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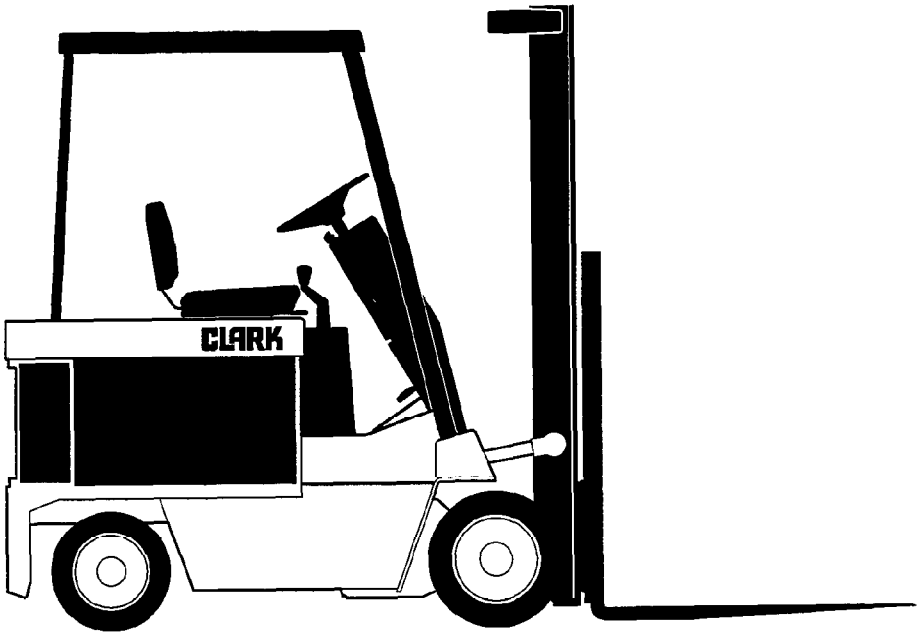
SM-548H
ECS 17-30
Hi Performance Supplement



ISO 9001 CERTIFIED CLARK

CLARK Technical Publications
Lexington, KY
40508

SM548
SERVICE MANUAL

ECS17-30

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Main Table of Contents

PM - PLANNED MAINTENANCE PROGRAM

CONTENTS

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.

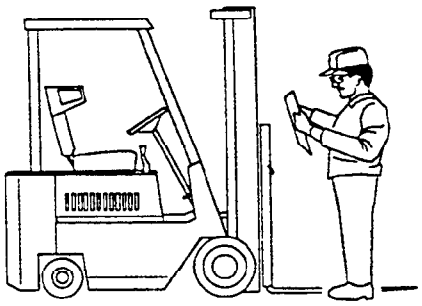
Disconnect battery from truck receptacle before working on electrical components.

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

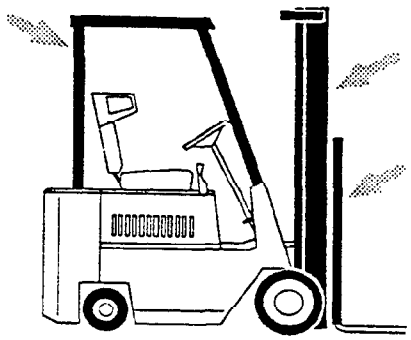
HYDRAULIC FLUID PRESSURE

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.

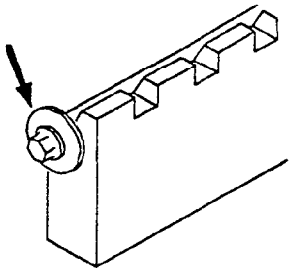
Then, check all of the critical components that handle or carry the load.



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.

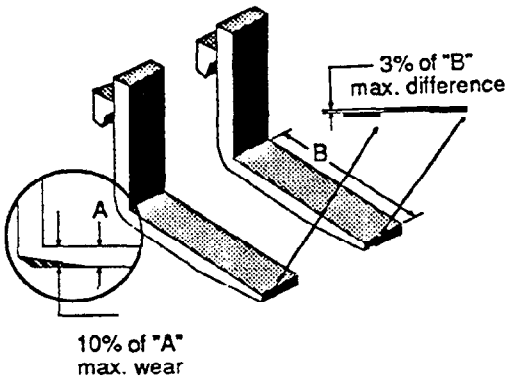
Inspect all lift line hydraulic connections for leaks. Check the lift cylinder rods for wear marks, grooves, and scratches. Check the cylinder seals for leaks.

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.

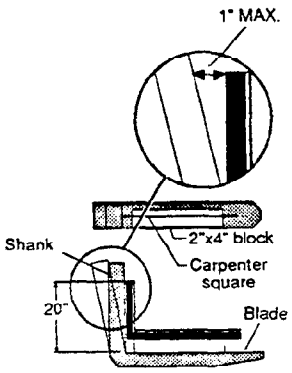


Check the amount of wear at the heel of the fork.

WARNING

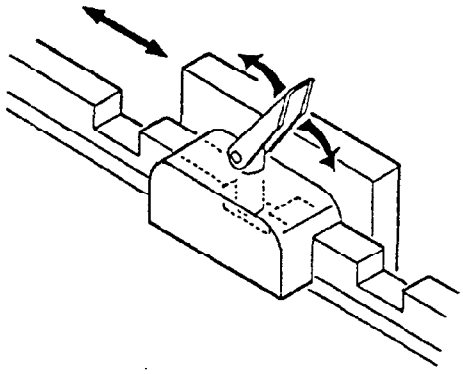
If the fork blade at the heel is worn down by more than 10%, the load capacity is reduced and the fork must be replaced.

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" carpenters 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.



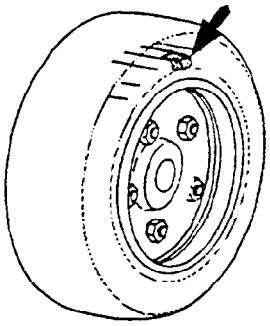
If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person.

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.



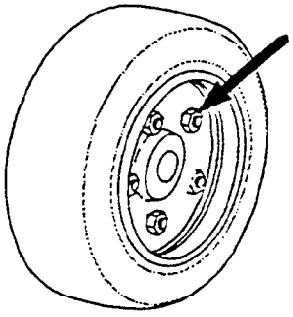
Wheels and Tires

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

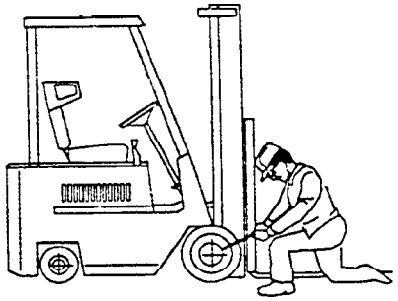
Personnel working on wheels and tires must be trained and qualified to do wheel and tire maintenance.

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

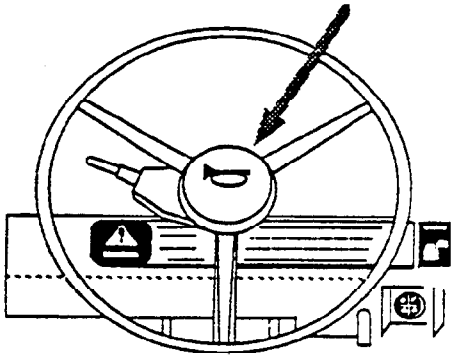
RIM SEPARATION

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

Functional Tests

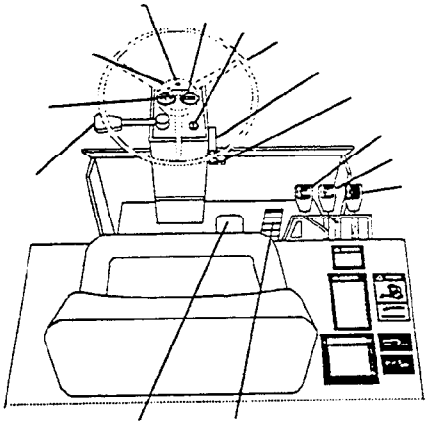
Now, be sure that all controls and systems are functioning correctly.

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

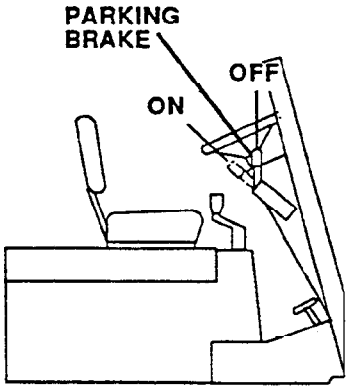


Press the horn button to check horn function. If the horn or any other part does not operate, report the failure and have it repaired before the truck is put back into operation.

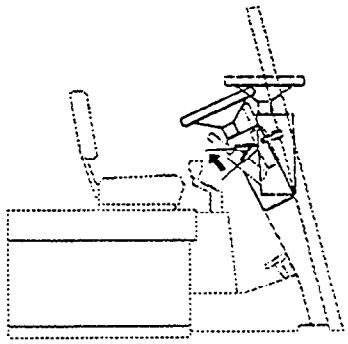
Operate service and parking brakes, all hydraulic controls: lift, tilt, and auxiliary (if installed), accelerator, directional controls, and steering system. Be sure all controls operate freely and return to neutral properly.



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:

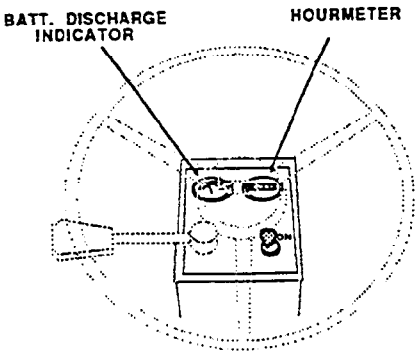
Parking brake is applied.
Forks are fully lowered to the floor.
You are familiar with how all the controls function.
All controls are in neutral or other correct position.

Turn key switch ON.

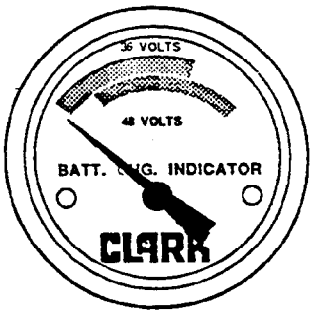
Check hourmeter operation. With key switch ON, release parking brake. Move direction control lever to FWD or REV position. The steer pump and hourmeter should begin operating. Watch for movement of the indicator in the right-hand dial opening. Report any malfunction or damage.

Return direction control to NEUTRAL and apply parking brake.

Write the hourmeter reading on the PM report form.

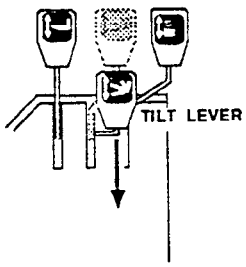


Check battery discharge indicator. The indicator should register in the green area when key switch is ON. Also, check function of battery discharge indicator when making a battery load test, below.



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 m oved 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.

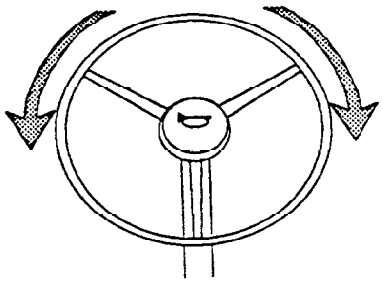
Check the parking brake switch and braking action. Release the parking brake with the lever. Push on accelerator pedal to move the truck slowly forward. Then, apply the parking brake. The parking brake should turn the drive motor off and stop and hold the truck from further movement.

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.

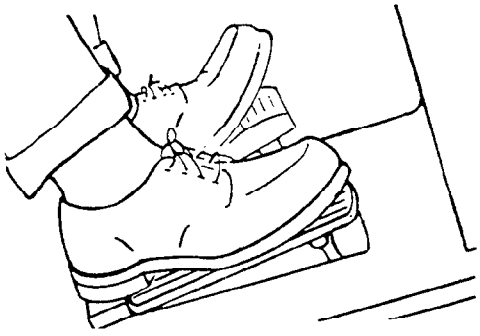
Stop truck with the service brakes. Note any unusual reactions in driving or braking performance, and need for adjustment.

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.