



SB2020E01
Mar.1994

Operation & Maintenance Manual

LIFT TRUCKS

GC20-2,	G20-2,	D20-2
GC25-2,	G25-2,	D25-2
GC20S-2,	G20S-2,	D20S-2
GC25S-2,	G25S-2,	D25S-2
GC30S-2,	G30S-2,	D30S-2

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Foreword

Literature Information

This manual should be stored in the operator's compartment in the literature holder or seat back literature storage area.

This manual contains safety, operation, transportation, lubrication and maintenance information.

Some photographs or illustrations in this publication show details or attachments that can be different from your lift truck. Guards and covers might have been removed for illustrative purposes.

Continuing improvement and advancement of product design might have caused changes to your lift truck which are not included in this publication. Read, study and keep this manual with the lift truck.

Whenever a question arises regarding your lift truck, or this publication, please consult your DAEWOO dealer for the latest available information.

Safety

The Safety Section lists basic safety precautions. In addition, this section identifies the text and locations of warning signs and labels used on the lift truck.

Read and understand the basic precautions listed in the Safety Section before operating or performing lubrication, maintenance and repair on this lift truck.

Operation

The Operation Section is a reference for the new operator and a refresher for the experienced one. This section includes a discussion of gauges, switches, lift truck controls, attachment controls, transportation and towing information.

Photographs and illustrations guide the operator through correct procedures of checking, starting, operating and stopping the lift truck.

Operating techniques outlined in this publication are basic. Skill and techniques develop as the operator gains knowledge of the lift truck and its capabilities.

Maintenance

The Maintenance Section is a guide to equipment care. The illustrated, step-by-step instructions are grouped by servicing intervals. Items without specific intervals are listed under "When Required" topics. Items in the "Maintenance Intervals" chart are referenced to detailed instructions that follow.

Maintenance Intervals

Use the service hour meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) can be used instead of service hour meter intervals if they provide more convenient servicing schedules and approximate the indicated service hour meter reading. Recommended service should always be performed at the interval that occurs first.

Under extremely severe, dusty or wet operating conditions, more frequent lubrication than is specified in the "Maintenance Intervals" chart might be necessary.

Perform service on items at multiples of the original requirement. For example, at "Every 500 Service Hours or 3 Months," also service those items listed under "Every 250 Service Hours or Monthly" and "Every 10 Service Hours or Daily."

Important Safety Information

Most accidents involving product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or other persons.

The hazards are identified by the "Safety Alert Symbol" and followed by a "Signal Word" such as "WARNING" as shown below.



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning, explaining the hazard, can be either written or pictorially presented.

Operations that may cause product damage are identified by NOTICE labels on the product and in this publication.

DAEWOO cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are therefore not all inclusive. If a tool, procedure, work method or operating technique not specifically recommended by DAEWOO is used, you must satisfy yourself that it is safe for you and others. You should also ensure that the product will not be damaged or made unsafe by the operation, lubrication, maintenance or repair procedures you choose.

The information, specifications, and illustrations in this publication are on the basis of information available at the time it was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service given to the product. Obtain the complete and most current information before starting any job. DAEWOO dealers have the most current information available.

Safety

The safety rules and regulations in this section are representative of some, but not all rules and regulations noted under the Occupational Safety and Health Act (OSHA) and are paraphrased without representation that the OSHA rules and regulations have been reproduced verbatim.

Please refer to 1910.178 in Federal Register Vol. 37, No. 202, the National Fire Protection Association No. 505 (NFPA), American National Standard, ANSI B56.1 Safety Standard for Low Lift and High Lift Trucks and subsequent revisions for a complete list of OSHA rules and regulations as to the safe operation of powered industrial lift trucks. Since regulations vary from country to country outside the U.S.A., operate this lift truck in accordance with local regulations.

The most effective method of preventing serious injury or death to the lift truck operator or others is for the lift truck operator to be familiar with the proper operation of the lift truck, to be alert and to avoid actions or conditions which can result in an accident.

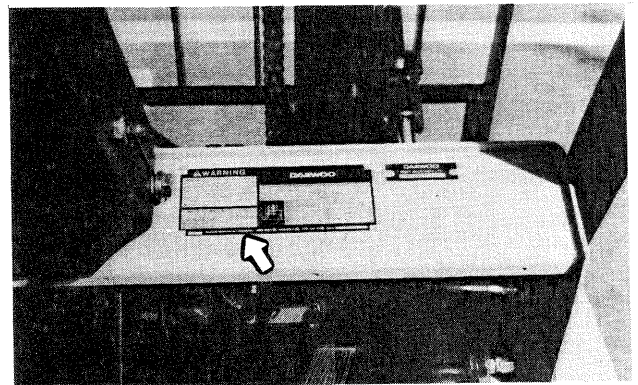
Do not operate a lift truck if in need of repair, defective or in any way unsafe. Report all defects and unsafe conditions immediately. Do not attempt any adjustments or repairs unless trained and authorized to do so.

Warning Signs and Labels

There are several specific safety signs on your lift truck. Their exact location and description of the hazard are reviewed in this section. Please take the time to familiarize yourself with these safety signs.

Make sure that you can read all warning and instruction labels. Clean or replace these labels if you cannot read the words or see the pictures. When cleaning the labels use a cloth, water and soap. Do not use solvent, gasoline, etc.

You must replace a label if it is damaged, missing or cannot be read. If a label is on a part that is replaced, make sure a new label is installed on the replaced part. See your dealer for new labels.

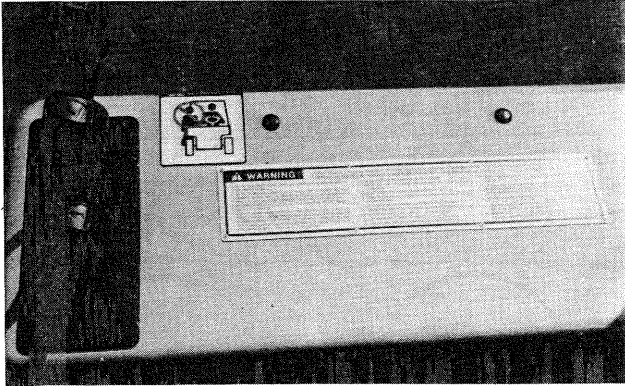


Located to the right of the steering wheel.

WARNING

Improper operation or maintenance could result in injury or death. Do not operate or work on the lift truck unless you are properly trained. Read and understand the Operation and Maintenance Manual. Additional manuals are available from DAEWOO Lift Truck dealers.

(This also provides allowable lift truck capacity information.)



Located on the right side of the operator's seat.

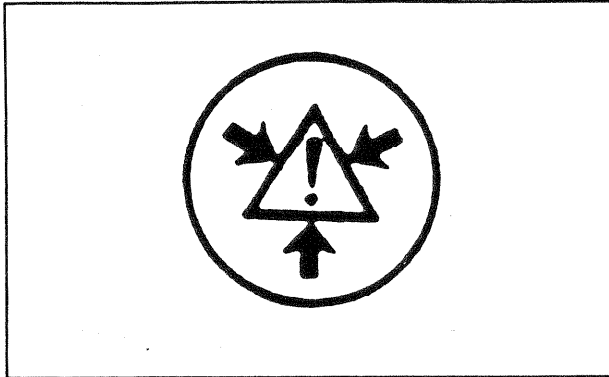
 WARNING

Only trained and authorized personnel may operate this machine. For safe operation, read and follow the Operation and Maintenance Manual furnished with this lift truck and observe the following warnings:

1. Before starting machine, check all controls and warning devices for proper operation.
2. Refer to machine identification plate for allowable machine capacity. Do not overload. Operate machines equipped with attachments as partially loaded machines when not handling a load.
3. Put directional control or shift lever in neutral before "ON-OFF" switch is turned on.
4. Start, turn and brake smoothly. Slow down for turns, slippery or uneven surfaces. Extremely poor surfaces should be repaired. Avoid running over loose objects or holes in the roadway surfaces. Use extreme caution when turning on inclines.
5. Travel with load as low as possible and tilted back. If load interferes with visibility, travel with load trailing.
6. On grade operations travel with load up grade.
7. Watch out for pedestrians and obstructions. Check overhead clearances.
8. Do not permit riders on forks or machine at any time.
9. Do not allow anyone to stand or pass under the elevated portion of any machine.
10. Be sure operating surface can safely support machine.
11. Operate machine and attachments only from operator's position.
12. Do not handle unstable or loosely stacked loads.
13. Use minimum tilt when picking up or depositing a load.
14. Use extreme care when handling long, high, or wide loads.
15. Forks should be completely under load and spread apart as far as load permits.
16. Machine should be equipped with overhead guard or equivalent protection. Where load requires it, use load backrest extension. Use extreme caution if operating without these devices.
17. Parking - Lower lifting mechanism to floor. Put directional control or shift lever in neutral. Set parking/secondary brake. Turn "ON-OFF" switch off. Chock wheels if machine is on incline. Disconnect battery when storing electric machines.
18. Observe safety rules when handling fuel for engine powered machine and when changing batteries for electric machines.

! WARNING

PRESSURE

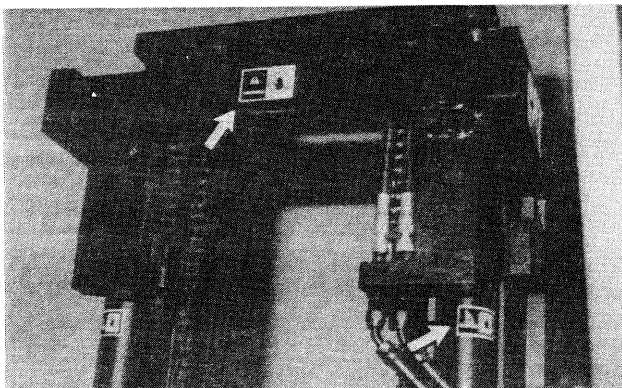


On GC-Series lift trucks, the label is located on the counterweight near the cover for the radiator cap. On D,G-Series lift trucks the label is located on the radiator top tank by the radiator cap.

! WARNING



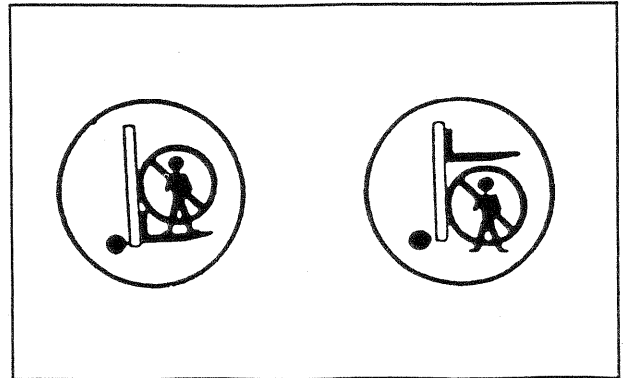
(No hands. Do not place hands in this area. Do not touch, lean on, or reach through the mast or permit others to do so.)



Located on the mast.

! WARNING

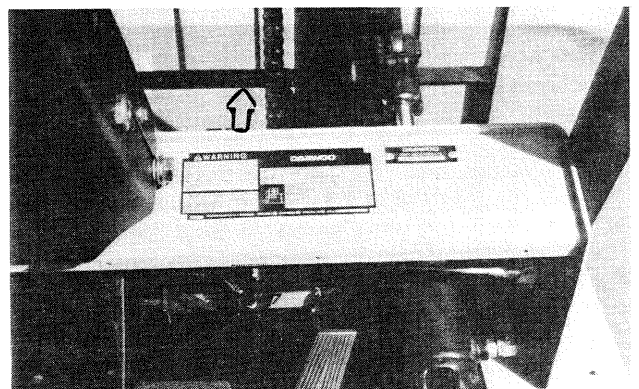
Do not stand or ride on the forks. Do not stand or ride on a load or pallet on the forks. Do not stand or walk under the forks.



Located on the mast.

! WARNING

Operation without this device in place may be hazardous.



Located on the load backrest.

⚠ WARNING

Operation without this device in place may be hazardous. This guard conforms to A.N.S.I. B56.1 and F.E.M. Section IV. This design has been tested with an impact of [10,800 N · m (8,000 lb.ft)].



Located on the Overhead Guard.

⚠ WARNING

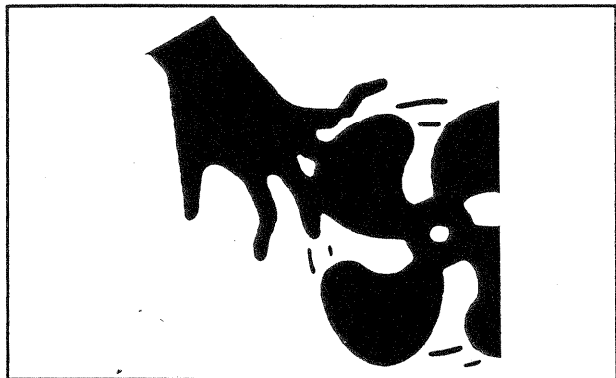
To avoid personal injury, allow no riders. A lift truck is designed for only one operator and no riders.



Located beside the operator's station.

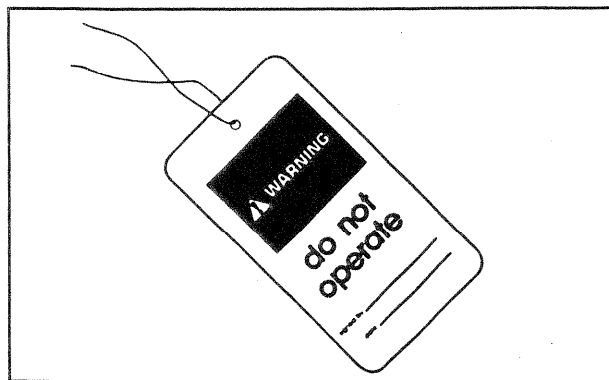
⚠ WARNING

To avoid personal injury, stay clear of moving fan.



Located inside the engine compartment cover.

General Hazard Information



Attach a "Do Not Operate" or similar warning tag to start switch or controls before servicing or repairing the lift truck.

Do not start or service the lift truck when a "DO NOT OPERATE" or similar warning tag is attached to the start switch or controls.

Wear a hard hat, protective glasses and other protective equipment as required by job conditions.

Know the width of your attachments so proper clearance can be maintained when operating near fences, boundary obstacles, etc.

Do not wear loose clothing or jewelry that can catch on controls or other parts of the lift truck.

Keep the lift truck, especially the deck and steps, free of foreign material such as debris, oil, tools and other items which are not part of the lift truck.

Secure all loose items such as lunch boxes, tools and other items which are not part of the lift truck.

Know the appropriate work-site hand signals and who gives them. Accept signals from one person only.

Always use the overhead guard. The overhead guard is intended to protect the lift truck operator from overhead obstructions and from falling objects.

A truck that is used for handling small objects or uneven loads must be fitted with a load backrest.

If the lift truck must be operated without the overhead guard in place due to low overhead clearance, use extreme care. Make sure there is no possibility of falling objects from any adjacent storage or work area. Make sure the load is stable and fully supported by the carriage and the load backrest extension (if equipped).

Do not raise loads any higher than necessary and never raise a load higher than 1830 mm (72 in) with the overhead guard removed.

Always use load backrest extension when the carriage or attachment does not fully support the load. The load backrest extension is intended to prevent the load or any part of the load from falling backwards into the operator's station.

When operating the lift truck, do not depend on flashing lights or back-up alarm (if equipped) to warn pedestrians.

Always be aware of pedestrians and do not proceed until the pedestrians are aware of your presence and intended actions and have moved clear of the lift truck and/or load.

Do not drive lift truck up to anyone standing in front of an object.

Obey all traffic rules and warning signs.

Keep hands, feet and head inside the operator station. Do not hold onto the overhead guard while operating the lift truck. Do not climb on any part of the mast or overhead guard or permit others to do so.

Do not allow unauthorized personnel to ride on the forks or any other part of the lift truck, at any time.

When working in a building or dock, observe floor load limits and overhead clearances.

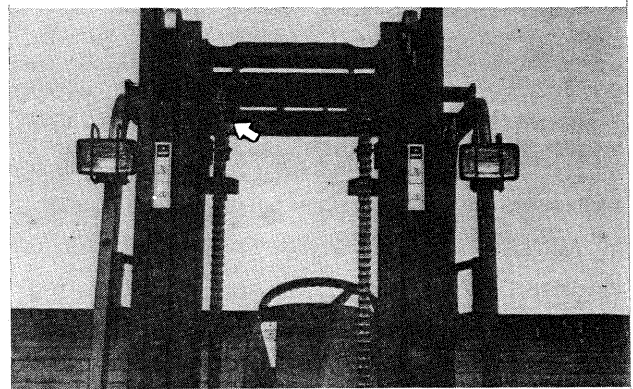
Inhaling freon gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting freon can cause bodily harm or death. Do not smoke when servicing air conditioners or wherever freon gas may be present.

Never put maintenance fluids into glass containers.

Use all cleaning solutions with care.

Do not use steam, solvent, or high air pressure to clean electrical components.

Report all needed repairs.



Inspect the part of the chain that is normally operated over the crosshead roller. When the chain bends over the roller, the movement of the parts against each other causes wear.

Inspect to be sure that chain link pins do not extend outside of the bore hole.

If any single link pin is extended beyond its connecting corresponding link, it should be suspected of being broken inside of its bore hole.

Inspect the chain anchor and the anchor links for wear.

Perform all maintenance unless otherwise specified as follows:

- Park the lift truck in authorized areas only.
- Park the lift truck level, with the forks lowered and the mast tilted forward until the fork tips touch the floor.
- Place the transmission controls in neutral.
- Engage the parking brake.
- Stop the engine.
- Remove the start switch key and turn the disconnect switch OFF (if equipped).
- Block the drive wheels when parking on an incline.

Pressure Air

Pressure air can cause personal injury. When using pressure air for cleaning, wear a protective face shield, protective clothing and protective shoes.

The maximum air pressure must be below 205 kPa (30 psi) for cleaning purposes.

Fluid Penetration

Always use a board or cardboard when checking for a leak. Escaping fluid under pressure, even a pin-hole size leak, can penetrate body tissue, causing serious injury, and possible death. If fluid is injected into your skin, it must be treated by a doctor familiar with this type of injury immediately.

Crushing or Cutting Prevention

Support equipment and attachments properly when working beneath them. Do not depend on hydraulic cylinders to hold it up. Any attachment can fall if a control is moved, or if a hydraulic line breaks.

Never attempt adjustments while the lift truck is moving or the engine is running unless otherwise specified.

Where there are attachment linkages, the clearance in the linkage area will increase or decrease with movement of the attachment.

Stay clear of all rotating and moving parts.

Keep objects away from moving fan blades. They will throw or cut any object or tool that falls or is pushed into them.

Do not use a kinked or frayed wire rope cable. Wear gloves when handling the wire rope cable.

Retainer pins, when struck with force, can fly out and injure nearby persons. Make sure the area is clear of people when driving retainer pins.

Wear protective glasses when striking a retainer pin to avoid injury to your eyes.

Chips or other debris can fly off objects when struck. Make sure no one can be injured by flying debris before striking any object.

Falling Objects Protective Structure (FOPS)

This is an attached guard located above the operator's compartment and secured to the lift truck.

To avoid possible weakening of the Falling Objects Protective Structure (FOPS), consult a DAEWOO dealer before altering, by adding weight to, welding on, or cutting or drilling holes into the structure.

The overhead guard is not intended to protect against every possible impact. The overhead guard may not protect against some objects penetrating into the operator's station from the sides or ends of the lift truck.

The lift truck is equipped with an overhead guard and FOPS as standard. If there is a possibility of overhead objects falling through the guard, the guard must be equipped with smaller holes or a plexiglass cover.

Any altering done that is not specifically authorized by DAEWOO invalidates DAEWOO's FOPS certification. The protection offered by this FOPS will be impaired if it has been subjected to structural damage. Structural damage can be caused by an overturn accident, by falling objects, etc.

Do not mount any item such as fire extinguishers, first aid kits and lights by welding brackets to or drilling holes in any FOPS structure. See your DAEWOO dealer for mounting guidelines.

Burn Prevention

Coolant

At operating temperature, the engine coolant is hot and under pressure. The radiator and all lines to heaters or the engine contain hot water or steam. Any contact can cause severe burns.

Steam can cause personal injury.

Check the coolant level only after the engine has been stopped and the fill cap is cool enough to remove with your bare hand.

Remove the cooling system fill cap slowly to relieve pressure.

Cooling system additive contains alkali that can cause personal injury. Avoid contact with the skin and eyes and do not drink.

Allow cooling system components to cool before draining.

Oils

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact the skin.

At operating temperature, the hydraulic tank is hot and can be under pressure.

Remove the hydraulic tank fill cap only after the engine has been stopped and the fill cap is cool enough to remove with your bare hand.

Remove the hydraulic tank fill cap slowly to relieve pressure.

Relieve all pressure in air, oil, fuel or cooling systems before any lines, fittings or related items are disconnected or removed.

Batteries

Batteries give off flammable fumes which can explode.

Do not smoke when observing the battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.

Always wear protective glasses when working with batteries.

Fire or Explosion Prevention

All fuels, most lubricants and some coolant mixtures are flammable.

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Do not smoke while refueling or in a refueling area.

Do not smoke in areas where batteries are charged, or where flammable materials are stored.

Batteries in series can be located in separate compartments. When using jumper cables always connect positive (+) cable to positive (+) terminal of battery connected to starter solenoid and negative (-) cable from external source to starter negative (-) terminal. (If not equipped with starter negative (-) terminal, connect to engine block.)

See the Operation Section of this manual for specific starting instructions.

Clean and tighten all electrical connections. Check daily for loose or frayed electrical wires. Have all loose or frayed electrical wires tightened, repaired or replaced before operating the lift truck.

Keep all fuels and lubricants stored in properly marked containers and away from all unauthorized persons.

Store all oily rags or other flammable material in a protective container, in a safe place.

Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.

Remove all flammable materials such as fuel, oil and other debris before they accumulate on the lift truck.

Do not expose the lift truck to flames, burning brush, etc., if at all possible.

Shields, which protect hot exhaust components from oil or fuel spray in the event of a line, tube or seal failure, must be installed correctly.

Fire Extinguisher

Have a fire extinguisher available and know how to use it. Inspect and have it serviced as recommended on its instruction plate.

Ether

Ether is poisonous and flammable.

Breathing ether vapors or repeated contact of ether with skin can cause personal injury.

Use ether only in well-ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 39°C (102°F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

Lines, Tubes and Hoses

Do not bend or strike high pressure lines. Do not install bent or damaged lines, tubes or hoses.

Repair any loose or damaged fuel and oil lines, tubes and hoses. Leaks can cause fires. Contact your DAEWOO dealer for repair or replacement.

Check lines, tubes and hoses carefully. Do not use your bare hand to check for leaks. Use a board or cardboard to check for leaks. See Fluid Penetration in the Safety Section for more details. Tighten all connections to the recommended torque. Replace if any of the following conditions are found.

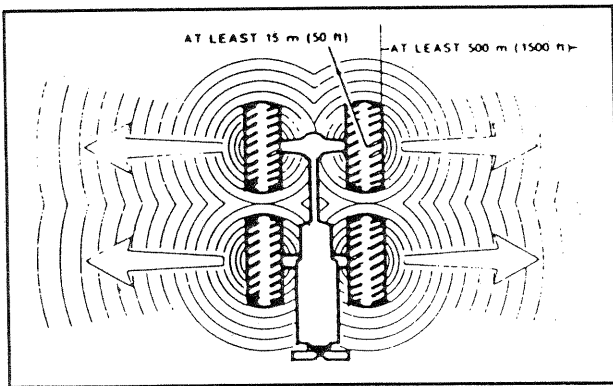
- End fittings damaged or leaking.
- Outer covering chafed or cut and wire reinforcing exposed.
- Outer covering ballooning locally.
- Evidence of kinking or crushing of the flexible part of hose.
- Armouring embedded in the outer cover.
- End fittings displaced.

Make sure that all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing against other parts, and excessive heat during operation.

Tire Information

Explosions of air-inflated tires have resulted from heat-induced gas combustion inside the tires. The heat, generated by welding or heating rim components, external fire, or excessive use of brakes can cause gaseous combustion.

A tire explosion is much more violent than a blowout. The explosion can propel the tire, rim and axle components as far as 500 m (1500 ft) or more from the lift truck. Both the force of the explosion and the flying debris can cause personal injury or death, and property damage.



Do not approach a warm tire closer than the outside of the area represented by the shaded area in the above drawing.

Dry nitrogen (N_2) gas is recommended for inflation of tires. If the tires were originally inflated with air, nitrogen is still preferred for adjusting the pressure. Nitrogen mixes properly with air.

Nitrogen inflated tires reduce the potential of a tire explosion, because nitrogen does not support combustion. Also, nitrogen helps prevent oxidation and the resulting deterioration of rubber and corrosion of rim components.

Proper nitrogen inflation equipment and training in its use are necessary to avoid overinflation. A tire blowout or rim failure can result from improper or misused equipment.

Stand behind the tread and use a self-attaching chuck when inflating a tire.

Servicing and changing tires and rims can be dangerous and should be done only by trained personnel using proper tools and procedures. If correct procedures are not followed while servicing tires and rims, the assemblies could burst with explosive force and cause serious personal injury or death. Follow carefully the specific information provided by your tire or rim servicing personnel or dealer.

Mounting and Dismounting

Mount and dismount the lift truck carefully.

Clean your shoes and wipe your hands before mounting.

Face the lift truck when mounting and dismounting.

Use both hands and face the lift truck when mounting and dismounting.

Use the handgrips for mounting and dismounting. If there are no hand grips, use the FOPS. Lastly, use the steering wheel.

Do not try to climb on or off the lift truck when carrying tools or supplies.

Never get on or off a moving lift truck.

Do not use any controls as handholds when entering or leaving the operator's station.

Never get on or off a moving lift truck. Never jump off the lift truck.

Keep hands and steering wheel free of slippery material.

Preparing to Start the Engine

Perform a walk-around inspection daily and at the start of each shift. Refer to the topic "Walk-around Inspection" in "Every 10 Service Hours or Daily" section of this manual.

Adjust the seat so that full brake pedal travel can be obtained with the operator's back against the seat back.

Make sure the lift truck is equipped with a lighting system as required by conditions.

Make sure all hydraulic controls are in the HOLD position.

Make sure the direction control lever is in the NEUTRAL position.

Make sure the parking brake is engaged.

Make sure no one is standing and/or working on, underneath or close to the lift truck before operating the lift truck.

Operate the lift truck and controls only from the operator's station.

Make sure the lift truck horn, lights, backup alarm (if equipped) and all other devices are working properly.

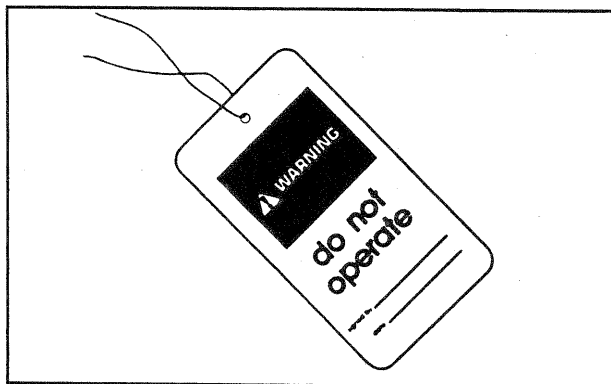
Check for proper operation of mast and attachments. Pay particular attention to unusual noises or erratic movement which might indicate a problem.

Make sure service and parking brakes, steering, and directional controls are operational.

Make sure all personnel are clear of lift truck and travel path.

Refer to the topic "Lift Truck Operation" in the "Operation Section" of this manual for specific starting instructions.

Starting the Engine



Do not start the engine or move any of the controls if there is a "DO NOT OPERATE" or similar warning tag attached to the start switch or controls.

Preparing to Operate the Lift Truck

Test brakes, steering controls, horn and other devices for proper operation. Report faulty performance. Do not operate lift truck until repaired.

Learn how your lift truck operates. Know its safety devices. Know how the attachments work.

Before moving the lift truck, look around. Start, turn and brake smoothly.

An operator must constantly observe his lift truck for proper operation.

Operating the Lift Truck

Always keep the lift truck under control

Obey all traffic rules and warning signs.

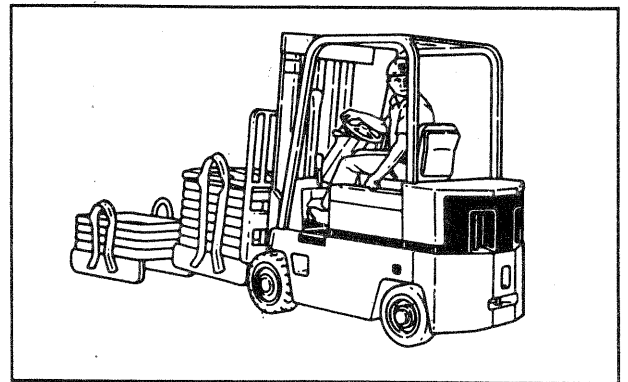
Never leave the lift truck with the engine operating, or with the parking brake disengaged.

Operate the engine only in a well ventilated area.

Lower mast, with or without load, before turning or traveling. Tip over could result. Watch out for overhead obstructions.

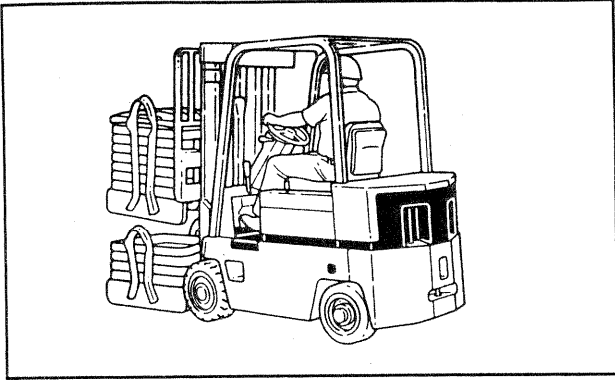
Always observe floor load limits and overhead clearance.

Start, turn, and brake smoothly, slow down for turns, grades, slippery or uneven surfaces.



Use special care when operating on grades. Do not angle across or turn on grades. Do not use lift truck on slippery grades. Travel with forks downgrade when unloaded. Travel with load upgrade.

Do not overload, or handle offset, unstable, or loosely stacked loads. Refer to load capacity plate on the lift truck. Use extreme caution when handling suspended, long, high or wide load.



Tilt elevated load forward only when directly over unloading area and with load as low as possible.

Do not stunt ride or indulge in horseplay.

Always look and keep a clear view of the path of travel

Travel in reverse if load or attachment obstructs visibility. Use extreme caution if visibility is obstructed.

Stay in designated travel path, clear of dock edges, ditches, other dropoffs and surfaces which cannot safely support the lift truck.

Slow down and use extra care through doorways, intersections and other location where visibility is reduced.

Slow down for and avoid pedestrians, other vehicles, obstructions, pot holes and other hazards or objects in the path of travel.

Always use overhead guards except where operating conditions do not permit. Do not operate lift truck in high stacking areas without overhead guards.

When stacking, watch for falling objects. Use load backrest extension and overhead guard.

Refer to the topic "Operating Techniques" in the "Operation Section" of this manual.

Loading or Unloading Trucks/Trailers

Do not operate lift trucks on trucks or trailers which are not designed or intended for that purpose.

Be certain truck or trailer brakes are applied and wheel chocks in place (or be certain unit is locked to the loading dock) before entering onto trucks or trailers.

If trailer is not coupled to a tractor, make sure the trailer landing gear is properly secured in place. On some trailers, extra supports may be needed to prevent upending or corner dipping.

Be certain dock plates are in good condition and properly placed and secured. Do not exceed the rated capacity of dock boards or bridge plates.

Lift Truck Parking

When leaving the operator station, park the lift truck in authorized areas only. Do not block traffic.

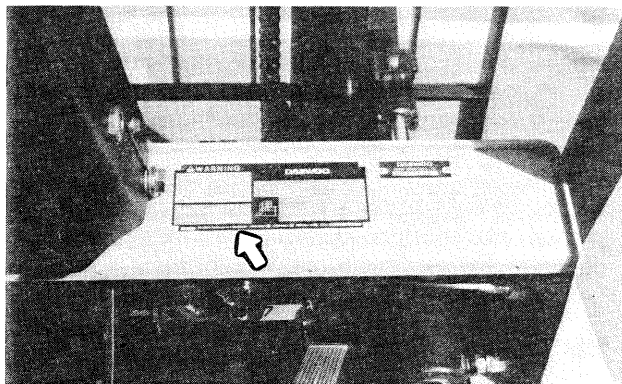


- Park the lift truck level, with the forks lowered and the mast tilted forward until the fork tips touch the floor.
- Move the direction control lever to NEUTRAL.
- Engage the parking brake.
- Turn the key switch off and remove the key.
- Turn the disconnect switch to OFF and remove the key (if equipped).
- Block the drive wheels when parking on an incline.

Serial Number and Capacity Plate Locations

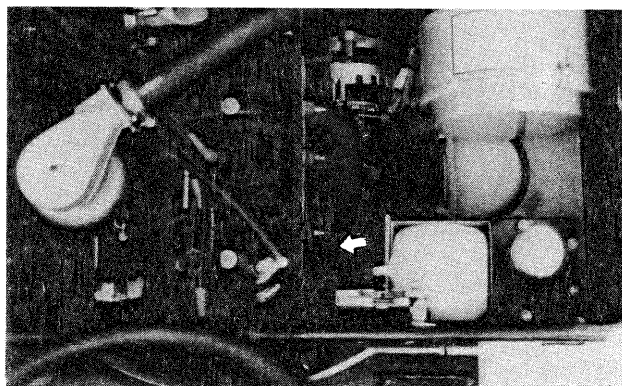
Serial Number Locations

For quick reference, record your lift truck's serial numbers in the spaces provided below the photographs.



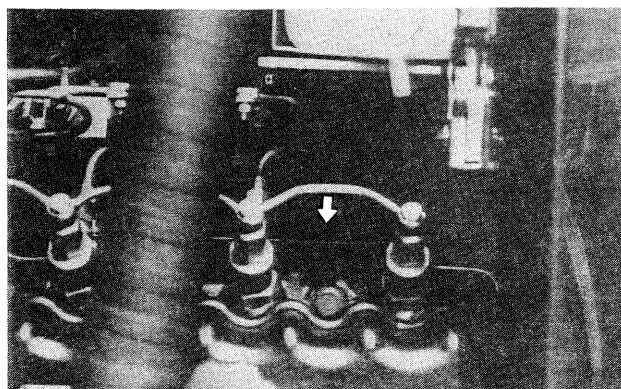
Lift Truck Serial Number

• _____



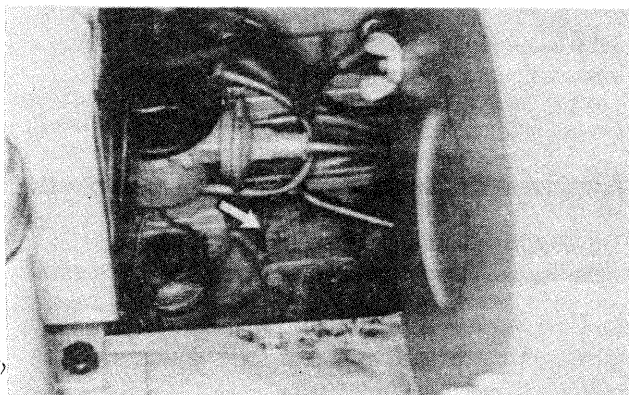
2.0 liter (XN1P) Gasoline and LP-Gas Engine Serial Number

• _____



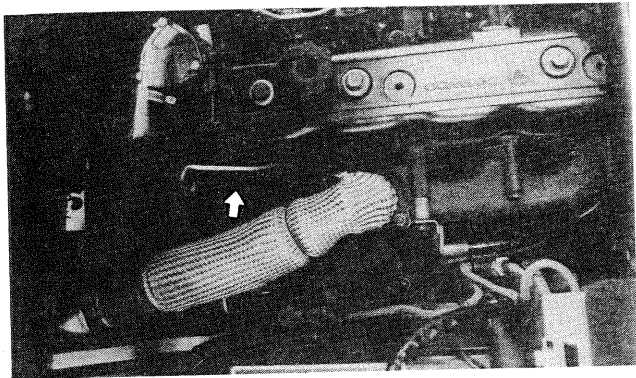
2.4 liter (DC24) Diesel Engine Serial Number

• _____



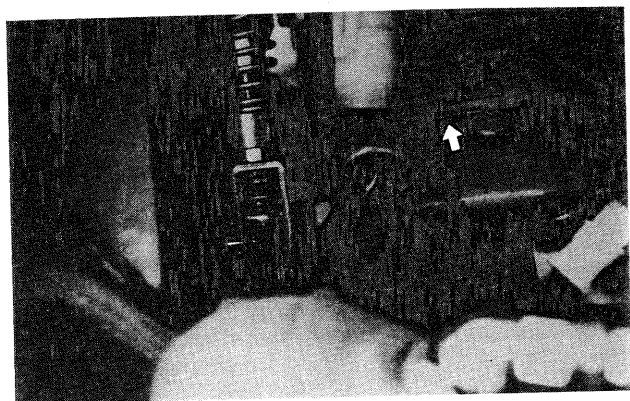
2.7 liter Gasoline, LP-Gas Fuel Engine Serial Number

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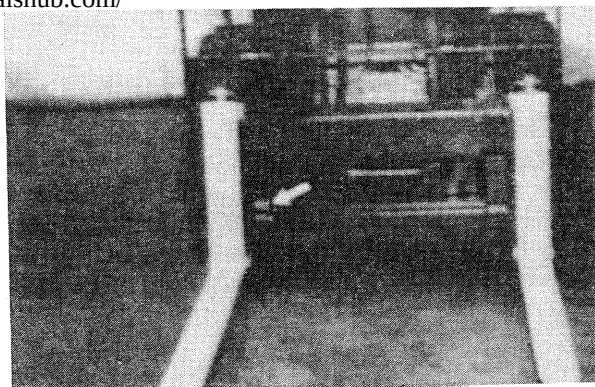
3.3 liter (DB33) Diesel Engine Serial Number

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Power Shift Transaxle Serial Number

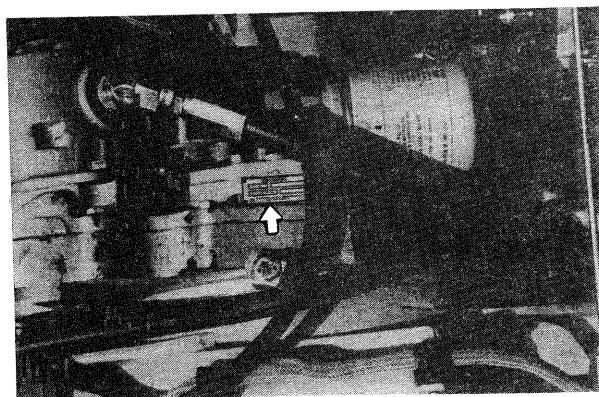
• _____



Typical Example

Side Shifter Serial Number (If Equipped)

• _____



Typical Example

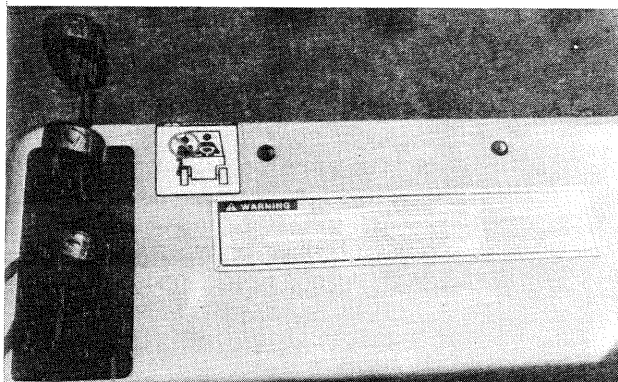
Torque Converter Serial Number

• _____

Operator's Warning, Capacity Plate and Attachment Plate Abbreviations

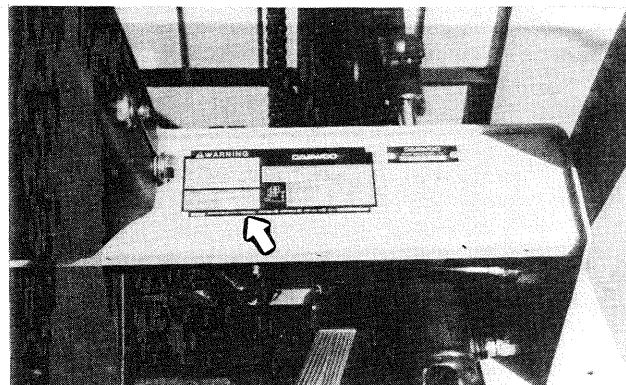
Familiarize yourself with the OPERATOR'S WARNING, IDENTIFICATION, LIFT CAPACITY and ATTACHMENT PLATES. DO NOT exceed CAPACITY AS EQUIPPED load ratings.

Operator's Warning Plate



Located by the right side of the operator's seat on the engine compartment cover.

Identification, Lift Capacity and Attachment Plate



Located on the cowl to the right side of the steering column.

Below are abbreviations that may appear on the IDENTIFICATION, LIFT CAPACITY and ATTACHMENT PLATES and their meanings.

Mast Abbreviations

STD - Standard Mast (single inner member, low free lift)

FF - Full Free Lift Mast (single inner member with high free lift duplex cylinder)

FFT - Triple Lift Mast (two inner members) with either low or full free lift characteristics

QUAD - Quadruple (Quad) Mast (with three inner members)

NOTE: When only a mast-type is listed on the identification plate, a standard carriage and forks are used.

Attachment Abbreviations (includes Special Forks)

SC - Special Carriage - increased width, height or outreach

SSS - Shaft-type Sideshift Carriage

HSS - Hook-type Sideshift Carriage (ITA)

CW - Counterweight

SF - Special Forks

SWS - Swing Shift, Sideshift

RAM - Ram or Boom

DBC BH - Double Cube Block Handler

HFP - Hydraulic Fork Positioner

CR - Crane Arm or Crane Boom

TH - Tire Handler

CTH - Container Handler

LPP - Load Push-Pull Device

CC - Carton Clamp

RC - Roll Clamp

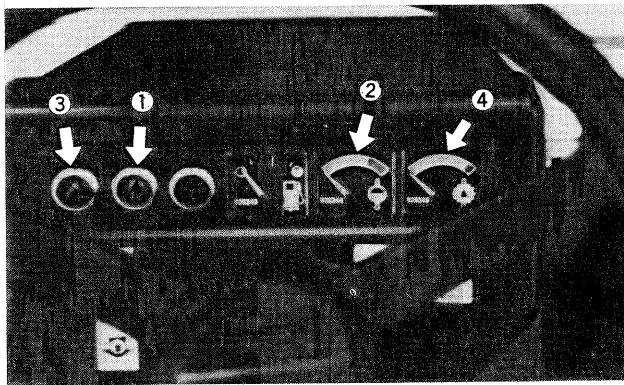
LS - Load Stabilizer

PWH - Pulp Wood Handler

SS-ST - Sideshift-Side Tilt Carriage

Operator's Station and Monitoring Systems

Instrument Panel



1. Alternator Indicator Light – Indicates if the battery charging system is operational. The light will come on when the ignition switch is turned to the ON position.

The light should go off after the engine is started, indicating the alternator is producing sufficient voltage to charge the battery. If the light turns on with the engine running, check the alternator charging system for a malfunction.



2. Engine Coolant Gauge – Indicates coolant temperature. If the pointer moves beyond the green band while operating the lift truck, overheating is indicated. Park the lift truck and stop the engine.

Check the cooling system for a malfunction. The pointer will be at the end of the green band when the coolant temperature reaches approximately 106°C (223°F) on all engines.



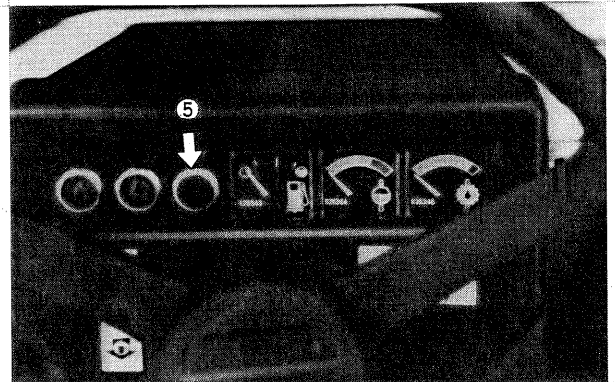
3. Engine Oil Pressure Indicator Light – Indicates insufficient engine oil pressure. The light will come on when the ignition switch is turned to the ON position. If the light turns on while operating the lift truck, insufficient engine oil lubricating system pressure is indicated. Park the lift truck and stop the engine.

Check the system for a malfunction. The light will turn on when the oil pressure drops to approximately 70 kPa (10 psi).



4. Transmission Oil Temperature Gauge – Indicates transmission oil temperature. If the pointer moves beyond the green band while operating the lift truck, excessive transmission oil temperature is indicated. Park the lift truck and stop the engine.

Check the system for a malfunction. The pointer will be at the end of the green band when the transmission oil temperature reaches approximately 129°C (264°F).

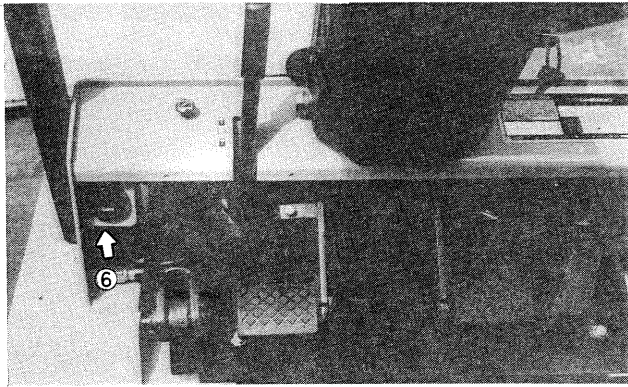


Typical Example

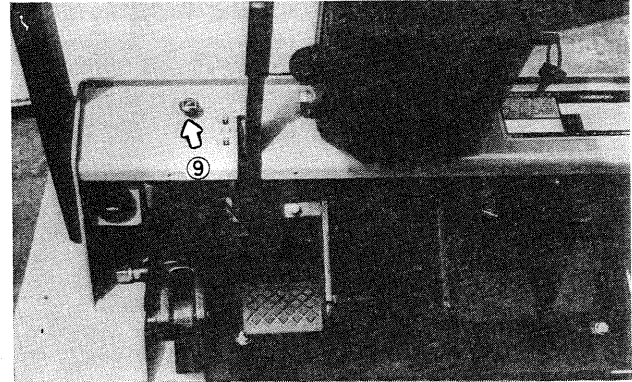


5. Diesel Engine Start Preheat Indicator Light The light will come ON when the key is turned to the ON position from the OFF position. This indicates that the glow plugs are preheating the precombustion chambers for easier starting.

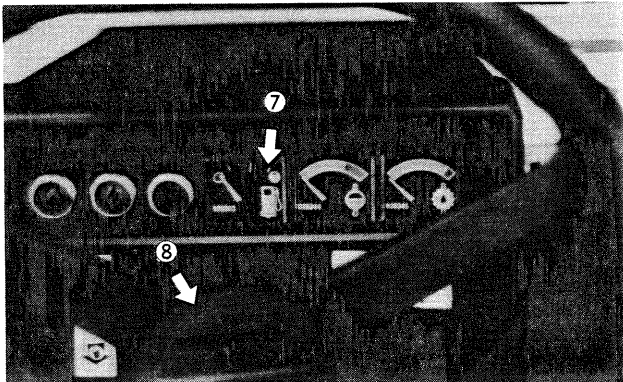
The amount of time needed to preheat the precombustion chambers is approximately seven seconds, depending on the surrounding air temperature. When the light goes OFF the maximum precombustion chamber temperature has been reached and the key can be turned to the START position to start the engine.



6. Service Hour Meter – Indicates the total number of hours the engine and the lift truck have operated. The hour meter will operate when the ignition switch is in the ON position, whether the engine is running or not. The hour meter is used to determine lubrication and maintenance intervals.



9. Choke Control – Controls the gasoline engine choke. When the engine is cold, pull the choke control out all the way. Gradually push the control in as the engine warms up.

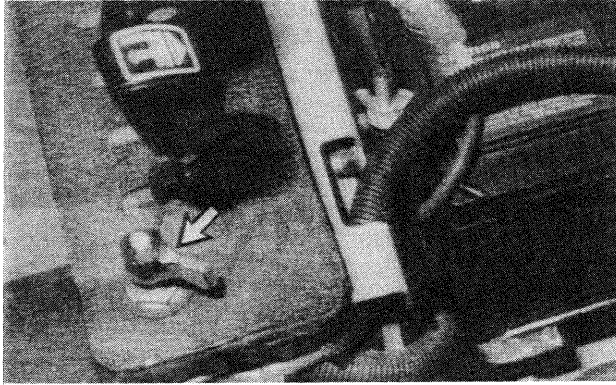


7. Fuel Level Gauge – Indicates fuel level. (Gas, Diesel, or Dual Fuel Trucks Only).



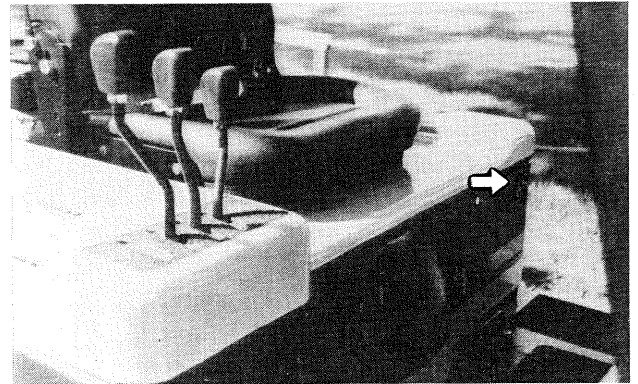
8. Horn Switch – Push on the horn button to sound the horn.

Electrical Disconnect Switch (If Equipped)

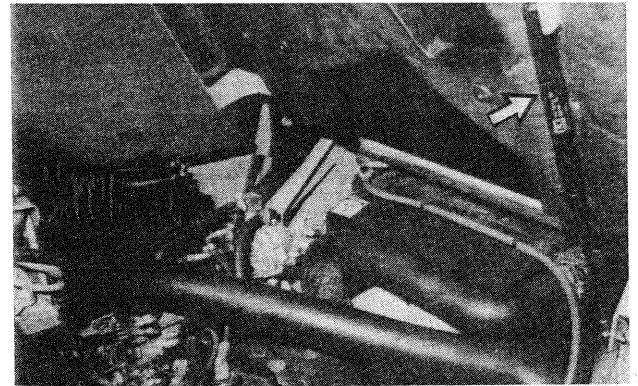


- ① 1. ON – Connects the battery for electrical power to all electrical circuits.
- ② 2. OFF – Disconnects the battery from all electrical circuits.

Engine Compartment

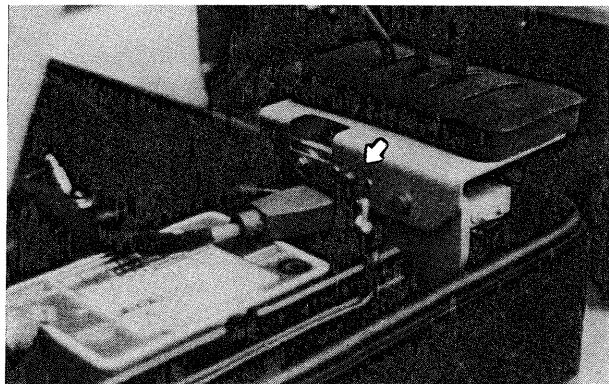


- 1. The engine compartment is accessible by pulling the latch and raising the hood and seat assembly.



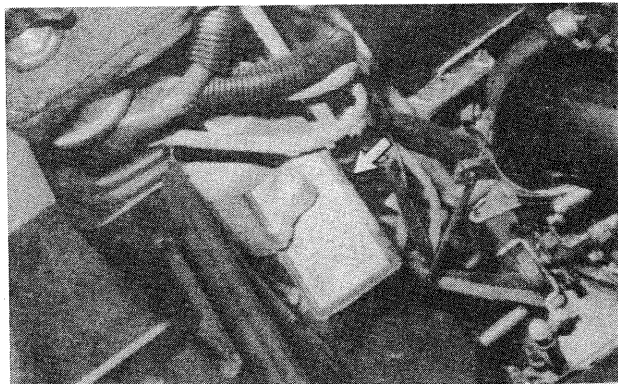
- 2. The hood and seat assembly is held up by a support cylinder. Make certain the air cylinder is operating properly and will hold the hood up before doing anything in the engine compartment.

Circuit Breaker



Circuit Breaker – Protects the main electrical circuits. To reset the circuit breaker, push the button in. Located in the engine compartment.

Fuel Selector Switch (If Dual Fuel Equipped)



NOTE: The switch is located in the engine compartment.



1. LPG – This position supplies electrical power to the LP fuellock solenoid and the vacuum switch, when the ignition switch is in the ON or the START position. With the LP-Gas fuel tank valve open and when vacuum is present, LP-Gas can then flow from the tank through the converter to the carburetor.



2. OFF – This position shuts off all fuel supply to the carburetor and is used when changing from Gasoline to LP-Gas or LP-Gas to Gasoline fuel.

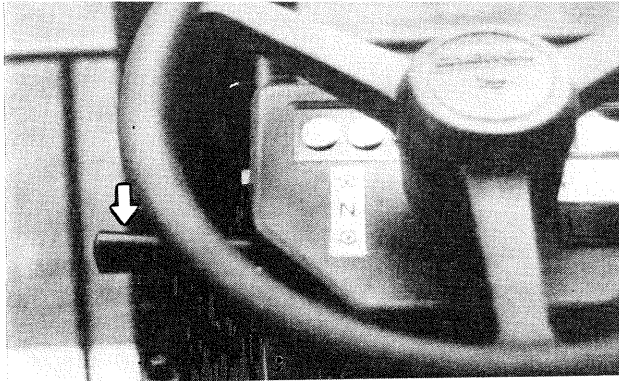
Electrical power shuts off the electric fuel pump and the fuellock solenoid. Before switching to the LPG position, allow the engine to run until all of the gasoline in the carburetor is consumed and the engine stops.



3. GAS – This position supplies electrical power to the electric fuel pump and the fuellock solenoid. This will allow gasoline fuel to flow from the tank through the fuel filter and fuel pump to the carburetor.

Controls

Direction Control Lever



1. Forward – Push the lever forward for FORWARD direction travel.

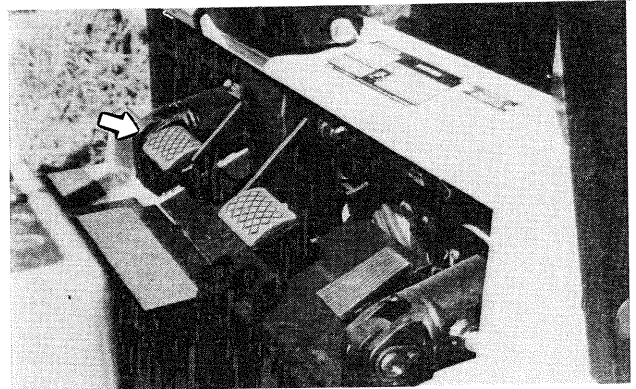


2. Neutral – Move the lever to center position for NEUTRAL.



3. Reverse – Pull the lever back for REVERSE direction travel.

Transmission Inching Control Pedal

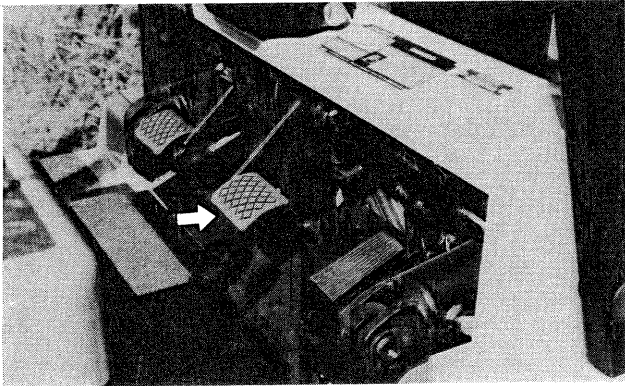


Inching Control Pedal – Pushing down on the inching pedal, modulates the hydraulic pressure to the clutch packs, permitting disc slippage.

Further pushing on the pedal completely relieves clutch pack pressure and applies the service brakes to stop and hold the lift truck.

NOTE: The purpose of the inching control pedal is to provide precise inching control at slow travel speed, with high engine rpm. This is used for fast hydraulic lift during load approach, pickup or positioning.

Service Brake Pedal

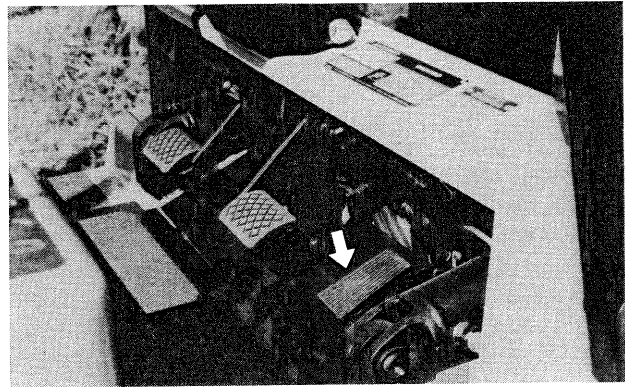


Push **DOWN** on the brake pedal to slow or stop the lift truck.



RELEASE the brake pedal to allow the lift truck to move.

Accelerator Pedal

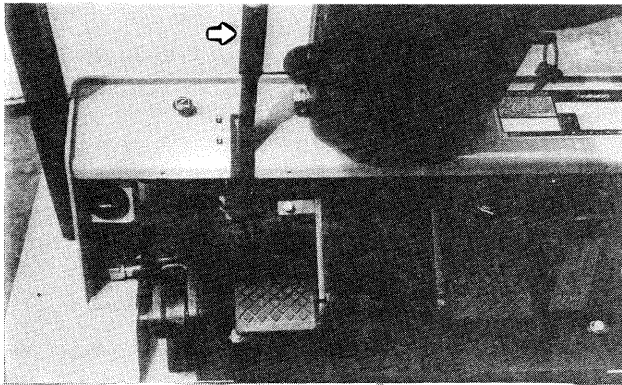


Push **DOWN** on the pedal to increase engine rpm (speed).



RELEASE the pedal to decrease engine rpm (speed).

Parking Brake Lever

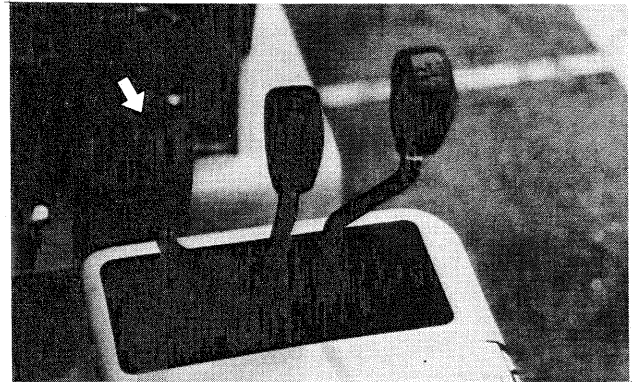


Pull the lever **BACK** to engage the parking brake.



Push the lever **FORWARD** to release the parking brake.

Lift Control



NOTE: To prevent a sudden change of position of the load, operate all lift, tilt and attachment controls smoothly.



1. Lower Position – Push the lever **FORWARD** smoothly to lower the load.

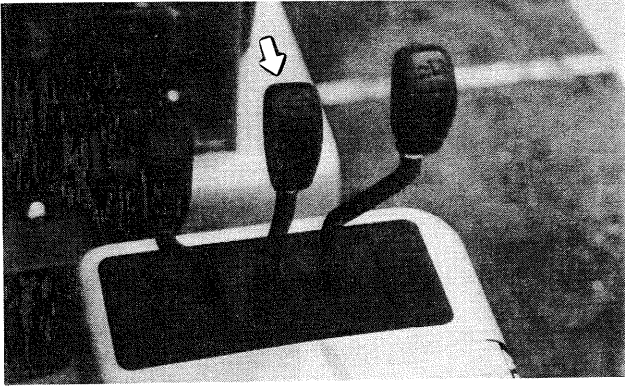


2. Hold Position – When the lever is released it will return to the **HOLD** or center position. Lifting or lowering action will stop.



3. Lift Position – Pull the lever **BACK** smoothly to lift the load.

Tilt Control



1. **Mast Tilt Forward** – Push the lever FORWARD smoothly to tilt the mast forward.

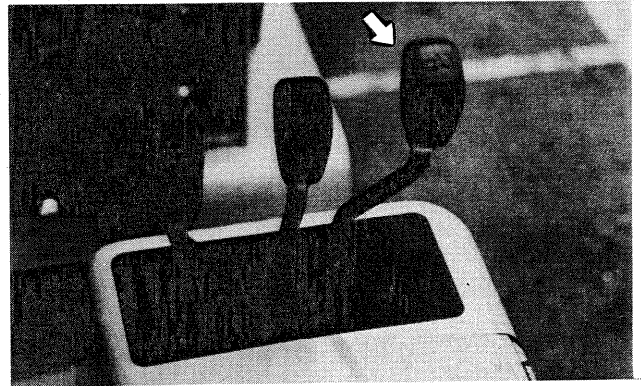


2. **Mast Hold** – When the lever is released it will return to the HOLD or center position. Tilting action will stop.



3. **Mast Tilt Back** – Pull the lever BACK smoothly to tilt the mast backward.

Sideshift Attachment (If Equipped)



1. **Sideshift Left** – Push the lever FORWARD to shift the carriage to the left.



2. **Sideshift Hold** – When the lever is released it will return to the HOLD or center position. Sideshifting action will stop.



3. **Sideshift Right** – Pull the lever BACK to shift the carriage to the right.

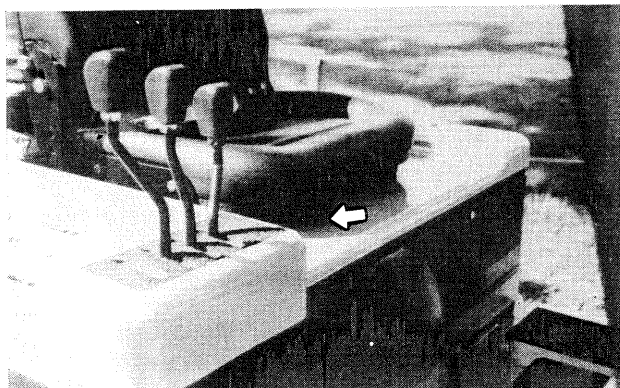
Seat

Seat Adjustment

NOTE: Seat arrangements may vary. Basic operation will be similar.

Seat adjustment should be checked at the beginning of each shift and when operators change.

Lock the seat into position before operating, to prevent an unexpected seat change.



Adjust seat to allow full brake pedal travel with operator's back against seat back.

NOTE: The seat can only be correctly adjusted with the operator fully seated.

Refueling

Gasoline or Diesel Engine Equipped

WARNING

Explosive fumes may be present during refueling.

Do not smoke in refueling areas.

Lift truck should be refueled only at designated safe locations. Safe outdoor locations are preferable to those indoors.

Stop the engine and get off the lift truck during refueling.

NOTICE

Do not allow the lift truck to become low on fuel or completely run out of fuel. Sediment or other impurities in the fuel tank could be drawn into the fuel system. This could result in difficult starting or damage to components.

Fill the fuel tank at the end of each day of operation to drive out moisture laden air and to prevent condensation. Do not fill the tank to the top. Fuel expands when it gets warm and may overflow.



1. Park the lift truck only at a designated safe location. Place the transmission in NEUTRAL. Lower the forks to the ground. Engage the parking brake. Stop the engine.



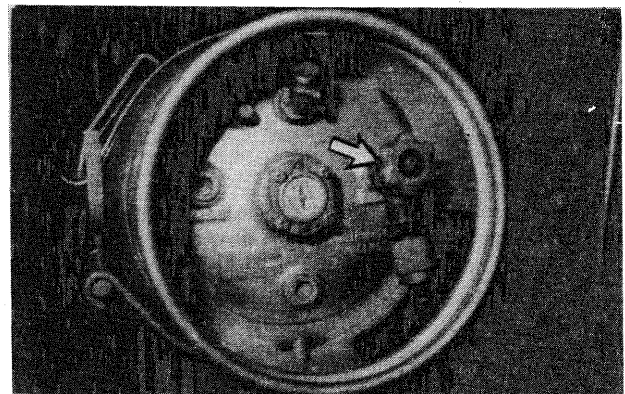
2. Remove the filler cap.

3. Fill the fuel tank slowly. Install the filler cap. If spillage occurs, wipe off excess fuel and wash down area with water.

NOTE: Drain water and sediment from fuel tank as required by prevailing conditions. Also, drain water and sediment from the main fuel storage tank weekly and before the tank is refilled. This will help prevent water or sediment being pumped from the storage tank into the lift truck fuel tank.

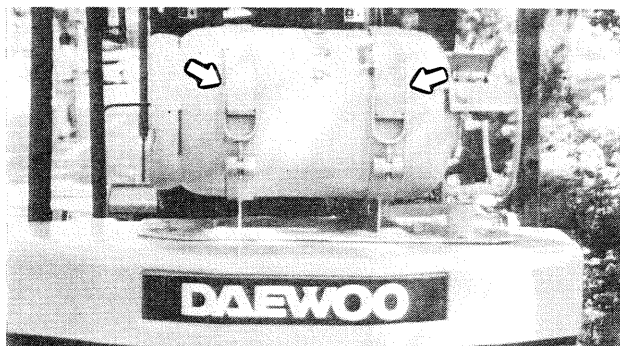
Changing LP-Gas Tanks

1. Park the lift truck on level ground, with the parking brake applied, the transmission in NEUTRAL, the forks lowered and the engine running at low idle.



2. Close the fuel shutoff valve at the LP-Gas tank. Run the engine until it stops, then turn off the ignition switch and disconnect the switch (if equipped).

3. Disconnect the fuel supply line.

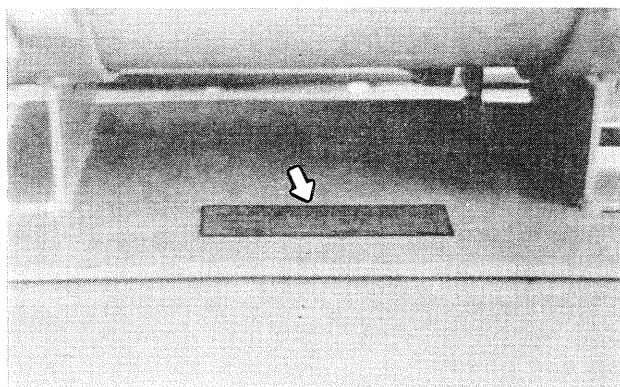


4. Loosen the retaining clamps and remove the tank.

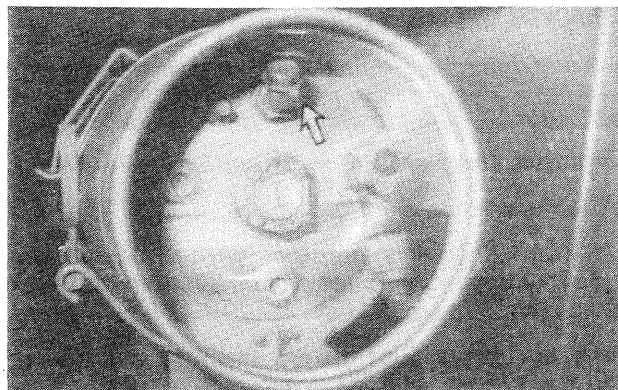
NOTICE

If the locating pin (dowel) is missing or broken, be sure the pin is replaced.

5. Check the mounting to be sure the locating pin (dowel) is not missing or broken.

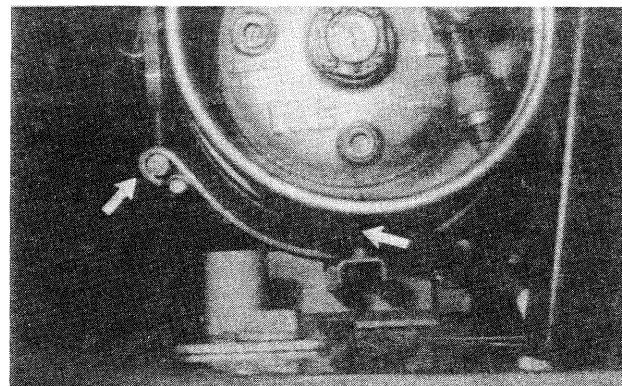


6. Check to be sure that the LP-Gas warning plate is in position on the lift truck, and is legible.
7. Check to be sure the replacement tank is of the correct type.
8. Inspect the replacement tank for damage such as dents, scrapes or gouges and for indication of leakage at valves or threaded connections.



9. Check for debris in the relief valve, for damage to various valves and liquid level gauge.

10. Inspect the quick-disconnect couplings for deterioration, damage or missing flexible seals.



11. Position the replacement tank so that the locating pin (dowel) is in place.

12. Clamp the tank securely.

13. Connect the fuel supply line.

14. Open the fuel valve by slowly turning the valve counterclockwise. If the fuel valve is opened too quickly, a back pressure check valve will shut off the fuel supply. If this happens, close the fuel valve completely. Wait five seconds and then open the fuel valve very slowly.

15. Inspect the LP-Gas fuel lines and fittings with a soap solution after filling the tank or when looking for leaks.

Before Starting the Engine

Walk-Around Inspection

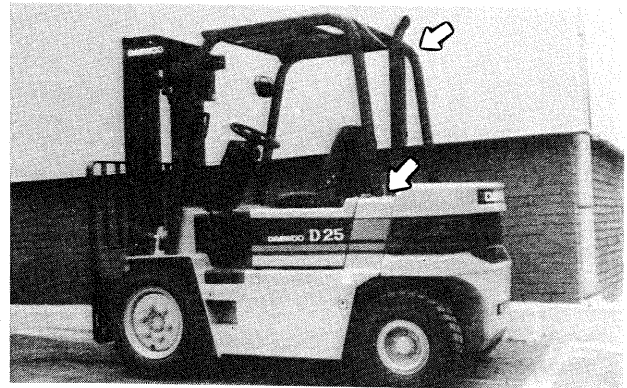
Make a thorough walk-around inspection before mounting the lift truck or starting the engine. Look for such items as loose bolts, debris buildup, oil or coolant leaks. Check condition of tires, mast, carriage, forks or attachments. Have repairs made as needed and all debris removed.



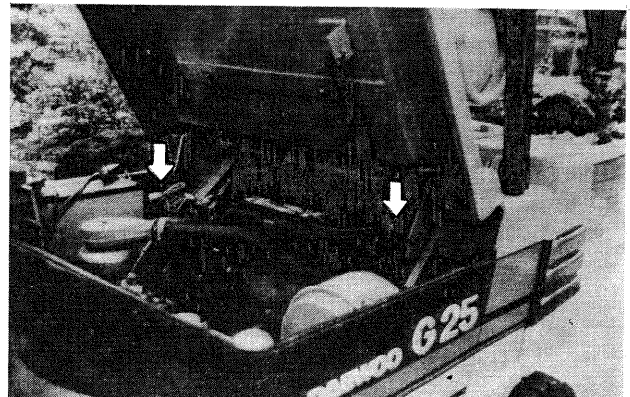
1. Inspect the operator's compartment for loose items and cleanliness.
2. Inspect the instrument panel for broken or damaged indicator lights or gauges.
3. Test the horn and other safety devices for proper operation.



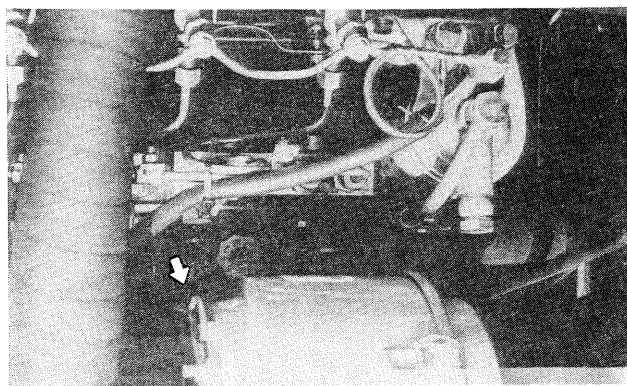
4. Inspect the mast and lift chains for wear, broken links, pins and loose rollers.
5. Inspect the carriage, forks or attachments for wear, damage and loose or missing bolts.
6. Inspect the tires and wheels for cuts, gouges, foreign objects, inflation pressure and loose or missing bolts.



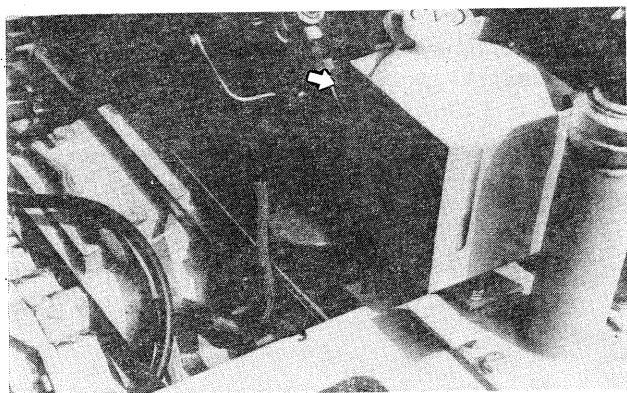
7. Inspect the overhead guard for damage and loose or missing mounting bolts.
8. Inspect the hydraulic system for leaks, worn hoses or damaged lines.
9. Look for transmission and drive axle leaks on the lift truck and on the ground.



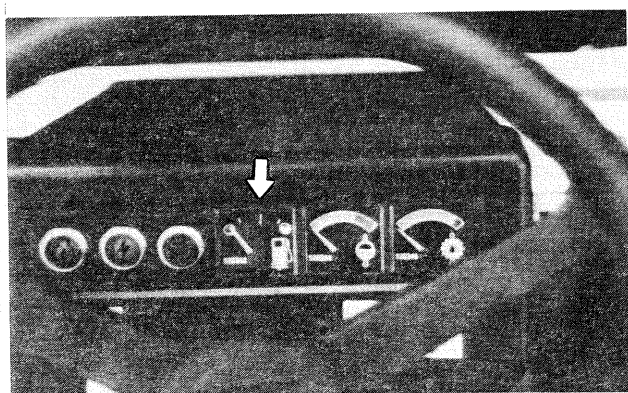
10. Inspect the engine compartment for oil, coolant and fuel leaks.



11. Measure the engine crankcase oil level with the dip stick. Maintain the oil level between the MAX. and MIN., (or FULL and ADD) notches on the dip stick.



12. Observe the engine coolant level in the coolant recovery bottle. With the engine cold, maintain the level to the COLD mark. If the recovery bottle is empty, also fill the radiator at the top tank.

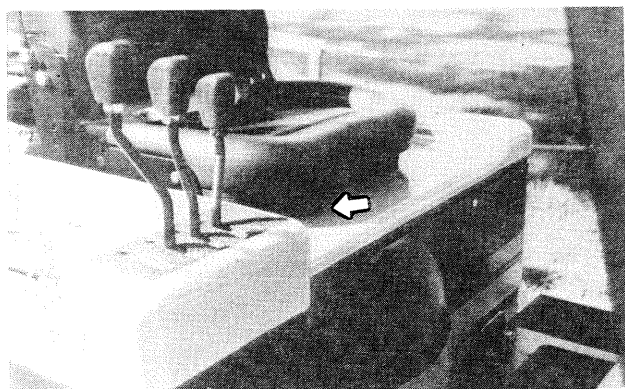


13. Observe the fuel level gauge after starting the truck. Add fuel if necessary.

WARNING

Personal injury may occur from accidents caused by improper seat adjustment. Always adjust the operator's seat before starting the lift truck engine.

Seat adjustment must be done at the beginning of each shift and when operators change.

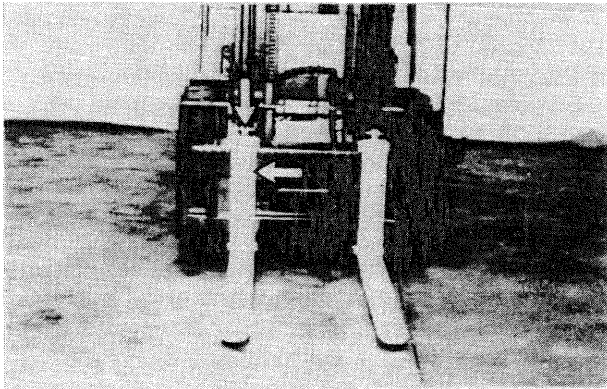


14. To position the seat, PUSH the lever away from the seat track and move the seat forward or backward to a comfortable position.

Lift Fork Adjustment

Hook-type Fork

For load stability, always adjust the forks as wide as possible. Position the load evenly on both forks.



1. Lift the hook pin and slide the fork to the new position.
2. Secure the hook pin in the carriage slot. Follow the same procedure for the other fork.

Inspection, Maintenance and Repair of Lift Truck Forks

The following provides practical guidelines for inspection, maintenance and repair of lift truck forks. It also provides general information on the design and application of forks and the common cause of fork failures

Lift truck forks can be dangerously weakened by improper repair or modification. They can also be damaged by the cumulative effects of age, abrasion, corrosion, overloading and misuse.

A fork failure during use can cause damage to the equipment and the load. A fork failure can also cause serious injury.

A good fork inspection and maintenance program along with the proper application can be very effective in preventing sudden on the job failures.

Repairs and modifications should be done only by the fork manufacturer or a qualified technician knowledgeable of the material used and the required welding and heat treatment process.

Users should evaluate the economics of returning the forks to the manufacturer for repairs or purchasing new forks. This will vary depending on many factors including the size and type of fork.

Forks should be properly sized to the weight and length of the loads, and to the size of the machine on which they are used. The general practice is to use a fork size such that the combined rated capacity of the number of forks used is equal to or greater than the "Standard (or rated) Capacity" of the lift truck.

The individual load rating, in most cases, will be stamped on the fork in a readily visible area. Generally on the top or side of the fork shank.

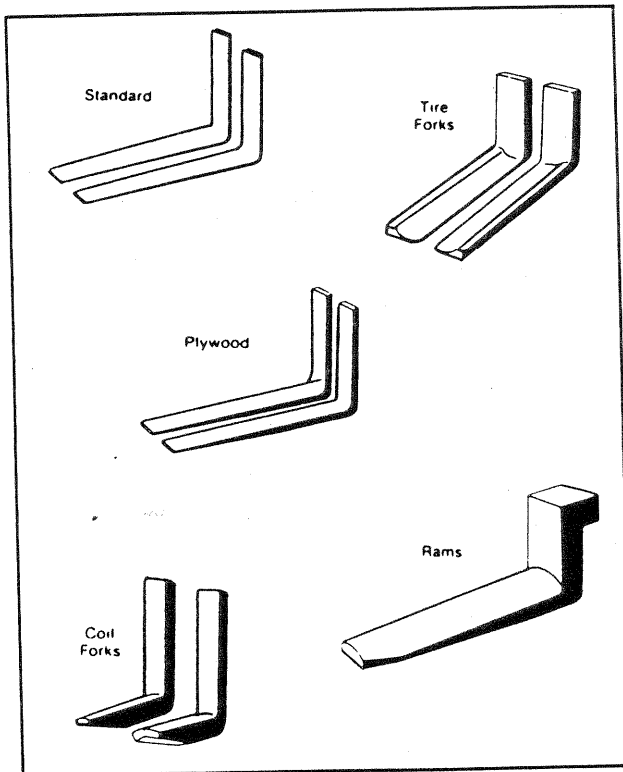
- A fork rated at 1500 pounds at 24 inch load center will be stamped 1500 x 24.
- A fork rated at 2000 kg at 600 mm load center will be stamped 2000 x 600.

The manufacturer identification and year and date of manufacture is also usually shown.

Some countries have standards or regulations which apply specifically to the inspection and repair of forks.

Users may also refer to the International Organization For Standardization-ISO Technical Report 5057- Inspection and Repair of Fork Arms and ISO Standard 2330- Fork Arms-Technical Characteristics and Testing.

While there are no specific standards or regulations in the United States, users should be familiar with the requirements for inspection and maintenance of lift trucks as provided by the 29 Code Federal Register 1910.178 Powered Industrial Trucks, and ANSI/ASME Safety Standard (s) B56.1, B56.5 or B56.6 as applicable to the type of machine (s) in use.



The most common lift truck forks are the standard pallet and the fully tapered forks. Other types of forks and similar engaging devices include lumber and plywood forks, tire forks, coil forks, concrete block forks and ram forks. Forks may also be provided with special features such as high heat resistance for use in furnace charging or non-sparking for use in hazardous locations.

Forks may be made by several methods. In most cases heat treated alloy steels are used to achieve the desired toughness and strength. Special processes and inspection procedures are required for proper welding of the alloy steels. Welding and machining operations are done prior to heat treatment.

- Forks with forged upset heels

Most forks are made by this process. An upset forging press is used to gather extra steel into the fork heel section as the fork is bent to shape. This strengthens the highly stressed heel area.

- Fully forged forks

Some forks may be fully forged for the purpose of providing improved mechanical properties and in some cases to provide a unique shape or contour.

- Welded forks

A variety of devices such as rams, attachment platens, special purpose forks and some large forks may be fabricated from cold or hot rolled steel.

Causes of Fork Failure

1. Improper Modification or Repair. Fork failure can occur as a result of a field modification involving welding, flame cutting or other similar process, which affect the heat treatment and reduces the strength of the fork.

In most cases, specific processes and techniques are also required to achieve proper welding of the particular alloy steels involved. Critical areas most likely to be affected by improper processing are the heel section, the mounting components and the fork tip.

2. Bent or Twisted Forks. Forks can be bent out of shape by extreme overloading, glancing blows against walls or other solid objects or using the fork tip as a pry bar.

Bent or twisted forks are much more likely to break and cause damage or injury. They should be removed from service immediately.

3. Fatigue. Parts which are subjected to repeated or fluctuating loads can fail after a large number of loading cycles even though the maximum stress was below the static strength of the part.

The first sign of a fatigue failure is usually a crack which starts in an area of high stress concentration. This is usually in the heel section or on the fork mounting.

As the crack progresses under repetitive load cycling, the load bearing cross section of the remaining metal is decreased in size until it becomes insufficient to support the load and complete failure occurs.

Fatigue failure is the most common mode of fork failure. It is also one which can be anticipated and prevented by recognizing the conditions which lead up to the failure and by removing the fork from service prior to failing.

- Repetitive Overloading

Repetitive cycling of loads which exceeds the fatigue strength of the material can lead to fatigue failure. The overload could be caused by loads in excess of the rated fork capacity and by use of the fork tips as pry bars. Also, by handling loads in a manner which causes the fork tips to spread and the forks to twist laterally about their mountings

- Wear

Forks are constantly subjected to abrasion as they slide on floors and loads. The thickness of the fork blade is gradually reduced to the point where it may not be capable of handling the load for which it was designed.

- Stress Risers

Scratches, nicks and corrosion are points of high stress concentration where cracks can develop. These cracks can progress under repetitive loading in a typical mode of fatigue failure.

4. Overloading. Extreme overloading can cause permanent bending or immediate failure of the forks. Using forks of less capacity than the load or lift truck when lifting loads and using forks in a manner for which they were not designed are some common causes of overloading

Fork Inspection



Establish a daily and 12 month inspection routine by keeping a record for the forks on each lift truck.

Initial information should include the machine serial number on which the forks are used, the fork manufacturer, type, original section size, original length and capacity. Also list any special characteristics specified in the fork design.

Record the date and results of each inspection, making sure the following information is included:

- Actual wear conditions, such as percent of original blade thickness remaining.
- Any damage, failure or deformation which might impair the use of the truck.
- Note any repairs or maintenance.

An ongoing record of this information will help in identifying proper inspection intervals for each operation, in identifying and solving problem areas and in anticipating time for replacement of the forks.

First Installation

1. Inspect forks to ensure they are the correct size for the truck on which they will be used. Make sure they are the correct length and type for the loads to be handled.

If the forks have been previously used, perform the "12 Month Inspection".

If the forks are rusted, see "Maintenance and Repair".

2. Make sure fork blades are level to each other within acceptable tolerances. See "Forks, Step 4," in the "2000 Service Hours or 1 Year" in "Maintenance Intervals".

3. Make sure positioning lock is in place and working. Lock forks in position before using truck. See "Forks, Step 7," in the "2000 Service Hours or 1 Year" in "Maintenance Intervals".

Daily Inspection - Before First Use and at Each Preventive Maintenance Inspection

1. Visually inspect forks for cracks, especially in the heel section, around the mounting brackets, and all weld areas. Inspect for broken or jagged fork tips, bent or twisted blades and shanks.

2. Make sure positioning lock is in place and working. Lock the forks in position before using the truck. See "2000 Service Hours or 1 Year" in "Maintenance Intervals".

3. Remove all defective forks from service.

12 Month Inspection

Forks should be inspected, at a minimum, every 12 months. If the truck is being used in a multi-shift or heavy duty operation, they should be checked every six months. See "Forks" in the Maintenance Section of this manual.

Maintenance and Repair

1. Repair forks only in accordance with the manufacturer's recommendations.

Most repairs or modifications should be done only by the original manufacturer of the forks or an expert knowledgeable of the materials, design, welding and heat treatment process.

2. The following repairs or modifications **SHOULD NOT** be attempted.

- Flame cutting holes or cutouts in fork blades.
- Welding on brackets or new mounting hangers.
- Repairing cracks or other damage by welding.
- Bending or resetting.

3. The following repairs **MAY** be performed.

- Forks may be sanded or lightly ground, to remove rust, corrosion or minor defects from the surfaces.
- Heel sections may be ground with a carbon stone to remove minor surface cracks or defects. Polish the inside radius of the heel section to increase the fatigue life of the fork. Always grind or polish in the direction of the blade and shank length.
- Repair or replace the positioning locks on hook type forks
- Repair or replace most fork retention devices used with other fork types.

4. A fork should be load tested before being returned to service on completion of repairs authorized and done in accordance with the manufacturer's recommendations.

Most manufacturers and standards require the repaired fork to be tested with a load 2.5 times the specified capacity and at the load center marked on the fork arm.

With the fork restrained in the same manner as its mounting on the lift truck, apply the test load twice, gradually and without shock. Maintain the test for 30 seconds each time.

Check the fork arm before and after the second application of the test load. It shall not show any permanent deformation.

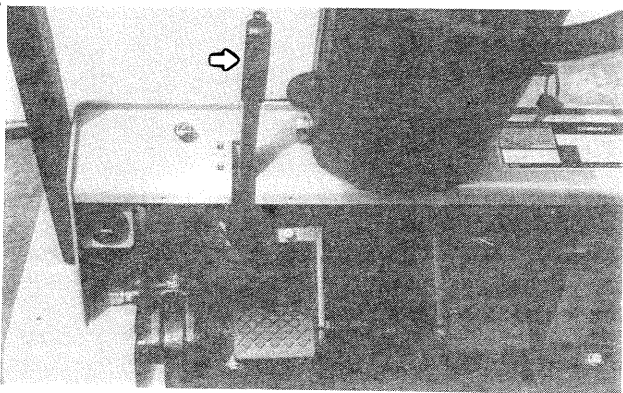
Consult the fork manufacturer for further information as may be applicable to the specific fork involved.

Testing is not required for repairs to the positioning lock or the markings.

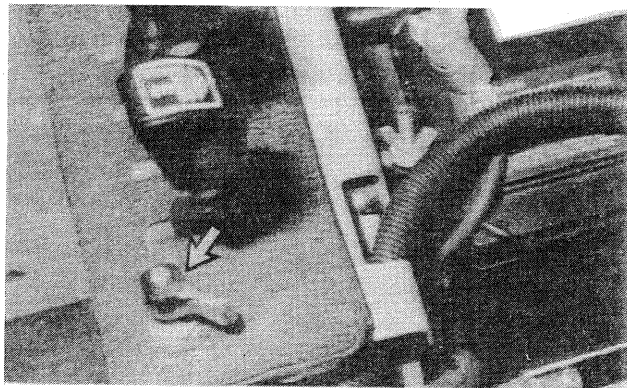
Starting the Engine

Prestart Conditions

NOTE: The engine will not start unless the transmission directional control lever is in the NEUTRAL position.

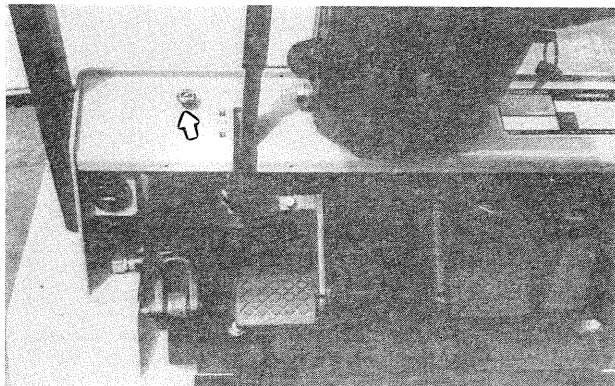


1. Engage the parking brake, if not already engaged. Place the transmission directional control lever in the NEUTRAL position.

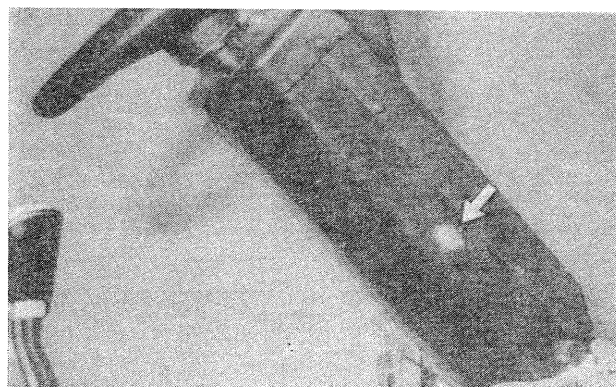


2. Lift trucks equipped with electrical disconnect switches; the engine will not start unless the disconnect switch is in the ON (closed) position.

Gasoline Engine



1. Pull the choke control all the way out. When starting a cold engine, push DOWN on the accelerator pedal completely, then release it.



2. Turn the ignition switch to the START position. Release it when the engine starts. Gradually push the choke control IN as the engine warms up. Allow the engine to warm up slowly.

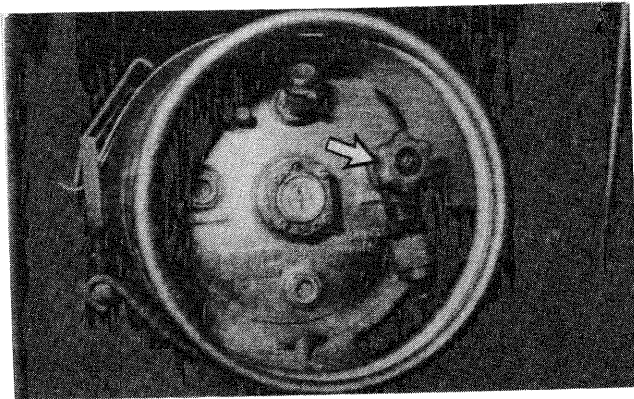
LP-Gas Engine

WARNING

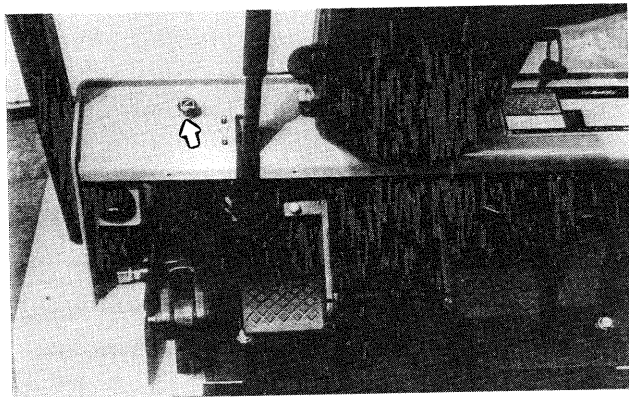
LP-Gas fuel is flammable and can cause personal injury.

Inspect LP-Gas fuel lines and fittings for leaks.

Inspect tank for secure mounting.



1. Turn the tank fuel valve ON by slowly turning the valve counterclockwise. Observe the LP-Gas gauge (if equipped).



2. Pull the choke control all the way out. When starting a cold engine, push DOWN on the accelerator pedal completely, then release it.
3. Turn the ignition switch to the START position. Release it when the engine starts.
4. Gradually push the choke control IN as the engine warms up. Allow the engine to warm up slowly.

Diesel Engine

Starting a Cold Diesel Engine

1. Turn the key to the ON position. The start preheat light will come ON. The preheat light will stay ON approximately seven seconds, depending on the surrounding air temperature.

NOTICE

Do not engage the starter for more than 30 seconds.

2. When the preheat light goes OFF, turn the key to the START position, with the accelerator pedal fully depressed.
3. Release the key when the engine starts and release the accelerator pedal to a low idle position.
4. If the engine stalls or does not start, turn the key to the OFF position, then repeat steps 1 thru 3.

Starting a Warm Diesel Engine

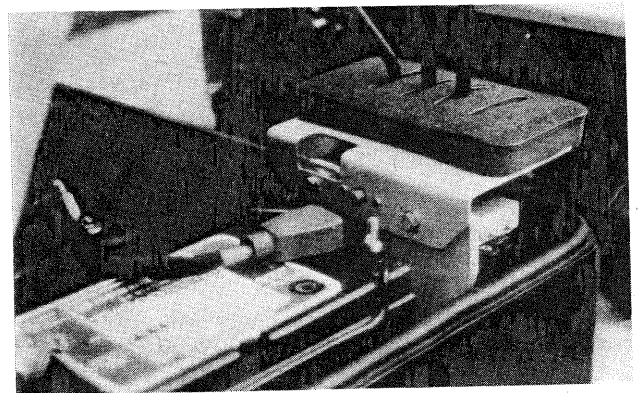
1. Turn the key to the ON position and then to START position, without waiting for the preheat light to go OFF. At the same time fully depress the accelerator.
2. Release the key when the engine starts and release the accelerator pedal to a low idle position.

Starting From a 12 Volt External Source

WARNING

Sparks occurring near the battery could cause vapors to explode.

Always connect the external power source ground cable to a point away from and below the battery, and well clear of fuel system components.



NOTICE

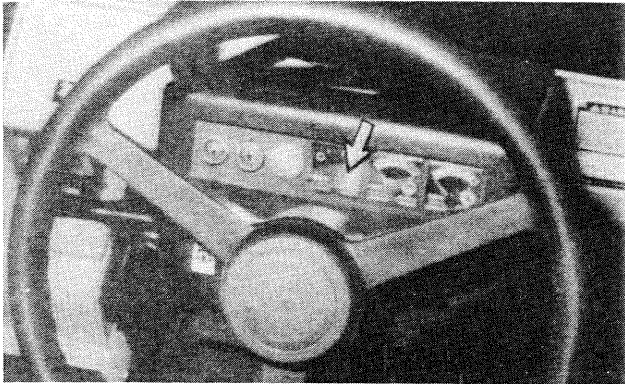
Do not reverse battery cables. It can cause damage to the alternator.

Always connect the external power source cables in parallel with the lift truck battery cables: POSITIVE (+) to POSITIVE (+) and NEGATIVE (-) to NEGATIVE (-).

Attach ground cable last, remove first. All lift trucks equipped with DAEWOO built internal combustion engines are NEGATIVE(-) ground.

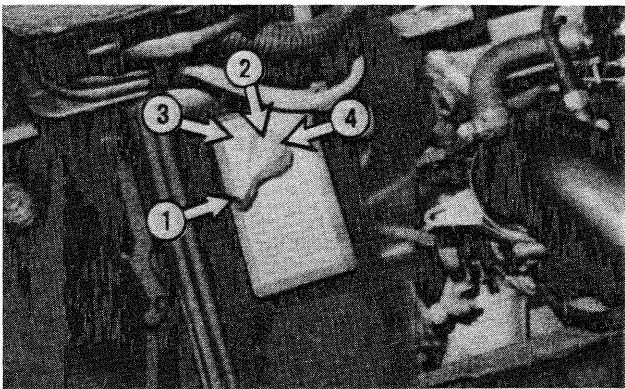
Dual Fuel System

Changing From Gasoline to LP-Gas

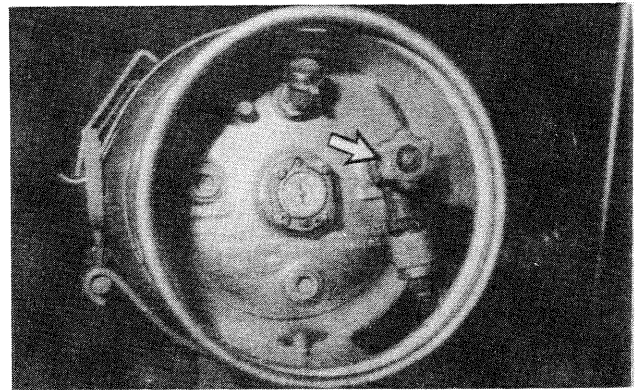


NOTE: The Underwriter's Laboratory (U.L.) requires that the gasoline tank must be at least one-quarter full when operating on LP-Gas. This will allow the lift truck to be restarted on gasoline and moved to an approved refueling area, when operating in a hazardous area.

1. Park the lift truck level in an authorized refueling area with the forks lowered, the parking brake applied, the transmission in NEUTRAL and the engine running.
2. Raise the hood and seat assembly. Make certain the air lift cylinder securely holds the hood open.



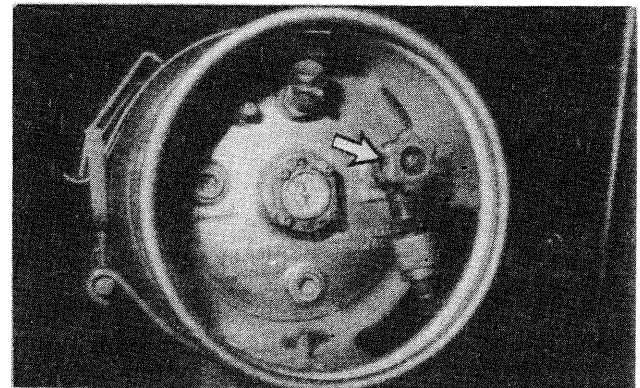
3. Move lever (1), on the fuel selector switch to the OFF (2) position. Leave lever (1) in this position until the gasoline in the carburetor is used and the engine stops.
4. Move lever (1) to the LPG (3) position.
5. Lower the hood and seat assembly.



6. Open the fuel valve, on the LP-Gas tank, by slowly turning the valve counterclockwise.
7. Turn the ignition switch key to the OFF position and then to the START position to start the engine. Release it when the engine starts.

Changing From LP-Gas to Gasoline

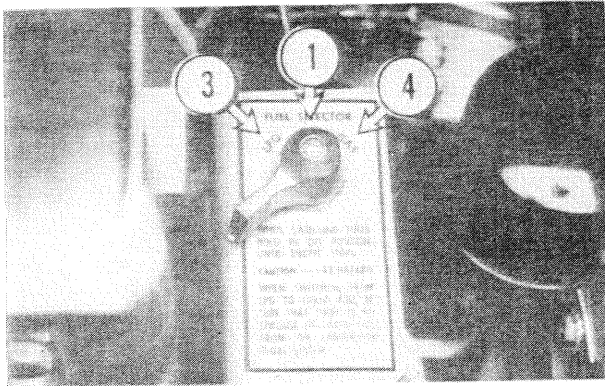
1. Park the lift truck level in an authorized refueling area with the forks lowered, the parking brake applied, the transmission in NEUTRAL and the engine running.



2. Close the fuel valve on the LP-Gas tank. Allow the engine to run until the fuel in the line runs out and the engine stops. Turn the ignition switch to the OFF position.
3. Raise the hood and seat assembly. Make certain the air lift cylinder securely holds the hood open.

After Starting the Engine

Observe all indicator lights and gauges frequently during operation, to make sure all systems are working properly. All of the indicator lights will come ON with the ignition switch in the ON position before the engine is started.



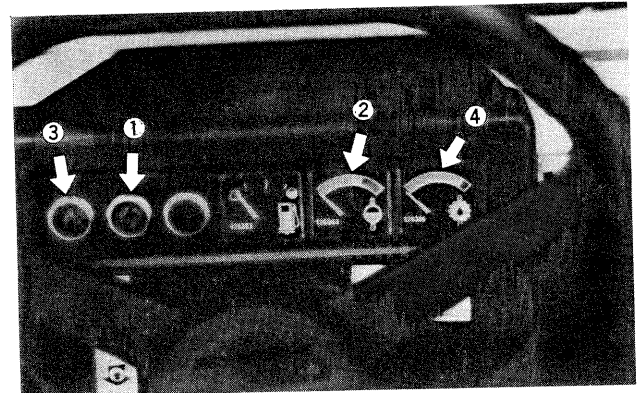
4. Move lever (1) from the LPG (3) position to the GAS (4) position.

5. Lower the hood and seat assembly.

6. Turn the ignition switch key to the ON position.

NOTE: On trucks equipped with electric fuel pumps wait approximately 15 seconds to fill the carburetor with gasoline.

7. Turn the ignition switch key to the START position and start the engine. Release it when the engine starts.

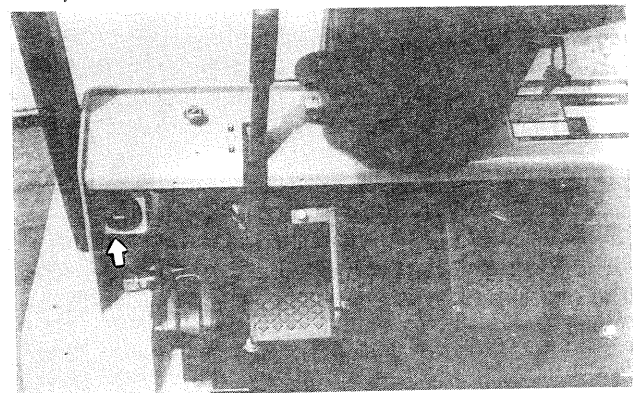


1. The alternator indicator light (1), should not come ON during normal operation. The alternator is not charging if the light comes ON with the engine running.

2. The engine coolant gauge pointer (2), will be in the green band with the engine running, unless the coolant temperature is excessive.

3. The engine oil pressure indicator light (3), will not come ON with the engine running, unless there is low or no oil pressure. Stop the engine immediately, if the light comes ON.

4. The power shift transmission gauge pointer (4), will be in the green band with the engine running, unless the oil temperature is excessive.



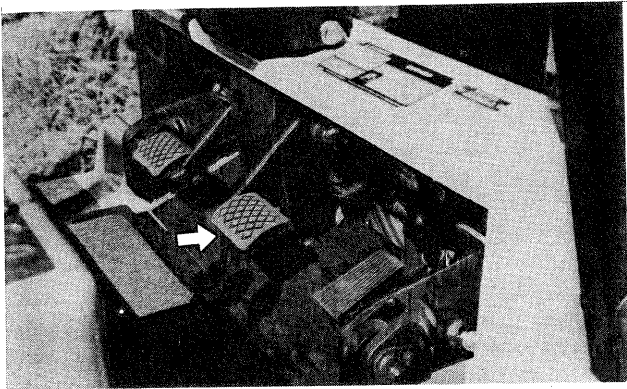
5. Observe the hour meter to make sure it is operating properly.

6. Observe the fuel level gauge for fuel level in the tank.

Lift Truck Operation

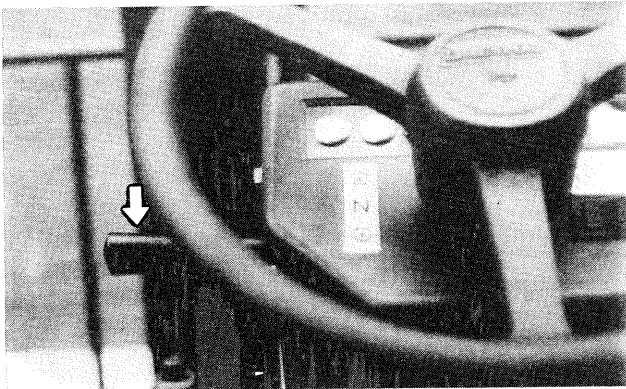
Power Shift Transaxle

1. Start the engine. See topic "Starting the Engine."



2. Push down on the service brake pedal to hold the lift truck until ready to move it.
3. Release the parking brake.

NOTE: The parking brake must be released before the directional control can be used.



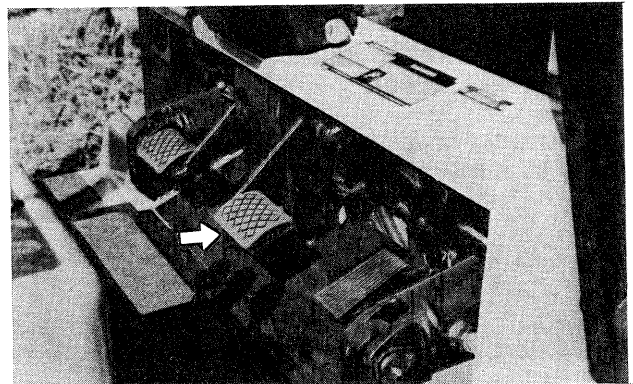
4. Select the direction of travel by pushing the directional lever FORWARD for forward direction or by pulling the lever BACK for reverse direction.

WARNING

A lift truck with the engine running but without an operator can move slowly (creep) if the transmission is engaged.

This could result in personal injury.

Always place the transmission control levers in the NEUTRAL (center) position and apply the parking brake before dismounting the lift truck.



5. Release the service brake.
6. Push down on the accelerator pedal to obtain the desired travel speed. Release the pedal to decrease travel speed.

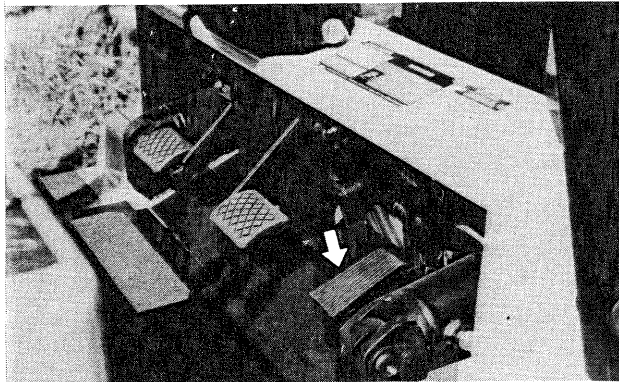
WARNING

Sudden reversal of a loaded lift truck traveling forward can cause the load to fall or the lift truck to tip.

Failure to comply could result in personal injury.

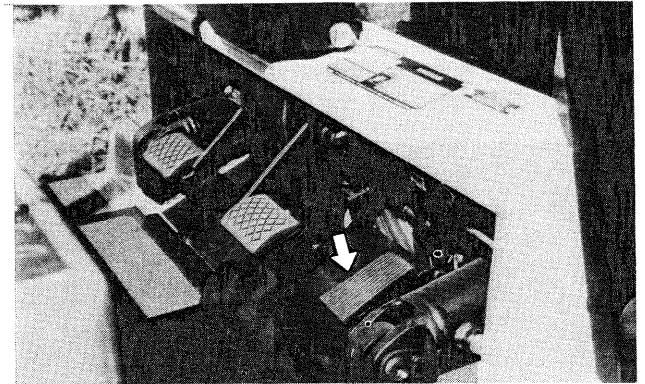
Stop the loaded lift truck completely, before shifting to reverse.

NOTE: Directional changes can be made under full power at speeds up to 8 km/h (5 mph). A speed of 8 km/h (5 mph) is a fast walk. Directional shift changes at speeds above 8 km/h (5 mph) are considered abusive.



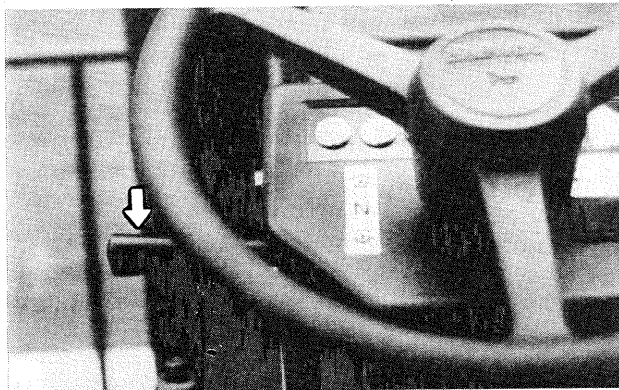
7. To change the lift truck direction of travel, release the accelerator pedal.

8. Push-down on the service brake pedal to reduce the lift truck speed as necessary.



11. To stop the lift truck when traveling in either direction, release the accelerator pedal.

12. Push down on the service brake pedal and bring the lift truck to a smooth stop.

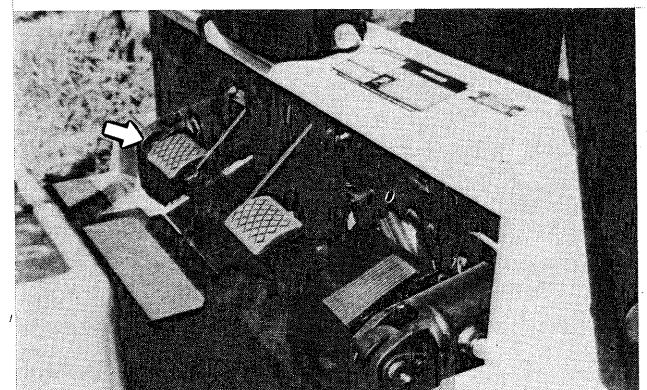


9. Move the directional lever to the desired direction of travel. Slowly push down on the accelerator pedal as the lift truck changes direction.

10. When the direction change is completed, continue to push down on the accelerator pedal to obtain the desired travel speed.

Inching

NOTE: The purpose of the inching pedal is to provide precise lift truck inching control at very slow travel speed and high engine rpm. This is used for fast hydraulic lift, during load approach, pick up or load positioning.



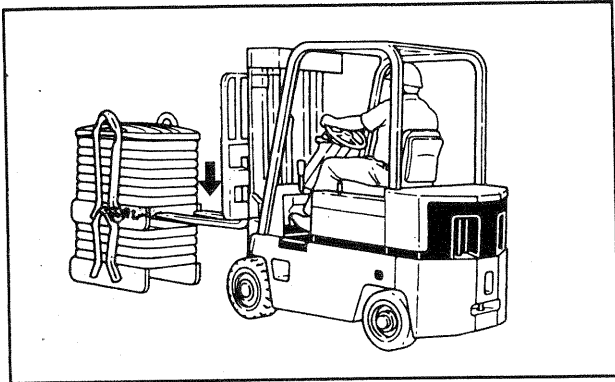
1. To inch (creep) in either direction, slowly push down on the inching pedal. This will start to apply the service brakes and allow the transmission clutch discs to slip.

2. Vary the position of the inching pedal and the accelerator pedal to control the inching speed and distance.

3. Pushing down further on the inching pedal will disengage the transmission completely and apply the service brakes fully to stop and hold the lift truck. This will provide full engine power for fast hydraulic lift.

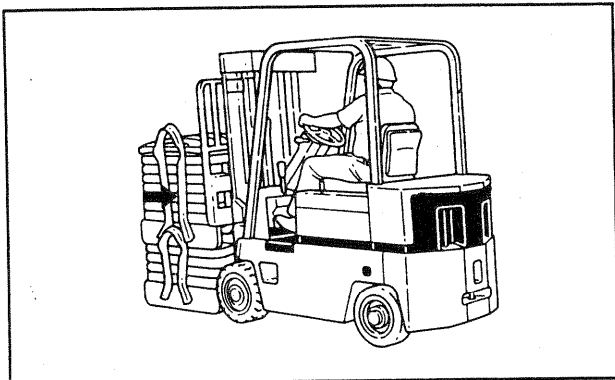
Operating Techniques

Inching into Loads



Typical Example

1. Move the lift truck slowly FORWARD into position and engage the load. The lift truck should be square with load, forks spaced evenly between pallet stringers and as far apart as load permits.

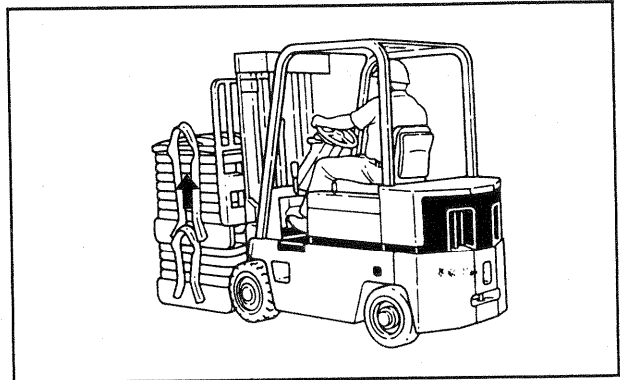


Typical Example

2. Move the lift truck FORWARD until the load touches the carriage.

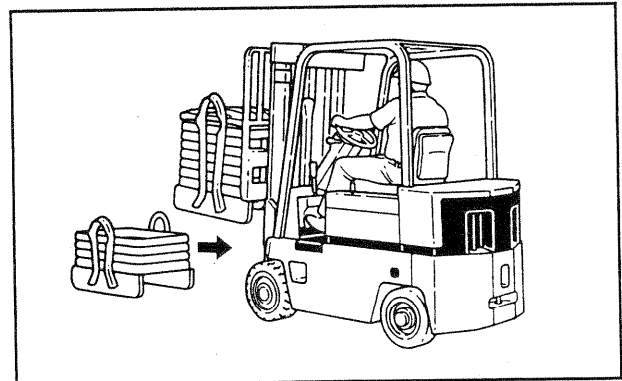
Lifting the Load

1. Tilt the mast BACK to cradle the load.



Typical Example

2. Lift the load carefully off the other material.



Typical Example

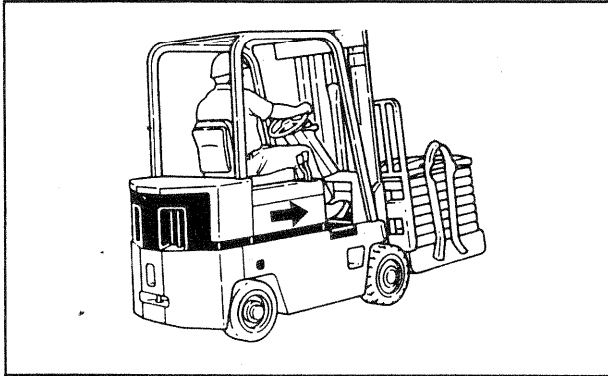
3. Operate the lift truck in reverse until the load is clear of the other material.
4. Lower the cradled load to the travel position.

NOTE: Lift and tilt speeds are controlled by engine rpm.

Traveling With the Load

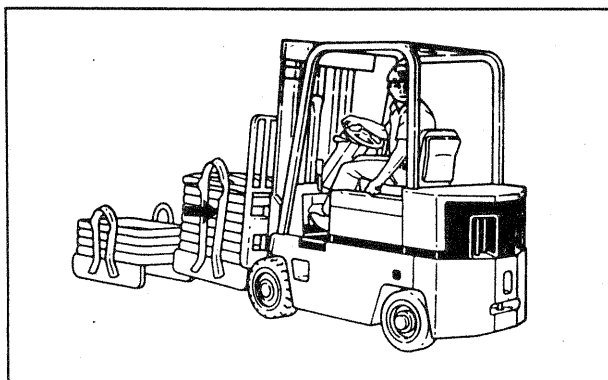
NOTICE

Travel with the load as low as possible, while still maintaining ground clearance.



Typical Example

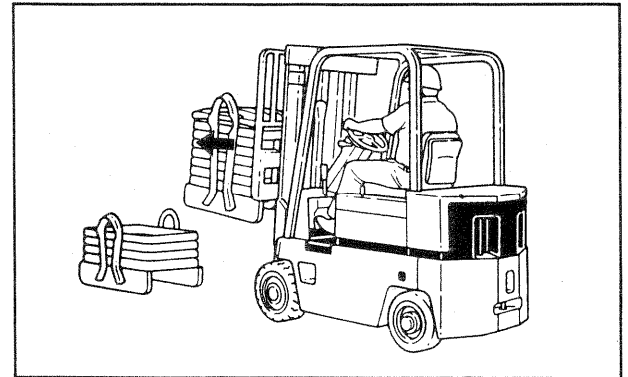
1. Travel with the load uphill on upgrades and downgrades.



Typical Example

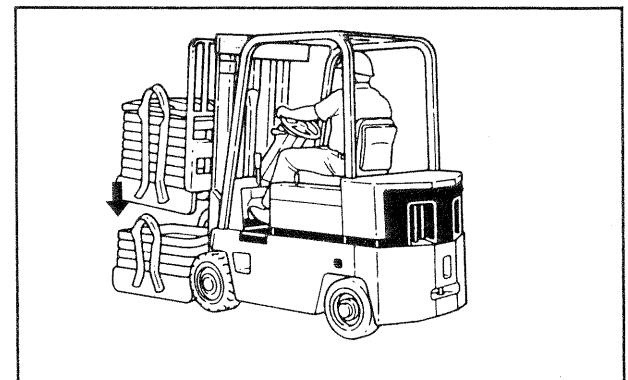
2. For better vision, travel in reverse with bulky loads.

Unloading



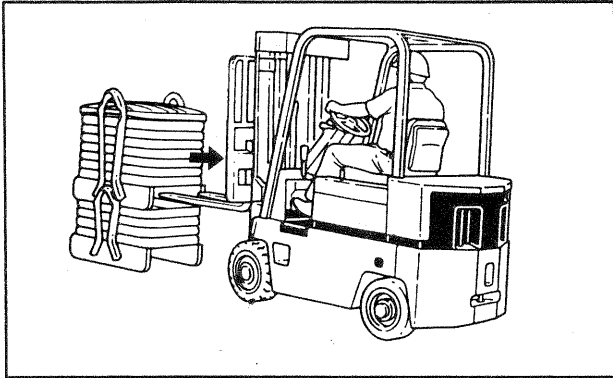
Typical Example

1. Move the lift truck into the unloading position.



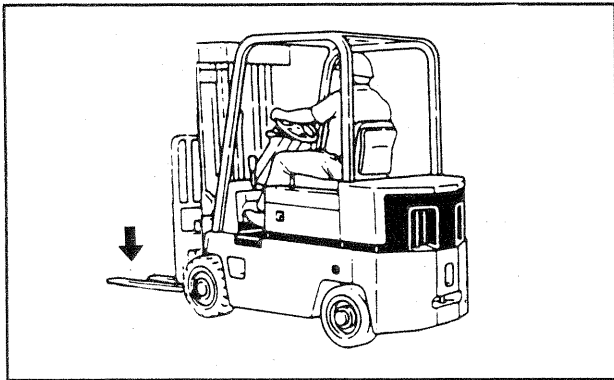
Typical Example

2. Tilt the mast FORWARD only when directly over the unloading area.



Typical Example

3. Deposit the load and BACK away carefully to disengage the forks.



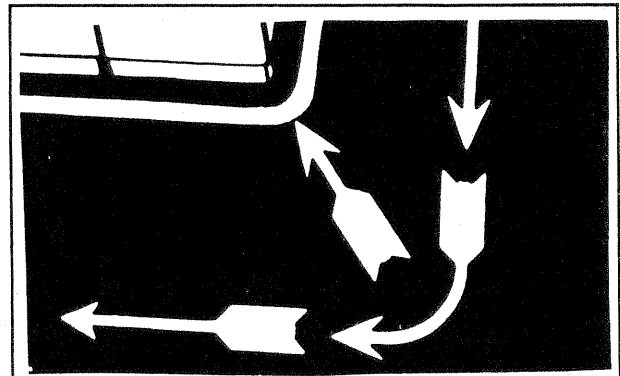
Typical Example

4. Lower the carriage and forks to the travel position or to the park position.

Turning

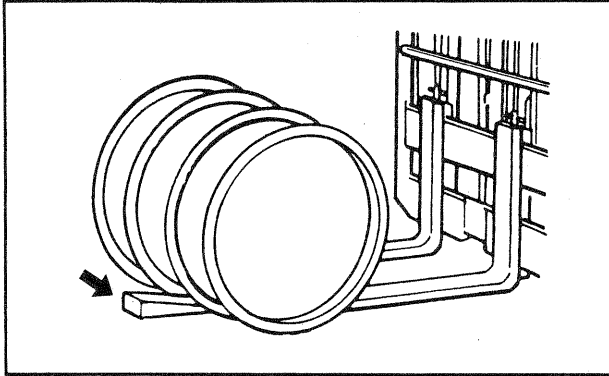


1. When turning sharp corners, keep close to the inside corner. Begin the turn when the inside drive wheel meets the corner.

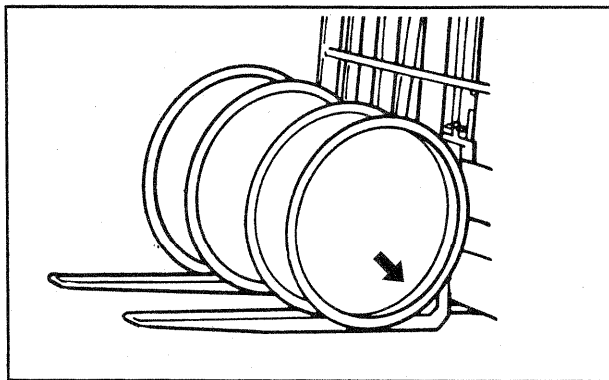


2. In narrow aisles, keep away from the stockpile when turning into the aisle. Allow for counterweight swing.

Lifting Drums or Round Objects



1. Block drums or round objects. Tilt the mast FORWARD and slide the fork tips along the floor to get under the load.

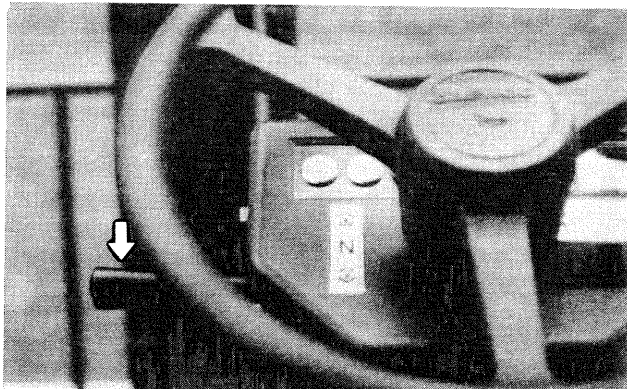


2. Before lifting, tilt the mast BACK slightly until the load is cradled on the forks.

Parking the Lift Truck



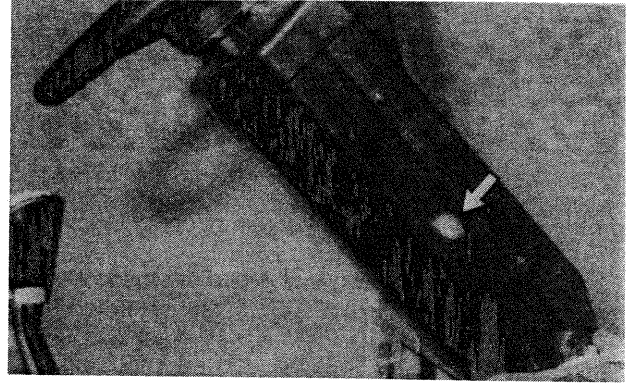
1. Park in an authorized area only. Do not block traffic. If LP-Gas equipped, do not park near elevator shafts or any other area where LP-Gas could collect in a pocket (low area), causing a potentially dangerous condition.



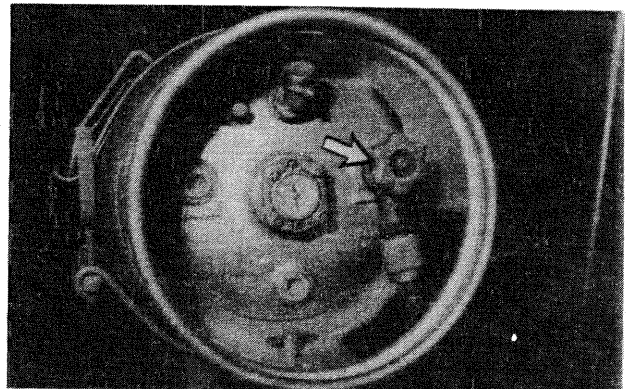
2. Place the transmission controls in NEUTRAL.
3. Engage the parking brake.
4. Lower the forks to the ground.

WARNING

Blocking the wheels will prevent unexpected lift truck movement, which could cause personal injury.



5. Turn the key in the ignition switch to the OFF position and remove the key.



NOTE: If an LP-Gas equipped lift truck is stopped or parked for an indefinite or prolonged period of time, shut off the LP-Gas fuel tank valve.

Transportation Hints

Lift Truck Shipping

Check travel route for overpass clearances. Make sure there is adequate clearance if the lift truck being transported is equipped with a high mast, overhead guard or cab.

To prevent the lift truck from slipping while loading, or shifting in transit, remove ice, snow or other slippery material from the loading dock and the truck bed before loading.

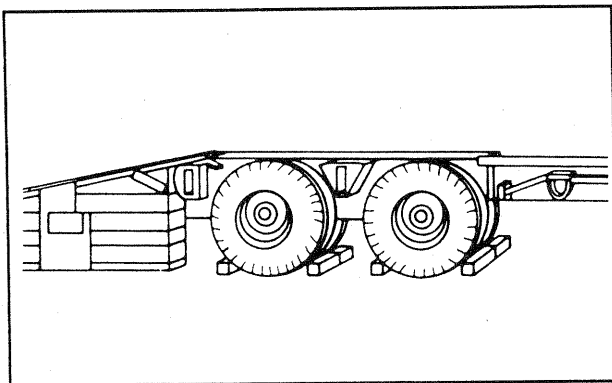
NOTICE

Obey all state and local laws governing the weight, width and length of a load.

Observe all regulations governing wide loads.

NOTICE

Remove ice, snow or other slippery material from the shipping vehicle and the loading dock.



Always block the trailer or the rail car wheels before loading the lift truck.

Position the lift truck on the truck bed or the rail car.

Apply the parking brake and place the transmission control in NEUTRAL.

Turn the ignition switch to the OFF position and remove the key. If LP-Gas equipped, shut off the LP-Gas fuel tank.

Block the wheels and secure the lift truck with tiedowns.

Machine Lifting and Tiedown Information

NOTICE

Improper lifting or tiedowns can allow load to shift and cause injury and/or damage.

1. Weight and instructions given herein apply to lift trucks as manufactured by DAEWOO.
2. Use proper rated cables and slings for lifting. Position the crane for level lift truck lift.
3. Spreader bar widths should be sufficient to prevent contact with the lift truck.
4. Use the tiedown locations provided for lift truck tiedown.

Check the state and local laws governing weight, width and length of a load.

Contact your DAEWOO Lift Truck dealer for shipping instructions for your lift truck.

Towing Information

WARNING

Personal injury or death could result when towing a disabled lift truck incorrectly.

Block the lift truck wheels to prevent movement before releasing the brakes. The lift truck can roll free if it is not blocked.

Follow the recommendations below, to properly perform the towing procedure.

These towing instructions are for moving a disabled lift truck a short distance, at low speed, no faster than 2 km/h (1.2 mph), to a convenient location for repair. These instructions are for emergencies only. Always haul the lift truck if long distance moving is required.

Shield must be provided on the towing lift truck to protect the operator if the tow line or bar should break.

Do not allow riders on the lift truck being towed unless the operator can control the steering and/or braking.

Before towing, make sure the tow line or bar is in good condition and has enough strength for the towing situation involved. Use a towing line or bar with a strength of at least 1.5 times the gross weight of the towing lift truck for a disabled lift truck stuck in the mud or when towing on a grade.

Keep the tow line angle to a minimum. Do not exceed a 30° angle from the straight ahead position. Connect the tow line as low as possible on the lift truck that is being towed.

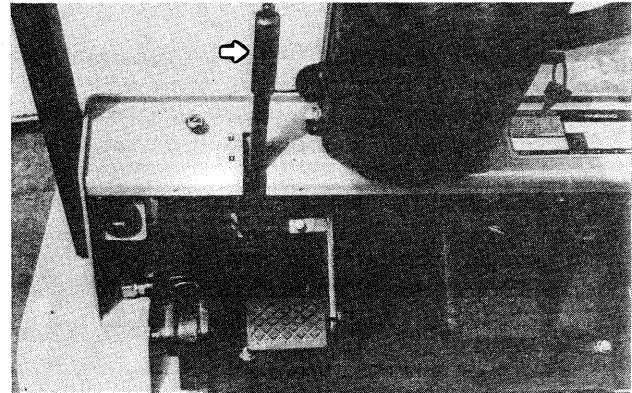
Quick lift truck movement could overload the tow line or bar and cause it to break. Gradual and smooth lift truck movement will work better.

Normally, the towing lift truck should be as large as the disabled lift truck. Satisfy yourself that the towing lift truck has enough brake capacity, weight and power, to control both lift trucks for the grade and the distance involved.

To provide sufficient control and braking when moving a disabled lift truck downhill, a larger towing lift truck or additional lift trucks connected to the rear could be required. This will prevent uncontrolled rolling.

The different situation requirements cannot be given, as minimal towing lift truck capacity is required on smooth level surfaces to maximum on inclines or poor surface conditions.

Consult your DAEWOO Lift Truck dealer for towing a disabled lift truck.



1. Release the parking brake.

NOTICE

Release the parking brake to prevent excessive wear and damage to the parking brake system.

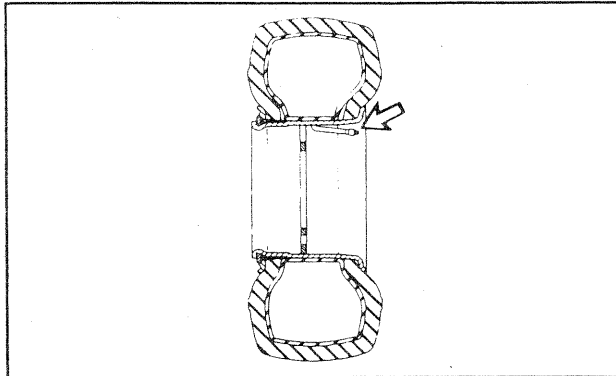
2. Check that the service brake pedal is released.
3. Key switch is in the OFF position.
4. Direction control lever is in neutral.
5. Fasten the tow bar to the lift truck.
6. Remove the wheel blocks. Tow the lift truck slowly. Do not tow any faster than 2 km/h (1.2 mph).

WARNING

Be sure all necessary repairs and adjustments have been made before a lift truck that has been towed to a service area is put back into operation.

Tire Inflation Information

Tire Inflation



WARNING

Personal injury or death could result when tires are inflated incorrectly.

Use a self-attaching inflation chuck and stand behind the tread when inflating a tire.

Proper inflation equipment, and training in using the equipment, are necessary to avoid overinflation. A tire blowout or rim failure can result from improper or misused equipment.

NOTICE

Set the tire inflation equipment regulator at no more than 140 kPa (20 psi) over the recommended tire pressure.

Tire Shipping Pressure

The tire inflation pressures shown in the following chart are cold inflation shipping pressures.

Size	Ply Rating or Strength Index	Shipping Pressure	
		kPa	psi
6.5×10	10	825	120
7.0×15	12	825	120
28×9-15	12	825	120
28×12.5-15	16	725	105

¹ Standard tire, ply rating and inflation pressures.

The operating inflation pressure is based on the weight of a ready-to-work machine without attachments, at rated payload, and in average operating conditions. Pressures for each application may vary and should always be obtained from your tire supplier.

NOTE: Fill tires to the recommended pressures listed ± 35 kPa (5 psi). Tires can be filled with nitrogen.

Tire Inflation Pressures Adjustment

A tire inflated in a warm shop area, 18° to 21°C (65° to 70°F), will be underinflated if the machine works in freezing temperatures. Low pressure shortens the life of a tire.

Torque Specifications



Metric Hardware – This lift truck is almost totally metric design. Specifications are given in metric and U.S. Customary measurement.

Metric hardware must be replaced with metric hardware. Check parts books for proper replacement.

NOTE: Use only metric tools on most hardware for proper fit. Other tools could slip and possibly cause injury.

Torque for Standard Hose Clamps – Worm Drive Band Type

NOTICE

The following chart gives the torques for initial installation of hose clamps on new hose and for reassembly or retightening of hose clamps on existing hose.

Clamp Width	Initial Installation Torque on New Hose	
	N•m ¹	lb in
16 mm (.625 inch)	7.5 ± 0.5	65 ± 5
13.5 mm (.531 inch)	4.5 ± 0.5	40 ± 5
8 mm (.312 inch)	0.9 ± 0.2	8 ± 2
Clamp Width	Reassembly or Retightening Torque	
	N•m ¹	lb in
16 mm (.625 inch)	4.5 ± 0.5	40 ± 5
13.5 mm (.531 inch)	3.0 ± 0.5	25 ± 5
8 mm (.312 inch)	0.7 ± 0.2	6 ± 2

¹ 1 Newton meter (N•m) is approximately the same as 0.1 mkg.

Torque for Standard Bolts, Nuts and Taperlock Studs

NOTICE

The following charts give general torques for bolts, nuts and taperlock studs of SAE Grade 5 or better quality.

Torques for Bolts and Nuts With Standard Threads

Thread Size Inch	Standard Bolt & Nut Torque	
	N•m ¹	lb ft
1/4	12 ± 4	9 ± 3
5/16	25 ± 7	18 ± 5
3/8	45 ± 7	33 ± 5
7/16	70 ± 15	50 ± 11
1/2	100 ± 15	75 ± 11
9/16	150 ± 20	110 ± 15
5/8	200 ± 25	150 ± 18
3/4	360 ± 50	270 ± 37
7/8	570 ± 80	420 ± 60
1	875 ± 100	640 ± 75
1 1/8	1100 ± 150	820 ± 110
1 1/4	1350 ± 175	1000 ± 130
1 3/8	1600 ± 200	1180 ± 150
1 1/2	2000 ± 275	1480 ± 200

¹ 1 Newton meter (N•m) is approximately the same as 0.1 mkg.

Torques for Taperlock Studs

Thread Size Inch	Standard Taperlock Stud Torque	
	N•m ¹	lb ft
1/4	8 ± 3	6 ± 2
5/16	17 ± 5	13 ± 4
3/8	35 ± 5	26 ± 4
7/16	45 ± 10	33 ± 7
1/2	65 ± 10	48 ± 7
5/8	110 ± 20	80 ± 15
3/4	170 ± 30	125 ± 22
7/8	260 ± 40	190 ± 30
1	400 ± 60	300 ± 45
1 1/8	500 ± 70	370 ± 50
1 1/4	650 ± 80	480 ± 60
1 3/8	750 ± 90	550 ± 65
1 1/2	870 ± 100	640 ± 75

¹ 1 Newton meter (N•m) is approximately the same as 0.1 mkg.

METRIC ISO ² THREAD		
Thread Size Metric	Standard Torque	
	N•m ¹	lb ft
M6	12 ± 4	9 ± 3
M8	25 ± 7	18 ± 5
M10	55 ± 10	41 ± 7
M12	95 ± 15	70 ± 11
M14	150 ± 20	110 ± 15
M16	220 ± 30	160 ± 22
M20	450 ± 70	330 ± 50
M24	775 ± 100	570 ± 75
M30	1600 ± 200	1180 ± 150
M36	2700 ± 400	2000 ± 300

¹ 1 Newton meter (N•m) is approximately the same as 0.1 mkg.

² ISO—International Standard Organization.

Torque for Metric Fasteners

NOTICE

Be very careful never to mix metric with U.S. customary (standard) fasteners. Mismatched or incorrect fasteners will cause lift truck damage or malfunction and may even result in personal injury.

Original fasteners removed from the lift truck should be saved for reassembly whenever possible. If new fasteners are needed, they must be of the same size and grade as the ones that are being replaced.

The material strength identification is usually shown on the bolt head by numbers (8.8, 10.9, etc.). The following chart gives standard torques for bolts and nuts with Grade 8.8.

NOTE: Metric hardware must be replaced with metric hardware. Check parts book for proper replacement.

Cooling System Specifications

Coolant Information

NOTE: The following information is generic and valid for lift trucks

Engine operating temperatures have increased to improve engine efficiency. This means proper cooling system maintenance is especially important. Overheating, overcooling, pitting, cavitation erosion, cracked heads, piston seizures, and plugged radiators are classic cooling system failures. In fact, coolant is as important as the quality of fuel and lubricating oil.

NOTICE

DAEWOO recommends that the coolant mixture contain a minimum of 30% **antifreeze** or equivalent.

Never add coolant to an overheated engine, engine damage can result. Allow the engine to cool first.

All water is corrosive at engine operating temperature. The cooling system should be protected with a 3 to 6% concentration of liquid supplemental coolant additive at all times, regardless of the concentration of antifreeze.

Excessive supplemental coolant additive greater than the recommended 6%, together with concentrations of antifreeze greater than 65% can cause deposits to form and can result in radiator tube blockage, overheating, and/or water pump seal damage.

If the machine is to be stored in, or shipped to, an area with freezing temperatures, the cooling system must be protected to the lowest expected outside (ambient) temperature.

The engine cooling system is normally protected to -28°C (-20°F) with antifreeze, when shipped from the factory unless special requirements are defined.

Check the specific gravity of the coolant solution frequently in cold weather to ensure adequate protection.

Clean the cooling system if it is contaminated, if the engine overheats or if foaming is observed in the radiator.

Coolant should be drained, the system cleaned and new coolant added every 2000 service hours or two years.

Filling at over 20 liters (5 U.S. gallons) per minute can cause air pockets in the cooling system.

After draining and refilling the cooling system, operate the engine with the radiator cap removed until the coolant reaches normal operating temperature and the coolant level stabilizes. Add coolant as necessary to fill the system to the proper level.

Never operate without a thermostat in the cooling system. Cooling system problems can arise without a thermostat.

Coolant Water

Hard water, or water with high levels of calcium and magnesium ions, encourages the formation of insoluble chemical compounds by combining with cooling system additives such as silicates and phosphates.

The tendency of silicates and phosphates to precipitate out-of-solution increases with increasing water hardness. Hard water, or water with high levels of calcium and magnesium ions encourages the formation of insoluble chemicals, especially after a number of heating and cooling cycles.

DAEWOO prefers the use of distilled water or deionized water to reduce the potential and severity of chemical insolubility.

MINIMUM ACCEPTABLE WATER	
Water Content	Limits gr/gal (ppm)
Chlorides	2.4 (40) maximum
Sulfates	5.9 (100) maximum
Total Hardness	10 (170) maximum
Total Solids	20 (340) maximum
pH	5.5 to 9.0

ppm = parts per million

Using water that meets the minimum acceptable water requirement may not prevent drop-out of these chemical compounds totally, but should minimize the rate to acceptable levels.

Antifreeze

Make proper antifreeze additions.

Adding pure antifreeze as a makeup solution for cooling system top-up is an unacceptable practice. It increases the concentration of antifreeze in the cooling system which increases the concentration of dissolved solids and undissolved chemical inhibitors in the cooling system. Add antifreeze mixed with water to the same freeze protection as your cooling system.

Use the chart below to assist in determining the concentration of antifreeze to use.

ANTIFREEZE CONCENTRATIONS	
Protection Temperature	Concentration
Protection to -15°C (5°F)	30% antifreeze and 70% water
Protection to -23°C (-10°F)	40% antifreeze and 60% water
Protection to -37°C (-34°F)	50% antifreeze and 50% water
Protection to -51°C (-60°F)	60% antifreeze and 40% water

Cooling System Information and Maintenance Requirements for the 2.0 liter (XN1P) Engine

The aluminum cylinder heads on 2.0 liter (XN1P) engine extremely sensitive to coolant quality. To prevent possible cylinder head erosion/pitting, follow the cooling system maintenance practices as stated below.

1. Use a 50/50 mixture of antifreeze and water. Only use greater concentrations of antifreeze if the anticipated outside temperature is below -37°C (-34°F).
2. Use ethylene glycol type antifreeze.
3. DO NOT ADD ANY COOLING SYSTEM INHIBITOR OR ADDITIVE.
4. Use distilled or deionized water if the local tap water is hard. (contains high levels of minerals). Refer to "Coolant Water" in this section.
5. Never add pure antifreeze or water for cooling system top-ups. Always make additions of a pre-mixed 50/50 mixture of antifreeze and water.
6. Drain and clean the cooling sytem every year or 1500 service hours. Refer to "Cooling system cleaning" in this section.

Fuel Specifications

Fuel Information

Use only fuel as recommended in this section.

NOTICE

Fill the fuel tank at the end of each day of operation to drive out moist air and to prevent condensation. Maintain a constant level near the top of the day tank to avoid drawing moisture into the tank as the level decreases.

Do not fill the tank to the top. Fuel expands as it gets warm and can overflow.

Do not fill the fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to the fuel system parts.

Drain the water and sediment from any fuel storage tank before it is refilled. This will help prevent water and/or sediment from being pumped from the fuel storage tank into the engine fuel tank.

Fuel Types

DAEWOO Diesel Engines have the ability to burn a wide variety of fuels. These fuels are divided into two general groups, preferred and permissible.

The **Preferred Fuels** provide maximum engine service, life and performance. They are distillate fuels. They are commonly called diesel fuel, MDO diesel, furnace oil, gas oil or kerosene (for cold weather operation).

Experience has proven that distillate fuels meeting the following basic specifications will result in optimum engine performance and durability.

DAEWOO strongly encourages the use of fuels that meet the Preferred Fuels specification.

The permissible fuels are crude oils or blended fuels. Use of these fuels can result in higher maintenance costs and reduced engine service life.

Crude oil is used to describe oils/fuels that are not refined and are in the original state as when pumped from the ground. Certain types of crude oils can be burned in DAEWOO Engines.

PREFERRED DISTILLATE FUEL FOR DIESEL ENGINES	
Specifications	Requirements ¹
Aromatics (ASTM D1319)	35% Max.
Ash (ASTM D482)	0.02% Weight Max.
Cetane Number (ASTM D613)	35 Min. for PC Engines 40 Min. for DI Engines
Cloud Point (ASTM D97)	Not Above Lowest Expected Ambient Temperature
Gravity API (ASTM D287)	30 Min. and 45 Max.
Pour Point (ASTM D97)	6°C (10°F) Below Ambient Min.
Sulfur (ASTM D2788, D3605 or D1552)	0.5 % Max (See Sulfur Topic)
Viscosity, Kinematic @ 38°C (100°F) (ASTM D445)	20.0 cSt Max. 1.4 cSt Min.
Water & Sediment (ASTM D1796)	0.01% Max.

¹ As delivered to fuel system

Fuel Sulfur Content

The percentage of sulfur in the fuel will affect the engine oil recommendations. Fuel sulfur is chemically changed during combustion to form both sulfurous and sulfuric acid. These acids chemically attack metal surfaces and cause corrosive wear.

Certain additives used in lubricating oils contain alkaline compounds that are formulated to neutralize these acids. The measure of this reserve alkalinity in a lubricating oil is known as its Total Base Number (TBN). TBN is essential to neutralize the acids from combustion gases and to minimize corrosive wear.

Any API classification performance oil should have sufficient TBN for fuels with less than 0.5% sulfur. For fuels with 0.5% to 1.5% sulfur by weight, engine oil must have a TBN of 20 times the percentage of fuel sulfur as measured by the ASTM (American Society of Testing Materials) D-2896 method. (ASTM D-2896 can normally be found at your local technological society, library or college.)

DAEWOO recommends infrared analysis (in conjunction with wear metal analysis) of used oil in determining the effectiveness of oil TBN and acid neutralization.

For fuel with sulfur exceeding 1.5% by weight, use an oil with a TBN of 30 and reduce the oil change interval by one half. Also, infrared analysis and wear metal analysis should be used to establish oil change intervals.

Periodically request fuel sulfur content information from your fuel supplier. Fuel sulfur content can change with each bulk delivery.

Lubricant Specifications

Lubricant Information

Certain abbreviations follow Society of Automotive Engineers (SAE) J754 nomenclature and some classifications follow SAE J183 abbreviations.

The MIL specifications are U.S.A. Military Specifications.

The recommended oil viscosities can be found in the Lubricant Viscosities chart in this publication.

Grease is classified by the National Lubricating Grease Institute (NLGI) based on ASTM D217-68 Worked Penetration characteristics which are given a defined consistency number.

Engine Oil (DEO and EO)

The following oil specifications provide guidelines for the selection of commercial products:

- API CF-4/SG, CF-4/SF, CE/SG, CE/SF, CD/SG or CD/SF

NOTICE

Failure to follow the oil recommendations can cause shortened engine life due to carbon deposits or excessive wear.

Consult the EMA Lubricating Oils Data Book for a listing of oil brands.

NOTE: The percentage of sulfur in the fuel will affect the engine oil recommendations. For fuel sulfur effects, the Infrared Analysis or the ASTM D2896 procedure can be used to evaluate the residual neutralization properties of an engine oil. The sulfur products formation depends on the fuel sulfur content, oil formulation, crankcase blowby, engine operating conditions and ambient temperature.

Hydraulic Oil (HYDO)

The following commercial classifications can be used in the hydraulic system

- API CF-4/SG, CF-4/SF, CE/SG, CE/SF, CD/SG, or CD/SF
- MIL-L-2104E or D

Industrial premium hydraulic oils that have passed the Vickers vane pump test (35VQ25) and/or have a minimum of 0.09% zinc additive may also be used. These oils should have antiwear, antifoam, antirust and antioxidation additives for heavy duty use as stated by the oil supplier. ISO viscosity grade of 46 would normally be selected.

Transmission Oil (TDTO)

NOTICE

This oil is formulated for transmissions and drive trains only, and should not be used in engines. Shortened engine life will result.

NOTE: Multi-grade oils are not blended by DAEWOO for use in transmissions. Multi-grade oils which use high molecular weight polymers as viscosity index improvers lose their viscosity effectiveness by permanent and temporary shear of the viscosity index improver and therefore, are not recommended for transmission and drive train compartments.

NOTE: Failure to follow this recommendation can cause shortened transmission life due to material incompatibility, inadequate frictional requirements for disk materials and/or excessive gear wear.

The API CD/TO-2 specification or MIL-L-2104D or E oils could be used.

Final Drives and Differential Oil (TDTO)

NOTE: Do not use Gear Oil in the final drives or differentials. Gear Oil can cause seal material to fail and possibly leak oil.

NOTE: Failure to follow the recommendation will cause shortened life due to excessive gear wear.

The API CD/TO—2 specification or MIL-L-2104D or E oils could be used.

NOTE: Multi-grade oils are not blended by DAEWOO for use in transmissions. Multi-grade oils which use high molecular weight polymers as viscosity index improvers lose their viscosity effectiveness by permanent and temporary shear of the viscosity index improver and therefore, are not recommended for transmission and drive train compartments.

Gear Oil (GO)

Select an oil that meets API GL-5 spec or MIL-L-2105C spec.

Lubricant Viscosities and Refill Capacities

Lubricant Viscosities

LUBRICANT VISCOSITIES FOR AMBIENT (OUTSIDE) TEMPERATURES					
Compartment or System	Oil Viscosities	°C		°F	
		Min	Max	Min	Max
Engine Crankcase (Gasoline and LP-Gas) and Lift Chains API CF-4, CF-4/SG, API CE, CE/SG	SAE 10W30	-20	+40	-4	+104
	SAE 15W40	-15	+50	+5	+122
Engine Crankcase Diesel API CF-4	SAE 10W	-20	+10	-4	+50
	SAE 10W30	-20	+40	-4	+104
	SAE 15W40	-15	+50	+5	+122
Power Shift Transmission API CD/TO-2	SAE 10W	-20	+10	-4	+50
	SAE 30W	0	+35	32	+95
Hydraulic and Power Steering System	SAE 10W	-20	+40	-4	+104
	SAE 10W30	-20	+40	-4	+104
	SAE 15W40	-15	+50	+5	+122

Refill Capacities

REFILL CAPACITIES-(APPROXIMATE)				
Compartment or System		Liters	U.S. Gal.	Imperial Gal.
Engine Crankcase w/Filter XN1P Gasoline & LP-Gas		4.0	1.04	0.88
Engine Crankcase w/Filter. Hercules 2.7 liter Gasoline & LP-Gas		9.9	2.578	2.178
Engine Crankcase w/Filter DC24 & DB33 Diesel	DC24	6.0	1.56	1.32
	DB33	7.5	1.95	1.65
Cooling System w/Coolant Recovery Bottle XN1P & Hercules 2.7 liter Gasoline & LP-Gas	XN1P	8.7	2.262	1.914
	Hercules 2.7 liter	13.0	3.385	2.86
Cooling System w/Coolant Recovery Bottle Diesel	DC24	9.8	2.55	2.174
	DB33	11.7	3.047	2.574
Fuel Tank-G,D Series Gasoline or Diesel		45.4	11.8	9.99
Fuel Tank-GC Series Gasoline		41.8	10.87	9.2
LP-Gas-G-Series		19.7kg	43.5lb	43.5lb
LP-Gas-GC-Series		15.2kg	33.5lb	33.5lb
Power Shift Transaxle		18.9	4.9	4.2
Hydraulic & Power Steering System		34	8.8	7.5

Maintenance Intervals

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Check if misfire or hard starting is experienced	66
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Every 10 Service Hours or Daily

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First 250 Service Hours or Monthly *

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Every 250 Service Hours or Monthly *

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Every 500 Service Hours or 3 Months *

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Every 1000 Service Hours or 6 Months *

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Every 2000 Service Hours or 1 Year *

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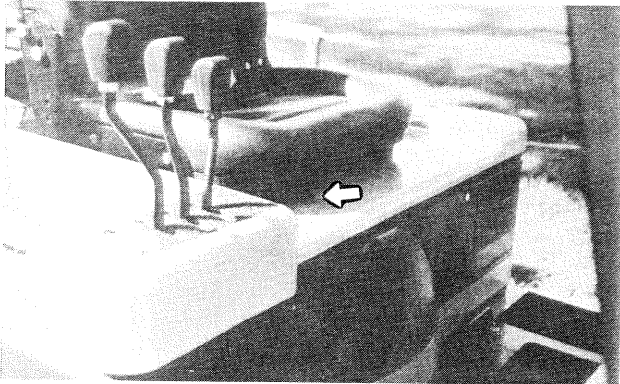
* First Perform Previous Service Hours Items

When Required

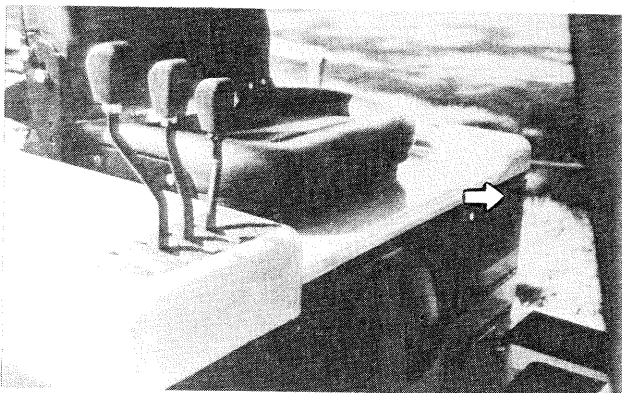
You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

Operator's Seat, Hood Latch & Support Cylinder

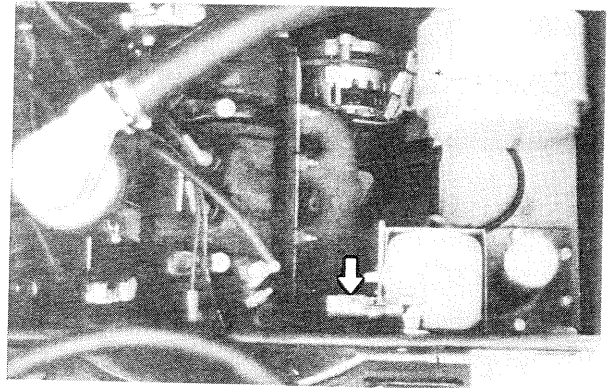
Check/Lubricate



1. Check the operation of the seat adjuster rod. Make sure that the seat slides freely on its track. Lightly oil the seat slider tracks if necessary.



2. Pull the latch to raise the hood and seat assembly. Make certain the support cylinder will hold the hood open.



Typical Example

3. Lightly oil the hood latch mechanism and the rod for the hood support cylinder.

Fuses and Circuit Breaker

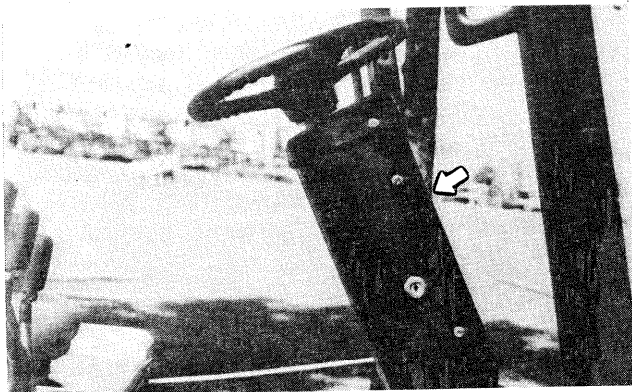
Replace/Reset

Fuses

NOTE: If a fuse filament separates, use only the same type and size fuses for replacement. If the filament in a new fuse separates, have the circuits and instruments checked.

NOTICE

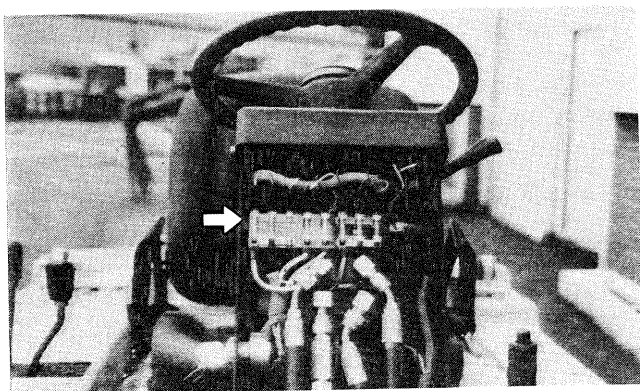
Always replace fuses with ones of the correct ampere rating.



Remove the front cover from the steering column. The fuses are located under the cover.

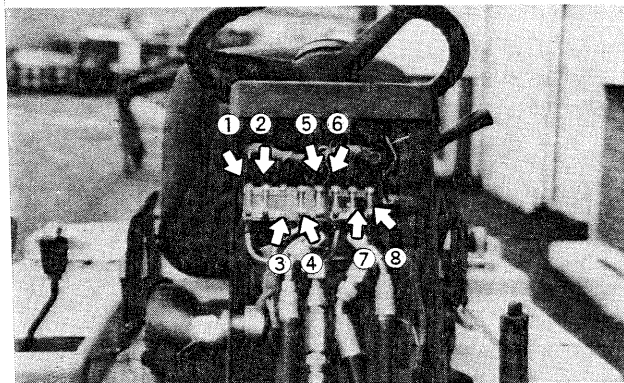


Fuse – Protects an electrical circuit from an overload. Opens (filament separates) if an overload occurs.



Typical Example

Check the fuses. Use a flashlight, if necessary.

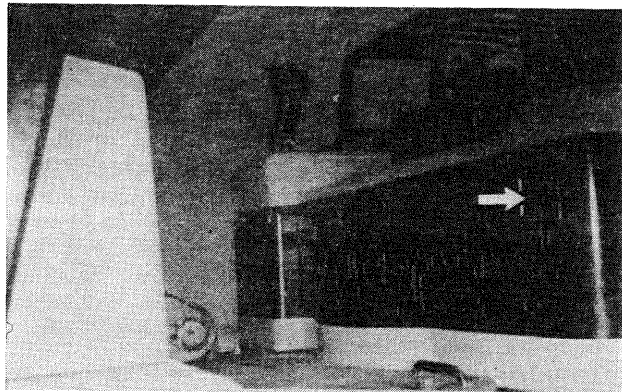


Typical Example

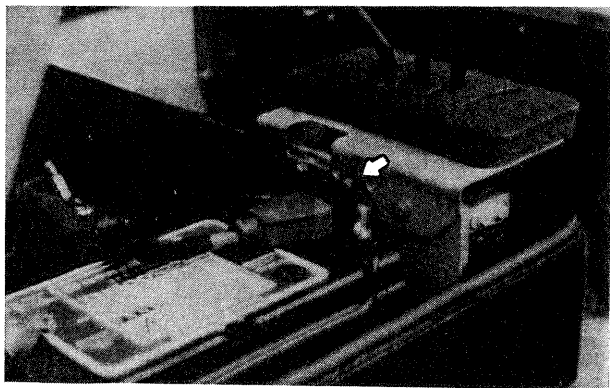
Fuses are identified as follows:

1. Operator Monitor Fuse – 10 amp.
2. Engine Stop Relay for D/DS Series – 15 amp.
Fuel Pump and Ignition Module for G/GS Series – 15 amp.
3. Accessory Fuses for Combination Lamp and Back-up Alarm, etc – 15 amp.
4. Directional Switch for Start Motor – 5 amp.
5. Directional Switch for FWD, REV Transmission Solenoid control – 5 amp.
6. Engine Stop Motor for D,DS Series – 15 amp.
7. Flood Lights – 15 amp.
8. Horn and Turn Signals – 15 amp.

Circuit Breaker



1. Raise the hood and seat assembly. Make sure the support cylinder securely holds the hood open.



2. The main circuit breaker is located on the rear of the support for the controls.

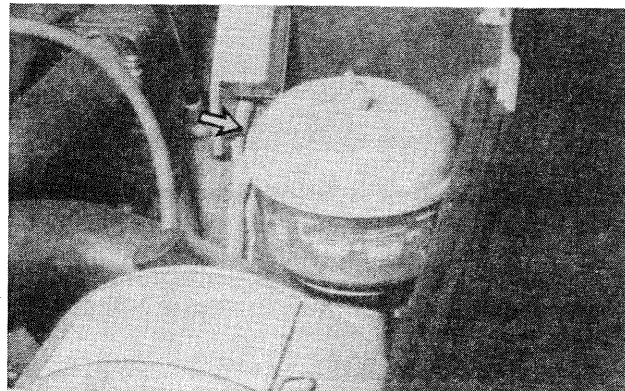
NOTE: To reset circuit breakers push in on the button. The button should stay in if the breaker is reset. If the button will not stay in, or comes out shortly after reset, have the circuits checked.

Air Intake System

Clean Precleaner (If Equipped)

NOTICE

Never service precleaner with the engine running.

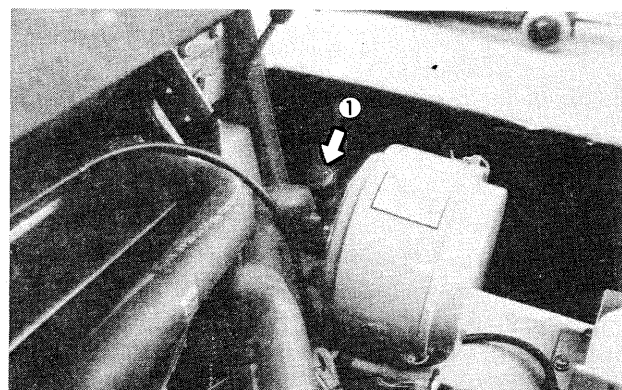


1. Check the precleaner bowl for dirt build-up. If the dirt is up to the line, remove the precleaner bowl and empty it. Periodically wash the cover and bowl in water.

Servicing Filter Element

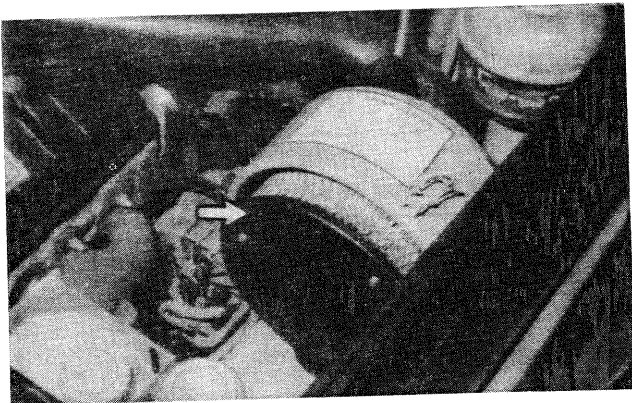
NOTICE

Never service filter with the engine running.



Service the air cleaner when the red target in the service indicator (1) stays locked in the visible position with the engine stopped.

1. To service the air cleaner, raise the hood and seat assembly. Make certain the support cylinder securely holds the hood open. Loosen the cover **latches** and remove the cover.



2. Rotate the element slightly to separate it from its base and remove it from the air cleaner housing.
3. Clean and inspect the element or replace with a new element. See topic, "Cleaning Primary Filter Element".
4. Clean the inside of air cleaner housing and the cover. Inspect all connections between the air cleaner and carburetor. Check intake hose for cracks, damage and loose clamps. Tighten or replace parts as necessary to prevent leakage.

NOTICE

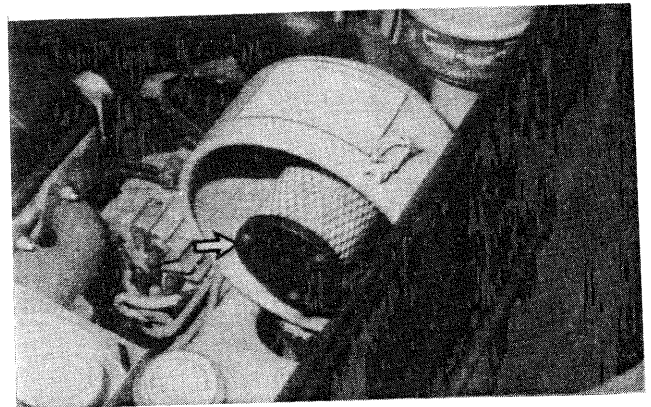
Do not allow dirty air to enter the intake hose when cleaning the inside of the air cleaner housing.

5. Check the air cleaner housing for loose latches.
6. Reset the air cleaner service indicator.
7. Install the air filter element.
8. Install the cover and tighten the cover latches.
9. Start the engine and observe the position of the indicator. If the indicator shows RED after the installation of the primary element, install another clean or a new element or, replace the secondary element. See topic, "Changing Secondary Element."
10. Stop the engine and close the hood and seat assembly.

Changing Secondary Element

Replace the secondary element after the primary element has been cleaned three times or yearly.

1. Remove the primary air cleaner element. See topic "Servicing Filter Element." Clean the inside of the air cleaner housing and cover.



2. Remove the secondary element. Inspect the gasket between the air cleaner housing and the engine inlet. Replace the gasket if it is damaged.

NOTICE

Always replace the secondary element. Do not attempt to reuse it by cleaning.

3. Install a new secondary element. Install a new or cleaned primary element. Install the cover. Tighten the latches.
4. Start the engine and observe the air cleaner service indicator. If the indicator shows RED after installing a new secondary element and a cleaned primary (outer) element, replace the cleaned primary filter with a new element.
5. Stop the engine. Close the hood and seat assembly.

Cleaning Primary Filter Elements

WARNING

Pressure air can cause personal injury.

When using pressure air for cleaning, wear a protective face shield, protective clothing and protective shoes.

The maximum air pressure must be below 205 kPa (30 psi) for cleaning purposes.

NOTICE

Do not clean the elements by bumping or tapping them.

Inspect filter elements after cleaning. Do not use a filter with damaged pleats, gaskets or seals.

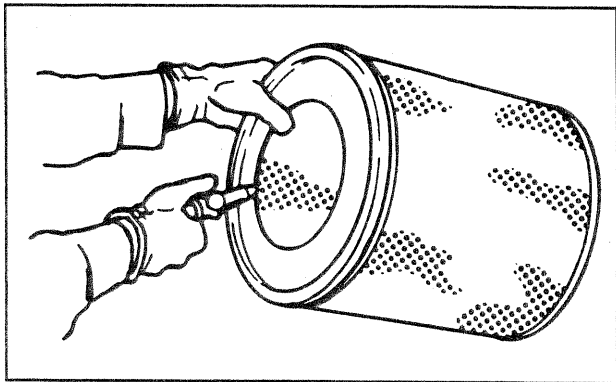
When cleaning with pressure air, use 205 kPa (30 psi) maximum pressure to prevent filter element damage.

When cleaning with pressure water, use 280 kPa (40 psi) maximum pressure to prevent filter element damage.

Have spare elements on hand to use while cleaning used elements.

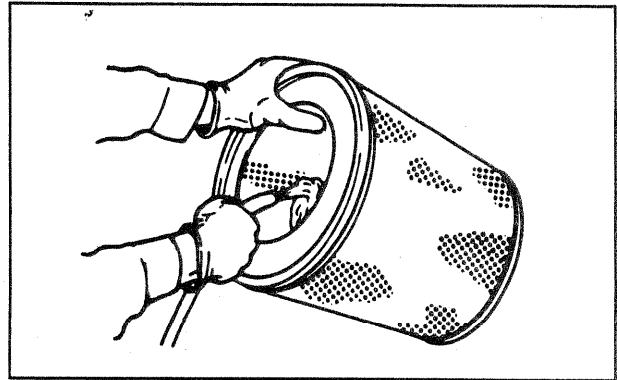
The primary element should be replaced after a year's service or after cleaning no more than 6 times.

Air – 205 kPa (30 psi) Maximum Pressure



Direct air on the inside and outside of the element along the length of the pleats. Check the element for any tears, rips or damage.

Water – 280 kPa (40 psi) Maximum Pressure

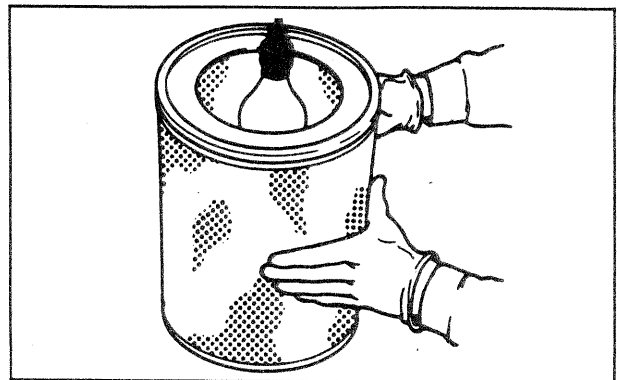


Direct water on the inside and outside of the element along the length of the pleats. Air dry it thoroughly and then examine it.

Detergent

1. Wash the element in warm water and nonsudsing household detergent.
2. Rinse the element with clean water. See instructions in preceding topic for cleaning with water.
3. Air dry it thoroughly, and then examine it.

Checking Element



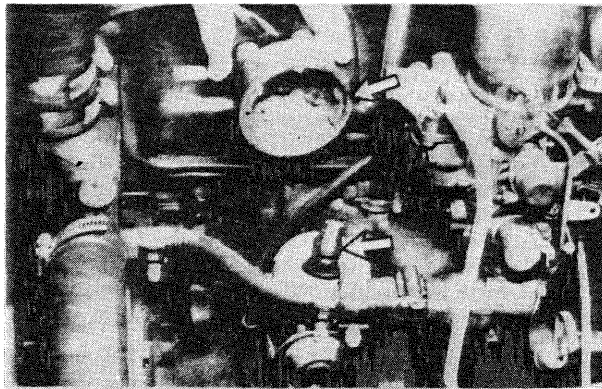
1. Insert a light inside the clean and dry element and examine it. Discard the element if tears, rips or damage are found.
2. Wrap and store good elements in a clean, dry place.

Distributor (Gasoline, LP-Gas and Dual Fuel Engines)

Check

Park the lift truck with the forks lowered, parking brake applied, transmission in neutral and the engine stopped.

1. Raise the hood and seat assembly.



2. Remove the distributor cap. Clean the distributor cap. Check the cap for cracks, carbon runners and corroded terminals. Replace the cap if necessary.
3. Remove the rotor. Check the rotor for burned and corroded contacts. Replace the rotor if necessary.

NOTE: No diagnostic check is necessary for contactless electronic sensor. A pulse transformer and electronic pack system performs this function. If the engine misfires, or will not start, consult your DAEWOO Lift Truck dealer for service or the proper procedure to service the electronic pack.

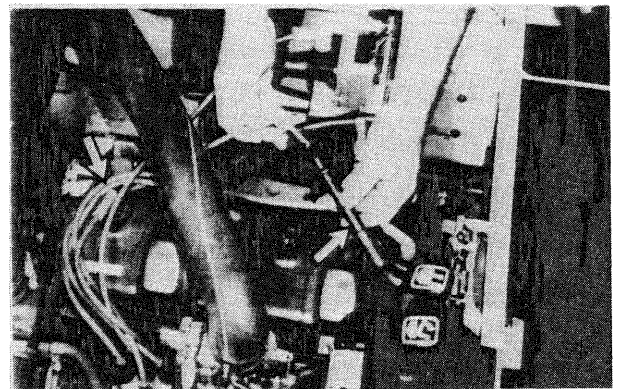
4. Install the rotor and distributor cap. Secure the distributor cap in position with the spring clips.
5. Close the hood and seat assembly.

Spark Plugs (Gasoline, LP-Gas and Dual Fuel Engines)

Check

Park the lift truck with the forks lowered, parking brake applied, transmission in neutral and the engine stopped.

1. Raise the hood and seat assembly.



2. Disconnect the spark plug wires. Check the wires for cracks, wear, high voltage leaks or broken connectors.
3. Clean the engine block in the area around the spark plugs.
4. Remove the spark plugs. Inspect the porcelain for cracks and high voltage tracking. Check the electrodes for wear, carbon or corrosion. Replace plugs that are defective.
5. Clean the spark plugs. To set the electrode gaps for a particular engine, see the "Service Manual". Install the plugs.
6. Close the hood and seat assembly.

Ignition Timing (Gasoline, LP-Gas and Dual Fuel Engines)

Check/Adjust

NOTICE

Be sure to check and set Dual fuel ignition timing on gasoline fuel. Dual fuel engines' timing must be 6° BTDC. If the engine is to be run on LP fuel for a long period of time, the timing can be adjusted to 14° BTDC for better performance. When the fuel is changed back to gasoline, the timing must be 6° BTDC. If the timing is at 14° BTDC on gasoline fuel for a long period of time, the pistons will be damaged.

Ignition timing may vary by engine type. See the "Service Manual" for the complete procedure and specifications for your specific engine.

Carburetor (Gasoline, LP-Gas and Dual Fuel Engines)

Adjust

If the engine is hard to start or the exhaust is smoking, the carburetor may need adjusting.

Before adjusting the carburetor make sure the engine is at normal operating temperature. Park the lift truck with the forks lowered, parking brake applied, transmission in neutral and the engine stopped.

For the complete procedure and specifications for your specific engine, see the "Service Manual".

Fuel Filters

Clean (Gasoline and Dual Fuel Engines)

NOTE: Engine must be stopped and cool.

Park the lift truck in an authorized refueling area with the forks lowered, parking brake applied, transmission in NEUTRAL and the engine stopped.

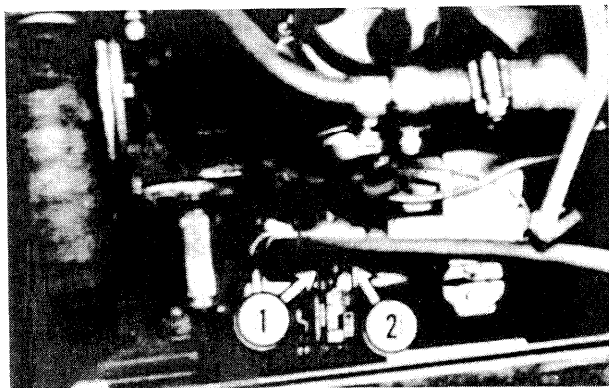
1. Raise the hood and seat assembly.

WARNING

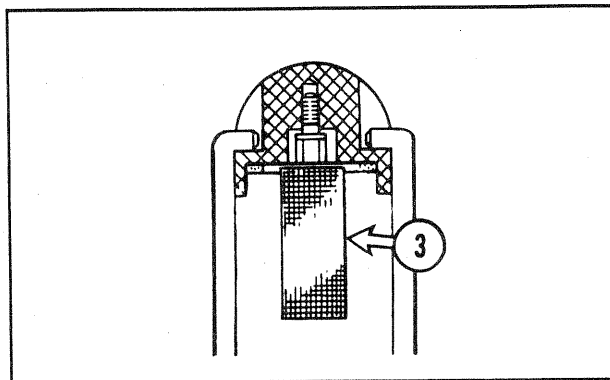
Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.

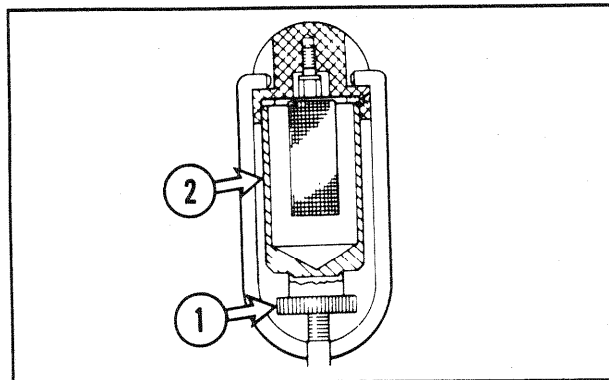
2.0 Liter (XN1P) Engine



1. Loosen wheel nut (1) and remove bowl (2).

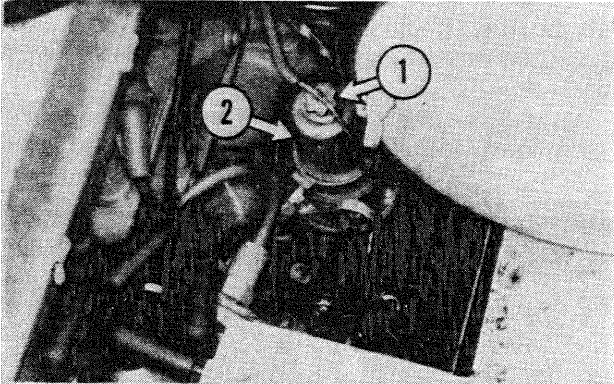


2. Unscrew and remove filter element (3). Clean bowl (2) in clean, nonflammable solvent.
3. Dry bowl (2) and install new filter element (3).

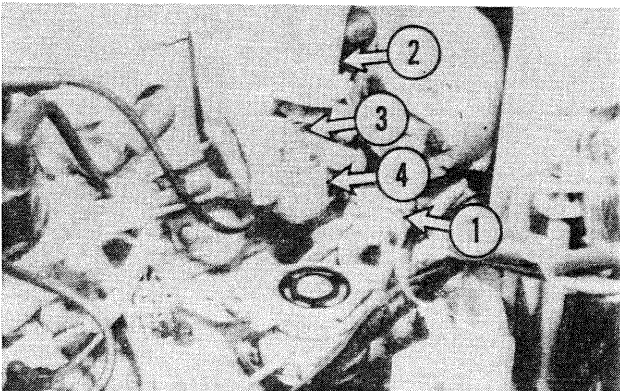


4. Install bowl (2). Tighten wheel nut (1) finger tight.
5. Start the engine and check for fuel leaks. Stop the engine.
6. Close hood and seat assembly.

Hercules 2.7 liter Engine



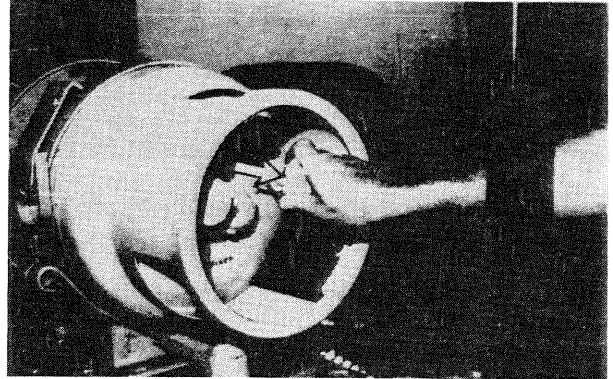
1. Loosen wheel nut (1) and remove bowl (2), filter element and spring.
2. Discard the old filter element.
3. Clean bowl (2) in clean, nonflammable solvent, then dry it.



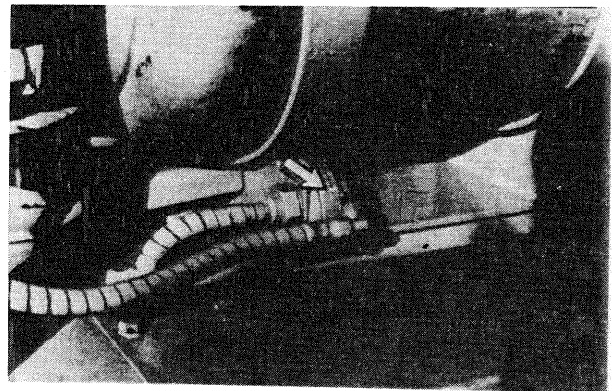
4. Install a new filter element (4), spring (3) and bowl (2). Tighten wheel nut (1) finger tight.
5. Close hood and seat assembly.

Clean - Replace (LP-Gas and Dual Fuel Engines)

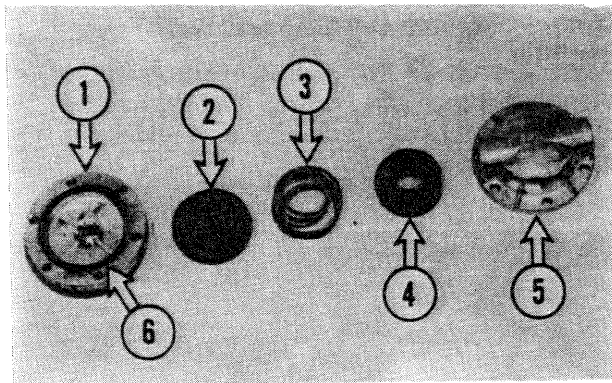
Park the lift truck in an authorized refueling area with the forks lowered, parking brake applied and the transmission in NEUTRAL.



1. Close the fuel shutoff valve on the LP-Gas tank. Run the engine until fuel in the line runs out and the engine stops. Turn off the ignition switch and disconnect switch (if equipped).



2. Scribe a line across the filter housing covers.
3. Remove the cover retaining screws.



4. Remove cover (5), magnet (4), spring (3) and filter element (2) from bottom cover (1).
5. Wash the filter element (2) in clean, nonflammable solvent.
6. Dry the filter element with 205 kPa (30 psi) maximum air pressure.
7. Check bottom cover gasket (6) for damage. Replace it if necessary.
8. Install the filter element (2), spring (3), magnet (4) and cover (5) on bottom cover (1). Align the scribe line on the covers.
9. Install the cover retaining screws. Tighten the screws in a sequence opposite each other.
10. Open the fuel valve by slowly turning the valve counterclockwise.
11. Crank the engine only enough to produce a vacuum at the fuellock. Turn the ignition key switch off.
12. Check the fuel lines and fittings with a soap solution. Make repairs if necessary.

Diesel Engine – Change Filter Element

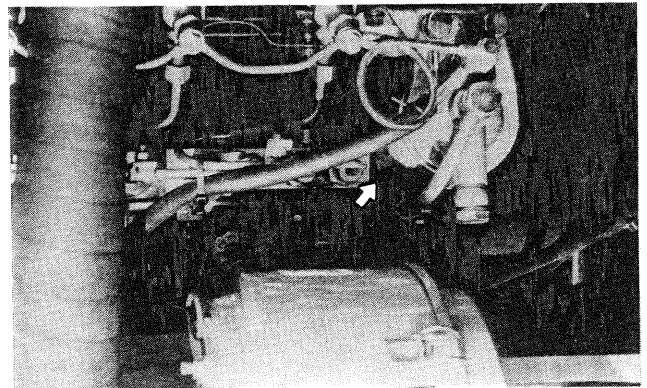
Park the lift truck with the forks lowered, parking brake applied, transmission in neutral, engine stopped and cool.

1. Raise the hood and seat assembly.

WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

Turn the disconnect switch OFF or disconnect the battery when changing fuel filters.



2. Remove fuel filter
3. Before installing a new filter element, apply a small amount of clean fuel to the filter element gasket.

NOTICE

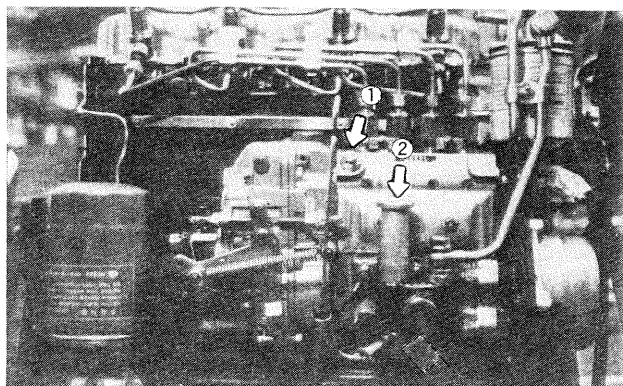
Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

4. Install the new fuel filter element.
5. Turn the new fuel filter until the filter gasket is fitted against the sealing face.
6. Turn the fuel filter an additional 2/3 of turn.

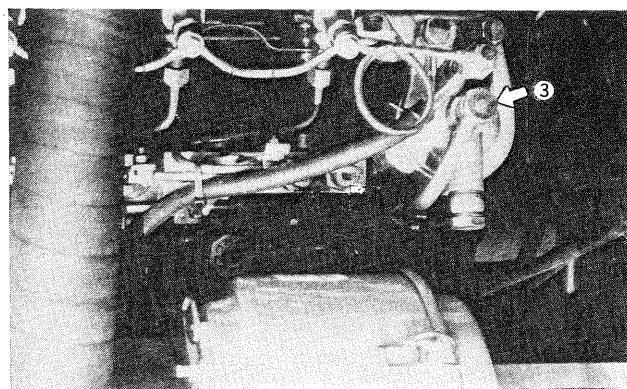
Priming the Fuel System(Diesel Engine)

Bleeding the Fuel System

After changing the fuel filter, or after having serviced any part of the fuel system, make sure that the air is bled from the system.



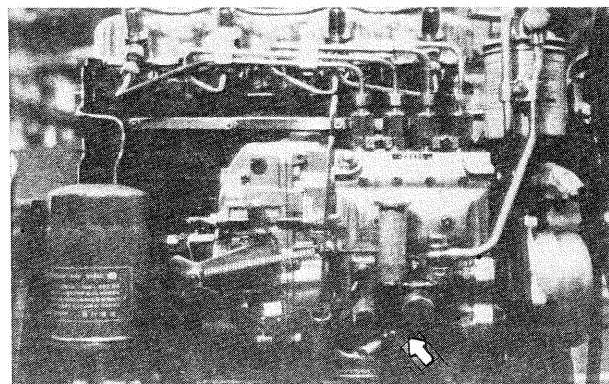
1. Loosen the bleed screw(1) on the fuel injection pump.
2. Turn the priming pump knob(2) counterclockwise until the internal spring pushes it upwards.
3. Pushing the priming pump against the spring will allow air mixed with fuel to escape through the bleed screw. Ensure that excess fuel is collected in a container or rag to prevent fuel from getting onto engine parts.
4. Repeat the pumping action until no bubbles are visible in the flowing fuel.
5. Tighten the bleed screw(1).



6. Loosen bleed screw(3) on top of the fuel filter housing, and repeat steps 3 and 4.
7. Tighten bleed screw(3)
8. Start the engine and check fuel system for leaks.

Cleaning Priming Pump Strainer

Clean the strainer with compressed air and rinse it in fuel oil.



Fuel Tank Filler Cap and Screen (If Equipped)

Clean

Park the lift truck with the forks lowered, parking brake applied, transmission in neutral and the engine stopped.



1. Remove the filler cap assembly. Separate the cap from the screen. Clean both in clean, nonflammable solvent.
2. Dry and assemble cap and screen.
3. Install filler cap assembly.

WARNING

Fuel leaked or spilled onto hot surfaces or electrical components can cause a fire.

4. Drain moisture and sediment from fuel tank as required by prevailing conditions.

Tires and Wheels (D,G-Series)

WARNING

Servicing and changing tires and rims can be dangerous and should be done only by trained personnel using proper tools and procedures.

If correct procedures are not followed while servicing tires and rims, the assemblies could burst with explosive force and cause serious physical injury or death.

Follow carefully the specific information provided by your tire servicing man or dealer.

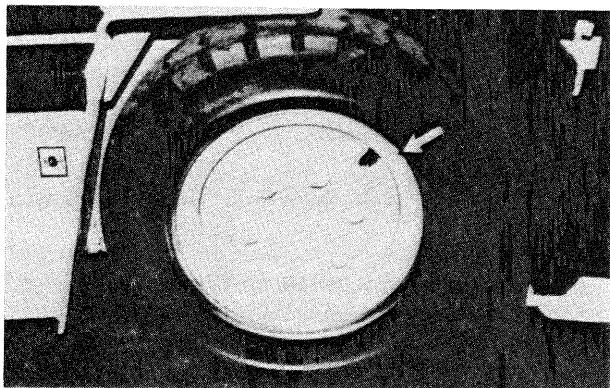
Check Inflation and Damage

Inspect tires for wear, cuts, gouges and foreign objects. Look for bent rims and correct seating of locking ring.

Check tires for proper inflation. See "Tire Inflation Pressures."

To inflate tires always use a clip-on chuck with a minimum 60 cm (24 inches) length of hose to an in-line valve and gauge.

Always stand behind the tread of the tire, NOT in front of the rim.



Do NOT reinflate a tire that has been run while flat or underinflated, without first checking to make sure the locking ring on the rim is not damaged and is in the correct position.

When tires are changed, be sure to clean all rim parts and, if necessary, repaint to stop detrimental effects of corrosion. Sand blasting is recommended for removal of rust.

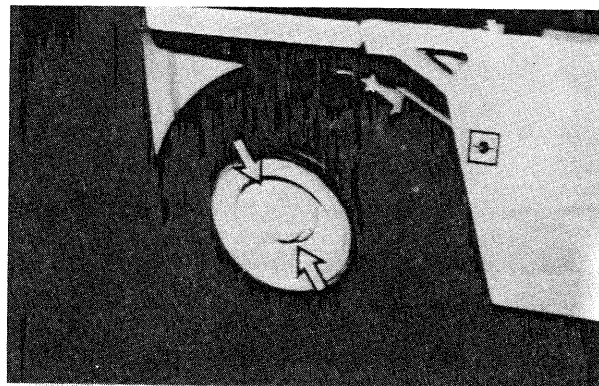
Check all components carefully and replace any cracked, badly worn, damaged and severely rusted or corroded parts with new parts of the same size and type. If there is any doubt, replace with new parts.

Do NOT, under any circumstances, attempt to rework, weld, heat or braze any rim components.

Wheel Bolts (D,G-Series)

Check Tightness

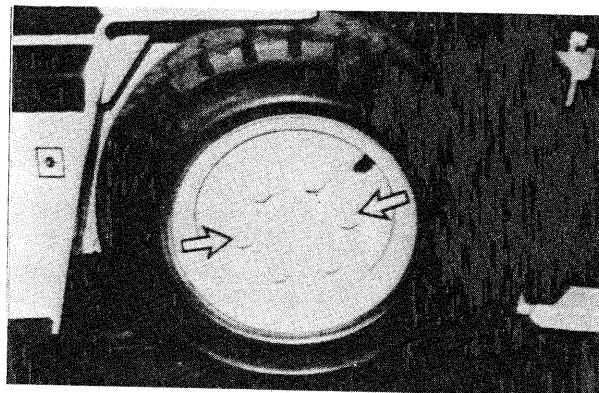
Steer Wheels



Typical Example

1. Inspect tightness of wheel bolts in a sequence opposite each other 100 N•m (75 lb ft).

Drive Wheels



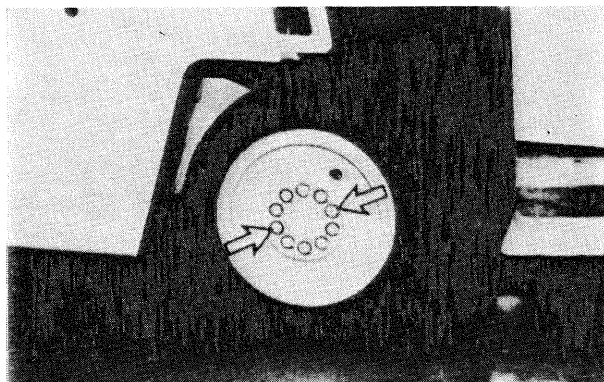
Typical Example

2. Inspect tightness of wheel nuts in a sequence opposite each other to 610 N•m (450 lb ft).

Wheel Bolts (GC-Series)

Check - Tightness

Drive Wheels



Typical Example

1. Inspect tightness of wheel bolts in a sequence opposite each other to 245 N•m (180 lb ft).

Every 10 Service Hours or Daily

You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

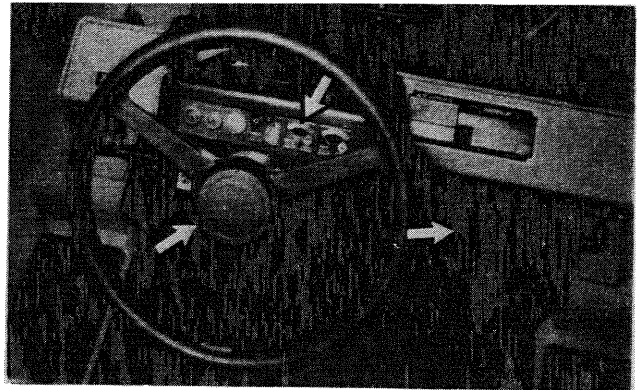
Walk-Around Inspection

For maximum service life of the lift truck, make a thorough walk-around inspection. Look around and under the truck for such items as loose or missing bolts, debris or dirt buildup, fuel, oil or coolant leaks and cut or gouged tires.

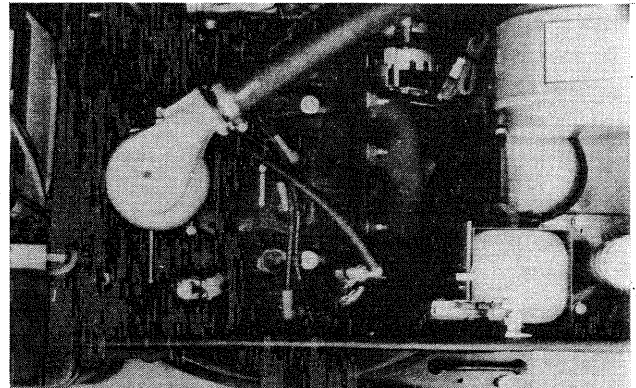
Have any repairs made and debris removed, as needed.



1. Inspect the tires and wheels for cuts, gouges, foreign objects, inflation pressure and loose or missing bolts.
2. Inspect the mast and lift chains for wear, broken links, pins and loose rollers.
3. Inspect the hydraulic system for leaks, worn hoses or damaged lines.
4. Look for transmission and differential leaks on the lift truck and on the ground.



5. Inspect the operator's compartment for loose items and cleanliness.
6. Inspect the instrument panel for broken gauges and indicator lights.
7. Test the horn and other safety devices for proper operation.



8. Inspect the cooling system for leaks, worn hoses and debris buildup.
9. Inspect engine compartment for oil, coolant and fuel leaks.
10. Inspect the forks.
 - Visually inspect forks for cracks, especially in the heel section, around the mounting brackets, and all weld areas.
 - Inspect for broken or jagged fork tips, bent or twisted blades and shanks.
 - Make sure positioning lock is in place and working. Lock the forks in position before using the truck. See Step 7 of "Forks" in "Every 2000 Service Hours of 1 Year".
 - Remove all defective forks from service.

Engine Crankcase

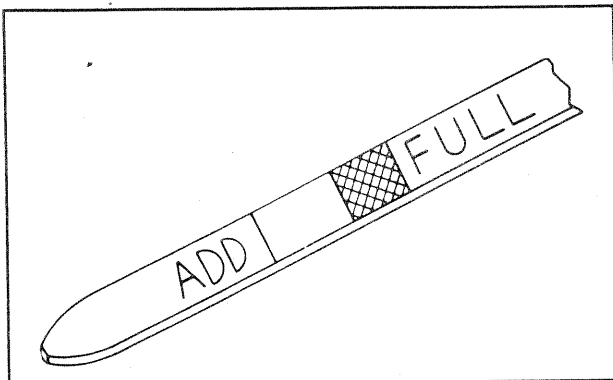
Measure Oil Level

1. Raise the hood and seat assembly.

WARNING

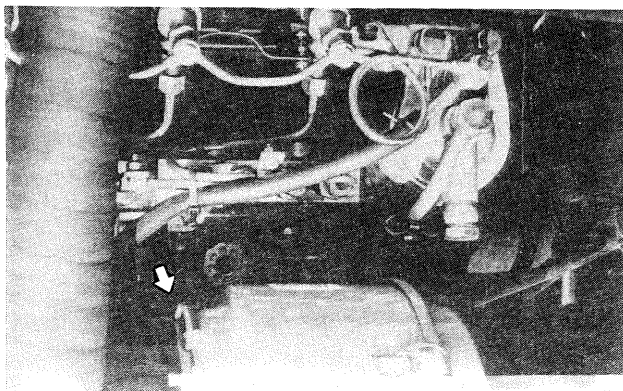
Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

Gasoline and LP-Gas Engines



2. Measure the crankcase oil level. Maintain the level to FULL mark on the dip stick.

Diesel Engines



3. Maintain oil level between the MAX. and MIN. marks on the dipstick.

Radiator

Check Coolant Level

WARNING

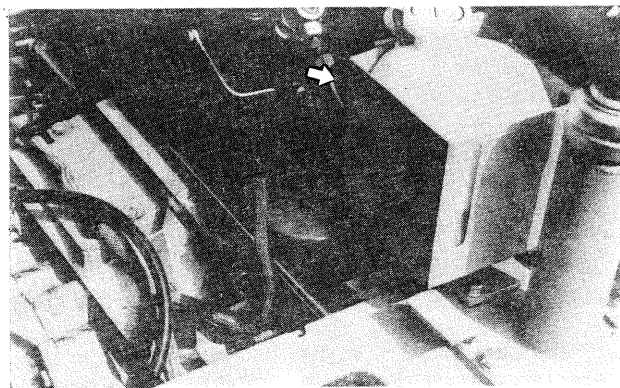
At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

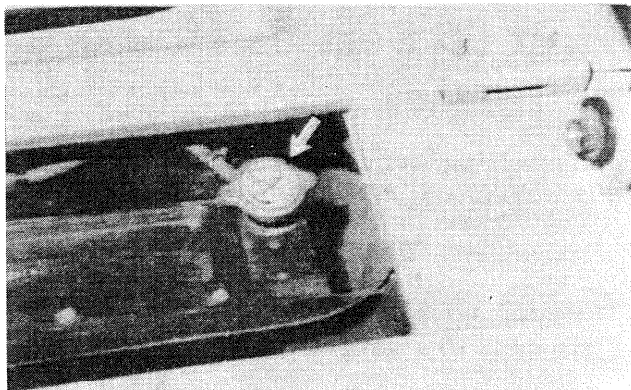
Check the coolant level only after the engine has been stopped and the fill cap is cool enough to touch with your bare hand.

Remove the fill cap slowly to relieve pressure.

Cooling system conditioner contains alkali. Avoid contact with the skin and eyes to prevent personal injury.



1. Observe the coolant level with engine cold. Maintain coolant level to the proper line on expansion bottle. If the expansion bottle has no coolant, it will be necessary to check coolant at the radiator filler neck.
2. Remove the radiator cap. Fill radiator to the top of the filler neck. Inspect radiator cap. Replace if damaged. Install the radiator cap.



3. Start and run the engine to stabilize the coolant level in the filler neck. If low add coolant until it reaches the top of the filler neck. Install the radiator cap. Observe coolant level in the expansion bottle. If necessary, add coolant to bring the coolant to the appropriate line on the expansion bottle.

4. Stop the engine.

5. Inspect the cooling system for leaks, hose cracks or loose connections.

WARNING

Pressure air can cause personal injury.

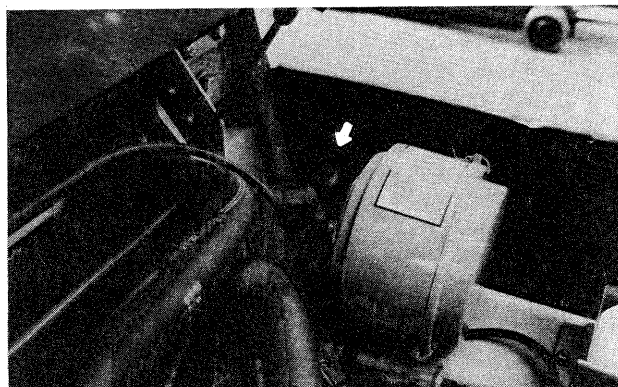
When using pressure air for cleaning, wear a protective face shield, protective clothing and protective shoes.

Maximum air pressure must be less than 205 kPa (30 psi) for cleaning purposes.

6. Blow any dust and lint from the radiator fins.

Air Cleaner

Check Service Indicator



1. Observe the air cleaner service indicator.

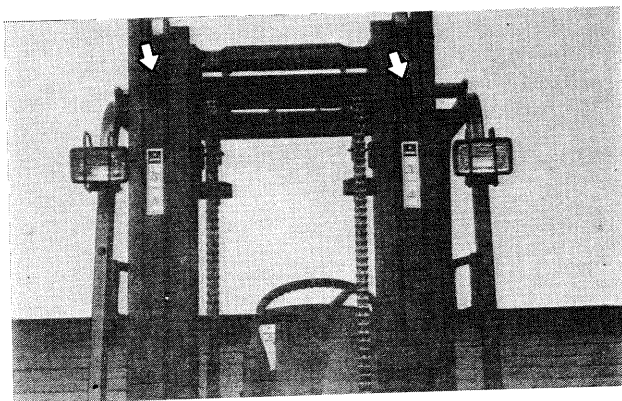
2. Service the air cleaner when the RED band in the service indicator, locks in the visible position. See topic, "Air Cleaner" in "When Required."

NOTE: Service the element more frequently, as required, in severe dust or lint conditions. Also, service it more frequently where the operator is required to wear a respirator.

3. Close hood and seat assembly.

Mast Channels

Lubricate



The channels on the roller-type mast require a break-in period. Apply a light film of lubricant on the channels where the rollers ride. This will prevent metal peel until the rollers set a pattern.

First 50 Service Hours or 1 Week

You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

Engine Crankcase (Diesel) Change Oil and Filter.

This step is the same as "Engine Crankcase(Diesel)" in "Every 250 Service Hours or Monthly". See "Change Oil and Filter" of "Engine Crankcase(Diesel)" in "Every 250 Service Hours or Monthly", in this manual.

NOTICE

Servicing of the engine oil and oil filter element has large affects on the engine performance as well as the engine life.
Engine oil and filter element must be changed after the first 50 hours.

You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

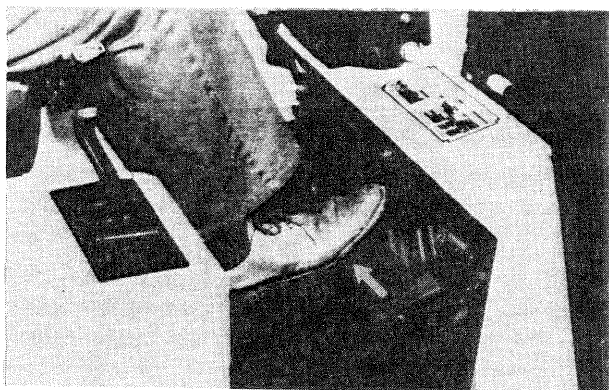
Parking Brake

Test/Adjust

NOTE: Be sure area around the lift truck is clear of personnel and obstructions.

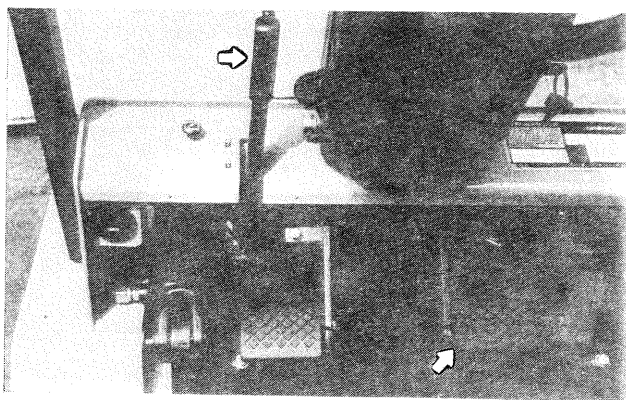
Test Operation

1. Drive the lift truck, fully loaded, forward up a 15% incline.



Typical Example

2. Halfway up the incline, stop the lift truck with the service brake.

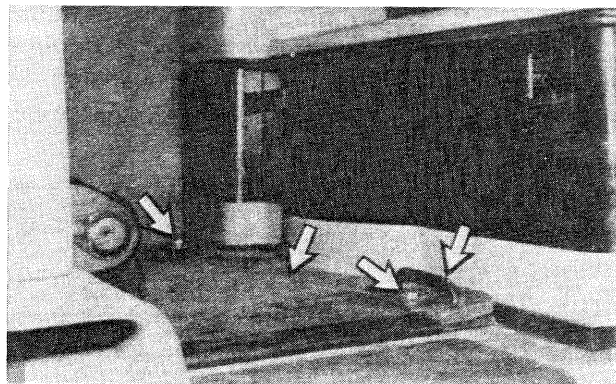


3. Engage the parking brake. Slowly release the service brake.

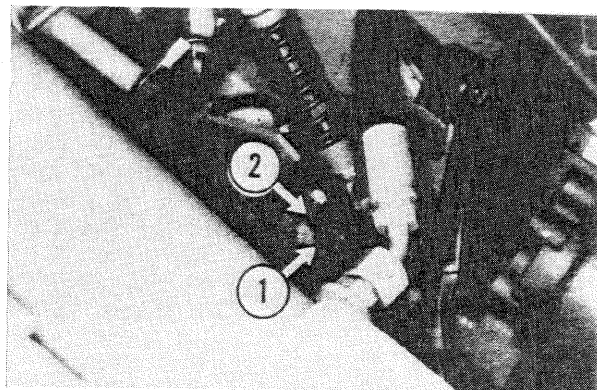
4. The parking brake should hold the lift truck. If the lift truck starts to move, immediately apply the service brakes. Have the parking brake adjusted.

To Adjust

Park the lift truck on the level, with forks lowered, transmission in NEUTRAL and the engine stopped.

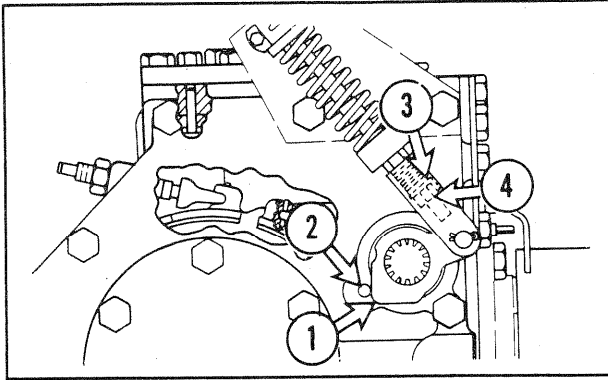


1. Remove the bolts, floor mat and floor plate.
2. Release the parking brake lever.

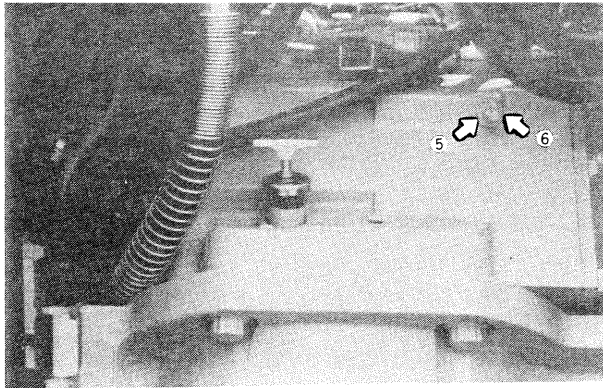


Typical Example

3. Make sure brake lever (1) is against stop pin (2). If lever is against pin, go to step 5. If lever is not against pin, go to step 4.



4. Bend lock (3) away from nut (4). Loosen nut (4) until lever (1) is against stop pin (2). Then tighten nut (4) finger tight and bend lock (3) to hold nut.



Typical Example

5. Loosen lock nut (5). Tighten screw (6) to 6 to 7 N•m (50 to 60 lb in). Loosen screw (6) 1 to 1.5 turns and tighten the locknut.

6. Install the floor plate, floor mat and bolts.

First 250 Service Hours

You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

Valve Lash Adjustment (Diesel, Gasoline, LP-Gas Fuel Engines)

Adjust

NOTE: Initial valve lash adjustment, on a new or rebuilt engine only, is recommended at the first scheduled oil change interval, due to initial wear and seating of valve train components.

WARNING

To prevent possible injury when adjusting diesel engines, do not use the starter motor to turn the flywheel.

Hot engine components can cause burns. Allow additional time for the engine to cool before measuring valve clearance.

NOTICE

Measure the valve lash with the engine stopped. TO obtain an accurate measurement, allow at least 20 minutes for the valves to cool the engine cylinder head and block temperature.

Set the clearance to the nominal appropriate clearance given in the "Valve Clearance Setting" chart shown below.

Valve Clearances		
Engine	Valve	Clearance
2.0 liter(XN1P) (Gas & LP-Gas)	Exhaust Valves	.25 mm (.010 in)
	Intake Valves	.10 mm (.004 in)
2.4 liter(DC24) Diesel	Exhaust Valves	.45 mm (.018 in)
	Intake Valves	.45 mm (.018 in)
Hercules 2.7 liter (Gas, LP Gas & Dual Fuel)	Exhaust Valves	.64 mm (.025 in)
	Intake Valves	.38 mm (.015 in)
3.3 liter (DB33) Diesel	Exhaust Valves	.40 mm (.016 in)
	Intake Valves	.40 mm (.016 in)

Refer to the "Service Manual" for the complete valve adjustment procedure.

Every 250 Service Hours or Monthly

You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

Hydraulic and Power Steering System

Measure Oil Level

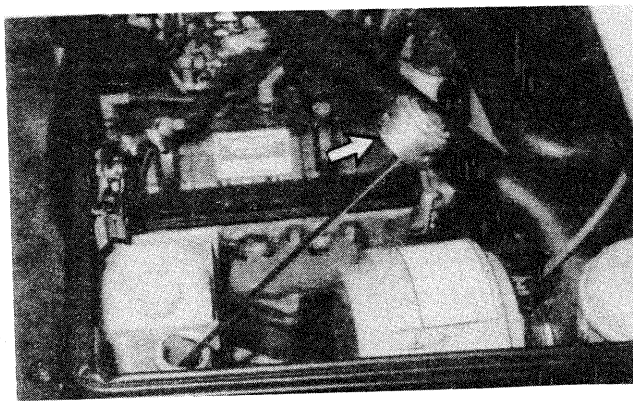
WARNING

At operating temperature, the hydraulic tank is hot and under pressure.

Hot oil can cause burns.

Remove the fill cap only when the engine is stopped, and the cap is cool enough to touch with your bare hand. Remove the fill cap slowly to relieve pressure.

1. Operate the lift truck for a few minutes to warm the oil. Park the lift truck on a level surface, with the forks lowered, mast tilted back, parking brake engaged, transmission in NEUTRAL and the engine stopped.
2. Pull the latch and raise the hood and seat assembly. Make sure the air lift cylinder securely holds the hood open.



3. Remove the breather/dip stick. Maintain the oil level to the FULL mark on the breather/dip stick.

Power Shift Transaxle

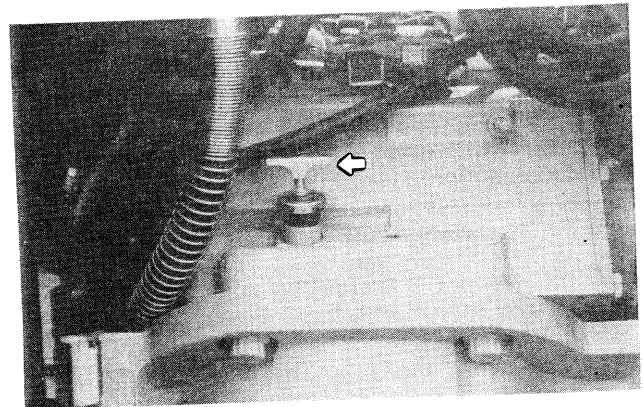
Measure Oil Level

WARNING

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

NOTE: The brake fluid shares fluid with the power shift transaxle. The master cylinder fluid is replenished each time the inching pedal is depressed.

1. Start and operate the lift truck until the engine reaches normal operating temperature.
2. Park the lift truck level with the forks lowered, parking brake applied and the transmission controls in NEUTRAL.
3. With the service brake applied and the engine at low idle, shift the directional control lever to forward and then to reverse, to fill the clutches.
4. Shift the direction control lever to the NEUTRAL position.

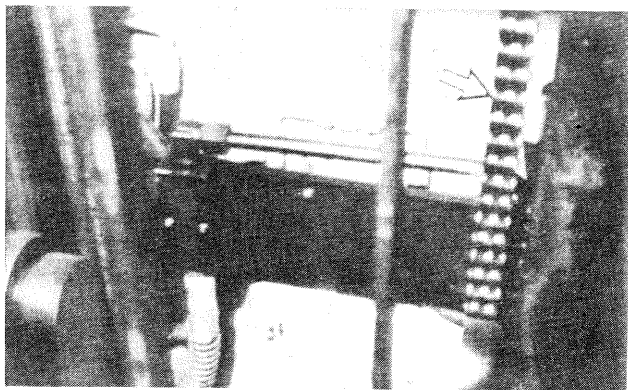


5. Remove the dip stick/filler cap. Observe the oil level.
6. Maintain the oil level between the ADD and FULL marks on the dip stick/filler cap.

Mast, Carriage, Lift Chains and Attachments

Inspect/Lubricate

1. Operate the lift, tilt and attachment controls. Listen for unusual noises. These may indicate a need for repair.
2. Check for loose bolts and nuts on the carriage. Remove any debris from the carriage and mast.
3. Check the forks and attachments for free operation and damage. Have repairs made if necessary.



4. Brush a film of oil on all links of the chain.
5. Raise and lower the carriage a few times to work lubricant into the chain links.

NOTICE

Lubricate chains more frequently than normal in applications where the lift truck is operating in an atmosphere which could cause corrosion of components or when lift truck must work in rapid lift cycles.

6. Check the chain anchors and individual links for wear, loose pins or cracked leaves.

Steering Mechanism

Check/Lubricate



1. Lubricate the steer axle king pins, total of four fittings. Two on the right side and two on the left side.
2. Lubricate the steering link bearings, total of four fittings. Two on the right side and two on the left side.
3. Check for any worn or loose components of the steering mechanism. Remove any debris or trash as required.

Battery

Clean

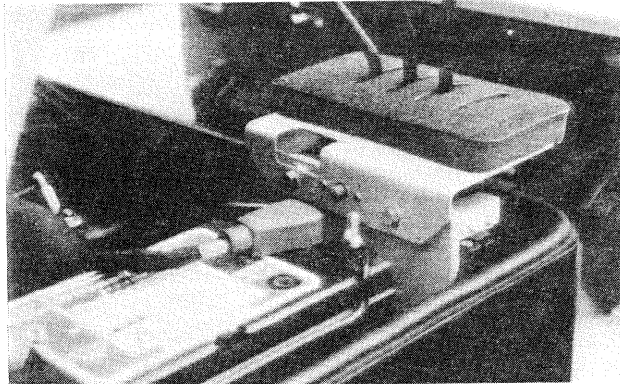
WARNING

Batteries give off flammable fumes that can explode.

Do not smoke when observing the battery electrolyte levels.

Electrolyte is an acid and can cause personal injury if it contacts skin or eyes.

Always wear protective glasses when working with batteries.



1. Clean the top of the battery and terminals
2. Check terminals for corrosion. Coat terminals with heavy grease.

Engine Crankcase (Diesel)

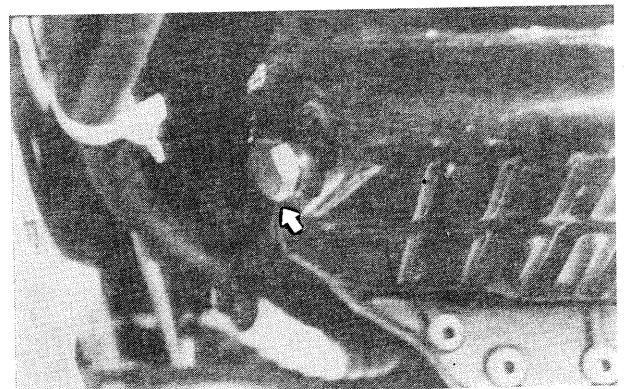
Change Oil and Filter

The percentage of sulfur in the fuel will affect the engine oil recommendations. If the fuel has over 0.5% sulfur content, the CD engine oil must have a TBN of 20 times the percentage of fuel sulfur (TBN as measured by the ASTM D-2896 method). Your oil supplier should be able to furnish the correct oils.

1. Operate lift truck a few minutes to warm oil. Park the lift truck with the forks lowered, parking brake applied, transmission in neutral and the engine stopped.
2. Raise rear of lift truck off ground and block securely.

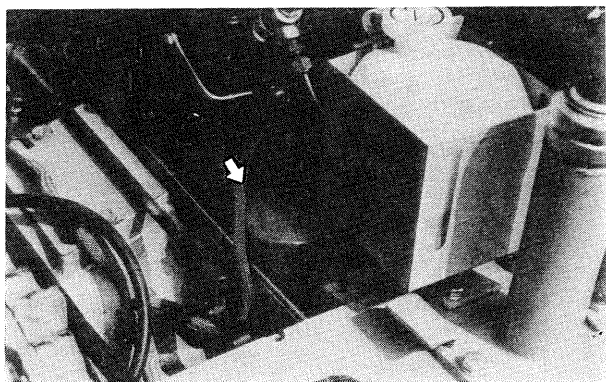
WARNING

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.



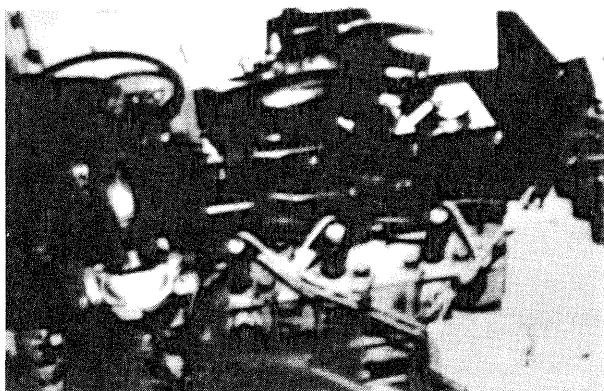
Typical Example

3. Remove the crankcase drain plug and allow oil to drain. Clean and install drain plug.



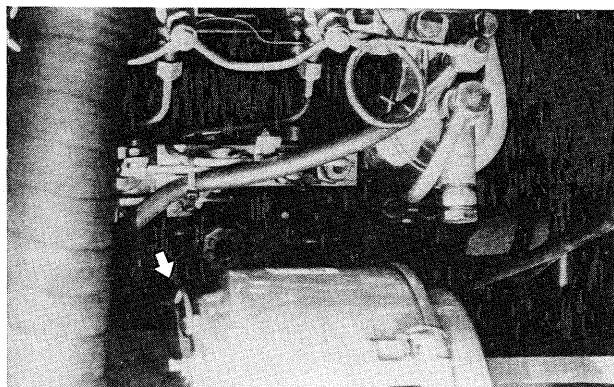
Typical Example

4. Remove and discard oil filter element.
5. Wipe sealing surface of oil filter element mounting base. Make sure all of the old gasket is removed.
6. Before installing a new filter element, apply a small amount of clean engine oil to the filter element gasket.
7. Install the new filter element. When the gasket contacts the base, tighten it 3/4 of a turn more. Do not overtighten.
8. Raise the lift truck, remove the blocking and lower the lift truck.
9. Raise the hood and seat assembly.



Typical Example

10. Fill the crankcase. See "Refill Capacities."
11. Start the engine and allow the oil to fill the filter and passages.
12. Check for oil leaks.



13. Stop the engine and measure the oil level. Maintain the oil level between the MAX. and MIN. marks on dip stick.
14. Close hood and seat assembly.

NOTICE

Servicing of the engine oil and oil filter element has large affects on the engine performance as well as the engine life. Engine oil and filter element must be changed after the first 50 hours.

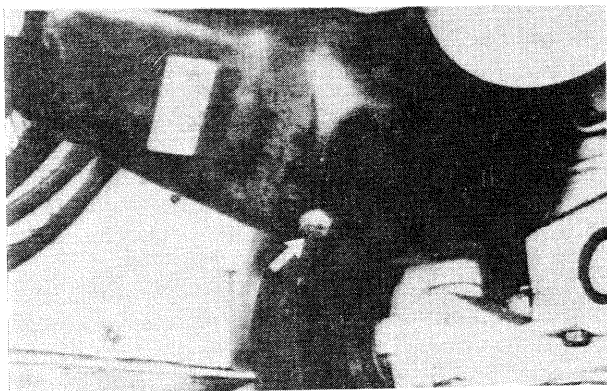
Engine Crankcase (Gasoline, LP-Gas and Dual Fuel)

Change Oil and Filter

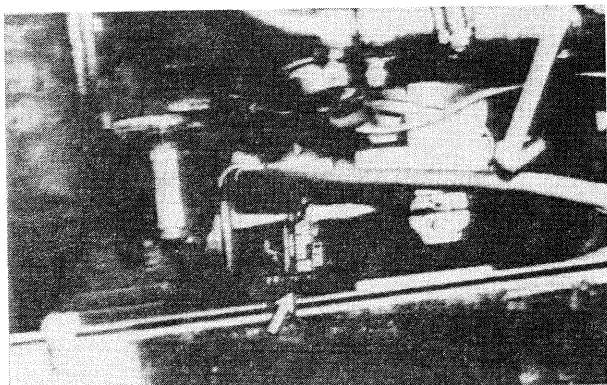
1. Operate lift truck a few minutes to warm oil. Park the lift truck with the forks lowered, parking brake applied, transmission in neutral and the engine stopped.
2. Raise rear of lift truck off ground and block securely.

WARNING

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.



3. Remove the crankcase drain plug and allow oil to drain. Clean and install drain plug.
4. Raise the hood and seat assembly.



5. Remove and discard oil filter element.

6. Wipe sealing surface of oil filter element mounting base. Make sure all of the old gasket is removed.

7. Before installing a new filter element, apply a small amount of clean engine oil to the filter element gasket.

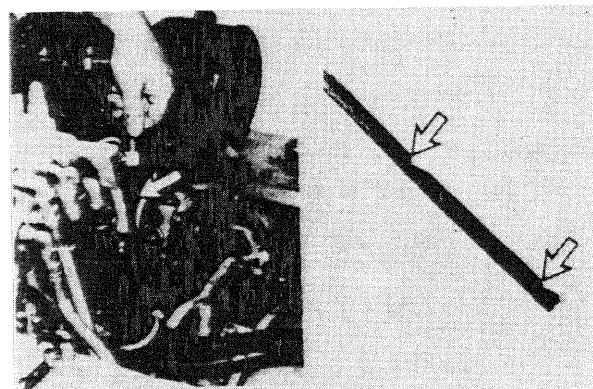
8. Install the new filter element. When the gasket contacts the base, tighten it 3/4 of a turn more. Do not overtighten.

9. Raise the lift truck, remove the blocking and lower the lift truck.

10. Fill the crankcase. See "Refill Capacities."

11. Start the engine and allow the oil to fill the filter and passages.

12. Check for oil leaks.

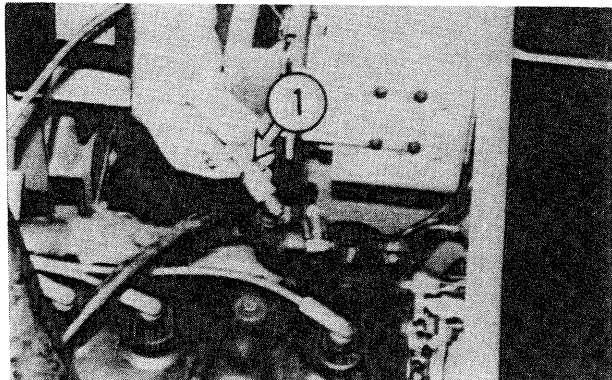


13. Stop the engine and measure the oil level. Maintain the oil level to the FULL mark on the dip stick.

14. Close hood and seat assembly.

PCV Valve and Crankcase Ventilator

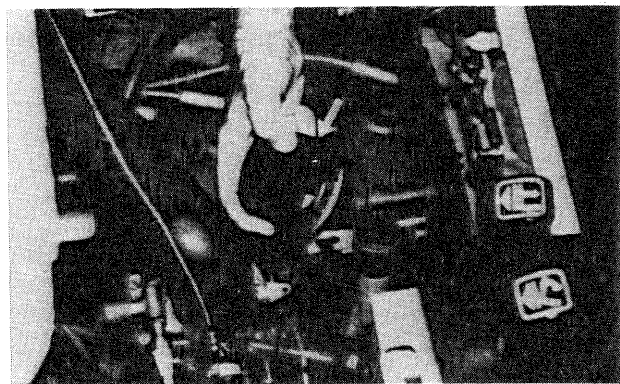
Gasoline, LP-Gas and Dual Fuel Engines



1. Loosen the hose clamps and remove the PCV valve.

2. Shake the PCV valve. If it rattles, reinstall it. If it does not rattle, replace it.

3. Tighten the hose clamps.



4. Remove the crankcase ventilator filter element.

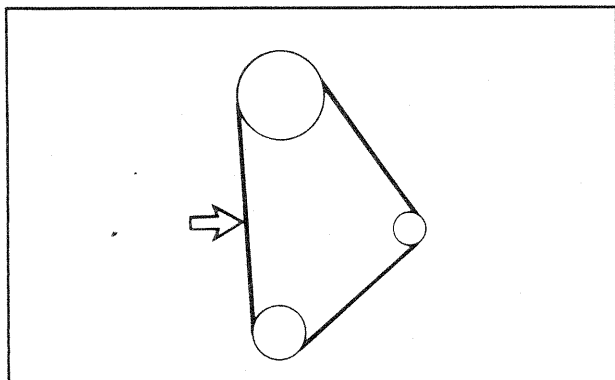
5. Install a new filter element if the used one is dirty.

Every 500 Service Hours or 3 Months

You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

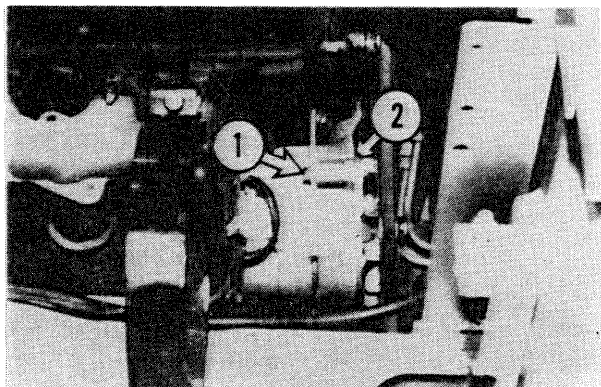
Belts

Check/Adjust



Typical Example

1. Check the condition and adjustment of the belt. Correct adjustment allows 10 mm (3/8 inch) deflection under 110 N (25 lb) of force.



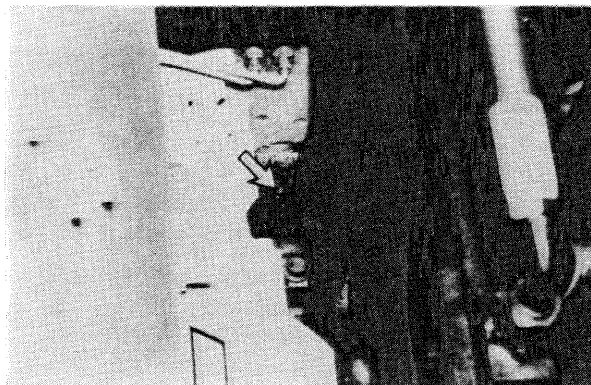
NOTICE

Failure to loosen the alternator mounting bolt (2) will cause excessive stress and break the alternator mounting ear.

2. To adjust the alternator drive belt, loosen adjusting bracket bolt (1) and mounting bolt (2). Move the alternator in or out as required. Tighten bolts (1) and (2).

Mast Hinge Pins

Lubricate



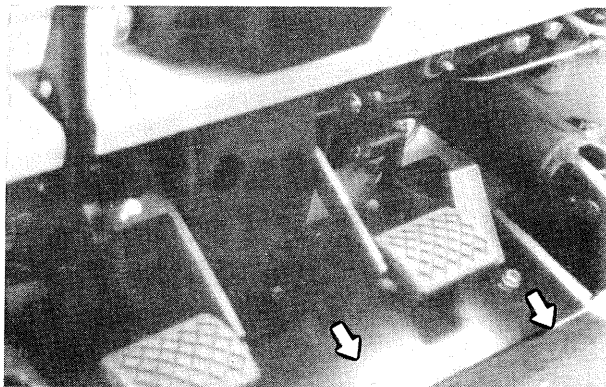
Typical Example

1. Lower the forks and tilt the mast forward.
2. Lubricate the two fittings for the mast hinge pins, one on each side of the mast.

Tilt Cylinders

Chassis Pivot Eyebolts/Lubricate

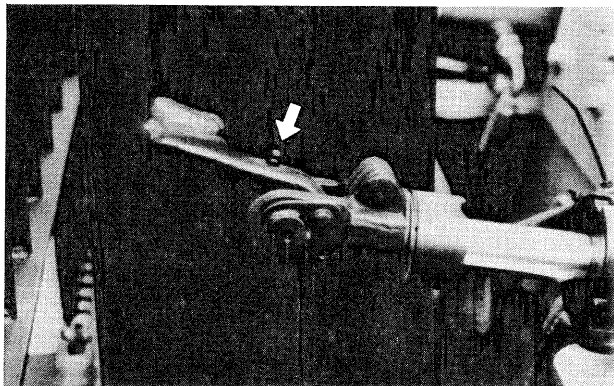
1. Remove floor plates.



Typical Example

2. Lubricate two fittings for the pivot eyebolts, one on each tilt cylinder.
3. Check the pivot eye pins for loose retainer bolts and wear.

Mast Pivot Eyes – Lubricate

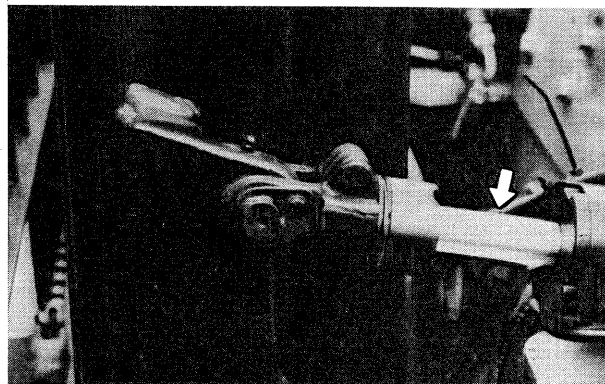


Typical Example

1. Lubricate two fittings for the mast pivot eyes, one on each side of the mast.
2. Check the pivot eye pins for loose retainer bolts and wear.

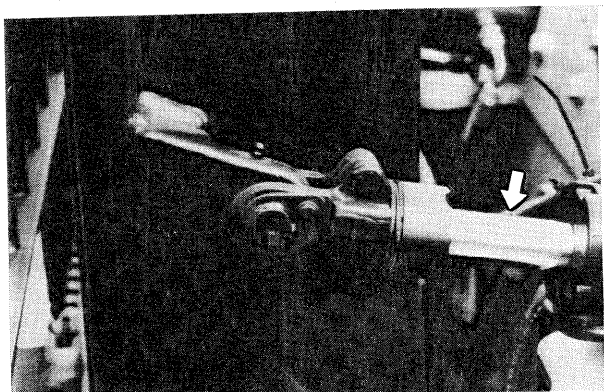
Cylinder Rod Extension – Adjust

NOTE: The following description is for forward tilt. For cylinder rod back tilt, the collar should be stationary by the tilt eye. If it is not, the O-ring inside the collar may need to be replaced. To adjust back tilt, spacers must be added or removed.



Typical Example

1. Check to make sure the tilt cylinders extend and retract evenly.
2. If one cylinder continues to move after the other cylinder has stopped in full forward or backward tilt, an adjustment must be made to one cylinder.



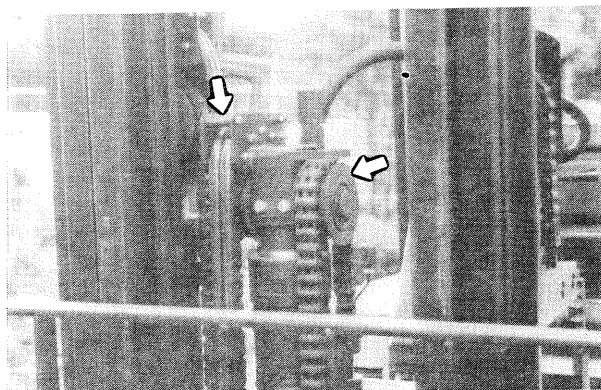
Typical Example

3. To adjust the cylinder rod extension, move the spacer to the rear and loosen the pinch bolt on the clevis.
4. Turn the cylinder rod in or out of the clevis to obtain the proper adjustment. Turning the rod into the clevis shortens the stroke. Turning the rod out of the clevis lengthens the stroke.
5. Tighten the pinch bolts to a torque of $95 \pm 15 \text{ N}\cdot\text{m}$ ($70 \pm 10 \text{ lb ft}$). Check the cylinder rods again for even travel.

Crosshead Rollers

Check Operation

1. Operate the mast through a lift cycle. Watch the chains move over the crosshead rollers. Make sure the chain is tracking over the rollers properly.



Typical Example

2. Check for damaged crosshead rollers, guards and retainer rings.

Power Shift Transaxle

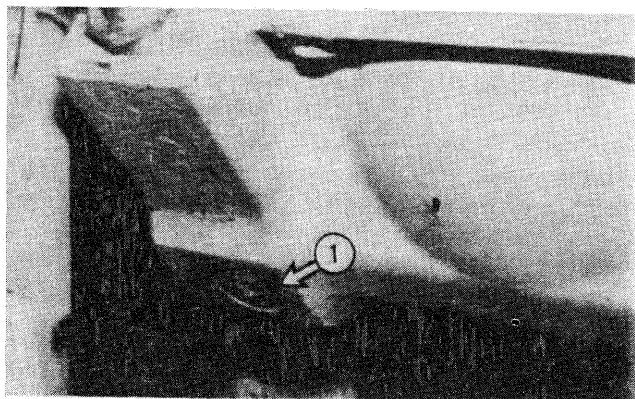
Change Oil and Filters/Clean Strainer

WARNING

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

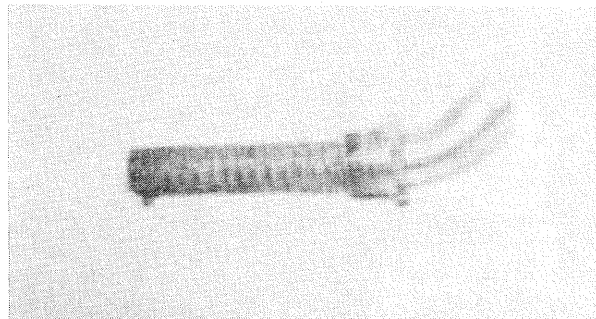
NOTE: The brake fluid shares fluid with the powershift transaxle. The master cylinder fluid is replenished each time the inching pedal is depressed.

Park the lift truck level, with the forks lowered, parking brake engaged, transmission in NEUTRAL and the engine stopped.

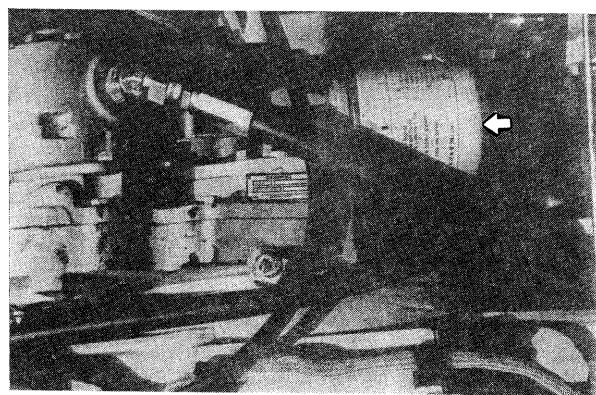


Component is shown removed from the lift truck for illustrative purposes.

1. Remove magnetic drain plug (1). Allow the oil to drain. Clean the magnetic drain plug. Check O-ring seal and replace if necessary. Remove hose (2) and the strainer.



2. Wash the strainer assembly in clean, nonflammable solvent and dry it. Install the strainer assembly and reconnect the hose.

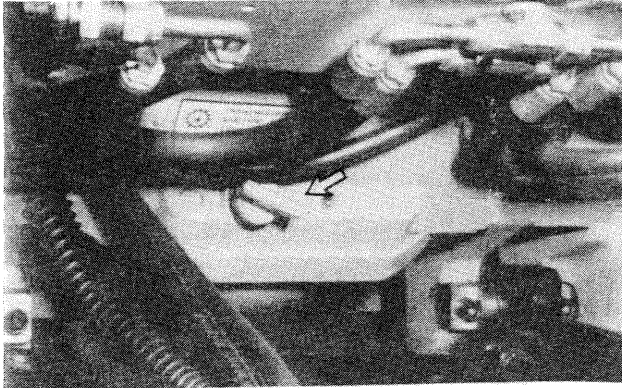


3. Remove the floor plate. Remove and discard the oil filter.

4. Wipe off the filter base. Make certain that all of the old gasket is removed.

5. Apply a small amount of clean oil on the gasket of the new filter.

6. Install the filter by hand. When the filter contacts the base, tighten an additional 3/4 turn.



7. Remove the dip stick/filler cap. Fill the compartment with oil. See "Refill Capacities". Install the dip stick/filler cap.
8. Start the engine.
9. With the service brake applied and engine at low idle, shift the transmission to forward and reverse to fill the clutches.
10. Shift the transmission into NEUTRAL. Engage the parking brake.
11. Remove the dip stick/filler cap. Observe the oil level.
12. Maintain the oil level to the lower mark (min. cold) when the oil temperature is about 40°C (104°F) or to the upper mark when the oil temperature is about 80°C (175°F), on the dip stick/filler cap.
13. Check for oil leaks at the filters and drain plug.
14. Stop the engine. Install the floor plate.

Parking Brake

Test/Adjust

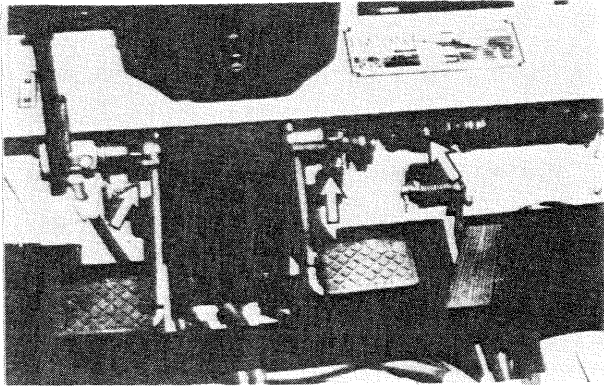
NOTE: Be sure area around the lift truck is clear of personnel and obstructions.

Test Operation

1. Drive the lift truck, fully loaded, forward up a 15% incline.
2. Halfway up the incline, stop the lift truck with the service brake.
3. Apply the parking brake on the left side of the steering column, and slowly release the service brake.
4. The parking brake should hold the lift truck. If the lift truck starts to move, immediately apply the service brakes.
5. Have the parking brake adjusted. Refer to the previous topic, "Parking Brake Adjustment", under "First 100 Service Hours".

Inching Brake Pedal Control Shaft

Lubricate

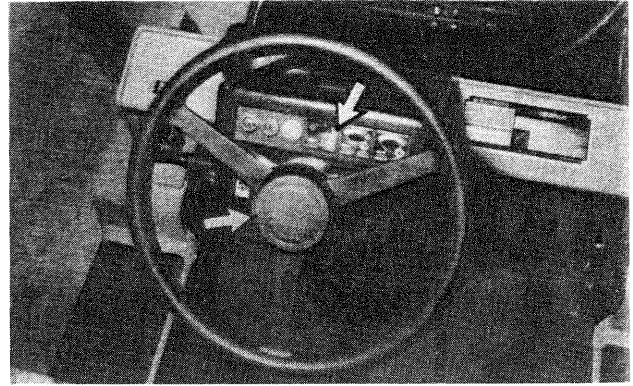


Typical Example

1. Lubricate three fittings for the inching and brake pedal control shaft.

Horn and Lights (If Equipped)

Check



1. Press horn button, to determine if horn is operational.
2. Check and replace all defective gauges.
3. Check all lights such as warning, directional, back-up, driving and flood lights for correct operation. Replace all burned out bulbs. Have repairs made if needed.

Overhead Guard

Check



1. Check tightness of overhead guard mounting bolts at 80 N•m (60 lb ft).
2. Check overhead guard for bent or cracked sections. Have repairs made if needed.

Every 1000 Service Hours or 6 Months

You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

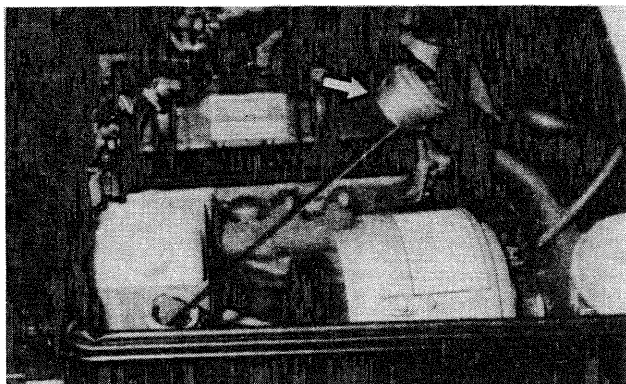
Hydraulic and Power Steering System

Clean Breather and Strainer

WARNING

Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

Park the lift truck level with the forks lowered, mast tilted back (all cylinders retracted), parking brake engaged, transmission in NEUTRAL and the engine stopped.



1. Remove the breather/dip stick.



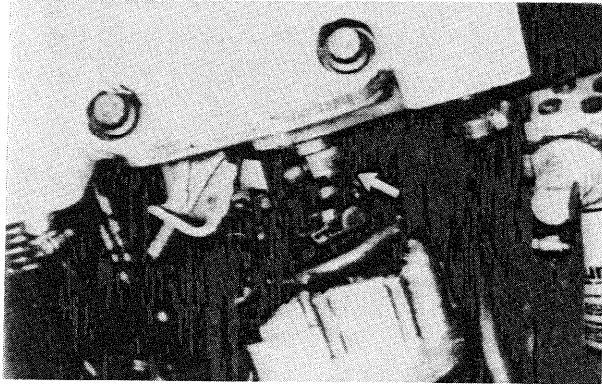
2. Remove the strainer. Wash the breather and strainer in clean, nonflammable solvent and dry them.

3. Install the strainer.

4. Measure the oil level with all cylinders retracted. Maintain the oil level to the FULL mark on the breather/dip stick.

Universal Joint

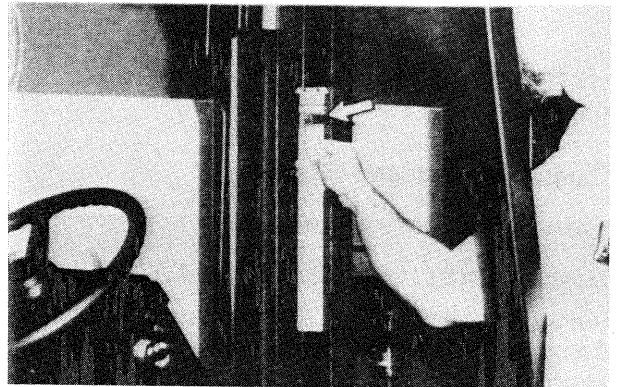
Check



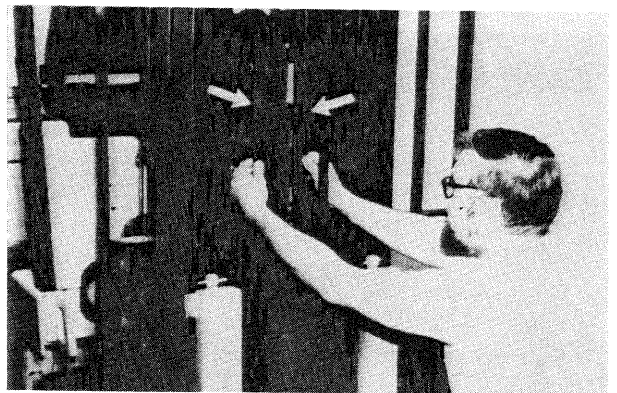
Check for worn or damaged bearings. Check for loose retaining bolts and nuts. Tighten the bolts and nuts, if necessary.

Lift Chains

Check/Adjust



1. Check the lift chains for wear. Complete instructions on the use of the tool are furnished.

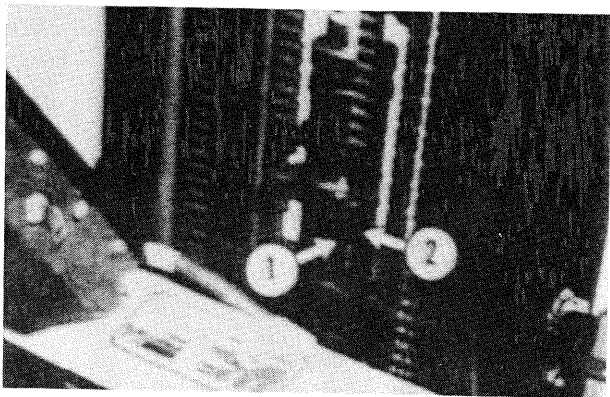


2. Lift the forks high enough to put their full weight on the carriage and chains.

3. Check the lift chains for equal tension. The tension on the chains must be equal.

4. If the chains are loose or the tension is not equal, have the chains adjusted.

To Adjust



1. Loosen locknut (1) and turn nut (2), on the loose chain to equalize tension on the lift chains.
2. Tighten locknut (1).

Every 2000 Service Hours or 1 Year.

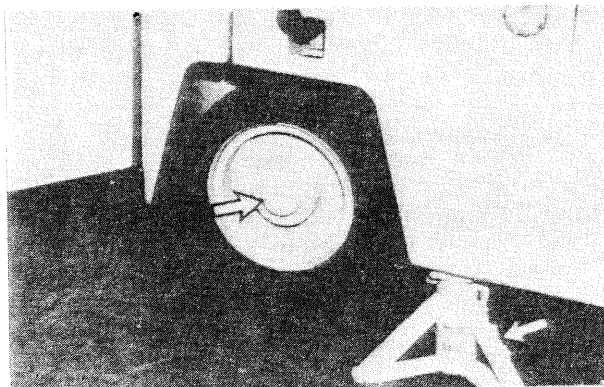
You must read and understand the warnings and instructions contained in the Safety section of this manual, before performing any operation or maintenance procedures.

Steer Wheel Bearings (GC and D,G Series)

Repack

Park the lift truck level with the forks lowered, parking brake engaged, transmission in NEUTRAL and the engine stopped.

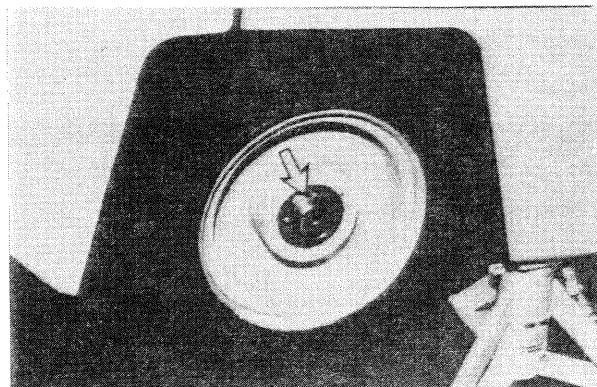
NOTE : The procedure is shown on a GC-Series lift truck. It is the same for D,G-Series lift trucks.



Typical Example

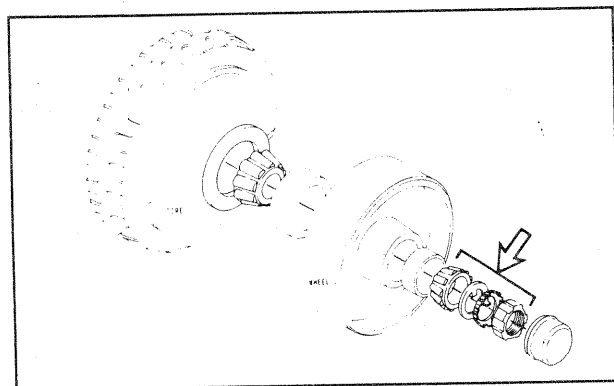
1. Lift the steer wheels off the ground. Place stands or blocking under the frame and steer axle to support the lift truck.

2. Remove the hub cap which is pressed into the wheel hub.

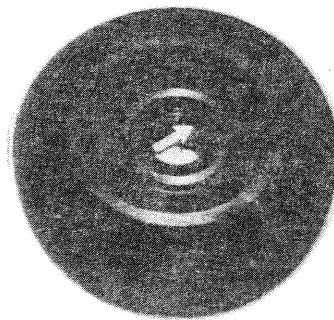


Typical Example

3. Straighten the lockwasher tangs.



4. Remove the locknut, lockwasher and flat washer. Remove the outer wheel bearing.

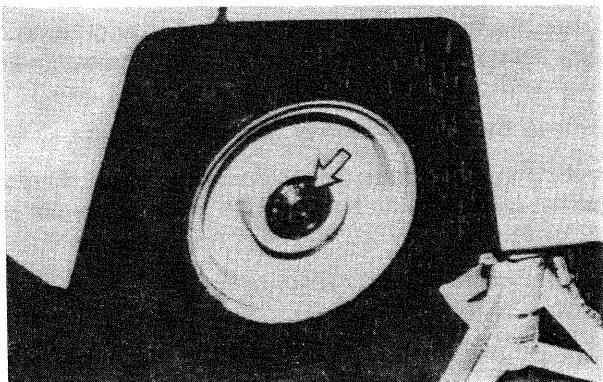


5. Remove the wheel assembly. Examine the seal for damage and wear. Replace the seal if necessary.

6. Remove the inner bearing. Clean and lubricate the steering knuckle. Repack both the inner and outer bearing cones.

7. Install the inner bearing. Lubricate the seal and install the wheel assembly on the knuckle.

8. Install the outer wheel bearing and the outer washer. Install the lockwasher and locknut.



Typical Example

9. Tighten the locknut to $135 \text{ N}\cdot\text{m}$ (100 lb ft), while turning wheel hub to seat the bearing.

10. Loosen the locknut. Retorque it to $50 \pm 5 \text{ N}\cdot\text{m}$ ($37 \pm 4 \text{ lb ft}$). Bend the lockwasher tang to secure locknut.

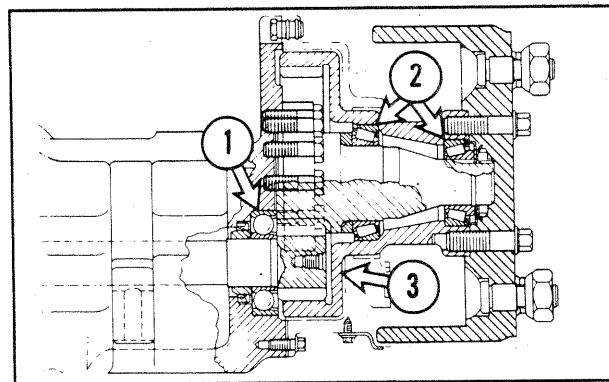
11. Install the hub cap.

12. Raise the lift truck and remove the blocking. Lower the lift truck to the ground.

Wheel Bearing (Power Shaft and Drive Wheel)

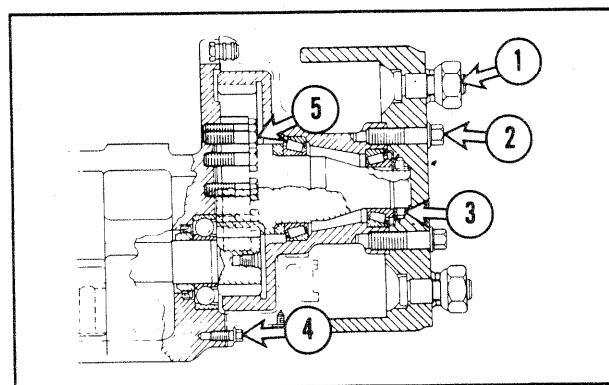
Repack

Consult your DAEWOO lift truck dealer for the proper wheel bearing repacking procedure. Packing of bearings and adjustment procedure must be made by a trained mechanic or dealer personnel.



Pack power shaft bearings (1) and spindle bearings (2). Pack ring gear (3) to the depth of the teeth.

D,G-Series Lift Trucks



Torque for single or dual wheel mounting nuts (1) is $644 \pm 34 \text{ N}\cdot\text{m}$ ($470 \pm 25 \text{ lb ft}$).

Torque for brake drum or adapter assembly bolts (2) is $285 \pm 13 \text{ N}\cdot\text{m}$ ($210 \pm 10 \text{ lb ft}$).

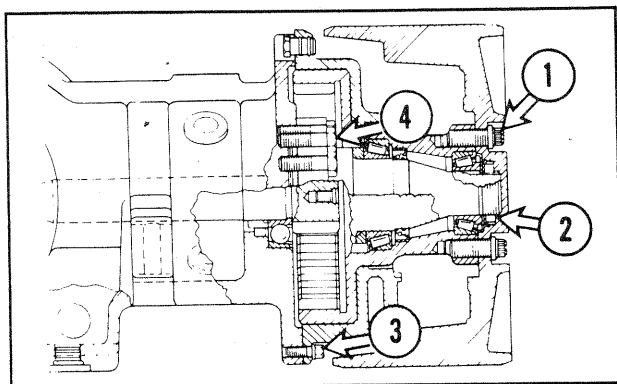
Tighten wheel bearing nut (3) to $135 \text{ N}\cdot\text{m}$ (100 lb ft) while the wheel is turned in both directions.

Loosen the nut completely and tighten nut again to $50 \pm 5 \text{ N}\cdot\text{m}$ ($37 \pm 4 \text{ lb ft}$). Bend the lockwasher tab into a groove of the nut.

Torque for bolts (4) that hold cover to transaxle housing is $55 \pm 10 \text{ N}\cdot\text{m}$ ($40 \pm 7 \text{ lb ft}$).

Apply Loctite No.242 to threads of spindle bolts (5). Torque for spindle bolts is $115 \pm 14 \text{ N}\cdot\text{m}$ ($85 \pm 10 \text{ lb ft}$).

GC-Series Lift Trucks



Torque for wheel bolts (1) is $270 \pm 25 \text{ N}\cdot\text{m}$ ($200 \pm 20 \text{ lb ft}$).

Tighten wheel bearing nut (2) to $135 \text{ N}\cdot\text{m}$ (100 lb ft) while the wheel is turned in both directions. Loosen the nut completely and tighten nut again to $50 \pm 5 \text{ N}\cdot\text{m}$ ($37 \pm 4 \text{ lb ft}$). Bend the lockwasher tab into a groove of the nut.

Torque for bolts (3) that hold cover to transaxle housing is $55 \pm 10 \text{ N}\cdot\text{m}$ ($40 \pm 7 \text{ lb ft}$).

Apply Loctite No.242 to threads of spindle bolts (4). Torque for spindle bolts is $115 \pm 14 \text{ N}\cdot\text{m}$ ($85 \pm 10 \text{ lb ft}$).

Cooling System

Clean and Refill

WARNING

At operating temperature, the engine coolant is hot and under pressure.

Steam can cause personal injury.

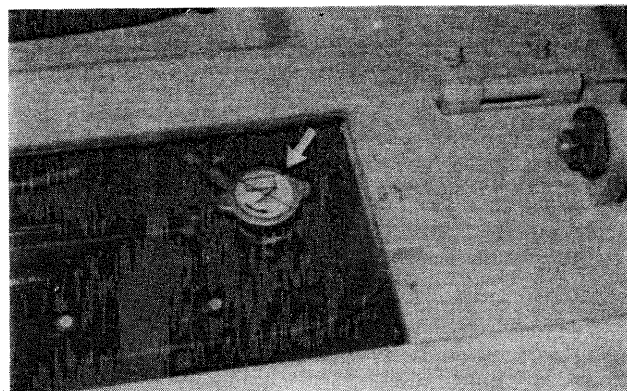
Check the coolant level only after the engine has been stopped and the fill cap is cool enough to touch with your bare hand.

Remove the fill cap slowly to relieve pressure.

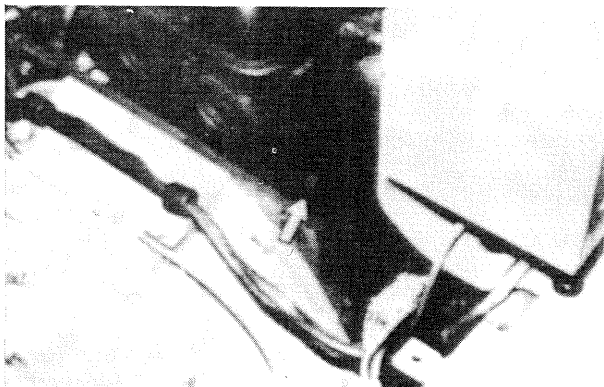
Cooling system conditioner contains alkali. Avoid contact with the skin and eyes to prevent personal injury.

Use all cleaning solutions with care.

The lift truck must be level, the forks lowered, the parking brake engaged, the transmission in NEUTRAL and the engine stopped and cool.

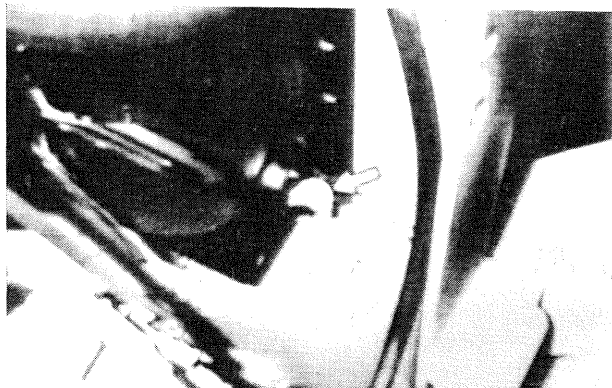


1. Turn the radiator cap slowly to relieve the pressure, then remove the cap.



Typical Example

- 2.** Remove the block drain plug.



Typical Example

- 3.** Open radiator drain valve. Allow the coolant to drain. Drain the recovery bottle.
- 4.** Close radiator drain valve and install block drain plug. Fill the cooling system with 1 kilo (2 lb) sodium bisulphate per 40 liters (10 gallons) of water. Most commercial cooling system cleaners can be used.
- 5.** Start and run the engine for 30 minutes.
- 6.** Stop the engine and drain the cleaning solution.
- 7.** Flush the system with clean water, until draining water is clear.
- 8.** Close the drain valve and install the block drain plug. Fill the system with neutralizing solution, 250 g (1/2 lb) sodium carbonate per 40 liters (10 gallons) of water.

- 9.** Start and run the engine for 10 minutes.
- 10.** Stop the engine and drain the neutralizing solution.
- 11.** Flush the system with clean water until draining water is clear.
- 12.** Close the drain valve and install the block drain plug. Add coolant to the top of the filler neck.
- 13.** Start and run the engine to stabilize the coolant level. See "Every 10 Service hours or Daily", "Radiator, Check Coolant Level", in this manual.

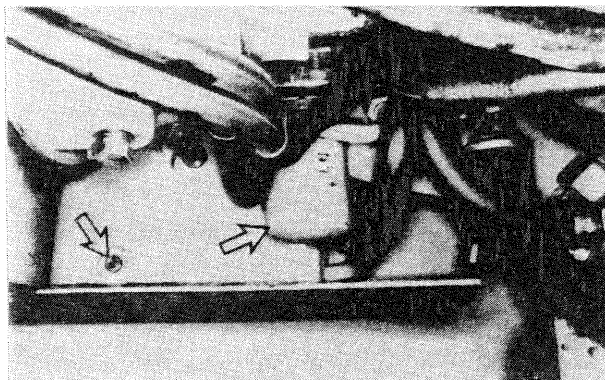
Hydraulic and Power Steering System

Change Oil and Filter/Clean Strainer and Breather

WARNING

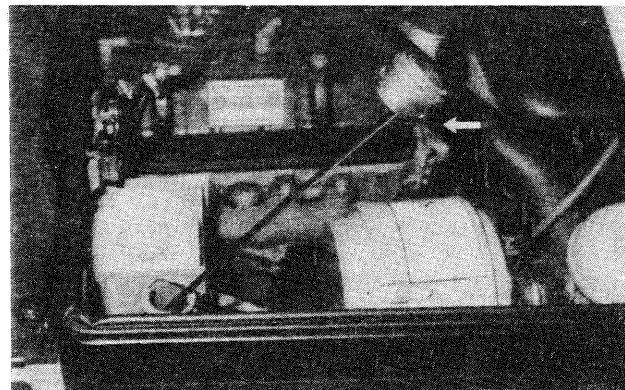
Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

Park the lift truck level with the forks lowered, parking brake engaged, transmission in NEUTRAL and the engine stopped.



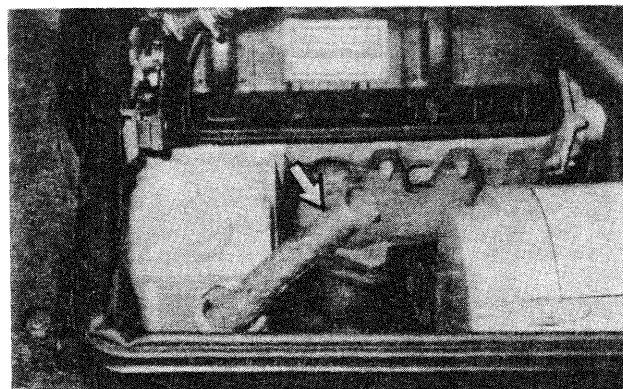
Typical Example

1. Remove the hydraulic tank drain plug. Allow the oil to drain. Clean and install the plug.
2. Remove and discard the filter. Wipe off the filter base. Make sure all of the old gasket is removed.
3. Put a small amount of clean oil on the gasket on the new filter. Install the filter by hand. When the filter contacts the base, tighten it an additional 3/4 turn.
4. Loosen the bolts of the hydraulic tank top plate.
5. Remove the strainer from the tank.
6. Install the new strainer by hand.
7. Install the tank top plate and fasten the bolts.



Typical Example

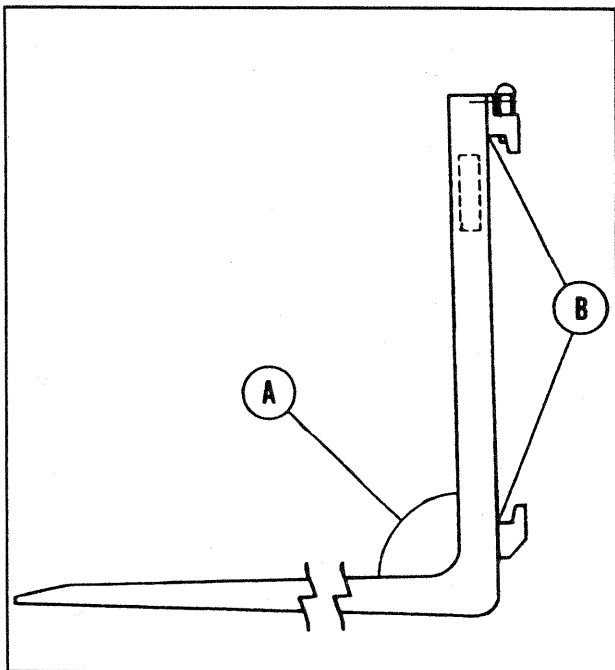
8. Remove the breather/dip stick.



9. Remove the strainer. Wash the breather and strainer in clean, nonflammable solvent and dry them.
10. Install the strainer. Fill the hydraulic tank. See topic "Refill Capacities". Install the breather/dip stick.
11. Start the engine and operate the hydraulic controls, and the steering system, through a few cycles to fill the lines. Look for oil leaks.
12. Stop the engine and check the oil level. With all cylinders retracted, maintain the oil level to the FULL mark on the breather/dip stick.

Forks

Inspect



Forks should be inspected, at a minimum, every 12 months. If the truck is being used in a multi-shift or heavy duty operation, they should be checked every six months.

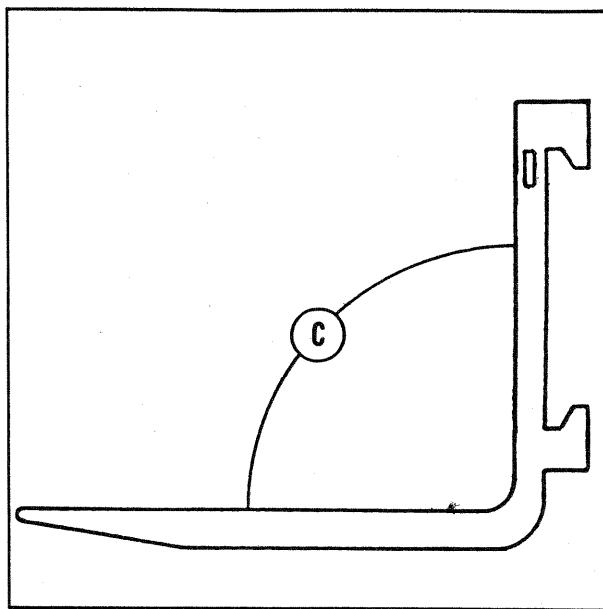
1. Inspect the forks carefully for cracks. Special attention should be given to the heel section (A), all weld areas and mounting brackets (B). Inspect the top and bottom hooks on forks used on hook type carriages and tubes on shaft mounted forks.

Forks with cracks should be removed from service.

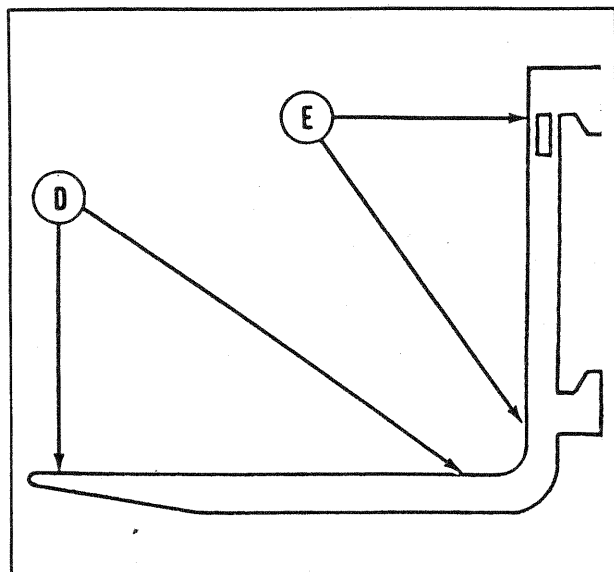
"Wet Test" magnetic particle inspection is generally preferred due to its sensitivity and the ease of interpreting the results. Portable equipment is usually recommended so it can be moved to the lift truck.

Inspectors should be trained and qualified in accordance with **The American Society for Non-Destructive Testing, Level II Qualifications.**

Contact your local DAEWOO Lift Truck Dealer for further information.

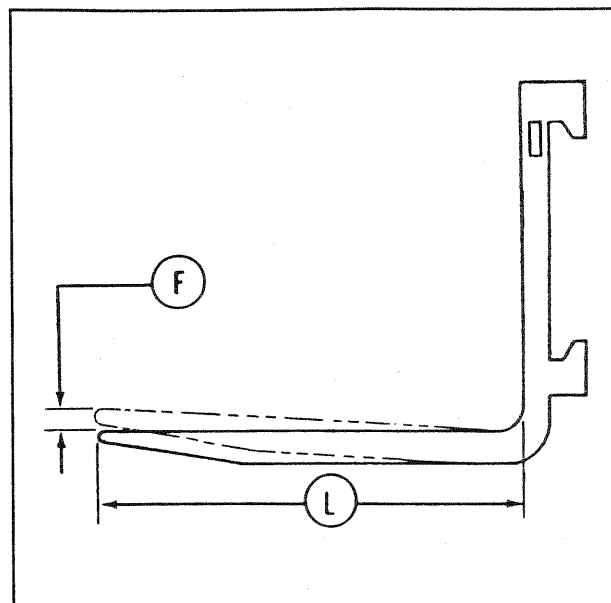


2. Check the angle between the upper face of the blade and the front face of the shank. The fork should be withdrawn from service if angle (C) exceeds 93 degrees or deviates by more than 3 degrees from an original angle other than 90 degrees, as may be found in some special application forks.



- 3.** Check the straightness of the upper face of blade (D) and the front face of shank (E) with a straight edge.

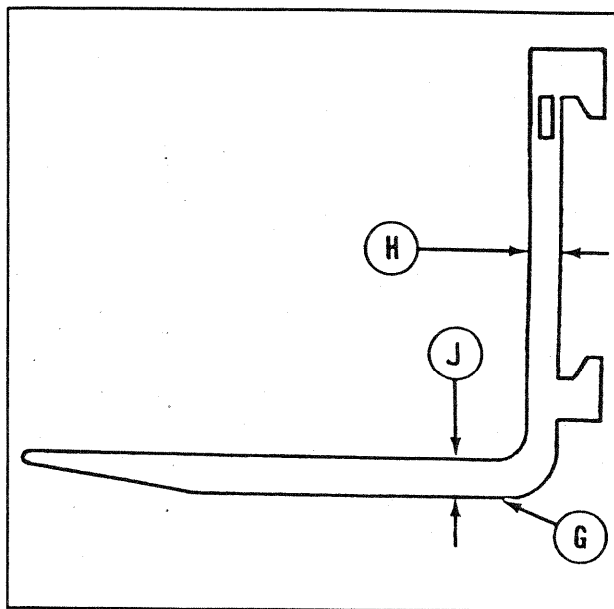
The fork should be withdrawn from service if the deviation from straightness exceeds 0.5 percent of the length of the blade and/or the height of the shank respectively 5 mm/1000 mm (0.18"/36").



- 4.** Check the difference in height of one fork tip to the other when mounted on the fork carrier. A difference in fork tip height can result in uneven support of the load and cause problems with entering loads.

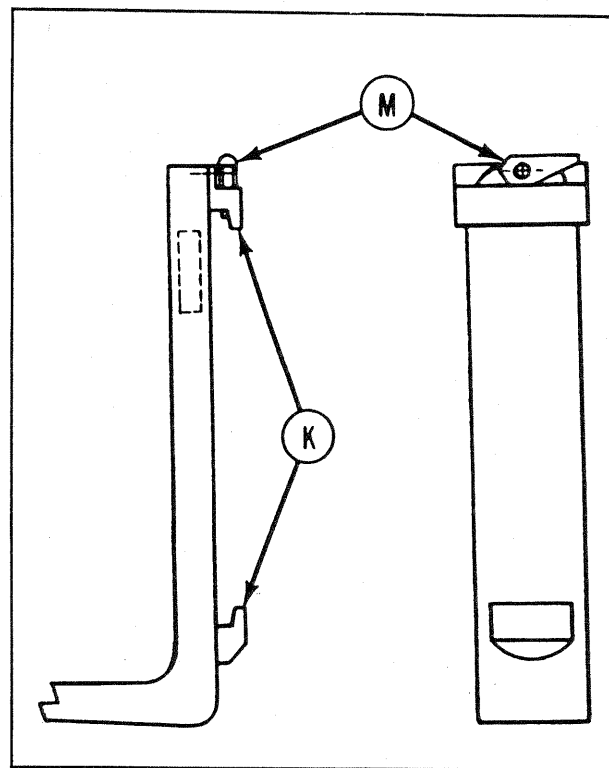
The maximum recommended difference in fork tip elevation (F) is 6.5 mm (0.25") for pallet forks and 3 mm (0.125") for fully tapered forks. The maximum allowable difference in fork tip elevation between the two or more forks is 3 percent of blade length (L).

Replace one or both forks when the difference in fork tip height exceeds the maximum allowable difference.



5. Check the fork blade (J) and shank (H) for wear with special attention to the heel (G). The fork should be withdrawn from service if the thickness is reduced to 90 percent or less of the original thickness.

Fork blade length may also be reduced by wear, especially on tapered forks and platens. Remove the forks from service when the blade length is no longer adequate for the intended loads.



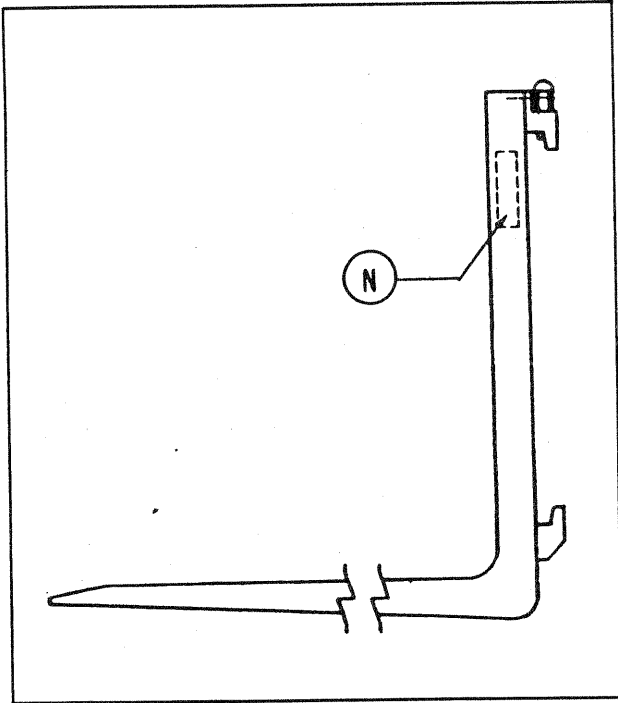
6. Check the fork mountings (K) for wear, crushing and other local deformation, which can cause excessive side to side wobble of the forks. Excessive clearance on hook type forks may allow them to fall from the carrier. Forks which show visible signs of such damage should be removed from service.

7. Check the positioning lock and other fork retention devices to make sure they are in place and working

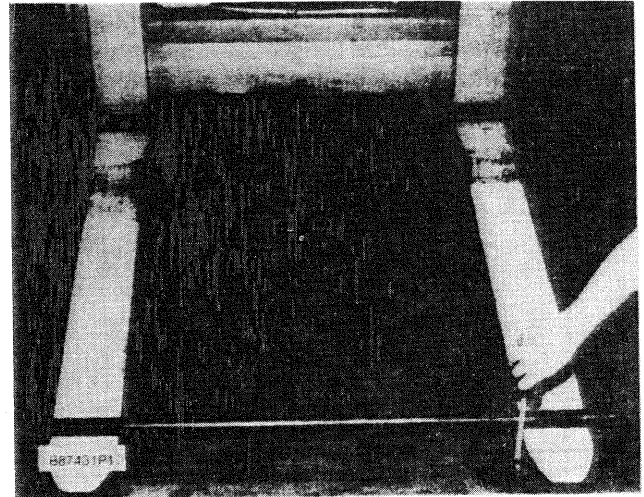
Hook type forks use a spring loaded pin (M), located in the top hook, to engage notches in the top carriage bar to hold the fork in place.

When adjusting the fork spacing, the forks are prevented from sliding off the end of the carriage by stop blocks. These stop blocks are at both ends of the carriage and in the path of the bottom fork hook. The load backrest extension may be used in place of the stop blocks in some cases.

Shaft mounted forks may use set collars or spacers on the shaft to either side of the fork. They may also use U bolts, pins, or similar devices which engage the fork through the top structure of the carriage.



8. Check fork markings (N) for legibility. Renew markings as required to retain legibility.



9. a. Lift the mast and operate the tilt control lever, until the top surface of the forks is parallel with the floor. Place two straight bars that are the same width as the carriage, across the forks as shown.

9. b. Measure the distance from the bottom of each end of the two bars to the floor. The forks must be parallel within 3mm (.12 in) for Full Tapered and Polished (FTP) forks, all other forks 6.4 mm (.25 in), for their complete length.

9. c. Put one fork, one third from the tip, under a fixture that will not move. Then operate the tilt control with caution until the rear of the truck lifts just off the floor. Follow the same procedure with the second fork. Repeat Step a.

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