OM073

OPERATION & MAINTENANCE MANUAL

AX and BX FORKLIFT TRUCKS
Federal Environmental Protection Agency (EPA) Emission-Control Compliant
AX S/N 670001A~
BX S/N 580001A~

AX – Gasoline & LPG	FG15/18(S)(H)-17
BX – Gasoline & LPG	FG20/25/30(S)(H)-14
BX – Diesel	FD20/25/30-14

AX
BX

WARNING

Read and observe all warnings on this unit before operating it.
DO NOT operate this equipment unless all factory-installed guards and shields are properly secured in place.

ISSUED: FEBRUARY 2004

KOMATSU®
Komatsu Forklift USA, Inc.

The information and specifications contained herein were accurate at the time of publication, but may change without notice as required for product improvements. Neither Komatsu Forklift USA, Inc., nor its parent company nor any of its subsidiaries will be held responsible for damages due to misuse or inappropriate use of its products.

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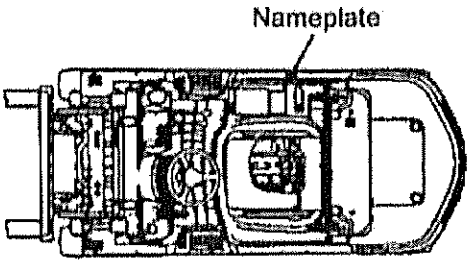
AX and BX



The "Name Plate / Data Plate" is located on the top of the lift truck hood to the right of the operator's seat. The lift truck model can be determined by viewing the information on this name plate. AX and BX lift truck model designations are dispayed as shown in the following table.

Komatsu Current Production Model Coding System

Internal Combustion Engine Trucks

Class IV (cushion tire) and Class V (pneumatic tire)

Example: F G 20 SHT LS – 14

Positions: 1 2 3 4 5 6

1 Type of Vehicle	2 Type of Motive Power	3 Load Capacity (Model: lbs)	4 Designations	5 UL Rating	6 Model Change Number
F = Forklift truck	G= Gas or LP engine D = Diesel engine	15: 3,000 18: 3,500 20: 4,000 25: 5,000 30: 6,000	S = Cushion tire type 1st H = High performance T = Torqflow-type power-shift trans w/torque converter C = Clutch-type manual trans w/dry, single-disc clutch	LS = LPG Special (Anti-Spark) US = Gas or Diesel Special (Anti-Spark)	1 = Original model built 2, 3, etc. = Changes in models

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FOREWORD

WARNING

READ AND FOLLOW ALL SAFETY PRECAUTIONS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

1. FOREWORD

This manual provides rules and guidelines which will help you use this lift truck safely and effectively. Always be sure to read and understand this manual thoroughly before operating and performing maintenance.
Some actions involved in operation and maintenance of the lift truck can cause a serious accident if they are not done in the manner described in this manual.

⚠ WARNING

- **Improper operation and maintenance of this lift truck can be hazardous and could result in serious injury or death.**
- **Operators and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.**
- **Keep this manual handy and have all personnel read it periodically.**
- **Do not use this lift truck unless you are sure that you understand the contents completely.**
- **If this manual has been lost, or has become dirty or worn and cannot be read, request a replacement manual from your Komatsu Forklift distributor/dealer.**
- **Komatsu Forklift delivers lift trucks that comply with (to the best of our knowledge at the time of delivery) all applicable regulations and standards of the country to which they have been shipped. If this lift truck has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult your Komatsu Forklift distributor/dealer before operating the lift truck.**
- **Continuing improvements in the design of this lift truck may not be reflected in this manual. Consult Komatsu Forklift or your Komatsu Forklift distributor/dealer for the latest available information on your lift truck or for questions regarding information in this manual.**
- **Information on safety is given in the SAFETY, OPERATION and MAINTENANCE sections throughout this manual; please read it carefully and completely.**

Most accidents are caused by a failure to follow fundamental safety rules for the operation and maintenance of lift trucks.
To avoid accidents, read, understand and follow all precautions and warnings in this manual and on the lift truck before operating and performing maintenance.
Do not operate or carry out maintenance of this lift truck unless you are sure that you understand the explanations and procedures completely.
To identify safety messages in this manual and on lift truck labels, the following signal words are used.

⚠ DANGER — These safety messages or labels describe precautions that must be taken to avoid a hazard which carries a serious risk of serious injury or death.

⚠ WARNING — These safety messages or labels usually describe precautions that must be taken to avoid a hazard which may lead to serious injury or death.

⚠ CAUTION — This word is used on safety messages and safety labels for hazards which could result in injury or damage to the lift truck or surrounding property if the hazard is not avoided.

NOTICE — This word is used for precautions that may not lead to damage or failure, but which must be taken to avoid actions that could shorten the life of the lift truck.

Safety precautions are described in the SAFETY, OPERATION and MAINTENANCE sections of this manual.

Komatsu Forklift cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, the safety messages in this manual and on the lift truck may not include all possible safety precautions.

If any procedures or actions not specifically recommended or allowed in this manual are used, it is your responsibility to be sure that you and others can do such procedures and actions safely and without damaging the lift truck. If you are unsure about the safety of some procedures, contact your Komatsu Forklift distributor/dealer.

The procedures and precautions given in this manual apply only to intended uses of the lift truck. If you use your lift truck for any unintended use that is not specifically prohibited, you must be sure that it is safe for you and others. In no event should you or others engage in prohibited uses or actions as described in this manual.

3.1 RUNNING IN A NEW LIFT TRUCK

Your Komatsu Forklift truck has been thoroughly adjusted and tested before shipment.
However, operating the lift truck under severe conditions at the beginning can adversely affect performance and shorten the lift truck life. Be sure to take special care concerning the following items during this initial period of operation.

- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starting or acceleration, unnecessarily abrupt braking and sharp turning, except in the case of emergency.

3.2 FIRST MONTH OF SERVICE (OR INITIAL 200 HOURS OF SERVICE) FOR NEW LIFT TRUCK

For new lift truck, carry out the following maintenance only after the first month or 200 hours.

Unit	Check Items	Remarks
Engine	Change oil in engine oil pan	Page 3-21
	Replace oil filter element	Page 3-21
	Check & adjust engine valve clearance	
	Tighten (retorque) engine cylinder head bolts	
	Check spark plugs for burning of electrode, burning of insulator	Page 3-24
	Check & clean air filter element	Page 3-28
	Check ignition timing	
	Check & adjust alternator belt (drive belt) tension	Page 2-25
TORQFLOW transmission	Change transmission fluid	Page 3-23
	Clean strainer	
Differential	Change oil	Page 3-24
Hydraulic tank	Change oil	Page 3-20
	Replace line filter	
	Clean strainer	
	Clean inside tank	
Misc. bolts & nuts	Tighten	Particularly lug (hub) nuts, overhead guard mounting bolts, backrest mounting bolts, and operator's seat mounting bolts
Other	Refer to "Check Before Operation"	Page 2-21

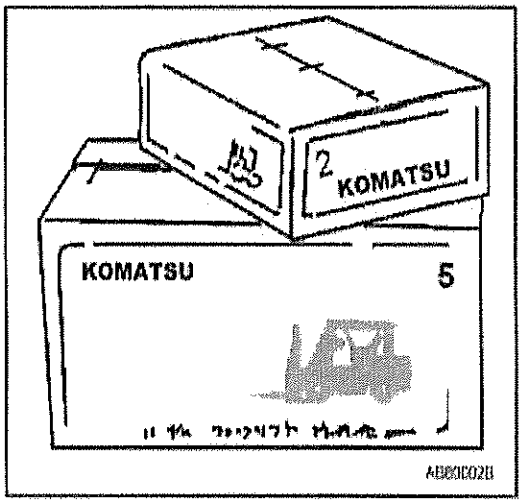
3.3 MODEL LINE UP

APPLICABLE "EPA" LIFT TRUCK MODELS	
Model	**Description**
AX (K21 Gasoline Engine)	
FG15HC-17	3,000 lb. capacity, Clutch Spec, Pneumatic Tire
FG15HT-17	3,000 lb. capacity, Torqflow Spec, Pneumatic Tire
FG15HTLS-17	3,000 lb. capacity, Torqflow Spec, LP Special, Pneumatic Tire
FG15ST-17	3,000 lb. capacity, Torqflow Spec, Cushion Tire
FG15STLS-17	3,000 lb. capacity, Torqflow Spec, LP Special, Cushion Tire
FG18HT-17	3,500 lb. capacity, Torqflow Spec, Pneumatic Tire
FG18HTLS-17	3,500 lb. capacity, Torqflow Spec, LP Special, Pneumatic Tire
FG18ST-17	3,500 lb. capacity, Torqflow Spec, Cushion Tire
FG18STLS-17	3,500 lb. capacity, Torqflow Spec, LP Special, Cushion Tire
BX (K21 and K25 Gasoline Engines)	
FG20C-14	4,000 lb. capacity, K21 Engine, Clutch Spec, Pneumatic Tire
FG20T-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, Pneumatic Tire
FG20TUS-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, Gasoline Special, Pneumatic Tire
FG20TLS-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG20ST-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, Cushion Tire
FG20STUS-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, Gasoline Special, Cushion Tire
FG20STLS-14	4,000 lb. capacity, K21 Engine, Torqflow Spec, LP Special, Cushion Tire
FG20HT-14	4,000 lb. capacity, K25 Engine, Torqflow Spec, Pneumatic Tire
FG20HTLS-14	4,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG20SHT-14	4,000 lb. capacity, K25 Engine, Torqflow Spec, Cushion Tire
FG25C-14	5,000 lb. capacity, K21 Engine, Clutch Spec, Pneumatic Tire
FG25T-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, Pneumatic Tire
FG25TUS-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, Gasoline Special, Pneumatic Tire
FG25TLS-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG25ST-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, Cushion Tire
FG25STUS-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, Gasoline Special, Cushion Tire
FG25STLS-14	5,000 lb. capacity, K21 Engine, Torqflow Spec, LP Special, Cushion Tire
FG25HT-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, Pneumatic Tire
FG25HTUS-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, Gasoline Special, Pneumatic
FG25HTLS-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG25SHT-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, Cushion Tire
FG25SHTLS-14	5,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Cushion Tire
FG30C-14	6,000 lb. capacity, K21 Engine, Clutch Spec, Pneumatic Tire
FG30HT-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, Pneumatic Tire
FG30HTUS-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, Gasoline Special, Pneumatic Tire
FG30HTLS-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Pneumatic Tire
FG30SHT-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, Cushion Tire
FG30SHTLS-14	6,000 lb. capacity, K25 Engine, Torqflow Spec, LP Special, Cushion Tire
BX (4D94E Diesel Engine)	
FD20T-14	4,000 lb. capacity, Diesel, Torqflow Spec, Pneumatic Tire
FD25T-14	5,000 lb. capacity, Diesel, Torqflow Spec, Pneumatic Tire
FD25TUS-14	5,000 lb. capacity, Diesel Special, Torqflow Spec, Pneumatic Tire
FD30T-14	6,000 lb. capacity, Diesel, Torqflow Spec, Pneumatic Tire

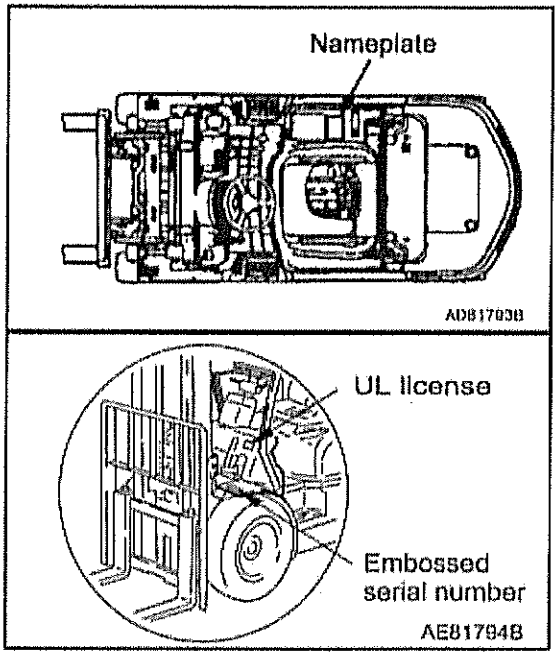
4.1 KOMATSU FORKLIFT GENUINE PARTS

Komatsu Forklift genuine parts are manufactured from the same materials, and by the same methods, as the parts built in the new lift truck.

In the event that the customer uses imitation parts, Komatsu Forklift will not be held accountable for any faults which result from the use of such imitation parts, and Komatsu Forklift warranty will not be applicable. Always use genuine Komatsu Forklift parts when replacing parts.



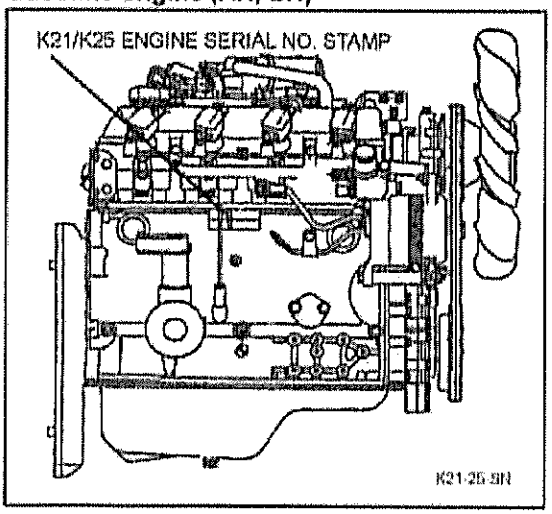
5.1 LIFT TRUCK SERIAL NO. PLATE POSITION



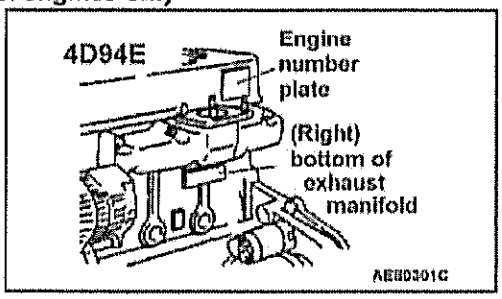
- **Nameplate location:**
  The nameplate is installed on the top of the hood on the right side of the operator's seat.
  The serial number is located on the nameplate.

- **Embossed serial number location:**
  The embossed serial number is stamped on top of the front fender on the left side of the lift truck.
  In addition, the UL license is installed to the left of the front side of the dashboard.
  The engine serial number is stamped in the position shown below.
  (Left) and (Right) in the diagram are as follows:
  (Left): Left side of engine.
  (Right): Right side of engine.

Gasoline engine (AX, BX)



Diesel engines only



- **Contacting Komatsu Forklift:**
  When contacting a Komatsu Forklift distributor/dealer for parts ordering or problem consultation, always give the lift truck serial number embossed on the lift truck.

NOTICE

Take care not to damage or remove the embossed serial number.

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SAFETY

⚠ WARNING

READ AND FOLLOW ALL SAFETY PRECAUTIONS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

6. SAFETY MANAGEMENT

⚠ WARNING — OPERATION MANUAL AND SAFETY LABELS

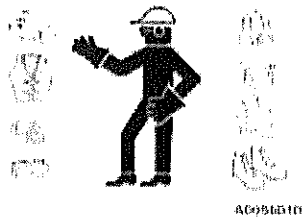
- Read the instructions in this Manual and the Safety Labels attached to the various parts of the lift truck, and make sure that you understand and follow them. If you do not understand or do not follow the instructions, this will lead to improper operation which may lead to damage, personal injury or death.
- Be sure that you understand the proper method of using the lift truck and the procedure for carrying out an inspection, and ensure that they are carried out safely.
- Read this Manual and the Safety Labels again from time to time. If the Operation and Maintenance Manual or Safety Labels have been lost or become dirty and cannot be read, obtain replacements from your Komatsu Forklift distributor/dealer and attach the Safety Labels in the specified positions.

⚠ WARNING — OPERATING QUALIFICATIONS

- This lift truck should be operated only by qualified personnel. Be sure you have proper qualifications before operating the lift truck.
- When operating this lift truck, even if you have experience in operating other lift trucks, obtain instructions from an authorized person who has experience in operating this lift truck or the same type of lift truck.

⚠ WARNING — CLOTHING AND PERSONAL PROTECTIVE ITEMS

- Avoid loose clothing, jewelry, and loose long hair. They can catch on controls or in moving parts and cause serious injury or death.
- Always wear a hard hat and safety boots.
- Depending on the working conditions, wear other safety equipment as well.



⚠ WARNING — OVERHEAD GUARD, LOAD BACKREST

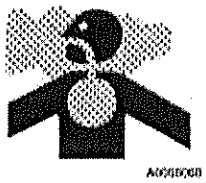
- Do not use this lift truck unless it is equipped with the overhead guard and load backrest shipped with the lift truck from the factory by Komatsu Forklift.

⚠ WARNING UNAUTHORIZED MODIFICATION

- Any modification made without authorization from Komatsu Forklift can create hazards.
- Before making any modification whatsoever, consult your Komatsu Forklift distributor/dealer. Komatsu Forklift will not be responsible for any damage, injury or death caused by any unauthorized modification.
- Do not install any equipment or parts which obstruct or limit the operator's view.

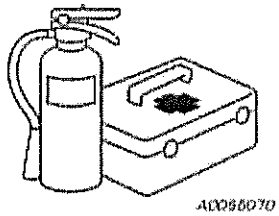
⚠ WARNING EXHAUST GAS

- Do not leave the engine running where there is poor ventiliation. The engine exhaust gas contains carbon monoxide. There is a danger that this will cause gas poisoning which may result in serious injury or death.



⚠ WARNING FIRE EXTINGUISHER AND FIRST AID KIT

- If any abnormality in the lift truck occurs, stop operation immediately, park the lift truck in a safe place and safe condition, then contact the person in charge.
- Be sure that fire extinguishers have been provided and that you read the labels to ensure that you know how to use them.
- Know what to do in the event of a fire.
- Be sure that you know the phone numbers of persons you should contact in case of an emergency.
- Provide a first aid kit at the storage point.
- Do not use the lift truck if it is leaking fuel. Inform the person on charge of the nature of the abnormality, and repair the leakage before using the lift truck.
- Do not leave the lift truck with the engine running. Always apply the parking brake securely, lower the forks to the ground, stop the engine, and remove the key before leaving the lift truck.



⚠ WARNING **SAFETY RULES**

- Do not operate the lift truck if you are fatigued, or when you have been drinking, or you have taken any medication which can make you drowsy or sleepy.
- When carrying out operation, inspection, or maintenance of the lift truck, always follow all work shop rules, safety regulations and precautions.
- During operation, always pay attention to safety and be careful of pedestrians, traffic and other surrounding conditions.

⚠ WARNING **CHECK WHEN TRAVELING IN REVERSE**

- When reversing, depending on the situation, an optional alarm, reversing lamp or rotary lamp should be used. In all cases, be sure to face the rear and check around before traveling in reverse.

⚠ WARNING **TRAVELING REGULATIONS ON PUBLIC ROADS**

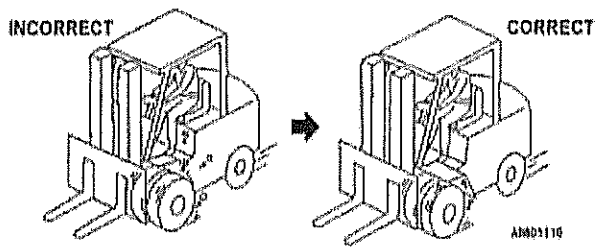
- Do not travel on public roads unless you comply with local, state or other laws which regulate such activity.
- Always observe all traffic regulations when operating the lift truck.
- Do not drive on public roads with the lift truck loaded.
- Do not tow other machines on public roads. (Do not tow other machines even when not on public roads).
- Always carry your driver's license when traveling on public roads.

⚠ WARNING **SAFETY EQUIPMENT**

- The overhead guard is installed to protect the operator from falling objects. It is designed to withstand the force of light boxes or small packages. It is not designed to withstand every possible impact. Always be careful to prevent damage or injury from falling objects.

⚠ WARNING **TIRE FENDERS**

- The tire fenders prevent objects from being thrown up by the tires. When changing from a single tire to a double tire arrangement on your forklift truck, always extend the tire fenders to cover the additional tires. If the fenders are not extended, small stones and other objects will be thrown up and may injure the operator or other people in the surrounding area.



⚠ WARNING SAFE WORKING AREA

- Always work on level surfaces and wipe up all oil or grease from the ground.
- When working on quays, platforms, docks or other places where there is a danger of falling, set up blocks to prevent the lift truck from going over the edge.
- Put warning signs up in dangerous places to warn the operator not to approach.
- Mark the travel areas clearly and maintain the road surfaces in good condition.
- Put up signs to prevent unauthorized machines from entering areas where trucks are being operated.
- Ensure that there is adequate lighting to enable operations to be carried out safely.

⚠ WARNING CLEAN OPERATOR'S COMPARTMENT

- Keep the operator's compartment clean and tidy. Be sure to clean up all oil or mud. If the operator's hand or foot slips, this may lead to a serious accident.
- Do not leave tools or spare parts lying around in the operator's compartment. They may damage or obstruct the control levers or pedals. Always keep them in the tool box when not being used.

⚠ WARNING SAFE OPERATING PLAN

- Before operation, establish an operating plan and hold a meeting to discuss operating safety.
- In confined areas, position a signal person and carry out operations in accordance with his/her instructions.
- When carrying out operations on roads, put up fences around the working area and carry out operations in accordance with instructions from the signal person.

⚠ WARNING REDUCE LOAD FOR LIFT TRUCKS WITH ATTACHMENT

- The permissible load for any lift trucks equipped with an attachment is lower than the permissible load for the standard lift truck.
  Reason:
  1) The permissible load must be reduced by an amount equivalent to the weight of the attachment itself.
  2) Because of the thickness of the attachment, the load center moves forward.
- Always observe the permissible load as stated on the capacity plate (also called "nameplate") strictly (this plate is stuck to the lift truck or the attachment). Never exceed the permissible load.

⚠ WARNING "NO JUMP START" SAFETY PLATE (DECAL)

- DO NOT JUMP START the engine by short circuiting the starting motor terminals.
- This SAFETY PLATE (DECAL) is located on the top center of the starter's magnet switch.
- If your machine is not equipped with this SAFETY PLATE, install a new plate (decal) in the specified location after cleaning the surface.

⚠ WARNING FIRE PREVENTION FOR FUEL

FUEL IS EXTREMELY FLAMMABLE AND CAN CAUSE FIRES AND EXPLOSIONS

- Carry out refueling away from flames or sparks.
- Stop the engine when refueling.
- After refueling, tighten the gas cap securely and wipe up any spilled fuel.
- The specific gravity of LPG is heavier than air, so it is easy for the vapors to accumulate in low places (holes, road surface depressions, etc.). This can create a fire or explosion hazard. Be extremely carefull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⚠ WARNING NO STARTING AIDS

Engine starting aids are highly flammable and may cause an explosion.

- Do not use starting aids to start the engine.

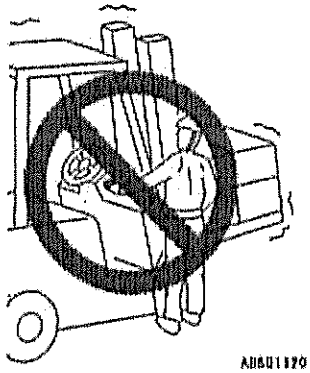
⚠ WARNING LPG SAFETY / FUEL SYSTEM SAFETY

Accidents involving fuel systems are always dangerous and can cause fire and explosion, serious injury, death and property damage. Keep the following points in mind when working with fuel systems.

- Read, understand and remember relevant information in the ***NATIONAL FIRE PROTECTION AGENCY (NFPA)*** standard for fuel in use. Do this BEFORE working on any fuel system.
- Ensure you are wearing proper personal protective equipment.
- Check for fuel leaks before you begin work on any fuel system.
- On LPG systems, DO NOT work on the system if the fuel storage container is filled with fuel past the 80% liquid level.
- Ensure there are NO SOURCES OF IGNITION nearby before beginning work.
- Be sure your work area is adequately ventilated.
- Disconnect the battery before working on the fuel system.
- **LPG is heavier than air** and will sink to the lowest area possible. Avoid areas near floor drains or lubrication pits where escaped fuel may collect.
- LPG is stored under high pressure. Ensure the LPG fuel storage container valve is turned OFF (closed), and pressure is released from the lines, before working on system.
- Store all LPG cylinders OUTDOORS in a secured area and safe from any vehicle traffic.
- **NEVER WELD ON AN LPG PRESSURE VESSEL, STORAGE TANK OR CYLINDER.**
- LPG fuel tanks mounted horizontally MUST BE positioned properly. See MAINTENANCE Section.
- Always utilize a UL listed LPG tank.

7. SAFE TRAVEL

⚠ WARNING PRECAUTIONS WHEN STARTING ENGINE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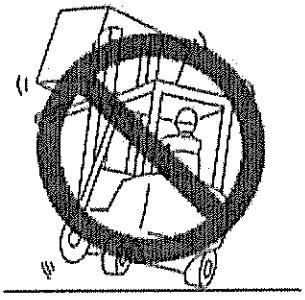
- Before starting the engine, always check that the parking brake is applied and that the directional and speed levers are in neutral. Depress the clutch pedal (for clutch type trucks), or the brake pedal (for TORQFLOW transmission trucks), firmly, and then start the engine.
- Adjust the operator's seat and the steering wheel before starting the engine. Always lock them in position after adjusting. Adjusting the seat or steering wheel during operation is dangerous and it may cause you to lose your balance or to operate the lift truck improperly.
- Before starting the engine, check that the surrounding area is safe. ALWAYS SIT IN THE OPERATOR'S SEAT when starting the engine.
- Before starting the engine, sound the horn to warn people in the area.
- With large-sized lift trucks, get off the lift truck and walk around it to check that no one is near the engine compartment, tires or counterweight, then get on the lift truck, sit in the operator's seat, and start the engine.

Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause serious bodily injury or fire.

⚠ WARNING PRECAUTIONS WHEN OPERATING DIRECTIONAL OR SPEED LEVERS

- When switching between FORWARD and REVERSE, always stop the lift truck. It is dangerous to change the direction of travel suddenly or when the lift truck is moving.
- When operating the directional lever or speed lever, always depress the clutch pedal before moving the lever (for clutch type lift trucks).
  If the lever is moved without disengaging the clutch, the lift truck will move suddenly and may cause injury.

⚠ WARNING TIPPING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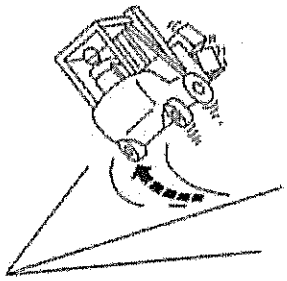
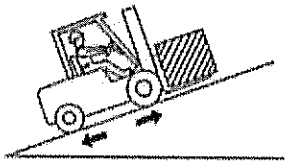
- If the load-engaging means or load is raised, the center of gravity of the lift truck will also rise and increase the danger of the lift truck tipping. Do not turn the lift truck when the forks are raised high.
- Do not suddenly raise the forks or tilt the mast to the front or rear when the forks are loaded. There is danger that the lift truck will tip.
- Reduce speed before turning the lift truck. In particular, when traveling unloaded, the rear of the lift truck is heavy.
- If the lift truck is turned at high speed, there is a greater chance of tipping than with the forks loaded.
- Always ensure that the hood is properly latched.

⚠ WARNING TRAVEL ON SLOPES

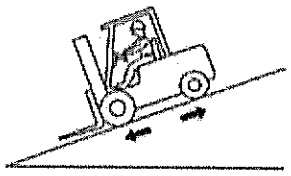
- Do not turn, or travel across or at an angle on slopes. There is danger that the lift truck will tip.
- Before starting to drive up a slope, stop the lift truck and adjust the clearance between the ground surface and the bottom of the forks so that the bottom of the forks or pallet do not contact the ground surface or the tip of the fork does not stick into the ground when traveling.



- For safe travel on slopes:
  When loaded: Travel FORWARD up the slope and in REVERSE down the slope with the load upgrade.
  When unloaded: Travel in REVERSE up the slope and FORWARD down the slope with the load-engaging means downgrade.



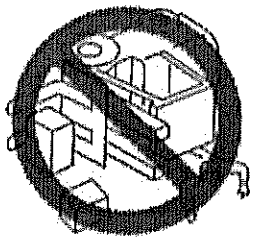
- When traveling down slopes, use the braking force of the engine together with the foot brake, and travel slowly down the slope.



⚠ WARNING DO NOT JUMP OFF LIFT TRUCK EVEN IF IT TIPS

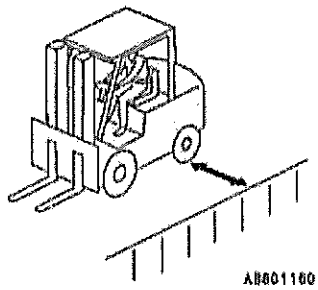
NEVER JUMP OFF the lift truck even if it seems that it will tip. Always do as follows:

- Hold the steering wheel securely.
- Stay in the operator's seat.
- Brace your legs.
- **If you jump off the lift truck when it turns over, there is danger that you will be fatally crushed under the lift truck.**
  Always stay in the operator's compartment if the lift truck turns over, then escape from the lift truck after it has stopped.
- Always wear the seat belt correctly.



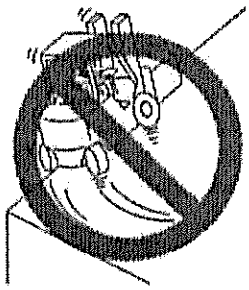
⚠ WARNING ROAD SHOULDER

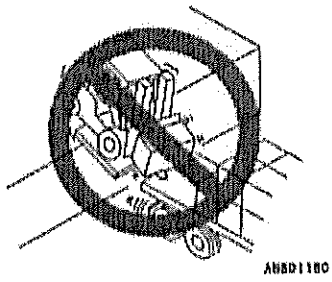
- There is danger that soft road shoulders may collapse, so do not go near them with the lift truck.
- Always maintain a safe distance from the edge of road shoulders and platforms.



⚠ WARNING LOADING HIGHWAY TRUCKS OR RAILROAD CARS

- **Do not travel on the edge of docks. There is danger that the lift truck may fall, which may result in serious injury or death.**
- Before starting operations, check the load limit for the gangplanks (dock boards), and do not use them if they do not have ample strength to take the weight of the lift truck when loaded.
- Apply the brakes on the highway truck and block the wheels.
- With trailers, use jacks and take steps to prevent the trailer from sinking when the forklift truck travels on it.
- When driving the forklift inside trucks, reduce speed when backing out and be sure to check that the gangplanks are safe.
- Be careful of pedestrians.
- Tell the truck driver not to move the truck until the operation is completed.
- If there is some system to secure the truck to the dock, always use this system. Secure the gangplanks so that they do not slip and fall.



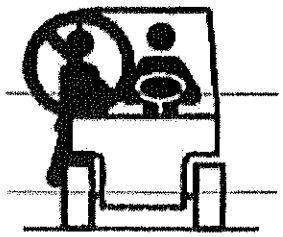


⚠ WARNING ESCAPING FROM A RAILROAD CROSSING

- If engine trouble occurs on a railroad crossing and the lift truck cannot move, you cannot use the starting motor to move the truck as can be done in automobiles. The lift truck's neutral safety switch prevents this action.
- In such an emergency, light a flare or smoke candle, to warn approaching trains, vehicles and persons in the area that there is a broken down truck on the tracks.
- It is critically important to remove the lift truck from the tracks as soon as possible.

⚠ WARNING NO RIDERS

FORKLIFT TRUCKS ARE ONE-PERSON MACHINES
Do not allow any other person to ride on the truck under any circumstances.
Never allow anyone to act as an extra counterweight.



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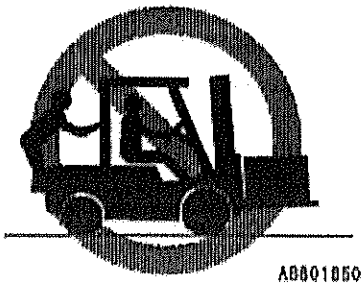

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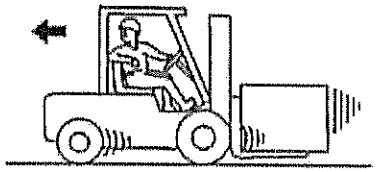
⚠ WARNING DRIVING IN REVERSE

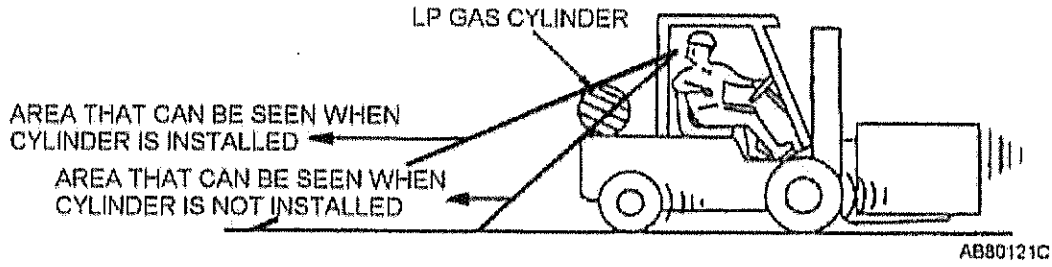
- When driving in REVERSE, turn to face the rear and check the area directly behind the lift truck.



AB801200

⚠ WARNING OBSTRUCTION OF REAR VIEW WHEN USING LP GAS FUEL

- The LP gas cylinder may partially block the view to the rear, so extra care is required to minimize the potential danger of hitting personnel, products or buildings in the surrounding area. Always turn to face the rear to check directly behind the lift truck when driving in reverse direction.
  If appropriate for your environment, you should consider installing backup warning devices (backup buzzer, rotating backup lamp, etc.) or backup confirmation devices (rear view mirror, etc.) to warn personnel in the surrounding area and to confirm that the area to the rear is safe.



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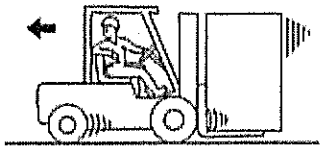
⚠ WARNING — WHEN FRONT VIEW IS POOR

- If the view to the front is obstructed by the load, turn to the rear and drive the forklift truck in reverse.
- When driving in reverse with a high load, use a signal person to ensure the safety of the load and the safety in the surrounding area.



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⚠ WARNING — CHECK BEFORE STARTING

- When checking the lift truck before starting, follow the procedure given in this Manual, and do not start the lift truck until all the checks have been completed.
- If anything abnormal is found, inform the person in charge and carry out the necessary repairs.

⚠ WARNING — LAMPS

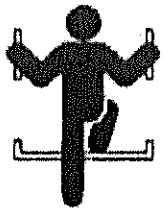
- Check that the lamps light up correctly. Replace any broken or inoperative bulbs.

⚠ WARNING — KEEP HANDS FREE FROM OIL AND WATER

- Do not drive the lift truck if your hands are wet or covered with oil. Your hands will slip on the work equipment control levers or directional lever, and this may cause a serious accident.

⚠ WARNING — MOUNTING AND DISMOUNTING

- **NEVER jump on or off the lift truck.**
- When getting on or off the lift truck, always stop the lift truck and use the handrails and steps to ensure that you support yourself.
- Never hold any control levers or the steering wheel when getting on or off the lift truck.
- If there is any oil, grease or mud on the handrails or steps, wipe it off immediately. Always keep these parts clean. Repair any damage.



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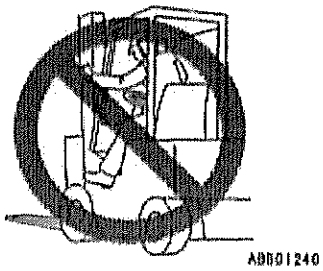
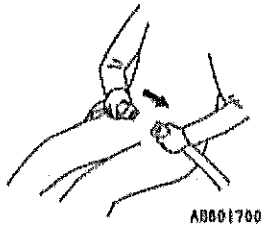
⚠ WARNING ALWAYS SIT IN OPERATOR'S SEAT

- Never operate the lift truck from outside the operator's compartment.
- Always keep your body under the overhead guard.
- Do not extend your arms and legs outside the operator's compartment.



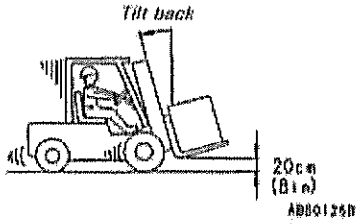
⚠ WARNING SEAT BELT

- Always wear your seat belt correctly when on the operator's seat. The seat belt will reduce the risk of injury.
- Always check the seat belt mounts and check for any damage to the seat belt itself. If any abnormality is found, repair or replace the seat belt immediately.



⚠ WARNING SAFETY WHEN STARTING

- Before starting and moving the lift truck, check that the surrounding area is safe.
- Before moving the lift truck, raise the forks (approx. 8 in. (20cm) from the ground surface), and tilt the mast back.
- Before moving the lift truck, release the parking brake.



⚠ WARNING BRAKING WHEN TRAVELING

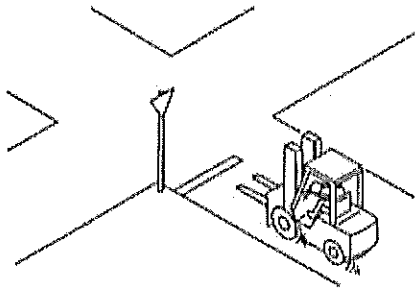
- Do not stop the engine when traveling. If the engine is stopped, the power steering (for lift trucks with power steering) and power brake (for trucks with power brakes) will not work.
- If the inching pedal is depressed, the braking effect of the engine will be lost.
- Do not use the brake excessively. Do not rest your foot on the brake pedal or inching pedal unless you are operating it.
  If you do, the brake will overheat and the braking effect will be lost.
  For TORQFLOW lift trucks, if you leave your foot on the inching pedal, the multiple disc clutch inside the transmission will overheat. In the worst case, the clutch discs will be deformed and the clutch will not function normally.

⚠ WARNING SAFETY DURING TRAVEL

- Keep a clear view of the path of travel and observe for other traffic, personnel and safe clearances.
- Yield the right of way to pedestrians,
- When passing oncoming vehicles, reduce speed and keep a safe distance from the other vehicle.
- In places where there are speed limits, observe the speed limit and maintain a safe distance from other vehicles.

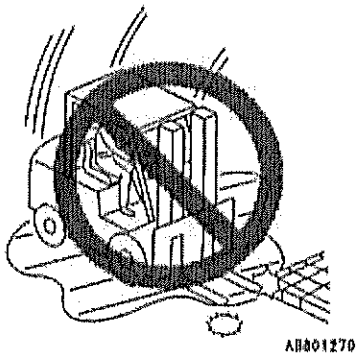
⚠ WARNING CONFIRMING SAFETY

- When traveling, always pay careful attention to the area around your lift truck, particularly in the direction of travel or when turning.
- Do not pass other vehicles on narrow roads or at crossings or other places where the view is poor.
- When traveling through crossings or other places where the view is poor, or when entering or leaving narrow roads, stop and sound the horn to confirm safety before driving on.
- Even if you sound the horn, not everyone in the surrounding area will necessarily hear it. Always pay careful attention to the movements of people in the surrounding area.
- When crossing roads or turning corners, stop and confirm safety before continuing.
- Always pay careful attention to the movements of people in the surrounding area, and take steps to prevent people from entering the working area.



⚠ WARNING SAFETY DURING TRAVEL

- Avoid traveling in places which are flooded or where there are holes.
- Do not try to drive the lift truck on soft ground.
- Avoid curbs, rails, ditches or other obstacles, and do not travel directly over them.
- Do not travel on slippery roads or other slippery surfaces.
- When entering buildings, check the weight limit of the floor and be careful not to exceed the limit.



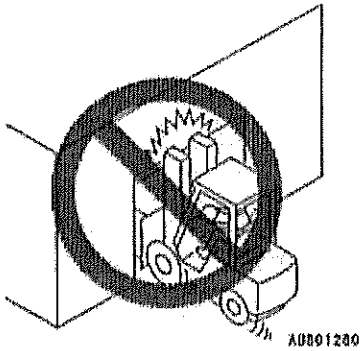
⚠ WARNING GIVE PRIORITY TO LOADED LIFT TRUCKS

- When traveling on slopes or in confined areas, unloaded lift trucks should always give the right of way to loaded trucks.

⚠ WARNING HEIGHT OR WIDTH LIMITS

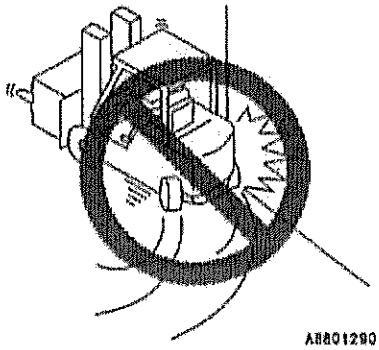
When going in or out of places with height or width limits:

- Ensure that there is ample height and width for the lift truck to pass.
- Do not extend your hands or legs outside the lift truck.
- Check that the surrounding area is safe.
- Be careful of electric wires and other obstacles inside and outside the building.



⚠ WARNING PRECAUTIONS WHEN TURNING

- When turning while traveling forward, the counterweight will swing far out. Keep an ample clearance from walls and other objects to ensure safety.
- When turning, travel slowly and be careful that the front or rear wheels do not come off the ground. When turning on soft road shoulders, there is danger that the rear wheels may come off the road shoulder and cause the lift truck to tip.



⚠ WARNING STOPPING DISTANCE

- When traveling downhill, it requires a longer distance for the lift truck to stop than when traveling on level ground.
- When traveling downhill, reduce the speed and make sure that you have ample room at the bottom of the slope to stop.
- When traveling on wet surfaces, it requires a longer distance to stop than when traveling on normal road surfaces. Always have ample room to stop.

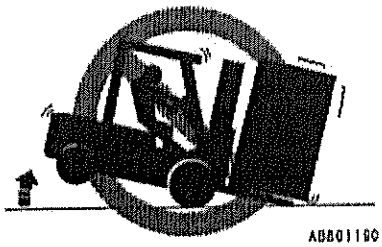
⚠ WARNING NO TOWING

If there is any problem with the brakes or steering system of your lift truck, do not use another lift truck to tow it.
There is danger that the lift truck may run away.

8. LOADING OPERATIONS

⚠ WARNING NO OVERLOADING

- Do not load the lift truck over the capacity set forth in the load capacity chart. If the rear wheels come off the ground because of overloading, the lift truck cannot travel or turn. There is also danger that it may tip.
- Always check the load capacity chart to confirm the loading capacity.

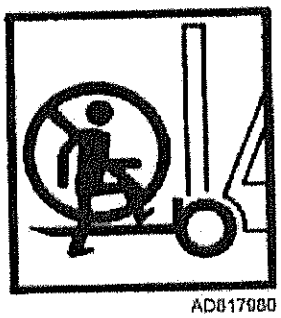


⚠ WARNING DON'T GO UNDER FORKS

- Never allow anyone to go under the load-engaging means or load when it is raised.
  The area under the forks is a danger area. If the forks come down, the person under the forks may be crushed, or seriously injured or killed.
- Never allow anyone to go under the load-engaging means or load even if it is elevated, stuck or caught in the up-position. It may fall down suddenly at any moment.

⚠ WARNING DO NOT LIFT PEOPLE ON FORKS

- Do not use the forks to lift people. If the person falls from the forks he/she may be seriously injured.



WARNING BE CAREFUL NOT TO GET CAUGHT OR FALL

- Never put your hands or feet into the mast structure. There is danger that you will get caught in moving parts and be seriously injured.

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- Do not use the mast, load backrest or dashboard as a ladder or step. If you slip, there is danger that you will fall.

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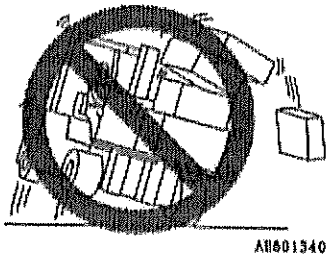
WARNING OPERATE FROM OPERATOR'S COMPARTMENT

- Always operate the mast and forks from the operator's compartment.

WARNING NO UNSTABLE LOADS

- Make sure that the center of gravity of the load is in line with the center of the lift truck. Do not carry loads off-center. There is danger that unbalanced loads may cause the lift truck to tip.
- Place the load so that it contacts the load backrest.
- Do not handle unstable loads. If there is danger that the load may fall off, secure it in position and take steps to prevent the load from collapsing or falling.
- When carrying stacked loads, tie with rope or otherwise secure it to prevent the load from falling.



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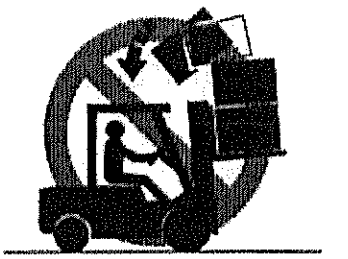
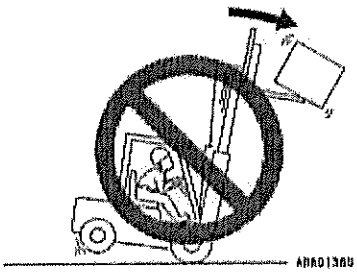
⚠ WARNING DO NOT LOAD ABOVE HEIGHT OF LOAD BACKREST

- Keep the height of the load within the height of the load backrest. Do not carry any load that is higher than the load backrest. If the load is higher than the load backrest, there is danger that it will fall back on top of the operator.
  This may lead to serious injury or death.



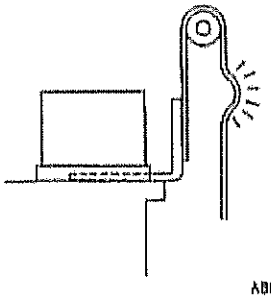
⚠ WARNING DO NOT TILT MAST FORWARD WHEN LOADED

- Do not tilt the mast forward when the forks are loaded and raised. There is danger that the load may fall and that the lift truck may tip.
- Do not travel with the mast tilted forward.
- Do not load and unload on slopes.



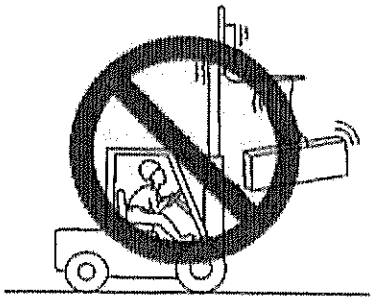
⚠ WARNING KEEP TENSION ON CHAIN

- If the mast rail or forks catch in a load or on a shelf, slack in the lift chain may be created, resulting in danger that the load may fall and the lift truck tip.
  Always be careful that there is no slack in the chain when pulling the forks out from a pallet or shelf.



⚠ WARNING USE ONLY FOR INTENDED PURPOSES

- Do not use the lift truck for anything other than the intended use (loading operations using the forks).
- Do not use the forks to open or close the doors of railroad cars or warehouses.
- Do not push any other vehicle.
- Do not hook ropes or cables on the forks and use the forks to lift loads.
- Do not use the drawbar pin for towing operations.



⚠ WARNING LEVER OPERATION

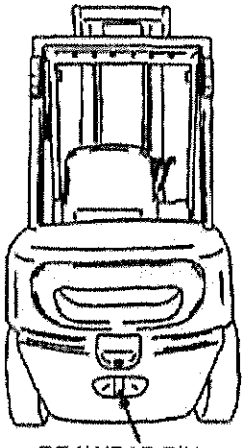
- Be careful not to operate the lever by mistake. There is danger that the forks or work equipment may cause serious injury.
- Do not operate the levers when getting off the lift truck.

⚠ WARNING USING DRAWBAR PIN

⚠ WARNING

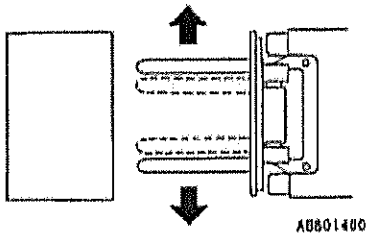
Do not use the drawbar pin for towing other lift trucks, for being towed by other lift trucks, or for lifting operations.

- The drawbar pin installed to the rear of the counterweight is used only to free the truck when the tires have become stuck in mud or in a ditch and the lift truck cannot move, or when loading the lift truck on to a trailer or truck.

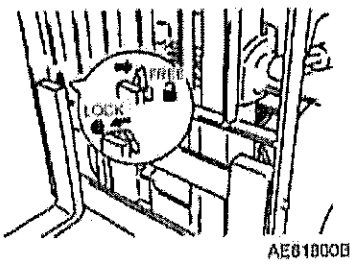


⚠ WARNING **FIT FORKS SECURELY IN POSITION**

- When adjusting the position (width) of the forks, be careful not to get your hands caught.



- After adjusting, check that the forks are held securely in position by the fork stopper. If the forks are not held in position, there is a danger that the forks may move when the lift truck is traveling and the load may fall off.

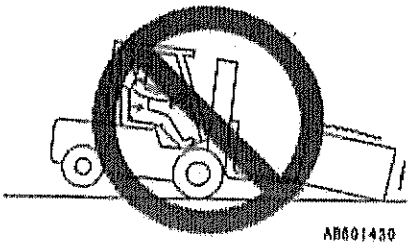


⚠ CAUTION **ADJUST CHAIN**

- Be sure the tension of the left and right chains is the same. (See CHECK BEFORE OPERATION). If the tension is not the same, the load will be unbalanced even if it is loaded correctly in the center, and there is danger that the lift truck may tip. (For details of adjustment, see page 2-30).

⚠ WARNING BE CAREFUL OF FORK TIPS

- Do not allow the tips of the forks to get close to people. The tips of the forks are pointed, so there is a risk that they may cause injury.
- Do not hook the tips of the forks under objects. If the forks slip out, there is danger that the lift truck or object may move unexpectedly.



⚠ WARNING PEOPLE IN WORKING AREA

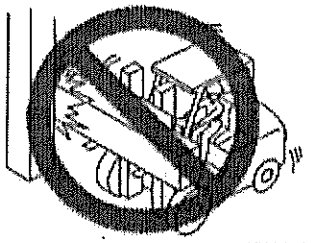
- Do not allow anyone except the signal person in the working area.
- Do not let any person or another lift truck come close during operation.
- When working with a signal person, always follow their instructions.

⚠ WARNING USE STRONG PALLETS AND SKIDS

- Always be sure that the pallets and skids have ample strength. If broken or damaged pallets or skids are used, there is a risk that the load may fall.

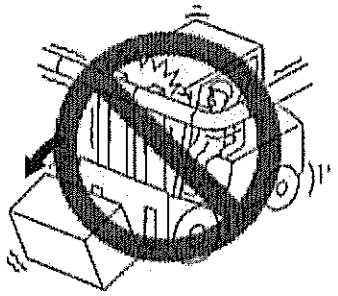
⚠ WARNING HANDLING LONG OR WIDE LOADS

- Be extremely careful when carrying long or wide loads. Raise the load slowly and be careful not to touch anything in the surrounding area.
- Keep the load as low as possible and be sure to maintain the balance.
- When turning, operate slowly and be careful not to let the load move.



WARNING OVERHEAD OBJECTS

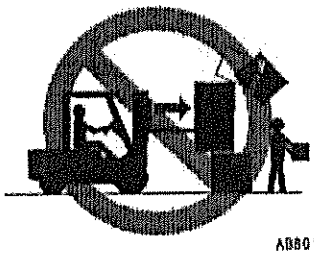
- Be careful not to let the mast, overhead guard or load contact electrical wiring, pipes, sprinklers or roof beams. If the truck hits such objects, there is a risk that the load will fall or the lift truck will tip. When the forks are raised, the mast height increases, so be particularly careful when the forks are raised.



A0001450

WARNING NO PUSHING

- Do not use the forks to push or pull loads. There is a risk that the load will be damaged or fall.



A0001460

WARNING PRECAUTIONS WHEN LOADING / UNLOADING

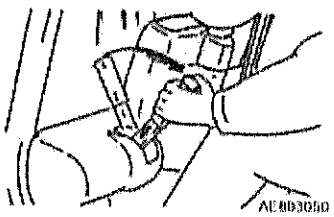
- Do not let anyone place a load on the forks.
- Do not let anyone remove a load directly from the forks.
- Standing on the forks is dangerous because the forks are slippery and the load may move.
- Do not use anyone to keep the load stable. The lift truck may move unexpectedly, causing the load to fall and crush the person.

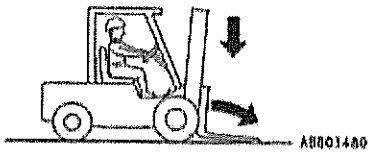
9. STOPPING AND PARKING

WARNING PRECAUTIONS WHEN STOPPING OR PARKING

Observe the following procedure when stopping or parking the lift truck:

1) Stop the lift truck on level ground.
2) Apply the parking brake securely to make sure that the lift truck cannot move.
3) Set the directional lever and the speed lever to neutral.
4) Lower the forks to the ground.
5) Turn the key switch OFF to stop the engine.
6) Remove the key from the key switch. Then get off the lift truck.



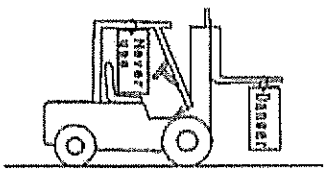


WARNING PARKING

- Park the lift truck in the specified place.
- Park the lift truck on a firm surface.
- Do not park near any emergency exit, stairway, fire extinguisher or other safety equipment. Park the lift truck in a place where it will not obstruct pedestrians or other vehicles.
- Never park the lift truck near any flammable object.
- When parking the lift truck on a slope, park as specified above (PRECAUTIONS WHEN STOPPING OR PARKING), then put blocks under the tires to prevent the lift truck from moving.
- Do not park near any holes for construction or elevator shafts. If LPG leaks, it can accumulate and cause fire or explosion.

⚠ WARNING PARKING MACHINE AFTER FAILURE

- If the lift truck has suffered a failure and the lift truck must be parked without lowering the forks, put markers on the tips of the forks and take steps to prevent pedestrians or other vehicles from hitting the forks.
- Select a parking place where people or vehicles do not pass, and stop the lift truck so that it is difficult for anyone to go under the forks. (The area under the forks is a DANGER zone).
- Place a stand or something similar under the inner mast rail or forks to prevent unexpected drop of the forks.
- Remove the key from the faulty lift truck and hang signs in the operator's compartment to prevent its use.



AB8014DB

⚠ WARNING ABRUPT LOWERING OF STUCK FORK

- Because a stuck fork may drop down unexpectedly, do not go under the fork when it is in this condition.
- Be very careful when dealing with this problem to prevent damage or injury, and warn those in the work area.

10. INSPECTION AND MAINTENANCE

WARNING **USE QUALIFIED PERSONNEL FOR INSPECTION AND MAINTENANCE**

- Only persons authorized by the owner or operator of the equipment and having proper certification (local or national) may carry out inspection, maintenance and repairs of the lift truck.
- If inspection, maintenance or repair work is carried out incorrectly, it is very dangerous.

WARNING **MAINTENANCE LOCATION**

- When carrying out inspection and maintenance, use a level, dry, dust-free area.
- If the work is carried out inside a building, make sure that there is ample ventilation.

WARNING **PRECAUTIONS FOR INSPECTION AND MAINTENANCE**

- To be prepared in the event of a fire, have a fire extinguisher nearby and make sure that you know how to use it.
- Before carrying out inspection, lower the forks to the ground and stop the machine.
- Do not run the engine unless it is necessary.
- Place the directional lever, speed lever and work equipment control levers in neutral.

WARNING **PRECAUTIONS WHEN CARRYING OUT INSPECTION AND MAINTENENCE**

- Wipe off any oil or grease. Immediately wipe up any oil that has leaked. If the lift truck is dirty, it becomes difficult or impossible to find cracks or other problems. Always clean the lift truck before starting inspection.
- Do not smoke or allow any flame to exist under any circumstances. Do not use any cloth which is soaked in fuel, flammable solvent, oil or grease. There is danger that it may catch fire.
- Wear suitable clothes for the job.
- Use suitable safety and protective equipment (hard hat, safety boots, safety glasses, gloves) for the job.
- When working on top of the lift truck, be careful not to fall.
- Do not put your feet under the forks.
- When opening or closing the floor plate or engine hood, be careful not to get your hands or body caught.
- When carrying out inspection with the forks raised, insert a stand under the inner mast to prevent the forks and mast from dropping.
- When carrying out the job with another worker, decide who is the leader and carry out the job in accordance with instructions from that person.
- After repairing, make sure that the trouble has been corrected by performing a trial run.
- During the trial run, start and operate the lift truck carefully because it is possible that the trouble has not been fully corrected or that defective parts have not been removed.

⚠ CAUTION USE SUITABLE TOOLS

- Always use tools that are suited for inspection and maintenance.
- It is extremely dangerous to use broken tools or tools designed for another purpose.

A0056120

⚠ WARNING REPLACE SAFETY CRITICAL PARTS PERIODICALLY

- Even if no abnormality is found, always replace safety critical parts periodically. As time passes, these parts deteriorate and may cause fire or failure in the work equipment system. The list of safety critical parts is on page 3-15.
- However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

⚠ WARNING PRECAUTIONS WITH HIGH TEMPERATURE COOLANT

- Immediately after using the lift truck, the engine coolant is at high temperature (HOT!) and high pressure. Do not remove the radiator cap under these conditions. Hot water may spurt out and cause burns.
- When removing the radiator cap, use a rag and turn it slowly to release the internal pressure.
- When checking the coolant level, stop the engine and wait for the engine to cool down before checking. For lift trucks equipped with a sub-tank or reservoir, check the level in the sub-tank.
- When adding water on lift trucks equipped with a sub-tank, add the water to the sub-tank.

A0055053

⚠ WARNING PRECAUTIONS WITH HIGH PRESSURE, HIGH TEMPERATURE OIL

- Immediately after using the lift truck, the oil is at high temperature. Do not drain the oil or replace the filter when the oil is hot. Hot oil may spurt out and cause burns.
- When carrying out inspection and maintenance, wait for the oil temperature to go down, and carry out the operation in the order given in this manual.
- Do not forget that the work equipment circuits are always under pressure. Do not add oil, drain oil or carry out maintenance or inspection before completely releasing the internal pressure.
- If oil is leaking under high pressure from holes, it is dangerous if the jet of high-pressure oil hits your skin or eyes. Always wear safety glasses and thick gloves, and use a piece of cardboard or a sheet of plywood to check for oil leakage.
- Release the internal pressure before checking the accumulator piping.
- If you are hit by a jet of high-pressure oil, consult a doctor immediately.

INCORRECT

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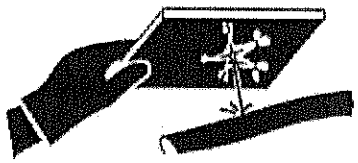
CORRECT



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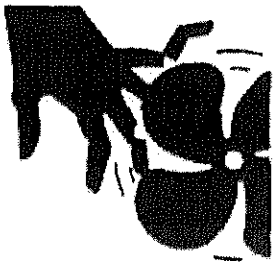
⚠ WARNING ROTATING FAN AND BELT

- It is extremely dangerous if you or any tool touches or gets caught in the fan or fan belt when the fan is rotating. Never touch the fan when it is rotating.
- Always stop the engine before inspecting rotating parts.
- When inspecting the areas around rotating parts, do not allow anything to come close which may get caught.



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WARNING **BE CAREFUL NOT TO GET CAUGHT OR FALL**

- NEVER put your hands or feet into the mast structure. There is danger that you will get caught in moving parts and be seriously injured.


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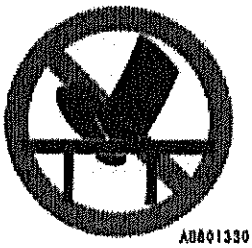
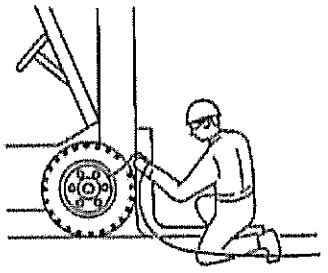
- Do not use the mast, load backrest or dashboard as a ladder. If you slip, there is danger that you will fall.


AD801330

DANGER **CHECKING AND INFLATING TIRES**

- If the tire inflation pressure is low, it will affect truck stability. However, do not inflate the tires immediately. The inflation pressure may have gone down because of damage to the rim. If the rim is damaged or cracked and the tires are inflated, there is danger that the rim will break when the tire is under high pressure, and this may cause personal injury or death.
- For safety, when checking tire pressure, place your body in front of the tread face of the tire. Do not check from the side face of the tire.
- Suitable qualifications are needed for tire inflation work on a lift truck. It is not like an automobile. Always have the work carried out by properly qualified personnel.
- The tire inflation pressure on a forklift truck is several times higher than the pressure on an automobile. When the tires are being inflated, there is danger that dirt or dust may be thrown up by the compressed air and enter your eyes. Always wear safety glasses to protect your eyes.


AD801610

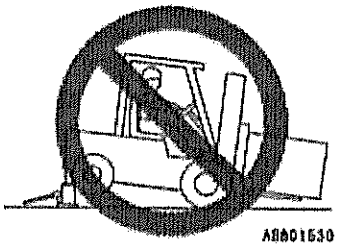
WARNING **HANDLING TIRES**

Disassembly and assembly of tires should be carried out by a tire dealer.
The tire pressure is extremely high, so caution is needed when handling tires.

- The wheel is fitted with mounting (lug) nuts. It also has rim nuts and bolts used to join the rim halves. When removing the tire from the lift truck, do not loosen the rim nuts and bolts. The tire is under high pressure, and there is a significant risk that the rim nuts and bolts may fly off. Relieve tire inflation pressure before removing.
- When the tires have been replaced, carry out a test drive and check again for any loose mounting bolts. If the tightening torque is low, tighten to the specified torque.

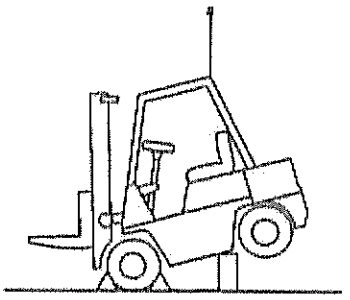
WARNING **JACKING UP LIFT TRUCK (when checking or replacing tires)**

- Do not go under the fork lift truck when it is jacked up.
- Check the following before jacking up the lift truck. (For details, see 3-page 41).
  1) Check that there is no one on the lift truck.
  2) Check that there is no load on the forks.
- When jacking up, stop when the tires come off the ground surface. Put blocks under both sides of the frame to prevent the lift truck from coming down.
- Put blocks under any tires contacting the ground to prevent the lift truck from moving.


AB001530

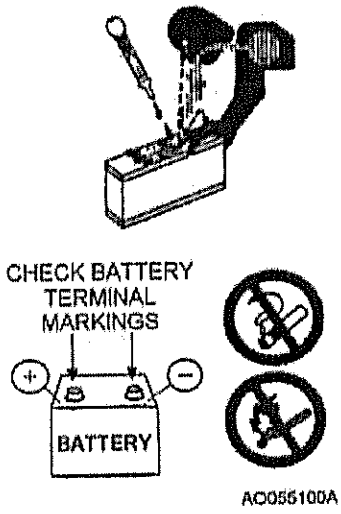
WARNING **LIFTING LIFT TRUCK (when checking tires)**

- Lift truck slinging work should be carried out by a qualified person who has completed a course in correct lifting methods.
- Fit wire ropes to the specified lifting points.
- When lifting the lift truck, check that the wire ropes have ample strength and are not damaged.
- Block the tires contacting the ground to prevent the lift truck from moving.
- Insert blocks to prevent the lift truck from coming down.
- Do not go under the lift truck during the lifting operation.
- If the specified lifting point is the counterweight, check that the counterweight mounting bolts are tightened to the specified torque before carrying out the lifting operation. Check also that there is no damage to the lifting portion on the counterweight.


AB001540

⚠ WARNING BATTERY HAZARD PREVENTION

- Battery electrolyte contains sulfuric acid and can quickly burn the skin and eat holes in clothing. If you spill electrolyte on yourself, immediately flush the area with a large quantity of water.
- Battery electrolyte can cause blindness if splashed into the eyes. If electrolyte gets into your eyes, flush them immediately with large quantities of water and consult a doctor at once.
- If you accidentally drink electrolyte, drink a large quantity of water or milk mixed with beaten egg white or vegetable oil. Call a doctor or poison control center immediately.
- When working with batteries, ALWAYS wear safety glasses or goggles.
- Batteries generate hydrogen gas. Hydrogen gas is highly EXPLOSIVE, and is easily ignited with a small spark or flame. Do not smoke or create any spark near a battery.
- Before working with batteries, stop the engine and turn the starting switch to the OFF position.
- When removing the battery, remove the cable from the negative (-) terminal first. When installing the battery, install the cable to the positive (+) terminal first. This prevents possible sparks or arcing between the positive terminal and the positive cable.
- Avoid short-circuiting the battery terminals through accidental contact with tools or other metal objects across the terminals.
- Tighten the battery terminals securely. Loose terminals can generate sparks and lead to an explosion.
- When removing or installing the battery, confirm which is the positive (+) terminal and which is the negative (-) terminal. Be careful not to connect the cables to the opposite / incorrect terminals.
- Tighten the battery caps securely.
- When cleaning the battery, leave the battery caps tightened.



AO055100A

⚠ WARNING DO NOT PUT METAL OBJECTS ON TOP OF BATTERY

- Never place any metal objects on top of the battery. There is danger that they will cause a short circuit and start a fire.

⚠ WARNING CHANGING LPG FUEL TANKS

- Only trained and certified personnel may change LPG tanks.
- Turn ignition switch to the OFF position.
- Change LPG tanks in designated and well ventilated area approved for this operation.
- Check LPG tank and lines for fuel leaks.
- Ensure no sparks, flame or ignition sources are present.
- Once the full tank is in place, ensure it is mounted correctly and securely. Check all connections.
- Do not attempt to start the truck until all LPG odor is gone.
- If the truck is hard to start, contact a certified mechanic to repair the problem. Tag the truck "Out of Service" until properly repaired.

WARNING PRECAUTIONS WHEN CHARGING

When the battery is charged, hydrogen gas is generated and the battery is heated by the chemical change. To prevent the danger of gas explosion, always do as follows:

- Carry out the charging operation in a well-ventilated place.
- Do not smoke or allow any flame.
- Start the charging operation when the temperature of the battery electrolyte is below 95° F (35° C). If the electrolyte temperature goes above 122° F (50° C) during the charging operation, wait for it to go down below 95° F (35° C) before starting charging operation again.
- When using a battery charger to charge the battery, take the battery caps off.

WARNING STARTING WITH BOOSTER CABLES

- ALWAYS wear safety glasses or goggles when starting the lift truck with booster (jumper) cables.
- When starting using the battery of another lift truck, do not allow the two lift trucks to touch.
- Stop the engine before connecting the cables.
- Be extremely careful not to let the cables get caught in the fan or fan belt.
- Connect the batteries in parallel; positive-to-positive and negative-to-negative. NEVER connect positive to negative.
- DO NOT short-circuit the starter terminals to start a forklift truck.

WARNING DO NOT PUSH START

- Do not push the lift truck to start the engine. There is danger that the lift truck may suddenly start and operate unexpectedly.

WARNING HANDLING BRAKE FLUID

It is dangerous if the brakes do not work because, in this condition, the lift truck cannot be stopped. Always do the following:

- Check the level of the brake fluid periodically.
- Always use the specified brake fluid.
- Check that the breather of the brake fluid reserve tank is not clogged.
- Be careful not to let dirt or dust get into the brake fluid reserve tank.

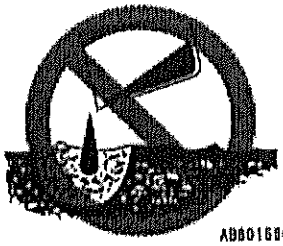
⚠ WARNING **HANDLING ANTIFREEZE**

- Antifreeze can be flammable. Keep away from flame when handling.
- Antifreeze is poisonous, so do not drink it. If you drink it by mistake, drink large amounts of water, vomit it out, and get medical attention immediately. Follow safety precautions on container.

⚠ CAUTION **WASTE MATERIALS**

- Obey appropriate laws and regulations when disposing of harmful items and materials such as oil, fuel, solvent, filters and batteries.

INCORRECT



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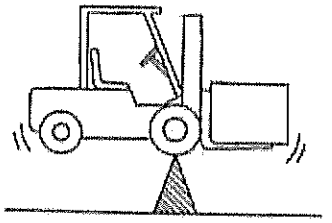
11. STRUCTURE AND STABILITY OF THE LIFT TRUCK (TO PREVENT LIFT TRUCK FROM TIPPING)

To operate the lift truck safely, it is important to understand the structure and stability of the lift truck.

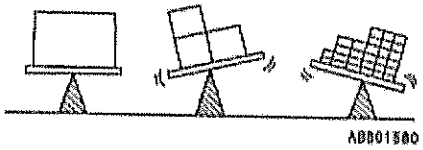
⚠ CAUTION STRUCTURE OF LIFT TRUCK

A forklift truck consists basically of the lifting mechanism (the forks and mast) at the front and the lift truck itself (with tires) at the rear.
The front wheels of the lift truck act as the fulcrum, and the center of gravity of the lift truck and center of gravity of the load are kept in balance.
The relationship between the position of the center of gravity of the lift truck and the center of gravity of the load is extremely important for maintaining the safety of the lift truck.



⚠ CAUTION CENTER OF GRAVITY OF LOAD

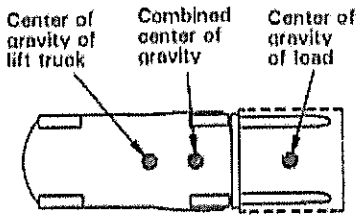
The loads carried by forklift trucks come in various shapes (and weights) from boxes to planks and long objects. To judge the stability of the lift truck, it is important to distinguish the position of the center of gravity for loads of various shapes.

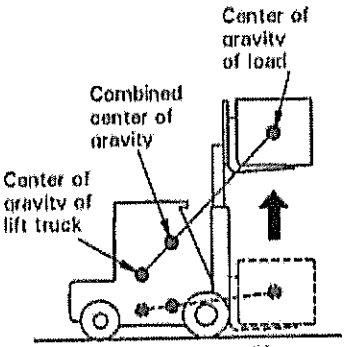


CAUTION CENTER OF GRAVITY AND STABILITY

The stability of the lift truck is determined by the position of the combined center of gravity resulting from the combination of the centers of gravity of the lift truck and the load.
When the lift truck is carrying no load, the center of gravity remains as it is, but when the lift truck is loaded, the combined center of gravity becomes the combination of the centers of gravity of both the lift truck and the load.
The position of the center of gravity of the load changes according to whether the mast is tilted forward or back or whether the mast is raised or lowered.
The position of the combined center of gravity of the lift truck is governed by the following factors:

- Size, weight, shape of load
- Lifting height
- Tilting angle of mast
- Inflation pressure of tires
- Acceleration, deceleration, turning radius
- Condition of road surface, angle of road
- Type of attachments

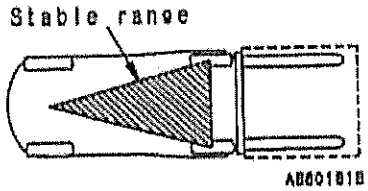




CAUTION STABLE RANGE OF CENTER OF GRAVITY

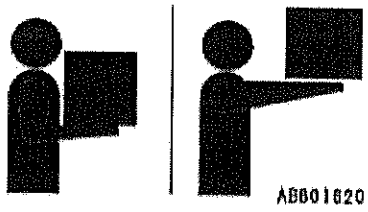
For the lift truck to be stable, the position of the combined center of gravity must be inside the triangle (stable range of center of gravity) formed by the ground contact points of the left and right front tires and the center of the rear axle.

If the position of the overall center of gravity is in front of the front axle, the front tires will form the fulcrum and the lift truck will tip to the front. If the position of the combined center of gravity moves outside the triangle forming the stable area for the center of gravity, the lift truck will tip in the direction where the combined center of gravity moves outside of the triangle.



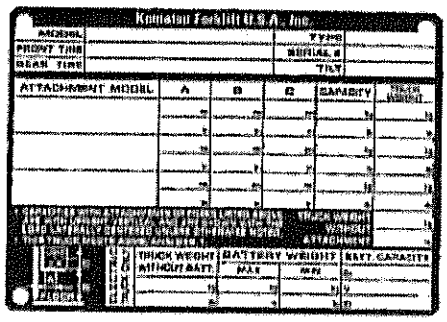
⚠ CAUTION MAXIMUM LOAD (weight and center of gravity of load)

The horizontal distance between the center of gravity of the load on the forks and the load backrest of the forks, or the front face of the forks (whichever is shorter), is called the load center.
The maximum load is the maximum weight of the load that can be loaded at the standard load center. The relationship between the maximum load and the load center is given in the load capacity charts on the nameplate on the lift truck. If the load center moves to the front of the forks, the overall center of gravity also moves to the front, so this means that the load must be reduced.



⚠ CAUTION ALLOWABLE LOAD

The allowable load is stamped on the nameplate to show the relationship regarding the position of the load center, the height of the fork and the maximum load. Before loading the forks, check that the load and load center are within the permitted range on the stamped allowable load.
If the shape of the load is complex, set it so that the heaviest part of the load is at the center of the forks and set the load close to the load backrest.
If the forks are loaded more than the allowable value, the drive wheels will float during travel and the steering system will not work. This is very dangerous. Furthermore, the lift truck will tip over easily under this condition. Therefore, be sure to keep the load below the allowable value and properly balanced.

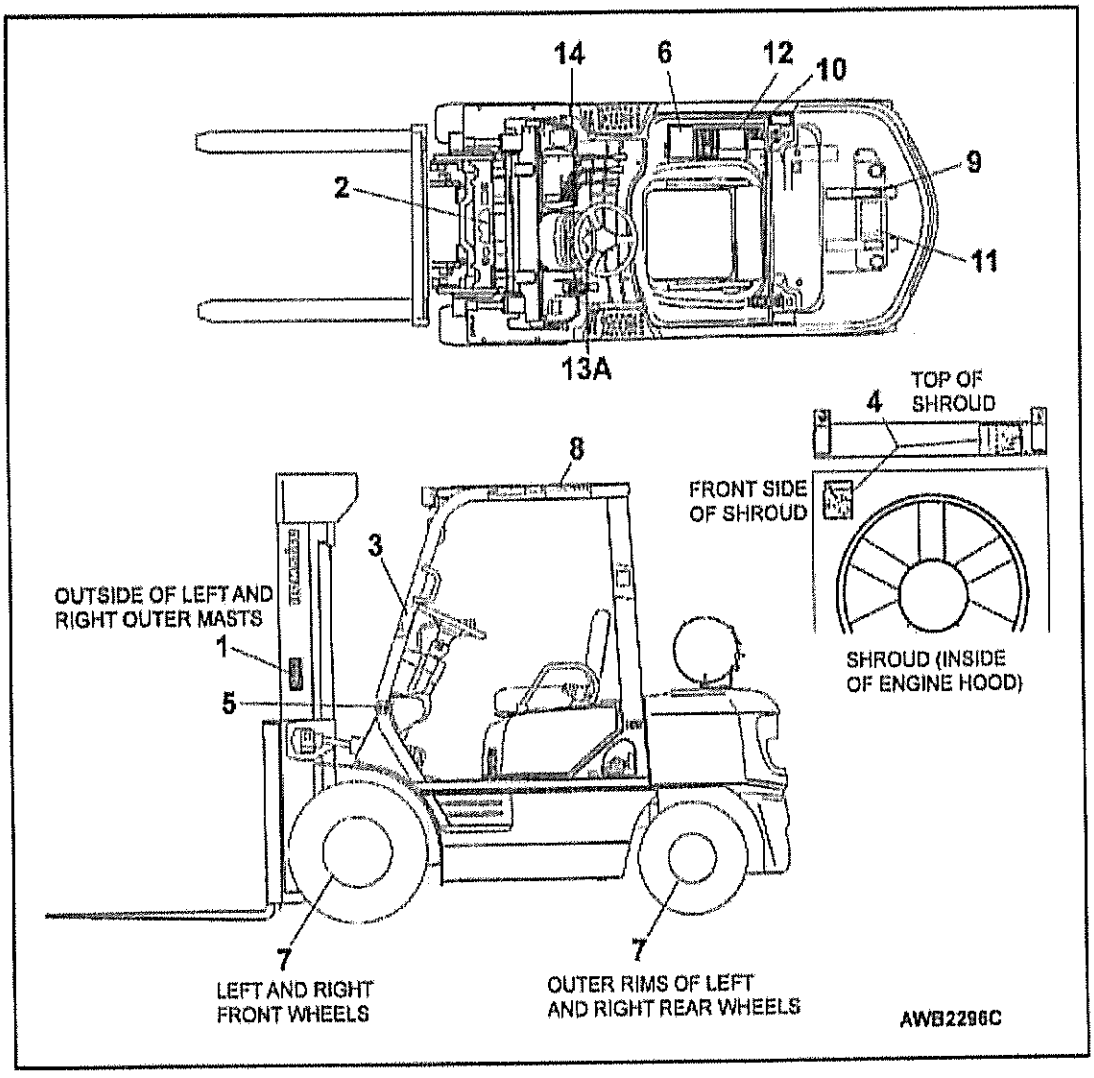


⚠ WARNING SPEED AND ACCELERATION

If a stationary object is not subjected to external force, it will remain stationary. In the same way, if a moving object is not subjected to external force, it will continue to move at the same speed. This is called inertia.
Because of inertia, a force is applied towards the rear when the lift truck starts to move, and is applied towards the front when the lift truck stops. If the brakes are applied suddenly, there is danger of a large force being applied towards the front which may make the lift truck tip or the load come off the forks.
When the lift truck is turned, a centrifugal force is applied to the outside from the center of the turn. This force pushes the lift truck to the outside and makes it tip. The range of stability to the left and right is particularly small, so it is necessary to reduce speed when turning, In order to prevent the lift truck from tipping. If the lift truck is traveling with a raised load, the position of the overall center of gravity is high, so the danger of tipping to the front, left or right becomes greater.

12.1 SAFETY LABEL STICKING POSITIONS

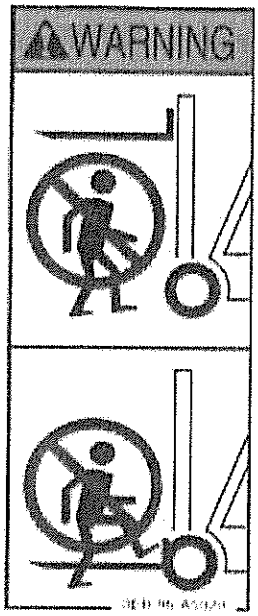
Keep these labels clean. If a label (decal) comes off, stick it on again in the same location or replace with a new one. Treat all labels (decals) in the same way, whether they are safety related or not.



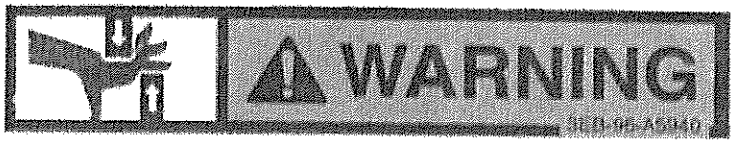
See following pages for labels corresponding to numbered locations in figure above.

12. SAFETY LABEL STICKING POSITIONS

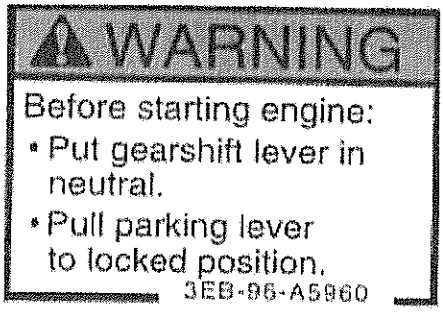
1. **Prohibit the operator from riding on the forks and lifting or lowering himself. Never enter the area under the forks. (Part No. 3EB-96-A5920)**



2. **Do not put your hand on the mast! (Warning to avoid getting hand caught) (Part No. 3EB-96-A5940)**



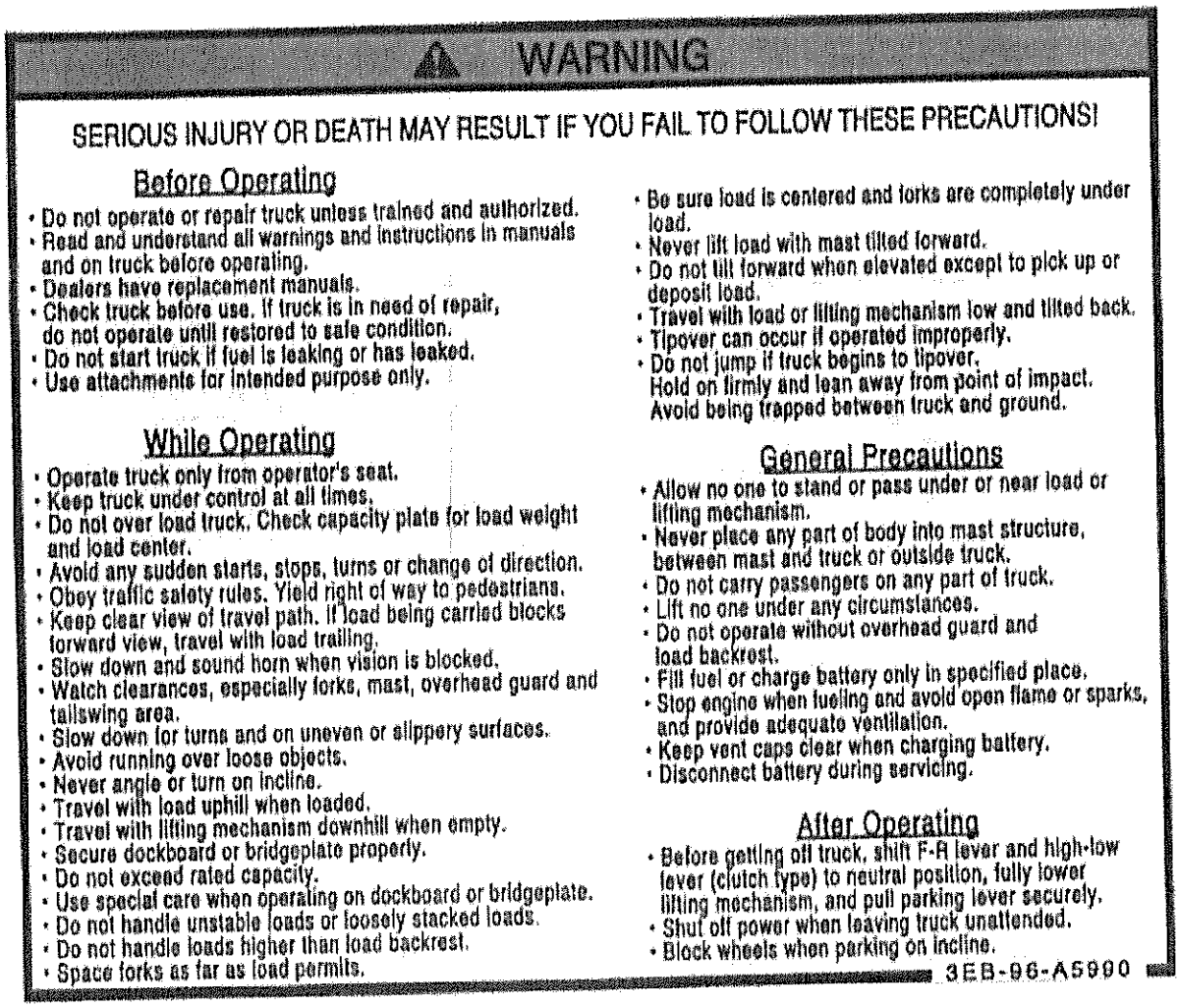
3. **Caution before operating machine. (Part No. 3EB-96-A5960)**



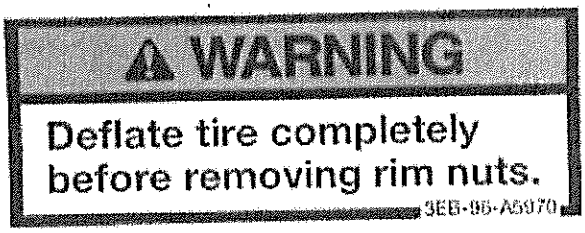
4. Never touch fan when rotating. (Part No. 3EB-96-A5930)

5. No one is permitted to ride the lift truck together with the operator. (Part No. 3EB-96-A5910)

6. **Warning for operation (decal)**
   (Part No. 3EB-96-A5990)

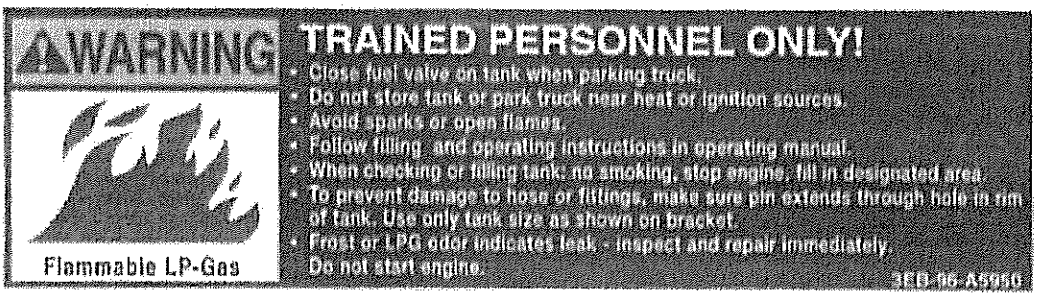


7. **Warning for use of split rim (pneumatic tires only)(decal)**
   (Part No. 3EB-96-A5970)



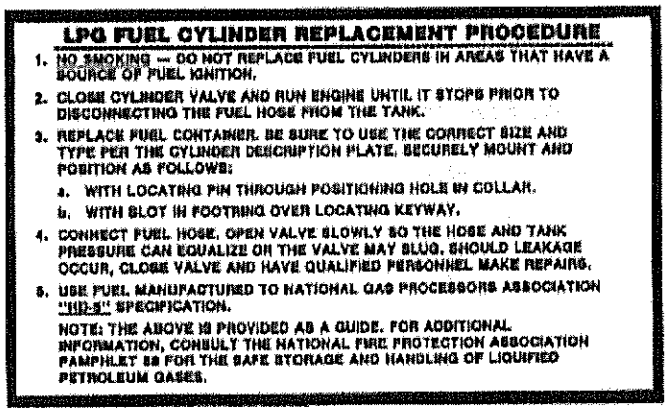
8. Prevention of tip-over (decal)
(Parts No. 3EB-96-A5111)

9. Warning for handling LPG/FLAMMABLE GAS (decal)
(Part No. 3EB-96-A5950)



10. "NO JUMP START" decal (Part No. 09842-A0481)
Located top center of starter solenoid.

11. LPG TANK CHANGE INSTRUCTIONS DECAL (On LPG Tank Bracket Base Plate) (Part No. 3EB-05-F5690)



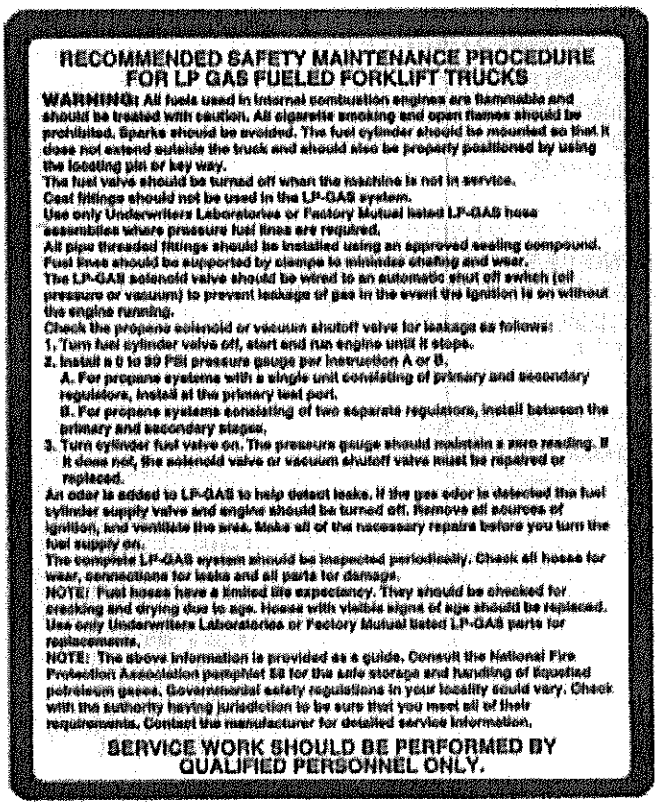
LPG FUEL CYLINDER REPLACEMENT PROCEDURE

1. NO SMOKING — DO NOT REPLACE FUEL CYLINDERS IN AREAS THAT HAVE A SOURCE OF FUEL IGNITION.
2. CLOSE CYLINDER VALVE AND RUN ENGINE UNTIL IT STOPS PRIOR TO DISCONNECTING THE FUEL HOSE FROM THE TANK.
3. REPLACE FUEL CONTAINER. BE SURE TO USE THE CORRECT SIZE AND TYPE PER THE CYLINDER DESCRIPTION PLATE. SECURELY MOUNT AND POSITION AS FOLLOWS:
   a. WITH LOCATING PIN THROUGH POSITIONING HOLE IN COLLAR.
   b. WITH SLOT IN FOOTRING OVER LOCATING KEYWAY.
4. CONNECT FUEL HOSE. OPEN VALVE SLOWLY SO THE HOSE AND TANK PRESSURE CAN EQUALIZE OR THE VALVE MAY SLUG. SHOULD LEAKAGE OCCUR, CLOSE VALVE AND HAVE QUALIFIED PERSONNEL MAKE REPAIRS.
5. USE FUEL MANUFACTURED TO NATIONAL GAS PROCESSORS ASSOCIATION "HD-5" SPECIFICATION.

NOTE: THE ABOVE IS PROVIDED AS A GUIDE. FOR ADDITIONAL INFORMATION, CONSULT THE NATIONAL FIRE PROTECTION ASSOCIATION PAMPHLET 58 FOR THE SAFE STORAGE AND HANDLING OF LIQUIFIED PETROLEUM GASES.

3EB-05-F5690

12. LPG SAFETY MAINTENANCE DECAL (Right side of seat on hood upper surface) (Part No. 3EB-05-F5730)



RECOMMENDED SAFETY MAINTENANCE PROCEDURE FOR LP GAS FUELED FORKLIFT TRUCKS

WARNING: All fuels used in internal combustion engines are flammable and should be treated with caution. All cigarette smoking and open flames should be prohibited. Sparks should be avoided. The fuel cylinder should be mounted so that it does not extend outside the truck and should also be properly positioned by using the locating pin or key way.

The fuel valve should be turned off when the machine is not in service.

Cast fittings should not be used in the LP-GAS system.

Use only Underwriters Laboratories or Factory Mutual listed LP-GAS hose assemblies where pressure fuel lines are required.

All pipe threaded fittings should be installed using an approved sealing compound.

Fuel lines should be supported by clamps to minimize chafing and wear.

The LP-GAS solenoid valve should be wired to an automatic shut off switch (oil pressure or vacuum) to prevent leakage of gas in the event the ignition is on without the engine running.

Check the propane solenoid or vacuum shutoff valve for leakage as follows:

1. Turn fuel cylinder valve off, start and run engine until it stops.
2. Install a 0 to 30 PSI pressure gauge per instruction A or B.
   A. For propane systems with a single unit consisting of primary and secondary regulators, install at the primary test port.
   B. For propane systems consisting of two separate regulators, install between the primary and secondary stages.
3. Turn cylinder fuel valve on. The pressure gauge should maintain a zero reading. If it does not, the solenoid valve or vacuum shutoff valve must be repaired or replaced.

An odor is added to LP-GAS to help detect leaks. If the gas odor is detected the fuel cylinder supply valve and engine should be turned off. Remove all sources of ignition, and ventilate the area. Make all of the necessary repairs before you turn the fuel supply on.

The complete LP-GAS system should be inspected periodically. Check all hoses for wear, connections for leaks and all parts for damage.

NOTE: Fuel hoses have a limited life expectancy. They should be checked for cracking and drying due to age. Hoses with visible signs of age should be replaced. Use only Underwriters Laboratories or Factory Mutual listed LP-GAS parts for replacements.

NOTE: The above information is provided as a guide. Consult the National Fire Protection Association pamphlet 58 for the safe storage and handling of liquified petroleum gases. Governmental safety regulations in your locality could vary. Check with the authority having jurisdiction to be sure that you meet all of their requirements. Contact the manufacturer for detailed service information.

SERVICE WORK SHOULD BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

13. LPG FUEL SYSTEM DECALS

A. LPG LOW FUEL ALARM LIGHT (On dashboard to left of steering column)(OP)

KFOM0006

B. DUAL-FUEL SYSTEM FUEL CHANGE-OVER INSTRUCTIONS (On air cleaner housing) (Part No. 3EB-96-A5790)

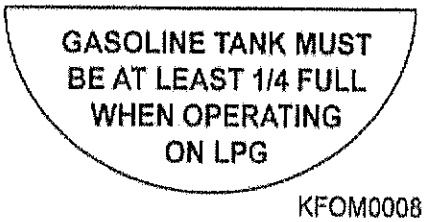
FUEL CHANGEOVER INSTRUCTIONS
DUAL FUEL SYSTEM

1. TURN OFF IGNITION SWITCH TO STOP ENGINE.
2. TURN SWITCH TO DESIRED FUEL SELECTION, LPG OR GASOLINE.
3. START ENGINE AS USUAL.

NOTE: WHEN TURNING KEY TO ANOTHER FUEL SELECTION WHILE ENGINE IS RUNNING, ENGINE WILL CONTINUE TO USE INITIAL FUEL SELECTION.

3EB-96-A5790

14. FUEL LEVEL REQUIREMENTS - GASOLINE AND LPG (On dashboard over Fuel Gauge) (Dual-Fuel applications only)



KFOM0008

Dual-Fuel Truck

KFOM0009

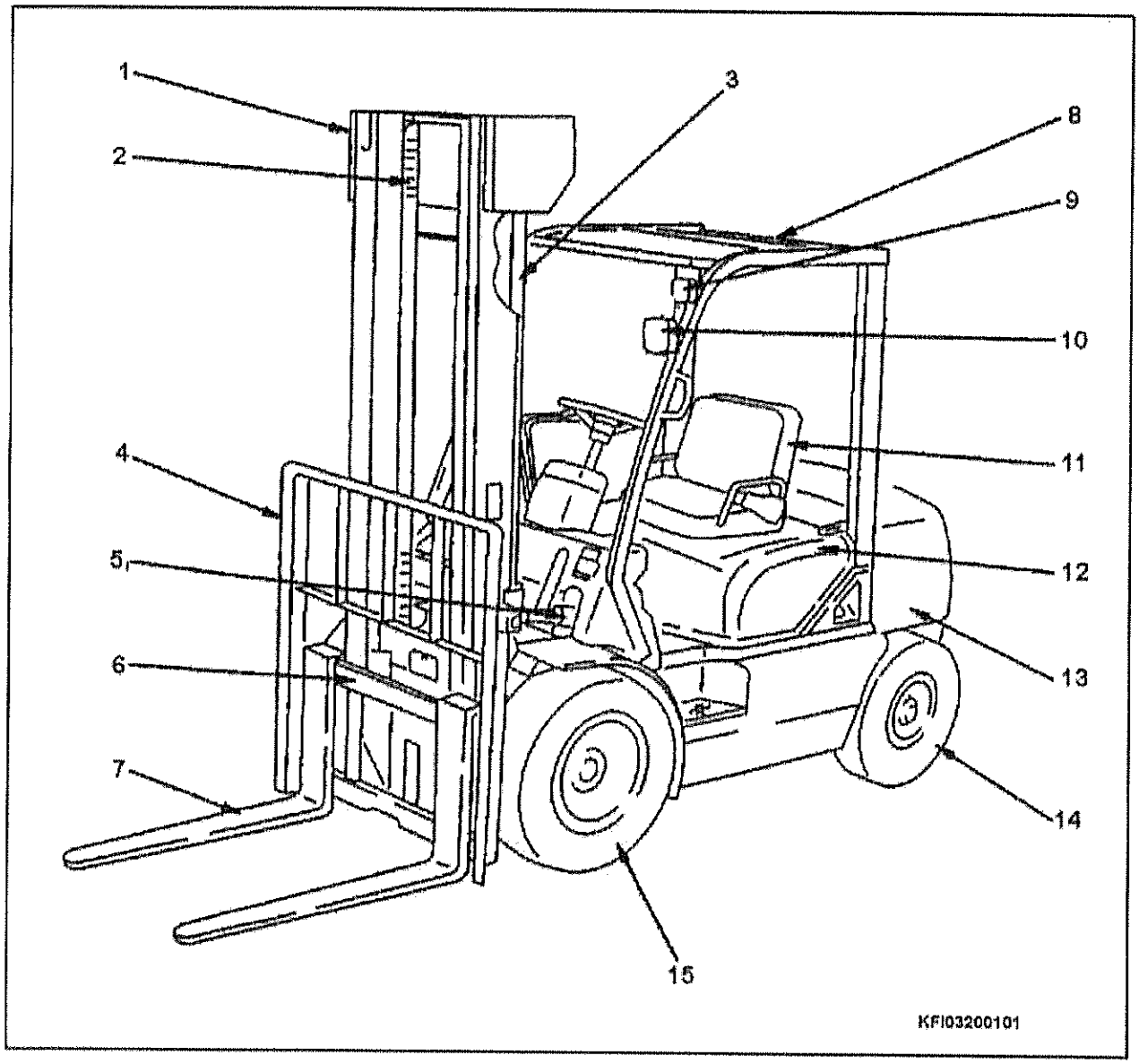
LPG Fuel Truck

OPERATION

WARNING

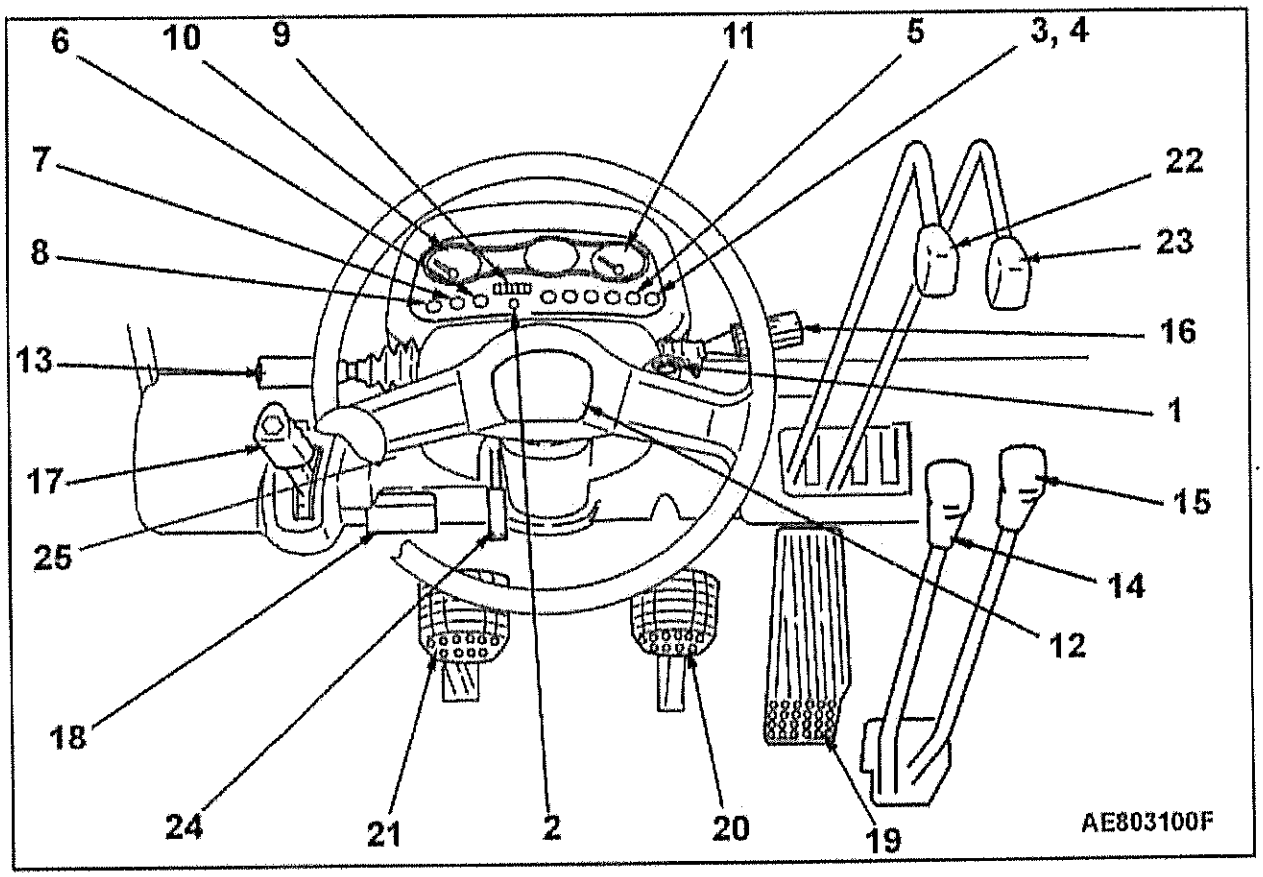
READ AND FOLLOW ALL SAFETY PRECAUTIONS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

13.1 GENERAL VIEW OF LIFT TRUCK



1. Mast
2. Lift-chain
3. Lift cylinder
4. Back rest
5. Tilt cylinder
6. Fork carriage
7. Fork
8. Head guard
9. Turn signal lamp (option)
10. Head lamp (option)
11. Operator's seat
12. Engine hood
13. Counterweight
14. Rear wheel
15. Front wheel

13.2 INSTRUMENTS AND CONTROLS (AX & BX)



See "Explanation of Components" (page 2-10) for details.

1. Starting switch
2. Operation indicator (displays during operation)
3. Glow indicator (diesel only)
4. ECU Failure warning lamp (gas only)
5. Sediment warning lamp (diesel)
6. Charging warning lamp
7. Engine oil pressure warning lamp
8. Brake fluid level warning lamp
9. Hourmeter
10. Engine water temperature gauge
11. Fuel gauge
12. Horn button
13. FORWARD/REVERSE switch (TORQFLOW transmission)
14. FORWARD/REVERSE lever (clutch-type truck)
15. HIGH/LOW speed lever (clutch-type lift truck)
16. Combination light switch (turn-signal lamp and lamp ON/OFF switch)
17. Parking brake lever
18. Fuse box
19. Accelerator pedal
20. Brake pedal
21. Inching pedal (TORQFLOW transmission)
    Clutch pedal (clutch-type truck)
22. Lift lever
23. Tilt lever
24. Tiltable steering wheel lock lever
25. LPG low-fuel alarm light (optional)

Method of checking for blown bulbs in warning lamps.

1. **Check that all warning lamps light up when the starting switch is turned ON.**
2. **If any warning lamp does not light up, the bulb for that lamp is blown.**

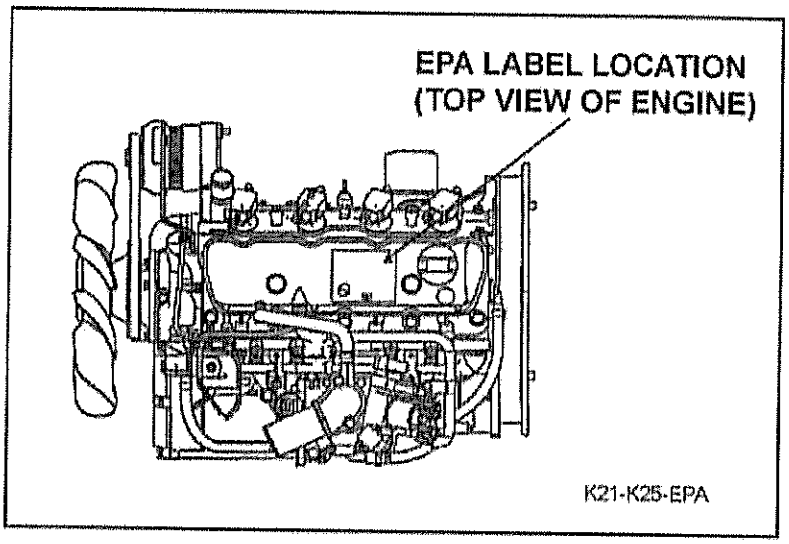
13.3 FEDERAL EPA EMISSION CONTROL STATEMENT FOR OFF-ROAD LSI (NON-DIESEL) ENGINES (K21 AND K25 ENGINES)

This section presents information concerning the correct labeling, warranty, parts and maintenance of K21 and K25 engines in order to comply with the EPA off-road, large-spark-ignition (LSI) engine regulations.

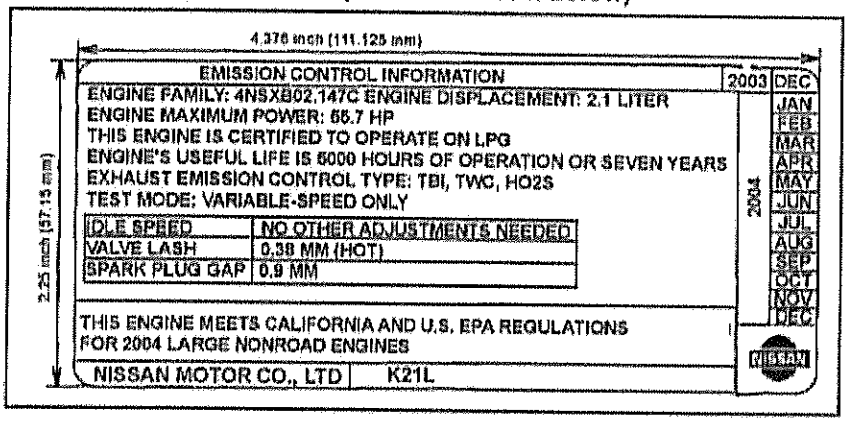
1. LABELS REQUIRED AND LABEL LOCATIONS

All "K" series engines will display the required identification label as follows.

Location on K21/K25 Series engines:



Emission compliance label (SAMPLE shown below)



2. WARRANTY

The following statement is hereby provided as required by regulations of the United States Environmental Protection Agency (EPA).

YOUR WARRANTY RIGHTS AND OBLIGATIONS

All off-road large spark-ignition (LSI) engines must be designed, built and equipped to meet the Federal EPA's stringent anti-smog standards.

Komatsu Forklift USA, Inc. ("KFI") must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, damage, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the carburetor, regulator or fuel-injection system, ignition system, engine computer unit (ECM), catalytic converter and air induction system.

Also included may be sensors, hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, an Authorized Komatsu Forklift Dealer will repair your LSI engine at no cost to you, including diagnosis, parts and labor.

MANUFACTURER'S WARRANTY COVERAGE

Beginning January 1, 2004 off-road large spark-ignition EPA engines are warranted for the time periods listed below. If any emission-related part on your engine is defective, the part will be repaired or replaced by an Authorized Komatsu Forklift Dealer.

OWNER'S WARRANTY RESPONSIBILITIES

As the off-road LSI engine owner, you are responsible for the performance of the required maintenance listed in your Operation and Maintenance Manual.

KFI recommends that you retain receipts covering maintenance on your off-road engine, but KFI cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

As the off-road large spark-ignition engine owner, you should be aware, however, that KFI may deny you warranty coverage if your off-road large spark-ignition engine, or a part thereof, has failed due to abuse, damage, neglect, improper maintenance or unapproved modifications.

Your engine is designed to operate on gasoline and/or LPG fuel. Use of any other fuel may result in your engine no longer operating in compliance with the Federal EPA's emissions requirements.

You are responsible for initiating the warranty process. It is suggested that you present your off-road large spark-ignition engine to an Authorized Komatsu Dealer as soon as you become aware that a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact Komatsu's Product Support Dept. at 1-770-385-4815.

In addition to the standard warranty periods, the components listed below are covered by the following specific warranty periods.

EMISSION CONTROL WARRANTY – 36 MONTHS OR 2,500 HOURS FOR GENERAL PARTS

For the first 2,500 operating hours, or for a period of thirty-six months from the date of the first use by the original purchaser from an Authorized Komatsu Forklift Dealer, whichever occurs first, KFI warrants the following emission-related parts:

- Oxygen sensor
- Water temperature sensor
- LPG injector
- LPG solenoid
- Mass air flow sensor
- Ignition coil
- Camshaft position sensor
- Spark plugs
- PCV valve
- Gasoline injector
- LPG pressure sensor
- LPG switching module
- Throttle chamber
- Crankshaft position sensor
- Distributor

EMISSION CONTROL WARRANTY – 36 MONTHS OR 4,000 HOURS FOR POWER TRAIN PARTS

- Intake manifold
- Exhaust manifold

EMISSION CONTROL WARRANTY – 60 MONTHS OR 3,500 HOURS FOR GENERAL PARTS

- ECM
- Catalytic converter
- Vaporizer

NOTICE

Follow the instructions in the Operations Manual concerning any other maintenance programs not required for EPA compliance.

For questions and additional information concerning EPA Diesel Engine Exhaust Regulations, contact:

Komatsu Forklift USA, Inc.
14481 Lochridge Blvd., Bldg. #2
Covington, GA 30014-4908

Voice phone: (770) 385-4815
Fax phone: (770) 385-4838

13.4 FEDERAL EPA EMISSION CONTROL STATEMENT FOR OFF-ROAD DIESEL ENGINES (4D94E ENGINES)

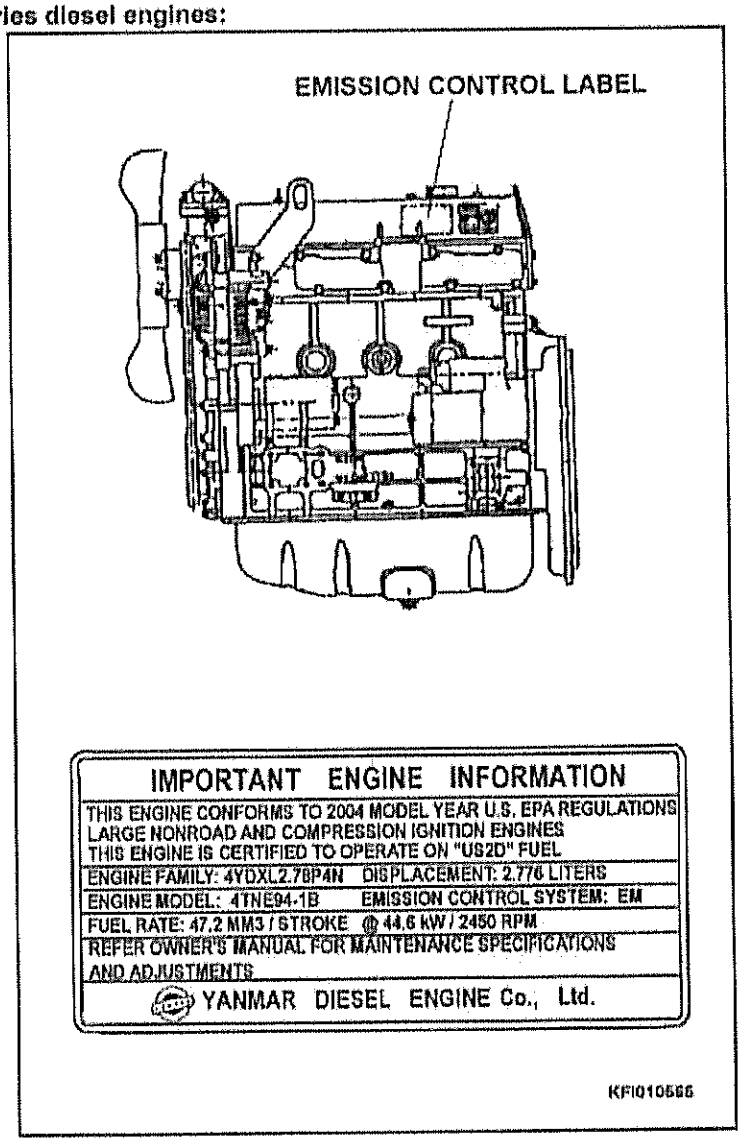
Exhaust emissions produced by diesel engines are regulated by the United States Environmental Protection Agency (EPA). This section presents information concerning the correct labeling, warranty, parts and maintenance of 4D94E diesel engines in order to comply with current EPA regulations.

1. LABELS REQUIRED AND LABEL LOCATIONS

All certified 4D94E diesel engines will display the required identification label as follows:

- 4D94E diesel engines: Labels will be affixed to all appropriate engines on KFI production trucks.

Location on 4D94E Series diesel engines:



2. WARRANTY

The following statement is hereby provided as required by regulations of the United States Environmental Protection Agency (EPA).

YOUR WARRANTY RIGHTS AND OBLIGATIONS

The Federal EPA and Komatsu Forklift USA, Inc. (hereinafter referred to as "KFI") are pleased to explain the emission control system warranty on your 2004 or later Diesel heavy duty off-road engine. All new, heavy-duty off-road engines must be designed, built and equipped to meet the EPA's stringent anti-smog standards. KFI must warrant the emission control system on your engine for the period of time listed below, provided there has been no abuse, damage, neglect or improper maintenance of your engine.

Your emission control system may include parts such as fuel injection pump. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, an authorized Komatsu dealer will repair the heavy-duty off-road engine at no cost to the owner, including diagnosis, parts and labor.

Now, KFI hereby certifies that diesel engines for lift trucks produced in 2004 model year and after shall be regulated by Federal EPA exhaust gaseous regulations. The difference between current and EPA-certified engines is only the label attached on the engine. See available drawing and/or illustration of emission label and its location.

MANUFACTURER'S WARRANTY COVERAGE

Beginning January 1, 2004 heavy-duty off-road EPA engines are warranted for a period of five (5) years, or three-thousand (3,000) hours of operation, whichever occurs first. If any emission-related part on your engine is defective, the part will be repaired or replaced by at an authorized Komatsu Forklift dealer.

EMISSION-RELATED PARTS

- Fuel injection pump
- Fuel injection nozzles
- Turbocharger

OWNER'S WARRANTY RESPONSIBILITIES

As the heavy-duty off-road engine owner, you are responsible for the performance of the required maintenance listed in owner's manual (Instruction Manual). KFI recommends that you retain all receipts and records covering the maintenance on your engine, but KFI cannot deny warranty solely for the lack of receipts and records or for your failure to ensure the performance of all scheduled maintenance. For your reference, the following is an emission control maintenance schedule for certified Diesel engines.

- Check oil level and coolant level – Everyday
- Change of lubricating – Every 200 hours
- Change lubricating oil filter – Every 200 hours
- Initial adjustment of valve clearance – Every 200 hours
- Change fuel filter – Every 500 hours
- Check turbocharger, rebuild or replace if necessary – Every 2,000 hours
- Adjust valve clearance – Every 2,000 hours
- Check fuel injection nozzles, replace if necessary – Every 2,000 hours

Keep records to show proof of compliance with the required maintenance practices and intervals.

- As the heavy-duty off-road engine owner you should, however, be aware that KFI may deny your warranty coverage if your heavy-duty off-road engine or part has failed due to abuse, damage, neglect, improper maintenance or disapproved modifications.
- Your engine is designed to operate on commercial diesel fuel only. Use of any other fuel in our engine will result in the engine operating in non-compliance with the Federal EPA regulations.
  You are responsible for initiating the warranty process. It is suggested that you present your heavy duty off-road engine to an authorized Komatsu dealer as soon as you become aware that problem exists. The warranty repair should be completed by the dealer as expeditiously as possible.
- If you have any questions regarding your warranty rights and responsibilities, you should contact the authorized KFI dealer.

LIMITATIONS

KFI is not responsible for resultant damages to an emission-related part or component resulting from:

- Any application or installation KFI deems improper as explained in the Instruction Manual.
- Attachments, accessory items or parts not authorized for use by KFI.
- Improper off-road engine maintenance, repair or abuse.
- Owner's unreasonable delay in making the product available after being notified of a potential product problem.

This warranty is in addition to the KFI standard warranty applicable to the off-road engine product involved.

Remedies under this warranty are limited to the provision of material and services as specified herein. KFI is not responsible for incidental or consequential damages, such as downtime or lost use of the forklift truck.

CUSTOMER ASSISTANCE – EMISSION CONTROL SYSTEMS WARRANTY

Komatsu Forklift aims to ensure that the Emission Control Systems Warranty is properly administered. In the event that you do not receive the warranty service to which you believe you are entitled under the Emission Control Systems Warranty, call or write to your Komatsu Forklift Dealer.

Authorized dealers are recommended for major maintenance and repair work, as they are staffed with trained personnel, proper tools and are aware of the latest maintenance methods and procedures. Owners and others who desire to perform their own work should purchase a service manual and obtain current service information from their KFI engine dealer.

NOTICE

Follow the instructions in the Operations Manual concerning any other maintenance programs not required for EPA compliance.

For questions and additional information concerning EPA Diesel Engine Exhaust Regulations, contact:

Komatsu Forklift USA, Inc.
14481 Lochridge Blvd., Bldg. #2
Covington, GA 30014-4908

Voice phone: (770) 385-4815
Fax phone: (770) 385-4838

14. EXPLANATION OF COMPONENTS

The following is an explanation of the devices shown on page 2-3 and which are employed to operate the lift truck To carry out suitable operations correctly and safely, it is important to understand fully the method of operating the equipment and the meanings of the displays.

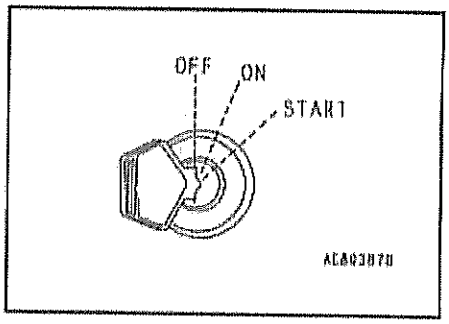
See page 2-3 for exact locations.

1. STARTING SWITCH

This is used to start and stop the engine.

- **Clutch-type lift truck:**
  When starting the engine, place the forward/reverse control lever and high/low speed control lever at the neutral position, pull the parking brake lever, and depress the clutch pedal fully. Then turn the key.

- **TORQFLOW transmission lift truck:**
  When starting the engine, place the forward/reverse control lever at the neutral position, pull the parking brake lever, and depress the inching pedal fully, then turn the key.



OFF: Engine stop position
The key can be inserted or removed. The lamps and horn are activated at this position.

ON: Engine running position
Also activates glow plug preheating circuit in diesel engine BX lift trucks
See "3. GLOW INDICATOR (BX DIESEL ENGINE LIFT TRUCK ONLY) on pg 2-11".

START: Position for starting engine
After the engine starts, release the key. It will automatically return to the ON position.

Precautions for restarting the engine (Applies to gasoline/LPG engine lift trucks only)
When the engine does not start, return the key from the START position to the OFF position. With the anti-restart feature installed, the key cannot be turned to the START position again, if it is returned only to the ON position. Return the key to the OFF position, then restart.

NOTICE

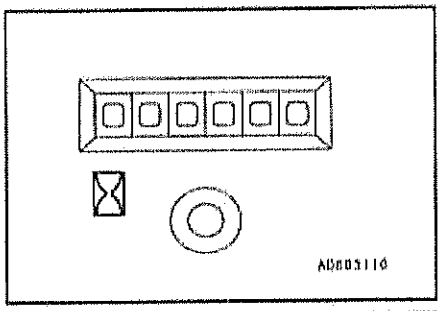
- **When the engine is stopped, do not leave the key at the ON position. This will discharge the battery and make it difficult to start the engine.**
- **Do not run the starting motor continuously for longer than the times given below.**

Gasoline and LPG engine lift truck (AX and BX Models)	**Maximum 5 seconds**
Diesel engine lift truck (BX models)	**Maximum 10 seconds**

- **Do not turn the key to the START position when the engine is running.**

2. **OPERATION INDICATOR**

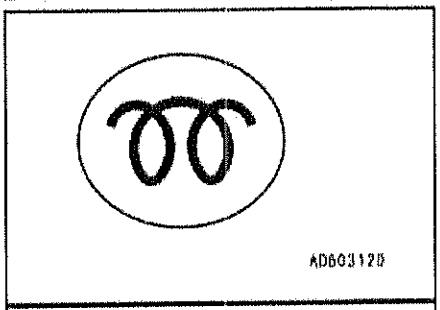
The lamp (green) flashes when the starting switch is turned ON. It shows that the hourmeter is working. (For details of the advance of the numbers on the hourmeter, see "9. HOURMETER".)



3. **GLOW INDICATOR (BX DIESEL ENGINE LIFT TRUCK ONLY)**

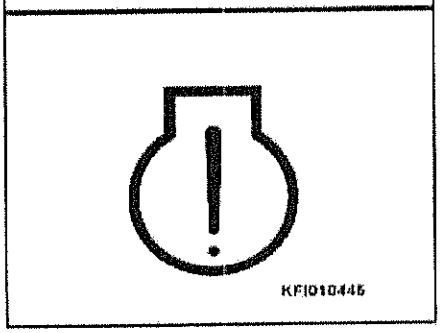
This lamp shows the preheating condition of the engine. It lights up when the starting switch is turned to the ON position and goes off when preheating is completed.

Lamp ON: Glow plug heating
Lamp OFF: Glow plug preheating completed
Start the engine when the lamp goes out.



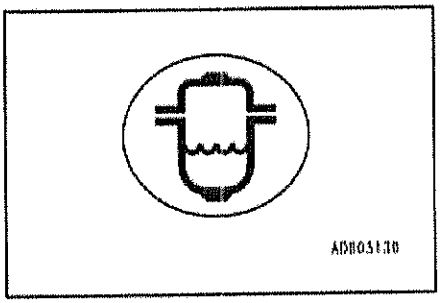
4. **ECU FAILURE WARNING LAMP (GAS/LPG MODELS ONLY)**

If this lamp lights up, contact your Komatsu Forklift dealer for information and corrective procedures.



5. **SEDIMENTER WARNING LAMP (DIESEL ENGINE ONLY)**

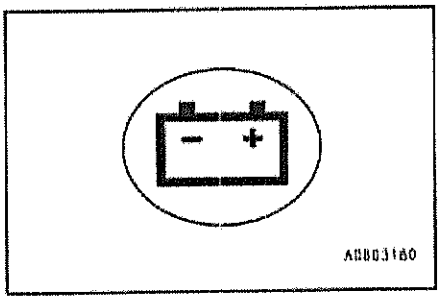
This lamp informs the operator that there is water collected in the fuel filter.
When the starting switch is turned ON, the check is carried out.
Lamp OFF: Normal
Lamp ON: Drain water from fuel filter.
For details of the method of draining the water, see **"DRAIN WATER FROM FUEL FILTER"on page 3-32.**



6. **CHARGE WARNING LAMP**

This lamp informs the operator of the generating condition of the alternator.
When the starting switch is turned ON it lights up, and after the engine starts, it should go off.

If this lamp lights up during operations, check the electrical system.

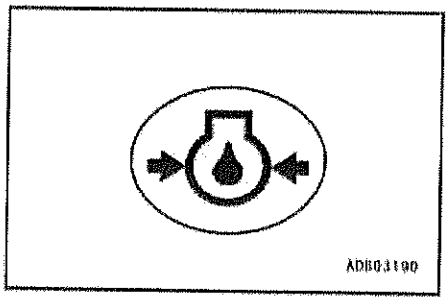


14. EXPLANATION OF COMPONENTS

7. ENGINE OIL PRESSURE WARNING LAMP

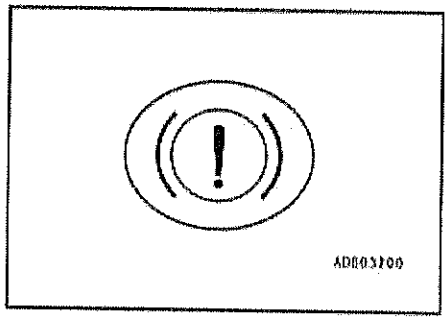
This lamp informs the operator of the engine lubricating oil pressure.
When the starting switch is turned ON it lights up, and after the engine starts it should go off.

If this lamp lights up during operations, stop operations immediately and check the engine lubricating oil system.



8. BRAKE FLUID LEVEL WARNING LAMP

If this lamp lights up, check the brake fluid level and add fluid.

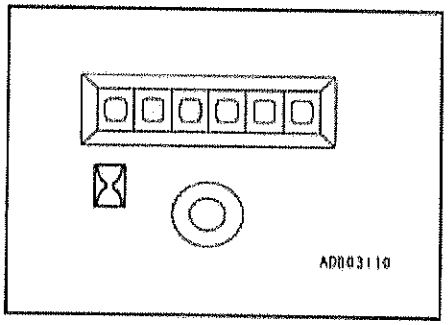


NOTICE

Always use genuine Komatsu Forklift brake fluid.

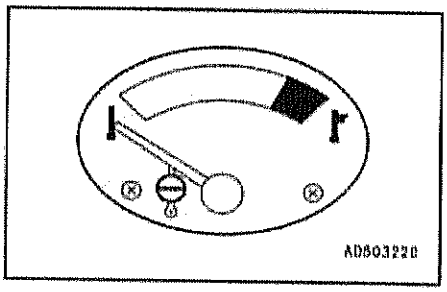
9. HOURMETER

When the starting switch is turned ON, the hourmeter starts moving and displays the total number of operating hours. (When the hour-meter is working, the operating indicator lamp flashes.) The last digit advances by 1 every 6 minutes when the starting switch is at the ON or START position.



10. ENGINE WATER TEMPERATURE GAUGE

The indicator shows the engine water cooling temperature.
White range: Normal
Red range: Overheating

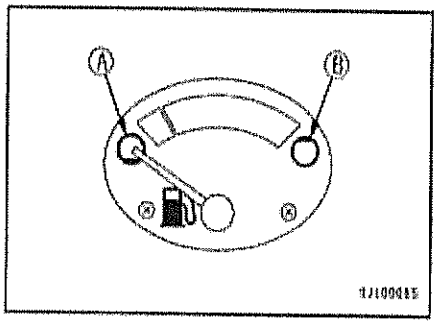


NOTICE

If the indicator enters the red range, stop operations immediately, and move the lift truck to a safe position. Then take corrective actions against engine overheating.
See "17.5 ACTION WHEN ENGINE HAS OVERHEATED" on pge 2-48).

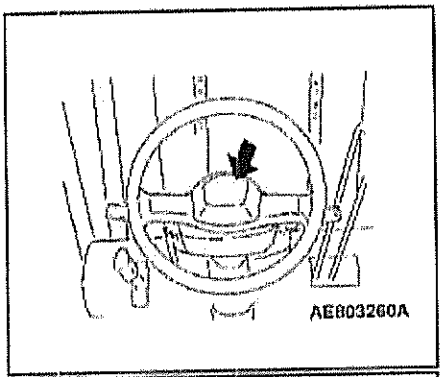
11. FUEL GAUGE

The indicator shows the remaining fuel level.
When the starting switch is turned on, a check is carried out.
(A): Empty
(B): Full
If the lift truck is on a slope, the correct fuel level will not be shown, so always check fuel level when the lift truck is on level ground.
Do not use up all the fuel. Fill the fuel tank before the fuel runs out.
Note that, on LPG or Dual-Fuel equipped trucks, the gauge is partially or completely covered by decals referencing the LPG tank gauge.
(See **"SAFETY LABEL STICKING POSITIONS"** in the SAFETY Section.)



12. HORN BUTTON

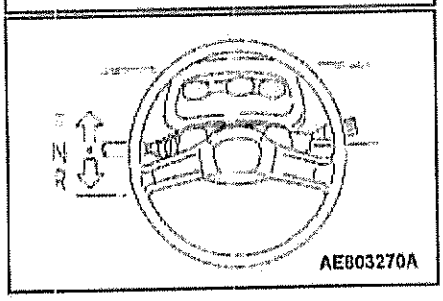
Press the button in the center of the steering wheel to sound the horn.



13. FORWARD/REVERSE SWITCH (TORQFLOW TRANSMISSION)

This switch is used to change the direction of travel (forward/reverse). Use light finger pressure to operate switch.

F: FORWARD
N: neutral
R: REVERSE

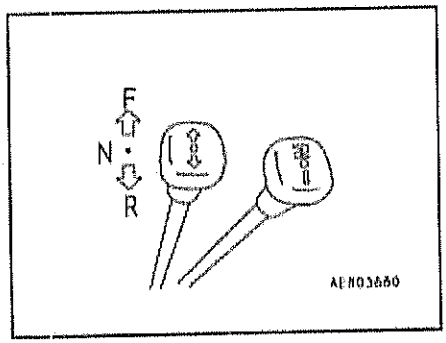


NOTICE

Always stop the lift truck completely before operating the lever to change the travel direction.

REMARK
The engine is equipped with a neutral safety switch and cannot be started if the lever is not at the n (neutral) position.

14. FORWARD/REVERSE LEVER (CLUTCH-TYPE LIFT TRUCK)



WARNING

When starting the engine, return this lever to the neutral position. Always depress the clutch pedal when operating the lever.

This lever is used to change the direction of travel (forward /reverse).

F: FORWARD
N: NEUTRAL
R: REVERSE

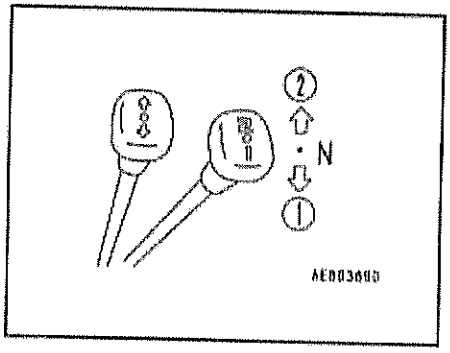
NOTICE

Always stop the lift truck completely before operating the lever to change travel direction.

REMARK
The engine cannot be started if this lever is not at the N (neutral) position. (It is equipped with a neutral safety switch.)

14. EXPLANATION OF COMPONENTS

15. HIGH/LOW SPEED LEVER (CLUTCH-TYPE LIFT TRUCK)



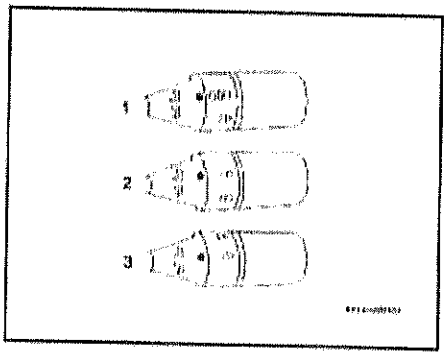
⚠ WARNING

When starting the engine, return this lever to the neutral position. Always depress the clutch pedal when operating the lever.

This lever is used to change the travel speed range.
(2): High speed
(N): neutral
(1): Low speed

16. COMBINATION LIGHT SWITCH

This switch is used to control the lamps.

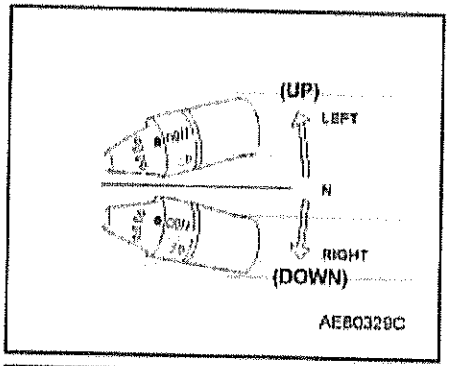


LIGHT SWITCH

Position 1: "OFF" - Parking lamp (side clearance lamp) and front lamps are OFF.
Position 2: Parking lamp (side clearance lamp) lights up.
Position 3: Parking lamp (side clearance lamp) stays lighted up, and front lamp lights up.

TURN SIGNAL INDICATOR SWITCH

This makes the turn signal indicator flash.

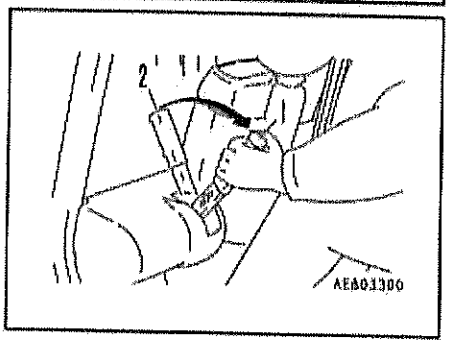


Left turn (L): Push lever forward
Right turn (R): Pull lever back

REMARK

This lever is equipped with an auto-return mechanism, so the lever will return automatically to the neutral position.

17. PARKING BRAKE LEVER



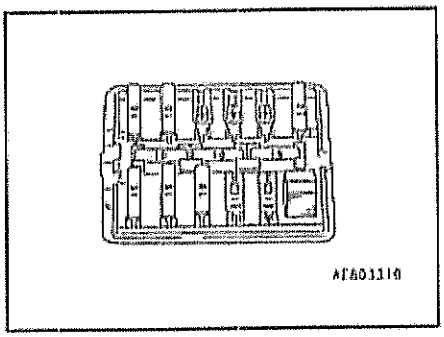
Position 1: Brake is applied.
When the lever is pulled back, the parking brake is applied and the front wheels are locked.
Use this when temporarily stopping or parking the lift truck.

Position 2: Brake is released.
When the lever is pushed forward, the parking brake is released.

18. FUSE BOX

The fuses protect the electrical components and wiring from burning out.

For details of replacing the fuses, see "25.1 REPLACING FUSES". (See page 3-39.)

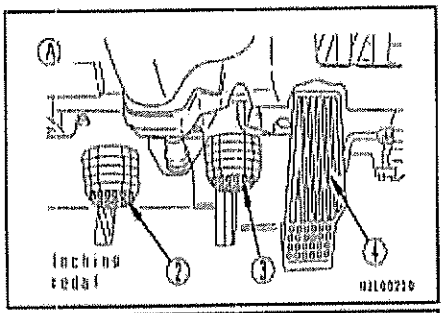


19, 20, 21. PEDALS

(TORQFLOW transmission)

(4): Accelerator pedal
(3): Brake pedal
(2): Inching pedal

- The inching pedal is used for fine control when driving the lift truck slowly forward or in reverse for loading or unloading.

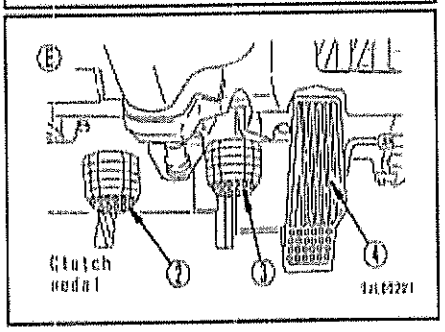


REMARK

Do not put your foot on the clutch pedal or accelerator pedal unless necessary for operation.

(Clutch-type lift truck)

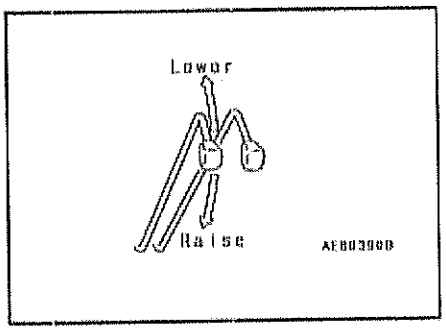
(4): Accelerator pedal
(3): Brake pedal
(2): Clutch pedal



22. LIFT LEVER

WARNING

Sit in the operator's seat and check that the surrounding area is safe before operating the lift lever.



This lever is used to raise and lower the forks.

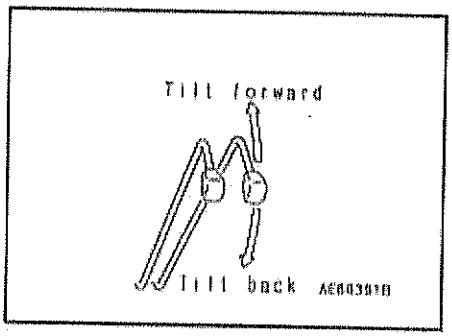
LOWER: Push the lever forward
RAISE: Pull the lever back

REMARK

The speed when raising the forks can be controlled by the amount that the lever is operated and the amount that the accelerator pedal is depressed.
The lowering speed can be controlled only by the amount that the lever is operated.

14. EXPLANATION OF COMPONENTS

23. TILT LEVER



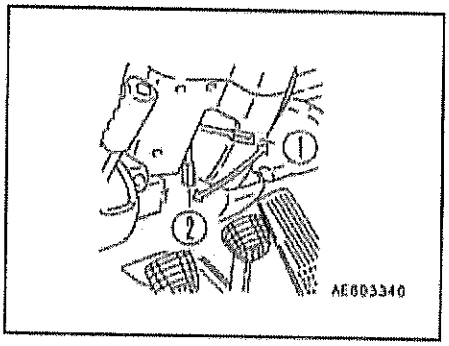
⚠ WARNING

Sit in the operator's seat and check that the surrounding area is safe before operating the lift lever.

This lever is used to tilt the mast forward and back.
Tilt forward: Push the lever forward
Tilt back: Pull the lever back

REMARK
The speed when tilting the mast forward or back can be controlled by the amount that the lever is operated and the amount that the accelerator pedal is depressed.

24. TILTABLE STEERING WHEEL LOCK LEVER



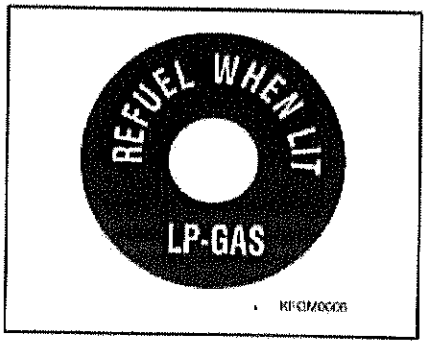
⚠ WARNING

Always stop the lift truck completely before adjusting the position of the steering wheel. After adjusting, move the steering wheel backward and forward to check that it is locked securely in position.

This lever is used to allow the position of the steering wheel to be adjusted and to lock it in position after adjustment.
Position (1): Lock is released
Position (2): Lock is applied

Method of adjustment
1. Pull the lock lever up (position (1))
2. Move the steering wheel forward and backward to adjust to the most suitable position.
3. Pull the lock lever down (position (2)) to lock the steering wheel in position.

25. LPG LOW FUEL ALARM LIGHT (OPTIONAL)



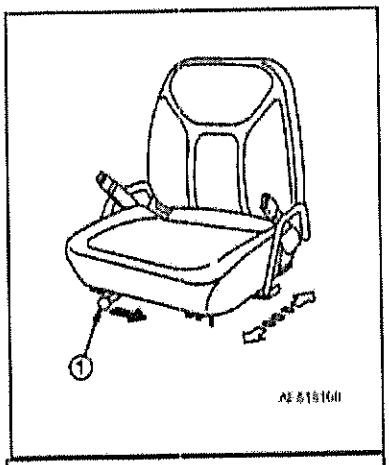
This optional alarm is located on the dashboard near the parking brake lever.
When this light comes on, the level of LPG is low.

• OPERATOR'S COMPARTMENT (ADJUSTINGTHE SEAT)

⚠ WARNING

- **Adjust the seat before starting operations or when changing operators at the beginning of a shift. (Always stop the lift truck before adjusting the seat.)**
- **Adjust the seat to a position where it is possible to depress the brake pedal fully with your back against the backrest of the operator's seat. (Always stop the lift truck before adjusting the seat.)**

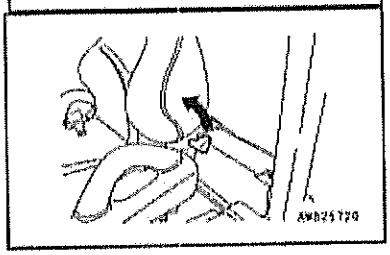
It is possible to slide the seat forward or backward to set it to the optimum position.



• ADJUSTING THE SEAT POSITION

1. Pull lever (1) left. (In this condition, the seat slides forward or backward.)
2. Set the seat to the optimum position, then release lever (1). (In this condition, the seat is locked in position.)

   Fore-and-aft adjustment: 5 in. (127 mm)



• ADJUSTING THE RECLINING ANGLE

(Optional suspension-style seat only)
With the suspension seat, it is possible to adjust the suspension to match the operator's weight in addition to adjusting the fore-and-aft position and reclining angle.

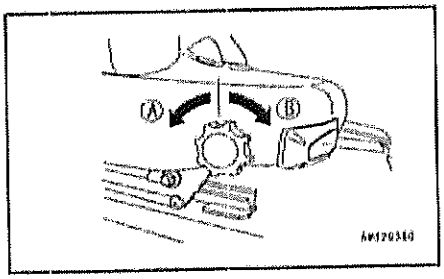
1. Pull up the lever. (When the lever is raised, the angle of the seat back can be adjusted.)
2. Adjust the angle of the seat back to a position where operation is easy, then release the lever.

After adjusting, move the seat lightly to the front and rear to check that it is securely locked in position.

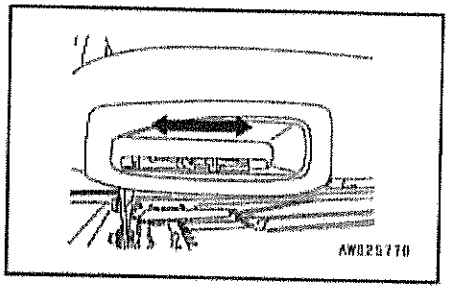
• ADJUSTING THE SUSPENSION

(Suspension-style seat only)

1. Turn the adjustment knob on the right side of the operator's seat to adjust the suspension to match your weight in kilograms.
2. Use the needle indicator and scale located on the front seat near the adjustment knob as a guide when setting the suspension.



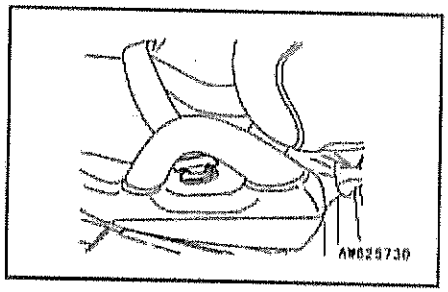
Adjust as follows:
To INCREASE the weight setting, turn to (B)
To DECREASE the weight setting, turn to (A)
(Weight adjustment range: 110 - 265 lbs.(50 - 120 kg)

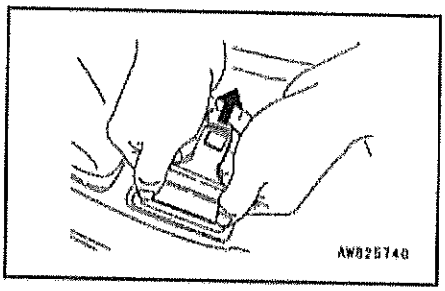


* **FITTING AND RELEASING THE SEAT BELT**

(Standard and suspension-style seats; suspension-style seat shown here)

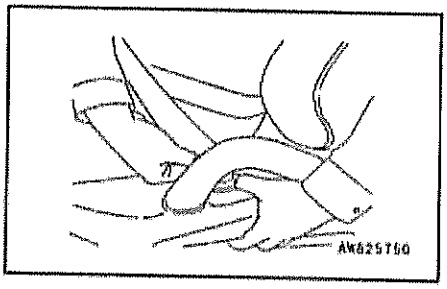
1. Pull the belt out of the holder at the right side of the seat, then insert the tongue into the buckle until it clicks (once it clicks, the seat belt is in the locked position).
   The seat belt is designed to hold the operator stationary when the holder senses a hard pull.
   The seat belt may occasionally bind in its holder. If this happens,hold the belt tongue with both hands, pull it up strongly, then pull the belt out slowly.





2. To unlatch the belt, hold the tongue portion of the belt with your right hand, then press the red button in the buckle with your left hand.

3. Continue to hold the belt and let it retract slowly into the holder.

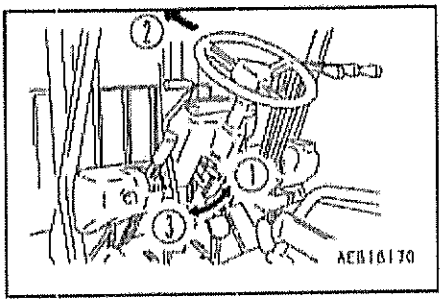


- **ENGINE HOOD**

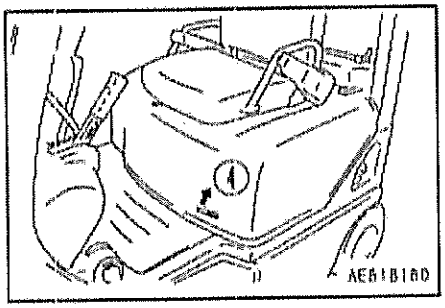
⚠ WARNING

Be careful not to get your hand caught when opening or closing the hood.

- **OPENING THE ENGINE HOOD**
  1. To prevent the hood from touching the steering wheel, lift the tilt steering wheel lock lever (1) and push the steering wheel to the most forward position (2), then return the lock lever to its original position (3).



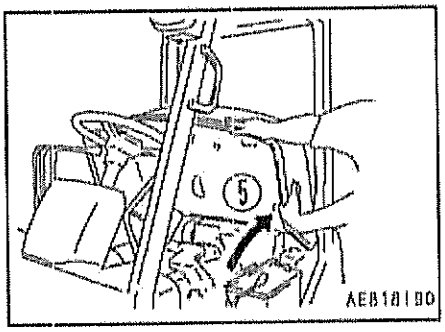
  2. Lift the lever (4) on the front left side of the engine hood with your left hand, and release the hood from the frame.



  3. Lift the hood all the way up (5) until the engine hood stopper fits into place.

     On trucks equipped with LPG capability, the seat back folds forward to clear the tank bracket.

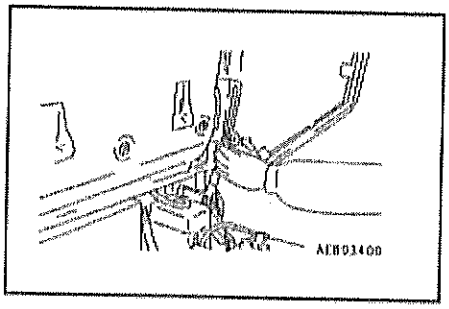
     On LPG trucks using the optional folding tank bracket, the bracket folds away allowing more clearance when the hood is in the UP position.



14. EXPLANATION OF COMPONENTS

- **CLOSING THE ENGINE HOOD**

1. Lift the engine hood up slightly with your right hand, push in the stopper with your left hand, then lower the engine hood slowly and check that the lock is applied.



⚠ WARNING

Be careful not to get your hand caught when closing the hood.

2. Lift the steering wheel lock lever, pull the steering column back to its original position, then return the lock lever to its original locked position.

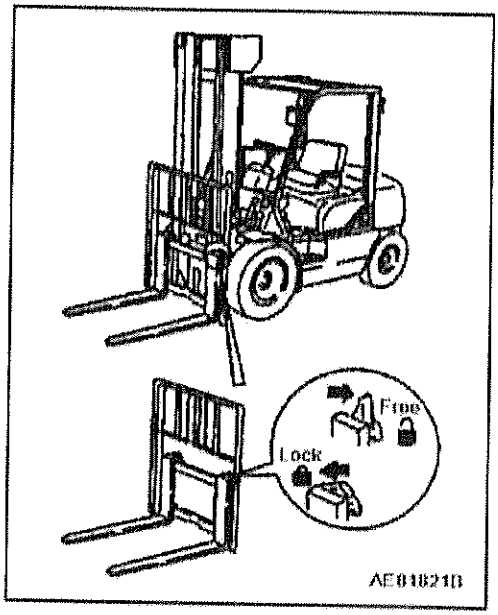
⚠ WARNING

It is dangerous to operate the lift truck with the steering column pushed forward because the steering wheel will not be fixed in position. Always be sure to return the steering column to its original position and check that the lock is securely applied.

- **FORK STOPPER**

LOCK position: The forks are secured to the fork carriage. Always use this position during operations.

FREE Position: The forks can be moved to the left and right, so it is possible to adjust the spread of the forks to match the size of the load.



NOTICE

For details of the method of adjustment, see **"15.8 FORK SPREAD ADJUSTMENT"**.

15.1 CHECK BEFORE OPERATION

⚠ WARNING

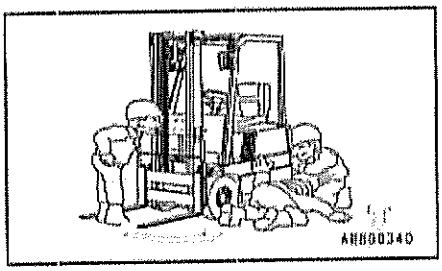
- **Never operate the lift truck before the check operation is completed.**
- **If any abnormality is found during the checking, immediately consult a Komatsu Forklift distributor and do not operate the lift truck until repaired.**
- **Oil or fuel leakage can cause a lift truck fire. Check for any fluid or LPG leakage before starting.**

Check the lift truck thoroughly. If any abnormality is found, always repair it or consult your Komatsu Forklift distributor.

15.1.1 CHECK BEFORE OPERATION (WITH KEY SWITCH OFF)

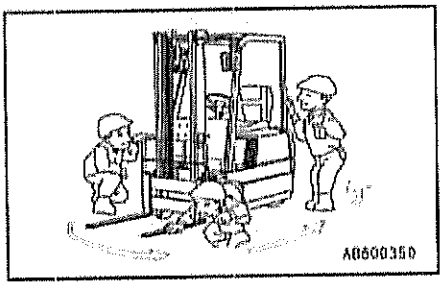
1. **CHECK FOR OIL OR FUEL LEAKAGE, AND BATTERY FLUID LEAKAGE**

   Check for leakage by conducting a walk-around check.
   Check the following items in particular:
   - Tubing
   - Hydraulic unit
   - Cylinder
   - Control valve
   - Battery
   - LPG fuel system connections and fuel level



2. **CHECK FOR CRACKS AND DAMAGE**

   Visually check for cracks and damage.
   Particularly check the following items.
   - Head guard
   - Fork
   - Load back-rest
   - Fork carriage
   - Mast
   - Fuel tank, LPG fuel tank and connections



3. CHECK TIRES AND RIMS

Check the tires and rims for the following items.

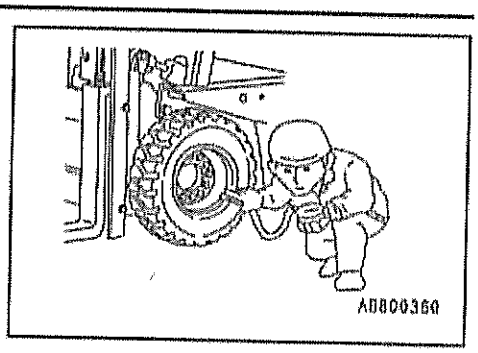
- Whether the tire pressure matches the specified pressure. (Pneumatic tire lift truck only)

Specified pressure:

Front tires: 100 PSI (0.69 MPa) (7.0 kgf/cm^2)

Rear tires: 100 PSI (0.69 MPa) (7.0 kgf/cm^2)

- Check that there are no loose lug nuts or rim mating nuts.



Tightening torque:

Check item	AX lug (hub) nut tightening torque	AX rim mating nut tightening torque*1
Front wheels	114 - 180 ft/lbs (154 - 245 Nm) (16 - 25 kgfm)	65 - 91 ft/lbs (88 - 123 Nm) (9 - 12.5 kgf)
Rear wheels	61 - 108 ft/lbs (83 - 147 Nm) (8.5 - 15 kgfm)	44 - 55 ft/lbs (59 - 74 Nm) (6 - 7.5 kgfm)
Check item	**BX lug (hub) nut tightening torque**	**BX rim mating nut tightening torque *1**
Front wheels	217 - 361 ft/lbs (294 - 490 Nm) (30 - 50 kgfm)	145 - 217 ft/lbs (196 - 294 Nm) (20 - 30 kgfm)*2
Rear wheels	145 - 181 ft/lbs (196 - 245 Nm) (20 - 25 kgfm)	65 - 91 ft/lbs (88 - 123 Nm) (9 - 12.5 kgfm)

*1: Pneumatic tire lift truck only.

*2: Except for 3-ton lift truck (uses different style rim)

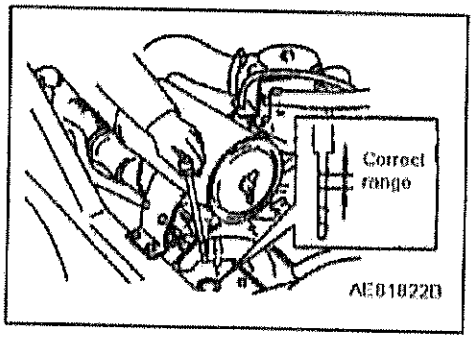
NOTICE

Tighten the lug nuts to the specified torque. (For tightening torque see **"21. SERVICE DATA".**)

- Check the tires for excessive wear, damage, and adhesion of foreign matter.
- Check the tires for deformation or damage.

4. CHECK OIL LEVEL IN HYDRAULIC TANK

1. Lower the forks fully to the floor and stand the mast vertically (perform on flat floor).
2. Open the engine hood and remove the dipstick (combined with breather) on the right side of the lift truck. (Diesel engine shown at right; gasoline engine similar.)
3. Wipe off hydraulic oil with a clean cloth and insert dipstick into the tank.
4. Take out the dipstick again and check to see if it indicates the proper level.
5. If the oil level is low, add genuine Komatsu Forklift oil through the filler.



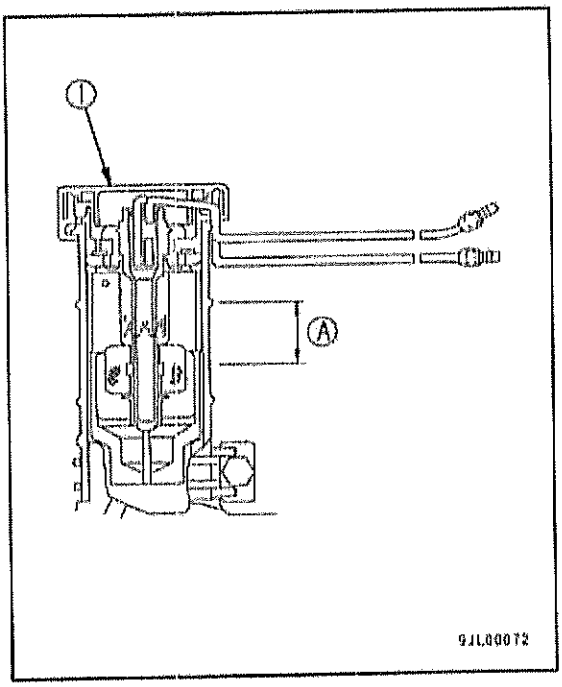
NOTICE

Always use genuine Komatsu Forklift hydraulic oil.

5. CHECK OIL LEVEL IN BRAKE RESERVOIR TANK
   1. Remove the floor plate.
   2. Remove the connector of the brake fluid level sensor, then remove the cap (1).

   Correct range: The oil should be within the correct range.

   Correct range (A): 0.7 In. (18 mm)
   3. If the oil level is low, add genuine Komatsu Forklift brake fluid.



NOTICE

Always use genuine Komatsu Forklift brake fluid.

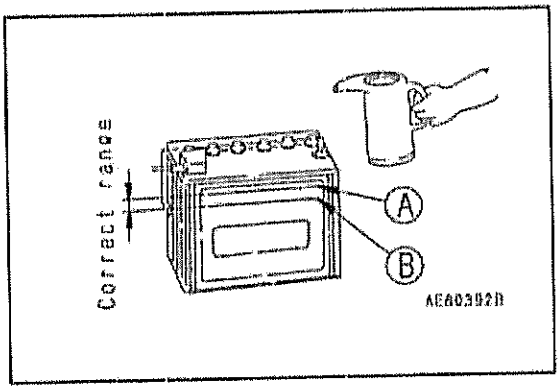
   4. Install the cap
   5. Install the floorboard and close the engine hood.

6. CHECK BATTERY ELECTROLYTE LEVEL

⚠ WARNING

- **Battery electrolyte is dangerous. If it gets in your eyes or on your skin or clothes, wash it off with large amounts of water. In particular, if it gets in your eyes, consult a doctor quickly.**
- **To avoid gas explosions, do not smoke or cause short circuits or sparks near the battery.**

If the battery electrolyte is below the top of the electrode plates, add distilled water to the top of the electrode plates.



Check the battery case for cracking and stain caused by electrolyte leakage.

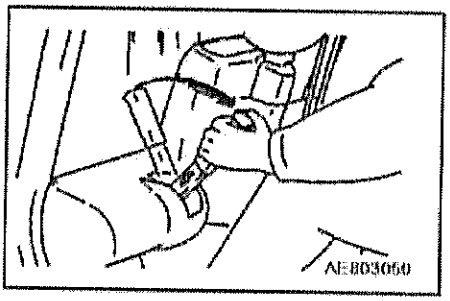
Clean the battery cap breathers and terminals.

NOTICE

- **If the battery electrolyte has spilled and the level has gone down, have your battery repair shop add dilute sulfuric acid of the same density.**
- **Do not use a metal funnel when using distilled water or dilute sulfuric acid.**

7. CHECK PARKING BRAKE

The operating effort for the parking lever should be 55 lbf (245 N) (25 kgf). If it is less then 44 lbf (196 N) (20 kgf), please contact your Komatsu Forklift distributor.



8. CHECK HORN

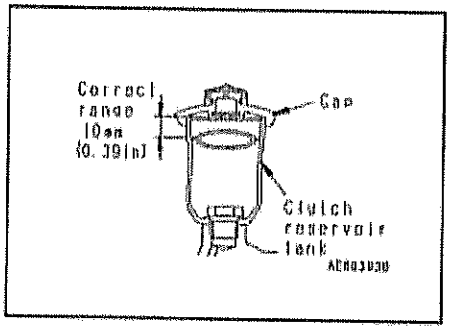
Check that the horn sounds normally when the horn button is pressed.

9. CHECK LAMPS

Check that the head lamps and turn signal lamps work properly. Check also for any dirt on, or damage to, the lamps.

10. CHECK OIL LEVEL IN CLUTCH RESERVOIR TANK

1. Open the inspection cover in the floorplate.
2. Remove the cap and the center cover, and check that the oil level is within the correct range.



Correct range: The oil level should be within a range of 0.39 in. (10 mm) from the cap as shown.

3. If the oil level is low, add genuine Komatsu Forklift brake fluid.

NOTICE

Always use genuine Komatsu Forklift brake fluid in the clutch reservoir tank.

4. Install the cap and the center cover.

NOTICE

Install the center cover with the embossed letters facing up.

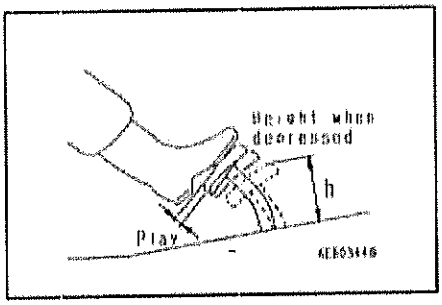
5. Close the inspection cover in the floorplate, and fit the floor mat back into place.

11. CHECK PEDAL

Depress the pedal and check that there is no abnormal heaviness or catching.

BRAKE PEDALS

Play	0.51 - 0.67 in. (13 - 17 mm)
Pedal height when depressed (h)	3.54 - 3.94 in. (90 - 100 mm)



CLUTCH PEDAL (CLUTCH-TYPE LIFT TRUCKS)

Play	0.12 - 0.20 in. (3 - 5 mm)

INCHING PEDAL (TORQFLOW TRANSMISSION LIFT TRUCKS)

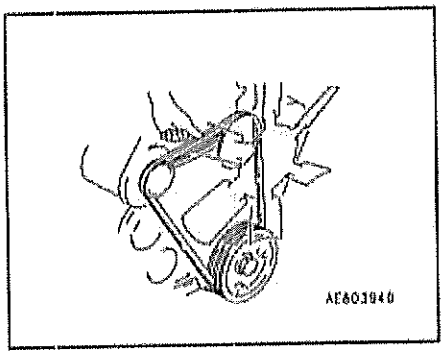
Play	0.08 - 0.12 in. (2 - 3 mm)
Interconnected travel	1.85 - 2.09 in. (47 - 53 mm)

REMARK

The interconnected travel is the distance that the brake pedal and inching pedal move together.

12. CHECK DEFLECTION OF DRIVE BELT

Push the belt at the mid-point between the pulleys with your finger and check that the deflection is the specified value.



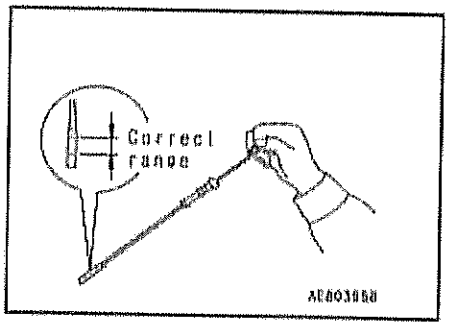
AX/BX Gas and LPG	0.43 - 0.51 in. (11 - 13 mm) (98 N finger pressure) (10 kgf finger pressure)
BX Diesel	0.39-0.59 in. (10 - 15 mm) (98 N finger pressure)

NOTICE

Replace the belt if the belt is stretched and there no allowance for adjustment, or if the belt is cut or cracked.

13. CHECK OIL LEVEL IN ENGINE OIL PAN

Use the dipstick to check that the oil is within the correct range. If the oil level is low, add engine oil through the oil filler.



NOTICE

- **If the oil is markedly dirty or discolored, change the oil.**
- **Always use genuine Komatsu Forklift engine oil. (See "20. LUBRICANT LIST".)**

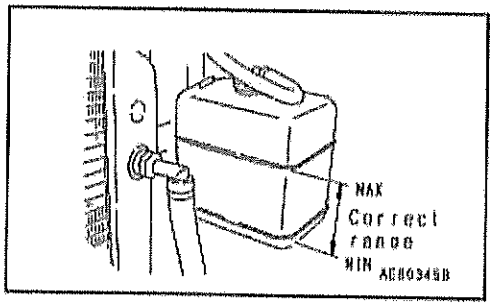
14. CHECK COOLANT LEVEL

WARNING

- **Normally, do not open the radiator cap. Check the coolant when the engine is cold, and check using the reservoir tank.**
- **NEVER remove the radiator or sub-tank cap when the coolant is hot. Boiling water may spurt out.**
- **When removing the radiator cap after the coolant temperature has gone down, turn the cap slowly to release the pressure before removing it.**

NOTICE

Even if coolant level in sub-tank is normal, check radiator coolant level every month or 200 hours on hour meter. If radiator coolant level is lower than specified, that may make overheating likely.



Check radiator and hoses for any water leakage.
Check that coolant in reservoir is cold, and add coolant to MAX level.
If reservoir is dry, add coolant to radiator and then to reservoir tank.
Also check deflection of V-belt (See **"12. CHECK DEFLECTION OF DRIVE BELT"** on page 2-25.

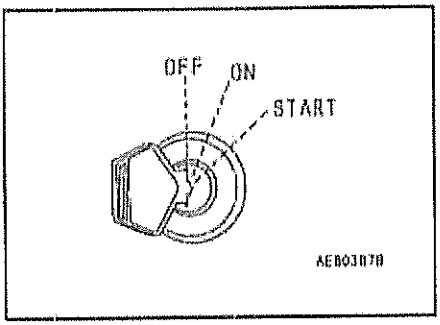
15. CHECK ABNORMALITIES FOUND ON PREVIOUS DAY

If any abnormality was found during the checks or operation on the previous day, check that the repairs have been carried out and that there is no abnormality.

NOTICE

On LPG trucks, open the Fuel Service Valve, on the tank, by turning it *gently* counterclockwise. Turning the valve clockwise shuts off the LPG flow to the engine.

15.1.2 CHECK AFTER STARTING (WITH STARTING SWITCH ON)



This switch is used to start and stop the engine (see page 2-33).

- **Clutch-type lift truck:**
  When starting the engine, place the forward/reverse control lever and high/low speed control lever at the neutral position, pull the parking brake lever, and depress the clutch pedal fully, then turn the key.

- **TORQFLOW transmission lift truck:**
  When starting the engine, place the forward/reverse control lever at the neutral position, pull the parking brake lever, and depress the inching pedal fully, then turn the key.

OFF: Engine stop position
The key can be inserted or removed. The lamps and horn are activated at this position.

ON: Engine running position
Also activates glow plug preheating circuit in diesel engine BX lift trucks
See **"3. GLOW INDICATOR (DIESEL ENGINE LIFT TRUCKS ONLY)" on pg 2-11.**

START: Position for starting engine
After the engine starts, release the key. It will automatically return to the ON position.

Warming up the engine
Let the engine warm up for five or six minutes. On LPG trucks, do not depress the accelerator too far after starting or during warmup. This may cause freezing of the regulator and/or damage to the engine.

Precautions for restarting the engine (Applies to gasoline and LPG engine lift trucks only)
When the engine does not start, return the key from the START position to the OFF position. With the anti-restart feature, the key cannot be turned to the START position again from just the ON position. Return the key to the OFF position and then restart.

NOTICE

Read **"15.2 MOUNTING/DISMOUNTING"**, **"15.3 OPERATOR'S SEAT POSITION ADJUSTMENT"** and **"15.4 PLACING LIFT TRUCK IN MOTION"**, then check the following items.

16. CHECK FOR ABNORMAL NOISE, ABNORMAL VIBRATION
Check in particular that there is no abnormal noise or abnormal vibration from the engine or hydraulic pump.

17. CHECK ENGINE EXHAUST GAS COLOR

No color, light blue:	Normal
Black:	Incomplete combustion
White:	Oil leaking into cylinder

18. CHECK FUEL LEVEL IN FUEL TANK

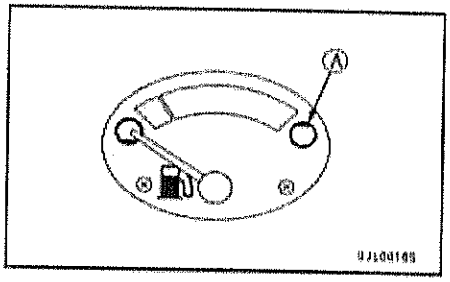
NOTICE

WARNING

When adding fuel, never let the fuel overflow. This may cause a fire. If you spill fuel, clean up any spillage.

Never use any fuel mixed with kerosene. (Diesel engine lift truck)

If the fuel gauge indicator is at the (A) position, the tank is full.
If the fuel level is low, stop the engine and fill the tank through the fuel filler port.
For details of the fuel to use, see "20. LUBRICANT LIST".



When adding fuel, remove all dirt from around the cap and be careful not to let any dirt get into the tank.
After adding fuel, tighten the fuel filler cap securely and wipe up any fuel that was spilled.

LPG engine lift trucks

Check the fuel gauge indicator on the LPG tank.

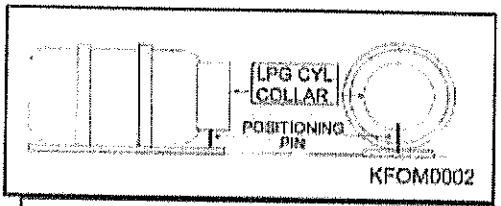
REMOVAL AND INSTALLATION OF LPG FUEL TANKS ON LIFT TRUCK

WARNING

- **Review "SAFETY" Section Warnings before changing tanks.**
- **Use trained and qualified personnel only.**
- **NO SMOKING during tank change operation.**

REMOVING LPG TANK FROM LIFT TRUCK

1. Close fuel service (cylinder) valve (turn clockwise) with engine running.
2. Let engine run out of fuel in lines before turning OFF ignition switch.
3. Remove fuel hose connection at tank and release the tank clamp.
4. Remove LPG tank from vehicle and place in designated area.



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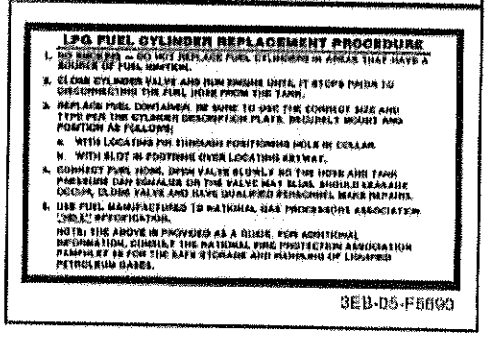

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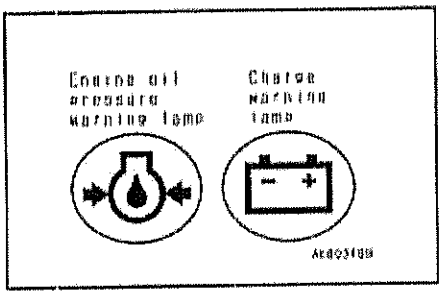
INSTALLING LPG FUEL TANK ON LIFT TRUCK

1. Place correct size and type LPG fuel tank onto lift truck.
2. Securely mount the tank while positioning as follows:
   a. Locating pin must fit through positioning hole in collar.
   b. Slot in footring must fit over keyway.
3. Connect LPG fuel hose to tank securely and open fuel service valve SLOWLY to gently equalize pressure.
4. Check for leakage at connections. If leakage is suspected, check with soapy water and look for bubbles at connections. If leakage is confirmed, turn OFF fuel service valve, tag truck "OUT OF SERVICE" and have qualified personnel make repairs.

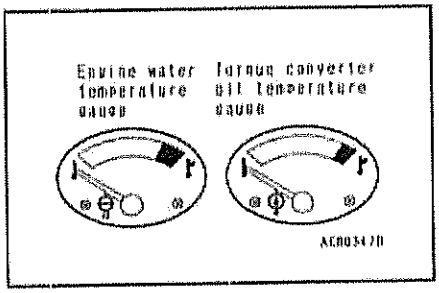
19. CHECKS USING GAUGES AND WARNING LAMPS (ENGINE OIL PRESSURE WARNING LAMP, CHARGE WARNING LAMP)

These lamps should not light up.



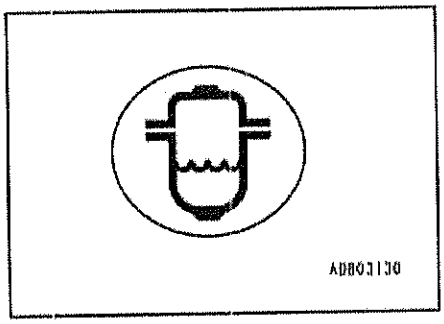
(ENGINE WATER TEMPERATURE GAUGE, TORQUE CONVERTER OIL TEMPERATURE GAUGE)

The indicator should be in the white range.



(SEDIMENTER WARNING LAMP) (Diesel only) (BX models)

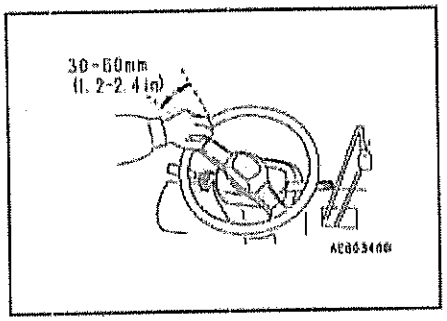
This lamp should not light up. If it lights up drain the water from the fuel filter.
(See "**24.6.1 DRAIN WATER FROM FUEL FILTER**".)



20. CHECK STEERING WHEEL

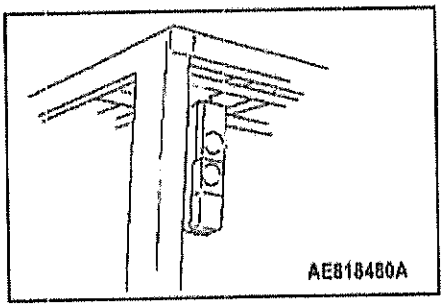
Check the following points.

- Play (the play should be 1.2 - 2.4 in. (30- 60 mm).
- There must be no up-down play.



21. CHECK LAMPS AND BACK-UP BUZZER

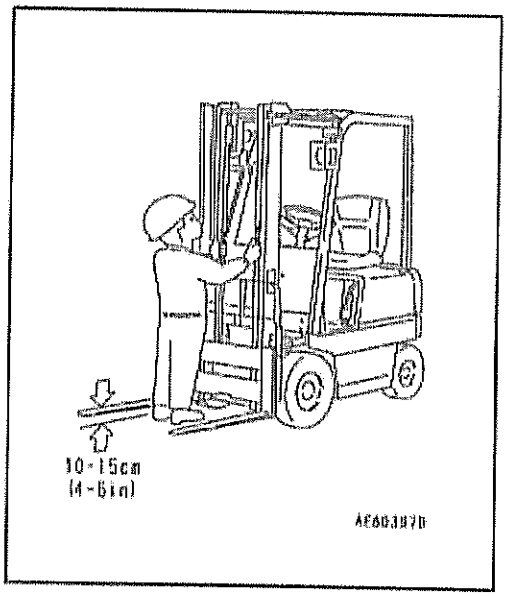
- Check that the lamps light up correctly. Replace any broken bulbs.
- For trucks equipped with the back-up buzzer option, check that the back-up buzzer sounds when the forward/reverse lever is placed in REVERSE. If the back-up buzzer does not sound when the forward/reverse lever is placed in REVERSE, carry out repairs or replacement immediately.



22. CHECK LIFT-CHAIN

⚠ WARNING

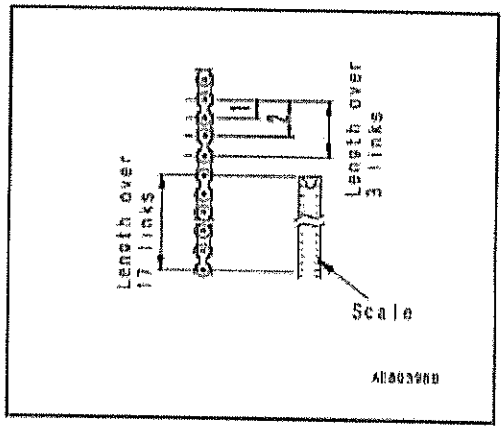
- **Set the forward/reverse control lever to the neutral position and apply the parking brake. Then perform checking.**
- **NEVER insert feet under the forks.**



Check lift-chain tension

1. Lift the forks 4 - 6 in. (10 - 15 cm) from the ground.
2. Check the right and left deflections of the lift-chain by pressing it at the center.
   The tension is normal when both deflections are approximately equal.
3. If the deflections differ from each other, adjust with the nut of the lift-chain stopper bolt.

- **Check elongation of the lift-chain**
  Measure the length over 17 links and check that the length is within the following specified value.



Length over 17 links	
AX models (all)	Max. 10.8 in. (275.5 mm)
BX 2.0 and 2.5 ton lift trucks	Max. 13.1 in. (332 mm)
BX 3.0 ton lift trucks	Max. 21.7 in. (550 mm)

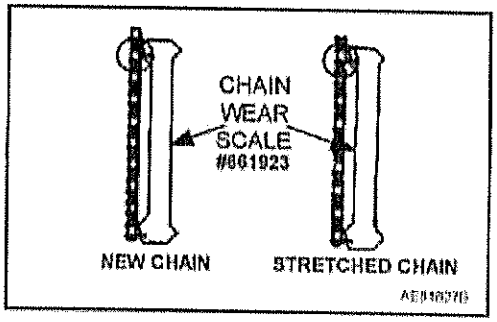
NOTICE

Replace the chain if the measurement value exceeds this range.

The elongation of the lift-chain can be checked with the following "chain wear scale" also.

Regular inspection and lubrication of the chains will increase their service life and reduce downtime.
If the chains stretch beyond the recommended amount, they should be replaced in pairs. Chain stretch can be measured with chain wear scale part No. 661923.
Measure the chains according to the instructions printed on the chain wear scale, without a load on the carriage.

To check the hoist chains, raise the carriage 12.0 in. (30 cm) off the ground to put tension on the chains.



- **Check the lift-chain lubricant**

⚠ WARNING

- **The lift-chain is liable to break if heavily rusted.**
- **If lubrication is insufficient, apply engine oil to prevent rusting.**
- **Visually check the lift-chain for damage or cracks. If any abnormality is found, consult your Komatsu Forklift distributor.**

NOTICE

Use genuine Komatsu Forklift engine oil.
(See "20. LUBRICANT LIST".)

15.1.3 CHECK WHILE ADVANCING SLOWLY

23. CHECK STEERING WHEEL OPERATION

Check the following items while advancing slowly.

- No deviation of steering wheel.
- No unstable steering in straight travel.
- No feeling of abnormally heavy steering when the steering wheel is turned.

24. CHECK BRAKE OPERATION

Check the following items by depressing the brake pedal to apply the brake while advancing slowly.

- The brake is properly applied.
- The brake is applied uniformly.

25. CHECK OPERATION OF CLUTCH PEDAL (CLUTCH-TYPE LIFT TRUCK)

- When the pedal is depressed, the clutch must be completely disengaged with a margin to spare.
- When the pedal is released, there must be no slipping of the clutch.

26. CHECK OPERATION OF INCHING PEDAL (TORQFLOW TRANSMISSION LIFT TRUCK)

- Depress the pedal slightly (partially engage the transmission) and check that it is possible to carry out inching.
- Check that the lift truck stops when the pedal is completely depressed.

27. CHECK FOR ABNORMAL NOISE, ABNORMAL SMELL

Check that there is no abnormal noise or abnormal smell when traveling at low speed.
Check for odor of LPG, on LPG equipped lift trucks.

15.1.4 CHECKS WHILE OPERATING CONTROL LEVERS

28. CHECK OPERATION OF WORK EQUIPMENT

Operate the work equipment control levers from the operator's seat and check that the forks can be raised and lowered and that the mast can be tilted forward and back smoothly.
If there is any abnormality, please contact your Komatsu Forklift distributor immediately.

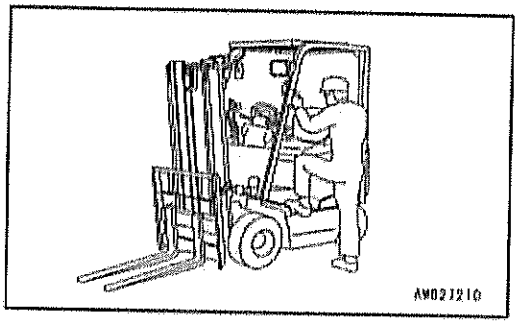
29. CHECK FOR ABNORMAL NOISE, ABNORMAL SMELL

Operate the work equipment control levers from the operator's compartment and check that there is no abnormal noise or abnormal smell during travel.

15.2 MOUNTING/DISMOUNTING

⚠ WARNING

- **Always mount/dismount only after first completely stopping the lift truck.**
- **NEVER jump on or off the lift truck as this is very**

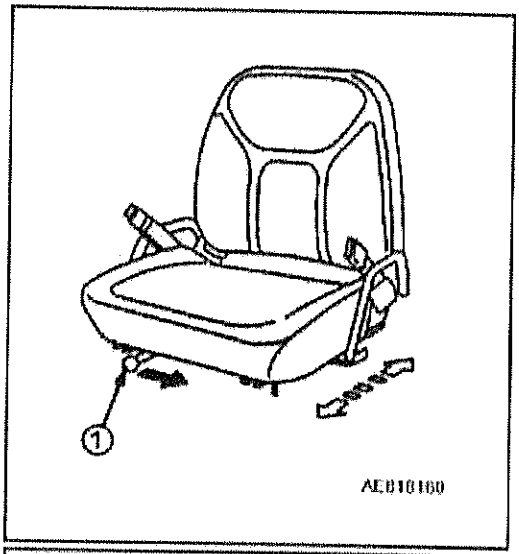


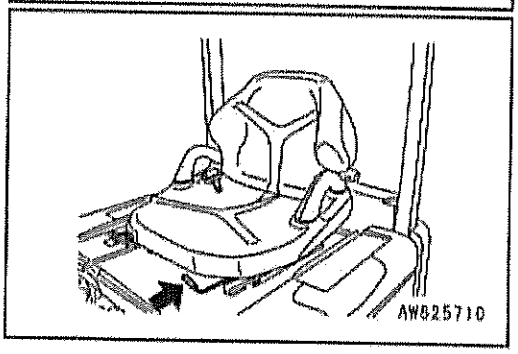
Mount and dismount facing the lift truck, using the foot of the head guard as shown in the illustration.

15.3 OPERATOR'S SEAT

ADJUSTING THE SEAT POSITION

1. Set the parking brake.
   ("15.7 TEMPORARY STOPPING AND PARKING".)
2. Sit in the seat and lift the lever (number 1 for standard seat in upper illustration; at arrow for suspension-style seat in bottom illustration).
   The standard seat adjustment range is 5.0 in. (127 mm) forward and backward.
   The suspension-style seat adjustment range is 5.5 in. (140 mm) forward and backward.
3. Set the seat to a position where operation is easy, then release your hand to lock the lever. (Seat will lock.)
4. After setting the seat position, confirm that it is firmly locked by trying to slide it forward and backward.

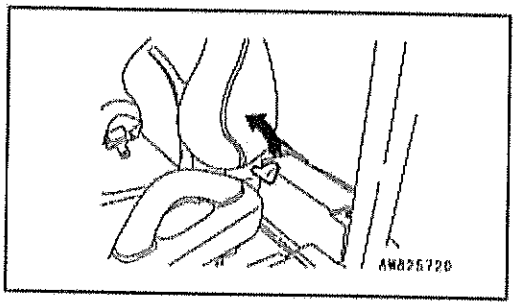




ADJUSTING THE SEATBACK RECLINING ANGLE

(Optional suspension-style seat only)

1. Pull up the lever. (When the lever is raised, the angle of the seat back can be adjusted).
2. Adjust the angle of the seat back to a position where operation is easy, then release the lever.
   After adjusting, try to move the seat lightly to front and rear to check that it is securely locked into position.



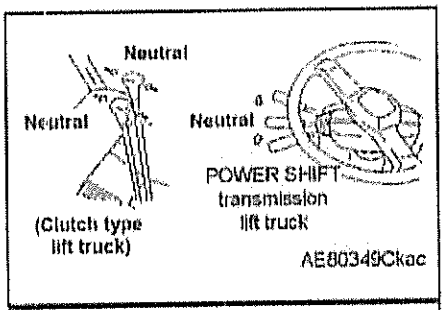
15.4 PLACING LIFT TRUCK IN MOTION

⚠ WARNING

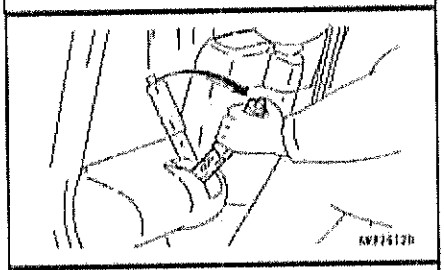
- ***Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause serious bodily injury or fire.***
- **When placing lift truck in motion, check that the area around the lift truck is safe and sound the horn before starting.**
- **Do not allow anyone to enter the area around the lift truck.**
- **There is a blind-spot behind the lift truck, so be particularly careful when traveling in reverse.**
- **When starting the engine, set the forward/reverse control lever and high/low speed control lever (clutch-type lift truck) to the neutral position and pull the parking brake lever, then depress the clutch pedal (inching pedal for lift trucks with torque converter) and start engine.**

STARTING ENGINE

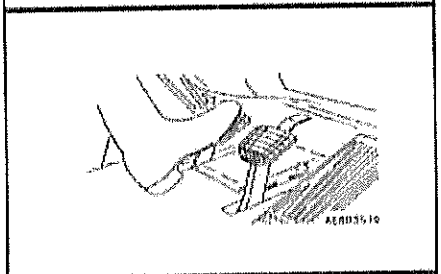
1. Set the forward/reverse control lever and high/low speed control lever to the neutral position.



2. Pull the parking brake lever.

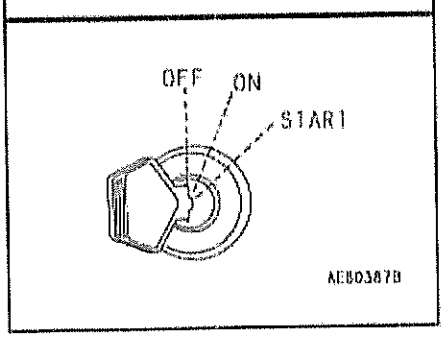


3. Depress the clutch pedal (clutch-type lift trucks) or inching pedal (TORQFLOW transmission lift trucks).



4. **Gasoline engine lift truck:** Depress the accelerator pedal fully, then slowly release it. (If the engine is warmed up, there is no need to depress the accelerator pedal.) With the accelerator pedal released, turn the starting switch to the START position to start the engine.

   LPG engine lift truck: Open fuel service valve at tank. Turn ignition switch to START position without depressing the accelerator pedal. As the engine starts, depress accelerator pedal gently. Do not depress pedal too far until warmed up.



Diesel engine lift truck: Turn the starting switch to the ON position. When the glow plug lamp goes out, turn the key to the START position *without using the accelrator pedal*. Allow the key to return to the ON position after the engine has started.

5. When the engine starts, release the key. (The key will return automatically to the ON position.)

6. Carry out the warming-up operation as directed below.
   Gasoline engine lift truck: Warm up the engine for approx. 1 minute, then depress the accelerator pedal slightly and release it. If the ambient temperature is high, depress the accelerator pedal lightly after starting, then release it. The engine speed will go down, and this will make it possible to carry out the warming-up operation more quietly, and will also save fuel.

   LPG engine lift truck: If engine does not start easily, do not "pump" the pedal or hold it open during starting to avoid damage to the regulator and the engine. Wait for about 2 minutes and retry.

   Diesel engine lift truck: Let the engine idle for a full 60 to 90 seconds *without using the accelerator pedal*..

NOTICE

- **Do not run the starting motor continuously for longer than the times given below.**

Gasoline/LPG engine lift truck	**Max. 5 seconds**
Diesel engine lift truck	**Max. 10 seconds**

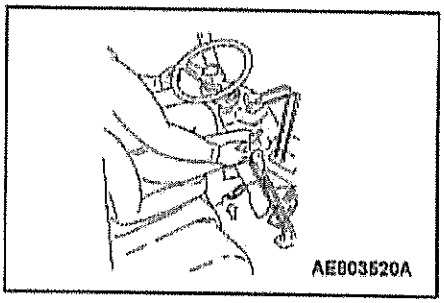
- **If the engine does not start, wait for at least 20 seconds (LPG engine - wait 2 minutes) before trying to start again.**
- **Do not turn the key to the START position when the engine is running.**

PLACING LIFT TRUCK IN MOTION

NOTICE

Do not rest your feet on the clutch pedal or inching pedal if you are not operating the pedal.

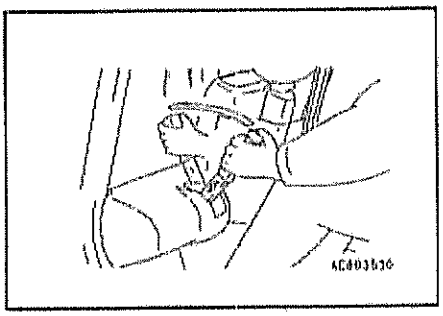
Clutch-type lift truck:
Depress the clutch pedal, set the forward/reverse control lever to the F or R position, and set high/low speed control lever to position 1.



TORQFLOW transmission lift truck:

Depress the inching pedal and place the forward/reverse control lever at F or R position.

Release the parking brake and check that the direction of travel and the area around the lift truck are safe.

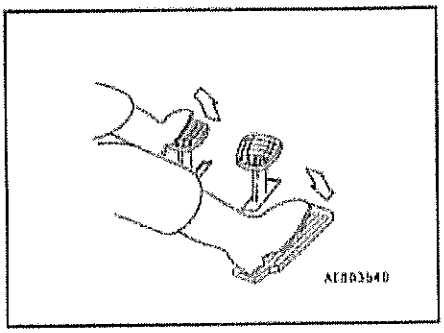


Clutch-type lift truck:

Depress the accelerator slowly with your right foot while releasing the clutch pedal slowly with your left foot.

TORQFLOW transmission lift truck:

Depress the accelerator pedal slowly with your right foot while releasing the inching pedal slowly with your left foot.

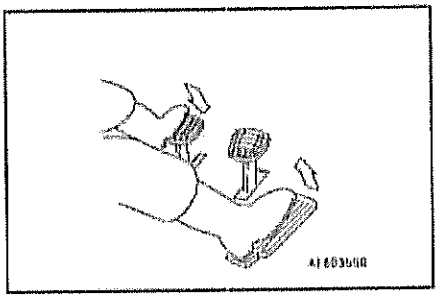


REMARK

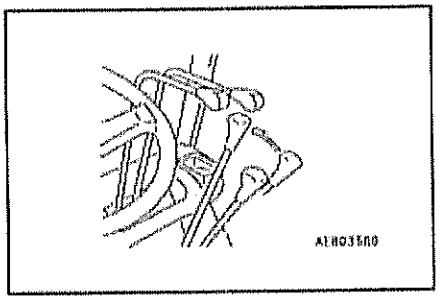
With the clutch pedal or inching pedal partially engaged, it is possible to carry out inching.

SHIFTING GEAR (CLUTCH-TYPE LIFT TRUCK)

Release the accelerator pedal and depress the clutch pedal at the same time.



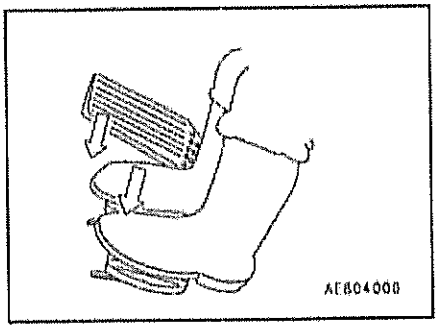
Shift the high/low speed control lever as shown. When it meshes, gradually release the clutch pedal while depressing the accelerator pedal.



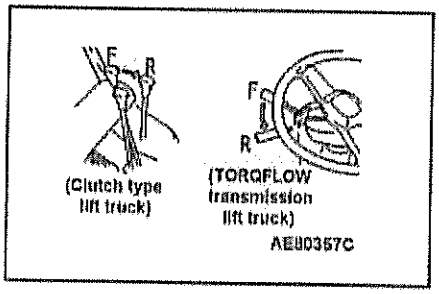
SHIFTING DIRECTION

Always stop the lift truck completely before shifting between forward and reverse.

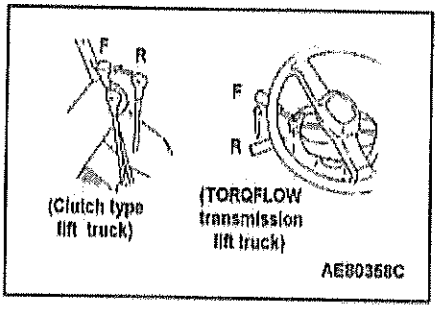
Stop the lift truck completely. (For details of the method of stopping the lift truck, see "**15.7 TEMPORARY STOPPING AND PARKING**".)



Move the forward/reverse control lever from F to R.



Or move the forward/reverse control lever from R to F.

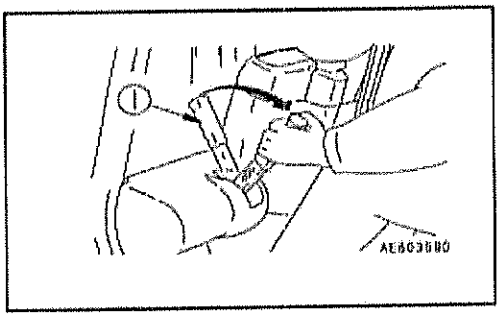


15.5 STARTING AND INCHING ON SLOPE

⚠ WARNING

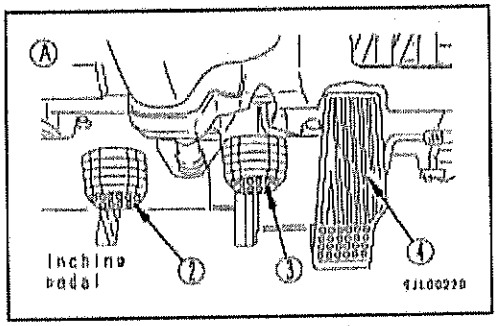
NEVER carry out inching by depressing the accelerator pedal fully and then adjusting the amount the brake pedal is depressed.

1. When starting the lift truck on a slope, first pull parking brake lever (1) and check that the lift truck is held in position.



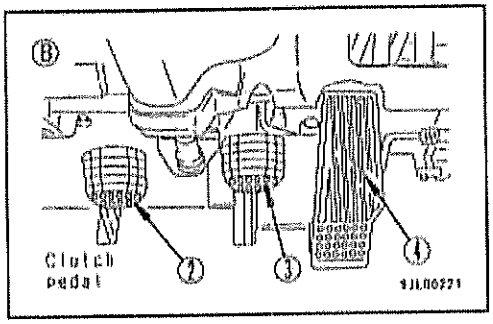
2. Depress accelerator pedal (4) a little at a time (for the clutch-type lift truck, release the clutch pedal at the same time), then release parking brake lever (1) slowly so that the lift truck starts up the slope.

3. When the lift truck starts to move up the slope, release parking brake lever (1) fully. Adjust the uphill travel speed with accelerator pedal (4).



4. When slowing down or stopping on slopes, gradually release accelerator pedal (4) (on the clutch-type lift truck, depress the clutch pedal at the same time), and depress brake pedal (3) just before stopping.

5. After stopping the lift truck, always pull parking brake lever (1) fully.

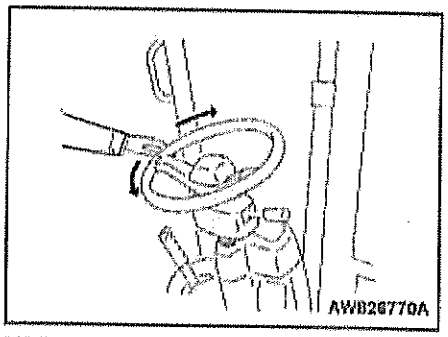


15.6 TURNING

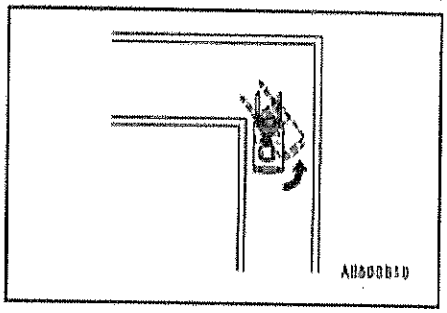
WARNING

Use great care to prevent the outside of the counterweight hitting against objects when turning.

Operate the steering wheel with the left hand.



When turning, keep to the inner side when advancing and outer side when reversing, considering the properties of the rear steering system.



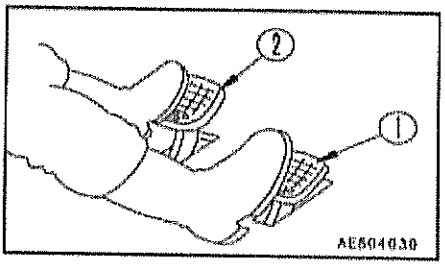
15.7 TEMPORARY STOPPING AND PARKING

WARNING

Do not park the lift truck on the route of travel for other vehicles or pedestrians.

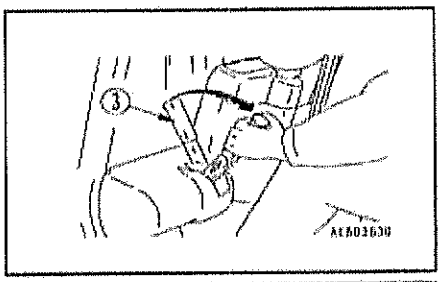
1. **Clutch-type lift truck:**
   Release the accelerator pedal, depress brake pedal (1), then depress clutch pedal (2) immediately before the lift truck stops.

   TORQFLOW transmission lift truck:
   Release the accelerator pedal, then depress brake pedal (1)



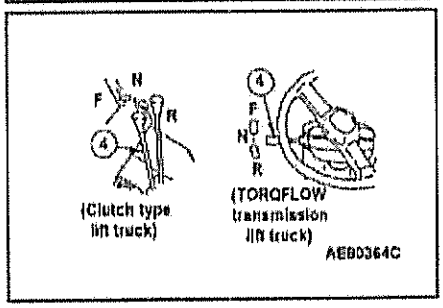
2. After the lift truck stops, pull parking brake lever (3) to apply the parking brake.

   After the lift truck stops, return the forward/reverse control lever and high/low speed control lever (clutch-type lift truck) to the neutral position.



3. (Clutch-type lift truck) Return both the forward/reverse lever (4) and the high/low speed lever to the neutral position.

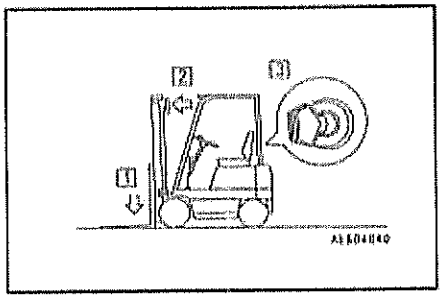
   (TORQFLOW) Return the forward/reverse switch (4) to the NEUTRAL position.



WHEN LEAVING LIFT TRUCK

When leaving the lift truck, always do as follows:

1. Lower the forks to the ground.
2. Tilt the mast until the fork tips touch the ground. Make sure there is no gap between fork tips and ground, as this will create a hazard and possibly cause those passing the lift truck to trip and fall.
3. Turn the starting key to the OFF position, then remove the key.
4. LPG engine trucks: When parking overnight, or for extended periods, turn off fuel service valve on tank (clockwise) and wait until engine stops before turning off ignition switch.

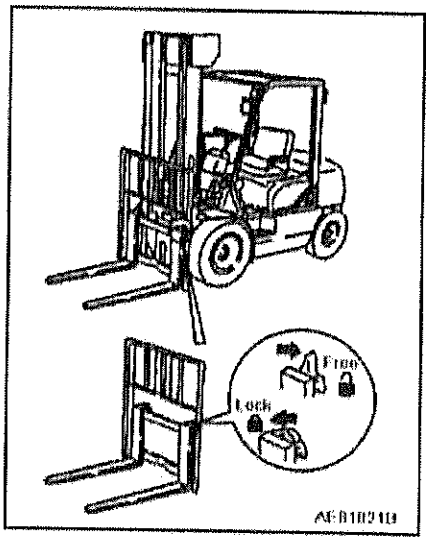


15.8 FORK SPREAD ADJUSTMENT

⚠ WARNING

Take extreme care not to get hands or fingers caught while adjusting the fork spread.

1. Move the lift truck in front of the load, and stop.
2. Position the mast vertically and lift the forks 4 in. (10cm) above the ground.
3. Tilt the mast forward.
4. Move up the fork stopper knob to the free position. (The forks are movable to left and right at this position.)
5. Adjust the fork spread corresponding to the load size so that the load center of gravity coincides with the center of the lift truck.
6. Set the mast vertically, lower the knob and insert the fork stopper to lock the forks. (The forks are fixed.)



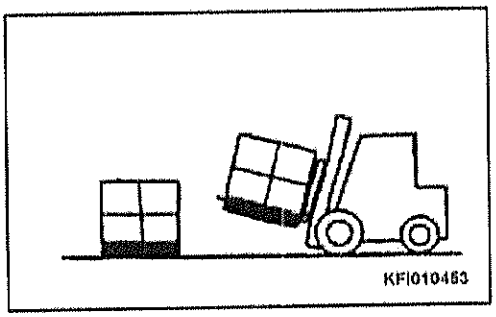
15.9 LOAD HANDLING OPERATION

15.9.1 LOADING

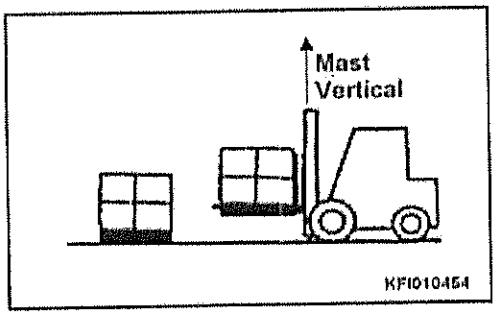
⚠ WARNING

- **Check that there is no danger of collapse or breakage of the load at the loading point.**
- **Check that the loading position is correct.**
- **Never push the load with the fork tips.**

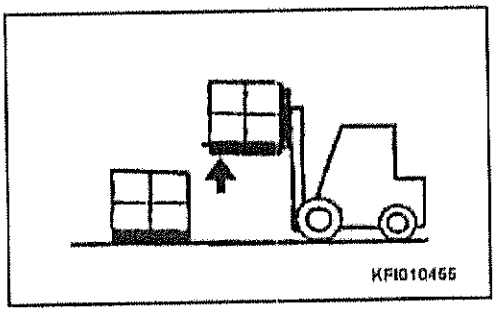
1. Stop slowly when reaching the stacking location.



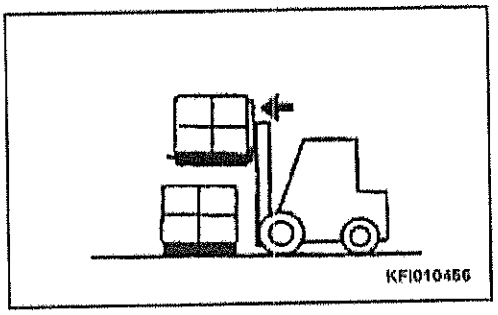
2. Tilt the mast forward until it is vertical.



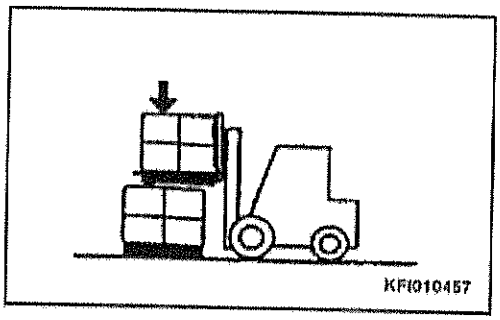
3. Raise the load to 2 - 4 in. (5 - 10 cm) above the stacking point.



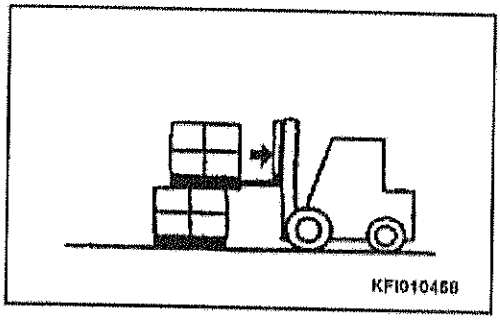
4. Drive slowly forward.



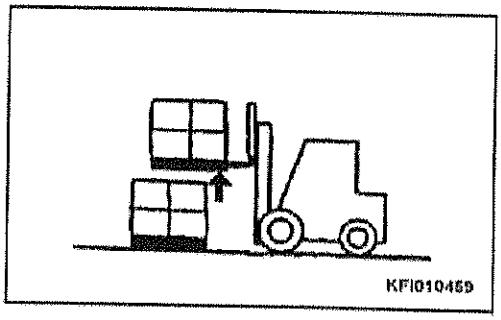
5. Lower the load temporarily to the stacking point.



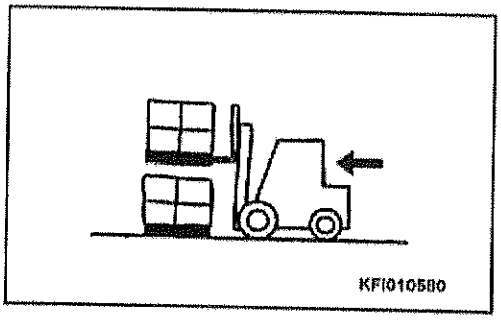
6. Reverse and slowly withdraw the forks 1/4 to 1/3 of the way out from beneath the load.



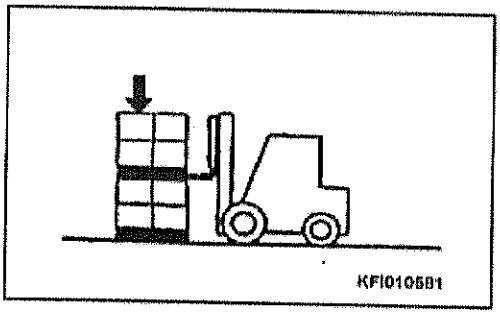
7. Raise the load again 2 - 4 in. (5 - 10 cm).



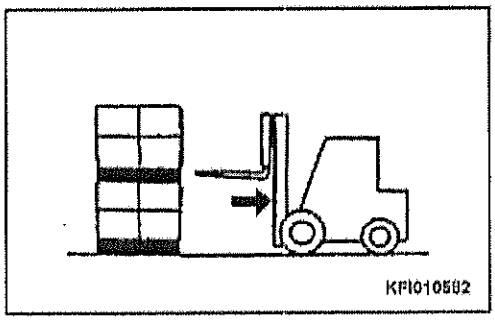
8. Position the load correctly above the stacking point.



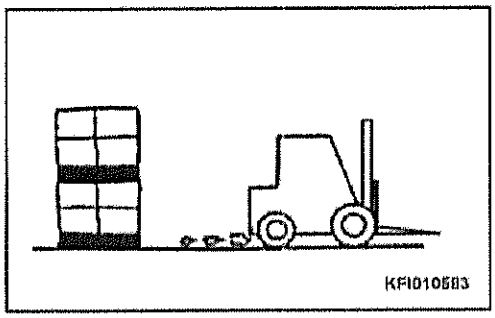
9. Lower the load to the correct stacking position.



10. Reverse the lift truck slowly and withdraw the forks fully from beneath the load.



11. Return the mast to the travelling position.

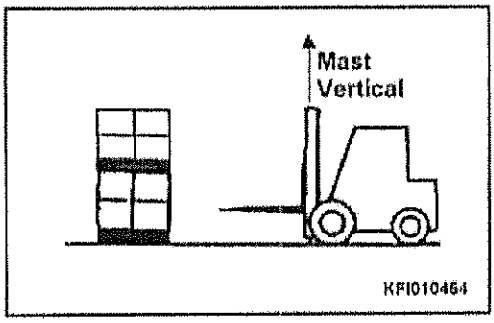


15.9.2 UNLOADING

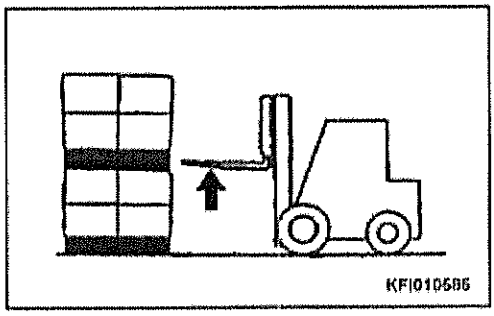
⚠ WARNING

- **Check that there is no danger of collapse of the load.**
- **Check that the forks are positioned correctly for insertion under the load.**
- **Check that the pallet is in a position where it can be lowered completely.**

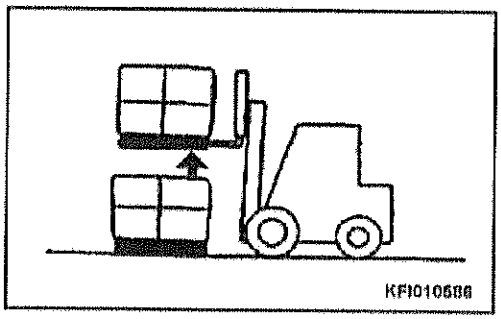
1. Stop the lift truck squarely in front of the load. Then bring the mast to a vertical position.



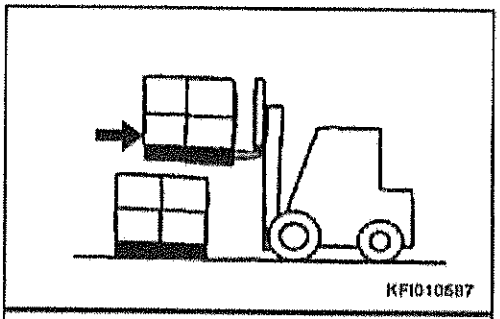
2. Align the forks with the fork insertion point.



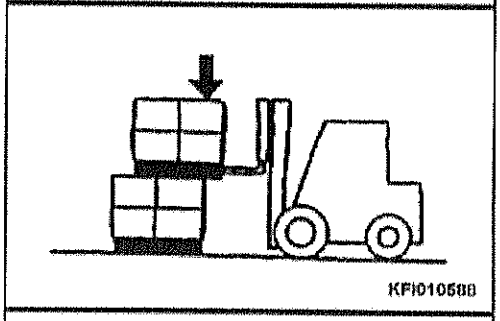
3. Drive forward and insert the forks 2/3 to 3/4 of the way under the load, then raise the load 2 - 4 in. (5 - 10 cm).



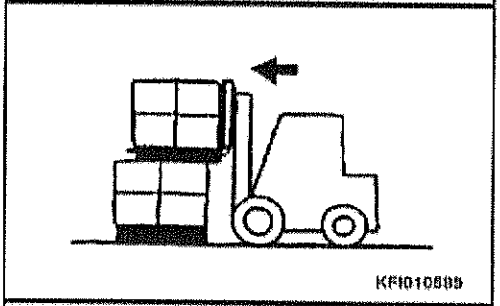
4. Reverse slowly 6 - 8 in. (15 - 20 cm).



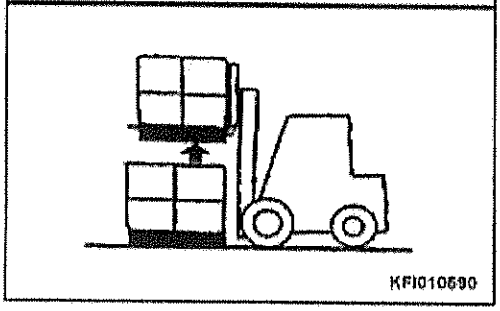
5. Lower the load slowly.



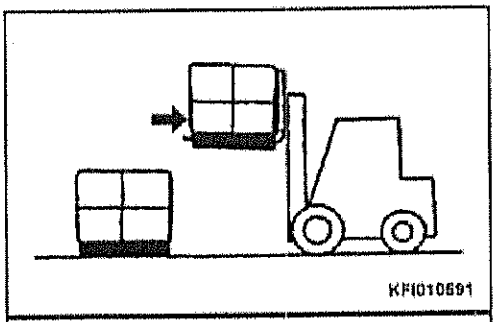
6. Drive forward slowly and insert the forks fully under the load.



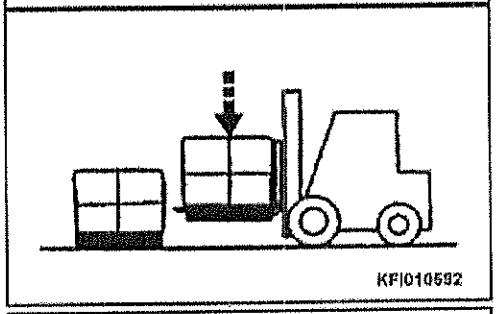
7. Raise the load 2 - 4 in. (5 - 10 cm).



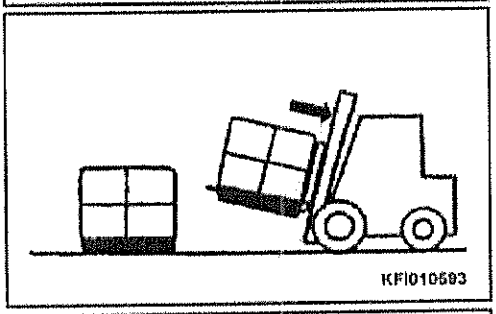
8. Reverse the lift truck to a position where the load can be safely lowered.



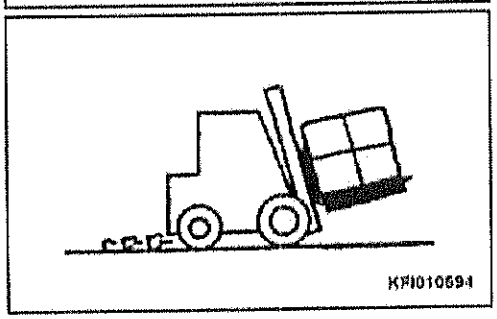
9. Lower the load until it is 6 - 8 in. (15 - 20 cm) from the ground.



10. Tilt the mast fully back.



11. Carry the load to the desired location.



15.10 CHECK AFTER OPERATION

On completion of operation, wipe off any dirt and dust. Before storage, check for the following items.

1. Oil leakage, battery fluid or fuel leakage from the units. Check LPG tank connections.
2. Cracks or damage.
3. Check faults found during operation and report them to the person responsible for the lift truck.
4. Lubricate the units (if necessary).

16.1 PREPARATIONS FOR LOW TEMPERATURE

If the temperature drops to colder levels, it becomes difficult to start the engine and the coolant may freeze, so do as follows:

16.1.1 FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components.
For details, see "**20. LUBRICANT LIST**".

16.1.2 HYDRAULIC OIL

Always use genuine Komatsu Forklift oil. This gives better protection against rust than normal hydraulic oil.

16.1.3 COOLANT

⚠ WARNING

Coolant is flammable, so keep it away from open flame. Never smoke when handling coolant.

NOTICE

When the truck is shipped from the factory, it is filled with low-emission type (*non-amine type*) glycol-based coolant. It may be used in ambient temperatures as low as -4°F (-20°C), unless otherwise instructed. On LPG lift trucks, coolant mixture should test safely down to -35°F (-37°C).

Precautions when handling coolant.

- Coolants are commonly used after being diluted. When diluting coolants, use distilled water or tap water.
- Check that there is no leakage of water from the radiator, water pump, or water hoses.
- Drain all coolant and flush the inside of the system to remove any scale before adding new coolant.
- Do not mix the low-emission type coolant with other conventional coolants for use in the truck.

Glycol-based- Dilution

Use dilution commensurate with the lift truck's operating environment. Note that the *lowest* allowable dilution is 30%. Be sure to use dilution percentages higher than 30%.

Proportions of water and antifreeze (or coolant)									
Min. temperature °F (°C)	14 (-10)	5 (-15)	-4 (-20)	-13 (-25)	-22 (-30)	(-35)	(-40)	(-45)	(-50)
Percentage (%) of Coolant	30	36	41	46	50	54	58	61	64

- Table values allow for approx. 2% safety margin as against the standard values.
- If coolant percentage exceeds 65%, freezing temperature *rises* conversely. DO NOT add too much coolant.

16.1.4 BATTERY

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge is low, the battery electrolyte may freeze.

- Maintain the battery charge above 75%, and insulate the battery against cold temperature so that the lift truck can be started easily in the morning.
- If water is to be added, to prevent freezing, wait until before starting operations the next morning before adding distilled water.

16.2 PRECAUTIONS AFTER COMPLETION OF OPERATIONS

DRAIN WATER

Drain any water accumulated in the fuel system to prevent water from freezing during the night.

ADD FUEL

To prevent moisture from collecting inside the fuel tank, always fill tank after completing operations.

17.1 PRECAUTIONS WHEN USING IN HEAVY-DUTY CONDITIONS

⚠ WARNING

Always wait for the engine to cool down before removing the radiator cap. If you attempt to cool the radiator too quickly and the radiator cap is removed too soon, hot steam may spurt out and may cause serious injury.

17.2 CLEANING INSIDE OF COOLING SYSTEM

Scale and rust form easily inside the cooling system, so flush the system with genuine Komatsu Forklift radiator rust prevention fluid, and take other steps to ensure that there is always clean water circulating in the system.

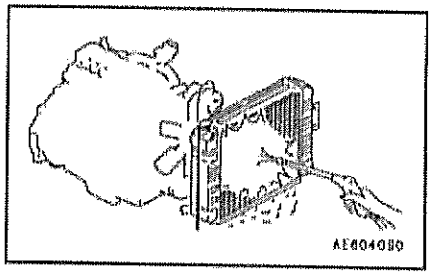
17.3 CLEAN RADIATOR FINS

⚠ WARNING

Dirt may fly and get into your eyes, so always wear protective glasses or goggles.

If the radiator fins are clogged, it will cause overheating, so blow through the radiator fins with compressed air, steam or water.

- When using air or steam, always point the nozzle at a right angle to the radiator when cleaning.



Air pressure: 142 PSI (0.98 MPa) (10 kg/cm^2)
Steam pressure: 57 PSI (0.39 MPa) (4 kg/cm^2)

17.4 CHECK FAN BELT TENSION

If the fan belt is loose, adjust it to the specified tension. A loose fan belt can contribute to overheating.

17.5 ACTION WHEN ENGINE HAS OVERHEATED

⚠ WARNING

DO NOT REMOVE THE RADIATOR CAP FROM A HOT RADIATOR! ALWAYS WAIT FOR THE ENGINE TO COOL DOWN BEFORE REMOVING THE CAP. IF YOU TRY AND REMOVE THE CAP WHILE THE COOLANT IS HOT, BOILING WATER AND HOT STEAM MAY SPURT OUT CAUSING INJURY.

- If the coolant temperature gauge indicator enters the overheat (RED) range, immediately park the lift truck in a safe place and take the following actions:

1. Keep engine running at low idle, open the engine hood (bonnet) for better airing of the engine compartment and wait for the engine to cool down. Once cooled down, shut off the engine. If the engine fan is not turning, shut off the engine immediately and let it cool down naturally.
2. After the engine has cooled (and is OFF), check the coolant level. Also check for water leakage from radiator and/or hoses.
3. If coolant level is low, refill the radiator (1st), and sub-tank (2nd), with cooling water. If water leakage is discovered, place the lift truck OUT OF SERVICE and contact your Komatsu Forklift distributor for repairs.

18.1 BEFORE STORAGE

When putting the lift truck in storage for a long time, do as follows:

- Wash, clean and dry every part, then house the lift truck in a dry building. Never leave it outdoors.

NOTICE

In case it must be left outdoors, park the lift truck on flat, dry ground, and cover it securely with a waterproof sheet.

- Completely fill the fuel tank, grease all parts, and change the oil before storage.
- Apply a thin coat of grease to the exposed surface of the piston rods of the hydraulic cylinders.
- Disconnect the negative terminal of the battery and cover the battery, or remove the battery from the lift truck and store it separately.
- If the temperature drops below 32° (0°C), add antifreeze to the cooling water.
- LPG engine lift trucks: Turn off fuel service valve (clockwise) and let engine run out of fuel. Then turn ignition switch of the OFF position. Remove the LPG tank from the truck and store properly in secured area.

18.2 DURING STORAGE

⚠ WARNING

If it is necessary to carry out the rust prevention operation while the lift truck is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

- **RUST PREVENTION OPERATION**
  Operate the engine and move the lift truck for a short distance once a month so that a new film of oil will be coated over the lubricated surfaces. This prevents loss of the oil film over the long period of storage.
  Before operating the work equipment, wipe off the coat of grease from the hydraulic cylinders.

- **CHARGE BATTERY**
  Even if the battery is not used, it will naturally discharge if left for a long period. Always charge the battery once a month.

18.3 AFTER STORAGE

NOTICE

If the lift truck has been stored for a long period without being covered or without carrying out the monthly rust prevention operation, do as follows before using it.

- Remove the drain plugs from the oil pan and each case, and drain out the water.
- Wipe off the grease from the hydraulic cylinder rods.
- Remove the cylinder head cover, add oil to the valves and rocker arms, and check the operation of the valves.
- After starting the engine, carry out the warming-up operation until the engine oil pressure warning lamp goes out in order to settle all the parts thoroughly.

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MAINTENANCE

⚠ WARNING

READ AND FOLLOW ALL SAFETY PRECAUTIONS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

- Use Komatsu Forklift genuine parts for replacement.
- When changing or adding oil, use only the oil that is recommended. Do not use a different kind or grade of oil.
- Unless otherwise specified, the oil and coolant used at delivery from the factory shall be as shown in the table below.

Item	Type of fluid
Engine oil	SAE 10W30 (gas/LPG) SAE 30W (diesel)
Differential case	SAE 90
Hydraulic tank	ISO # 32 Hydraulic Fluid
TORQFLOW transmission case	Dexron Automatic Transmission Fluid
Cooling system	Fresh water and Glycol-based Coolant

19.1 SUITABLE OIL

19.1.1 OIL

- Since the oil is used for the work equipment, etc., under severe conditions (at high temperature and high pressure), it will deteriorate as operating time passes. Always use an oil matching the grade and working temperatures given in the Operation Manual.
  Always replace the oil at specified time intervals even if it is not deteriorated.
- Oil is often compared to human blood.
  A lift truck should be maintained with the same care taken for the human body so that impurities (water, metal chips, dust, etc.) do not enter the lift truck system.
  Most lift truck malfunctions are caused by the entry of impurities.
  Take special care to avoid the entry of impurities during storage and lubrication, etc.
- Never blend oils of different grades or brands.
- Add specified volume of oil.
  Too little or too much oil may both cause problems in the fork lift truck.
- If the oil in the work equipment becomes cloudy, it is likely that air or water have entered the circuit. Consult a Komatsu Forklift dealer/distributor.
- When replacing oil, replace the relevant filters at the same time.

19.1.2 GREASE

- Grease prevents wear and tear and the generation of squeaking noise from the joints, etc.
- Lift trucks are provided with grease nipples in various places. Some of these are not mentioned in this manual since they are for overhauling purposes and do not require greasing.
  If friction is noticed in movable parts after operation, grease them.
- After greasing, wipe off any old grease that is forced out, especially on rotating parts that will be worn by adhering sand and dirt.

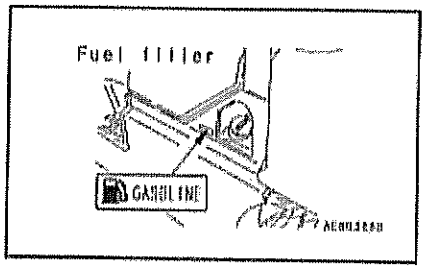
19.1.3 OIL STORAGE AND PRESERVATION

- Store and preserve oil so as to prevent entry of dirt, dust, water or other contaminants.
- When storing oil drums for long periods, place them side-by-side with filler sides facing in the same direction. If necessary to store drums outdoors, cover them with waterproof sheeting. Ensure that the screw caps (bung plugs) are tight.
- To prevent oil deterioration during long periods of storage, use drums on a "first-in, first-out" basis.

19.1.4 FILTERS

- Filters are very important safety items which prevent problems caused by impurities contained in the oil or hydraulic circuit which sends oil into important units. Periodically replace the filters referring to this manual.
- When replacing oil filters, check for metal powder or shavings deposited on the used filters.
- Do not unpack replacement filters until immediately before installation.
- Always use genuine Komatsu Forklift filters.

20.1 AX - GASOLINE/LPG ENGINE (FG15H(S)/18H(S)-17)



NOTICE

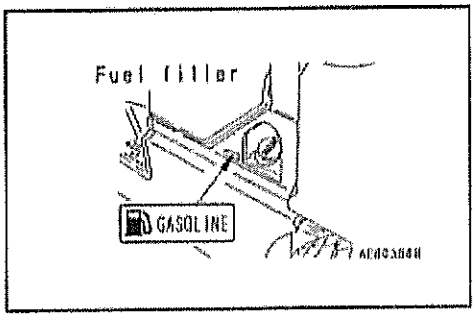
Always use genuine Komatsu Forklift oil and grease.
(Oil and grease are available from your Komatsu Forklift dealer.)

⚠ WARNING

Never use the incorrect kind of brake fluid.
Use genuine Komatsu Forklift DOT 3 brake fluid.

Location	Type of Fluid	Ambient Temperature -4 14 32 50 68 86°F -20 -10 0 10 20 30°C	Capacities
Engine oil pan	Engine oil (SAE10W-30SJ)		(including filter) 4.50 qts. 3.7 L (w/filter)
TORQFLOW transmission case	DEXRON Automatic transmission fluid		12.50 qts. / 12.00 L
Differential case	Gear oil (SAE80W) Gear oil (SAE90W)		**TORQFLOW transmission:** 1.72 qts. / 6.00 L **CLUTCH-TYPE transmission:** 13.74 qts. / 13.00 L
Hydraulic tank	Hydraulic oil ISO # 32		**FG15/18HT-17** 7.10 US gal / 26.90 L **FG15/18ST-17** 5.00 US gal. / 18.90 L
Fuel tank	Gasoline 87 Octane (recommended) LPG 107 Octane Propane		**FG15/18HT-17** 9.7 US gal. **FG15/18ST-17** 6.6 US gal.
Brake system	Brake fluid (DOT 3) (SAE7OR-3)		5.07 oz. / 0.15 L
Greasing points	Lithium grease (NLGI No.2)		—
Clutch reservoir tank (option)	Brake fluid (DOT 3)		0.026 US gal. / 0.1 L
Cooling system	Glycol-based coolant		2.41 US gal. / 10.90 L

20.2 BX - GASOLINE/LPG ENGINE LIFT TRUCK
(FG20/25/30-14, FG20H/25H/30H-14, FG20S/25S-14, FG20SH/25SH/30SH-14)



NOTICE

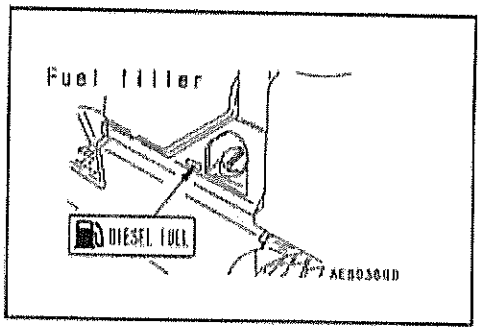
Always use genuine Komatsu Forklift oil and grease.

⚠ WARNING

Never use the incorrect kind of brake fluid.
Use genuine Komatsu Forklift DOT 3 brake fluid.

Location	Type of Fluid	Ambient Temperature -4 -20 14 -10 32 0 50 10 68 2 86°F 30°C	Capacities
Engine oil pan	Engine oil (SAE10W-30SJ)		(including filter) 4.5 quarts / 4.25 L
TORQFLOW transmission case	DEXRON Automatic transmission fluid		12.5 quarts / 11.8 L
Differential case	Gear oil (SAE80W) Gear oil (SAE90W)		**TORQFLOW transmission:** 6.0 quarts / 5.7 L **CLUTCH transmission:** 14 quarts / 13.25 L
Hydraulic tank	Hydraulic oil ISO # 32		**FG20/25/30, FG20H/25H/30H** 14.8 US gallons / 56 L **FG20S(H)/25S(H)/30S(H)** 9.5 US gallons / 36 L
Fuel tank	Gasoline: 87 Octane (recommended) LPG: 107 Octane Propane		**FG20(H)/25(H)/3-(H)** 14.5 US gallons / 55 L **FG20S(H)/25S(H)/30S(H)** 10.6 US gallons / 40 L
Brake system	Brake fluid (DOT 3)		16.64 oz. / 0.5 L
Greasing points	Lithium grease (NLGI No.2)		—
Clutch reservoir tank (option)	Brake fluid (DOT 3)		0.026 US gal. / 0.1 L
Cooling system	Glycol-based coolant		2.4 US gal. / 9.2 L

20.3 BX DIESEL ENGINE LIFT TRUCK (4D94E)
(FD20/25/30-14)



NOTICE

- **Never use fuel mixed with kerosene.**
- **Always use genuine Komatsu Forklift oil and grease.**

⚠ WARNING

Never use the incorrect kind of brake fluid.
Use genuine Komatsu Forklift DOT 3 brake fluid.

Location	Type of Fluid	Ambient Temperature -4 14 32 50 68 86°F -20 -10 0 10 20 30°C	Capacities
Engine oil pan	Engine oil (SAE 10W-CD) (SAE 30W-30-CD)		(including filter) 8.0 quarts, 7.6 L
TORQFLOW transmission case	DEXRON Automatic transmission fluid		12.5 quarts, 11.8 L
Differential case	Gear oil (SAE80W) Gear oil (SAE90W)		**TORQFLOW transmission:** 6.0 quarts, 5.7 L **CLUTCH-TYPE transmission:** 14.0 quarts, 13.2 L
Hydraulic tank	Hydraulic oil ISO # 32		56 L, 14.8 US gallons
Fuel tank	Diesel fuel ASTM D975 No. 2 ASTM D975 No. 1		14.8 US gallons, 56 L
Brake system	Brake fluid (DOT 3)		0.16 quart, 0.15 L
Greasing points	Lithium grease (NLGI No.2)		—
Clutch reservoir tank (option)	Brake fluid (DOT 3)		0.104 quart, 0.1 L
Cooling system	Glycol-based coolant		2.5 US gallons, 9.5 L

20.4 OIL AND GREASING CHART (OIL, GREASE LOCATIONS AND INSPECTION AND MAINTENANCE INTERVALS)

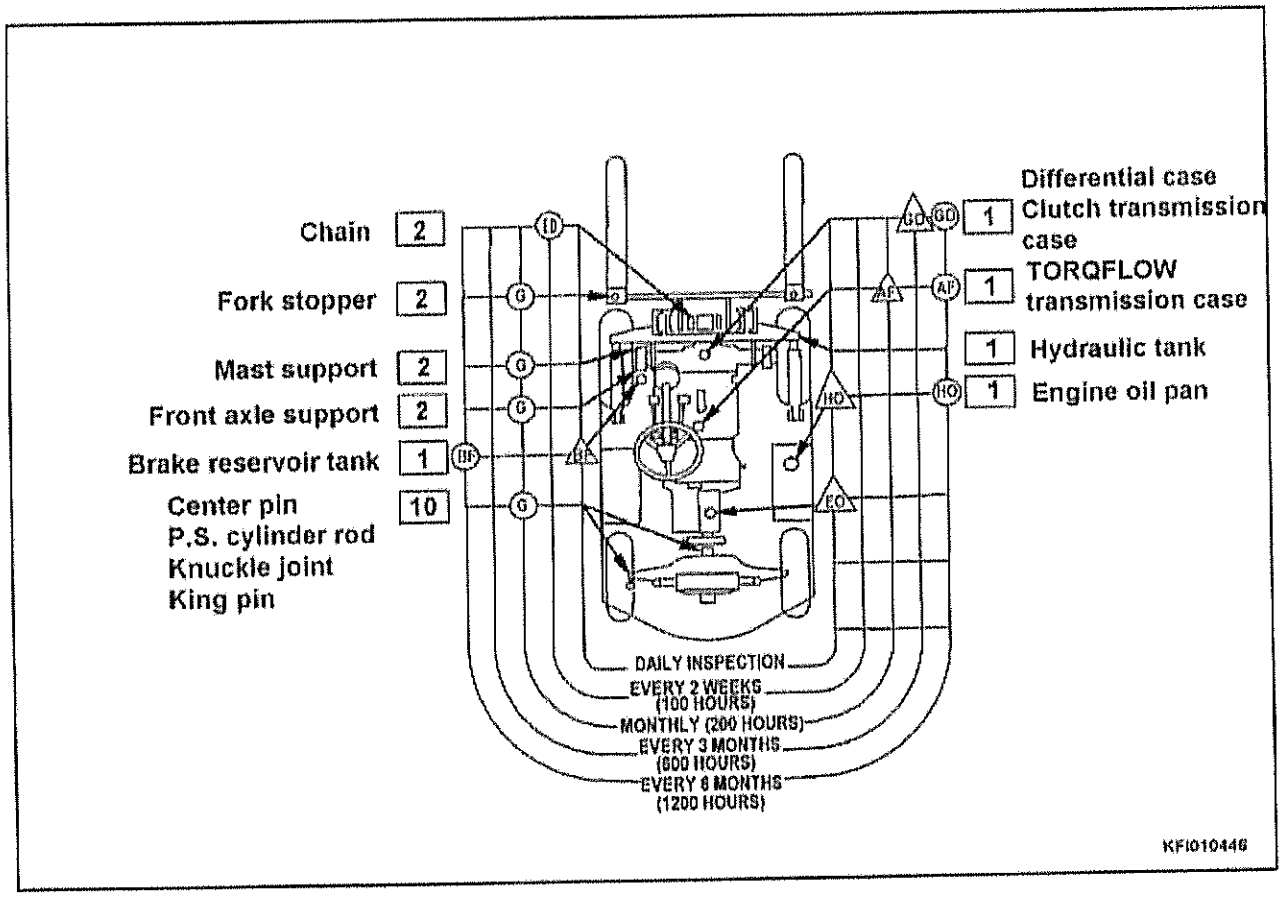


Chart symbol	Type of fluid
AF	Automatic transmission fluid (Komatsu Forklift / Dexron II)
EO	Diesel engine oil
	Gasoline engine oil
MO	Engine oil
GO	Gear oil
HO	ISO #32
BF	Brake fluid (Komatsu Forklift / DOT 3)
G	Grease

21.1 AX SERVICE DATA - ALL MODELS

Component		Inspection item		Unit	FG15H/18H-17 FG15S/18S-17
Engine	Engine	Engine model		--	NISSAN K21 (4-cyl)
		Idling speed		rpm	750
		Maximum speed		rpm	2,950
		Compression		psi	Gasoline/Dual-fuel: 178psi@350 rpm LPG: 185 psi@1,250 rpm
	Lubricating oil cooling system	Fan belt deflection		in.(mm)	0.43 - 0.51 in. (11 - 13 mm) (finger pressure: 98N) (finger pressure: 10 kgf)
	Fuel system	Injection timing		BTDC deg.	ECU control
		Injection order		--	1-3-4-2
		Injection rail pressure		psi	50
		LPG maximum tank pressure		psi	250
		LPG dry gas pressure		psi	4.6
	Intake / exhaust system	Valve clearance	Intake	in.(mm)	0.015 in. (0.38 mm) Warm
			Exhaust		
	Electric system	Electronic ignition air gap		in. (mm)	0.0138" - 0.0177" (0.35 - 0.45 mm)
		Spark plug gap		in.(mm)	0.031 - 0.035 in. (0.8 - 0.9 mm)
		Spark plug type		--	NGK: FR2A-D
		Ignition timing (gasoline) Ignition timing (LPG)		BTDC deg.	ECU control
		Firing order		--	1 - 3 - 4 - 2

21.1 AX SERVICE DATA - ALL MODELS (Continued)

Component		Inspection item		Unit	FG15H/18H-17 FG15S/18S-17
Travel system	Tires	Tire inflation pressure	Front wheels	psi	100 psi 0.69MPa (7.0 kgf/cm^2) *1
			Rear wheels		
	Lug (hub) nuts	Tightening torque	Front wheels	ft/lbs	114 - 160 ft/lbs 154 - 245 Nm (16 - 25 kgfm)
			Rear wheels		61 - 108 ft/lbs 83 - 147 Nm (8.5 - 15 kgfm) *1
	Rim mating nuts	Tightening torque	Front wheels		65 - 91 ft/lbs 88 - 123 Nm (9.0 - 12.5 kgfm) *1
			Rear wheels		44 - 55 ft/lbs 59 - 74 Nm (6.0 - 7.5 kgfm) *1
Steering, braking system	Steering wheel	Play		in. (mm)	1.2 - 2.4 in. (30 - 60 mm)
	Clutch pedal	Play			0.12 - 0.20 in. (3 - 5 mm)
	Inching pedal	Play			0.08 - 0.12 in. (2 - 3 mm)
		Interconnected travel			1.85 - 2.09 in. (47 - 53 mm)
	Brake pedal	Play		in. (mm)	0.51 - 0.67 in. (13 - 17 mm)
		Pedal height when pedal is depressed			3.54 - 3.94 in. (90 -100 mm)
	Brake	Parking brake operating force		ft/lbs	55 ft/lbs (245 Nm) (25 kgf)
		Tightening torque for back plate mounting bolts		ft/lbs	108 - 146 ft/lbs (147 - 198 Nm) (15 - 20 kgfm)
Loading equipment	Forks	Fork thickness (at base of forks)		in. (mm)	1.5 ton truck: Min. 1.26 in. (32 mm) 1.8 ton truck: Min. 1.34 in. (34 mm)
	Chain	Length over 17 links			Max. 10.8 in. (275.5 mm)
	Hydraulic system	Relief pressure		psi(MPa)	2,611 psi 18 MPa (185 kgf/cm^2)

*1: Pneumatic tire lift trucks only

21.2 BX SERVICE DATA (GASOLINE/LPG ENGINE LIFT TRUCKS)

Component		Inspection item		Unit	FG20/25 - 14 FG20S/25S - 14	FG20H/25H/30H - 14 FG20SH/25SH/30SH - 14
Engine	Engine	Engine model		--	NISSAN K21 (4-cyl.)	NISSAN K25
		Idling speed		rpm	750 rpm	
		Maximum speed		rpm	2,950	2,900
		Compression		psi	Gasoline/Dual-fuel: 178 psi /250 rpm LPG: 185 psi / 250 rpm	
	Lubricating oil cooling system	Fan belt deflection		in. (mm)	0.43 - 0.51 in. (11 - 13 mm) (finger pressure: 98N) (finger pressure: 10 kgf)	
	Fuel system	Injection timing		BTDC deg.	ECU control	
		Injection order		--	1 - 3 - 4 - 2	
		Injection pressure		psi	50	
		LPG max. tank pressure		psi	250	
		LPG dry gas pressure		psi	4.6	
	Intake / exhaust system	Valve clearance	Intake	in. (mm)	0.015 in. (0.38) Warm	
			Exhaust			
	Electric system	Spark plug gap		in. (mm)	0.031 - 0.035 in. (0.8 - 0.9 mm)	
		Spark plug type		--	NGK: FR2A-D	
		Ignition timing (gas) Ignition timing (LPG)		BTDC deg.	ECU control	
		Firing order		--	1 - 3 - 4 - 2	

21.2 BX SERVICE DATA (GASOLINE/LPG ENGINE LIFT TRUCKS) (Continued)

Component		Inspection item		Unit	FG20/25/30-14 ALL MODELS
Travel system	Tires	Tire inflation pressure	Front wheels	PSI	100 PSI (0.69 MPa) (7.0 kgf/cm^2) *1
			Rear wheels		
	Lug (hub) nuts	Tightening torque	Front wheels	lbs/ft	217 - 361 lbs/ft (294 - 490 Nm) (30 - 50 kgfm)
			Rear wheels		145 - 181 lbs/ft (196 - 245 Nm)(20 - 25 kgfm) *1
	Rim mating nuts	Tightening torque	Front wheels		145 - 217 lbs/ft (196 - 294 Nm)(20 - 30 kgfm) *1 (excluding 3.0 ton lift truck)
			Rear wheels		65 - 91 lbs/ft (88 - 123) (9.0 - 12.5 kgfm)
Steering, braking system	Steering wheel	Play		In. (mm)	1.2 - 2.4 in. (30 - 60 mm)
	Clutch pedal	Play			0.12 - 0.20 in. (3 - 5 mm)
	Inching pedal	Play			0.08 - 0.12 in. (2 - 3 mm)
		Interconnected travel			1.85 - 2.09 in. (47 - 53 mm)
	Brake pedal	Play		In. (mm)	0.51 - 0.67 in. (13 - 17 mm)
		Pedal height when pedal is depressed			3.54 - 3.94 in. (90 - 100 mm)
	Brake	Parking brake operating force		lbf	55 lbf (245 N) (25 kgf)
		Tightening torque for back plate mounting bolts		lbs/ft	108 - 146 lbs/ft (147 - 196 Nm) (15 - 20 kgfm)
Loading equipment	Forks	Fork thickness (at base of forks)		In. (mm)	2.0 ton truck: Min. 1.42 in. (36 mm) 2.5 ton truck: Min. 1.58 in. (40 mm) 3.0 ton truck: Min. 1.58 in. (40 mm)
	Chain	Length over 17 links			Max. 332 (13.1 in.)
	Hydraulic system	Relief pressure		PSI (MPa)	2,610.7 PSI (18 MPa) (185 kgf/cm^2)

*1: Pneumatic tire lift truck only

21.3 BX SERVICE DATA (DIESEL ENGINE LIFT TRUCKS)

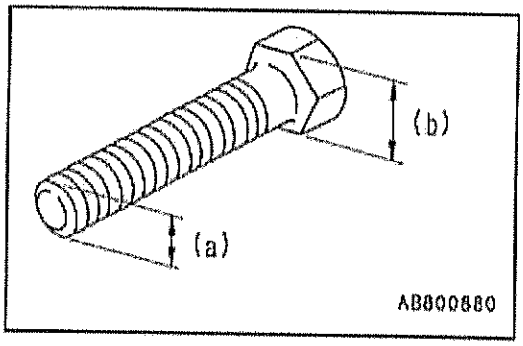
Component		Inspection Item		Unit	FD20/25/30 - 14
Engine	Engine	Engine model		--	KOMATSU 4D94E
		Idling speed		rpm	675 - 725 rpm
		Maximum speed		rpm	2,650 - 2,750 rpm
		Compression		psi @ rpm MPa @ rpm	412 - 441 psi (min. 340) @ 250rpm 2.94MPa @ 250rpm
	Lubricating oil cooling system	Fan belt deflection		in.(mm)	0.39 - 0.59 in. (10 - 15 mm) (finger pressure: 98N) (finger pressure: 10 kgf)
	Fuel system	Injection timing		ATDC°	6°
		Injection order		--	1 - 3 - 4 - 2
		Injection pressure		psi (MPa)	1,850 psi (12.75MPa)
	Intake / exhaust system	Valve clearance	Intake	in. (mm)	0.008 in. (0.20 mm) Cool
			Exhaust		

21.3 BX SERVICE DATA (DIESEL ENGINE LIFT TRUCKS) (Continued)

Component		Inspection item		Unit	FD20/25/30 - 14
Travel system	Tires	Tire inflation pressure	Front wheels	PSI (MPa)	100 PSI (0,69 MPa)
			Rear wheels		
	Lug (hub) nuts	Tightening torque	Front wheels	lbs/ft (Nm)	217 - 361 lbs/ft (294 - 490 Nm) (30 - 50 kgfm)
			Rear wheels		145 - 181 lbs/ft (196 - 245 Nm) (20 - 25 kgfm)
	Rim mating nuts	Tightening torque	Front wheels		145 - 217 lbs/ft (196 - 294 Nm) (20 - 30 kgfm) (excluding 3.0 ton lift truck)
			Rear wheels		65 - 91 lbs/ft (88 - 123 Nm) (9.0 - 12.5 kgfm)
Steering, braking system	Steering wheel	Play		in. (mm)	1.2 - 2.4 in. (30 - 60 mm)
	Clutch pedal	Play			0.12 - 0.20 in (3 - 5 mm)
	Inching pedal	Play			0.08 - 0.12 in.(2 - 3 mm)
		Interconnected travel			1.85 - 2.09 in. (47 - 53 mm)
	Brake pedal	Play		in. (mm)	0.51 - 0.67 in. (13 - 17 mm)
		Pedal height when pedal is depressed			3.54 - 3.94 in. (90 - 100 mm)
	Brake	Parking brake operating force		lbf (N)	55 lbf (245 N) (25 kgf)
		Tightening torque for back plate mounting bolts		lbs/ft (Nm)	108 - 146 lbs/ft (147 - 196 Nm) (15 - 20 kgfm)
Loading equipment	Forks	Fork thickness (at base of forks)		in. (mm)	2.0 ton truck: Min. 1.42 in. (36 mm) 2.5 ton truck: Min. 1.58 in. (40 mm) 3.0 ton truck: Min. 1.58 in. (40 mm)
	Chain	Length over 17 links			Max. 13.1 in. (332 mm)
	Hydraulic system	Relief pressure		PSI (MPa)	2,610.7 PSI (18 MPa) (185 kgf/cm^2)

21.4 TORQUE LIST

For unspecified bolts and nuts, use the torque specifications in this list.
Select the proper torque corresponding to the width across flats (b) of bolts and nuts.
When replacing bolts and nuts, always use genuine Komatsu Forklift parts that match the previous installation in size.



Thread diameter of bolt (mm) (a)	Width across flat (mm) (b)	Tightening torque		
		lbft	kgfm	Nm
6	10	9.73 ± 1.03	1.35 ± 0.15	13.2 ± 1.4
8	13	23.2 ± 2.1	3.2 ± 0.3	31.4 ± 2.9
10	17	48.5 ± 5.0	6.7 ± 0.7	65.7 ± 6.8
12	19	82.6 ± 7.2	11.5 ± 1.0	112 ± 9.8
14	22	131 ± 14	18.0 ± 2.0	177 ± 19
16	24	206 ± 21	28.5 ± 3	279 ± 29
18	27	282 ± 29	39 ± 3	383 ± 39
20	30	405 ± 43	56 ± 6	549 ± 58
22	32	549 ± 58	76 ± 8	745 ± 78
24	36	684 ± 72	94.5 ± 10	927 ± 98
27	41	973 ± 100	135 ± 15	1,320 ± 140
30	48	1,270 ± 140	175 ± 20	1,720 ± 190
33	50	1,630 ± 180	225 ± 25	2,210 ± 240
36	55	2,030 ± 210	280 ± 30	2,750 ± 290
39	60	2,420 ± 250	335 ± 35	3,280 ± 340

22. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the lift truck, the lift truck user must always carry out periodic maintenance. In addition, to further improve safety, the user should also perform periodic replacement of parts given in the table below. These parts, in particular, are closely relate to safety and fire prevention.

The material of these parts may change over time, or they may easily wear or deteriorate. However, it is difficult to judge the condition of these parts simply by periodic maintenance. The parts listed should always be replaced after a fixed, specified time has passed, regardless of their condition. This is necessary to ensure that these parts maintain their full function at all times.
Note that if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

If the hose clamps show any signs of deterioration, such as deformation or cracking, replace them at the same time as the hoses.

Note that this periodic replacement is not covered by warranty.

IMPORTANT PARTS LIST

No.	Part name	Years elapsed
1	Brake valve, wheel cylinder cup and dust seal, etc.	1
2	Brake hose or tube	1 - 2
3	Clutch reservoir tank, tube	2 - 4
4	Power steering hose	2
5	Stop lamp switch (hydraulic type)	2 - 4
6	Fuel hose	2
7	Rubber parts inside power steering system	2
8	Lift chain	2 - 4
9	Hydraulic hose for lifting mechanism	1 - 2

⚠ WARNING

Use only genuine fuel hose.
If a poor quality hose is used, plasticizer material or other harmful material from the hose may contaminate the LPG and cause the injection valve to stick.
This will prevent the engine from starting.

23. MAINTENANCE SCHEDULE CHART

Perform maintenance at intervals of months or operation hours, whichever occurs first.

Service Item (AX and BX models; gasoline/LPG/diesel engines) (#) Indicates Emissions-Related (EPA) Maintenance Service Items (AX & BX)	Page
First month or initial 200 hours service (only after the first one month)	
Change oil in hydraulic tank, replace line filter, clean strainer, clean inside of tank	3-20
(#) Change oil in engine oil pan	3-20
(#) Replace engine oil filter cartridge	3-21
(#) Check, adjust engine valve clearance	3-22
Tighten (retorque) engine cylinder head bolts	3-22
Change oil in TORQFLOW transmission case	3-23
Clean TORQFLOW transmission strainer	3-23
Change oil in differential case (includes oil in transmission case on clutch-type lift trucks	3-24
(#) Check spark plugs for burning of electrode, burning of insulator	3-24
Check, adjust alternator belt (drive belt) tension	2-25
Tighten bolts and nuts (especially lug nuts [hub nuts], and overhead guard, load backrest and operator's seat mounting bolts and nuts)	3-25
Complete "Check Before Operation" items in previous section of this manual	2-21
Every 2 weeks or every 100 hours service	
Grease lift chain	3-25
Every month or every 200 hours service	
Check wheel rims for deformation, cracking and damage	3-25
Check wheel bearings for play and abnormal noise	3-25
Check hydraulic cylinders for looseness, deformation, cracking, damage and wear	3-25
Check all piping/tubing/connectors for oil leakage, deformation or damage	3-25
Check operation of hydraulic cylinders	3-25
Check hydraulic drift of lift cylinder	3-25
Check hydraulic drift of tilt cylinders	3-25
Check movement of work equipment control lever(s)	3-25
Check forks and fork stopper for deformation, cracking, damage and wear	3-25
Check forks for unevenness and twisting	3-25
Check mast for deformation, cracking, damage and wear	3-25
Check mast roller for play	3-25
Check chain and chain wheel for deformation, damage, rust and poor lubrication	3-25
Check chain wheel bearing for play	3-25
Check chain anchor bolt for deformation and damage	3-25

Service Item (AX and BX models; gasoline/LPG/diesel engines) (#) Indicates Emissions-Related (EPA) Maintenance Service Items (AX & BX)	Page
Every month or every 200 hours service (continued)	
Check gear box for oil leakage, looseness of mount	3-25
Check mounting condition of power steering, check for looseness at connections	3-26
Check pedals for play, looseness, damage and wear	3-26
Check brake piping/tubing for damage, leakage, looseness, contact, looseness of brake tubing clips and disconnection at fittings	3-26
Check clearance between brake drum and lining, check brake for grabbing, dragging or pulling	3-26
Check shift lever for play, meshing	3-26
Check for oil leakage from transmission and differential cases	3-26
Check oil level in TORQFLOW transmission, add oil as necessary (Do not overfill)	3-27
Clean inside of cooling system	3-27
Check for catching, stalling and knocking when accelerating	3-28
(#) Check and clean air cleaner element	3-28
Check operation of governor (maximum speed)	3-29
(#) Check piping/tubing and connections/fittings for fuel/gas leakage	3-29
(#) Drain water from fuel filter (diesel engine lift trucks)	3-29
(#) (LPG Engine) Check vaporizer for tar, drain	3-30
Check radiator hoses for cracking, damage	3-30
Check operating condition of radiator cap, check installation	3-30
Check fan for deformation, cracking, and damage	3-30
Check fan for looseness and mounting	3-30
(#) Check, adjust alternator belt (drive belt) tension	2-25
(#) Check spark plugs for burning of electrode, burning of insulator	3-30
Check operation of starting switch, check meshing of pinion gear	3-31
Check level and specific gravity of electrolyte. Check and clean battery caps and terminals.	3-31
(Diesel Engine) Change oil in engine oil pan	3-20
(Diesel Engine) Replace engine oil filter cartridge	3-21
Check wiring connections for looseness	3-31
Check overhead guard, load backrest for deformation, cracking, damage and looseness	3-31
Check operator's seat mount for looseness and damage, (#) check LPG cylinder mounting bracket	3-31
Grease all lubrication points	3-32

23. MAINTENANCE SCHEDULE CHART

Service Item (AX and BX models; gasoline/LPG/diesel engines) (#) Indicates Emissions-Related (EPA) Maintenance Service Items (AX & BX)	Page
Every 500 hours service	
(#) Change oil in engine oil pan	3-32
Every 3 months or every 600 hours service	
(#) (Diesel Engine) Drain water from fuel filter and replace fuel filter cartridge	3-32
(#) Clean LPG filter (EPA models)	3-33
Adjust valve clearance	3-33
(#) (Gasoline Engine) Inspect PCV valve and hoses	3-33
Grease fuel injection pump governor, change governor oil	3-34
Check oil level in transmission case, add oil as necessary (clutch-type trucks, include differential case)	3-34
Check oil level in differential case, add oil as necessary (clutch-type trucks, include transmission case)	3-34
Every 1,000 hours service (EPA, diesel engines only)	
Check and adjust fuel injection pressure and atomizing condition of nozzles	3-34
Every 6 months or every 1,200 hours service	
Check steering link for bending, damage and wear	3-34
Check steering knuckle for play, deformation and damage	3-34
Check for marked variation in minimum turning radius	3-34
Change oil in differential case (clutch-type lift trucks, include transmission case)	3-34
Change oil in TORQFLOW transmission case	3-35
Clean TORQFLOW transmission strainer	3-35
Replace torque converter oil filter	3-35
Change clutch oil	3-35
Change brake oil/fluid	3-35
Measure compression pressure	3-35
(#) (Diesel Engine) Check, adjust fuel injection timing, check and inspect fuel injection nozzles	3-35
(#) (Gasoline Engine) Check PCV blow-by gas reduction system for clogging, damage	3-35
Clean inside of cooling system	3-35
(#) Replace air cleaner element	3-36
Change oil in hydraulic tank, replace hydraulic line filter, clean hydraulic tank strainer, clean inside of hydraulic tank	3-37

Service Item (AX and BX models; gasoline/LPG/diesel engines) (#) Indicates Emissions-Related (EPA) Maintenance Service Items (AX & BX)	Page
Every 2,000 hours service	
(Diesel Engine) Check and adjust fuel injection timing (EPA Regulations)	3-37
Replace LPG mixer air valve diaphragm, under normal operating conditions. Replace more often in cold or severe service applications. Replace O-ring for LPG tank valve.	3-37
Every 12 months (year) or every 2,400 hours service	
Check operation of brake master cylinder, check for oil leakage, damage and wear	3-37
Check operation of wheel cylinders, check for oil leakage, damage and wear	3-37
Check operation of brake drum, check for damage and wear	3-37
Check brake linings for wear	3-37
Check operating condition of brake shoes	3-37
Check brake adjustment lever and ratchet for wear and damage	3-37
Check brake springs for deterioration	3-37
Check brake back plates for deformation and cracking, check mounting condition	3-38
Check air tightness of brake piping/tubing	3-38
Check axle for deformation, cracking and damage	3-38
Check mounting condition of differential	3-38
Check root (base) of forks for cracking (use color check)	3-38
Check roller shaft of loading equipment for cracking and damage	3-38
Check mast support for damage and wear	3-38
Check operation of relief valve, check relief pressure	3-38
(#) Replace air breather	3-38
(#) Replace fuel filter (diesel), clean inside of fuel tank (gasoline and diesel lift trucks)	3-38
(#) Check fuel injection pressure, injection amount, injector condition	3-38
Tighten (retorque) engine cylinder head bolts	3-38
Check frame and crossmember for cracking and damage	3-38
(#) Replace engine coolant (Glycol-based)	3-38
(#) Clean LPG filter	3-38
Every 18 months or every 3,600 hours service	
Replace spark plugs	3-38

24.1 FIRST ONE MONTH OR INITIAL 200 HOURS SERVICE

Carry out this maintenance, for new lift trucks only, after the first one month or initial 200 hours of operation, whichever comes sooner.

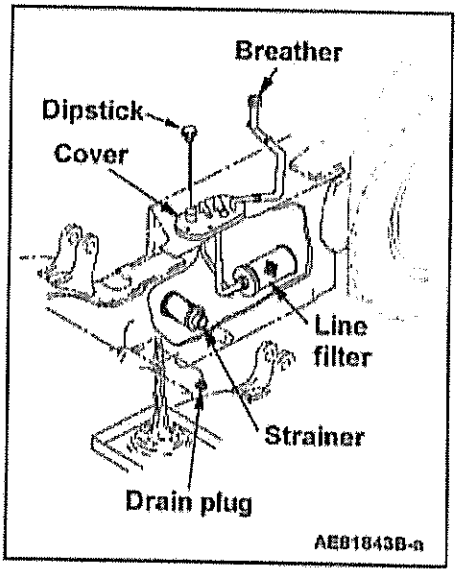
(Hydraulic equipment)

24.1.1 CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC LINE FILTER, CLEAN HYDRAULIC TANK STRAINER, CLEAN INSIDE OF HYDRAULIC TANK

⚠ WARNING

Watch out for HOT OIL. Immediately after operations, the hydraulic oil is at high temperature.
Never change the oil immediately after stopping operations.
Wait for the oil temperature to go down before changing the oil.

1. Remove the drain plug at the bottom of the tank. Then remove the cover, take out the strainer, and wash it in flushing oil.
2. Clean the inside of the tank, then install the drain plug.
3. After washing the strainer, blow air from the inside of the strainer to dry it completely, then reinstall the strainer.
4. Replace the line filter, then install the cover.
5. Add the specified amount of ISO #32 hydraulic oil through the dipstick hole, then check the oil level with the dipstick.



Specified oil refill amount	
FG15H/18H-17 (AX)	7.1 U.S. gal. (26.9 L)
FG15S/18S-17 (AX)	5.0 U.S. gal. (18.9 L)
FG20/25/30-14 (BX) FG20H/25H/30H-14 (BX) FD20/25/30-14 (BX)	14.80 US gal (56 L) (12.32 UK gal)
FG20S/25S-14 (BX) FG20SH/25SH/30SH-14 (BX)	10.57 US gal (40 L) (8.80 UK gal)

6. Start the engine, then operate the cylinders (lift, tilt) to the end of their travel 5 or 6 times to bleed the air.

NOTICE

Always use genuine Komatsu Forklift hydraulic oil.

(Engine)

24.1.2 CHANGE OIL IN ENGINE OIL PAN AND REPLACE ENGINE OIL FILTER CARTRIDGE

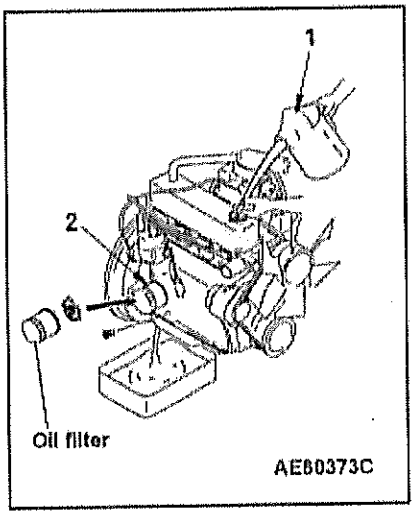
⚠ WARNING

When carrying out engine maintenance, stop the engine and wait for it to fully cool down.

(Gas & LP Engines)

CHANGE ENGINE OIL (See Illustration)

1. Remove the drain plug, drain the oil, then reinstall and tighten the drain plug.
2. Add the specified amount of genuine Komatsu Forklift engine oil.
3. Check the oil level with the dipstick.



NOTICE

Oil refill amount: 1.0 US gal (3.8 L) (0.84 UK gal)

REPLACE ENGINE OIL FILTER (See Illustration)

1. Using a filter wrench, remove the oil filter cartridge.
2. Clean the filter holder on the engine.
3. Coat the threads on the holder and the seal on the new filter with clean engine oil.
4. Install the new filter.

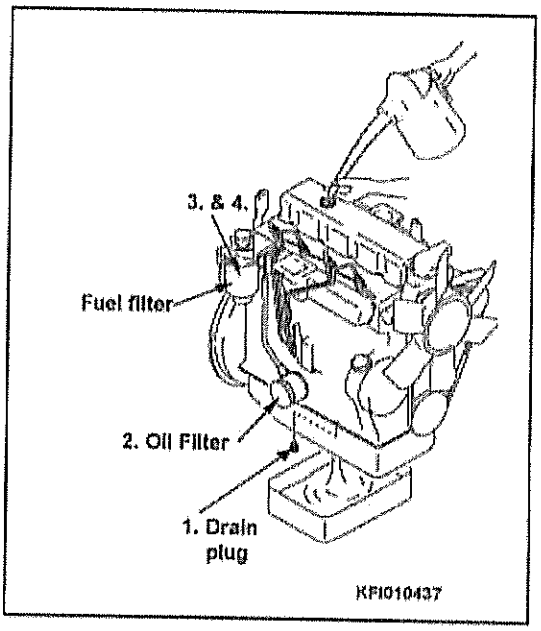
NOTICE

After installing the new oil filter cartridge, start the engine and check for oil leakage around the oil filter seal and at the oil pan drain plug.

(Diesel Engine)

CHANGE ENGINE OIL (See Illustration)

1. Remove the drain plug, drain the oil, then reinstall and tighten the drain plug.
2. Remove the dipstick.
3. Add the specified amount of engine oil. Use care to prevent oil overflow.
4. Check the oil level with the dipstick.



NOTICE

Oil refill amount: 1.98 US gal (7.5 L) (1.65 UK gal)

REPLACE ENGINE OIL FILTER (See Illustration)

1. Using a filter wrench, remove the oil filter cartridge.
2. Clean the oil filter holder.
3. Coat the threads of the holder and the new filter seal with clean engine oil.
4. Install the new oil filter cartridge.

NOTICE

After installing the new oil filter, start the engine and check for oil leakage at the filter seal and the oil pan drain plug.

24.1.3 CHECK, ADJUST ENGINE VALVE CLEARANCE

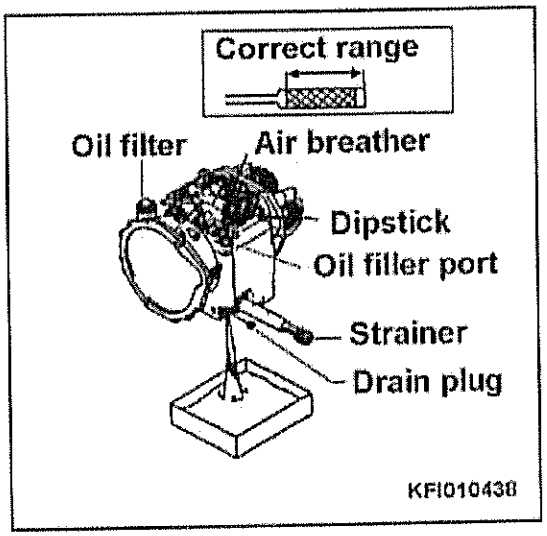
24.1.4 TIGHTEN (RETORQUE) ENGINE CYLINDER HEAD BOLTS

(Power train)
24.1.5 CHANGE OIL IN TORQFLOW TRANSMISSION CASE; CLEAN TORQFLOW TRANSMISSION STRAINER

⚠ WARNING

Watch out for HOT OIL. Immediately after operations, the oil will be very hot. Wait for the oil temperature to go down before starting this maintenance operation.

1. Remove the drain plug, drain the oil, then reinstall and tighten the drain plug.
2. Remove the mounting bolts, take out the strainer, and wash it off in flushing oil.
3. After washing the strainer, blow air from the inside of the strainer to dry it completely, then reinstall the strainer.
4. Add the specified amount of oil through the oil filler port.
5. After filling with oil, check the oil level.



Specified oil refill amount	
TORQFLOW transmission (including torque converter)	3.17 US gal (12 L) (2.64 UK gal)

NOTICE

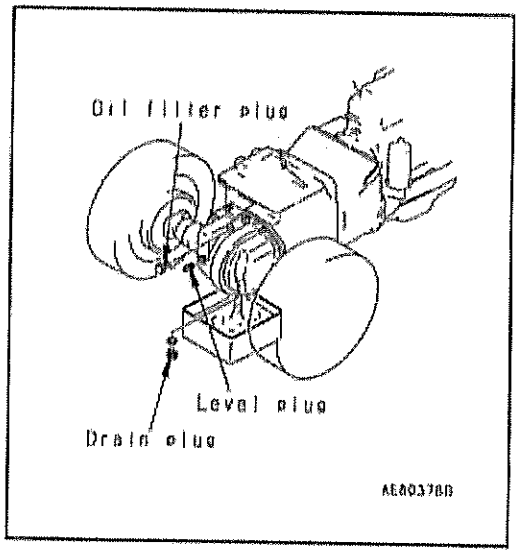
Always use genuine Komatsu Forklift or DEXRON II Automatic Transmission Fluid.

24.1.6 CHANGE OIL IN DIFFERENTIAL CASE (INCLUDES OIL IN TRANSMISSION CASE ON CLUTCH-TYPE LIFT TRUCKS)

⚠ WARNING

Watch out for HOT OIL. Immediately after operations the oil will be very hot. Wait for the oil temperature to go down before starting this maintenance operation.

1. Remove the oil filler plug, then remove the drain plug and drain the oil.
2. After draining the oil, reinstall and tighten the drain plug and add the specified amount of Komatsu Forklift oil through the oil filler.
3. After filling with new oil, check the oil level.



Specified oil refill amount	
Clutch-type lift truck	3.43 US gal (13 L) (2.86 UK gal)
TORQFLOW transmission lift truck	1.59 US gal (6 L) (1.32 UK gal)

NOTICE

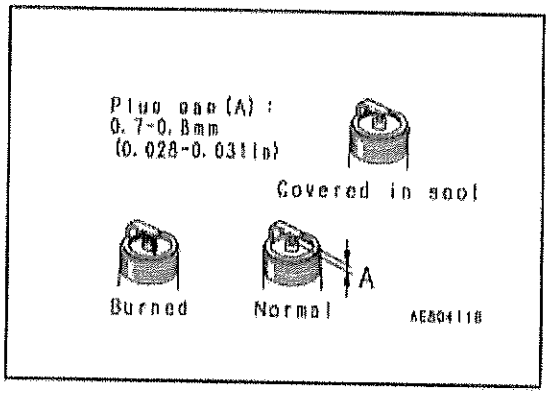
Always use genuine Komatsu Forklift gear oil (SAE 90). For details, see "20. LUBRICANT LIST".

REMARK
On clutch-type lift trucks, the oil is used for **both** the differential case and the transmission case. However, on the TORQFLOW transmission lift truck, each case has its own special oil, so it is necessary to check and change the oil in the TORQFLOW transmission case in addition to checking and changing the oil in the differential case in two separate operations.

24.1.7 (GAS & LP ENGINES) CHECK SPARK PLUGS FOR BURNING OF ELECTRODE, BURNING OF INSULATOR

(See Illustration)

1. Remove the spark plug using the plug wrench provided with the lift truck.
2. Clean off any carbon buildup on the tip of the plug or the surrounding area.
3. Measure gap (A) with plug gap gauge.



Specified spark plugs	
NGK	FR2A-D

24.1.8 CHECK, ADJUST ALTERNATOR BELT (DRIVE BELT) TENSION

See procedure on page 2-25.

(General)
24.1.9 TIGHTEN BOLTS AND NUTS (ESPECIALLY LUG NUTS [HUB NUTS], AND OVERHEAD GUARD, LOAD BACKREST AND OPERATOR'S SEAT MOUNTING BOLTS AND NUTS)

24.2 CHECK BEFORE OPERATION

For details, see "15.1 CHECK BEFORE OPERATION" on page 2-21.

24.3 EVERY 2 WEEKS OR EVERY 100 HOURS SERVICE

(Loading equipment)
24.3.1 GREASE LIFT CHAIN

24.4 EVERY MONTH OR EVERY 200 HOURS SERVICE

(Travel equipment)
24.4.1 CHECK WHEEL RIMS FOR DEFORMATION, CRACKING AND DAMAGE

24.4.2 CHECK WHEEL BEARINGS FOR PLAY AND ABNORMAL NOISE

(Hydraulic equipment)
24.4.3 CHECK HYDRAULIC CYLINDERS FOR LOOSENESS, DEFORMATION, CRACKING, DAMAGE AND WEAR

24.4.4 CHECK ALL PIPING/TUBING/CONNECTORS FOR OIL LEAKAGE, DEFORMATION OR DAMAGE

24.4.5 CHECK OPERATION OF HYDRAULIC CYLINDERS

24.4.6 CHECK HYDRAULIC DRIFT OF LIFT CYLINDER

24.4.7 CHECK HYDRAULIC DRIFT OF TILT CYLINDERS

24.4.8 CHECK MOVEMENT OF WORK EQUIPMENT CONTROL LEVER(S)

(Loading equipment)
24.4.9 CHECK FORKS AND FORK STOPPER FOR DEFORMATION, CRACKING, DAMAGE AND WEAR

24.4.10 CHECK FORKS FOR UNEVENNESS AND TWISTING

24.4.11 CHECK MAST FOR DEFORMATION, CRACKING, DAMAGE AND WEAR

24.4.12 CHECK MAST ROLLER FOR PLAY

24.4.13 CHECK CHAIN AND CHAIN WHEEL FOR DEFORMATION, DAMAGE, RUST AND POOR LUBRICATION

24.4.14 CHECK CHAIN WHEEL BEARING FOR PLAY

24.4.15 CHECK CHAIN ANCHOR BOLT FOR DEFORMATION AND DAMAGE

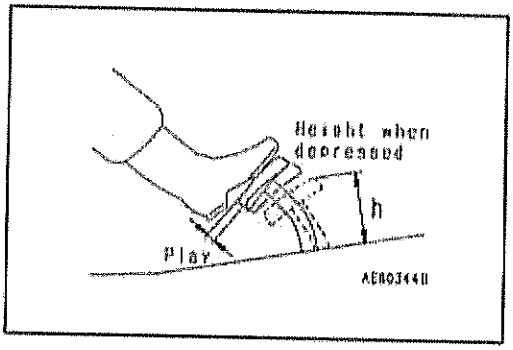
(Steering system)
24.4.16 CHECK GEAR BOX FOR OIL LEAKAGE, LOOSENESS OF MOUNT

24.4.17 CHECK MOUNTING CONDITION OF POWER STEERING, CHECK FOR LOOSENESS AT CONNECTIONS

24.4.18 CHECK PEDALS FOR PLAY, LOOSENESS, DAMAGE AND WEAR

BRAKE PEDAL

1. Check the play and the height of the brake pedal when it is depressed to check that it matches the specified values.



Play	0.51 - 0.67 in. (13 - 17 mm)
Pedal height when depressed	3.54 - 3.94 in. (90 - 100 mm)

2. Test the brake while gradually increasing your speed from a low speed. Check that the brakes do not pull, grab or drag. If necessary, adjust the brakes until they apply smoothly.

   Depress the pedal and check that there is no abnormal heaviness or catching.

CLUTCH PEDAL (CLUTCH-TYPE LIFT TRUCKS)

Play	0.12 - 0.20 in. (3 - 5 mm)

INCHING PEDAL (TORQFLOW TRANSMISSION LIFT TRUCKS)

Play	0.08 - 0.12 in. (2 - 3 mm)
Interconnected travel	1.85 - 2.09 in. (47 - 53 mm)

REMARK
The interconnected travel is the distance that the brake pedal and inching pedal move together.

⚠ WARNING

Inspect the lift truck in an area where it will not obstruct other vehicles or workers.

24.4.19 CHECK BRAKE PIPING/TUBING FOR DAMAGE, LEAKAGE, LOOSENESS, CONTACT, LOOSENESS OF BRAKE TUBING CLIPS AND DISCONNECTION AT FITTINGS

24.4.20 CHECK CLEARANCE BETWEEN BRAKE DRUM AND LINING, CHECK BRAKE FOR GRABBING, DRAGGING OR PULLING

(Power train)

24.4.21 CHECK SHIFT LEVER FOR PLAY, MESHING

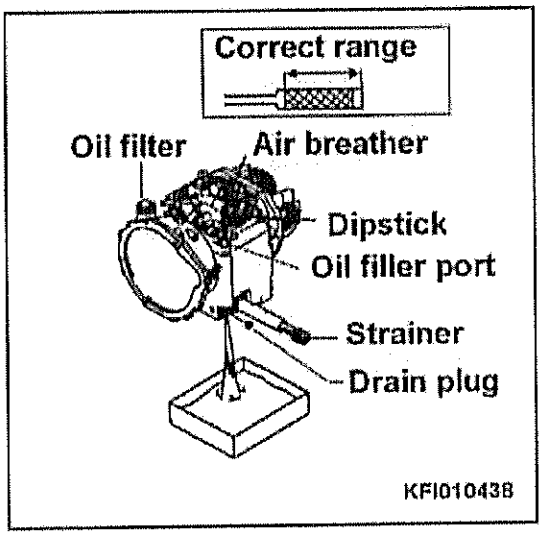
24.4.22 CHECK FOR OIL LEAKAGE FROM TRANSMISSION AND DIFFERENTIAL CASES

24.4.23 CHECK OIL LEVEL IN TORQFLOW TRANSMISSION, ADD OIL AS NECESSARY

WARNING

Watch out for HOT OIL. Immediately after operations the oil will be very hot. Wait for the oil temperature to go down before starting this maintenance operation.

1. Remove the floor plate and check oil with dipstick.
2. If oil level is low, remove the dipstick and add oil through the oil filler port.
3. After filling with oil, check the oil level.



TORQFLOW Trans Case Capacity	
TORQFLOW transmission (including torque converter)	12.5 qts (11.8 L) (2.6 UK gal)

NOTICE

Always use genuine Komatsu Forklift or DEXRON II Automatic Transmission Fluid.

24.4.24 CLEAN INSIDE OF COOLING SYSTEM

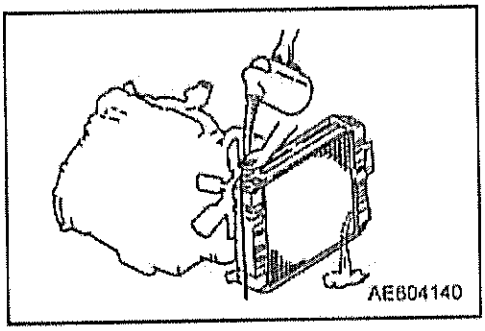
WARNING

- **If air bleeding is improperly carried out after the coolant has been replaced, or after the radiator or carburetor has been replaced, it may contribute to overheating. Be sure to bleed all of the air from the engine cooling system.**
- **After operating the engine, the radiator coolant mixture will be extremely hot. Boiling water and steam can cause severe burns if it touches the skin or clothing. Always wait for the engine to cool down before opening the radiator cap or draining the water from the radiator.**
- **Radiator cleaning operations are carried out with the engine running. NEVER go under the lift truck during cleaning operations as the truck may move unexpectedly.**
- **Do not remove the radiator cap when the radiator coolant is hot. Always wait for the radiator coolant to cool down, and then turn the cap slowly to release the pressure before fully removing.**

CLEANING THE RADIATOR

Stop the lift truck on level ground in a safe place.

1. With engine cooled, open the drain valves at the bottom of the radiator and the engine cylinder block to drain the water.
2. After fully drained, close the drain valves. Fill the radiator with fresh water and radiator flushing fluid. Start the engine and run at idle for 15 minutes.
3. Stop the engine and open the drain valves to drain the water using care to avoid burns. Add fresh water and again run the engine at idle for 5 or 10 minutes until clean water comes out from the drain valves.



4. Stop the engine and drain all the water. Close the drain valves and fill with water and long life coolant.

⚠ WARNING

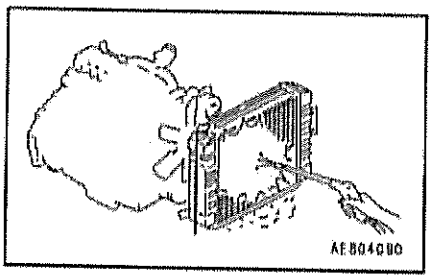
Antifreeze is flammable. Keep it away from sparks and flame.

NOTICE

- **In cold areas, add long life coolant (non-amine type). See "COLD WEATHER OPERATION".**
- **When not using long life coolant, add rust prevention fluid to the radiator.**
- **Always use genuine Komatsu Forklift products for the flushing fluid, rust prevention fluid and long life coolant.**

Blow the radiator fins with compressed air, steam or water.

Air pressure	142 PSI (0.98 MPa) (10 kgf/cm^2)
Steam pressure	56 PSI (0.39 MPa) (4 kgf/cm^2)



Testing
Check visually to ensure there are no dents or damage to the fins.

24.4.25 CHECK FOR CATCHING, STALLING AND KNOCKING WHEN ACCELERATING

24.4.26 CHECK AND CLEAN AIR CLEANER ELEMENT

⚠ WARNING

Always wear safety goggles when using compressed air.

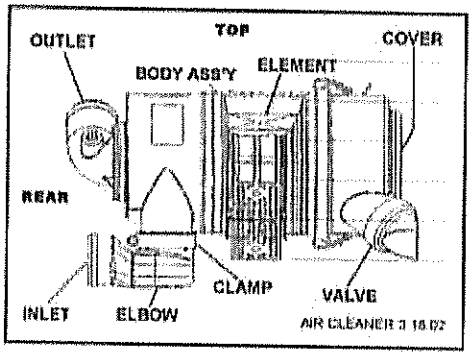
NOTICE

- If oil, grease or carbon is stuck to the element, clean the element with special element cleaner. Follow the instructions provided with the cleaner.
- Do not remove the inner element from diesel engine air cleaners (FD20/25/30 models).
- In heavy-duty operating environments or conditions, clean and replace the element more frequently.

NEW STYLE "RADIAL SEAL" AIR CLEANER ASSEMBLY FOR AX & BX SERIES TRUCKS (Gas trucks in service since 03.18.02)

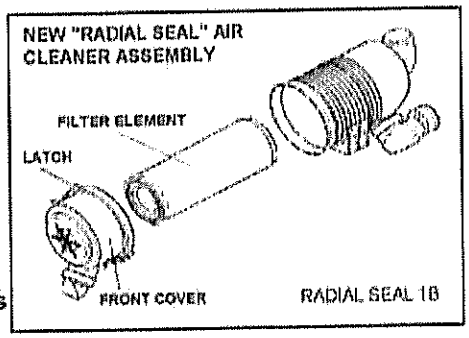
NOTICE

Diesel engine air cleaner filters and the new "Radial Seal" style filters are NOT interchangeable with each other. The new style element has a soft-compound dedicated sealing surface. The diesel engine style filter elements will not seat and seal properly in the new style air cleaner housings. The engine warranty will be voided if improper or aftermarket elements are used.



Cleaning

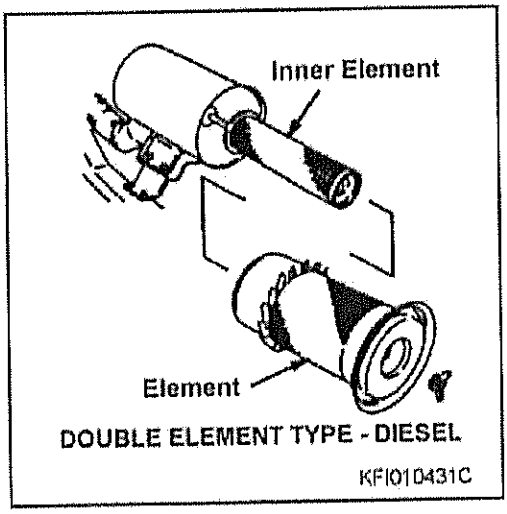
1. Unscrew the wing nut (diesel engine air cleaner) or release the latches ("Radial Seal"-style) to remove air cleaner housing cover.
2. Gently remove filter element using care not to dislodge dirt and dust.



NOTICE

Do not remove the inner element from diesel engine air cleaners (FD20/25/30 models).

3. Thoroughly clean air cleaner housing sealing surface and outlet tube outer diameter. Then clean the inside of the outlet tube using a clean cloth.
4. Visually inspect old filter for signs of leakage. Never reinstall a damaged filter.
5. Blow out the element from the inside with dry compressed air at 98 psi (0.68MPa) (7 kgf/cm2) and clean the entire circumference.
6. After cleaning, reinstall the element.



24.4.27 CHECK OPERATION OF GOVERNOR (MAXIMUM SPEED)

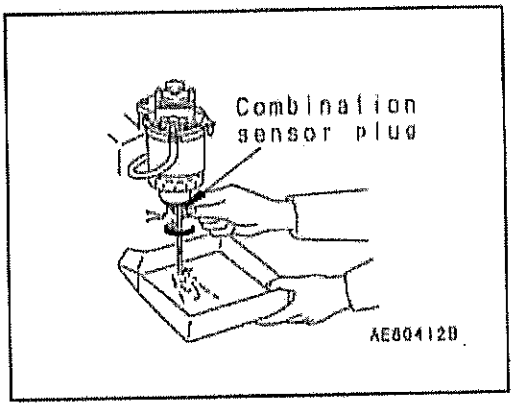
24.4.28 CHECK PIPING/TUBING AND CONNECTIONS/FITTINGS FOR FUEL/GAS LEAKAGE

24.4.29 (DIESEL ENGINE) DRAIN WATER FROM FUEL FILTER

Loosen the combination sensor plug and drain any water and sediment accumulated at the bottom of the filter.

NOTICE

- **Fuel will also drain out of the fuel filter, so prepare a suitable container to catch it.**
- **Always be sure to wipe up any spilled fuel.**



24.4.30 (LPG ENGINE) CHECK VAPORIZER FOR TAR, DRAIN

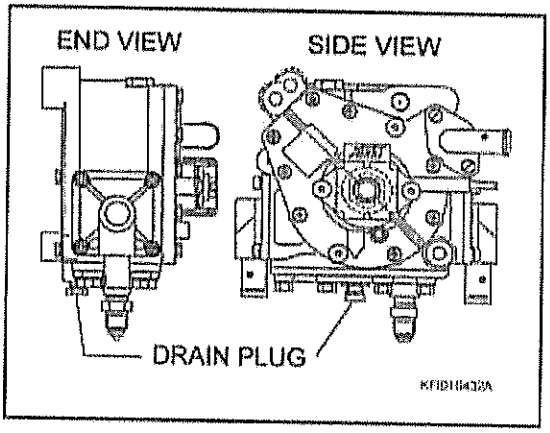
The vaporizer is a device used during LPG operation to control and reduce fuel pressure within the LPG cylinder and regulate vaporization. Tar, a thick, sticky liquid, is produced during this process and accumulates in the vaporizer. Excessive tar buildup in the vaporizer adversely affects idling speed.

⚠ WARNING

- Ensure that the service valve on the fuel feed line is turned fully to the OFF position. Otherwise, pressure in the line may cause operator injury when the drain plug is removed.
- Always wear protective glasses or goggles.
- Do not smoke or allow any open flame near the worksite.

NOTICE

Tar must be drained from the vaporizer at least once per month.



1. Run the engine until it is fully warmed up to operating temperature.
2. As the engine continues to run, close the service valve on the line from the LP tank.
3. Turn the ignition switch to the OFF position when the engine stops.
4. Place a rag under the drain valve to catch the draining tar.
5. Remove the drain plug from the bottom of the vaporizer.
6. Reinstall the drain plug after draining the tar onto the rag.

24.4.31 CHECK RADIATOR HOSES FOR CRACKING, DAMAGE

24.4.32 CHECK OPERATING CONDITION OF RADIATOR CAP, CHECK INSTALLATION

24.4.33 CHECK FAN FOR DEFORMATION, CRACKING AND DAMAGE

24.4.34 CHECK FAN FOR LOOSENESS AND MOUNTING

24.4.35 CHECK, ADJUST ALTERNATOR BELT (DRIVE BELT) TENSION

For details, see page 2-25.

24.4.36 (GAS & LP ENGINES) CHECK SPARK PLUGS FOR BURNING OF ELECTRODE, BURNING OF INSULATOR

See procedure on page 3-24.

24.4.37 (DIESEL ENGINE) CHANGE OIL IN ENGINE OIL PAN

See procedure on page 3-22.

24.4.38 (DIESEL ENGINE) REPLACE ENGINE OIL FILTER CARTRIDGE

See procedure on page 3-22.

(Electrical components)

24.4.39 CHECK OPERATION OF STARTING SWITCH, CHECK MESHING OF PINION GEAR

24.4.40 CHECK SPECIFIC GRAVITY OF BATTERY ELECTROLYTE

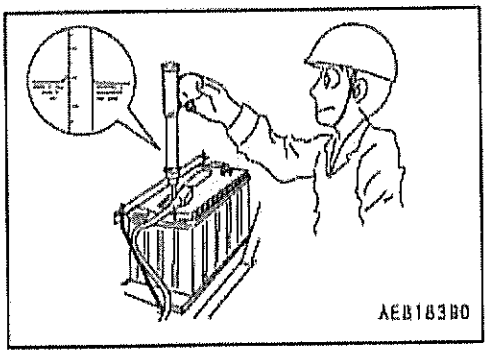
⚠ WARNING

Precautions when handling battery:

- **Battery electrolyte is dangerous. If it gets into your eyes or on your skin or clothes, wash it off with large amounts of water quickly. If it gets into your eyes, seek medical attention immediately.**
- **Keep away from sparks or flame.**
- **To avoid gas explosions, do not smoke or cause short circuits or sparks near the battery.**

1. Charge the battery, and after charging, check that the battery electrolyte level is correct. If the electrolyte level is below the top of the electrode plates, add distilled water to the top of the plates. Check and clean battery caps and terminals. Check the battery case for cracking and stains caused by leakage.

2. Using a specific gravity meter and thermometer, measure the specific gravity and temperature of the battery electrolyte.



3. Insert the values measured in Steps 1 and 2 in the formula below, and calculate S_{20}.

   $S_{20} = St + 0.0007 (t - 20)$

   S_{20}: Specific gravity at 68°F (20°C)

   St: Specific gravity (measured value) at t°C

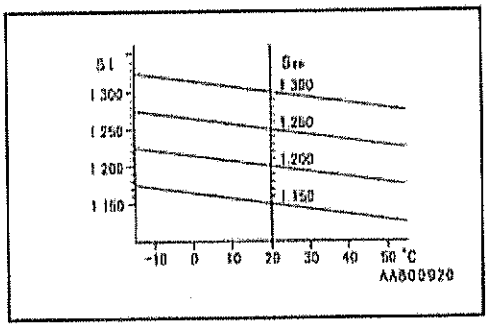
   t: Temperature of battery electrolyte (measured value)

   Normal value: S_{20} = 1.27 - 1.29

   If specific gravity is below 1.225, check terminals, cables, charging system and repair as necessary.

4. Charge the battery if necessary.

Specific gravity of electrolyte	Condition of charge	Charge needed?
1.280 1.240	Fully charged 1/4 discharged	No
1.210 1.130	1/2 discharged Fully discharged	Yes



Relation between specific gravity and temperature of electrolyte

24.4.41 CHECK WIRING CONNECTIONS FOR LOOSENESS

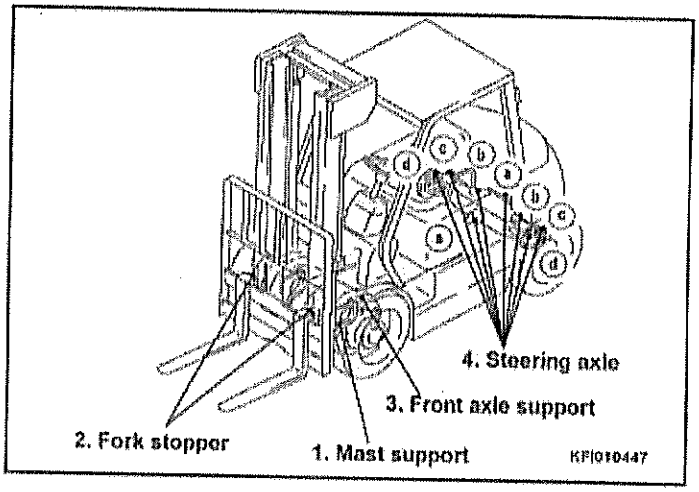
(General)

24.4.42 CHECK OVERHEAD GUARD, LOAD BACKREST FOR DEFORMATION, CRACKING, DAMAGE AND LOOSENESS

24.4.43 CHECK OPERATOR'S SEAT MOUNT FOR LOOSENESS AND DAMAGE, CHECK LPG CYLINDER MOUNTING BRACKET

24.4.44 GREASE ALL LUBRICATION POINTS

1. Mast support (left and right: 2 points)
2. Fork stopper (left and right: 2 points)
3. Front axle support (left and right: 2 points)
4. Steering axle
   (a) Center pin (front and rear: 2 points)
   (b) P.S. cylinder rod (left and right: 2 points)
   (c) Knuckle joint (left and right: 2 points)
   (d) King pin (left and right: 4 points)



24.5 EVERY 500 HOURS SERVICE

24.5.1 CHANGE OIL IN ENGINE OIL PAN AND REPLACE ENGINE OIL FILTER

See procedure on page 3-21.

24.6 EVERY 3 MONTHS OR EVERY 600 HOURS SERVICE

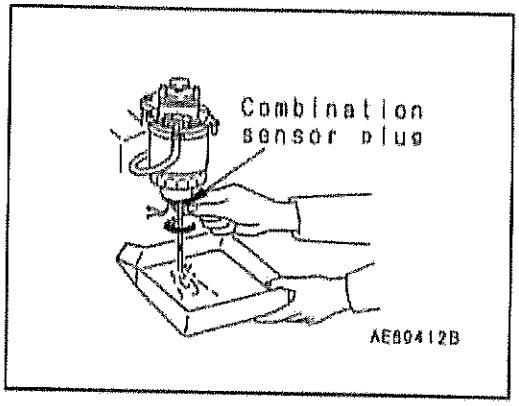
24.6.1 (DIESEL ENGINE) DRAIN WATER FROM THE FUEL FILTER AND REPLACE THE FUEL FILTER CARTRIDGE

DRAIN FUEL FILTER (See Illustration)

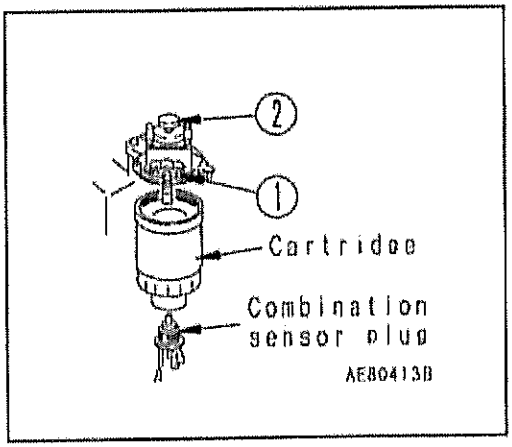
Loosen the combination sensor plug and drain any water and sediment accumulated at the bottom of the filter.

NOTICE

- **Fuel will also drain out of the fuel filter, so prepare a suitable container to catch it.**
- **Always be sure to wipe up any spilled fuel.**

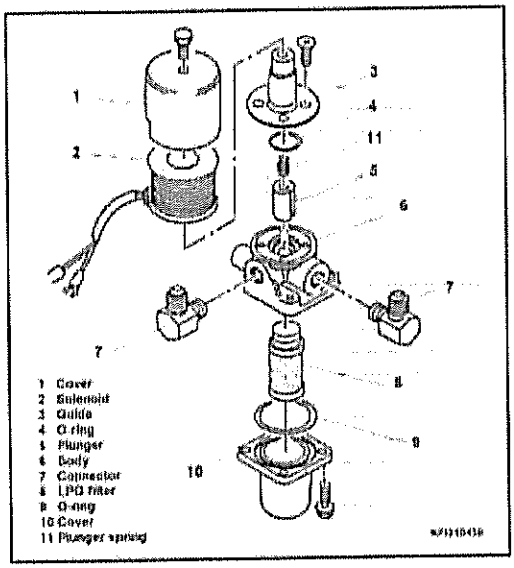


REPLACE FUEL FILTER



1. Remove the combination sensor plug at the bottom of the cartridge.
2. Using a filter wrench, remove the cartridge.
3. Install the combination sensor plug on the new cartridge.
4. Fill the new cartridge with clean fuel, coat the packing surface with a thin layer of clean engine oil, then install.
5. Loosen plug (1) and hand pump knob (2) up and down to bleed air bubbles from fuel. Continue until no more bubbles come out with the fuel.
6. Tighten plug (1).

24.6.2 CLEAN LPG FILTER



Clean the "bronze mesh" LPG filter every 600 hours of operation or every 3 months of service, whichever comes first.

Replace the filter element every 2,400 hours of operation or every 12 months, whichever comes first.

In dusty operating conditions, carry out maintenance as often as possible.

1. Carefully remove the LPG filter (8) from the filter cover (10) located on the lower portion of the LPG Solenoid Valve. Use care not to damage the O-ring (9).
2. Clean bronze mesh filter with suitable cleaning solvent.
3. While wearing eye protection, blow out and dry the filter.
4. Reinstall the cleaned filter. Ensure that the O-ring is properly seated and gently tighten cover screws.

24.6.3 CHECK, ADJUST ENGINE VALVE CLEARANCE

24.6.4 INSPECT PCV VALVE AND HOSES (GASOLINE ENGINE LIFT TRUCKS)

24.6.5 GREASE FUEL INJECTION PUMP GOVERNOR, CHANGE GOVERNOR OIL

(Power train)

24.6.6 CHECK OIL LEVEL IN TRANSMISSION CASE, ADD OIL AS NECESSARY (INCLUDES DIFFERENTIAL CASE ON CLUTCH-TYPE TRUCKS)

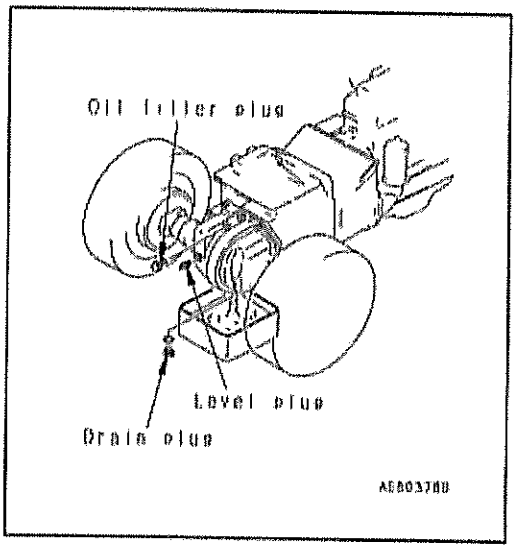
See procedure on page 3-27.

24.6.7 CHECK OIL LEVEL IN DIFFERENTIAL CASE, ADD OIL AS NECESSARY (TORQFLOW LIFT TRUCKS)

⚠ WARNING

Watch out for HOT OIL. Immediately after operations, the oil will be very hot. Wait for the oil temperature to go down before starting this maintenance operation.

1. Remove the oil level plug and check that the oil is near the bottom edge of the plug hole.
2. If the oil level is low, remove the oil filler plug and add oil until it reaches the bottom edge of the oil level plug hole.
3. After filling with new oil, check the oil level.



NOTICE

Always use genuine Komatsu Forklift gear oil (SAE 90). For details, see "20. LUBRICANT LIST".

REMARK

On clutch-type lift trucks, the oil is used for **both** the differential case and the transmission case. However, on the TORQFLOW transmission lift truck, each case has its own special oil, so it is necessary to check and change the oil in the TORQFLOW transmission case in addition to checking and changing the oil in the differential case in two separate operations.

24.7 EVERY 1,000 HOURS SERVICE (EPA and DIESEL ENGINES)

Perform these operations in order to maintain compliance with EPA Diesel Exhaust Emission regulations.

24.7.1 CHECK AND ADJUST FUEL INJECTION PRESSURE AND ATOMIZING CONDITION OF NOZZLES.

To prevent improper adjustment by untrained personnel, load and speed control screws have tamper-proof caps.

24.8 EVERY 6 MONTHS OR EVERY 1,200 HOURS SERVICE

(Steering system)

24.8.1 CHECK STEERING LINK FOR BENDING, DAMAGE AND WEAR

24.8.2 CHECK STEERING KNUCKLE FOR PLAY, DEFORMATION AND DAMAGE

24.8.3 CHECK FOR MARKED VARIATION IN MINIMUM TURNING RADIUS

24.8.4 CHANGE OIL IN DIFFERENTIAL CASE (INCLUDES TRANSMISSION CASE ON CLUTCH-TYPE LIFT TRUCKS)

See procedure on page 3-24.

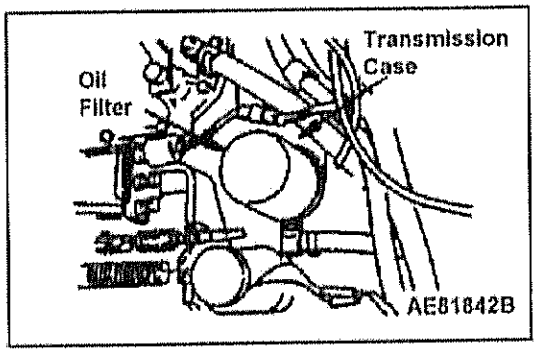
24.8.5 CHANGE OIL IN TORQFLOW TRANSMISSION CASE
See procedure on page 3-23.

24.8.6 CLEAN TORQFLOW TRANSMISSION STRAINER
See procedure on page 3-23.

24.8.7 REPLACE TORQUE CONVERTER OIL FILTER

NOTICE

Replace with genuine Komatsu Forklift oil filter.



24.8.8 CHANGE CLUTCH OIL

(Brake system)
24.8.9 CHANGE BRAKE OIL/FLUID

(Engine)
24.8.10 MEASURE COMPRESSION PRESSURE

24.8.11 CHECK, ADJUST FUEL INJECTION TIMING, CHECK AND INSPECT FUEL INJECTION NOZZLES (DIESEL)

24.8.12 CHECK PCV BLOW-BY GAS REDUCTION SYSTEM FOR CLOGGING, DAMAGE

24.8.13 CLEAN INSIDE OF COOLING SYSTEM

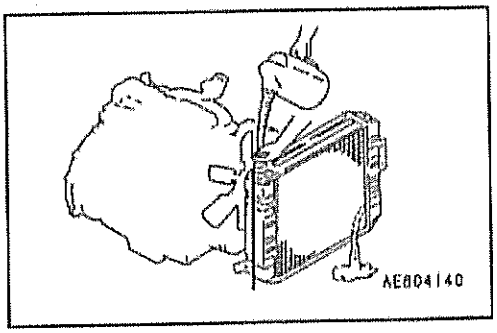
⚠ WARNING

- After the engine has been operated, the coolant is HOT. There is a danger of burns and injury if the cooling water is drained immediately. Always wait for the engine to cool down before draining the coolant.
- The cleaning operation is carried out with the engine running. The lift truck may move suddenly and unexpectedly, so never go under the lift truck during this operation. Never go under the lift truck when the engine is running.
- Do not remove the radiator cap when the engine and coolant is hot. Boiling water and steam may spurt out. Always wait for the temperature to go down, then turn the radiator cap slowly to release pressure gradually before removing the cap completely.

CLEAN RADIATOR

Stop the lift truck on level ground.

1. After the engine has cooled off, open the drain valves at the bottom of the radiator and the engine cylinder block to drain the water/coolant mixture.
2. After draining, close the drain valves. Fill the radiator with fresh water (tap water) and radiator flushing fluid through the water filler, then run the engine at idling for approximately 15 minutes.
3. Stop the engine, open the drain valves to drain the water, then add fresh water and run the engine at idling until clean, clear water comes out of the drain valves (5 - 10 minutes).



4. Stop the engine, drain all the water from the drain valves, then close the drain valves and fill the radiator with fresh water and glycol-based coolant.

Water and Coolant Capacities	
K21 engine	2.40 US gal (9.1 L) (2.00 UK gal)
K25 engine	
4D94E engine	2.43 US gal (9.2 L) (2.02 UK gal)

NOTICE

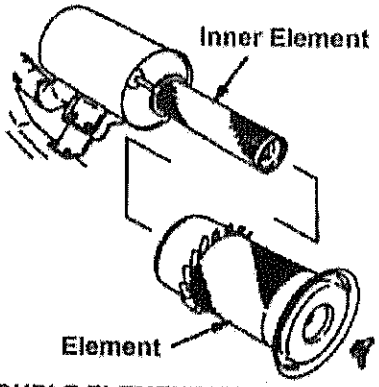
Coolant is flammable.
Keep it away from open flame and sparks.

- **In cold areas, add glycol-based coolant.**
  (For details, see "16. COLD WEATHER OPERATION" on page 2-46.)
- **When not using glycol-based coolant, add rust prevention fluid to the radiator.**
- **Always use genuine Komatsu Forklift products for the flushing fluid, rust prevention fluid and glycol-based coolant.**

24.8.14 REPLACE AIR CLEANER ELEMENT (EPA Engines)

⚠ WARNING

- **Never clean or replace air cleaner while the engine is running.**
- **If compressed air is used to clean the element, dust will fly and there is danger that it may get into your eyes.**
- **Always wear safety goggles.**



DOUBLE ELEMENT TYPE - DIESEL
KFI010431C

REPLACE ELEMENT (DIESEL ENGINE)

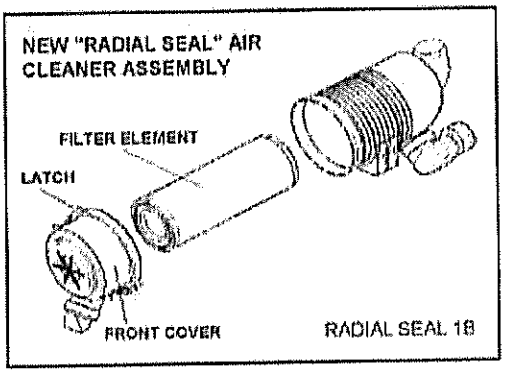
1. Remove the air cleaner housing from engine.
2. Remove the wing-nut and take out the inner element.
3. Cover the air connector end with a clean cloth or tape.
4. Clean the inside of the body, then remove the cover fitted in Step 3.
5. Install a new element and reinstall air cleaner to engine.

NOTICE

Diesel engine air cleaner filters and the new "Radial Seal" style filters are NOT interchangeable. The new style element has a soft-compound dedicated sealing surface. The diesel engine style filter elements will not seat and seal properly in the new style air cleaner housings. The engine warranty will be voided if improper or aftermarket elements are used.

REPLACE "RADIAL SEAL" AIR FILTER (GAS / LPG ENGINES)

1. Release latches to remove air cleaner housing cover.
2. Gently remove filter element using care not to dislodge dirt and dust. Discard old filter element.
3. Thoroughly clean air cleaner housing sealing surface and outlet tube outer diameter. Then clean the inside of the outlet tube using a clean cloth.
4. Inspect and then insert new "Radial Seal" filter carefully with open end towards air cleaner housing. Never install a damaged filter.
5. Seat filter completely by hand. Each new element sealing surface is coated with a dry lubricant to aid in sealing.
6. DO NOT USE COVER TO FORCE FILTER ELEMENT INTO PLACE. THIS WILL DAMAGE THE FILTER AND THE HOUSING.
7. When seating element, apply hand pressure to outer edge of filter, not in the flexible center.
8. Once element is seated and sealed, reinstall cover and secure the latches.
9. Check all clamps, bolts and connections for tightness.



(Hydraulic equipment)

24.8.15 CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC LINE FILTER, CLEAN HYDRAULIC TANK STRAINER, CLEAN INSIDE OF HYDRAULIC TANK

See procedure on page 3-20.

24.9 EVERY 2,000 HOURS SERVICE

24.9.1 DIESEL TRUCKS: CHECK AND ADJUST FUEL INJECTION TIMING

Perform this operation in order to maintain compliance with EPA Diesel Engine Exhaust regulations.

24.9.2 (LPG TRUCKS) REPLACE AIR VALVE DIAPHRAGM ON MIXER. REPLACE O-RING FOR LPG TANK VALVE.

24.10 EVERY YEAR OR EVERY 2,400 HOURS SERVICE

(Brake system)

24.10.1 CHECK OPERATION OF BRAKE MASTER CYLINDER, CHECK FOR OIL LEAKAGE, DAMAGE AND WEAR

24.10.2 CHECK OPERATION OF WHEEL CYLINDERS, CHECK FOR OIL LEAKAGE, DAMAGE & WEAR

24.10.3 CHECK OPERATION OF BRAKE DRUM, CHECK FOR DAMAGE AND WEAR

24.10.4 CHECK BRAKE LININGS FOR WEAR

24.10.5 CHECK OPERATING CONDITION OF BRAKE SHOES

24.10.6 CHECK BRAKE ADJUSTMENT LEVER AND RATCHET FOR WEAR AND DAMAGE

24.10.7 CHECK BRAKE SPRINGS FOR DETERIORATION

24.10.8 CHECK BRAKE BACK PLATES FOR DEFORMATION AND CRACKING, CHECK MOUNTING CONDITION

24.10.9 CHECK AIR TIGHTNESS OF BRAKE PIPING/TUBING

(Travel system)
24.10.10 CHECK AXLE FOR DEFORMATION, CRACKING AND DAMAGE

24.10.11 CHECK MOUNTING CONDITION OF DIFFERENTIAL

24.10.12 CHECK ROOT (BASE) OF FORKS FOR CRACKING (USE COLOR CHECK)

24.10.13 CHECK ROLLER SHAFT OF LOADING EQUIPMENT FOR CRACKING AND DAMAGE

24.10.14 CHECK MAST SUPPORT FOR DAMAGE AND WEAR

(Hydraulic equipment)
24.10.15 CHECK OPERATION OF RELIEF VALVE, CHECK RELIEF PRESSURE

24.10.16 REPLACE AIR BREATHER

(Engine)
24.10.17 REPLACE FUEL FILTER (DIESEL), CLEAN INSIDE OF FUEL TANK (GASOLINE AND DIESEL LIFT TRUCKS)
See filter replacement procedure on page 3-32.

24.10.18 CHECK FUEL INJECTION PRESSURE, INJECTION AMOUNT, INJECTOR CONDITION

24.10.19 TIGHTEN (RETORQUE) ENGINE CYLINDER HEAD BOLTS

(General)
24.10.20 CHECK FRAME AND CROSSMEMBER FOR CRACKING AND DAMAGE

24.10.21 REPLACE ENGINE COOLANT (GLYCOL-BASED) (EPA MODELS)
See procedure on page 3-35.

24.10.22 REPLACE LPG FILTER
See procedure on page 3-33.

24.11 EVERY 18 MONTHS OR EVERY 3,600 HOURS SERVICE

(Brake system)
24.11.1 REPLACE SPARK PLUGS

25.1 REPLACING FUSES AND RELAYS

25.1.1 CHASSIS FUSES (ALL TRUCKS)

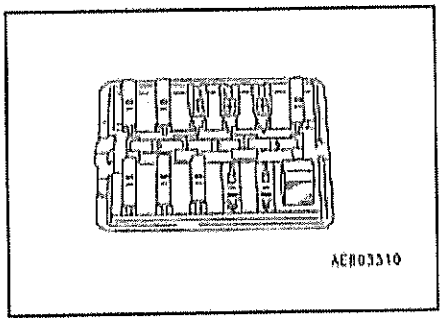
NOTICE

- **When replacing the fuses, always turn OFF the electric power (turn the starting switch to the OFF position) first.**
- **Always replace the fuses with a fuse of the same capacity.**

The CHASSIS fuses are used to protect the electrical components and wiring from burning out and are located in a fusebox located to the left of the steering column and below the dashboard panel of dials and gauges.

1. Turn the starting switch to the OFF position.
2. Open the cover of the fuse box and replace necessary fuses inside. To remove the cover from the fuse box, push the side face of the cover lightly with your fingers and pull it out.

   Check the relationship between the fuses and the electrical components when replacing.



Fuse Capacity and Related Electrical Component

No.	Capacity	Color	Related Electrical Component
(1)	5 Amp (EPA gas) 10 Amp (diesel)	Red	Starter relay (neutral safety switch)
(2)	10 Amp	Yellow	Meter
(3)	10 Amp	Red-Yellow	Back-up lamp
(4)	15 Amp	Green	Stop lamp
(5)	15 Amp	Red	Lamps
(6)	10 Amp	Green-White	Horn

25.1.2 ENGINE FUSES AND RELAYS (K21 AND K25 ENGINES ONLY [BX GAS AND LP TRUCKS])

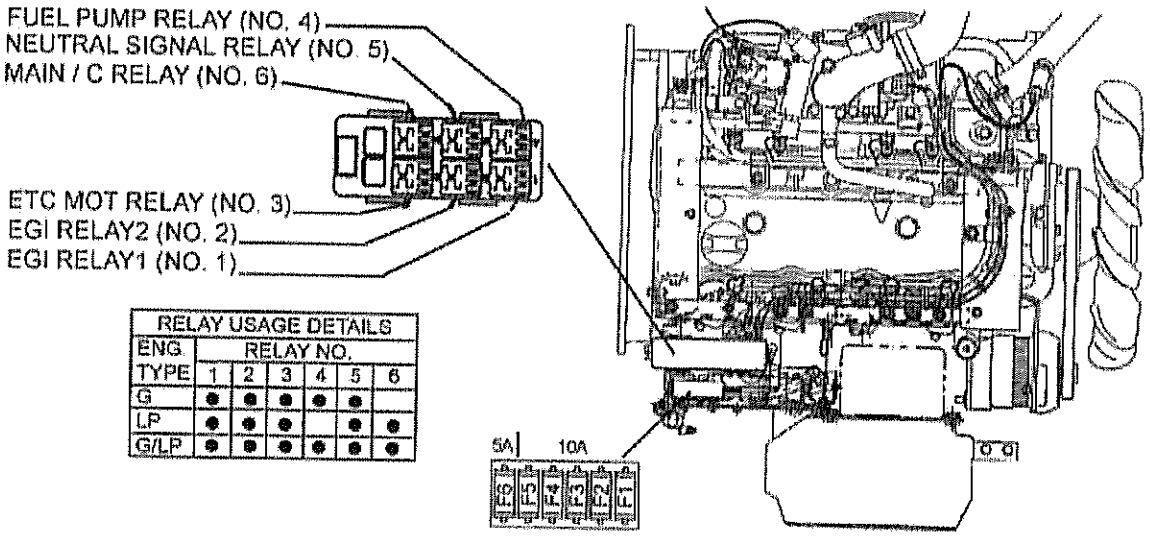
NOTICE

- **When replacing the fuses, always turn OFF the electric power (turn the starting switch to the OFF position) first.**
- **Always replace the fuses with a fuse of the same capacity.**

The ENGINE fuses and relays are located in separate boxes mounted at one corner of the engine as viewed from the top.

1. Turn the starting switch to the OFF position.
2. Open the engine bonnet.
3. Open the cover of the fuse box or relay box and replace the failed component.
   To remove the cover from the fuse box or relay box, push the side face of the cover lightly with your fingers and pull it out.

   Check the relationship between the fuses and the electrical components when replacing.



RELAY USAGE DETAILS						
ENG. TYPE	RELAY NO. 1	2	3	4	5	6
G	●	●	●	●	●	
LP	●	●	●		●	●
G/LP	●	●	●	●	●	●

FUSE USAGE DETAILS						
ENG. TYPE	FUSE NO. F1	F2	F3	F4	F5	F6
G	●	●	●	●	●	●
LP	●	●	●			●
G/LP	●	●	●	●	●	●

K21/25 RELAYS

25.2 REPLACING TIRES

1. Stop the lift truck on a flat, safe area and apply the parking brake.
2. Chock the wheel diagonally across from the wheel to be replaced.

⚠ WARNING

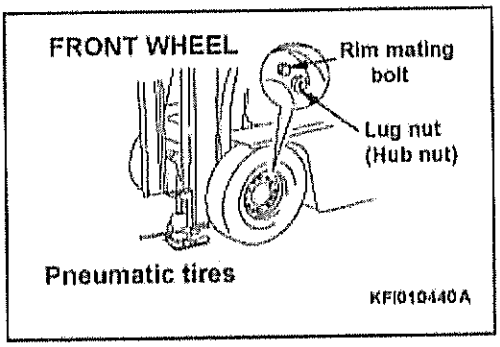
- **After confirming that the rim mating bolts are tight, loosen the lug nuts (hub nuts).**
- **NEVER loosen the rim mating bolts by mistake.**

3. Using a lug wrench, loosen the lug nuts until they can be turned by hand

⚠ WARNING

Jack up the fork lift truck after confirming that the jack will not slip. NEVER enter under the body of the fork lift truck.

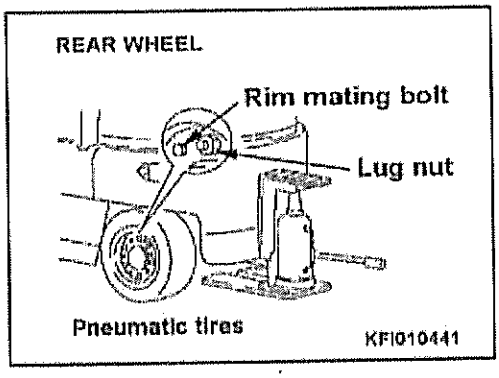
4. Place the jack on the jacking point and raise the lift truck up until the wheel to be replaced clears the ground.
5. Remove the lug nuts, then remove the wheel.



⚠ WARNING

Ask a tire and wheel specialist to carry out disassembly and assembly of tires and wheels.

6. Install the replacement wheel on the hub and hand tighten the lug nuts to hold the wheel in place.
7. Tighten the lug nuts again with a lug wrench, using a diagonal "criss-cross" pattern, ensuring that the wheel is snugly in place, but not fully tightened.
8. Let the jack down slowly to lower the lift truck. Tighten the lug nuts to the specified torque.
   (For specified torque, see **"21. SERVICE DATA".**)



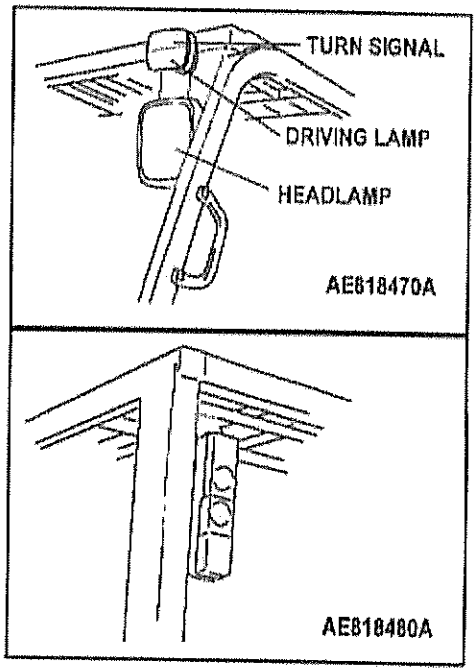
⚠ WARNING

- **Always ask a specialist to carry out disassembly of the tires, tubes and rims, and for inflation of the tires. The tires used on forklift trucks are at a high inflation pressure, so operations with tires are extremely dangerous.**
- **The tires are inflated to a high pressure, so deformed or cracked rims are extremely dangerous. Check carefully before inflating tires. NEVER use tires with deformed or cracked rims.**
- **Before inflating the tires, adjust the pressure of the air compressor to the correct set pressure so that the tires are not inflated above the set pressure.**

9. Adjust the tire inflation pressure to the set pressure.
   (For details of the set inflation pressure, see "21. SERVICE DATA".)

25.3 REPLACING LAMPS

Check for any blown fuses or disconnections in the wiring harnesses, and replace the lamps as necessary.



Lamp capacity	
Head lamp	55 W (For 12 Volt)
Turn signal lamp	23 W (For 12 Volt)
Driving lamp	8 W (For 12 Volt)
Tail lamp	8 W (For 12 Volt)
Stop lamp	23 W (For 12 Volt)
Back-up lamp	3 W (For 12 Volt)
Warning lamp	2.0 W (For 12 Volt)
Meter lighting lamp	3.4 W (For 12 Volt)

TECHNICAL DATA

⚠ WARNING

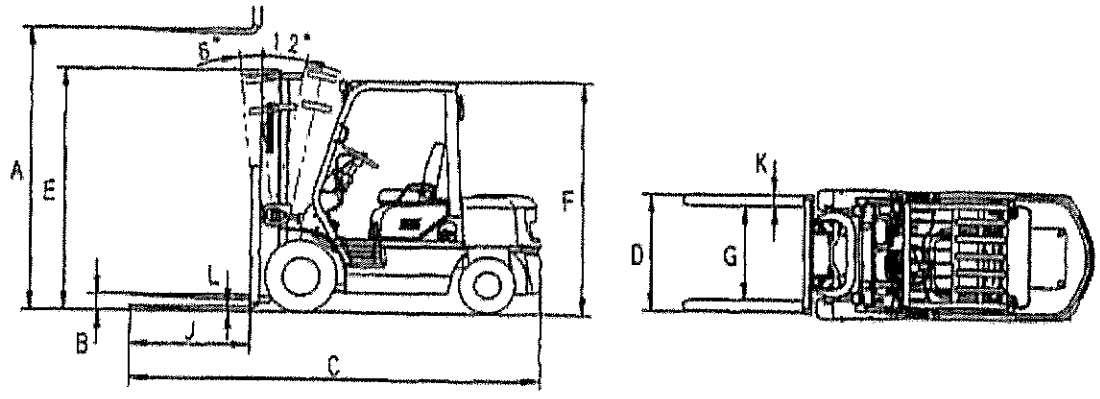
READ AND FOLLOW ALL SAFETY PRECAUTIONS. FAILURE TO DO SO MAY RESULT IN SERIOUS INJURY OR DEATH.

26. TECHNICAL DATA - AX MODEL LIFT TRUCKS

Specifications: AX lift trucks (gasoline/LPG engines)

Item			Unit	FG15H-17	FG18H-17
• Performance					
Capacity			lb (kg)	3,000 (1,361)	3,500 (1,588)
Load center			in. (mm)	24 (610)	
Max. lifting height		A		127.5 (3,239)	
Free lift		B		5.51 (140)	
Fork lifting speed (with load)			in./s (mm/s)	27.0 (685)	24.6 (625)
Max. travel speed (without load)	Clutch (forward/reverse)		mph (km/h)	12.1(19.5) / 12.1(19.5)	-
	TORQFLOW (forward/reverse)			12.4 (20.0) / 12.4 (20.0)	
Gradeability (with load) Clutch/TORQFLOW			%	31.0 / 39.0	- / 35.0
• Dimensions, weight					
Overall length		C	in. (mm)	129.7 (3,295)	131.0 (3,327)
Overall width		D		42.1 (1,069)	
Overall height	w/mast raised	E		175.5 (4,458)	
	overhead guard	F		29.7 (2,025)	
Fork length x width x thickness J K L				42.0 x 3.9 x 1.5 (1,067 x 100 x 38)	
Fork spread		G		7.9 - 41.0 (200 - 1,041)	
Service weight	Clutch-type		lb (kg)	5,865 (2,660)	-
	TORQFLOW			5,930 (2,690)	6,385 (2,895)
• Engine					
Type			–	NISSAN K21	
Piston displacement			cu.in. (cc)	126 (2,065)	
Flywheel horsepower			HP (kW)/rpm	60.1 (44.8) / 2,950 rpm	
• Tires					
Front tires			–	6.50 - 10 - 10PR(I)	
Rear tires			–	5.00 - 8 - 8PR(I)	

Dimension chart



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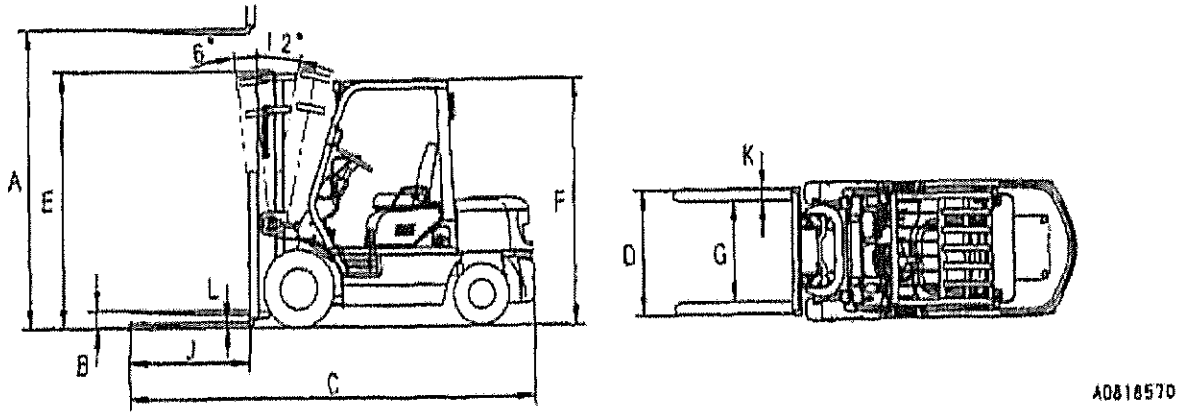
Specifications: AX lift trucks (gasoline/LPG engines; continued)

Item			Unit	FG15S-17	FG18S-17
• Performance					
Capacity			lb (kg)	3,000 (1,361)	3,500 (1,588)
Load center			in. (mm)	24 (610)	
Max. lifting height		A		127.5 (3,239)	
Free lift		B		5.51 (140)	
Fork lifting speed (with load)			in./s (mm/s)	27.0 (685)	24.6 (625)
Max. travel speed (without load)	Clutch (forward/reverse)		mph (km/h)	–	
	TORQFLOW (forward/reverse)			10.3 (16.5) / 10.3 (16.5)	
Gradeability (with load) Clutch/TORQFLOW			%	– /41.0	– /37.0
• Dimensions, weight					
Overall length		C	in. (mm)	121.3 (3,082)	122.9 (3,122)
Overall width		D		38 (965)	
Overall height	w/mast raised	E		175.5 (4,458)	
	Overhead guard	F		83.0 (2,108)	
Fork length x width x thickness J K L				42.0 x 3.9 x 1.5 (1,067 x 100 x 38)	
Fork spread		G		7.9 - 37.0 (200 - 940)	
Service weight	Clutch-type		lb (kg)	-	-
	TORQFLOW			5,940 (2,695)	6, 450 (2,925)
• Engine					
Type			–	NISSAN K21	
Piston displacement			cu.in. (cc)	126 (2,065)	
Flywheel horsepower			HP (kW)/rpm	60.1 (44.8) / 2,950 rpm	
• Tires					
Front tires			–	18 x 6 x 12-1/8	
Rear tires			–	14 x 4-1/2 x 8	

Dimension chart



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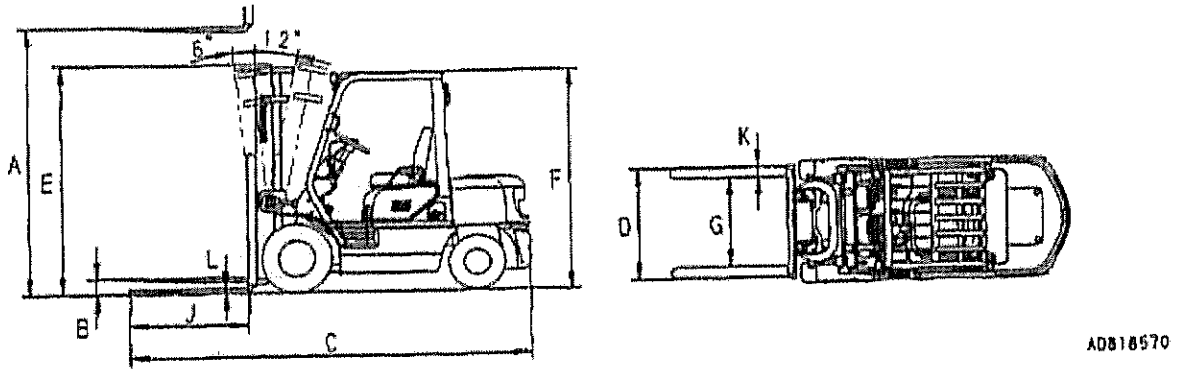
Specifications: BX lift trucks (diesel engines)

Item			Unit	FD20-14	FD25-14	FD30-14
• Performance						
Capacity			lb (kg)	4,000 (1,814)	5,000 (2,268)	6,000 (2,722)
Load center			in. (mm)	24 (610)		
Max. lifting height		A		127.5 (3,239)		
Free lift		B		5.7 (145)		6.0 (152)
Fork lifting speed (with load)			in./s (mm/s)	23.6 (600)		22.0 (560)
Max. travel speed (without load)	Clutch (forward/reverse)		mph (km/h)	–		
	TORQFLOW (forward/reverse)			11.2 (18.0)		11.8 (19.0)
Gradeability (with load) Clutch/TORQFLOW			%	– /20.0	– /17.2	– /13.5
• Dimensions, weight						
Overall length		C	in. (mm)	141.6 (3,595)	144.0 (3,655)	148.3 (3,765)
Overall width		D		45.3 (1,150)		48.6 (1,235)
Overall height	Mast	E		85.1 (2,160)		82.3 (2,090)
	Overhead guard	F		81.5 (2,070)		82.3 (2,090)
Fork length x width x thickness J K L				42.1 x 3.9 x 1.6 (1,070 x 100 x 40)		42.1 x 4.9 x 2.0 (1,070x125x50)
Fork spread		G		7.9 - 141 (200 - 1,041)		9.9 - 41.0 (250 - 1,041)
Service weight	Clutch-type		lb (kg)	–		
	TORQFLOW			7,605 (3,450)	8,390 (3,805)	9,690 (4,395)
• Engine						
Type			–	KOMATSU 4D94E		
Piston displacement			cu.in. (cc)	170 (2,775)		
Flywheel horsepower			HP(kW)/rpm	65 (48) / 2,450 rpm		
• Tires						
Front tires			in.	7.00 - 12 - 12PR		8.15 - 15 - 16PR
Rear tires			in.	6.00 - 9 - 10PR		6.50 - 10 - 10PR

Dimension chart

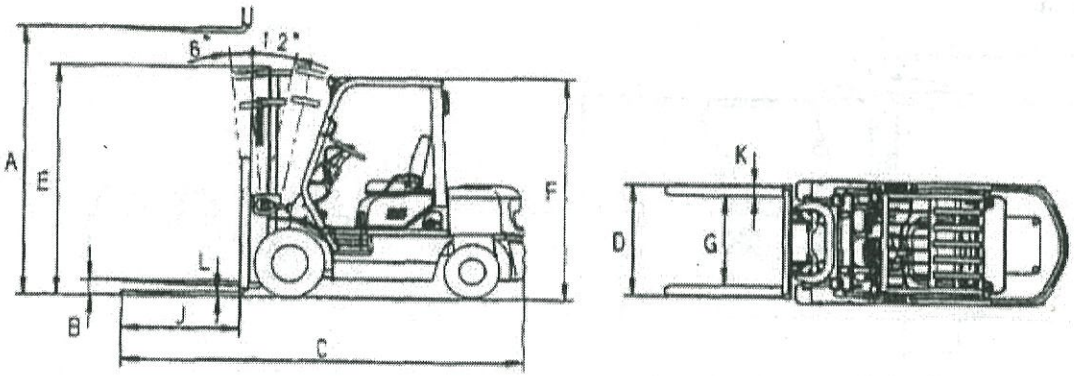


26. TECHNICAL DATA - AX MODEL LIFT TRUCKS

Specifications: BX lift trucks (gasoline/LPG engines)

Item			Unit	FG20-14	FG25-14	FG30-14
• Performance						
Capacity			lb (kg)	4,000 (1,814)	5,000 (2,268)	6,000 (2,722)
Load center			in. (mm)	24 (610)		
Max. lifting height		A		127.5 (3,239)		
Free lift		B		5.7 (145)		6.0 (152)
Fork lifting speed (with load)			in./s(mm/s)	24.0 (610)		21.7 (550)
Max. travel speed (without load)	Clutch (forward/reverse)		mph (km/h)	11.5 (18.5)		—
	TORQFLOW (forward/reverse)			11.8 (19.0)		12.1 (19.5)
Gradeability (with load) Clutch/TORQFLOW			%	29 / 32	24 / 27	– / 16
• Dimensions, weight						
Overall length		C	in. (mm)	141.6 (3,595)	144.0 (3,655)	148.3 (3,765)
Overall width		D		45.3 (1,150)		48.6 (1,235)
Overall height	w/ mast raised	E		175.5 (4,458)		
	Overhead guard	F		85.1 (2,160)		
Fork length x width x thickness		J K L		42.0 x 3.9 x 1.6 (1,070 x 100 x 40)		42.0 x 4.9 x 2.0 (1,070 x 125 x 50)
Fork spread		G		7.9 - 141.0 (200 - 1,041)		9.8-141.0 (250-1,041)
Service weight	Clutch-type		lb (kg)	7,255 (3,290)	8,035 (3,645)	—
	TORQFLOW			7,375 (3,345)	8,160 (3,700)	9337 (4,235)
• Engine						
Type			–	NISSAN K21		
Piston displacement			cu.in. (cc)	126 (2,065)		
Flywheel horsepower			HP (kW)/rpm	60.1 (44.8) / 2,950 rpm		
• Tires						
Front tires			in.	7.00 - 12 - 12PR		8.15 - 15 - 16PR(I)
Rear tires			in.	6.00 - 9 - 10PR		6.50 - 10 - 10PR(I)

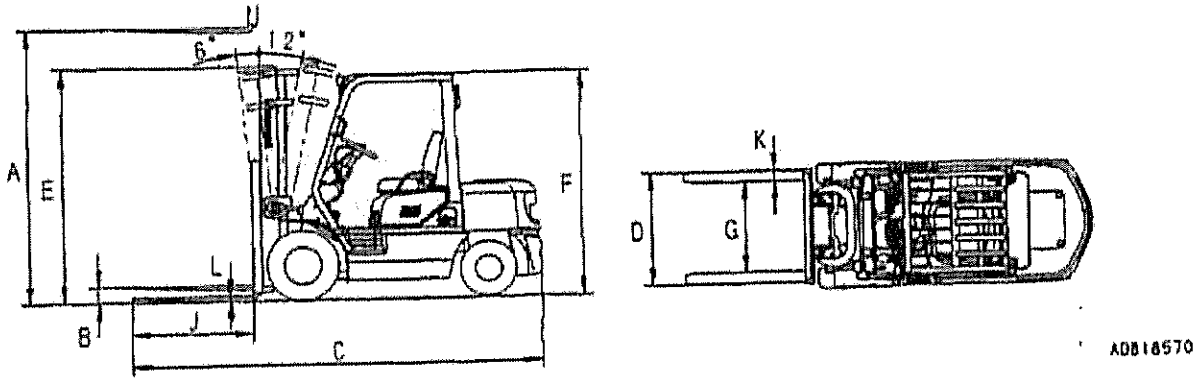
Dimension chart



Specifications: BX lift trucks (gasoline/LPG engines; continued)

Item			Unit	FG20H-14	FG25H-14	FG30H-14
• Performance						
Capacity			lb (kg)	4,000 (1,814)	5,000 (2,268)	6,000 (2,722)
Load center			in. (mm)	610 (24)		
Max. lifting height		A		127.5 (3,239)		
Free lift		B		5.7 (145)		6.0 (152)
Fork lifting speed (with load)			in./s (mm/s)	24.0 (610)		21.7 (550)
Max. travel speed (without load)	Clutch (forward/reverse)		mph (km/h)	–		
	TORQFLOW (forward/reverse)			11.8 (19.0)		12.1 (19.5)
Gradeability (with load) Clutch/TORQFLOW			%	– /40	– /34	– /27
• Dimensions, weight						
Overall length		C	in. (mm)	141.6 (3,595)	144.0 (3,655)	148.3 (3,765)
Overall width		D		145.2 (1,150)		48.6 (1,235)
Overall height	w/ mast raised	E		175.5 (4,458)		
	Overhead guard	F		85.0 (2,160)		
Fork length x width x thickness J K L				42.1 x 3.9 x 1.6 (1,070 x 100 x 40)		42.1 x 4.9 x 2.0 (1,070 x 125 x 50)
Fork spread		G		7.9 - 41.0 (200 - 1,041)		9.9 - 41.0 (250 - 1,041)
Service weight	Clutch-type		lb (kg)	–		
	TORQFLOW			7,375 (3,345)	8,160 (3,700)	9,460 (4,290)
• Engine						
Type			–	NISSAN K25		
Piston displacement			cu.in. (cc)	152 (2,490)		
Flywheel horsepower			HP (kW)/rpm	65.7 (49) / 2,900 rpm		
• Tires						
Front tires			in.	7.00 - 12 - 12PR		8.15 - 15 - 16PR(I)
Rear tires			in.	6.00 - 9 - 10PR		6.50 - 10 - 10PR(I)

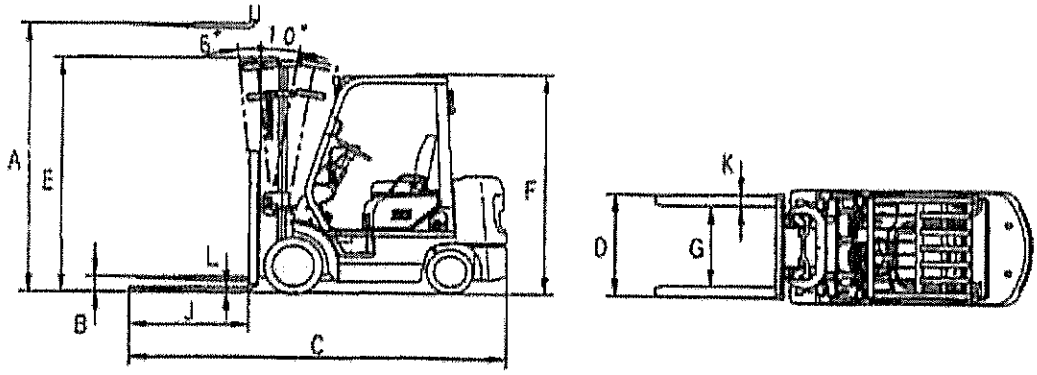
Dimension chart



Specifications: BX lift trucks (gasoline/LPG engines; continued)

Item			Unit	FG20S-14	FG25S-14
• Performance					
Capacity			lb (kg)	4,000 (1,814)	5,000 (2,268)
Load center			in. (mm)	24 (610)	
Max. lifting height		A		127.5 (3,239)	
Free lift		B		5.7 (145)	
Fork lifting speed (with load)			in./s (mm/s)	24.0 (610)	
Max. travel speed (without load)	Clutch (forward/reverse)		mph (km/h)	–	
	TORQFLOW (forward/reverse)			10.2 (16.5)	
Gradeability (with load) Clutch/TORQFLOW			%	– /36	– /30
• Dimensions, weight					
Overall length		C	in. (mm)	131.0 (3,325)	133.2 (3,380)
Overall width		D		41.7 (1,059)	
Overall height	w/ mast raised	E		175.5 (4,458)	
	Overhead guard	F		85.0 (2,160)	
Fork length x width x thickness J K L				42.1 x 3.9 x 1.6 (1,070 x 100 x 40)	
Fork spread		G		7.9 - 37.0 (200 - 940)	
Service weight	Clutch-type		lb (kg)	–	
	TORQFLOW			7,340 (3,330)	8,180 (3,710)
• Engine					
Type			–	NISSAN K21	
Piston displacement			cu.in. (cc)	126 (2,065)	
Flywheel horsepower			HP (kW)/rpm	60.1 (44.8) / 2,950 rpm	
• Tires					
Front tires			in.	21 - 7 - 15	
Rear tires			in.	16 1/4 x 5 x 11-1/4	

Dimension chart



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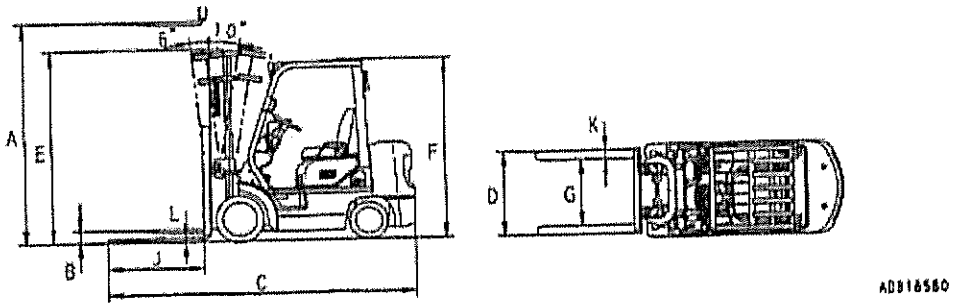
Specifications: BX lift trucks (gasoline/LPG engines; continued)

Item			Unit	FG20SH-14	FG25SH-14	FG30SH-14
• Performance						
Capacity			lb (kg)	4,000 (1,814)	5,000 (2,268)	6,000 (2,722)
Load center			in. (mm)	24 (610)		
Max. lifting height		A		127.5 (3,239)		
Free lift		B		5.7 (145)		6.0 (152)
Fork lifting speed (with load)			in./s(mm/s)	24.0 (610)		21.7 (550)
Max. travel speed (without load)	Clutch (forward/reverse)		mph (km/h)	–		
	TORQFLOW (forward/reverse)			10.2 (16.5)		
Gradeability (with load) Clutch/TORQFLOW			%	– /47	– /39	– /32
• Dimensions, weight						
Overall length		C	in. (mm)	131.0 (3,325)	133.2 (3,380)	136.7 (3,470)
Overall width		D		41.7 (1,059)		43.3 (1,100)
Overall height	w/ mast raised	E		175.5 (4,458)		
	Overhead guard	F		85.0 (2,160)		
Fork length x width x thickness J K L				42.1 x 3.9 x 1.6 (1,070 x 100 x 40)		42.1 x 4.9 x 2.0 (1,070 x 125 x 50)
Fork spread		G		7.9 - 37.0 (200 - 940)		9.9 - 37.0 (250 - 940)
Service weight	Clutch-type		lb (kg)	–		
	TORQFLOW			7,340 (3,330)	8,180 (3,710)	9,415 (4,270)
• Engine						
Type			–	NISSAN K25		
Piston displacement			cu.in. (cc)	152 (2,490)		
Flywheel horsepower			HP (kW)/rpm	65 (49) / 2,900 rpm		
• Tires						
Front tires			in.	21 x 7 x 15		21 x 8 x 15
Rear tires			in.	16-1/4 x 5 x 11-1/4		16-1/4 x 6 x 11-1/4

Dimension chart



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