# **KOMATSU**

N. W.

1

3

9

3

5

# **Operation & Maintenance Manual**

**FORKLIFT TRUCK** 

# FG20/25/30-12 FG20H/25H/30H-12 FD20/25/30-12 FD20H/25H/30H-12

# **▲** WARNING

Unsafe use of this lift truck may cause serious injury or death.

Operators and maintenance personnel must read this manual and be sure that they understand its contents before operating, inspecting, or carrying out maintenance on this lift truck. This manual should be kept near the lift truck for reference and periodically reviewed by all operators and maintenance personnel who will come into contact with it.

TVH/8549939



104/0H1002

KOMATSU FORKLIFT

E E E 

# 1. FOREWORD

This manual provides rules and guidelines which will help you use this lift truck safely and effectively. Always be sure to read and understand this manual thoroughly before operating and performing maintenance.

Some actions involved in operation and maintenance of the lift truck can cause a serious accident if they are not done in the manner described in this manual.

# - 🛕 WARNING --

- Improper operation and maintenance of this lift truck can be hazardous and could result in serious injury or death.
- Operators and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.
- Keep this manual handy and have all personnel read it periodically.
- Do not use this lift truck unless you are sure that you have understood the contents completely.
- If this manual has been lost or has become dirty or worn and cannot be read, request a replacement manual from your Komatsu Forklift distributor/dealer.
- Komatsu Forklift delivers lift trucks that comply with (to the best of our knowledge at the time of delivery) all applicable regulations and standards of the country to which they have been shipped. If this lift truck has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult your Komatsu Forklift distributor/dealer before operating the lift truck.
- Continuing improvements in the design of this lift truck may not be reflected in this manual. Consult Komatsu Forklift or your Komatsu Forklift distributor/dealer for the latest available information on your lift truck or for questions regarding information in this manual.
- Information on safety is given in the SAFETY INFORMATION section on page 0-2 and in chapter 1, the SAFETY section, starting on page 1-1.

Ε

# 2. SAFETY INFORMATION

Most accidents are caused by a failure to follow fundamental safety rules for the operation and maintenance of lift trucks.

To avoid accidents, read, understand and follow all precautions and warnings in this manual and on the lift truck before operating and performing maintenance.

Do not operate or carry out maintenance of this lift truck unless you are sure that you understand the explanations and procedures completely.

To identify safety messages in this manual and on lift truck labels, the following signal words are used.

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

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

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

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

Safety precautions are described in the SAFETY section starting on page 1-1.

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

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

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

E

E

E

E

E

E

E

E

E

E

2

# 3. RUNNING IN NEW LIFT TRUCK

# 3.1 RUNNING IN NEW LIFT TRUCK

Your Komatsu Forklift truck has been thoroughly adjusted and tested before shipment. However, operating the lift truck under severe conditions at the beginning can adversely affect performance and shorten the lift truck life. Be sure to run in the lift truck, taking special care concerning the following items.

- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starting or acceleration, unnecessarily abrupt braking and sharp turning, except in the case of emergency.

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

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

Unit	Check items	Remarks	
	Change oil		
Engine	Replace oil filter element		
	Drain water from fuel filter	Diesel engine lift truck only	
TOROFLOW	Change oil	TORQFLOW lift truck only	
transmission	Clean strainer		
Differential	Change oil		
	Change oil		
Hydraulic tank	Replace line filter		
riyuraunc tank	Clean strainer		
	Clean inside tank		
Other	Tighten all bolts and nuts	Particularly hub nuts, overhead guard mounting bolts, backrest mounting bolts, and operator's seat mounting bolts.	

# 3.3 MODEL LINE UP

Model	Applicable lift truck No.	Model	Applicable lift truck No.
FG20/25/30-12	500001 and up	FD20/25/30-12	500001 and up
FG20H/25H/30H-12	500001 and up	FD20H/25H/30H-12	500001 and up

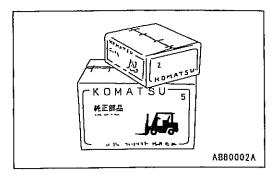
3

# 4. WARRANTY AND SERVICE FOR NEW LIFT TRUCK

# 4.1 KOMATSU FORKLIFT GENUINE PARTS

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

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



E

# 5. LOCATION OF PLATES

# 5.1 LIFT TRUCK SERIAL NO. PLATE POSITION

- Nameplate location: On front left of dashboard
- Embossed serial No. location:

It is stamped on top of the front fender on the left side of the lift truck.

The engine serial number is stamped in the position shown below.

(Left) and (Right) in the diagram are as follows.

(Left): Left side of engine, (Right): Right side of engine

# Nameplate Embossed serial No. AE802968

# Gasoline engine

4

95 E

7

700

100

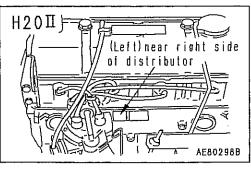
196

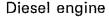
35 m

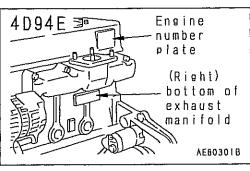
9

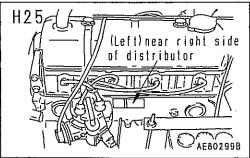
.....

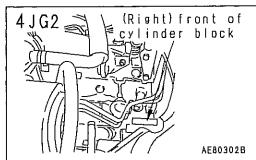
5











### Contacting

When contacting a Komatsu Forklift distributor for parts ordering or problem consulting, always give the lift truck serial No. embossed on the lift truck.

### NOTICE

Take care not to damage the embossed serial No..

### REMARK

The serial No. is located on the nameplate.

# 6. CONTENTS

1.	Foreword			
2.	Safety information	0- 2		
3.	3.1 Running in new lift truck	0- 3 0- 3		
	(or initial 200 hours service) for new lift truck	0- 3 0- 3		
4.	Warranty and service for new lift truck	0- 4 0- 4		
5.	Location of plates	0- 5 0- 5		
SA	AFETY	1 2		
7.	General (Operation)	1- 2		
8.	3. During traveling operation			
9.	During loading and unloading operation	1-10		
	Others	1-14 1-15		
	11.1 Precautions for loading and unloading	1-17		
12.	. Precautions for maintenance	1-18		
13.	Safety label sticking positions	1-38 1-38 1-41		
Ol	PERATION			
14.	. General view	2- 2		
	14.1 General view of lift truck	2- 2		
	14.2 Instruments and controls	2- 3	i	
15.	Explanation of components	2- 4		
	15.1 Description of normal components	2- 4		
	15.2 Description of accessories	2-18	ļ	
	15.3 Removing and installation of attachments	2-19	ŀ	

16.	Operation	. 2-18
. •	16.1 Check before operation	
	16.2 Mounting/dismounting	
	16.3 Operator's seat position adjustment	
	16.4 Starting lift truck off	
	16.5 Starting, inching on slope	
	16.6 Turning	
	16.7 Temporary stopping and parking	
	16.8 Fork spread adjustment	
	16.9 Load handling operation	
	16.10 Check after operation	
17.	Cold weather operation	2-40
	17.1 Preparations for low temperature	2-40
	17.2 Precautions after completion of operations	2-41
18.	Handling in heavy-duty conditions	2-42
19.	Long-term storage	2-43
	19.1 Before storage	
	19.2 During storage	
	19.3 After storage	2-44
20.	Transportation	2-51
M	AINTENANCE	
21.	Outline of service	3- 2
	21.1 Suitable oil	3- 2
22.	Lubricant list	. 3- 4
	22.1 Gasoline engine lift truck	
	22.2 Diesel engine lift truck	. 3- 5
	22.3 Oil and greasing chart (Oil, grease locations and inspection and	
	maintenance intervals)	. 3- 6
23.	Service data	
	23.1 Service data (Gasoline engine lift truck)	
	23.2 Service data (Diesel engine lift truck)	
	23.3 Torque list	3-12
24.	Periodic replacement of safety critical parts	3-13
25.	Maintenance schedule chart	3-14

3 3 3

### 6. CONTENTS

25.	Maint	enance	3-18
	25.1	First one month or initial 200 hours service	3-18
	25.2	Chark before operation	3-19
	25.3	2-weekly/100 hours service	3-19
	25 /	Monthly/200 hours service	J-13
	25.5	3-monthly/600 hours service	3-31
	25.6	6-monthly/1200 hours service	3-31
	25.7	Yearly/2400 hours service	3-38
	20.7	Touriy/2400 Hours of Floor Million	
26	Repla	cement procedure	3-40
	26 1	Replacing fuses	3-40
	26.2	Penlacing tires	3-41
	26.2	Replacing lamps	3-42
	20.0	replacing turnpo minimum minimum minimum management man	
TE	CHN	ICAL DATA	
27	Toobe	nical data	4- 2
ZI.	reciii	iivai vata	

=

E

E

3		
3		
<b>3</b> .		
§ .		
3		
E		
3		
3		
3		
3		
3		
3		
3		
3		
3		
3		
<b>-</b> <b>3</b>		
3		
<b>-</b> <b>-</b>		
2 <b>1</b>		

# MEMO

- 13

E

ŢĨ.

Ĩ.

Ž.

E i

1

E

E:

11

E

, i

E

2.8

N.

# **SAFETY**

- 🛕 WARNING -

Read and follow all safety precautions. Failure to do so may result in serious injury or death.

# 7. SAFETY MANAGEMENT

# 7. SAFETY MANAGEMENT

# **A** WARNING OPERATION MANUAL AND SAFETY LABELS

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

# MARNING OPERATING QUALIFICATIONS

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

# **A** WARNING CLOTHING AND PERSONAL PROTECTIVE ITEMS

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



# A WARNING OVERHEAD GUARD, LOAD BACKREST

 Do not use this lift truck unless it is equipped with the overhead guard and load backrest shipped with the lift truck from the factory by Komatsu Forklift. 5

# **MARNING** UNAUTHORIZED MODIFICATION

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

# A WARNING EXHAUST GAS

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 which may result in serious injury or death.

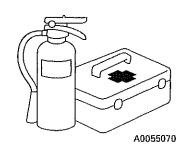


A0055060

۵

# **⚠** WARNING FIRE EXTINGUISHER AND FIRST AID KIT

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



# WARNING | SAFETY RULES

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

### WARNING CHECK WHEN TRAVELING IN REVERSE

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

### **₩** WARNING: TRAFFIC REGULATIONS ON PUBLIC ROADS

- Always observe all traffic regulations when operating the lift truck.
- Do not drive on public roads with the lift truck loaded.
- Do not tow other machines on public roads. (Do not tow other machines even when not on public roads.)
- Always carry your driver's license when traveling on public roads if required.

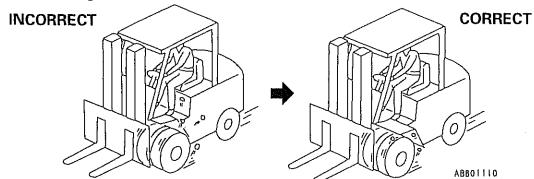
### **⚠** WARNING | SAFETY EQUIPMENT

The overhead guard is installed to protect the operator from falling objects. It is designed to withstand the force of light boxes or small packages. It is not designed to withstand every possible impact.

Always be careful to prevent damage or injury from falling objects.

### A CAUTION TIRE FENDER

The tire fender prevents objects from being thrown up by the tires. When changing from a single tire to a double tire, always extend the tire fender. If the fender is not extended, small stones and other objects will be thrown up and may injure the operator or people in the surrounding area.



E

Į.

٠

### MARNING | SAFE WORKING AREA

- Always work on level surfaces and wipe up all oil or grease from the ground.
- When working on quays, platforms, or docks, 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 travel areas clearly and maintain the road surface in good condition.
- Put up signs to prevent unauthorized machines from entering areas where trucks are being operated.
- Ensure that there is adequate lighting to enable safe operations to be carried out safely.

### **₩** WARNING **CLEAN OPERATOR'S COMPARTMENT**

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

### **WARNING** SAFE OPERATING PLAN

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

### **⚠** WARNING REDUCE LOAD FOR LIFT TRUCKS WITH ATTACHMENT

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

E

# WARNING FIRE PREVENTION FOR FUEL AND OIL

Fuel is extremely flammable and can cause fires and explosions.

- Carry out refueling away from flames or sparks.
- Stop the engine when refueling.
- After refueling, tighten the gas cap securely and wipe up any spilled fuel.
- The specific gravity of LPG is heavier than air, so it is easy for it to accumulate in low places (holes, road surface depressions, etc.). This can create a fire hazard or explosion. Be extremely careful!









A0055020

A0055040

E

E

E

E

E

E

E

E

E

# MARNING NO STARTING AIDS

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

• Do not use starting aids to start the engine.

# 8. SAFE TRAVEL

# 8. SAFE TRAVEL

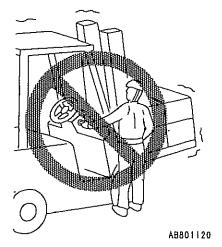
3

# **A** WARNING PRECAUTIONS WHEN STARTING ENGINE

• Before starting the engine, always check that the parking brake is applied and that the directional and speed levers are in neutral.

Depress the clutch pedal (for clutch type lift trucks) or the brake pedal (for TORQFLOW transmission lift trucks) firmly, then start the engine.

- Adjust the operator's seat and the steering wheel before starting the engine. Always lock them in position after adjusting. Adjusting the seat or steering wheel during operation is dangerous as it may cause you to lose your balance or operate the lift truck wrongly.
- Before starting the engine, check that the surrounding area is safe. ALWAYS SIT IN THE OP-ERATOR'S SEAT when starting the engine.



# **MARNING PRECAUTIONS WHEN OPERATING DIRECTIONAL OR SPEED LEVERS**

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

# A WARNING ESCAPING FROM RAILROAD CROSSING

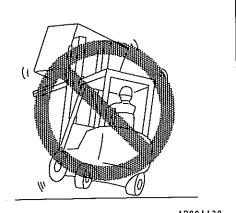
- If engine trouble occurs on a railroad crossing and the lift truck does not move, it
  is impossible to use the starting motor as can be done on an automobile.
  (This is because a neutral safety switch is installed.)
- In such an emergency, light a flare or smoke candle to warn approaching trains and people in the area that there is a broken-down truck on the tracks.

  Before starting to drive in reverse, check that there is no one behind the lift truck.

# **WARNING**

### **TIPPING**

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



AB801130

### **WARNING** TRAVEL ON SLOPES

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

When loaded:

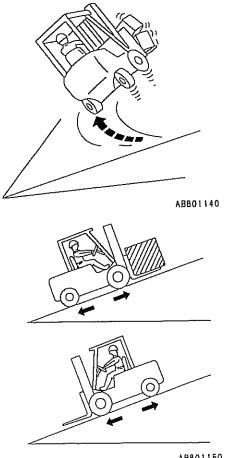
Travel forward up the slope and in reverse down the slope with

the load upgrade.

When unloaded: Travel in reverse up the slope and forward down the slope with the load-engaging means down-

grade.

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

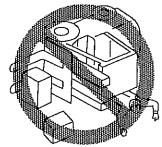


AB801150

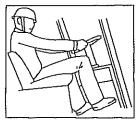
3

# **WARNING** DO NOT JUMP OFF LIFT TRUCK EVEN IF IT TIPS

- NEVER JUMP OFF the lift truck even if it seems that it will tip. Always do as follows.
- Hold the steering wheel securely.
- Stay in the operator's seat.
- Brace your legs.
- If you jump off the lift truck when it turns over, there is danger that you will be fatally crushed under the lift truck. Always stay in the operator's compartment if the lift truck turns over, then escape from the lift truck after it has stopped.
- Always wear the seat belt correctly (for lift trucks equipped with seat belt).

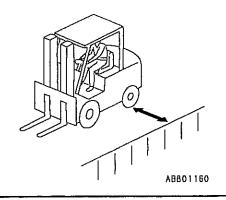


AB801680



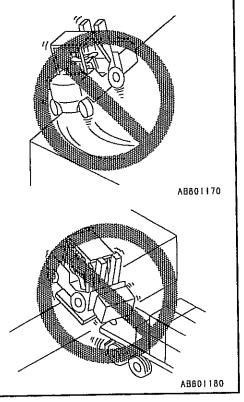
### ⚠ WARNING ROAD SHOULDER

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



# ⚠ WARNING LOADING HIGHWAY TRUCKS OR RAILROAD CARS

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

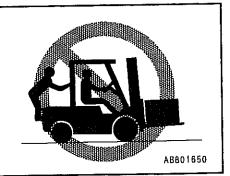


### MARNING NO RIDERS

Forklift trucks are one-person machines.

Do not allow any other person to ride on the truck under any circumstances.

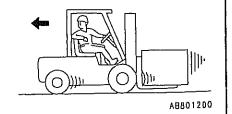
Never allow anyone to act as an extra counterweight.



# WARNING DRIVING IN REVERSE

For lift trucks equipped with rear view mirror or back-up buzzer.

- The rear view mirror is simply an aid for checking the rear. When driving in reverse, do not use the rear view mirror. Turn to face the rear and check the area directly behind the lift truck.
- Even if you sound the back-up buzzer, the people behind the truck do not necessarily hear it. Always check that there is no one behind the truck before driving the truck.



# **M** WARNING

 $\equiv$ 

3

I.

a.

3

SP.

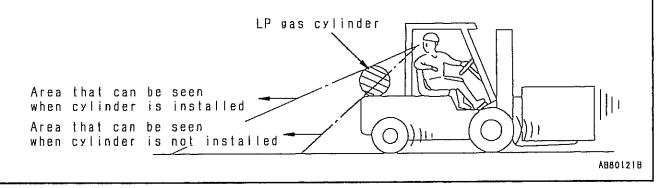
yyr.

33

### **OBSTRUCTION OF REARVIEW WHEN USING LP GAS FUEL** (GASOLINE ENGINE LIFT TRUCK)

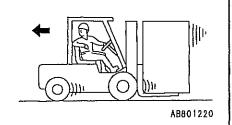
• The LP gas cylinder partially blocks the view to the rear, so there is danger of hitting personnel or products or buildings in the surrounding area. Install backup warning devices (backup buzzer, rotating backup lamp, etc.) or backup confirmation devices (rearview mirror, etc.) to warn personnel in the surrounding area and to confirm that the area to the rear is safe.

Please contact your Komatsu Forklift distributor for details of installing such optional warning equipment.



# WARNING WHEN FRONT VIEW IS POOR

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



# MARNING | CHECK BEFORE STARTING

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

1-11

### **REARVIEW MIRROR, LAMPS ₩** WARNING

 When reversing, never depend on the rearview mirror; the operator must visually check behind him. Also, adjust the rearview mirror so that the operator can check from the operator's seat that the area behind the lift truck is safe. Always keep the surface of the mirror clean. If the mirror is broken, replace it with a new one (For lift trucks equipped with rearview mirror).

 Check that the lamps light up correctly. Replace any broken bulbs (for lift trucks) equipped with lamps).

### KEEP HANDS FREE FROM OIL OR WATER WARNING !

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

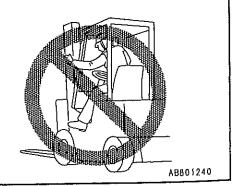
# WARNING | MOUNTING AND DISMOUNTING

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



# MARNING ALWAYS SIT IN OPERATOR'S SEAT

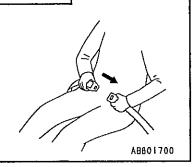
- Never operate the lift truck from outside the operator's compartment.
- Always keep your body under the overhead guard.
- Do not extend your arms or legs outside the operator's compartment.



Ε

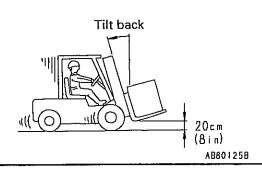
# MARNING SEAT BELT (for lift trucks equipped with seat belt)

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



# A WARNING SAFETY WHEN STARTING

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



# **MARNING BRAKING WHEN TRAVELING**

- Do not stop the engine when traveling.

  If the engine is stopped, the power steering and power brake will not work.
- If the inching pedal is depressed, the braking effect of the engine will be lost.
- Do not use the brake excessively. Do not rest your foot on the brake pedal or inching pedal unless you are operating it.

If you do, the brake will overheat and the braking effect will be lost. For TORQFLOW lift trucks, if you leave your foot on the inching pedal, the multiple disc clutch inside the transmission will overheat. In the worst case, the clutch discs will be deformed and the clutch will not function normally.

# **A** WARNING SAFETY DURING TRAVEL

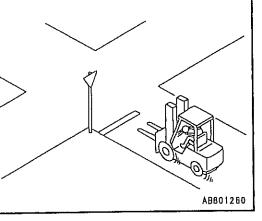
- Keep a clear view of the path of travel and observe for other traffic, personnel, and safe clearances.
- When passing oncoming vehicles, reduce speed and keep a safe distance from the other vehicle.
- In places where there are speed limits, observe the speed limit and maintain a safe distance from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

15

[B

### **CONFIRMING SAFETY WARNING**

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



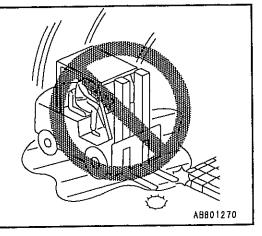
1

1

i i

### WARNING | SAFETY DURING TRAVEL

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



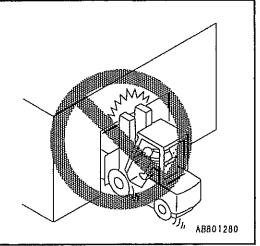
### GIVE PRIORITY TO LOADED LIFT TRUCKS **WARNING**

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

### WARNING | HEIGHT OR WIDTH LIMITS

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

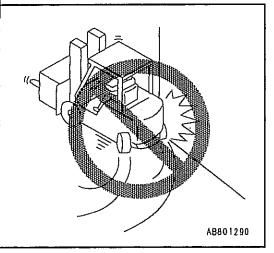
- Ensure that there is ample height and width for the lift truck to pass.
- Do not extend your hands or legs outside the lift truck.
- Check that the surrounding area is safe.
- Be careful of electric wires and other obstacles inside and outside the building.



OF STREET

### **WARNING** PRECAUTIONS WHEN TURNING

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



# **WARNING** STOPPING DISTANCE

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

### WARNING | **NO TOWING**

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

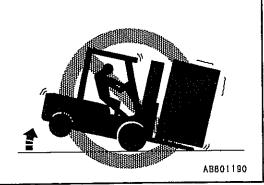
There is danger that the lift truck may run away.

# 9. LOADING OPERATIONS

# 9. LOADING OPERATIONS

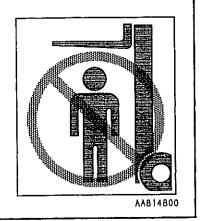
# **A** WARNING NO OVERLOADING

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



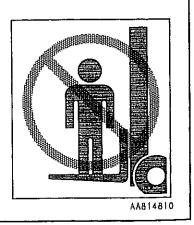
# **A** WARNING DON'T GO UNDER FORKS

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



# **⚠** WARNING DO NOT LIFT PEOPLE ON FORKS

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



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

- Never put your hands or feet into the mast structure. There is danger that you will get caught in moving parts and be seriously injured.
- Do not use the mast as a ladder. If you slip, there is danger that you will fall.

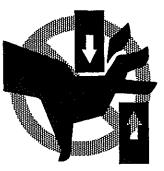
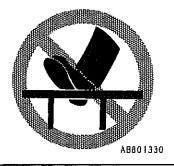


ABB01320

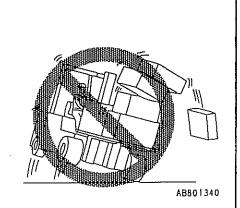


# **MARNING** OPERATE FROM OPERATOR'S COMPARTMENT

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

# **MARNING** NO UNSTABLE LOADS

- Place the load so that its center of gravity will be on the center line of the lift truck. If the load is unbalanced, the truck may turn over.
- Place the load so that it contacts the load backrest.
- Do not handle unstable loads. If there is danger that the load may fall off, secure it in position and take steps to prevent the load from collapsing or falling.
- When carrying stacked loads, tie with rope to prevent the load from falling.



1-17

E.

=

I

T.

3

E.

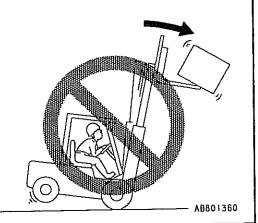
# **A** WARNING DO NOT LOAD ABOVE HEIGHT OF LOAD BACKREST

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



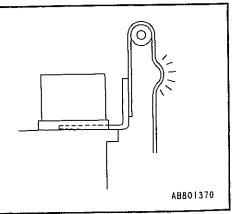
# **A** WARNING DO NOT TILT MAST FORWARD WHEN LOADED

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



# MARNING KEEP CHAIN TENSE

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



3

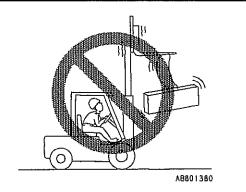
2 **13** 

ĩ B

3 **2** 

### MARNING USE ONLY FOR INTENDED PURPOSES

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



### WARNING LEVER OPERATION

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

### MARNING |

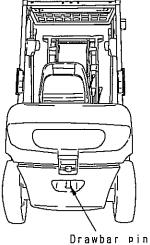
### **USING DRAWBAR PIN**



### **WARNING**

Do not use the DRAWBAR PIN for towing, for being towed and for slinging operations.

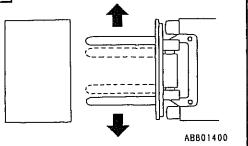
- This drawbar pin is used only when the lift truck becomes disable to move, or when loading the lift truck on a trailer or on a wagon.
- Please read the instruction "HOW TO MOVE A DISABLED LIFT TRUCK".



AE80303B

# **MARNING** FIT FORKS SECURELY IN POSITION

- When adjusting the position (width) of the forks, be careful not to get your hands caught.
- After adjusting, check that the forks are held securely in position by the fork stopper.
   If the forks are not held in position, there is a danger that the forks may move when the lift truck is traveling and the load may fall off.



2

130

3

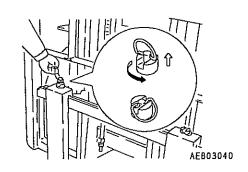
13

7

I

33

I



3

3

3

=

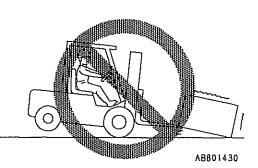
\_

### **CAUTION ADJUST CHAIN**

 Be sure the tension of the left and right chains are the same (See CHECK BEFORE OPERATION). If the tension is not the same, the load will be unbalanced even if it is loaded correctly in the center, and there is danger that the lift truck may tip. (For details of adjustment, see page 2-31.)

### ■ WARNING | BE CAREFUL OF FORK TIPS

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



# 🕰 Warning | People in Working Area

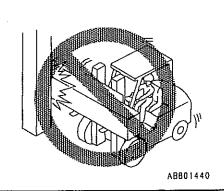
- Do not allow anyone except the signal person in the working area.
- Do not let any person or other lift truck come close during operation.
- When working with a signalperson, always follow their instructions.

### WARNING USE STRONG PALLETS AND SKIDS

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

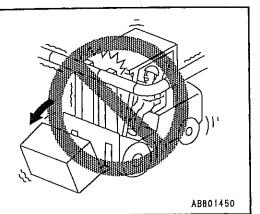
# WARNING | HANDLING LONG OR WIDE LOADS

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



### WARNING OVERHEAD OBJECTS

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





### **♠** WARNING **NO PUSHING**

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



AB801460

E

E

E

li.

E

E

II.

E,

E.

12

33

143

ž:

# **▲** WARNING PRECAUTIONS WHEN LOADING/UNLOADING

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

Е

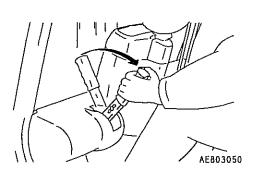
# 10. STOPPING AND PARKING

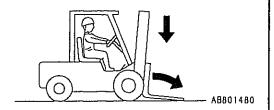
# 10. STOPPING AND PARKING

### **MARNING** PRECAUTIONS WHEN STOPPING OR PARKING

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

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



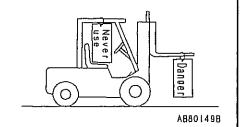


### WARNING PARKING

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

### MARNING | PARKING MACHINE AFTER FAILURE

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



W.E.

B.

E.

E

E

Œį

130

E

3

### ABRUPT LOWERING OF STUCK FORK **WARNING**

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

# 11. INSPECTION AND MAINTENANCE

## 11. INSPECTION AND MAINTENANCE

# **MARNING** USE QUALIFIED PERSONNEL FOR INSPECTION AND MAINTENANCE

 Only persons authorized by the owner or operator of the equipment and having proper certification (local or national) may carry out inspection, maintenance and repairs of the lift truck.

If inspection, maintenance, or repair work is carried out incorrectly, it is very dangerous.

# **A** WARNING MAINTENANCE LOCATION

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

# **MARNING PRECAUTIONS FOR INSPECTION AND MAINTENANCE**

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

# **MARNING** PRECAUTIONS WHEN CARRYING OUT INSPECTION AND MAINTENANCE

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

3

3

#### **USE SUITABLE TOOLS CAUTION**

Always use tools that are suited for inspection and maintenance.

It is extremely dangerous to use broken tools or tools designed for another purpose.



#### REPLACE SAFETY CRITICAL PARTS PERIODICALLY **▲** WARNING

 Even if no abnormality is found, always replace safety critical parts periodically. As time passes, these parts deteriorate and may cause fire or failure in the work equipment system.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

# ⚠ WARNING | PRECAUTIONS WITH HIGH TEMPERATURE COOLANT

 Immediately after using the lift truck, the engine coolant is at high temperature and high pressure. Do not remove the radiator cap under these conditions. Hot water may spurt out and cause burns.

 When removing the radiator cap, turn it slowly to release the internal pressure.

 When checking the coolant level, stop the engine and wait for the engine and radiator to cool down before checking. For lift trucks equipped with a subtank or reservoir, check the level in the subtank.

When adding water on lift trucks equipped with a subtank, add the water to the subtank.

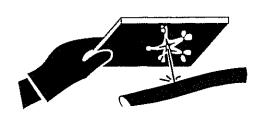


A0055050

# **MARNING** PRECAUTIONS WITH HIGH PRESSURE, HIGH TEMPERATURE OIL

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

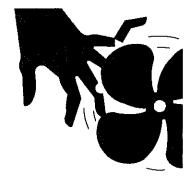




A0055190

## **A** WARNING ROTATING FAN AND BELT

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



AB801500

N,

28

-

## WARNING BE CAREFUL NOT TO GET CAUGHT OR FALL

- Never put your hands or feet into the mast structure. There is danger that you will get caught in moving parts and be seriously injured.
- Do not use the mast as a ladder. If you slip, there is danger that you will fall.



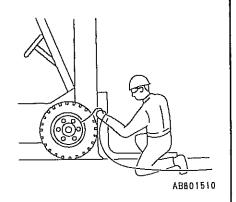
ABB01320

E



## **⚠** WARNING | CHECKING AND INFLATING TIRES

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



Ε

#### MARNING | HANDLING TIRES

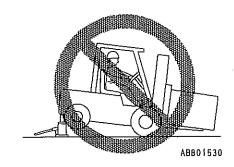
Disassembly and assembly of tires should be carried out by tire dealer.

The tire inflation pressure is extremely high, so caution is needed when handling tires.

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

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

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



=

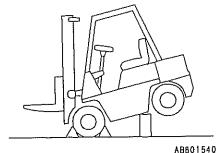
3

\_

=

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

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



# **A** WARNING BATTERY HAZARD PREVENTION

- Battery electrolyte contains sulfuric acid and can quickly burn the skin and eat holes in clothing. If you spill electrolyte on yourself, immediately flush the area with a large quantity of water.
- Battery electrolyte can cause blindness if splashed into the eyes. If electrolyte gets into your eyes, flush them immediately with large quantities of water and consult a doctor at once.
- If you accidentally drink electrolyte, drink a large quantity of water, or milk mixed with beaten eggwhite or vegetable oil. Call a doctor or poison prevention center immediately.
- When working with batteries, ALWAYS wear safety glasses or goggles.
- Batteries generate hydrogen gas. Hydrogen gas is highly EXPLOSIVE, and is easily ignited with a small spark or flame. Do not smoke or create any spark near the battery.
- Before working with batteries, stop the engine and turn the starting switch to the OFF position.
- Avoid short-circuiting the battery terminals through accidental contact with tools or other metal objects across the terminals.
- Tighten the battery terminals securely. Loose terminals can generate sparks and lead to an explosion.
- When removing or installing the battery, confirm which is the positive 

   terminal and negative

   terminal. Be careful not to connect the cables to the opposite terminals.
- Tighten the battery caps securely.
- When cleaning the battery, leave the battery caps tightened.



8

F

3.

1



A0055100

# **⚠** WARNING DO NOT PUT METAL OBJECTS ON TOP OF BATTERY

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

#### **WARNING** PRECAUTIONS WHEN CHARGING

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

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

APRICE D

#### MARNING STARTING WITH BOOSTER CABLES

- ALWAYS wear safety glasses or goggles when starting the lift truck with booster cables.
- When starting using the battery of another lift truck, do not allow the two lift trucks to touch.
  - For details of the order of operations when using a booster cable.
- Stop the engine before connecting the cables.
- Be extremely careful not to let the cables get caught in the fan or fan belt.
- Connect the batteries in parallel: positive to positive and negative to negative. Never connect positive to negative.

## M WARNING DO NOT PUSH START

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

## WARNING | HANDLING BRAKE FLUID

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

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

#### HANDLING ANTIFREEZE MARNING |

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

# **CAUTION**

## **WASTE MATERIALS**

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



AB801560

E

E

E

E

# 12. STRUCTURE AND STABILITY OF THE LIFT TRUCK (to prevent lift truck from tipping!)

# 12. STRUCTURE AND STABILITY OF THE LIFT TRUCK (TO PREVENT LIFT TRUCK FROM TIPPING!)

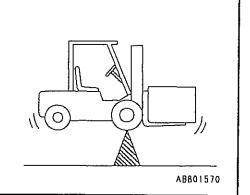
To operate the lift truck safely, it is important to understand the structure and stability of the lift truck.

# A CAUTION STRUCTURE OF LIFT TRUCK

A forklift truck consists basically of the lifting mechanism (the forks and mast) at the front and the lift truck itself (with tires) at the rear.

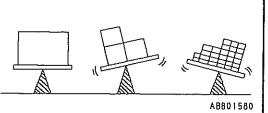
The front wheels of the lift truck act as the fulcrum, and the center of gravity of the lift truck and center of gravity of the load are kept in balance.

The relationship between the position of the center of gravity of the lift truck and the center of gravity of the load is extremely important for maintaining the safety of the lift truck.



# ▲ CAUTION | CENTER OF GRAVITY OF LOAD

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



#### CENTER OF GRAVITY AND STABILITY **CAUTION**

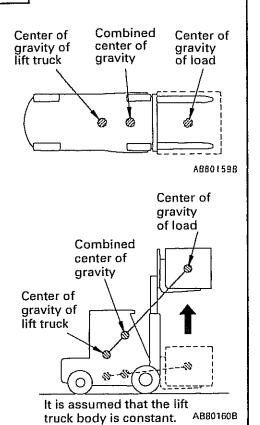
The stability of the lift truck is determined by the position of the combined center of gravity resulting from the combination of the centers of gravity of the lift truck and load.

When the lift truck is carrying no load, the center of gravity remains as it is, but when the lift truck is loaded, the combined center of gravity becomes the combination of the centers of gravity of both the lift truck and the load.

The position of the center of gravity of the load changes according to whether the mast is tilted forward or back or whether the mast is raised or lowered, so the position of the combined center of gravity also changes accordingly.

The position of the combined center of gravity of the lift truck is governed by the following factors:

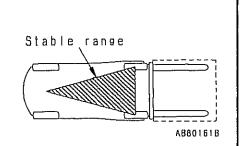
- Size, weight, shape of load
- Lifting height
- Tilting angle of mast
- Inflation pressure of tires
- Acceleration, deceleration, turning radius
- Condition of road surface, angle of road
- Type of attachments



#### STABLE RANGE OF CENTER OF GRAVITY **CAUTION**

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

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



E

MH.

(4)

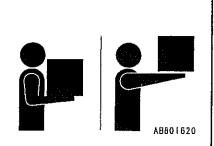
Tax.

Line

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

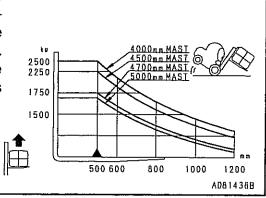
The horizontal distance between the center of gravity of the load on the forks and the load backrest of the forks or the front face of the forks (whichever is shorter) is called the load center.

The maximum load is the maximum weight of the load that can be loaded at the standard load center. The relationship between the maximum load and the load center is given in the load capacity chart on the plate on the lift truck. If the load center moves to the front of the forks, the overall center of gravity also moves to the front, so this means that the load must be reduced.



#### **CAUTION** LOAD CAPACITY CHART

This shows the relationship between the position of the load center and the maximum load. Before loading the forks, check that the load and load center are within the permitted range on the load capacity chart. If the shape of the load is complex, set so that the heaviest part of the load is at the center of the forks and set the load close to the load backrest.



#### MARNING | SPEED AND ACCELERATION

If a stationary object is not subjected to external force, it will remain stationary. In the same way, if a moving object is not subjected to external force, it will continue to move at the same speed. This is called inertia.

8

Because of inertia, a force is applied towards the rear when the lift truck starts to move, and is applied towards the front when the lift truck stops. If the brake are applied suddenly, there is danger of a large force being applied towards the front which may make the lift truck tip or the load to be expelled. When the lift truck is turned, a centrifugal force is applied to the outside from the center of the turn. This force pushes the lift truck to the outside and makes it tip. The range of stability to the left and right is particularly small, so it is necessary to reduce speed when turning, in order to prevent the lift truck from tipping. If the lift truck is traveling with a raised load, the position of the overall center of gravity is high, so the danger of tipping to the front, left, or right becomes greater.

#### MARNING 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. Tires 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 nameplate 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 damage the under side of the lift truck.

#### How To Tow The Lift Truck

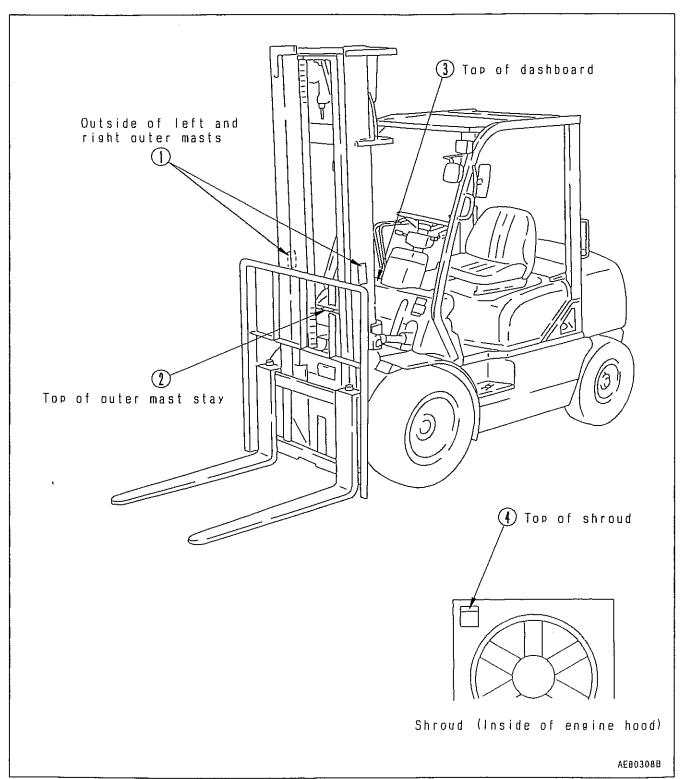
- 1. The towed lift truck must have an operator.
- 2. Tow the lift truck slowly.
- 3. Raise the carriage and forks approximately 30cm(12inches) from the surface. Install a chain to prevent the carriage and mast channels from moving.
- If another lift truck is used tow the disablad lift truck, that lift 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 posible.
- Use a towing link made of steel that attaches to the tow pins in the counterweights of both lift trucks.

# **MEMO**

# 13. SAFETY LABEL STICKING POSITIONS

Keep these labels clean. If a label comes off, stick it on again or replace with a new one. Concerning labels other than the safety labels, use these in the same way.

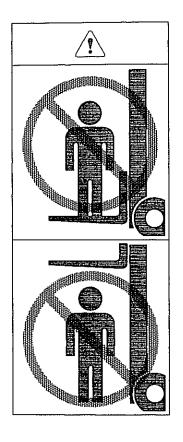
## 13.1 SAFETY LABEL STICKING POSITIONS



EB

E

 Prohibit the operator from riding on the forks and lifting/lowering himself.
 Never enter the area under the forks.



4. Never touch fan when rotating.

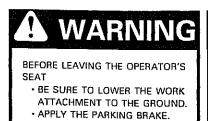


For safety label 1, order Part No. 3EB-96-25130 For safety label 2, order Part No. 3EB-96-25120 For safety label 3, order Part No. 3EB-96-15130 For safety label 4, order Part No. 3EB-96-25770

2. Caution to avoid getting hand caught.



3. Caution before operating machine.



# A CAUTION

- 1. BEFORE STARTING ENGINE
- PUT GEARSHIFT LEVER IN NEUTRAL
- APPLY BRAKE

2. BEFORE OPERATING, MACHINE, READ OPERATION MANUAL CAREFULLY.

3EB-96-15130 \*\*

誰

18

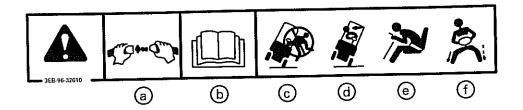
逛

EEE.

TIT

ie.

5. Avoiding danger if lift truck overturns during operations If the steering is operated suddenly during operations, there is danger that the lift truck may lose its balance and tip over. To avoid danger, always observe the following precautions strictly.



AW82592B

- a) Always wear your seat belt during operations.
- (b) Make sure that you read and understand the Operation and Maintenance Manual before operating the lift truck.
- © Never jump off the lift truck.
- $\stackrel{\smile}{ ext{d}}$  Lean in the opposite direction from the direction in which the lift truck is tipping.
- (e) Grip the steering wheel tightly.
- f Brace yourself with both feet to support your body.

Items © to f are for when the lift truck tips over.

## 13.2 INTRODUCTION OF SAFETY DEVICES (OPTION)

Various safety devices are available as potions. If the operating conditions demand, please install these devices. The devices listed below are only examples. Various other devices are also available. For details, please contact your Komatsu Forklift distributor.

#### 1. Rear lamp

Install this when carrying out operations at night which require the rear area to be lighted. (The law demands that sufficient lighting be provided to ensure safety.)

#### 1. Rear lamp

Install this when carrying out operations at night which require the rear area to be lighted. (The law demands that sufficient lighting be provided to ensure safety.)

#### 2. Speedometer

This shows the travel speed (km/h) and distance traveled by the lift truck.

#### 3. Speed alarm

When the lift truck exceeds the preset speed, a buzzer sounds to warn the operator.

#### 4. Safety checker

Warning lamps are added to the meter panel.

- Battery electrolyte level warning lamp
- Radiator cooling water level warning lamp
- · Air cleaner element warning lamp

#### 5. High backrest

13

J P

31

25

35

200

35

30

, 3 B

This improves the support for high loads and improves the stability of load.

#### 6. Wide fork carriage

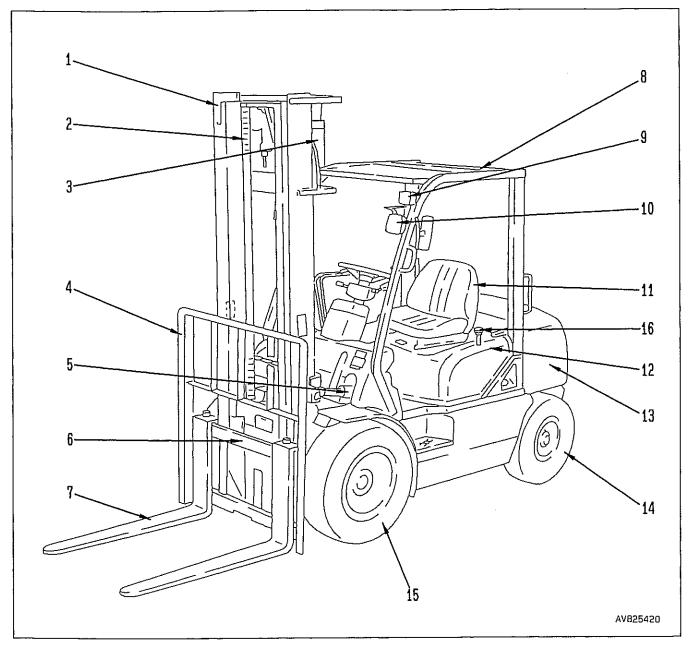
This improves the support for wide load and improves the stability.

E
<b>37</b> E
E
Œ
-
E
E

# **OPERATION**

# 14. GENERAL VIEW

## 14.1 GENERAL VIEW OF LIFT TRUCK



- 1. Mast
- 2. Lift chain
- 3. Lift cylinder
- 4. Back rest
- 5. Tilt cylinder
- 6. Fork carriage
- 7. Fork
- 8. Head guard
- 9. Turn signal lamp

- 10. Head lamp
- 11. Operator's seat
- 12. Engine hood
- 13. Counterweight
- 14. Rear wheel
- 15. Front wheel
- 16. Manual battery cut off switch

**273**11

33.2

327

261

Asi.

Mã.

XEE.

127

E.

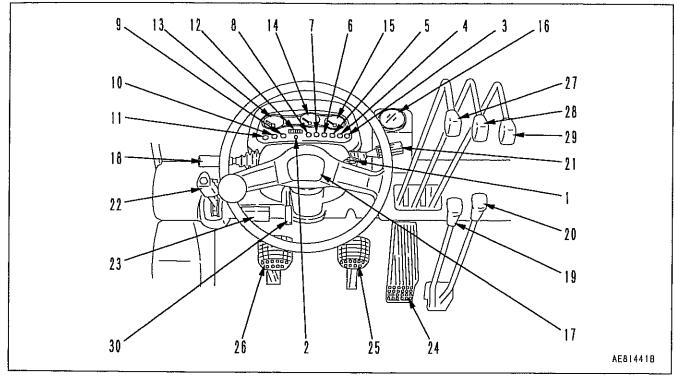
(S)

Wi.

W.

2

## 14.2 INSTRUMENTS AND CONTROLS



- 1. Starting switch
- Operation indicator (displays during operation)
- Glow indicator (diesel engine lift truck)
- Sedimenter warning lamp (diesel engine lift truck)
- Battery electrolyte level warning lamp (option)
- Radiator cooling water level warning lamp (option)
- 7. Fuel level warning lamp
- Air cleaner element warning lamp (option)
- 9. Charge warning lamp
- 10. Engine oil pressure warning lamp
- 11. Brake fluid level warning lamp
- 12. Hourmeter

- Engine water temperature gauge
- Torque converter oil temperature gauge (option)
- 15. Fuel gauge
- 16. Speedometer (option)
- 17. Horn button
- FORWARD/REVERSE lever (TORQFLOW transmission lift truck)
- FORWARD/REVERSE lever (Clutch type lift truck, A, C type)
   High/low speed lever (Clutch type lift truck, B type)
- High/low speed lever (Clutch type lift truck, A, C type)
   FORWARD/REVERSE lever
  - FORWARD/REVERSE lever (Clutch type lift truck, B type)

- 21. Combination switch (turn signal lamp and lamp switch)
- 22. Parking brake lever
- 23. Fuse box
- 24. Accelerator pedal
- 25. Brake pedal
- 26. Inching pedal (TORQFLOW transmission lift truck)
  Clutch pedal (clutch type lift truck)
- 27. Lift lever
- 28. Tilt lever
- 29. 3-spool valve lever (see attachment)
- 30. Tiltable steering wheel lock lever

## NOTICE

Method of checking for blown bulbs in warning lamps

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

# 15. EXPLANATION OF COMPONENTS

# 15.1 DESCRIPTION OF NORMAL COMPONENTS

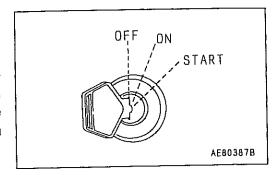
The following is an explanation of the devices employed to operate the lift truck. To carry out suitable operations correctly and safely, it is important to understand fully the method of operating the equipment and the meanings of the displays.

#### 1. STARTING SWITCH

This is used to start and stop the engine.

Clutch type lift truck:

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



J...

3/1

7

1

**T**(()

13.

13.

EX!

Ž,

## TORQFLOW transmission lift truck:

When starting the engine, place the forward/reverse control lever at the neutral position, pull the parking lever, and depress the inching pedal fully, then turn the key.

OFF: Engine stop position

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

ON: Engine running position

For diesel engine lift trucks, carry out preheating before starting the engine.

START: Position for starting engine

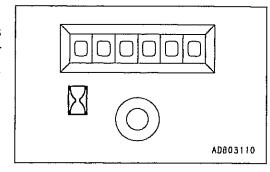
After the engine starts, release the key. It will automatically return to the ON position.

## NOTICE

- When the engine is stopped, do not leave the key at the ON position. This will discharge the battery and make it difficult to start the engine.
- Do not run the starting motor continuously for longer than the times given below. Gasoline engine lift truck: Max. 5 seconds Diesel engine lift truck: Max. 20 seconds
- Do not turn the key to the START position when the engine is running.

#### 2. OPERATION INDICATOR

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



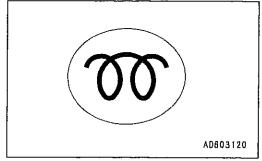
## 3. GLOW INDICATOR (DIESEL ENGINE LIFT TRUCK)

This lamp shows the preheating condition of the engine.

When the starting switch is turned ON it lights up, and when the preheating is completed, it goes out.

Lamp ON: Glow plug heating

Lamp OFF: Glow plug preheating completed When the lamp goes out, start the engine.



# 4. SEDIMENTER WARNING LAMP (DIESEL ENGINE LIFT TRUCK)

This lamp informs the operator that there is water collected in the fuel filter.

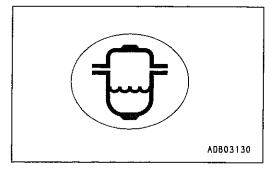
When the starting switch is turned ON, the check is carried out.

Lamp OFF: Normal

Lamp ON: Drain water from fuel filter.

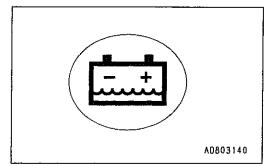
For details of the method of draining the water, see

PERIODIC MAINTENANCE.



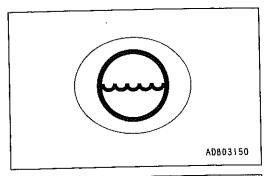
# 5. BATTERY ELECTROLYTE LEVEL WARNING LAMP (OPTION)

If this lamp lights up, add distilled water.



# 6. RADIATOR COOLING WATER LEVEL WARNING LAMP (OPTION)

If this lamp lights up, check the cooling water level and add water.



-

T.

El.

464.

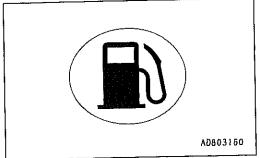
更差

**E**(1)

E.E.

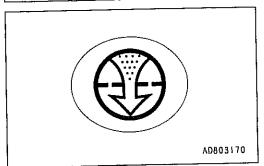
## 7. FUEL LEVEL WARNING LAMP

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



# 8. AIR CLEANER ELEMENT WARNING LAMP (OPTION)

If this lamp lights up, clean or replace the element.

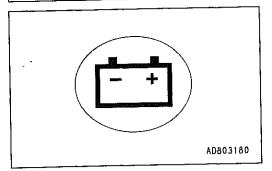


#### 9. CHARGE WARNING LAMP

This lamp informs the operator of the generating condition of the alternator.

When the starting switch is turned ON it lights up, and after the engine starts, it should go off.

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

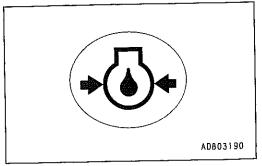


## 10. ENGINE OIL PRESSURE WARNING LAMP

This lamp informs the operator of the engine lubricating oil pressure.

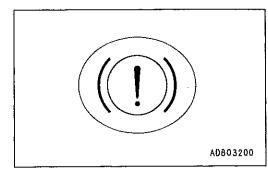
When the starting switch is turned ON it lights up, and after the engine starts, it should go off.

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



#### 11. BRAKE FLUID LEVEL WARNING LAMP

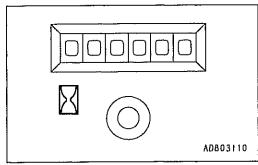
If this lamp lights up, check the brake fluid level and add fluid.



#### 12. HOURMETER

When the starting switch is turned ON, the hourmeter starts moving and displays the total number of operating hours. (When the hourmeter is working, the operating indicator lamp flashes.)

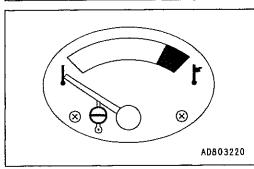
The last digit advances by 1 every 6 minutes when the starting switch is at the ON or START position.



#### 13. ENGINE WATER TEMPERATURE GAUGE

The indicator shows the engine water cooling temperature.

White range: Normal Red range: Overheating



#### NOTICE

If the indicator enters the red range, stop operations immediately, and move the lift truck to a safe position. Then open the engine hood to ensure that there is good ventilation and run the engine at low idling until the water temperature goes down.

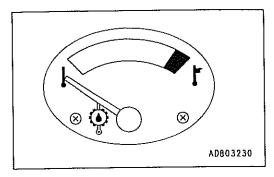
(For details, see HANDLING IN HEAVY-DUTY CONDI-

(For details, see HANDLING IN HEAVY-DUTY CONDITIONS.)

# 14. TORQUE CONVERTER OIL TEMPERATURE GAUGE (OPTION)

The indicator shows the torque converter oil temperature.

White range: Normal Red range: Abnormal



#S

1300

gzi

188

赵

8

#### NOTICE

Action to take if indicator enters red range

- 1. Stop operations, stop the lift truck, run the engine at idling, and wait for the temperature to go down.
- 2. Stop the engine and check the oil level in the TORQFLOW transmission.
- 3. If the oil level is correct and the indicator enters the red range, please contact your Komatsu Forklift distributor.

#### 15. FUEL GAUGE

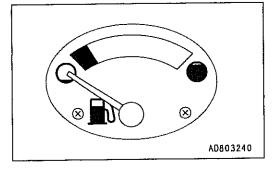
The indicator shows the remaining fuel level.

When the starting switch is turned on, a check is carried out.

○: Empty

🕽 : Full

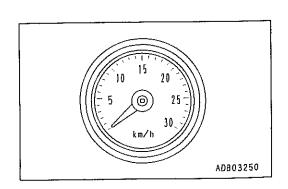
If the lift truck is on a slope, the correct fuel level will not be shown, so always check when the lift truck is on level ground.



Do not use up all the fuel. Fill the fuel tank before the fuel runs out.

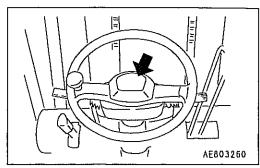
#### 16. SPEEDOMETER (OPTION)

This indicates the travel speed of the lift truck.



#### 17. HORN BUTTON

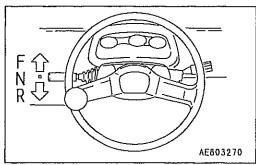
Press the button in the middle of the steering wheel to sound the horn.



# 18. FORWARD/REVERSE LEVER (TORQFLOW TRANS-MISSION LIFT TRUCK)

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

F: FORWARD
N: Neutral
R: REVERSE



#### NOTICE

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

#### REMARK

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

#### 19, 20 TRAVEL LEVER (CLUTCH TYPE LIFT TRUCK)

**A** WARNING -

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

#### A type

=

#### 19: FORWARD/REVERSE LEVER

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

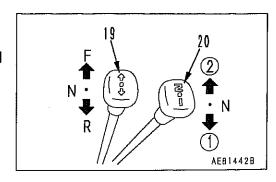
F: FORWARD
N: Neutral
R: REVERSE

## 20: HIGH/LOW SPEED LEVER

This lever is used to change the travel speed range.

2: High speed

N: Neutral
1: Low speed



## B type (option)

#### 19: HIGH/LOW SPEED LEVER

This lever is used to change the travel speed range.

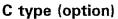
①: Low speed N: Neutral

2: High speed

#### 20: FORWARD/REVERSE LEVER

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

F: FORWARD
N: Neutral
R: REVERSE



## 19: FORWARD/REVERSE LEVER

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

F: FORWARD
N: Neutral
R: REVERSE

## 20: HIGH/LOW SPEED LEVER

This lever is used to change the travel speed range.

①: Low speed N: Neutral

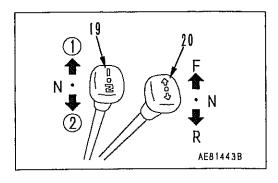
2: High speed

## NOTICE

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

#### REMARK

The engine cannot be started if this FORWARD/RE-VERSE lever is not at the N (neutral) position. (It is equipped with a neutral switch.)



138

TAL.

E

E

E

E

E

F

E

E

E

E

F

E

F

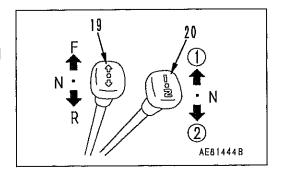
E

F

F

E

E



#### 21. COMBINATION SWITCH

Light switch

Position 1 (OFF): Parking lamp (side clearance lamp)

and front lamps are OFF

Position 2: Parking lamp (side clearance lamp)

lights up

Position 3: Parking lamp (side clearance lamp)

stays lighted up, and front lamp lights

up

## Hi, Lo selector type

Light switch

Position 1 (OFF): Parking lamp (side clearance lamp)

and front lamps are OFF

Position 2: Parking lamp (side clearance lamp)

lights up

Position 3 (LO): Parking lamp (side clearance lamp)

stays lighted up, and front lamp lights

up at low beam

Position 4 (HI): Parking lamp (side clearance lamp)

stays lighted up, and front lamp lights

up at high beam

#### Turn signal indicator switch

This makes the turn signal indicator lamp flash.

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

#### REMARK

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

#### 22. PARKING BRAKE LEVER

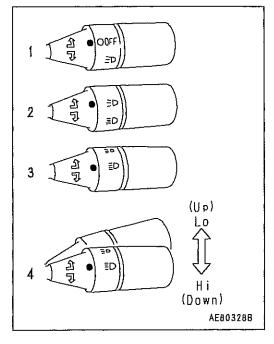
Position 1: Brake is applied.

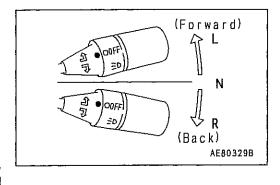
When the lever is pulled back, the parking brake is applied and the front wheels are locked

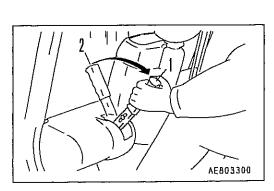
Use this when temporarily stopping or parking the lift truck.

Position 2: Brake is released.

When the lever is pushed forward, the parking brake is released.



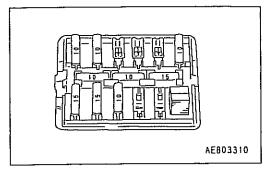




#### 23. FUSE BOX

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

For details of replacing the fuses, see "27.1 Replacing fuses".



HI.

19.

TE.

45

38

MI.

PHI

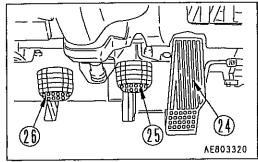
Sel

220

## 24, 25, 26 PEDALS

[TORQFLOW transmission lift truck]

- ②: Accelerator pedal
- 25: Brake pedal
- 26: Inching pedal
- The inching pedal is used for fine control when driving the lift truck slowly forward or in reverse for loading or unloading.



#### NOTICE

Do not put your foot on the inching pedal or decelerator pedal unless necessary.

## [Clutch type lift truck]

- (4): Accelerator pedal
- ②5: Brake pedal
- 26: Clutch pedal

# 26 AE803320

#### NOTICE

Do not put your foot on the clutch pedal or decelerator pedal unless necessary.

#### 27. LIFT LEVER

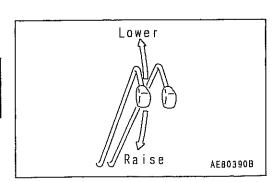


Sit in the operator's seat and check that the surrounding area is safe before operating the lift lever.

This lever is used to raise and lower the forks.

LOWER ( \( \ldots \)): Push the lever forward

RAISE ( !!! ): Pull the lever back



#### **REMARK**

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

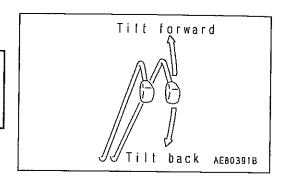
The lowering speed can be controlled only by the amount that the lever is operated.

#### 28. TILT LEVER

## **M** WARNING -

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

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

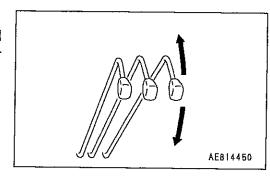


#### **REMARK**

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

## 29. 3-SPOOL VALVE LEVER

For details of the lever used for 3-spool valves and above, see the Operation and Maintenance Manual for the attachment.



## 30. TILTABLE STEERING WHEEL LOCK LEVER

## · 🛕 WARNING :

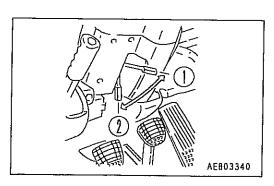
Always stop the lift truck completely before adjusting the position of the steering wheel. After adjusting, move the steering wheel backward and forward to check that it is locked securely in position.

This lever is used to allow the position of the steering wheel to be adjusted and to lock it in position after adjustment.

Position ①: Lock is released Position ②: Lock is applied

## Method of adjustment

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



#### OPERATOR'S COMPARTMENT ADJUSTING SEAT

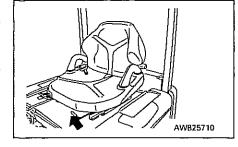
## WARNING -

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

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

#### Method of adjusting fore-and-aft position

- 1. Raise the lever. (When the lever is raised, the seat can slide to the front or rear.)
- 2. Set the seat to the position where operation is easy, then release the lever. (The seat will be locked in position.)

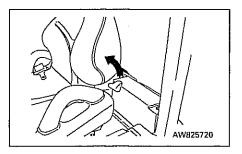


Æ.

Amount fore-and-aft adjustment: 160 mm (6.3 in)

#### Method of adjusting reclining angle (suspension seat only):

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

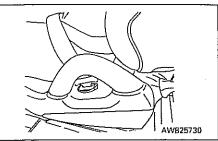


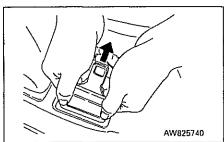
Method of fitting and releasing seat belt

 Pull the belt out from the holder at the right side of the seat, then insert the tongue into the buckle until a click is heard. (In this condition the seat belt is locked in position.)

The seat belt is designed to give a shock in the holder when the belt locks. The same shock may occasionally be felt if the belt locks when it is pulled out of the holder.

If this happens, grip the tongue end of the belt with both hands, pull up strongly, and when the belt loosens, pull the belt out again slowly.





- To release the lock, hold the tongue portion of the belt with your right hand, then press the red button in the buckle with your left hand.
- 3. The belt automatically be wound into the holder. When this happens, hold the belt and let it wind in slowly.

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



Turn the adjustment knob on the right side of the operator's seat to adjust the suspension to match your weight.

Adjust as follows:

3

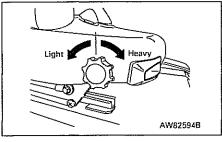
3

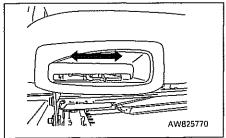
-

3

To INCREASE the weight setting, turn to the RIGHT. To DECREASE the weight setting, turn to the LEFT. (Weight adjustment range: 50 - 120 kg (110 - 265 lb))







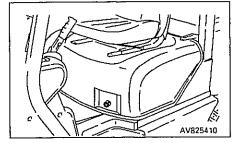
#### ENGINE HOOD

## - 🛕 CAUTION –

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

When opening engine hood

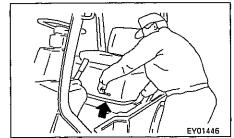
 Turn the bolt at the front left of the engine hood using the special wrench.



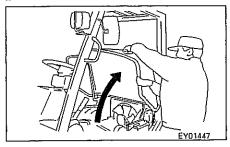
\*

**2** 

2. Raise the engine hood slightly and put your right hand along the engine hood.



3. Lift the engine hood up and push up until the engine hood stopper is fitted in place. (When this is done, the steering column will move to the front to avoid interference with the engine hood.)



- A CAUTION ----

The meter panel also moves to the front together with the steering column, so be careful not to put your hand between the meter panel and the dashboard.

When closing engine hood

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

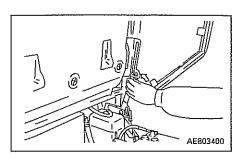
## - 🛕 CAUTION –

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

2. Pull the steering column back to its original position.



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



#### FORK STOPPER

LOCK position: The forks are secured to the fork carriage. Always

use this position during operations.

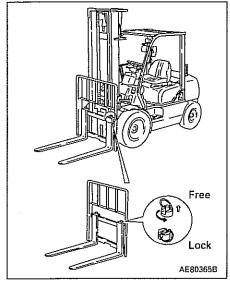
FREE position: The forks can be moved to the left and right, so it is

possible to adjust the spread of the forks to match

the size of the load.

#### NOTICE

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



#### 15.2 DESCRIPTION OF ACCESSORIES

#### BALE CLAMP ATTACHMENT

The bale Clamp is distinguished by having arms ribbed on the clamp surface that 'bite' the load for extra holding power. Frequently used for carrying baled material like cotton, woo!, rags, scrap paper, scrap metal, bulk rubber, and other products that are not dameged by the ribbed constructions.

201

e e

Ħ

=

(in

-

#### ROTATING CLAMP ATTACHMENT

The rotating clamp attachment combines a basic clamp and rotator. Pilot-operated check valves prevents accidental unclamping. Stopping the truck or even cutting hydraulic lines will not unclamp and release the load.

The integral rotator allows the operator to turn it 360 degress of accurate, safe, fast positioning.

#### SIDE SHIFT ATTACHMENT

The side shift attachment enables, when the load has been engaged, the operator to move the load sideways for accurate, safe, fast positioning and full utilization of the available space.

#### FORKSPREAD ATTACHMENT

The forkspread attachment enables the operator to extend or retract the forks to a safe and accurate position, particularly when handling an irregular shaped load.

# 15.3 REMOVING AND INSTALLATION OF ATTACHMENTS

#### 1. SAFETY PRECAUTIONS

A WARNING -

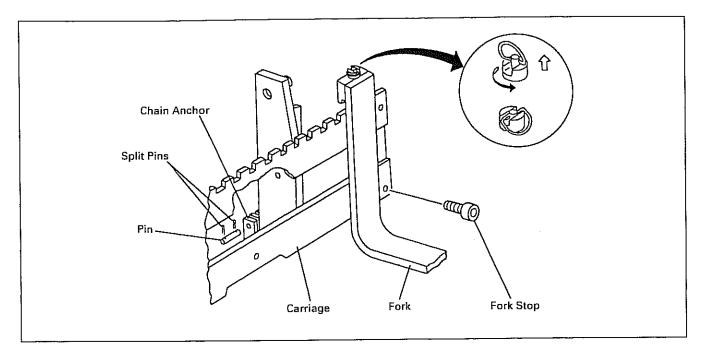
The attachment(s) and major components are heavy and can cause serious injury if improperly handled.

- 1.1. 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).
- 1.2. Secure the truck against accidental movement of truck or attachements when work is being carried out. When working underneath raised load handling attachments, alloways secure them to prevent lowering.
- 1.3. 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, sideshift speed).
- 1.4. 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 disloadged parts may fall.
- 1.5. Do not climb onto any part of the truck which is in motion (e.g. mast, carriage, etc.).
- 1.6. No servicing should be carried out on the hydraulic system until the mast, carriage or relevant component has been suitably supported or restrained.

#### 2. FORKS

- 2.1. Lower the carriage until the forks are resting on the ground and the lift chains are still taut.
- 2.2. Release the fork stopper.

  Move the forks toward center, fit the lower hook into the notch and remove the fork.
- 2.3. Replacement is the reverse of the removal procedure. Smear the fork hooks with grease and adjust the fork width to suit.



E

**E** 

E 3

ETES.

EU.Z

11.

ETT:

T.E.

M.

FILE.

TET.

EE C

12.5

#### 3. CARRIAGE

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

# NOTICE

If a sideshift 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.

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

# 4. MAST

Prior to removal of the mast, detach the carriage and forks - refer to para 2 and 3. Remove the drive wheels (if required).

4.1. 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. 4.2. Disconnect hydraulic pipes from the lift cylinders and blank off all open ends to prevent the ingress of foreign matter.

# · 🛕 CAUTION -

# Residual oil will be discharged during disconnection.

- 4.3. Inclining the mast forward a little from its vertical position, remove the dif mounting cap bolt.
- 4.4. Reassembly is the reverse of the removal sequence, noting the following:-
  - 4.4.1. Renew chain anchor split pins.
  - 4.4.2. Tighten to the correct torque, the mast locking bolts refer to repair manual for torque figure.
  - 4.4.3. Lubricate all pivot pins.
  - 4.4.4. 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.



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

# 5. INSTALLATION/ASSEMBLY OF SIDE SHIFT, FORKSPREADER OR CLAMP ATTACHMENTS The side shift, forkspreader and clamp attachments all have a common method of installation/assembly

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

- 5.1. 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 face plate itself.
- 5.2. Place the clamp into an upright position in preparation for mounting it on the truck.
- 5.3. Remove the lower mounting hooks from the back of the clamp frame.
- 5.4. Attach the two jumper hoses securely to the clamp's check valve before connecting them to the junction block on the truck carriage.
- 5.5. 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.
- 5.6. If the hose junction block is located on the upper portin 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.

- 5.7. 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 centre 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 acrriage.
- 5.8. Attach the hoses to the carriage junction block.
- 5.9. 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.
- 5.10. 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.

E.

5.11. 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:

- 5.11.1. Open both restictor 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.
- 5.11.2. Close the arms from their full extension, watching to see which one is closing most rapidly.
- 5.11.3. Close the restrictor fitting on the cylinder controlling the faster arm until both arms are travelling at the same rate. The clamp will probally have to be opened and closed several times to make this adjustment accurately.
- 5.12. 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.

# 6. REMOVAL OF SIDE SHIFT, FORKSPREADER OR CLAMP ATTACHMENTS

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

1.

$\Lambda$	WARNING	

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

# 16. OPERATION

# 16.1 CHECK BEFORE OPERATION

- 🛕 WARNING ~

- Never operate the lift truck before the "check before operation" is completed.
- If any abnormality is found during checking, immediately consult a Komatsu Forklift distributor and do not operate the lift truck until repaired.
- Oil leakage can cause a lift truck fire.

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

# 16.1.1 CHECK BEFORE OPERATION (WITH KEY SWITCH OFF)

1. CHECK FOR OIL LEAKAGE AND BATTERY ELECTROLYTE LEAK-AGE

Check for leakage by conducting a walk-around check. Check the following items, in particular.

- Tubing
- Control valve
- Hydraulic pump
- Hydraulic cylinder

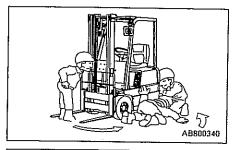
# 2. CHECK FOR CRACKS AND DAMAGE

Visually check for cracks and damage. Particularly check the following items.

- Head guard
- Fork carriage

Fork

- Mast
- Load back-rest
- Fuel tank





#### 3. CHECK TIRES AND RIMS

Check the tires and rims for the following items.

Whether the tire pressure matches the specified pressure.
 Specified pressure:

Front tires: 0.68 MPa (7.0 kgf/cm²) Rear tires: 0.68 MPa (7.0 kgf/cm²)

Check that there are no loose hub nuts or rim mating nuts.

# AB800360

推

- E

# Tightening torque:

Check item	Hub nut tightening torque	Rim mating nut tightening torque
Front wheels	294 – 490 Nm (30 – 50 kgfm)	196 – 294 Nm (20 – 30 kgfm)
Rear wheels	196 – 245 Nm (20 – 25 kgfm)	88 – 123 Nm (9 – 12.5 kgfm) *

\*: Except for 3-ton lift truck

# NOTICE

Tighten the hub nuts to the specified torque. (For tightening torque see "23. SERVICE DATA".)

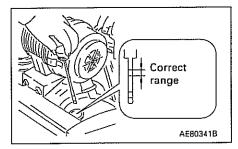
- Check the tires for excessive wear, damage, and adhesion of foreign matter.
- · Check the rims for deformation or damage.

#### 4. CHECK OIL LEVEL IN HYDRAULIC TANK

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

# NOTICE

Always use Komatsu Forklift genuine hydraulic oil.



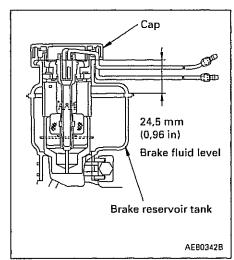
# 5. CHECK OIL LEVEL IN BRAKE RESERVOIR TANK

- 1. Remove the floor plate.
- 2. Remove the connector of the brake fluid level sensor, then remove the cap.
  - Correct range: The fluid should be within a range of 24.5 mm (0.96 in) from the top surface of the tank.
- 3. If the oil level is low, add Komatsu Forklift genuine brake fluid.

# NOTICE

Always use Komatsu Forklift genuine brake fluid for the brake fluid.

- 4. Install the cap and insert the connector of the brake fluid level sensor.
- 5. Install the floor plate.



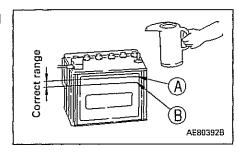
#### 6. CHECK BATTERY ELECTROLYTE LEVEL

# . A WARNING -

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

If the battery electrolyte level is not within the correct range, add distilled water to top line  $\triangle$ .

Clean the battery cap breathers and terminals.



# NOTICE

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

#### 7. CHECK PARKING BRAKE

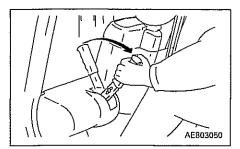
The operating effort for the parking lever should be 196 – 294 N (20 – 30 kgf). If it is less than 196 N (20 kgf), please contact your Komatsu Forklift distributor.

# 8. CHECK HORN

Check that the horn sounds normally when the horn button is pressed. Check also for any dirt or damage to the lamps

# 9. CHECK LAMPS

Check that the head lamp and parking lamps (side clearance lamps) light up properly. Check also for any dirt or damage to the lamps.



**1** 

300

#### 10. CHECK OIL LEVEL IN CLUTCH RESERVOIR TANK

- 1. Remove the floor plate.
- 2. Remove the cap and the center cover, and check that the oil level is within the correct range.

Correct range: The oil level should be within a range of 10 mm (0.39 in) from the top surface of the tank.

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

# Correct range: 10 mm (0.39 in) Clutch reservoir tank

# NOTICE

Always use Komatsu Forklift genuine brake fluid for the brake fluid.

4. Install the cap and the center cover.

# NOTICE

Install the center cover with the embossed letters facing up.

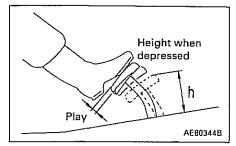
5. Install the floor plate, and fit the floor mat.

# 11. CHECK PEDAL

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

# **BRAKE PEDALS**

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



# **CLUTCH PEDAL (CLUTCH TYPE LIFT TRUCKS)**

Plav	3 – 5 mm (0.12 – 0.20 in)
	0 0 11111 (01.12 01.20 111)

# **INCHING PEDAL (TORQFLOW TRANSMISSION LIFT TRUCKS)**

Play	2 – 3 mm (0.08 – 0.12 in)
Interconnected travel	35 – 41 mm (1.38 – 1.61 in)

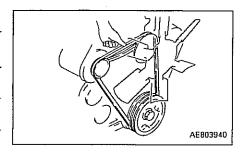
# **REMARK**

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

#### 12. CHECK DEFLECTION OF V-BELT

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

FG20/25/30-12	11 - 13 mm (0.43 - 0.51 in) (98 N finger pressure)
FG20H/25H/30H-12	11 – 13 mm (0.43 – 0.51 in) (10 kgf finger pressure)
FD20/25/30-12	10 - 15 mm (0.39 - 0.59 in) (98 N finger pressure)
1020/23/30-12	10 – 15 mm (0.39 – 0.59 in) (10 kgf finger pressure)
FD20H/25H/30H-12	10 mm (0.39 in) (98 N finger pressure)
	10 mm (0.39 in) (10 kgf finger pressure)



# NOTICE

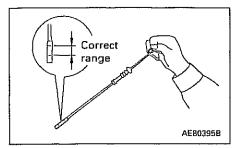
Replace the belt if the belt is stretched and there is no allowance for adjustment, or if the belt is cut or cracked.

# 13. CHECK OIL LEVEL IN ENGINE OIL PAN

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

# NOTICE

- If the oil is markedly dirty or discolored, change the oil.
- Always use genuine Komatsu Forklift engine oil. (See "22. LU-BRICANT LIST".)



**1**300

#### 14. CHECK COOLANT LEVEL

# - 🕰 WARNING -

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

# NOTICE

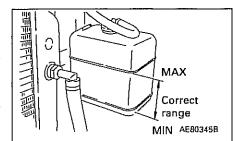
If anti-freeze is being used, add anti-freeze also. (For details of the proportions to use for anti-freeze, see 17. COLD WEATHER OPERATION.)

Check that the coolant in the radiator reservoir tank is cold, and if the coolant level is low, add coolant to the MAX level.

If there is no more water in the reservoir tank, remove the radiator cap and add water directly to the radiator, then add water to the reservoir tank.

#### 15. CHECK ABNORMALITIES FOUND ON PREVIOUS DAY

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

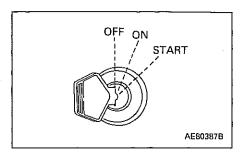


# 16.1.3 CHECK AFTER STARTING (WITH STARTING SWITCH ON)

This is used to start and stop the engine.

# Clutch type lift truck:

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



#### TORQFLOW transmission lift truck:

When starting the engine, place the forward/reverse control lever at the neutral position, pull the parking brake lever, and depress the inching pedal fully, then turn the key.

#### OFF: Engine stop position

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

# ON: Engine running position

For diesel engine lift trucks, carry out preheating before starting the engine.

# START: Position for starting engine

After the engine starts, release the key. It will automatically return to the ON position.

#### NOTICE

Read "16.2 MOUNTING/DISMOUNTING", "16.3 OPERATOR'S SEAT POSITION ADJUSTMENT" AND "16.4 STARTING LIFT TRUCK OFF", then check the following items.

#### 16. CHECK FOR ABNORMAL NOISE, ABNORMAL VIBRATION

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

# 17. CHECK ENGINE EXHAUST GAS COLOR

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

# 18. CHECK FUEL LEVEL IN FUEL TANK



# - 🕰 WARNING -

When adding fuel, never let the fuel overflow. This may cause a fire. If any spilled fuel is found, wipe up thoroughly.

# NOTICE

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

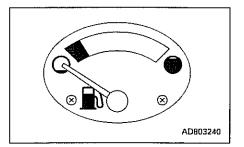
If the fuel gauge indicator is at the position, the tank is full.

If the fuel level is low, stop the engine and fill the tank through the fuel filler port.

For details of the fuel to use, see "22. LUBRICANT LIST".

When adding fuel, remove all dirt from around the cap and be careful not to let any dirt get into the tank.

After adding fuel, tighten the fuel filler cap securely and wipe up any fuel that was spilled.



E SE

ALC:

E.

E

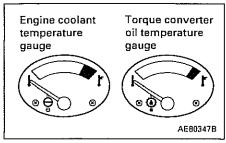
**E** 

19. CHECKS USING GAUGES AND WARNING LAMPS [ENGINE OIL PRESSURE WARNING LAMP, CHARGE WARNING LAMP] These lamp should not light up.

# Engine oil Charge warning warning lamp lamp AE80346B

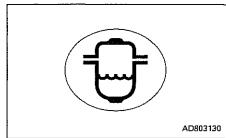
# [ENGINE COOLANT TEMPERATURE GAUGE, TORQUE CONVERTER OIL TEMPERATURE GAUGE]

The indicator should be in the white range.



# [SEDIMENTER WARNING LAMP]

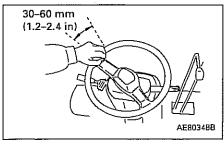
This lamp should not light up. If it lights up, drain the water. (See PERIODIC MAINTENANCE.)



# 20. CHECK STEERING WHEEL

Check the following points.

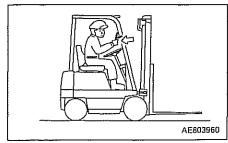
- Play (the play should be 30 60 mm (1.2 2.4 in)).
- There must be no up-down play.



# 21. CHECK REAR VIEW MIRROR (OPTION)

Check the following points.

- Check that it is easy to see the rear.
- · Check that there is no dirt or damage to the mirror.



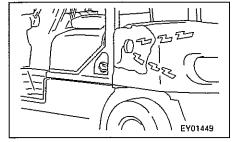
# 22. CHECK BACK-UP BUZZER (OPTION)

# -- 🖍 WARNING-

Set the high/low speed lover (clutch type lift truck) to the neutral position, pull the parking brake lever, and depress the clutch pedal (inching pedal on TORQFLOW type lift truck) when checking.

Check that the back-up buzzer sounds when the forward/reverse lever is placed at REVERSE.

If the back-up buzzer does not sound when the forward/reverse lever is placed at REVERSE, carry out repairs or replacement immediately.



E

E

#### 23. CHECK TURN SIGNAL LAMP

Check that the turn signal lamp works properly and that it is not dirty or damaged.

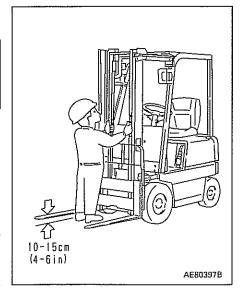
#### 24. CHECK LIFT CHAIN

# A WARNING -

- Set the FORWARD/REVERSE lever to the "NEUTRAL" position and apply the parking brake. Then perform checking.
- Never insert feet under the forks.
- · Check lift chain tension
- 1. Lift the forks 10 15 cm (4 6 in) from the ground.
- 2. Check the right and left deflections of the lift chain by pressing it at the center.

The tension is normal when both deflections are approximately equal.

3. If the deflections differ from each other, adjust with the nut of the lift chain stopper bolt.

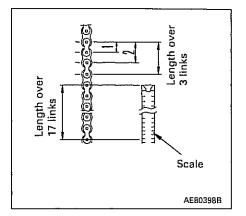


# Check elongation of the lift chain

Measure the length over 17 links and check that the length is within the following specified value.

Length over 17 links	2 - 2.5 ton lift truck	Max. 330 mm (13.0 in)		
	3 ton lift truck	Max. 550 mm (21.7 in)		

If the measurement value exceeds this range, replace the chain.



#### Check the lift chain lubricant

# · 🛕 WARNING -

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

If there is insufficient lubrication, apply engine oil.

# NOTICE

Use Komatsu Forklift genuine engine oil. (See "22. LUBRICANT LIST".)

# 16.1.3 CHECK WHILE ADVANCING SLOWLY

#### 25. CHECK STEERING WHEEL OPERATION

Check the following items while advancing slowly.

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

#### 26. CHECK OF BRAKE OPERATION

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

1AEI

Time.

THE REAL PROPERTY.

Tal.

485

Bi.

45

48.

**2**1

**1** 

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

#### 27. CHECK OPERATION OF CLUTCH PEDAL (CLUTCH TYPE LIFT TRUCK)

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

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

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

#### 29. CHECK FOR ABNORMAL NOISE, ABNORMAL SMELL

Check that there is no abnormal noise or abnormal smell when traveling at low speed.

#### 16.1.5 CHECKS WHILE OPERATING CONTROL LEVERS

#### 30. CHECK OPERATION OF WORK EQUIPMENT

Operate the work equipment control levers from the operator's seat and check that the forks can be raised and lowered and that the mast can be tilted forward and back smoothly.

If there is any abnormality, please contact your Komatsu Forklift distributor immediately.

# 31. CHECK FOR ABNORMAL NOISE, ABNORMAL SMELL

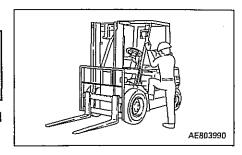
Operate the work equipment control levers from the operator's compartment and check that there is no abnormal noise or abnormal smell during travel.

# 16.2 MOUNTING/DISMOUNTING

# A WARNING -

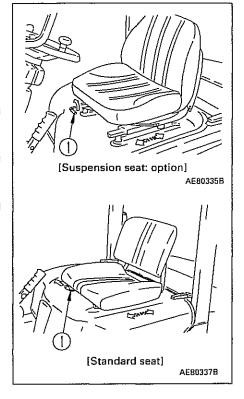
- Always mount/dismount only after first completely stopping the lift truck.
- Never jump on or off the lift truck as this is very dangerous.

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



# 16.3 OPERATOR'S SEAT POSITION ADJUSTMENT

- Set the parking brake. (See "16.7 TEMPORARY STOPPING AND PARKING".)
- Sit in the seat and lift the lever ①.
   (The seat may be slide 140 mm (5.5 in) forwards and backwards at this condition.)
- 3. Set the seat to a position where operation is easy, then release the hand to lock the lever. (Seat will be locked.)
- 4. After setting the seat, confirm that it is firmly locked by sliding it forwards/backwards.



# 16.4 STARTING LIFT TRUCK OFF

# - MARNING

- When starting the lift truck off, check that the area around the lift truck is safe and sound the horn before starting.
- Do not allow anyone to enter the area around the lift truck.
- There is a blind spot behind the lift truck, so be particularly careful when traveling in reverse.
- When starting the engine, set the forward/reverse lever and high/low speed lever (clutch type lift truck) to the neutral position and pull the parking brake lever, then depress the clutch pedal (inching pedal for lift trucks with torque converter) and start the engine.

#### STARTING ENGINE

- Set the forward/reverse lever and high/low speed lever to the neutral position.
- 2 Pull the parking brake lever.
- 3 Depress the clutch pedal (clutch type lift trucks) or inching pedal (TORQFLOW transmission lift trucks).
- 4. (1) Gasoline engine lift truck: Depress the accelerator pedal lightly, then slowly release it. (If the engine is warmed up, there is no need to depress the accelerator pedal.) With the accelerator pedal released, turn the starting switch to the START position to start the engine.

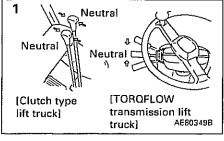
Diesel engine lift truck: Turn the starter switch to the ON position, and when the preheating monitor goes out, keep the accelerator pedal depressed fully and turn the starting switch to the START position to start the engine.

- (2) When the engine starts, release the key. (The key will return automatically to the ON position.)
- (3) Carry out the warming-up operation.

Diesel engine lift truck: Release the accelerator pedal and carry out warming up for a short time.

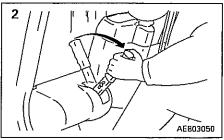
Gasoline engine lift truck: Warm up the engine for approx. 1 minute, then depress the accelerator pedal slightly and release it.

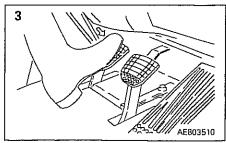
If the ambient temperature is high, depress the accelerator pedal lightly after starting, then release it. The engine speed will go down, and this will make it possible to carry out the warming-up operation more quietly, and will also save fuel.

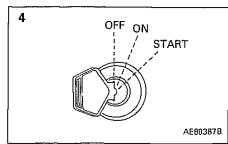


THE L

E







МЕМО

# NOTICE

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

Gasoline engine lift truck	Max. 5 seconds
Diesel engine lift truck	Max. 10 seconds

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

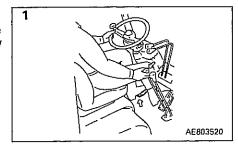
#### STARTING LIFT TRUCK OFF

# NOTICE

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

# Clutch type lift truck:

Depress the clutch pedal, set the forward/reverse control lever to the F or R position, and set high/low speed control lever to position 1.



瘘

885.i

153

H.

E.B.

E.

# **TORQFLOW transmission lift truck:**

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

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

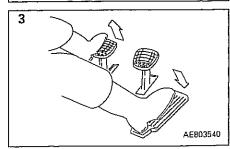


# Clutch type lift truck:

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



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

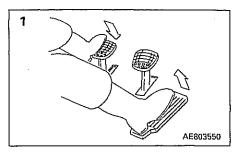


#### REMARK

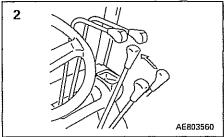
If the clutch pedal or inching pedal are partially engaged, it is possible to carry out inching.

# SHIFTING GEAR (CLUTCH TYPE LIFT TRUCK)

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



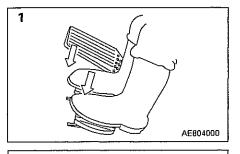
Shift the high/low speed lever to position 2. When it meshes, gradually release the clutch pedal while depressing the accelerator pedal.



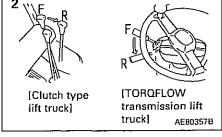
#### SHIFTING DIRECTION

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

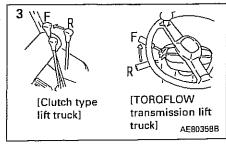
Stop the lift truck completely. (For details of the method of stopping the lift truck, see "16.7 TEMPORARY STOPPING AND PARKING".)



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



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

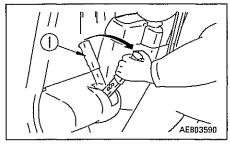


# 16.5 STARTING, INCHING ON SLOPE

**MARNING** -

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

- 1. When starting the lift truck on a slope, first pull parking brake lever ① and check that the lift truck is held in position.
- 2. Depress accelerator pedal ④ a little at a time (for the clutch type lift truck, release the clutch pedal at the same time), then release parking brake lever ① slowly so that the lift truck starts up the slope.
- 3. When the lift truck starts to move up the slope, release parking brake lever ① fully. Adjust the uphill travel speed with accelerator pedal ④.
- 4. When slowing down or stopping on slopes, gradually release accelerator pedal ④ (on the clutch type lift truck, depress the clutch pedal at the same time), and depress brake pedal ③ just before stopping.
- 5. After stopping the lift truck, always pull parking brake lever (1) fully.



E

TE I

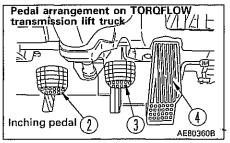
37

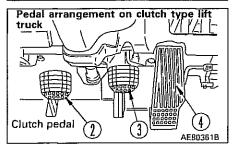
T, i I

13,1

E

**=**:



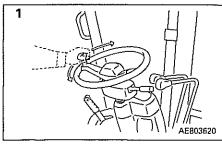


# 16.6 TURNING

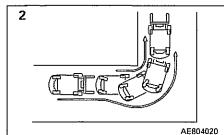
· 🛕 WARNING ----

Take care to avoid the outside of the counterweight hitting against objects when turning.

1. Operate steering wheel knob with the left hand.



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



# TEMPORARY STOPPING AND PARKING

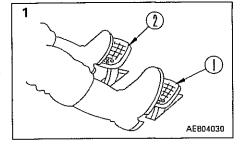
– 🛕 WARNING –

Do not park the lift truck on the travel route.

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

# TORQFLOW transmission lift truck:

Release the accelerator pedal, then depress brake pedal (1).

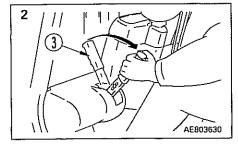


1

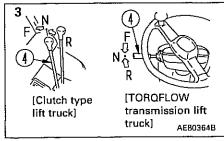
20

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

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



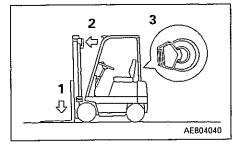
Return forward/reverse control lever 4 to the neutral position.



#### WHEN LEAVING LIFT TRUCK

When leaving the lift truck, always do as follows.

- Lower the forks to the ground.
- Tilt the mast full forward.
- Turn the starting key to the OFF position, then remove the key.

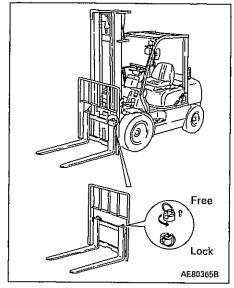


# 16.8 FORK SPREAD ADJUSTMENT

# **MARNING** –

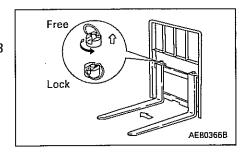
Take extreme care not to get hands or fingers caught while adjusting the fork spread.

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



# 16.9 LOAD HANDLING OPERATION 16.9.1 PICKING UP

 Adjust the fork spread corresponding to the load size. (See "16.8 FORK SPREAD ADJUSTMENT".)

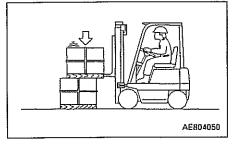


100

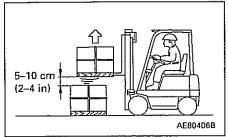
**1** ₹ . §

**T** 

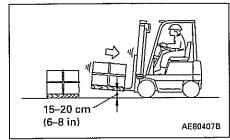
- 2. Advance the lift truck until 2/3 to 3/4 of the forks enter under the load, and raise the load 5 10 cm (2 4 in).
- 3. Reverse the lift truck 10 20 cm (4 8 in) slowly and lower the load once. Advance again and fully insert the forks.



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

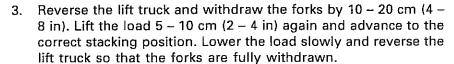


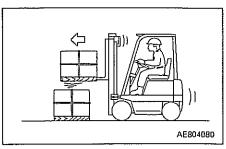
5. Lower the load to a height of 15 - 20 cm (6 - 8 in) above the ground and tilt the mast fully backward.

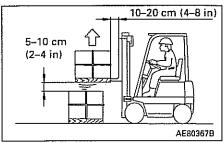


# **16.9.2 STACKING**

- 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.







# 16.10 CHECK AFTER OPERATION

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

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

# 17. COLD WEATHER OPERATION

# 17.1 PREPARATIONS FOR LOW TEMPERATURE

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

14

22

201

41...

--

# 17.1.1 FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components. For details, see "22. LUBRICANT LIST".

# 17.1.2 HYDRAULIC OIL

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

#### 17.1.3 COOLANT



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

# NOTICE

When the truck is shipped from the factory, it is filled 40% with long life coolant.

# Precautions when handling anti-freeze

- Always use clean, fresh water (tap water) when mixing with anti-freeze.
- Check that there is no leakage of water from the radiator, water pump, or water hoses.
- Drain all coolant and flush the inside of the system to remove any scale before adding new coolant.

#### Anti-freeze (FAF-PT)

# Long life coolant (FLL-CT)

If the ambient temperature goes below 0°C when the lift truck is not being used, add anti-freeze or long life coolant to the cooling water according to the table below to prevent freezing.

# Proportions of water and anti-freeze (or coolant)

Min. temperature (°C)	-5	-10	-15	-20	-25	-30
Anti-freeze (%) Coolant (%)	25	30	35	40	45	50
Water (%)	75	70	65	60	55	50

# **17.1.4 BATTERY**

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

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

# 17.1.5 CHECK OF ELECTRIC HEATER TO PREHEAT ENGINE INTAKE AIR

Before starting the engine in the cold season (once a year), request us to check the electric heater for wire breakage and dust sticking to it.

# 17.2 PRECAUTIONS AFTER COMPLETION OF OPERATIONS

#### **DRAIN WATER**

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

#### ADD FUEL

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

# 18. HANDLING IN HEAVY-DUTY CONDITIONS

# PRECAUTIONS WHEN USING IN HEAVY-DUTY CONDITIONS

**WARNING-**

Always wait for the engine too cool down before removing the radiator cap. If it is attempted to cool the radiator quickly and the radiator cap is removed too soon, steam may spurt out.

#### **CLEANING INSIDE OF COOLING SYSTEM**

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

#### **CLEAN RADIATOR FINS**



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

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

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

Air pressure: 0.98 MPa (10 kgf/cm²) Steam pressure: 0.39 MPa (4 kgf/cm²)

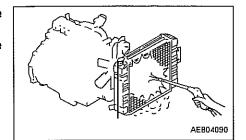


If the fan belt is loose, adjust it to the specified tension.

# **ACTION WHEN ENGINE HAS OVERHEATED**

If the engine should overheat, do as follows. Do not stop the engine immediately.

- 1. Run the engine at low idling.
- Open the engine hood to improve the ventilation of the engine room.
- 3. When the water temperature goes down, stop the engine.
- Check the coolant and add water if necessary.



953

100

Zefá.

100 E

8

100

# 19. LONG-TERM STORAGE

# 19.1 BEFORE STORAGE

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

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

# NOTICE

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

- Completely fill the fuel tank, grease all parts, and change the oil before storage.
- Apply a thin coat of grease to the exposed surface of the piston rods of the hydraulic cylinders.
- Disconnect the negative terminal of the battery and cover the battery, or remove the battery from the lift truck and store it separately.
- If the temperature drops below 0°C, add antifreeze to the cooling water.

# 19.2 DURING STORAGE



▲ WARNING -

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

# RUST PREVENTION OPERATION

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

#### **CHARGE BATTERY**

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

# 19.3 AFTER STORAGE

# NOTICE

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

1

201

Zi.

e i

- S.

al.

87

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

# **20.TRANSPORTATION**

# 1. DIMENSIONS

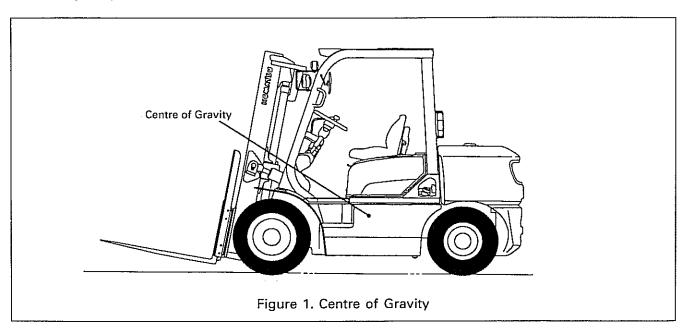
For truck dimensions, refer to the Standard Specifications Sheet(s).

# 2. WEIGHTS

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

#### 3. CENTRE OF GRAVITY

Refer to Figure 1. for the centre of gravity of the Frontlift truck. For further information or advice regarding centre of gravity, contact the manufacturer or trained manufacturer representative.



#### 4. SECURING TRUCK

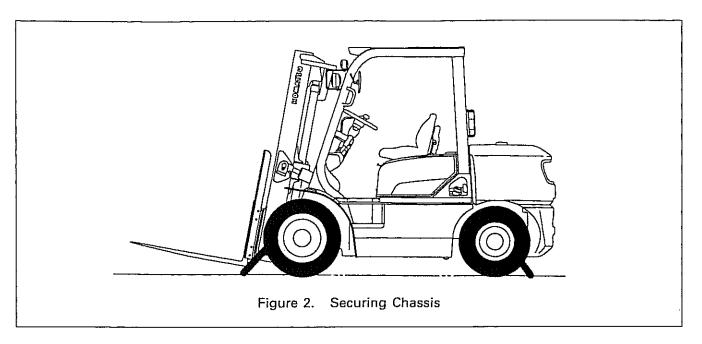
# A CAUTION -

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

All trucks being transported by road, rail, or sea have a common method of stowage, which reduces the possibility of damege 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 deck bolt. All four corners of the chassis will be secured, preferably with adjusting screws, to ensure that the chains are under tension, see Figure 2.

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



# 4.1. Securing of Mast

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

- 4.1.1. Remove forks from carriage and action, as securing of forks below.
- 4.1.2. Remove mast and carriage assembly from truck.
- 4.1.3. 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.

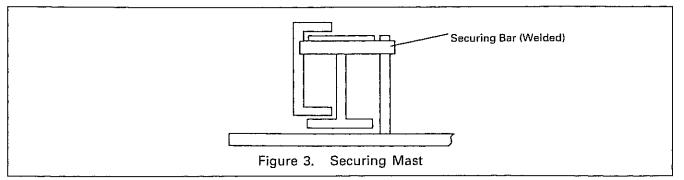
Where possible, and in particular with high lift masts, the lift chain is to be lightly banded to the lift cylinder, at not less than 1 metre intervals to ensure that the chain does not slap during transportation.

- 10 m

240

Thick card or 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 is to be wired to a suitable position, and care taken to ensure paintwork is not damaged during transportation.



# NOTICE

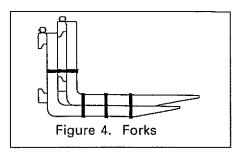
Other than the welding specified in Fig. 3, no welding is to take place on the carriage stiles and the mast channels.

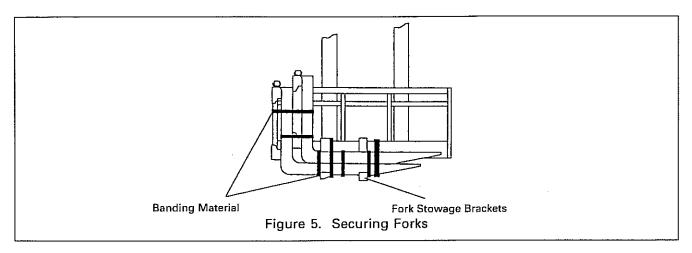
# 4.2. Securing Forks

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

# 4.3. Securing Forks - Mast Assembly in 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.





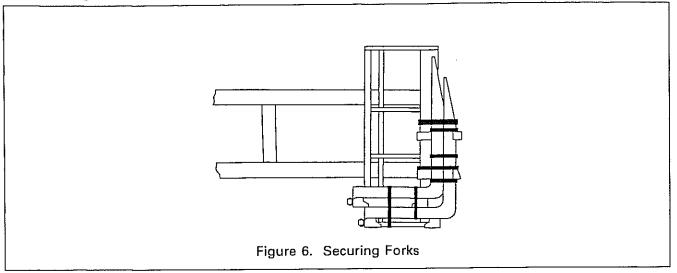
# 4.4. Securing Forks - Mast Assembly Out of Truck

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 with preservatives.



Est

TIE.

W. L.

202

EAST.

2.5

CIT C

251

255

ŒĹ

1

# 5. ELECTRICAL AND HYDRAULIC CONNECTIONS

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

# 6. SLININGING

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

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

# NOTICE

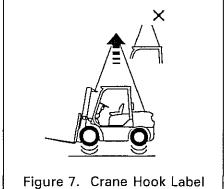
Ensure that all lifting tackle has a Safe Wiring Load (S.W.L.) suitable for the truck unladen weight.

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

#### 6.1. Lifting the truck

Attach suitable lifting tackle to the trucks lifting points.

- Place packing material to avoid damage to truck finish, where lifting tackle is likely to contact truck.
- 6.1.2. Take up the slack and stand clear of the truck.
- 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.
- 6.1.4. If the above are all corect then proceed with the lifting of the truck to the required position, with slow and definite movements.
- 6.1.5. Lower to the required position and remove lifting tackle.



### **MEMO**

E

E

E

Ē,

E

E

E

E

E

E

E

E

E

E

Z

# **MAINTENANCE**

## **21. OUTLINE OF SERVICE**

- Use Komatsu Forklift genuine parts for replacement.
- When changing or adding oil, do not use a different type of oil.
- Unless otherwise specified, the oil and coolant used at delivery from the factory shall be as shown in the table below.
  - 1) Tank, cases

ltem	Type of fluid
Differential case	SAE90
Hydraulic tank	SAE10W-CD
TORQFLOW transmission case	SAE10W-CD

2) Cooling system
Fresh water + long life coolant (40%)

#### 21.1 SUITABLE OIL

#### 21.1.1 OIL

 Since the oil is used for the work equipment, etc., under severe conditions (at high temperature and high pressure), it will deteriorate as the operation time passes.
 Always use an oil matching the grade and working temperatures given in the operation manual.

Always replace oil at the specified period even if not deteriorated.

- Oil is often likened to human blood.
  - A lift truck should be maintained with the same care taken for the human body so that impurities (water, metal chips, dust etc.) do not enter the lift truck system.

Most lift truck malfunctions are caused by entry of impurities.

Take special care to avoid entry of impurities during storage and lubrication, etc.

- Never blend oils of different grades or brands.
- Add specified volume of oil.
   Insufficient or excessive amounts of oil may both cause problems.
- If the oil in the work equipment becomes cloudy, it is likely that air or water have entered the circuit. Consult a Komatsu Forklift distributor.
- When replacing oil, replace the relevant filters at the same time.

**2**E.

=

- M.

4

E

E

E

E

E

E

E

E

E

E

T.

E

#### 21.1.2 GREASE

1

d

HSI

2000

- Grease prevents the generation of squeaking or noise from the joints, etc.
- Lift trucks are provided with grease nipples in various places. Some of these are not mentioned in this manual since they are for overhauling purposes, and do not require greasing.

If friction is noticed in movable parts after operation, grease.

 After greasing, wipe off old grease forced out, especially on rotating parts that will be worn by adhering sand and dirt.

#### 21.1.3 OIL STORAGE AND PRESERVATION

- Store and preserve oil so as not to allow entry of any water or dust.
- When storing oil drums for long periods, place them side by side with the filler sides facing in the same direction.
   If necessary to store outdoors, cover them with waterproof sheets.
- To prevent deterioration during long-term storage, use drums on a "first in, first out" basis.

#### **21.1.4 FILTERS**

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

#### 22.1 GASOLINE ENGINE LIFT TRUCK

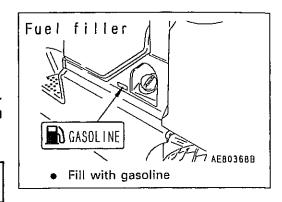
[FG20/25/30-12, FG20H/25H/30H-12]

#### NOTICE

Always use genuine Komatsu Forklift oil and grease. (Oil, grease, and anti-freeze are available from Komatsu Forklift distributors.)



Never use the wrong type of brake fluid.



4

E

E

<u>.</u>

E

E

E

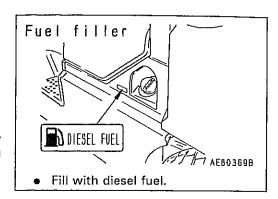
Lubrication point	Type of fluid	Ambient temperature -4 14 32 50 68 86°F	Capacity
Engine oil pan	Engine oil	-20 -10 0 10 20 30°C  SAE30-CD	3.8 ℓ 1.00 US gal, 0.84 UK gal
TORQFLOW transmission case	Engine oil	SAE10W-CD	10 ℓ 2.64 US gal, 2.20 UKgal
Differential case	Gear oil	SAE80 SAE90	TORQFLOW transmission lift truck: 6 \( \ell \) 1.59 US gal, 1.32 UK gal Clutch type lift truck: 13 \( \ell \) 3.43 US gal, 2.86 UK gal
Hydraulic tank	Hydraulic oil	SAE5W-CD	56 ℓ 14.80 US gal, 12.32 UK gal
Fuel tank	Gasoline		55 ℓ 14.53 US gal, 12.10 UK gal
Brake reservoir tank	Brake fluid	SAE70R-1, SAE70R-3	0.5 <i>l</i> 0.13 US gal, 0.11 UK gal
Clutch reservoir tank (option)	Brake fluid	SAE70R-1, SAE70R-3	0.1 $\ell$ 0.026 US gal, 0.022 UK gal
Greasing points	Lithium grease	NLGI No. 2	
Cooling system	Fresh water, coolant (FLL-CT)	Add sntifreeze	9.1 <i>l</i> 2.40 US gal, 2.00 UK gal

#### 22.2 DIESEL ENGINE LIFT TRUCK

( FD20/25/30-12, FD20H/25H/30H-12)

#### **NOTICE**

- Never use fuel mixed with kerosene.
- Always use genuine Komatsu Forklift oil and grease.
   (Oil, grease, and anti-freeze are available from Komatsu Forklift distributors.)

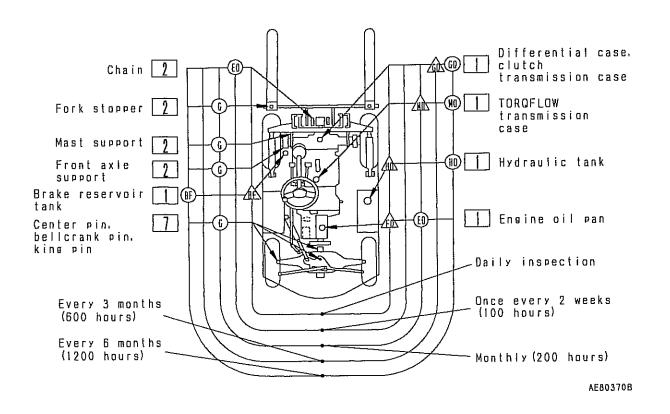


· 🛕 CAUTION -

Never use the wrong type of brake fluid.

	T**	·
Lubrication point	Type of fluid	Ambient temperature  -4 14 32 50 68 86°F  -20 -10 0 10 20 30°C
Engine oil pan	Engine oil	SAE30-CD 4D94E and 4JG2 engine: 7.5 £ 1.98 US gal, 1.65 UK gal
TORQFLOW transmission case	Engine oil	SAE10W-CD 10 & 2.64 US gal, 2.20 UKgal
Differential case	Gear oil	TORQFLOW transmission lift truck: 6 ℓ 1.59 US gal, 1.32 UK gal Clutch type lift truck: 13 ℓ 3.43 US gal, 2.86 UK gal
Hydraulic tank	Hydraulic oil	SAE5W- CD 56 ℓ SAE10W-CD 14.80 US gal, 12.32 UK gal
Fuel tank	Diesel fuel	ASTM D975 No.2 55 & 14.53 US gal 12.10 UK gal
Brake reservoir tank	Brake fluid	0.15 ℓ SAE70R-1, SAE70R-3 0.040 US gal, 0.033 UK gal
Clutch reservoir tank (option)	Brake fluid	0.1 ℓ SAE70R-1, SAE70R-3 0.026 US gal, 0.022 UK gal
Greasing points	Lithium grease	NLGI No. 2
Cooling system	Fresh water, coolant (FLL-CT)	4D94E engine: 9.2 & 2.43 US gal, 2.02 UK gal 4JG2 engine: 9.1 & 2.40 US gal, 2.00 UK gal

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



Curahal	Type of fluid
Symbol	Type of fluid
EO	Diesel engine oil
LO	Gasoline engine oil
МО	Engine oil
GO	Gear oil
НО	Hydraulic oil
BF	Brake fluid
G	Grease
	***

 $\triangle$ : Check and add fluid if necessary

: Change or add oil

The figure in  $\square$  indicates the number of oil or greasing locations.

E 33

E 17

1

W/1

E

E

## **MEMO**

#### 23.1 SERVICE DATA (GASOLINE ENGINE LIFT TRUCK)

	Component Inspection item			Unit	FG20/25/30-12	FG20H/25H/30H-12
		Engine model		_	NISSAN H20II	NISSAN H25
		Idling spee	d	rpm	600 - 700	600 – 700
	Engine proper	Max. speed	d	rpm	2850 - 3050	2700 – 2900
		Compression	on	MPa/rpm	1.23 (12.5 kgf/cm²) /300	1.28 (13.0 kgf/cm²) /300
ľ	Lubricating oil cooling system	Fan belt deflection		mm	11 - 13 (0.43 - 0.51 in) (finger pressure: 98N) 11 - 13 (0.43 - 0.51 in) (finger pressure: 10 kgf)	11 – 13 (0.43 – 0.51 in) (finger pressure: 98N) 11 – 13 (0.43 – 0.51 in) (finger pressure: 10 kgf)
	Fuel system	Injection timing		BTDC°	_	<u> </u>
Engine		Injection order		_		
П		Injection pressure		MPa	<del>-</del>	_
	Intake, exhaust	Valve	Intake	mm	0.38 (0.015 in) (Warm)	0.38 (0.015 in) (Warm)
	system	clearance	Exhaust	mm	0.38 (0.015 in) (Warm)	0.38 (0.015 in) (Warm)
		Distributor point gap		mm	_	_
		Spark plug gap		mm	0.8 - 0.9 (0.031 - 0.035 in)	0.8 - 0.9 (0.031 - 0.035 in)
	Electric system	Spark plug type			NGK: BP-4ES BPR-4ES (Noise protect type)	NGK: BP-4ES BPR-4ES (Noise protect type)
		Ignition tim	ing	BTDC° /rpm	4/650	4/650
		Firing orde	r	-	1–3–4–2	1–3–4–2

3-8

					1	T
(	Component	Inspection item		Unit	FG20/25/30-12	FG20H/25H/30H-12
		Tire inflation	Front wheels	MPa	0.68 (7.0 kgf/cm²)	
F	Tires	pressure	Rear wheels	MPa	0.68 (7.0	kgf/cm²)
Travel system		Tightening	Front wheels	Nm	294 - 490 (30 - 50 kgfm)	
vel s	Hub nuts	torque	Rear wheels	Nm	196 – 245 (2	0 – 25 kgfm)
Tra	Rim mating	Tightening torque	Front wheels	Nm	1	0 – 30 kgfm) ton lift truck)
	Huts	torque	Rear wheels	Nm	88 – 123 (9	– 12.5 kgfm)
	Steering wheel	Play		mm	30 ~ 60 (1	.2 – 2.4 in)
Ę	Clutch pedal	Play		mm	3 - 5 (0.12 - 0.20 in)	
syste	Inching pedal	Play		mm	2 - 3 (0.08 - 0.12 in)	
ing s		Interconnected travel		mm	35 – 41 (1.38 – 1.61 in)	
Steering, braking system		Play		mm	13 – 17 (0.9	51 - 0.67 in)
teering	Brake pedal	Pedal height when pedal is depressed		mm	90 - 100 (3.	54 – 3.94 in)
Ó	Parking brak force		e operating	N	Min. 196	6 (20 kgf)
	Diake	Tightening torque for back plate mounting bolts		Nm	147 – 196 (1	5 – 20 kgfm)
Loading equipment	Forks	Fork thickness (at base)		mm	2.5 ton lift truck:	Min. 32.5 (1.28 in) Min. 36 (1.42 in) Min. 39.5 (1.56 in)
ing eq	Chain	Length over 17 links		mm		:: Max. 330 (13.0 in) Max. 550 (21.7 in)
Loac	Hydraulic system	Relief pressu	ıre	MPa	18 (185	kgf/cm²)
	****					

4

100

3

]

÷

3

=

E E

N .

2

1

#### 23.2 SERVICE DATA (DIESEL ENGINE LIFT TRUCK)

	Component	Inspection item		Unit	FD20/25/30-12	FD20H/25H/ 30H-12	
		Engine model			KOMATSU 4D94E	ISUZU 4JG2	
	Engine proper	Idling speed	t	rpm	675 – 725	650 – 750	
		Max. speed		rpm	2650 - 2750	2650 – 2750	
		Compression	n	MPa/rpm	/250	3.04 (31 kgf/cm²) /200	
	Lubricating oil cooling system	Fan belt deflection		mm	10 – 15 (0.39 – 0.59 in) (finger pressure: 98N) 10 – 15 (0.39 – 0.59 in) (finger pressure:10 kgf)	(finger prssure: 98N) 10	
Engìne		Injection timing		втос°	ATDC6	6	
	Fuel system	Injection order		_	1-3-4-2	1–3–4–2	
		Injection pressure		MPa	11.8 (120 kgf/cm²)		
	Intake, exhaust	Valve	Intake	mm	(Cool)	0.40 (0.0157 in) (Cool)	
Lity Market	system	clearance	Exhaust	mm	0.20 (0.0079 in) (Cool)	0.40 (0.0157 in) (Cool)	
		Distributor	point gap	mm	_	_	
	Electric system	Spark plug	gap	mm	_	_	
		Ignition timing		BTDC° /rpm	_	· <del>-</del>	
		Firing order		_			

100

agg.

Maria.

KII.

ZZ.

E S

1882

35

**3**[]

25

E

•

(	Component	Inspection item		Unit	FD20/25/30-12	FD20H/25H/ 30H-12
	Tires	Tire inflation	Front wheels	MPa	0.68 (7.0 kgf/cm²)	
F		pressure	Rear wheels	MPa	0.68 (7.0 kgf/cm²)	
Travel system		Tightening	Front wheels	Nm	294 – 490 (3	30 – 50 kgfm)
vel s	Hub nuts	torque	Rear wheels	Nm	196 – 245 (2	20 – 25 kgfm)
⊤ra	Rim mating	Tightening torque	Front wheels	Nm		20 – 30 kgfm) 3 ton lift truck)
	Huts	torque	Rear wheels	Nm	88 – 123 (9	– 12.5 kgfm)
_	Steering wheel	Play		mm	30 - 60 (1.2 - 2.4 in)	
	Clutch pedal	Play		mm	3 - 5 (0.12 - 0.20 in)	
yster	Inching pedal	Play		mm	2 – 3 (0.08 – 0.12 in)	
ing s		Interconnected travel		mm	35 – 41 (1.	38 – 1.61 in)
, brak	Dual-suradal	Play		mm	13 – 17 (0.	51 – 0.67 in)
Steering, braking system	Brake pedal	Pedal height when pedal is depressed		mm	· ·	.54 - 3.94 in)  0 - 120 (4.33 - 4.72 in))
ş	Brake	Parking brake opera		N	Min. 19	6 (20 kgf)
	Бгаке	Tightening torque for back plate mounting bolts		Nm	147 – 196 (1	15 – 20 kgfm)
Loading equipment	Forks	Fork thickness (at base)		mm	2.5 ton lift truck:	Min. 32.5 (1.28 in) Min. 36 (1.42 in) Min. 39.5 (1.56 in)
	Chain	Length over 17 links		mm		k: Max. 330 (13.0 in) Max. 550 (21.7 in)
Load	Hydraulic system	Relief pressu	ıre	MPa	18 (185	kgf/cm²)

ЕВ

Ī

đ

7

3

3

441

KORE .

end .

3

1000

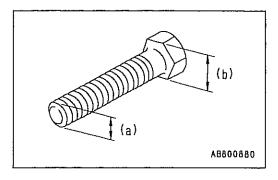
3

#### 23.3 TORQUE LIST

For unspecified 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 genuine Komatsu Forklift parts the same size as the previous ones.



**E** 

ZSI\_

EFF.

**E**E.:

S ...

**E** 

Thread diameter	Width across	Т	ightening torque	9
of bolt (mm) (a)	flat (mm) (b)	Nm	kgfm	lbft
6	10	13.2 ± 1.4	1.35 ± 0.15	9.73 ± 1.03
8	13	31.4 ± 2.9	$3.2 \pm 0.3$	23.2 ± 2.1
10	17	65.7 ± 6.8	$6.7 \pm 0.7$	48.5 ± 5.0
12	19	112 ± 9.8	11.5 ± 1.0	82.6 ± 7.2
14	22	177 ± 19	18.0 ± 2.0	131 ± 14
16	24	279 ± 29	28.5 ± 3	206 ± 21
18	27	383 ± 39	39 ± 3	282 ± 29
20	30	549 ± 58	56 ± 6	405 ± 43
22	32	745 ± 78	76 ± 8	549 ± 58
24	36	927 ± 98	94.5 ± 10	684 ± 72
27	41	1320 ± 140	135 ± 15	973 ± 100
30	46	1720 ± 190	175 ± 20	1270 ± 140
33	50	2210 ± 240	225 ± 25	1630 ± 180
36	55	2750 ± 290	280 ± 30	2030 ± 210
39	60	3280 ± 340	335 ± 35	2420 ± 250

3-12

## 24. PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

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

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 at the same time as the hoses.

Note that the periodic replacement is not covered by warranty.

#### **IMPORTANT PARTS LIST**

Ű

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

## 25. MAINTENANCE SCHEDULE CHART

(Perform maintenance at interval of months or operation hours, whichever occurs first)

ast!

W.S.

**X**...

Ε

Service item	Page			
First one month or initial 200 hours service (only after the first one month)				
Change oil in hydraulic tank, replace line filter, clean strainer, clean inside of tank	3-18			
Change oil in engine oil pan	3-18			
Replace engine oil filter cartridge	3-18			
Check, adjust engine valve clearance	3-18			
Tighten engine cylinder head bolts	3-18			
Clean TORQFLOW transmission strainer	3-18			
Change oil in differential case (for clutch type lift trucks, includes oil in transmission case)	3-18			
Change oil in TORQFLOW transmission case	3-18			
Tighten bolts and nuts (in particular, hub nuts, and mounting bolts of overhead guard, backrest, and operator's seat)	3-19			
Check before operation (for details, see "16.1 CHECK BEFORE OPERATION").				
Every 2 weeks or every 100 hours service				
Grease lift chain	3-19			
Every month or every 200 hours service				
Check rim for deformation, cracking, and damage	3-19			
Check wheel bearing for play and abnormal noise	3-19			
Check hydraulic cylinder for looseness, deformation, cracking, damage, and wear	3-19			
Check piping for damage, oil leakage, and deformation	3-19			
Check operation of hydraulic cylinders	3-19			
Check hydraulic drift of lift cylinder	3-19			
Check hydraulic drift of tilt cylinder	3-19			
Check movement of work equipment control lever	3-19			
Check forks and fork stopper for deformation, cracking, damage, and wear	3-20			
Check forks for unevenness and twisting	3-20			
Check mast for deformation, cracking, damage, and wear	3-20			
Check mast roller for play	3-20			
Check chain and chain wheel for deformation, damage, rust, and poor lubrication	3-20			
Check chain wheel bearing for play	3-20			

3-14

Service item	Page			
Every month or every 200 hours service (continued)				
Check chain anchor bolt for deformation, damage	3-20			
Check gear box for oil leakage, looseness of mount	3-20			
Check mounting condition of power steering, check for looseness at connections	3-20			
Check brake link for play, looseness, damage, and wear	3-21			
Check brake piping for damage, leakage, looseness, contact, looseness of brake pipe clip, disconnection	3-21			
Check clearance between brake drum and lining, check brake for dragging	3-21			
Check pedal height when clutch pedal is depressed	3-21			
Check shift lever for play, meshing	3-21			
Check for oil leakage from transmission case, differential case	3-21			
Check oil level in TORQFLOW transmission, add oil	3-21			
Check pedal height when inching pedal is depressed	3-21			
Check starting of engine	3-22			
Check idling speed	3-22			
Clean radiator fins, check for damage	3-22			
Check for catching, stalling, and knocking when accelerating	3-22			
Clean air cleaner element	3-23			
Check operation of governor (maximum speed)	3-23			
Check for fuel leakage	3-23			
Check fuel filter for cracking, damage	3-23			
Check radiator hoses for cracking	3-24			
Check operating condition of radiator cap, check installation	3-24			
Check fan for deformation, cracking, and damage	3-24			
Check fan for looseness of mount	3-24			
Check, adjust fan belt tension	3-24			
Check, adjust alternator belt tension	3-24			
Check distributor cap for cracking and damage	3-24			
Check clearance of distributor points, check contact surface for roughness	3-24			
Check spark plug for burning, burning of insulator	3-24			
Change oil in engine oil pan	3-25			
Check operation of starting switch, check meshing of pinion gear	3-29			

EA/B

ď

3-16

Service item	Page
Every month or every 200 hours service (continued)	
Check specific gravity of battery electrolyte	3-29
Check wiring connections for looseness	3-30
Check ignition timing	3-30
Check overhead guard, backrest for deformation, cracking, damage and looseness	3-30
Check operator's seat mount for looseness, damage	3-30
Grease all lubrication points	3-30
Every 3 months or every 600 hours service	
Replace oil filter cartridge	3-31
Grease fuel injection pump governor, change governor oil	3-31
Replace fuel filter cartridge (diesel engine lift trucks)	3-31
Check oil level in transmission case, add oil (for clutch type lift trucks, includes differential case)	
Check oil level in differential case, add oil (for clutch type lift trucks, includes transmission case)	
Every 6 months or every 1200 hours service	
Check steering link for bending, damage and wear	3-31
Check knuckle for play, deformation and damage	3-31
Check for marked variation in minimum turning radius	3-31
Change oil in differential case (for clutch type lift trucks, includes transmission case)	3-32
Change oil in TORQFLOW transmission case	3-33
Replace line filter in transmission oil pressure circuit	3-34
Change clutch oil	3-34
Change brake oil	3-34
Check, adjust valve clearance	3-34
Measure compression pressure	3-34
Check, adjust fuel injection timing	3-34
Check blowby gas reduction system for clogging, damage	3-34
Check distributor cap center piece for wear	3-34
Replace fuel filter element (gasoline engine lift trucks)	3-34

ZE S

271 V

E.E.S.

Œij.

E.

TET.

E E

E E

1 SE

EA/B

Service item	Page
Every 6 months or every 1200 hours service	
Clean inside of cooling system	3-35
Replace air cleaner element	3-36
Change oil in hydraulic tank, replace hydraulic line filter, clean hydraulic tank strainer, clean inside of hydraulic tank	3-37
Every year or every 2400 hours service	
Check operation of master cylinder, check for oil leakage, damage, and wear	3-38
Check operation of wheel cylinder, check for oil leakage, damage, and wear	3-38
Check operating condition of brake drum, check for damage and wear	3-38
Check brake lining for wear	3-38
Check operating condition of brake shoe	3-38
Check brake adjustment lever and ratchet for wear and damage	3-38
Check brake spring for deterioration	3-38
Check brake back plate for deformation and cracking, check mounting condition	3-38
Check air tightness of brake piping	3-38
Check axle for deformation, cracking, and damage	3-38
Check mounting condition of differential	3-38
Check root of forks for cracking (use color check)	3-38
Check roller shaft of loading equipment for cracking and damage	3-38
Check mast support for damage and wear	3-38
Check operation of relief valve, check relief pressure	3-38
Replace air breather	3-38
Clean inside of fuel tank	3-39
Check injection pressure, injection amount, injection condition	3-39
Tighten engine cylinder head bolts	3-39
Check frame and cross member for cracking and damage	3-39

E

#### **26. MAINTENANCE**

#### 26.1 FIRST ONE MONTH OR INITIAL 200 HOURS SERVICE

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

#### [Hydraulic equipment]

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

For details of the method of replacing and cleaning, see "26.6.17 CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC LINE FILTER, CLEAN HYDRAULIC TANK STRAINER, CLEAN INSIDE OF HYDRAULIC TANK".

#### [Engine]

#### 26.1.2 CHANGE OIL IN ENGINE OIL PAN

For details of the method of changing the oil, see "26.4.43 CHANGE OIL IN ENGINE OIL PAN".

#### 26.1.3 REPLACE ENGINE OIL FILTER CARTRIDGE

For details of the method of changing the oil, see "26.4.43 CHANGE OIL IN ENGINE OIL PAN".

#### 26.1.4 CHECK, ADJUST ENGINE VALVE CLEARANCE

#### 26.1.5 TIGHTEN ENGINE CYLINDER HEAD BOLTS

#### [Power train]

#### 26.1.6 CLEAN TOROFLOW TRANSMISSION STRAINER

## 26.1.7 CHANGE OIL IN DIFFERENTIAL CASE (FOR CLUTCH TYPE LIFT TRUCKS, INCLUDES OIL IN TRANSMISSION CASE)

For details of the method of changing the oil, see "26.6.4 CHANGE OIL IN DIFFERENTIAL CASE".

#### 26.1.8 CHANGE OIL IN TOROFLOW TRANSMISSION CASE

For details of the method of changing the oil, see "26.6.5 CHANGE OIL IN TORQFLOW TRANSMISSION CASE".

3-18

#816 #816

**ZI**II

ECC.

14. T.

277.

SZ:

10 A.A.

E1.

13.

EU.

5,63

43

TO STATE OF

[General]

न

an I

1

ď

4

Ĭ,

**III** 

9

**A** 

**1** 

4

4

26.1.9 TIGHTEN BOLTS AND NUTS (IN PARTICULAR, HUB NUTS, AND MOUNTING BOLTS OF OVERHEAD GUARD, BACKREST, AND OPERATOR'S SEAT)

#### 26.2 CHECK BEFORE OPERATION

For details, see "16.1 CHECK BEFORE OPERATION".

#### 26.3 EVERY 2 WEEKS OR EVERY 100 HOURS SERVICE

[Loading equipment]
26.3.1 GREASE LIFT CHAIN

#### 26.4 EVERY MONTH OR EVERY 200 HOURS SERVICE

[Travel equipment]

26.4.1 CHECK RIM FOR DEFORMATION, CRACKING, AND DAMAGE

26.4.2 CHECK WHEEL BEARING FOR PLAY AND ABNORMAL NOISE

[Hydraulic equipment]

- 26.4.3 CHECK HYDRAULIC CYLINDER FOR LOOSENESS, DEFORMATION, CRACKING, DAMAGE, AND WEAR
- 26.4.4 CHECK PIPING FOR DAMAGE, OIL LEAKAGE, AND DEFORMATION
- 26.4.5 CHECK OPERATION OF HYDRAULIC CYLINDERS
- 26.4.6 CHECK HYDRAULIC DRIFT OF LIFT CYLINDER
- 26.4.7 CHECK HYDRAULIC DRIFT OF TILT CYLINDER
- 26.4.8 CHECK MOVEMENT OF WORK EQUIPMENT CONTROL LEVER

E

[Loading equipment]

- 26.4.9 CHECK FORKS AND FORK STOPPER FOR DEFORMATION, CRACKING, DAMAGE, AND WEAR
- 26.4.10 CHECK FORKS FOR UNEVENNESS AND TWISTING
- 26.4.11 CHECK MAST FOR DEFORMATION, CRACKING, DAMAGE, AND WEAR
- 26.4.12 CHECK MAST ROLLER FOR PLAY
- 26.4.13 CHECK CHAIN AND CHAIN WHEEL FOR DEFORMATION, DAMAGE, RUST, AND POOR LUBRICATION
- 26.4.14 CHECK CHAIN WHEEL BEARING FOR PLAY
- 26.4.15 CHECK CHAIN ANCHOR BOLT FOR DEFORMATION, DAMAGE

[Steering system]

- 26.4.16 CHECK GEAR BOX FOR OIL LEAKAGE, LOOSENESS OF MOUNT
- 26.4.17 CHECK MOUNTING CONDITION OF POWER STEERING, CHECK FOR LOOSENESS AT CONNECTIONS

Ε

#!! #!!

£.

i i

Ti.

1

C

E

Ži.

E

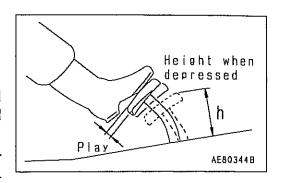
#### [Braking system]

#### 26.4.18 CHECK BRAKE LINK FOR PLAY, LOOSENESS, DAMAGE, AND WEAR

#### Checking

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

Play	3 – 7 mm (0.12 – 0.28 in)	
Pedal height when depressed (h)	90 – 100 mm (3.54 – 3.94 in)	



Test the brake while gradually increasing the speed from low speed. Check that there is no pulling or dragging of the brakes. If necessary, adjust the brake until it is applied smoothly.

**A** WARNING -

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

- 26.4.19 CHECK BRAKE PIPING FOR DAMAGE, LEAKAGE, LOOSENESS, CONTACT, LOOSENESS OF BRAKE PIPE CLIP, DISCONNECTION
- 26.4.20 CHECK CLEARANCE BETWEEN BRAKE DRUM AND LINING, CHECK BRAKE FOR DRAGGING

[Power train]

100

- 26.4.21 CHECK PEDAL HEIGHT WHEN CLUTCH PEDAL IS DEPRESSED
- 26.4.22 CHECK SHIFT LEVER FOR PLAY, MESHING

IN TOROFLOW TRANSMISSION CASE".

- 26.4.23 CHECK FOR OIL LEAKAGE FROM TRANSMISSION CASE, DIFFERENTIAL CASE
- 26.4.24 CHECK OIL LEVEL IN TOROFLOW TRANSMISSION, ADD OIL For details of the method of checking the oil level and adding oil, see "26.6.5 CHANGE OIL
- 26.4.25 CHECK PEDAL HEIGHT WHEN INCHING PEDAL IS DEPRESSED

Е

#### [Engine]

26.4.26 CHECK STARTING OF ENGINE

#### 26.4.27 CHECK IDLING SPEED

#### 26.4.28 CLEAN RADIATOR FINS, CHECK FOR DAMAGE

#### Cleaning



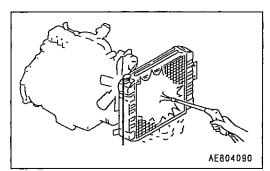
- 🕰 WARNING -

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

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

Air pressure: Max. 0.98 MPa (10 kgf/cm²) Steam pressure: Max. 0.39 MPa (4 kgf/cm²)

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



#### Testing

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

#### 26.4.29 CHECK FOR CATCHING, STALLING, AND KNOCKING WHEN **ACCELERATING**

3-22

Ε

Œ

## [Engine continued] 26.4.30 CLEAN AIR CLEANER ELEMENT

**MARNING** 

Always wear safety goggles when using compressed air.

#### NOTICE

\$ 5 1

1

3

7

3

- 1

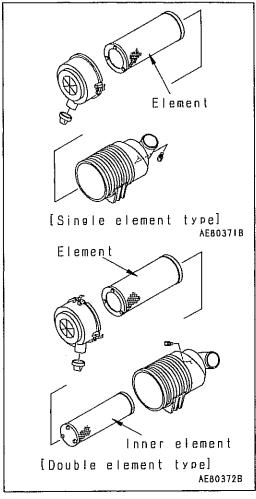
3

3

3

3

- If oil, grease, or carbon are stuck to the element, clean the element with special element cleaner.
   Follow the instructions given with the cleaner.
- Do not remove the inner element (FD20 - 30, FD20H - 30H)
- In heavy-duty operating environment or conditions, clean and replace the element sooner.



#### Cleaning

- Remove the element, blow the element from the inside with dry compressed air at 0.68 MPa (7 kgf/ cm²) and clean the whole circumference.
- 2. After cleaning the element, install it again.

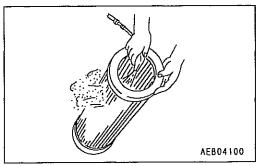
#### **Testing**

Check visually that there is no damage to the element.

## 26.4.31 CHECK OPERATION OF GOVERNOR (MAXIMUM SPEED)

26.4.32 CHECK FOR FUEL LEAKAGE

26.4.33 CHECK FUEL FILTER FOR CRACKING, DAMAGE



[Engine continued]
26.4.34 CHECK RADIATOR HOSES FOR CRACKING

- 26.4.35 CHECK OPERATING CONDITION OF RADIATOR CAP, CHECK INSTALLATION
- 26.4.36 CHECK FAN FOR DEFORMATION, CRACKING, AND DAMAGE
- 26.4.37 CHECK FAN FOR LOOSENESS OF MOUNT
- 26.4.38 CHECK, ADJUST FAN BELT TENSION
- 26.4.39 CHECK, ADJUST ALTERNATOR BELT TENSION
- 26.4.40 CHECK DISTRIBUTOR CAP FOR CRACKING AND DAMAGE
- 26.4.41 CHECK CLEARANCE OF DISTRIBUTOR POINTS, CHECK CONTACT SURFACE FOR ROUGHNESS
- 26.4.42 CHECK SPARK PLUG FOR BURNING, BURNING OF INSULATOR For details of the method of checking for burning of the spark plugs and insulators, see "26.4.43 GASOLINE ENGINE".

-

491

80.81.;

79

SE.

5 00

E ...

1

-

#### [Engine continued] 26.4.43 CHANGE OIL IN ENGINE OIL PAN

**WARNING** -

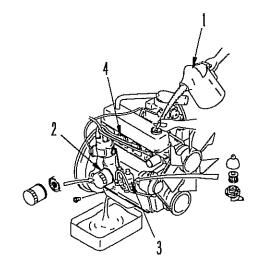
When carrying out maintenance of the engine, stop the engine and wait for it to cool down fully before starting.

#### **GASOLINE ENGINE**

- 1. CHANGE ENGINE OIL
- 1. Remove the drain plug, drain the oil, then tighten the plug again.
- 2. Add the specified amount of engine oil.
- Check the oil level with the dipstick.

#### Refill amount:

3.8 \( \( (1.00 \) US gal, 0.84 UK gal)



AE80373B

#### 2. REPLACE ENGINE OIL FILTER

- 1. Using a filter wrench, remove the cartridge.
- 2. Clean the filter holder, coat the thread and the seal of the new cartridge with engine oil, then install.

#### NOTICE

After installing the cartridge, start the engine and check that there is no leakage of oil from the filter mount surface.

EB

#### 3. REPLACE FUEL FILTER

- Loosen the nut, remove the glass bowl, then take out the filter.
- 2. Drain the water and clean out the dirt accumulated at the bottom.
- 3. Install the new filter.

#### NOTICE

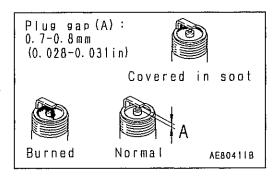
- If the packing of the glass bowl is damaged, replace it.
- After replacing, check that there is no leakage of fuel from the hose mount.

#### 4. CHECK SPARK PLUG

- 1. Remove the plug using the plug wrench supplied with the lift truck.
- 2. Clean off any carbon stuck to the tip of the plug or the surrounding area.
- 3. Measure gap (A) with a plug gap gauge.

#### Brands of plug

NGK	BP-4ES
NGK	BPR-4ES (Noise protect type)



3-26

-

202

- 100

William .

**-**---

....

#### **DIESEL ENGINE**

Ī

ď

- 1. CHANGE ENGINE OIL
- 1. Remove the drain plug, drain the oil, then tighten the plug again.
- 2. Remove the dipstick.
- Add the specified amount of engine oil, and be careful not to let it overflow.
- 4. Check the oil level with the dipstick.

#### Refill amount

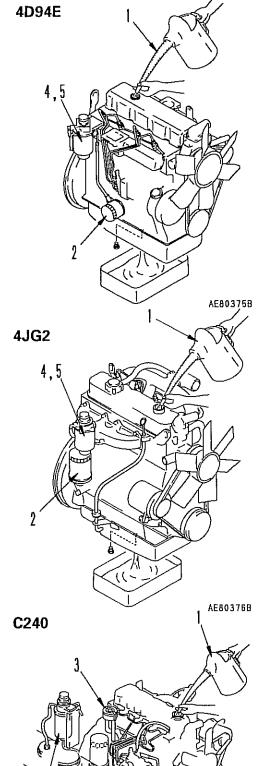
4D94E engine 4JG2 engine	7.5 £ (1.98 US gal, 1.65 UK gal)
C240 engine	4.8 ℓ (1.27 US gal, 1.06 UK gal)

#### 2. REPLACE ENGINE OIL FILTER

- 1. Using a filter wrench, remove the cartridge.
- 2. Clean the filter holder, coat the thread and the seal of the new cartridge with engine oil, then install.

#### NOTICE

After installing the cartridge, start the engine and check that there is no leakage of oil from the filter mount surface.



AE805528

#### 3. CLEAN CRANK CASE BREATHER (C240 engine only)

- Remove the cover and take out the metal mesh.
- 2. lean the metal mesh in flushing oil.
- 3. After cleaning, dry it properly.
- Fill the metal mesh with clean engine oil and install it.

# AEB05530

E-15

775

11 To

E

E

C.L.

#### 4. DRAIN WATER FROM FUEL FILTER

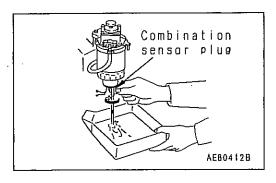
 Loosen the combination sensor plug and drain the water and sediment accumulated at the bottom.

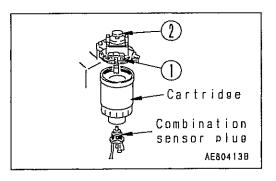
#### NOTICE

- Fuel is drained out at the same time, so prepare a container to catch it.
- Always be sure to wipe up any spilled fuel.



- Remove the combination sensor plug at the bottom of the cartridge.
- 2. Using a filter wrench, remove the cartridge.
- Install the combination sensor plug to the new cartridge.
- 4. Fill the new cartridge with fuel, coat the packing surface thinly with engine oil, then install.
- 5. Loosen plug ① and pump knob ② up and down until no more bubbles come out with the fuel.
- 6. Tighten plug 1.





EB

#### [Electrical components]

## 26.4.44 CHECK OPERATION OF STARTING SWITCH, CHECK MESHING OF PINION GEAR

#### 26.4.45 CHECK SPECIFIC GRAVITY OF BATTERY ELECTROLYTE

#### **MARNING**

#### Precautions when handling battery

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

## CHECK SPECIFIC GRAVITY OF BATTERY ELECTROLYTE

- 1. Charge the battery, and after charging, check that the battery electrolyte level is correct.
- 2. Using a specific gravity meter and thermometer, measure the specific gravity and temperature of the battery electrolyte.
- 3. Insert the values measured in Steps 1 and 2 in the formula below, and calculate S<sub>20</sub>.

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

S20: Specific gravity at 20°C

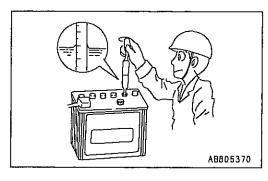
St: Specific gravity (measured value) at t°C

t: Temperature of battery electrolyte (measured value)

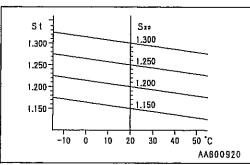
Normal value:  $S_{20} = 1.27 - 1.29$ 

4. Charge the battery if necessary.

Specific gravity of electrolyte	Condition of charge	Necessity to charge	
1.280	Fully charged	N.I.	
1.240	1/4 discharged	No	
1.210	1/2 discharged		
1.130	Fully discharged	Yes	



Relation between specific gravity and temperature of electrolyte



J

## [Electrical components continued] 26.4.46 CHECK WIRING CONNECTIONS FOR LOOSENESS

#### 26.4.47 CHECK IGNITION TIMING

#### [Others]

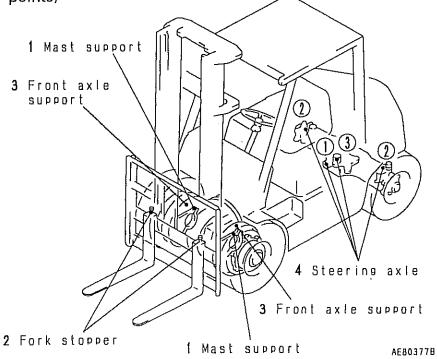
26.4.48 CHECK OVERHEAD GUARD, BACKREST FOR DEFORMATION, CRACKING, DAMAGE AND LOOSENESS

#### 26.4.49 CHECK OPERATOR'S SEAT MOUNT FOR LOOSENESS, DAMAGE

#### 26.4.50 GREASE ALL LUBRICATION POINTS

#### **LUBRICATION POINTS**

- 1. Mast support (left and right: 2 points)
- Fork stopper (left and right: 2 points)
- 3. Front axle support (left and right: 2 points)
- 4. Steering axle
- ① Center pin (front and rear: 2 points)
- ② King pin (left and right: 4 points)
- 3 Bellcrank pin (1 point)



3-30

(1) (E)

200

at si

E

255

7

130

E A

12.5

132

12.

## 26.5 EVERY 3 MONTHS OR EVERY 600 HOURS SERVICE [Engine]

#### 26.5.1 REPLACE OIL FILTER CARTRIDGE

For details of the method of replacing the oil filter, see "26.4.43 CHANGE OIL IN ENGINE OIL PAN".

## 26.5.2 GREASE FUEL INJECTION PUMP GOVERNOR, CHANGE GOVERNOR OIL

For details of the method of changing the governor oil, see "26.4.43 CHANGE OIL IN ENGINE OIL PAN".

# **26.5.3 REPLACE FUEL FILTER CARTRIDGE (DIESEL ENGINE LIFT TRUCKS)** For details of the method of replacing the cartridge, see "26.4.43 CHANGE OIL IN ENGINE OIL PAN".

#### [Power train]

1

## 26.5.4 CHECK OIL LEVEL IN TRANSMISSION CASE, ADD OIL (FOR CLUTCH TYPE LIFT TRUCKS, INCLUDES DIFFERENTIAL CASE)

For details of the method of checking and adding oil, see "26.6.4 CHANGE OIL IN DIFFERENTIAL CASE (FOR CLUTCH TYPE LIFT TRUCKS, INCLUDES TRANSMISSION CASE)" and "26.6.5 CHANGE OIL IN TORQFLOW TRANSMISSION CASE".

## 26.5.5 CHECK OIL LEVEL IN DIFFERENTIAL CASE, ADD OIL (FOR CLUTCH TYPE LIFT TRUCKS, INCLUDES TRANSMISSION CASE)

For details of the method of checking and adding oil, see "26.6.4 CHANGE OIL IN DIFFERENTIAL CASE (FOR CLUTCH TYPE LIFT TRUCKS, INCLUDES TRANSMISSION CASE)".

## 26.6 EVERY 6 MONTHS OR EVERY 1200 HOURS SERVICE [Steering system]

26.6.1 CHECK STEERING LINK FOR BENDING, DAMAGE, AND WEAR

26.6.2 CHECK KNUCKLE FOR PLAY, DEFORMATION, AND DAMAGE

26.6.3 CHECK FOR MARKED VARIATION IN MINIMUM TURNING RADIUS

Ε

#### [Power train]

## 26.6.4 CHANGE OIL IN DIFFERENTIAL CASE (FOR CLUTCH TYPE LIFT TRUCKS, INCLUDES TRANSMISSION CASE)

#### - A WARNING -

Immediately after operations, the oil is at high temperature. Wait for the temperature to go down before starting this operation.

#### **CHECK OIL LEVEL**

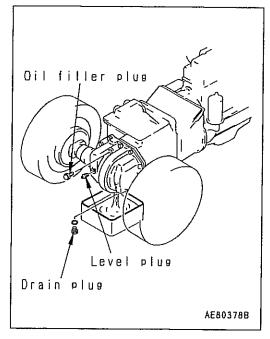
 Remove the level plug and check that the oil is near the bottom edge of the plug hole.
 If the oil level is low, remove the oil filler plug and add oil.

#### **CHANGE OIL**

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

#### Refill amount

Clutch type lift truck	13 ℓ (3.43 US gal, 2.86 UK gal)	
TORQFLOW transmission lift truck	6 ℓ (1.59 US gal, 1.32 UK gal)	



ES.

est i

600

E

E

7

E

E

F

F

F

E

#### NOTICE

Always use genuine Komatsu Forklift gear oil (SAE90). (For details, see "22. LUBRICANT LIST".)

#### REMARK

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

3-32

#### [Power train continued] 26.6.5 CHANGE OIL IN TOROFLOW TRANSMISSION CASE

WARNING -

Immediately after operations, the oil is at high temperature. Wait for the temperature to go down before starting this operation.

#### **CHECK OIL LEVEL**

3

7

3

- 1. Open the inspection window in the floor plate and check with the dipstick.
- 2. If the oil level is low, remove the oil filler plug and add oil.

#### **CHANGE OIL, CLEAN STRAINER**

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

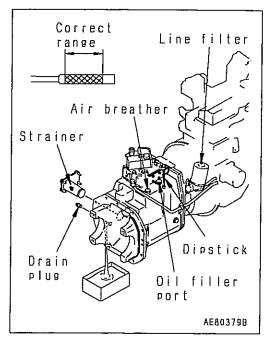
#### Refill amount:

10 ℓ (2.64 US gal, 2.20 UK gal) (includes torque converter)

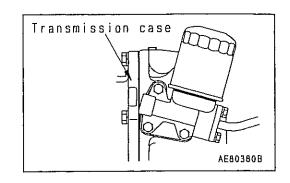
#### **NOTICE**

Always use genuine Komatsu Forklift engine oil (SAE10W-CD).

(For details, see "22. LUBRICANT LIST".)



[Power train continued]
26.6.6 REPLACE LINE FILTER IN
TRANSMISSION OIL PRESSURE
CIRCUIT



77.8 T.

E

E.7...

E

EZ

**3**...

...

26.6.7 CHANGE CLUTCH OIL

[Brake system] 26.6.8 CHANGE BRAKE OIL

[Engine]

26.6.9 CHECK, ADJUST VALVE CLEARANCE

26.6.10 MEASURE COMPRESSION PRESSURE

26.6.11 CHECK, ADJUST FUEL INJECTION TIMING

26.6.12 CHECK BLOWBY GAS REDUCTION SYSTEM FOR CLOGGING, DAMAGE

26.6.13 CHECK DISTRIBUTOR CAP CENTER PIECE FOR WEAR

26.6.14 REPLACE FUEL FILTER ELEMENT (GASOLINE ENGINE LIFT TRUCKS) For details of the method of replacing the element, see "26.4.43 CHANGE OIL IN ENGINE OIL PAN".

# [Engine continued] 26.6.15 CLEAN INSIDE OF COOLING SYSTEM

## **WARNING**

- After the engine has been operated, the cooling water is at a high temperature, so there is danger of burns if the cooling water is drained immediately. Always wait for the engine to cool down before draining the water.
- The cleaning is carried out while running the engine, and there is danger that the truck may move unexpectedly, so it is extremely dangerous to go under the lift truck. Never go under the lift truck when the engine is running.
- Do not remove the radiator cap when the radiator water is hot. Boiling water may spurt out. Always wait for the temperature to go down, and turn the cap slowly to release the pressure before removing the cap.

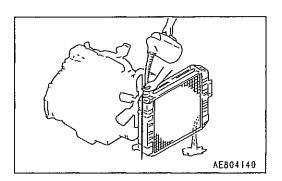
#### **CLEAN RADIATOR**

Stop the lift truck on level ground.

- 1. Open the drain valves at the bottom of the radiator and the engine cylinder block to drain the water.
- 2. Close the drain valves, fill the radiator with fresh water (tap water) and radiator flushing fluid through the water filler, then run the engine at idling for approx. 15 minutes.
- 3. Stop the engine, open the drain valves to drain the water, then add fresh water and run the engine at idling until clean water comes out from the drain valves (5 10 minutes).
- Stop the engine, drain all the water from the drain valves, then close the drain valves and fill the radiator with fresh water and long life coolant.

#### Water amount

H20II engine	9.1 ℓ (2.40 US gal, 2.00 UK gal)
H25 engine	9.1 ℓ (2.40 US gal, 2.00 UK gal)
4D94E engine	9.2 ℓ (2.43 US gal, 2.02 UK gal)
4JG2 engine	9.1 & (2.40 US gal, 2.00 UK gal)



#### **M** WARNING -

Coolant is flammable, so keep it away from open flame.

#### NOTICE

- In cold areas, add long life coolant. (For details, see "17. COLD WEATHER OPERA-TION".)
- When not using long life coolant, add rust prevention fluid to the radiator.
- Always use genuine Komatsu Forklift products for the flushing fluid, rust prevention fluid, and long life coolant.

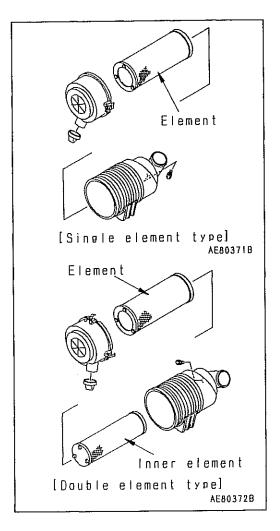
## 26.6.16 REPLACE AIR CLEANER ELEMENT

#### **WARNING** -

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

#### REPLACE ELEMENT

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



EEE.

ESSE.

1325

E 215.

eni.

HE S

[Hydraulic equipment]

1

đ

J

1

J

J

1

(

ď

d

1

()

**E**(3

(

**1** 

Æ(

**(** 

€Q

ı.U

£Ĺ

EU

,

**A** 

国

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

## **WARNING**

Immediately after operations, the oil is at high temperature. Never change the oil immediately after stopping operations.

Wait for the oil temperature to go down before changing the oil.

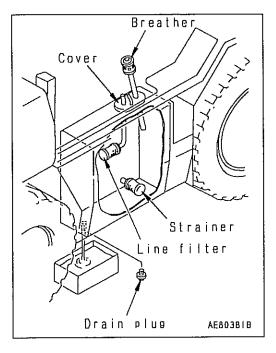
- Drain the oil from the drain plug at the bottom of the tank, then remove the cover, take out the strainer, and wash it in flushing oil.
- 2. Clean the inside of the tank, then install the drain plug.
- After washing the strainer, blow air from the inside of the strainer to dry it completely, then install it again.
- 4. Replace the line filter, then install the cover.
- Add the specified amount of hydraulic oil through the insertion port of the breather (with dipstick), then check the oil level with the dipstick.

Refill amount: 56  $\ell$  (14.80 US gal, 12.32 UK gal)

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

#### NOTICE

Always use genuine Komatsu Forklift hydraulic oil.



## 26.7 EVERY YEAR OR EVERY 2400 HOURS SERVICE

[Brake sy 26.7.1	rstem] CHECK OPERATION OF MASTER CYLINDER, CHECK FOR OIL LEAKAGE, DAMAGE, AND WEAR
26.7.2	CHECK OPERATION OF WHEEL CYLINDER, CHECK FOR OIL LEAKAGE, DAMAGE, AND WEAR
26.7.3	CHECK OPERATING CONDITION OF BRAKE DRUM, CHECK FOR DAMAGE AND WEAR
26.7.4	CHECK BRAKE LINING FOR WEAR
26.7.5	CHECK OPERATING CONDITION OF BRAKE SHOE
26.7.6	CHECK BRAKE ADJUSTMENT LEVER AND RATCHET FOR WEAR AND DAMAGE
26.7.7	CHECK BRAKE SPRING FOR DETERIORATION
26.7.8	CHECK BRAKE BACK PLATE FOR DEFORMATION AND CRACKING, CHECK MOUNTING CONDITION
26.7.9	CHECK AIR TIGHTNESS OF BRAKE PIPING
[Travel s 26.7.10	ystem] CHECK AXLE FOR DEFORMATION, CRACKING, AND DAMAGE
26.7.11	CHECK MOUNTING CONDITION OF DIFFERENTIAL
26.7.12	CHECK ROOT OF FORKS FOR CRACKING (USE COLOR CHECK)
26.7.13	CHECK ROLLER SHAFT OF LOADING EQUIPMENT FOR CRACKING AND DAMAGE
26.7.14	CHECK MAST SUPPORT FOR DAMAGE AND WEAR
	ic equipment] CHECK OPERATION OF RELIEF VALVE, CHECK RELIEF PRESSURE
26.7.16	REPLACE AIR BREATHER

Ε

E ...

**E** 

**7** (1)

TO I

E

Exi:

E

**E**::

E

E.i.

[Engine] CONDITION [Others] **DAMAGE** 

26.7.17 CLEAN INSIDE OF FUEL TANK

1

1

đ

đ

J

(

- 26.7.18 CHECK INJECTION PRESSURE, INJECTION AMOUNT, INJECTION
- 26.7.19 TIGHTEN ENGINE CYLINDER HEAD BOLTS

26.7.20 CHECK FRAME AND CROSS MEMBER FOR CRACKING AND

E

## **27. REPLACEMENT PROCEDURE**

#### 27.1 REPLACING FUSES

#### NOTICE

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

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

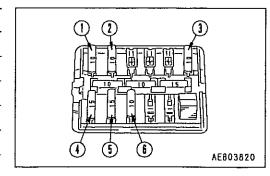
- 1. Turn the starting switch to the OFF position.
- 2. Open the cover of the fuse box and replace the fuses inside.

To remove the cover from the fuse box, push the side face of the cover lightly with your fingers and pull it out.

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

### Fuse capacity and related electrical component

No.	Capacity	Color	Related electrical component
1	10 A	Red	Meters
2	10 A	Red	Back lamp
3	10 A	Red	Starting relay
4	15 A	Blue	Stop lamp
(5)	15 A	Blue	Lamps
6	10 A	Red	Horn



The unmarked fuses (10A  $\times$  2, 15A  $\times$  1) are spares.

3-40

## 27.2 REPLACING TIRES

1

3

1

KA #

89

071 š

water Water

noist

viie#

APPEL A

 $\exists$ 

3

3

- Stop the lift truck on a flat, safe area and apply the parking brake.
- 2. Chock the wheel in the diagonal position to the one to be replaced.

### A WARNING -

- After confirming that the rim nuts are not loose, loosen the hub nuts.
- Never mistakenly loosen the rim nuts instead of the hub nuts.
- 3. Using a hub nut wrench, loosen the hub nuts until they can be rotated by hand.

## · 🛕 WARNING ---

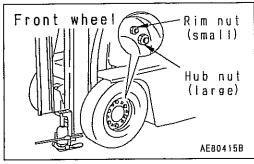
Jack up the machine after confirming that the jack will not slip. Never enter under the lift truck body.

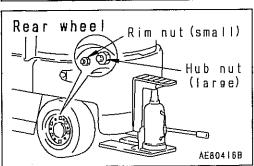
- 4. Place the jack on the jacking point and raise the lift truck above the ground.
- Remove the hub nuts then replace the wheel.

## **A** WARNING -

Ask a specialist to carry out disassembly and assembly of the tires.

- Install the replacement wheel on the hub and temporarily tighten it with the hub nuts.
- 7. Tighten the hub nuts again ensuring no play is generated, by alternately tightening diagonally-located nuts.
- Let the jack down to lower the lift truck. Tighten the hub nuts to the specified torque.
   (For specified torque see "23. SERVICE DATA".)





## A DANGER -

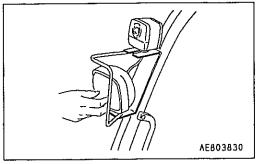
- Always ask a specialist to carry out disassembly and assembly of the tires, tubes, and rims, and inflation of the tires. The tires used on forklift trucks are at a high inflation pressure, so operations with tires are extremely dangerous.
- The tires are inflated to a high pressure, so deformed or cracked rims are extremely dangerous. Check carefully before inflating tires. Never use tires with deformed or cracked rims.
- Before inflating the tires, adjust the pressure of the air compressor to the set pressure so that the tires are not inflated above the set pressure.
- Adjust the tire inflation pressure to the set pressure. (For details of the set inflation pressure, see "23. SERVICE DATA".)

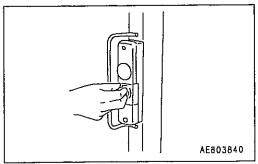
#### 27.3 REPLACING LAMPS

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

#### Lamp capacity

Head lamp	55 W (For 12V)
Turn signal lamp	23 W (For 12V)
Clearance lamp	8 W (For 12V)
Number plate lamp (option)	10 W (For 12V)
Back lamp	8 W (For 12V)
Stop lamp	27 W (For 12V)
Warning lamp	2.0 W (For 12V)
Meter lighting lamp	3.4 W (For 12V)





**F**A

**E**(12

233

E 11

1234

E33.

2550

#### 27.4 DISPOSAL

d

đ

J

Ű

đ

đ

1

I

1

(

0

1

0

0

1

1

1

E.

1

4

A CAUTION -

Disposal of the truck may only be carried out by the manufacturer or trained manufacturer representative.

#### 1. DISPOSAL

Prior to flame cutting the truck for disposal, the following precautions are to be adhered to:

- 1.1. Remove batteries from truck as these can become explosive.
- 1.2. Drain diesel fuel into a suitable container: remove diesel tank from truck. Remove L.P. Gas bottles if applicable.
- 1.3. Drain hydraulic oil into a suitable container.
- 1.4. Ensure a fire extinguisher is on hand.
- 1.5. DO NOT flame cut truck components that are under tension as these could "spring out".
- 1.6. Support the truck whilst flame cutting.
- 1.7. Remove, or tie back, hydraulic hoses and electrical cables from areas where flame cutting is to be applied.

Dispose of waste material and consumables in a safe and responsible manner. Advice on waste disposal can be obtained from your nearest Health and Safety Executive or licensed waste disposal company.

Е

## МЕМО

3-44

# **TECHNICAL DATA**

\*

đ

đ

(

J

J

₹(

(

(

(

3

3

3

ž 🔨

**I** 

3

4

3

3

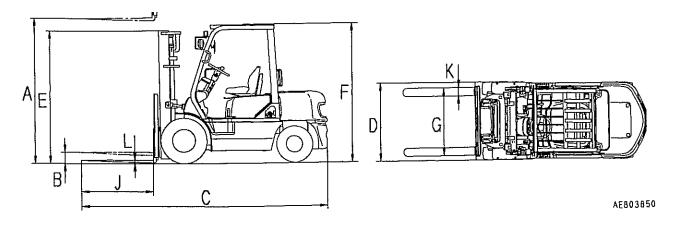
## 28. TECHNICAL DATA

## **Specifications**

## Diesel engine lift truck

lt:	em	Unit	FD20-12	FD25-12	FD30-12
Performance	<u> </u>				
Capacity		kgf (lb)	2000 (4400)	2500 (5500)	3000 (6600)
Load center		mm (in)	500 (20)	500 (20)	500 (20)
Max. lifting heig	ıht A	mm (in)	3000 (118)	3000 (118)	3000 (118)
Free lift	В	mm (in)	150 (5.9)	155 (6.1)	155 (6.1)
Fork lifting spee		mm/s (in/s)	620 (24.4)	620 (24.4)	500 (19.7)
Max. travel	Clutch (forward/reverse)	km/h (MPH)	18.0 (11.2)	18.0 (11.2)	19.0 (11.8)
speed (without load)	TORQFLOW (forward/reverse)	km/h (MPH)	18.5 (11.5)	18.5 (11.5)	19.5 (12.1)
Gradeability (wi		degree	17.6/22.4	14.9/19.1	11.4/14.7
Dimensions, we					
Overall length	С	mm (in)	3440 (135.4)	3505 (138.0)	3765 (148.2)
Overall width	D	mm (in)	1150 (45.3)	1150 (45.3)	1235 (48.6)
	Mast E	mm (in)	1995 (78.5)	1995 (78.5)	2015 (79.3)
Overall height	Overhead guard F	mm (in)	2070 (81.5)	2070 (81.5)	2090 (82.3)
Fork length x w	idth x thickness	mm (in)	920x122x36	1070x122x40	1070x122x44
j κ L		111111 (1317	(36.2x4.8x1.4)	(42.1x4.8x1.6)	(42.1x4.8x1.7
Fork spread	G	mm (in)	245 – 1020	245 – 1020	245 - 1060
TOTK Spread		111111 (11.7	(9.6 – 40.2)	(9.6 – 40.2)	(9.6 – 41.7)
Service weight		kgf (lb)	3380 (7450)	3720 (8200)	4310 (9500)
• Engine					<u>,</u>
T			KOMATSU	KOMATSU	KOMATSU
Type			4D94E	4D94E	4D94E
Piston displacement		cc (cu.in)	2775 (169)	2775 (169)	2775 (169)
Flywheel horsepower		kW (HP)/rpm	63 (84)/2450	63 (84)/2450	63 (84)/2450
• Tires		<u> </u>	1		
Front tires		_	7.00-12-12PR	7.00-12-12PR	28x9-15-12Pf
Rear tires			6.00-9-10PR	6.00-9-10PR	6.50-10-10PF

## **Dimension chart**



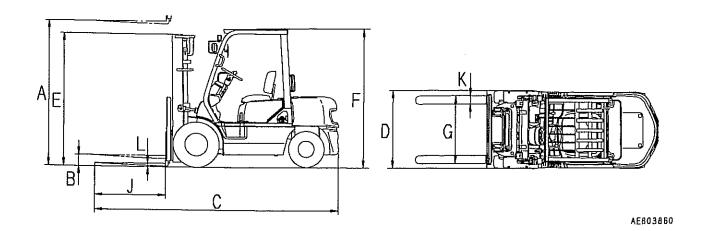
EΒ

15

CL.

Z.5

FD20H-12	FD25H-12	FD30H-12		1	
10201112	1 DEGIT IE	1 20011 12			
2000 (4400)	2500 (5500)	3000 (6600)			
500 (20)	500 (20)	500 (20)	****		
3000 (118)	3000 (118)	3000 (118)			
150 (5.9)	155 (6.1)	155 (6.1)			
660 (26.0)	660 (26.0)	540 (21.3)			
18.5 (11.5)	18.5 (11.5)	19.5 (12.1)		1	
18.5 (11.5)	18.5 (11.5)	19.5 (12.1)			
21.1/26.8	17.7/22.9	13.5/17.6			
16 World H17 of 17 OF 18	-	I			
3340 (131.5)	3730 (146.9)	4320 (170.1)			
1150 (45.3)	1150 (45.3)	1235 (48.6)			
1995 (78.5)	1995 (78.5)	2015 (79.3)			
2070 (81.5)	2070 (81.5)	2090 (82.3)		-	
920x122x36	1070×122×40	1070x122x44			
(36.2x4.8x1.4)	(42.1x4.8x1.6)	(42.1x4.8x1.7)			
245 - 1020	245 – 1020	245 – 1060			
(9.6 – 40.2)	(9.6 – 40.2)	(9.6 – 41.7)			
3340 (7360)	3730 (8220)	4320 (9530)			
		······		•	
ISUZU	ISUZU	ISUZU			
4JG2	4JG2	4JG2			1
3059 (187)	3059 (187)	3059 (187)			
70 (94)/2400	70 (94)/2400	70 (94)/2400			
		1.5			
7.00-12-12PR	7.00-12-12PR	28x9-15-12PR			
6.00-9-10PR	6.00-9-10PR	6.50-10-10PR			



ΕB

U

ā

đ

Ō

Û

Ū

d

đ

Ū

Œ

•

3

•

(

(

0

9

(

Q

(

**3** 

₫

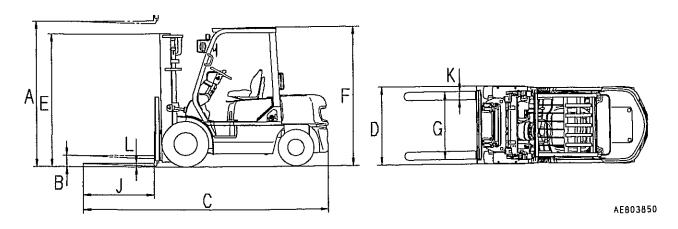
Œ

Q

## Gasoline engine lift truck

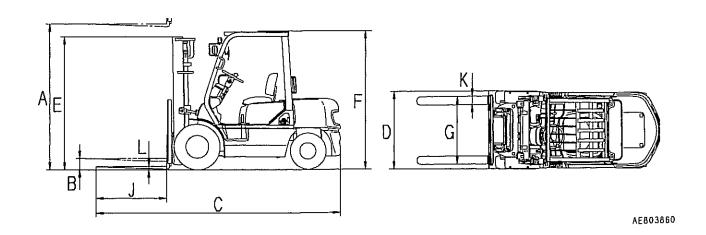
lte	em	Unit	FG20-12	FG25-12	FG30-12
Performance	· · · · · · · · · · · · · · · · · · ·				
Capacity		kgf (lb)	2000 (4400)	2500 (5500)	3000 (6600)
Load center		mm (in)	500 (20)	500 (20)	500 (20)
Max. lifting heig	ıht A	mm (in)	3000 (118)	3000 (118)	3000 (118)
Free lift	В	mm (in)	150 (5.9)	155 (6.1)	155 (6.1)
Fork lifting spee	d (with load)	mm/s (in/s)	520 (20.5)	520 (20.5)	430 (16.9)
Max. travel	Clutch (forward/reverse)	km/h (MPH)	18.0 (11.2)	18.0 (11.2)	19.0 (11.8)
speed (without load)	TORQFLOW (forward/reverse)	km/h (MPH)	18.5 (11.5)	18.5 (11.5)	19.5 (12.1)
Gradeability (wire Clutch/TORQFLC		degree	14.2/18.5	13.1/15.7	9.0/12.0
• Dimensions, we	ight				
Overall length	С	mm (in)	3440 (135.4)	3505 (138.0)	3765 (148.2)
Overall width	D	mm (in)	1150 (45.3)	1150 (45.3)	1235 (48.6)
	Mast E	mm (in)	1995 (78.5)	1995 (78.5)	2015 (79.3)
Overall height	Overhead guard F	mm (in)	2070 (81.5)	2070 (81.5)	2090 (82.3)
Fork length x w	idth x thickness	mm (in)	920x122x36	1070x122x40	1070x122x44
J	K L		(36.2x4.8x1.4)	(42.1x4.8x1.6)	(42.1x4.8x1.7)
Fork spread	G	mm (in)	245 – 1020	245 – 1020	245 – 1060
roik spiedu			(9.6 – 40.2)	(9.6 - 40.2)	(9.6 – 41.7)
Service weight		kgf (lb)	3220 (7100)	3610 (7960)	4210 (9280)
• Engine					
	ALSO MARKET		NISSAN	NISSAN	NISSAN
Type	Туре		H20II	H20II	H20II
Piston displacer	ment	cc (cu.in)	1982 (121)	1982 (121)	1982 (121)
Flywheel horse	power	kW (HP)/rpm	47 (63)/2450	47 (63)/2450	47 (63)/2450
• Tires		· · · · · · · · · · · · · · · · · · ·		****	
Front tires		_	7.00-12-12PR	7.00-12-12PR	28x9-15-12PR
Rear tires		_	6.00-9-10PR	6.00-9-10PR	6.50-10-10PR

## **Dimension chart**



EB

FG20H-12	FG25H-12	FG30H-12		 
2000 (4400)	2500 (5500)	3000 (6600)		
500 (20)	500 (20)	500 (20)	11277-1-1077	, , , , , , , , , , , , , , , , , , ,
3000 (118)	3000 (118)	3000 (118)	,	
150 (5.9)	155 (6.1)	155 (6.1)		
600 (23.6)	600 (23.6)	490 (19.3)		
18.0 (11.2)	18.0 (11.2)	19.0 (11.8)		
18.5 (11.5)	18.5 (11.5)	19.5 (12.1)		
	- /19.3	- /14.8		
			I	 
3220 (126.8)	3610 (142.1)	4210 (165.7)		
1150 (45.3)	1150 (45.3)	1235 (48.6)		
1995 (78.5)	1995 (78.5)	2015 (79.3)		
2070 (81.5)	2070 (81.5)	2090 (82.3)		
920x122x36	1070x122x40	1070x122x44		
(36.2x4.8x1.4)	(42.1x4.8x1.6)	(42.1x4.8x1.7)		
245 - 1020	245 - 1020	245 – 1060		
(9.6 - 40.2)	(9.6 – 40.2)	(9.6 – 41.7)		
3220 (7100)	3610 (7960)	4210 (9280)		
NISSAN	NISSAN	NISSAN		
H <b>25</b>	H25	H25		
2472 (151)	2472 (151)	2472 (151)		
58 (78)/2400	58 (78)/2400	58 (78)/2400		
7.00-12-12PR	7.00-12-12PR	28x9-15-12PR		1000
6.00-9-10PR	6.00-9-10PR	6.50-10-10PR		



4-5

G

1

(

Ī

Q

0

Ū

Š

1

0

0

(

\_(

=Q

\_0

EQ

**\_Q** 

Q

<u>EU</u>

**E** 

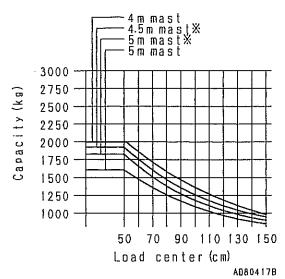
9

4

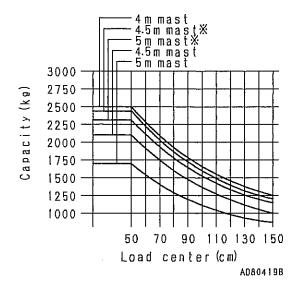
q

#### Permissible load chart (\*: with double tires)

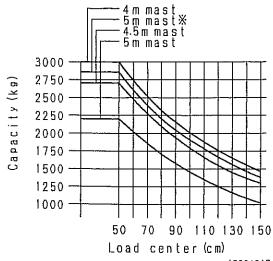
#### 2.0 ton lift truck



#### 2.5 ton lift truck



#### 3.0 ton lift truck



AD804218

E ...

E1...

#### **EUROPEAN NON-ROAD DIESEL REGULATION**

Engine with an emission label listed below are in compliance with the European non-road diesel engine exhaust gaseous regulation.

(EC directive 97/68 EC Stage 1)

Fork lift Model	Engine model
BX	Komatsu 4D94E
CX/DX20	Komatsu (S) 6D102E
EX	Isuzu 6BG1T

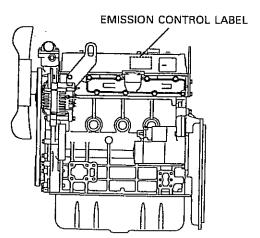
#### 1. Emission label sample:

IMPORTANT ENGINE INFORMATION
THIS ENGINE CONFORMS TO 97/68/EC DIRECTIVE
ENGINE FAMILY :
ENGINE MODEL :
APPROYAL NUMBER :
YANMAR DIESEL ENGINE Co. , Ltd .

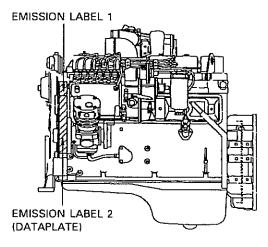
#### 2. Emission label location:

The certified engine has the emission label as follows.

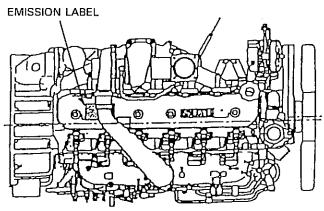
#### A. 4D94E



#### B. (S)6D102E



C. 6BG1T



#### 3. Maintenance:

To maintain optimum engine performance and compliance with the EC regulation for large non-road engine, it is of the utmost importance that scheduled appropriate maintenance requirements shall be performed on a timely basis according to the operation manual.

The following are amended maintenance schedules for certified engines.

#### A. 4D94E

	Current manual	Amended
Valve clearance adjustment	6 months or 1200h	Every 1000h
<ul> <li>Check &amp; adjustment of fuel injection pressure and atom- izing condition of nozzles</li> </ul>		Every 1000h
Check & adjustment of fuel injection timing	6 months or 1200h	Every 2000h

#### B. (S)6D102E

And the second s	Current manual	Amended
Lubricating oil filter	3 months or 1200h	Every 200h
• Fuel filter	3 months or 1200h	Every 500h
Check / rebuilt or replace of turbocharger	1200h or 2400h	Every 2000h
Valve clearance adjustment	6 months or 1200h	Every 2000h
Check & adjustment of fuel injection pressure and atomizing condition of nozzles	12 months or 2400h	Every 2000h

#### C. 6BG1T

	Current manual	Amended
Valve clearance adjustment	6 months or 1200h	Every 1000h
<ul> <li>Check &amp; adjustment of fuel injection pressure and atom- izing condition of nozzles</li> </ul>		Every 500h
Cylinder compression pressure	6 months or 1200h	Every 1000h