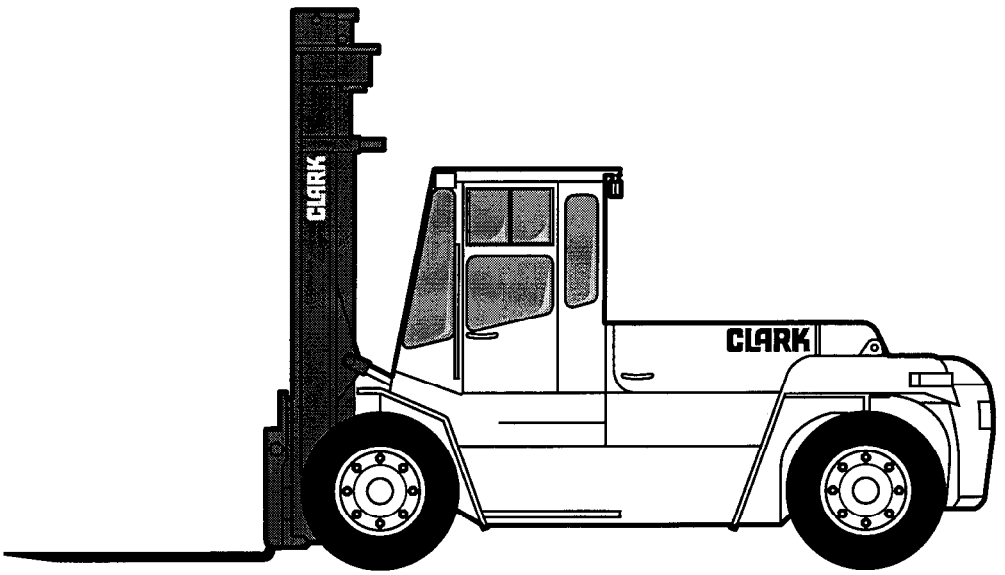
SM 622
CDP 100/164
Service Manual



ISO 9001 CERTIFIED CLARK

CLARK Technical Publications Lexington, KY 40508

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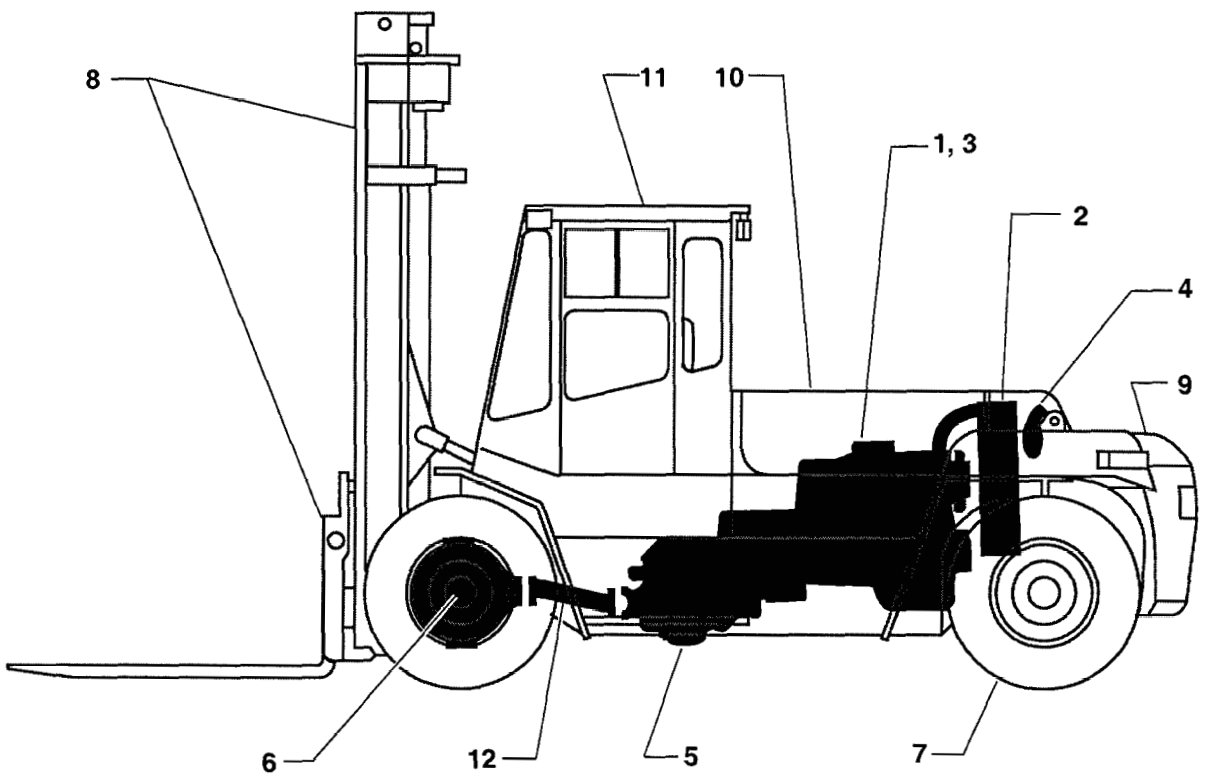
Major Component Location

Use this illustration to help locate components included in the PM procedures.



1. Engine
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3. Fuel
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PERIODIC SERVICE

Section 1.

INTRODUCTION

Proper maintenance and care are essential if your Clark truck is to be always ready for use.
These preventative maintenance procedures provide a basic guide which should be followed when servicing your Clark truck.
A lubrication guide and recommended preventative maintenance program is included in this section and for further information regarding adjustment procedures, specifications, etc., please refer to the index in the front of this manual.

IMPORTANT

Your Clark dealer has both the facilities, parts, and adequately trained personnel enabling them to carry out all necessary service procedures, including complete inspections, maintenance and lubrication programs, all aimed at ensuring your Clark Lift truck will perform safety and efficiently and most importantly, maximizing its availability for your day to day work schedules.

RECOMMENDED MAINTENANCE PROCEDURE

Particular attention should be paid to the conditions under which your CDP 100/164 forklift truck is used as those conditions play a significant role in determining how long the interval between each maintenance task should be.

It is quite clear that a truck used in sandy, dusty, dirty locations will require more frequent maintenance than one being used in a clean warehouse situation.

The maintenance schedules and recommendations made in this book apply for use under normal operating conditions.

The following classifies the different types of operating conditions..

Class 1 - Normal conditions of use
Basically transfer and loading of goods and materials for eight hours per day in buildings or in the open air.

Class 2 - Longer hours of use or continuous 3 shift operation.

Class 3 & 4 - Extreme conditions

a) Use in sandy or dusty places, such as cement works, steel mills, saw mills, flour mills, brick factories, or rock breaking applications.
b) Use in areas of high temperature including steel works, foundries, etc.
c) Use in areas of frequent temperature changes such as loading bays handling frozen goods, at refrigeration plants, or making frequent trips from a building into the open air and back again.

IMPORTANT

Your Clark truck is designed for work in all of the above conditions, however if your particular application should fall into Class 2, 3 or 4 then appropriate changes to service frequencies must be made to all maintenance procedures.

LUBRICATION

Greasing should be carried out every 250 hours, or after any washing.

SAFETY PRECAUTIONS DURING MAINTENANCE

- When lifting parts or assemblies, make sure that all slings, chains or cables are correctly fastened and that the load being lifted is balanced. Make sure that the crane, cables and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand. Use a lifting mechanism.
- Wear safety glasses.
- Disconnect the battery ground cable.
- Always use correct blocks to prevent the unit from rolling or falling.
- Keep the unit and working area clean and in order.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use original Clark parts when making repairs.
- Make sure that all nuts, bolts, snap rings and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE sign to the controls of the unit when making repairs or if the unit needs repairs.
- Make sure you follow the DANGER WARNING and CAUTION notes in the instructions.
- Diesel is a flammable fuel. Make sure that you follow the necessary safety precautions when handling fuel and when working on the fuel system.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area has ventilation.

SAFETY PRECAUTIONS DURING LIFTING, JACKING & BLOCKING

Lifting or jacking any large piece of equipment, such as your Clark fork truck, presents obvious hazards. It must be with great care and forethought. Consult the truck weight tabulations in the specifications sections of this manual to ensure that your lifting equipment is of adequate capacity.

1. The correct way to lift the front of the CDP100/164 is by rigging a chain pull lift or hoist to the upright through the lift eyes provided. Chock the steer wheels before lifting. Place wheel stands under the drive tires or solid blocking under the base of the upright rails.

⚠ WARNING

The upright should be fully down before lifting. On uprights with negative drop such as Marina trucks, clamp or chain the rails together so they cannot move if at all possible, remove the forks before lifting by the upright.

2. The rear of the truck may be lifted by the counterweight. Chock the drive wheels before lifting and be sure lifting equipment is of adequate capacity.

⚠ WARNING

Check to see if the counterweight bolt is in place and property torqued before lifting. Never attempt to lift the rear of the truck with another fork truck.

3. Place wheel stands under the steer tires or put solid blocking under the truck frame.

⚠ WARNING

Take care to place block under the frame back far enough from the truck center of gravity so that it is stably supported.

INITIAL SERVICING & MAINTENANCE RECORDS

a) Initial Service

An initial service should be carried out after your Clark forklift truck has been in operation for fifty hours.

In this service, the following work must be carried out: (Check the Preventative Maintenance schedule)

Engine *(at operating temperature)*

- Check engine oil level
- Check fan belt tension
- Start engine and check for obvious leaks in fuel system, lubricating oil system and cooling system stem.
- Check that all external screws, nuts, and securing parts are firm.

Transmission *(at operating temperature 83° - 94°C)*

- Change transmission- oil filter
- Take sample of transmission oil (if on S.O.S. system)
- Check all screws, nuts and securing parts are tight and have a firm seat.

General

- Grease all grease points (steer axle, upright, etc.)
- Check that all screws, nuts and securing parts are firm and pay particular attention to the wheel and upright studs and nuts. (See Critical Torque areas on following page).

IMPORTANT This work should be carried out by a qualified Clark service mechanic.

b) Maintenance Records

Any preventative maintenance system relies on the programmed planning of all service work and also on correct, up to date records being held, enabling systematic scheduling and tracking of maintenance costs per unit. This does not vary from systems which are of a manual nature or computer assisted.

To ensure that the daily inspections and periodical preventative maintenance services are properly performed, we recommend the use of inspection forms. Such forms not only provide a guide for the person carrying out such inspections and services, but serve as a record in keeping track of maintenance requirements for each vehicle. Moreover, such records eventually assist you in determining when to schedule downtime for major component overhaul without the disruptive effects of unscheduled downtime. Your Clark dealer is always able to provide assistance in setting up maintenance systems and also in keeping maintenance records on your behalf.

A typical maintenance schedule is provided in this manual. This should be used as a guide to the minimum requirements and should be adapted to suit local conditions and operational experience.

VISUAL CHECKS

Check that all capacity, safety and warning plates or decals are attached and legible.

Check, before and after starting engine, for any sign of external leakage; fuel, engine coolant, transmission fluid, etc. Check for hydraulic oil leaks and loose fitting.

⚠ WARNING

Do not use bare hands to check. Oil may be hot or under pressure.

Be sure that the devices safety devices are in place, undamaged and attached securely. For example: seat belt, horn, load safety rail, beacon etc.

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

Inspect the upright and lift chains. Check for obvious wear and maintenance problems such as damaged or missing parts, leaks, slack or broken chains, bent parts, etc.

Carefully inspect the load forks for cracks, breaks, bending, twists and wear. Be surd that the forks are correctly Installed and looked In their proper position.

Inspect the wheels and lyres for safe mounting, wear condition and correct inflation pressure.

Function Checks

Test warning devices, horn, lights and other safety equipment and accessories. Start the engine and be sure all controls and systems are functioning correctly. Check the hour meter for operation. Operate the service and parking brakes, all hydraulic controls: lift, tilt and auxiliary functions. accelerator, directional control and steering system. Be sure all controls operate freely and return to neutral properly. Operate the lift mechanism and auxiliary functions, accelerator, directional control and steering system. Be sure all controls operate freely and return to neutral properly. Operate the lift mechanism and auxiliary function (if Installed).

Standard Shut Down Procedure

When parking and leaving truck unattended, lift mechanism shall be fully lowered, controls placed in neutral, engine shut off, brakes set and key removed. Chock the wheels if truck is parked on an incline or has the possibility of moving.

Make a record on the Drivers Daily Checklist of all the operating and truck problems that you find. Review the checklist to be sure it has been completed and turn It In to the person responsible for lift truck maintenance. Be sure any unusual noises or problems are investigated immediately.

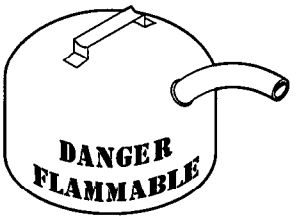
Do not operate a lift truck that has a maintenance problem, or is not safe to operate.

Remove the key from the-ignition switch and put an "Out of Service" tag on the truck.

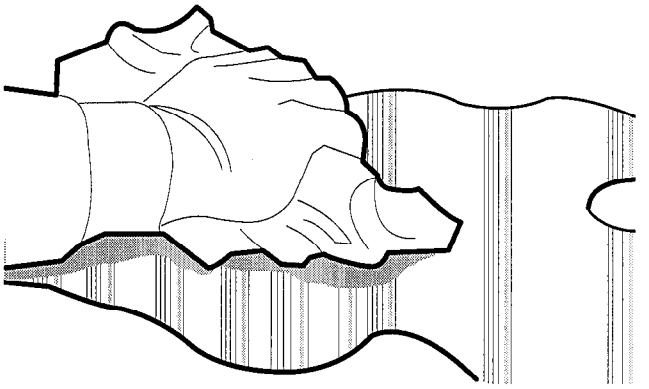
If all of the "Before Operation" checks were normal or satisfactory, the truck can be operated.

FUEL SAFETY PRACTICES

Take care when filling, not to allow any fuel to spill or flow into the engine compartment. Fuel in the engine compartment is a fire hazard and should be completely removed immeadiately.



Use clean, properly marked fuel cans.



Clean up spills.

Section 2.

Lift Truck Maintenance

Regular maintenance and care of your lift truck is not only important for full and efficient truck life; it is essential for your safety. 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. Experience has shown that powered industrial trucks can cause injury if improperly used or not maintained. In the interest of promoting safety, several current industry and government safety standards specify that any powered industrial truck not in safe operating condition be removed from service, and that all repairs be made by trained and authorized persons. To assist you in keeping your lift truck in service in good operating condition, this section outlines maintenance procedures to be done at regular intervals and that are considered essential to the life and safe performance of your truck. It is your responsibility to be alert for any indication that your truck may need service and have it attended to promptly. You play an important part in maintenance. You should make sure that your lift truck regularly receives the care it needs.

⚠ CAUTION

Powered industrial trucks may become hazardous if maintenance is neglected.

Planned Maintenance

As outlined previously, a safety inspection of your lift truck should always be made before operating it. The purpose of this daily examination is to check for any obvious damage and maintenance problems, and to have minor adjustments and repairs made to correct any unsafe conditions. In addition to the daily inspection, OSHA recommends that you set up and follow a periodic planned maintenance and inspection program. Performed on a regular basis, the program will provide the opportunity to make thorough inspections and checks on the safe operating condition of your lift truck.

Your local Clark dealer is prepared to help you with your Planned Maintenance Program He has specially trained service personnel who are authorized to check your lift truck according to the respective safety regulations.

In the specifications section you will find a listing of useful specifications for selected components, fuel and lubricants, critical bolt torques, refill capacities and settings for your truck.

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

Operating Conditions

Time intervals between maintenance/service are largely determined by operating conditions. For example, operation in sandy, dusty locations requires shorter maintenance intervals than operation in clean warehouses. The indicated intervals are intended for normal operation.

Daily Check Lift

Following are the items to be checked on your Clark lift truck before the commencement of each working shift. These items, if checked correctly, will ensure the safe and highly efficient operation of your Clark lift truck.

1. Walk around truck and visually check for damage and leaks. Check mast structure for cracking and lift chain adjustment and security. Note all damage and leaks, and report to maintenance personnel.
2. Check pressure and condition of all drive and steer tires and wheels. Tire pressure tags are located on frame adjacent to each wheel. Remove foreign material such as stones and nails etc., which have become lodged in tire treads. Note apparent tire or wheel damage.
3. Visually check drive and steer wheel mounting nuts. Tighten any loose wheel lugs or nuts to the specified torque. (See Critical Torque attachment);
4. Examine twist lock shafts located on the lift frame, for any fatigue fractures or damage. Report any faults immediately.
5. Remove hydraulic tank cap and check to make sure tank is filled to the proper level.
6. Check cab base mounting for damage, loose or missing studs.
7. Visually check condition of engine, wiring, fan, belts, hoses, etc.
8. Check the condition of the batteries, battery terminals, electrolyte level and cables.
9. Check water level in windshield washer reservoir.
10. Check engine oil level and add oil if necessary DO NOT OVERFILL.
11. Always check radiator coolant level with the engine turned off and when possible, with the engine cold. Proper coolant level is one inch below the bottom of the filler neck.

⚠ CAUTION

Use extreme care when removing radiator pressure cap. The sudden release of pressure can cause a steam flash resulting in serious injury. Place a rag over cap and loosen slowly to allow gradual escape of steam.

NEVER add cold water or antifreeze to the radiator of an overheated engine. Always allow the engine to cool to avoid the danger of cracking the cylinder block or heads. Keep engine running when adding water or antifreeze. A solution of ethylene glycol and water is recommended. NEVER USE WATER ONLY.

12. Fill truck with diesel fuel.
13. Clean all dirty glass and make a note of any cracked or broken glass sot that it may be replace as soon as possible.
14. Check that entry step to cab, and hand rail is not damaged.
15. Check that right hand side cab door opens freely and make a note of any maintenance or adjustment needed.

CLARK

Operator's Daily Checklist

Check Before Start of Each Shift

Check one: ☐ Gas, LPG or Diesel truck ☐ Electric truck

Date

Truck number	Operator	Supervisor's OK	
Hour meter reading	Start of day	End of day	Hours for day

Check boxes accordingly: ☑ OK ☑ Needs attention or repair. Circle problem and explain below.

		Tires/Wheels: pressure, wear, damage, nuts tight			Engine: rough, noise, leaks
		Head/Tail lights: damage, function			Steering: loose, tight
		Gauges/Instruments: function			Service brakes: leaks, loose, grab, low fluid
		Operator Restraint: damage, function, dirty			Parking brakes: loose, adjustment
		Warning Decals/Operator's Manual: missing, not readable			Seat Brake: loose, adjustment
		Overhead Guard: bent, cracked, loose			Horn: function
		Load Backrest: bent, cracked, loose			Audible Alarm: function
		Engine Oil: level, dirty, leaks			Lift/Lower: loose, sticks, leaks
		Hydraulic Oil: level, dirty, leaks			Tilt: loose, sticks, leaks
		Radiator: fluid level, dirty, leaks			Attachments: function, leaks
		Fuel: level, leaks			Battery Test: electric trucks only -Indicator in green with key on -Indicator in green. Green while holding full back tilt
		Battery: connections loose, charge, low fluid			

Remarks (explain all items needing attention or repair):

250 Hour Service Check list

1. Visually inspect machine for obvious damage.
2. Raise bonnet to give access to engine bay.
3. Check engine oil. Add oil to full mark on engine dipstick.
4. Check the coolant level.
5. Check the fuel level and condition of screen located under fuel filler cap.
6. Lower the upright and check the hydraulic fluid level. When necessary, add *BP Super TOU*, or equivalent, to the proper level. Check condition of hydraulic tank cap and torque tank cap base securing bolts.
7. Check the transmission fluid level with the engine at idle. The fluid level is checked by removing a level plug at the side of the transmission. Add oil until off flows from plug hose. For transmission oil specification, see lubrication guide.
8. Check the seat mounting for security and the seat adjuster for proper forward and back operation.
9. Start the engine and listen for unusual engine noise. Report any unusual noises immediately.
10. Check drive tire inside turning diameters which should be about equal in forward left and right turns. While driving, listen for unusual drive train noise.
11. Make a visual check of the truck. Look for signs of obvious leaks.
12. Inspect the sheet metal. Any damage should be noted on the P.M. check sheet.
13. Check the hydraulic control levers for security and freedom of movement.
14. Jack up the machine and check for loose wheel bearings by trying to rock the wheels vertically. Rocking wheels horizontally may indicate wear in steering linkage.
15. Turn the steering wheel left and right with engine idling and truck not moving. Steer wheels should respond immediately. The engine should not lug down.
16. Check hydraulic lines and cylinders for leaks.
17. Using a two foot extension on the air hose, blow through the radiator from the counterweight side and blow off the engine. Then blow through the radiator from the engine side.

⚠ WARNING

Do not use air pressure greater than 30 PSI.

18. Also, blow off the transmission, the differential, and surrounding areas.
19. Check the alternator mounting bolts to make sure they are secure.
20. Adjust the drive belt for proper tension. If tension is low, belt will slip, if to high, bearing and seal damage can occur in alternator and water pump.
21. Check the fan blades for looseness and damage. Make sure the fan is properly installed. Check for correct fan blade to radiator cowling clearance.
22. Pressure test the radiator cap, replacing it if necessary. Pressure requirement is 7 PSI.
23. Pressure test the cooling system, eliminating any leaks which are found. Check for operation of low water level sensor. Check for leaks at all hose fittings.
24. While the oil drains, clean and lubricate all grease fittings. See lubrication section for details..
25. Refill engine with engine oil. Recheck level.
26. Check linkages, lubricating all connections. In dirty, abrasive operations, use a dry type lubricant.
27. Check the fuel control linkage for security and mounting.
28. Replace all filters at specified intervals. See Preventative Maintenance schedule for details.
29. Engine oil filter is located on left hand side of engine. Change as per the preventative maintenance program.
30. Water corrosion filter is located on left hand side of engine. Shut off taps are located both sides of the filter. Change as per the preventative maintenance program.

IMPORTANT

To prevent intercooler damage, air caught in water system must be bled after changing this filter. Bleed points are located behind oil cooler filter mount, top of ????

31. Check tires for excessive wear and cuts. Remove any objects which could damage the tires. Also check wheel lug nuts for tightness and make sure none are missing. Re-torque wheel lug bolts two or three times during the first three initial work days. Torque to required specifications (see Critical Torque Areas).
32. Differential: Check lubricant level after each 250 hours of operation. Always maintain lubricant level to bottom of filler plug hole. Drain oil every 1,000 operating hours.
33. Check axle and lubricant level, and if necessary, fill to the required level.
34. Clean the upright and chains.
35. Check wear patterns in the rails. A wear pattern like this indicates that chain adjustment is correct.
36. A wear pattern like this means. that the chains are too long and must be adjusted to correct length. See upright section for adjustment procedures.
37. Check the condition of the load rollers and the corresponding area on the carriage.
38. Check chain adjustment by making sure the chains are under equal tension. See upright section for adjustments.
39. Make sure chains are properly mounted on rollers. Check rollers for damage.
40. Use an approved safety platform, raised by another lift truck, to perform these checks in the raised positions. Refer to Section 14 for adjustment procedures.
41. Check to see that the lift cylinders are securely bolted to the upright.
42. Check the chain anchors and cotter pins. Make sure they are secure and in good condition.

43. Check the upright for racking in full forward tilt and full backward tilt. Racking is caused by uneven adjustment of tilt cylinder rods and will result in excessive stress on all related components.
    Now check for upright free play and racking by tilting the upright fore and aft with the carriage fully raised. If there is excessive free play between rails and channels, upright adjustment of cylinder rod yokes is required.
44. Make sure that the tilt cylinders are securely fastened on both ends. Rear end of cylinder to frame.
45. Tilt cylinder mounting front to upright.
46. Perform a tilt drift test. Drift should not exceed 1.5/2 cm in a five minute period.
47. Now make a drift test on the upright cylinders. Drift should not exceed 2.5 cm per minute. If it does cylinder or control valve repair is indicated.

Preventative Maintenance Schedule

Item No.	Item	8 hr Daily Check	After First 100 hr	250 hours	1000 hours	Procedures & Quanities	Lubrication, Specifications & Comments
1	Upright and Truck -			•			Steam clean before 250 hours of service, check all welds for cracking.
2	Engine Oil	•	•	©	©	*	15W-40 Low Ash
3	Engine Oil Filter	•		©	©		
4	Brake Air Receivers	•	•	•	•	Drain water	
5	Hydraulic System	•			©	*340 Liters	BP Tracton TF10 or equivalent
6	Hydraulic Filter	•			©		
7	Air Filter Element	•		•			
8	Air Cleaner Indicator	•				If activated, change element, reset indicator	
9	Transmission Oil	•			©	Check level capacity 19 Liters	
10	Transmission Filter		©	©	©	Check transmission section	
11	Engine Water Filter				©	Bleed system after changing	
12	Cooling System	•				Capacity: Check level	Use a suitable coolant
13	Batteries, Elecrical Wipers and Washers	•				Check electrolyte level, condition of connections, clean as required.	
14	Fuel Filters			©	©		
15	Horn, Gauges, Lights	•				Check operation and condition	
16	Tire condition and Pressure	•				Check condition See plate for pressure	
17	Fan drive belt	•			©	Check condition and tension	
18	Wheel nuts	•	•			Check torque	See torque specifications
19	Brake, Service Parking	•		•		Check operation Check pad cond.	
20	Upright, Carriage and	•		Ⓛ		Check condition	

*** Oil change intervals may be determined by labortory analysis**

Preventative Maintenance Schedule

Item No.	Item	8 hr Daily Check	After First 100 hr	250 hours	1000 hours	Procedures & Quantities	Lubrication, Specifications & Comments
21	Lift Chains	Ⓛ	•	•	•	Check condition adjustment, lubricate	Use Engine Oil SAE 30
22	Forks	•		•		Check condition	
23	Seat and Seat belts	•	Ⓛ	Ⓛ	Ⓛ	Check condition and operation	
24	Drive Shafts		Ⓛ	Ⓛ	•	Check bolt torque	Multi purpose grease
25	Steering system and pivots		Ⓛ	Ⓛ	Ⓛ		Multi purpose grease
26	Steer wheel hubs	Ⓛ	Ⓛ	Ⓛ			Multi purpose grease
27	Upright &Tilt Cylinder pivots		Ⓛ	Ⓛ			Multi purpose grease
28	Upright rollers, sheave & pins			Ⓛ			Multi purpose grease
29	Forks, pins and guides			Ⓛ			Engine Oil
30	Pedals, cables, levers hinges, rails		©		©	As necessary	Engine Oil
31	Drive Axle and Diff			•		*	See Specifications
32	Cab mounting, glass		•	•		Check condition	
33	Alternator & Starter mounting & wiring		•	•		Check securing bolt torque	
34	Cooling fan securing bolts			•		Check for tightness	
35	Radiator Cap		•	•		Check condition and operation	
36	Electrical Harness			•		General check for tightness & security	
37	System pressures & multi gauge			•		Check pressures check leaks	
38	Engine RPM, High free idle			•		Check and adjust	See Cummins Engine book
39	Engine transmission mount			•		Check torque of all bolts	
40	Transmission				•	Check transmission pressures	See transmission service manual
41	Accumulators			•			Check correct operation of accumulators. See wetdisc brake and hydraulic lift circuit.

• **Check** © **Change** Ⓛ **Lubricate**

*** Oil change intervals may be determined by labortory analysis**

CLARK

GAS LPG or DIESEL
PLANNED MAINTENANCE REPORT

C O D E: O.K. | Potential | Urgent

✓ = O.K.
x = Adjust (Not P.M.)
r = Repair or replace
s = Requires shop repair

CUSTOMER

MODEL & SERIAL NO.
ATTACHMENT NO.

DATE	HOUR METER
DATE LAST P.M.	HRS. LAST P.M.
CUST. P.O. NO.	

AUTHORIZED SIGNATURE | INSPECTOR | SPECIAL INSTRUCTIONS

A TEST DRIVE MACHINE			
a Drive Train Noise			
b Steering Operation			
c Service Brake Operation			
d Inching Operation			
e Transmission Operation			
f Clutch Operation			
g Hydraulic System Operation			
h Engine Performance			
i Parking Brake Operation			
j Pedal Pads & Linkages			
k Return to Neutral			
l Pedestrian Warning Devices			
m Dead Engine Service Brake			
00 ENGINE			
a Mounting			
* b Head Bolt Torque			
c RPM - Idle			
Gov. No Load			
Tilt By-Pass			
d Stall RPM			
Fwd Rev			
High Low			
e Inspect Exhaust for Smoke			
01 CLEANING & LUBRICATION			
a Air Clean Truck/Radiator			
b Lubricate Truck			
01 ENGINE LUBRICATION			
a Check for Leakage			
b Check Oil Level			
* c Drain & Replace Oil			
* d Replace Oil Filter			
e Filler Cap Condition			
f Clean Crankcase Breather			
* g Check/Replace PCV			
01 COOLING SYSTEM			
a Coolant Level/Condition			
b Temperature Protection			
c Inspect Fan & Control			
* d Inspect & Adjust Belts			
* e Drain/Flush Radiator			
f Coolant Leakage			
g Inspect Water Pump			

02 FUEL SYSTEM			
a Check Filler Cap			
b Check Accelerator & Return Spring			
c Choke Operation			
d Fuel Leakage			
e Inspect Tank Fitting LPG			
f Lock Off Valve Operation - LPG			
g Clean/Replace Filter			
h Glow Plug Operation - Diesel			
i Idle Up System			
02 AIR INTAKE & EXHAUST			
a Air Filter Condition/Replace			
b Hoses & Clamps			
c Muffler & Exhaust			
06 & 08 TRANSMISSION			
a Fluid Level			
* b Condition of Fluid/Change			
c Clean Air Vent			
* d Replace Filter			
e Fluid Leakage			
f Inspect Control Linkage			
11 IGNITION & CRANKING SYSTEM			
a Check Neutral Start			
b Check Anti-Restart			
c Distributor Condition			
* d Point Condition/Dwell			
e Check Engine Timing			
f Cap and Rotor Condition			
* g Wiring Condition			
h Engine Shut Down System			
12 BATTERY AND CABLES			
* a Clean & Check Terminals			
b Fluid Level			
c Cranking Voltage			
12 CHARGING SYSTEM			
a Alternator/General Mounting			
* b Inspect & Adjust Belts			
c Check Charging Voltage			

13 GAUGES-LIGHTS-INDICATORS			
a Hour Meter Operation			
b Gauges - All Operate			
c Lights - All Operate			
d Wiring Condition			
e Horn			
f Operation of Accessories			
20 DRIVE AXLE			
* a Differential Level			
b Clean Air Vent			
c Security of Mounting			
d Check Wheel Bearings			
23 WHEELS AND TIRES			
a Tighten Mounting Bolts			
b Tire Condition			
RF LF			
RR LR			
c Check Air Pressure			
23 BRAKE SYSTEM			
a Check for Leakage			
b Cylinder Fluid Level			
c Clean Vent Cap			
d Pedal Free Travel			
e Pedal Drift			
f Cylinder/Valve Mounting			
g Service Brake Wear/Adjustment			
h Parking Brake Wear/Adjustment			
i Brake Line/Cable Condition			
26 STEER AXLE			
a Security of Mounting			
b Axle Stop Adjustment			
c Drag Link Adjustment			
d Articulation Stops			
e Check Wheel Bearings			
26 STEERING SYSTEM			
a Check for Leakage			
b Oil Level - Condition			
c Security of Mounting			
d Tilt Column Operation			
e Steering Control Adjustment			
29/30 HYDRAULIC SYSTEM			
a Check for Leakage			
b Fluid Level - Condition			
c Clean/Replace Breather			

29/30 HYDRAULIC SYSTEM			
* d Replace Filter			
e Linkage Adjustment			
f Hose Condition			
g Lift Speed (In./Sec.)			
No Load			
Full Load			
h Drift Test (In./Min.)			
Lift Cylinder			
Tilt Cylinder			
32 TILT CYLINDERS			
a Check for Leakage			
b Cylinder Rod Condition			
c Mounting Security			
d Tilt Cylinder Adjustment			
34 UPRIGHT-CARRIAGE			
a Security of Mounting			
b Roller Condition/Clearance			
c Chain and Anchor Condition			
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COMMENTS:

** SEE MAINTENANCE INTERVAL IN P.M.A. MANUAL*

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1 Powered industrial trucks can become hazardous if maintenance is neglected. Therefore, suitable maintenance facilities, trained personnel and procedures should be provided.
2. Maintenance and inspection of all powered industrial trucks should be done in conformance with the manufacturers recommendations.
3. A scheduled planned maintenance, lubrication and inspection system should be followed.
4. Only trained and authorized personnel should be permitted to maintain, repair, adjust and inspect industrial trucks and in accordance with the manufacturers specifications.
5. Properly ventilate work area, vent exhaust fumes and keep shop clean and floors dry.
6. Avoid fire hazards and have fire protection equipment presents in the work area. Do not use an open flame to check for level or leakage 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 free of floor and use blocks or other positive truck positioning devices.
   b. Put blocks under the load-engaging means, innermasts or chassis before work on them.
   c. Disconnect battery before working on the electrical system, or if welding is to be performed on the fork truck.
8. Operation of the truck to check performance must be conducted in an authorized, safe, clear area.
9. Before Starting To Drive Truck:
   a. Make sure parking brake Is applied.
   b. Put direction control In neutral.
   c. Start engine.
   d. Check functioning of lift and tilt systems, directional and speed controls, steering, brakes, warning devices and any load handling attachments.
10. 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.
   f. Turn the key switch to the OFF position.
   g. Put blocks at the wheels if truck must be left on an incline.
11. Brakes, steering mechanisms, control mechanisms, warning devices, lights, governors, lift overload devices, lift and tilt mechanisms, articulating axle stops and frame members must be carefully and regularly inspected and maintained in a safe operating condition.
12. Special trucks or devices designed and approved for hazardous area operation must receive special attention to insure that maintenance preserves the original approved safe operating features.
13. 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.
14. All hydraulic systems must be regularly inspected and maintained in conformance with good practice. Tilt and lift cylinders, valve and other parts must be checked to assure that "drifts" or leakage has not developed to the extent that would create a hazard. Tilt cylinder drift rates should not exceed 25mm in a 5 minute period. Tilt cylinder drift rates should not exceed 20mm in a 5 minute period.
15. When working on hydraulic system, be sure the engine is turned off, upright is in the 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.

16. The truck manufacturers capacity, operation and maintenance instruction plates, tags or decals must be maintained in legible condition.
17. Batteries, limit switches, protective devices, electrical conductors and connections must be maintained in conformance with good practice. Special attention must be paid to the condition of electrical insulation.
18. To avoid injury to personnel or damage to the equipment, consult the manufacturers procedures in replacing contacts on any battery connection.
19. Industrial trucks must be kept in a clean condition to minimize fire hazards and help in detection of loose or defective parts.
20. Modifications and additions that affect capacity and safe truck operation must not be performed without the manufacturers prior written approval. Capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly.
21. 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.
22. When removing tires follow industry safety practices. Most important, deflate pneumatic tires completely prior to removal. Following assembly of on multi-piece rims, use a safety cage or restraining device while inflating.
23. 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.

Planned Maintenance Program (PM)
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.

When you have finished the PM inspections, be sure to give a copy of the report to the designated authority or 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.
- Tie-up or cover long hair.
- Disconnect the battery ground cable from the engine or frame 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 and required.

HOW TO PERFORM PLANNED MAINTENANCE

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

NOTICE
NAMEPLATES & DECALS
Do not operate a lift truck with damaged or lost decals and nameplates. Replace them immediately. They contain important information.

Inspect the truck, before and after starting engine, for any sign of external leakage: fuel, engine coolant, transmission fluid, etc.

Check for hydraulic oil leaks and loose fittings.

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

PM Program
Check all of the critical components that handle or carry the load.

Check the cabin for damage. Be sure that it is properly positioned and all mounting fasteners are In place and tight.

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, and that the chain is lubricated throughout its entire length. Inspect all lift line hydraulic connections 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 (particularly the inside heel area), breaks, bending and wear. The fork top surface 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.

⚠ WARNING
If the fork blade at the heel is worn down by more that 10 percent the toad capacity is reduced and the fork must be replaced.

Inspect the fork locking pins for cracks or damage. Reinsert them and note whether they fit properly.

Inspect forks for twists and bends. The angle between the front face of the fork and the topface of the blade should not exceed 3 degrees.

Inspect forks for deviation from front face of the fork to full length of the upper face of the fork for straightness, this should not exceed 0.5%.

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".

Check all wheel lug nuts or bolts to be sure none are loose or missing. Have missing bolts or lug nuts replaced and tightened to the correct torque before operating truck. Torque to ????

⚠ WARNING

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, do not add air. Check with a mechanic. The tire may require removal and repair. Incorrect (low) tire pressure can reduce stability of your lift truck, and destroy the load carrying capacity of the tire. Tire inflation label is located on the guard above each tire position.

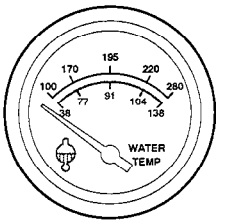
Functional Tests
Now be sure that all controls and systems are functioning correctly.

After checking that the parking brake is set, test horn, lights and all other safety equipment and accessories. Be sure they are property mounted and working correctly.

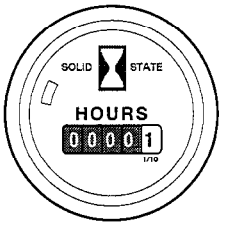
If they do not operate, report the failure and have it repaired before the truck is put into operation.

Check the operation of the neutral start switch by placing direction control lever in forward or reverse and turning key switch to *"START"* position. Starter must not engage until direction control lever in moved to the neutral position.

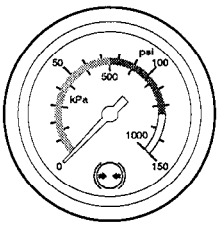
Water Temperature Gauge
Indicates temperature of engine coolant water in degrees 40°C - 140°C (100°F to 280°F). Water temperature should be about 80°C (180°F) after 10 minutes of operation. If the indicator registers in the *"HOT"* zone, turn off engine until trouble is located and corrected.



Hour Meter
Indicates total engine operating time in hours and tenths. The indicated hours are used for planned maintenance. The total hours should be recorded at the beginning and end of each shift.



Air Pressure Gauge
Indicates brake system air pressure from 0 to 1000 kPa (0 to 150 psi). Air pressure should register between 760 kPa and 900 kPa (110 and 130 psi) to assure proper operation of the brakes and the parking brake. A warning buzzer is activated if pressure drops below 300 kPa (44 psi).



Key/Start Switch
A 3-posftion switch is standard equipment. To start engine, rotate clockwise. Release to *"RUN"* position when engine starts. The switch incorporates an *"ANTI-RESTART"* feature which requires that the key be returned to the "off" position before it can again be turned to *"START"*. If engine does not start on the first attempt, do not re-engage the starter until engine comes to a complete stop (approximately 5 seconds).

Transmission Light
When illuminated, indicates inadequate transmission oil pressure. Light will be illuminated when key-start switch is turned to *"RUN"* and *"START"* positions. It should go out shortly after engine starts. If light does not go out or if it comes on during truck, operation you should immediately shut down the engine until the cause is located and corrected.

The gauges, lights and hour meter, conveniently grouped in the instrument panel, are designed to tell you at a glance many important things about the performance of your lift truck. Familiarize yourself with their location and purpose and make it a practice to scan the instrument panel as you start the engine, after it starts and periodically as you drive. Report to the designated authority if any gauge is not functioning properly.

NOTE: The electrically operated gauges register correctly when the key switch is in the *"ON"* position. When the key switch is turned "off", the indicator needle will not necessarily return to any given position.

Checks with the engine running...
Be sure that:

- Parking brake is applied.
- Directional control is in "N" (neutral).
- Start the engine, let it warm up until it runs evenly and accelerates smoothly when you push on the accelerator pedal.
- Check the hour meter for operation with the engine running. Report any malfunction or damage.

Write the hour meter reading on the PM report form.

- 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.

Air Brakes
Check the service brake system. Push the brake pedal fully down and hold. The brakes should be applied before the pedal reaches the floorplate. If the pedal continues to creep downwards report the failure immediately. DO NOT OPERATE THE TRUCK UNTIL THE BRAKES ARE REPAIRED.

- Check the function of the parking brake.
- If the engine stops, the air tank will supply a minimum of 12 brake applications.
- To check parking brake holding capability, park the lift truck on a grade and apply the parking brake. The parking brake should hold a lift truck with rated load on a minimum grade of 15%.

CAUTION

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

Wet Disc Brakes
To check the service brakes for accumulated systems, start truck, allow to run for 5 minutes without activating any functions. Turn the truck off, proceed to apply the brake pedal until hydraulic pressure drops off. There should be a minimum of 10-15 brake applications. If the pressure drops in less than the 10-15 applications the machine should be checked before going into operation. The brake accumulator may be faulty.

Note: If the Ignition Is switched on and the pressure In the brake system drops below 4000 kPa (580 psi) the Brake Warning light and audible alarm activate.

- Check the function of the park brake.

- Check parking brake holding capability. Park the truck on a grade, apply the parking brake. The parking brake should hold the lift truck with a rated load on a minimum of 15% grade.

WARNING

Hydraulic systems with accumulators may cause serious injury or death. Ensure hydraulic pressure is fully released before working on any systems.

WARNING

Hydraulic systems with accumulators may cause serious injury or death. Ensure hydraulic pressure is fully released before working on any systems.

Lift Mechanisms and Controls

- Check the function of the lift system and controls with the hydraulic pump (engine) running.

- Pull back on the tilt control lever and hold until the upright reaches the full back tilt position. Push forward on the lever to return the upright to the vertical position.

CAUTION

Be sure that there is adequate overhead clearance before raising the upright.

- Pull back on the lift control lever and raise the fork carriage to full height. Watch the upright assembly as it rises. All movements of the uptight, fork carriage and lift chains must be even and smooth, without binding or jerking. Watch for chain wobble or looseness; the chains should have equal tension and move smoothly without noticeable wobble. Release the lever.

- Push forward on the lift control lever. Watch the upright as it lowers. When the forks reach the floor, release the lever.

Auxiliary Controls
If your lift truck is equipped with an attachment, test the control lever for correct function and briefly operate the attachment.

Steering System
The steering system, steer axle and steering linkage on your truck should be inspected periodically for abnormal looseness and damage, leaking seals, etc. Hard steering, excessive freeplay (looseness) or unusual sound when turning or maneuvering indicates a need for inspection or servicing.
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 system components should operate smoothly when the steering wheel is turned. Never operate a truck which has a steering system fault.

Shift Control (for forward travel)
Check and make sure that the travel area is clear in front of the truck.

- Push firmly on the brake pedal. Release the parking brake. Move the directional control lever from "N" (neutral) to FORWARD travel position.

- Remove your foot from the brake pedal and put it on the accelerator pedal. Push down until the truck moves slowly forward. Remove your foot from the accelerator pedal and push down on the brake pedal to stop the truck. The brakes should apply smoothly and equally.

For reverse travel, be sure the travel area is clear behind the truck.

- Put the directional control lever in the REVERSE travel position. Push down on the accelerator pedal until the truck moves slowly in the reverse direction. Remove your foot from the accelerator pedal and push down on the brake pedal to stop the truck. The brakes should apply smoothly and equally. When you have completed the operational tests, park and leave truck according to standard shut down procedures. Be sure to make a record of all maintenance and operating problems you find.

Fluid and Filters
Check fluid levels and other components within the engine compartment.
Unlatch and open the hood to access the engine compartment.

⚠ CAUTION

To avoid the possibility of personal injury, never work in engine compartment with engine running except when absolutely necessary to check or make adjustments. Take extreme care to keep hands, tools and loose clothing, etc., away from fan, drive belts hot radiator and exhaust manifold and piping. Also remove watches, bracelets and rings.

Engine Accessories
Inspect the engine coolant hoses and fan belt(s). Look for leaking and obvious damage, worn (frayed) condition, breaks, etc., which could cause failure during operation.

Engine Air Cleaner
Check the engine air cleaner for damage and contamination (excessive dirt buildup and clogging). Check for correct mounting attachments of the air cleaner. Be sure that the air cleaner hose is securely connected (not loose or leaking). Change or service the air cleaner element when required, depending upon your application. Service intervals may also be determined by the air restriction indicator.

Batteries
Inspect the batteries for any damage, cracks, leaking condition, etc. if the terminals are corroded, clean and protect them. If your battery has removable cell caps, check to be sure the cells are all filled. If possible, refill with distilled water.

⚠ WARNING

Do not smoke, have sparks or any naked flames nearby when checking or filling batteries.

Engine Cooling System
Check engine coolant level. The engine coolant level is checked by removing the radiator cap. Remove the cap only when the engine is cold. First turn the cap slowly to release any pressure that may be in the radiator. Later production forklift trucks have a radiator cap which incorporates a pressure relieving lever which should be activated before slowly turning and removing the cap.

⚠ CAUTION *STEAM*

Do not remove the radiator cap when the radiator is hot. Steam from the radiator will cause severe burns.

Never remove the radiator cap while the engine is running. Stop the engine and wait until it has cooled. Even then, use extreme care when removing the cap from the radiator. It is a good safety practice to use a shop cloth to cover the radiator cap while it is being removed. Wrap the cloth around the cap and turn it slowly to the first stop. Step-back while the pressure is released from the cooling system. When you are sure all the pressure has been released, press down on the cap, with the cloth in place, turn and remove it. Stand clear of the radiator opening; hot coolant may splash out. Failure to follow these instructions could result in serious personal injury from hot coolant or steam blowout and/or damage to the cooling system or engine. The correct FULL level is the top edge of the filter neck. If level is low, add a mixture of specified coolant and water to the correct fill level. If you have to add coolant more than once a month or if you have to add more than 250ml at a time, check the cooling system for leaks.

Inspect the coolant for condition. Look for excessive contamination or rust or oil in the coolant solution. Check the PM time interval for need to change coolant.

Check condition of radiator cap rubber seal and radiator filler neck for damage. Be sure they are clean. Check overflow hose for clogging or damage.

NOTICE - Your lift truck cooling system is filled with a factory installed permanent-type antifreeze containing rust and corrosion inhibitors. Plain water may be used only in an emergency, but replace it with the specified coolant as soon as possible to avoid damage to the system. With only water in the system, do not let the engine run hot.

⚠ CAUTION

Inadequate concentration of the coolant additive can result in major corrosive damage to cooling system components. Over concentration can cause formation of *"gel"* that can cause restriction, plugging of coolant passages, and over heating. For more information consult your Cummins Operation and Maintenance Manual for the Engine.

Radiator

The radiator core should be inspected and back-flushed as required. Take particular note to the areas around the outside of the fan blade where most of the dirt can block air flow through the radiator. This blockage is difficult to see due to the shroud and location of the radiator and periodic complete removal of the radiator for cleaning of the core may be required. This type of external core blockage can cause overheating of the cooling system. For more information see your local Clark dealer

Engine Oil

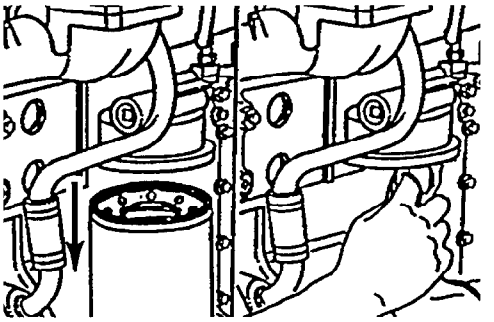
Check the engine oil level. Locate the engine oil dipstick (at left side of engine). Pull the dipstick out, wipe it with a clean cloth and re-insert it fully into the dipstick tube. Remove the dipstick and check oil level.

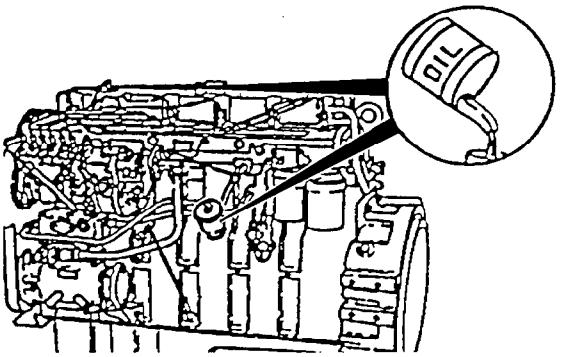
It is normal to add some oil between oil changes. Keep the oil level above the ADD mark on the dipstick by adding oil as required. DO NOT OVERFILL. Use the correct oil at specified under Lubricant Specifications.

Engine Oil and Filter Change

It is recommended to:
Drain and replace the engine crankcase oil every 250 operating hours. See NOTICE below.
Replace the engine oil filter every oil change.
Remove the oil sump drain plug to drain old oil, after truck has been in operation and engine (oil) is hot (at operating temperature).

NOTICE - The time interval for changing engine oil will depend upon your application and operating conditions. To determine the correct schedule for your truck it is suggested that you periodically submit engine oil samples to a commercial laboratory for analysis of the condition of the oil.





Air Brakes Adjustment

When the brake system is operating properly, the cam like action of the reaction arm allows self-adjustment for the total thickness of the brake linings. The self-adjustment feature eliminates the need for manual adjustment of the brakes.

When the brake linings become worn beyond their designed limits, there will be a noticeable change in the brake effort required to stop the truck or brakes will become noisy during application. If either of these conditions are noted, have the brakes checked by a mechanic before continuing to operate the truck.

See Workshop Manual for greater detail.

Testing

A simple operation test to determine whether the compressor unit is operating can be made as follows:

1. Start the engine and allow air to build up in the system and then shut the engine off.

2. Depress the brake pedal to a given point several times noting any increase in pedal pressure required to depress the pedal.

3. If, however there is no change in the amount of pedal pressure required between first and last test, then the power system is not functioning, necessitating corrective action. Have the brakes checked by a mechanic before operating truck.