INTRODUCTION

1. INTRODUCTION
1.1 ABOUT THIS MANUAL

This manual describes procedures for proper operation, inspection, and maintenance of this lift truck, and rules you must follow for your safety.
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

This manual describes fundamental prohibitions and precautions for operations, inspections, and maintenance of this lift truck. Failure to follow these instructions will result in a serious bodily injury or damage.
Operators and service staffs must follow the followings before conducting operations, inspections, and maintenance of this lift truck.
Operators must understand this manual for conducting safety control of this lift truck.

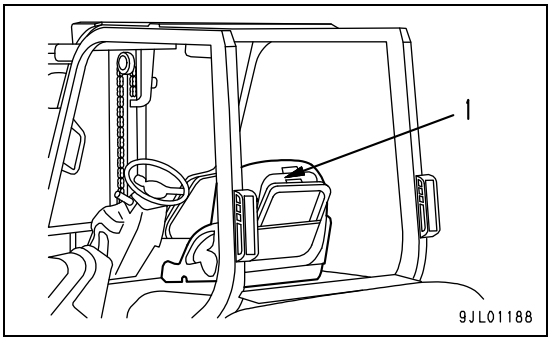
- **Read this manual carefully and understand it fully.**
- **Make sure you fully understand the instructions and safety indicators of this manual.**
- **For the lift truck equipped with options, read also "OPTIONS".**

Be sure to store this manual in the designated location for the Operation and Maintenance Manual as shown below, so that it will be avail for the concerned persons repeatedly as needed.
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.
When you transfer this lift truck to others, make sure to attach this manual together.

Continuing improvements in the design of this lift truck may not be reflected in this manual. Consult Komatsu Ltd. FORKLIFT COMPANY or your KOMATSU FORKLIFT distributor for the latest available information on your lift truck or for questions regarding information in this manual.

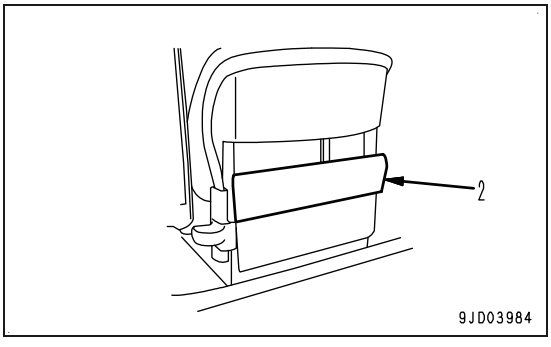
TYPE A

Storage location for Operation and Maintenance Manual
- Retractable pocket behind the operator's seat (1)



TYPE B

Storage location for Operation and Maintenance Manual
- Operator’s seat back literature storage area (2)



1.2 FOR YOUR SAFETY

For your safety, the information of possible hazards and how to avoid them are provided on this manual and with the safety indicators attached to this lift truck.

1.2.1 SIGNAL WORDS

The following signal words indicate the possible hazard which leads bodily injury.
For this lift truck and this manual, the following signal words are used depending on the degree of possible hazard.

⚠ WARNING WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Example of safety message using signal word

⚠ CAUTION

Do not open the radiator cap immediately after the engine stops, since the coolant temperature is very high. Steam or boiling water may spurt out, causing burns. After the coolant temperature has gone down, turn the cap slowly to release the pressure before removing it.

Other signal words
Besides the above signal words, the followings indicate precautions you must take for the lift truck as well as useful information.

NOTICE - - - - - -The lift truck can get damaged or shortens its service life when handled incorrectly.

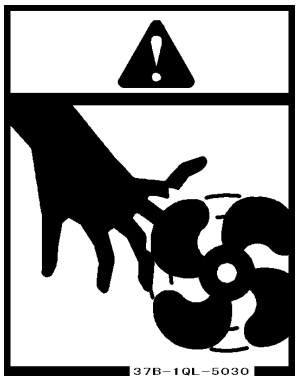
REMARKS - - - - -Useful information.

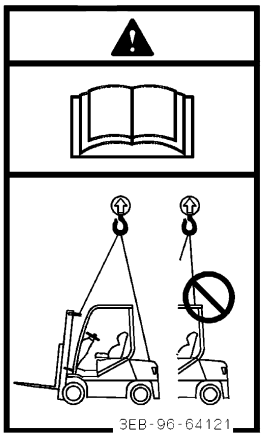
1.2.2 SAFETY INDICATORS

Safety indicators are used in the various locations of the lift truck to indicate the possible hazards to the concerned persons during operations, inspections, and maintenances.This lift truck employs [pictorial safety indicator] for safety indicators.

EXAMPLE OF PICTORIAL SAFETY INDICATOR

The pictorial safety indicators indicate the hazard equivalent to the signal words. Illustrations are used for these safety indicators to tell the operators and service staffs clearly of the existence and content of a hazard.
In addition, there are pictorial indicators which simply indicate the prohibition content as well as indicators which comply with the international standards.





Komatsu Ltd. FORKLIFT COMPANY cannot predict every circumstance that the customers will experience. Therefore the precautions in this manual and on the lift truck may not include all possible safety precautions.
When carrying out any procedures or actions which are not specifically recommended or allowed in this manual, it is your responsibility to carry out such procedures and actions safely.
The explanations, numeric vales, and illustrations of this manual are based on the information at the time of publication. Continuing improvements in the design of this lift truck may not be reflected in this manual.
Consult KOMATSU FORKLIFT distributor for the latest available information or for questions regarding this manual.

1.3 APPLICABLE MODEL AND SERIAL No.

This Operation and Maintenance Manual applies to the following lift trucks.

Model type	Serial No.
FG10/15/18-21	M221-200001 and up
FG15H/18H-21	M256-200001 and up
FG20/25-17	M225-300001 and up
FG30/35A-17	M226-300001 and up
FG20H/25H-17	M227-300001 and up
FG20N/25N-17	M232-300001 and up
FG30N-17	M233-300001 and up
FD10/15/18-21	M223-200001 and up
FD20/25-17	M228-300001 and up
FD30-17	M229-300001 and up
FD20H/25H-17	M230-300001 and up
FD30H/35A-17	M231-300001 and up

1.4 GENERAL VIEW OF LIFT TRUCK

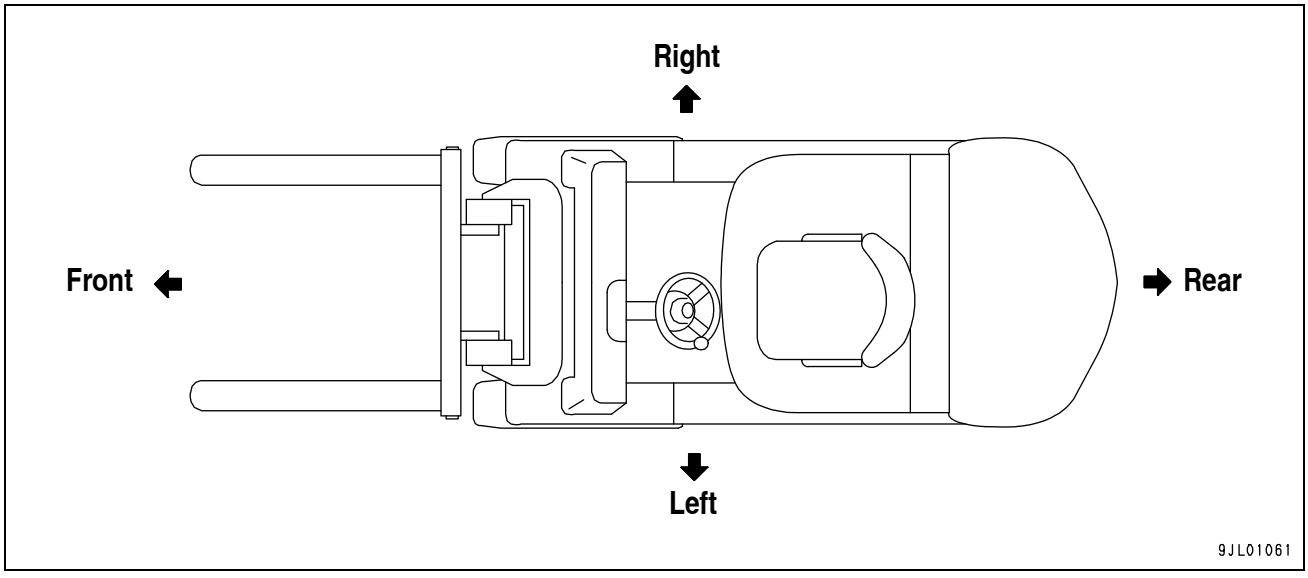
1.4.1 APPLICATION OF LIFT TRUCK

This lift truck is intended to use mainly for the following work.

- Load handling with the forks of the lift truck.

1.4.2 DIRECTION OF LIFT TRUCK

This manual determines the left and right directions and fore and aft directions as seen from the operator's seat.



1.5 UNITS OF MEASURE

This manual uses the international system of units (SI) for units of measure.
Also the gravitational system of units, conventionally used, are provided as { } for reference.

1.6 QUALIFICATION FOR OPERATION

⚠ WARNING

Only the trained and qualified persons are allowed to operate this lift truck. Operation by unqualified persons may result in serious injury or death.

1.7 RUNNING IN NEW LIFT TRUCK

1.7.1 RUNNING IN NEW LIFT TRUCK

Your KOMATSU FORKLIFT truck has been thoroughly adjusted and tested before shipment. However, operate moderately during the first one month (or initial 200 hours) until each part of the lift truck comes into stable. Operating the lift truck under severe conditions at the beginning can adversely affect performance and shorten the lift truck life.

Be sure to run in the lift truck, taking special care concerning the followings.
- Idle the engine for 5 minutes after starting it up.
- Do not operate with heavy loads or at high speeds.
- Avoid sudden starting, acceleration, braking, and sharp turning.

1.7.2 MAINTENANCE FOR NEW LIFT TRUCK

For new lift truck, carry out the followings after the first month or 200 hours: Replacement of oil and cleaning of filters, retightening of bolts and nuts. Have your lift truck serviced by KOMATSU FORKLIFT distributor.

1.8 WARRANTY AND SERVICE

1.8.1 PERIODICAL EXCHANGE PARTS

Other than those specified by the law, KOMATSU FORKLIFT designates "periodical exchange parts." Deterioration of such parts is unavoidable over time but is critical for safety and therefore must be replaced periodically. Replace those parts at the designated periods regardless of their appearance. For the periodic replacement of safety critical parts, see the Section "4.15 PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS (PAGE 4-53)".

1.8.2 USE OF GENUINE KOMATSU PARTS AND OILS

Any problem caused by the use of other than Genuine Komatsu Parts (including oils) warranted by Komatsu is not covered by the warranty.

1.9 NECESSARY INFORMATION OF LIFT TRUCK

When you need maintenance of the lift truck or order parts, please provide KOMATSU FORKLIFT distributor with necessary information of the lift truck such as model type, serial No. engine serial No. attachment, option, etc.

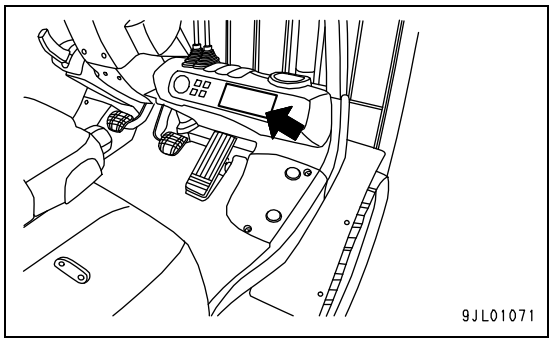
1.9.1 MEMORANDUM (To be filled by KOMATSU FORKLIFT distributor)

Model type	
Serial No.	
Engine serial No.	
Attachment/option	
Distributor	
Address	
Telephone, fax No.	
Service person in charge	
Sales representative in charge	

1.9.2 MODEL AND SERIAL NO. LOCATION

LIFT TRUCK SERIAL NO. PLATE LOCATION

Located in the right top of the dashboard.

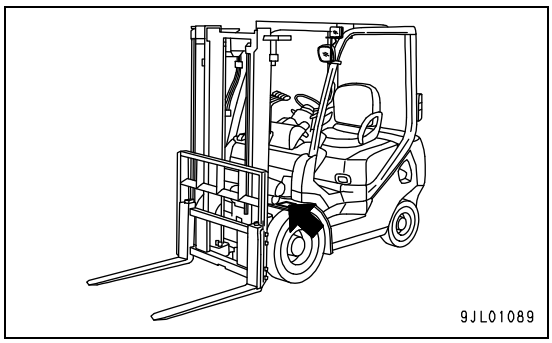


LIFT TRUCK EMBOSSED SERIAL NO. LOCATION

Besides the serial No. plate, serial No. is also embossed on the top of the left-side front wheel fender.

Example of embossed mark: M *** - #######

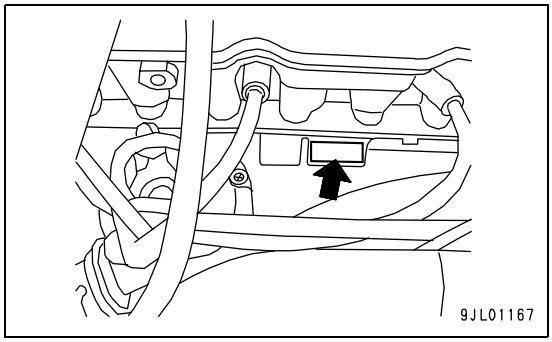
Serial No. is shown as # after the hyphen.



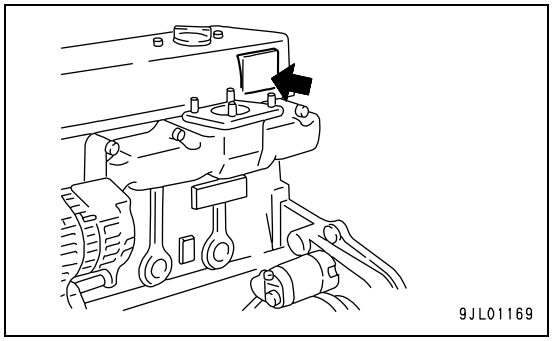
1.9.3 ENGINE SERIAL NO. PLATE OR EMBOSSED LOCATION

Engine serial No. is shown either by the plate or embossed in the location below.

- Gasoline engine (K15, K21, K25)

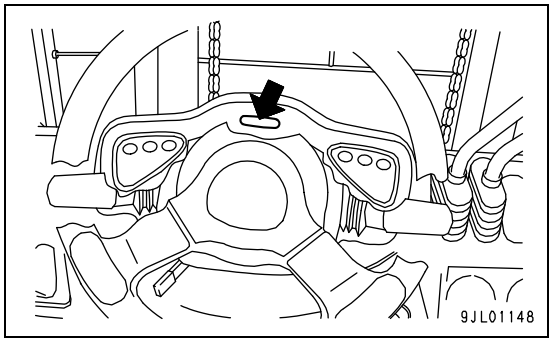


- Diesel engine (4D92E, 4D94LE, 4D98E)



1.9.4 HOUR METER LOCATION

Located in the center of the instrument panel under the steering wheel.



CONTENTS

SAFETY

⚠ WARNING

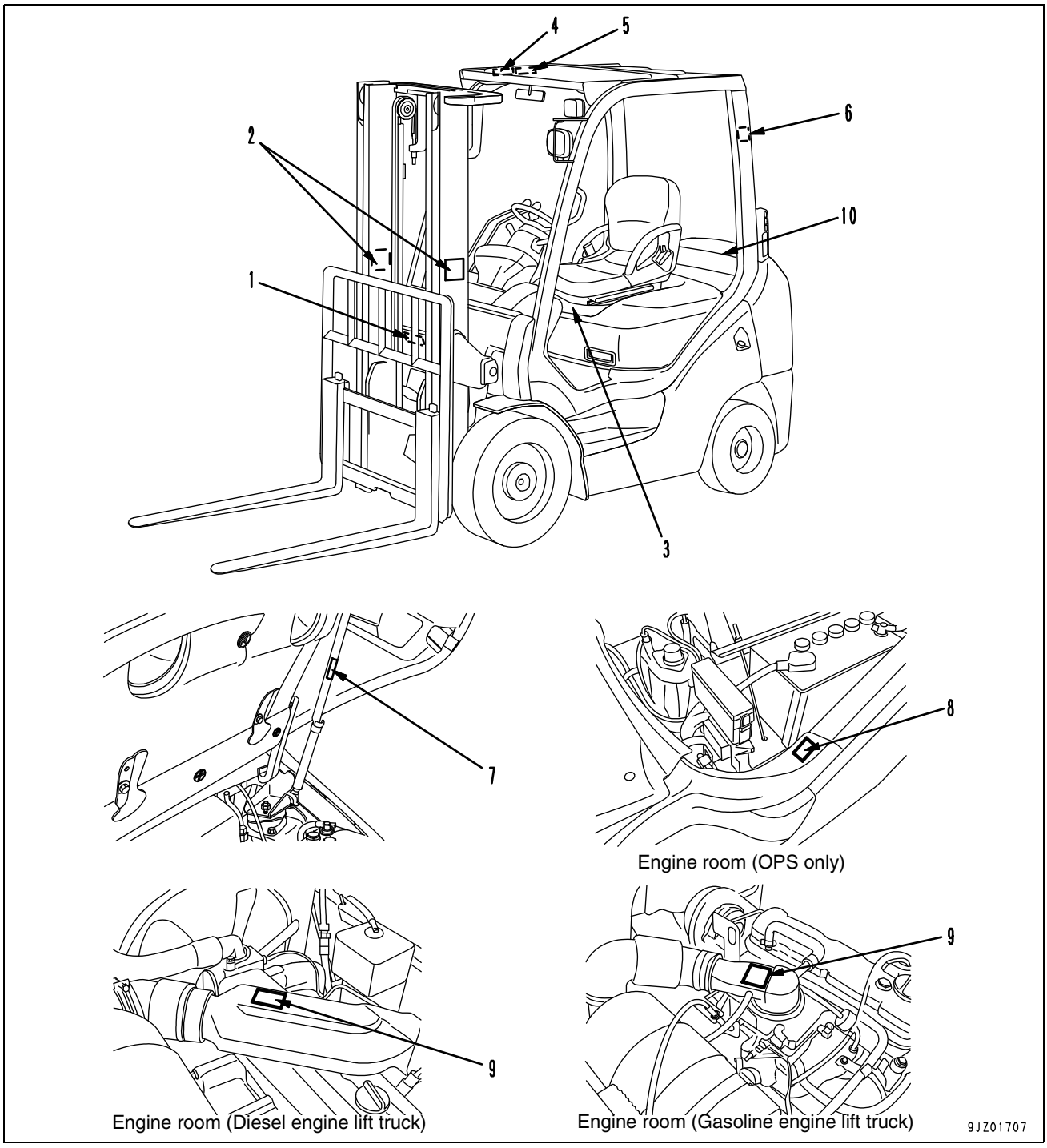
Please be sure that you fully understand this manual and the precautions related to safety for the lift truck.
When operating, inspecting, or servicing the lift truck, always follow these precautions strictly.

2. SAFETY
2.1 SAFETY LABEL

Followings are the safety labels used for this lift truck.

- Make sure that you understand the exact locations of the safety labels, the contents of the danger, and how to avoid them.
- Keep the safety labels clean so that it can be easily seen at all times. Do not use organic solvent or gasoline for cleaning. Or the safety label may come unstuck.
- If the safety label is damaged, lost, or become unreadable, replace it with a new one. Before placing an order to KOMATSU FORKLIFT distributor, check the part No. of safety label referring to this manual or the replacing label itself.
- Concerning labels other than the safety labels, use these in the same way.

2.1.1 SAFETY LABEL LOCATION CHART

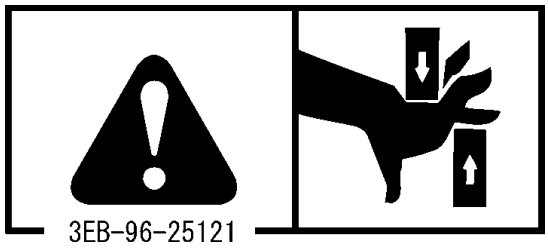


No.	Safety labels name	Position
1	Caution to avoid getting hand caught	Rear side of tilt mast stay and head stay
2	Prohibit the operators from riding on the forks and lifting/lowering themselves	Outside of left and right outer masts
3	Jump start prohibited	Starting motor (Inside of engine hood)
4	Avoiding danger if lift truck tips over during operations	Right inside of overhead guard
5	Take a right posture while operating lift truck	Right inside of overhead guard
6	Caution when hoisting the lift truck	Inside of overhead guard left leg
7	Caution for explosion of gas spring (*1)	Gas spring
8	Precaution when washing lift truck (*2)	Inside of engine hood
9	Caution to avoid getting caught	Inside of engine hood
10	Caution when handling radiator (*1)	Radiator (Inside of counterbalance-weight cover)

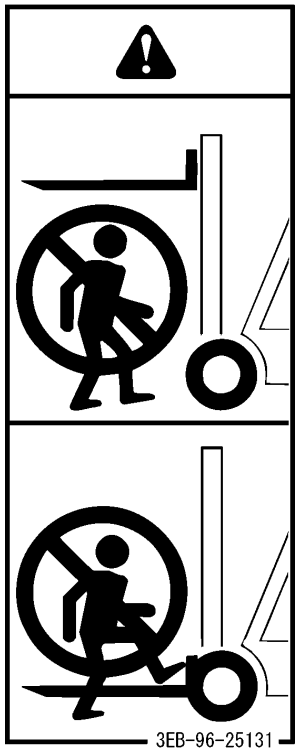
KOMATSU FORKLIFT reserves the right to change or add to these safety label requirements and label contents.
*1 : For EU specification only
*2 : Lift truck equipped with OPS (Operator presence sensing system).

2.1.2 SAFETY LABELS

(1) Caution to avoid getting hand caught. (3EB-96-25121)
- Do not place your hands.

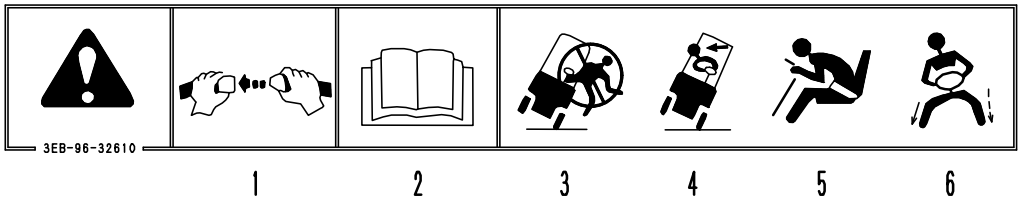


(2) Prohibit the operators from riding on the forks and lifting/ lowering themselves (3EB-96-25131)
- Never enter the area under the forks.



(3) Jump start prohibited (09842-A0481)
- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by intentionally short-circuiting the engine starting circuit. Such a malpractice can cause a serious bodily injury and fire.

(4) Avoiding danger if lift truck tips over during operations (3EB-96-32610)



BEFORE OPERATION:

1. Always use your seat belt when operating.
2. Read and understand the Operation and Maintenance Manual.

IF THE LIFT TRUCK SEEMS TO TIP OVER ANY MOMENT DURING OPERATION:

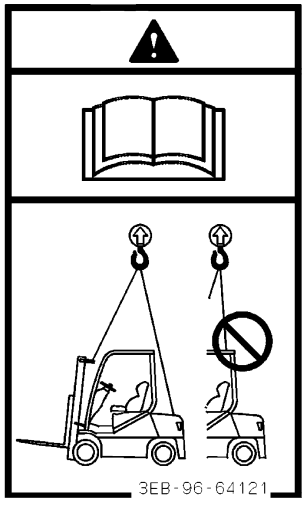
3. Do not jump off the lift truck.
4. Lean yourself in the opposite direction to the tipping of the lift truck.
5. Grip the steering wheel tightly.
6. Brace yourself with both feet to support your body.

(5) Take a right posture while operating lift truck (3EB-96-59231)
(TORQFLOW transmission lift truck with OPS only)

- If you operate the lift truck in such a posture that your weight is not properly applied to the seat, like standing up or leaning forward/backward or sideways, the power will be cut off in approx. three seconds, making travel and lift truck operation impossible. Take a right posture while operating.
  It is especially dangerous when you operate like this on an uphill. Due to the power is cut off, the lift truck will slither down even if you depress the accelerator pedal, which can lead an accident such as crash or falling off.

(6) Caution when hoisting the lift truck (3EB-96-64121)

- Never lift the truck by the overhead guard.

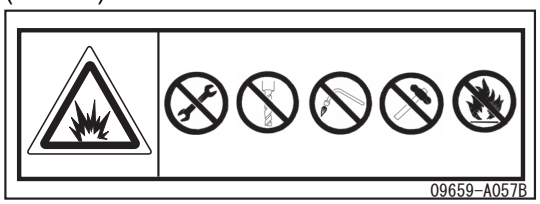


(7) Caution for explosion of gas spring (09659-A057B) (*)

- There is the hazard of explosion causing injury.
- Do not disassemble the gas spring, make holes in it, weld it, cut it, hit it, bring it near flame.

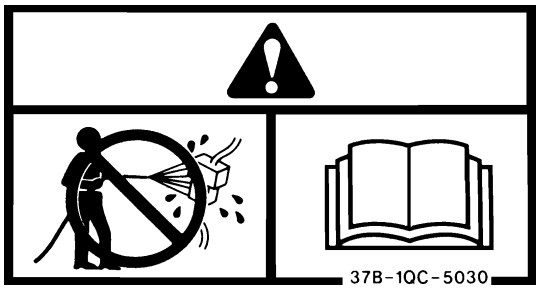
* : For EU specification only

(For EU)



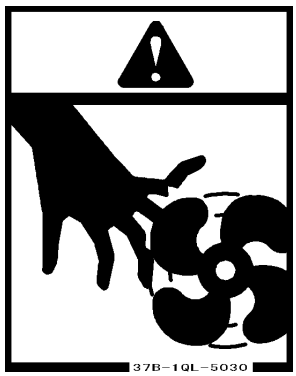
(8) Precaution when washing lift truck (37B-1QC-5030)

- For washing the lift trucks, see the Section "4.10 WASHING LIFT TRUCK (PAGE 4-43)".



(9) Caution to avoid getting caught (37B-1QL-5030)

- Keep hand off the rotating fan.



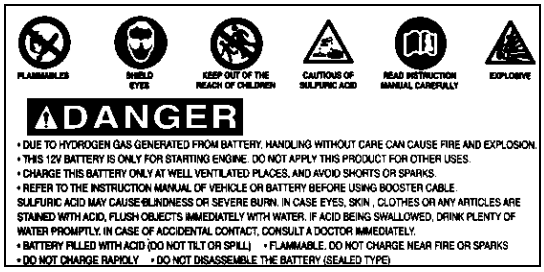
(10) Caution when handling radiator (09653-A0361) (*)

- For handling of the radiator, see the Section "2.7.9 BE CAREFUL OF BOILING COOLANT (PAGE 2-40)".

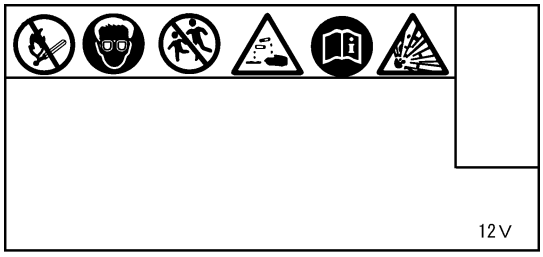
* : For EU specification only

(For EU)

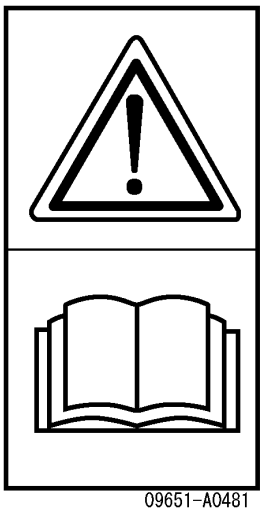
(11) Caution when handling battery
(Shape and layout may vary depending on the battery supplier.)
- For handling of the battery, see the Section "2.7.14 CAUTION WHEN HANDLING BATTERY (PAGE 2-42)" and "2.7.15 STRICTLY FOLLOW THE INSTRUCTIONS SHOWN BELOW TO AVOID GENERATION OF SPARKS (PAGE 2-42)" and "2.7.16 CAUTION WHEN CHARGING A BATTERY (PAGE 2-42)".



(For EU)



(12) Caution before operation (09651-A0481)
(Caution label may be attached depending on the specifications.)
- Warning: Be sure to read the Operation and Maintenance Manual thoroughly before operating, servicing, disassembling, assembling or transporting.



2.2 FIRE PREVENTION

2.2.1 ENGINE FIRE PREVENTION

2.2.1.1 CHECKING BEFORE STARTING THE ENGINE

Always check the following points before starting the lift truck engine. If you find a loosely connected battery terminal, secure it. Also, if you find any abnormalities such as accumulation of dirt, tree waste or paper, clean them off.

If the problem persists, do not hesitate to contact your KOMATSU FORKLIFT distributor for servicing.

1. Checking around the engine
   - Accumulation of tree waste or paper around the hot engine area and its circumference
   - Oil leakage or fuel leakage around the engine
   - Damage or gas leakage of muffler or exhaust pipe

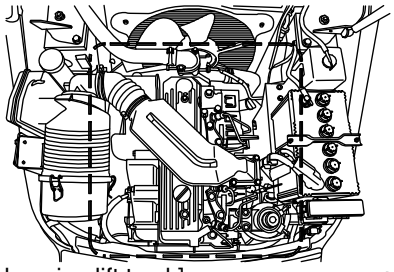
REMARK

These instructions apply to the following diesel engine lift trucks (see illustrations at right).

A : FD20/FD20H/FD25/FD25H/FD30/FD30H/FD35A-17

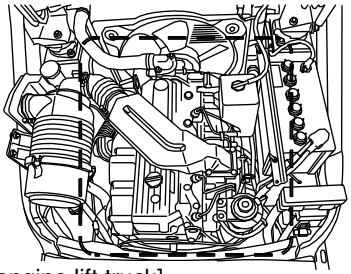
B : FD10/FD15/18-21

A

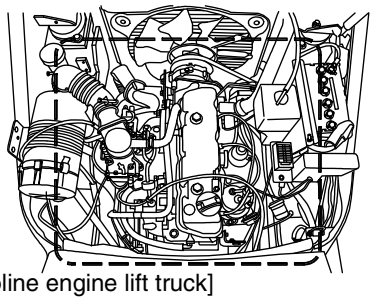


[Diesel engine lift truck] 9JM08048

B



[Diesel engine lift truck] 9JM08025



[Gasoline engine lift truck] 9JZ01680

- Loosen or damaged electrical wiring or clamps around the engine

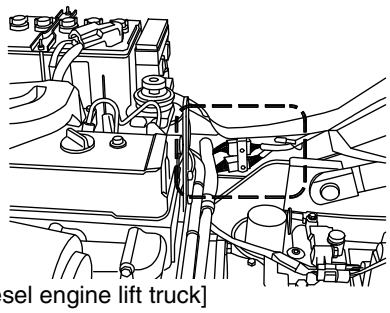
REMARK

These instructions apply to the following diesel engine lift trucks (see illustrations at right).

A : FD20/FD20H/FD25/FD25H/FD30/FD30H/FD35A-17

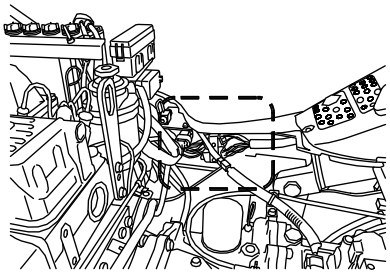
B : FD10/FD15/18-21

A

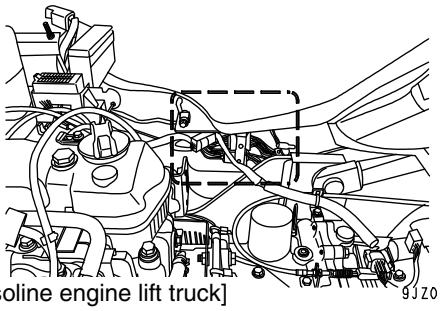


[Diesel engine lift truck] 9JM08049

B



[Diesel engine lift truck] 9JM08026



[Gasoline engine lift truck] 9JZ01681

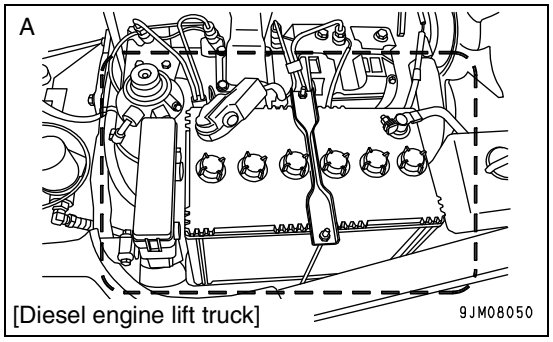
2. Checking around batteries
   - Loose or corroded battery terminals, connectors or clamps
   - Accumulation of tree waste, paper or entry of metals around batteries
   - Damage of cable or wiring harness

REMARK

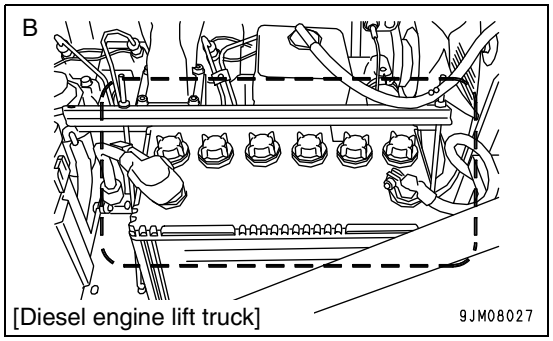
These instructions apply to the following diesel engine lift trucks (see illustrations at right).

A : FD20/FD20H/FD25/FD25H/FD30/FD30H/FD35A-17

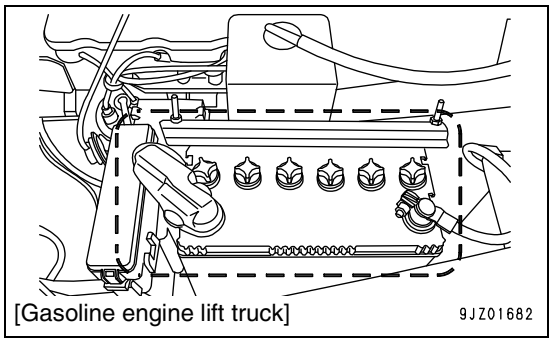
B : FD10/FD15/18-21



[Diesel engine lift truck]

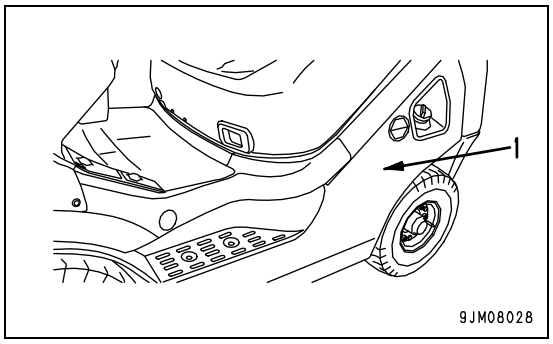


[Diesel engine lift truck]

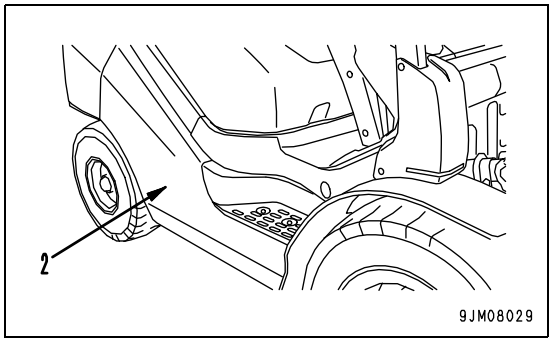


[Gasoline engine lift truck]

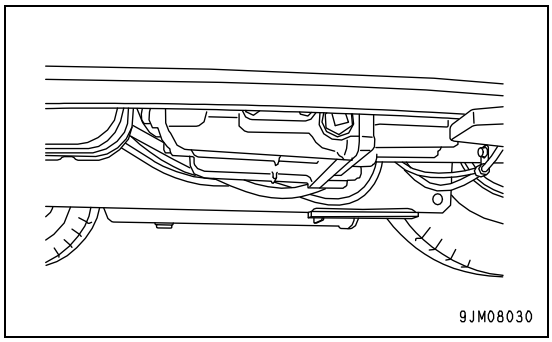
3. Checking oil or fuel leakage
   - Oil leakage from hydraulic piping or fuel leakage from fuel tank (1)



- Accumulation of tree waste or paper around fuel tank (1) or hydraulic oil tank (2)



- Accumulation of dirt under the frame (engine or transmission system)
  In particular, dirt or paper may accumulate easily on a lift truck with an undercover. Carefully check for such accumulation.



4. Checking the inside of the operator's cab (for cab models)
   - Accumulation of cigarettes and other flammables

2.2.2 PREVENTION FIRES CAUSED BY FUEL OR OIL

Fuel, oil, coolant and window washer fluid are flammable, so keep them away from open flame.
Strictly follow the instructions shown below.

- Do not smoke or allow any flame near fuel, oil, coolant or window washer fluid, or clothes soaked in them.
- Stop the engine before refilling fuel.
- Do not leave the area while refilling fuel or oil.
- Tighten the fuel cap and oil cap securely.
- Do not spill fuel on the overheated surface or electrical system components.
- Store fuel and oil in a well-ventilated dark cold place.
- Store fuel and oil in a designated place away from unauthorized people.
- Wipe off the spilled fuel, oil, and grease after refilling.
- Put clothes soaked in oil and other flammable objects in a secure container and store them in a safe place.
- Also, be cautious and take measures for fires ignited with a spark or flame, when inspecting or servicing the lift truck using devices and equipment.

Failure to comply with these safety policies may result in serious injury or death.

2.2.3 PREVENTION OF FIRE CAUSED BY DEPOSITED OR ADHERED FLAMMABLE SUBSTANCES

- Deposits or fouling of flammable objects in the engine exhaust manifold, muffler, exhaust pipe, near the battery, and inside the under cover may cause a fire. Remove the deposits and fouling from the above locations.

2.2.4 PREVENTION OF FIRE CAUSED BY FAULTY ELECTRICAL WIRING

Short-circuiting of the electrical wiring may cause a fire.

- Clean all the electrical wiring connections, and fix them firmly.
- Check daily for looseness, wear and damage of the wiring. Retighten the loose connector and wiring clamp. Damaged wiring must be repaired or replaced by KOMATSU FORKLIFT distributor.

2.2.5 PREVENTION OF FIRE CAUSED BY FAULTY PIPING

- Make sure that the clamp, guard and cushion of the hose and tube are fixed securely. Loose hose or tube may get damaged by vibration during operation or by rubbing against other parts, and cause the high pressure fluid to spurt out which may lead a fire or bodily injury.

2.2.6 CLEANING

After operating, use an air blower or similar device to clean off any dirt, tree waste, and paper that has accumulated on the lift truck.

- Around the engine
  Carefully clean the circumference of the exhaust manifold.

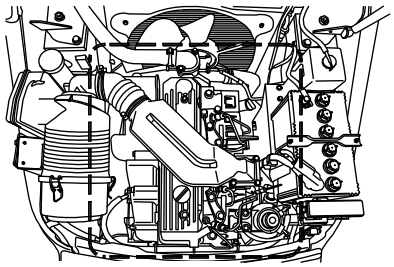
REMARK

These instructions apply to the following diesel engine lift trucks (see illustrations at right).

A : FD20/FD20H/FD25/FD25H/FD30/FD30H/FD35A-17

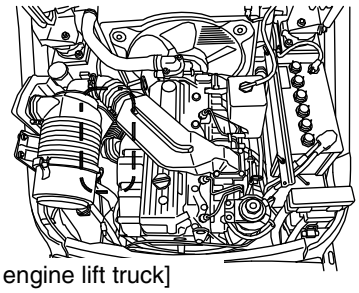
B : FD10/FD15/18-21

A

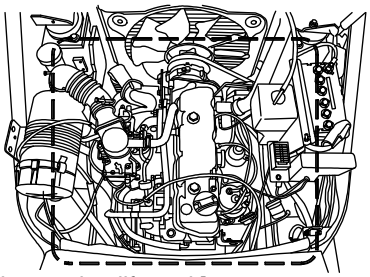


[Diesel engine lift truck] 9JM08048

B

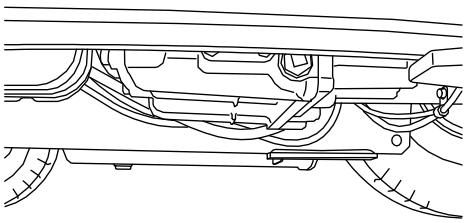


[Diesel engine lift truck] 9JM08031



[Gasoline engine lift truck] 9JZ01680

- Under the frame
  In particular, dirt or paper may accumulate easily on a lift truck with an undercover. Carefully clean such accumulation.



9JM08030

• On the floor plate

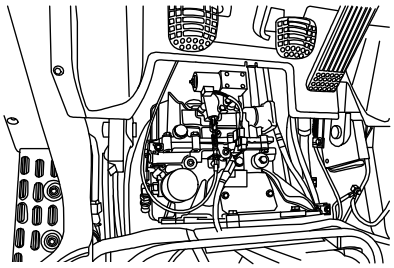
REMARK

These instructions apply to the following diesel engine lift trucks (see illustrations at right).

A : FD20/FD20H/FD25/FD25H/FD30/FD30H/FD35A-17

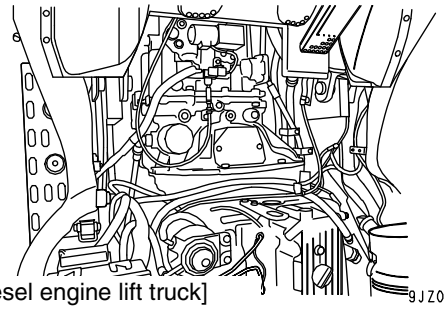
B : FD10/FD15/18-21

A

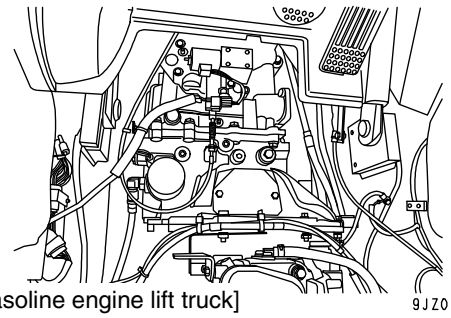


[Diesel engine lift truck] 9JM08051

B

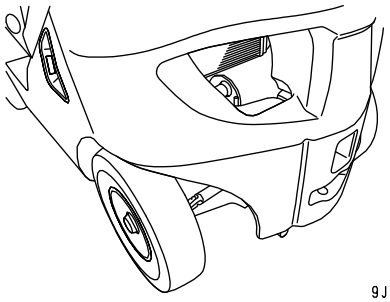


[Diesel engine lift truck] 9JZ01689



[Gasoline engine lift truck] 9JZ01683

• Around the muffler



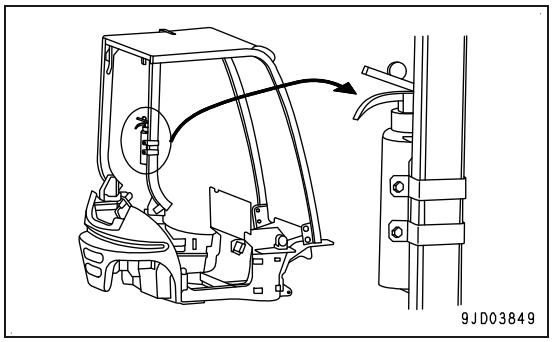
9JM08033

2.2.7 IF A FIRE BREAKS OUT

- If a fire breaks out, turn the starting switch to the [○] (OFF) position to stop the engine.
- Do not jump off the lift truck in a rush. Support yourself securely with handrails and steps to evacuate.

2.2.8 INSTALLATION OF FIRE EXTINGUISHER(IF EQUIPPED)

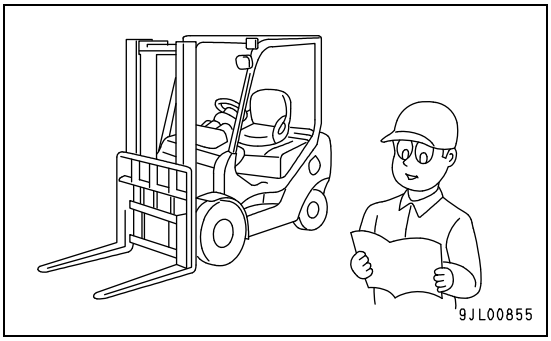
- If equipped, a fire extinguisher is provided. (1 kg)
  See the instruction plate attached on the fire extinguisher about how to use it.



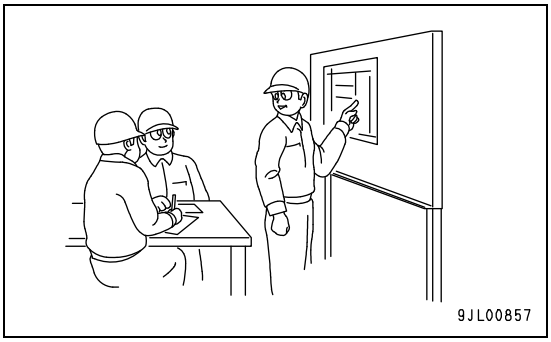
2.3 BASIC PRECAUTIONS

2.3.1 FOLLOW RULES

- Only the trained and qualified persons are allowed to operate this lift truck.
- Fully understand and follow this operation and maintenance manual.
- Do not operate the lift truck when you are ill conditioned, taking medicine that causes drowsiness, under the influence of alcohol, or mentally unstable.

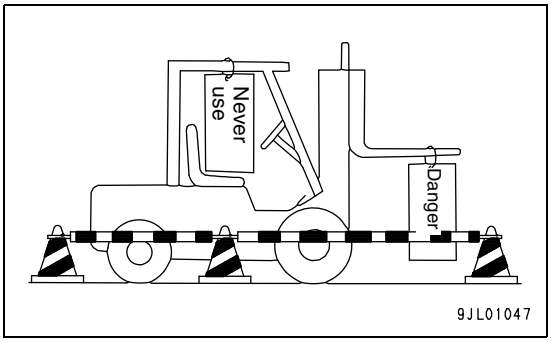


- Plan safety work beforehand.
  Before operation, make up an operating plan that fits the workplace conditions, type and capacity of the lift truck, and the load conditions.
  In confined areas or when loading/unloading large items, position a signal person and carry out operations in accordance with their instructions.
- During operation, safety must be your primary responsibility ensuring the safety of those you are working around, the lift truck, yourself, and other property in the work area.



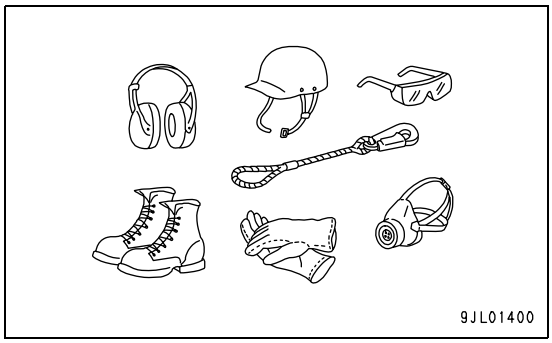
2.3.2 NEVER OPERATE THE BROKEN-DOWN LIFT TRUCK

- If any abnormality is detected during the start-up inspection or during the operation (noise, vibration, odor, maladjusted gauge, smoke, oil leak, or erroneous indication of warning device or monitor), report the administrator immediately and take adequate corrective actions.
- Do not operate the lift truck until the abnormality is corrected.
- Remove the key from the faulty lift truck and put up signs in the operator's compartment to prevent its use.
- If the lift truck has a failure and 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. Take measures to prevent anyone to go under the forks. (Space under lifted forks is dangerous zone.)



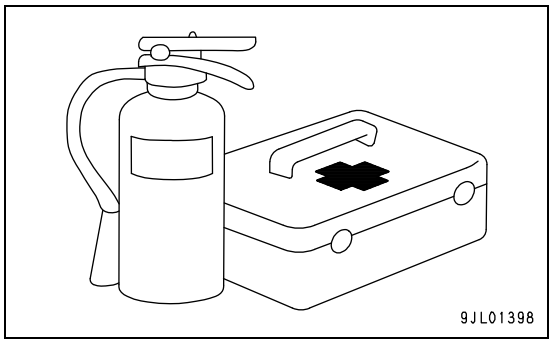
2.3.3 WEAR ADEQUATE CLOTHES AND SAFETY EQUIPMENT FOR OPERATION

- Avoid loose clothing and accessories. It is dangerous when they catch on control levers and projections.
- Long, loose hair can be caught in a rotating part. Long hair must be tied back.
- Always wear a safety helmet and safety shoes. Wear other safety equipment appropriate for the working conditions or as may be required by your administrator.
- Check that the safety equipment works properly before use.



2.3.4 FIRE EXTINGUISHER AND FIRST AID KIT

- In preparation for a fire or bodily injury, check the locations of fire extinguisher and first aid kit, and be familiar with the usage.



2.3.5 CAUTIONS FOR SAFETY-RELATED EQUIPMENT

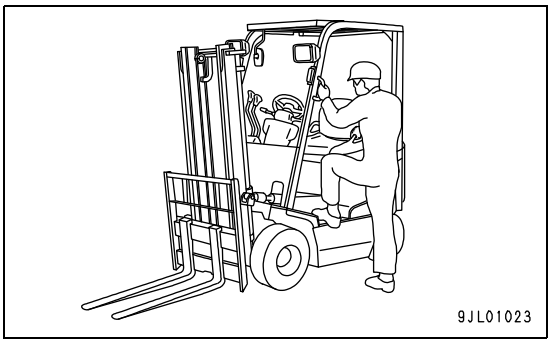
- Confirm that all protective guards, covers, and mirrors are properly mounted. Repair them immediately when broken.
- Be sure that you fully understand the usage of safety-related equipment.
- Never remove the safety-related equipment. Keep them fully functional at any time.
- Do not operate this lift truck if the overhead guard or load backrest has been or appears to have been damaged or loosened until repairs have been made by your authorized KOMATSU FORKLIFT distributor.

2.3.6 PRACTICE SUFFICIENTLY BEFORE OPERATION

- Take sufficient time for practice until you become familiar with the operation of each component before starting the actual operation.
- Even after you become familiar with it, operate with caution and avoid harsh operation.Or it can cause a bodily injury or damage.
- Each lift truck is more or less peculiar in the performance of brake, accelerator, and load handling device even though it is the same model type. When you changeover the lift trucks, understand the peculiarity of each lift truck before stating operation. Be especially careful with brake, since its performance varies by individual lift truck.

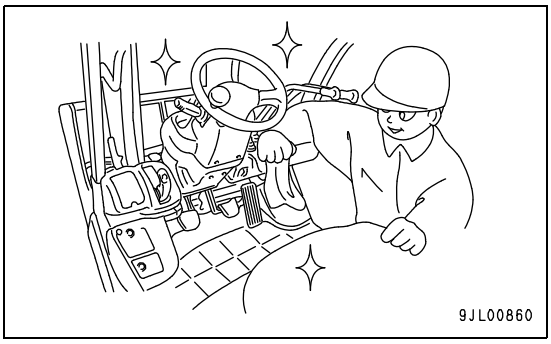
2.3.7 JUMPING ON AND OFF FROM THE LIFT TRUCK IS STRICTLY PROHIBITED

- Never jump on or off the lift truck. It is extremely dangerous.
- Even if the lift truck accidentally starts to move without operator onboard, never attempt to jump on the lift truck to stop.
- Always mount and dismount the lift truck from the left side.
- While mounting and dismounting the lift truck, always support yourself securely with your hands and feet at more than 3 locations; put your left foot on the step, grab the assist grip (handrail) with your left hand, and grab the backrest or hip support of the seat with your right hand.
- Do not hold on the control levers or steering wheel when mounting or dismounting the lift truck.



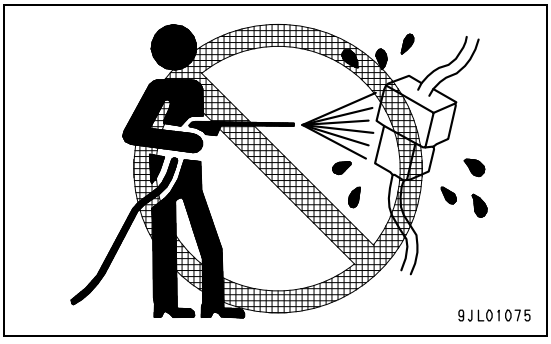
2.3.8 KEEP THE OPERATOR'S COMPARTMENT AND PLATFORM CLEAN AND TIDY

- Always keep the operator's compartment and platform (assist grip, step, floor) clean and tidy. Oil, mud or dust attached, or spare parts or tools left lying around in the operator's compartment may cause the operator's hand or foot slips or the clothes get caught, which will lead a falling accident or erroneous operation.



2.3.9 PRECAUTION WHEN WASHING LIFT TRUCK

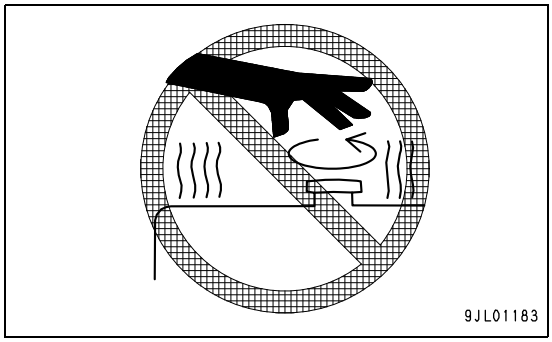
- If water gets into the electrical system (controller, sensor, connector, etc.), there is a hazard that it will cause malfunctions or miss-movement. Do not use flushing water or high- pressure steam to wash the electrical system. For washing the lift trucks, see the Section "4.10 WASHING LIFT TRUCK (PAGE 4-43)".



2.3.10 TO AVOID BURN INJURY

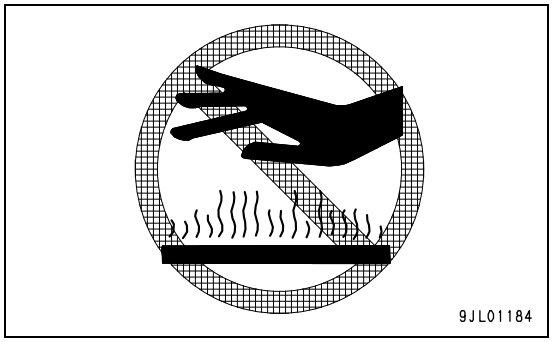
HIGH TEMPERATURE COOLANT

- Immediately after the operation, the cooling water is at a high temperature, so there is always the danger of burns if you open the radiator cap as steam or boiling water may spurt out. Turn the radiator cap slowly, after the coolant temperature has gone down sufficiently.



HIGH TEMPERATURE PARTS AND OIL

- To prevent burns with the high temperature parts or by the spurt of oil, wait for the lift truck temperature to go down enough before the inspection and maintenance work.



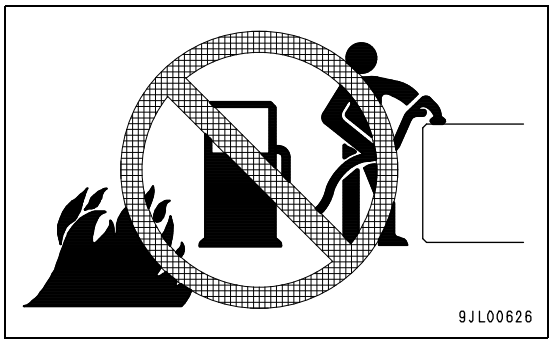
2.3.11 FIRE PREVENTION

FIRE WITH FUEL AND OIL

Fuel, oil, coolant and window washer fluid are flammable, so keep them away from open flame.
Strictly follow the instructions shown below.

- Do not smoke or allow any flame near fuel, oil, coolant or window washer fluid, or clothes soaked in them.
- Stop the engine before refilling fuel.
- Do not leave the area while refilling fuel or oil.
- Tighten the fuel cap and oil cap securely.
- Do not spill fuel on the overheated surface or electrical system components.
- Store fuel and oil in a well-ventilated dark cold place.
- Store fuel and oil in a designated place away from unauthorized people.
- Wipe off the spilled fuel, oil, and grease after refilling.
- Put clothes soaked in oil and other flammable objects in a secure container and store them in a safe place.
- Also, be cautious and take measures for fires ignited with a spark or flame, when inspecting or servicing the lift truck using devices and equipment.

Failure to comply with these safety policies may result in serious injury or death.



PREVENTION OF FIRE CAUSED BY DEPOSITED OR ADHERED FLAMMABLE SUBSTANCES

- Deposits or fouling of flammable objects in the engine exhaust manifold, muffler, exhaust pipe, near the battery, and inside the under cover may cause a fire. Remove the deposits and fouling from the above locations.

PREVENTION OF FIRE CAUSED BY FAULTY ELECTRICAL WIRING

Short-circuiting of the electrical wiring may cause a fire.

- Clean all the electrical wiring connections, and fix them firmly.
- Check daily for looseness, wear and damage of the wiring. Retighten the loose connector and wiring clamp. Damaged wiring must be repaired or replaced by KOMATSU FORKLIFT distributor.

PREVENTION OF FIRE CAUSED BY FAULTY PIPING

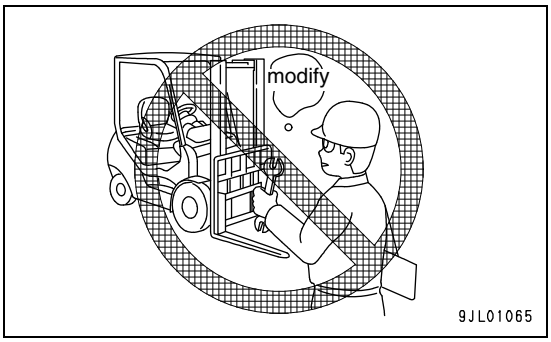
- Make sure that the clamp, guard and cushion of the hose and tube are fixed securely. Loose hose or tube may get damaged by vibration during operation or by rubbing against other parts, and cause the high pressure fluid to spurt out which may lead a fire or bodily injury.

2.3.12 IF A FIRE BREAKS OUT

- If a fire breaks out, turn the starting switch to the [○] (OFF) position to stop the engine.
- Do not jump off the lift truck in a rush. Support yourself securely with handrails and steps to evacuate.

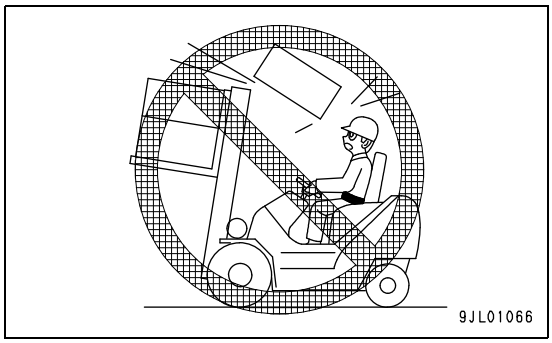
2.3.13 DO NOT MODIFY THE LIFT TRUCK

- Contact KOMATSU FORKLIFT distributor in advance for any modification (installation, removal and modification) of the lift truck, attachment or option. It may cause safety hazard and may violate the law.
- KOMATSU FORKLIFT will not be responsible for any bodily injury, damage or failure which results from the modification made without prior consent of KOMATSU FORKLIFT in writing.



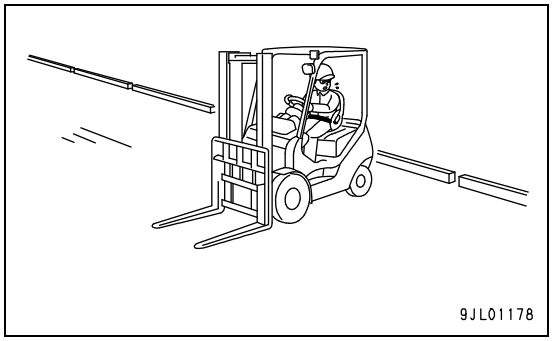
2.3.14 DO NOT REMOVE THE OVERHEAD GUARD AND LOAD BACKREST

- Do not remove the overhead guard or load backrest, which are installed to protect the operator from falling objects.
- Do not operate 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.
- The overhead guard is built in compliance with the safety standards. However, it is not designed to withstand every possible impact. Always be careful to prevent damage or injury from falling objects.

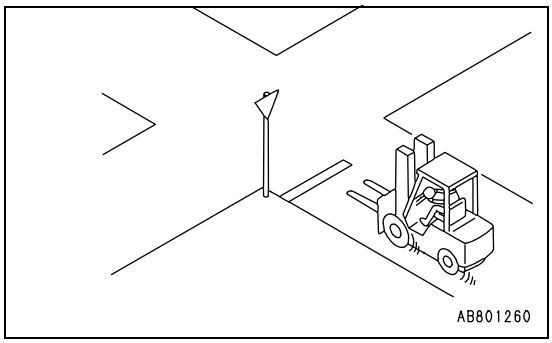


2.3.15 SECURE SAFETY AT THE WORKING AREA

- Working on a rough surface can result in bodily injuries such as backache. Always keep the passages and work areas flat and smooth without bump.
- Wipe up all spill oil or grease from the ground to prevent tip over or collision due to slipping.
- When working on platforms, docks, quays, or other places where there is 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.

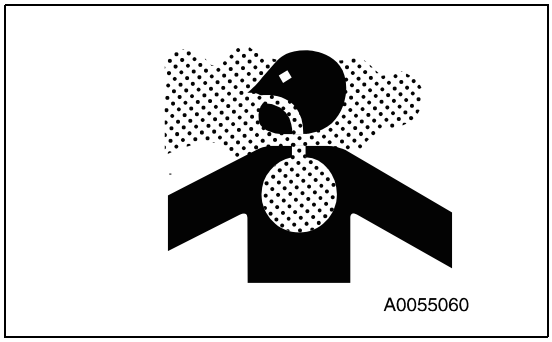


- Mark the traffic areas clearly, and establish a clear traffic rule such as temporary stop line, speed limit, no-entry area for other vehicles and pedestrians.
- Provide adequate lighting for safety operations.



2.3.16 ENGINE EXHAUST GAS IS POISONOUS

- Do not leave the engine running where there is poor ventilation. The engine exhaust gas contains carbon monoxide. There is danger that this will cause gas poisoning. Open the windows and doors for ventilation.



2.3.17 ASBESTOS CAUTION

- Non-Genuine Parts (unspecified parts of KOMATSU FORKLIFT) such as clutch disc, brake lining, gasket and packing may contain asbestos. Use Genuine Parts.
- All the parts used in this lift truck are asbestos-free.

2.3.18 WINDOW WASHER CAUTION

- Use the window washer which contains ethyl alcohol.
- Never use the window washer containing methanol which is harmful to eyes.

2.4 BEFORE STARTING OPERATION

2.4.1 START-UP INSPECTION

ALWAYS CONDUCT A START-UP INSPECTION IN THE BEGINNING OF THE DAY FOR YOUR SAFETY OPERATION OF THE LIFT TRUCK

- For details of the inspection, see the Section "4.1 ABOUT INSPECTION AND MAINTENANCE (PAGE 4-2)".

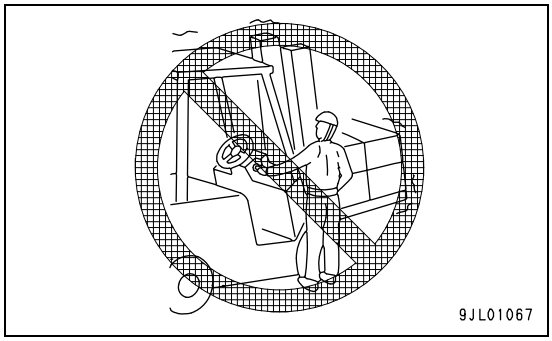
2.4.2 INSPECTION AND ADJUSTMENT BEFORE STARTING ENGINE

CHECK THE FOLLOWINGS BEFORE STARTING THE ENGINE

- Check for coolant level, fuel level and oil level in the engine oil pan, and clogging in the air cleaner.
- Adjust the seat (seat position, backrest angle, etc), steering wheel position and rear view mirror, and make sure the locks are secured.

CAUTION WHEN STARTING THE ENGINE

- Before starting the engine, check that the parking brakes are set, and that the forward/reverse lever and high/low speed levers are in the neutral position.
- When starting the engine, first check that the surrounding area is safe, and sit in the operator's seat.
- Sound the horn before starting the engine to warn people around.



- Do not start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- Do not start the engine by pushing the lift truck.

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CAUTION IN COLD WEATHER

- Allow sufficient time for warming-up the engine in cold weather. If the engine is insufficiently warmed-up, the lift truck may move slow or change its motion suddenly which will result in an accident.
- For operation and maintenance, see the Section "3.3.3 STARTING, GEAR SHIFTING, AND TRAVELING (PAGE 3-23)" and Section "4.6 RUNNING IN COLD WEATHER (PAGE 4-38)".

CAUTION ON WINDY DAYS

- On a windy day, the stability of lift truck and load are affected by the wind.
  Take extreme care when picking and placing a load at high lift. In addition, take measures to prevent the load from being blown down by the wind.

2.4.3 START-UP INSPECTION

CHECK THE FOLLOWING BEFORE STARTING THE OPERATION

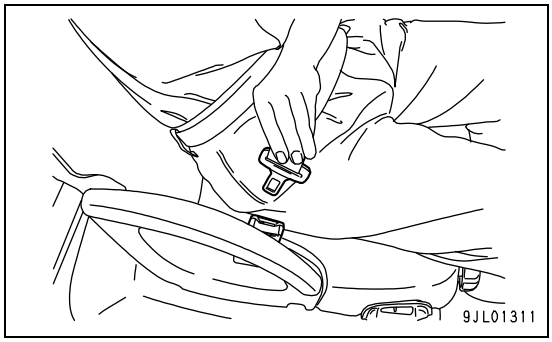
- Check the operating conditions of the lamps and warning lights on the instrument panel.
- Make sure that the traveling and load handling interlock function properly.
- This lift truck is provided with TRAVEL INTERLOCK and LIFT INTERLOCK that make travel and truck operation impossible when you are not seated properly. see "TRAVEL INTERLOCK (ENGINE POWER CUTOFF) (PAGE 3-26)" and "LIFT INTERLOCK (PAGE 3-34)".
- If any fault is found (noise, vibration, heat, odor, maladjusted gauge, oil leak, or fuel leak), be sure to repair the fault before starting the operation.

2.5 TRAVELING THE LIFT TRUCK

2.5.1 PREPARATION BEFORE TRAVELING THE LIFT TRUCK

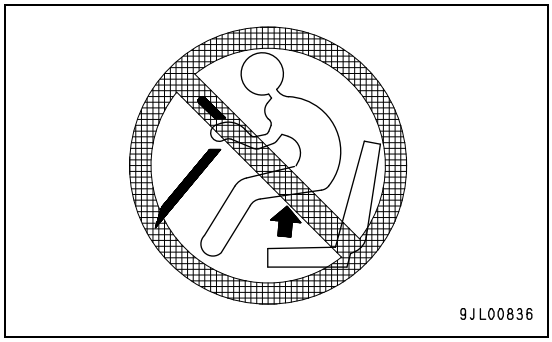
USE THE SEAT BELT

- Always fit the seat belt properly before operation.
- Not using the seat belt properly may result in serious bodily injuries if the lift truck tips over.
- Make sure the seat belt is free from damage and flaw.



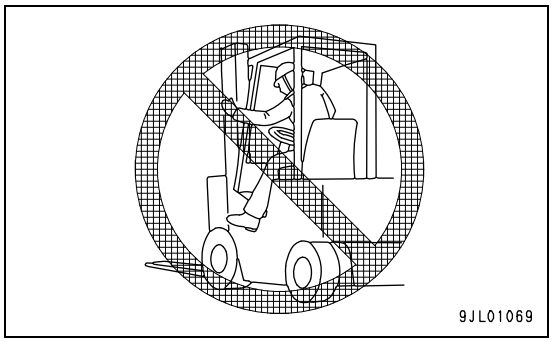
TAKE A RIGHT POSTURE ON THE SEAT

- If you operate the lift truck when you are not seated properly or off the seat, an accident may happen unexpectedly. To forestall such a possible accident, this lift truck is provided with TRAVEL INTERLOCK and LIFT INTERLOCK that make traveling and lift truck operation disabled if you are not seated properly.
  For details, see "TRAVEL INTERLOCK (ENGINE POWER CUTOFF) (PAGE 3-26)" and "LIFT INTERLOCK (PAGE 3-34)".



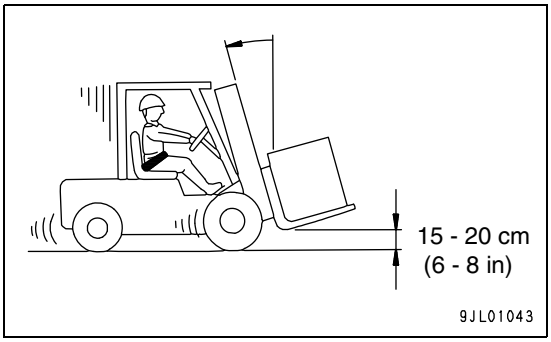
TAKE A RIGHT POSTURE WHILE OPERATING

- Do not stick the hand or foot outside the lift truck body.
- Always keep your body under the overhead guard.



BEFORE TRAVELING THE LIFT TRUCK, CHECK THE SAFETY OF SURROUNDING AREA

- Before starting to travel the lift truck, check that the surrounding area is clear of obstructions such as pedestrians, other trucks and loads.
- Raise the forks approx. 15 - 20 cm (6 - 8 in) from the ground and tilt the mast back.
- Sound the horn areas as may be needed.



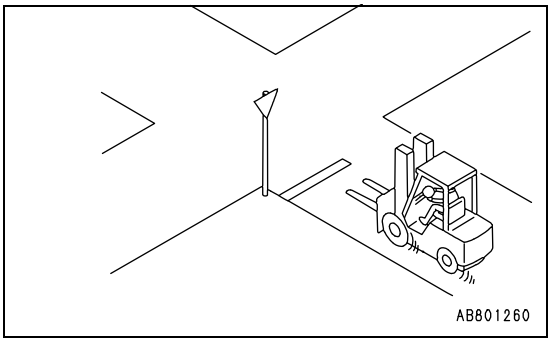
2.5.2 WHILE TRAVELING THE LIFT TRUCK

AVOID SUDDEN STARTING OR SUDDEN FORWARD/REVERSE DIRECTIONAL CHANGE

- Stop the lift truck before changing the forward/reverse travel direction.
- When operating the forward/reverse lever or high/low speed lever, be sure to shift the lever only after fully depressing the clutch pedal (clutch type lift truck).

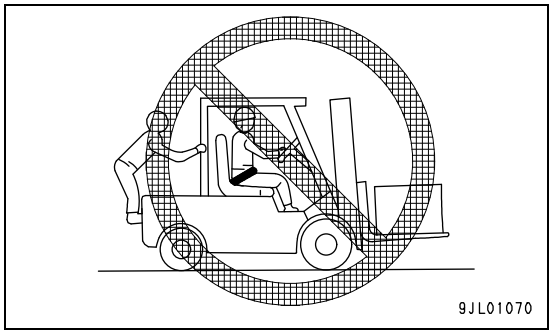
BE ALWAYS CONSCIOUS OF SAFETY WHILE TRAVELING

- Avoid sudden starting, braking, or making sharp turns.
- Keep a clear view of the path of travel.
- 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.
- When traveling, always pay careful attention to the area around your lift truck, particularly in the direction of travel or when turning.
- Do not attempt to pass another lift truck or vehicle on a narrow path or on a spot of limited view like a crossing.
- When passing through a crossing or turning a corner, or when traveling into a narrow path, stop the lift truck once to check the safety. Sound the horn to warn people around if necessary.
- 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.
- Do not allow people to enter the working area.
- When traveling on a slope or through a crowded spot, always give way to a loaded lift truck.



DO NOT ALLOW ANY PASSENGER

- Never allow any other person to ride with you on the lift truck for whatever reasons.
- Do not use anyone for a counterbalance-weight.

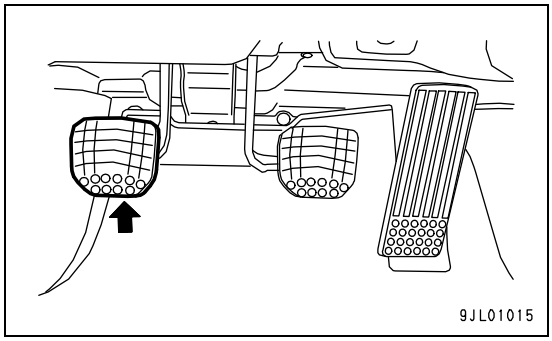


NEVER TURN OFF THE STARTING SWITCH WHILE TRAVELING

- When the starting switch is turned to [○] (OFF) while traveling, the operating efforts for power steering and power brakes (if present) may increase, which is dangerous.

DO NOT HOLD YOUR FOOT RESTED ON THE INCHING PEDAL WHILE TRAVELING (TORQFLOW TRANSMISSION LIFT TRUCK ONLY)

- Keep your foot off the inching pedal in the normal traveling. Otherwise the brake will overheat and the braking effect may be lost.
- Depressing the pedal engages the clutch halfway, which makes the engine brake ineffective.
- This can cause the transmission to overheat, leading the overheat of transmission fluid, and wear or seizure of the multiple clutch plates.

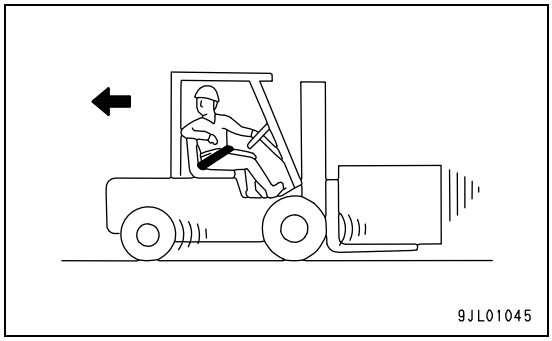


OPERATING BRAKE PEDAL

- Allow plenty of time for brake operation depending on the situation, as the road surface and weight of the load affect the stopping distance. Longer distance is required to stop on a downhill, wet or slippery surfaces, and with heavy load.

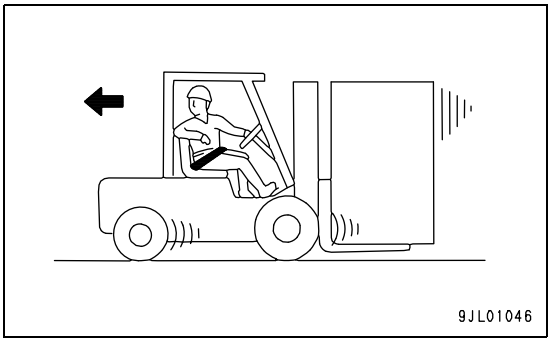
WHEN BACKING UP THE LIFT TRUCK, CHECK REVERSE DIRECTION VISUALLY

- When backing up the lift truck, always look back and make a direct visual check on the rear of the lift truck. The rear view mirror is simply an auxiliary aid for checking the rear. When reversing, do not depend on the rear view mirror alone for checking safety.
- Even if you sound the backup buzzer, the people behind the lift truck do not necessarily hear it. Always visually check directly with your own eyes that there is no one behind the truck while traveling.



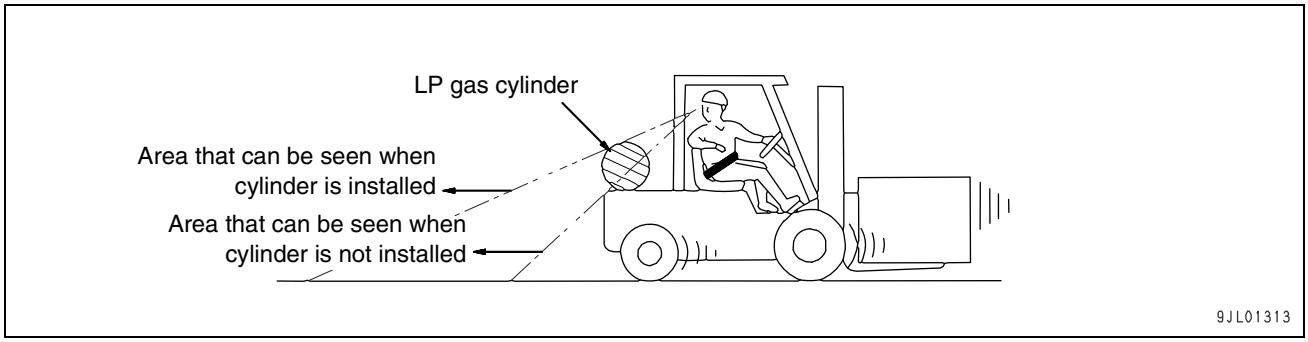
WHEN CARRYING A HIGH LOAD, USE A SIGNAL PERSON OR TRAVEL BACKWARD

- If the view to the front is obstructed by the load, operate the lift truck in reverse while minding safety in the area the truck is heading to, or have a signal person to guide the travel.



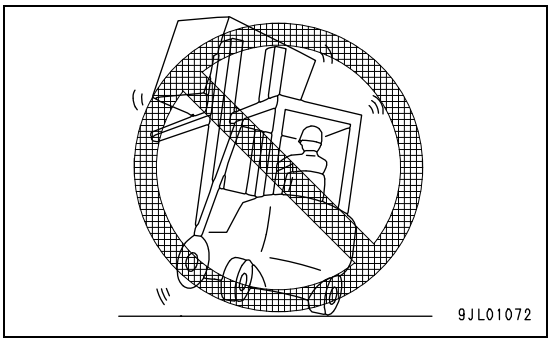
PAY SPECIAL ATTENTION TO THE REARVIEW WITH A LPG CYLINDER-INSTALLED (GASOLINE ENGINE) LIFT TRUCK

- The installed LP gas cylinder partially blocks the rear view and poses a danger of hitting people around or piled commodities, or run against a nearby building. Have this in mind and check the rear view without fail.
- When installing optional warning devices (reverse warning flasher, backward sensor, back-up assist mirror, etc), call your KOMATSU FORKLIFT distributor for details.



DO NOT TRAVEL THE LIFT TRUCK WHEN THE FORKS ARE RAISED HIGH

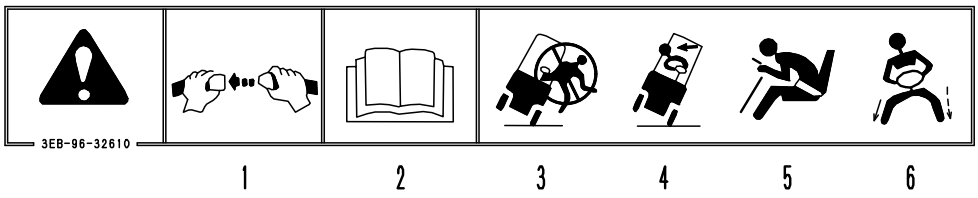
- If loaded or unloaded, raising the forks also raises the center of gravity of the lift truck increasing a risk of tipping over. Do not travel the lift truck with the up-raised forks. (During a travel, keep the forks approx. 15 - 20 cm (6 - 8 in) above the ground with the mast tilted backward.)



NEVER JUMP OFF THE LIFT TRUCK WHEN THE LIFT TRUCK SEEMS TIPPING OVER

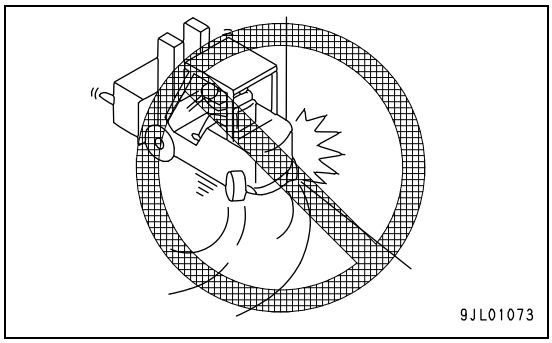
(1) Always use your seat belt during operations for your safety if lift truck should tip over.
(2) To avoid tipping over and other accidents, carry on proper operation, inspection and maintenance work, read and understand the Operation and Maintenance Manual.
(3) Do not jump off the lift truck if the lift truck seems tipping over. Or you may be crushed by the lift truck resulting a serious bodily injury.
(4) Lean yourself in the opposite direction to the direction the lift truck is tipping.
(5) Grip the steering wheel tightly.
(6) Brace yourself with both feet to support your body.

- Practice this series of actions from time to time to master how to act in emergency situations.



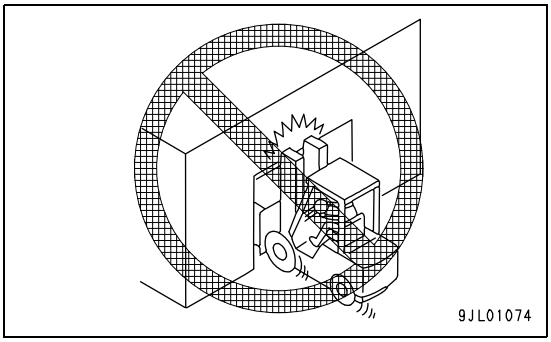
WHEN MAKING A TURN, BE CAREFUL OF THE SWINGING TAIL

- The lift truck has rear steering wheels. Be careful as if behaves differently from passenger cars.
- When turning while traveling forward, the counterbalance-weight will swing far out. Keep an ample clearance from walls to ensure safety.



PAY CAREFUL ATTENTION TO THE LIFT TRUCK'S MAX. HEIGHT AND WIDTH

- Ensure that there is ample height and width for the lift truck to pass.
- Keep clearance from the doors, ceiling, wirings and pipes.
- Be careful with the height of the mast and load backrest when the forks go up.



DO NOT TRAVEL ON ROUGH OR SLIPPERY ROAD

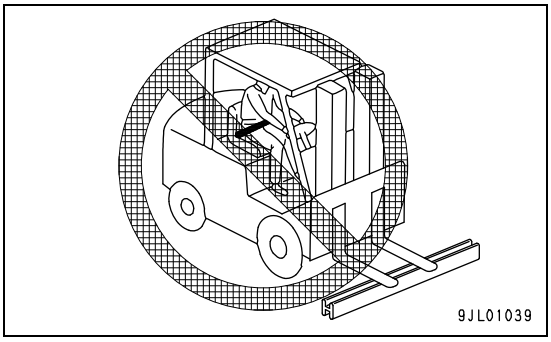
- Do not try to travel on bumpy or soft ground. It can lead to a serious accident when you lose steering control or the tyres stuck in the mud.
- Avoid traveling on the slippery road covered with water and oil. You will lose brake or steering control.

OBSERVE THE WEIGHT LIMIT

- Do not allow overweight on the floors and roads where weight limit is specified.

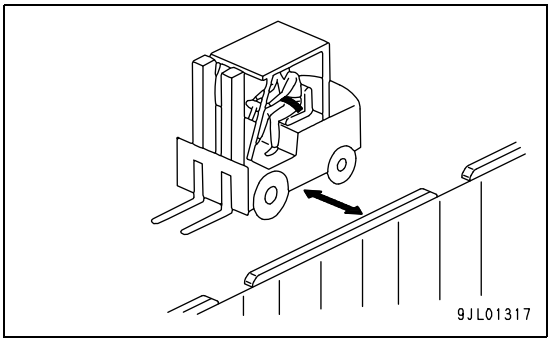
DO NOT TRAVEL DIRECTLY OVER OBSTACLES ON THE ROAD

- Avoid clutter, curbs, rails, ditches, or other obstacles, and do not travel directly over them. Also, the impact applied when traveling over obstacles can result in bodily injuries such as backache.



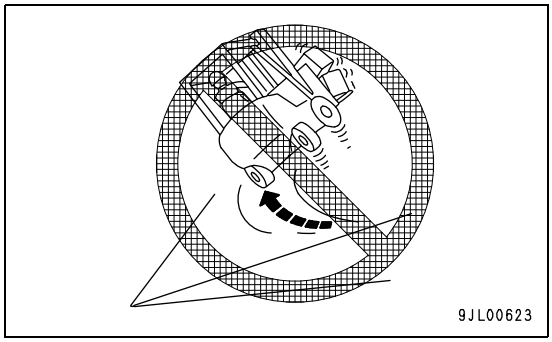
TRAVELING ON A ROAD SHOULDER IS STRICTLY PROHIBITED

- There is danger that soft road shoulders may collapse. Do not approach them.
- Always maintain a safe distance from the edge of road shoulders and platforms to prevent the lift truck from falling off.



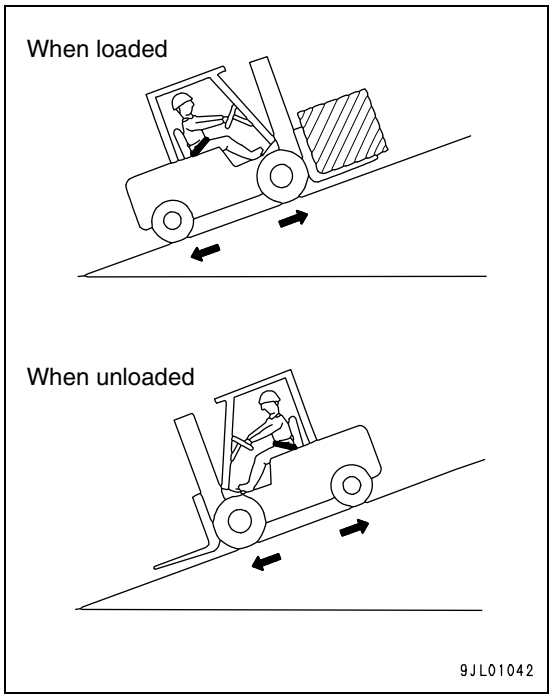
CAUTION WHEN TRAVELING ON SLOPES

- Do not turn, or traverse or be careful for the approach/departure angle on slopes. The lift truck may tip over.
- Before traveling uphill, stop the lift truck and adjust the fork clearance between the ground. Keep the bottom of the forks or pallet off the ground or prevent the tips of the forks from sticking into the ground when traveling.



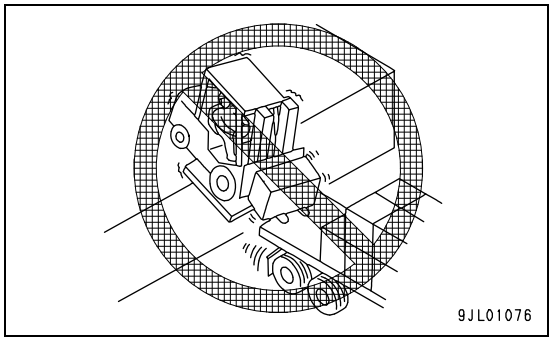
- For safe travel on slopes
  When loaded : Travel forward uphill and in reverse downhill.
  When unloaded: Travel in reverse uphill and forward downhill.

- On a down slope, travel down slowly using the engine as a brake.
- If you are not properly seated, the travel interlock activates to cut off the engine power, resulting the lift truck may slither down on a slope. Take a right posture while operating. For more details on the function of travel interlocking, see "TRAVEL INTERLOCK WARNING LAMP (TORQFLOW TRANSMISSION LIFT TRUCK) (OPTION) (PAGE 3-6)".



EXERCISE CARE WHEN TRAVELING INTO A RAILWAY WAGON OR CONTAINER

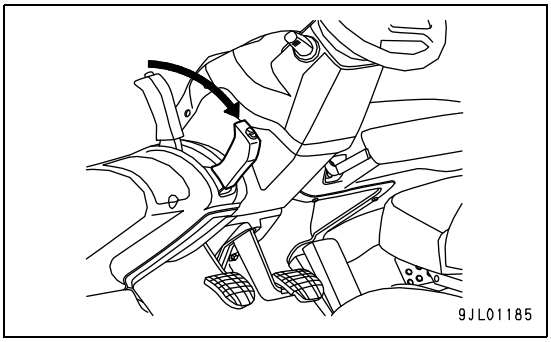
- Check that brake and block are applied to the wagons, trailers, and containers to stop them.
- Tell the carrier drivers not to move their vehicles until the load handling operation is completed.
- Ramps used for approaching the wagon and/or trailers must stand the travels of loaded lift trucks.
- Engage the ramps securely to wagons and trainers.
- Do not travel at the edge of the platforms or loading docks, or there is a danger of the lift truck falling down.



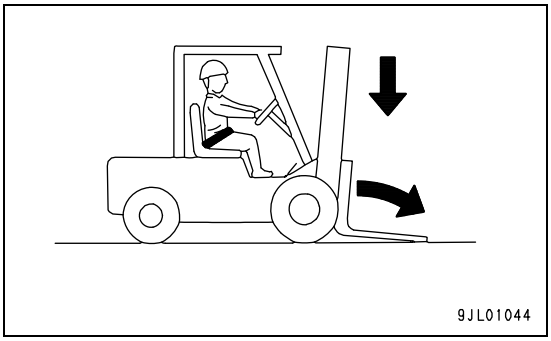
2.5.3 STOPPING AND PARKING

FOLLOW THE STEPS FOR STOPPING AND PARKING

1. Stop the lift truck on level ground.
2. Apply the parking brake lever to prevent the lift truck from moving.
3. Set the forward/reverse lever and high/low speed lever to neutral.



4. Tilt the mast forward and lower the forks to the floor.
5. Turn the starting switch key to the [○] (OFF) position.
6. Pull out the starting key and leave the lift truck.



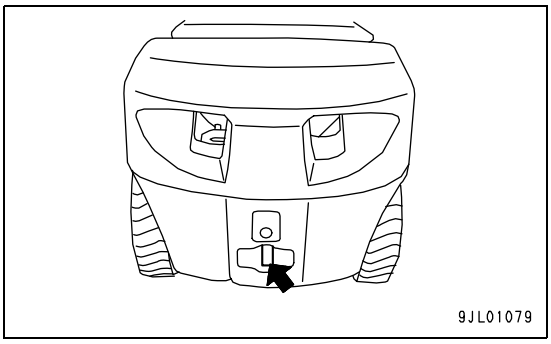
PARK THE LIFT TRUCK IN A SAFE PLACE

- Park the lift truck on a firm level ground.
- Do not stop or park near any emergency exit or other safety equipment. Stop or park the lift truck in a place where it will not obstruct pedestrians or other vehicles.
- Do not park the lift truck on a slope. If parking on a slope is unavailable, apply blocks to the tyres.

2.5.4 TOWING

BE CAREFUL WHEN USING THE DRAWBAR PIN

- The drawbar pin is provided for being towed by the wrecking car when the tyres are stuck in a ditch or mud.
- Do not use it for towing or hoisting.
- The drawbar pin can be used for an anchor point of this lift truck when being transported by a truck.



DO NOT TOW A DISABLED LIFT TRUCK

- If there is any problem with the brakes or steering system of your lift truck, do not use tow is with another lift truck. There is a danger that disabled the lift truck may move accidentally.

2.6 LOAD HANDLING OPERATION

SIT ON THE SEAT CORRECTLY FOR LOAD HANDLING OPERATION

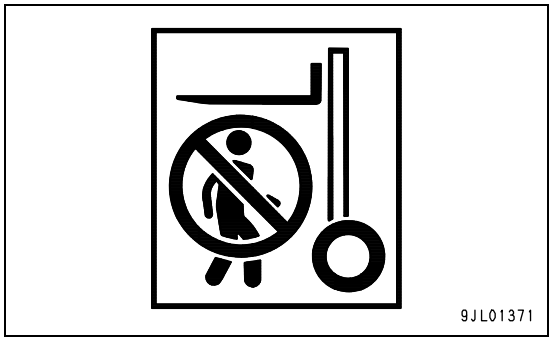
- To avoid accidents, Load Handling Interlock activates to disable the load handling operation when you are not seated properly or off the seat. For more details on the function of load handling interlocking, see "LIFT INTERLOCK (PAGE 3-34)".

DO NOT ALLOW ANYONE IN THE WORKING AREA EXCEPT THE SIGNAL PERSON

- To avoid accidents, keep unauthorized people and other vehicle off the working area except a signal person during the load handling operation.
- Use a signal person when it is necessary to ensure visibility or for other safety reasons.
- When working with a signal person, always follow his/her instructions.

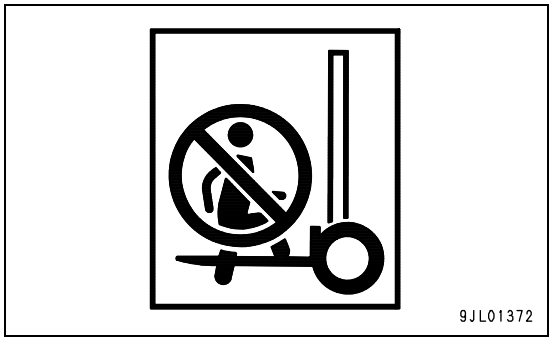
DO NOT GO UNDER THE LIFTED FORKS

- The lifted forks may accidentally fall down to cause serious injuries to person below, of any. Keep everyone away from under the lifted forks.



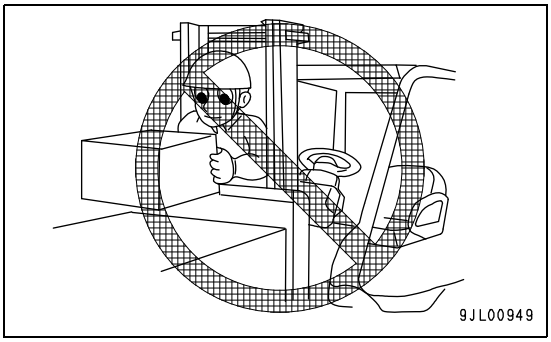
WORKING ON THE FORKS IS STRICTLY PROHIBITED

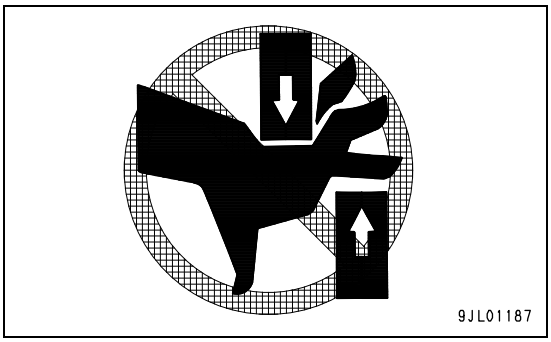
- Do not directly place a load manually on the forks.
- Do not directly remove a load manually from the forks.
- Don not step on the forks to handle a load. The load may slip down the forks.
- Do not hold the load on the forks by hands. Sudden lift truck movement may cause the load to fall on the person below.



BE CAREFUL NOT TO GET CAUGHT IN THE MAST STRUCTURE

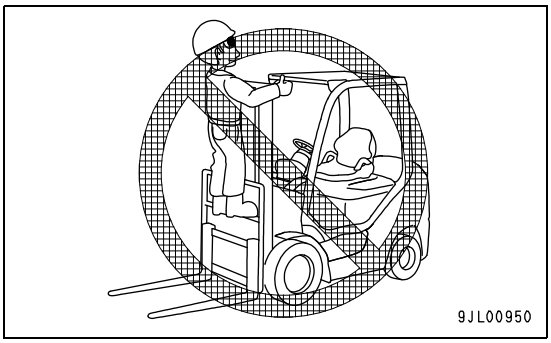
- Never put your hands, feet, or other body parts into the mast structure. There is a danger that you may get caught in moving parts and be seriously injured.
- Do not stand between mast and operator's compartment as you may be crushed and be seriously injured or killed.
- Always operate the mast and forks from the operator's compartment.





DO NOT CLIMB ON THE MAST OR LOAD BACKREST

- If you climb on the mast or load backrest, there is a danger of being caught in the moving parts or fall off.

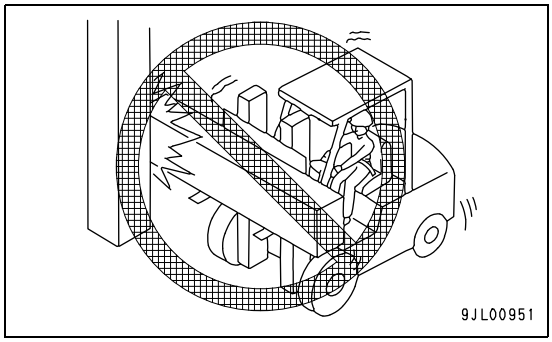


USE A PALLET OR SKID OF AMPLE STRENGTH

- Always use the pallets and skids of robust construction. Do not use broken or damaged pallets or skids.
- Before traveling, always check that the load is positioned securely and safely on the pallet.

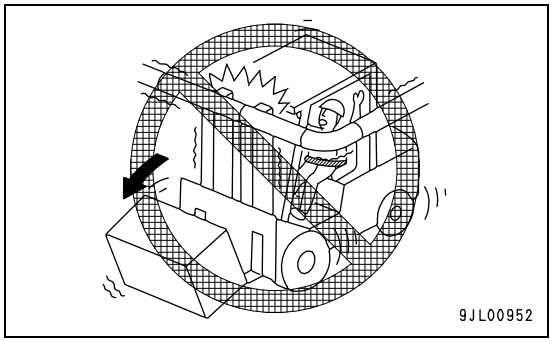
HANDLE A LONG OR WIDE LOAD WITH EXTRA CARE

- Be extremely careful when carrying long or wide loads. Lift the load slowly without hitting anything in the surrounding area.
- When switching direction, keep the load as low as possible and maintain the balance.



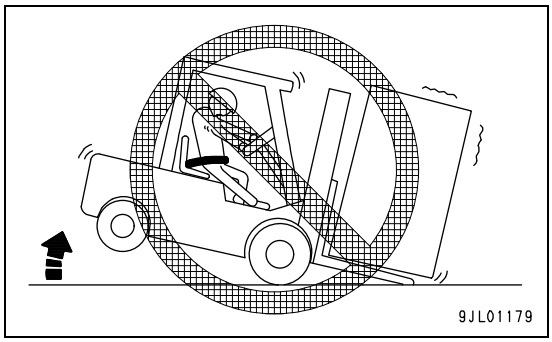
BE CAREFUL WITH THE MAST HEIGHT

- As the forks go up, the mast height increases. Be mindful of this face during the operation.
- Take care not to hit with the mast electric wirings, piping, sprinklers, beams in the ceiling, etc. If such hitting occurs, there is a danger that the load on the forks drops off or the lift truck tips over.



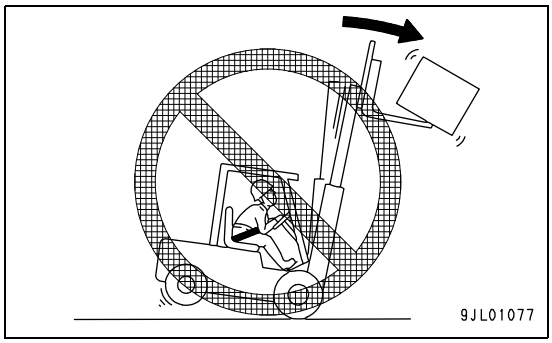
OVERLOADING IS STRICTLY PROHIBITED

- Overloading may cause the rear wheels come off the ground, and the lift truck loses the balance and tips over. Do not load the lift truck over the max. capacity shown in the load table. For details, see "2.9.4 ACTUAL CAPACITY (PAGE 2-47)" and "2.9.5 SERIAL NO. AND LOAD TABLE (PAGE 2-48)".



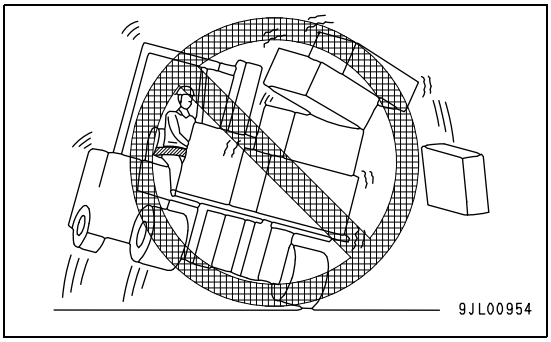
DO NOT TILT THE MAST FORWARD WITH A LOAD ON THE FORKS

- Do not tilt the mast forward with the load raised. Do not raise the load with the mast tilted forward. Or the load may fall or the lift truck may tip over.
- Do not travel with the mast tilted forward.



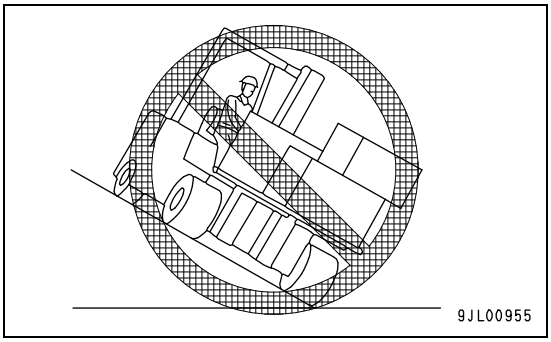
DO NOT HANDLE A LOAD IN AN INSECURE MANNER

- 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.
- Secure the load in position to prevent collapsing or falling. Do not handle unstable loads.
- Place the load so that it makes contact with the load backrest.



DO NOT LOAD AND UNLOAD ON SLOPES

- Loading or unloading on the slopes may cause the lift truck to lose its balance and tip over.

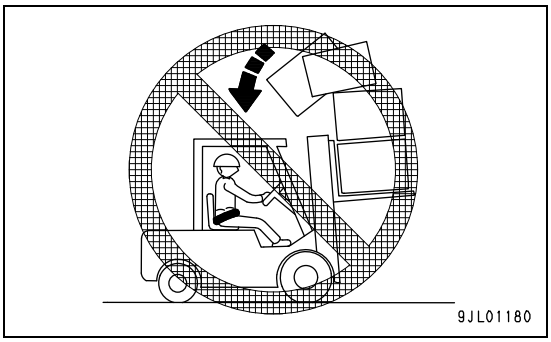


DO NOT LOWER THE LOADED FORKS HASTILY

- Do not operate the forks roughly or make a sudden stop. Sudden lowering may cause the collapsing or falling of the load, and the lift truck may go off balance and tip over.

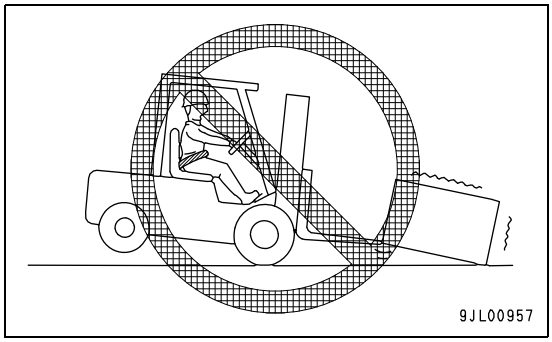
DO NOT HANDLE A LOAD EXCEEDING THE LOAD BACKREST HEIGHT

- If the load is higher than the load backrest, there is danger that it may fall back on the operator. Do not handle a load exceeding the load backrest height.



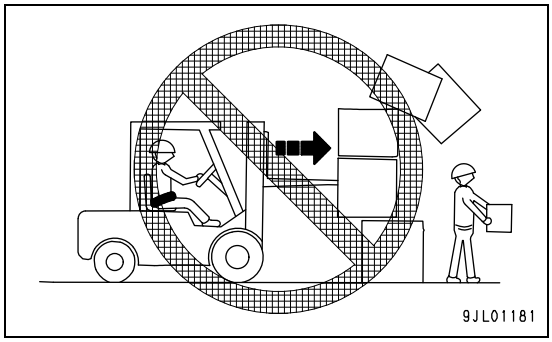
DO NOT PRY SOMETHING WITH THE TIPS OF THE FORK

- Or the hooked object may suddenly come off the tip and be damaged. The reaction may result in an unexpected motion of the lift truck or load and the risk to the safety.



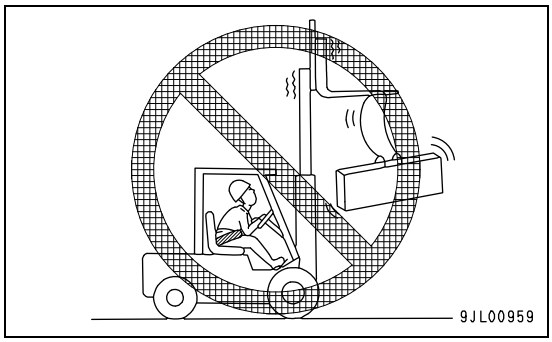
DO NOT USE THE FORKS TO PUSH OR PULL A LOAD

- There is a risk that the load will be damaged or fall.



DO NOT USE THE LIFT TRUCK FOR ANY OTHER PURPOSE

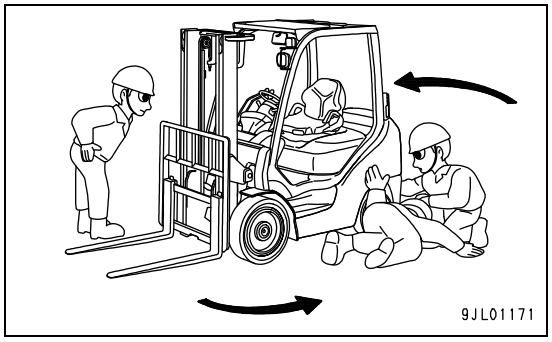
- Do not use the lift truck for any other purpose than load handling using forks or attachments.
- Do not open or close the doors of railroad cars or warehouses with the forks.
- Do not push or pull any other vehicle.
- Do not lift loads suspended from the fork with ropes. The rope may slip, come off, break, or even cause cracks on the forks. Also the lift truck may lose its balance and tip over as the load swings.



2.7 PRECAUTIONS FOR INSPECTION AND MAINTENANCE

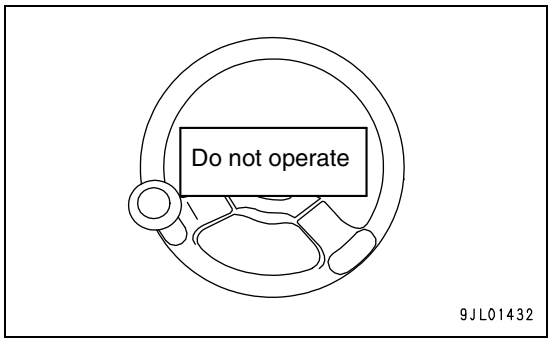
2.7.1 ALWAY PERFORM THE START-UP INSPECTION

- This Operation and Maintenance Manual provides only the simple inspection and maintenance information that operators can perform relatively easily. For inspection and maintenance that requires a trained, skilled and qualified personnel, contact your KOMATSU FORKLIFT distributor.
- Do not operate the lift trucks before completing start-up inspection.
- Report abnormality, if any, immediately to the administrator. Do not operate faulty lift truck until the repair is completed.
- Incorrect inspection, maintenance and repair services may cause critical accident or shorten lift truck service life. For your safety operation, contact KOMATSU FORKLIFT distributor for inspection, maintenance and repair services.



2.7.2 PUT UP A WARNING SIGN DURING INSPECTION AND MAINTENANCE

- Put up a warning sign on the steering wheel or load handling lever during inspection and maintenance work. Put up the sign around the lift truck, if necessary.
- Do not let any other person than the inspector or maintenance staff start lift truck or touch the load handling lever during inspection and maintenance. Or serious injuries may result.
  When jointly making inspection or maintenance with other personnel, name the leader and follow his/her instructions.



2.7.3 KEEP THE WORKING AREA CLEAN AND TIDY

- Keep the working area clean and tidy. Get obstacles out of the way. Wipe off any grease or oil.
- Perform the work on level surface with ample space.
- If the work is carried out inside a building, keep it well-ventilated.

2.7.4 CAUTIONS BEFORE INSPECTION AND MAINTENANCE

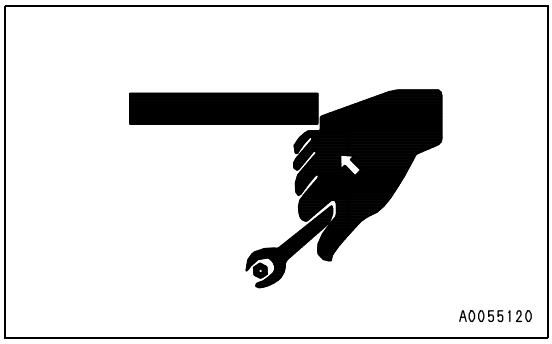
- Arrange for a fire extinguisher. Know the location and how to use it.
- Do not allow anyone with loose clothing or long loose hair near the mast while operation.
- Wear adequate working clothes and protective items (safety helmet, safety shoes, goggles and gloves).
- Lower the forks to the ground, pull the parking brake lever in the direction to the rear of the lift truck, set all the lever to the neutral positions, then turn the starting switch to [○] (OFF) to stop the engine.
- Block the front and rear tyres.

2.7.5 KEEP UNAUTHORIZED PEOPLE OFF

- No unauthorized person is allowed near the lift truck under maintenance service.

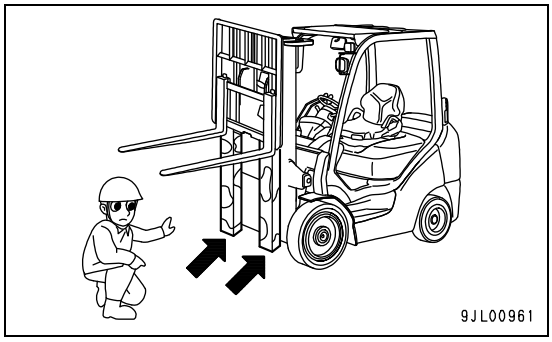
2.7.6 USE OF RIGHT TOOLS AND EQUIPMENT

- Use a suitable tool correctly. Do not use broken or deformed tools, or wrong tools designed for another purpose, or a serious accident may result.



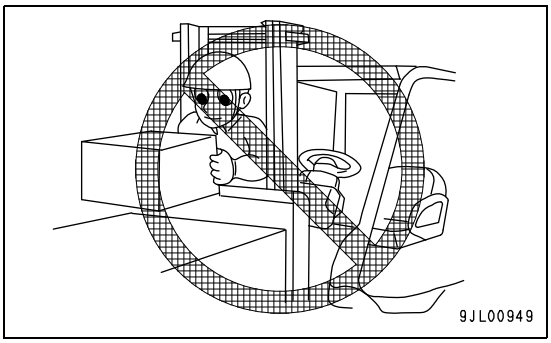
2.7.7 CAUTIONS WHEN WORKING UNDER WORK EQUIPMENT

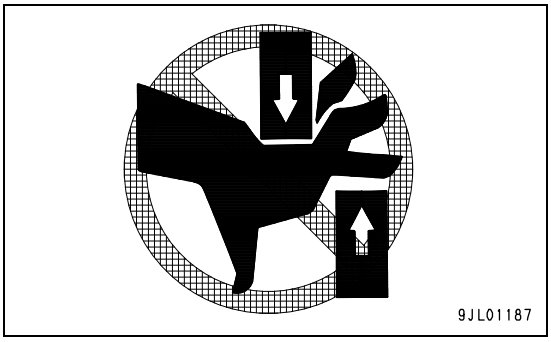
- Block the forks and mast to prevent falling before working under the raised forks. Otherwise a serious accident may result.



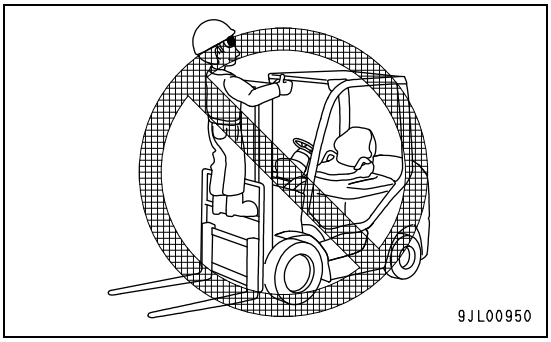
2.7.8 AVOID GETTING CAUGHT UP BY THE MAST OR FALLING OFF

- Do not put your hands, feet, or other body parts into the mast structure. Or you may be caught by the mast parts.
- Do not stand between mast and operator's compartment as you may be crushed and be seriously injured or killed.
- Always operate the mast and forks from the operator's compartment.



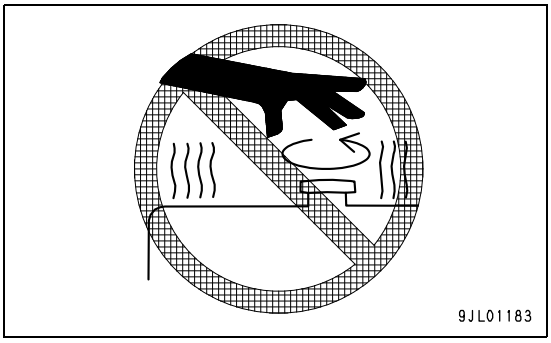


- Do not climb on the mast load backrest or on top of the dashboard. You may slip and fall or get caught in the moving parts. Use a stepladder for inspection and maintenance at elevated level.



2.7.9 BE CAREFUL OF BOILING COOLANT

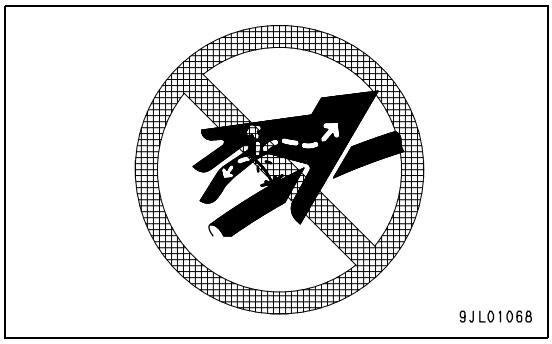
- Immediately after using the lift truck, the engine cooling water is at high temperature and high pressure. Do not remove the radiator cap under these conditions or it may cause burns.
- When removing the radiator cap, turn it slowly to release the internal pressure after the coolant temperature has gone down sufficiently.



2.7.10 BE CAREFUL OF HIGH PRESSURE OIL

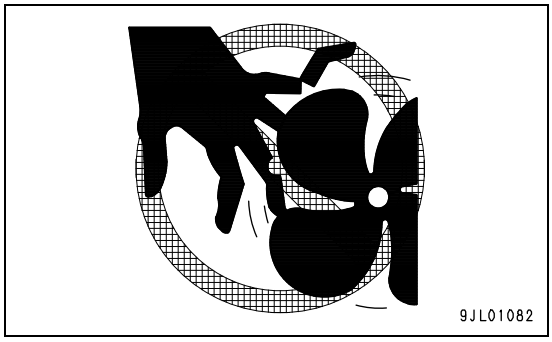
Remember that the hydraulic system is constantly under pressure. Check the hydraulic system for no pressure before checking or replacing piping or hose, or a serious accident may result. Follow the instructions below:

- When checking hydraulic piping or hose for leakage, don't touch it directly by hand. The pipe or hose may be pressurized.
- If your skin and/or eye are injured by high-pressure oil, wash it with fresh water and immediately see a physician.



2.7.11 BEWARE OF ROTATING COOLING FAN AND BELT

- Keep hand off the rotating fan or fan belt.
- Always stop the engine before opening the engine hood. Only the authorized people are allowed to open the engine hood.



2.7.12 CAUTION WHEN REPAIRING THE ELECTRICAL SYSTEM

- When repairing the electrical system, disconnect the cable of the negative (-) terminal to stop power supply.

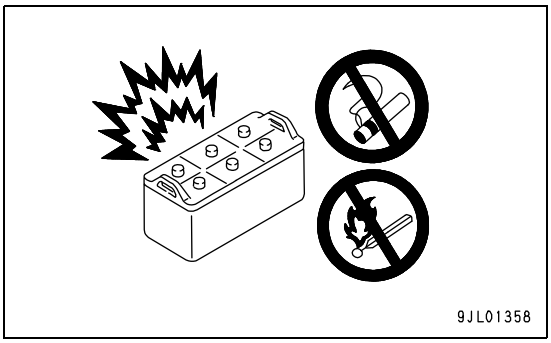
2.7.13 CAUTIONS FOR USING COMPRESSED AIR FOR CLEANING

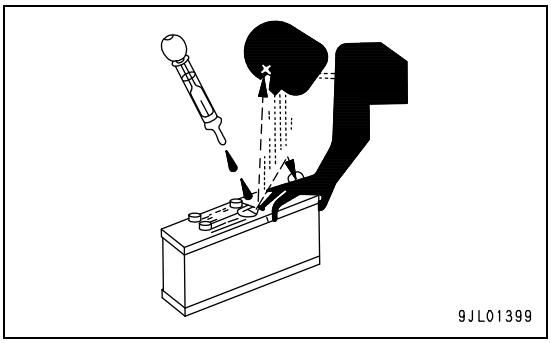
- The dust particles may cause a serious bodily injury if compressed air is used for cleaning.
- Always wear protective gears such as goggles, dust mask, and gloves.

2.7.14 CAUTION WHEN HANDLING BATTERY

Batteries generate flammable hydrogen gas and may explode. Battery electrolyte also contains dilute sulfuric acid. If you make a mistake in handling, it may cause personal injuries, explosions and fires. Strictly follow the instructions shown below.

- Do not use or charge the battery if the battery electrolyte level is below the lower level. This may cause battery explosion. Check the electrolyte level regularly to maintain it between the lower level and upper level. If the level is low, refill distilled water.
- When handling the battery, always wear safety glasses and rubber gloves.
- Do not smoke or allow any flame near the battery.
- If you spill battery electrolyte on yourself, immediately flush the part with a large quantity of tap water.
- If battery electrolyte gets into your eyes, flush them immediately with fresh tap water and see a physician.
- When inspecting or handling the battery, the starting switch must be turned to the [○] (OFF) position.





2.7.15 STRICTLY FOLLOW THE INSTRUCTIONS SHOWN BELOW TO AVOID GENERATION OF SPARKS

- Do not place tools or other metal objects on the battery. They may accidentally contact the positive (+) and negative (-) terminals of the battery.
- When disconnecting the battery cables, always disconnect the cable of the negative (-) terminal first. Conversely, when connecting them again, connect the cable of the positive (+) terminal first.

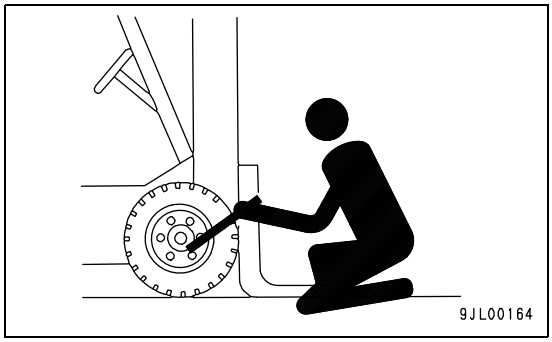
2.7.16 CAUTION WHEN CHARGING A BATTERY

- When the battery is charged, flammable hydrogen gas is generated.
- Remove the battery from the lift truck, and open the battery cap in a well-ventilated place before charging.
- Tighten the battery cap securely.
- Fix the battery in place securely.

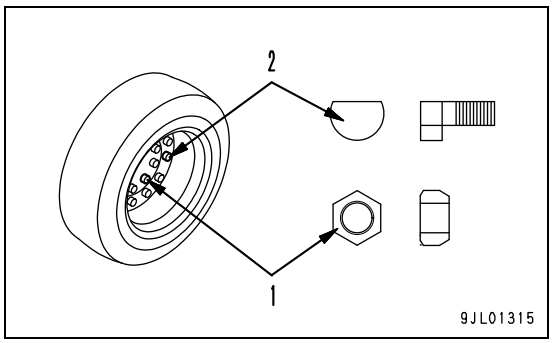
2.7.17 CAUTION WHEN HANDLING TYRES

The lift truck tyres are very highly pressurized with the air. Do not mishandle, or the tyres may burst, be damaged or the rim may break into pieces causing a serious injury. For your safety, follow the instructions shown below.

- Do not disassemble/assemble tyre, tube or rim, nor inflate removed tyres with the air.
- For safety, when filling a tyre with air or replacing it, place your body in front of the tread face of the tyre (see the figure at right). Do not work from the side of the tyre.

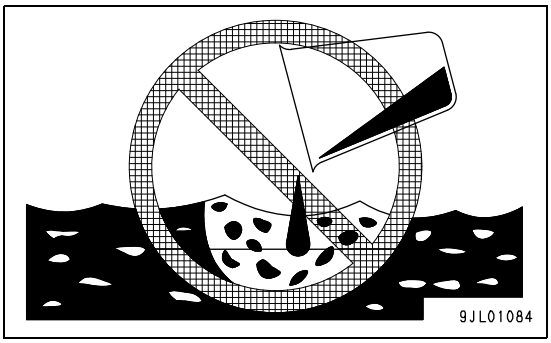


- When removing the tyre with divided rim from the lift truck, always loosen the hub nuts (1) after depressurizing the tyre. Do not loosen the rim bolt (irregular shape) (2) of the divided rim. For the tyre replacement, see "4.4.4 REPLACING TYRES (PAGE 4-30)".



- Always use the specified tyre of KOMATSU FORKLIFT, and observe the specified tyre inflation pressure. For the right tyre inflation pressure, see "4.16 SERVICE DATA (PAGE 4-54)".
- When filling up the tyres, make sure no one is around and use a clip-on air chuck that can be fixed to the air valve. Fill up the tyre while checking with an air gauge to avoid over inflation.
- The rim will not " fit " the tyre if either the tyre or rim is defective, or if it is not properly assembled. To fit, the rim must contact with the tyre evenly around the circumference. Contact your KOMATSU FORKLIFT distributor.

2.7.18 CAUTION IN WASTE DISPOSAL



Take full cautions for waste disposal to prevent environment pollution.

- Always drain waste fluid such as oil, fuel, coolant and battery electrolyte into containers like cans and tanks. (Do not drain the battery electrolyte into metallic containers. Always use plastic containers.) Do not pour on the ground or into rivers, drains, seas or lakes.
- Comply strictly with applicable laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, batteries and refrigerant (CFCs).

2.7.19 CAUTION AFTER INSPECTION AND REPAIR

- Wipe off the spilt oil and grease immediately. If the lift truck is dirty, it becomes difficult or impossible to find cracks or other problems.
- Test the lift truck upon completion of the repair to check if there is no abnormality.

2.7.20 PERIODIC INSPECTION OF SAFETY CRITICAL PARTS

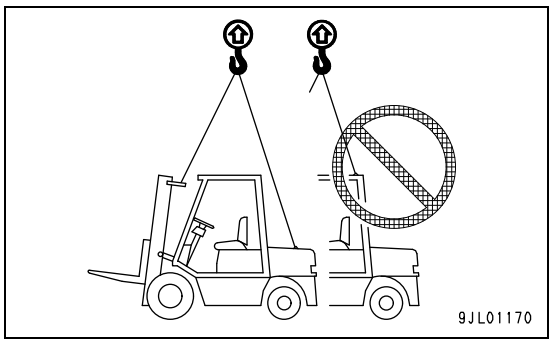
- To ensure the safety and long service life of the lift truck, be sure to perform lubrication, inspection and maintenance regularly. Especially the safety critical parts, must be replaced regularly.
- Quality of these parts may change over time or deteriorate, wear or fatigue as they are repeatedly used, leading serious bodily injuries and damages. Furthermore, the remaining service life of such parts is usually hard to determine for operators or during visual inspection.
- For details of safety critical parts, see "4.15 PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS (PAGE 4-53)".
- Replace the safety critical parts with a new one periodically even if no anomaly is found.
- Replace the safety critical parts immediately when any abnormality is found, even if the replacement interval is not up yet.

REMARK

- This Operation and Maintenance Manual does not describe the details on how to inspect or replace the safety critical parts.
- Inspection and replacement of the safety critical parts, and refilling of greases must be done by KOMATSU FORKLIFT distributor.

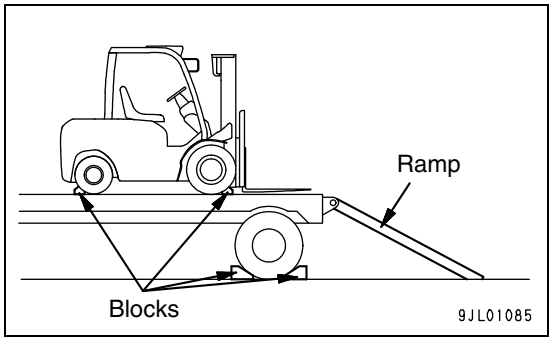
2.8 HOISTING AND TRANSPORTING THE LIFT TRUCK

2.8.1 CAUTION WHEN HOISTING THE LIFT TRUCK



- Never lift up by the overhead guard.
- Before lifting-up, Check that the mounting bolts of mast and counterbalance-weight are tightened to the specified torque.
  Tightening torque for the counterbalance-weight mount bolts
  : 441 - 639Nm {45 - 65kgfm}
  Tightening torque for the mast lower mount bolts
  : 157 - 196Nm {16 - 20kgfm} (AX50 Series)
  : 343 - 427Nm {35 - 43kgfm} (BX50 Series)
- To hoist the lift truck, hook on the holes on the top of the outer mast for the front, and the hole on the top of the counterbalance-weight for the rear.
- Do not go under the lifted truck.
- Use undamaged wire having sufficient strength. For the hoisting of lift truck, see "4.12 HOISTING LIFT TRUCK (PAGE 4-45)".
- If the lift truck has to be lifted frequently, it is necessary to install special lifting equipment, so please contact your KOMATSU FORKLIFT distributor.

2.8.2 PRECAUTIONS FOR LOADING AND UNLOADING THE LIFT TRUCK



Loading and unloading a lift truck to and from a trailer always involve a hazard of the lift truck tipping over or falling off by handling error. Follow the instructions below:

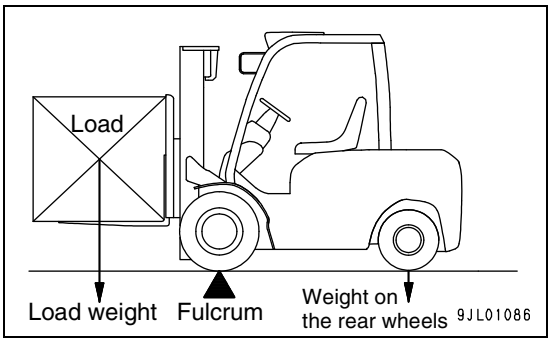
- Stop the trailer on level, flat road. Always apply parking brake. Apply blocks to the tyres.
- Use ramps or dock plate of appropriate length, width and strength. Secure it tightly to prevent it from being dislocated or disengaged.
- Take a right posture on the seat while operating.
- If you operate the lift truck in such a posture that your weight is not properly applied to the seat, like standing up or leaning forward or sideways, travel interlock activates to cut off the transmission of engine power. Then the lift truck may slither down even if the accelerator pedal is stepped on or an uphill. Operate the lift truck assisted by a signal person if necessary so that you don't have to stand up or lean forward or sideways to watch. For more details on the function of travel interlocking, see "TRAVEL INTERLOCK (ENGINE POWER CUTOFF) (PAGE 3-26)".
- When using the ramps, set them in gentle gradient, align the center of both the trailer and the lift truck and lock securely to prevent misalignment.
- Do not change the course of the lift truck while on the ramps. If course change is needed, move off the ramps once and make another uphill travel on them in right direction.

2.9 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.

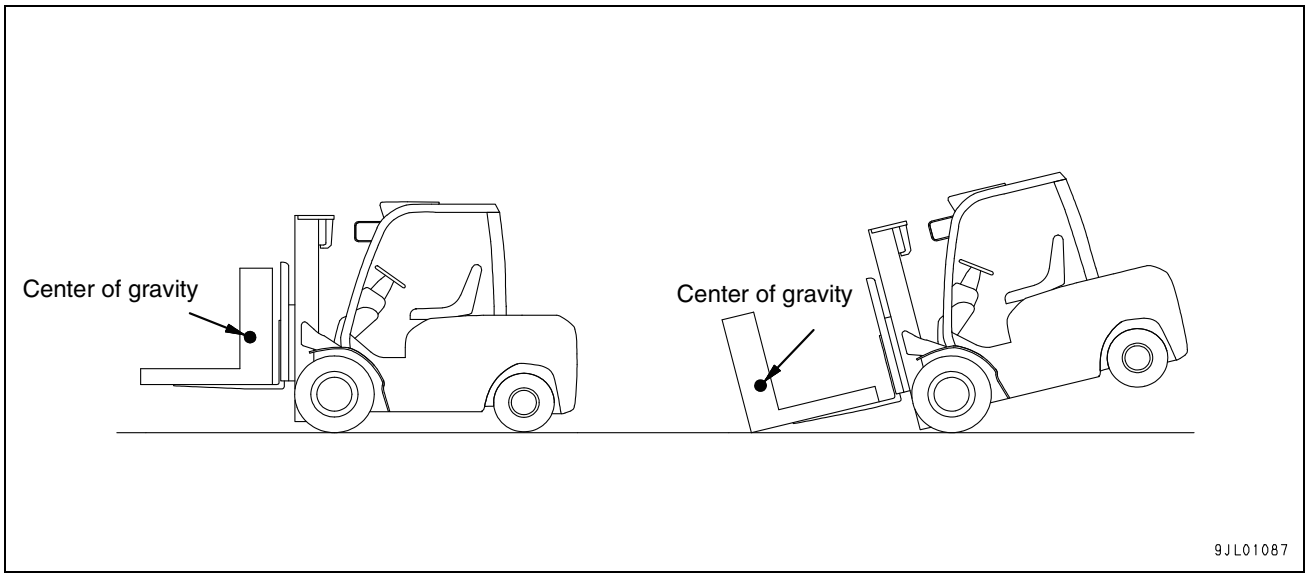
2.9.1 LONGITUDINAL STABILITY

- The front wheels of the lift truck act as a fulcrum, and the load weight and the weight on the rear wheels are kept in balance to prevent the lift truck from falling forward.
- When an overbalanced load weight is applied, the rear wheels will be raised off the ground. It is very dangerous and poses a high risk of serious accident like tipping over.



2.9.2 CENTER OF GRAVITY OF A LOAD

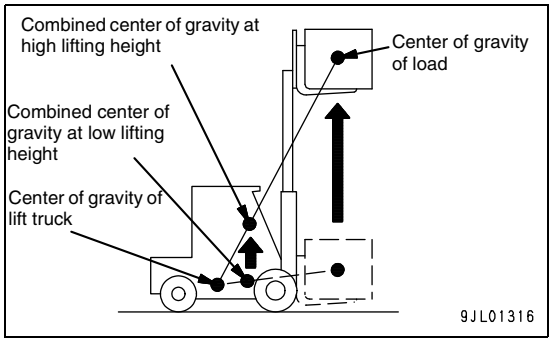
- The shapes of loads carried by lift trucks vary from boxes to planks and long objects.
- To judge the stability of the lift truck, it is important to determine the position of the center of gravity for loads of various shapes.



2.9.3 COMBINED CENTER OF GRAVITY AND STABILITY ON THE LOADED LIFT TRUCK

COMBINED CENTER OF GRAVITY

The center of gravity of the loaded lift truck shifts to a combined center of gravity of both the lift truck and the load. When the load is raised, its center of gravity will rise, hence the combined center of gravity will also rise.



COMBINED CENTER OF GRAVITY AND STABILITY

The higher the position of the center of gravity, the worse the longitudinal and lateral stabilities become. In addition, swaying or shock encountered during traveling or load handling will have a larger impact on the stability of the lift truck.

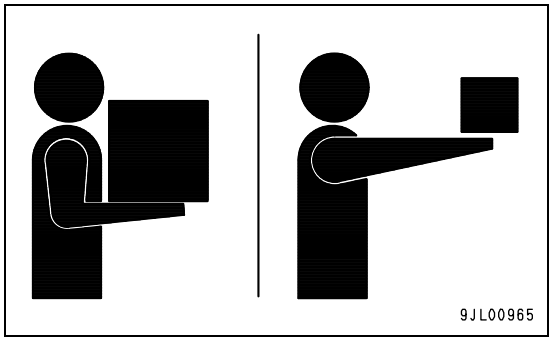
Stability of the lift truck also changes depending on the following factors.

- Size, weight, shape of load (position of center of gravity etc.)
- Lifting height
- Tilting angle of mast
- Inflation pressure of tyres
- Acceleration, deceleration and turning speed when traveling and load handling
- Road condition and gradient
- Type of attachments

Do not travel with the forks (load) raised. Do not make sharp turns or apply sudden brakes. Do not raise or tilt the forks abruptly. There are dangerous and poses a high risk of serious accident like tipping over.

2.9.4 ACTUAL CAPACITY

- The horizontal distance from the position of the center of gravity of a load on the forks to the upright load backrest of the fork is called a load center. Actual capacity means the maximum weight of a load that can be loaded at a certain load center.
- The load table is given in the name plate accessible from the operator's seat. The table shows the relationship between the actual capacity and load center.
- When the load center shifts toward the fork tips, the load weight (mass) has to be decreased in the actual operation to maintain the balance.



Load center: Small
Load : Large

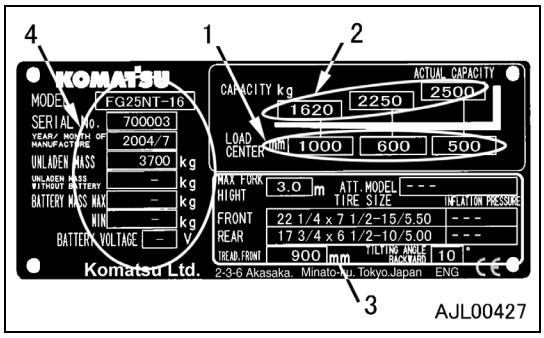
Load center: Large
Load : Small

2.9.5 SERIAL NO. AND LOAD TABLE

A serial No. plate for lift trucks of the US specifications differs from the one shown above in the shape.
Since actual conditions will vary, be sure to check your capacity rating being adequate for the particular job before beginning.
If you are unsure at the capacity, please contact your employer for assistance.

EXPLANATION OF LOAD TABLE

- In the load table of the serial No. plate, actual capacity and maximum load (2) are shown in relation to load center (1).
- Actual capacity and maximum load are determined according to each model on the condition of the specifications shown in area (3).
- Before loading, make sure that the load center and the load are well within the range of capacity.
- When the load is in a complex shape, pull the load so that the heaviest portion of the load comes to closer to the load backrest and the lateral center comes to the two forks center.
- Should a load be loaded beyond the range of capacity, it would pose a big danger to the lift truck as the rear wheels (for steering) may lift off the ground, letting the operator lose control of steering, or the lift truck may tip over. Always keep the load within the range of capacity.
- Work within the specification ranges given in the serial No. plate attached to the lift truck. Replace the broken or unreadable serial No. plate. Call your KOMATSU FORKLIFT distributor for a new serial No. plate.



EXAMPLE OF LOAD CENTER AND ACTUAL CAPACITY

- The areas (1) and (2) in the example provide the following information:
  When the load center is 500mm
  - - - Maximum capacity: 2,500kg (*1)
  When the load center is 600mm - - - - - - Capacity: 2,250kg
  When the load center is 1,000mm - - - - Capacity: 1,620kg
  *1: Even when the load center is smaller than 500mm, the maximum capacity is 2,500kg.

- The area (3) shows the main specifications of the model.
  Max. lifting height : 3m
  Attachment : Not equipped
  Front wheel tread : 900mm
  Mast rear tilting angle : 10degrees
  Front wheel size, inflation pressure : 22 1/4 x 7 1/2-15/5.50, no inflation (*2)
  Rear wheel size, inflation pressure : 17 3/4 x 6 1/2-10/5.00, no inflation
  *2: Pneumatic cushion tyre in this example, which does not require air inflation.

• The following symbols indicate the types of attachment if any.

Attachment	Symbol						Attachment	Symbol					
	Type			Capacity				Type			Capacity		
Side shifter	F	S	*	*	*	*	Clamp	C	*	*	*	*	*
Fork positioner	F	M	*	*	*	*	Roll clamp	R	S	*	*	*	*
Load stabilizer	F	T	*	*	*	*	Rotating fork	R	F	*	*	*	*
3-way stacker	F	W	*	*	*	*	Ram	L	*	*	*	*	*
Hinged fork	H	F	*	*	*	*	Spreader	N	*	*	*	*	*
Push-pull	P	P	*	*	*	*	Hook	K	*	*	*	*	*
Pusher	P	A	*	*	*	*							

* marks in the chart will be replaced with alphabets and numbers which stand for types and capacities of the attachment.
Numbers are not necessarily in 6 digits.

LOAD CAPACITY WHEN EQUIPPED WITH ATTACHMENT AND / OR HIGH MAST

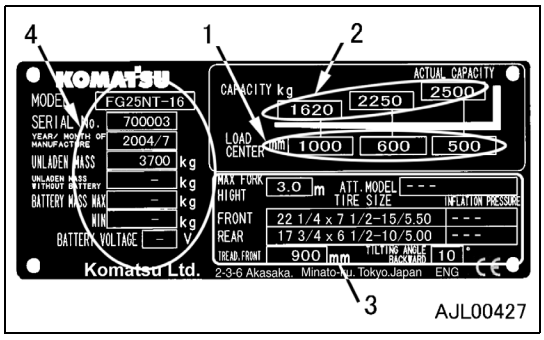
• Please note that the lift truck equipped with attachments and/or high mast has a smaller maximum capacity and actual capacity than the standard truck.
• Follow the load limit as indicated in the load table of the serial No. plate.

LOAD TABLE AND LOAD CAPACITY FOR DETACHABLE AND INSERT-TYPE ATTACHMENTS

• For some detachable attachments, additional load table is provided at a certain place of the lift truck. In this case, follow the instructions in the table when installing such an attachment.
• For insert-type bucket and fork extension sleeve, calculate the capacity as follows: Subtract the weight of insert-type bucket or fork extension sleeve from the capacity on the chart.
• To check if weight of the insert-type bucket or fork extension sleeve must be considered, see the label attached on the right side of the operator's seat.

OTHER INFORMATION ON THE SERIAL NO. PLATE

• The area (4) shows other basic information of the lift truck.
  Model
  Serial No.
  Date of manufacture
  Unladen mass
• [-] means that no information is required.
• Logo and the company name are shown on the top and bottom of the serial No. plate.



2.9.6 INTRODUCTION OF OPTIONAL SAFETY DEVICE

Various safety devices are available as options. The devices listed below are only examples. Contact your KOMATSU FORKLIFT distributor for more information.

Note that the devices and equipment may not be effective depending on the usage and working conditions. Follow the instruction of the safety control personnel for installation.

- Working lamp : Top and rear
- Warning for traveling (forward/reverse) or approach : Chime, revolving warning lamp and flash light
- Handling of high/wide item : High or wide load backrest, and finger board (fork carriage)
- Speed warning : Speedometer and alarm buzzer
- Load indicator/warning : Load sensor
- Better visibility : Rear view mirror
- Fire extinguisher

etc.

2.10 TOWING

⚠ WARNING

HOW TO MOVE A DISABLED LIFT TRUCK

Use extra care when towing a lift truck if there is a problem with any the following;

a. Brakes do not operate correctly.
b. Steering does not operate correctly.
c. Tyres are damaged.
d. Traction conditions are bad.
e. The lift truck must be moved on a steep grade.

If the steering pump motor does not operate, steering control of the lift truck can be slow.
This can make the control of the lift truck difficult. If there is no power, there is no power steering.
Do not tow the lift truck if there is no power. Poor traction can cause the disabled lift truck or towing vehicle to slide. Steep grades will require additional brake force to stop the lift truck.
Never carry a disabled lift truck unless the lift truck MUST be moved and cannot be towed. The lift truck used to carry the disabled lift truck MUST have a rated capacity equal to or greater than the weight of the disabled lift truck. The capacity must be for a load center equal to half the width of the disabled lift truck. See the serial No. plate of the approximate total weight. The forks must extend the full width of the disabled lift truck. Center the weight of the disabled lift truck on the forks and be careful not to the damage the under side of the lift truck.
the tow pins in the counterbalance-weights of both lift trucks.

TOWING

How To Tow The Lift Truck

1. The towed lift truck must have an operator.
2. Tow the lift truck slowly.
3. Raise the carriage and mast channels from moving.
4. If another lift truck is used tow the disabled lift truck, that lift truck must have an equal or larger capacity than the disabled lift truck. Install an approximate half-capacity load on the forks of the lift truck that is being used to tow the disabled lift truck. This half-capacity load will increase the traction of the lift truck. Keep the load as low as possible.
5. Use a towing link made of steel that attaches to the tow pins in the counterbalance-weights of both lift trucks.

OPERATION

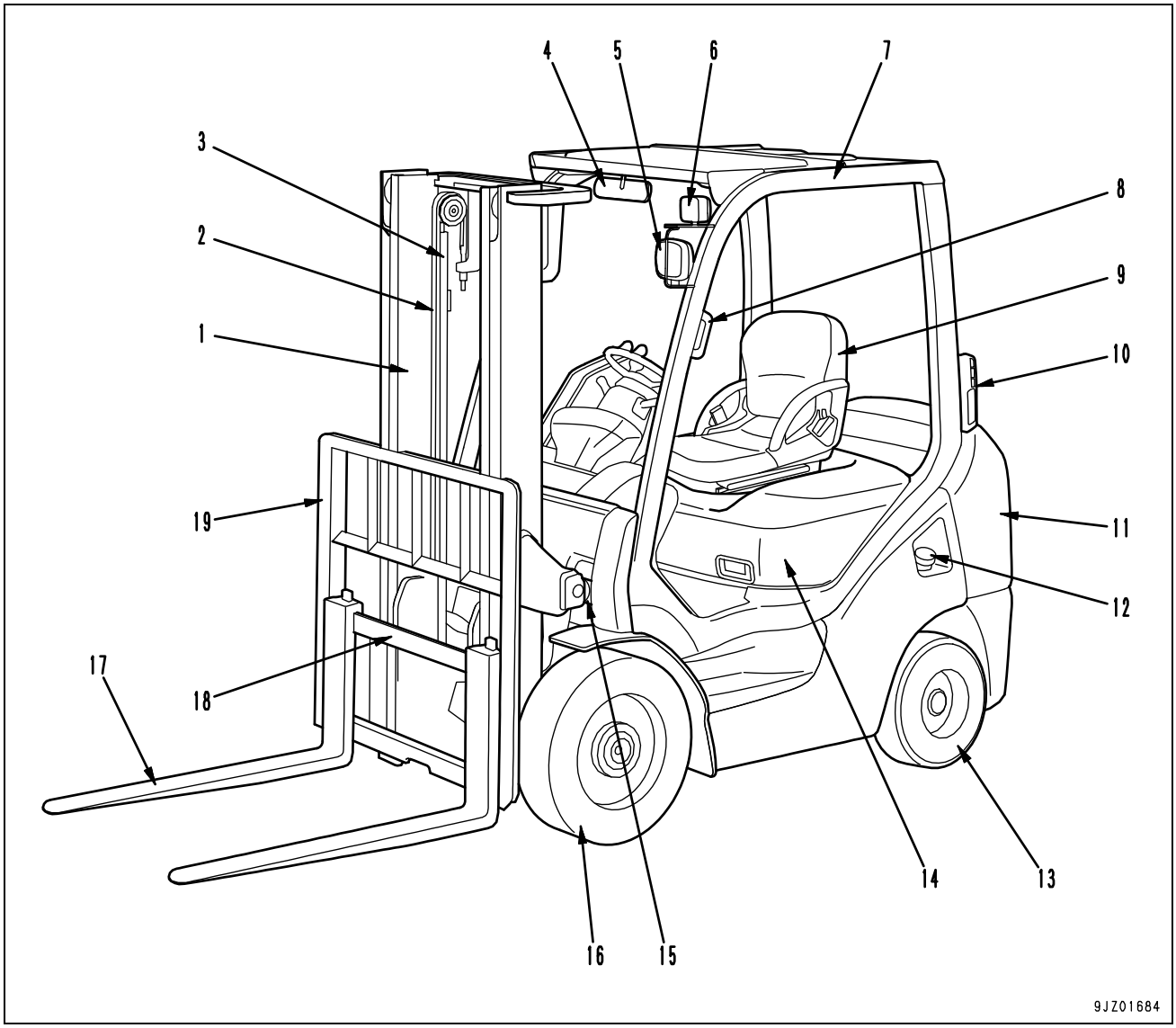
⚠ WARNING

Please be sure that you fully understand this manual and the precautions related to safety for the lift truck.
When operating the lift truck, always strictly follow these precautions. Failing to heed this warning may result in serious injuries.

3. OPERATION

3.1 GENERAL VIEW

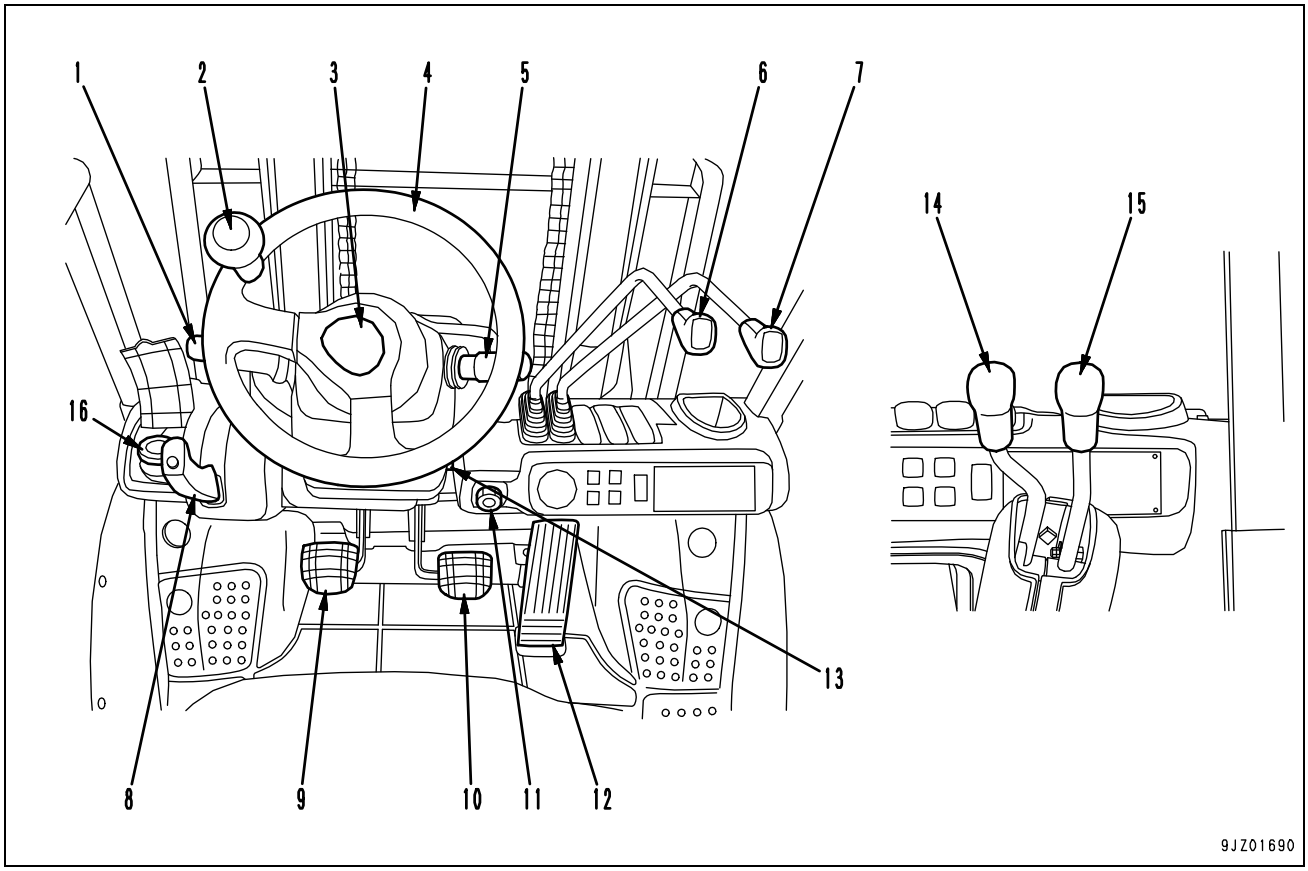
3.1.1 GENERAL VIEW OF LIFT TRUCK



(1) Mast
(2) Lift chain
(3) Lift cylinder
(4) Rear view mirror (option)
(5) Head lamp
(6) Turn signal lamp and clearance lamp (parking lamp)
(7) Overhead guard
(8) Assist grip
(9) Operator's seat
(10) Rear combination lamps (turn signal lamp, back-up lamp, brake lamp, and tail lamp)
(11) Counterbalance-weight
(12) Fuel filler
(13) Rear wheel
(14) Engine hood
(15) Tilt cylinder
(16) Front wheel
(17) Fork
(18) Fork carriage
(19) Load backrest

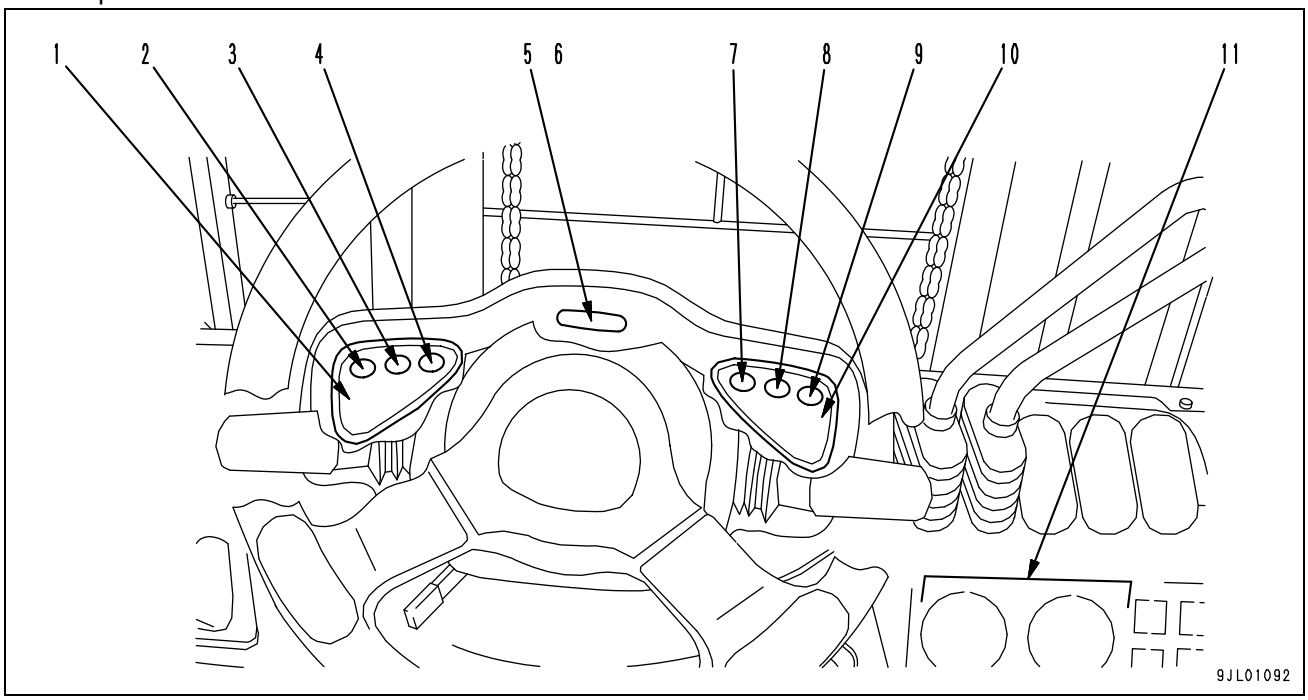
3.1.2 INSTRUMENTS AND CONTROLS

• OPERATOR'S COMPARTMENT



(1) Forward/reverse lever (TORQFLOW transmission lift truck)
(2) Steering wheel knob
(3) Horn switch
(4) Steering wheel
(5) Combination switch (Turn signal switch and lighting switch)
(6) Lift control lever
(7) Tilt control lever
(8) Parking brake lever
(9) Clutch pedal (Clutch type lift truck)/ Inching pedal (TORQFLOW transmission lift truck)
(10) Brake pedal
(11) Starting motor switch
(12) Accelerator pedal
(13) Tiltable steering wheel lock lever
(14) Forward/reverse lever (Clutch type lift truck)
(15) High/low speed lever (Clutch type lift truck)
(16) Brake reservoir tank

• Meter panel



(1) Fuel gauge
(2) Neutral indicator lamp/Travel interlock warning lamp (option)
(3) Engine oil pressure warning lamp
(4) Charge warning lamp
(5) Operation indicator
(6) Hour meter
(7) Lift interlock warning lamp (option)
(8) Sedimenter warning lamp (Diesel engine lift truck)/ Maintenance lamp (Also function as a failure indicator) (Gasoline engine lift truck) (option)
(9) Glow indicator (Diesel engine lift truck)
(10) Coolant temperature gauge
(11) Optional meter

3.2 EXPLANATION OF COMPONENTS

The followings are explanation of the devices employed to operate the lift truck.
To carry out suitable operations correctly and safely, it is important to fully understand the method of operating the equipment and the meanings of the displays.

3.2.1 METER PANEL

METER LAMPS

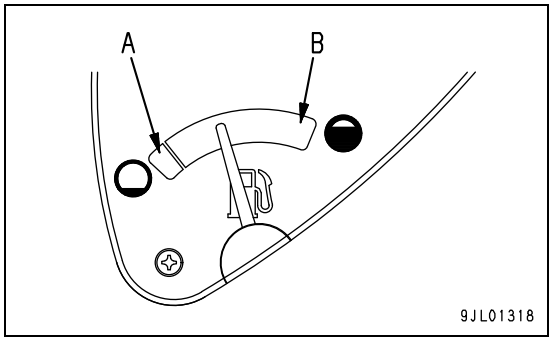
Each meter is provided with lamp for easy view at night. The lamps turn on with the lighting switch on, regardless the starting switch position.

NOTICE
How to check a blown bulb of each warning light

1. **With the engine stopped, check that the warning lights light up when the starting switch is turned to the [I] (ON).**
2. **If there is any warning light that does not light up, check if the bulb is blown. When the warning light lights up during operation, it indicates an abnormality. You should take corrective actions. Contact your KOMATSU FORKLIFT distributor immediately.**

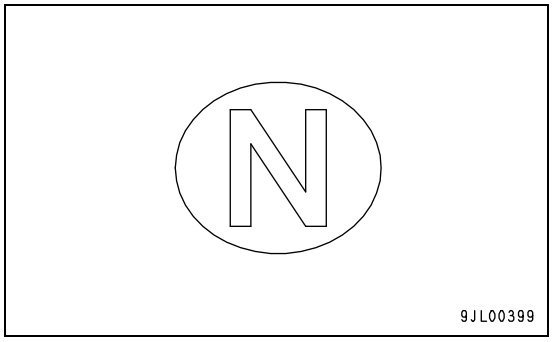
FUEL GAUGE

Fuel gauge displays the approximate remaining amount of fuel.
Check the fuel amount on a level surface.
Check the remaining fuel level with the engine starting switch in the [I] (ON) position.
Position (A): it indicates that there is little fuel left.
Position (B): it indicates that the fuel tank is full now.
Do not use up all the fuel. Fill the fuel tank before the fuel runs out.



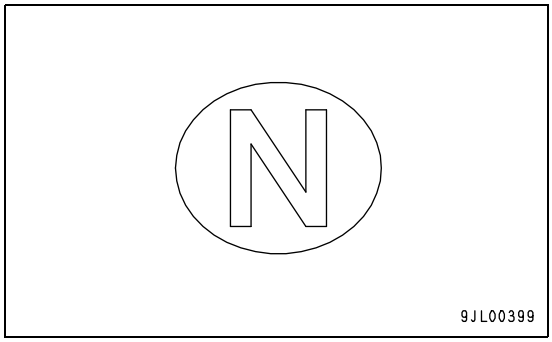
NEUTRAL INDICATOR LAMP

Neutral indicator lamp indicates that the forward/reverse lever is in the neutral position.
With the starting switch key in the [I] (ON) position, this lamp lights up when the forward/reverse lever is in the neutral position, and goes off when it is either in the forward or reverse position.
Before starting up the engine, be sure to turn the starting switch is in the [I] (ON) position and check that this lamp is on.



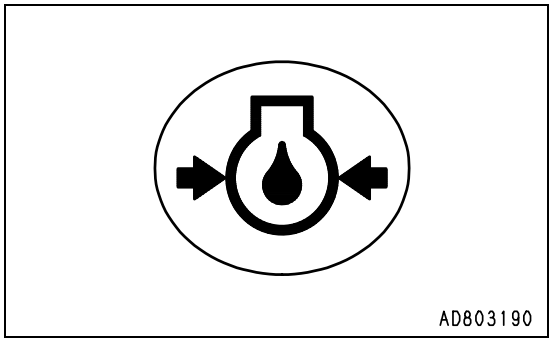
TRAVEL INTERLOCK WARNING LAMP (TORQFLOW TRANSMISSION LIFT TRUCK) (OPTION)

This indicator lamp doubles as the neutral indicator lamp.
It begins to flash when travel interlock activates, cutting off the transmission of engine power.
When you seat yourself properly and return the forward/reverse lever to the neutral position, the flashing lamp goes off and the lift truck is now ready for travel again.
For more details on the function of travel interlocking, see "TRAVEL INTERLOCK (ENGINE POWER CUTOFF) (PAGE 3-26)".



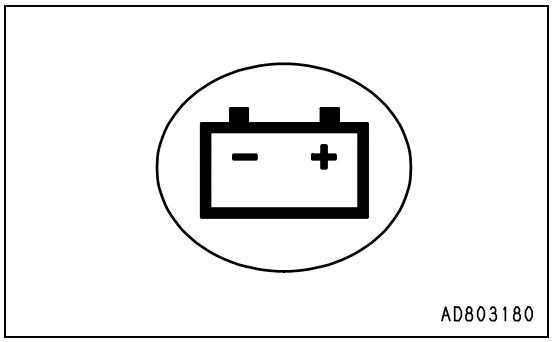
ENGINE OIL PRESSURE WARNING LAMP

This warning lamp indicates abnormality of the engine lubricating oil pressure.
This lamp lights up when the starting switch is turned to the [I] (ON) position, and goes off after the engine startup.
When it lights up during operation, stop the engine and check the engine lubrication system, oil pan oil level, etc.



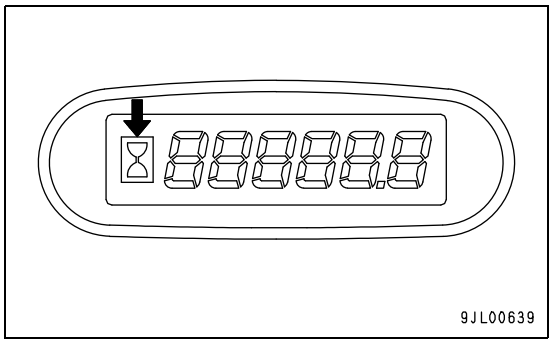
CHARGE WARNING LAMP

This warning lamp indicates abnormality of the alternator charging system while the engine is running.
This lamp lights up when the starting switch is turned to the [I] (ON) position, and goes off after the engine startup.
Should the lamp light up during the work, check the V-belt for looseness and the electrical system for any abnormality.



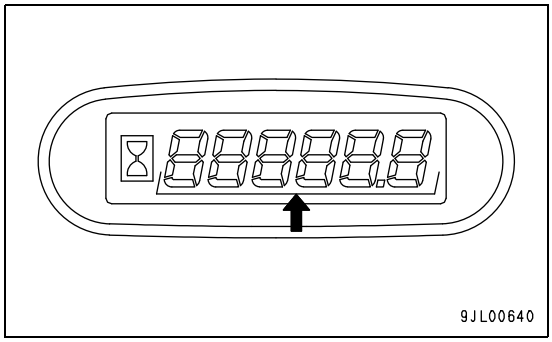
OPERATION INDICATOR

An hourglass symbol on the left side of the hour meter indicates that the hour meter is functioning.
This symbol flashes when the starting switch is at the [I] (ON) position.



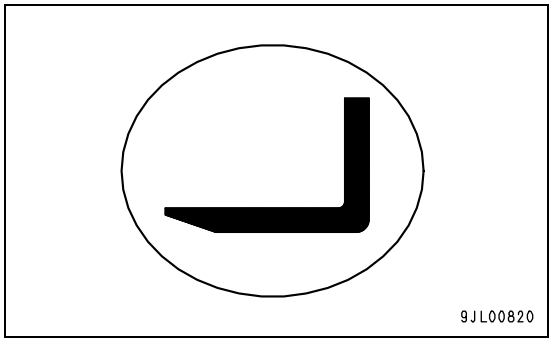
HOUR METER

Hour meter begins to work when the starting switch is turned to the [I] (ON) position, and indicates the cumulative value of operating hours.
(While the hour meter is in operation, the operation indicator keeps flashing.)
Use this meter for checking the periodic inspection intervals and operation hours.
The last digit advances by 1 (meaning 0.1 hour) when the starting switch is kept in the [I] (ON) position for 6 minutes.



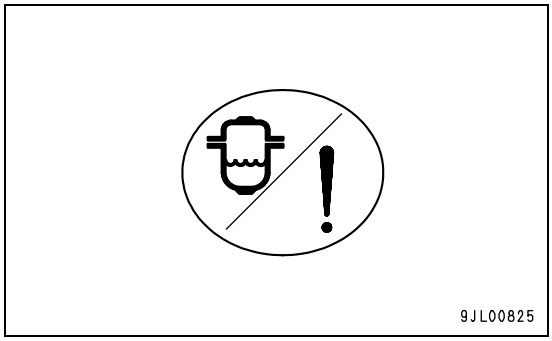
LIFT INTERLOCK WARNING LAMP (OPTION)

It begins to flash when Load Handling Interlock activates, stopping the operation of forks and mast.
When you seat yourself properly on the operator's seat, the lamp stops flashing and the lift truck is now ready for load handling operation again. For more details on load handling interlocking, see "LIFT INTERLOCK (PAGE 3-34)".



SEDIMENTER WARNING LAMP (ALSO FUNCTION AS A FAILURE INDICATOR) (DIESEL ENGINE LIFT TRUCK)

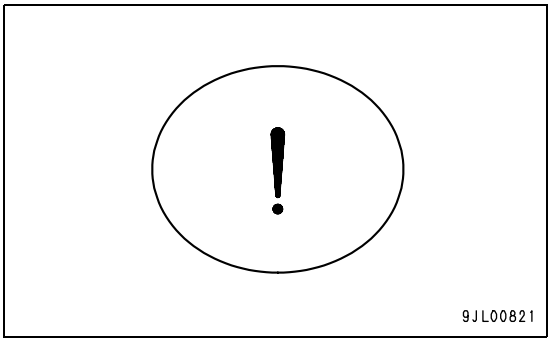
- This warning lamp lights up when there is some water accumulated in the fuel filter. If the lamp lights up, drain water from the fuel filter. If water is left inside the fuel filter, the functions of the fuel injection pump and injection nozzles will likely be lowered. For the draining of fuel filter, see "4.4.3 FUEL FILTER WATER DRAINING AND AIR BLEEDING (DIESEL ENGINE LIFT TRUCK) (PAGE 4-29)".
- This lamp also flashes when the traveling or load handling interlock does not function properly.



NOTICE
If the lamp begins to flash, stop the work on the spot and report the trouble to the administrator, or call your KOMATSU FORKLIFT distributor for checkup.

MAINTENANCE LAMP (GASOLINE ENGINE LIFT TRUCK) (OPTION)

This lamp flashes when an error has occurred in the traveling or load handling interlock control system.

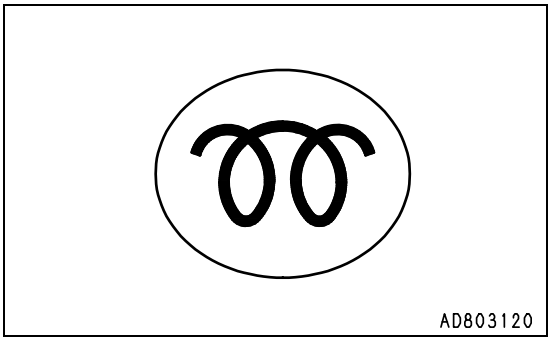


NOTICE

If the lamp begins to flash, stop the work on the spot and report the trouble to the administrator, or call your KOMATSU FORKLIFT distributor for checkup.

GLOW INDICATOR (DIESEL ENGINE LIFT TRUCK)

This indicator acts to indicate that the engine is being preheated. This lamp lights up when the starting switch is turned to the [I] (ON) position, and goes off about 8 seconds later.

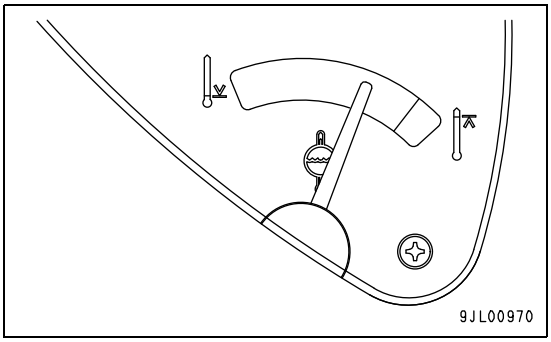


COOLANT TEMPERATURE GAUGE

The coolant temperature gauge indicates the engine cooling water temperature with a needle.

White range : Normal

Red range : Overheat



NOTICE

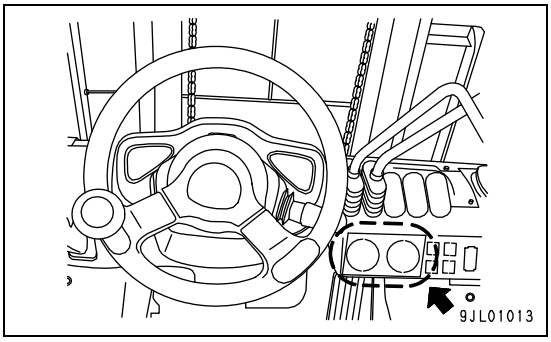
If the indicator enters the red range, stop the work immediately and park the lift truck in a safe place. Then take corrective actions against engine overheating.

For the engine overheating, see "4.7 ACTION IN ENGINE OVERHEATING (PAGE 4-40)".

OTHER OPTIONAL METERS

The optional meters below are installed to the locations as shown at the right figure.

- Speedometer
- Ampere meter (ammeter)
- TORQFLOW transmission oil temperature gauge
- Coolant temperature gauge (when the lift truck is equipped with a digital load meter)



3.2.2 OPERATING DEVICES

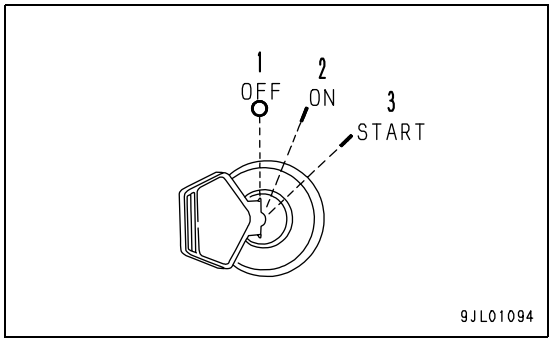
STARTING MOTOR SWITCH

This switch turns on and off the engine.

(1) [○] position : You can insert and pull out the starting switch key at the OFF position.

(2) [I] position : The electric circuits are switched on at the ON position.
For the diesel engine lift truck, preheating starts automatically with this position.

(3) [I] position : The starter begins to rotate to start-up the engine at the START position. When the engine has started up, release the engine starting switch key. The key automatically returns to the (2) position.



REMARK

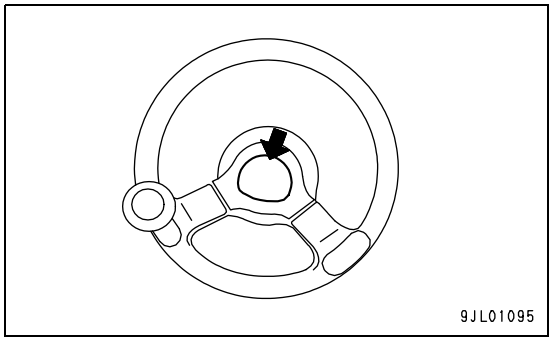
When restarting the engine by turning the Starter Switch to the [I] (START) position, return it to the [○] (OFF) position and then turn it to the [I] (START) position.

NOTICE

Do not leave the starting switch key in the [I] (ON) position while the engine is not running. The battery capacity goes down, making it difficult to start up the engine.

HORN SWITCH

Press the switch in the middle of the steering wheel to sound the horn.

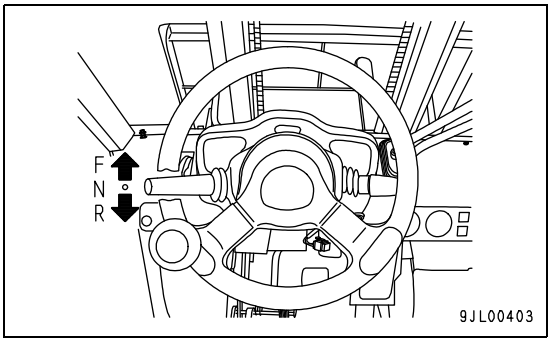


FORWARD/REVERSE LEVER (TORQFLOW TRANSMISSION LIFT TRUCK)

This lever acts to change the travel direction (forward/reverse) of the lift truck.

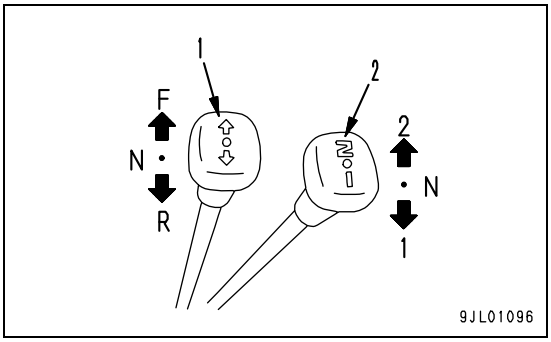
- ↑ : F (Forward)
- ● : N (Neutral)
- ↓ : R (Reverse)

The engine cannot be started if this lever is not at the [●] N (Neutral) position.



FORWARD/REVERSE LEVER, HIGH/LOW SPEED LEVER (CLUTCH TYPE LIFT TRUCK)

The forward/reverse lever (1) acts to change the travel direction (forward/reverse) of the lift truck, and the high/low speed lever (2) acts to change the speed gears of the lift truck.
The engine cannot be started if the forward/reverse lever (1) is not at the [●] N (Neutral) position.



Forward/reverse lever (1)

- ↑ : F (Forward)
- ● : N (Neutral)
- ↓ : R (Reverse)

High/low speed lever (2)

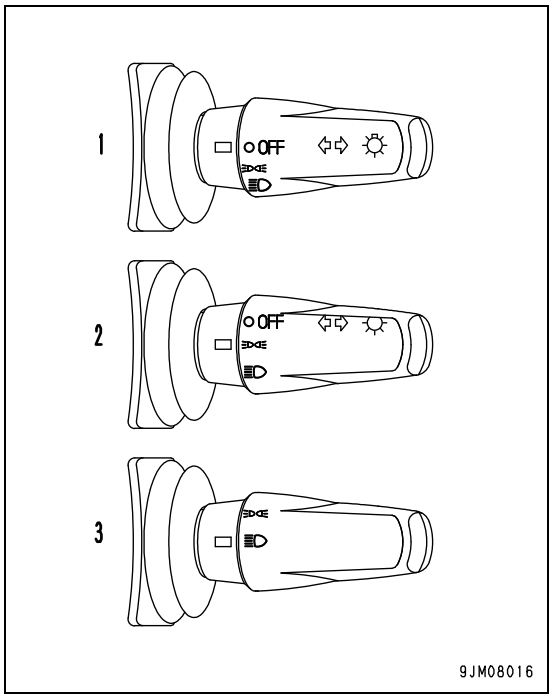
- 2 : High speed
- ● : N (Neutral)
- 1 : Low speed

REMARK

If you use an optional lever which employs different lever arrangement or control direction, check with the indication marks on the top of the lever knob before operation.

COMBINATION SWITCH (LIGHTING SWITCH/TURN SIGNAL SWITCH)

This lever incorporates the lighting switch and the turn signal switch.



LIGHTING SWITCH

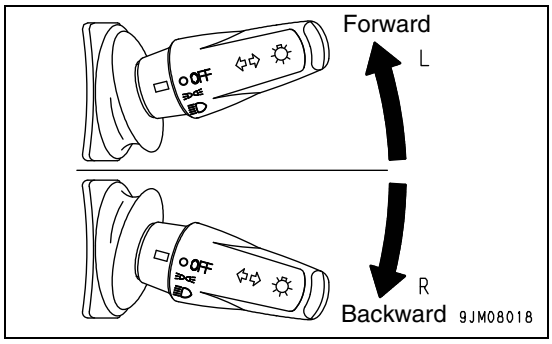
When turning the switch to the arrow marks, the lamps light up and go off as follows.

No.	Head lamp	Meter lamp, clearance lamp, and tail lamp
1	OFF	OFF
2	OFF	ON
3	ON	ON

TURN SIGNAL SWITCH

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

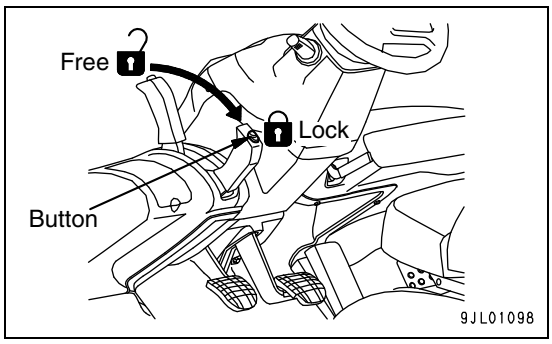
This lever will automatically return to the neutral position when the steering wheel is turned back.



PARKING BRAKE LEVER

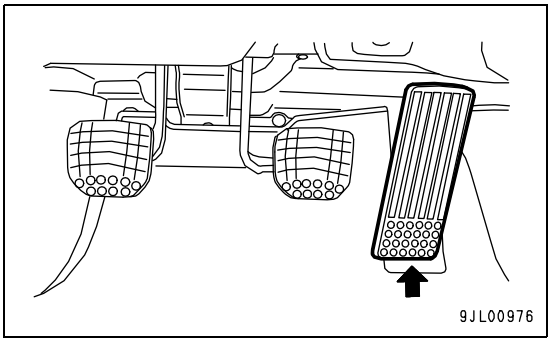
This lever is used to operate the parking brake.
Pulling back the parking lever fully (Lock position) will set the parking brake.
To release the parking brake, press and hold the button on top of the lever, and return the lever to the free position.

REMARK
A reminder buzzer sounds when the parking brake is not applied.



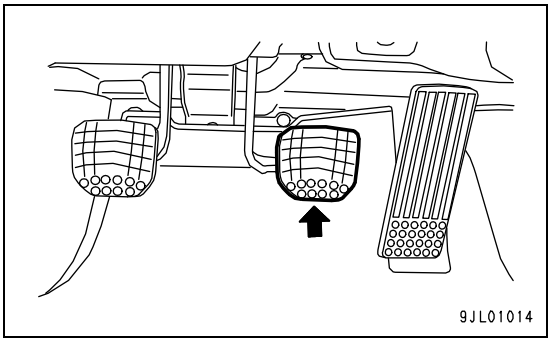
ACCELERATOR PEDAL

This pedal adjusts the engine speed.
The engine speed increases in response to the amount of the pedal depressed.



BRAKE PEDAL

This pedal is used to stop or decelerate traveling the lift truck.

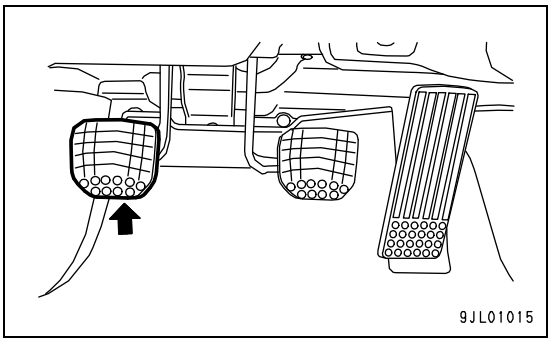


CLUTCH PEDAL (CLUTCH TYPE LIFT TRUCK)

This pedal is used when operating the forward/reverse lever or high/low speed lever.
Fully depress this pedal before operating the forward/reverse lever or high/low speed lever, and gently release the pedal upon completion of the lever operation.

INCHING PEDAL (TORQFLOW TRANSMISSION LIFT TRUCK)

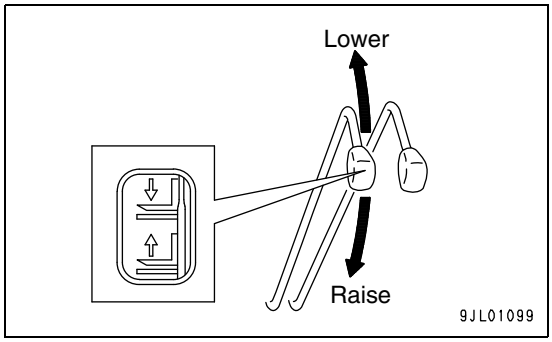
This pedal adjusts the travel speed during a very low speed travel such as for load handling operation.
Depressing this pedal slightly engages the clutch halfway, and the lift truck will crawl along. Further depressing this pedal applies the brake by working with the brake pedal. Depressing this pedal to the full disengages the clutch completely.



LIFT CONTROL LEVER

This is a lever to raise or lower the forks with.

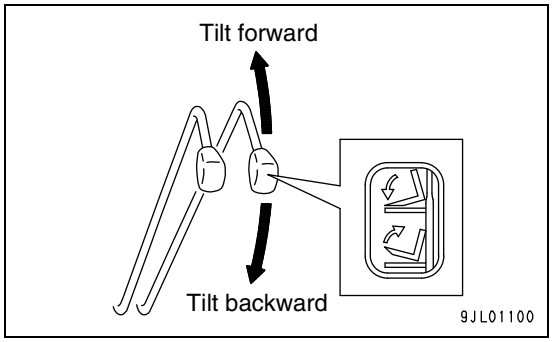
Raise : Pull the lever backward.
Lower : Push the lever forward.



TILT CONTROL LEVER

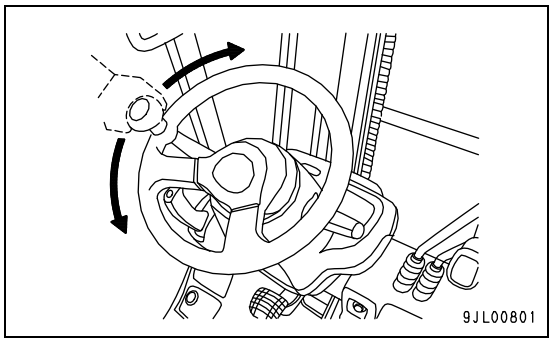
This lever tilts the mast back and forth.

Tilt forward : Push the lever forward.
Tilt backward : Pull the lever backward.



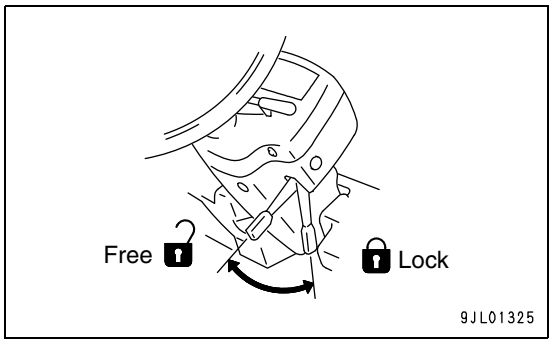
STEERING WHEEL AND STEERING WHEEL KNOB

- The steering wheel changes the direction of the lift truck to the right and left.
- Hold the knob on the steering wheel with your left hand for operation.



TILTABLE STEERING WHEEL LOCK LEVER

- This lever adjusts the tilt angle (up/down) of the steering wheel.
- Pulling this lever up adjusts the steering wheel tilt angle.Pushing the lever down locks the steering wheel.



3.2.3 REMOVING AND INSTALLATION OF ATTACHMENTS

SAFETY PRECAUTIONS

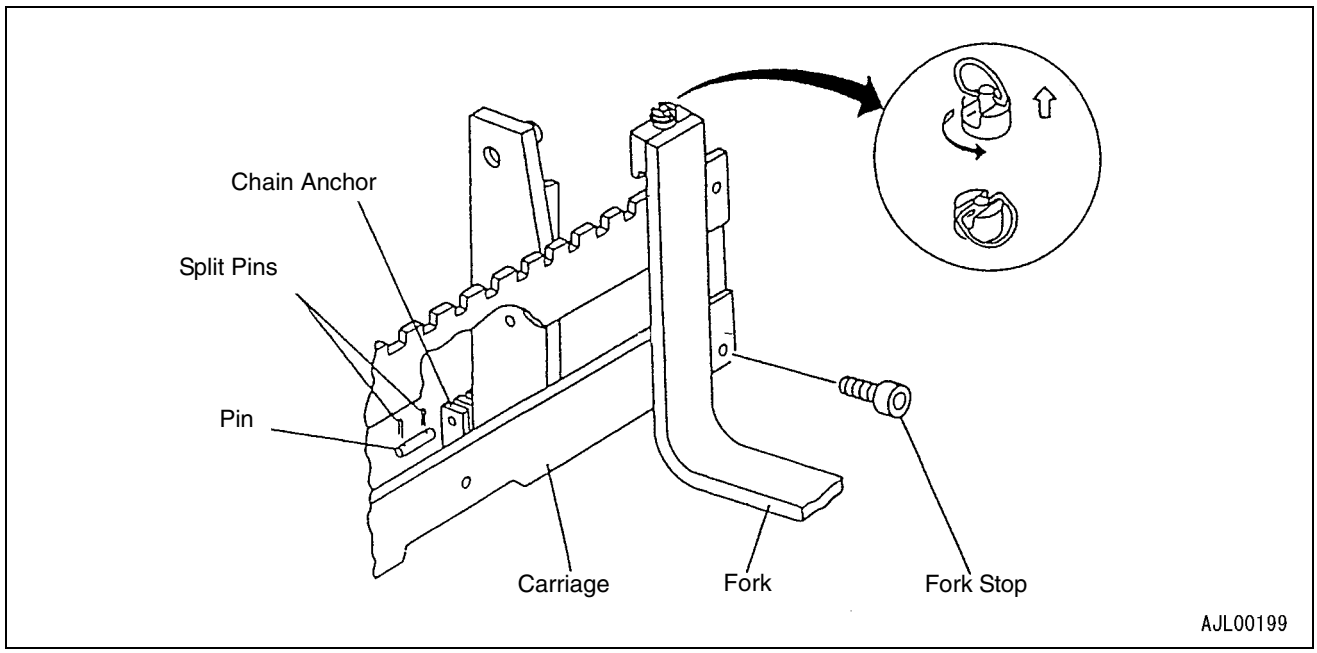
⚠ WARNING

The attachment(s) and major components are heavy and can cause serious injury if improperly handled.

1. When working underneath raised load-handling attachments, always secure them to prevent lowering. When working with lifting equipment (forklifts) never walk or reach under suspended loads. Use only load-bearing equipment that is in perfect condition (ropes, chains).
2. Secure the truck against accidental movement of truck of attachments when work is being carried out. When working underneath raised load-handling attachments, always secure them to prevent lowering.
3. When repairing or renewing hydraulic and electrical components all truck related setting values must be observed. Under no circumstances may the working speeds be altered (e. g. lift speed, side shift speed).
4. Personnel may not remain in any Danger Zone in which they are at risk due to movement of the truck, attachments or lift gear, or any Danger Zone into which descending or dislodged parts may fall.
5. Do not climb onto any part of the truck, which is in motion (e. g. mast, carriage, etc.).
6. No servicing should be carried out on the hydraulic system until the mast, carriage or relevant component has been suitably supported or restrained.

FORKS

1. Lower the carriage until the forks are resting on the ground and the lift chains are still taut.
2. Release the fork stopper.
   Move the forks toward center, fit the lower hook into the notch and remove the fork.
3. Replacement is the reverse of the removal procedure. Smear the fork hooks with grease and adjust the fork width to suit.



CARRIAGE

1. Lower the carriage until the forks are resting on the ground.

NOTICE

If a side shift carriage is fitted, disconnect the hydraulic hoses at the carriage, draining the fluid into a suitable container. Blank the opened connections to prevent ingress of foreign matter.

2. Disconnect the lift chains from the carriage and tie the ends of the chain to the outer mast upper cross member.
3. Raise the mast inner section under power until the bottom of the inner section clears the carriage top roller assemblies.
4. Ensure that the lift chains do not foul during raising.
5. Reverse the truck away from the carriage.
6. Replacement of the carriage is the reverse of the removal procedure. If a side shift carriage is fitted, operate to both extremes of travel several times to expel air from the system.

MAST

Prior to removal of the mast, detach the carriage and forks-refer to par. “FORKS“ and “CARRIAGE“ above. Remove the drive wheels (if required).

1. With the mast vertical, support the mast securely by attaching lifting tackle to the lifting eyes on the upper cross brace indicated by the crane hook label. Remove tilt cylinder to mast pivot pins.
2. Disconnect hydraulic pies from lift cylinders and blank off all open ends to prevent the ingress of foreign matter.

⚠ CAUTION

Residual oil will be discharged during disconnection.

3. Inclining the mast forward a little from its vertical position, remove the mounting cap bolts.
4. Reassemble is the reverse of the removal sequence, noting the following:
   1) Renew chain anchor split pins.
   2) Tighten to the correct torque, the mast locking bolts - refer to repair manual for torque figure.
   3) Lubricate all pivot pins.
   4) If any removal of components affecting tilt angles have been carried out, check and adjust tilt angles. Refer to the repair manual for further information.

⚠ WARNING

Ensure that all locking devices are engaged upon assembly of attachment.

INSTALLATION/ASSEMBLY OF SIDE SHIFT, FORK POSITIONER OR CLAMP ATTACHMENTS

The side shift, fork spreader and clamp attachments all have a common method of installation/assembly as follows:

1. Before installing, inspect the truck carriage to make sure that the locating notches along the top of the truck carriage are undamaged and that there are no obstructions on the faceplate itself.
2. Place the clamp into an upright position in preparation for mounting it on the truck.
3. Remove the lower mounting hooks from the back of the clamp frame.
4. Attach the two jumper hoses securely to the clamp's check valve before connecting them to the junction block on the truck carriage.
5. The open line on the top of the valve is the “clamp open“ circuit. The line on the side of the valve is “clamp close“ circuit.

6. If the hose junction block is located on the upper portion of the truck carriage, do not connect the jumper hoses to it until the clamp is mounted on the truck. Lay the hoses over the top of the frame. However, if the junction block is located on the lower portion or in the center opening of the carriage, and thus nearly inaccessible when the clamp is mounted, attach the jumper hoses securely before installing the unit.
7. Install the clamp on the truck. It may be lifted onto the truck or simply positioned on the floor (and blocked up under the frame and arms) or placed on a pallet so that the truck may be driven up and the truck carriage moved under the upper mounting hooks on the frame. Line up the locating lug on the clamp with the center notch on the truck carriage. (The carriage can be raised into the hooks at this point). Be careful not to pinch, twist, or otherwise damage the jumper hoses in mounting. After the unit has been placed on the truck, bolt the lower mounting hooks into position on the lower clamp frame, firmly securing it to the truck carriage.
8. Attach the hoses to the carriage junction block.
9. It is normal at this point to re-check the hoses from the truck valve to the clamp. Make sure that the hoses are routed correctly, and that all connections are tight. For best results, there should be as few 90 degree bends and other similar flow restrictions as possible in the hydraulic circuits. Check the mounting hooks to be certain that the clamp is solidly mounted to the truck carriage.
10. Start the truck. Operate the clamping function several times to remove any air trapped in the system. Before proceeding to the next step, check to make sure that the retaining nuts on the anchor and rod ends of each clamp cylinder are tight.
11. Adjust the rate of arm travel. When the clamp is correctly adjusted both arms should close together from full extension at the fastest possible speed and reach their minimum range at the same moment. The speed with which the arms close is controlled by two restrictor fittings, one located on each cylinder at the rod end.
    To equalize arm travel:
    1) Open both restrictor fittings completely by loosening the lock nut and backing out the threaded shaft. The restrictor is wide open when 1/2 inch of the shaft is exposed above the tightened lock nut. Opening the valves completely before making the adjustment is important, because the speed of clamp operation is directly affected by the degree of restriction in the lines. The fittings should be as wide open as possible with both arms operating at the same speed.
    2) Close the arms from their full extension, watching to see which one is closing most rapidly.
    3) Close the restrictor fitting on the cylinder controlling the faster arm until both arms are travelling at the same rate. The clamp will probably have to be opened and closed several times to make this adjustment accurately.
12. To complete installation, insert a hydraulic pressure gauge into the truck system's test port and adjust the pressure relief setting. Never exceed maximum operating pressure for this clamp.

REMOVAL OF SIDE SHIFT, FORK POSITIONER OR CLAMP ATTACHMENTS

Removal is the reverse of the installation/assembly sequence noting all the safety precautions in par.1.

⚠ WARNING

Ensure that all locking devices are engaged upon assembly of attachment.

3.3 OPERATION

3.3.1 START-UP INSPECTION

⚠ CAUTION

- **Do not operate the lift trucks before completing start-up inspection.**
- **Report abnormality, if any, immediately to the administrator. Never operate the lift truck in question until the repair is completed.**

For your safe operation, always make the start-up inspection.
For details about the start-up inspection and daily maintenance, see "4.2 START-UP INSPECTION (PAGE 4-2)".

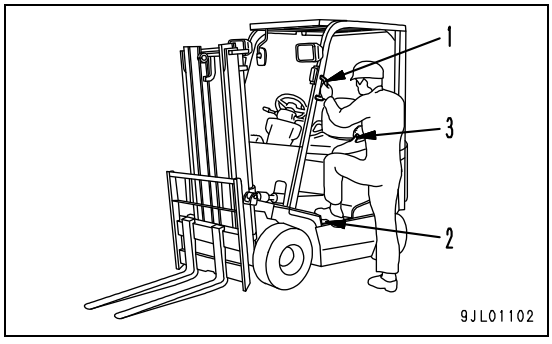
3.3.2 MOUNTING/DISMOUNTING AND OPERATING POSTURE ADJUSTMENT

MOUNTING/DISMOUNTING

⚠ CAUTION

- **Mount or dismount the lift truck only after the lift truck comes to a complete stop.**
- **Never jump on or off the lift truck. It is extremely dangerous.**
- **Do not hold on the control levers or steering wheel when mounting or dismounting the lift truck.**
- **Keep the handrails (assist grips) and step clean all the time, and repair the damage, if any.**
- **Do not use the handrails (assist grips) for any other purpose than mounting or dismounting the lift truck.**

- Always mount and dismount the lift truck from the left side.
- While mounting or dismounting the lift truck, always support yourself securely with your hands and feet at more than 3 locations; put your left foot on the step (2), grab the assist grip (1) with your left hand, and grab the backrest or hip support (3) of the seat with your right hand.



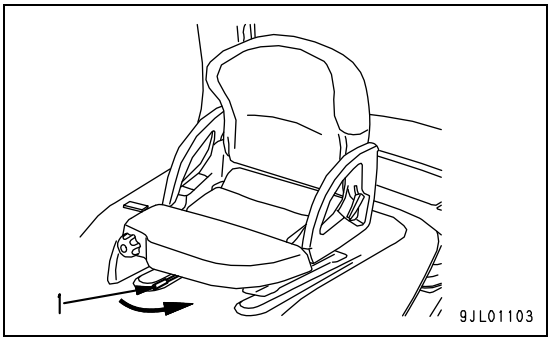
SEAT POSITION ADJUSTMENT

⚠ CAUTION

- **Adjust the seat position before getting on the lift truck, or at the time of operator change. (Adjust only when the lift truck is at a complete standstill.)**
- **Adjust the seat position so that you can fully depress the brake pedal while reclining yourself against the backrest.**

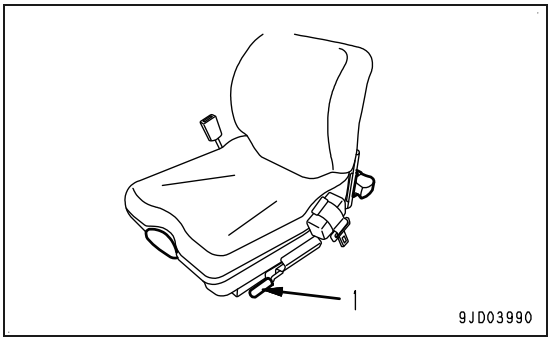
TYPE A

1. Park the lift truck. For details on parking, see "3.3.8 TEMPORARY STOPPING AND PARKING (PAGE 3-30)".
2. Take a seat and pull the lever (1) to the left. (The operator's seat can slide back and forth in this condition.)
3. Bring the operator's seat to the optimum position and release the lever (1).The seat is locked in this condition.
4. After adjusting the seat, check that it is firmly locked by pulling it forwards/backwards.



TYPE B

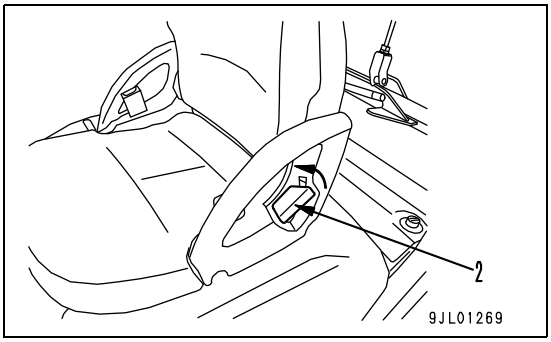
1. Park the lift truck. For details on parking, see "3.3.8 TEMPORARY STOPPING AND PARKING (PAGE 3-30)".
2. Take a seat and pull up lever (1).This will allow movement of the seat forward or back.
3. Bring the operator's seat to the optimum position and release the lever (1).The seat is locked in this condition
4. After adjusting the seat, check that it is firmly locked by pulling it forwards/backwards.



BACKREST ANGLE ADJUSTMENT

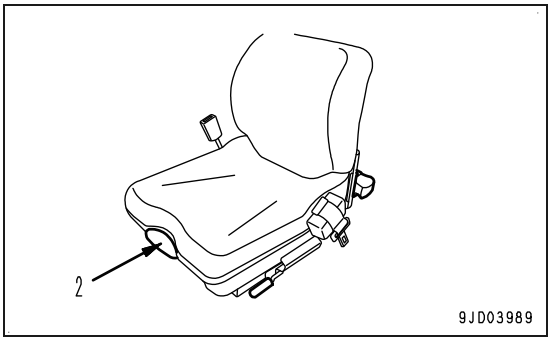
TYPE A

1. Pull up the lever (2). The backrest angle can be adjusted in this condition.
2. Adjust the backrest angle and release the lever (2). After adjusting the backrest, check that it is firmly locked by pushing and pulling it.



TYPE B

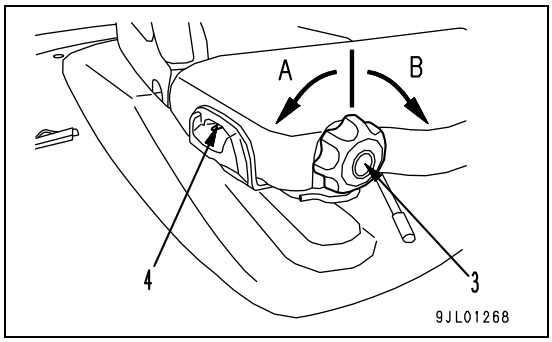
1. Pull up the lever (2). The backrest angle can be adjusted in this condition.
2. Adjust the backrest angle and release the lever (2). After adjusting the backrest, check that it is firmly locked by pushing and pulling it.



SUSPENSION ADJUSTMENT

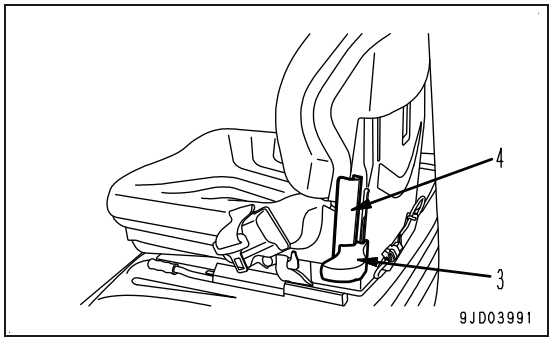
TYPE A

Turn the seat cushioning adjustment dial (3) located on the front right side of the operator's seat to select the scale to your weight (4) for suspension adjustment.
Turn the dial to the (A) side for lighter weight and to the (B) side for heavier weight.
Weight adjustable range: 50 to 120kg



TYPE B

Push the weight adjustment lever (3) at the rear left of the seat and set scale (4) to your weight.
If the lever is pushed, the scale is set to heavier weight. To set the scale to light weight, push the lever to the bottom once.
Weight adjustable range: 50 to 130 kg



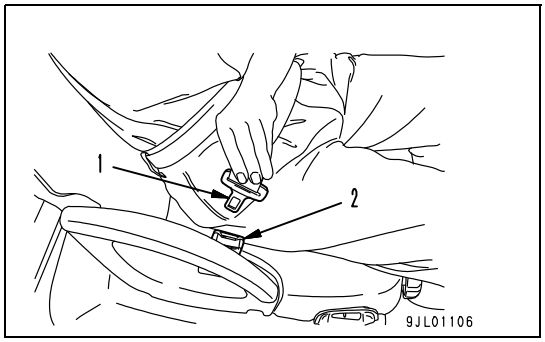
FASTENING AND UNFASTENING THE SEAT BELT

⚠ CAUTION

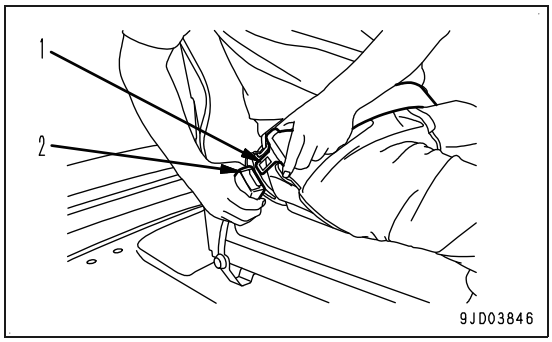
Always wear your seat belt during operations.

1. Pull the tongue (1) out of the belt holder located on the left side of the operator's seat and push it into the buckle (2) on the right until it clicks into place.The safety seat belt is locked in this condition.

TYPE A

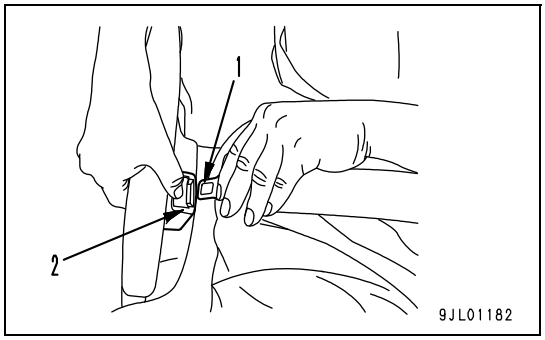


TYPE B

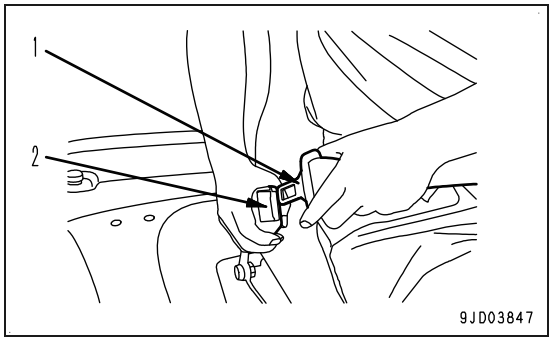


2. To unfasten, hold the belt with your left hand, and push down the red button of the buckle (2) with your right hand.
3. The belt is tucked into the holder automatically.
   While the belt is being tucked in, hold tongue (1) so that the belt is tucked in slowly.

TYPE A



TYPE B



OPERATION AND MAINTENANCE MANUAL STORAGE

OPERATOR´S SEAT BACK LITERATURE STORAGE AREA FOR THE OPERATION AND MAINTENANCE MANUAL

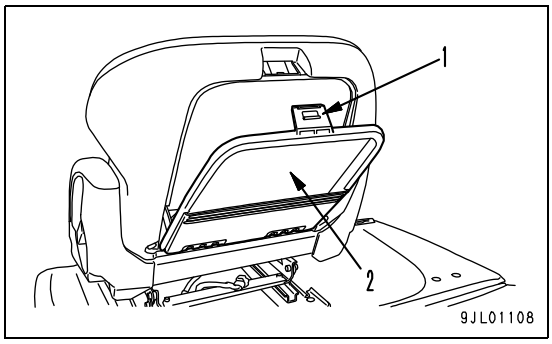
⚠ CAUTION

- **Store the Operation and Maintenance Manual in the literature storage area behind the operator's seat for ready reference.**
- **If this manual has been lost or has become dirty or worn and cannot be read, request for a replacement from your KOMATSU FORKLIFT distributor.**

TYPE A

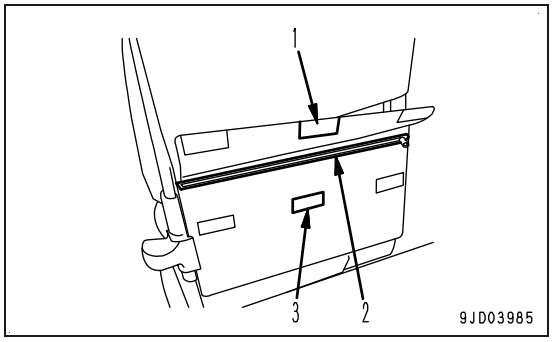
1. Push the unlock button (1) of the pocket behind the operator's seat backrest.
2. Open the pocket (2) backward to take out or store the Operation and Maintenance Manual.

An open-type magazine box is provided in the outer side of this storage. You are free to use this box for storing necessary documents, etc.



TYPE B

1. Peel off Velcro (1) of the upper cover of the literature storage area and open zipper (2)
2. Store or take out the Operation and Maintenance Manual.
3. Close zipper (2) and fasten upper Velcro (1) to lower Velcro (3).

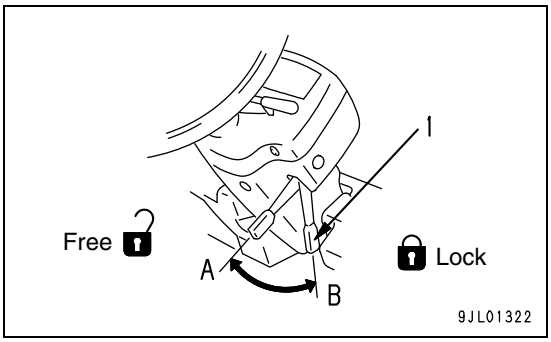


ADJUSTING STEERING WHEEL POSITION

⚠ CAUTION

- **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.**

1. Park the lift truck. For details on parking, see "3.3.8 TEMPORARY STOPPING AND PARKING (PAGE 3-30)".
2. Pull up the tiltable steering wheel lock lever (1) to the position (A).
3. Move the steering wheel back and forth to select the optimum position.
4. Push down the tiltable steering wheel lock lever (1) to the position (B) to lock the steering wheel.
5. After adjusting the steering wheel, check that it is firmly locked by pushing and pulling it.



3.3.3 STARTING, GEAR SHIFTING, AND TRAVELING

STARTING ENGINE

⚠ WARNING

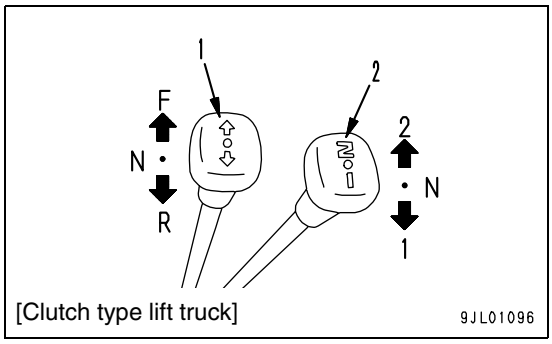
Do not attempt to start the engine by short-circuiting the engine starting circuit. Such a malpractice can cause a serious bodily injury and fire.

⚠ CAUTION

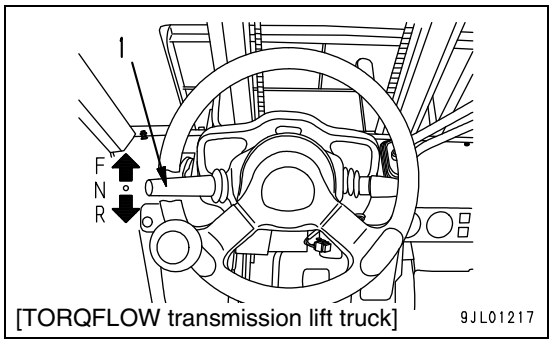
- **Start the engine only after sitting down in the operator's seat.**
- **Before starting the engine, move the forward/reverse lever and high/low speed lever (clutch type lift truck) to the neutral positions, and pull the parking brake lever in the direction to the rear of the lift truck.**
- **Exhaust gas is toxic. When starting engine indoor or in a poorly-ventilated site, take extreme care for ventilation.**
- **If you lean forward or sideways, or if you are not seated properly while operating the lift truck on an uphill, the system will cut off power to the engine and the lift truck may slither down, which can result in an accident or a crash.Maintain the correct right posture while traveling uphill.**

1. Move the forward/reverse lever and high/low speed lever to the N (neutral) positions.

REMARK
The engine does not start unless the forward/reverse lever is set in the N (neutral) position.

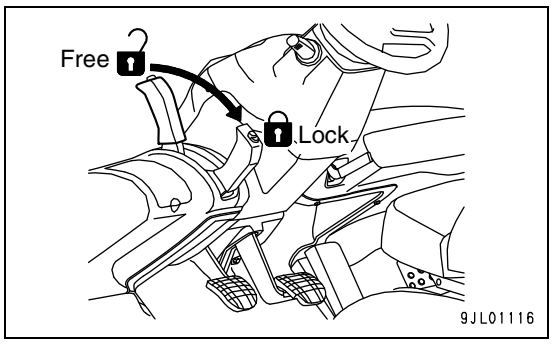


[Clutch type lift truck] 9JL01096



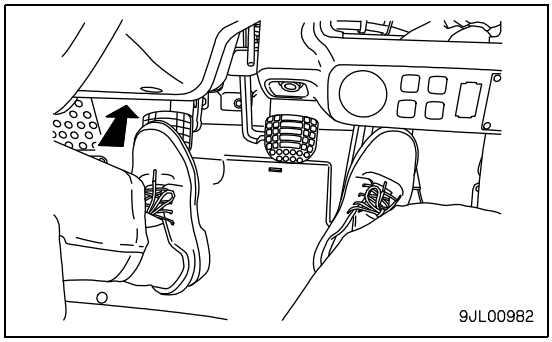
[TORQFLOW transmission lift truck] 9JL01217

2. Apply parking brake by pulling the lever to the rear direction of the lift truck. (Parking brake being applied)

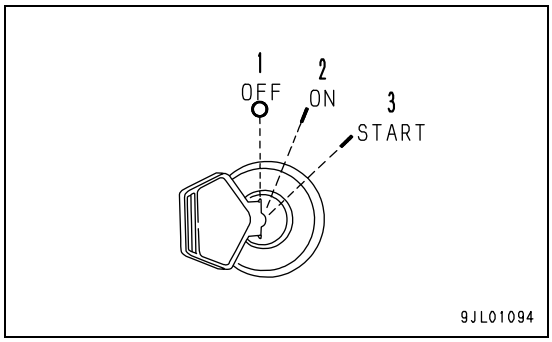


9JL01116

3. For the TORQFLOW transmission lift truck, depress the inching pedal.
   For the clutch type lift truck, fully depress the clutch pedal.



4. Starting Switch Operation
   - Gasoline engine
     Turn the starting switch key to the [I] (START) position (3) with the foot off the accelerator pedal. The engine will start up.
   - Diesel engine
     Turn the starting switch key to the [I] (ON) position (2). The glow indicator in the instrument panel lights up to indicate the engine preheating starts. The glow indicator goes off in 8 seconds (◎ refer to preheat time), telling that preheating has been finished.
     Turn the starting switch key to the [I] (START) position (3) with the accelerator pedal slightly depressed. The engine will start up.



◎Preheating time
The necessary preheating time varies depending on the ambient temperature and engine temperature. Use the followings as rough guide. If the engine is started while preheating, the preheating is terminated automatically.

12°C(53.6°F) : Preheating not required
0°C(32°F) : Several seconds
-20°C (-4°F) : 8 seconds

Starting the engine when ambient temperature is below -15°C (5°F)
When the ambient temperature is below -15°C (5°F), start the lift truck engine according to the following procedure.

(1)Turn the starting switch key to [I] (START) position (3) and rotate the engine for a maximum of approximately 20 seconds.
(2)If the engine does not start after approximately 20 seconds, return the starting switch to [○] (OFF) position (1). Wait for approximately one minute. Then, turn the starting switch key to [I] (START) position (3) again and rotate the engine for a maximum of approximately 20 seconds.
(3)If the engine still does not start, return the starting switch to [○] (OFF) position (1). Again, wait for approximately one minute. Then, start the engine for the third time.

When the engine has started up, release the engine starting switch key immediately.The key will automatically return to the [I](ON) position (2). Make sure the key is kept in this position while the engine is rotating.

5. Warm-up the engine.
   - Gasoline engine lift truck: The warming-up run is terminated automatically after the engine has warmed-up.
   - Diesel engine lift truck : Release the accelerator pedal and continue with a warming-up run for a while.

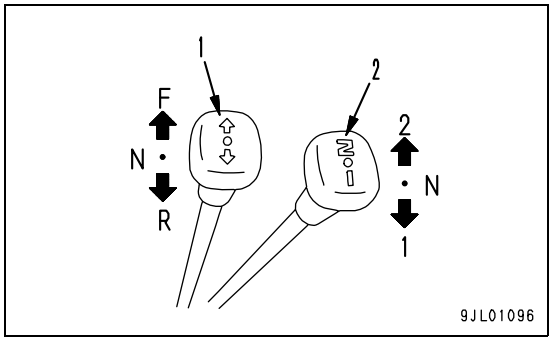
NOTICE

- **The starting switch key must be at the [○] (OFF) position (1) while the engine is not running. Do not leave the starting switch key in the [I] (ON) position (2). The battery capacity goes down, making it difficult to start up the engine.**
- **Limit the use of the starting motor within 10 seconds and do not let it run continuously beyond 10 seconds. (*)**
- **Wait for another 20 seconds before using the starting motor again. (*)**
- **Do not turn the starting switch key to the [I] (START) position (3) while the engine is running.**

*** : These rules do not apply to a diesel engine lift truck when ambient temperature is below -15°C (5°F).**

STARTING LIFT TRUCK OFF

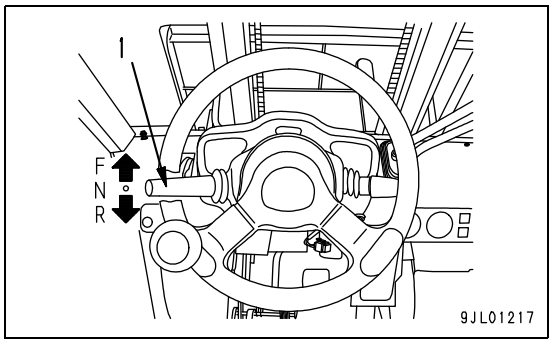
1. Carry out the following operations for each clutch type and TORQFLOW transmission lift truck.
   - Clutch type lift truck: Depress the clutch pedal fully, and move the forward/reverse lever (1) to the forward [↑] (F) or reverse [↓] (R) position and the high/low speed lever (2) to the [1] (Low) position.



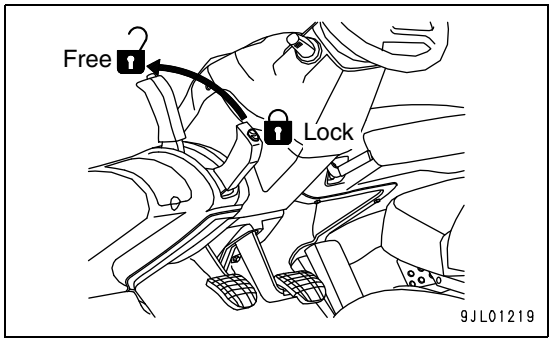
NOTICE

When operating the forward/reverse lever or high/low speed lever, be sure to fully depress the clutch pedal.

   - TORQFLOW transmission lift truck
     : Depress the inching pedal and move the forward/reverse lever to either the forward [↑] (F) or reverse [↓] (R) position.



2. Return the parking brake lever in the direction of the front of the lift truck to the free position. (Parking brake being released)

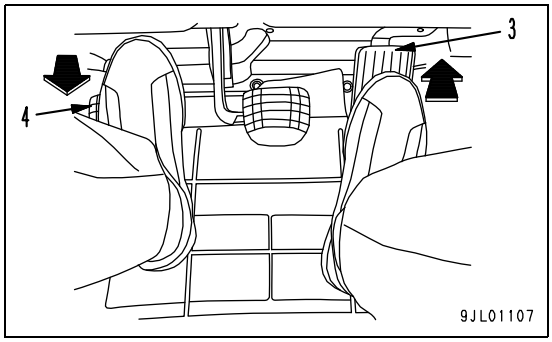


NOTICE

- **If you travel the lift truck with the parking brake lever pulled in the direction to the rear of the lift truck, the brake will overheat and the braking effect may be lost. Also it accelerates wear on the brakes.**
- **If you had traveled long distance with this condition, have your lift truck inspected by KOMATSU FORKLIFT distributor.**

3. Check that the direction of travel and the area around the lift truck are safe.

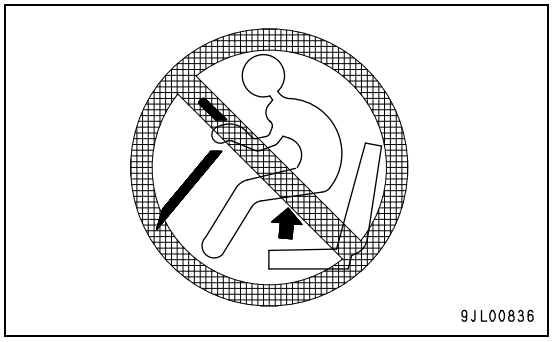
4. The lift truck will start up, if you release the clutch pedal (4) or inching pedal (4) slowly while gently depressing the accelerator pedal (3). Take your foot off the clutch pedal (4) or inching pedal (4) once the lift truck starts to move.



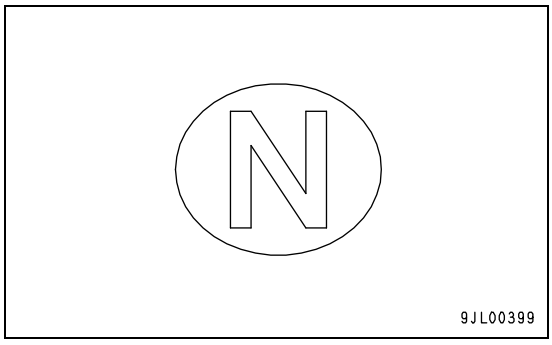
NOTICE
Do not rest the foot on the clutch pedal, inching pedal, or brake pedal except when so required.

TRAVEL INTERLOCK (ENGINE POWER CUTOFF)

- This safety device disables operation of the lift truck if you are seated in such a posture that your weight is not fully applied to the seat, like standing up or leaning forward or sideways. If you take such posture, the travel interlock activates in approx. three seconds and cuts off the transmission of engine power. Then the lift truck does not move any more even if you depress the accelerator pedal or operate the forward/reverse lever.

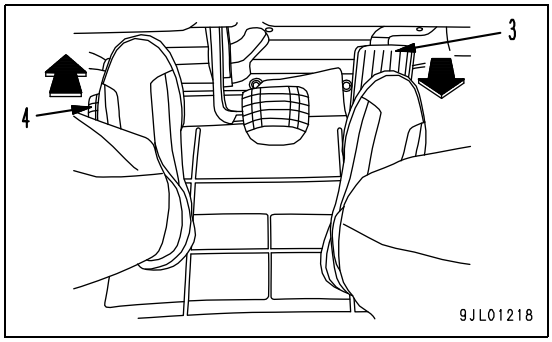


- While travel interlock is activated, the travel interlock warning lamp on the instrument panel flashes. (The lamp doubles as the neutral indicator lamp.)
- Return to travel condition: Seat yourself properly and return the forward/reverse lever to the N (neutral) position. Then the lift truck is ready for travel again. Take this step only after you check the surroundings for safety.
- This Traveling Interlock does not brake the lift truck forcibly.

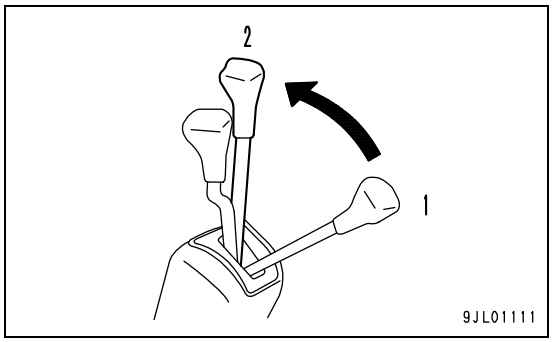


SHIFTING GEAR (CLUTCH TYPE LIFT TRUCK ONLY)

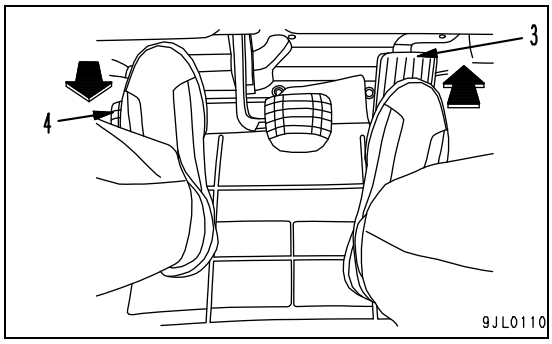
1. Release the accelerator pedal (3) and fully depress the clutch pedal (4) at the same time.



2. Move the high/low speed lever from [1] (Low) to [2] (High).

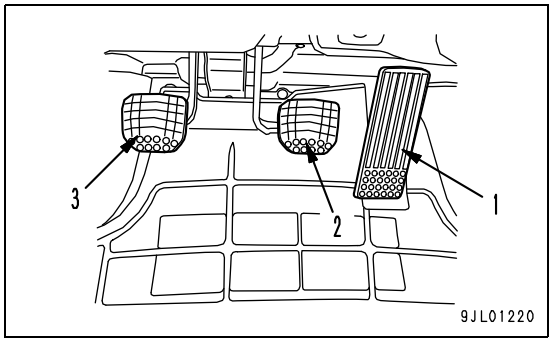


3. When the lever is set in position (the high gear meshes), gradually release the clutch pedal (4) while depressing the accelerator pedal (3).

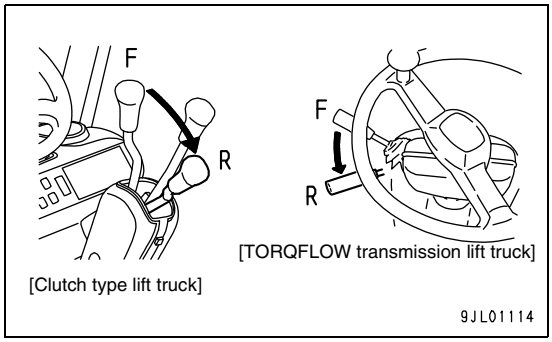


SHIFTING DIRECTION

1. Release the accelerator pedal (1), depress the brake pedal (2), then fully depress the clutch pedal (3) immediately before the lift truck stops.
2. After the lift truck stops completely, move the forward/reverse lever from the forward [↑] (F) to reverse [↓] (R) position or vise versa.
   For the clutch type lift truck, move the high/low speed lever to the [1] (Low).

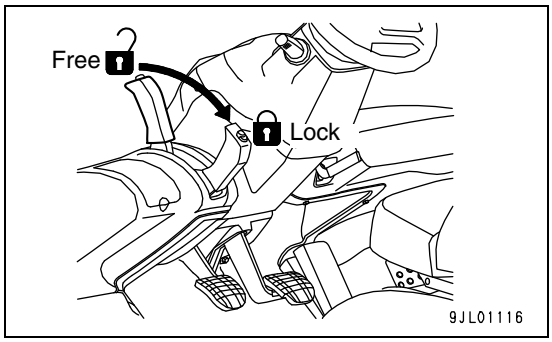


NOTICE
Shift the direction only after the lift truck stops completely.

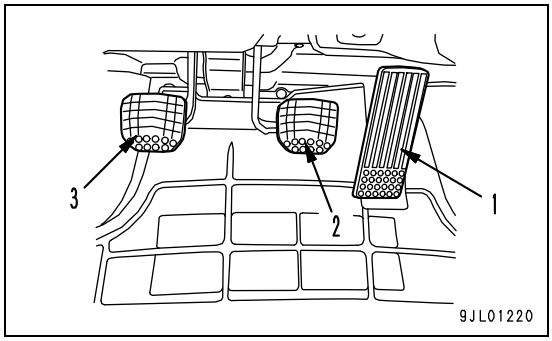


3.3.4 STARTING AND STOPPING ON SLOPE

1. When starting off the lift truck on an upslope, pull the parking brake lever in the direction to the rear of the truck. (Parking brake activated)
2. While gradually depressing accelerator pedal (1) (releasing the clutch pedal (3) in case of a clutch type), return the parking brake lever to the forward direction of the truck slowly, allowing the lift truck to climb up the slope. (Parking brake being released)



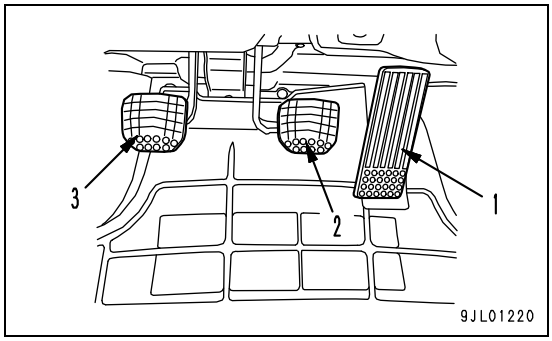
3. When the lift truck has gained some speed, release the parking brake lever completely. Climbing speed can be controlled by the amount of accelerator pedal (1) depressed.
4. When slowing down or stopping the lift truck on an upslope, release the accelerator pedal (1) gradually (depressing the clutch pedal (3) simultaneously in case of a clutch type) and depress the brake pedal (2) immediately before the lift truck stops.
5. After the lift truck stops completely, pull the parking brake lever to the rear direction of the lift truck. (Parking brake activated)



3.3.5 INCHING TRAVEL

⚠ CAUTION

Never carry out inching by depressing the accelerator pedal (1) and adjusting the amount the brake pedal (2) depressed.



Engaging the clutch halfway with the clutch pedal (3) or inching pedal (3) enables the lift truck to crawl along.

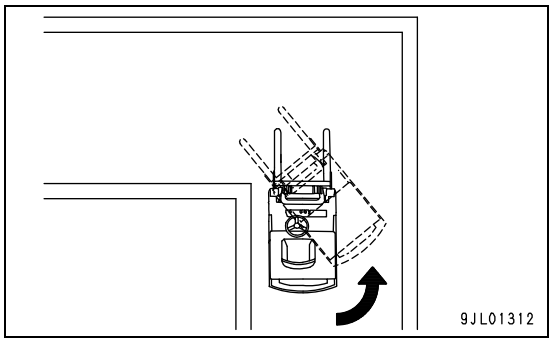
NOTICE

- **Traveling a long distance while the clutch is half engaged can cause damage to the lift truck, so limit such travel to the shortest time necessary (less than 10 seconds).**
- **Do not hold your foot rested on the clutch pedal (3) or inching pedal (3) while traveling. You may unintentionally engage the clutch half way, which can cause damage to the lift truck.**

3.3.6 TURNING

⚠ CAUTION

Take care to avoid the outside of the counterbalance-weight hitting against people and objects around when turning.



The forklift has rear steering wheels. When turning, keep to the inner side when advancing and outer side when reversing.

REMARK

- Turning the steering wheel with the lift truck stand still (stationary steering) will accelerate wear of the tyres.
- Turning the steering wheel as traveling low speed will help to reduce this problem.

3.3.7 OPERATION ON SNOWY AND FROZEN ROADS

⚠ CAUTION

- **Be aware that even tyre chains or snow tyres cannot prevent skidding completely.**
- **Tyre chains or snow tyres may not fit on some model.**

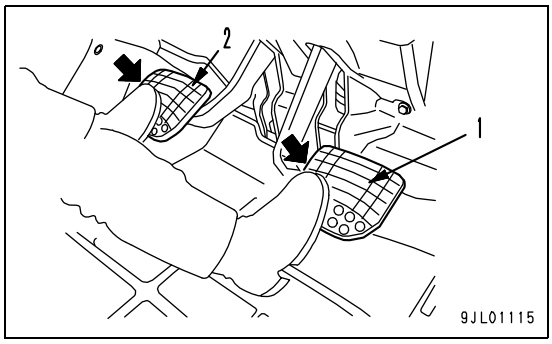
- Put on tyre chains or snow tyres when traveling on snowy or frozen roads.
- Avoid sudden braking, acceleration, or steering on snowy or frozen roads. Operate the accelerator carefully or skidding may result.

3.3.8 TEMPORARY STOPPING AND PARKING

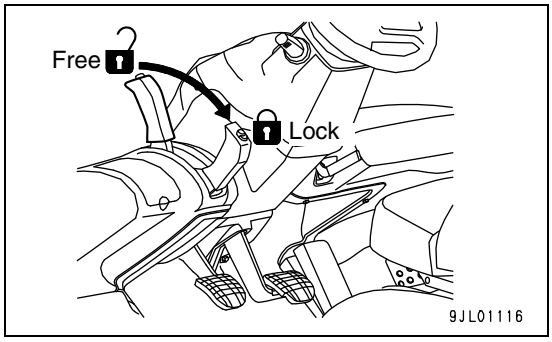
⚠ CAUTION

Select a parking area well away from the traffic areas.

1. Carry out the following operations for each clutch type and TORQFLOW transmission lift truck.
   - 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 comes to a stop, apply the parking brake by pulling the parking brake lever in the direction to the rear of the lift truck. (Parking brake activated)
   After it stops completely, move the forward/reverse lever and high/low speed lever (clutch type lift truck) to the N (neutral) positions.



REMARK

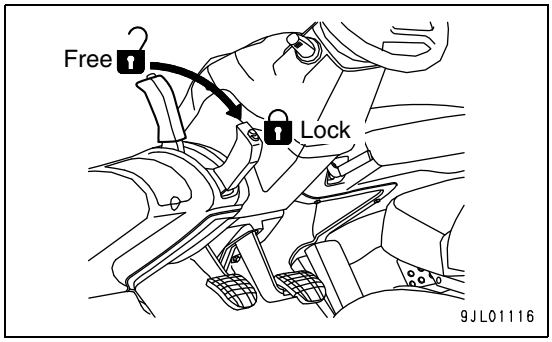
When the parking brake lever is in the Free position, and if you take a posture that your weight is not fully applied to the seat, e.g. leaving the operator's seat or leaning forward or sideways, the parking brake alarm buzzer begins to sound. When it does, take the following actions.

When leaving the lift truck: Pull the parking brake lever in the rear direction of the lift truck to the Lock position.

When continuing to operate the lift truck
: Seat yourself properly.

FOLLOW THE STEPS FOR PARKING

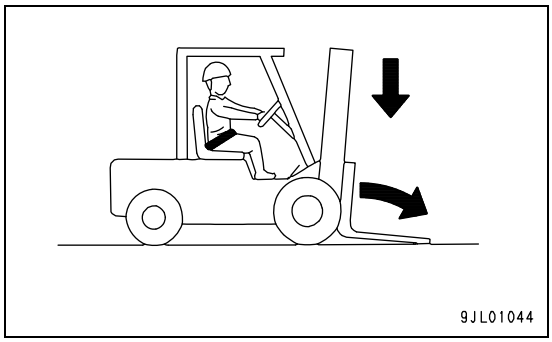
1. Stop the lift truck on level ground.
2. Pull the parking brake lever to the rear direction of the lift truck. (Parking brake activated)
3. Set the forward/reverse lever and high/low speed lever to N (neutral).



4. Tilt the mast forward and lower the forks to the floor.
5. Turn the starting switch key to the [○] (OFF) position.
6. Pull out the starting switch key and leave the lift truck.

REMARK

If you leave the lift truck without pulling the parking brake lever in the direction to the rear of the lift truck, an alarm buzzer will sound.



3.3.9 LOAD HANDLING OPERATION

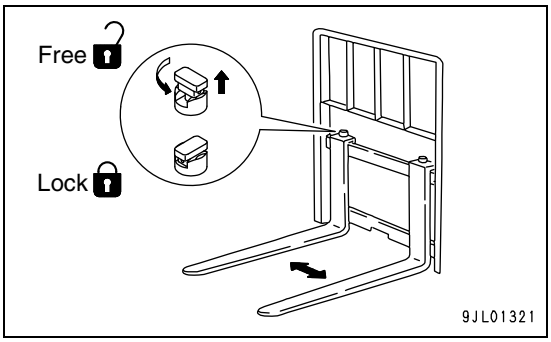
FORK SPREAD ADJUSTMENT

Before carrying out load handling, always adjust the space between the forks to fit the size of the pallets and loads.

⚠ CAUTION

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

1. Move the lift truck in front of the load, and stop.
2. Position the mast vertically and raise the forks 10 cm (4 in) above the ground.
3. Tilt the mast forward.
4. Pull up the knob of the fork stopper and turn it 90 degrees to the Free position. (In this condition, the forks can be moved to the left or right.)
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 vertical, turn the fork stopper 90 degrees and lower the knob to the Lock position. (In this condition, the forks are locked in position.)
7. After fork spread adjustment, check that the forks are secured with the fork stopper.
   If forks are not secured, there is the danger that the forks freely move sideways to let the load fall, while the lift truck is traveling.



OPERATION OF CONTROL LEVERS

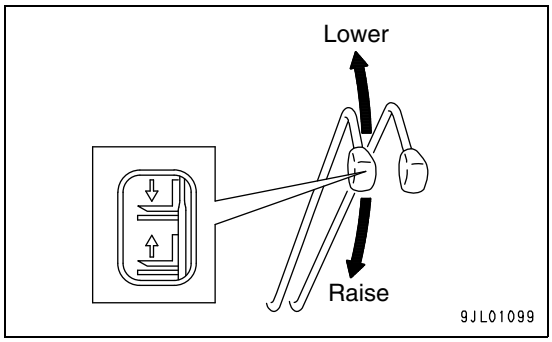
⚠ CAUTION

Sit in the operator's seat properly and check that the surrounding area is safe before operating the lift control lever.
Operating the lift truck when you are not seated properly or operating it from outside the operator's compartment can result in erroneous operation, and may result in serious injuries.

LIFT CONTROL LEVER

Raise : Pull the lever backward.
Lower: Push the lever forward.

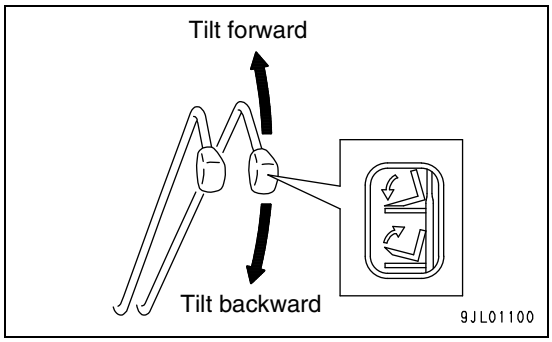
REMARK
A rising and lowering speed of the forks can be adjusted with the extent of lever tilting. Rising speed can also be adjusted by the degree of accelerator pedal depressed.



TILT CONTROL LEVER

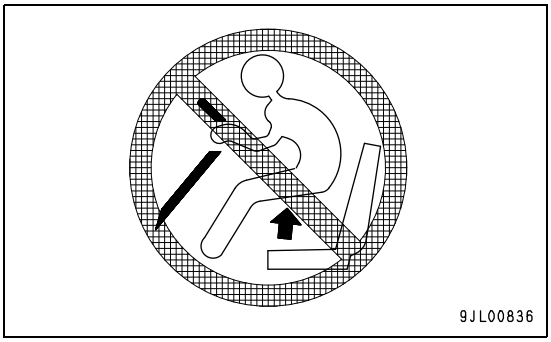
Tilt forward : Push the lever forward.
Tilt backward : Pull the lever backward.

REMARK
The forward and backward tilting speed of the forks can be adjusted with the extent of lever tilting and the degree of accelerator pedal depressed.

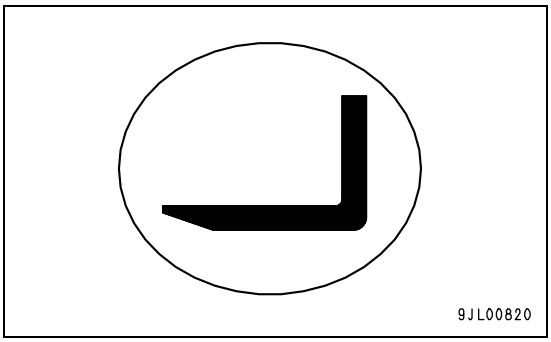


LIFT INTERLOCK

- If you operate the lift truck in such a posture that your weight is not fully applied to the seat, like standing up or leaning forward or sideways, the Load Handling Interlock activates in approx. three seconds. Then each motion of the fork and mast is locked and none of them moves any more even if you operate the lift control lever or the tilt control lever.



- While lift Interlock is in operation, the lift interlock warning lamp on the instrument panel flashes. (See the figure at right.)



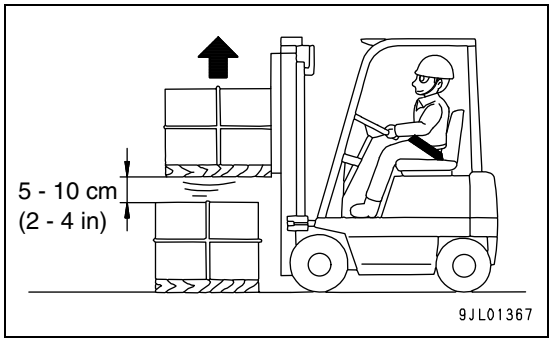
- Return to operation condition : When you seat yourself properly on the operator's seat, the lift truck is ready for load handling operation again. Start the load handling operation again only after you check the surroundings for safety.

PICKING UP

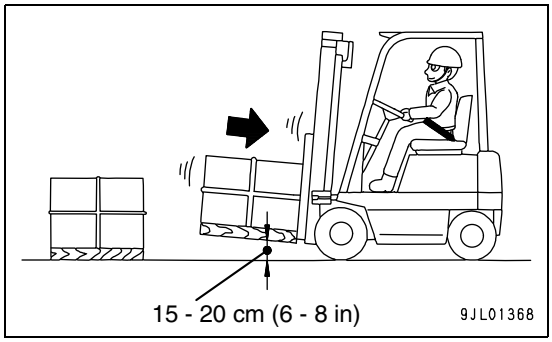
1. Insert the fork up to the bottom.
2. If the fork cannot be inserted up to the bottom at one go, drive the lift truck forward until the fork is inserted into a pallet by 2/3 to 3/4 of the fork length and lift the load by 5 - 10 cm (2 - 4 in).

   Then drive the lift truck backward by 10 - 20 cm (4 - 8 in), lower the load once and then drive the lift truck once again until the fork is inserted up to the bottom.

3. Raise the load 5 - 10 cm (2 - 4 in) and reverse the lift truck to a position where the load can be lowered.

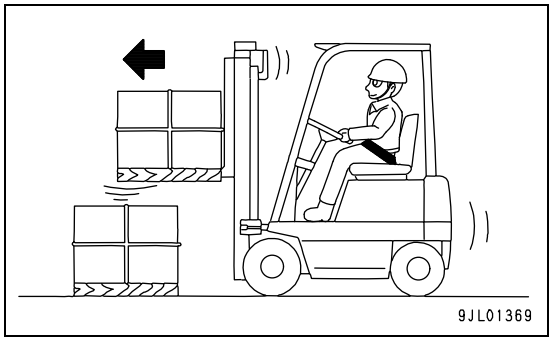


4. Lower the load to the height of 15 - 20 cm (6 - 8 in) above the ground and tilt the mast back.



STACKING

1. Stand the mast vertically and lift forks 5 - 10 cm (2 - 4 in) past the stacking position. Advance the lift truck slowly.
2. Lower the load once to the desired place.
3. Pull the fork out of the pallet.



3.3.10 CHECKING AFTER OPERATION

After all the above procedures have been finished and each part of the lift truck is cleaned, and before it is stored, carry out the following inspections.

1. Leakage of fuel, water, and battery electrolyte.
2. Cracks or damage.
3. Check faults found during operation and report them to the administrator. Be sure to place a sign or other notice identifying "Do Not Use". (if necessary)
4. Lubricate the units (if necessary)

For the procedure during cold weather, procedure with overheated engine, long-term storage, and loading and unloading of lift truck, refer to the followings:

- For the procedure during cold weather, see "4.6 RUNNING IN COLD WEATHER (PAGE 4-38)".
- For the procedure with overheated engine, see "4.7 ACTION IN ENGINE OVERHEATING (PAGE 4-40)".
- For the long-term storage, see "4.11 LONG-TERM STORAGE (PAGE 4-44)".
- For the loading and unloading of lift truck, see "4.13 LOADING AND UNLOADING OF LIFT TRUCK (PAGE 4-46)".

3.4 TRANSPORTATION

DIMENSIONS

For lift truck dimensions, refer to the Standard Specifications Sheet(s).

WEIGHTS

For lift truck weight refer to the Standard Specifications Sheet(s).

CENTRE OF GRAVITY

Refer to Figure 1. for the centre of gravity of the Front lift. For further information or regarding center of gravity, contract the manufacturer or trained manufacturer representative.

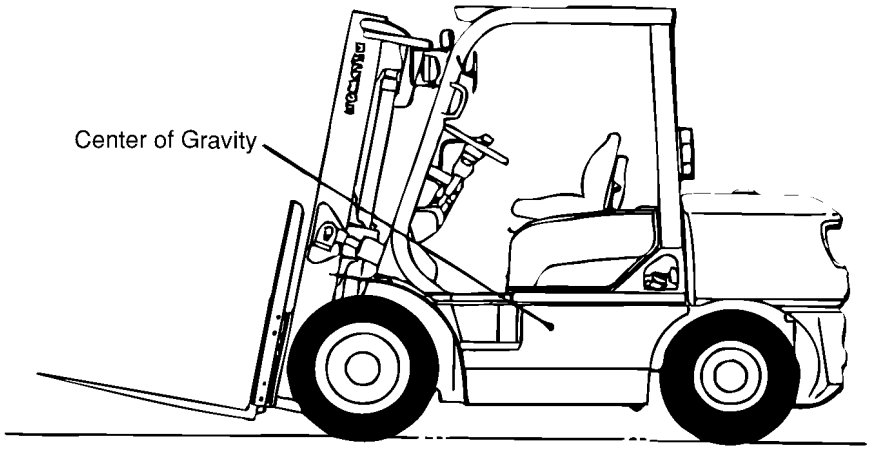


Figure 1. Center of Gravity

AJL00192

SECURING LIFT TRUCK

⚠ CAUTION

It is recommended that the transporting of the lift truck by road, rail or sea, may only be undertaken by an authorized transport company.

All truck being transported by road, rail, or sea have a common method of stowage, which reduces the possibility of damage to the truck and paintwork.

The chassis will be secured to the deck of the lorry, rail truck or ship by means of chains from the chassis lifting eyes to a convenient desk bolt. All four corners of the chassis will be secured, preferably with adjust screws, to ensure that the chains are in under tension, see Figure 2.

The chassis will be secured with the mast tilt in the fully back position.

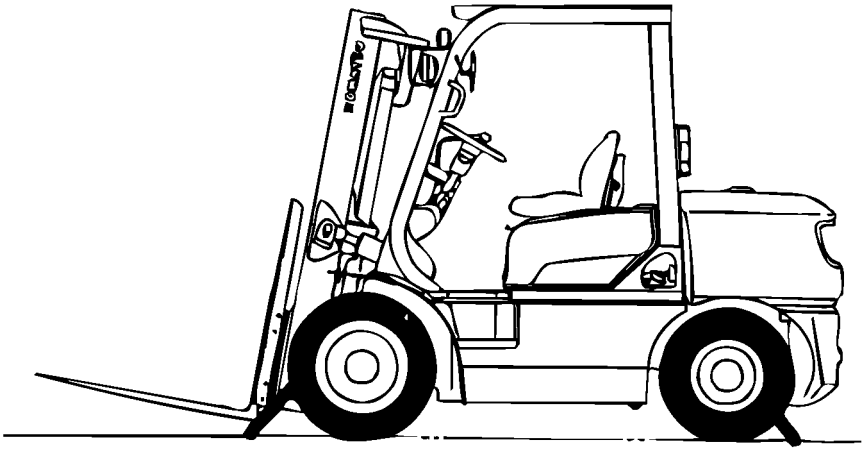


Figure 2. Securing chassis

AJL00193

SECURING OF MAST

Where lift truck are being transported with the mast fitted into the truck, no action is required. When it is necessary to remove the mast during transportation the following procedure will be undertaken:

1. Remove forks from carriage and action, as securing of forks below.
2. Remove mast and carriage assembly from truck.
3. Weld securing bar across bottom of mast and carriage, to prevent movement of mast and carriage assembly of where holes are available, fit bolt though masts and carriage, and retain with a nut-refer to Fig.3.
   Where possible, and in particular with high lift masts, the lift chain is to lightly banded to the lift cylinder, at not less than 1 meter intervals to ensure that the chain does not slap during transportation.
   Trick card of rubber is to be laid between the chain and the lift cylinder, and all around the cylinder where banding is taking place, to protect the paintwork.
   Where it is impracticable to retain the chain as above, the free end id to be wired to a suitable position, and care taken to ensure paintwork is not damaged during transportation.

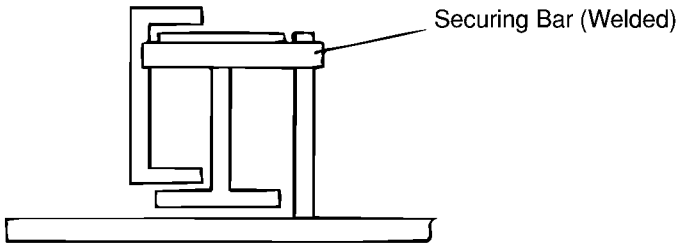


Figure 3. Securing Mast

AJL00194

NOTICE

Other than the welding specified Fig.3, no welding is to take place on the carriage and the mast channels.

SECURING FORKS

Each pair of forks will be securely bended together using banding material as show in Fig.4.

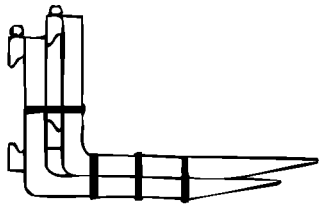


Figure 4. Forks

AJL00195

SECURING FORKS - MAST ASSEMBLY IN LIFT TRUCK

The forks having been handed together will be offered up to the mast/carriage assembly and laid on the fork stowage brackets which would have been previously hooked onto the carriage. The assembly will then be securely banded to the carriage, see Fig.5.

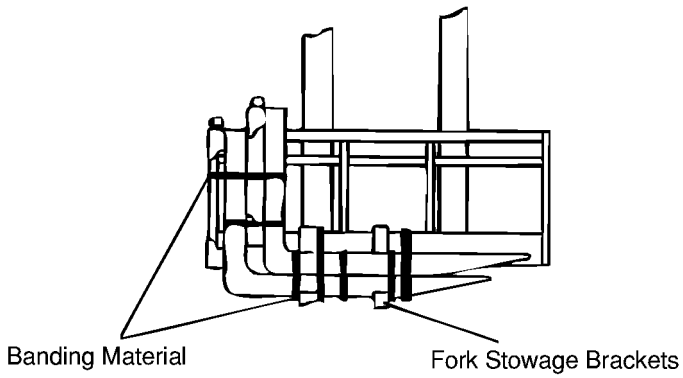


Figure 5. Securing Forks

AJL00196

SECURING FORKS - MAST ASSEMBLY OUT OF LIFT TRUCK

The forks having been banded together will be offered up to the mast/carriage assembly.
Banding material is passed under the mast channels and over the forks, and securely connected, see Fig.6.

NOTICE
When welding to any part of the assembled truck, ensure that the batteries and alternator are disconnected.

After welding has been completed, spray all bare metal and welding preservatives.

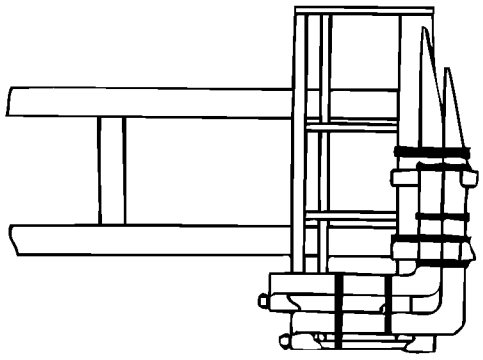


Figure 6. Securing Forks

AJL00197

ELECTRICAL AND HYDRAULIC CONNECTIONS

All electrical and hydraulic connections which are lift disconnected are to be plugged.

SLINGING

Some of the suitable lifting point for the lift truck are indicated by the crane hook label shown in figure seven; these lifting points are situated on the mast and counterbalance-weight.

For further information or advice regarding suitable lift for the truck contact the manufacturer or their authorized representative.

NOTICE

Ensure that all lifting tackle has a Safe Wiring Load (S.W.L) suitable for the truck unladed weight.

Before any lifting attempt is made, check that the mast is in the vertical position.

LIFTING THE LIFT TRUCK

Attach suitable lifting tackle to the lift trucks points.

1. Place packing material to avoid damage to truck finish, where lifting tackle is likely to contact track.
2. Take up the slack and stand clear of the truck.
3. Make a test lift, just clear of the ground, to ensure that the lift is square and even, if not lower to ground and adjust lifting tackle as required.
4. If the above are all correct then proceed with the lift of the truck to the required position, with slow and definite movements.
5. Lower to the required position and remove lifting tackle.

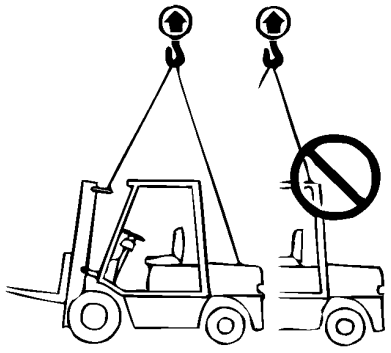


Figure 7. Crane Hook Label

9JL00175

INSPECTION AND MAINTENANCE

⚠ WARNING

Please be sure that you fully understand this manual and the precautions related to safety for the lift truck.
When inspecting or servicing the lift truck, always strictly follow these precautions. Failing to heed this warning may result in serious injuries.

4. INSPECTION AND MAINTENANCE

4.1 ABOUT INSPECTION AND MAINTENANCE

This inspection and maintenance manual describes start-up inspection mandatory for the operators and replenishment of oil, cleaning of air filters and other related simple maintenance work. For other inspection and maintenance items not described here, contact KOMATSU FORKLIFT distributor.
For your safe inspection and maintenance work, peruse "2.7 PRECAUTIONS FOR INSPECTION AND MAINTENANCE (PAGE 2-38)". Carry on inspection and maintenance service with care.

Incorrect maintenance and repair service may cause critical accident or shorten lift truck service life. Contact KOMATSU FORKLIFT distributor for maintenance and repair services.

4.2 START-UP INSPECTION

⚠ CAUTION

- **Do not operate the lift trucks before completing start-up inspection.**
- **Report abnormality, if any, immediately to the administrator. Never operate the lift truck in question until the repair is completed.**

OBLIGATION TO CONDUCT START-UP INSPECTION

- For your safe operation, always conduct a start-up inspection of the lift truck before starting operation for the day.
- Record and store the results of start-up inspection in the inspection record.

LIST OF START-UP CHECK POINTS

Item	Check points
-	Checking of repaired abnormalities detected on previous day
Walk around a lift truck	Leakage of oil, fuel, coolant and battery electrolyte
	Cracks, damages and the state of mounting (of overhead guard, fork, load backrest, etc.)
	Loose tilt cylinder rod lock nuts
	Contamination and/or damages of lamp, lens, etc.
	Contamination and/or damages of reflector and license number plate
	Loose hub nuts
	Deformed or damaged tyres and rims
	Inflation pressure of tyres
Open the engine hood	Hydraulic oil level
	Engine oil level and contamination
	Battery electrolyte level
	Coolant level
	Brake oil level
Sit on the operator seat	Damages and performance of seat belt
	Seat and handle adjustment
	Brake pedal play and height
	Inching and clutch pedal play and height
	Parking brake lever operating effort
	Horn performance
	Rear view mirror contamination, damages and angle
Turn the starting switch to ON position	Performance of warning lamps on the instrument panel (Check by turning the starter switch ON and OFF)
	Operation of lamps
	Fuel level
	Backup buzzer performance
Start the engine	Abnormal noise and vibration
	Exhaust gas color
	Play of steering wheel
Travel slowly	Operating state of steering wheel (runout and unstable driving)
	Brake operating condition (response)
	Inching and clutch pedal operating condition (letting out the clutch, slip, inching travel)
Operating load handling	Mast operating condition
	Tension, damages and rusted condition of lift chain
Checking of safety function	Travel interlock function (TORQFLOW transmission lift truck only)
	Lift interlock function
	Neutral safety function
	Overlooking application of parking brake, warning buzzer function

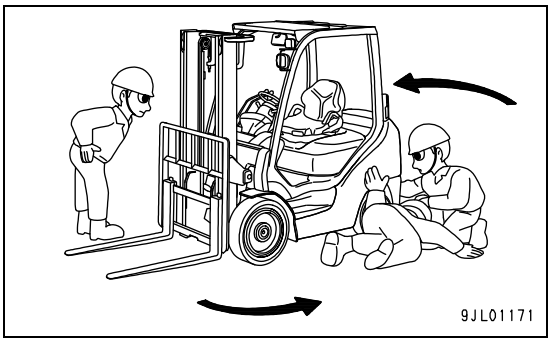
4.2.1 CHECKING ABNORMALITIES DETECTED ON THE PREVIOUS DAY

Check again the abnormal points detected during the operation and closing inspection on the preceding day. Double check that no abnormality persists to exist.

4.2.2 WALK AROUND A LIFT TRUCK

CHECKING FOR LEAKAGE OF FUEL, WATER, OR BATTERY ELECTROLYTE

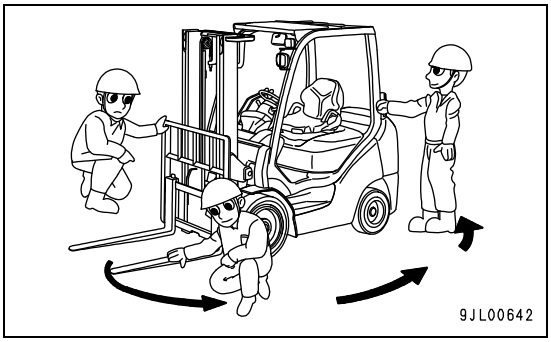
- Walk around the lift truck to check for leakage of oil, fuel, coolant and battery electrolyte.
- Look under the lift truck to check for oil or water leakage.



CHECKING OF CRACKS, DAMAGES AND THE STATE OF MOUNTING

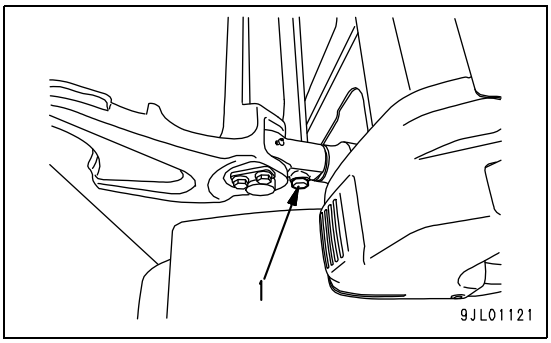
Visually check for any damages, cracks, loose mounting and/or play. Give priority in checking the following points particularly.

- Overhead guard
- Fork
- Load backrest
- Fork carriage
- Mast
- Fuel tank
- Hydraulic oil tank



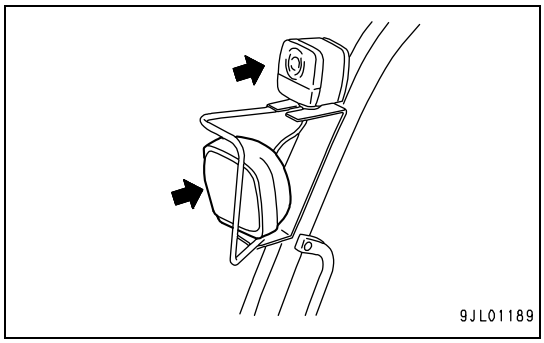
CHECKING OF LOOSE TILT CYLINDER ROD AND LOCK NUTS

Visually check if the tilt cylinder rod and the rod head are rotating in loose condition or if the lock nut (1) is loosened.



CONTAMINATION AND/OR DAMAGES OF LAMP, LENS, ETC

Visually check lamp, lens, etc. for any contamination and/or damages.



CHECKING OF CONTAMINATION AND/OR DAMAGES OF REFLECTOR

Visually check the reflector for any contamination and/or damages.

CHECKING OF LOOSE HUB NUTS

Check for loose hub nuts by tightening them with a wrench.

NOTICE
Tighten the hub nuts to the specified torque.
For the right tightening torque, see "4.16 SERVICE DATA (PAGE 4-54)".

CHECKING OF TYRES AND RIMS

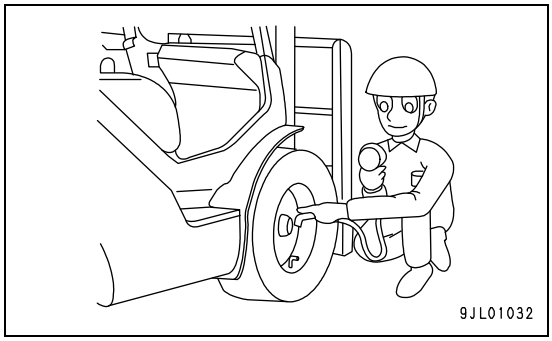
- Visually check for any excessive wear, damages, spikes and other foreign matters stuck to the tyres, deformation and damages of the rims.
- Replace a tyre if the tread depth becomes under 5 mm (0.2 in) or if the slip sign (wear limit mark) should appear.

CHECKING OF INFLATION PRESSURE OF TYRES

⚠ CAUTION

Tyres have high pressure air inside. When checking the inflation pressure, position yourself to face the tyre tread surface (see the figure at right) while holding the tyre air gauge firmly.

Check the tyre inflation pressure with the tyre air gauge and adjust it to specified pressure. For the right tyre inflation pressure, see "4.16 SERVICE DATA (PAGE 4-54)".



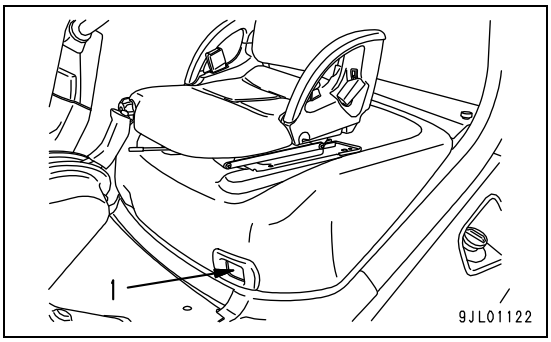
4.2.3 INSPECTION BY OPENING THE ENGINE HOOD

⚠ CAUTION

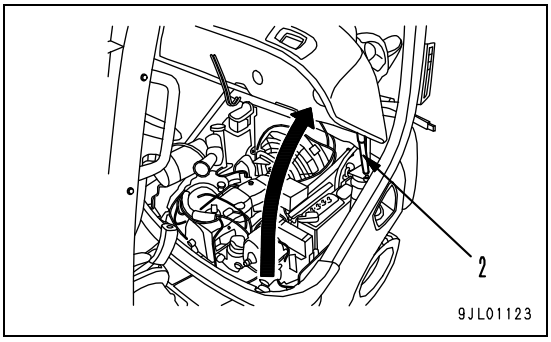
- **Before opening the engine hood, always stop the engine.**
- **Be careful not to have hand caught when opening/closing the engine hood.**
- **Only the authorized people are allowed to open the engine hood.**

HOW TO OPEN THE ENGINE HOOD

1. Push up lever (1) on the front left side of the engine hood to unlock the hood.

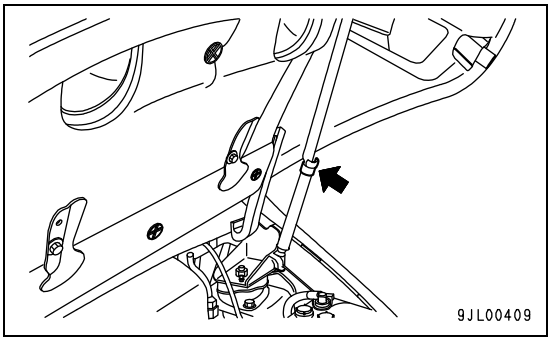


2. Push up the engine hood until red stopper (2) of the engine hood supporting stay is set.



HOW TO CLOSE THE ENGINE HOOD

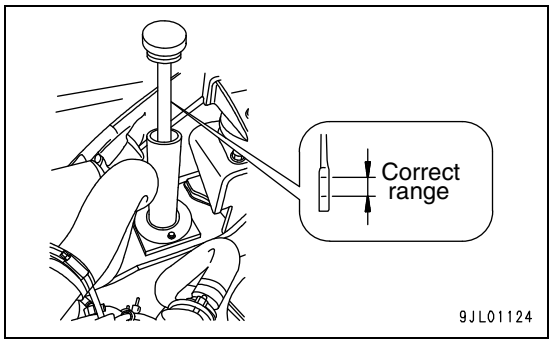
- Press in the red stopper of supporting stay (by the portion stamped "PRESS") to the arrow direction (backward), while closing the engine hood slowly with other hand.
- Check that the engine hood is closed completely and locked.



CHECKING OF OIL LEVEL IN HYDRAULIC TANK

Check if hydraulic oil is filled to the specified level.

1. Lower the forks fully to the floor and hold the mast vertical on a flat site.
2. Withdraw the oil gauge (integrated with the breather) on the R.H. side of the lift truck body. Wipe hydraulic oil off the oil gauge with a clean cloth and insert the gauge into the tank.
3. Pull out the oil level gauge again and check that the stuck oil is within the normal range.
4. When hydraulic oil is low, replenish it. If the oil is spilt, wipe it off completely.

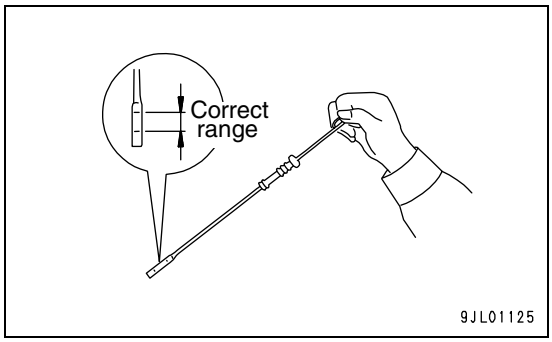


NOTICE

Always use Komatsu Genuine Hydraulic oil.

CHECKING THE ENGINE OIL LEVEL IN THE OIL PAN

1. Check if the engine oil is within the normal range.
2. Withdraw the oil gauge. Wipe hydraulic oil off the oil gauge with a clean cloth and insert the gauge back into the tank.
3. Pull out the oil level gauge again and check that the stuck oil is within the normal range.
4. When hydraulic oil is low, replenish it. If the oil is spilt, wipe it off completely.



NOTICE

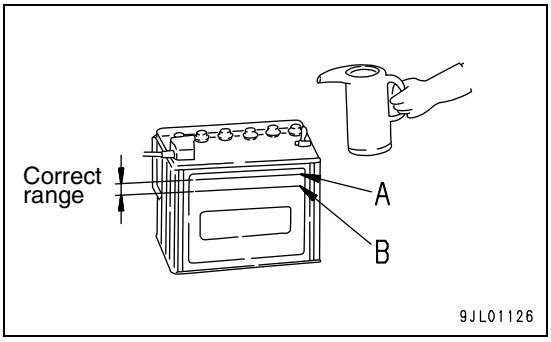
- **When the engine oil is considerably contaminated or has been discolored, replace with new oil.**
- **Always use Komatsu Genuine Engine oil.**

CHECKING OF BATTERY ELECTROLYTE LEVEL

⚠ CAUTION

Batteries generate flammable hydrogen gas and may explode. Battery electrolyte also contains dilute sulfuric acid. Handling error may cause personal injuries, explosions and fires. Strictly follow the "2.7.14 CAUTION WHEN HANDLING BATTERY (PAGE 2-42)".

- Check whether the battery electrolyte level is within the normal range between the upper limit line (A) and lower limit line (B). If the level is low, refill it with distilled water until the level reaches the upper limit line (A).
- Always keep the breather and terminal of the battery cap on the top of the battery clean with no dust attachment.



NOTICE

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

CHECKING OF COOLANT LEVEL

⚠ CAUTION

Do not open the radiator cap immediately after the engine stops, since the coolant temperature is very high. Steam or boiling water may spurt out, causing burns. After the coolant temperature has gone down, turn the cap slowly to release the pressure before removing it.

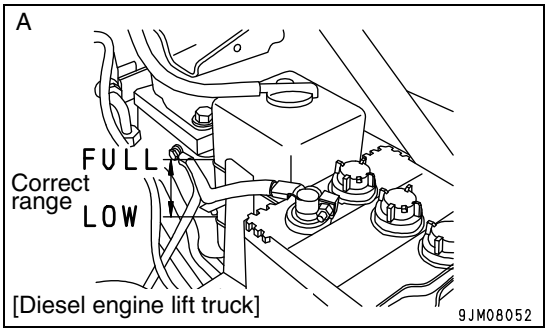
1. Check whether the coolant level is within the normal range, i.e. between FULL and LOW when the coolant in the radiator reservoir tank in the engine hood is in a cooled state.

REMARK

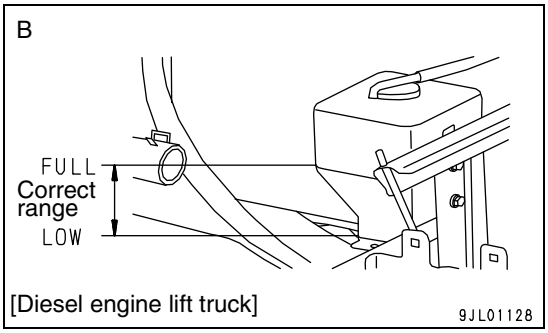
These instructions apply to the following diesel engine lift trucks (see illustrations at right).

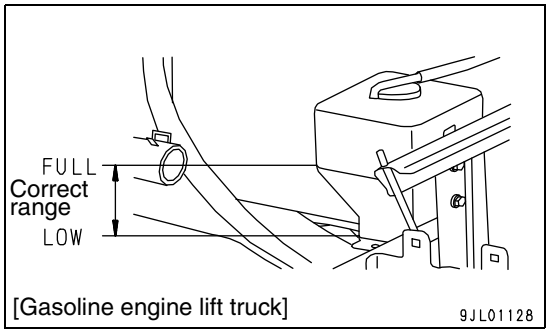
A : FD20/FD20H/FD25/FD25H/FD30/FD30H/FD35A-17

B : FD10/FD15/18-21



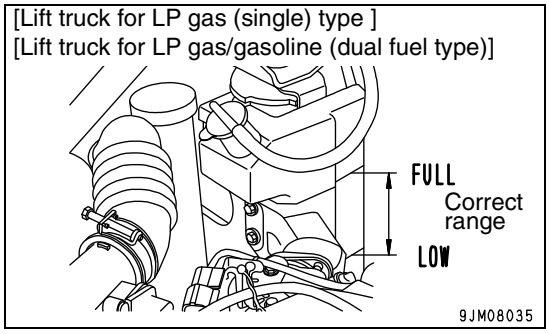
2. If not in normal range, refill coolant to FULL position.
3. Check the radiator and radiator hose for any water leakage.





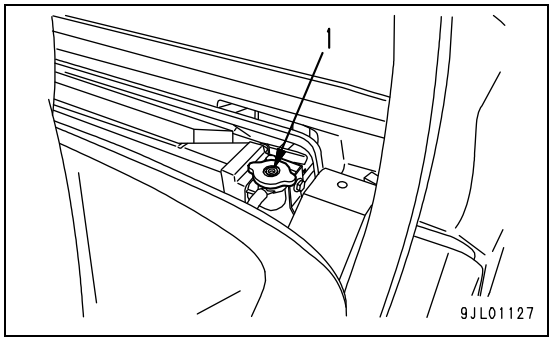
[Gasoline engine lift truck]

[Lift truck for LP gas (single) type]
[Lift truck for LP gas/gasoline (dual fuel type)]



4. When the cooling water in the sub-tank is all gone, open radiator cap (1) to refill the radiator tank and sub-tank with coolant.

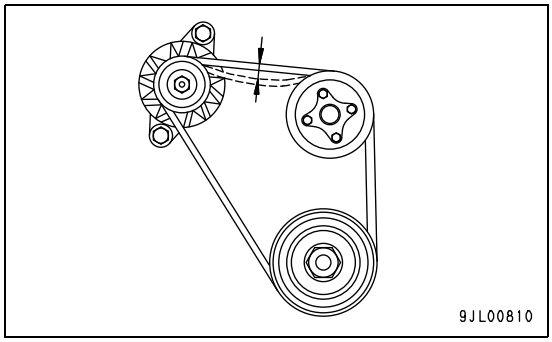
REMARK
Radiator cap (1) is on the left side of the diesel engine lift truck and on the right side of the gasoline engine lift truck.



CHECK DEFLECTION OF V-BELT

For the inspection of V belt tension, depress the belt center with force of 98 N (10 kgf).
For the inspection of V belt deflection, refer to "4.16 SERVICE DATA (PAGE 4-54)".

NOTICE
Replace the belt if the belt is stretched and there is no allowance for adjustment, or if the belt is cut or cracked.
Contact your KOMATSU FORKLIFT distributor for the replacement of belts.

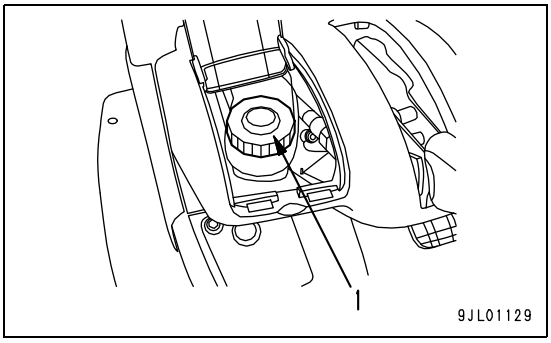


CHECKING OF OIL LEVEL IN THE BRAKE RESERVOIR TANK

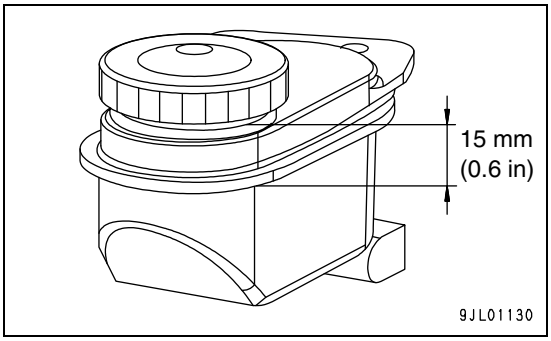
⚠ WARNING

Using wrong brake fluid causes leakage to disable braking function.Always use specified brake fluid (non-mineral oil brake fluid for vehicles).

1. Open the cover on the top left end of the dashboard to locate brake reservoir tank (1).



2. Check if the fluid level is within the normal range of up to 15 mm (0.6 in) from the under side of the cap. If the brake fluid is low, remove the cap and refill the fluid to the upper limit of the normal range.



NOTICE

When replenishing brake fluid, be careful not to allow sands and dirt to enter the brake reservoir tank.

4.2.4 CHECKING FROM THE OPERATOR SEAT

CHECKING OF SEAT BELT

Upon sitting on the operator seat, first check the seat belt.

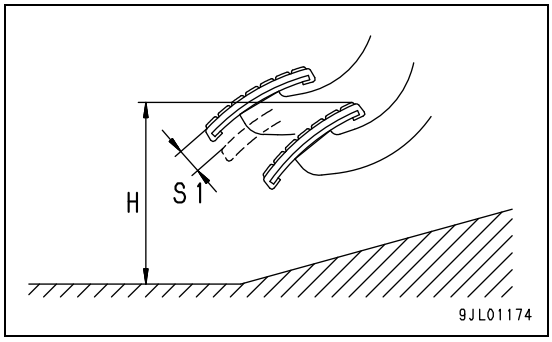
- Check the seat belt webbing and buckle, etc. are free from damage, wear or fray.
- Does the belt come out and retract smoothly? Does the fitting lock and unlock without abnormality?
- Does the belt lock when pull suddenly?

CHECKING THE SEAT AND STEERING WHEEL POSITION

Upon sitting on the operator seat, check if the pedals, levers and switches can be operated smoothly. For the position of the seat and steering wheel, see the section for "SEAT POSITION ADJUSTMENT (PAGE 3-18)" and "ADJUSTING STEERING WHEEL POSITION (PAGE 3-22)".

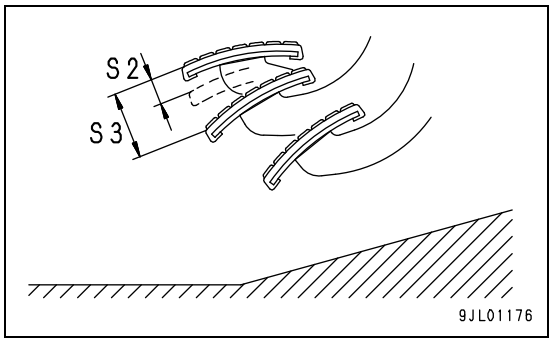
CHECKING THE BRAKE PEDAL

Check the brake pedal for correct application effort, play and for correct dimensions of the pedal height. For the standard values of the play (S1) and pedal height dimensions during braking effort (H), see the "4.16 SERVICE DATA (PAGE 4-54)".



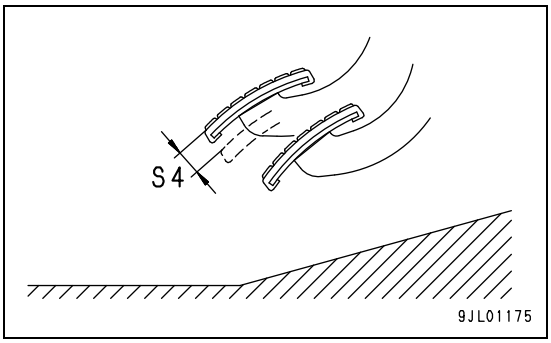
CHECKING THE INCHING PEDAL (TORQFLOW TRANSMISSION LIFT TRUCK)

Check the brake pedal for correct application effort, play and for correct interlocked stroke with the brake pedal. For the standard values of the play (S2) and the interlocked stroke dimension (S3), see the "4.16 SERVICE DATA (PAGE 4-54)".



CHECKING THE CLUTCH PEDAL (CLUTCH TYPE LIFT TRUCK)

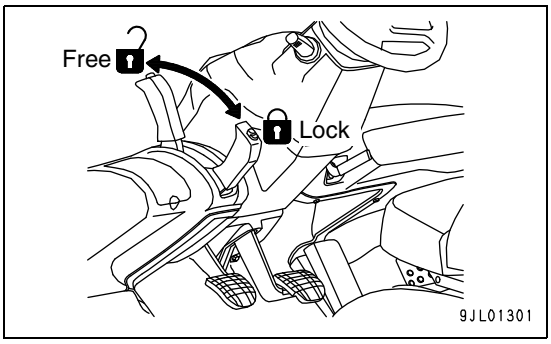
Check the clutch pedal for correct application and play dimension with the clutch pedal. For the standard value for the clutch pedal play dimension (S4), see "4.16 SERVICE DATA (PAGE 4-54)".



CHECKING THE PARKING BRAKE LEVER

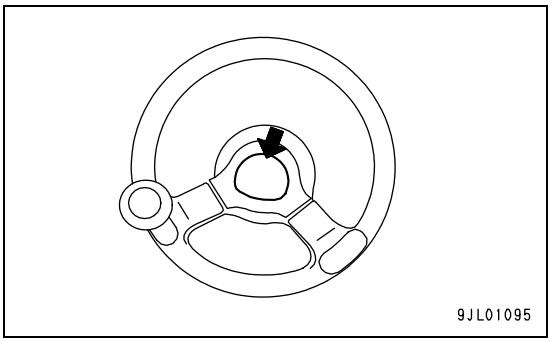
Check if the parking brake lever can be pull back fully toward the rear of lift truck. Also check if the parking brake lever returns fully and smoothly when released toward the front of the lift truck. For the standard value of the lever operating effort, see "4.4.5 ADJUSTING PARKING BRAKE LEVER OPERATING EFFORT (PAGE 4-32)".

NOTICE
If the value of the lever operating effort is not within the standard range, contact your KOMATSU FORKLIFT distributor for repair.



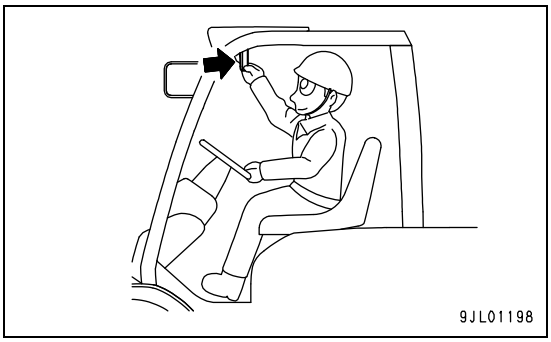
CHECKING THE HORN

Check if the horn sounds normally when switched ON.



CHECKING THE REARVIEW MIRROR (OPTION)

Check if the mirror is set at an easy angle for the operator to see the rear. Also check for any contamination or damages.



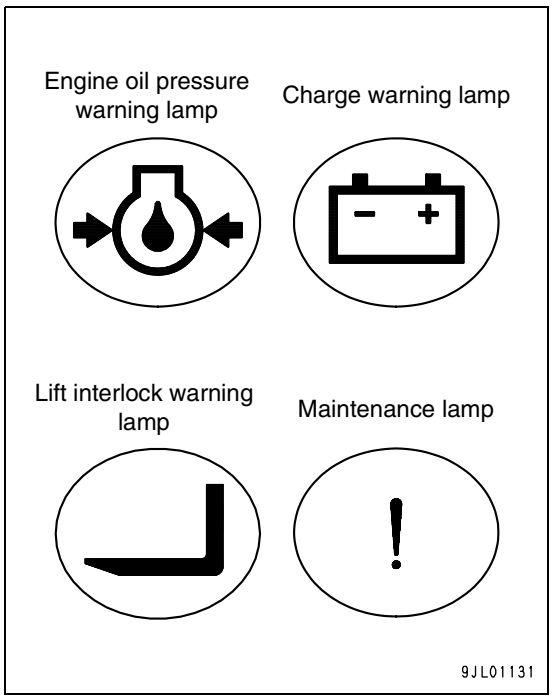
4.2.5 CHECK BY SETTING THE STARTER SWITCH TO [I] (ON) POSITION

CHECKING PERFORMANCE OF WARNING LAMPS ON THE INSTRUMENT PANEL

Check that the following lamps are ON when the starter switch is set to the [I] (ON) position: engine oil pressure warning, charge warning, load handling interlock indicator and the safety control system abnormality warning.

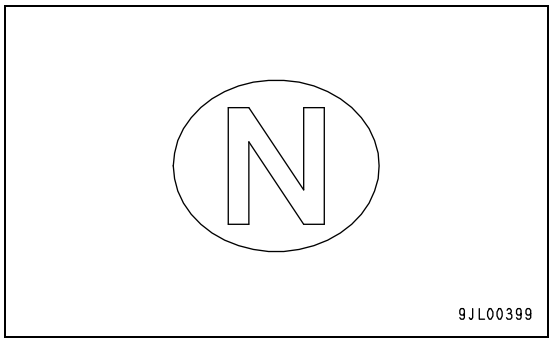
REMARK

Lift interlock warning lamp will flash if the operator fails to sit on the seat correctly. For more details on the function of load handling interlocking, see "LIFT INTERLOCK (PAGE 3-34)".



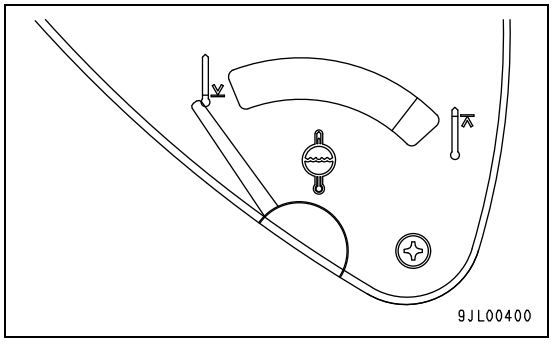
NEUTRAL INDICATOR LAMP

The neutral indicator lamp is functioning normally when it lights up as the starter switch is set to the [I] (ON) position, and goes off when forward/reverse lever is set to forward (F) or rear (R).



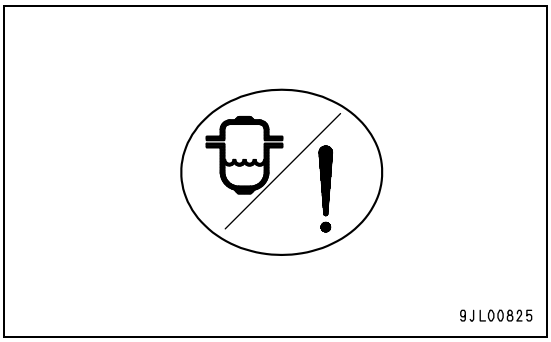
COOLANT TEMPERATURE GAUGE

The pointer points to the left when the engine is cold, and points at the white range when warmed up.



SEDIMENTER WARNING LAMP (ALSO FUNCTION AS A FAILURE INDICATOR) (DIESEL ENGINE LIFT TRUCK)

- This lamp is functioning normally when it lights up when the engine starting switch key is turned to the [I] (ON) position, and goes off after the engine startup.
- If the lamp remains lit after the engine starts, drain water from the fuel filter. For the draining of fuel filter, see Section "4.4.3 FUEL FILTER WATER DRAINING AND AIR BLEEDING (DIESEL ENGINE LIFT TRUCK) (PAGE 4-29)".



CHECKING OPERATION OF LAMPS

- Check if the head lamps, clearance lamps, turn signal lamps, brake lamps and backup lamp work normally.

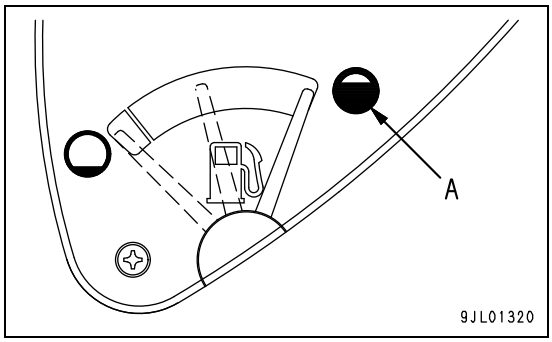
CHECKING OF FUEL TANK LEVEL AND REPLENISHMENT

⚠ CAUTION

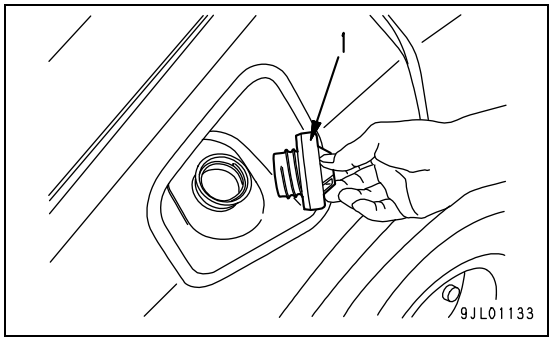
- **Before refilling fuel, always stop the engine and keep fire away.**
- **When refilling fuel, never let the fuel overflow. This may cause a fire. If the fuel is spilt, wipe it off completely.**

Check the fuel gauge to see if the fuel tank contains enough fuel for the day's work.

- When fuel level gauge needle points to (A), the fuel tank is full.
- If the fuel level is low, stop the engine and refill fuel from the fuel filler port. For the type of fuel, see "LUBRICANT LIST (PAGE 4-27)".



- When refilling, remove dirt in and around the filler port cap (1) to prevent the dirt from entering the fuel tank.
- After refilling, tighten the filler port cap (1) securely and wipe off spilt fuel without fail.



NOTICE

Using kerosene-mixed fuel with a diesel engine lift truck results in early degradation of the fuel injection system. Never use kerosene-mixed fuel with the diesel engine lift truck.

REMARK

The following indicate approximate fuel capacity when the fuel gauge needle points at the center of the scale

Model	Center (ℓ)	Full (ℓ)
1 - 1.75 ton	24	40
2 - 3.5 ton	34	58
2 - 3 ton (Compact model)	24	40

Compact model : FG20N - 30N - 17

CHECKING BACKUP BUZZER PERFORMANCE

⚠ CAUTION

Check the backup buzzer performance under the following conditions

- **For TORQFLOW transmission lift trucks, pull the parking brake lever in the direction to the rear of the lift truck and step on the inching pedal.**
- **For clutch type lift trucks, pull the parking brake lever in the direction to the rear of the lift truck and step on the clutch pedal after setting the high/low speed lever to the neutral position.**

Check that the backup buzzer sounds when the forward/reverse lever is set to the REVERSE position.

4.2.6 CHECKING WITH THE ENGINE STARTED

⚠ CAUTION

Exhaust gas is toxic. When starting engine indoors or in a poorly-ventilated site, take extreme care for ventilation.

CHECKING THE GOING OFF OF WARNING LAMPS ON THE INSTRUMENT PANEL

- Check that the warning lamps on the instrument panel go off immediately upon starting the engine.
- Engine pressure warning lamp may goes off with slight time lag, which does not mean a failure.

CHECKING ABNORMAL NOISE AND VIBRATION

Check in particular that there is no abnormal noise or abnormal vibration from the engine or hydraulic pump.

CHECKING ENGINE EXHAUST GAS COLOR

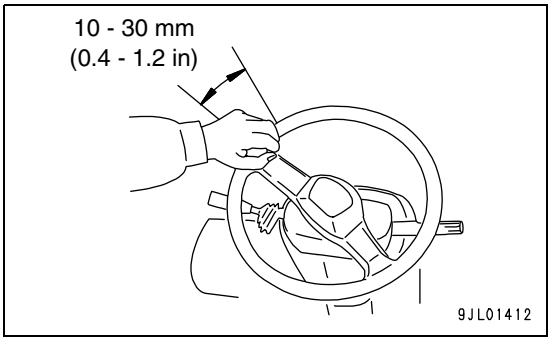
Check if the color of exhaust gas is not in black or white.

REMARK

- For diesel engines, some black or white exhaust gas may be emitted immediately after the engine start, which is not abnormal.
- Black or white exhaust may be caused by the following:
  Black: Incomplete combustion
  White: Engine oil scraped up or scraped down

CHECK THE STEERING WHEEL FOR PLAY

- Check the play of steering handle by operating it in the direction of a turn. Play should be normal if within 10 - 30 mm (0.4 - 1.2 in).
- Check if it is free of looseness by shaking it in the vertical and longitudinal directions.



4.2.7 CHECKING WHILE TRAVELING SLOWLY

CHECKING OF THE STEERING WHEEL FUNCTION

Check the following points by operating the wheel while traveling slowly.
Make sure that:

- The steering wheel does not have any 'play'.
- The steering wheel is stable (ie: does not move left or right) when the vehicle traveling in a straight line.
- The steering wheel does not have any abnormal swing or does not seem heavy when it is turned.

CHECKING OF BRAKE FUNCTION

Check the brake response by stepping on the brake pedal while traveling slowly.
Make sure that:

- The brakes are operating effectively.
- Both brakes are responding, (not just one side).

CHECKING THE INCHING PEDAL FUNCTION (TORQFLOW TRANSMISSION LIFT TRUCK)

Check the inching function by stepping on the inching pedal while traveling slowly.

- Can the travel speed be adjusted according to the stepping effort of the inching pedal?
- Does the lift truck stop when the inching pedal is fully stepped on?

CHECKING THE CLUTCH PEDAL FUNCTION (CLUTCH TYPE LIFT TRUCK)

Check the clutch pedal function by stepping on the clutch pedal while traveling slowly.

- Can the travel speed be adjusted according to the stepping effort of the clutch pedal?
- When the clutch pedal is fully stepped on, is the clutch completely released and that it does not slip while in operation?

CHECKING OF ABNORMAL NOISE AND ODOR

Check that no abnormal sound or odor is emitted while traveling slowly.

4.2.8 CHECKING BY OPERATING THE WORK EQUIPMENT LEVER

CHECKING OF MAST FUNCTION AND ABNORMAL NOISE AND ODOR

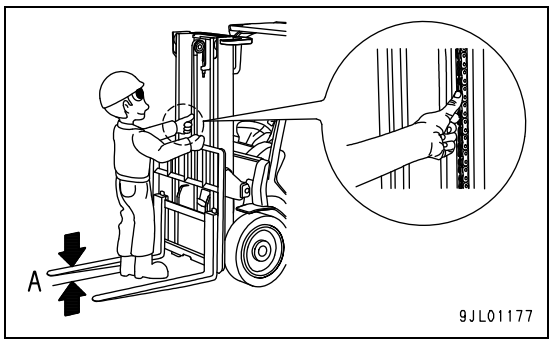
- Check that the forks lift and lower smoothly and the mast tilts forward and backward smoothly during operation of the work equipment lever from the operator seat. Always make full stroke operation of cylinder piston two to three times everyday before starting work.
- Check that no abnormal sound or odor is emitted while operating the work equipment lever.

CHECKING OF TENSION OF LIFT CHAIN

⚠ CAUTION

- **If the chain tension is asymmetrical to the left and right, load would concentrate on the chain of one side to cause it to break, leading to the falling of material and the tipping over of lift truck.**
- **To prevent the lift truck from traveling uncontrolled or the checking personnel from being caught by the truck, set the forward/reverse lever to the neutral position, pull the parking brake lever in the direction of the truck, stop the engine, and alight from the truck before starting check.**
- **Never step the foot under the fork as it may get caught.**

1. Raise the fork 5 - 10 cm (4 - 6 in) from the ground. (A)
2. Press the center of lift chain with a finger and check if the tension is equal to the right and left.



CHECKING OF LIFT CHAIN

⚠ CAUTION

- **If the lift chain break, the load may fall down or the lift truck may tip over. When lift chain is found abnormal with damages and cracks, please contact your KOMATSU FORKLIFT distributor for replacement of the lift chain.**
- **Rust on the lift chain is a cause of damages and cracks. Take rust preventive measures at an early date to keep rust off.**

1. Visually check lift chain for any damages, cracks and rust.
2. Check the state of lubrication of lift chain. If it is in poor state or rust has generated on the lift chain, apply engine oil, etc. on it.

CHECKING OF ATTACHMENT FUNCTION AND ABNORMAL NOISE AND ODOR (FOR MACHINES WITH ATTACHMENTS)

Check the attachment according to the relevant operating manual.

4.2.9 CHECKING OF SAFETY FUNCTION

⚠ CAUTION

- **Check this function by placing the lift truck on a level, hard flat road surface.**
- **Secure enough traveling space without human beings and other obstacles around the lift truck.**

CHECKING OF TRAVEL INTERLOCK FUNCTION (TORQFLOW TRANSMISSION LIFT TRUCK)

Check the safety function to disable the lift truck to travel when the operator is away from the seat.

CHECKING PROCEDURE

1. Park the lift truck in a level, flat and hard surface and apply the parking brake. (Parking brake activated)
2. Set the forward/reverse lever to the N (neutral) position, and raise the forks 15 cm (6 in) above the ground.
3. Step the foot off the brake pedal, inching pedal and accelerator pedal.
4. Set the forward/reverse lever to F (forward) or R (reverse) and lift the hip from the seat.
5. Check that the travel interlock warning lamp (with N mark) on the instrument panel starts flashing about 3 seconds later.
6. In this condition, release the parking brake. (Parking brake being released)
7. Depress the accelerator pedal with your hip lifted from the seat, and check that the lift truck does not travel.
8. Releasing travel interlock function
   Sit on the seat correctly and set the forward/reverse lever to N (Neutral) position. Flashing travel interlock warning lamp turn out and the lift truck returns to normal operating conditions.

CHECKING OF LIFT INTERLOCK FUNCTION

Check the safety function to disable the lift operation when the operator is away from the seat.

CHECKING PROCEDURE

1. Park the lift truck in a level, flat and hard surface and apply the parking brake. (Parking brake activated)
2. Set the forward/reverse lever to the neutral position, and raise the fork to a position about 1 meter from the ground which is visible to the operator.
3. Step foot from every pedal and lift the hip from the seat.
4. Check that the lift interlock warning lamp on the instrument panel starts flashing about 3 seconds later.
5. Check the following in this state:
   - The forks do not rise or lower if the lift lever is operated.
   - The mast does not tilt forward or backward if the tilt lever is operated.
6. Releasing lift interlock function.
   Take a right posture in the operator's seat. Flashing lift interlock warning lamp turn out and the lift truck returns to normal operating conditions.

CHECKING OF NEUTRAL SAFETY FUNCTION

Check the neutral safety function to prevent the risk of the lift truck suddenly traveling when the engine is started with the forward/reverse lever set in either forward (F) or reverse (R) position.

CHECKING PROCEDURE

1. Park the lift truck in a level, flat and hard surface and apply the parking brake. (Parking brake activated)
2. Set the forward/reverse lever to N (neutral) and stop the engine.
3. Check that the starter motor does not run and the engine does not start if the starter switch is set to [I] (START) position and the forward/reverse lever set to either forward (F) or reverse (R) position.
4. Releasing neutral safety function
   After checking the neutral safety function, set the forward/reverse lever to the neutral position. The neutral safety function is released and the engine returns to normal state. The engine starts when the starter switch is set to [I] (START) position.

CHECKING OF WARNING BUZZER AGAINST OVERLOOKING APPLICATION OF PARKING BRAKE LEVER

Check the warning function that sounds buzzer if operator left the seat without pulling the parking brake lever to the rear direction of the lift truck.

CHECKING PROCEDURE

1. Park the lift truck in a level, flat and hard surface and apply the parking brake. (Parking brake activated)
2. Set the forward/reverse lever to the neutral position, and lower the forks to the ground. Tilt the mast forward until the fork is in contact with the ground.
3. Stop the engine. Pull out the starter switch. Return the parking brake lever to the forward direction of the lift truck (release) and leave the seat.
4. Check that the warning buzzer sounds about 3 seconds later.
5. Stopping the sound of warning buzzer
   Pull the parking brake lever to the rear direction of the lift truck. The buzzer stops sounding and the system returns to normal state.

4.3 CHECKING AND REPORTING AFTER OPERATION

Checking and reporting after the day's operation are important job for getting the lift truck ready for operation on the following day. Before washing and storing the lift truck after the day's operation, take the following check procedure and always report to the administrator on the finding.

1. Checking of leakage of oil, fuel, coolant and battery electrolyte.
2. Checking of cracks, damages and loosened parts, etc.
3. Grease up and lubricate the parts if necessary.
4. Checking of abnormal points detected during the operation.

4.4 SIMPLE MAINTENANCE

4.4.1 GREASES AND FUEL

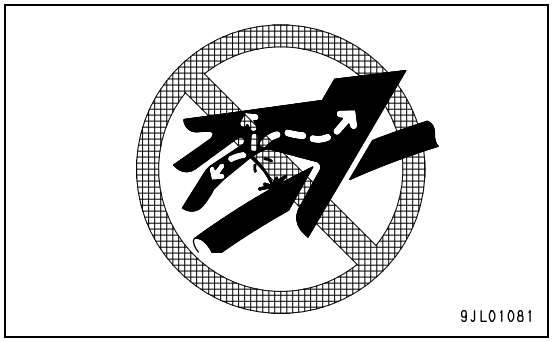
4.4.1.1 BASIC PRECAUTIONS

When refilling greases according to "Start-up inspection" and/or "Checking after operation", do so by understanding the following basic cautions for required greases.

OIL

⚠ CAUTION

- **When checking leakage from hydraulic piping or hose, do not touch it directly by hand. The pipe or hose may be pressurized and can be dangerous.**
- **If your skin and/or eye are injured by high-pressure oil, wash the skin/eye with fresh water and immediately see a physician.**
- **For other than leakage that can be checked visually by the appearance, call your KOMATSU FORKLIFT distributor for inspection and repair service.**



- Since engine oil, hydraulic oil, TORQFLOW transmission oil, gear oil, etc. are used under severe conditions (at high temperature and high pressure), they deteriorate as the operation time passes. Therefore oil must be changed periodically. For the standard oil change intervals, see "OIL AND GREASING CHART (PAGE 4-26)" and "LUBRICANT LIST (PAGE 4-27)".
- Always replace oil at the specified period even if not deteriorated.
- Always use Komatsu Genuine Engine oil. At shipment from a plant, the lift truck is applied with those listed in the "LUBRICANT LIST (PAGE 4-27)".
- Never mix oils of different grade (class) or brand.
- A lift truck should be maintained so that contaminants (water, metal chips, dust, etc.) do not enter the lift truck system. Most lift truck malfunctions are caused by entry of impurities such as dirt, dust, water, etc. Take special care to avoid entry of impurities during storage and lubrication, etc.
- Add specified volume of oil. Insufficient or excessive amounts of oil may both cause problems.
- If the hydraulic oil has become murky, there is a possibility that either air or water entered into the circuit. If no corrective measures were taken, it may damage the lift truck. In such a case, call your KOMATSU FORKLIFT distributor for their service.
- When replacing oil, replace the relevant filters at the same time. For oil and filter changes, contact your KOMATSU FORKLIFT distributor for service.

FUEL

⚠ CAUTION

Unless KOMATSU FORKLIFT-designated fuel is used, the engine emission cleanliness cannot be maintained within required environmental standard. For environmental and your health protection, always use designated fuel.

- At the end of the day's work, fill the fuel tank to full. Reducing the air inside the fuel tank helps reduce mixture in the fuel of condensed moisture from the air.
- Since the fuel pump is a precision machine, it may fail to operate if fuel containing moisture and/or impurities is used. Take special care to avoid entry of moisture and impurities during storage and lubrication.
- Always use fuel of appropriate grade from among those listed in the "LUBRICANT LIST (PAGE 4-27)".
- When a diesel engine runs out of fuel or has its filters replaced, the fuel circuit has to be purged.

COOLING WATER (COOLANT AND DILUTED WATER)

⚠ CAUTION

- **After the engine stops, the coolant temperature is very high, and high pressure is accumulated inside the radiator. Do not remove the radiator cap under these conditions or it may cause burns. After the coolant temperature has gone down, turn the cap slowly to release the pressure before removing it.**
- **Undiluted Supercoolant is flammable. So keep it away from open flame.**
- **Dilute the coolant according to the ambient temperature before applying to the radiator. Use distilled or soft water for dilution. Most of Japanese supply water is soft except a part of supply water, well water, small-scale water-supply system and river water, which are hard water. Hard water contains high mineral contents (calcium and magnesium). These contents are deposited inside the radiator as water stain and scale, causing an overheat of engine. They are difficult to remove. For the radiator, it is recommended to use diluted water having total hardness of 100 ppm (mg/ℓ) or under.**
- **This lift truck is filled with Komatsu Genuine Supercoolant (AF-NAC). This Supercoolant has other important function as the corrosion inhibitor of the cooling system than antifreeze function.**
  Continue to use this Supercoolant in an area where antifreeze is not required.
  Using other brand of coolant may cause critical failure to the cooling system including the engine.
- **Komatsu Genuine Supercoolant is good for continual use for two years or 4,000 service hours.**
- **Apply different mixing ratio for the Supercoolant according to the outside temperature.**
  For the right mixing ratio, see "4.6 RUNNING IN COLD WEATHER (PAGE 4-38)".
- **Shortage of coolant causes engine overheating and corrosive defect of cooling circuit due to the mixing of the air.**

GREASE

- Grease prevents the joints from seizure, rusting and noise emission.
- Always use recommended grease and strictly follow the greasing intervals. For the type of grease, see the "LUBRICANT LIST (PAGE 4-27)".
- Wipe clean old grease extracted after greasing. Wipe grease off with particular care from sections where attached sands and dirt promote the wear of the rotating units.

FILTERS

Filters are very important items which prevent impurities contained in the oil, fuel and hydraulic circuits from entering important machine components to cause failure. They require periodical replacement. Call your KOMATSU FORKLIFT distributor for service.

Cautions when replacing filters by other than KOMATSU FORKLIFT distributor or yourself.

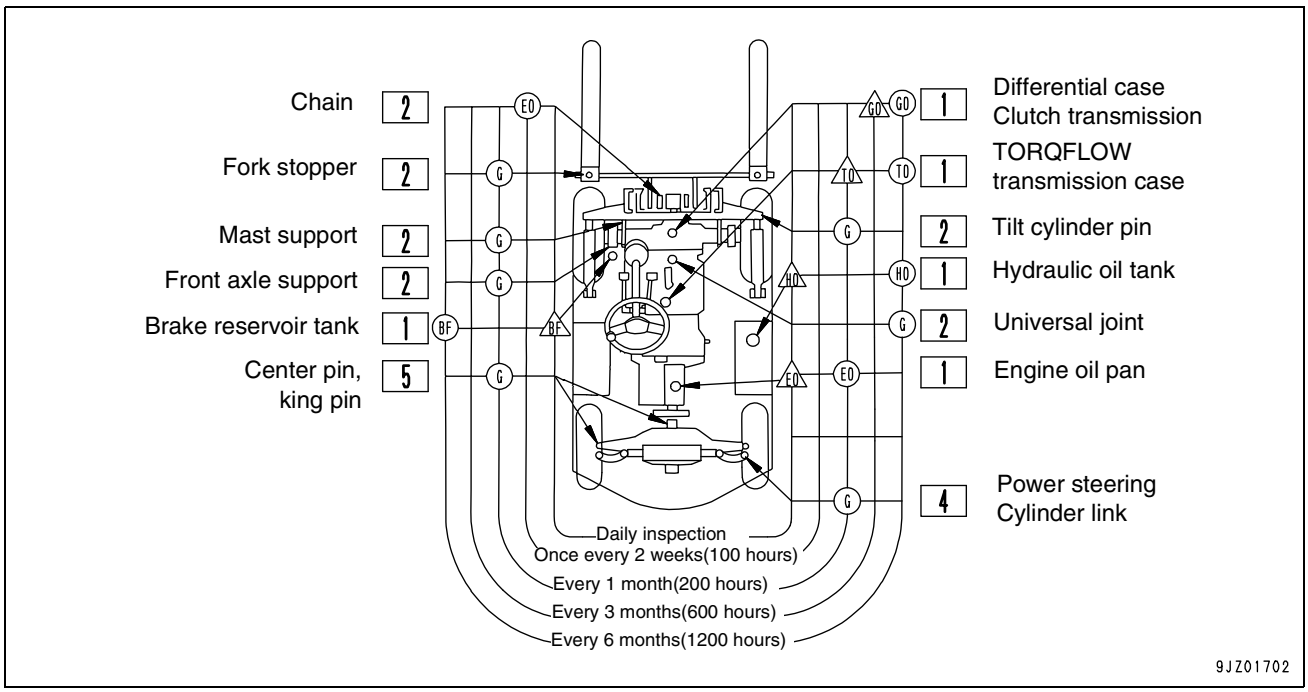
- Never reuse filters (cartridge type) after washing.
- When replacing oil filters, check for metal powder, etc. accumulated on the used filters. If metal powder is detected, investigation for the cause and countermeasures are necessary.
- Do not unpack replacement filters until immediately before installation.

NOTICE

- **Always use Komatsu Genuine Filters.**
- **Some of commercial filters are inferior to the Genuine Parts in performance. Using such filters may affect performance and durability of the lift truck. If Komatsu Genuine Parts are not used, quality assurance may not apply.**

4.4.1.2 LUBRICANT LIST

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

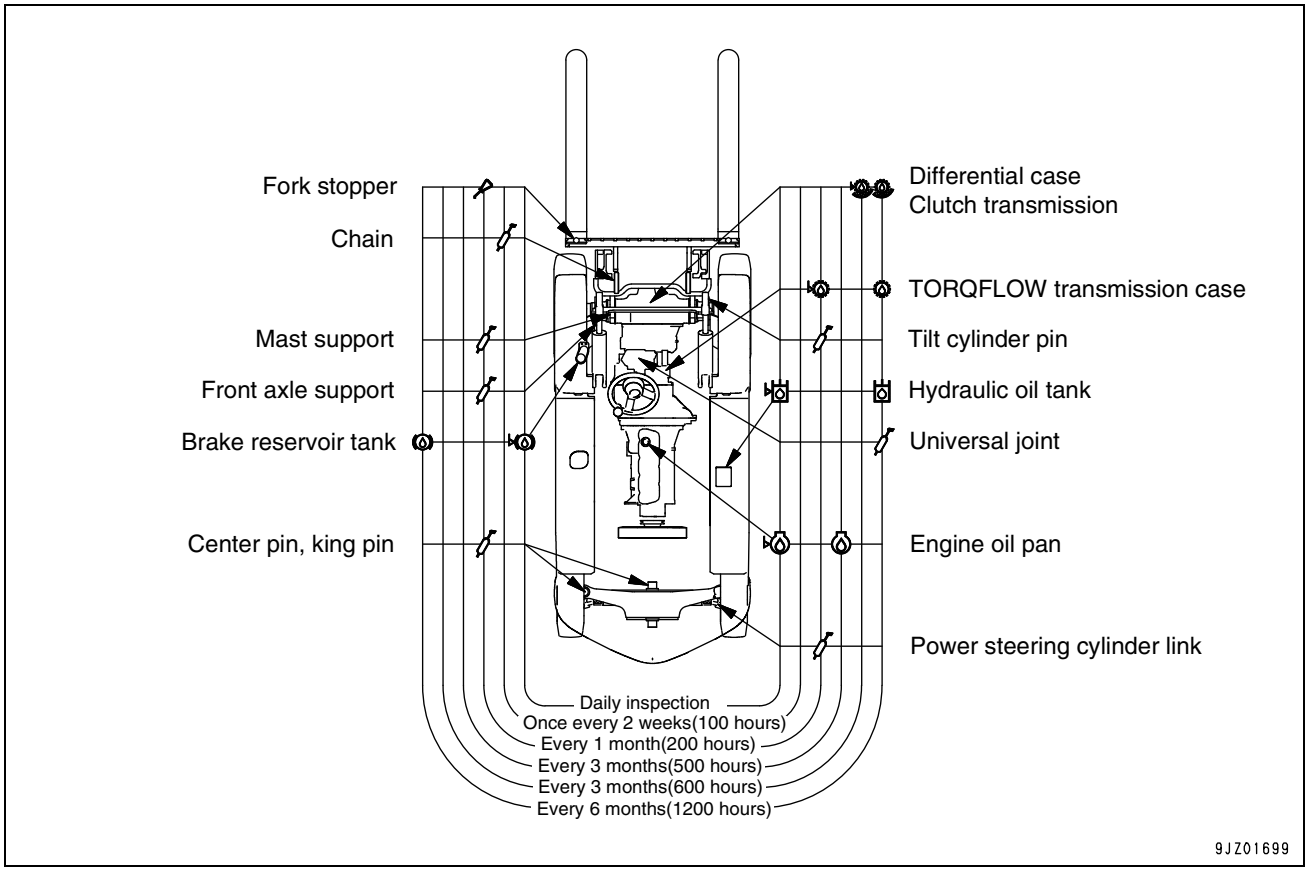


△ : Check and add fluid if necessary
○ : Total oil change or greasing and application
□ : Figure inside the box shows the number of places to apply oil or grease to.

Symbol	Type of fluid
EO	Engine oil
TO	Power train oil
GO	Gear oil
HO	Hydraulic oil
BF	Brake fluid
G	Lithium grease

4.4.1.3 LUBRICANT LIST (GASOLINE ENGINE LIFT TRUCK) (FOR EU)

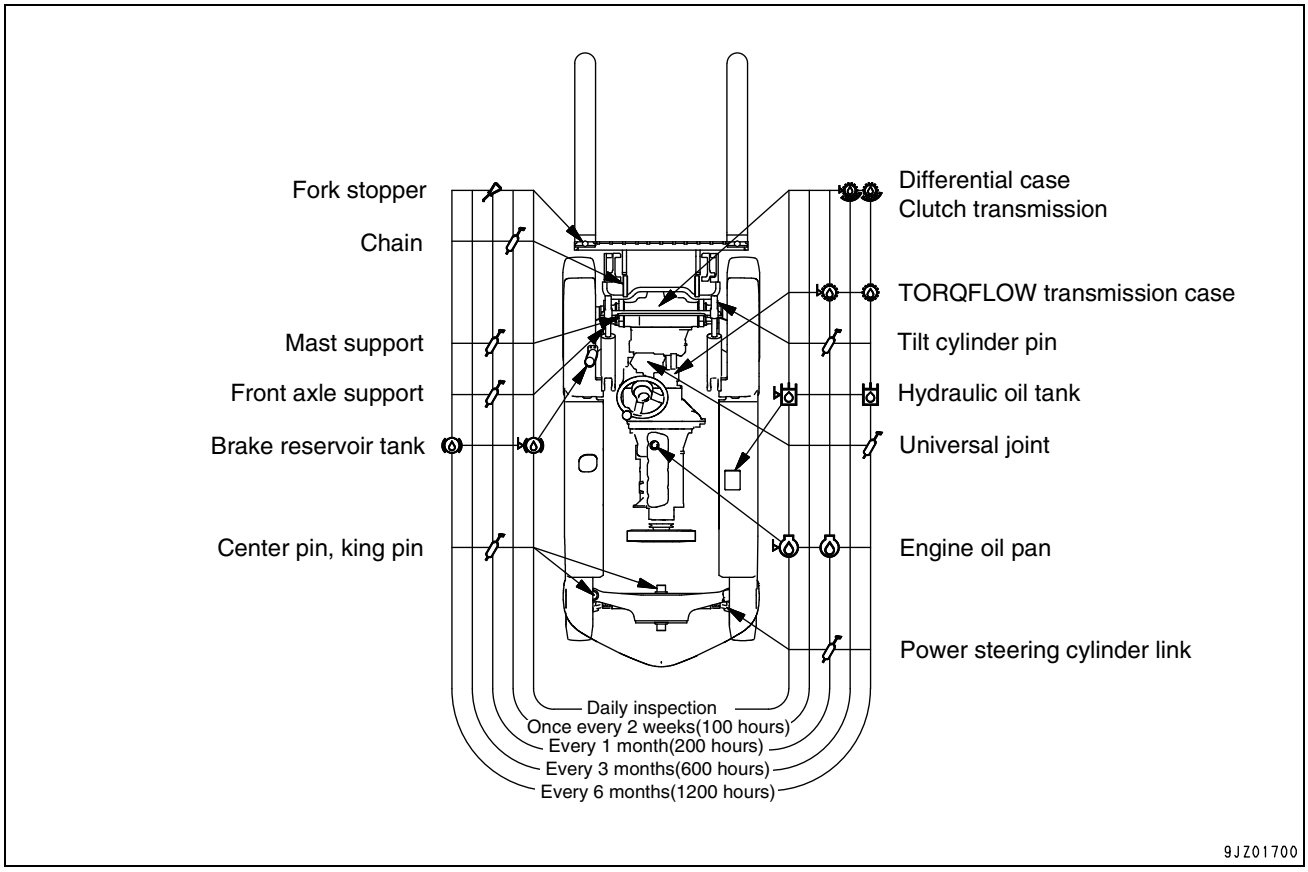
OIL AND GREASING CHART (OIL, GREASE LOCATIONS AND INSPECTION AND MAINTENANCE INTERVALS)



Symbols	Meaning of symbols
	Check the brake fluid level
	Change the brake fluid
	Check the hydraulic oil level
	Change the hydraulic oil
	Check the power train oil level
	Change the power train oil
	Check the gear oil level
	Change the gear oil
	Check the engine oil level
	Change the engine oil
	Apply grease
	Check or change of oil

4.4.1.4 LUBRICANT LIST (DIESEL ENGINE LIFT TRUCK) (FOR EU)

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



Symbols	Meaning of symbols
	Check the brake fluid level
	Change the brake fluid
	Check the hydraulic oil level
	Change the hydraulic oil
	Check the power train oil level
	Change the power train oil
	Check the gear oil level
	Change the gear oil
	Check the engine oil level
	Change the engine oil
	Apply grease
	Check or change of oil

LUBRICANT LIST

Lubrication point		Type of fluid	Ambient Temperature -22 -4 14 32 50 68 86 104°F -30 -20 -10 0 10 20 30 40°C
Engine oil pan	Gasoline engine lift truck	Engine oil	SAE10W30SH
	Diesel engine lift truck	Engine oil	SAE10W30CD
TORQFLOW transmission case		Power train oil	SAE10W
Clutch mission case		Gear oil	SAE90GL4
Differential case		Gear oil	SAE90GL4
Hydraulic oil tank		Hydraulic oil	SAE10WCD
Fuel tank	Gasoline engine lift truck	Gasoline	
	Diesel engine lift truck	Diesel fuel	ASTM D975 No.2 ASTM D975 No.1
Brake/Clutch reservoir tank		Brake fluid	SAE70R-1, SAE70R-3, DOT3
Greasing points		Lithium grease	NLGI No.2
Cooling system		Supercoolant AF-NAC	AF-NAC

Use CD or higher grade

Capacity [ℓ, (US gal, UK gal)]	Engine oil pan		TORQFLOW transmission case (incl. torque converter)	Clutch mission case	Differential case	Hydraulic oil tank	Fuel tank	Brake/ Clutch reservoir tank	Cooling system	
	Gasoline engine	Diesel engine							Gasoline engine	Diesel engine
	K15 K21 K25	4D92E 4D94LE 4D98E							K15 K21 K25	4D92E 4D94LE 4D98E
1 - 1.75 ton	3.8 (1.0 0.84)	7.5 (1.98, 1.65)	9.6 (2.54, 2.11)	4.6 (1.22, 1.01)	4.5 (1.19, 0.99)	40 (10.57, 8.80)	40 (10.57, 8.80)	0.15 (0.04, 0.03)	9.1 (2.40, 2.00)	9.2 (2.43, 2.02)
2 - 3.5 ton					6.0 (1.59, 1.32)	55 (14.53, 12.10)	58 (15.32, 12.76)			
2 - 3 ton (N)					[(3 ton std.) 5.8 (1.53, 1.28)]	40 (10.57, 8.80)	40 (10.57, 8.80)			

NOTICE

- **Never use fuel mixed with kerosene as such a malpractice can damage the fuel injection system much earlier than life.**
- **Always use Komatsu Genuine Parts for greases.**

⚠ CAUTION

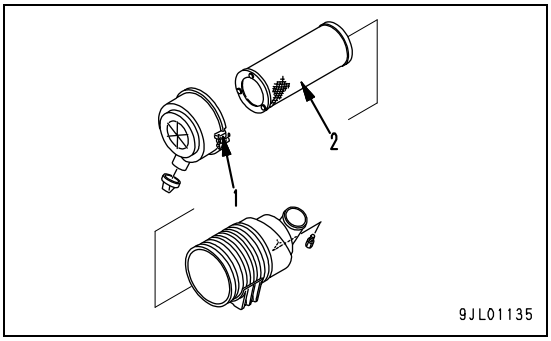
Using wrong type brake fluid may cause critical failure to the brake system. Check the type of brake fluid without fail before using.

4.4.2 AIR CLEANER ELEMENT CLEANING

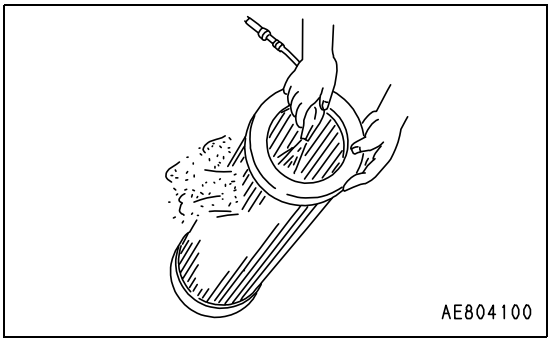
⚠ CAUTION

- **Physical injuries may be caused by being caught by the fan or in the belt while the engine is running. Always stop the engine before removing or cleaning the air cleaner element.**
- **While cleaning the element, dust may fly out to enter the eye or be inhaled. Always wear safety goggles, dust mask and other protective gears. Clean the element in a place where no other persons are endangered by it.**

1. Remove the clamps (at three locations) on the air cleaner case and remove the element.



2. Lightly slap the element without damaging sealed surface or blow the element carefully from inside to outside by applying dry compressed air (0.68MPa ({7kgf/cm^2}, 99.4PSI)) or under without damaging the element. Clean it all round.
3. After cleaning, visually check the element. If contamination persists or the element is damaged, replace the element with new one.



NOTICE

Checking, cleaning or maintaining the air element while the engine is running may allow the dirt to enter the engine, damaging it. Carry on maintenance work always after stopping the engine.

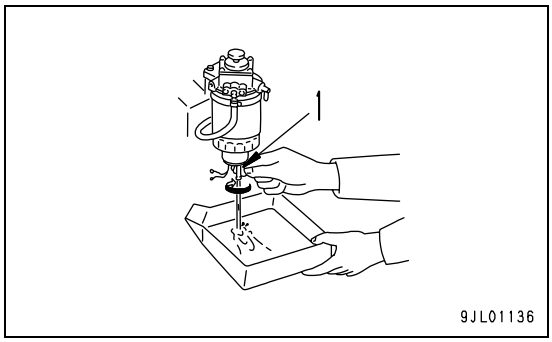
4.4.3 FUEL FILTER WATER DRAINING AND AIR BLEEDING (DIESEL ENGINE LIFT TRUCK)

⚠ CAUTION

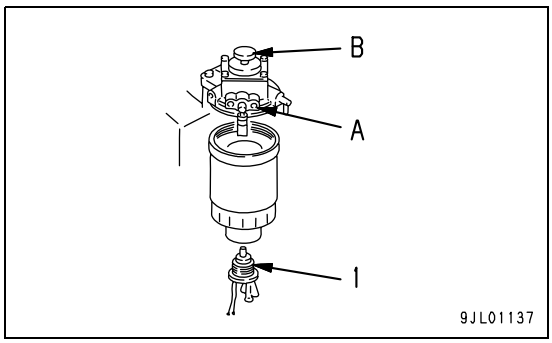
- **Beware the engine is high-temperature immediately after stopping. Drain water and/or bleed air after the engine temperature has lowered sufficiently.**
- **When draining water, fuel is also drained. Receive them in a oil pan. Always wipe spilt fuel off and keep it away from open flame.**

When the sedimenter warning lamp flashed, water is settled on the bottom of fuel filter casing beyond the specified limit. Drain water according to the following procedure:

1. Loosen the drain plug (also working as the sensor) (1) on the bottom of the fuel filter and drain water deposited.
2. After draining, tighten the drain plug securely.



3. Bleeding air
   Loosen plug (A) and move knob (B) up and down. Check that no more air bubbles come out and tighten plug (A).



4.4.4 REPLACING TYRES

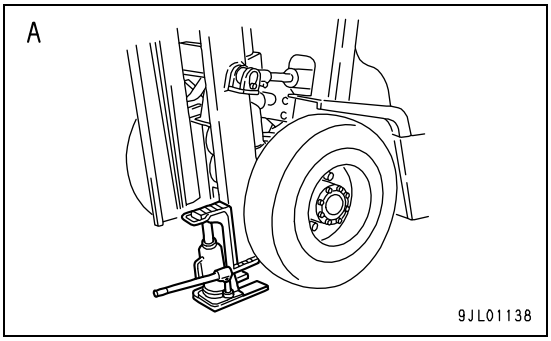
⚠ WARNING

- **Beware of danger of being caught by the jack if it came away. When lifting the lift truck with a jack, check that the jack is firmly in place. Do not crawl under the lifted truck body.**
- **Forklift truck tyre air pressure is high and dangerous.**
- **Do not disassemble/assemble tyre, tube and rim or fill removed tyres from the lift truck with the air. (These works require special equipment and skill. Persons engaged in this work are required to receive mandatory special training according.)**

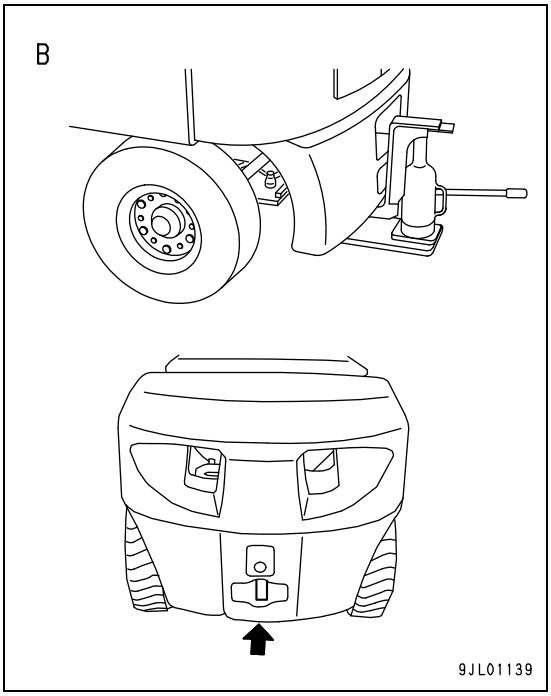
1. Unload the lift truck. Stop it on level, flat and hard road surface. (Apply parking brake)
2. Put blocks under the tyre diagonally opposite to the tyre which is to be replaced.
3. Always jack a lift truck up by the specified jack up point.

   (1) For replacing a front tyre: (A) Under the outer mast

   (2) For replacing a rear tyre: (B) Under the counterbalance-weight



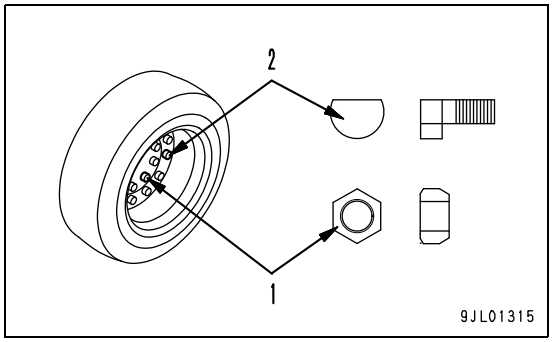
4. Jack the lift truck up to a level where the tyre is still slightly in contact with the ground.
   Place a block under the lift truck frame for preventing the falling.
   Place the block in front when replacing a front wheel, and in the rear when replacing a rear tyre.



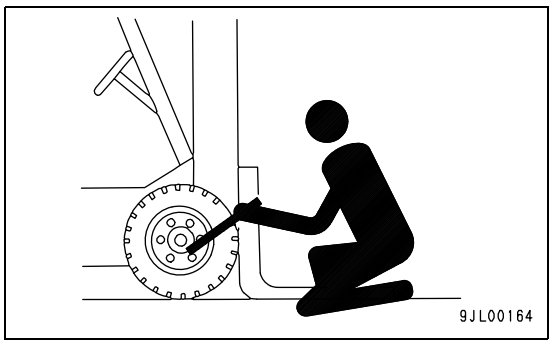
5. Removing tyres

⚠ WARNING

- **For a tyre with divided ring rim, never loosen the rim jointing bolts (special bolt) (2) and nuts.**
- **Always loosen the hub nuts of the tyre with divided ring rim after depressurizing it.**
- **For safety, when filling a tyre with air or replacing it, place your body in front of the tread face of the tyre. Do not work from the side of the tyre.**
- **When adjusting the air pressure with an air compressor, adjust the compressor pressure in advance to prevent pressurizing the tyre beyond the specified level.**
- **Deformed or cracked rim poses a great danger. Before installing a replacement tyre, check it thoroughly. Do not use a tyre with deformed or cracked rim.**



(1)Using a hub nut wrench or other tool, loosen the hub nuts(1) until they can be turned manually.
(2)Jack the lift truck up until the tyre slightly clear the ground. Remove the hub nuts (1) and remove the tyre.



6. Install a replacement tyre to the hub. Tighten the hub nuts(1) temporarily. Tighten the nuts diagonally until the tyre does not rattle.
7. Remove the block from under the frame. Lower the jack and tighten the hub nuts (1) with the specified torque. For the right tightening torque, see "4.16 SERVICE DATA (PAGE 4-54)".
8. Adjust the tyre inflation pressure to specified pressure. For the right tyre inflation pressure, see "4.16 SERVICE DATA (PAGE 4-54)".
9. After replacing the tyre, have a trial run to check the hub nuts (1) for looseness. Tighten if necessary.

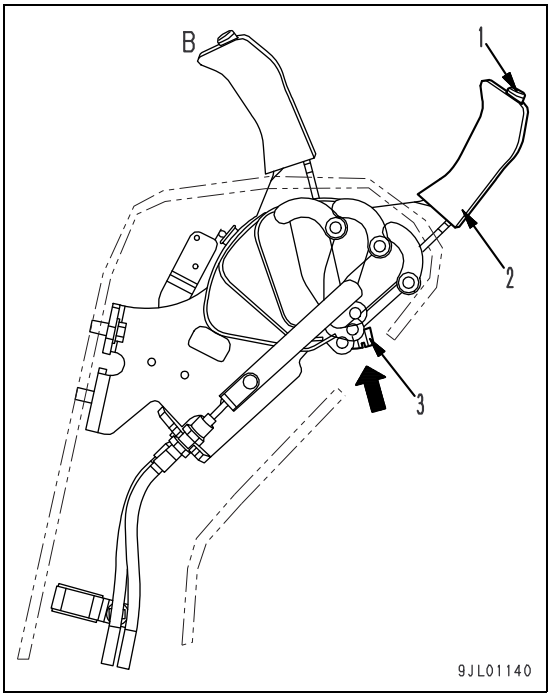
4.4.5 ADJUSTING PARKING BRAKE LEVER OPERATING EFFORT

⚠ CAUTION

Block the front and rear tyres before starting adjustment.

1. Press push button (1) and set parking brake lever (2) to releasing position (B).
2. Turn the adjust bolt (3) with a driver through the arrowed window and adjust the parking brake lever operating effort to reach the specified value.

For the standard value of the parking brake lever operating effort, see "4.16 SERVICE DATA (PAGE 4-54)".



4.4.6 REPLACING FUSES

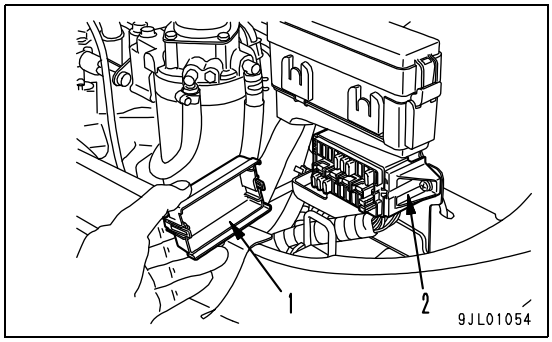
If the lamps and indicator lamps fail to light up or the control system fails to operate, there is a possibility that fuses may be blown. Check fuses that protect each equipment and system for blowing.

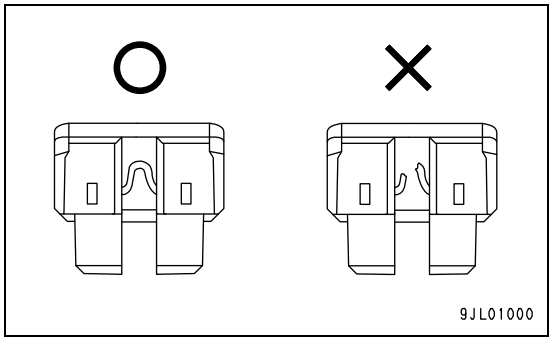
⚠ CAUTION

- **When replacing the fuses, always turn off the electric power (turn the starting switch to [○] (OFF)) position before replacing.**
- **Always use fuse of same capacity for replacement.**
- **If replaced fuse is blown again, abnormal electric system may be causing the problem. Contact KOMATSU FORKLIFT distributor for checking.**

DIESEL ENGINE LIFT TRUCK (FD10/15/18-21), GASOLINE ENGINE LIFT TRUCK

1. Turn the starting switch to the [○] (OFF) position.
2. Open the engine hood. Fuses are installed in the fuse box in front of the battery to the left hand side of the lift truck body. Large capacity fuses are installed in the relay box.
3. Remove the fuse box cover. Remove the puller attached to the inside of the fuse box.
4. Hold the fuse with the puller to remove. Visually check if it is blown.
5. If a fuse is blown, replace it with spare fuse of same capacity.





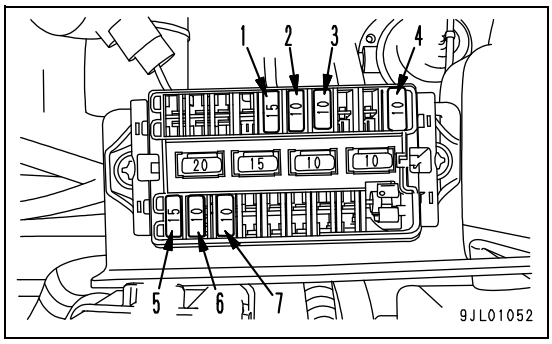
RESPECTIVE FUSES AND THE DEVICES THEY PROTECT

• FUSE BOX

Fuse capacity and related electrical component

No.	Capacity	Color	Related electrical component
1	15A	Blue	Head lamp, clearance lamp, tail lamp
2	10A	Red	Clearance lamp
3	10A	Red	Horn and stop lamp
4	10A	Red	Starting relay
5	15A	Blue	Backup lamp
6	10A	Red	Meters
7	10A	Red	PS controller

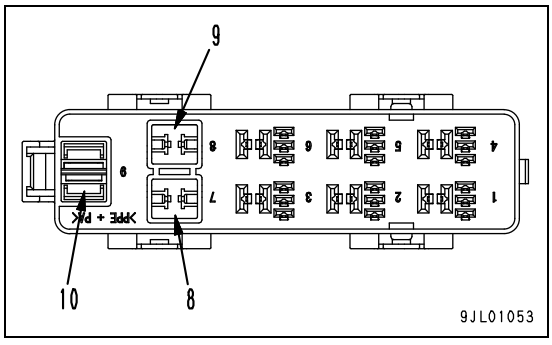
The unmarked fuses (10A x 2, 15A x 1, 20A x 1) are spares.



• RELAY BOX

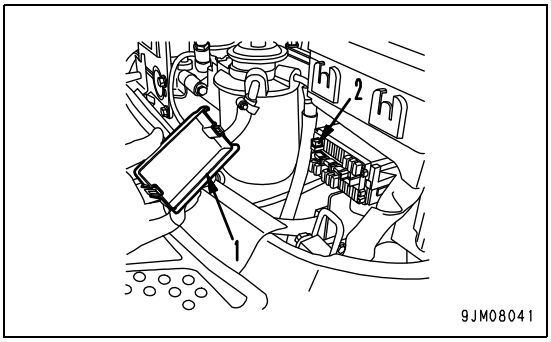
Fuse capacity and related electrical component

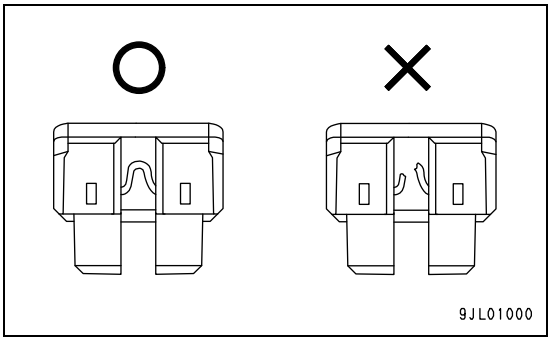
No.	Capacity	Related electrical component
8	60A	Starting motor
9	40A	Starting motor switch
10	100A(gasoline engine lift truck) 120A(diesel engine lift truck)	Alternator and preheater Fuse box (Circuit to be operated when key OFF)



DIESEL ENGINE LIFT TRUCK (FD20/20H/25/25H/30/30H/35A-17)

1. Turn the starting switch to the [○] (OFF) position.
2. Open the engine hood. Fuses are installed in the fuse box in front of the battery to the left hand side of the lift truck body. Large capacity fuses are installed in the relay box.
3. Remove the fuse box cover. Remove the puller attached to the inside of the fuse box.
4. Hold the fuse with the puller to remove. Visually check if it is blown.
5. If a fuse is blown, replace it with spare fuse of same capacity.





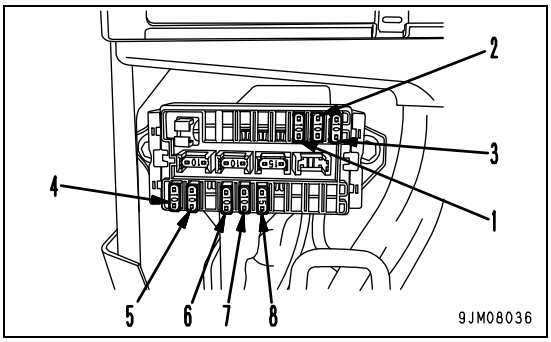
RESPECTIVE FUSES AND THE DEVICES THEY PROTECT

• FUSE BOX

Fuse capacity and related electrical component

No.	Capacity	Color	Related electrical component
1	15A	Blue	Head lamp, clearance lamp, tail lamp
2	10A	Red	Clearance lamp
3	10A	Red	Horn and stop lamp
4	10A	Red	Rear lamp
5	10A	Red	Starting relay
6	15A	Blue	Backup lamp
7	10A	Red	Meters
8	10A	Red	PS controller

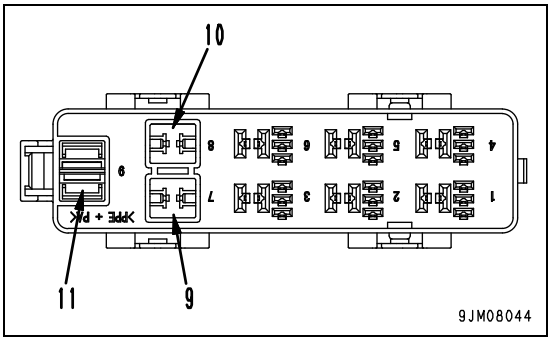
The unmarked fuses (10A x 2, 15A x 1, 20A x 1) are spares.



• RELAY BOX

Fuse capacity and related electrical component

No.	Capacity	Related electrical component
9	60A	Starting motor
10	40A	Starting motor switch
11	120A	Alternator and preheater Fuse box (Circuit to be operated when key OFF)



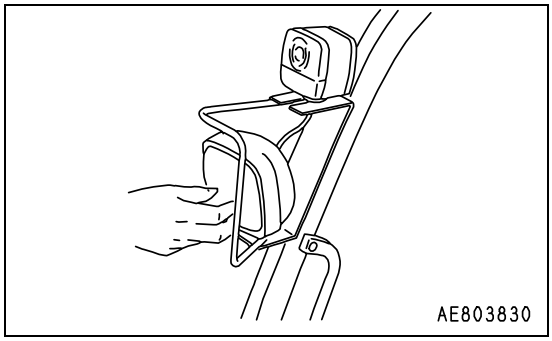
4.4.7 REPLACING BULBS

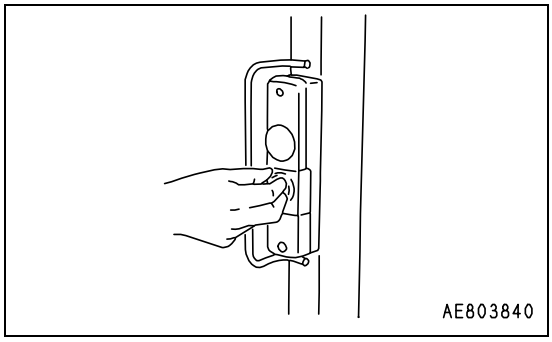
If a lamp fails to light up, it may be caused by burnt bulb beside blown fuse. Replace the bulb after checking if the fuse is blown.

⚠ CAUTION

- **Always use bulb of same capacity for replacement.**
- **If replaced bulb still fails to light up, abnormal electrical system may be causing the problem. Contact your KOMATSU FORKLIFT distributor for checking immediately.**

1. Turn the starting switch to the [○] (OFF) position, and the lamp switch to the OFF position.
2. Remove the lamp lens and replace the bulb.





Lamp capacity

Head lamp	55W (For 12V)
Turn signal lamp (Front/Rear)	23W (For 12V)/ 123W (For 12V)
Clearance lamp	8W (For 12V)
Backup lamp	8W (For 12V)
Stop lamp	21W (For 12V)
Warning lamp	1.4W (For 12V)
Meter lighting lamp	1.4W (For 12V)

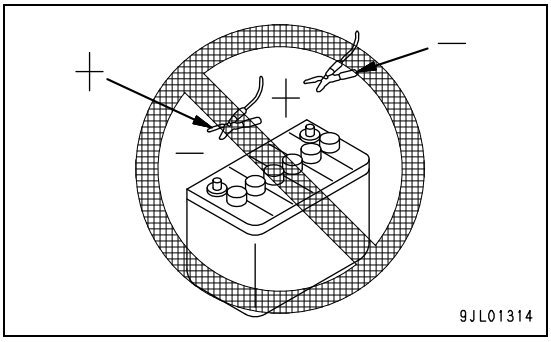
4.5 PROCEDURE FOR A DOWN BATTERY

If a battery is down, the lift truck can be started by using the battery of other lift truck via booster cables.

CAUTIONS ON CONNECTING/DISCONNECTING BOOSTER CABLES

⚠ CAUTION

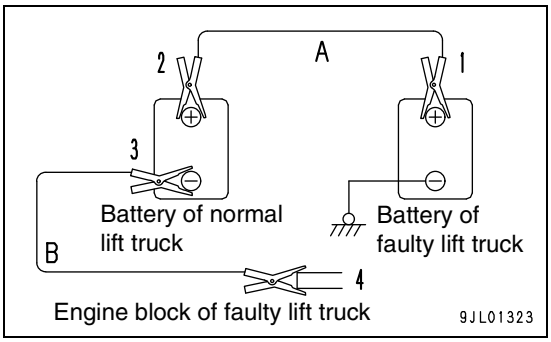
- **When connecting the booster cables, never connect its positive (+) and negative (-) terminals.**
- **When starting the engine using the booster cables, always wear protective goggles and rubber gloves.**
- **When using other lift truck for starting engine, be careful not to allow the normal lift truck to make contact with faulty lift truck. Batteries generate hydrogen gas. Hydrogen gas is highly explosive, and is easily ignited with a small spark emitted near the battery.**
- **Turn the starting switch to the [○] (OFF) position on both the normal and faulty lift trucks when the booster cables are connected. Or the lift trucks may make a sudden movement when the power supply is connected.**
- **Do not make mistake about the right connection of the booster cables. Start with the positive (+) terminal for connection. Conversely, start with the negative (-) terminal (grounding side) for disconnection. When making connection, the final length of cable is connected to the engine block of the faulty lift truck emitting the sparks. Make connection to a spot as separated from the battery as possible on the engine block.**
- **When disconnecting the booster cables, never allow the clip to contact with other clip or the lift truck.**
- **The mating battery for booster connection must have same voltage as one on the faulty lift truck.**



BOOSTER CABLE CONNECTION

Turn the starting switch to the [○] (OFF) position on both the normal and faulty lift trucks. Then set the forward/reverse lever to neutral. Check if the parking brake lever is ON and connect the cable according to the numbers in the figure in that order.

1. Connect the clip of booster cable (A) to the positive (+) terminal of the faulty lift truck.
2. Connect the other clip of booster cable (A) to the positive (+) terminal of the normal lift truck.
3. Connect the clip of booster cable (B) to the negative (-) terminal of the normal lift truck.
4. Connect the other clip of booster cable (B) to the engine block of the faulty lift truck.



NOTICE

- **Use appropriate size of booster cables and clips for the size of battery.**
- **For the normal lift truck, use battery of same capacity as that on the faulty lift truck.**
- **Check that the cables and clips are free from damages and corrosion**
- **Connect the clip securely to the mating terminal or block.**

STARTING ENGINE

⚠ CAUTION

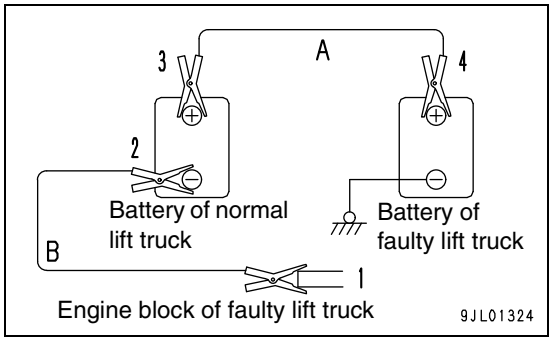
Check if both normal and faulty lift trucks for their forward/reverse lever being set to the neutral position and the parking brakes to ON.

1. Check that clips are securely connected to the battery terminals.
2. Start the engine on the normal lift truck and raise the speed to full (maximum revolution).
3. Turn the starting switch on the faulty lift truck to [I] (START) to start engine.
   If the engine fails to start, try again after two minutes or over.

REMOVING THE BOOSTER CABLES

When the engine has started, remove the booster cables in reverse order to the connection.

1. Disconnect the clip of booster cable (B) from the engine block of the faulty lift truck.
2. Disconnect the clip of booster cable (B) from the negative (-) terminal of the normal lift truck.
3. Disconnect the other clip of booster cable (A) from the positive (+) terminal of the normal lift truck.
4. Disconnect the other clip of booster cable (A) from the positive (+) terminal of the faulty lift truck.



4.6 RUNNING IN COLD WEATHER

PREPARATIONS FOR LOW TEMPERATURE

When the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

FUEL, LUBRICANT AND HYDRAULIC OIL

Use fuel, lubricant and oil of low viscosity.
For specified viscosity, see the "4.4.1.4 LUBRICANT LIST (DIESEL ENGINE LIFT TRUCK) (FOR EU) (PAGE 4-26)".

COOLANT

⚠ CAUTION

- **Supercoolant is toxic. Protect your skin and/or from it. If exposed to it, wash the skin/eye with fresh water and immediately see a physician.**
- **For disposing Supercoolant-added waste coolant drained during the replacement of coolant and the repair of radiator, contact a disposal specialist or your KOMATSU FORKLIFT distributor. Supercoolant is toxic, so be sure not drain it to the drainage ditch or the ground.**
- **Undiluted Supercoolant is flammable. Keep it away from fire. Don't smoke while handling it.**

NOTICE
Use Komatsu Genuine Supercoolant (AF-NAC). Other brands than Komatsu Genuine Supercoolant are not recommended as principle.

When the lift truck is shipped out from the factory, it is filled with Supercoolant of concentration applicable to the outside temperature of -20°C.
When the ambient temperature should fall below -20°C, raise the concentration of the coolant according to the following table.

Diluted concentration for Supercoolant (AF-NAC)

Minimum temperature (°C)	-10	-15	-20	-25	-30	-35
Concentration (%)	30	35	40	45	50	55

Cautions when refilling or replacing coolant
- Dilute the coolant with distilled water or supply water (soft water) to an appropriate concentration for use.
- Check the radiator, water pump and hoses for any water leakage.
- Drain all coolant and flush the inside of the system before adding new coolant.

BATTERY

⚠ CAUTION

- **Batteries generate flammable gas. Keep it away from open flame.**
- **Battery electrolyte is hazardous substance. Protect your skin and/or from it. If exposed to it, wash the skin/eye with large amount of fresh water and immediately see a physician.**
- **Battery electrolyte is hazardous substance, so be sure not drain it to the drainage ditch or the ground.**
- **Battery electrolyte dissolves the coating. If attached to the lift truck, wash it down with water immediately.**
- **If battery is frozen, do not charge it or start the engine using other power supply. Or the battery may explode.**

- When the temperature drops, the battery performance is deteriorated, making engine start difficult. Insufficiently charged battery electrolyte may freeze. Get ready for the start in the following morning by charging the battery close to 100% at the day's end.
- Since battery performance remarkably drops as the temperature drops, remove it from the lift truck, place it in a warmer place overnight and install it the following morning. (Particularly when the temperature is low or the lift truck is not to be used for some period)
- If the battery electrolyte level is low, refill distilled water before starting operation the next morning. To prevent freezing during the night, do not refill electrolyte after the end of operation.

REMARK

For finding the battery charge level, measure the specific gravity of battery electrolyte and convert it according to the following table.

Electrolyte temperature (°C) / Battery charge level (%)	20	0	-10	-20
100	1.28	1.29	1.30	1.31
90	1.26	1.27	1.28	1.29
80	1.24	1.25	1.26	1.27
75	1.23	1.24	1.25	1.26

PRECAUTIONS AFTER COMPLETION OF OPERATIONS

Drain water to prevent water deposited in the fuel pipe from freezing.

For the draining of the sedimenter of diesel engine lift truck, see Section "4.4.3 FUEL FILTER WATER DRAINING AND AIR BLEEDING (DIESEL ENGINE LIFT TRUCK) (PAGE 4-29)".

WHEN COLD SEASON IS OVER

When the weather becomes milder with the change of season, do as follows

- Change oil of respective devices and fuel to those of specified viscosity according to the "LUBRICANT LIST (PAGE 4-27)".

4.7 ACTION IN ENGINE OVERHEATING

ACTION WHEN ENGINE HAS OVERHEATED

⚠ CAUTION

When overheated, opening the radiator reservoir tank or radiator cap immediately after stopping engine let steam spurt out to cause burns. Do not open the cap until the engine cools down.

When the engine has overheated and the coolant temperature gauge points the red range, do not panic and take the following actions:

1. Park the lift truck in a safe place.
2. Keep the engine running at low idling, open the engine hood for better ventilation of the engine room.
   If the cooling fan is not running, stop the engine immediately.
3. When the water temperature gauge enters the white range, stop the engine.
4. Check the followings after the engine has fully cooled down
   - Is the coolant level right?
   - Is the fan belt not sheared or loosened?
   - Is the engine oil level right?
   - Isn't the radiator clogged?
5. If coolant or engine oil level is low, refill to appropriate level.
   In the case of other failure or the cause of overheat is unknown, contact the administrator, stop using the lift truck and call your KOMATSU FORKLIFT distributor.

CLEANING INSIDE THE COOLING SYSTEM

If water stain and/or rust is generated inside the cooling system, cooling efficiency is deteriorated, causing overheat.

As the cooling system requires periodical inspection and washing using radiator detergent liquid, please call KOMATSU FORKLIFT distributor for maintenance service.

CLEANING OF RADIATOR FINS

⚠ CAUTION

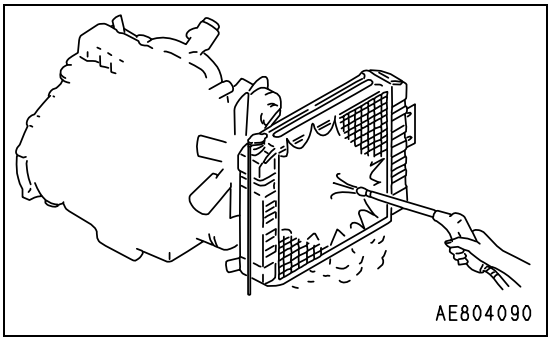
- **To prevent flying objects from getting into your eyes, always wear protective glasses or goggles when cleaning.**
- **Never direct compressed air, steam or water at yourself or any personnel as injury and/or burns may occur.**

Clogged radiator fins can cause engine overheat. Clean them by blowing the air, steam or water.

Set the pressure for the air or steam for blowing as described below. Direct the nozzle at right angles

Air pressure : 0.98MPa ({10kgf/cm^2}, 142PSI) or under

Steam pressure: 0.39MPa ({4kgf/cm^2}, 56.8PSI) or under



CHECK FAN BELT TENSION

If the fan belt is loose, adjust it to the specified tension.

Contact your KOMATSU FORKLIFT distributor regarding adjustment of fan belt tension.

4.8 OPERATING LIFT TRUCKS IN SPECIAL ENVIRONMENT OR IN FORCIBLE WAY

This lift truck is designed and tested to cover most customers' uses under general application or environment. Under some special working environment or condition that requires mode of operation quite punishing to the lift truck, abnormality and degradation occur to it including early failures, shorter service life, persisting failure to certain parts and failure of usually fault-free parts and components.
When the lift truck is used under special environment or in forcible way, it requires to receive maintenance and various other measures appropriate to a lift truck subjected to such hard and trying operating conditions. For more details, call your KOMATSU FORKLIFT distributor.

EXAMPLES OF SPECIAL ENVIRONMENT OR FORCIBLE USE OF LIFT TRUCK

- Operating environment where the lift truck has to travel on the roads covered with salt water, chemicals (acid and/or alkaline), solvents, etc. or it is indirectly poured or attached with them via operator's hands and feet.
- Environment surrounded by corrosive gases that corrode metal and/or resin.
- Environment near the sea shore blown by salty wind from the sea.
- Environment where dew condensation occurs to the lift truck as it travels indoor and outdoor by getting sharp temperature difference or environment where it is constantly soaked with water.
- Environment filled with excessive sludge and those filled with dust, fine dust, and aggressive dust from polishing.
- Using lift truck for other application than original designed.
- Operation by which a lift truck is used for a specific work for extended span of time or used continuously in concentration for a particular work.
- Application inhibited by this operating manual.
- Others

NOTICE

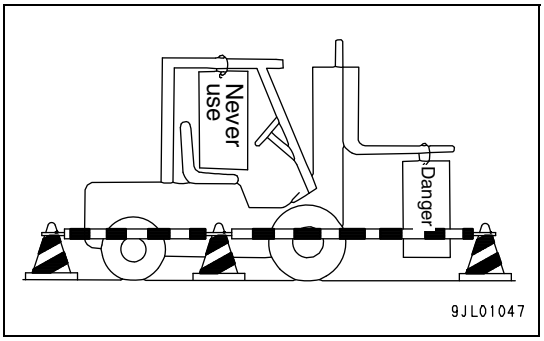
- **Operating the lift trucks in a special environment or in forcible way excludes them from the object of warranty provided by Komatsu Ltd.**
- **There are conditions technologies cannot cover.**
- **This lift truck cannot be used under a condition to which a risk of explosion accompanies.**

4.9 ACTION TO TAKE IF THE FORK FAILS TO LOWER

⚠ CAUTION

- **If the fork stops lowering during operation, stop the work immediately. Never use this lift truck until repaired.**
- **Put up "No Entry" and "Never use" signs to keep other persons from entering under or in front of the raised fork.**
- **The lift truck may suddenly start moving leading to a critical accident. Do not touch the mast, fork, chain and other load handling devices. (Do not shake, touch or pry with a stick or tool)**
- **Immediately contact with the administrator or your KOMATSU FORKLIFT distributor for repair service.**

1. If the fork stops lowering during operation, stop the work immediately.
2. Move the lift truck in question to a flat place and park it by avoiding emergency exit or fire fighting equipment. For details on parking, see "2.5.3 STOPPING AND PARKING (PAGE 2-32)" and "3.3.8 TEMPORARY STOPPING AND PARKING (PAGE 3-30)".
3. If the loaded fork should stop operating in raised condition, secure wide "No Entry" area around the lift truck or park the lift truck directly facing a stout wall surface in checking a risk of falling load to the ground.



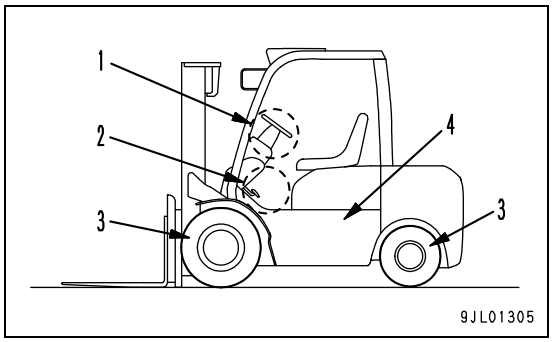
4.10 WASHING LIFT TRUCK

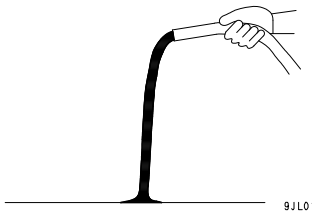
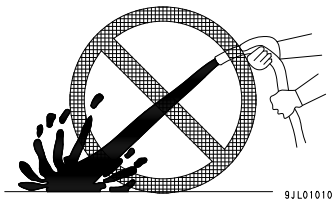
⚠ CAUTION

If water gets into the electrical system (controller, sensor, connector, etc.), there is a hazard that it will cause malfunctions or miss-movement. Do not use flushing water or high- pressure steam to wash the electrical system.

Step for Washing

1. Turn the starting switch key to the [○] (OFF) position, then remove the key.
2. Wash each part ((1) to (4) parts in the figure at right), following the instructions in the table below.
3. Dry off the washed parts.
4. After checking that the washed parts have dried out, insert the starting switch key and turn it to the [I] (ON) position then make sure that there is no abnormality, and then start operation.



No.	Spot to Wash	Washing Method
1	Meter Panel	Wash by spraying water with a hose from above. (Note) In washing, reduce the flow of water to lower water pressure as illustrated below (only for (1) and (2) parts).  9JL01009  9JL01010
2	Dashboard Front Pedals Floor Plate	
3	Front & Rear Tyres Front & Rear Axles	Wash with high pressure steam or flushing water from a hose. (Note) Do not use high pressure steam or flushing water for the tyre angle sensor and electric wirings.
4	Exterior parts other than the above	Wash with high pressure steam or flushing water from a hose.
Other Precautions		1. Never wash the inside of the dashboard. 2. When using high pressure steam or flushing water from a hose to wash the engine room and underpart of the floor plate (power train parts), cover the engine and transmission including electric wirings for them, and the electric system parts like the connector, fuse box, etc. with a tarpaulin so that those parts and components do not get splashed with water.

4.11 LONG-TERM STORAGE

Store lift trucks as follows when storing them for a long period (over one month)

BEFORE STORAGE

After washing and cleaning respective parts, implement the following maintenance service before storing the lift trucks indoor: If it must unavoidably be left outdoors, park the lift truck on flat ground and cover it with a tarpaulin.

- Fill up the fuel tank to full. This helps prevent water deposit.
- Apply grease and change oil without fail.
- Fully apply grease to the exposed portions of hydraulic cylinder piston rod.
- Disconnect the negative (-) terminal of the battery and cover it or remove it from the lift truck and store indoors.
- To prevent freezing, add Komatsu Genuine Supercoolant (AF-NAC) (concentration 30% or upward) to the engine coolant.

DURING STORAGE

⚠ CAUTION

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

- During storage, always operate and move the lift truck once a month to retain the lubricated sections fully covered under oil film.
- When operating work equipment, wipe the applied grease off the hydraulic cylinder piston rod.
- As the battery discharges naturally, charge it once a month.

AFTER STORAGE

When using lift trucks after some long period of storage, implement the following service before proceeding to operation:

- Wipe the applied grease off the hydraulic cylinder piston rod.
- Apply grease and oil to necessary sections without fail.
- When a lift truck has been in storage for a long period, moisture in the air is mixed in oil. Check oil of respective sections before and after starting engine. If water is mixed in oil, change oil completely.

NOTICE

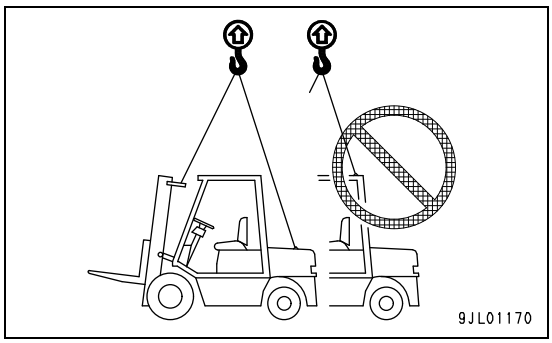
When using lift trucks that were not operated once a month to prevent rusting, consult your KOMATSU FORKLIFT distributor before operation.

4.12 HOISTING LIFT TRUCK

⚠ CAUTION

- **Hook the sling to the designated holes on the top of the mast and the counterbalance-weight.**
- **Overhead guard and the cab mount (for a cab specification lift truck) have no strength to hoist the lift truck. Never use them for hoisting lift truck, or there is a danger of falling.**
- **Hook the sling to the mast and counterbalance-weight after checking that they are securely installed.**
- **Never allow other persons to go under or near the lifted truck.**

1. The sling hooking positions are the holes on the top of the outer mast and the counterbalance-weight.
2. Check that the mast and counterbalance-weight are securely installed.
   Tightening torque for the counterbalance-weight mount bolts.
   : 441 - 639Nm {45 - 65kgfm}
   Tightening torque for the mast lower mount bolts.
   : 157 - 196Nm {16 - 20kgfm} (AX50 Series)
   : 343 - 427Nm {35 - 43kgfm} (BX50 Series)
3. Use undamaged sling and wire, having sufficient strength.
4. When hoisting a lift truck, do not allow the overhead guard and/or cab to make contact with wire, etc. Adjust the wire length to prevent the lift truck from being tilted. Do not give impact to it while hoisting.



4.13 LOADING AND UNLOADING OF LIFT TRUCK

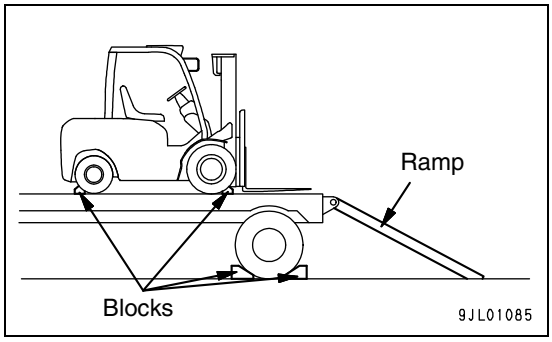
⚠ CAUTION

The work of loading and unloading a lift truck on a trailer always involves a hazard that the lift truck tips over or falls off if you make a mistake in handling.

Strictly follow the instructions shown below.

- **Stop the trailer on level, flat road surface. Apply parking brake without fail and apply blocks to the tyres.**
- **Use ramps or dock plate of sufficient length, width and sufficient strength. Secure it tightly to prevent it from being dislocated or disengaged.**
- **Take a right posture on the seat while operating.**
- **If you operate the lift truck in a posture that your weight is not properly applied to the seat, like standing up or leaning forward or sideways, travel interlock functions to cut off the transmission of engine power. Then the lift truck may slither down if the accelerator pedal is stepped on an uphill or a slope.Operate the lift truck assisted by a signal person if necessary so that you don't have to stand up or lean forward or sideways to watch. For more details on the function of travel interlocking, see "TRAVEL INTERLOCK (ENGINE POWER CUTOFF) (PAGE 3-26)".**
- **When using the ramp, make the gradient gentle, align the center of both the trailer and the lift truck and lock the ramp securely to prevent misalignment.**
- **Never correct the course of the lift truck while on the ramps. If course change is required, move off the ramps once and correct the course direction.**

1. Arrange for a trailer having adequate loading capacity for the weight and size of a lift truck to transport.
2. Stop the trailer on level, flat road surface. Apply parking brake without fail and apply blocks to the tyres.
3. Install the ramp, dock plate, etc. between the loading platform of the trailer and the road surface and fix it securely so that it would not be disengaged.
4. Instruct the trailer operator not to move the trailer until loading/unloading of lift truck is completed.
5. When loading/unloading a lift truck to or from the trailer, drive the lift truck at slow speed by sitting on the seat with right posture.
6. To prevent a loaded lift truck from moving during transportation, apply blocks to the tyres and secure it with wire rope and/or chain before starting the trailer.



4.14 INSPECTION AND MAINTENANCE SCHEDULE CHART

- For other inspection and maintenance items not described in this manual, contact KOMATSU FORKLIFT distributor.
- Incorrect inspection, maintenance and repair services may cause critical accident or shorten lift truck service life. For your safety operation, contact KOMATSU FORKLIFT distributor for inspection, maintenance and repair services.

INSPECTION AND MAINTENANCE SCHEDULE CHART

[○] indicates the intervals and time of inspection and maintenance by operating hours recommended by Komatsu .

	Inspection & Maintenance Item	Inspection & Maintenance Intervals (hours)						Replace-ment Intervals (month)
		At startup	Every 2 weeks (100h)	Every 1 month (200h)	Every 3 months (600h)	Every 6 months (1200h)	Every 1 year (2400h)	
Engine	Engine proper							
	Startup condition & abnormal noise	○		○			○	
	Operation of preheater plug and heater			○			○	
	Exhaust gas color, exhaust sound	○		○		○	○	
	Idling speed	○		○			○	
	No-load max. speed						○	
	Acceleration	○		○			○	
	Cylinder head and manifold parts bolt tightening condition						○	
	Valve clearance					○	○	
	Compression pressure						○	
	Muffler & exhaust pipe							
	Gas leakage, looseness, damage						○	
	Operating condition						○	
	Engine mount							
	Cracking, abnormal sound, deformation, looseness and falling of bracket, damage and deterioration of vibration proof rubber						○	
	Air cleaner							
	Contamination and damage of element			○		○	○	
	Cracking, deformation and damage of case			○		○	○	
	Air cleaner element replacement					○		6
	Lubrication system							
	Oil level and contamination	○		○			○	
	Oil leakage	○		○		○	○	
	Replacement of oil in oil pan (diesel engine lift truck)			○				1
	Replacement of oil in oil pan (gasoline engine lift truck) (*1)				○			500 h or 3 months
	Oil filter cartridge replacement (diesel engine lift truck)			○				1
	Oil filter cartridge replacement (gasoline engine lift truck) (*1)				○			500 h or 3 months
	Fuel system							
	Fuel leakage	○		○			○	
	Fuel filter clogging						○	
	Injection nozzle injection pressure and spray condition						○	
	Fuel filter water drain (diesel engine lift truck)				○			
	Fuel filter cartridge replacement (diesel engine lift truck)				○			3
	Fuel filter element replacement (gasoline engine lift truck) (*2)					○		6
	Fuel tank crack and damage	○						
	Fuel tank oil level	○						
	Fuel tank cleaning						○	
	Ignition system							
	Ignition timing					○	○	
	Ignition plug burn and damage					○	○	
	High-pressure fuel gas system (models with LP gas)							
	Gas leakage, feed pipe cracking and damage, gas cylinder, looseness of mounted parts and damage	○					○	
	Positive crankcase ventilation							
	Valve operation, piping clogging and damage						○	

*1: Also applied to a hybrid LPG/gasoline engine lift truck and a dedicate LPG engine lift truck.
*2: Also applied to a hybrid LPG/gasoline engine lift truck.

	Inspection & Maintenance Item	Inspection & Maintenance Intervals (hours)						Replacement Intervals (month)
		At startup	Every 2 weeks (100h)	Every 1 month (200h)	Every 3 months (600h)	Every 6 months (1200h)	Every 1 year (2400h)	
Engine	Cooling system							
	Coolant level and contamination	○						
	Water leakage	○		○			○	
	Contamination, hose damage and deterioration, radiator cap function						○	
	Belt deflection, wear and damage	○		○		○	○	
	Fan and cover cracking, deformation and looseness						○	
	Carbon monoxide emission prevention device							
	Mounting looseness and damage to carbon monoxide emission prevention device						○	
	Pipe damage and installation condition						○	
Power train	Clutch							
	Oil level	○		○			○	
	Operating condition			○		○	○	
	Pedal play and pedal height when depressed	○		○		○	○	
	Abnormal noise, oil leakage and contamination			○			○	
	Oil replacement					○		6
	Transmission							
	Oil level	○		○		○	○	
	Oil leakage and contamination	○		○		○	○	
	Inching pedal operating condition	○						
	Pedal height	○						
	Oil replacement					○		6
	Strainer replacement					○		6
	Line filter cartridge replacement					○		6
	Differential gear							
	Oil level	○		○		○	○	
	Oil leakage and contamination			○		○	○	
	Oil replacement					○		6
	Shift lever							
	Play and engagement condition			○				
	Installation condition					○		
	Forward/Reverse lever							
	Lighting of neutral lamp	○						
	Drive shaft							
	Looseness at connection					○	○	
	Runout, play, damage, cracking and bearing play						○	
Steering system	Steering wheel							
	Operation feel	○		○			○	
	Play, rattle, runout, unstable driving, returning condition, wheel play and rattle	○		○			○	
	Steering valve							
	Loose mounting						○	
	Oil leakage			○			○	
	Rod and arm							
	Loosening, play and damage			○			○	
	Knuckle							
	Looseness at connection						○	
	King pin play, abnormal noise, cracking, damage			○			○	
	Wheel							
	Fluctuation in min. turning radius						○	
	Contact of wheel with other parts						○	

	Inspection & Maintenance Item	Inspection & Maintenance Intervals (hours)						Replacement Intervals (month)
		At startup	Every 2 weeks (100h)	Every 1 month (200h)	Every 3 months (600h)	Every 6 months (1200h)	Every 1 year (2400h)	
Steering system	Power steering							
	Oil leakage	○		○			○	
	Oil level	○		○			○	
	Mounting condition and loosening at connection						○	
	Hose pipe damage			○			○	
Braking system	Brake pedal							
	Stroke and braking effect	○		○			○	
	Play and pedal height when depressed	○		○			○	
	Inching pedal operation	○						
	Parking Brake							
	Operating effort	○		○			○	
	Braking effect	○		○			○	
	Rod, cable and link							
	Looseness, play, damage, wear and missing cotter pin						○	
	Hose and piping							
	Leakage, damage and installation condition			○		○	○	
	Reservoir tank							
	Oil level	○		○			○	
	Contamination			○			○	
	Oil replacement					○	○	6
	Master cylinder and wheel cylinder							
	Operating condition, wear and damage						○	
	Oil leakage						○	
	Servo system							
	Operating condition						○	
	Brake drum and bake shoe							
	Clearance between drum and lining					○	○	
	Shoe and lining wear						○	
	Drum wear and damage						○	
	Drum mount bolts looseness						○	
	Backing plate cracking, damage, deformation and bolt looseness						○	
	Brake spring deterioration, and anchor pin corrosion						○	
	Work equipment operating condition	○		○			○	
Loading equipment	Fork							
	Fork and fork stopper deformation, crack and damage	○		○			○	
	Cracking and wear at fork bottom and upper and lower hooks (by dye penetration check)						○	
	Opening, level difference and bend at fork tips						○	
	Mast and lift brackets							
	Deformation, crack and damage	○		○			○	
	Roller wear, play, and pin cracking						○	
	Mast support portion play, and cap mounting bolt looseness						○	
	Chain and chain wheel							
	Chain cracking, deformation, damage and corrosion						○	
	Chain wheel deformation, damage and play						○	
	Chain tension	○		○			○	
	Chain elongation						○	
	Chain lubrication		○				○	100
	Load backrest							
	Mounting bolt looseness, cracking, damage and deformation	○		○			○	
	Looseness of tilt cylinder rod and locknut	○						

	Inspection & Maintenance Item	Inspection & Maintenance Intervals (hours)						Replacement Intervals (month)
		At startup	Every 2 weeks (100h)	Every 1 month (200h)	Every 3 months (600h)	Every 6 months (1200h)	Every 1 year (2400h)	
Hydraulic system	Hydraulic pump							
	Oil leakage, abnormal vibration and noise			○			○	
	Lift cylinder and tilt cylinder							
	Operating condition and oil leakage	○		○			○	
	Dents, cracking, bends, scratches, and mounting bolt looseness			○			○	
	Cylinder drift and tilt by itself						○	
	Directional control valve							
	Operating condition and oil leakage	○		○			○	
	Play and mounting bolt looseness			○			○	
	Relief pressure						○	
	Hydraulic oil							
	Hydraulic oil tank damage and cracks						○	
	Oil replacement					○		6
	Tank oil level, contamination and oil leakage	○		○			○	
	Tank cleaning						○	
	Air breather replacement						○	12
	Line filter replacement					○		6
	Strainer cleaning						○	
	Piping							
	Piping damage, oil leakage and deformation	○		○			○	
	Piping clip loosening and slipping off			○			○	
	Solenoid valve operation, abnormal noise, abnormal heat and oil leakage						○	
Electric system	Charging system function						○	
	Battery							
	Electrolyte level	○		○			○	
	Looseness and corrosion of terminal connection						○	
	Wiring							
	Looseness and damages at connection			○			○	
Traveling equipment	Front axle							
	Axle cracks, damage and deformation, and mounting bolt looseness						○	
	Rear axle							
	Axle cracks, damage and deformation, and mounting bolt looseness						○	
	Center pin play, and cap mounting bolt looseness						○	
	Wheel							
	Tyre inflation pressure	○		○			○	
	Tyre crack and damage	○		○			○	
	Tyre tread depth and abnormal wear	○		○			○	
	Tyre condition						○	
	Play and abnormal noise of front wheel bearing			○			○	
	Play and abnormal noise of rear wheel bearing			○			○	
	Looseness of wheel nut and bolt			○		○	○	
	Disc and wheel deformation, cracking and damage			○			○	

	Inspection & Maintenance Item	Inspection & Maintenance Intervals (hours)						Replacement Intervals (month)
		At startup	Every 2 weeks (100h)	Every 1 month (200h)	Every 3 months (600h)	Every 6 months (1200h)	Every 1 year (2400h)	
Safety devices, chassis, etc.	Main Body							
	Looseness and damage of mounting bolt and nut						○	
	Cracks and deformation						○	
	Overhead guard							
	Looseness, deformation, damage and cracking of mounting bolt	○		○			○	
	Looseness and damage of each part						○	
	Seat							
	Seat operation, looseness and damage of mounting bolt, and seat belt damage			○			○	
	Operating condition of seat belt lock	○					○	
	Function of buckle or retractor	○		○			○	
	Open seam of seat belt webbing			○			○	
	Turn signal lamp							
	Lighting and flashing operations, contamination and damage	○		○			○	
	Alarms							
	Operation, sound volume and tone	○		○			○	
	Lighting device							
	Operating condition (Head lamp, clearance lamp, brake lamp and backup lamp)	○		○			○	
	Instrument operating condition, installation condition, breakage and water entry	○		○			○	
	Rear view mirror							
	Contamination, damage, reflection and installation condition	○		○			○	
	Lubrication			○		○	○	
	Backup buzzer performance	○						
	Display board damage and installation condition						○	
	Abnormality found on preceding day	○						
	Safety device performance							
	(Travel interlock, lift interlock and neutral safety)	○						
	Parking brake reminder buzzer	○						
Comprehensive test	Operation of various devices	○		○	○	○	○	
	Abnormal vibration, noise, odor and heating	○						

4.15 PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

For your safety use of lift trucks, you are requested to always implement periodic replacement of parts listed in the Periodic Replacement of Safety Critical Parts below related particularly to the safety and fires.
The material of these parts may change over time, or may easily wear or deteriorate. However, as it is difficult to judge the condition of the parts simply by periodic maintenance, they should always be replaced after a fixed time has passed, regardless of their condition. This is necessary to ensure that their full function is always maintained.
However, 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 sign of deterioration such as deformation or cracking, replace them with the hoses at the same time.
Note that the periodic replacement is not covered by warranty.

IMPORTANT PARTS LIST

No.	Part name	Years elapsed
1	Master cylinder, wheel cylinder cup and dust seal, etc.	1
2	Rubber parts for brake booster	1
3	Brake hose or tube	2
4	Reservoir tank and tube	2
5	Power steering hose	2
6	Stop lamp switch (hydraulic type)	2
7	Fuel hose	2
8	Rubber parts inside power steering system	2
9	Lift chain	2 - 4
10	Hydraulic hose (for travel, loading & unloading and torque converter)	2

4.16 SERVICE DATA

SERVICE DATA (GASOLINE ENGINE LIFT TRUCK)

Component		Inspection item		Unit	FG10/15/18-21	FG15H/18H-21
Engine	Engine proper	Engine model		–	NISSAN K15	NISSAN K21
		Idling speed		rpm	750 - 900	750 - 900
		Max. speed		rpm	2900 - 3100	2900 - 3100
		Compression		MPa (PSI) {kgf/cm^2}/rpm	1.27 (185) {13.0} / 250	1.23 (177) {12.5} / 250
	Lubricating oil cooling system	Fan belt deflection mm (98N{10kgf}by finger force)		mm (in)	11 - 13 (0.43 - 0.51)	11 - 13 (0.43 - 0.51)
	Fuel system	Injection timing		deg-BTDC	–	–
		Injection order		–	–	–
		Injection pressure		MPa (PSI) {kgf/cm^2}	–	–
	Intake, exhaust system	Valve Clearance	Intake	mm (in)	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]
			Exhaust	mm (in)	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]
	Electric system	Distributor point gap		–	–	–
		Spark plug gap		mm (in)	0.8 - 0.9 (0.031 - 0.035)	0.8 - 0.9 (0.031 - 0.035)
		Spark plug type		–	FR2A - D	FR2A - D
		Ignition timing		deg-BTDC/rpm	4 / 850	2 / 850
		Firing order		–	1 - 3 - 4 - 2	1 - 3 - 4 - 2
Travel System	Tyres	Tyre inflation pressure	Front wheels	kPa (PSI) {kgf/cm^2}	700 (101) {7.1}	700 (101) {7.1}
			Rear wheels	kPa (PSI) {kgf/cm^2}	800 (116) {8.2}	800 (116) {8.2}
	Hub nut	Tightening torque	Front wheels	Nm {kgfm}	157 - 245 {16 - 25}	157 - 245 {16 - 25}
			Rear wheels	Nm {kgfm}	83 - 147 {8.5 - 15}	83 - 147 {8.5 - 15}
	Rim mating nuts	Tightening torque	Front wheels	Nm {kgfm}	88 - 123 {9.0 - 12.5}	88 - 123 {9.0 - 12.5}
			Rear wheels	Nm {kgfm}	59 - 74 {6.0 - 7.5}	59 - 74 {6.0 - 7.5}
Steering, braking system	Steering wheel	Play (At the time of a pump operation)		mm (in)	10 - 30 (0.4 - 1.2)	10 - 30 (0.4 - 1.2)
	Clutch pedal	Play		mm (in)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)
	Inching pedal	Play		mm (in)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)
		Interconnected stroke		mm (in)	35 - 41 (1.38 - 1.61)	35 - 41 (1.38 - 1.61)
	Brake pedal	Play		mm (in)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)
		Pedal height when pedal is depressed		mm (in)	76 - 96 (3.0 - 3.8)	76 - 96 (3.0 - 3.8)
	BRAKE	Parking brake operating force		N {kgf}	147 - 196 {15 - 20}	147 - 196 {15 - 20}
		Tightening torque for back plate mounting bolts		Nm {kgfm}	176 - 196 {18 - 20}	176 - 196 {18 - 20}
Loading equipment	Fork	Fork thickness at base		mm (in)	1.0 ton lift truck : Min. 26 (1.02) 1.5 ton lift truck : Min. 30 (1.18) 1.75 ton lift truck: Min. 33 (1.30)	
	Chain	Length over 17 links		mm (in)	Max. 275.5 (10.8)	Max. 275.5 (10.8)
	Hydraulic system	Relief pressure		MPa (PSI) {kgf/cm^2}	17.2 (2490) {175}	17.2 (2490) {175}

Component		Inspection item		Unit	FG20/25-17	FG20H/25H-17	FG20N/25N-17
Engine	Engine proper	Engine model		–	NISSAN K21	NISSAN K25	NISSAN K21
		Idling speed		rpm	750 - 900	750 - 900	750 - 900
		Max. speed		rpm	2900 - 3100	2720 - 2920	2900 - 3100
		Compression		MPa (PSI) {kgf/cm^2}/rpm	1.23 (177) {12.5} / 250	1.27 (185) {13.0} / 250	1.23 (177) {12.5} / 250
	Lubricating oil cooling system	Fan belt deflection mm (98N{10kgf} by finger force)		mm (in)	11 - 13 (0.43 - 0.51)	11 - 13 (0.43 - 0.51)	11 - 13 (0.43 - 0.51)
	Fuel system	Injection timing		deg-BTDC	–	–	–
		Injection order		–	–	–	–
		Injection pressure		MPa (PSI) {kgf/cm^2}	–	–	–
	Intake, exhaust system	Valve clearance	Intake	mm (in)	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]
			Exhaust	mm (in)	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]
	Electric system	Distributor point gap		–	–	–	–
		Spark plug gap		mm (in)	0.8 - 0.9 (0.031 - 0.035)	0.8 - 0.9 (0.031 - 0.035)	0.8 - 0.9 (0.031 - 0.035)
		Spark plug type		–	FR2A - D(*1)	FR2A - D(*1)	FR2A - D(*1)
		Ignition timing		deg-BTDC/rpm	2 / 850	0 / 850	2 / 850
		Firing order		–	1 - 3 - 4 - 2	1 - 3 - 4 - 2	1 - 3 - 4 - 2
Travel System	Tyres	Tyre inflation pressure	Front wheels	kPa (PSI) {kgf/cm^2}	700 (101) {7.1}	700 (101) {7.1}	-
			Rear wheels	kPa (PSI) {kgf/cm^2}	700 (101) {7.1}	700 (101) {7.1}	-
	Hub nut	Tightening torque	Front wheels	Nm {kgfm}	294 - 490 {30 - 50}	294 - 490 {30 - 50}	294 - 490 {30 - 50}
			Rear wheels	Nm {kgfm}	157 - 245 {16 - 25}	157 - 245 {16 - 25}	157 - 245 {16 - 25}
	Rim bolt	Tightening torque	Front wheels	Nm {kgfm}	196 - 294 {20 - 30}		–
			Rear wheels	Nm {kgfm}	88 - 123 {9 - 12.5}	88 - 123 {9 - 12.5}	–
Steering, braking system	Steering wheel	Play		mm (in)	10 - 30 (0.4 - 1.2)	10 - 30 (0.4 - 1.2)	10 - 30 (0.4 - 1.2)
	Clutch pedal	Play		mm (in)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)	–
	Inching pedal	Play		mm (in)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)
		Interconnected stroke		mm (in)	35 - 41 (1.38 - 1.61)	35 - 41 (1.38 - 1.61)	35 - 41 (1.38 - 1.61)
	Brake pedal	Play		mm (in)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)
		Pedal height when pedal is depressed		mm (in)	62 - 82 (2.4 - 3.2)	62 - 82 (2.4 - 3.2)	62 - 82 (2.4 - 3.2)
	BRAKE	Parking brake operating force		N {kgf}	147 - 196 {15 - 20}(*2)	147 - 196 {15 - 20}(*2)	147 - 196 {15 - 20}(*2)
		Back plate mounting bolt tightening torque		Nm {kgfm}	176 - 196 {18 - 20}	176 - 196 {18 - 20}	176 - 196 {18 - 20}
Loading equipment	Fork	Fork thickness (at base)		mm (in)	2 ton lift truck : Min. 32.5 (1.28) 2.5 ton lift truck : Min. 36 (1.42)		
	Chain	Length over 17 links		mm (in)	2 - 2.5 ton lift truck : Max. 330 (13.0)		
	Hydraulic system	Relief pressure		MPa (PSI) {kgf/cm^2}	18 (2630) {185}	18 (2630) {185}	18 (2630) {185}

*1: Use BP4ES for lift trucks of LPG specifications to prevent engine knocking and run-on.

*2: Power brake-installed lift truck: 245 - 294N (25 - 30kgf).

Component		Inspection item		Unit	FG30-17	FG30N-17	FG35A-17
Engine	Engine proper	Engine model		–	NISSAN K25	NISSAN K25	NISSAN K25
		Idling speed		rpm	750 - 900	750 - 900	750 - 900
		Max. speed		rpm	2720 - 2920	2720 - 2920	2720 - 2920
		Compression		MPa (PSI) {kgf/cm^2}/rpm	1.27 (185) {13.0} / 250	1.27 (185) {13.0} / 250	1.27 (185) {13.0} / 250
	Lubricating oil cooling system	Fan belt deflection mm (98N{10kgf}by finger force)		mm (in)	11 - 13 (0.43 - 0.51)	11 - 13 (0.43 - 0.51)	11 - 13 (0.43 - 0.51)
	Fuel system	Injection timing		deg-BTDC	–	–	–
		Injection order		–	–	–	–
		Injection pressure		MPa (PSI) {kgf/cm^2}	–	–	–
	Intake, exhaust system	Valve clearance	Intake	mm (in)	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]
			Exhaust	mm (in)	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]	0.38 (0.015) [Warm]
	Electric system	Distributor point gap		–	–	–	–
		Spark plug gap		mm (in)	0.8 - 0.9 (0.031 - 0.035)	0.8 - 0.9 (0.031 - 0.035)	0.8 - 0.9 (0.031 - 0.035)
		Spark plug type		–	FR2A - D(*1)	FR2A - D(*1)	FR2A - D(*1)
		Ignition timing		deg-BTDC/rpm	0 / 850	0 / 850	0 / 850
		Firing order		–	1 - 3 - 4 - 2	1 - 3 - 4 - 2	1 - 3 - 4 - 2
Travel System	Tyres	Tyre inflation pressure	Front wheels	kPa (PSI) {kgf/cm^2}	700 (101) {7.1}	–	850 (121) {8.5}
			Rear wheels	kPa (PSI) {kgf/cm^2}	700 (101) {7.1}	–	900 (130) {9.2}
	Hub nut	Tightening torque	Front wheels	Nm {kgfm}	294 - 490 {30 - 50}	294 - 490 {30 - 50}	294 - 490 {30 - 50}
			Rear wheels	Nm {kgfm}	157 - 245 {16 - 25}	157 - 245 {16 - 25}	157 - 245 {16 - 25}
	Rim bolt	Tightening torque	Front wheels	Nm {kgfm}	–	–	–
			Rear wheels	Nm {kgfm}	–	–	–
Steering, braking system	Steering wheel	Play		mm (in)	10 - 30 (0.4 - 1.2)	10 - 30 (0.4 - 1.2)	10 - 30 (0.4 - 1.2)
	Clutch pedal	Play		mm (in)	–	–	–
	Inching pedal	Play		mm (in)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)
		Interconnected stroke		mm (in)	35 - 41 (1.38 - 1.61)	35 - 41 (1.38 - 1.61)	40 - 46 (1.58 - 1.81)
	Brake pedal	Play		mm (in)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)	0 - 4 (0 - 0.158)
		Pedal height when pedal is depressed		mm (in)	62 - 82 (2.4 - 3.2)	62 - 82 (2.4 - 3.2)	62 - 82 (2.4 - 3.2)
	BRAKE	Parking brake operating force		N {kgf}	147 - 196 {15 - 20}(*2)	147 - 196 {15 - 20}(*2)	147 - 196 {15 - 20}(*2)
		Back plate mounting bolt tightening torque		Nm {kgfm}	176 - 196 {18 - 20}	176 - 196 {18 - 20}	245 - 294 {25 - 30}
Loading equipment	Fork	Fork thickness at base		mm (in)	3 ton lift truck : Min. 39.5 (1.60) 3.5 ton lift truck: Min. 45 (1.80)		
	Chain	Length over 17 links		mm (in)	3 ton lift truck : Max. 550 (21.7) 3.5 ton lift truck: Max. 440 (17.3)		
	Hydraulic system	Relief pressure		MPa (PSI) {kgf/cm^2}	18 (2630) {185}	18 (2630) {185}	18 (2630) {185}

*1: Use BP4ES for lift trucks of LPG specifications to prevent engine knocking and run-on.

*2: Power brake-installed lift truck: 245 - 294N (25 - 30kgf).

SERVICE DATA (DIESEL ENGINE LIFT TRUCK)

Component		Inspection item		Unit	FD10/15/18-21
Engine	Engine proper	Engine model		–	Komatsu 4D92E
		Idling speed		rpm	785 - 835
		Max. speed		rpm	2700 - 2750
		Compression		MPa (PSI) {kgf/cm²}/rpm	2.94 (426) {30} / 250
	Lubricating oil cooling system	Fan belt deflection mm (98N{10kgf} by finger force)		mm (in)	10 - 15 (0.39 - 0.59)
	Fuel system	Injection timing		deg-BTDC	ATDC4
		Injection order		–	1 - 3 - 4 - 2
		Injection pressure		MPa (PSI) {kgf/cm²}	12.7 (1850) {130}
	Intake, exhaust system	Valve clearance	Intake	mm (in)	0.2 (Cold)
			Exhaust	mm (in)	0.2 (Cold)
	Electric system	Distributor point gap		mm (in)	–
		Spark plug gap		mm (in)	–
		Ignition timing		deg-BTDC/rpm	–
		Ignition order		–	–
Travel System	Tyres	Tyre inflation pressure	Front wheels	kPa (PSI) {kgf/cm²}	700 (101) {7.1}
			Rear wheels	kPa (PSI) {kgf/cm²}	800 (116) {8.2}
	Hub nut	Tightening torque	Front wheels	Nm {kgfm}	157 - 245 {16 - 25}
			Rear wheels	Nm {kgfm}	83 - 147 {8.5 - 15}
	Rim mating bolts	Tightening torque	Front wheels	Nm {kgfm}	88 - 123 {9.0 - 12.5}
			Rear wheels	Nm {kgfm}	59 - 74 {6.0 - 7.5}
Steering, braking system	Steering wheel	Play (At the time of a pump operation)		mm (in)	10 - 30 (0.4 - 1.2)
	Clutch pedal	Play		mm (in)	0 - 4 (0 - 0.158)
	Inching pedal	Play		mm (in)	0 - 4 (0 - 0.158)
		Interconnected stroke		mm (in)	36 - 40 (1.42 - 1.58)
	Brake pedal	Play		mm (in)	0 - 4 (0 - 0.158)
		Pedal height when pedal is depressed		mm (in)	76 - 96 (3.0 - 3.8)
	BRAKE	Parking brake operating force		N {kgf}	147 - 196 {15 - 20}
		Back plate mounting bolt tightening torque		Nm {kgfm}	176 - 196 {18 - 20}
Loading equipment	Fork	Fork thickness at base		mm (in)	1.0 ton lift truck : Min. 26 (1.02) 1.5 ton lift truck : Min. 30 (1.18) 1.75 ton lift truck: Min. 33 (1.30)
	Chain	Length over 17 links		mm (in)	Max. 275.5 (10.8)
	Hydraulic system	Relief pressure		MPa (PSI) {kgf/cm²}	17.2 (2490) {175}

Component		Inspection item		Unit	FD20/25/30-17
Engine	Engine proper	Engine model		–	Komatsu 4D94LE
		Idling speed		rpm	785 - 835
		Max. speed		rpm	2425 - 2475
		Compression		MPa (PSI) {kgf/cm^2}/rpm	2.94 (426) {30} / 250
	Lubricating oil cooling system	Fan belt deflection mm (98N{10kgf}by finger force)		mm (in)	10 - 15 (0.39 - 0.59)
	Fuel system	Injection timing		deg-BTDC	ATDC4
		Injection order		–	1 - 3 - 4 - 2
		Injection pressure		MPa (PSI) {kgf/cm^2}	12.7 (1850) {130}
	Intake, exhaust system	Valve clearance	Intake	mm (in)	0.2 (0.0079) [Cool]
			Exhaust	mm (in)	0.2 (0.0079) [Cool]
	Electric system	Distributor point gap		mm (in)	–
		Spark plug gap		mm (in)	–
		Ignition timing		deg-BTDC/rpm	–
		Ignition order		–	–
Travel System	Tyres	Tyre inflation pressure	Front wheels	kPa (PSI) {kgf/cm^2}	700 (101) {7.1}
			Rear wheels	kPa (PSI) {kgf/cm^2}	700 (101) {7.1}
	Hub nut	Tightening torque	Front wheels	Nm {kgfm}	294 - 490 {30 - 50}
			Rear wheels	Nm {kgfm}	157 - 245 {16 - 25}
	Rim bolt	Tightening torque	Front wheels	Nm {kgfm}	196 - 294 {20 - 30} [except 3 ton lift truck]
			Rear wheels	Nm {kgfm}	88 - 123 {9 - 12.5}
Steering, braking system	Steering wheel	Play		mm (in)	10 - 30 (0.4 - 1.2)
	Clutch pedal	Play		mm (in)	0 - 4 (0 - 0.158)
	Inching pedal	Play		mm (in)	0 - 4 (0 - 0.158)
		Interconnected stroke		mm (in)	36 - 40 (1.42 - 1.58)
	Brake pedal	Play		mm (in)	0 - 4 (0 - 0.158)
		Pedal height when pedal is depressed		mm (in)	62 - 82 (2.4 - 3.2)
	BRAKE	Parking brake operating force		N {kgf}	147 - 196 {15 - 20}
		Back plate mounting bolt tightening torque		Nm {kgfm}	176 - 196 {18 - 20}
Loading equipment	Fork	Fork thickness at base		mm (in)	2 ton lift truck : Min. 32.5 (1.28) 2.5 ton lift truck : Min. 36 (1.42) 3 ton lift truck : Min. 39.5 (1.56) 3.5 ton lift truck : Min. 45 (1.80)
	Chain	Length over 17 links		mm (in)	2 - 2.5 ton lift truck: Max. 330 (13.0) 3 ton lift truck : Max. 550 (21.7) 3.5 ton lift truck : Max. 440 (17.3)
	Hydraulic system	Relief pressure		MPa (PSI) {kgf/cm^2}	18.1 (2630) {185}

*1: FD35A: 40 - 46 mm (1.6 - 1.8 in).

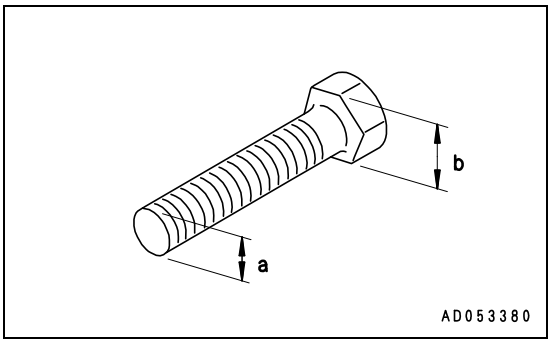
*2: FD35A and power brake-installed lift truck: 245 - 294N (25 - 30kgf).

Component		Inspection item		Unit	FD20H/25H/30H/35A-17
Engine	Engine proper	Engine model		–	Komatsu 4D98E
		Idling speed		rpm	820 - 870
		Max. speed		rpm	2700 - 2750
		Compression		MPa (PSI) {kgf/cm²}/rpm	2.94 (426) {30} / 250
	Lubricating oil cooling system	Fan belt deflection mm (98N{10kgf}by finger force)		mm (in)	10 - 15 (0.39 - 0.59)
	Fuel system	Injection timing		deg-BTDC	ATDC11
		Injection order		–	1 - 3 - 4 - 2
		Injection pressure		MPa (PSI) {kgf/cm²}	12.7 (1850) {130}
	Intake, exhaust system	Valve clearance	Intake	mm (in)	0.2 (0.0079) [Cool]
			Exhaust	mm (in)	0.2 (0.0079) [Cool]
	Electric system	Distributor point gap		mm (in)	–
		Spark plug gap		mm (in)	–
		Ignition timing		deg-BTDC/rpm	–
		Ignition order		–	–
Travel System	Tyres	Tyre inflation pressure	Front wheels	kPa (PSI) {kgf/cm²}	700 (101) {7.1} (*1)
			Rear wheels	kPa (PSI) {kgf/cm²}	700 (101) {7.1} (*2)
	Hub nut	Tightening torque	Front wheels	Nm {kgfm}	294 - 490 {30 - 50}
			Rear wheels	Nm {kgfm}	157 - 245 {16 - 25}
	Rim bolt	Tightening torque	Front wheels	Nm {kgfm}	196 - 294 {20 - 30} [except 3 ton lift truck]
			Rear wheels	Nm {kgfm}	88 - 123 {9 - 12.5}
Steering, braking system	Steering wheel	Play		mm (in)	10 - 30 (0.4 - 1.2)
	Clutch pedal	Play		mm (in)	0 - 4 (0 - 0.158)
	Inching pedal	Play		mm (in)	0 - 4 (0 - 0.158)
		Interconnected stroke		mm (in)	36 - 40 (1.42 - 1.58) (*3)
	Brake pedal	Play		mm (in)	0 - 4 (0 - 0.158)
		Pedal height when pedal is depressed		mm (in)	62 - 82 (2.4 - 3.2)
	BRAKE	Parking brake operating force		N {kgf}	147 - 196 {15 - 20} (*4)
		Back plate mounting bolt tightening torque		Nm {kgfm}	176 - 196 {18 - 20}
Loading equipment	Fork	Fork thickness at base		mm (in)	2 ton lift truck : Min. 32.5 (1.28) 2.5 ton lift truck : Min. 36 (1.42) 3 ton lift truck : Min. 39.5 (1.56) 3.5 ton lift truck : Min. 45 (1.80)
	Chain	Length over 17 links		mm (in)	2 - 2.5 ton lift truck: Max. 330 (13.0) 3 ton lift truck : Max. 550 (21.7) 3.5 ton lift truck : Max. 440 (17.3)
	Hydraulic system	Relief pressure		MPa (PSI) {kgf/cm²}	18.1 (2630) {185}

*1: FD35A: 850 kPa (121 PSI) {8.5 kgf/cm²}.
*2: FD35A: 900 kPa (130 PSI) {9.2 kgf/cm²}.
*3: FD35A: 40 - 46 mm (1.58 - 1.81 in).
*4: FD35A: 245 - 294N (25 - 30kgf).

BOLT TIGHTENING TORQUE

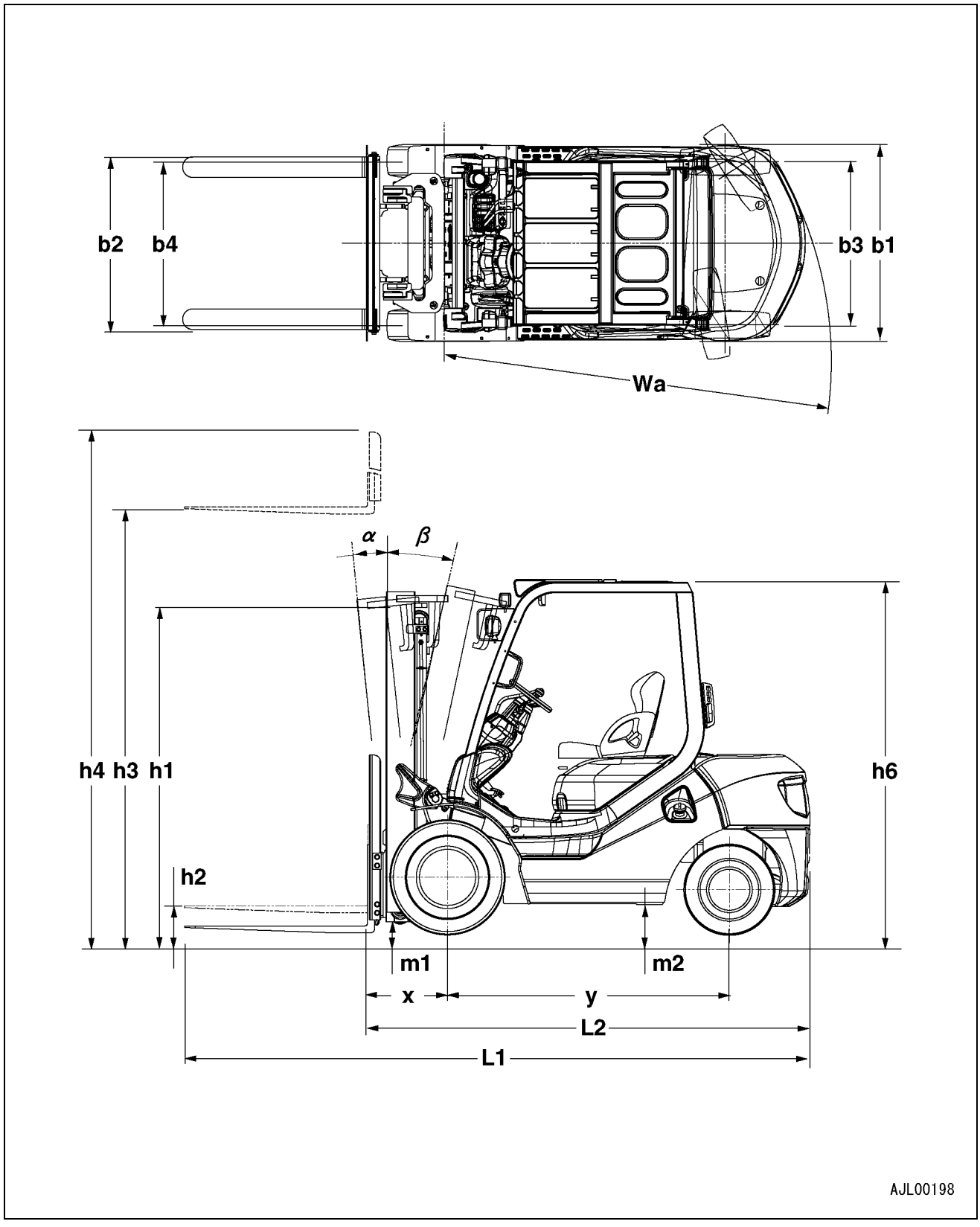
- For unspecified metric bolts and nuts, use the torques specified in this list.
- Select a proper torque corresponding to the width across flats (b) of bolts and nuts.
- When replacing bolts and nuts, always use Komatsu Genuine Parts of the same size as the previous ones.



Thread outside diameter (a) mm	Width across flat (b) mm	Tightening torque Nm {kgfm}	
		Within target	allowable range
6	10	13 {1.35}	12 - 15 {1.2 - 1.5}
8	13	31 {3.2}	27 - 34 {2.8 - 3.5}
10	17	66 {6.7}	59 - 74 {6.0 - 7.5}
12	19	113 {11.5}	98 - 123 {10.0 - 12.5}
14	22	177 {18.0}	157 - 196 {16.0 - 20.0}
16	24	279 {28.5}	245 - 309 {25.0 - 31.5}
18	27	382 {39.0}	343 - 427 {35.0 - 43.5}
20	30	549 {56.0}	490 - 608 {50.0 - 62.0}
22	32	745 {76.0}	662 - 829 {67.5 - 84.5}
24	36	927 {94.5}	824 - 1030 {84.0 - 105.0}
27	41	1324 {135.0}	1177 - 1471 {120.0 - 150.0}
30	46	1716 {175.0}	1520 - 1912 {155.0 - 195.0}
33	50	2206 {225.0}	1961 - 2452 {200.0 - 250.0}
36	55	2746 {280.0}	2452 - 3040 {250.0 - 310.0}
39	60	3285 {335.0}	2893 - 3628 {295.0 - 370.0}

TECHNICAL DATA

5. TECHNICAL DATA



AX50 (1.0 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation			FG10T-21	FG10C-21	FD10T-21	FD10C-21
	1.3	Power Type	Electric, Diesel, Gasoline, LPG			Gasoline		Diesel	
	1.4	Operation Type				Sitting		Sitting	
	1.5	Rated Capacity	Rated Capacity		kg	1000		1000	
	1.6	Load Center	Rated Load Center		mm	500		500	
	1.6.1	Alternative Capacity	Capacity@600mm Load Center		kg	910		910	
	1.8	Load Distance	x	Front Axle Center to Fork Face	mm	400		400	
	1.9	Wheelbase	y		mm	1400		1400	
Weight	2.1	Service Weight			kg	2080	2120	2180	2220
	2.2	Axle Loading	Loaded	Front	kg	2725	2735	2760	2765
	2.2.1			Rear	kg	355	360	420	430
	2.3		Unloaded	Front	kg	1065	1075	1095	1105
	2.3.1			Rear	kg	1015	1020	1085	1090
Tyres	3.1	Tyre Type				Pneumatic		Pneumatic	
	3.2	Tyre Size	Front			6.50-10-10PR(I)		6.50-10-10PR(I)	
	3.3		Rear			5.00- 8- 8PR(I)		5.00- 8- 8PR(I)	
	3.5	Number of Wheel	Front/Rear (x=driven)			2*/2		2*/2	
	3.6	Tread, Front	b4		mm	890		890	
	3.7	Tread, Rear	b3		mm	895		895	
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward	degree	6/10		6/10	
	4.2	Mast Height, Lowered	h1	2-stage Mast	mm	1995		1995	
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground	mm	135		135	
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground	mm	3000		3000	
	4.5	Mast Height, Extended	h4	2-stage Std. Mast	mm	3955		3955	
	4.7	Height, Overhead Guard	h6		mm	2070		2070	
	4.19	Length, with Std. Forks	L1		mm	2965		2965	
	4.20	Length, to Fork Face	L2		mm	2195		2195	
	4.21	Width, at Tyre	b1	Single	mm	1070		1070	
	4.22	Forks	Thickness x Width x Length		mm	31x100x770		31x100x770	
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no			Class 2		Class 2	
	4.24	Width, Fork Carriage	b2		mm	970		970	
	4.31	Ground Clearance	m1	Under Mast	mm	120		120	
	4.32		m2	at Center of Wheelbase	mm	130		130	
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet		mm	3315		3315	
	4.34		with L1200 x W800 pallet		mm	3515		3515	
	4.35	Turning Radius	Wa		mm	1915		1915	
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd		km/h	19.0	9.0/19.0	19.0	8.5/19.0
			Unloaded, 1st/2nd		km/h	19.0	9.0/19.0	19.5	8.5/19.5
	5.2	Lifting Speed	Loaded		mm/s	580		620	
			Unloaded		mm/s	640		670	
	5.3	Lowering Speed	Loaded		mm/s	500		500	
			Unloaded		mm/s	550		550	
	5.6	Max. Drawbar Pull	Loaded		KN	10	11	13	14
	5.8	Max. Gradeability	Loaded		%	34	38	49	41
	5.10	Service Brake	Operation/Control			Foot/Hydraulic		Foot/Hydraulic	
	5.11	Parking Brake	Operation/Control			Hand/Mechanical		Hand/Mechanical	
	5.12	Steering	Type			FHPS		FHPS	
	6.4	Battery	Voltage/ Capacity at 5-hour rating		V/ah	12/33		12/64	
I.C Engine	7.1	Maker Model				NISSAN K15		Komatsu 4D92E	
	7.2	Rated Output, SAE gross			KW	27@2500		35@2450	
	7.3	Rated RPM			min-1	2500		2450	
	7.3.1	Max. Torque, SAE gross			Nm@min-1	113@1600		142@1800	
	7.4	No. of Cylinder/Displacement			cm^3	4-1486		4-2659	
Others	7.6	Fuel Tank Capacity			Ltr	40		40	
	8.2	Relief Pressure for Attachment			bar	172		172	
	8.7	Transmission				TORQFLOW	Manual	TORQFLOW	Manual
Noise Level		L_{pAZ} as Measured in accordance with EN12053			dB(A)	82		84	
		K_{PZ} The uncertainty of measurement in accordance with EN12053				2.5		2.5	
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC			dB(A)	105		106	
		The uncertainty of measurement				2.1		1.3	
Vibration		VIBRATION in accordance with EN 13059			m/s^2	0.7		0.7	
		The uncertainty of measurement				0.4		0.4	

AX50 (1.5 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation			FG15T-21	FG15C-21	FD15T-21	FD15C-21	FG15HT-21	FG15HC-21
	1.3	Power Type	Electric, Diesel, Gasoline, LPG			Gasoline		Diesel		Gasoline	
	1.4	Operation Type				Sitting		Sitting		Sitting	
	1.5	Rated Capacity	Rated Capacity		kg	1500		1500		1500	
	1.6	Load Center	Rated Load Center		mm	500		500		500	
	1.6.1	Alternative Capacity	Capacity@600mm Load Center		kg	1360		1360		1360	
	1.8	Load Distance	x	Front Axle Center to Fork Face	mm	405		405		405	
	1.9	Wheelbase	y		mm	1400		1400		1400	
Weight	2.1	Service Weight			kg	2450	2490	2550	2590	2450	2490
	2.2	Axle Loading	Loaded	Front	kg	3500	3510	3530	3540	3500	3510
	2.2.1			Rear	kg	450	455	520	525	450	455
	2.3		Unloaded	Front	kg	1005	1015	1035	1045	1005	1015
	2.3.1			Rear	kg	1445	1450	1515	1520	1445	1450
Tyres	3.1	Tyre Type				Pneumatic		Pneumatic		Pneumatic	
	3.2	Tyre Size	Front			6.50-10-10PR(I)		6.50-10-10PR(I)		6.50-10-10PR(I)	
	3.3		Rear			5.00- 8- 8PR(I)		5.00- 8- 8PR(I)		5.00- 8- 8PR(I)	
	3.5	Number of Wheel	Front/Rear (x=driven)			2*/2		2*/2		2*/2	
	3.6	Tread, Front	b4		mm	890		890		890	
	3.7	Tread, Rear	b3		mm	895		895		895	
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward	degree	6/10		6/10		6/10	
	4.2	Mast Height, Lowered	h1	2-stage Mast	mm	1995		1995		1995	
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground	mm	140		140		140	
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground	mm	3000		3000		3000	
	4.5	Mast Height, Extended	h4	2-stage Std. Mast	mm	3955		3955		3955	
	4.7	Height, Overhead Guard	h6		mm	2070		2070		2070	
	4.19	Length, with Std. Forks	L1		mm	3160		3160		3160	
	4.20	Length, to Fork Face	L2		mm	2240		2240		2240	
	4.21	Width, at Tyre	b1	Single	mm	1070		1070		1070	
	4.22	Forks	Thickness x Width x Length		mm	35x100x920		35x100x920		35x100x920	
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no			Class 2		Class 2		Class 2	
	4.24	Width, Fork Carriage	b2		mm	970		970		970	
	4.31	Ground Clearance	m1	Under Mast	mm	120		120		120	
	4.32		m2	at Center of Wheelbase	mm	130		130		130	
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet		mm	3360		3360		3360	
	4.34		with L1200 x W800 pallet		mm	3560		3560		3560	
	4.35	Turning Radius	Wa		mm	1955		1955		1955	
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd		km/h	18.5	8.5/18.5	18.5	8.5/19.0	18.5	8.5/18.5
			Unloaded, 1st/2nd		km/h	19.0	9.0/19.0	19.0	8.5/19.5	19.0	9.0/19.0
	5.2	Lifting Speed	Loaded		mm/s	570		620		590	
			Unloaded		mm/s	640		670		640	
	5.3	Lowering Speed	Loaded		mm/s	500		500		500	
			Unloaded		mm/s	550		550		550	
	5.6	Max. Drawbar Pull	Loaded		KN	10	11	13	14	15	14
	5.8	Max. Gradeability	Loaded		%	26	27	33	31	37	35
	5.10	Service Brake	Operation/Control			Foot/Hydraulic		Foot/Hydraulic		Foot/Hydraulic	
	5.11	Parking Brake	Operation/Control			Hand/Mechanical		Hand/Mechanical		Hand/Mechanical	
	5.12	Steering	Type			FHPS		FHPS		FHPS	
	6.4	Battery	Voltage/ Capacity at 5-hour rating		V/ah	12/33		12/64		12/33	
I.C Engine	7.1	Maker Model				NISSAN K15		Komatsu 4D92E		NISSAN K21	
	7.2	Rated Output, SAE gross			KW	27@2500		35@2450		35@2450	
	7.3	Rated RPM			min-1	2500		2450		2450	
	7.3.1	Max. Torque, SAE gross			Nm@min-1	113@1600		142@1800		152@1600	
	7.4	No. of Cylinder/Displacement			cm^3	4-1486		4-2659		4-2065	
Others	7.6	Fuel Tank Capacity			Ltr	40		40		40	
	8.2	Relief Pressure for Attachment			bar	172		172		172	
	8.7	Transmission				TORQFLOW	Manual	TORQFLOW	Manual	TORQFLOW	Manual
Noise Level		L_{pAZ} as Measured in accordance with EN12053			dB(A)	82		84		82	
		K_{PZ} The uncertainty of measurement in accordance with EN12053				2.5		2.5		2.5	
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC			dB(A)	105		106		105	
		The uncertainty of measurement				2.1		1.3		2.1	
Vibration		VIBRATION in accordance with EN 13059			m/s^2	0.7		0.7		0.7	
		The uncertainty of measurement				0.4		0.4		0.4	

AX50 (1.8 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation			FG18T-21	FG18C-21	FD18T-21	FD18C-21	FG18HT-21	FG18HC-21
	1.3	Power Type	Electric, Diesel, Gasoline, LPG			Gasoline		Diesel		Gasoline	
	1.4	Operation Type				Sitting		Sitting		Sitting	
	1.5	Rated Capacity	Rated Capacity		kg	1750		1750		1750	
	1.6	Load Center	Rated Load Center		mm	500		500		500	
	1.6.1	Alternative Capacity	Capacity@600mm Load Center		kg	1590		1590		1590	
	1.8	Load Distance	x	Front Axle Center to Fork Face	mm	405		405		405	
	1.9	Wheelbase	y		mm	1400		1400		1400	
Weight	2.1	Service Weight			kg	2645	2685	2745	2785	2645	2685
	2.2	Axle Loading	Loaded	Front	kg	3870	3880	3900	3910	3870	3880
	2.2.1			Rear	kg	525	530	595	600	525	530
	2.3		Unloaded	Front	kg	960	970	990	1000	960	970
	2.3.1			Rear	kg	1685	1690	1755	1760	1685	1690
Tyres	3.1	Tyre Type				Pneumatic		Pneumatic		Pneumatic	
	3.2	Tyre Size	Front			6.50-10-10PR(I)		6.50-10-10PR(I)		6.50-10-10PR(I)	
	3.3		Rear			5.00- 8- 8PR(I)		5.00- 8- 8PR(I)		5.00- 8- 8PR(I)	
	3.5	Number of Wheel	Front/Rear (x=driven)			2*/2		2*/2		2*/2	
	3.6	Tread, Front	b4		mm	890		890		890	
	3.7	Tread, Rear	b3		mm	895		895		895	
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward	degree	6/10		6/10		6/10	
	4.2	Mast Height, Lowered	h1	2-stage Mast	mm	1995		1995		1995	
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground	mm	140		140		140	
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground	mm	3000		3000		3000	
	4.5	Mast Height, Extended	h4	2-stage Std. Mast	mm	3955		3955		3955	
	4.7	Height, Overhead Guard	h6		mm	2070		2070		2070	
	4.19	Length, with Std. Forks	L1		mm	3200		3200		3200	
	4.20	Length, to Fork Face	L2		mm	2280		2280		2280	
	4.21	Width, at Tyre	b1	Single	mm	1070		1070		1070	
	4.22	Forks	Thickness x Width x Length		mm	35x100x920		35x100x920		35x100x920	
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no			Class 2		Class 2		Class 2	
	4.24	Width, Fork Carriage	b2		mm	970		970		970	
	4.31	Ground Clearance	m1	Under Mast	mm	120		120		120	
	4.32		m2	at Center of Wheelbase	mm	130		130		130	
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet		mm	3395		3395		3395	
	4.34		with L1200 x W800 pallet		mm	3595		3595		3595	
	4.35	Turning Radius	Wa		mm	1990		1990		1990	
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd		km/h	18.5	8.5/18.5	18.5	8.5/18.5	18.5	8.5/18.5
			Unloaded, 1st/2nd		km/h	19.0	9.0/19.0	19.0	8.5/19.0	19.0	9.0/19.0
	5.2	Lifting Speed	Loaded		mm/s	570		620		590	
			Unloaded		mm/s	640		670		640	
	5.3	Lowering Speed	Loaded		mm/s	500		500		500	
			Unloaded		mm/s	550		550		550	
	5.6	Max. Drawbar Pull	Loaded		KN	10	11	13	14	15	14
	5.8	Max. Gradeability	Loaded		%	25	24	29	28	33	32
	5.10	Service Brake	Operation/Control			Foot/Hydraulic		Foot/Hydraulic		Foot/Hydraulic	
	5.11	Parking Brake	Operation/Control			Hand/Mechanical		Hand/Mechanical		Hand/Mechanical	
	5.12	Steering	Type			FHPS		FHPS		FHPS	
	6.4	Battery	Voltage/ Capacity at 5-hour rating		V/ah	12/33		12/64		12/33	
I.C Engine	7.1	Maker Model				NISSAN K15		Komatsu 4D92E		NISSAN K21	
	7.2	Rated Output, SAE gross			KW	27@2500		35@2450		35@2450	
	7.3	Rated RPM			min-1	2500		2450		2450	
	7.3.1	Max. Torque, SAE gross			Nm@min-1	113@1600		142@1800		152@1600	
	7.4	No. of Cylinder/Displacement			cm^3	4-1486		4-2659		4-2065	
Others	7.6	Fuel Tank Capacity			Ltr	40		40		40	
	8.2	Relief Pressure for Attachment			bar	172		172		172	
	8.7	Transmission				TORQFLOW	Manual	TORQFLOW	Manual	TORQFLOW	Manual
Noise Level		L_{pAZ} as Measured in accordance with EN12053			dB(A)	82		84		82	
		K_{PZ} The uncertainty of measurement in accordance with EN12053				2.5		2.5		2.5	
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC			dB(A)	105		106		105	
		The uncertainty of measurement				2.1		1.3		2.1	
Vibration		VIBRATION in accordance with EN 13059			m/s^2	0.7		0.7		0.7	
		The uncertainty of measurement				0.4		0.4		0.4	

BX50 (2.0 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation				FG20T-17	FD20T-17	FD20C-17
	1.3	Power Type	Electric, Diesel, Gasoline, LPG				Gasoline	Diesel	
	1.4	Operation Type					Sitting	Sitting	
	1.5	Rated Capacity	Rated Capacity			kg	2000	2000	
	1.6	Load Center	Rated Load Center			mm	500	500	
	1.6.1	Alternative Capacity	Capacity@600mm Load Center			kg	1810	1810	
	1.8	Load Distance	x	Front Axle Center to Fork Face		mm	460	460	
	1.9	Wheelbase	y			mm	1650	1650	
Weight	2.1	Service Weight				kg	3220	3305	3345
	2.2	Axle Loading	Loaded		Front	kg	4670	4710	4735
	2.2.1				Rear	kg	550	595	610
	2.3		Unloaded		Front	kg	1480	1520	1545
	2.3.1				Rear	kg	1740	1785	1800
Tyres	3.1	Tyre Type					Pneumatic	Pneumatic	
	3.2	Tyre Size	Front				7.00-12-12PR(I)	7.00-12-12PR(I)	
	3.3		Rear				6.00-09-10PR(I)	6.00-09-10PR(I)	
	3.5	Number of Wheel	Front/Rear (x=driven)				2*/2	2*/2	
	3.6	Tread, Front	b4			mm	965	965	
	3.7	Tread, Rear	b3			mm	960	960	
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward		degree	6/12	6/12	
	4.2	Mast Height, Lowered	h1	2-stage Mast		mm	1995	1995	
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground		mm	150	150	
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground		mm	3000	3000	
	4.5	Mast Height, Extended	h4	2-stage Std. Mast		mm	4050	4050	
	4.7	Height, Overhead Guard	h6			mm	2110	2110	
	4.19	Length, with Std. Forks	L1			mm	3450	3450	
	4.20	Length, to Fork Face	L2			mm	2530	2530	
	4.21	Width, at Tyre	b1	Single		mm	1150	1150	
	4.22	Forks	Thickness x Width x Length			mm	36x122x920	36x122x920	
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no				Class 2	Class 2	
	4.24	Width, Fork Carriage	b2			mm	1020	1020	
	4.31	Ground Clearance	m1	Under Mast		mm	115	115	
	4.32		m2	at Center of Wheelbase		mm	160	160	
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet			mm	3650	3650	
	4.34		with L1200 x W800 pallet			mm	3850	3850	
	4.35	Turning Radius	Wa			mm	2190	2190	
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd			km/h	18.5	18.5	8.5/18.5
			Unloaded, 1st/2nd			km/h	19.0	19.0	8.5/19.0
	5.2	Lifting Speed	Loaded			mm/s	545	590	
			Unloaded			mm/s	600	630	
	5.3	Lowering Speed	Loaded			mm/s	450	450	
			Unloaded			mm/s	500	500	
	5.6	Max. Drawbar Pull	Loaded			KN	14	14	13
	5.8	Max. Gradeability	Loaded			%	28	28	26
	5.10	Service Brake	Operation/Control				Foot/Hydraulic	Foot/Hydraulic	
	5.11	Parking Brake	Operation/Control				Hand/Mechanical	Hand/Mechanical	
	5.12	Steering	Type				FHPS	FHPS	
	6.4	Battery	Voltage/ Capacity at 5-hour rating			V/ah	12/33	12/64	
I.C Engine	7.1	Maker Model					NISSAN K21	Komatsu 4D94LE	
	7.2	Rated Output, SAE gross				KW	35@2450	33.2@2200	
	7.3	Rated RPM				min-1	2450	2200	
	7.3.1	Max. Torque, SAE gross				Nm@min-1	152@1600	156@1500	
	7.4	No. of Cylinder/Displacement				cm^3	4-2065	4-3052	
Others	7.6	Fuel Tank Capacity				Ltr	58	58	
	8.2	Relief Pressure for Attachment				bar	181	181	
	8.7	Transmission					TORQFLOW	TORQFLOW	Manual
Noise Level		L_{pAZ} as Measured in accordance with EN12053				dB(A)	80	87	
		K_{PZ} The uncertainty of measurement in accordance with EN12053					2.5	2.5	
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC				dB(A)	103	107	
		The uncertainty of measurement					1.6	1.1	
Vibration		VIBRATION in accordance with EN 13059				m/s^2	0.7	0.7	
		The uncertainty of measurement					0.4	0.4	

BX50 (2.0 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation				FG20HT-17	FD20HT-17
	1.3	Power Type	Electric, Diesel, Gasoline, LPG				Gasoline	Diesel
	1.4	Operation Type					Sitting	Sitting
	1.5	Rated Capacity	Rated Capacity			kg	2000	2000
	1.6	Load Center	Rated Load Center			mm	500	500
	1.6.1	Alternative Capacity	Capacity@600mm Load Center			kg	1810	1810
	1.8	Load Distance	x	Front Axle Center to Fork Face		mm	460	460
	1.9	Wheelbase	y			mm	1650	1650
Weight	2.1	Service Weight				kg	3220	3305
	2.2	Axle Loading	Loaded		Front	kg	4670	4710
	2.2.1				Rear	kg	550	595
	2.3		Unloaded		Front	kg	1480	1520
	2.3.1				Rear	kg	1740	1785
Tyres	3.1	Tyre Type					Pneumatic	Pneumatic
	3.2	Tyre Size	Front				7.00-12-12PR(I)	7.00-12-12PR(I)
	3.3		Rear				6.00-09-10PR(I)	6.00-09-10PR(I)
	3.5	Number of Wheel	Front/Rear (x=driven)				2*/2	2*/2
	3.6	Tread, Front	b4			mm	965	965
	3.7	Tread, Rear	b3			mm	960	960
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward		degree	6/12	6/12
	4.2	Mast Height, Lowered	h1	2-stage Mast		mm	1995	1995
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground		mm	150	150
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground		mm	3000	3000
	4.5	Mast Height, Extended	h4	2-stage Std. Mast		mm	4050	4050
	4.7	Height, Overhead Guard	h6			mm	2110	2110
	4.19	Length, with Std. Forks	L1			mm	3450	3450
	4.20	Length, to Fork Face	L2			mm	2530	2530
	4.21	Width, at Tyre	b1	Single		mm	1150	1150
	4.22	Forks	Thickness x Width x Length			mm	36x122x920	36x122x920
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no				Class 2	Class 2
	4.24	Width, Fork Carriage	b2			mm	1020	1020
	4.31	Ground Clearance	m1	Under Mast		mm	115	115
	4.32		m2	at Center of Wheelbase		mm	160	160
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet			mm	3650	3650
	4.34		with L1200 x W800 pallet			mm	3850	3850
	4.35	Turning Radius	Wa			mm	2190	2190
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd			km/h	19.0	18.5
			Unloaded, 1st/2nd			km/h	19.5	19.0
	5.2	Lifting Speed	Loaded			mm/s	620	660
			Unloaded			mm/s	670	710
	5.3	Lowering Speed	Loaded			mm/s	450	450
			Unloaded			mm/s	500	500
	5.6	Max. Drawbar Pull	Loaded			KN	19	18
	5.8	Max. Gradeability	Loaded			%	38	37
	5.10	Service Brake	Operation/Control				Foot/Hydraulic	Foot/Hydraulic
	5.11	Parking Brake	Operation/Control				Hand/Mechanical	Hand/Mechanical
	5.12	Steering	Type				FHPS	FHPS
	6.4	Battery	Voltage/ Capacity at 5-hour rating			V/ah	12/33	12/64
I.C Engine	7.1	Maker Model					NISSAN K21	Komatsu 4D98E
	7.2	Rated Output, SAE gross				KW	43@2400	44.2@2450
	7.3	Rated RPM				min-1	2400	2450
	7.3.1	Max. Torque, SAE gross				Nm@min-1	186@1600	185@1500
	7.4	No. of Cylinder/Displacement				cm^3	4-2488	4-3318
Others	7.6	Fuel Tank Capacity				Ltr	58	58
	8.2	Relief Pressure for Attachment				bar	181	181
	8.7	Transmission					TORQFLOW	TORQFLOW
Noise Level		L_{pAZ} as Measured in accordance with EN12053				dB(A)	80	87
		K_{PZ} The uncertainty of measurement in accordance with EN12053					2.5	2.5
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC				dB(A)	103	107
		The uncertainty of measurement					1.6	1.1
Vibration		VIBRATION in accordance with EN 13059				m/s^2	0.7	0.7
		The uncertainty of measurement					0.4	0.4

BX50 (2.5 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation				FG25T-17	FD25T-17	FD25C-17
	1.3	Power Type	Electric, Diesel, Gasoline, LPG				Gasoline	Diesel	
	1.4	Operation Type					Sitting	Sitting	
	1.5	Rated Capacity	Rated Capacity			kg	2500	2500	
	1.6	Load Center	Rated Load Center			mm	500	500	
	1.6.1	Alternative Capacity	Capacity@600mm Load Center			kg	2270	2270	
	1.8	Load Distance	x	Front Axle Center to Fork Face		mm	465	465	
	1.9	Wheelbase	y			mm	1650	1650	
Weight	2.1	Service Weight				kg	3590	3680	3720
	2.2	Axle Loading	Loaded		Front	kg	5420	5475	5495
	2.2.1				Rear	kg	670	705	725
	2.3		Unloaded		Front	kg	1430	1470	1500
	2.3.1				Rear	kg	2160	2210	2220
Tyres	3.1	Tyre Type					Pneumatic	Pneumatic	
	3.2	Tyre Size	Front				7.00-12-12PR(I)	7.00-12-12PR(I)	
	3.3		Rear				6.00-09-10PR(I)	6.00-09-10PR(I)	
	3.5	Number of Wheel	Front/Rear (x=driven)				2*/2	2*/2	
	3.6	Tread, Front	b4			mm	965	965	
	3.7	Tread, Rear	b3			mm	960	960	
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward		degree	6/12	6/12	
	4.2	Mast Height, Lowered	h1	2-stage Mast		mm	1995	1995	
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground		mm	155	155	
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground		mm	3000	3000	
	4.5	Mast Height, Extended	h4	2-stage Std. Mast		mm	4050	4050	
	4.7	Height, Overhead Guard	h6			mm	2110	2110	
	4.19	Length, with Std. Forks	L1			mm	3655	3655	
	4.20	Length, to Fork Face	L2			mm	2585	2580	
	4.21	Width, at Tyre	b1	Single		mm	1150	1150	
	4.22	Forks	Thickness x Width x Length			mm	40x122x1070	40x122x1070	
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no				Class 2	Class 2	
	4.24	Width, Fork Carriage	b2			mm	1020	1020	
	4.31	Ground Clearance	m1	Under Mast		mm	115	115	
	4.32		m2	at Center of Wheelbase		mm	160	160	
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet			mm	3775	3775	
	4.34		with L1200 x W800 pallet			mm	3905	3905	
	4.35	Turning Radius	Wa			mm	2240	2240	
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd			km/h	18.5	18.5	8.5/18.5
			Unloaded, 1st/2nd			km/h	19.0	19.0	8.5/19.0
	5.2	Lifting Speed	Loaded			mm/s	545	590	
			Unloaded			mm/s	600	630	
	5.3	Lowering Speed	Loaded			mm/s	450	450	
			Unloaded			mm/s	500	500	
	5.6	Max. Drawbar Pull	Loaded			KN	14	14	13
	5.8	Max. Gradeability	Loaded			%	23	23	22
	5.10	Service Brake	Operation/Control				Foot/Hydraulic	Foot/Hydraulic	
	5.11	Parking Brake	Operation/Control				Hand/Mechanical	Hand/Mechanical	
	5.12	Steering	Type				FHPS	FHPS	
	6.4	Battery	Voltage/ Capacity at 5-hour rating			V/ah	12/33	12/64	
I.C Engine	7.1	Maker Model					NISSAN K21	Komatsu 4D94LE	
	7.2	Rated Output, SAE gross				KW	35@2450	33.2@2200	
	7.3	Rated RPM				min-1	2450	2220	
	7.3.1	Max. Torque, SAE gross				Nm@min-1	152@1600	156@1500	
	7.4	No. of Cylinder/Displacement				cm^3	4-2065	4-3052	
Others	7.6	Fuel Tank Capacity				Ltr	58	58	
	8.2	Relief Pressure for Attachment				bar	181	181	
	8.7	Transmission					TORQFLOW	TORQFLOW	Manual
Noise Level		L_{pAZ} as Measured in accordance with EN12053				dB(A)	80	87	
		K_{PZ} The uncertainty of measurement in accordance with EN12053					2.5	2.5	
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC				dB(A)	103	107	
		The uncertainty of measurement					1.6	1.1	
Vibration		VIBRATION in accordance with EN 13059				m/s^2	0.7	0.7	
		The uncertainty of measurement					0.4	0.4	

BX50 (2.5 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation			FG25HT-17	FD25HT-17
	1.3	Power Type	Electric, Diesel, Gasoline, LPG			Gasoline	Diesel
	1.4	Operation Type				Sitting	Sitting
	1.5	Rated Capacity	Rated Capacity		kg	2500	2500
	1.6	Load Center	Rated Load Center		mm	500	500
	1.6.1	Alternative Capacity	Capacity@600mm Load Center		kg	2270	2270
	1.8	Load Distance	x	Front Axle Center to Fork Face	mm	465	465
	1.9	Wheelbase	y		mm	1650	1650
Weight	2.1	Service Weight			kg	3590	3680
	2.2	Axle Loading	Loaded	Front	kg	5420	5475
	2.2.1			Rear	kg	670	705
	2.3		Unloaded	Front	kg	1430	1470
	2.3.1			Rear	kg	2160	2210
Tyres	3.1	Tyre Type				Pneumatic	Pneumatic
	3.2	Tyre Size	Front			7.00-12-12PR(I)	7.00-12-12PR(I)
	3.3		Rear			6.00-09-10PR(I)	6.00-09-10PR(I)
	3.5	Number of Wheel	Front/Rear (x=driven)			2*/2	2*/2
	3.6	Tread, Front	b4		mm	965	965
	3.7	Tread, Rear	b3		mm	960	960
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward	degree	6/12	6/12
	4.2	Mast Height, Lowered	h1	2-stage Mast	mm	1995	1995
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground	mm	155	155
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground	mm	3000	3000
	4.5	Mast Height, Extended	h4	2-stage Std. Mast	mm	4050	4050
	4.7	Height, Overhead Guard	h6		mm	2110	2110
	4.19	Length, with Std. Forks	L1		mm	3655	3655
	4.20	Length, to Fork Face	L2		mm	2585	2585
	4.21	Width, at Tyre	b1	Single	mm	1150	1150
	4.22	Forks	Thickness x Width x Length		mm	40x122x1070	40x122x1070
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no			Class 2	Class 2
	4.24	Width, Fork Carriage	b2		mm	1020	1020
	4.31	Ground Clearance	m1	Under Mast	mm	115	115
	4.32		m2	at Center of Wheelbase	mm	160	160
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet		mm	3775	3775
	4.34		with L1200 x W800 pallet		mm	3905	3905
	4.35	Turning Radius	Wa		mm	2240	2240
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd		km/h	19.0	18.5
			Unloaded, 1st/2nd		km/h	19.5	19.0
	5.2	Lifting Speed	Loaded		mm/s	620	660
			Unloaded		mm/s	670	710
	5.3	Lowering Speed	Loaded		mm/s	450	450
			Unloaded		mm/s	500	500
	5.6	Max. Drawbar Pull	Loaded		KN	19	18
	5.8	Max. Gradeability	Loaded		%	32	31
	5.10	Service Brake	Operation/Control			Foot/Hydraulic	Foot/Hydraulic
	5.11	Parking Brake	Operation/Control			Hand/Mechanical	Hand/Mechanical
	5.12	Steering	Type			FHPS	FHPS
	6.4	Battery	Voltage/ Capacity at 5-hour rating		V/ah	12/33	12/64
I.C Engine	7.1	Maker Model				NISSAN K25	Komatsu 4D98E
	7.2	Rated Output, SAE gross			KW	43@2400	44.2@2450
	7.3	Rated RPM			min-1	2400	2450
	7.3.1	Max. Torque, SAE gross			Nm@min-1	186@1600	185@1500
	7.4	No. of Cylinder/Displacement			cm^3	4-2488	4-3318
Others	7.6	Fuel Tank Capacity			Ltr	58	58
	8.2	Relief Pressure for Attachment			bar	181	181
	8.7	Transmission				TORQFLOW	TORQFLOW
Noise Level		L_{pAZ} as Measured in accordance with EN12053			dB(A)	80	87
		K_{PZ} The uncertainty of measurement in accordance with EN12053				2.5	2.5
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC			dB(A)	103	107
		The uncertainty of measurement				1.6	1.1
Vibration		VIBRATION in accordance with EN 13059			m/s^2	0.7	0.7
		The uncertainty of measurement				0.4	0.4

BX50 (3.0 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation				FG30T-17	FD30T-17	FD30C-17
	1.3	Power Type	Electric, Diesel, Gasoline, LPG				Gasoline	Diesel	
	1.4	Operation Type					Sitting	Sitting	
	1.5	Rated Capacity	Rated Capacity			kg	3000	3000	
	1.6	Load Center	Rated Load Center			mm	500	500	
	1.6.1	Alternative Capacity	Capacity@600mm Load Center			kg	2720	2720	
	1.8	Load Distance	x	Front Axle Center to Fork Face		mm	490	490	
	1.9	Wheelbase	y			mm	1700	1700	
Weight	2.1	Service Weight				kg	4210	4310	4345
	2.2	Axle Loading	Loaded		Front	kg	6390	6435	6460
	2.2.1				Rear	kg	820	885	875
	2.3		Unloaded		Front	kg	1600	1640	1670
	2.3.1				Rear	kg	2610	2670	2675
Tyres	3.1	Tyre Type					Pneumatic	Pneumatic	
	3.2	Tyre Size	Front				28x9-15-12PR(I)	28x9-15-12PR(I)	
	3.3		Rear				6.50-10-10PR(I)	6.50-10-10PR(I)	
	3.5	Number of Wheel	Front/Rear (x=driven)				2*/2	2*/2	
	3.6	Tread, Front	b4			mm	1005	1005	
	3.7	Tread, Rear	b3			mm	965	965	
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward		degree	6/12	6/12	
	4.2	Mast Height, Lowered	h1	2-stage Mast		mm	2070	2070	
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground		mm	160	160	
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground		mm	3000	3000	
	4.5	Mast Height, Extended	h4	2-stage Std. Mast		mm	4275	4275	
	4.7	Height, Overhead Guard	h6			mm	2130	2130	
	4.19	Length, with Std. Forks	L1			mm	3775	3775	
	4.20	Length, to Fork Face	L2			mm	2705	2705	
	4.21	Width, at Tyre	b1	Single		mm	1235	1235	
	4.22	Forks	Thickness x Width x Length			mm	44x122x1070	45x122x1070	
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no				Class 3	Class 3	
	4.24	Width, Fork Carriage	b2			mm	1060	1060	
	4.31	Ground Clearance	m1	Under Mast		mm	135	135	
	4.32		m2	at Center of Wheelbase		mm	185	185	
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet			mm	3930	3930	
	4.34		with L1200 x W800 pallet			mm	4060	4060	
	4.35	Turning Radius	Wa			mm	2370	2370	
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd			km/h	18.5	17.0	7.5/17.0
			Unloaded, 1st/2nd			km/h	19.5	17.5	8.0/17.5
	5.2	Lifting Speed	Loaded			mm/s	515	490	
			Unloaded			mm/s	500	530	
	5.3	Lowering Speed	Loaded			mm/s	400	420	
			Unloaded			mm/s	500	500	
	5.6	Max. Drawbar Pull	Loaded			KN	18	14	14
	5.8	Max. Gradeability	Loaded			%	26	20	20
	5.10	Service Brake	Operation/Control				Foot/Hydraulic	Foot/Hydraulic	
	5.11	Parking Brake	Operation/Control				Hand/Mechanical	Hand/Mechanical	
	5.12	Steering	Type				FHPS	FHPS	
	6.4	Battery	Voltage/ Capacity at 5-hour rating			V/ah	12/33	12/64	
I.C Engine	7.1	Maker Model					NISSAN K25	Komatsu 4D94LE	
	7.2	Rated Output, SAE gross				KW	43@2400	33.2@2200	
	7.3	Rated RPM				min-1	2400	2200	
	7.3.1	Max. Torque, SAE gross				Nm@min-1	186@1600	156@1500	
	7.4	No. of Cylinder/Displacement				cm^3	4-2488	4-3052	
Others	7.6	Fuel Tank Capacity				Ltr	58	58	
	8.2	Relief Pressure for Attachment				bar	181	181	
	8.7	Transmission					TORQFLOW	TORQFLOW	Manual
Noise Level		L_{pAZ} as Measured in accordance with EN12053				dB(A)	80	87	
		K_{PZ} The uncertainty of measurement in accordance with EN12053					2.5	2.5	
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC				dB(A)	103	107	
		The uncertainty of measurement					1.6	1.1	
Vibration		VIBRATION in accordance with EN 13059				m/s^2	0.7	0.7	
		The uncertainty of measurement					0.4	0.4	

BX50 (3.0 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation				FD30HT-17
	1.3	Power Type	Electric, Diesel, Gasoline, LPG				Diesel
	1.4	Operation Type					Sitting
	1.5	Rated Capacity	Rated Capacity			kg	3000
	1.6	Load Center	Rated Load Center			mm	500
	1.6.1	Alternative Capacity	Capacity@600mm Load Center			kg	2720
	1.8	Load Distance	x	Front Axle Center to Fork Face		mm	490
	1.9	Wheelbase	y			mm	1700
Weight	2.1	Service Weight				kg	4310
	2.2	Axle Loading	Loaded		Front	kg	6460
	2.2.1				Rear	kg	885
	2.3		Unloaded		Front	kg	1640
	2.3.1				Rear	kg	2670
Tyres	3.1	Tyre Type					Pneumatic
	3.2	Tyre Size	Front				28x9-15-12PR(I)
	3.3		Rear				6.50x10-10PR(I)
	3.5	Number of Wheel	Front/Rear (x=driven)				2*/2
	3.6	Tread, Front	b4			mm	1005
	3.7	Tread, Rear	b3			mm	965
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward		degree	6/12
	4.2	Mast Height, Lowered	h1	2-stage Mast		mm	2070
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground		mm	160
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground		mm	3000
	4.5	Mast Height, Extended	h4	2-stage Std. Mast		mm	4275
	4.7	Height, Overhead Guard	h6			mm	2130
	4.19	Length, with Std. Forks	L1			mm	3775
	4.20	Length, to Fork Face	L2			mm	2705
	4.21	Width, at Tyre	b1	Single		mm	1235
	4.22	Forks	Thickness x Width x Length			mm	45x122x1070
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no				Class 3
	4.24	Width, Fork Carriage	b2			mm	1060
	4.31	Ground Clearance	m1	Under Mast		mm	135
	4.32		m2	at Center of Wheelbase		mm	185
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet			mm	3930
	4.34		with L1200 x W800 pallet			mm	4060
	4.35	Turning Radius	Wa			mm	2370
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd			km/h	18.5
			Unloaded, 1st/2nd			km/h	19.0
	5.2	Lifting Speed	Loaded			mm/s	550
			Unloaded			mm/s	595
	5.3	Lowering Speed	Loaded			mm/s	420
			Unloaded			mm/s	500
	5.6	Max. Drawbar Pull	Loaded			KN	17
	5.8	Max. Gradeability	Loaded			%	25
	5.10	Service Brake	Operation/Control				Foot/Hydraulic
	5.11	Parking Brake	Operation/Control				Hand/Mechanical
	5.12	Steering	Type				FHPS
	6.4	Battery	Voltage/ Capacity at 5-hour rating			V/ah	12/64
I.C Engine	7.1	Maker Model					Komatsu 4D98E
	7.2	Rated Output, SAE gross				KW	44.2@2450
	7.3	Rated RPM				min-1	2450
	7.3.1	Max. Torque, SAE gross				Nm@min-1	185@1500
	7.4	No. of Cylinder/Displacement				cm^3	4-3318
Others	7.6	Fuel Tank Capacity				Ltr	58
	8.2	Relief Pressure for Attachment				bar	181
	8.7	Transmission					TORQFLOW
Noise Level		L_{pAZ} as Measured in accordance with EN12053				dB(A)	87
		K_{PZ} The uncertainty of measurement in accordance with EN12053					2.5
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC				dB(A)	107
		The uncertainty of measurement					1.1
Vibration		VIBRATION in accordance with EN 13059				m/s^2	0.7
		The uncertainty of measurement					0.4

BX50 (3.5 ton) Series

Characteristics	1.2	Model	Manufacturer's Designation				FG35A-17	FD35A-17
	1.3	Power Type	Electric, Diesel, Gasoline, LPG				Gasoline	Diesel
	1.4	Operation Type					Sitting	Sitting
	1.5	Rated Capacity	Rated Capacity			kg	3500	3500
	1.6	Load Center	Rated Load Center			mm	500	500
	1.6.1	Alternative Capacity	Capacity@600mm Load Center			kg	3180	3180
	1.8	Load Distance	x	Front Axle Center to Fork Face		mm	505	505
	1.9	Wheelbase	y			mm	1700	1700
Weight	2.1	Service Weight				kg	4910	4950
	2.2	Axle Loading	Loaded		Front	kg	7440	7430
	2.2.1				Rear	kg	970	1020
	2.3		Unloaded		Front	kg	1820	1810
	2.3.1				Rear	kg	3090	3140
Tyres	3.1	Tyre Type					Pneumatic	Pneumatic
	3.2	Tyre Size	Front				250-15-16PR(I)	250-15-16PR(I)
	3.3		Rear				6.50x10-12PR(I)	6.50-10-12PR(I)
	3.5	Number of Wheel	Front/Rear (x=driven)				2*/2	2*/2
	3.6	Tread, Front	b4			mm	1060	1060
	3.7	Tread, Rear	b3			mm	965	965
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward		degree	6/12	6/12
	4.2	Mast Height, Lowered	h1	2-stage Mast		mm	2100	2100
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground		mm	145	145
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground		mm	3000	3000
	4.5	Mast Height, Extended	h4	2-stage Std. Mast		mm	4280	4280
	4.7	Height, Overhead Guard	h6			mm	2145	2145
	4.19	Length, with Std. Forks	L1			mm	3865	3865
	4.20	Length, to Fork Face	L2			mm	2795	2795
	4.21	Width, at Tyre	b1	Single		mm	1290	1290
	4.22	Forks	Thickness x Width x Length			mm	50x150x1070	50x150x1070
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no				Class 3	Class 3
	4.24	Width, Fork Carriage	b2			mm	1060	1060
	4.31	Ground Clearance	m1	Under Mast		mm	135	135
	4.32		m2	at Center of Wheelbase		mm	185	185
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet			mm	4055	4055
	4.34		with L1200 x W800 pallet			mm	4185	4185
	4.35	Turning Radius	Wa			mm	2480	2480
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd			km/h	18.0	18.0
			Unloaded, 1st/2nd			km/h	19.0	18.5
	5.2	Lifting Speed	Loaded			mm/s	410	450
			Unloaded			mm/s	450	490
	5.3	Lowering Speed	Loaded			mm/s	400	420
			Unloaded			mm/s	400	400
	5.6	Max. Drawbar Pull	Loaded			KN	16	17
	5.8	Max. Gradeability	Loaded			%	20	21
	5.10	Service Brake	Operation/Control				Foot/Hydraulic	Foot/Hydraulic
	5.11	Parking Brake	Operation/Control				Hand/Mechanical	Hand/Mechanical
	5.12	Steering	Type				FHPS	FHPS
	6.4	Battery	Voltage/ Capacity at 5-hour rating			V/ah	12/33	12/64
I.C Engine	7.1	Maker Model					NISSAN K25	Komatsu 4D98E
	7.2	Rated Output, SAE gross				KW	43@2400	44.2@2450
	7.3	Rated RPM				min-1	2400	2450
	7.3.1	Max. Torque, SAE gross				Nm@min-1	186@1600	185@1500
	7.4	No. of Cylinder/Displacement				cm^3	4-2488	4-3318
Others	7.6	Fuel Tank Capacity				Ltr	58	58
	8.2	Relief Pressure for Attachment				bar	181	181
	8.7	Transmission					TORQFLOW	TORQFLOW
Noise Level		L_{pAZ} as Measured in accordance with EN12053				dB(A)	80	87
		K_{PZ} The uncertainty of measurement in accordance with EN12053					2.5	2.5
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC				dB(A)	103	107
		The uncertainty of measurement					1.6	1.1
Vibration		VIBRATION in accordance with EN 13059				m/s^2	0.7	0.7
		The uncertainty of measurement					0.4	0.4

BX50 109 Series

Characteristics	1.2	Model	Manufacturer's Designation			FG20NT-17	FG25NT-17	FG30NT-17
	1.3	Power Type	Electric, Diesel, Gasoline, LPG			Gasoline	Gasoline	Gasoline
	1.4	Operation Type				Sitting	Sitting	Sitting
	1.5	Rated Capacity	Rated Capacity		kg	2000	2500	3000
	1.6	Load Center	Rated Load Center		mm	500	500	500
	1.6.1	Alternative Capacity	Capacity@600mm Load Center		kg	1810	2250	2710
	1.8	Load Distance	x	Front Axle Center to Fork Face	mm	430	435	440
	1.9	Wheelbase	y		mm	1400	1400	1450
Weight	2.1	Service Weight			kg	3230	3630	4070
	2.2	Axle Loading	Loaded	Front	kg	4600	5350	6250
	2.2.1			Rear	kg	630	780	820
	2.3		Unloaded	Front	kg	1250	1140	1260
	2.3.1			Rear	kg	1980	2490	2810
Tyres	3.1	Tyre Type				Pneumatic	Pneumatic	Pneumatic
	3.2	Tyre Size	Front			22 1/4 x7 1/2-15/5.50	22 1/4 x7 1/2-15/5.50	22 1/4 x7 1/2-15/5.50
	3.3		Rear			17 3/4 x6 1/2 -10/5.00	17 3/4 x6 1/2 -10/5.00	17 3/4 x6 1/2 -10/5.00
	3.5	Number of Wheel	Front/Rear (x=driven)			2*/2	2*/2	2*/2
	3.6	Tread, Front	b4		mm	900	900	900
	3.7	Tread, Rear	b3		mm	885	885	885
Dimensions	4.1	Tilting Angle	α/β	Forward/Backward	degree	6/10	6/10	6/10
	4.2	Mast Height, Lowered	h1	2-stage Mast	mm	1995	1995	2070
	4.3	Std. Free Lift	h2	2-stage Std. Mast, from Ground	mm	150	155	160
	4.4	Std. Lift Height	h3	2-stage Std. Mast, from Ground	mm	3000	3000	3000
	4.5	Mast Height, Extended	h4	2-stage Std. Mast	mm	4050	4050	4275
	4.7	Height, Overhead Guard	h6		mm	2065	2065	2065
	4.19	Length, with Std. Forks	L1		mm	3260	3475	3535
	4.20	Length, to Fork Face	L2		mm	2340	2405	2465
	4.21	Width, at Tyre	b1	Single	mm	1090	1090	1090
	4.22	Forks	Thickness x Width x Length		mm	36x122x920	40x122x1070	45x122x1070
	4.23	Fork Carriage Class	ISO 2328, Type A/B/no			Class 2	Class 2	Class 3
	4.24	Width, Fork Carriage	b2		mm	960	960	940
	4.31	Ground Clearance	m1	Under Mast	mm	105	105	105
	4.32		m2	at Center of Wheelbase	mm	115	115	115
	4.33	Right Angle Stacking Aisle	with L1000 x W1200 pallet		mm	3410	3555	3620
	4.34		with L1200 x W800 pallet		mm	3610	3685	3750
	4.35	Turning Radius	Wa		mm	1980	2050	2110
Performance	5.1	Travel Speed (FWD)	Loaded, 1st/2nd		km/h	17.0	16.5	16.0
			Unloaded, 1st/2nd		km/h	16.5	16.5	16.0
	5.2	Lifting Speed	Loaded		mm/s	545	545	515
			Unloaded		mm/s	600	600	550
	5.3	Lowering Speed	Loaded		mm/s	450	450	420
			Unloaded		mm/s	500	500	500
	5.6	Max. Drawbar Pull	Loaded		KN	14	14	16
	5.8	Max. Gradeability	Loaded		%	27	23	24
	5.10	Service Brake	Operation/Control			Foot/Hydraulic	Foot/Hydraulic	Foot/Hydraulic
	5.11	Parking Brake	Operation/Control			Hand/ Mechanical	Hand/ Mechanical	Hand/ Mechanical
	5.12	Steering	Type			FHPS	FHPS	FHPS
	6.4	Battery	Voltage/ Capacity at 5-hour rating		V/ah	12/33	12/33	12/33
I.C Engine	7.1	Maker Model				NISSAN K21	NISSAN K21	NISSAN K25
	7.2	Rated Output, SAE gross			KW	34.6@2450	34.6@2450	42.6@2400
	7.3	Rated RPM			min-1	2450	2450	2400
	7.3.1	Max. Torque, SAE gross			Nm@min-1	152@1600	152@1600	186@1600
	7.4	No. of Cylinder/Displacement			cm^3	4-2065	4-2065	4-2488
Others	7.6	Fuel Tank Capacity			Ltr	40	40	40
	8.2	Relief Pressure for Attachment			bar	181	181	181
	8.7	Transmission				TORQFLOW	TORQFLOW	TORQFLOW
Noise Level		L_{pAZ} as Measured in accordance with EN12053			dB(A)	80	80	80
		K_{PZ} The uncertainty of measurement in accordance with EN12053				2.5	2.5	2.5
		L_{WAd} Guaranteed sound power level accordance with 2000/14/EC			dB(A)	103	103	103
		The uncertainty of measurement				1.6	1.6	1.6
Vibration		VIBRATION in accordance with EN 13059			m/s^2	0.7	0.7	0.7
		The uncertainty of measurement				0.4	0.4	0.4

EC DECLARATION OF CONFORMITY

6. EC DECLARATION OF CONFORMITY

6.1 EC DECLARATION OF CONFORMITY (FG(D)10 - 18-21)

We, **Komatsu Ltd.** of which registered office is at 110 Yokokura-Shinden, Oyama-shi, Tochigi-ken 323-8567, Japan, hereby declare under our sole responsibility that the following machines

Category : Forklift Truck
(I.C. engine type, self-propelled counterbalanced truck)
Manufacturer : **Komatsu Ltd**, Tochigi, Japan
Type : FD10T-21,FD15T-21,FD18T-21,
FG10T-21,FG15T-21,FG18T-21,FG15HT-21,FG18HT-21

meet the requirements of the latest valid version of Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC by complying with the harmonized standards and equivalent as attached.

We also declare that they meet the specification of Noise Emission Directive 2000/14/EC amended by 2005/88/EC as measured and approved by the Conformity Evaluation Method set out in Annex V(internal production control). Sound power levels are listed as attached.

6.2 EC DECLARATION OF CONFORMITY (FG(D)20 - 35A-17)

We, **Komatsu Ltd.** of which registered office is at 110 Yokokura-Shinden, Oyama-shi, Tochigi-ken 323-8567, Japan, hereby declare under our sole responsibility that the following machines

Category : Forklift Truck
(I.C. engine type, self-propelled counterbalanced truck)
Manufacturer : **Komatsu Ltd**, Tochigi, Japan
Type : FD20T-17,FD25T-17,FD30T-17,FD35AT-17,
FD20NT-17,FD25NT-17,FD30NT-17,
FG20T-17,FG25T-17,FG30T-17,FG35AT-17,
FG20HT-17,FG25HT-17,
FG20NT-17,FG25NT-17,FG30NT-17

meet the requirements of the latest valid version of Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC by complying with the harmonized standards and equivalent as attached.

We also declare that they meet the specification of Noise Emission Directive 2000/14/EC amended by 2005/88/EC as measured and approved by the Conformity Evaluation Method set out in Annex V(internal production control). Sound power levels are listed as attached.

6.3 EC DECLARATION OF CONFORMITY (FD20 - 35A-17)

We, **Komatsu Ltd.** of which registered office is at 110 Yokokura-Shinden, Oyama-shi, Tochigi-ken 323-8567, Japan, hereby declare under our sole responsibility that the following machines

Category : Forklift Truck
(I.C. engine type, self-propelled counterbalanced truck)
Manufacturer : **Komatsu Ltd**, Tochigi, Japan
Type : FD20T-17,FD25T-17,FD30T-17,FD35AT-17,
FD20HT-17,FD25HT-17,FD30HT-17

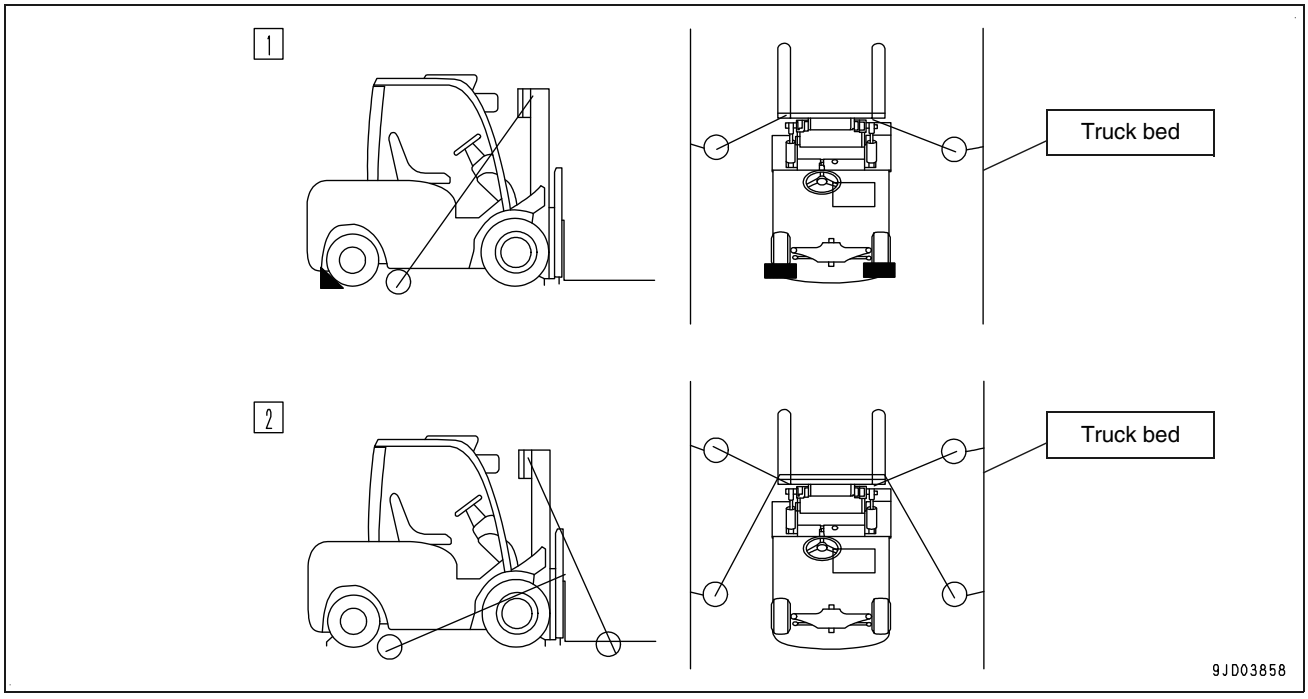
meet the requirements of the latest valid version of Machinery Directive 2006/42/EC and EMC Directive 2004/108/EC by complying with the harmonized standards and equivalent as attached.

We also declare that they meet the specification of Noise Emission Directive 2000/14/EC amended by 2005/88/EC as measured and approved by the Conformity Evaluation Method set out in Annex V(internal production control). Sound power levels are listed as attached.

6.4 TIE-DOWN POSITIONS OF LIFT TRUCK

When transporting the lift truck, bind it by either of the following two methods.

1. Chock the rear wheels and fix the two holes on both sides of the mast head stay and the hooks of the truck bed with wire ropes or chains.
2. Fix the two holes on both sides of the mast head stay and the front hooks of the truck bed, and fix the mast board and two rear hooks of the truck bed.



LPG FORK LIFT

⚠ WARNING

This chapter describes only the parts of the LPG forklift that are different from those on standard forklifts. For the parts that are similar on each forklift, refer to the standard forklift manual.

7. LPG FORK LIFT

7.1 CHAPTER CONTENTS

This chapter describes the procedures for proper operation, inspection, and maintenance of the LPG forklift, and the rules you must follow for your safety.Most accidents are caused by failing to follow basic safety precautions regarding operation, inspection, and maintenance of forklifts. Also, being aware of possible hazards will help to avoid accidents.

⚠ WARNING

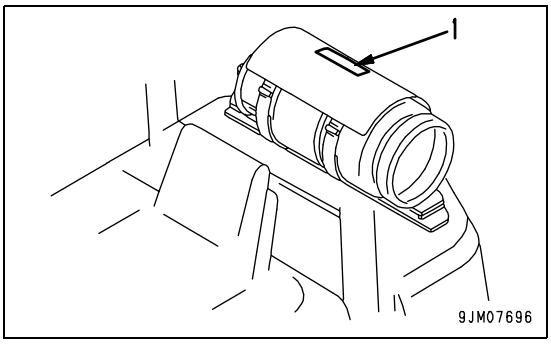
Operators and maintenance personnel must do the following before operating, or performing inspections and maintenance on the LPG forklift.

- **Read this chapter carefully and have a clear understanding of the material.**
- **Read and have a clear understanding of the precautions in this chapter.**
- **Clearly understand the descriptions for the standard forklift.**

7.2 SAFETY LABELS

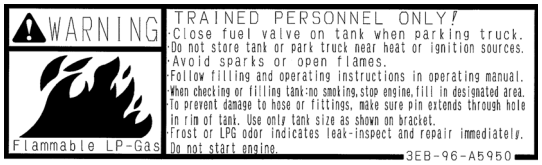
7.2.1 SAFETY LABEL LOCATIONS

No.	Safety label name	Places where safety labels are attached
1	LPG cylinder handling precautions	Cylinder bracket



7.2.2 SAFETY LABELS

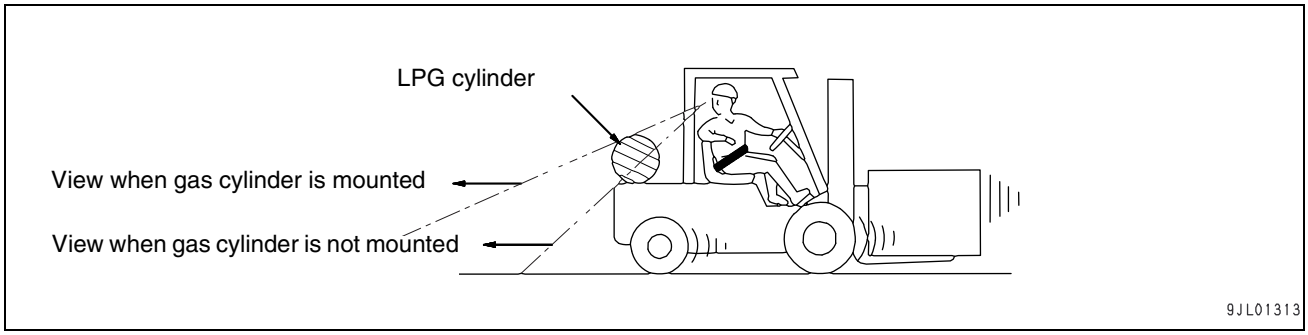
(1) LPG cylinder handling precautions (3EB-96-A5950)



7.3 BASIC PRECAUTIONS

⚠ CAUTION

- **The Head of the Land Transportation Office must train the supervisor on the LPG forklift. The supervisor must then provide operators with training on the design and handling of the forklift.**
- **When parking the lift truck for a long time in a hot season, stop it in the shade.If it is exposed to the direct sunlight, the gas cylinder may explode.**
- **Always warm-up the forklift. Running the forklift with a cold engine will decrease the life of the engine, and will not allow possible water deposits in the vaporizer to melt causing the forklift or engine to breakdown.**
- **When storing the forklift or leaving it unattended for a long time, close all of the valves on the LPG cylinder, expend all of the fuel in the lines, and store it in a dark, ventilated area.**
- **The LPG cylinder on the standard forklift partially obstructs the operator's rear view. Workers, parts, building structures (walls, etc.) and other objects located in this blind spot behind the forklift run a higher risk of being struck.Keep this in mind when operating the forklift, and always check the blind spot in the rear.**
- **To help make your work environment safer, call your KOMATSU FORKLIFT distributor for details on optional attachments that make checking blind spots easier and ones that alert workers (reversing light, rear sensor, back-up assist mirror, etc).**

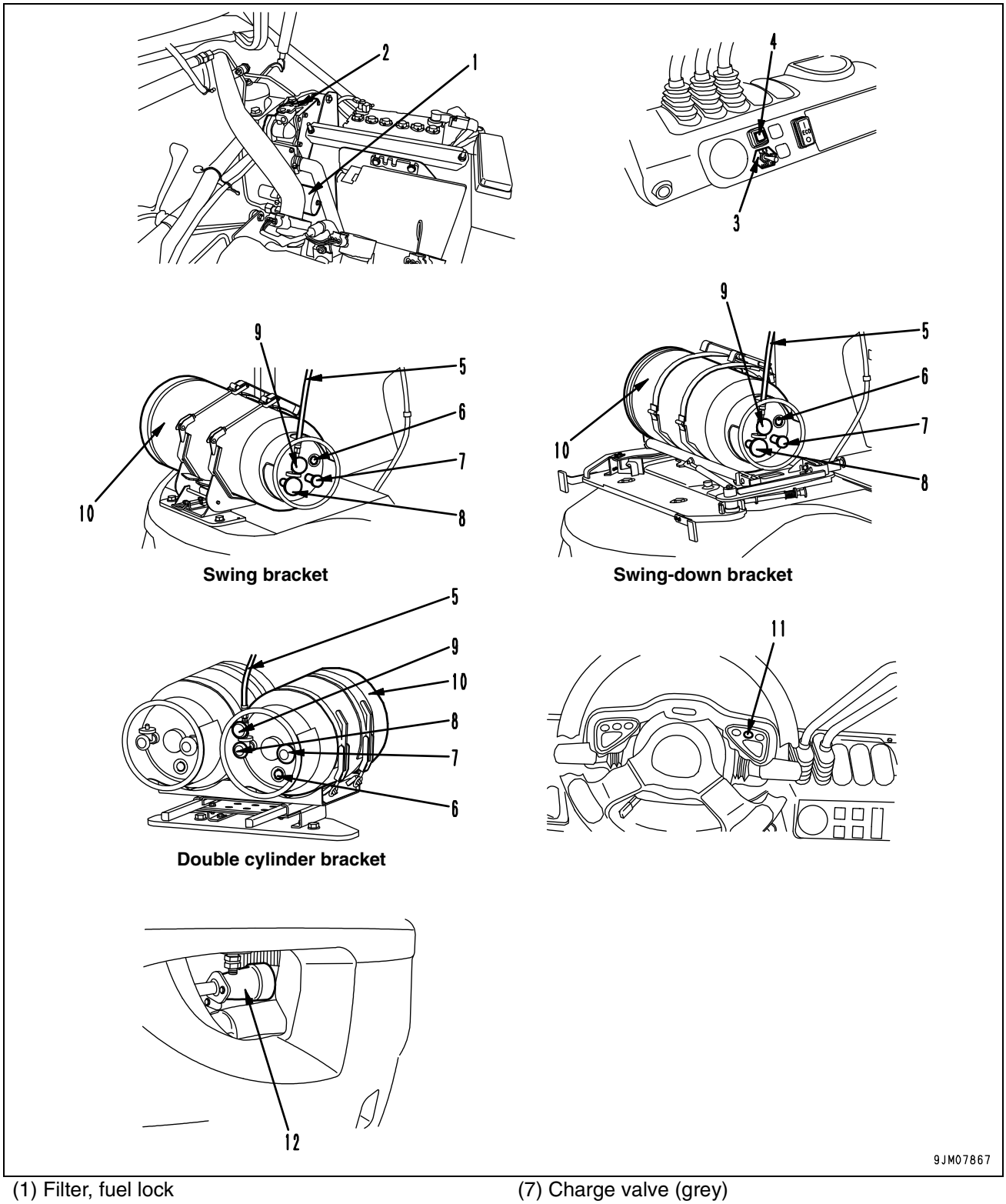


⚠ WARNING

- **Inspect or periodically inspect the forklift prior to starting it.If a gas leak is detected, immediately close the discharge valve completely, and call your KOMATSU FORKLIFT distributor. Keep open flames away from the forklift and wait until a technician arrives.**
- **Use only the specified LP gas and LPG cylinder. Failure to use the specified LP gas or LPG cylinder may lead to gas leaks.**
  Replace the LPG cylinder in a well ventilated area and keep it away from open flame.
- **Use a gas detection fluid or leak detection soap to check for LP gas leaks. Never check for leaks with a flame.**
- **The gasoline lines and LPG hoses are pressurized. Do not touch them. Touching them may cause fuel may spout and may lead to unexpected accidents.**
- **Cut the engine off before refueling (LP gas).**
- **Do not smoke or use open flames when refueling (LP gas).**
- **Do not leave the area while refueling (LP gas).**
- **Tighten the charge valve plug completely.**
- **Also, when handling equipment and devices used in inspection or maintenance be sure that you have taken sufficient measures to prevent triggering sparks, flames or other fire hazards.**

7.4 OPERATING THE LPG FORKLIFT

7.4.1 PART NAME



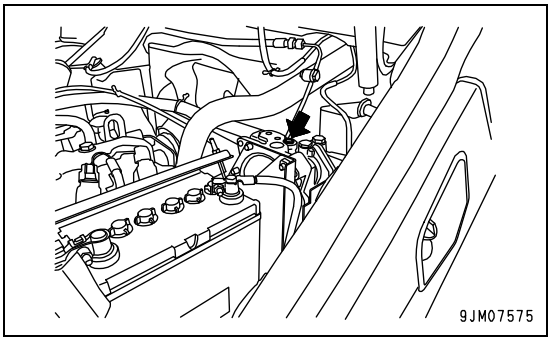
(1) Filter, fuel lock
(2) Vaporizer
(3) LPG/gasoline selector switch (LP gas/gasoline (dual fuel) type)
(4) LPG warning lamp
(5) High-pressure line
(6) Fuel gauge
(7) Charge valve (grey)
(8) Discharge valve (red)
(9) Stop valve (green)
(10)LPG cylinder
(11)Engine failure lamp
(12)Three-way catalyst

7.4.2 DESCRIPTION OF COMPONENTS

The followings are descriptions of the devices used to operate the LPG forklift.
To operate the LPG forklift correctly and safely, it is important to fully understand how to operate the equipment as well as the meaning of the indicators.

VAPORIZER

A device to decompress and vaporize LP gas.
There are no external places for adjustments.



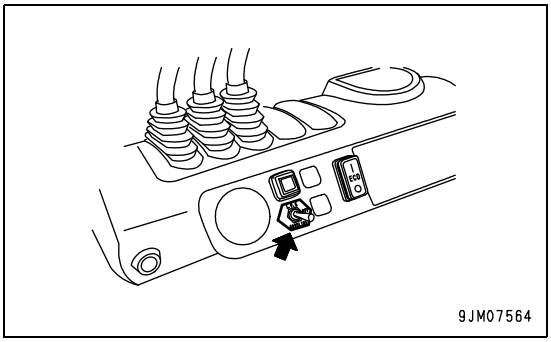
LPG/GASOLINE SELECTOR SWITCH (LP GAS/GASOLINE (DUAL FUEL) TYPE)

A switch to select the fuel supplied to the engine.

LPG: Supplies LP gas to the engine.
OFF: Gasoline is supplied to the engine.
Gasoline: Supplies gasoline to the engine.

NOTICE

For selection of fuel, see "LPG FORK LIFT 7.7.3 SWITCHING FUEL FROM LP GAS TO GASOLINE (Page 7-31)", "LPG FORK LIFT 7.7.4 SWITCHING FUEL FROM GASOLINE TO LP GAS (Page 7-33)".



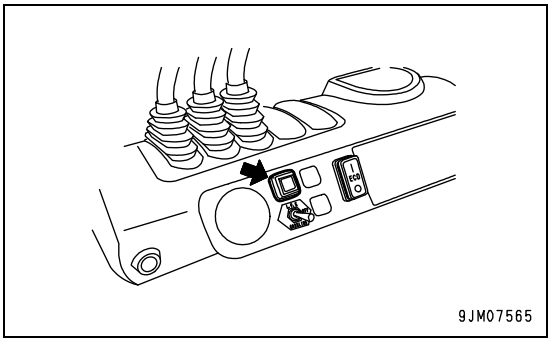
LPG WARNING LAMP

A lamp that light-up when the LP gas level is low.

Lamp ON: Lights-up when the LP gas level is low.
Lamp OFF: Goes out to indicate that the amount of LP gas is near full.

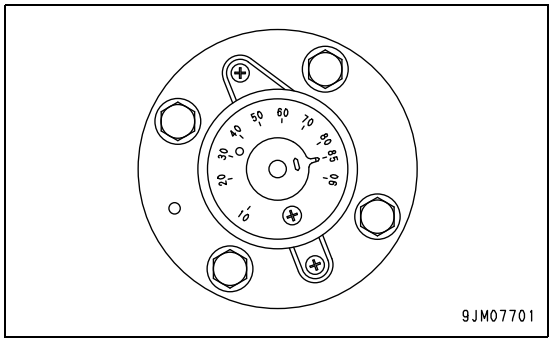
NOTICE

If the lamp turns ON, immediately refill with fuel (LP gas).
For refueling (LP gas), see "LPG FORK LIFT 7.5 REFUELING (LP GAS) (Page 7-10)".



FUEL GAUGE

This gauge shows the LP gas level.



85: Fuel tank full

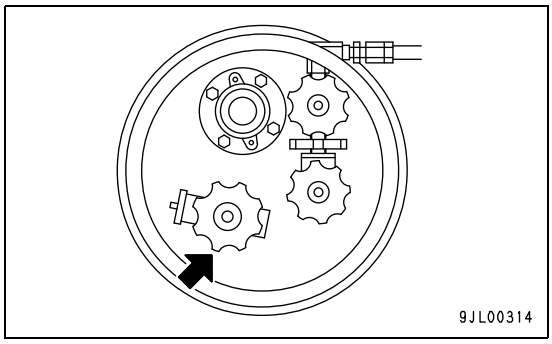
10: Fuel tank low

NOTICE

For refueling, see "LPG FORK LIFT 7.5 REFUELING (LP GAS) (Page 7-10)".

CHARGE VALVE (GREY)

A valve used when charging LP gas.

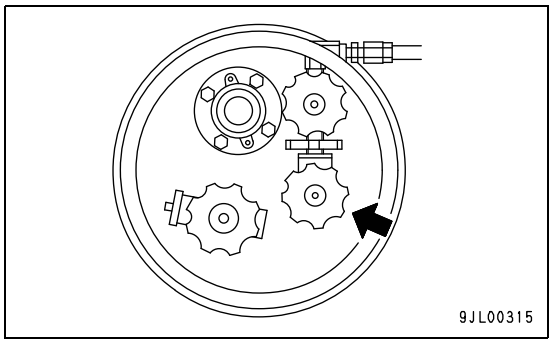


NOTICE

When the LP gas is not being charged, this valve must be fully closed (turn to the right).

DISCHARGE VALVE (RED)

A valve that opens and closes the LP gas line to the engine.

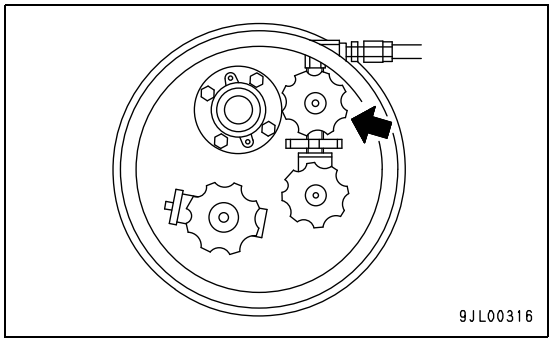


NOTICE

When the forklift is not running, this valve must be fully closed (turn to the right).

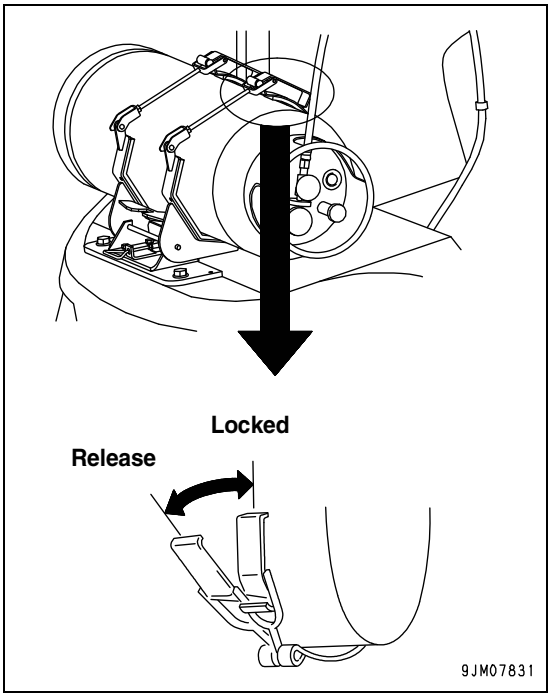
STOP VALVE (GREEN)

A valve to prevent the gas within the line from flowing out when the LPG cylinder is mounted or removed.

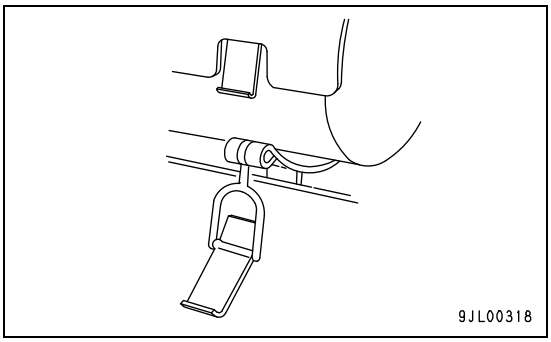


LPG CYLINDER COVER

- A cover to lock the LP gas cylinder.
- Pull the stopper back. The cover is now in the release position and the LPG cylinder can be replaced.
  Push the lever towards the LPG cylinder to lock the cylinder in place.



Set the stopper, as shown on the right, to open and close the cover.

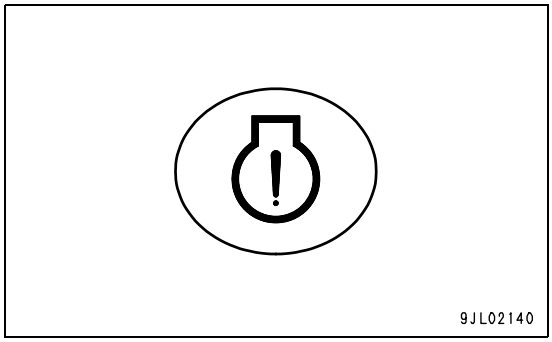


NOTICE

Open the LPG cylinder cover only when replacing the LP gas cylinder.

ENGINE FAILURE LAMP

If the engine has a malfunction, the failure lamp lights-up or flashes to alert the operator of the problem.

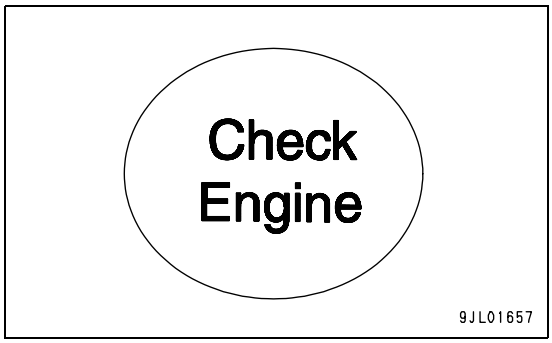


NOTICE

If the lamp lights-up or flashes, stop the forklift immediately and report the problem to the manager to have them fix it, or call your KOMATSU FORKLIFT distributor.

REMARK

The lamp shown on the right may differ on some models.



7.5 REFUELING (LP GAS)

⚠ WARNING

Replace the LPG cylinder in a well ventilated area and keep it away from open flames.

⚠ CAUTION

The LPG cylinder of this forklift is covered under the [High Pressure Gas Safety Act]. Refueling must be done when a supervisor is present.

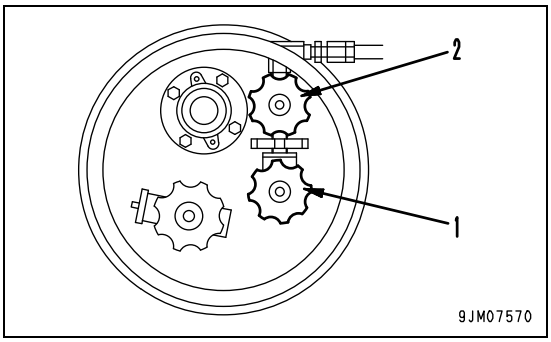
7.5.1 REFUELING (LP GAS) BY REPLACING THE LPG CYLINDER

⚠ WARNING

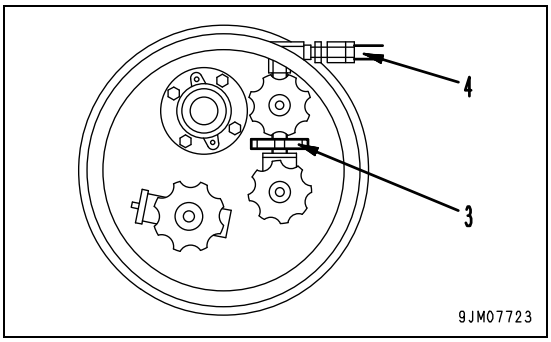
- **Mount the LPG cylinder in the LPG cylinder bracket, and then check that it is securely locked.**
- **Lift the LPG cylinder and LPG cylinder bracket together and mount them using the safety button. After this, lightly jostle the LPG cylinder to make sure that it is securely locked.**
- **Swing the LPG cylinder to the left and mount it using the safety lever. After this, lightly jostle the LPG cylinder to make sure that it is securely locked.**

7.5.1.1 FORKLIFT W/ SWING BRACKET

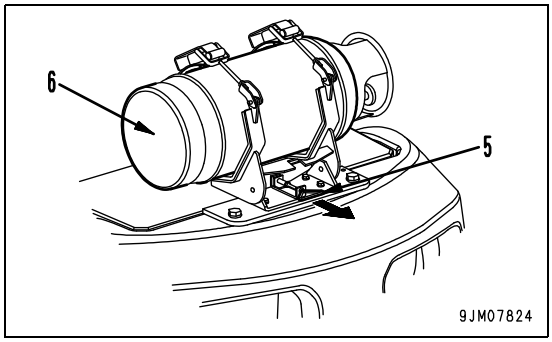
1. Fully close the red discharge valve (1) and green stop valve (2) (turn them to the right).

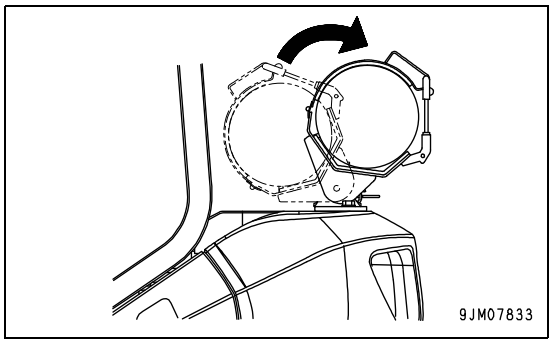


2. Loosen the LPG cylinder connection screw (3) to remove the high-pressure line (4) to the engine.

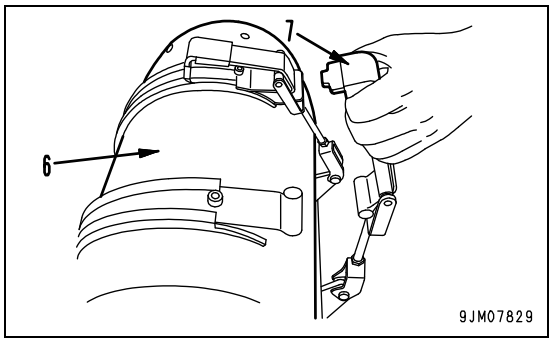


3. Pull the lever (5) back towards you and tilt the LPG cylinder (6) back toward the rear of the forklift.

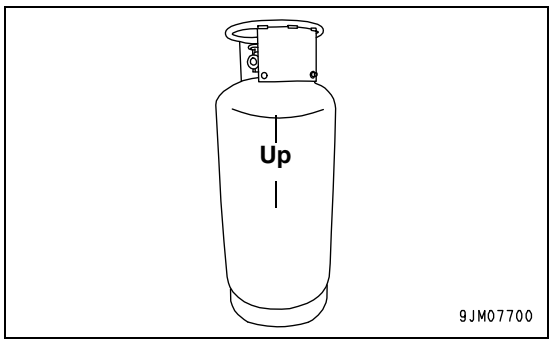




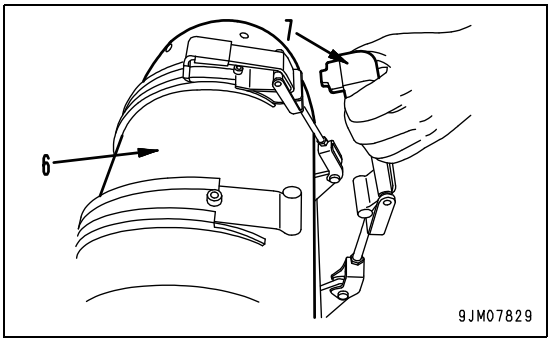
4. Remove the two stoppers (7) and remove the LPG cylinder (6) from the LPG cylinder bracket.

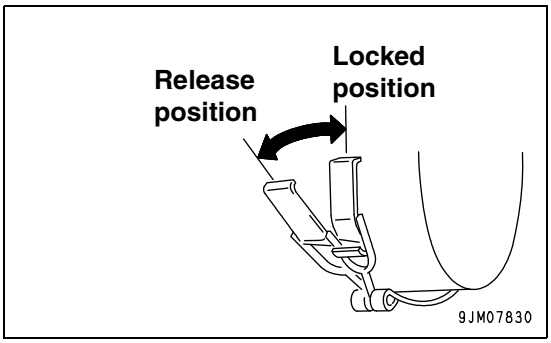


5. Replace the empty LPG cylinder with a full one.The valve side of the LPG cylinder has [Up] marked on it. When mounting a full LPG cylinder, be sure to position the cylinder so that this side is faces up.

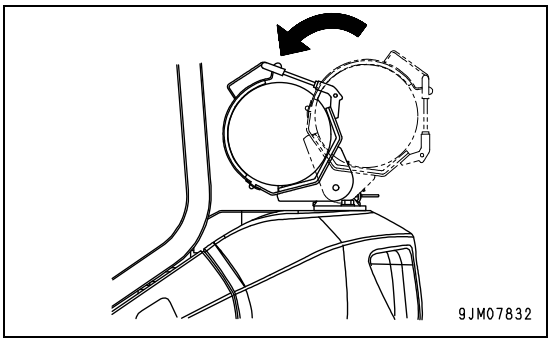


6. Place the LPG cylinder (6) in the LPG cylinder bracket, and push the stopper (7) in until it locks into position. Lightly jostle the LPG cylinder (6) to check that it is securely locked.

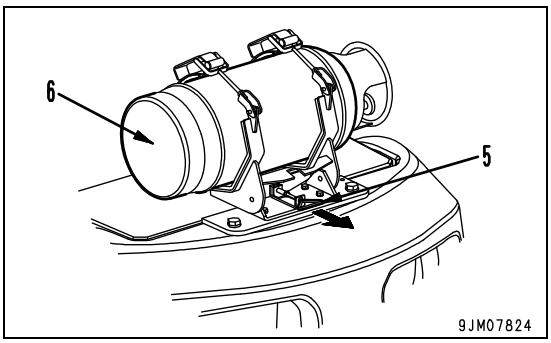




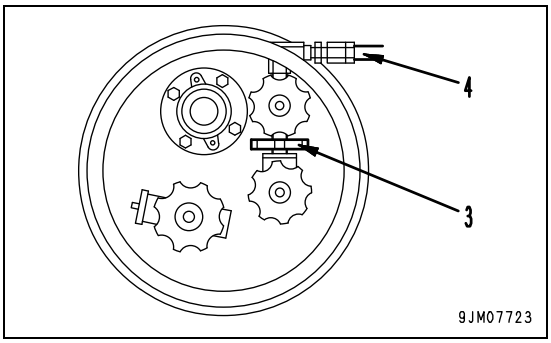
7. Lift up the LPG cylinder (6) and LPG cylinder bracket together.



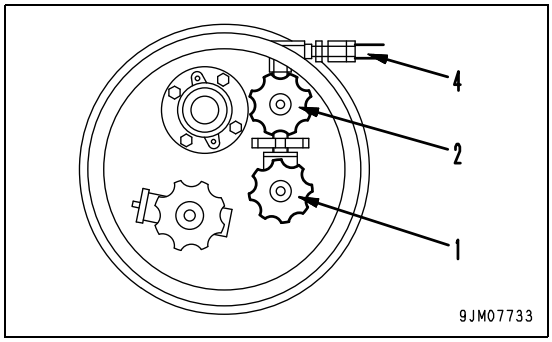
8. Pull the lever (5) back toward you matching the hole on the LPG cylinder bracket, and then insert the end of the lever (5).Lightly jostle the LPG cylinder bracket to check that it is securely locked.



9. Tighten the LPG cylinder connection screw (3) and connect the high-pressure line (4) to the engine.

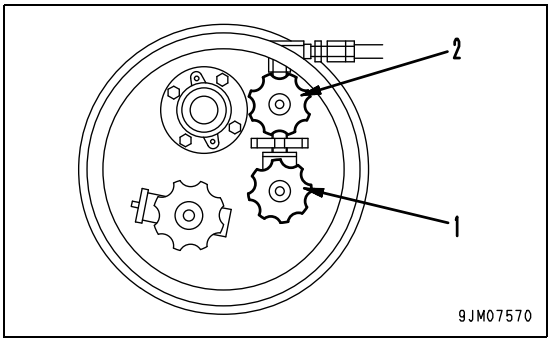


10. Fully open the red discharge valve (1) and the green stop valve (2) (turn them to the left). Check for LP gas leaks from the joint of the high-pressure line (4).

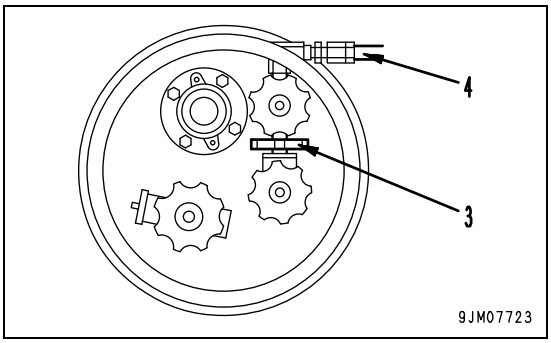


7.5.1.2 FORKLIFT W/ SWING-DOWN BRACKET

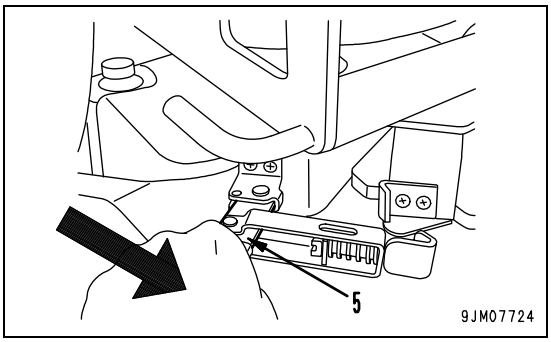
1. Fully close the red discharge valve (1) and green stop valve (2) (turn them to the right).

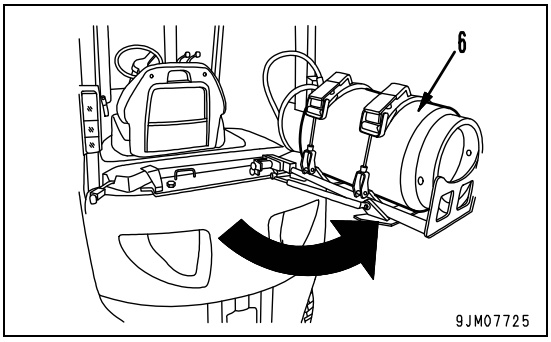


2. Loosen the LPG cylinder connection screw (3) to remove the high-pressure line (4) to the engine.

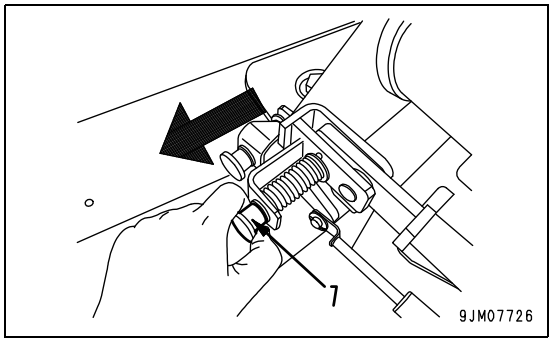


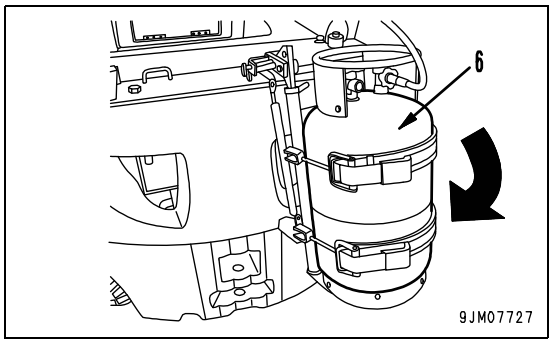
3. Pull the safety lever (5) on the left side toward you and swing the LPG cylinder (6) to the right.



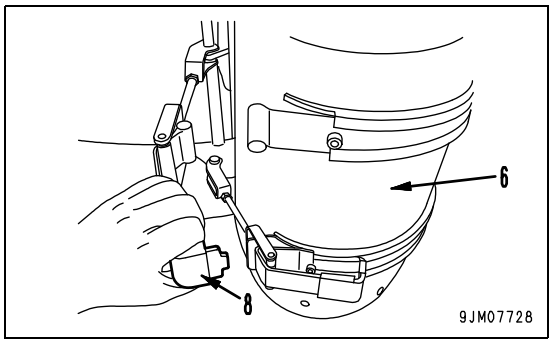


4. Pull the safety button (7) on the LPG cylinder bracket and lower the LPG cylinder (6).

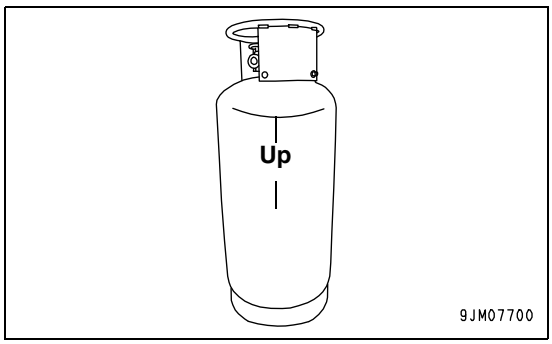




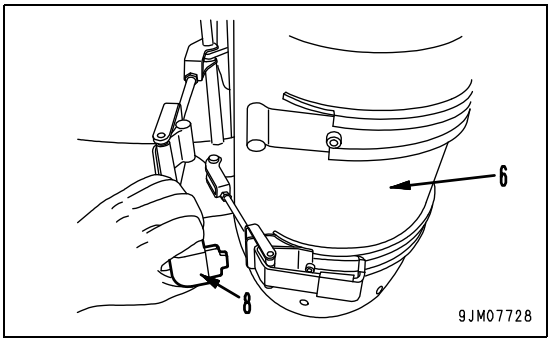
5. Remove the two stoppers (8) and remove the LPG cylinder (6) from the LPG cylinder bracket.

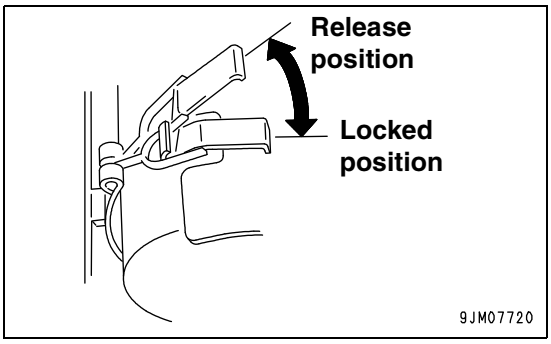


6. Replace the empty LPG cylinder with a full one. The valve side of the LPG cylinder has [Up] marked on it. When mounting a full LPG cylinder, be sure to position the LPG cylinder so that this side is faces up.

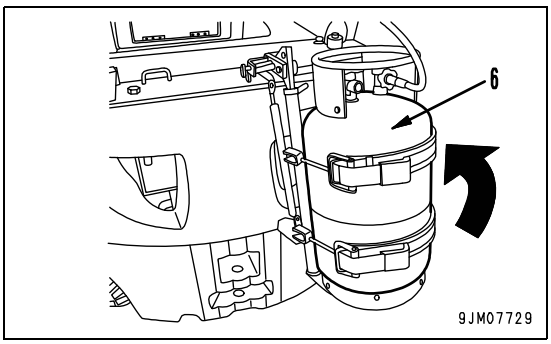


7. Place the LPG cylinder (6) in the LPG cylinder bracket, and push the stopper (8) in until it locks into position. Lightly jostle the LPG cylinder (6) to check that it is securely locked.

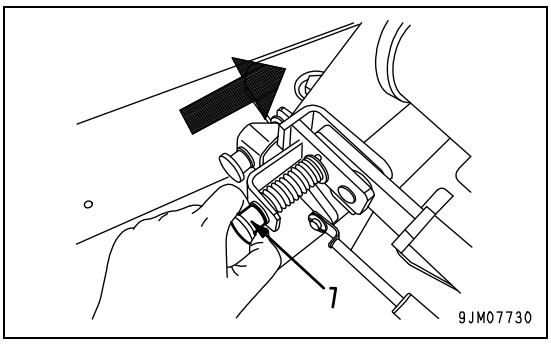




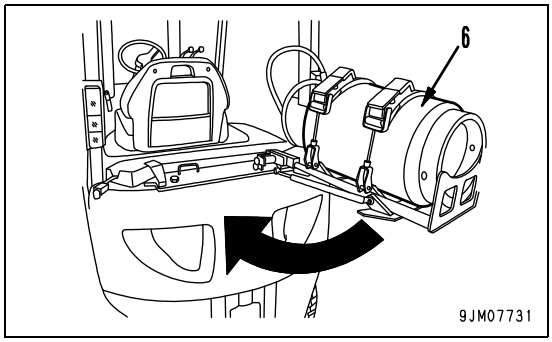
8. Lift up the LPG cylinder (6) and LPG cylinder bracket together.

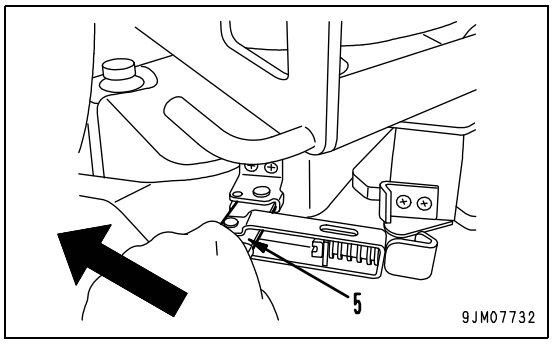


9. Pull the safety button (7) out matching the hole on the LPG cylinder bracket, and then insert the safety button (7).
   Lightly jostle the LPG cylinder bracket to check that it is securely locked.

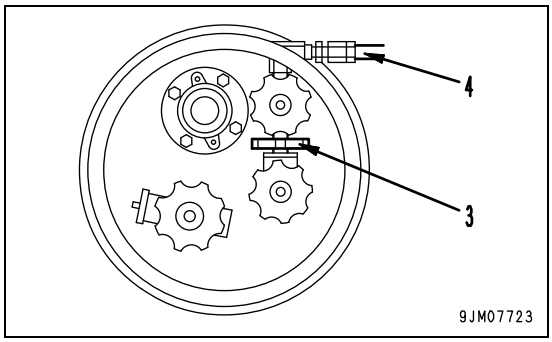


10. Swing the LPG cylinder (6) to the left and lock it with the safety lever (5).
    Lightly jostle the LPG cylinder (6) to check that it is securely locked.

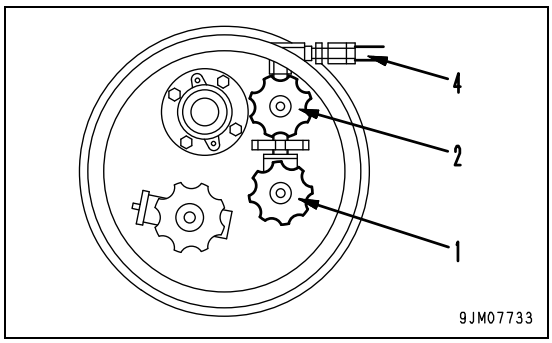




11. Tighten the LPG cylinder connection screw (3) and connect the high-pressure line (4) to the engine.

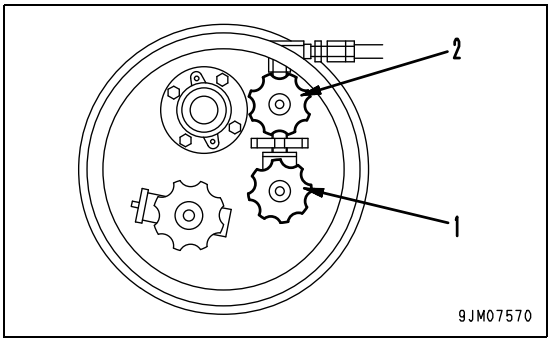


12. Fully open the red discharge valve (1) and the green stop valve (2) (turn them to the left). Check for LP gas leaks from the joint of the high-pressure line (4).

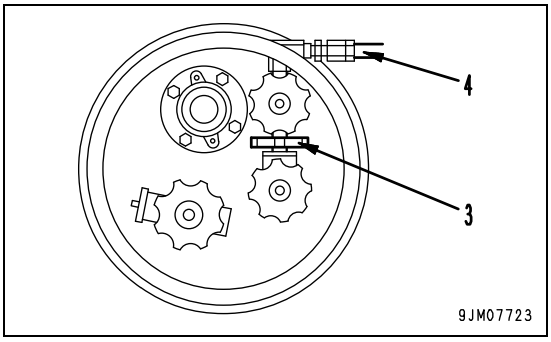


7.5.1.3 FORKLIFT W/ DOUBLE CYLINDER BRACKET

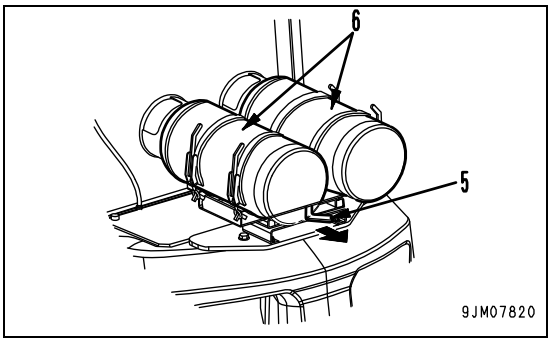
1. Fully close the red discharge valve (1) and green stop valve (2) (turn them to the right).

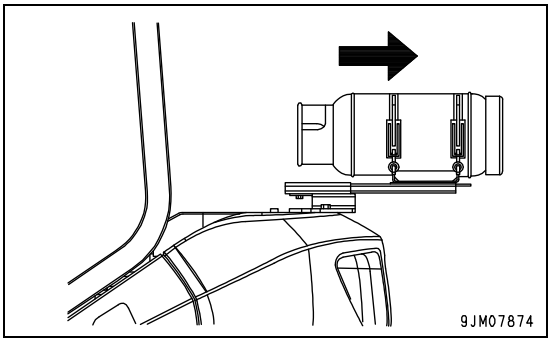


2. Loosen the LPG cylinder connection screw (3) to remove the high-pressure line coupler (4) to the engine.

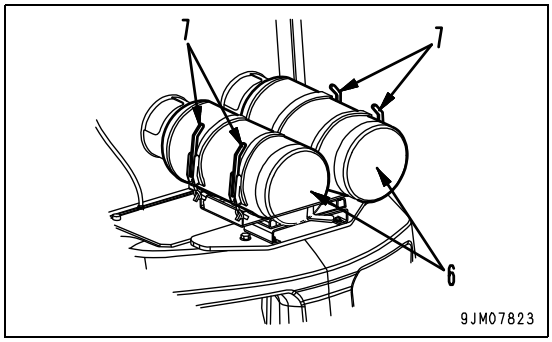


3. Pull the lever (5) back towards you. Slide the two LPG cylinders (6) and LPG cylinder bracket together back toward the rear of the forklift.

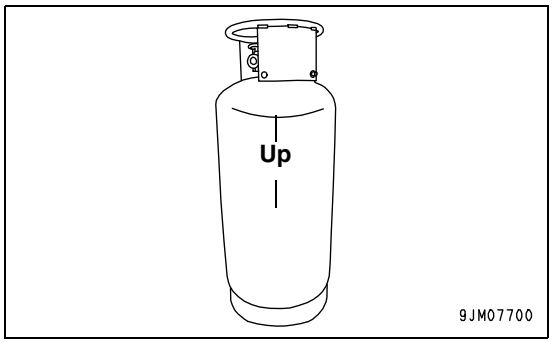




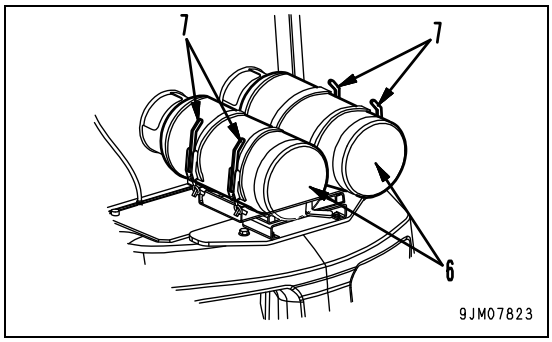
4. Remove the two stoppers (7) and remove the two LPG cylinders (6) from the LPG cylinder bracket.

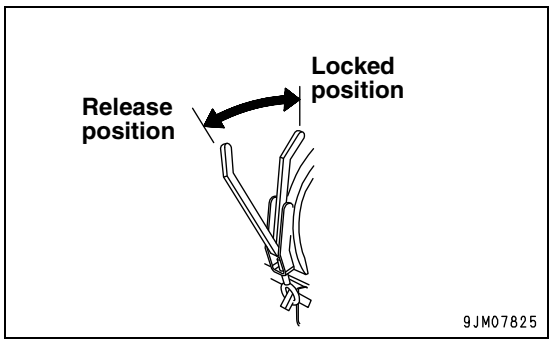


5. Replace the empty LPG cylinder with a full one.The valve side of the LPG cylinder has [Up] marked on it. When mounting a full LPG cylinder, be sure to position the cylinder so that this side is faces up.

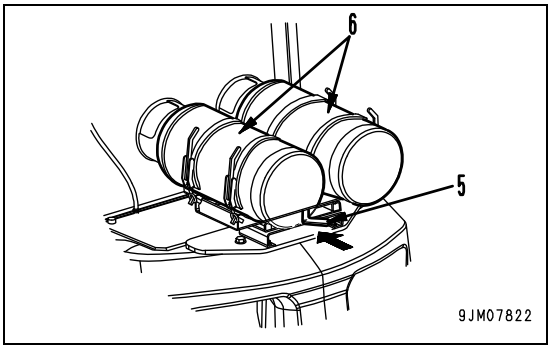


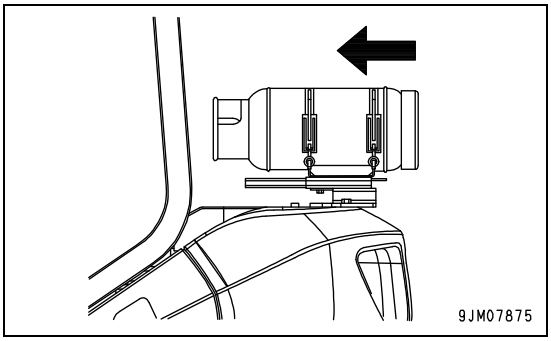
6. Place the LPG cylinder (6) in the LPG cylinder bracket, and push the stopper (7) in until it locks into position. Lightly jostle the LPG cylinder (6) to check that it is securely locked.



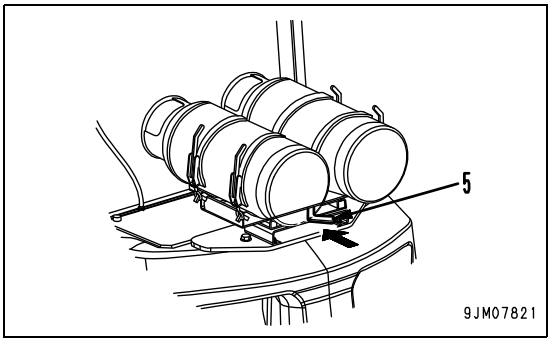


7. Push the lever (5) to slide the two LPG cylinders (6) and LPG cylinder bracket together back toward the front of the forklift.

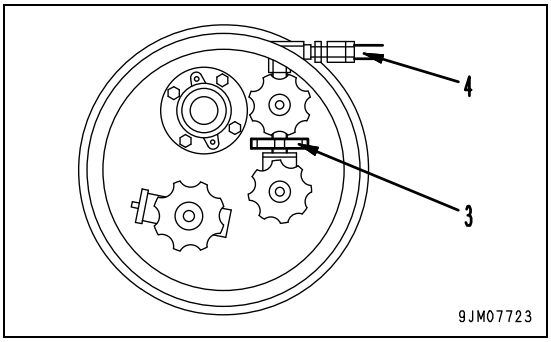




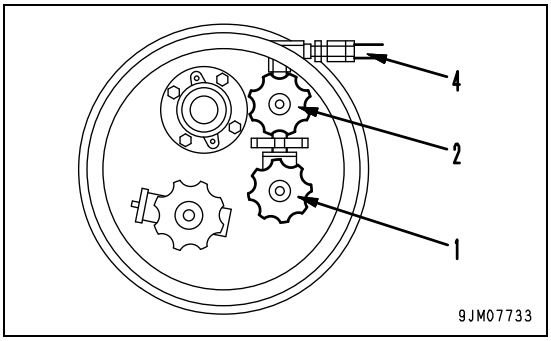
8. Push in the lever (5).
   Lightly jostle the LPG cylinder bracket to check that it is securely locked.



9. Tighten the LPG cylinder connection screw (3) and connect the high-pressure line coupler (4) to the engine.



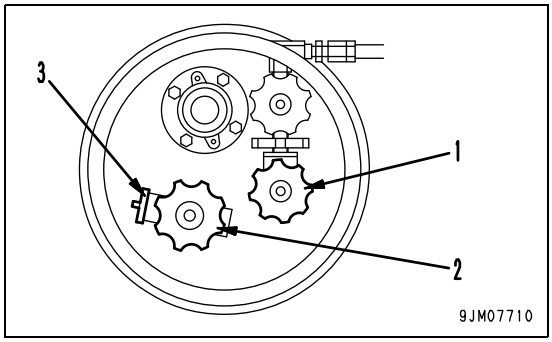
10. Fully open the red discharge valve (1) and the green stop valve (2) (turn them to the left). Check for LP gas leaks from the joint of the high-pressure line coupler (4).



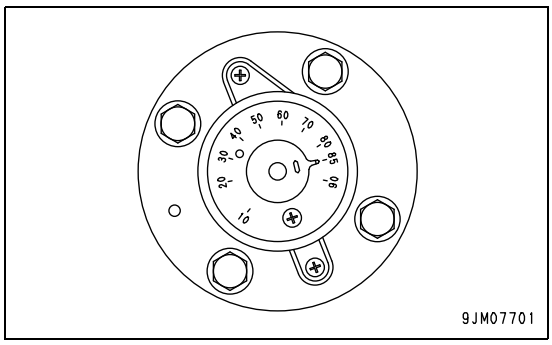
7.5.2 REFUELING (LP GAS) THE LPG CYLINDER WHEN MOUNTED ON THE FORKLIFT

If the LPG cylinder is fixed to the forklift and comes with an overcharge prevention valve, add LP gas to the cylinder.

1. Drive the forklift to an LPG dispenser.
2. Fully close the red discharge valve (1) (turn to the right).
3. Remove the plug (3) from the grey charge valve (2), and connect the LPG line from the LPG dispenser.
4. Open the grey charge valve (2) and the valve on the LPG dispenser side to add LP gas to the LPG cylinder.



5. Add LP gas until the fuel level gauge reads 85 (red).
6. Fully close the grey charge valve (2) and the valve on the LPG dispenser.
7. Remove the LPG line from the LPG dispenser and reinsert the plug (3) into the grey charge valve (2).
8. Fully open the red discharge valve (1) (turn it to the left).



7.6 PRESTART INSPECTION

⚠ WARNING

- **Operate the forklift only after completing the pre-start inspection.**
- **Immediately report any problems to the supervisor. Never operate a malfunctioning forklift before repairs are completed.**

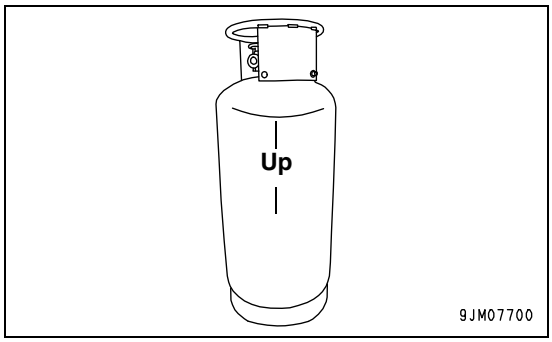
THE MANDATORY PRE-START INSPECTION

- Perform the pre-start inspection for the standard forklift as well.
- Record and save the results of the pre-start inspection on an inspection record sheet.

Do the following start-up inspection while the engine is OFF.

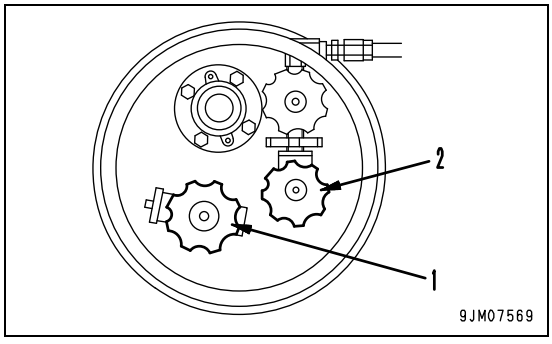
7.6.1 INSPECTING THE LPG CYLINDER WHILE MOUNTED ON THE FORKLIFT

- Checking the direction the LPG cylinder is installed
  The valve side of the LPG cylinder has [Up] marked on it. When mounting a full LPG cylinder, be sure to position the LPG cylinder so that this side is faces up.
- Make sure the section where the LPG cylinder is mounted is secure and undamaged.



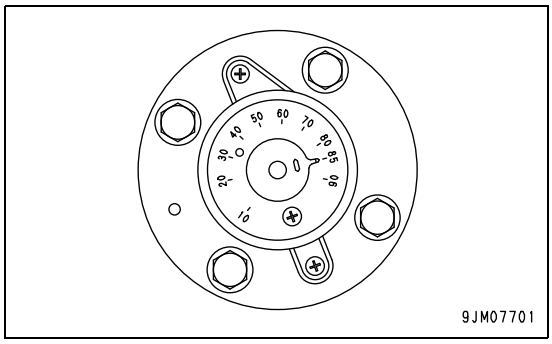
7.6.2 CHECKING THE CHARGE AND DISCHARGE VALVES

Make sure the grey charge valve (1) and red discharge valve (2) are fully closed (turn them to the right).



7.6.3 CHECKING THE LPG LEVEL

Check the LPG level with the fuel gauge.

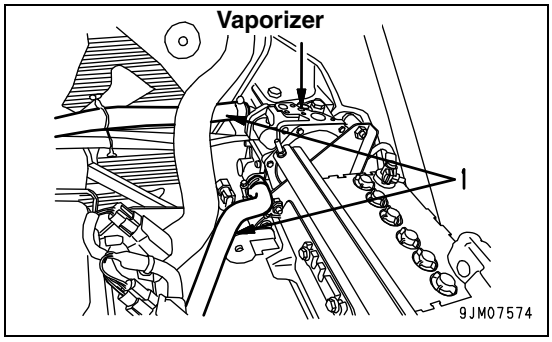


REMARK

If the fuel level gauge reads "85", the fuel tank is full.If the fuel level is low, add LP gas. For refueling, see "LPG FORK LIFT 7.5 REFUELING (LP GAS) (Page 7-10)".

7.6.4 CHECKING THE HOT WATER HOSE CONNECTION

Make sure the hot water hose (1) connections are secure and there are no water leaks.



7.6.5 CHECKING THE ELECTRICAL WIRING

Check that the electrical wire sheathing and connections are undamaged.

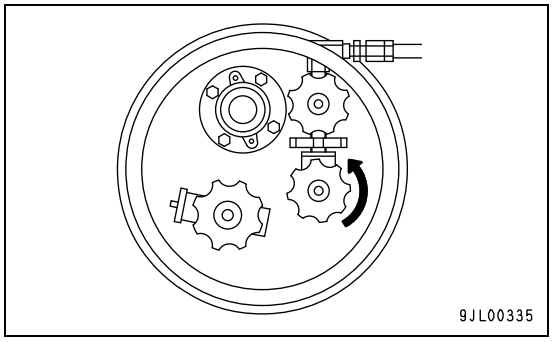
7.6.6 CHECKING THE HIGH-PRESSURE LINES FOR GAS LEAKS

⚠ WARNING

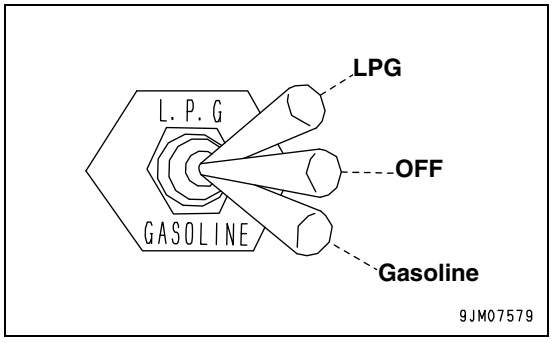
If a gas leak in the high-pressure lines is detected, fully close the red discharge valve (turn it to the left) immediately and call your KOMATSU FORKLIFT distributor.Keep the open flame away from the forklift and wait until a technician arrives.

Let LP gas into the vaporizer inlet using to the procedure below.
After this, check the high-pressure lines for LP gas leaks.

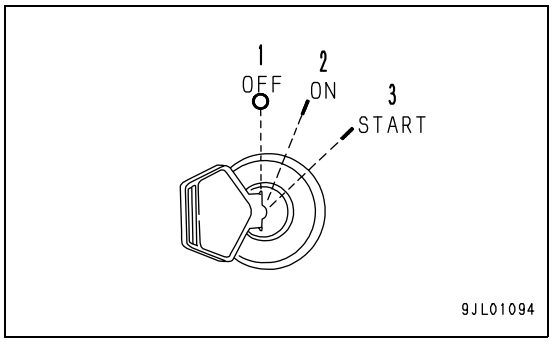
1. Fully open the red discharge valve (turn it to the left).



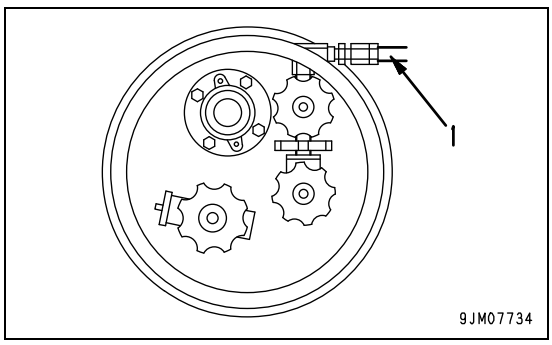
2. Place the LPG/Gasoline selector switch in the [LPG] position. (LPgas/gasoline (dual fuel) forklift type)



3. Turn the starter switch in the [I] (ON) position.



4. Check the high-pressure lines (1) for gas leaks using a leak detection fluid or soap.

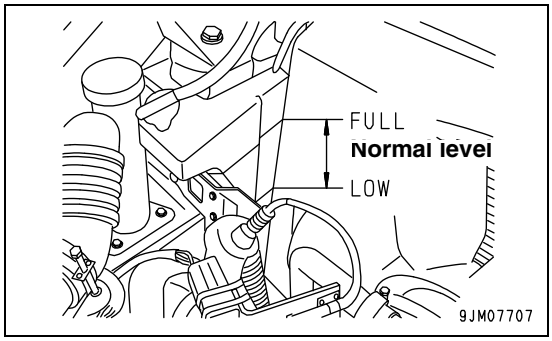


7.6.7 CHECKING THE COOLANT LEVEL

⚠ CAUTION

The coolant within the radiator is very hot. Therefore, do not open the radiator cap immediately after stopping the engine.Opening the cap while the engine is hot may cause steam or boiling water to gush out of the radiator, causing burns.After the coolant has cooled, turn the cap slowly to release the pressure, and then remove the coolant.

- Check whether the coolant level is within the normal range, i.e. between FULL and LOW when the coolant within the radiator reservoir tank in the engine hood is in a cooled state.
- If the coolant level is below normal range, add coolant up to the [FULL] mark.
- Check the radiator and radiator hose for any fluid leaks.
- If the reserve tank is empty, open the radiator cap, and refill the radiator and reserve tank with coolant.



NOTICE

- **If the coolant level is low, water may freeze in the vaporizer causing it to malfunction.**
- **If antifreeze is used, add it as well.**

7.7 OPERATING

⚠ WARNING

Do not attempt to start the engine by short-circuiting the engine starting circuit.Doing this poses a serious threat of bodily injury and risk of fire.

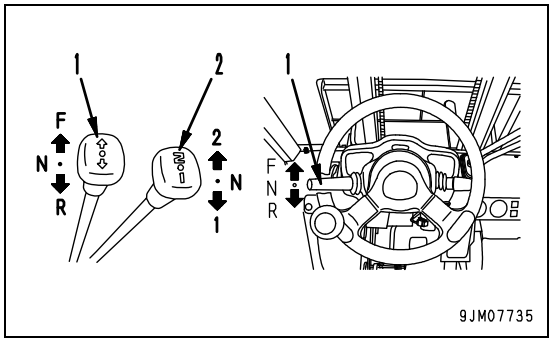
⚠ CAUTION

- **Only start the engine when sitting in the operator's seat.**
- **Prior to starting the engine, place the forward/reverse lever and 1st/2nd gear lever (clutch) in neutral (N), and pull the parking brake lever toward the rear of the forklift (Engage the parking brake)**
- **Exhaust is toxic. Therefore, when starting engine indoors or in a poorly-ventilated area, pay close attention to the ventilation setup within the area.**
- **If you are leaning forward or sideways i.e., are not seated properly while traveling on an incline in the forklift, it may hamper your ability to operate the forklift and could cause the forklift to slid backwards resulting in an accident. Maintain the correct posture while traveling on an incline.**

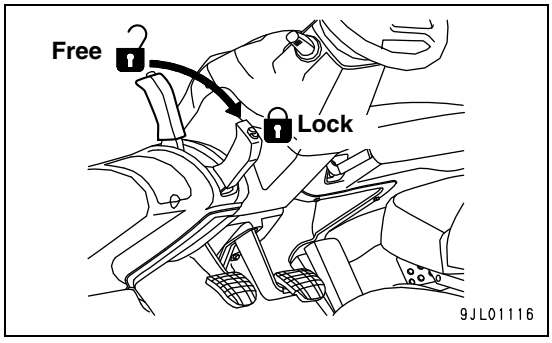
7.7.1 STARTING ENGINE W/ LP GAS

1. Place the forward/reverse lever (1) and 1st/2nd gear lever (clutch) (2) in neutral (N).

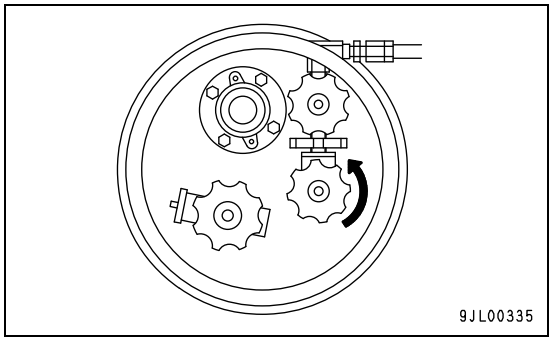
REMARK
The engine does not start unless the forward/reverse lever (1) is set in neutral (N).



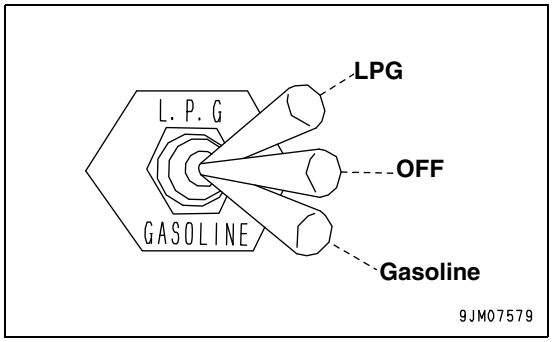
2. Pull the parking brake lever to the lock position toward the rear of the forklift. (Engage the parking brake)



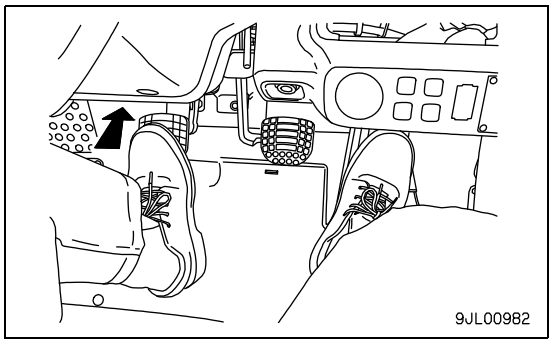
3. Fully open the red discharge valve (turn it to the left).



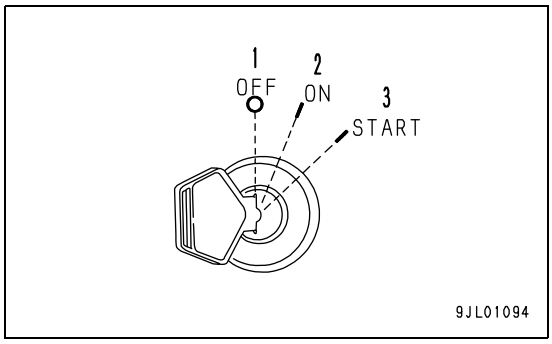
4. Place the LPG/Gasoline selector switch in the [LPG] position. (LP gas/gasoline (dual fuel) type)



5. For forklifts with a torque controller, depress the inching pedal. For forklifts with a clutch, depress the clutch pedal all the way down.



6. Operating the starting switch
   - To start the engine, turn the starter switch key to the [I] (START) position (3) with your foot off the accelerator pedal.
   - Once the engine has started, immediately release the engine starter switch key. The key will automatically return to the [I] (ON) position (2). Keep the key in this position while the engine is running.



REMARK
- When starting the engine of the LPG forklift in a cold weather, keep the key in the [I] (ON) position (2) for 1 minute before turning it to the [I] (START) position (3). This step turns on the heater for the vaporizer.
- Start the gasoline engine referring to "LPG FORK LIFT 7.7.2 STARTING THE ENGINE IN COLD CONDITIONS (Page 7-29)" that is on starting the engine of the LPG/gasoline (dual fuel) type in cold conditions.

7. Warm-up the engine.
   - Warm-up the engine for about 5 minutes until the engine coolant temperature gauge reaches the correct level (white range).

REMARK

Running the forklift while the engine is cold will result in the following problems.

- Backfiring in the exhaust pipe
- Engine speed does not rise when accelerator pedal is depressed
- Engine stalls
- Water deposits in the vaporizer will freeze when the LP gas is vaporized due to latent heat vaporization causing the engine to stall. If the frozen water deposits are melted, the engine can be restarted.

NOTICE

- **The starter switch key must be in the [○] (OFF) position (1) while the engine is stopped. Do not leave it in the [I] (ON) position (2). Leaving the starter switch key in the (ON) position will drain the battery which will make it difficult to start the engine.**
- **Limit the use of the starter motor to within 10 seconds. Do not turn it over continuously past this interval.**
- **Wait for approx. 20 seconds between each starter motor try.**
- **Do not turn the starter switch key to the [I] (START) position (3) while the engine is running.**

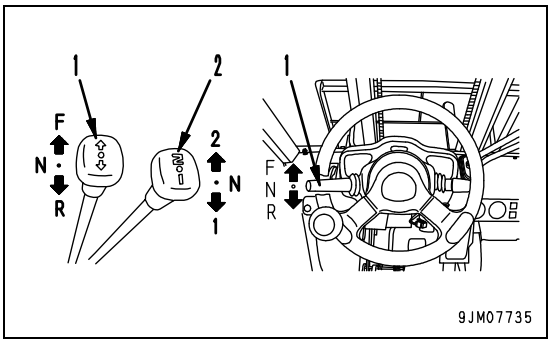
7.7.2 STARTING THE ENGINE IN COLD CONDITIONS

When starting the engine of the LPG/gasoline (dual fuel) forklift in cold conditions, switch the fuel from LPG to gasoline using the following procedure.

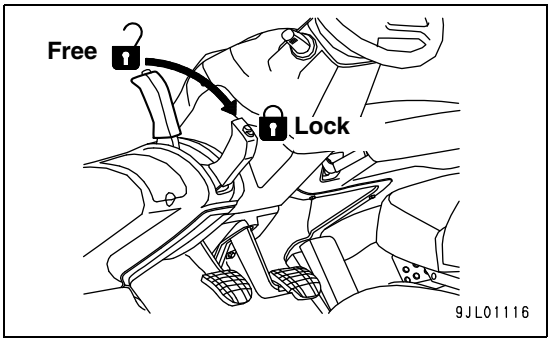
1. Place the forward/reverse lever (1) and 1st/2nd gear lever (clutch) (2) in neutral (N).

NOTICE

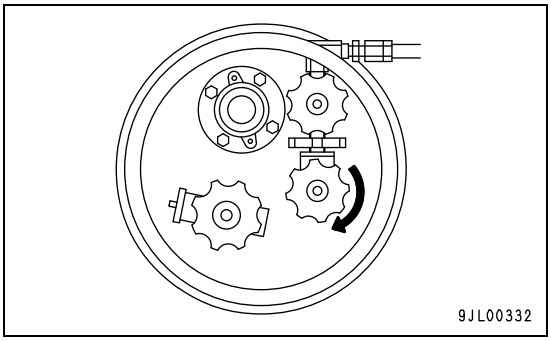
The engine does not start unless the forward/reverse lever (1) is set in neutral (N).



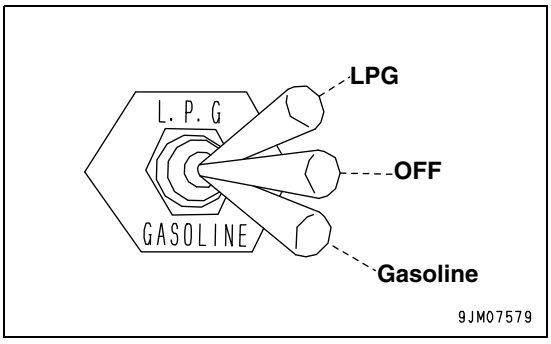
2. Pull the parking brake lever to the lock position toward the rear of the forklift. (Engage the parking brake)



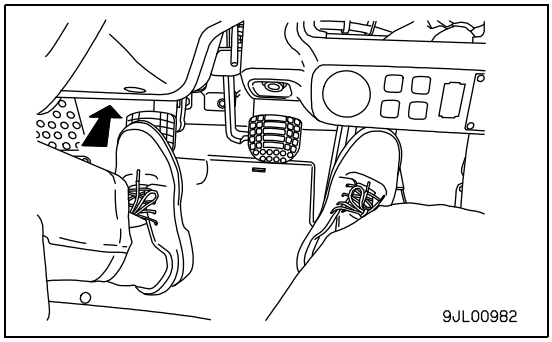
3. Make sure the red discharge valve (turn to the right) is fully closed.



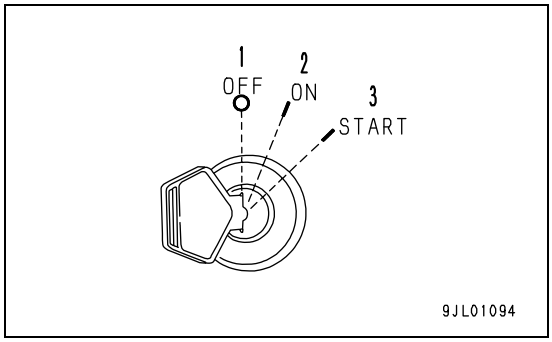
4. Place the LPG/Gasoline selector switch in the [Gasoline] position.



5. For forklifts with a torque controller, depress the inching pedal. For forklifts with a clutch, depress the clutch pedal all the way down.



6. Operating the starting switch
   - To start the engine, turn the starter switch key to the [I] (START) position (3) with your foot off the accelerator pedal.
   - Once the engine has started, immediately release the engine starter switch key. The key will automatically return to the [I] (ON) position (2). Keep the key in this position while the engine is running.
7. Warm-up the engine.
   - When the engine is warm, the warm-up automatically stops. After the warm-up ends, switch the fuel from gasoline to LP gas. For switching to LP gas, see "LPG FORK LIFT 7.7.4 SWITCHING FUEL FROM GASOLINE TO LP GAS (Page 7-33)".



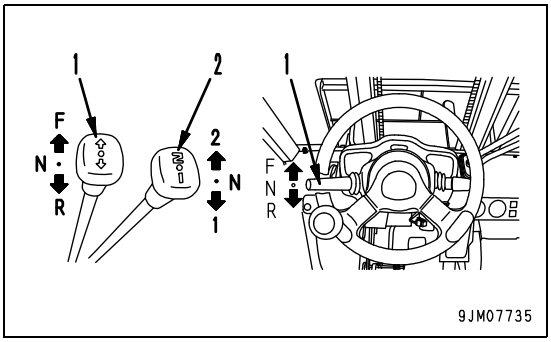
NOTICE

- **The starter switch key must be in the [○] (OFF) position (1) while the engine is stopped. Do not leave it in the [I] (ON) position (2). Leaving the starter switch key in the (ON) position will drain the battery which will make it difficult to start the engine.**
- **Limit the use of the starter motor to within 10 seconds. Do not turn it over continuously past this interval.**
- **Wait for approx. 20 seconds between each starter motor try.**
- **Do not turn the starter switch key to the [I] (START) position (3) while the engine is running.**

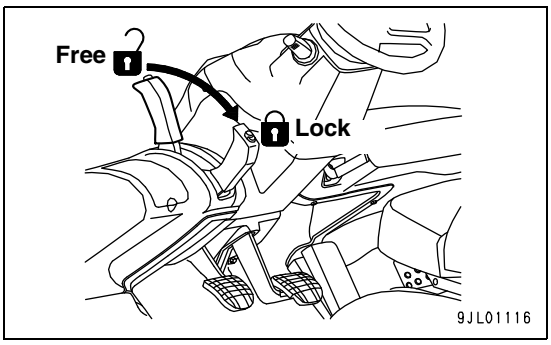
7.7.3 SWITCHING FUEL FROM LP GAS TO GASOLINE

The fuel for the LP gas/gasoline (dual fuel) type can be switched from LP gas to gasoline using the following procedure.

1. Place the forward/reverse lever (1) and 1st/2nd gear lever (clutch) (2) in neutral (N).



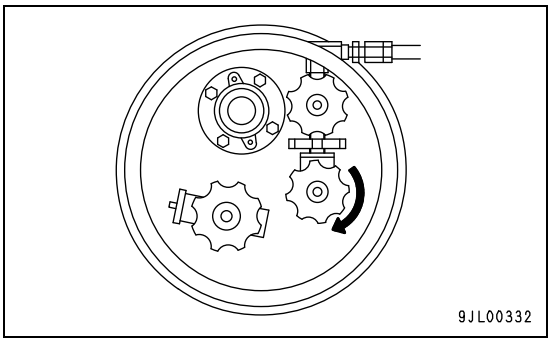
2. Pull the parking brake lever to the lock position toward the rear of the forklift. (Engage the parking brake)



3. Fully close the red discharge valve (turn to the right) and wait until the engine stops naturally.

NOTICE

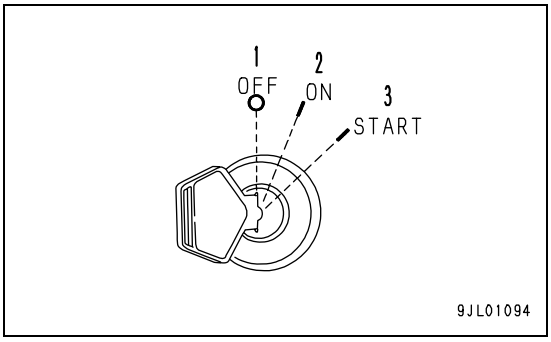
The engine stops when all of the remaining LP gas in the line is consumed.



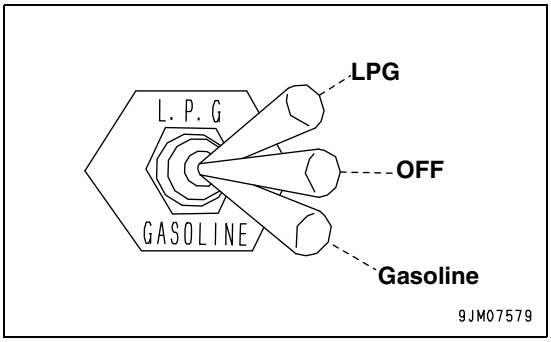
4. After the engine stops, turn the starter switch key to the [○] (OFF) position (1).

NOTICE

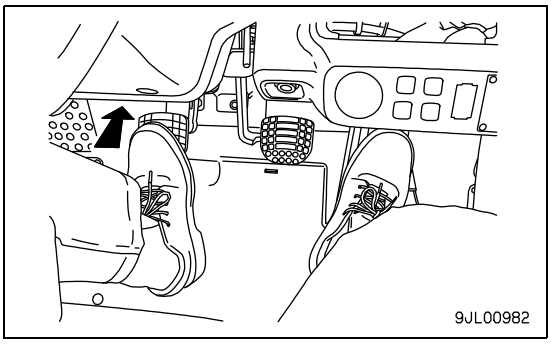
If the key is kept in the [I] (ON) position (2), the fuel will not switchover even if the LPG/gasoline selector switch is changed. Be sure to turn the key to the [○] (OFF) position (1) before switching the fuel.



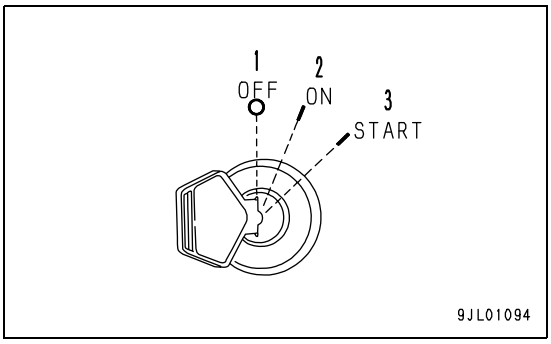
5. Place the LPG/Gasoline selector switch in the [Gasoline] position.



6. For forklifts with a torque controller, depress the inching pedal. For forklifts with a clutch, depress the clutch pedal all the way down.



7. Operating the starting switch
   - To start the engine, turn the starter switch key to the [I] (START) position (3) with your foot off the accelerator pedal.
   - Once the engine has started, immediately release the engine starter switch key. The key will automatically return to the [I] (ON) position (2). Keep the key in this position while the engine is running.



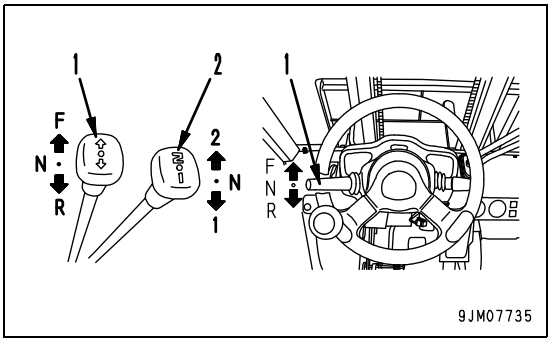
NOTICE

- **The starter switch key must be in the [○] (OFF) position (1) while the engine is stopped. Do not leave it in the [I] (ON) position (2). Leaving the starter switch key in the (ON) position will drain the battery which will make it difficult to start the engine.**
- **Limit the use of the starter motor to within 10 seconds. Do not turn it over continuously past this interval.**
- **Wait for approx. 20 seconds between each starter motor try.**
- **Do not turn the starter switch key to the [I] (START) position (3) while the engine is running.**

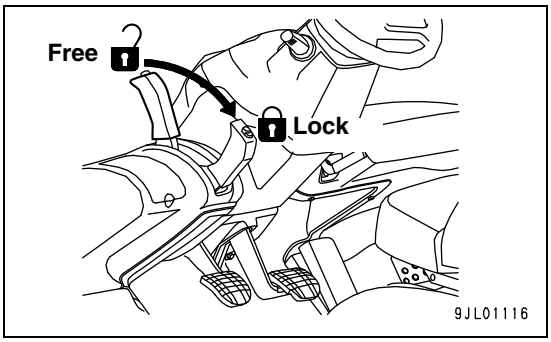
7.7.4 SWITCHING FUEL FROM GASOLINE TO LP GAS

The fuel for the LP gas/gasoline (dual fuel) type can be switched from gasoline to LP gas using the following procedure.

1. Place the forward/reverse lever (1) and 1st/2nd gear lever (clutch) (2) in neutral (N).



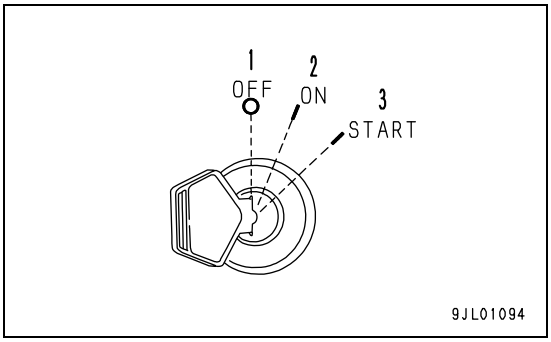
2. Pull the parking brake lever to the lock position toward the rear of the forklift. (Engage the parking brake)



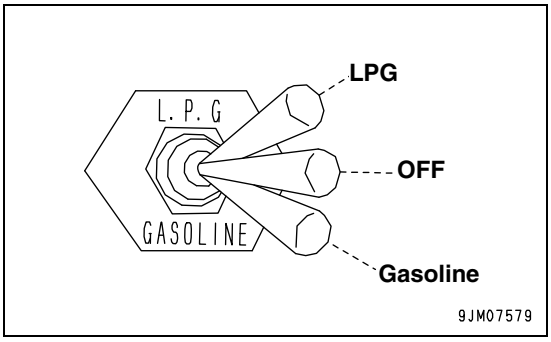
3. Turn the starter switch key to the [○] (OFF) position (1).

NOTICE

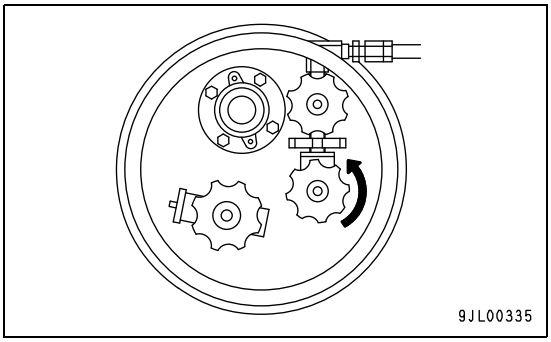
If the key is kept in the [I] (ON) position (2), the fuel will not switchover even if the LPG/gasoline selector switch is changed. Be sure to turn the key to the [○] (OFF) position (1) before switching the fuel.



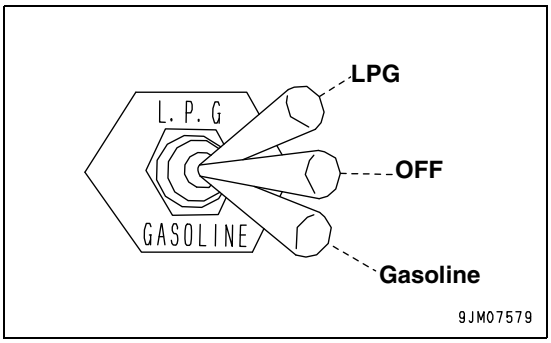
4. Place the LPG/Gasoline selector switch in the [OFF] position.



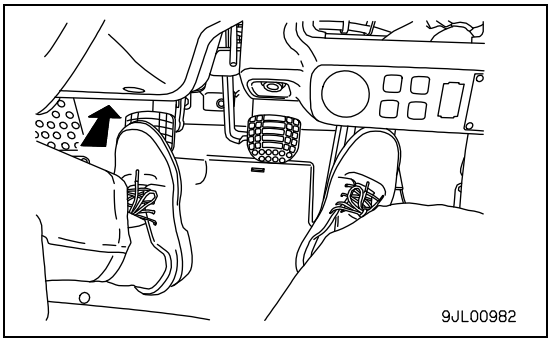
5. Fully open the red discharge valve (turn it to the left).



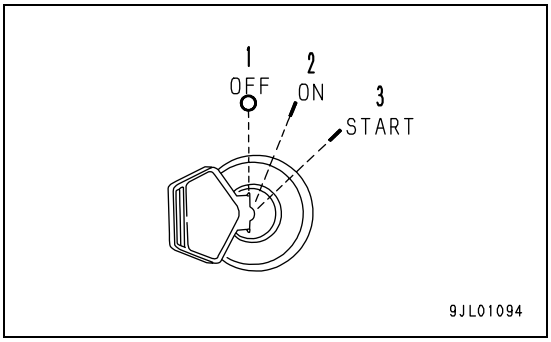
6. Place the LPG/Gasoline selector switch in the [LPG] position.



7. For forklifts with a torque controller, depress the inching pedal. For forklifts with a clutch, depress the clutch pedal all the way down.



8. Operating the starting switch
   - To start the engine, turn the starter switch key to the [I] (START) position (3) with your foot off the accelerator pedal.
   - Once the engine has started, immediately release the engine starter switch key. The key will automatically return to the [I] (ON) position (2). Keep the key in this position while the engine is running.

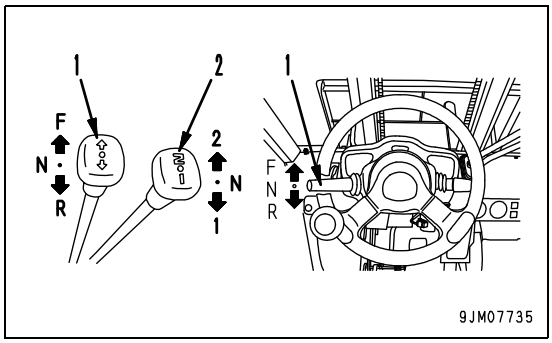


NOTICE

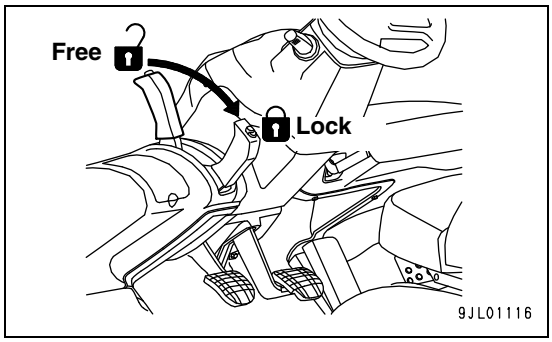
- **The starter switch key must be in the [○] (OFF) position (1) while the engine is stopped. Do not leave it in the [I] (ON) position (2). Leaving the starter switch key in the (ON) position will drain the battery which will make it difficult to start the engine.**
- **Limit the use of the starter motor to within 10 seconds. Do not turn it over continuously past this interval.**
- **Wait for approx. 20 seconds between each starter motor try.**
- **Do not turn the starter switch key to the [I] (START) position (3) while the engine is running.**

7.7.5 STOPPING LP GAS DRIVEN ENGINES

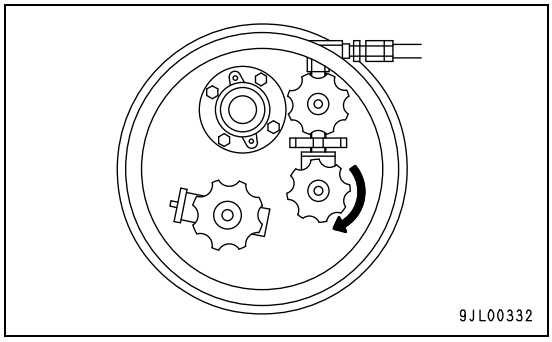
1. Place the forward/reverse lever (1) and 1st/2nd gear lever (clutch) (2) in neutral (N).



2. Pull the parking brake lever to the lock position toward the rear of the forklift. (Engage the parking brake)
3. Run the engine at low idle for approx. 5 minutes to gradually cool it down.

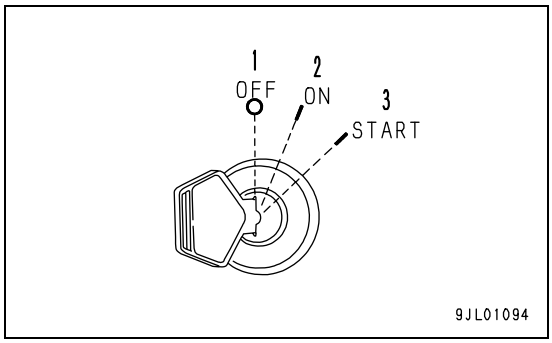


4. Fully close the red discharge valve (turn to the right) and wait until the engine stops naturally.



REMARK
The engine stops when all of the remaining LP gas in the line is consumed.

5. After the engine stops, turn the starter switch key to the [O] (OFF) position (1).
6. Pull out the starter switch key and leave the lift truck.



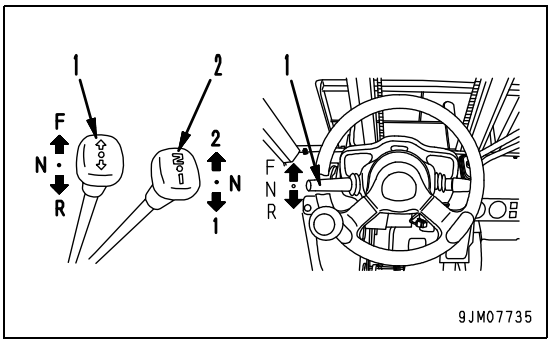
REMARK
If you leave the lift truck without engaging the parking brake (with the parking brake in a position other than LOCK), an alarm buzzer will sound.

NOTICE

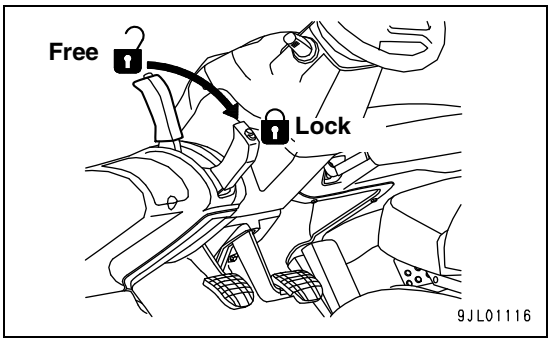
- **Suddenly stopping the engine while it is hot may shorten the life of the engine components. Avoid stopping the engine suddenly unless in an emergency.**
- **If the engine is overheated, do not stop it suddenly. Instead, run it at medium idle to gradually cool it down, and then turn it off.**

7.7.6 STOPPING GASOLINE DRIVEN ENGINES

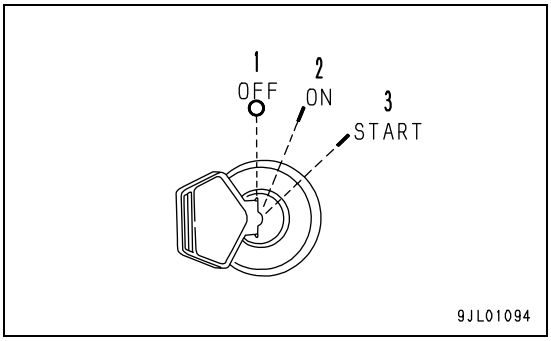
1. Place the forward/reverse lever (1) and 1st/2nd gear lever (clutch) (2) in neutral (N).



2. Pull the parking brake lever to the lock position toward the rear of the forklift. (Engage the parking brake)
3. Run the engine at low idle for approx. 5 minutes to gradually cool it down.



4. Turn the starter switch key to the [○] (OFF) position (1).
5. Pull out the starter switch key and leave the lift truck.



REMARK

If you leave the lift truck without engaging the parking brake (with the parking brake in a position other than LOCK), an alarm buzzer will sound.

NOTICE

- **Suddenly stopping the engine while it is hot may shorten the life of the engine components. Avoid stopping the engine suddenly unless in an emergency.**
- **If the engine is overheated, do not stop it suddenly. Instead, run it at medium idle to gradually cool it down, and then turn it off.**

7.8 BASIC MAINTENANCE

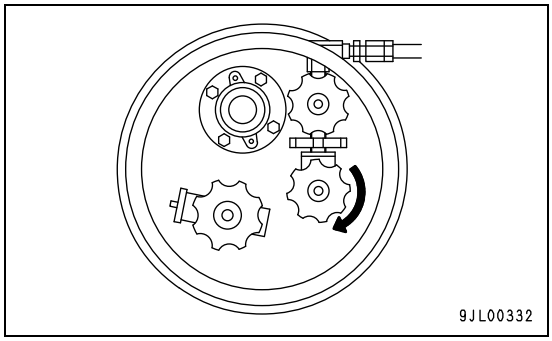
7.8.1 CHECK AND DRAINING OF TAR IN THE VAPORIZER

The vaporizer is a device used to adjust/reduce the pressure in the LPG cylinder and limits vaporization while the engine is running on LP gas. A thick viscous tar-like liquid is produced during this process and collects in the vaporizer. Too much of the tar built up in the vaporizer will have adverse affects on the idling performance of the engine.

⚠ WARNING

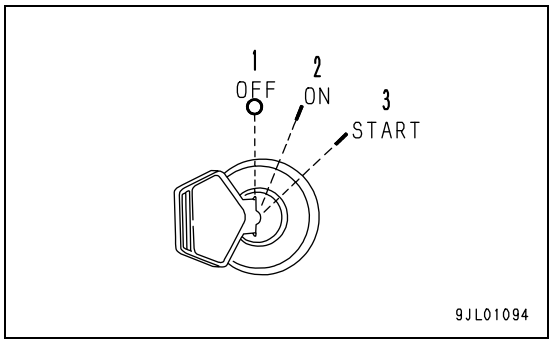
- **Make sure the red discharge valve (turn to the right) on the LPG cylinder is fully closed. If the discharge valve is not closed fully, the operator could be unexpectedly injured by the pressure build-up in the fuel supply line when the drain plug is removed.**
- **Be sure to don safety glasses and gloves.**
- **Do not smoke or allow any open flames near the work area.**

1. Thoroughly warm-up the engine for about 5 minutes at low-speed until its coolant temperature gauge reaches the correct level (white range).
2. While the engine is running, fully close the red discharge valve on the LPG cylinder (turn it to the right) and wait until the engine stops naturally.

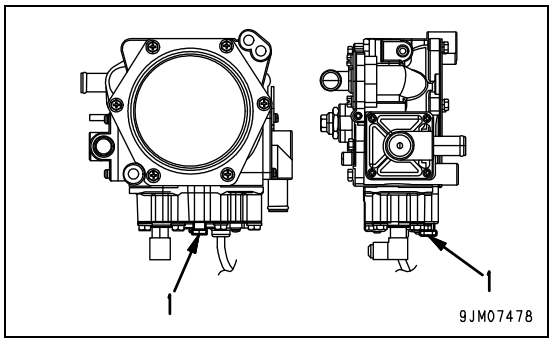


REMARK
The engine stops when all of the remaining LP gas in the line is consumed.

3. After the engine stops, turn the starter switch key to the [○] (OFF) position (1).



4. Lay a cloth, etc., under vaporizer drain plug (1) to catch any discharged tar.
5. Remove the drain plug (1) at the bottom of the vaporizer.
6. After the tar is discharged, reinsert the drain plug (1).



NOTICE
Discharge tar from the vaporizer at least once a month.

7.8.2 CLEANING THE LPG FILTER

Clean the LPG filter during regular inspection every three months or every 600-hours of use, whichever comes first.

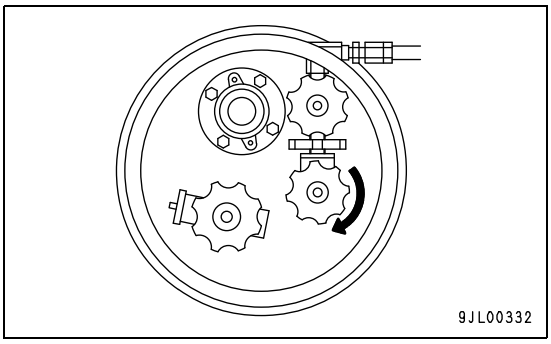
REMARK
Ask your KOMATSU FORKLIFT distributor about filter element replacement.

7.9 PARKING, DISUSE, STORAGE

When leaving the LPG forklift parked for an extended period or storing it, do the following.

⚠ CAUTION

- **When leaving the forklift parked for an extended period, fully close the red gas discharge valve on the LPG cylinder (turn it to the right).**
- **When storing or letting it sit, start the engine and then fully close the red gas discharge valve on the LPG cylinder (turn it to the right).**
  Wait until the engine stops naturally. The engine stops when all of the remaining LP gas in the line is consumed.
- **When leaving the forklift parked for an extended period, leave it in the shade to protect the LPG cylinder from direct sunlight.**



7.10 INSPECTION AND MAINTENANCE SCHEDULE

This Inspection and Maintenance Schedule describes the inspection and maintenance items the operator must perform including the start-up inspection as well as special independent annual inspections.

- For inspection and maintenance items not described in this manual, contact your KOMATSU FORKLIFT distributor.
- Incorrect inspection, maintenance or repair may lead to serious accidents and may shorten the service life of the forklift. Contact your KOMATSU FORKLIFT distributor for servicing details.

Inspection points	Inspection items	Every 1 months (200 h)	Every 3 months (600 h)	2000 Every 2000 hours	Yearly (2400 h)	Every 18 months (3600 h)	Replace-ment interval (month(s))
Lines	Damaged, loose mounted parts, extensive warping	○	○	○	○	○	
Piping connec-tions Part joints	Gas leaks (Check with leak detection soap, leak detection fluid or detector)	○	○	○	○	○	
Electrical wiring Electrical con-tacts	Sheathing damage	○	○	○	○	○	
LP gas vaporizer	Tar discharge, looseness,gas leakage,abnormal installation	○	○	○	○	○	
	Disassembly check and adjust-ment				○		
	Diaphragm replacement			○			
LPG cylinder lock stand	Damaged and loosely mounted parts	○	○	○	○	○	
LPG cylinder valves	Gas leakage from mounted parts	○	○	○	○	○	
Exhaust pipe	Abnormal exhaust leaks		○		○	○	
Rubber hoses	Damaged, loose		○		○	○	
PCV valve and hoses	Damaged, loose		○		○	○	
Vaporizer, other devices	Abnormalities, functionality		○		○	○	
Fuel lock filter	Functionality		○		○	○	
Spark plug	Functionality, replacement					○	

7.11 PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To use the LPG forklift safely we ask that you always periodically replace parts, especially those critical to safety and fire prevention. These parts are listed on the [Periodic Replacement of Safety Critical Parts] Table below.
Overt time the material quality of these parts will change and will easily wear or deteriorate. However, it is difficult to judge the degree of these changes simply by performing periodic maintenance. Therefore, the old parts should always be replaced with new ones after a certain amount of time, regardless of their condition. This is necessary to ensure that they remain fully functional at all times.
However, if these parts show any abnormalities before their replacement period expiration, repair or replace them immediately.
If the hose clamps show any sign of deterioration such as warping or cracking, replace them as well as the hoses at the same time.
Note: The warranty does not cover items associated with periodic replacements.

PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

Periodical replacement parts	6 months	2000 hours	One year	Two years	Number of years or operating hours
Quick coupler O-ring (only forklift w/ quick coupler)	○		○	○	0.5 years
Water hose			○	○	1 year
Vacuum hose				○	2 years
Vaporizer inner parts (Packing, seal parts)				○	2 years
Filter, fuel lock				○	2 years
LPG hose (rubber hose) *1				○	2 years
LPG vaporizer, LPG cylinder valve, O-ring		○			2000 h

*1 : LPG hoses are special hoses. If normal NBR hoses are used, the engine may be damaged. Always use genuine Komatsu LPG hoses.

7.12 SERVICE DATA

System	Inspection item	Unit	FG09/FG10/FG15/ FG18-20	FG20/FG25/FG20N/ FG25N/FG30N-16	FG20H/FG25H/FG30/ FG35A-16
Model	Engine model	-	EBT-K21-2A (LP gas/gasoline (dual fuel) type) EBT-K21-3A (LP gas/gasoline (dual fuel) type)		EBT-K25-2A (LP gas/gasoline (dual fuel) type) EBT-K25-3A (LPG exclusive)
	Idling speed	rpm	750 ± 50 (Electronic control)		
	Max. speed	rpm	2700 ± 50 (Electronic control)		
Fuel system	Injection timing	-	Electronic control		
	Gasoline injection pressure	MPa	0.34		
	LPG injection pressure	MPa	0.03		
Electric system	Ignition timing	-	Electronic control		
	Spark plug type	-	FR2B-D		

ATTACHMENT

WARNING

In this section, only the attachment parts different from the standard lift truck are described. For the parts not shown in this section, see the explanation of the standard lift truck.

8. ATTACHMENT

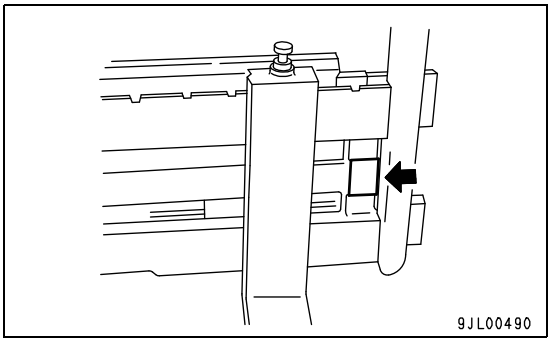
8.1 OPERATION OF SIDE SHIFT

8.1.1 ATTACHMENT MODEL PLATE LOCATION, SERIAL NO.

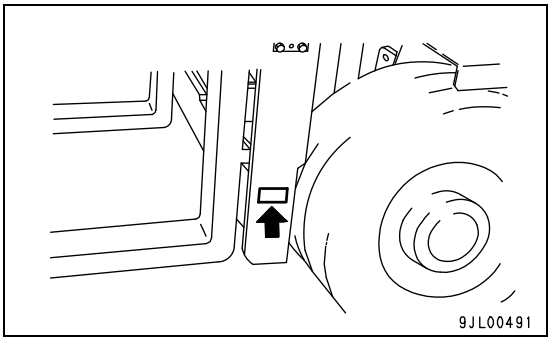
ATTACHMENT MODEL PLATE LOCATION

The attachment model is stamped on the nameplate stuck to a conspicuous place of each attachment.
The location of the name plate may differ according to the model of the machine. In cases where a combination of side shift and another attachment are used, the name plate is attached on the attachment installed in front of the side shift.

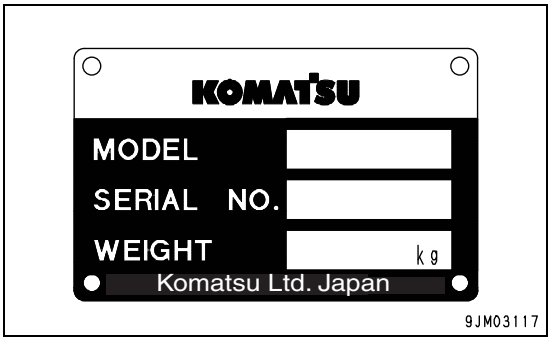
Side shift



Fork mover



MODEL and SERIAL NO. are stamped on the nameplate.



8.1.2 SAFETY OF ATTACHEMENTS

OPERATION MANUAL FOR LIFT TRUCK

Prior to using this attachment, be sure to read the operation manual for the lift truck and understand its contents as well.

STRICT OBSERVANCE OF ALLOWABLE LOAD AND CENTER OF GRAVITY

- Never carry a load exceeding an allowable load. Follow the Load Table pasted to the driver's seat.
- When traveling, center the load with the lift truck so that the load will not be shifted to either side.

PRECAUTIONS FOR HANDLING SIDE SHIFT

- Do not shift the fork while it is loaded and lifted high (150 cm or higher above the floor) unless the safety is secured by a stand under the fork etc.
- Do not shift the fork abruptly while it is loaded and lifted high.
- Eliminate eccentricity of the load before lifting it or traveling, and do not shift the fork while traveling with the load.
- Do not use the fork for a purpose other than the normal work, such as pushing a cargo on the side of the lift truck by moving the fork.

PRECAUTIONS FOR HANDLING FORK POSITIONER

- Arrange the load evenly and set the right and left forks symmetrically before starting work.
- Do not move the fork while it is loaded.
- Do not clamp a cargo with the fork.
- Do not use the fork for a purpose other than the normal work, such as pushing a cargo on the side of the lift truck by moving the fork.

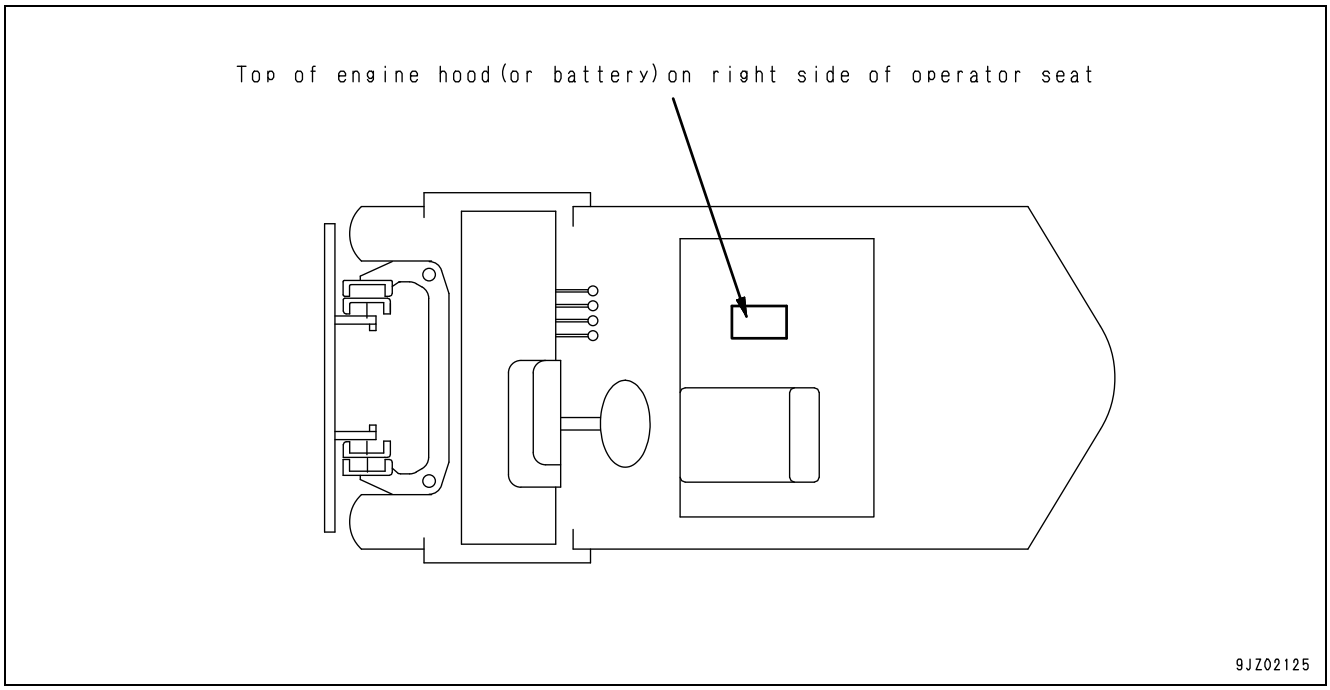
INTENDED USE ONLY

Do not use the hydraulic cylinders for a purpose other than the normal work, such as pulling, pushing, or sling a thing by utilizing their force.

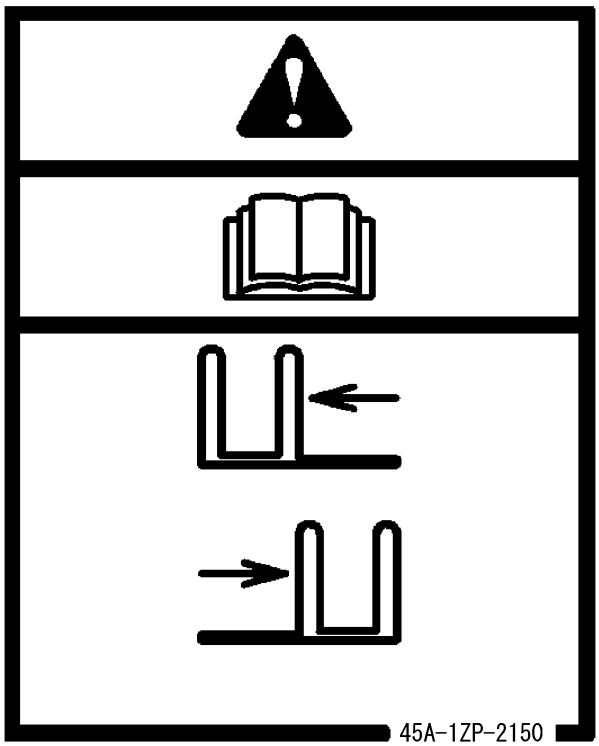
8.1.3 SAFETY LABEL

Keep this label clean. If it has peeled off, stick it again or replace it with a new one.

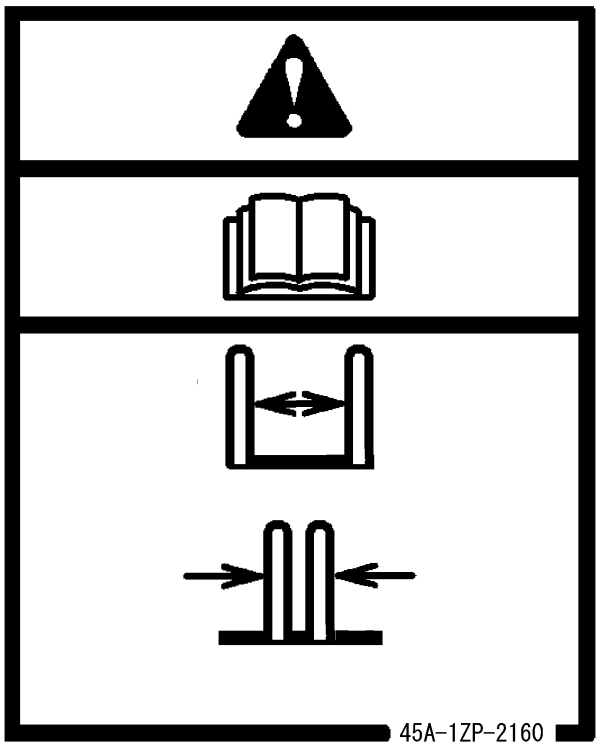
STUCK LOCATION OF SAFETY LABEL



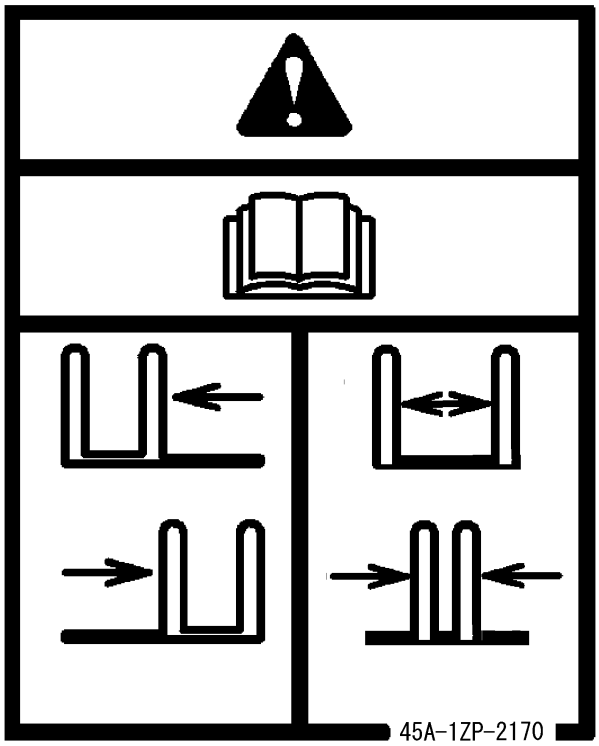
Precautions for handling side shift
(45A-1ZP-2150)



Precautions for handling fork positioner (fork mover)
(45A-1ZP-2160)



Precautions for handling side shift with fork positioner
(fork mover with shift) (45A-1ZP-2170)



8.1.4 FEATURES OF ATTACHMENTS

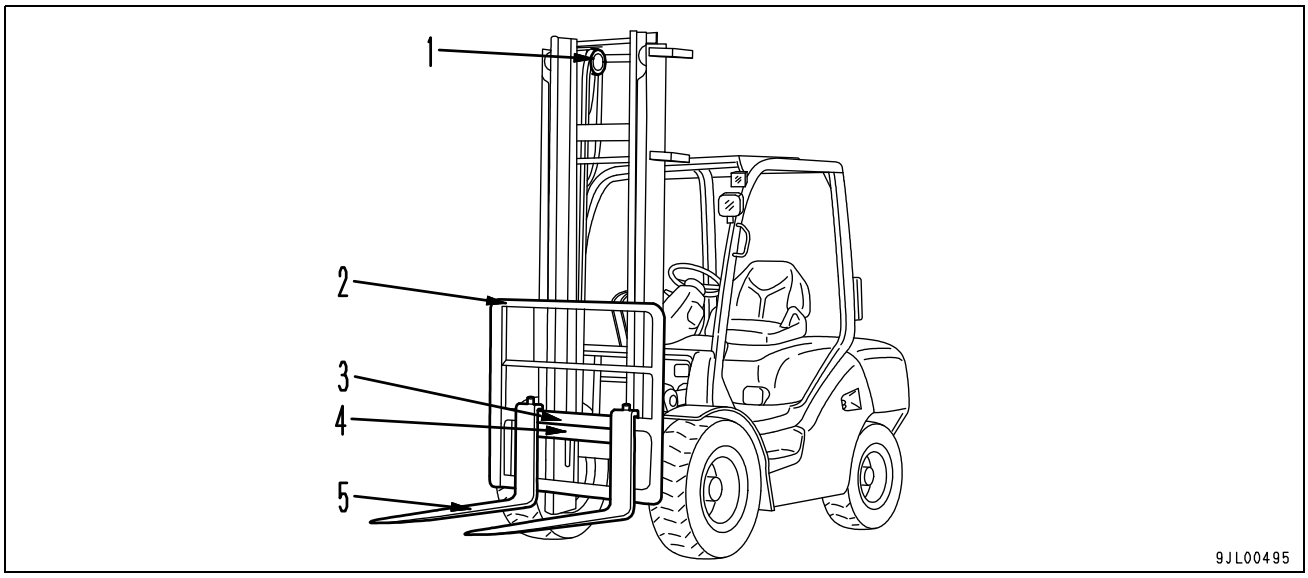
These attachments are suitable for the following works.

Attachment	Suitable Work
Side shift	The entire finger bar moves to the left and right and can perform loading/unloading without changing a lift truck position.
Fork mover (Hydraulic)	The fork distance can be adjusted in line with a load size.

8.1.5 GENERAL VIEW

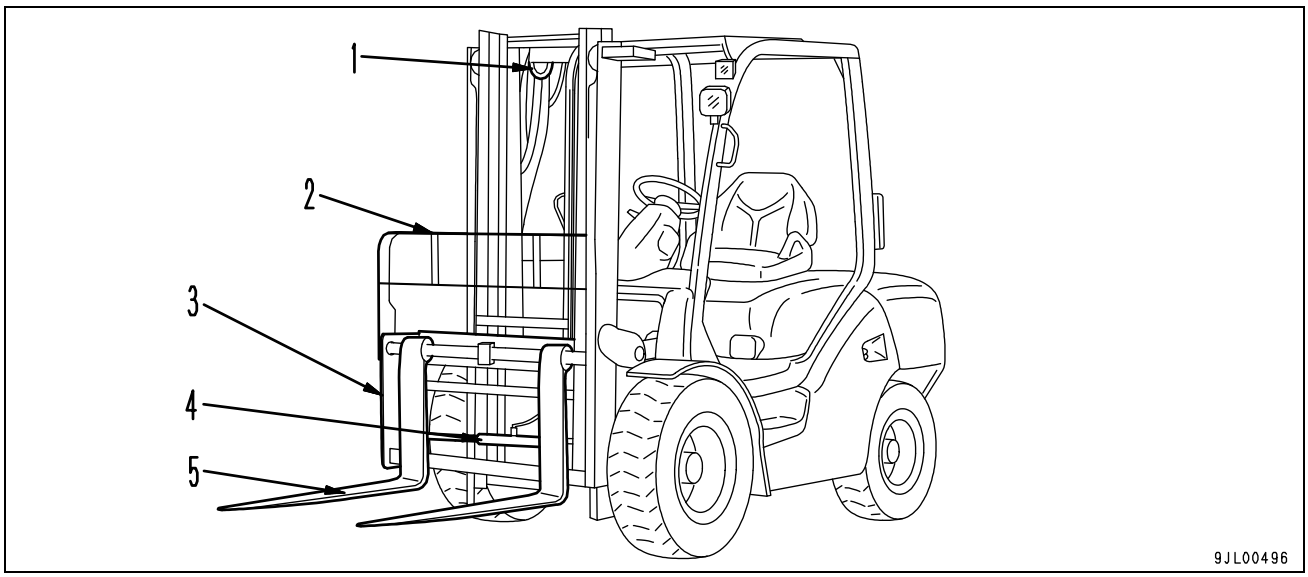
The shape may differ according to the model.

SIDE SHIFT



(1) Hose pulley
(2) Backrest
(3) Finger bar
(4) Shift cylinder
(5) Fork

FORK MOVER



(1) Hose pulley
(2) Backrest
(3) Finger bar
(4) Fork mover cylinder
(5) Fork

8.1.6 EXPLANATION OF COMPONENTS

⚠ CAUTION

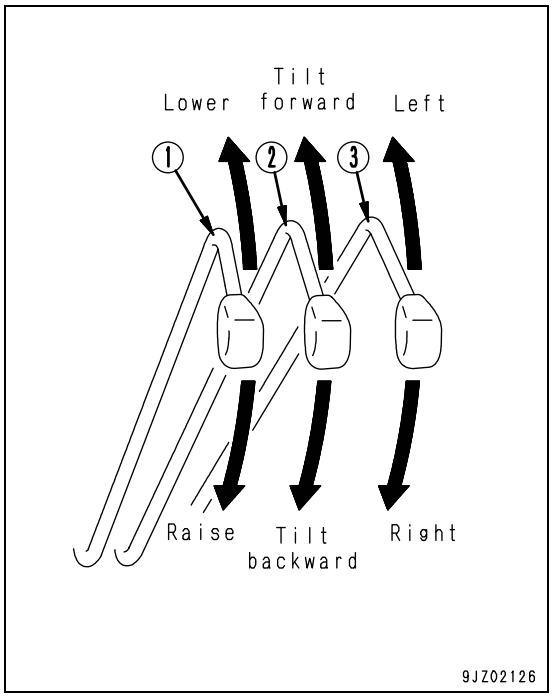
Before operating any lever, sit on the operator seat and confirm the safety around the lift truck.

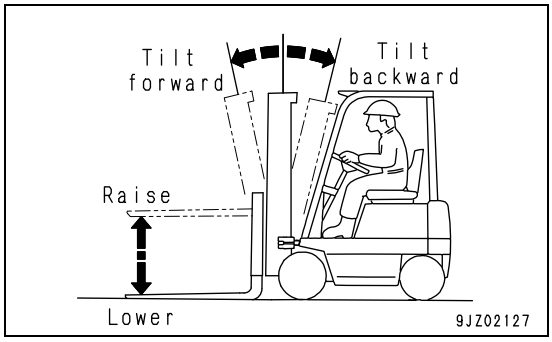
EXPLANATION OF OPERATING DEVICES

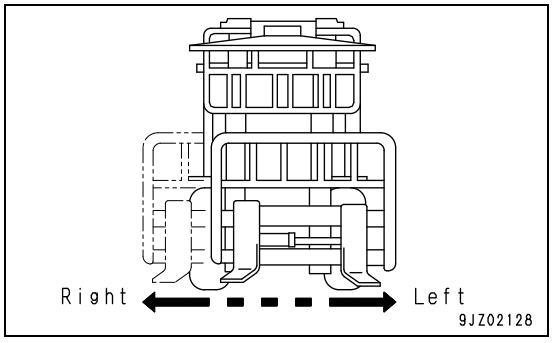
SIDE SHIFT

(1) Lift control lever
(2) Tilt control lever
(3) Side shift control lever

REMARK
Operating speeds depend on engine speed and movement of control lever.



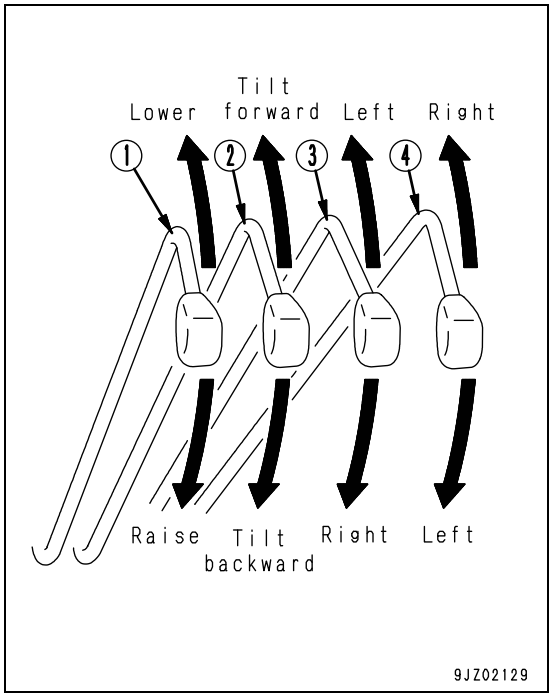


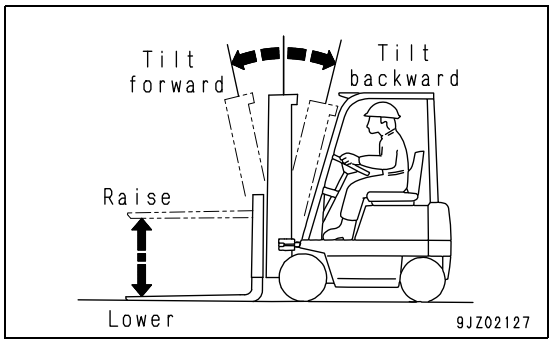


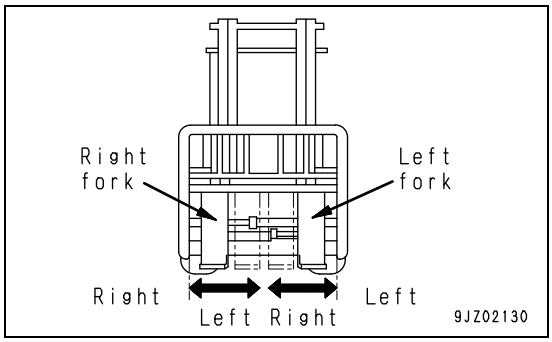
FORK MOVER

(1) Lift control lever
(2) Tilt control lever
(3) Mover control lever (Left fork)
(4) Mover control lever (Right fork)

REMARK
Operating speeds depend on engine speed and movement of control lever.





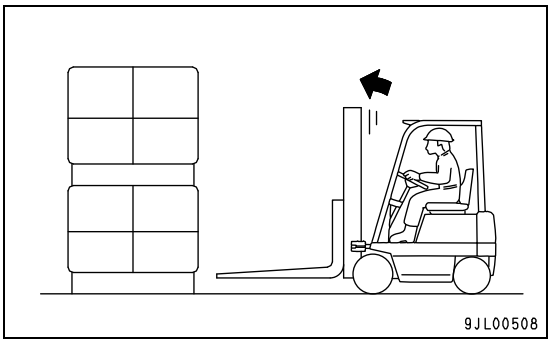


8.1.7 OPERATION

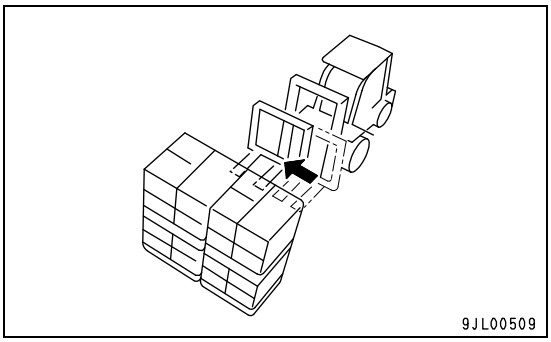
LOADING AND UNLOADING

SIDE SHIFT WORK

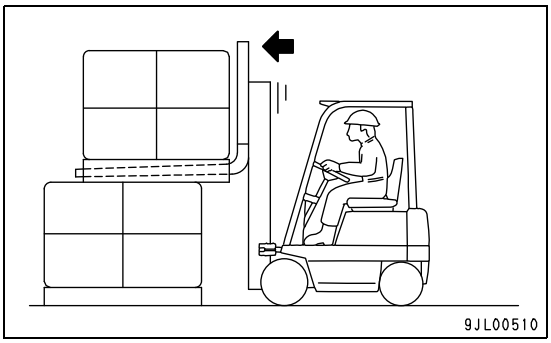
1. Stop the machine in front of the load and set the forks horizontal.



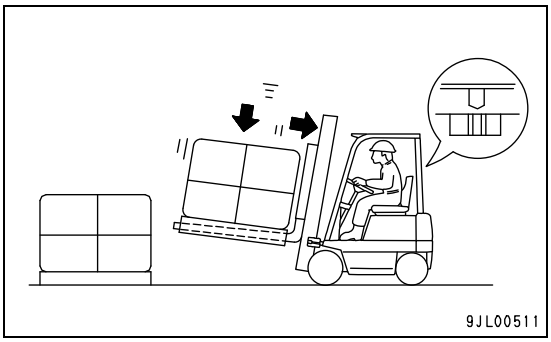
2. Align the center of shift frame and load by operating the shift lever.



3. Insert the forks into the pallet and raise the load about 10 cm (4 in). Drive slowly in reverse, then lower the load to 15 – 20 cm (6 – 8 in) from the ground.

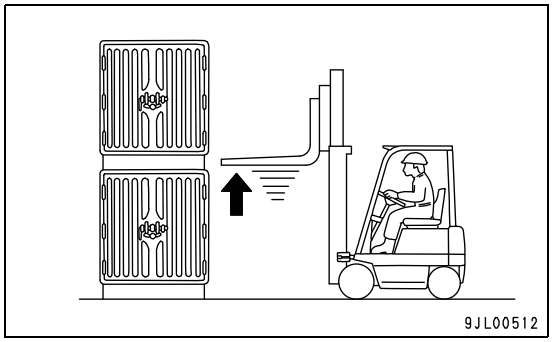


4. Watch the shift indicator at the rear of the finger bar and align the center of the shift frame and the finger bar, then tilt the mast back.

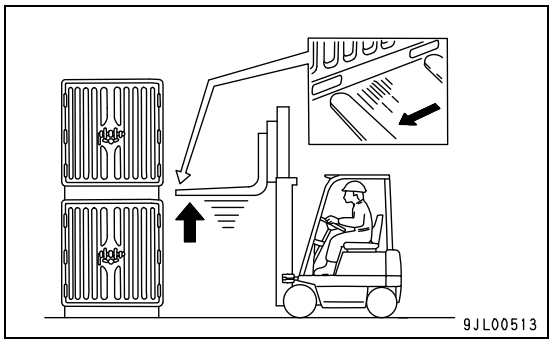


FORK MOVER OPERATION

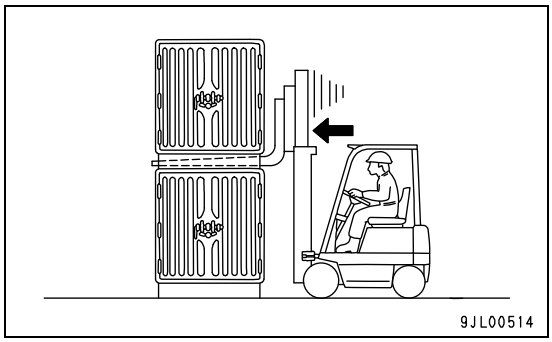
1. Stop the machine in front of the load and set the forks horizontal. Raise the forks until they are level with the slots in the load.



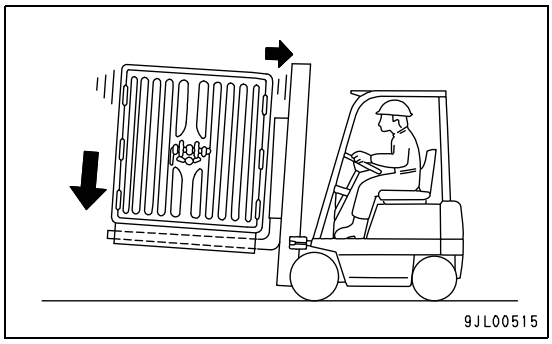
2. Operate the fork move control lever and align the space between the forks to match the slots in the load.



3. Drive the machine forward and insert the forks fully, then raise the load about 10 cm (4 in) and drive the machine in reverse.



4. Lower the load to 15 – 20 cm (6 – 8 in) from the ground. Then tilt the mast back to the travel position.



8.1.8 INSPECTION AND MAINTENANCE SCHEDULE CHART

Since the attachments, as well as the lift truck, need the following inspections, place an order for check of them and the lift truck with your Komatsu distributor.

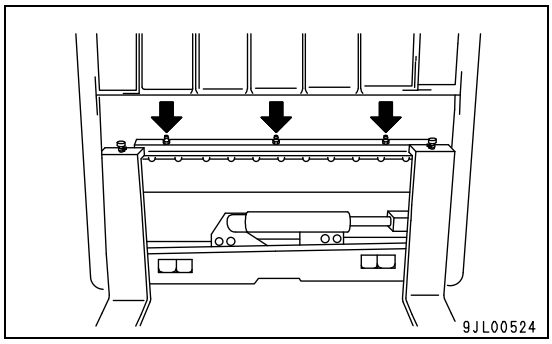
Component	Inspection & Maintenance Item	Start-up inspection	Every month (200 h)	Every year (2400 h)
Fork unit	Damage and installed condition of fork	○		
	Crack at fork base			○
Hydraulic unit	Operation of cylinders and oil leakage from them	○		
	Loose mounting parts of cylinder		○	
	Damage of and oil leakage from hoses	○		
Shift device	Grease supply to grease fittings		○	
	Deformation and damage of shift frame		○	
	Damage of shift roller		○	
Fork mover device	Grease supply to grease fittings		○	
	Deformation and damage of fork mounting shafts		○	

8.1.9 MAINTENANCE WORK

EVERY 1-MONTH OR EVERY 200-HOUR MAINTENANCE WORK

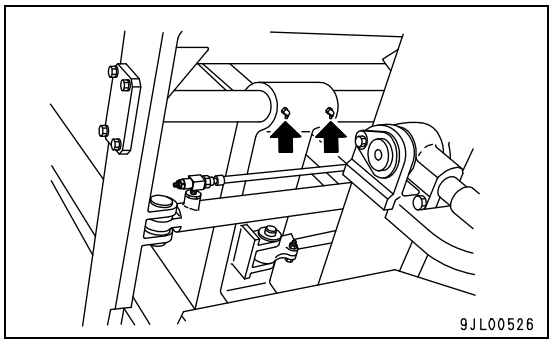
GREASING SIDE SHIFT

Grease the parts indicated with the arrows.
The shift roller needs to be greased, too, depending on the model.



GREASING FORK MOVER

Grease the parts indicated with the arrows.



OPTIONS

WARNING

In this section, only the optional parts different from the standard lift truck are described. For the parts not shown in this section, see the explanation of the standard lift truck.

9. OPTIONS

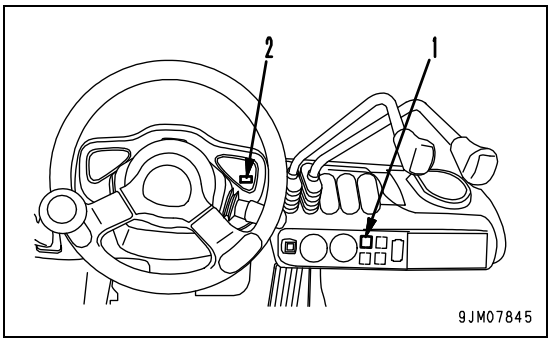
9.1 HANDLING OF LOAD CHECKER WITH OVERLOAD ALARM

⚠ CAUTION

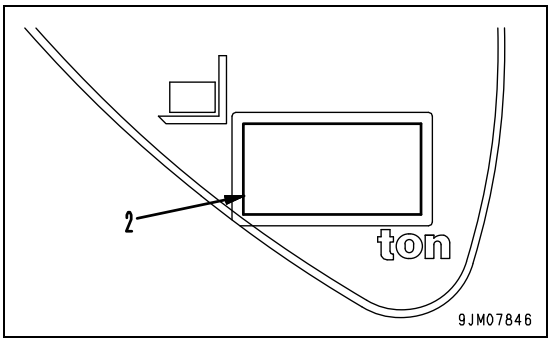
This device indicates the load roughly. Use the indicated load for reference only.

LOAD CHECK PROCEDURE

1. Position the mast vertically, and set the fork to 50 - 150 mm above the ground with the load on it.
2. Press button (1) of the load checker (green) with the fork in the horizontal position. Load meter (2) in the instrument panel indicates the load.
   - Indication unit: 0.01 ton (10 kg)
3. If the lifted load exceeds the set load, the buzzer sounds to notify that the lift truck is overloaded.



4. If the buzzer sounds, stop the lifting work, lower the load to the ground, and reduce it.



REMARK

- When a load lighter than the set load is lifted up, the buzzer may sound for a moment because of oil pressure fluctuation in the lift cylinder at the start of lifting. This is not an abnormal phenomenon. The buzzer stops sounding after the oil pressure settles.
- The overload value is set according to the customer's request when the lift truck is delivered. For changing of the set load and 0 kg adjustment procedure, contact your KOMATSU FORKLIFT distributor.
- The lift truck equipped with the 3-stage free view mast or the full free view mast sets the load meter with the center cylinder. Measure the load within the operating range of the center cylinder.

9.2 HANDLING OF MAST TILT ANGLE METER + AUTO STOP FUNCTION

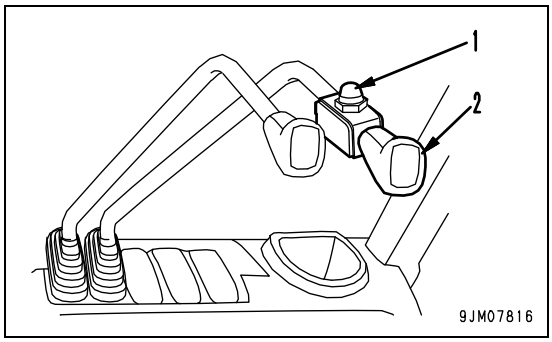
Mast tilt angle meter + auto stop function stops the tilting operation of mast automatically when the forks reach approximately level position.

⚠ CAUTION

- **This function does not work while the lift truck is loaded.**
- **This function stops the mast only when the mast tilts forward.**
- **This function does not stop the forks in the absolute level position. The forks do not stop as level as water surface. On a slope, the forks will be tilted position.**
- **Even if this function is in operation, operate the tilt lever while checking the movement of the forks and mast and the condition around the lift truck. Operating the tilt lever without watching it may cause the forks to hit cargo and shelves.**

OPERATING PROCEDURE

1. Tilt the mast backward with no load on the forks.
2. Depress fork level button (1) installed to tilt lever (2) knob.
3. While depressing fork level button (1), operate tilt lever (2) in the forward tilt direction so that the forks will be level.
4. The mast tilts forward and stops when the forks reach a level position.



REMARK

- When tilting the mast forward or backward again after it stops automatically, return tilt lever (2) to the neutral position, and then operate it.
- If fork level button (2) is released while the mast tilt angle meter + auto stop function is in operation, the auto stop function is reset and the tilt system is set in the manual operation mode.
- For adjustment of the mast auto stop position, contact your KOMATSU FORKLIFT distributor.

9.3 HANDLING OF LASER LIFT HEIGHT SENSOR

9.3.1 MAIN SPECIFICATIONS AND EXPLANATION

The laser lift height sensor indicates the fork height with a laser beam so that the operator can insert the forks in a pallet in a dim warehouse.

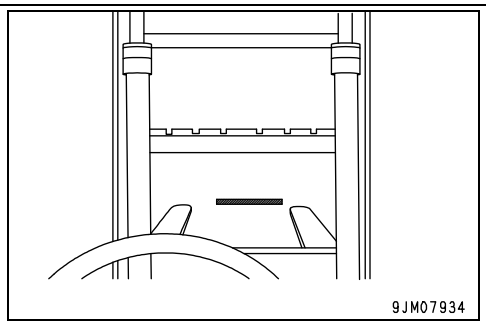
⚠ CAUTION

Laser beam is a light of single wavelength having strong directionality, which can damage your eyes and skins unlike the lights of an incandescent lamp or a fluorescent lamp.

Since it is especially dangerous to human eyes, never look in the laser source or radiate the laser beam directly against a human eye or an animal.Do not directly look at the laser beam reflected in a mirror etc.

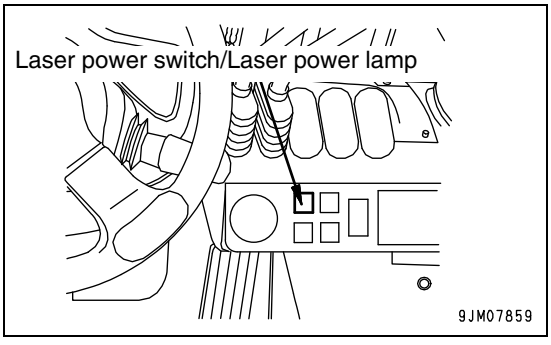
LASER UNIT SPECIFICATIONS

Laser power supply voltage	DC 3 V±0.3 V
Laser beam line pattern (Point at 1,000 mm from fork bottom)	Max. width: 600 mm However, if forks are moved in, laser beam may be hidden. Take care.
Laser beam width	1 - 3 mm
Laser drive current	55 mA
Laser output	0.9 - 1.0 mW
Laser class	JIS C 6802 Class 2
Laser using environment [Using temperature range] [Using humidity range] [Using ambient illuminance]	 -10 - 60°C 5 - 95% (No condensation) Level of dim indoor warehouse If too light, laser beam cannot be checked. Laser cannot be checked easily on dark pallet which absorbs colors.



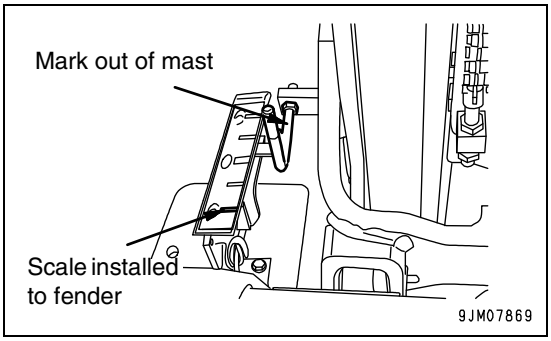
LASER POWER SWITCH/LASER POWER LAMP

The laser power switch is under the right front of the operator seat.



TILT INDICATOR

Check that the forks are in level by the scale installed to the left fender of the lift truck and the mark out of the mast.

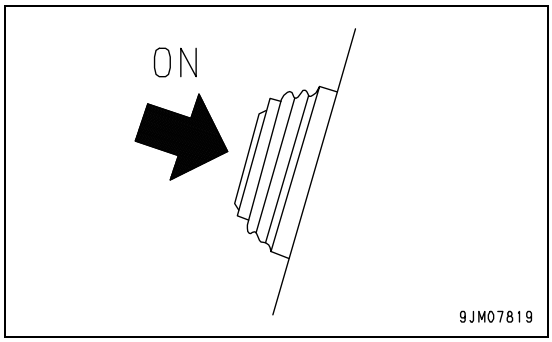


9.3.2 EXPLANATION OF OPERATION

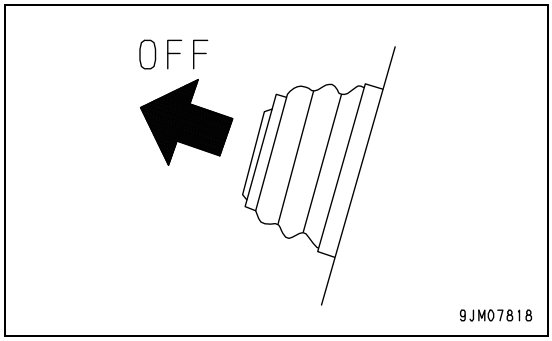
⚠ CAUTION

- **Explain the precautions for handling the laser beam to the lift truck operators and the workers in the site.**
- **Before turning on the laser power switch, check the safety around the lift truck.**
- **The laser lift height sensor uses a laser beam, which is basically dangerous to human eye. When not using the laser lift height sensor, turn the laser power switch OFF.**

1. When using the laser lift height sensor, turn the key switch ON, and then turn the laser power switch ON.
   - Press the button to turn the power ON and light up the laser power lamp.



   - Press again to turn the power OFF and put out the laser power lamp.



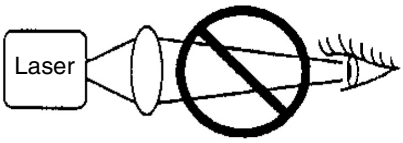
2. After finishing use of the laser lift height sensor, turn the laser power switch OFF.

9.3.3 PRECAUTIONS FOR HANDLING

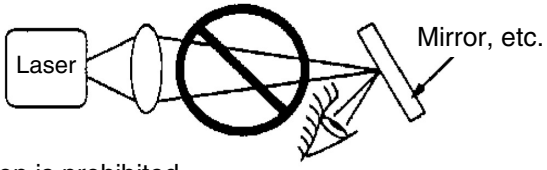
⚠ CAUTION

If you have looked at the laser beam by mistake, look away from it quickly.
Your eye can be protected from the laser of this class by blinking 2 - 3 times.

Do not directly look at the laser beam.



Do not directly look at the laser beam reflected by a mirror, etc.

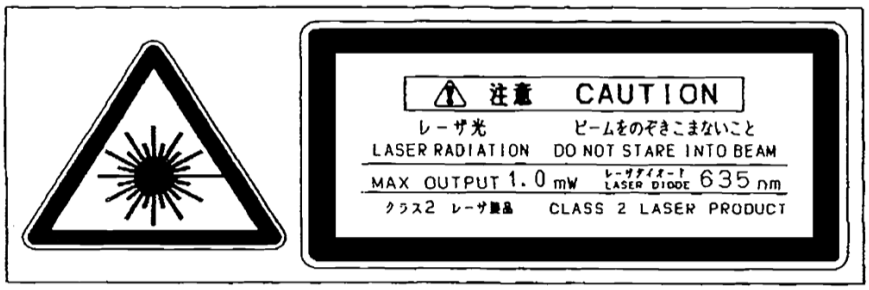


Symbol indicates that the action is prohibited.

The laser used for the safety laser system is in Class 2 of the 5 classes defined by JIS C 6802.

[Safety standard of laser products] Excerpt from JIS C 6802

Class	Danger evaluation	Label regulation	Output standard
1	No injury to human body.	Warning label : Unnecessary Explanation label : Class 1 laser product	Approx. max. 0.39 μW
2	Eyes are protected by their aversive reaction such as blinking.	Warning label : Necessary Explanation label : Do not look in beam Class 2 laser product	Approx. max. 1 mW
3A	Eyes are protected by their aversive reaction such as blinking. However, it is dangerous to observe inside of beam directly by optical means.	Warning label : Necessary Explanation label : Do not look in beam Do not look at the beam directly through optical device Class 3A laser product	Approx. max. 5 mW
3B	It is dangerous to observe the beam directly. Eyes are not injured by diffuse reflection.	Warning label : Necessary Explanation label : Do not look at or touch beam directly Do not look at the beam directly through optical device Class 3B laser product	Approx. max. 0.5 W
4	Even diffuse reflection can injure eyes and also can cause skin damage and fire.	Warning label : Necessary Explanation label : Both direct beam and scattered beam are dangerous. Do not look at or touch Class 4 laser product	Approx. above 0.5 W

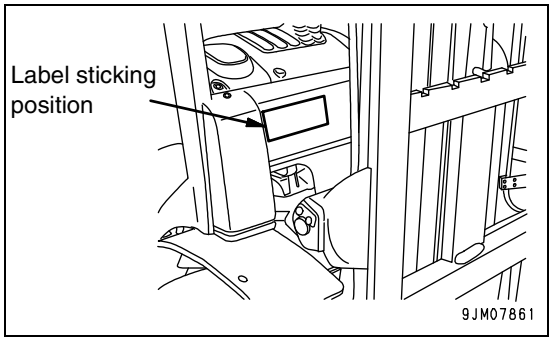


Warning label Explanation label

⚠ CAUTION

Keep the warning label and explanation label clean.
If any label is lost, stick new one.

These labels are specified by above JIS C 6802 "Radiation safety standard of laser products" and it is obligatory to stick them.



⚠ CAUTION

- **When performing the startup inspection, be sure to check the optical axis of the laser beam. If the optical axis is shifted, adjust it or stop using the laser lift height sensor and contact your KOMATSU FORKLIFT distributor.**
- **Avoid using the laser lift height sensor on a slope. It cannot indicate an accurate position.**
- **Avoid using the laser lift height sensor in a place where the laser unit is exposed to water constantly. The laser beam is refracted and you cannot check a position easily.**
- **Do not use the laser lift height sensor in a place where the laser beam can cause a malfunction or abnormality in the peripheral equipment.**
- **Never disassemble or modify the laser unit.**

9.4 TRAVEL SPEED LIMITER

The travel speed limiter limits the travel speed to a set speed automatically even if the accelerator pedal is depressed.

⚠ CAUTION

- **This device cannot be removed from the lift truck.**
- **The lifting speed is not limited, but lifting work during travel at the set speed is limited.**
- **For changing of the set speed, etc., contact your KOMATSU FORKLIFT distributor.**

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