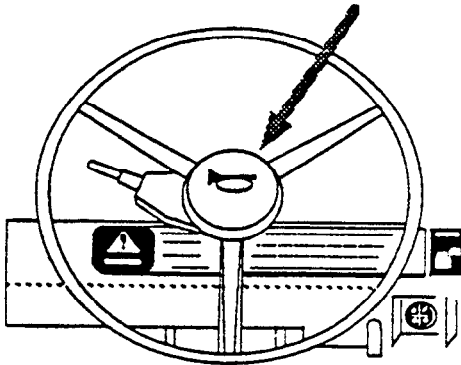
RIM SEPARATION

Remove the air from tires before doing any work on tires or rims. Multi-piece rims can separate with enough force to cause injury or death.

Functional Tests

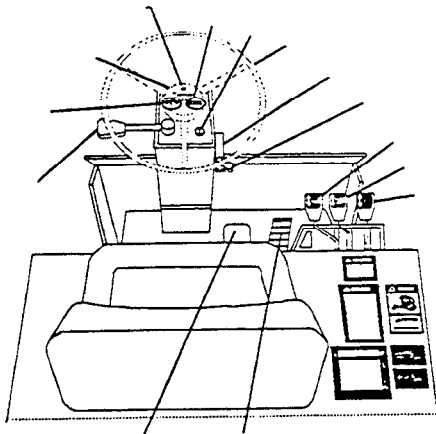
Now, be sure that all controls and systems are functioning correctly.

Test all warning devices, horn, lights, and other safety equipment and accessories. Be sure they are properly mounted and working correctly.



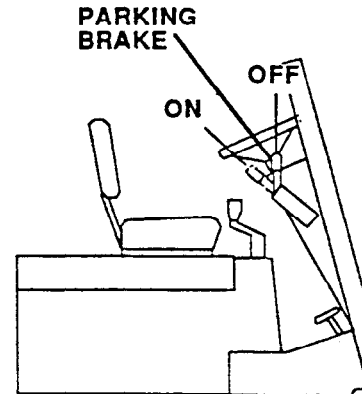
Press the horn button to check horn function. If the horn or any other part does not operate, report the failure and have it repaired before the truck is put back into operation.

Operate service and parking brakes, all hydraulic controls: lift, tilt, and auxiliary (if installed), accelerator, directional controls, and steering system. Be sure all controls operate freely and return to neutral properly.

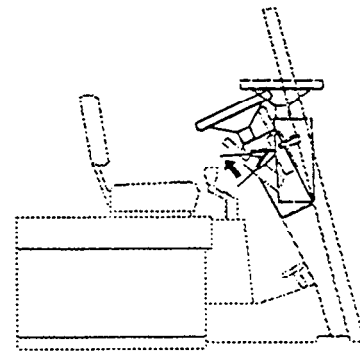


Check function of the parking brake mechanism. Release, then apply the parking brake with the lever. When correctly adjusted, the lever should

snap-lock into the over-center applied position without having to use excessive force. If the lever binds or does not operate freely, apply lubricant to the linkage at pivot and sliding points.



Check steering column (pylon) release lever. Pylon must move up freely and also pull back and latch into the driving position without restrictions. Lubricate the lever pivot and pylon hinge points as necessary.



Check the service brake system. Push the brake pedal fully down and hold. The brakes should be applied before the pedal reaches the floorplate. Check for a feeling of solid resistance when the pedal stops. The pedal must feel firm and not move down farther after it stops. If the pedal continues to creep downwards, report the failure. **DO NOT OPERATE THE TRUCK UNTIL THE BRAKES ARE REPAIRED.**

NOTE - A low pedal reserve (clearance at floor plate) is normal.

Fully depress the accelerator pedal and release to check for free movement.

Check the directional control switch lever for correct function. Report any malfunction. Do not attempt to operate the truck until repair has been made.

Be sure the hydraulic control levers all move freely and return to the center or neutral position when released.

Before starting a lift truck, begin from a safe condition. Check to see that:

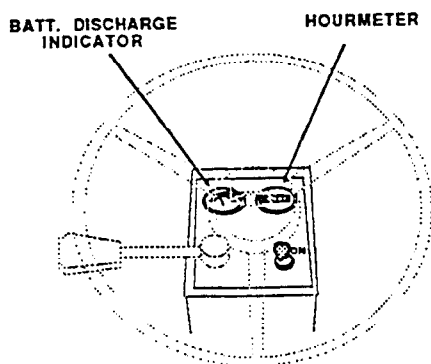
- Parking brake is applied.
- Forks are fully lowered to the floor.
- You are familiar with how all the controls function.
- All controls are in neutral or other correct position.

Turn key switch ON.

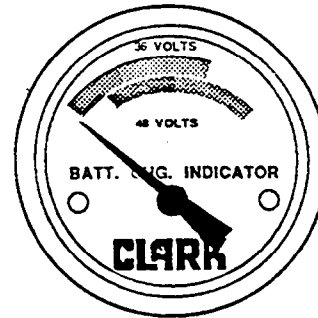
Check hourmeter operation. With key switch ON, release parking brake. Move direction control lever to FWD or REV position. The steer pump and hourmeter should begin operating. Watch for movement of the indicator in the right-hand dial opening. Report any malfunction or damage.

Return direction control to NEUTRAL and apply parking brake.

Write the hourmeter reading on the PM report form.

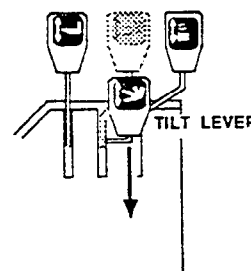


Check battery discharge indicator. The indicator should register in the green area when key switch is ON. Also, check function of battery discharge indicator when making a battery load test, below.



Battery Load Test

Check the battery condition by holding the tilt lever in full back-tilt position, allowing main pump to run against loading of bypass relief pressure for a few seconds. Watch the battery discharge indicator. The needle should stay in the green area. If needle falls into the red area, the battery is faulty or charge level is low and battery must be recharged before completing other electrical tests and performance parts of the PM.



BEFORE DRIVING THE TRUCK, DO THESE TESTS:

Test for correct function of lift pump motor switch on LIFT control lever. Turn key switch ON. Slowly pull back on the lift control lever towards the "raise" position. The pump motor should start to run as

the lever moves from the neutral position. Push lever forward until upright starts to lower. Pump will stop running. Pump motor should not operate when lever is moved to "lower" position.

If lever movement is excessive before the pump starts, or if pump does not stop running when lever returns to neutral, the microswitch needs repair or adjustment.

Test for correct function of lift pump motor switches on TILT and AUX levers. Slowly move the tilt (or AUX) control lever forward and then backwards, each a small distance from the neutral position. The pump motor should start up and run as the lever moves from the neutral position, in each direction. Repeat test for each AUX lever, if installed. Refer to discussion above if lever movement or switch action is not correct.

Check function of parking brake microswitch. With key switch ON and parking brake applied, move the direction control lever to the FORWARD position. Push slowly on the accelerator pedal. The drive motor should not operate. If it does, the microswitch on the parking brake linkage is not adjusted correctly. Also, check REVERSE position.

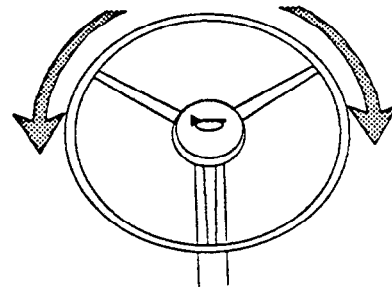
Check the parking brake switch and braking action. Release the parking brake with the lever. Push on accelerator pedal to move the truck slowly forward. Then, apply the parking brake. The parking brake should turn the drive motor off and stop and hold the truck from further movement.

To check parking brake holding capability and adjustment, park the truck on a grade and apply the parking brake. The parking brake should hold a lift truck with rated load on a 15% grade. When the lever is released, the brakes should not drag.

Do not operate a lift truck if the service or parking brakes are not operating properly.

Test for correct function of the power steering pump switch and system. Turn key switch ON, and release the parking brake. Move the directional control lever from neutral to either FORWARD or REVERSE position. The steer pump should begin operating.

With the truck not moving, check the steering system by moving the steering handwheel in a full right turn, and then in a full left turn. Return the handwheel (steer wheels) to the straight-ahead position. The steering components should operate smoothly when the steering wheel is turned. Listen for the steering pressure relief valve to by-pass when the steer wheels hit the stops. The steer pump and motor should not stall or exhibit excessive loading. If it does, the power steering system relief pressure valve may be malfunctioning.



Return direction control to NEUTRAL and apply parking brake. Steer pump should stop.

NOTICE - The steering system, steer axle and steering linkage should be inspected periodically for abnormal looseness and damage, leaking seals, etc. Check for any changes in steering action. Hard steering, excessive freeplay (looseness) or unusual sounds when turning or maneuvering indicates a need for inspection and servicing.

Never operate a truck which has a steering system fault.

Test Drive The Truck

NOTE - It is recommended that these tests be conducted with a rated capacity load, if possible.

Test the truck for general correct operation and drive train function, by driving the truck in both the forward and reverse directions first in a straight line and then, slowly, through a series of full right and left turns.

Check all around to be sure that your intended path of travel is clear of obstructions and pedestrians.

Test for correct function of the SCR control.

Check CREEP SPEED, 1A RANGE, and PLUGGING.

1. Check CREEP SPEED and 1A RANGE while driving the truck in a straight line in both FORWARD and REVERSE directions. CREEP SPEED should be obtained at the beginning of SCR RANGE after pushing lightly on the accelerator pedal and closing 1MS switch. 1A RANGE - When the accelerator control is pushed farther and/or fully down, the truck should accelerate in SCR RANGE and make a smooth transition into 1A RANGE for maximum travel speed. As the 1A contactor closes, there should be very little surge as the truck goes out of SCR RANGE and into 1A. All speed changes should be smooth while increasing and decreasing speed. Listen for any unusual drive train noises or actions of the controls and drive train components.

Stop truck with the service brakes. Note any unusual reactions in driving or braking performance, and need for adjustment.

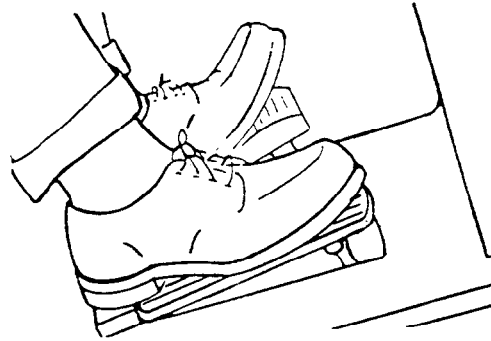
2. PLUGGING is an SCR control function which provides for reversing the direction of travel under controlled conditions. A correctly-adjusted plugging control should result in a smooth deceleration, or gradual stop of travel from any speed in one direction, and acceleration in the opposite direction. Plugging speed and distance is determined by accelerator control pedal position.

Check PLUGGING function first at a slow speed. If operating correctly, then test at full speed. First, drive truck in the FORWARD direction. Push the accelerator pedal and allow the truck to accelerate to the desired travel speed. Then, move the

direction control to REVERSE position while your foot is still depressing the accelerator pedal. The truck should slow to a smooth, controlled stop and accelerate in the opposite direction. Repeat test by moving direction control back to FORWARD position.

Check the accelerator control while conducting the speed range tests. It must move easily and smoothly throughout the acceleration stroke, and return without binding. There should be no restriction to movement on either acceleration or deceleration.

Test the service brake (drive motor cut-off) switch. Drive the truck FORWARD (or in REVERSE) at creep speed. While holding the accelerator pedal steady in creep-speed position, push on the brake pedal with left foot. The braking action should interrupt power to the drive motor and stop the truck. Release the brake pedal. The drive motor should start again moving the truck.



Retest service brake operation by applying and releasing the brakes several times while driving the truck. 1) Check for firm pedal pressure, quick pedal return, full stopping without pulling to one side, and for brake fading (must use more pedal effort each time to stop the truck). 2) Check for changes in pedal pressure. 3) Listen for brake squeal and other abnormal noise.

Check steering control operation. First, drive the truck in a straight line. Then, drive slowly (creep speed) through a series of full right and left turns. The truck must drive in a straight line without drifting toward either side. Check steering response and smoothness of operation. Turning effort must be the same in either direction.

NOTICE - It is recommended that the following tests also be conducted with a rated capacity load, if available.

Test for general drive train operation and noises. Drive the truck at various speed and operating conditions, in both FORWARD and REVERSE directions. Test shifting from NEUTRAL to FORWARD, then back to "N". Next, test shift from "N" to REVERSE, then back to "N". Check for positive control action when changing directions.

Listen for clunking, squealing, grinding, scraping or other unusual noise. Check for vibration. Listen for wheel bearing or other specific running noise.

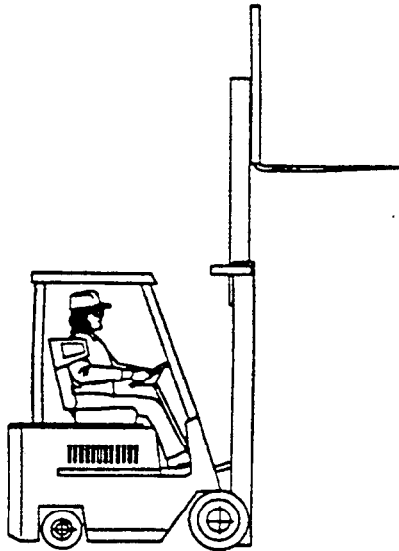
Lift mechanism and controls

NOTE - It is recommended that these tests be conducted with a rated capacity load, if possible.

Test the operation of the hydraulic system and upright.

SAFETY NOTE

BE SURE THERE IS ADEQUATE OVERHEAD CLEARANCE BEFORE RAISING THE UPRIGHT.



Cycle (raise to full height and then lower) the upright at both slow and fast speed, with the rails tilted slightly backwards. Watch the upright assembly as it rises. All movements of the upright, fork carriage, and lift chains must be even and smooth, without binding or jerking motion. Watch

for chain wobble or looseness; the chains should have equal tension and move smoothly without noticeable wobble.

Check for correct function of the lift control lever and main hydraulic valve. Listen for abnormal noise in the hydraulic valve, main hydraulic pump, and system components.

If the maximum fork height is not reached, this indicates there is an inadequate (low) oil level in the hydraulic sump tank, or severe binding within the upright.

WARNING

FALLING FORKS

Do not walk or stand under raised forks. The forks can fall and cause injury or death.

Observe the upright assembly: rails, rollers, carriage, lift chains and cylinders as they move. Check for binding or excessive freeplay (looseness) between the carriage and the upright rails and rollers. Listen for abnormal noises. If there is excessive clearance between the rails and channels, the need for upright roller adjustment is indicated. If the rails or carriage bind or hesitate when lowering, this indicates either damaged rollers or incorrect roller adjustment.

Check the upright for excessive downdrift. Stop the fork carriage in an intermediate position. Check that it holds its position and raises or lowers smoothly from any height position. If the fork carriage does not hold its position when stopped, the upright may have too much downdrift due to wear of the cylinder seals. Conduct an upright cylinder downdrift test, with rated load, as needed.

Test the tilt control. Check for excessive tilt cylinder drift. Stop the upright at a position near vertical. Check that the upright holds its position without moving forward. If you observe forward movement (drift), or have a report of a tilt drift problem, check the tilt cylinders for too much drift.

Test for correct tilt cylinder rod adjustment (upright racking). Raise the carriage to an intermediate position. Tilt the upright fully FORWARD (without load on forks). Check for upright racking (twisting) as the tilt cylinders reach the end of their stroke.

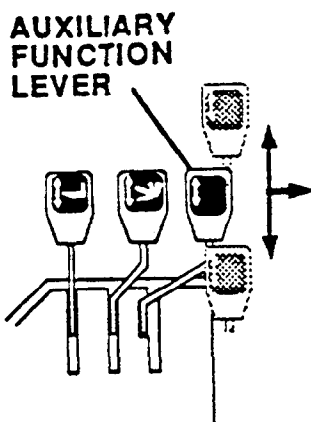
Tilt the upright fully BACKWARD. The upright should not rack (twist) when the tilt cylinders reach the end of their travel. If upright racking is found,

adjustment of the tilt cylinder rod ends (yokes) is required.

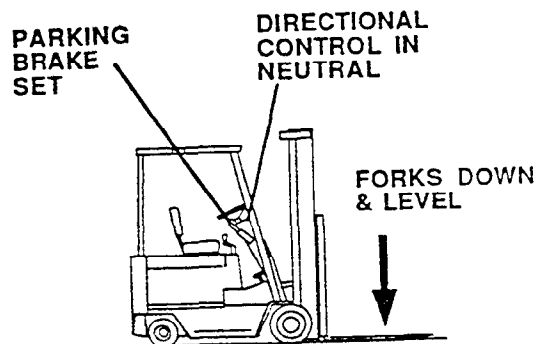
Check correct fork height adjustment (also carriage chain adjustment). Tilt the upright to the vertical position and fully lower the carriage. The forks should stop and be held approximately [13 mm] .50 inch above the floor. If the forks hit the floor, the carriage lift chains should be adjusted.

Auxiliary function control

If truck is equipped with an attachment, check the control for correct function by briefly operating the attachment.



When you have completed the operational tests, park and leave truck according to standard shutdown procedures.



Be sure to make a record of all maintenance and operating problems you find.

Battery Compartment Inspection

For convenience, release the steering pylon latch and raise the steering column to the forward position.

Unlatch and open the hood (seat deck/battery compartment cover). Check that the gas springs correctly assist (help) in raising the cover. Be sure that it is held securely in the open position by the supports (gas springs).

Turn key switch OFF. Disconnect battery from truck receptacle.

Inspect condition of the battery connector. Check the spring-loaded terminal and retaining tab for poor connection due to burning, bad crimp, or loose or broken retainer. Check the molded body for damage from overheating, burning and chips or cracks. Clean all corrosion from contacts, as necessary.

Inspect the spring-loaded connectors in the truck battery receptacle. Look for looseness, burned parts and other damaged areas due to excessive heat. Refer to checks noted above. If any of the above conditions are evident, replace the connectors.

Inspect condition of the battery and cables. Check the battery cables for wear or other damage, and routing clear of interference (rubbing) with other components. Be sure that the cable terminals are tight and clean. Clean off minor deposits of corrosion that you find on the battery.

Never wash the battery when it is in the truck.

Check battery post terminals for corrosion and damage. Clean all corrosion from cable end and battery post. Check tightness of cable and post terminals.

If necessary, check the state-of-charge condition of the battery. Take a specific gravity test of the electrolyte with a hydrometer. Be sure to check a minimum of six battery cells.