# INTRODUCTION

Thank you for purchasing HYUNDAI GENUINE Forklift.
This manual describes the procedures for operation, handling, maintenance, checking and adjustment.

It will help the operator realize peak performance through effective, economical and safe truck operation.

The contents in this manual must be understood and utilized before the equipment use for safe operation and continuous maintenance of the outstanding performance.

## Routine Servicing and Maintenance

Regular maintenance and care of your lift truck is not only important for economy and utilization reasons; it is essential for your safety. Defective equipment may cause potential risk to not only the operator, but also to other workers. Genuine parts of HYUNDAI must be used at all times, and maintenance plan shall be practiced to maintain the good equipment condition.

## Operator Daily Inspection

A lift truck should always be examined by the operator, before driving, to be sure it is safe to operate. The operator shall utilize the 『OPERATOR DAILY CHECK LIST』.

## Planned Maintenance

In this manual, periodic planned maintenance program that covers inspections, operational checks, cleaning, lubrication, and minor adjustments are outlined, and for additional inquiries, please refer to your HYUNDAI dealer.

HYUNDAI GENUINE is producing various construction heavy equipment to be developed as a global construction equipment maker, and best work efficiency is guaranteed through perfect work capacity and outstanding economic feasibility. Especially, HYUNDAI is continuing the efforts on R&D based on ergonomic research to be suitable for the body type of Korean workers and for various working environments.

Periodic inspection service is performed for convenience of the user. Please take into consideration that during the initial use of the equipment and after reaching 100 hours and 500 hours of equipment use, please contact HYUNDAI for a visit and free inspection service. In addition, please refer to the policy on the equipment performance and quality assurance as follows to have no issue in use.

## 1. Warranty Coverage

The forklift produced and distributed by HYUNDAI is provided with free replacement of parts or repair and maintenance work when acknowledged with the fault in material or manufacture during normal use within the warranty period in the standard of the item that is arrived first among 12 months from the date of release or 2000 hours on the hour meter.

## 2. Matters excluded from warranty (Following matters are excluded from the warranty even during the warranty period)

1) Matters judged to be the caused from not following the handling, operating, periodic check and storage method provided in the 『OPERATOR MANUAL』.

2) Defects considered to be occurred from failure due to negligence of the user, delay in maintenance and accidents (including natural disasters)

3) Defects judged to be occurred from all parts used in the equipment not being using the genuine parts acknowledged by the company

4) Other periodic check details requested by the company for performance by the customer such as ordinary equipment maintenance - fuel system cleaning, brake check and adjustments, etc.

5) Consumables from normal use, in other words, periodic replacement parts for the equipment such as the filters, bulbs, fuse and oil, etc.

6) Abrasion of abrasive parts

7) Remodeling and changing the equipment without the approval by the company

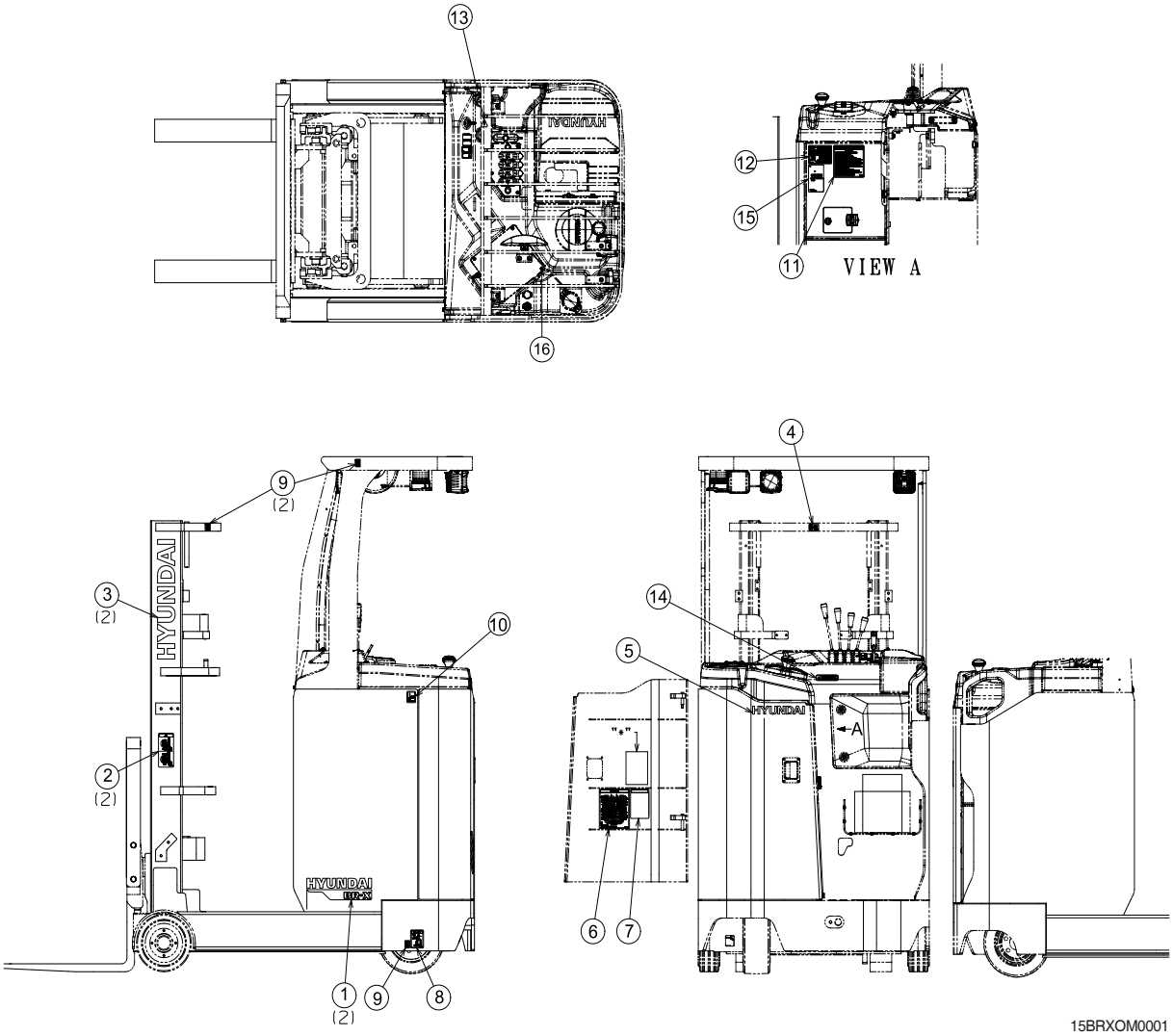
HYUNDAI GENUINE is continuing the research and development for more outstanding performance and quality improvement. Therefore, the contents in this operator's manual may be changed at any time without prior notice.

## SAFETY LABELS

### 1. LOCATION

Label must be maintained of the clean state at all times. If they are lost or damaged, attach them again.

#### 1) 15/18/20/25 BR-X




15BRXOM0001

| | | | | | |
|---|---|---|---|---|---|
| 1 | Model name | 7 | Battery handling caution | 13 | Horn |
| 2 | Mast warning | 8 | Hanger | 14 | Brake |
| 3 | HYUNDAI logo | 9 | Hook | 15 | Call Center |
| 4 | Hand caution | 10 | Temperature | 16 | Hydraulic oil injection |
| 5 | HYUNDAI logo | 11 | Safety warning | | |
| 6 | Maintenance Instruction | 12 | Nameplate | | |

## 2. DESCRIPTION

Special warning label attached to the lift truck must be familiarized with all other warning labels. Reattach the label when it is damaged.

### 1) MAST WARNING (item 2)

This warning label is positioned on the both side of the mast.

⚠ **Never stand or work under the raised forks at any circumstances even when the hydraulic safety shutoff valve is in the lock position.**

⚠ **In case of working under the forks, it is essential to support the carriage with blocks.**

15BRXOM0002

### 2) HAND CAUTION (item 4)

This warning label is positioned on the upper side of the mast.

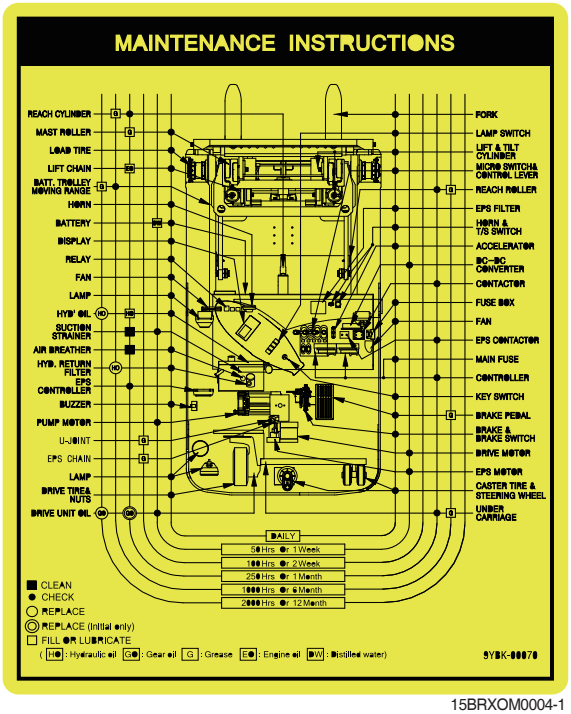
⚠ **It warns of the danger of injury from movement between rails, chains, sheaves, fork carriage, and other parts of the mast. Do not climb on or reach into the mast. Personal injury will result if any part of your body is put between moving parts of the mast.**


15BRXOM0003

### 3) MAINTENANCE INSTRUCTION (item 6)

This label is attached on the left side. Please refer to the checklist during the maintenance work.

⚠ **For the maintenance work, refer to Chapter 6 Planned Maintenance.**




15BRXOM0004-1

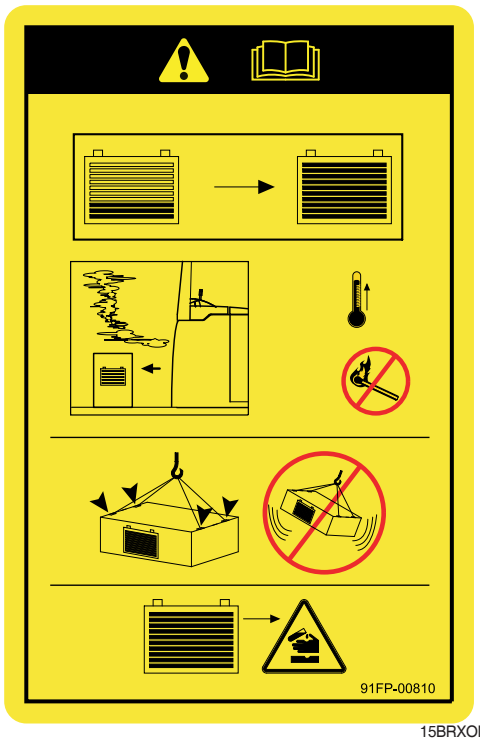
4) **BATTERY HANDLING CAUTION** (item 7)
This label is attached on the left side.

**⚠ Please see Page 7-20 for the method of removing the battery.**

**※ Please open the battery cover while charging the battery.**
**Heat and explosive hydrogen gas are generated during battery charging. Never place fire near the battery.**

**※ When lifting the battery, hand the wire rope on 2 or 4 hooks, and take caution on not shaking the rope or applying impact.**

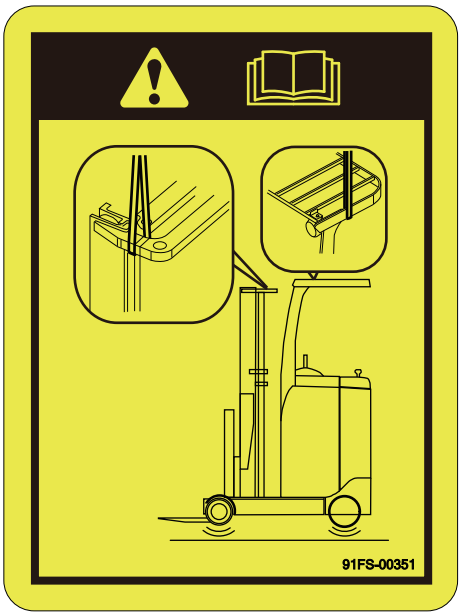
**※ Caution is required when handling the battery as there are inflammable liquid inside the battery.**




15BRXOM0005

5) **HANGER** (item 8)
This warning label is located on the left side of the bumper on the rear side of the frame.

**⚠ Please see Page 1-18 of the manual for safe hauling.**

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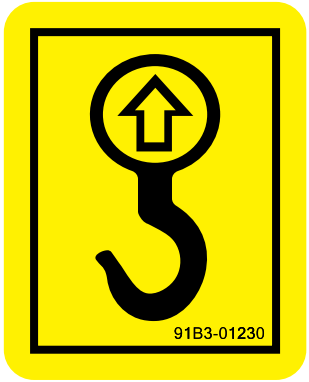
6) **HOOK** (item 9)
This label is attached to the point of installing the hook during the lifting process.

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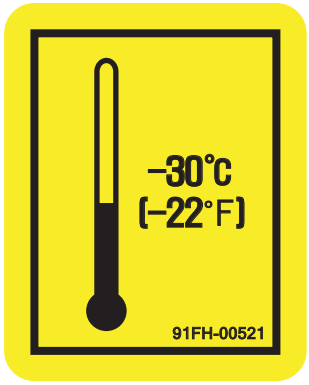
### 7) TEMPERATURE (item 10)

This warning label is positioned on the side cover.

⚠ **Do not use when the temperature is -30˚C or less.**

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### 8) SAFETY INSTRUCTION (item 11)


15BRXOM0009-1

10) **HYDRAULIC OIL INJECTION UNIT** (item 16)

This label is located on the hydraulic oil injection unit of the dashboard.

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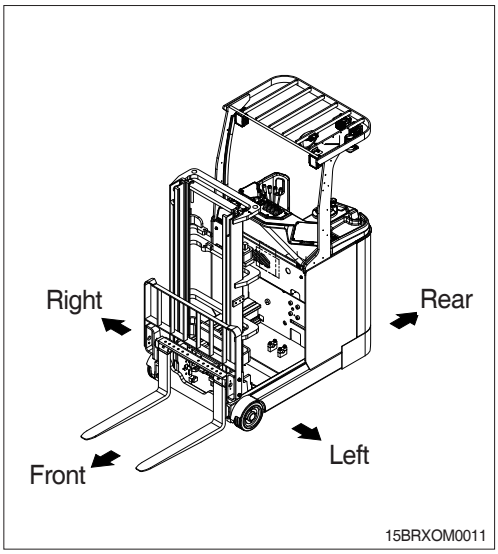
## 1. DIRECTION

The directions of this truck indicate forward, backward, right and left when truck is in the traveling direction.

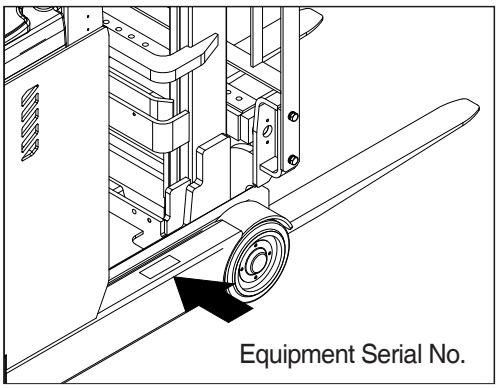



## 2. SERIAL NUMBER

Inform following when you order parts or the truck is out of order.

**1) TRUCK SERIAL NUMBER**

It is imprinted on the upper side of the leg on the right side of the frame.




## 3. SYMBOLS

**⚠ As the contents important for safety, symbols indicate the matters that can have critical impact.**

**⚠ It indicates matters which can cause the great loss on the truck or the surroundings.**

**※ It indicates the matters that can having impact to the performance or function of the parts, or useful information for the operator.**

## 4. HOW TO USE THIS MANUAL

This manual is a digest of essential information about the safe operation, the features, functions and maintenance of the equipment, and this manual is organized into eight parts.

「CHAPTER 1 SAFETY HINTS」 describes the general matters required for safe operation of the lift truck.

「CHAPTER 2 OPERATING HAZARDS」 warns of conditions that could cause damage to the truck or injury to the operator or other personnel.

「CHAPTER 3 KNOW YOUR TRUCK」 describes the major operating components, systems, controls, and other features of your truck and tells how they function.

「CHAPTER 4 OPERATOR MAINTENANCE AND CARE」 describes the daily safety and functional checks that the operator must perform.

「CHAPTER 5 STARTING AND OPERATING PROCEDURES」 describes the method of safe and efficient use of the equipment operated by the operator.

「CHAPTER 6 PLANNED MAINTENANCE」 describes the overall matters on checking and maintenance of the equipment.

「CHAPTER 7 SPECIFICATIONS」 provide information and data on the main parts of the equipment.

Take time to read and understand the information on general safety rules and operating hazards. Acquaint yourself with the various procedures in this manual.
Understand how all gauges, indicator lights, and controls function. Please contact your authorized HYUNDAI dealer for the answers to any questions you may have about your lift truck's features, operation, or manuals.

Operate your lift truck safely; careful driving is your responsibility. Drive defensively and think about the safety of people who are working nearby. Know your truck's capabilities and limitations. To prevent the harm to the operator and other workers, all instructions included in the manual must be followed, along with those described in Main Matters and Risks, etc.

## 5. SAFETY LABEL AND SYMBOLS

Please read this manual carefully before operating the truck.
The manual must be read consistently until proper operation is familiarized.

Safety label and signs are indicated in the manual and truck to provide necessary instructions and signs on possibility of accidents and risks to the operator, and preventive measures are also indicated. These instructions, labels and symbols must be familiarized and understood. In the case of not following these signs, it will result in not only damaging the truck, but also result in serious injury or even death of the operator and other workers. Please replace any damaged sign stickers.

⚠ **As the contents important for safety, symbols indicate the matters that can have critical impact.**

⚠ **It indicates matters which can cause the great loss on the truck or the surroundings.**

※ **It indicates the matters that can having impact to the parts or functions, or useful information for the operator.**

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## CHAPTER 1 SAFETY HINTS



## CHAPTER 2 OPERATING HAZARDS



## CHAPTER 3 KNOW YOUR TRUCK

## CHAPTER 4 OPERATOR MAINTENANCE AND CARE



## CHAPTER 5 STARTING AND OPERATING PROCEDURES



## CHAPTER 6 PLANNED MAINTENANCE



## CHAPTER 7 SPECIFICATIONS

# CHAPTER 1 SAFETY HINTS

## 1. DAILY INSPECTION

At the beginning of each shift, inspect your truck and fill out a check, maintenance and lubrication table. Check for damage and maintenance problems. Have repairs made before you operate the truck.

Do not make repairs yourself. Lift truck mechanics are trained professionals. They know how to make repairs safely.

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## 2. DO'S AND DON'TS


Do watch for pedestrians.

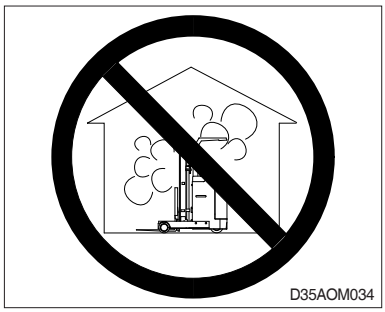

Do wear safety equipment when required.


Do not mix drugs or alcohol with your job. You can be punished according to the relevant laws and regulations.


Do not block safety or emergency equipment.


Do not smoke while charging or operating the truck.
It can result in fire.

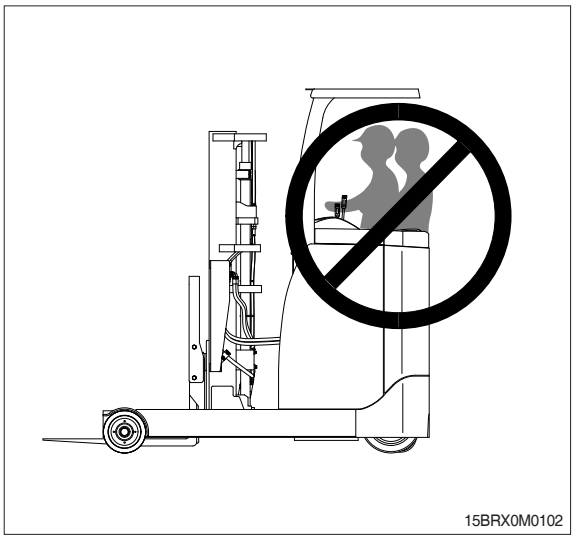

Do not operate the truck outdoors in rainy day.




Do not charge in indoor environment where ventilation is not performed.

## 3. NO RIDERS

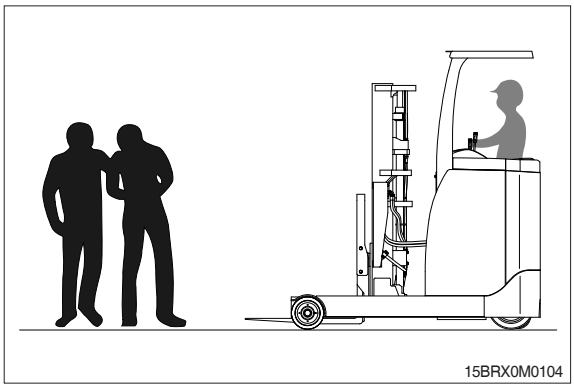
1) The operator is the only one who should be on a truck.




2) Never let anyone step on the forks.

## 4. PEDESTRIANS

1) Watch where you are going. Look in the direction of travel.
   Pedestrians may use the same roadway you do. Sound your horn at all intersections or blind spots.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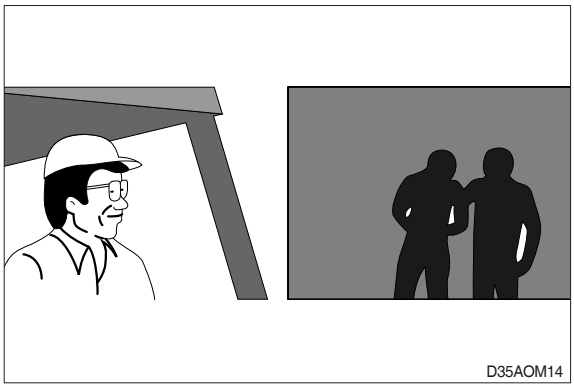
2) Watch for people in your work area even if your truck has warning lights or alarms. People may not watch for you.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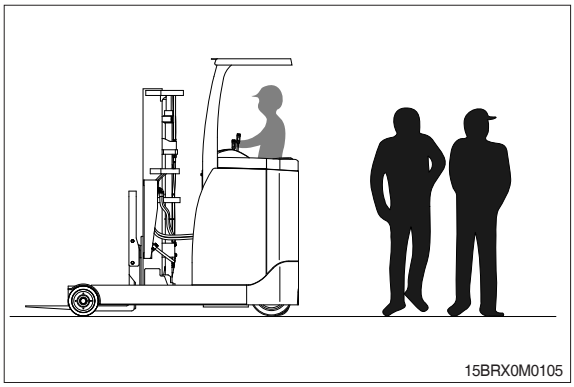
3) Watch for people standing back, even when you are parked.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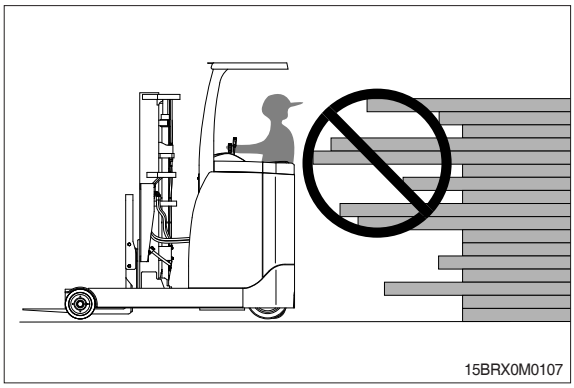
## 5. OPERATOR PROTECTION

1) Keep yourself under the overhead guard while operating.
2) Always keep your body on the seat within the confines of the truck.

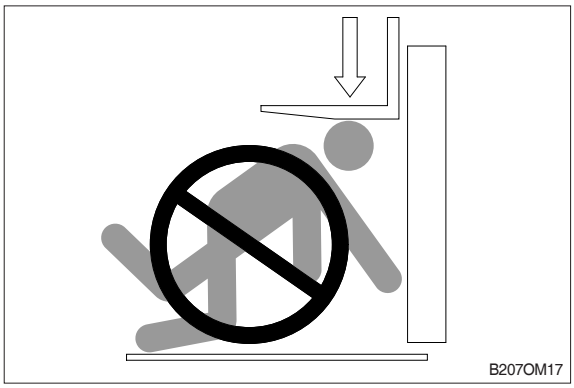
**⚠ Do not operate truck without the overhead guard, unless condition prevents use of it.**


3) Take special caution when driving backward or operating the truck in narrow space.

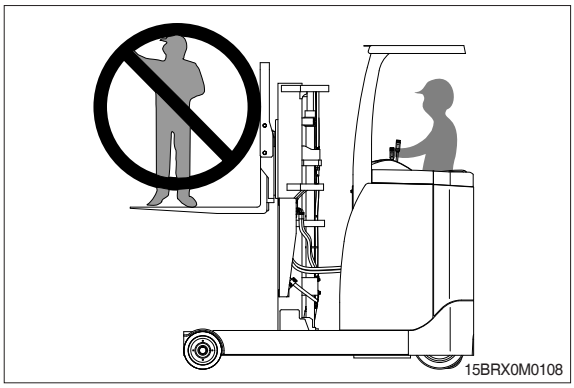


## 6. FORK SAFETY

⚠ Never allow anyone to walk under raised ever allow anyone to walk under raised forks.

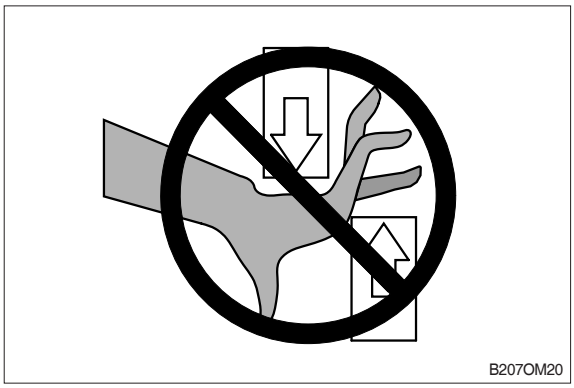



⚠ Do not use the folks of the truck as an elevator for work at high place.



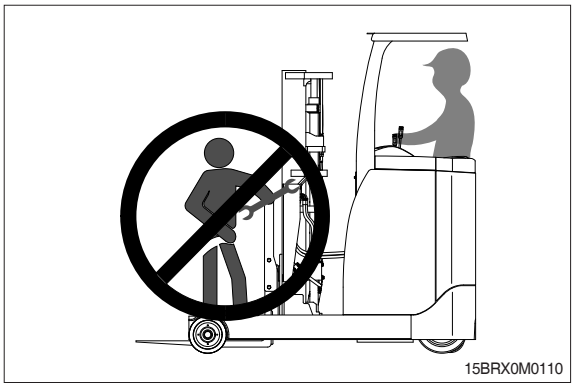
## 7. PINCH POINTS

⚠ Keep hands, feet and legs out of the mast.




⚠ Do not use the mast as a ladder.

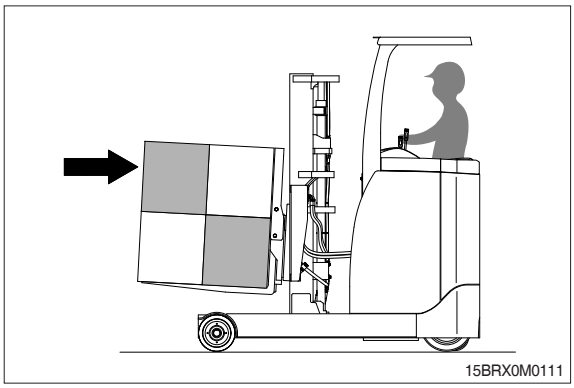

⚠ Never try to repair the mast, carriage, or attachment by yourself. Always get a trained mechanic.



## 8. SAFE OPERATION DURING CARGO LOADING

1) Follow the proper loading amount, tilt the mas backward at all times during travel, and travel with the load near the floor and the ground.

**⚠ Never lift or lower the load when the truck is in motion.**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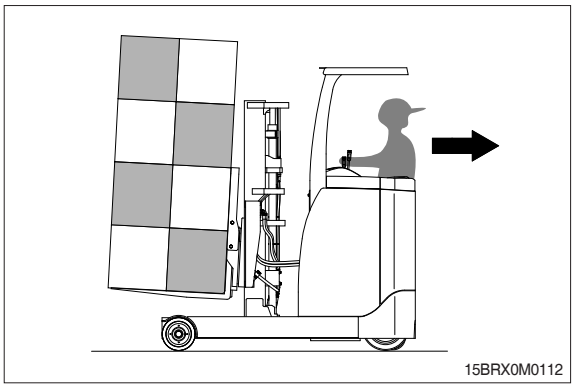
2) When handling bulky loads that restrict your vision operate your truck in reverse to improve visibility. Be sure to pivot in the seat to give maximum visibility.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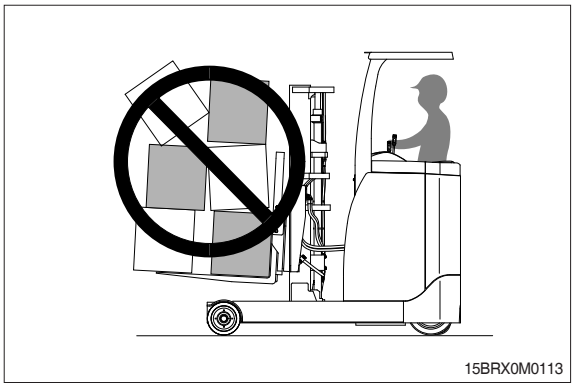
3) Unstable loads are a hazard to you and to your fellow workers.
Always make certain that the load is well stacked and evenly positioned across both forks. Never attempt to lift a load with only one fork.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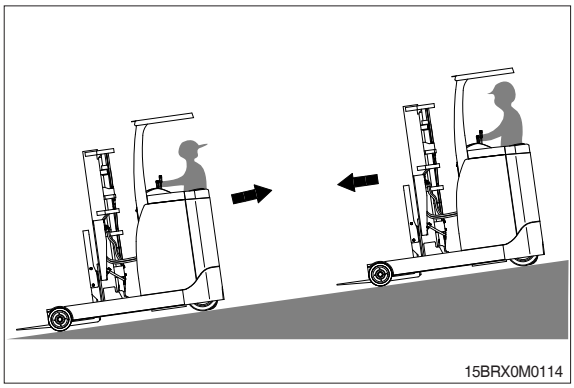
## 9. GRADES, RAMPS, SLOPES AND INCLINES

⚠ **Never turn on a grade, either loaded or unloaded.**

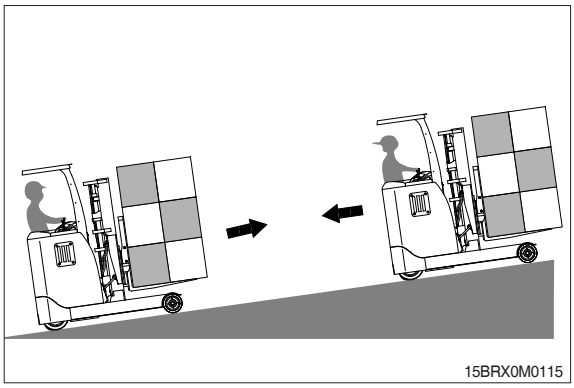
**1) UNLOADED**

Forks downgrade




**2) Loaded**

Travel with the fork in the upper direction.



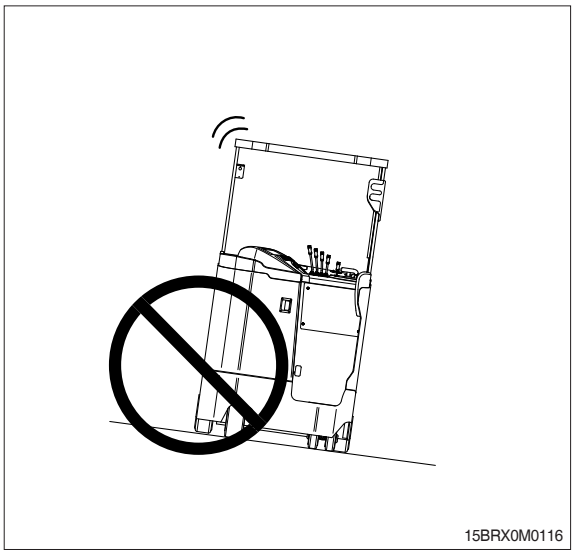
## 10. TIP OVER (OVERTURN)

### 1) LATERAL TIP OVER

(1) Lateral tip over can occur with a combination of speed and sharpness of turn. This combination will exceed the stability of the truck. This condition is even more likely with an unloaded truck.

(2) With the load or mast raised, lateral tip over can occur while turning and/or braking when traveling in reverse or accelerating and turning while traveling forward.

(3) Lateral tip over can occur loaded or unloaded by turning on an incline or ramp.



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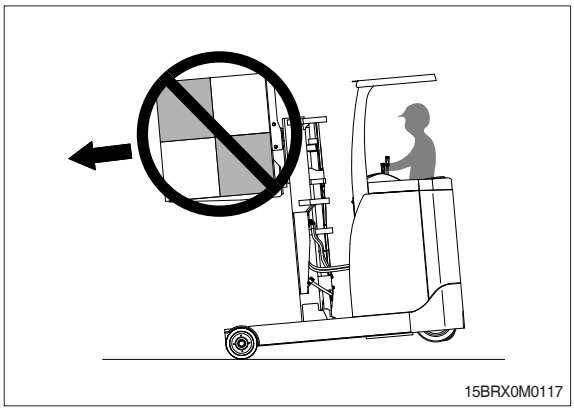
### 2) LONGITUDINAL TIP OVER

(1) Longitudinal tip over can occur with combination of overloading and load elevated. This condition is even more likely with excessive forward tilt, braking in forward travel or accelerating rearward.

(2) Longitudinal tip over can occur by driving with the load down slope on a steep grade. Lateral and longitudinal tip over can occur if the truck is driven over objects on the floor or ground, off the edge of improved surfaces, or into potholes in the road surface, or by running into overhead objects or collisions. An off dock type of tip over can occur if the truck is steered too close to the dock edge, driven off the edge of the dock or ramp, or if the highway truck or trailer rolls away from the dock or is driven away during loading.



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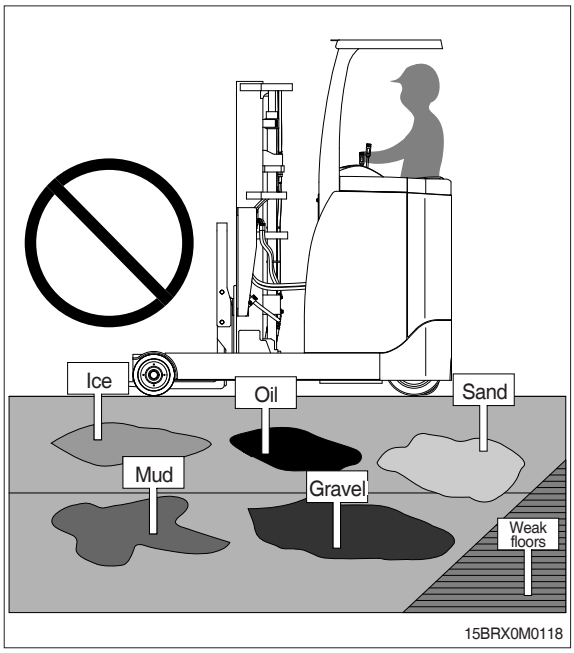
**⚠ The conditions listed above can be further aggravated by overloading, excessive tilt, or off center loads.**

**⚠ Lift truck tip over can cause serious injury or death if the operator is trapped between the truck and the ground.**

## 11. SURFACE AND CAPACITY

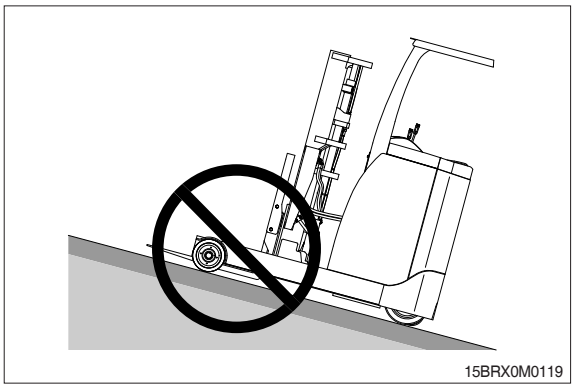
Avoid these conditions shown on the right. They can cause a truck to tip over or lose traction for braking or driving.

⚠ **Know the weight of your truck and load, and especially when using elevators, know the capacity of the elevator you intend to use. Do not overload.**

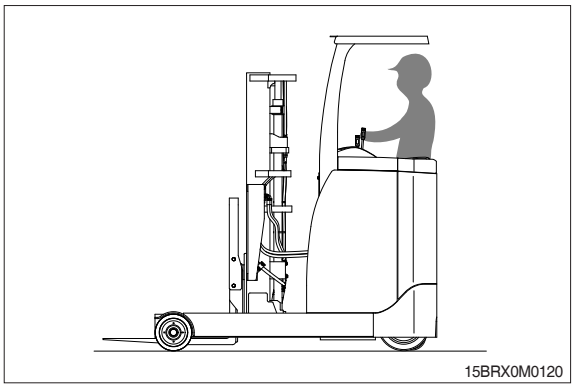


## 12. PARKING

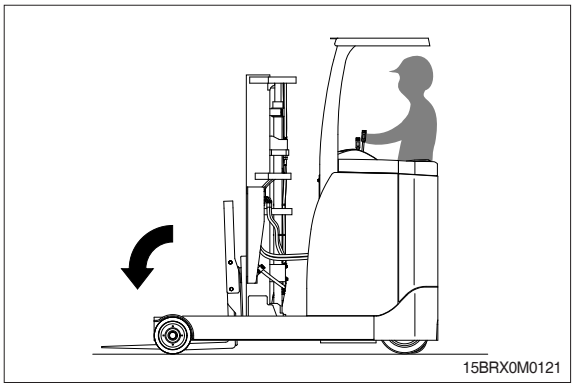
1) Never park on a grade.



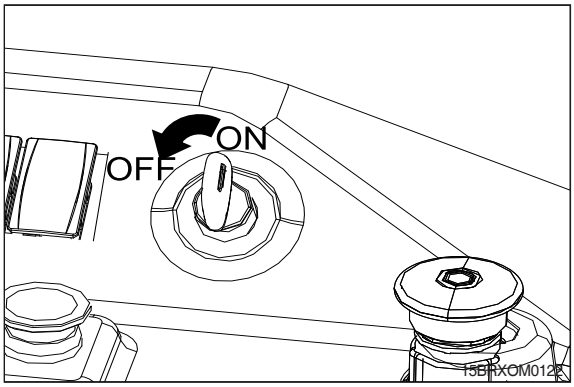

2) Always check that the truck comes to a complete stop before leaving truck. Be sure the travel control is in NEUTRAL.




3) Lower forks fully to the floor and tilt mast forward




4) Turn start key to OFF position.



## 13. LIFTING, JACK-UP AND BLOCKING

⚠ Lifting or Jack-up of large-scale equipment such as the lift truck can cause risk during the work, so special caution and preventive measures are required.

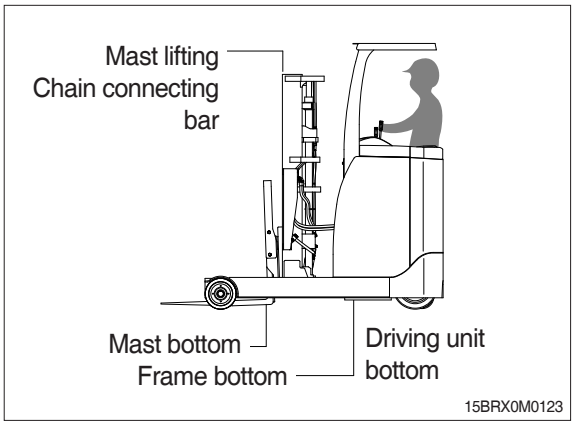
### 1) SAFE PARKING

(1) Park the lift truck on a flat and firm surface.
(2) Erect the mast vertical, and fully lower the forks or the attachment.
(3) Put all controls in NEUTRAL, and turn the start switch to OFF position to withdraw the key.
(4) Apply the parking brake, and keep the tires stationary with blocks.

**⚠ Defective truck may cause accident. All tools and lifting devices must maintain the normal state, and satisfy the standard of proper loading capacity.**

### 2) POSITIONS OF LIFTING, FIXING AND JACK-UP

See the figure for fixing sections of the truck during work of lifting, fixing and jack-up. Fully understand lifting, fixing and jack-up procedures, and perform the procedures precisely and safely.




### 3) LIFTING WITH CRANE

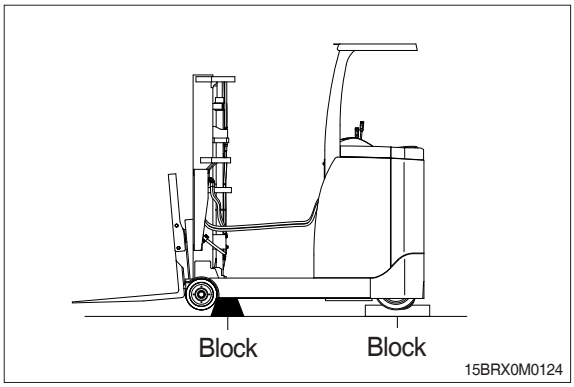
Lift the front part of the truck with a crane to install the block below the frame.

**⚠ Look carefully whether the truck maintains the balance during the lifting. The truck may tip over to the left or the right. Support both sides of the truck or the overhead guard, or use the guide to prevent tip over.**

(1) Park the truck safely, and install blocks on the rear wheels (steering wheels).
(2) Tie the outer master rails with two chains respectively to lift the front of the truck by making use of the mast.

**⚠ Make sure that capacity of the chain or the crane is sufficient for lifting the truck before lifting the truck. Refer to the nameplate on the truck.**

(3) Slowly lift the truck, and then lower the truck slowly onto blocks under the frame.
(4) Once maintenance is complete, perform the lifting procedures in reverse order to safely lower the truck. Care should be exercised to prevent tools or other devices left under the wheels.



### 4) LIFTING AND FASTENING THE MAST

(1) Part the lift truck safely.

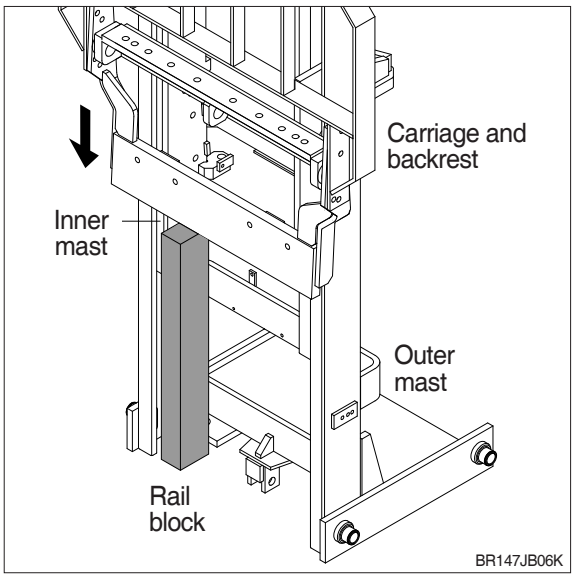
(2) Install blocks on the front and the rear of the load wheel.
Move two supporting blocks near the mast rail before lifting the mast.

(3) Use two strong wooden blocks of 1100 mm in length or in the length of about 300 mm or 600 mm.

※ **The block length may require to be reduced on the standard mast.**
**As shown in the illustration, the carriage may be fixed on the block on the 3-stage mast.**

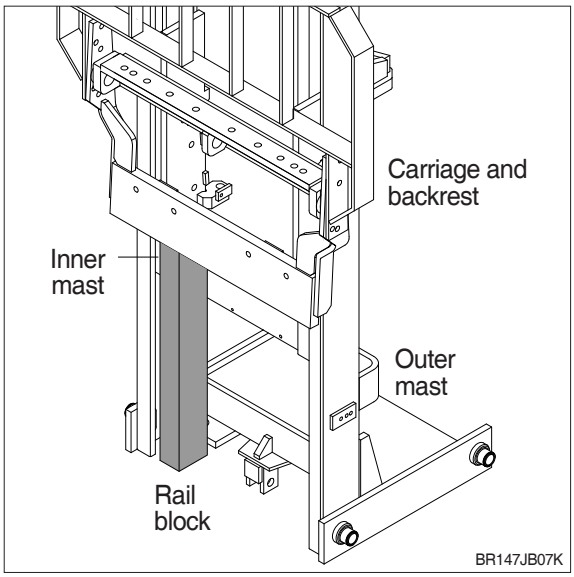
(4) Start the engine, and ascend the mast and the carriage.

(5) Fix the long block on the inner rail, and lower the mast until the carriage is settled on the block.




(6) Fix the short block on the inner rail, and lower the mast until the inner rail is settled.

(7) Perform the work in reverse order as indicated above to remove the block.



### 5) LIFTING REAR SIDE OF THE TRUCK

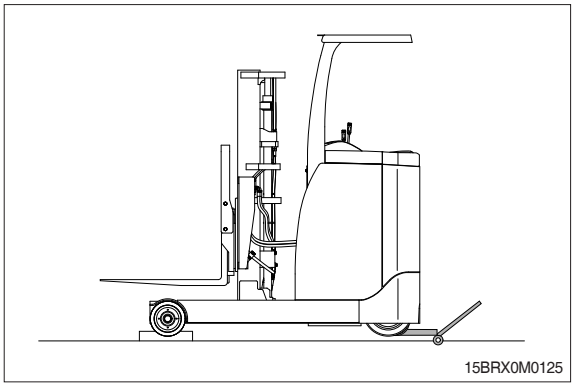
Block can the installed below the frame on back of the truck or jack-up for lifting.

(1) Part the lift truck safely. Block is installed on the front and rear side of the load wheel.

(2) Install the floor jack on the frame unit.

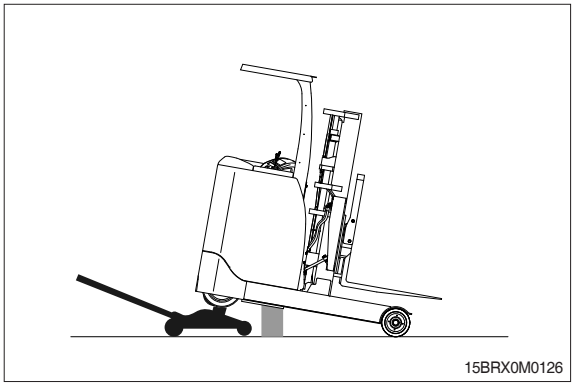
※ **If there is no space sufficient for installing the jack under the frame, move the truck over the seam to secure required space.**

(3) Lift the truck to the least height for allowing maintenance.




(4) Install blocks in same number on both sides of the truck to keep the block balanced for operation.

⚠ **Make sure that blocks are safely installed before beginning maintenance.**




(5) After finishing the maintenance, perform the work in the reverse order of the above process to lower the rear side of the truck to the ground.
Lower one side of the truck by 50 ㎜ each.
- Place jack under the frame bottom to lift the truck.
- Carefully remove blocks, and lower the truck.
- Remove jack and blocks from the driving wheel.

### 6) LIFTING ENTIRE TRUCK

The truck weight is indicated on the nameplate.

(1) Part the lift truck safely.

(2) Park the truck on board, if required, to expand gap from the ground.

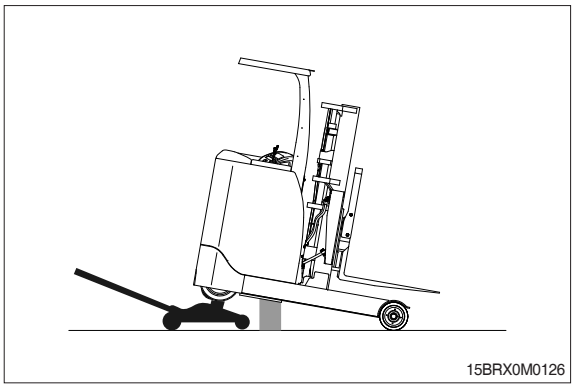
⚠ **LATERAL TIP OVER**

**When lifting one side of the truck, adjust the opposite side of the lifted side from having the difference of 50 ㎜ or more to prevent lateral tip over.**

(3) Install the jack on the bottom of the side frame.

※ **Correctly install jack on the bottom of the main side frame.**

(4) Lift in one direction at a time alternately in opposite direction up to 150 ㎜ for maintenance work.


15BRX0M0126

(5) Install the block on the bottom of the bumper on the rear side of the frame. Install the block near the steering wheel and load wheel for stabilization as much as possible.

(6) When only one jack is used, put the truck on blocks, and then move the jack to the opposite side to work.

(7) Repeat individual lifting procedures.
Use the block of same size to maintain the flatness.

⚠ **Correctly install jack on the bottom of the main side frame.**

(8) After finishing the maintenance lower the entire truck safely to the ground in the reverse order of lifting.
Remove the block carefully from each direction at a time. Check for any tools or other equipment below the truck or the wheel.

※ **A number of seams may be required to install under tires dependent upon the height of jack.**

### 7) HOW TO FASTEN THE TRUCK WHEN SHIPPING

**(1) Front of truck**

**① Mast and carriage mounted**

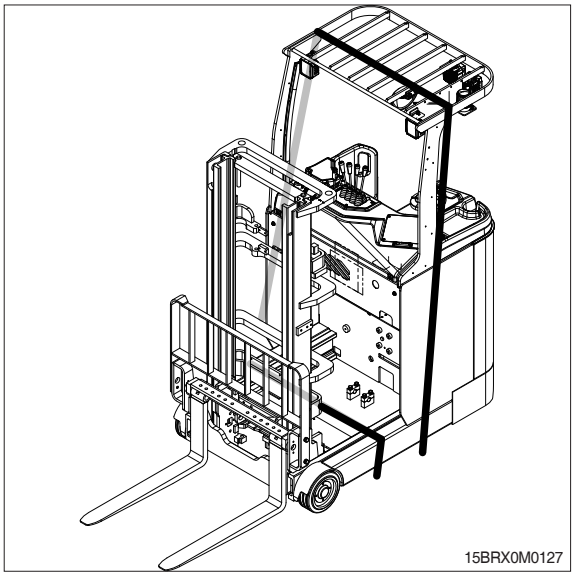
a. Fully lower the carriage.

b. Use the chain or sling belt to fix the truck.

**② Mast and carriage not mounted**

a. Install chain over the floor plate of the truck,

※ **When using the chain, use a chain with the protective cover, or install the protective material on the contact part with the truck to prevent the truck from damage by the chain.**


15BRX0M0127

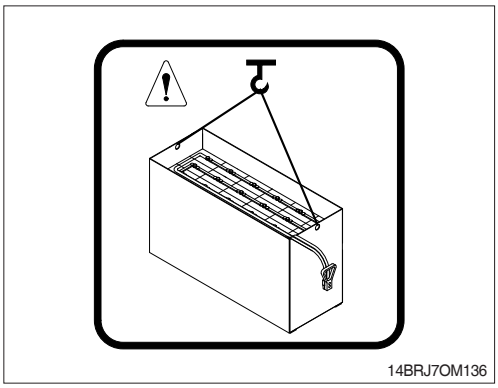
**(2) Rear of truck**

Fix by using the chain or sling belt on the upper part of the head guard.

## 14. LIFTING OF LIFT TRUCK

1) Check the weight, the full length, the full width, and the full height before lifting the truck.

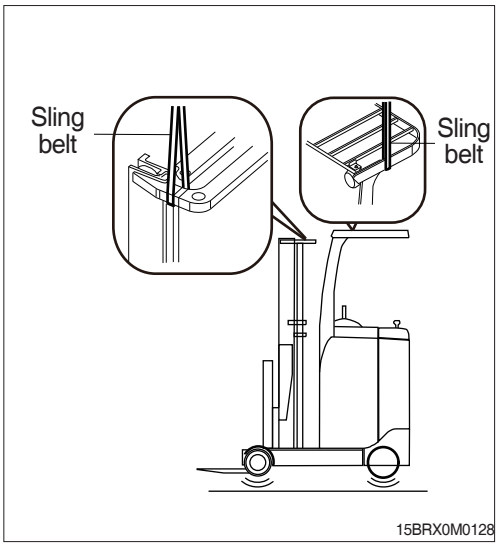
⚠ **The battery should be removed before lifting the lift truck. Lifting the truck without removing the battery can cause serious casualties or truck damage due to electric shock or electrolyte leakage.**
**Please see Page 7-20 for the method of removing the battery.**




2) Check the truck weight, and consider the position and lifting part of the crane to select the appropriate sling belt, and check for any damages.

3) Position a crane at adequate place.

4) Install the sling belt as illustrated on the right.




⚠ **Use the sling belt and lifting tools without damage, and product certified with sufficient strength.**

⚠ **Do not apply load suddenly on the sling belt and lifting tool.**

⚠ **Prevent access of people under the lift truck during lifting, and to surroundings of the truck.**

⚠ **Inappropriate lifting method or use of the sling belt may result in falling of the truck during lifting to cause casualties or truck damage.**

⚠ **Connect the sling belt only on the locations indicated on the lifting label. There may be risk of truck falling when the belt is connected and lifted on the inappropriate position.**

⚠ **Lifting of the lift truck should safely be done upon instructions of skilled engineer.**

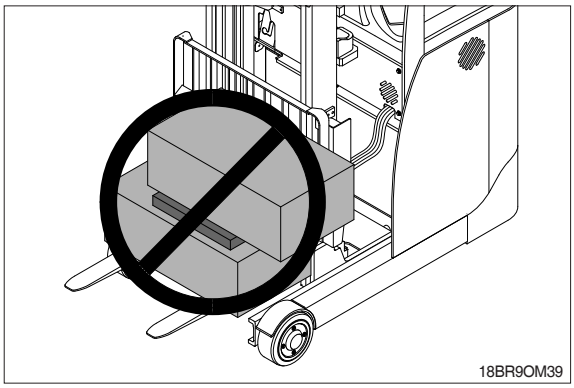
⚠ **If you have any trouble for lifting, please call the service center.**

# CHAPTER 2 OPERATING HAZARDS

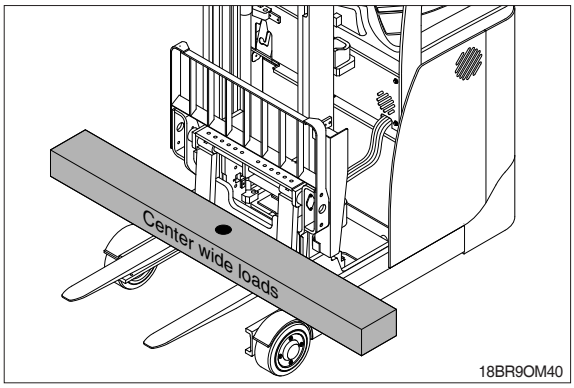
## 1. LOOSE LOADS

**⚠ Unstable loading can cause accidents. Observe these precautions.**

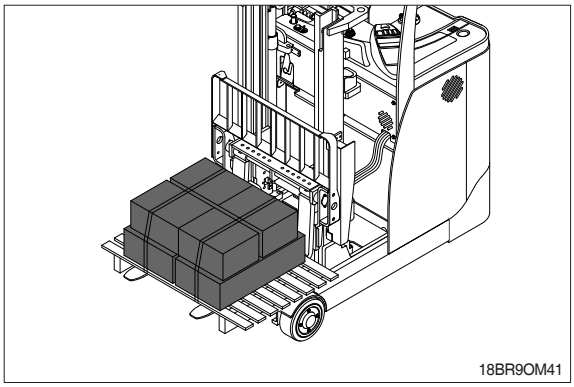
Do not carry loads that are unstable or unbalanced.




Place the long and wide load balanced in the center.




Stack and band loose material.

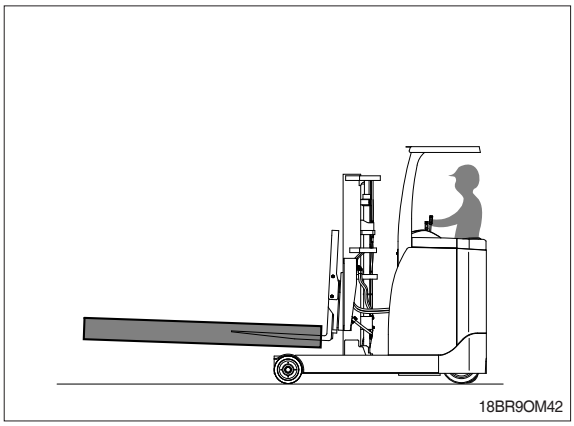


## 2. LONG AND WIDE LOADS

⚠ With long or wide loads, you need more room. When lowering the load, caution must be taken on the gap clearance with the floor to lower slowly.

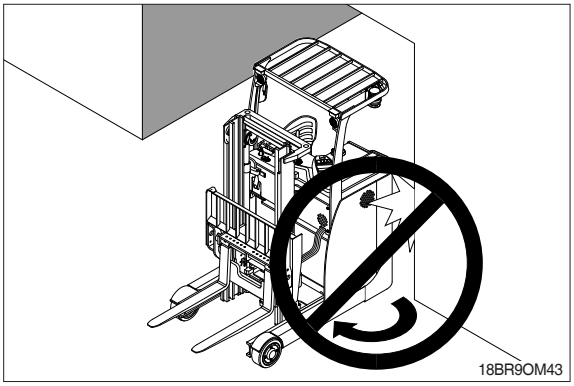
※ When traveling with the long material lifted, special caution is required to prevent the end of the load from colliding with the surroundings while turning the truck.

⚠ Long load shall be loaded in proper loading capacity on the truck. The proper loading capacity of the truck must be identified in advance.



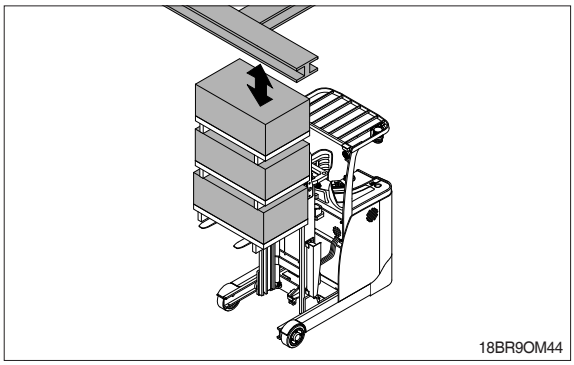

## 3. CAUTION ON TURNING

⚠ When turning, be sure the rear end of the truck does not swing into racks, the truck does not swing into racks, posts, etc.

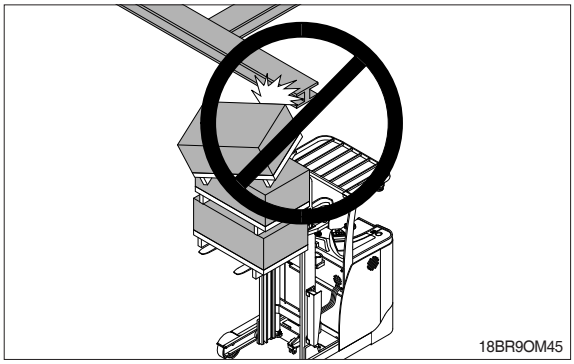


## 4. LOW OVERHEAD CLEARANCE

⚠ Identify the truck height in advance and check the height clearance. Reduce the load as much as possible, and tilt back during travel.

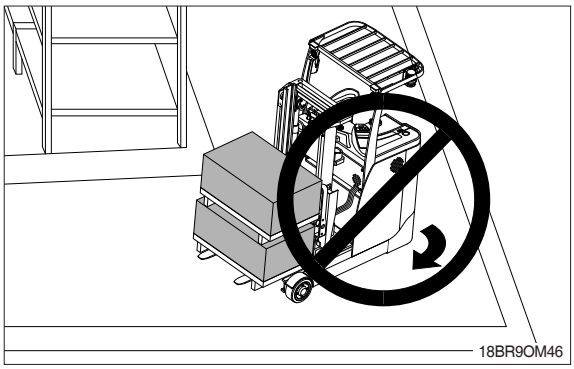



⚠ Watch overhead clearance
Moving into overhead structures can tip a truck over, or spill a load.



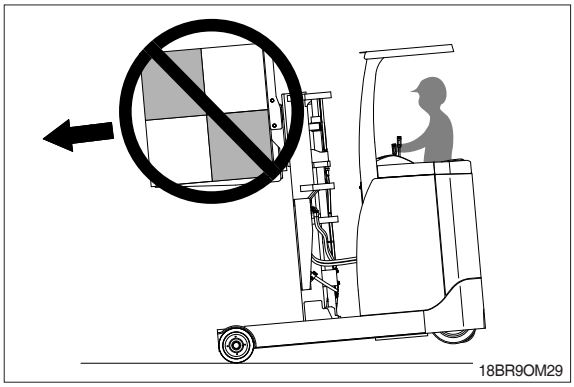

## 5. FAST TURNS AND HIGH LOADS

⚠ Slow down before turning.
The truck can tip over.



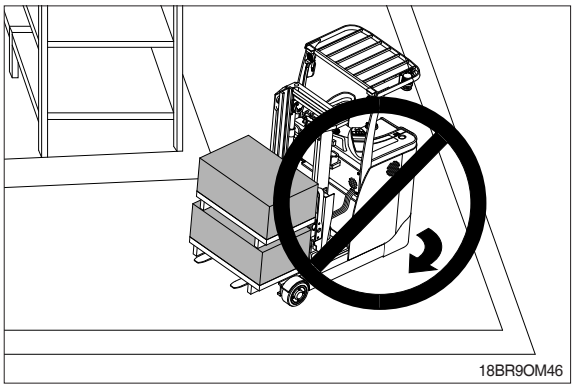

⚠ Turn too sharp with a raised load and your truck can tip even at slow speeds.

The truck may be unstable when the fork is lifted up. Operate the truck with the fork lifted only when lowering or loading the load.



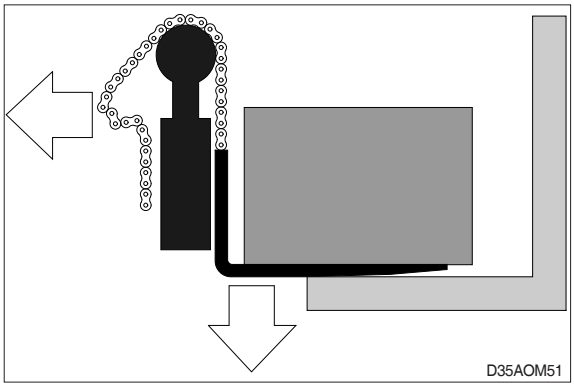
## 6. RIGHT ANGLE STACKING

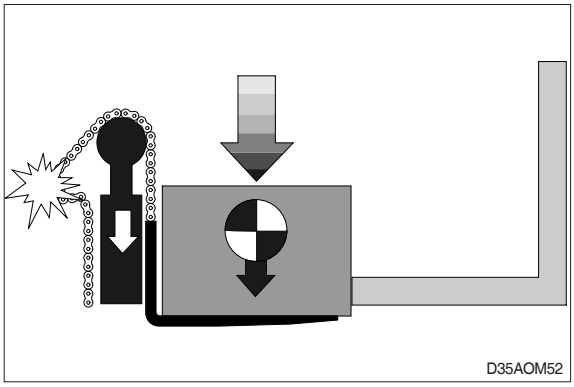
⚠ When right angle stacking or moving with a raised load to clear low objects, avoid sharp turns and move slowly.




## 7. CHAIN SLACK

⚠ Slack chains mean rail or carriage hang-up. Raise the forks before you move, or broken chains can result.

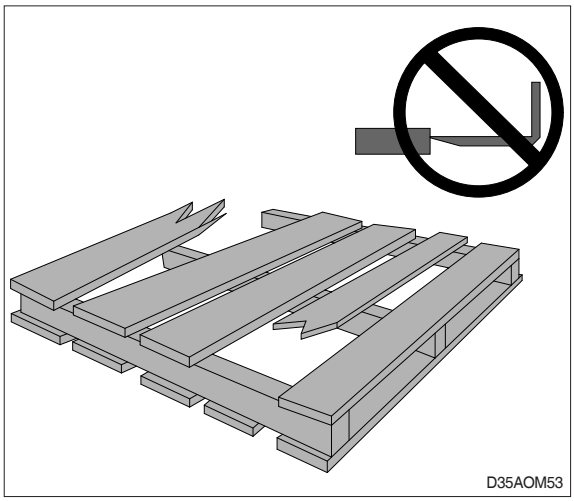


## 8. PALLETS AND SKIDS

⚠ Do not move or store materials on damaged pallets. It can result in load falling to cause accidents.

⚠ Check for any abnormal pallet or skids.

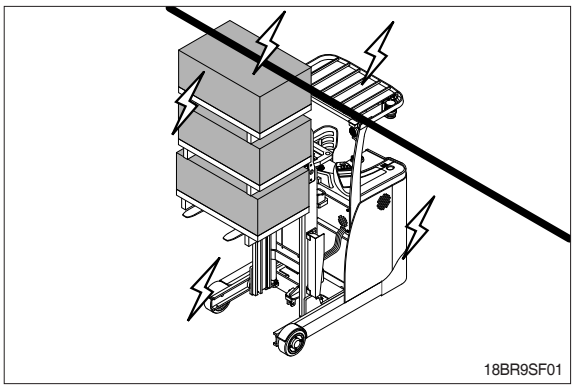



## 9. CAUTION FOR ELECTRIC LINES

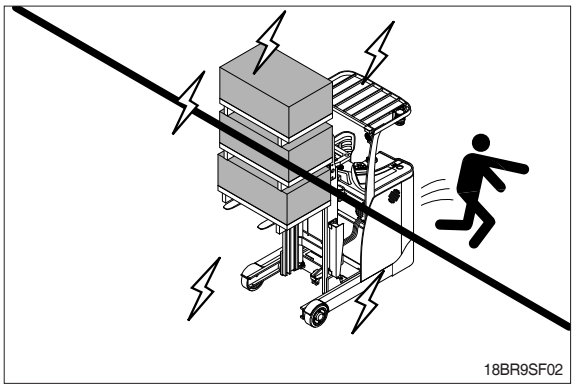
⚠ When the mast must be increased and moved, take special caution on not having the mast in contact with the electric lines.

⚠ If possible, avoid work near the electric lines, and set the work range in advance to perform the work for preventing electric shock.

| Supply voltage | Min. safe distance |
|---|---|
| 6.6 kV | 3 m |
| 33.0 kV | 4 m |
| 66.0 kV | 5 m |
| 154.0 kV | 8 m |
| 275.0 kV | 10 m |




⚠ If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current.
Jump off the machine without contacting the machine when you need to get off.



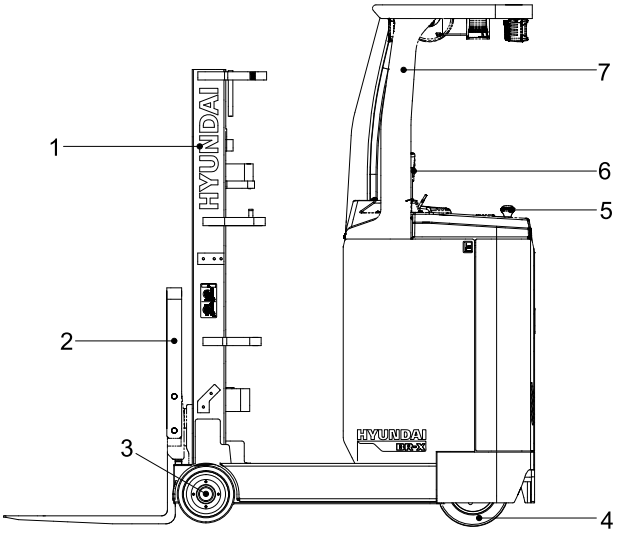
## 10. SOLID TIRE

1) Do not drive over 25 km/h.
2) Do not drive over 8km per hour.
3) Do not drive on the road for automobiles.
4) Have sufficient time for emitting heat on continuous driving. (Example: Heat emitting for one hour after continuous driving for two hours)

⚠ **Non-compliance of the above matters shall be excluded from warranty.**

# CHAPTER 3 KNOW YOUR TRUCK

## 1. GENERAL LOCATIONS



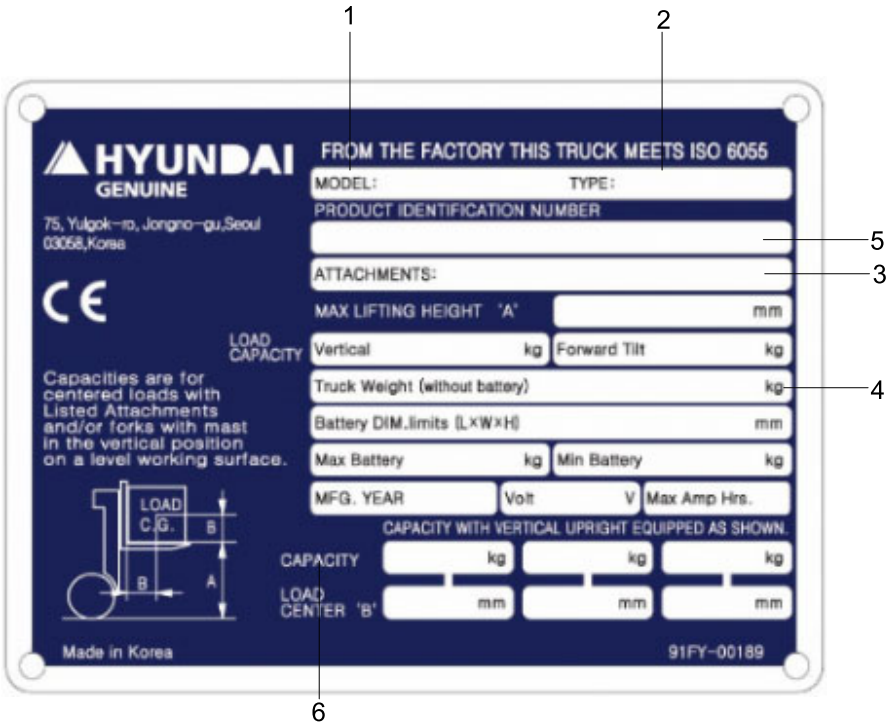

15BRX0M0301

Type : Electric-powered, 48V

| | | | | | |
|---|---|---|---|---|---|
| 1 | Mast | 4 | Driving unit | 7 | Overhead guard |
| 2 | Carriage and backrest | 5 | Steering wheel | | |
| 3 | Road tire | 6 | Operating lever | | |

## 2. TRUCK NAMEPLATE AND LABEL

### 1) TRUCK NAMEPLATE




**(1) Truck model name**

**(2) Type**

Truck type such as diesel, LPG and electric-powered is indicated.

**(3) Attachments** (Applicable if mounted)

The user must be aware whether the information on the additional devices and equipment weight and capacity when mounting the additional device are indicated on the truck.

**(4) Truck weight**

The approximate weight of the truck without load is indicated. This weight plus the weight of the load must be determined when operating on elevators, elevated floors, etc. to be sure they are safe.

**(5) Serial number**

An identification number assigned to this particular lift truck and should be used when requesting information or ordering service parts for this truck from your authorized HYUNDAI dealer. The serial number is imprinted on the upper side of the leg on the right side of the frame.

**(6) Capacity**

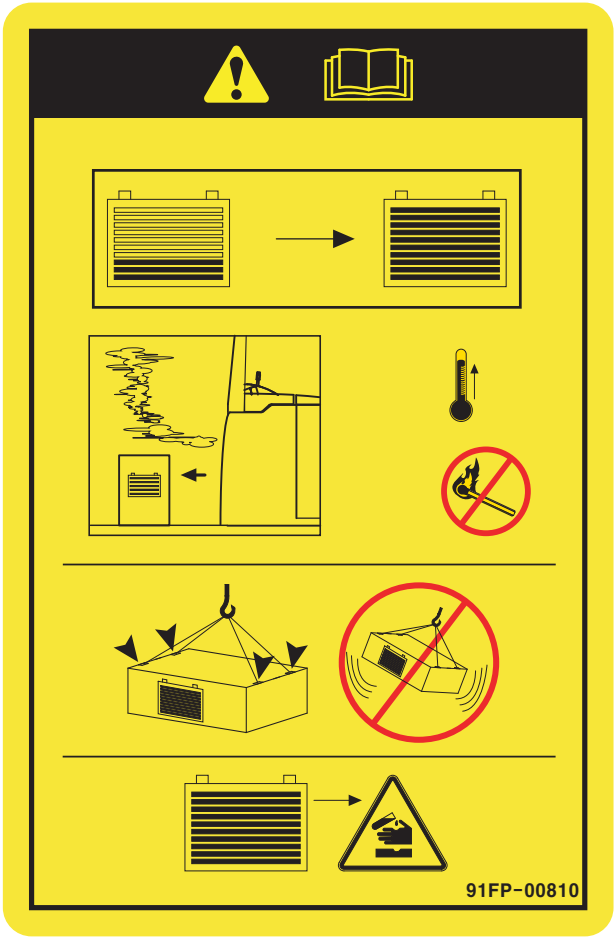
The maximum loading capacity of the truck is indicated.

In addition, the load center and maximum lifting height, etc. are described. The name plate must be identified and referred during truck use.

**⚠ Before modifications that affect the stability of safety systems are made only after obtaining written approval from HYUNDAI. Contact your authorized HYUNDAI dealer for a new nameplate showing the revised capacity.**

## 2) OPERATOR SAFETY WARNING LABEL


## 3) BATTERY HANDLING CAUTION



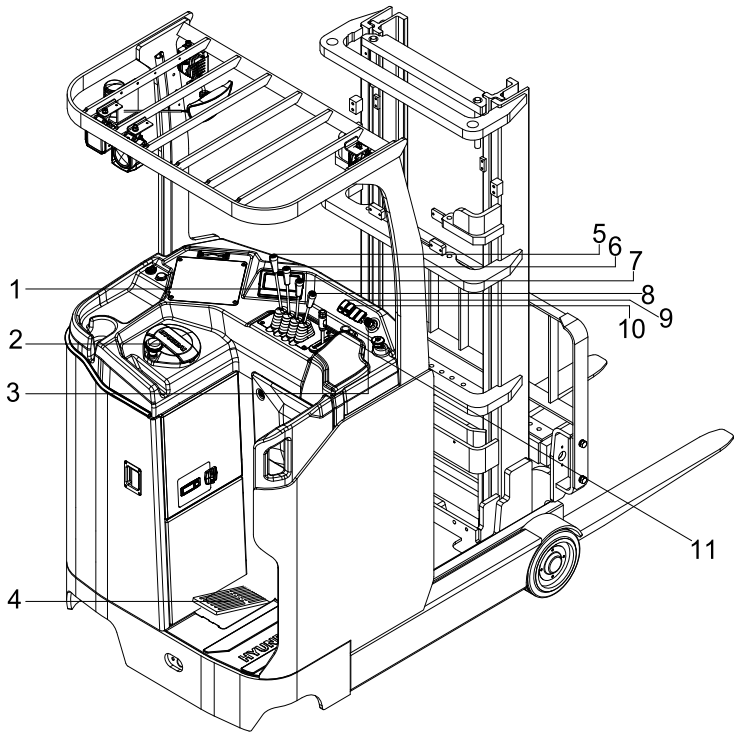
### 4) HAND CAUTION LABEL


This label is attached to the mast, and provides warning on the risk of safety accidents when operating the rail, chain, sheave, fork carriage and mast.
Climbing up the mast or having part of the body in contact with the mast operating unit can result in serious injury or casualties.

### 5) MAST WARNING LABEL

This safety label is indicated on the mast, and provides warning on the risk of safety accidents when the fork is lifted.
Do not stand below or get on the lifted fork or working device. The fork may be lowered, and it can cause injury or even death.
The fork must be lowered below the knees at all times when the lift truck is not loaded.

## 3. CLUSTER AND CONTROL DEVICES




15BRXOM0302

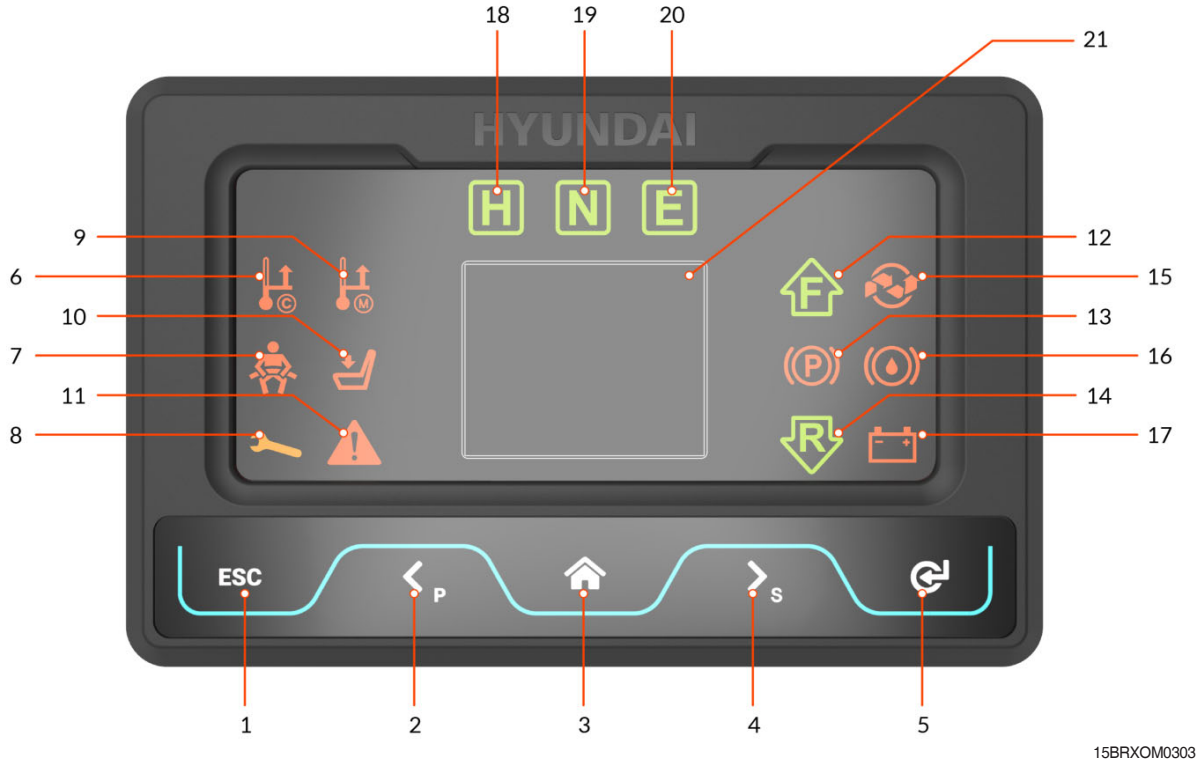
| | | | | | |
|---|---|---|---|---|---|
| 1 | Cluster | 5 | Lift lever | 9 | Headlight switch |
| 2 | Steering wheel | 6 | Tilt lever | 10 | Warning lamp switch |
| 3 | Start switch | 7 | Reach lever | 11 | Forward/Backward lever |
| 4 | Brake pedal | 8 | Attachment lever (option) | | |

**※ Control devices and safe operating methods must be understood.**

## 4. CLUSTER

### 1) STRUCTURE

The cluster is installed with 15 red, green and yellow LEDs. The driver can identify the truck condition conveniently through this LED.




15BRXOM0303

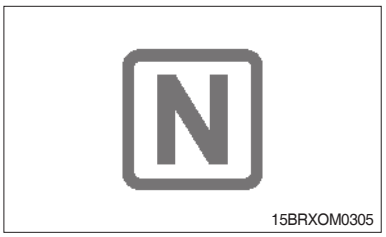
| | | | | | |
|---|---|---|---|---|---|
| 1 | ESC button | 8 | Wrench warning lamp | 15 | Consumable exchange lamp |
| 2 | Left/power mode change button | 9 | Motor high-temperature warning lamp | 16 | Brake oil lamp |
| 3 | Home button | 10 | Seat lamp | 17 | Battery level lamp |
| 4 | Right/speed mode button | 11 | Warning lamp | 18 | Hi mode lamp |
| 5 | Enter button | 12 | Forward driving lamp | 19 | Normal mode lamp |
| 6 | Controller high-temperature warning lamp | 13 | Parking brake lamp | 20 | ECO mode lamp |
| 7 | Seat belt warning lamp | 14 | Reverse driving lamp | 21 | LCD function |

## 2) WARNING LAMP

### (1) Hi mode lamp


Lights up when Power Mode is HIGH.

### (2) Normal mode lamp

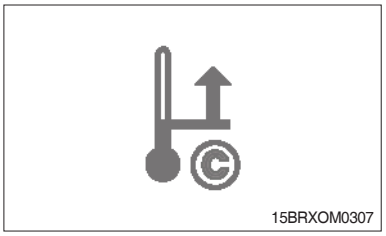



Lights up when Power Mode is NORMAL.

### (3) ECO mode lamp

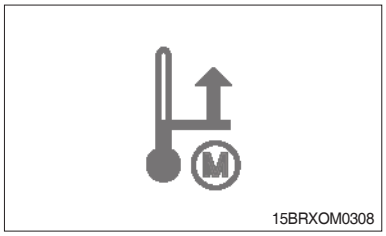

Lights up when Power Mode is in ECO.

### (4) Controller high-temperature lamp




Lights up when the controller is in high temperature.

### (5) Motor high-temperature lamp




Lights up when the motor is in high temperature.

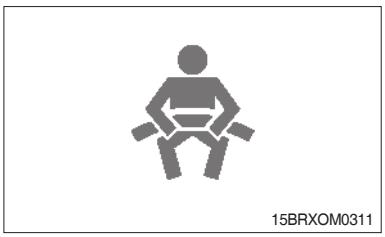
### (6) 12 Forward driving lamp


Lights up when the truck is driving forward.

### (7) Consumable exchange lamp

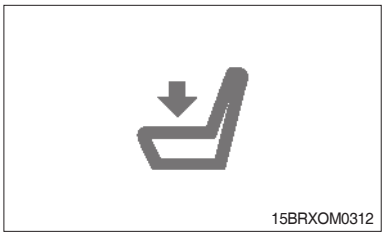

Lights up when the consumable must be replaced.

### (8) Safety belt warning lamp




Lights up when the safety belt is not tightened.

### (9) Seat lamp

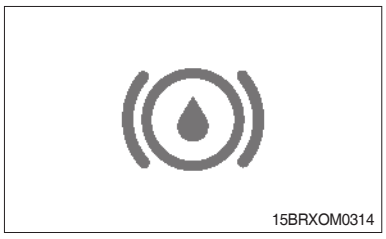



Lights up when the driver is not seated on the driver's seat.

### (10) Parking brake lamp

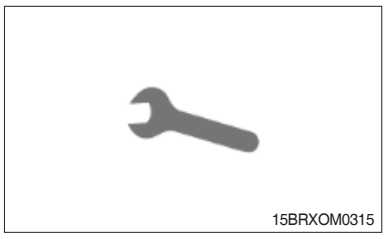

Lights up when parking brake is applied.

### (11) Brake oil lamp



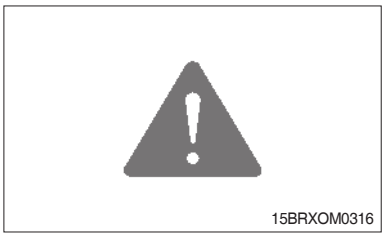

Lights up when brake oil level is low.

### (12) Wrench lamp




Lights up when the truck is in abnormal state.

### (13) Warning lamp

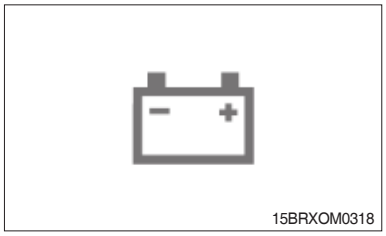



Lights up when the truck is in abnormal state.

### (14) Reverse driving lamp


Lights up when the truck is driving in reverse.

### (15) Battery level lamp




Lights up when the remaining battery amount is low.

### 3) BUTTON

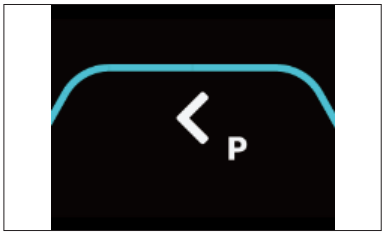
The buttons are used to change or select the cluster menu.

#### (1) ESC button


15BRXOM0319

Pressed to cancel or to exit the menu.

#### (2) Left/power mode change button




15BRXOM0320

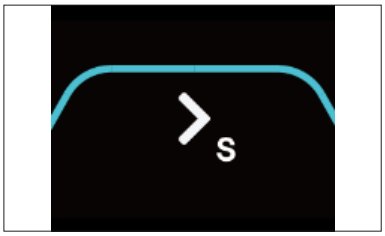
Pressed to move to the left or up.
Also used to change to the Power Mode. (H/N/E)

#### (3) Home button

15BRXOM0321

Pressed to move to the menu from the Home screen.
Also used to move from the menu screen to Home.

#### (4) Right/speed mode change button




15BRXOM0322

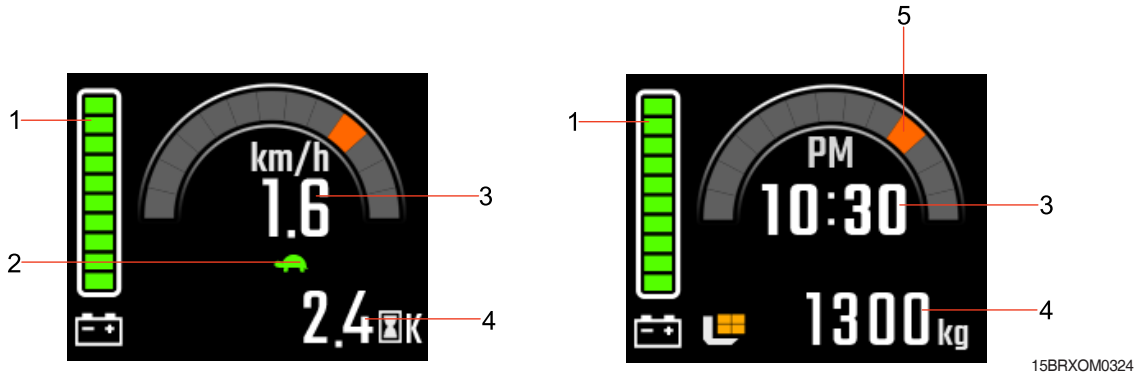
Press when moving to menus on the right or to the lower menu.
Also used to change to the speed mode.
(When changing to the Turtle / Rabbit Mode)

#### (5) Enter button

15BRXOM0323

Pressed when entering the menu.

## 4) LCD FUNCTION




1 BDI (Battery Discharge Indicator)
2 Speed mode (Turtle or Rabbit)
3 Truck speed / current time
4 Hour meter / weight indicator
5 Steering angle indicator

### (1) BDI (Battery Discharge Indicator)

The battery charging state is indicated in 10 bars, and one bar shows 10% of battery charge. When the battery is discharged, the bar is turned OFF in order according to the charging ratio of the battery to indicate the remaining battery amount.

| BDI % | Battery Bar | Color |
|---|---|---|
| 91 - 100 | 10 | Green |
| 81 - 90 | 9 | |
| 71 - 80 | 8 | |
| 61 - 70 | 7 | |
| 51 - 60 | 6 | |
| 41 - 50 | 5 | |
| 31 - 40 | 4 | Orange |
| 21 - 30 | 3 | |
| 11 - 20 | 2 | Red |
| 1 - 10 | 1 | |

### (2) Speed mode

Turtle mode is normally in OFF state. When this symbol is shown, the Turtle mode is operated regardless of the Power mode of the lift truck to reduce the maximum speed to the set value. By pressing the button, this mode is operated.

### (3) Truck speed / current time

1. During operation - Truck speed is indicated in numbers. Unit can be changed to km/h or mph according to the cluster setting.
2. Stopped - When the truck is stopped, the current time is indicated according to the cluster setting.

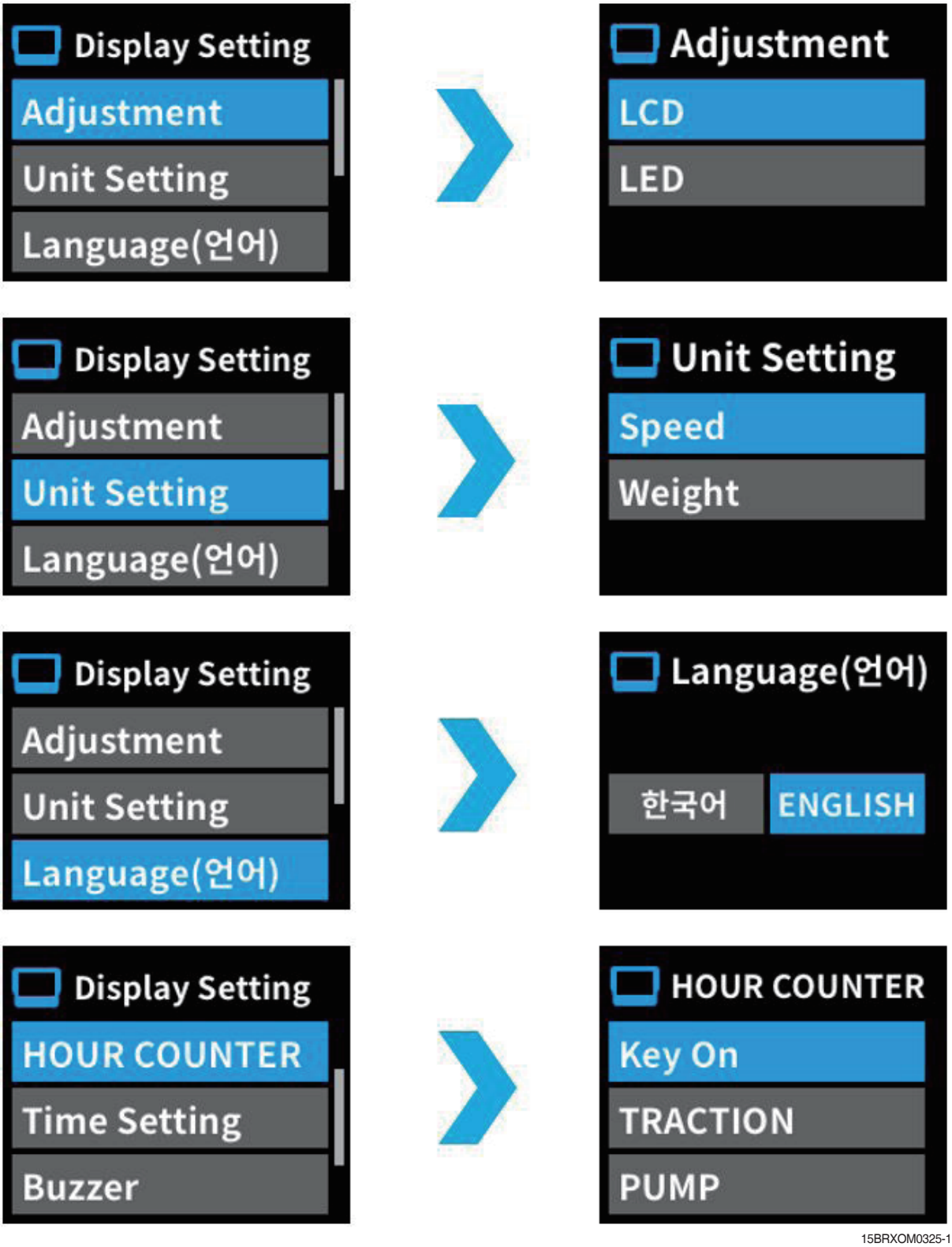
### (4) Hour meter / weight indicator

1. Unloaded - Working time is indicated in numbers. For the meaning of the alphabet next to the number,
   K : Time from turning the key on the truck
   T : Driving time detected through the driving motor
   P : Pump use time detected through the pump motor
2. Loaded - The loaded weight is indicated

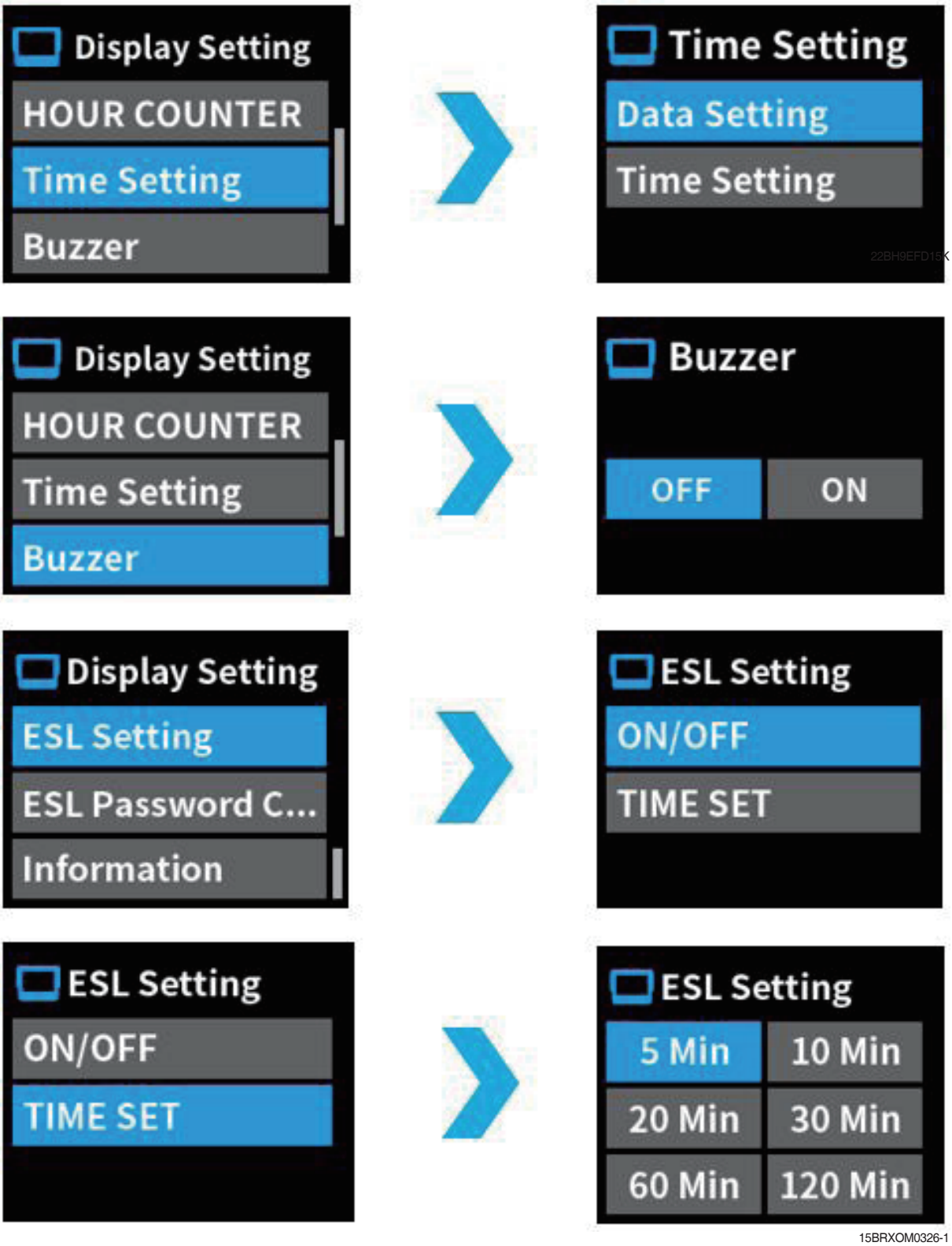
### (5) Steering angle indicator

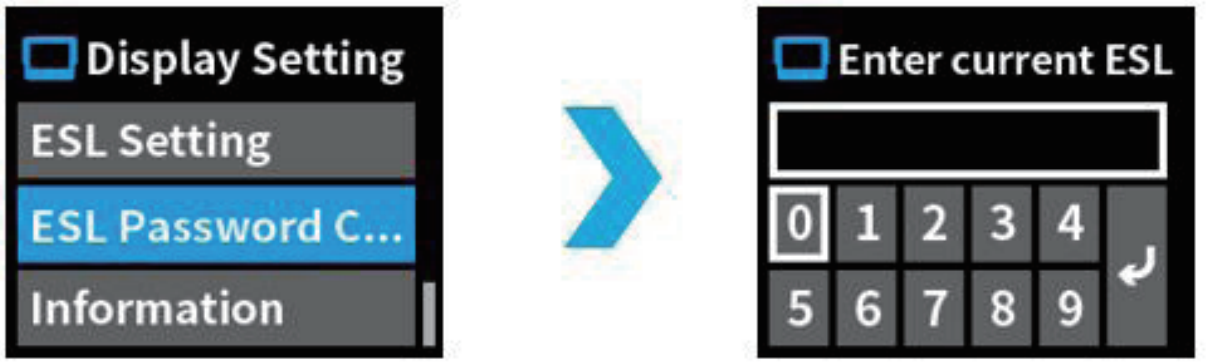
Steering angle of the truck is indicated.

5) HOW TO SET THE CLUSTER MENU




15BRXOM0325-1


Display Setting
HOUR COUNTER
Time Setting
Buzzer
Time Setting
Data Setting
Time Setting
22BH9EFD15
Display Setting
HOUR COUNTER
Time Setting
Buzzer
Buzzer
OFF
ON
Display Setting
ESL Setting
ESL Password C...
Information
ESL Setting
ON/OFF
TIME SET
ESL Setting
ON/OFF
TIME SET
ESL Setting
5 Min
10 Min
20 Min
30 Min
60 Min
120 Min
15BRXOM0326-1

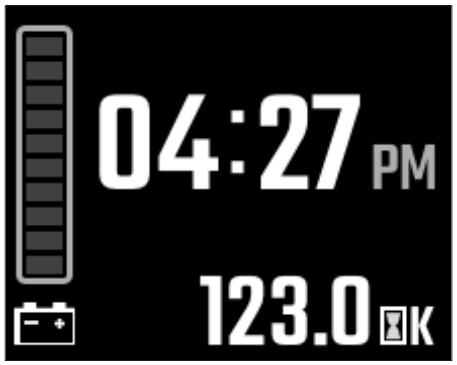



15BRXOM0327-1

### 6) SERVICE MENU

(1) How to enter the service menu

①

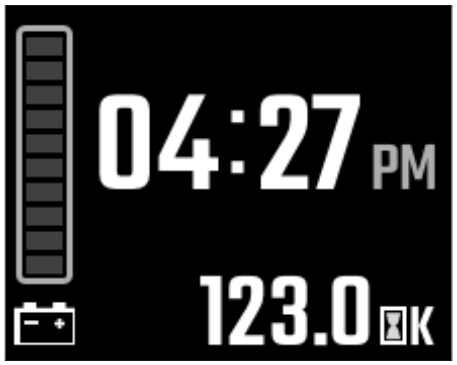



The above screen is shown when the engine is started on the truck. ESC button is pressed for more than 1 sec.

②

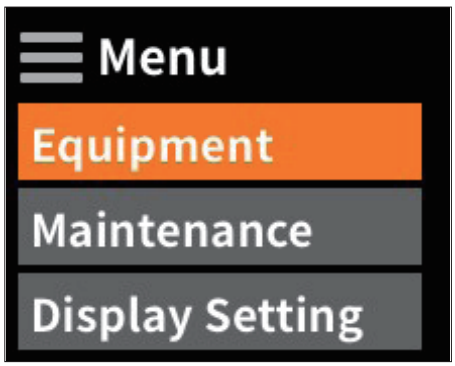

When the password input screen is shown, use the left/right button and ENTER button to enter the password.

③




After entering the password, the initial screen is shown as above, and HOME button is pressed.

④

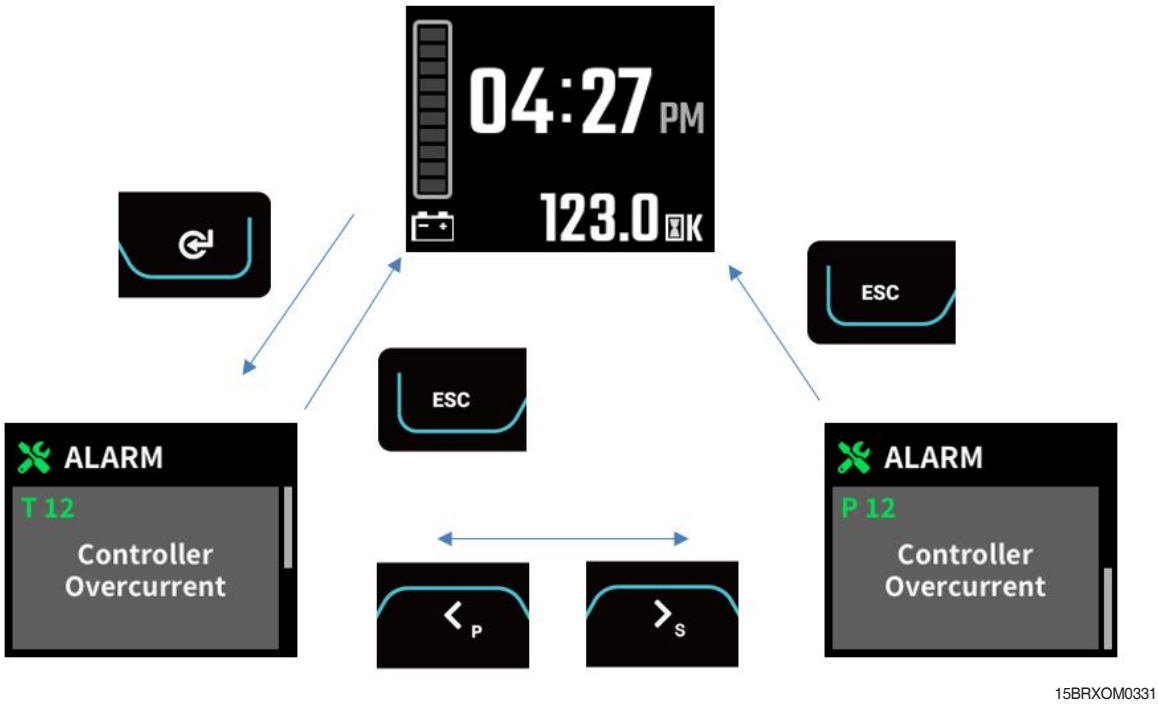



When the service menu is shown, press the left/right button is select the preferred menu, and press ENTER. Press ESC to go to the upper menu.

### 7) Alarm and alarm history

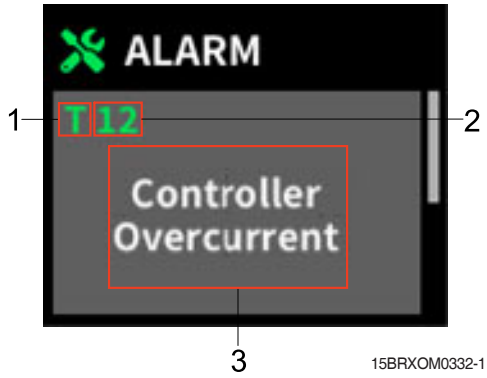
(1) Alarm verification method

Alarm screen is displayed when alarm is occurred, and “ENTER” and “ESC” buttons can be pressed as shown below to change to the Main screen and Alarm screen.




15BRXOM0331

(2) Detailed description of the Alarm screen



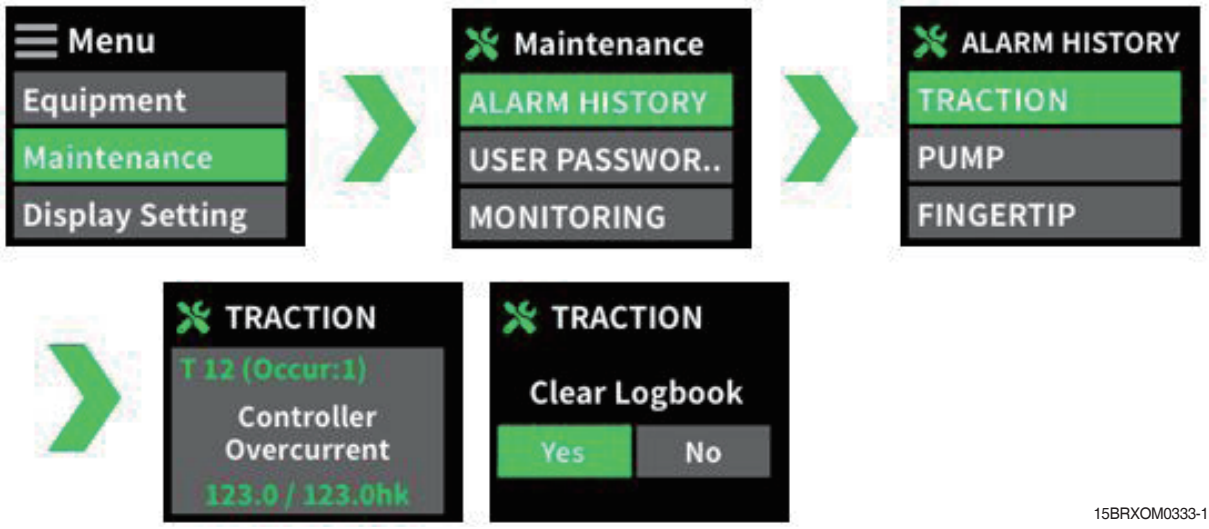

15BRXOM0332-1

① The green capital letter indicates the location of the controller (T : Travel, P : Pump)

② The number indicates the alarm code.

③ The name of the alarm is displayed.

(8) Alarm history




15BRXOM0333-1

① The Maintenance menu is entered from the Main menu.
② In the Maintenance menu, enter the Alarm History menu.
③ The alarm history of each controller is checked.
④ 20 alarm histories and details can be checked.
⑤ Alarm history can be deleted by pressing the "ENTER" button, and "ESC" button is pressed to return to the previous screen.

### 8) PARAMETER CHANGE

Variable value of the travel and pump controller can be changed.


15BRXOM0334-1

① The Maintenance menu is entered from the Main menu.
② In the Maintenance menu, enter the Alarm History menu.
③ The alarm history of each controller is checked.
④ 20 alarm histories and details can be checked.
⑤ Alarm history can be deleted by pressing the "ENTER" button, and "ESC" button is pressed to return to the previous screen.

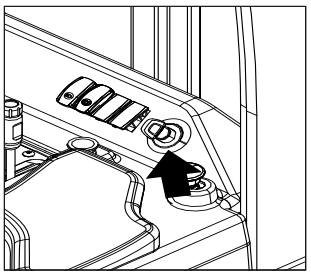
### 9) MONITORING

The monitoring status of the traction, pump, finger tip controller can be checked.


15BRXOM0334-2

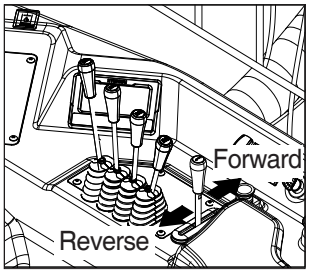
## 5. SWITCHES AND LEVERS

### 1) START SWITCH


15BRXOM0335

(1) The switch supplies power to control circuit, and operates in sequence of OFF → ON clockwise.
① OFF : The key is inserted or removed, and the power is OFF.
② ON : The preparation for opeartion of the circuit for controlling the hydraulic device and travel is completed.

### 2) FORWARD AND REVERSE DRIVING LEVER (ACCELERATOR)

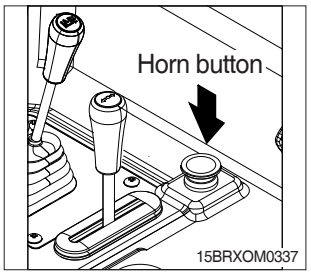


15BRXOM0336

(1) Forward driving : Lever is pushed forward.
(2) Reverse driving : Lever is pulled backward.
(3) In neutral state, the control circuit in operation is stopped.
(4) When the lever is changed to the opposite direction while driving, electric brake applies.

**⚠ The driving speed is increased proportional to the operating range, so sudden operation and change in direction can cause accidents.**

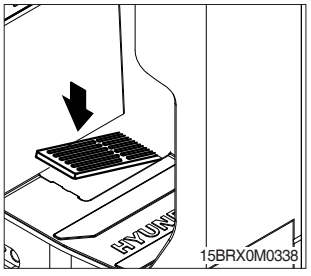
### 4) HORN SWITCH



15BRXOM0337

(1) Horn is sounded when the switch is pressed.
(2) The horn is released automatically when letting go of the switch.

### 5) BRAKE PEDAL

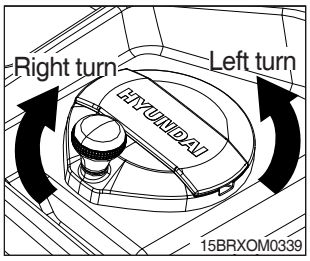

15BRX0M0338

(1) Press the pedal to operate the truck, and take your foot off the pedal to stop.

**⚠ Take special caution on brake operation when carrying the load.**

**⚠ This truck does not have a separate parking brake system, and the driving motor does not opeate when the pedal is not pressed, so brake is applied at all times on the truck.**

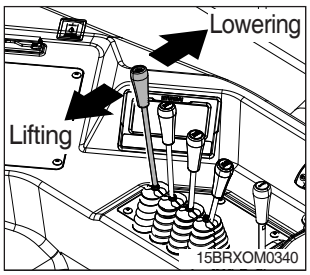
### 6) STEERING WHEEL




(1) A knob is mounted on the wheel for handling the steering wheel with a hand.
(2) It is allowed to perform unloading work with the right hand, and handle the steering wheel with the left hand.

⚠ **Rapid handling of the steering wheel may cause risky situation.**

### 7) LIFT LEVER

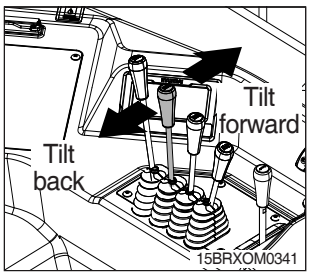



(1) Lift : The fork is lifted when the lever is pulled backward.
(2) Lower : The fork is lowered when the lever is pushed forward.
(3) Maintain : When the lever is released while the fork is lifted (lowered) to the preferred position, the fork is stopped in that position.

※ **The fork speed is adjusted according to the slope of the lever.**

⚠ **The maximum lowering speed is maintained constantly by the flow control value regardless of the load.**

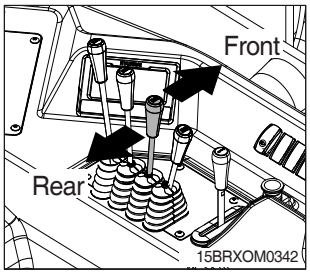
### 8) TILT LEVER




(1) Front tilt : The carriage and backrest are tilted forward when the lever is pushed forward.
(2) Back tilt : The carriage and backrest are tilted backward when the lever is pulled backward.
(3) Maintain : The tilting operation is stopped when the lever is released.

※ **The tilting speed is adjusted according to the slope of the lever.**

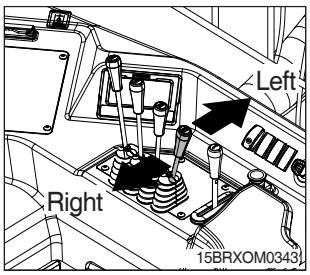
### 9) REACH LEVER




(1) This lever moves the mask forward·backward horizontally.
① Forward movement : The mast moves forward when the lever is pushed to the front.
② Backward movement : The mast moves backward when the lever is pulled to the back.

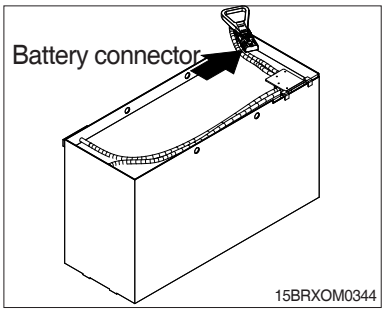
※ **The movement speed is adjusted according to the slope of the lever.**

### 10) SIDE SHIFT (OPTION)




(1) Left movement : The carriage moves to the left when the lever is pushed to the front.
(2) Right movement : The carriage moves to the right when the lever is pulled to the back.

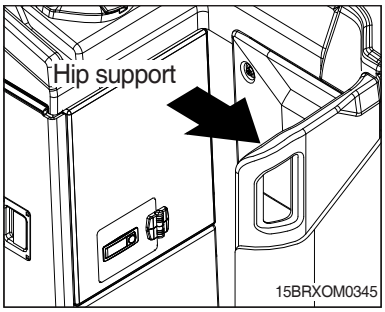
## 6. BATTERY CONNECTOR




Please connect the battery connector.

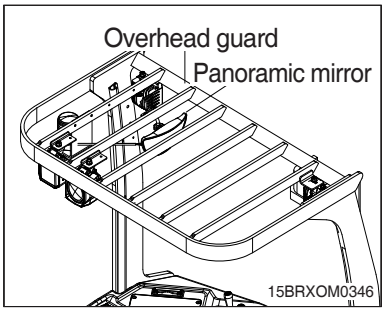
## 7. SUPPORT AND SAFETY PARTS

### 1) HIP SUPPORT




Pad is installed on the location in contact with the back of the driver to reduce the fatigue while operating the truck.

### 2) OVERHEAD GUARD




Reinforced structure of head guard is provided to guarantee the safety of the driver.

# CHAPTER 4 DAILY SAFETY INSPECTION

## 1. DAILY SAFETY INSPECTION

Before using a lift truck, it is the operator's responsibility to check its condition and be sure it is safe to operate.

Check for damage and maintenance problems; have repairs made before you operate the truck. Unusual noises or problems must be reported immediately to your supervisor or other designated authority.

Do not make repairs yourself unless you are trained in lift truck repair procedures and authorized by your employer. Have a qualified mechanic make repairs using genuine HYUNDAI or HYUNDAI-approved parts.

⚠ **Do not operate a truck if it is in need of repair. If it is in an unsafe condition, remove the key and report the condition to the proper authority If the truck becomes unsafe in any way while you are operating it, stop operating the truck, report the problem immediately, and have it corrected.**

Lift trucks should be inspected every eight hours, or at the start of each shift. In general, the daily inspection should include the visual and functional checks described on the followings.

⚠ **Leaking hydraulic oil may be hot or under pressure. When inspecting a lift truck, wear safety glasses and do not check for leaks with bare hands.**

## 2. VISUAL INSPECTION

※ **First, perform a visual inspection of the truck and its major components;**

1) Inspect around the lift truck to check any damages or issues that may have occurred during the previous operation.

2) Check that all warnings related to safety, and nameplates or labels are attached and legible.

3) Make sure that battery is safely mounted on correct position. Check the battery connector for safety.

4) Check surroundings of driving axle for any external oil leak.

5) Check for hydraulic oil leaks and loose fittings.

⚠ **Oil from leakage may be in high temperature and pressure. Do not use bare hands to check.**

6) Be sure that all safety devices including the overhead guard and back rest for protecting the driver are in place, securely fastened and undamaged.

7) Check all of the critical components required for handling or carrying the load.

8) Check the mast and lift chain.
Check for abrasion, damage, breakaway of parts, oil leakage, chain loosening or damage, rust, corrosion, bended parts and crack, etc.

9) Carefully inspect the load forks for cracks, breaks, bending, twists, and wear. Be sure that the forks are correctly installed and locked in their proper position.

10) Inspect the wheels and tires for safe mounting, wear condition, and air pressure.

11) Check the hydraulic oil amount.

## 3. FUNCTIONAL CHECKS

**※ Check the operation of the truck as follows.**

**※ Before performing these checks, familiarize yourself with the 「STARTING AND OPERATING PROCEDURES」 in Chapter 5. In addition, read and follow the 「SAFETY HINTS」 in Chapter 1.**

1) Test warning devices, horn, light, and safety equipment and accessories.

2) While the start switch is ON, check the warning lamp on abnormal self-diagnosis, driving time lamp and remaining battery amount lamp, etc.

3) Check that all controllers are operating normally and returned to NEUTRAL position properly, and inspect the following matters.

(1) Service brake, parking brake
(2) Hydraulic control device : Lift, tilt, reach and other devices
(3) Acceleration pedal
(4) Forward and reverse driving device
(5) Steering systems
(6) Lift mechanism and other attachments

· Action after inspection
① The lift truck must be stopped completely.
② Return the forward and reverse levers to the neutral position.
③ Fully lower the attachment.
④ turn the start switch to OFF position.

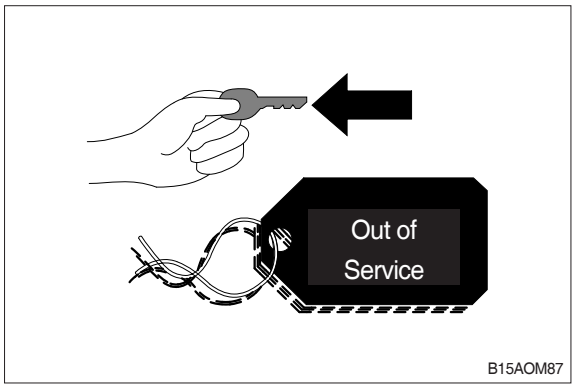
· Action on stopped lift truck
① Remove the key from the starting switch.
② Lift truck may move on slope. Fix the wheels with base blocks.

## 4. CONCLUDING THE INSPECTION

1) Do not operate the lift truck that has a maintenance problem or is not safe to operate.

2) Remove the key from the starting switch, and attach the tag on the truck indicating 「Out of Service」.

3) If all of the daily inspection checks were normal or satisfactory, the truck can be operated.



# CHAPTER 5 STARTING AND OPERATING PROCEDURES

## 1. BEFORE OPERATING THE TRUCK

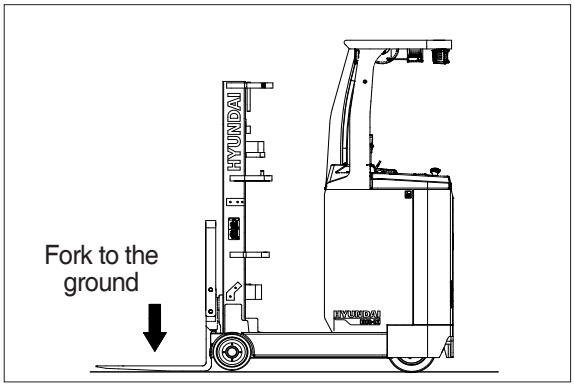
The truck operator must read and understand the information in this Operator's Manual and must be trained and authorized before operating the lift truck.

- ⚠ **Inappropriate operation of the lift truck is very dangerous. Safe operation is the responsibility of the operator.**
- ⚠ **Do not start or operate the truck, or any of its functions or attachments, from any place other than the designated operator's position.**
- ⚠ **Inspect your lift truck before operating at the start of each shift. Before putting your truck to operating, check the operation of the controls and all systems.**
- ⚠ **Protect yourself. Do not operate truck without a DRIVER'S OVERHEAD GUARD unless conditions prevent its use. Do not remove overhead guard unless specifically authorized. Use special care if operation without this safety device is required.**

## 2. STARTING FROM A SAFE CONDITION

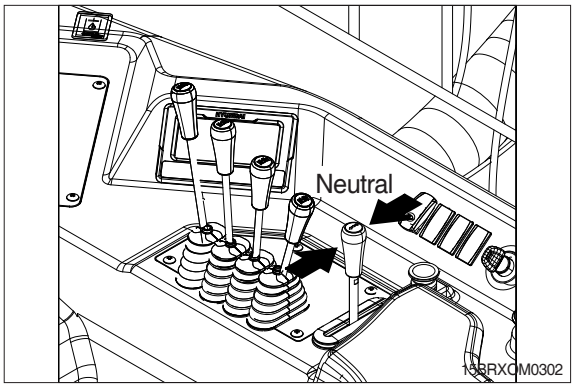
The following matters must be checked before operating the lift truck.

1) Whether the truck is parked in a safe location,
2) Whether the forks are fully lowered to the floor or ground,
3) Whether you are familiar with how all the controls function,



15BRXOM0301

4) Check that all levers are in NEUTRAL or in the appropriate position to have no issue when starting the engine, and that the truck has received its daily inspection and ready and safe to operate.
5) Put the gear selector lever in the NEUTRAL position before starting. The truck must be started only when in the NEUTRAL position.



15BRXOM0302

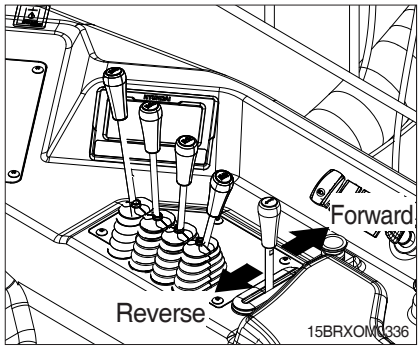
## 3. BEFORE OPERATING THE TRUCK

Check the aforementioned requirements, and make sure that the forward and reverse levers are on NEUTRAL position before operating the truck.

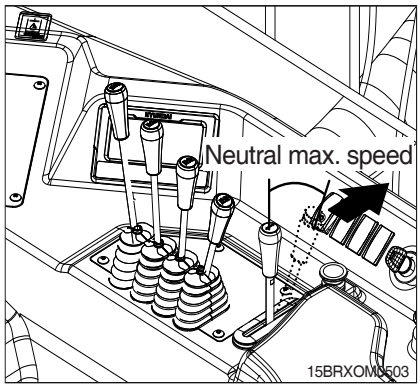
### 1) TRAVELING

(1) Press the brake pedal completely to operate the forward and reverse lever slowly in the forward or backward direction.

(2) The truck will move in the forward or backward direction.



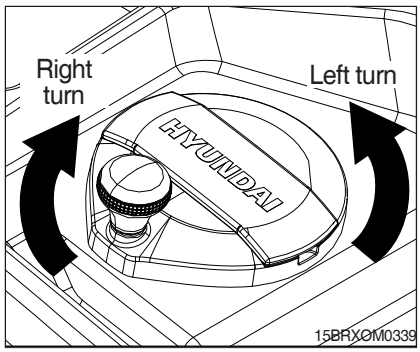

(3) The speed is changed from minimum to maximum according to the degree of tilting the forward and reverse lever.
The truck is slowly accelerated without vibration even on rapid operation of the lever, so fine operation is possible conveniently.




### 2) CHANGE IN DRIVING DIRECTION

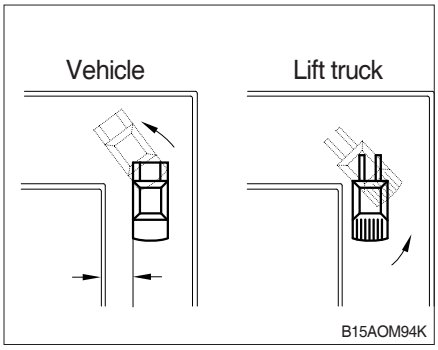
(1) Hold the handle knob with the left hand ot change the direction.

(2) Steering of the lift truck is enabled through the rear wheels, so caution is required when changing the direction.




(3) As the truck uses rear wheel steering, the truck rotates to the inside when moving forward, and also to the outside when moving backward.

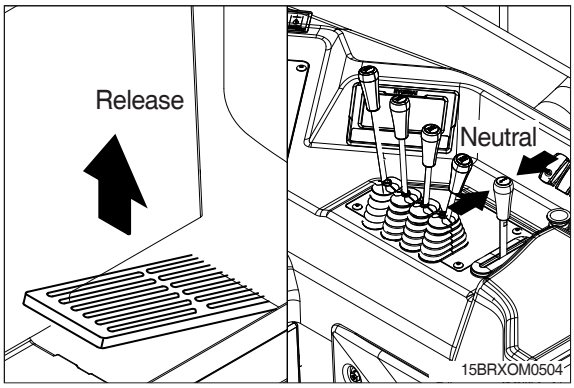
(4) Care should be exercised to prevent collision of the rear end of the truck with the surrounding when turning direction.



### 3) STOP AND PARKING

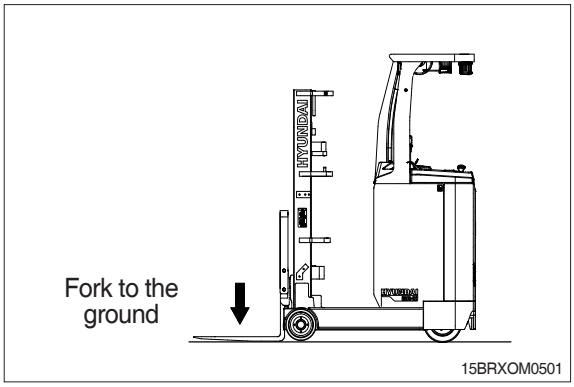
(1) Forward and reverse levers are positioned in NEUTRAL to reduce the truck speed, and the foot is released slowly from the brake pedal to stop the truck smoothly.

⚠ **When the brake pedal is released rapidly during the operation of the forward and reverse driving lever, the load may fall off or cause danger to the driver due to rapid braking, so caution is required.**

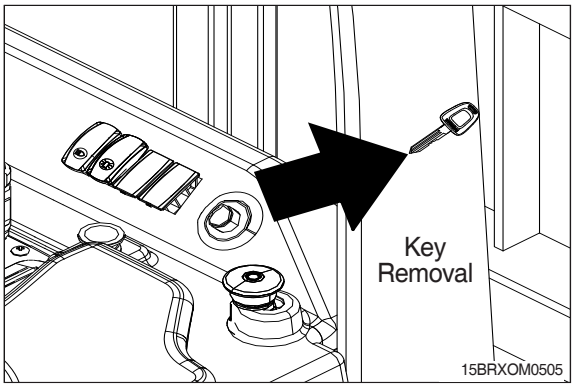



(2) Position the forward and reverse driving lever to NEUTRAL after stopping the truck.

When parking the truck, release the foot from the brake pedal, and check whether the forward and reverse driving lever is in NEUTRAL to lower the fork to the ground.

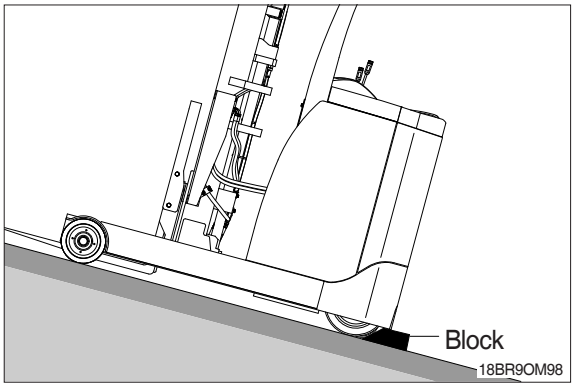



(3) Key must be removed when the truck is not operating.




(4) If possible, do not park the truck on the slope. When parking the truck on the slope, fix the wheels with the block, and check for safety.

⚠ **Special caution is required as the load can fall off or the truck can tip over due to rapid braking or changing directions on the slope.**



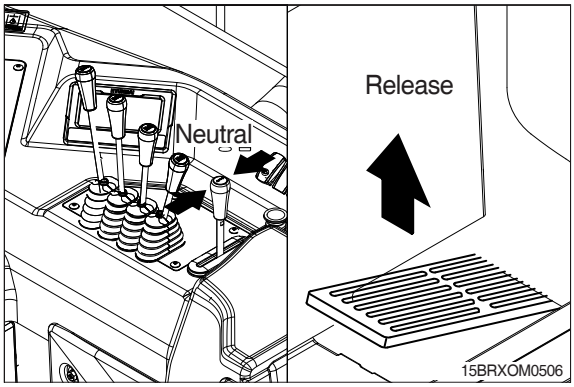
## 4. SPEED ADJUSTMENT

The driving speed is changed from minimum to maximum according to the adjustment of the tilt on the forward and reverse driving lever.

## 5. BRAKE OPERATION

First, put the gear selector lever in NEUTRAL.
Remove the foot slowly from the brake pedal until the lift truck is stopped.

**⚠ If possible, stop the truck slowly.**
**If the truck skips by sudden stop, main parts may be damaged, load may fall, or the truck may tip over.**




## 6. PLUGGING

1) It is allowed to change direction by making use of plugging without applying the brake.
When operating the forward or the reverse lever in the opposite direction during travel, the truck slowly stops, and then starts driving in the opposite direction.

2) It is possible to adjust distance of change of direction with the forward and reverse levers.
The distance of changing direction becomes shorter proportional to the strength of pushing the forward and reverse levers.

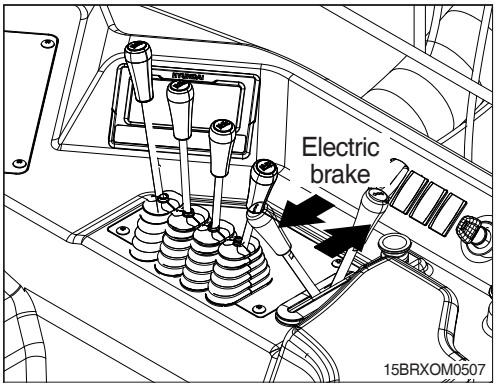
**⚠ Accidents may occur from sudden change in direction due to the load falling or moving, so special caution is required when using the plugging.**

### 3) ELECTRIC BRAKE

(1) Electric brake is applied when the forward and reverse levers are operated in the direction opposite to travel.

(2) When the forward and reverse levers are pushed continuously, the equipment moves in the opposite direction after electric braking.

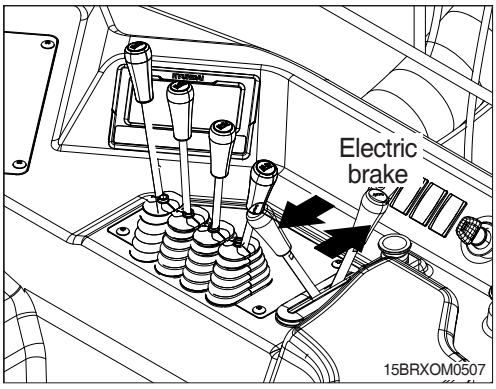
(3) Use of electric brake is prohibited when driving the truck on a downhill. Caution is required when using the elctric brake to prevent the damage of loads.



### 4) POWER GENERATION FUNCTION OF THE BRAKE

(1) The motor performs the power generator function when the brake is applied, and electricity is sent to the battery.

(2) When the direction of the forward and reverse levers are changed, power generation from braking is started in the standard set by the braking current. The braking effect is proportional to the position of the forward and reverse levers. The set braking power in the minimum acceleration position is 50%, and increased to 100% in the maximum acceleration position.



## 7. OPERATING SAFELY

**※ Safe operation is the responsibility of the operator.**

1) Watch the surroundings of the location for driving. Drive only when sufficient amount of view is secured.

(1) Before driving, check for any obstacles or pedestrians around the working space.

**⚠ Especially, special caution is required on the upper space that is not clearly visible when seated on the truck. Watch for falling objects. If the load blocks your view, drive backwards, except up slopes.**

(2) Do not allow anyone to stand or pass under the load or raised forks. Warning light and sound do not guarantee the safety Safety of the pedestrians are top priority in the workplace.

(3) Sound horn at intersections and wherever vision is obstructed.
Do not operate the truck when there are workers in front of the working material.

2) Take caution on the following matters to protect the operator and the pedestrians.

(1) Operate the truck only from the designated operator's position. Stay within the confines of the lift truck profile dimensions. The overhead guard protects the driver from falling objects.

**※ The overhead guard protects the driver from falling objects, but all impact occurred from the upper part are not protected, so caution is still required when handling the load even when the overhead guard is mounted.**

**⚠ Keep clean of the mast and lift mechanism. Never reach into or put hands, arms, legs, or head into or through the working devices such as the carriage, lift chain and mask, and around the related parts. Never put any part of your body between the mast and the truck. Don't use the mast as a ladder. Keep all persons clear of the load and mast mechanism while attempting to handle a load.**

**3) NO RIDERS**

(1) No one should ride on the truck other than the operator. The operator is the only one who should be on the truck.

4) The lift truck must be operated only when it can be controlled completely.

(1) Do not operate the truck when the operator is not in the proper position.

(2) Never operate a lift truck when your hands and feet are wet or greasy.

(3) Always pick the smoothest travel route for your lift truck. Remove any obstacles with concerns of collision, or those that can cause the truck to be off the course or tip over. If these conditions are unavoidable, slow down and carefully drive past them. Slow down when the surface is wet or unsafe.

(4) Rapid operation of the truck can cause the truck to tip over. Start, stop and operation of the attachment must be performed as smooth as possible.

(5) Operate the truck in the speed to stop safely even when occurring with emergencies.

(6) The fork carriage must be tilted back and lifted in the minimum height to avoid any obstacles on the surface during travel. The vehicle safety is reduced when the load is lifted high, so do not lift the load too high except when loading.

5) Take caution on the following matters on the slope.

(1) Driving in a straight direction in the uphill or downhill. Do not turn or drive at an angle across an incline or ramp. Do not attempt to operate on grades in excess of those specified and/or recommended by the manufacturer.

(2) When the truck is loaded, travel with the load upward.
When the truck is empty, travel with lifting mechanism (mast) downward.

(3) Apply the brake at all times when traveling down the slope.

6) Practice safe driving when operating the lift truck.

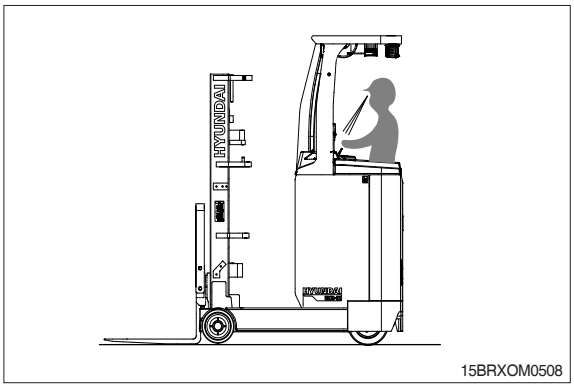
(1) Careful driving and operation is your responsibility. Be completely familiar with all the safe driving and load handling techniques in this Operator's Manual.

(2) Use common sense. Drive carefully; do not indulge in stunt driving or horseplay. Follow the traffic rules. Watch for people and hazards. Slow down, be in full control of your lift truck at all times.

(3) Follow the instructions in this manual to avoid damage to your truck or the possibility of injury to yourself of others.

(4) During your work, observe all functions of your lift truck. This allows you to immediately recognize a problem or irregularity that could affect the safe operation of your truck. Periodically check the gauges and warning indicator lights in the cluster to be sure they indicate a normal condition. If an abnormal condition appears bring the truck to a safe condition and safe location, shut off the starting switch immediately and report the problem.

**⚠ Do not continue to operate a truck that has a malfunction. Stop and have it fixed immediately.**



## 8. LOAD HANDLING

### 1) LOAD HANDLING

Handle only loads that are within the truck rated capacity as shown on the nameplate.
This rating specifies the maximum load that should be lifted.
However, other factors such as special load handling attachments, load having a high center of gravity, or uneven terrain may dictate that the safe working load be less than the rated capacity. Under these conditions, the operator must reduce the load carried so that the lift truck remains stable. Handle only stable or safely arranged loads. Do not handle loads made up of loose, unevenly stacked, or unstable items that can easily shift and fall. Take the time to stack correctly and handle loose items. Center the load on the forks.

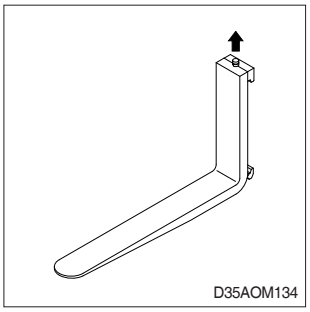
Do not lift items that have risk of falling.
Do not handle loads that are higher than the fork carriage because the load may back backward. Place the load close to the backrest. Load placed on the end of the fork may result in unstable lift truck. The load must be tilted back after loading.
Operate the lift and tilt controls slowly and smoothly. Do not tilt the mast forward except when lifting or lowering the load.

⚠ **Slack chains will damage the rail or carriage. Raise the mast before you move. If the mast malfunctions in any way or becomes stuck in a raised position, operate the lift control to eliminate any slack chains by raising the carriage. Do not go under a raised mast or forks to attempt repair. To not climb up the mast or on the truck.**

Remember your truck is designed to carry loads forward of the front wheels so that the weight of the load is counterbalanced by the weight of the truck.

The farther the load is carried from the pivot point (center of front wheels), the less the weight on the steer wheels (rear wheels). Therefore, the load must be placed closest to the front wheels for transfer.
The permissible load indicated on the nameplate is in the standard of the average weight per unit volume and center of gravity located in fixed distance from the fork surface. If the weight of the actual load to be handled is not evenly distributed, put the heaviest part closest to the carriage.

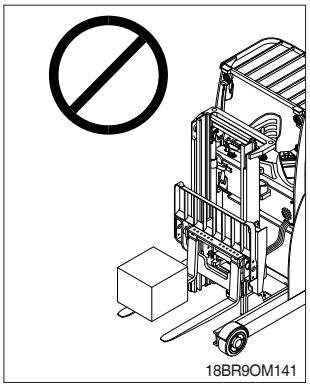
## 2) ADJUSTING THE LOAD FORKS



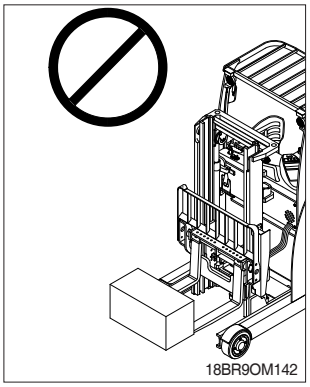

The load forks are adjustable on the hanger or the carriage. Forks should be spaced as far apart as the load will allow. Both forks should always be the same distance from the center of the fork carriage for ensure stability. To adjust the forks, raise the carriage slightly, and tilt the mast fully forward to reduce friction and make the fork slide easier. Then, unlock the fork locking pins. Position the forks by pushing them away from you. Secure the fork locking pins.

**⚠ Make sure the load backrest or fork retaining bolts are fasten securely in place.**

## 3) CAUTION ON FORK LOADING




(1) Do not elevate the load with one forks.
Lifting the load with one side of the fork can result in load tip over, and casualties may be occurred.
When excessive load is applied to one side of the fork, the fork may be deformed to occur with height difference between the forks.




(2) Do not elevate the load with the ends of the forks.
This can cause height difference between both fork tips due to overload in the end of the forks resulted from farther center of gravity of load.
The load should be loaded at least over 2/3 of fork length.

### 4) TRAVELING WITH LOAD

Transfer the load or cargo in the low position as possible and tilted back. Never travel with the load or carriage raised (elevated) in a high position. Do not lift the load high except when loading or unloading.

Follow all traffic rules, and check other vehicles, pedestrians and safety distance. Always look in the direction of travel. Keep a clear view of the path of travel and when the load blocks your visibility travel in reverse with load trailing (Except when climbing an incline).

Rapid operation shall not be performed when carrying the load. Start, stop, travel and steer, etc. smoothly. Steer clear of bumps, holes, and loose materials or debris on the ground.
Lifting and tilting must be performed slowly and smoothly. Changing the direction must also be performed slowly. Cross railroad tracks slowly and at an angle wherever possible.

Use special care when handling and traveling with long, high, or wide loads-to avoid losing the load, striking bystanders or obstructions, or tipping the truck. Watch clearances around the truck and load as you travel. Raise the forks or attachment only to pick up or stack a load. Look out for obstructions, especially overhead.

Be aware that exaggerated tail swing, when turning while traveling forward, is a characteristic of lift trucks that are steered by the rear wheels. Check for obstacles on the rear side when changing directions.

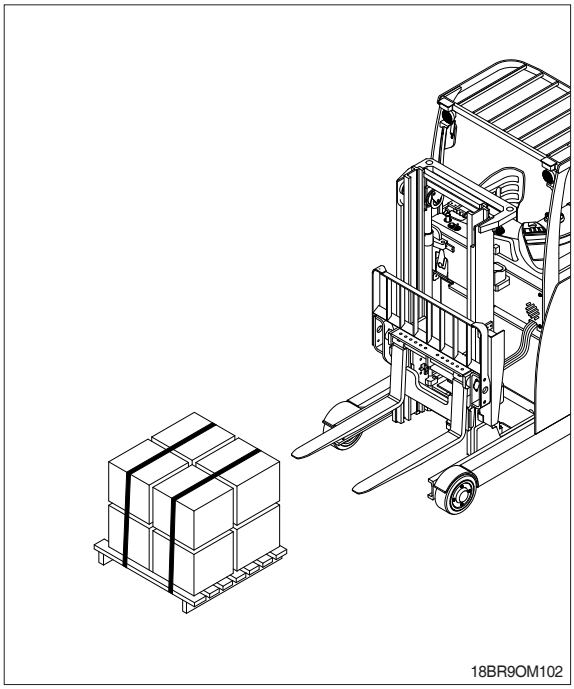
Stability of the lift truck must be considered at all times. When optional working devices are used, extra care should be taken in securing, manipulating, positioning, and transporting the load. Because working devices generally add extra weight and complexity to the truck, operate trucks equipped with attachments as partially-loaded trucks when not handling load.

### 5) PICKING UP AND MOVING LOADS

When lifting the load from the floor, approach the load slowly to have the truck positioned carefully in front of the load, and the fork is adjusted according to the pallet handling the load. It must be adjusted as wide as possible for stability and balance.

Before lifting the load, check that the load is positioned in the center, and that the fork is supporting the bottom of the load completely.

Fork length should be at least 2/3 of load length. To enable the fork to enter and exit the pallet freely, use the lift and tilt functions to set the exact height and angle. Afterwards, move forward until the forks are squarely and completely under the load.




**※ Be sure that the forks do not extend beyond the load, causing damage or tipping of other adjacent loads or materials behind the load being moved.**

If the forks are longer than the load, move the tips partially under the load without extending beyond the load. Raise the load to clear the ground. Back out several inches, or whatever distance is necessary, then set the load down and move forward until the load is positioned against the carriage.

Then raise the load to traveling height and tilt fully back to travel (Except for loads that must be transported as level as possible).

### 6) UNLOADING

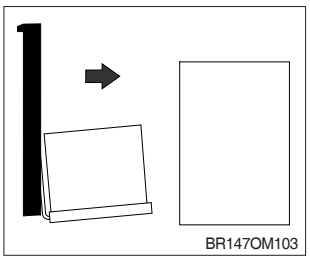
To deposit a load on the floor after being moved into the correct position, tilt the mast forward to a vertical position and lower the load.

If required for adjusting the fork height and to remove the fork smoothly from the load or the pallet, tilt the mast slightly to the front.

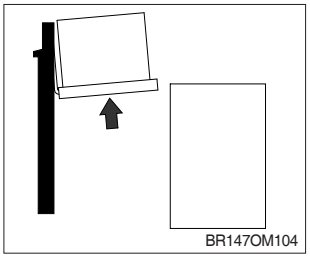
After removing the fork carefully and completely from the load, lift the fork 150~200㎜ from the floor, and tilt back completely for travel.

## 7) STACKING

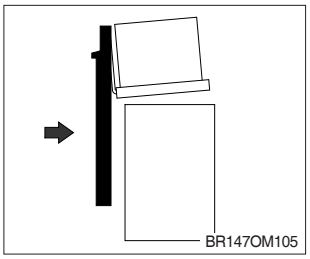
### (1) To load the cargo on top of the stack



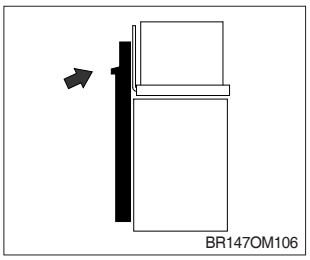

① Approach slowly and align the lift truck and load squarely with the stack.



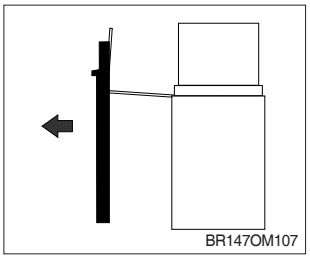

② Raise the load as the lift truck nears the stack.




③ Move forward slowly until the load almost touches the stack. The leading edge and sides of the load pallet should line up with the near edge and side of the load or rack on which you are stacking.

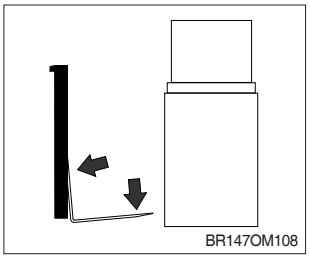



④ Stop close to the stack and further lift the load high enough to clear the top of the stack. Position the load slowly on the proper position. Use care not to damage or move adjacent loads.




⑤ When the load is positioned exactly with the stack on the bottom, tilt down the mast vertically to release the load accurately on top of the stack.

⑥ Lower the forks slightly to clear the load pallet. Tilt the forks forward slightly, if necessary.




⑦ Check your travel path, then carefully back away until the forks are clear of the stack. Stop and lower the forks to the travel position (150~200 mm above the ground), then tilt back the mast.

### (2) To move a load from a stack

Approach the stack slowly, with the truck lined up squarely with the load. Position the mast vertically, and lift the fork to the exact height to match the load pallet. Adjust fork angle as necessary to fit squarely under the load.

The fork must not come outside the load.
It can damage or tip over other load and object near the rear side of the load for movement. If the forks are longer than the load, move the tips partially under the load without extending beyond the load.
Raise the load to clear the ground. Back out several inches, then set the load down and move forward until the front face of the forks contacts the load.

Take caution on not damaging due to the fork having in contact with the object.
Tilt back the mast sufficiently within the range of lifting the load from the stack, and stop the mast vertically to lift the load slowly.

At this point, apply the minimum back tilt that will stabilize the load.
Check your travel path, slowly back up until clear of the stack, stop, and then lower the load to the travel position (150-200 mm off the ground). Except for having to travel horizontally, tilt the mast back completely for travel. Be sure the load is back flush against the carriage or front face of the forks.

※ **Certain loads must be transported as level as possible.**

## 9. SHUT DOWN PROCEDURE

**※ Get off the truck when the truck is in safe state.**

1) Follow the safety rules stated below when getting off or parking the truck.

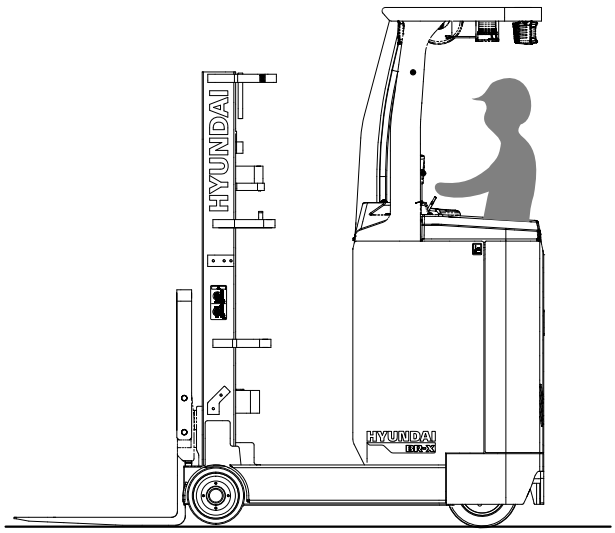
(1) Park the truck in a safe location such as the edge of the road without vehicle passage.
(2) Do not park the truck on the slope.
(3) Do not park the truck on the location that intrudes with the use of emergency road and equipment, and also stairs and firefighting equipment.

**2) BEFORE LEAVING THE OPERATOR'S POSITION**

(1) The lift truck must be stopped completely.
(2) Put the gear selector lever in NEUTRAL.
(3) Lower the lifting mechanism-carriage and forks or attachment fully to the ground.

**3) WHEN LEAVING THE TRUCK**

(1) Tilt the mast forward until the forks are level and flat on the ground. Let the engine run at idle speed.
(2) Turn the start switch to the OFF position and remove the key.
(3) Install the support on the wheels in the slope with issues on moving the truck to a safe location.

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# CHAPTER 6 PLANNED MAINTENANCE

## 1. INTRODUCTION

Periodic maintenance shall be performed by the trained and authorized personnel. HYUNDAI dealers are prepared to help customers to perform inspection and maintenance of the lift trucks according to applicable safety regulations.

**⚠ Safety accidents may occur if maintenance is neglected.**

As mentioned in 「CHAPTER 4 OPERATOR'S MAINTENANCE AND CARE」, the operator must perform safety inspection before operating the truck. The purpose of this daily examination is to check for any obvious damage and maintenance problems, and to have minor adjustments and repairs made to correct any unsafe condition.

In addition, HYUNDAI recommends to perform periodic maintenance and inspection. Performed on a regular basis by trained personnel, the program provides through truck. The PM identifies needed adjustments, repairs, or replacements so they can be made before failure occurs. The specific schedule (frequency) for the PM inspections depends on the particular application and lift truck usage.

This chapter recommends typical planned maintenance and lubrication schedules for items essential to the safety, life, and performance of the truck. It also outlines safe maintenance practices and gives brief procedures for inspections, operational checks, cleaning, lubrication, and minor adjustments.

Specifications for selected components, fuel, lubricants, critical bolt torques, refill, and settings for the truck are found in Chapter 7.

Please inquire to the HYUNDAI dealer for detailed infromation on the maintenance.

## 2. SAFE MAINTENANCE PRACTICES

The following instructions have been prepared from current industry and government safety standards applicable to industrial truck operation and maintenance.
For safe maintenance work, the following recommended procedures indicate the necessary conditions for safe maintenance of the lift truck, method and accommodation procedures, etc. for reference by all workers. Carefully read and understand these instructions and the specific maintenance procedures before attempting to do any repair work. When in doubt of any, please contact your local HYUNDAI dealer.

1) Powered industrial trucks can become hazardous if maintenance is neglected. Therefore, suitable maintenance facilities and trained personnel and procedures shall be provided.

2) Maintenance and inspection of all lift trucks shall be performed in conformance with the manufacturer's recommendations.

3) Follow a scheduled planned maintenance, lubrication, and inspection system.

4) Only trained and authorized personnel are permitted to maintain, repair, adjust, and inspect trucks and must do so in accordance with the manufacturer's specifications.

5) Always wear safety glasses. Wear a safety (hard) hat in industrial plants and in special work areas where protection is necessary and required.

6) Properly ventilate work area, vent exhaust fumes, and keep shop clean and floors dry.

7) Avoid fire hazards and have fire protection equipment present in the work area. Do not use open flame such as lighter, etc. to inspect the parts with oil leakage and risk of fire, etc.

**BEFORE STARTING WORK ON TRUCK**

(1) Lift the driving wheels to use the support or other device to fix the lift truck.

(2) Remove all jewelry (watches, rings, bracelets, etc.).

(3) Put oak blocks under the load engaging means, inner masts, or chassis before working on them.

(4) Separate the battery grounding cable (-) before working on the electrical system.

**⚠ Performance inspection shall be performed on the safe and clean location.**

**Before starting to operate the truck**

(1) Put the direction control lever in the NEUTRAL position

(2) Start the truck.

(3) Check functioning of lift and tilt systems, direction and speed controls, steering, brakes, warning devices, and load handling attachments.

11) **BEFORE LEAVING THE TRUCK.**

(1) Return the forward and reverse levers to the neutral position.

(2) Release the foot from the brake pedal to stop the truck.

(3) Lower the attachments (mast, carriage, fork or attachments) completely on the floor.

(4) Turn the to the OFF position.

(5) Put blocks at the wheels if the truck must be left on an incline.

12) Brakes, steering mechanisms, control mechanisms, warning devices, lights, lift, tilting device, reach device, driving unit, backrest, overhead guard and frame must be carefully inspected in detail, and maintained in a safe operating condition.

13) Special trucks or devices designed and approved for hazardous area operation must receive special attention for maintenance.

14) Hydraulic system must be performed with periodic inspection and maintenance.
Tilt, lift cylinder and valve system may have risk of oil leakage, and detailed inspection must be performed.

15) When working on the hydraulic system, be sure the engine is turned off, mast is in the fully-lowered position, and hydraulic pressure is relieved in hoses and tubing.

⚠ **When working with the mast lifted, block must be place below the carriage and mast rail at all times to prepare for unexpected lowering.**

16) The nameplate, operation and maintenance indicating sign and label of the lift truck must maintain the normal state.

17) Batteries, limit switches, protective devices, electrical conductors, and connections must be maintained in conformance with good practice. Special attention must be paid to the condition of electrical insulation.

18) To avoid injury to personnel or damage to the equipment, consult the manufacturer's procedures in replacing contacts on any battery connection.

19) Fire can be prevented by maintaining the cleanliness of the truck, and part loosening and damage can be identified more easily.

20) Modifications and additions that affect capacity and safe truck operation must not be done without the manufacturer's prior written approval. Specification, work, maintenance indicator sign and label, etc. must be changed according to the relevant procedure, and relevant nameplate, etc. must be changed after the modification.

21) All consumables must be used with the same part as used when the truck is released, or the equivalent or higher grade of parts, and if possible, use genuine parts approved according to the quality control procedures by the manufacturer for replacement.

22) Tire is performed with detailed inspection before removal when near the exchange period. During the installation, skid or safety device is used for safe exchange.

23) Use special care when removing heavy components, such as mast, etc.

## 3. INSPECTION INTERVAL AND OPERATING CONDITION

### 1) INSPECTION AND MAINTENANCE INTERVAL

(1) You may inspect and service the truck by the period as described at based on service meter of LCD on the truck. Work hour indicator and truck use period are almost the same, so the schedule may be established to perform the inspection and maintenance based on this.

(2) The inspection and maintenance check is in the standard of general working environment, so the inspection and maintenance interval must be reduced and performed in the bad working condition or with high amount of dust and humidity.

(3) Practice the entire related details at the same time when the service interval is doubled.
Ex) For 250 hours of inspection interval, [Every 250 hours and 100 hours, and daily inspection] items are performed simultaneously.

**※ The inspection interval is difference according to the operating condition of the truck.**
**Operation in the area with high amount of sand or dust has shorter inspection interval compared to the operation in the clean warehouse. Contents related to the inspection interval indicated without detailed description specifies the truck use in the general workplace. Definition of the operating condition is as follows.**

**· Normal operation**

Eight hour material handling, mostly in buildings or in clean, open air on clean paved surfaces.

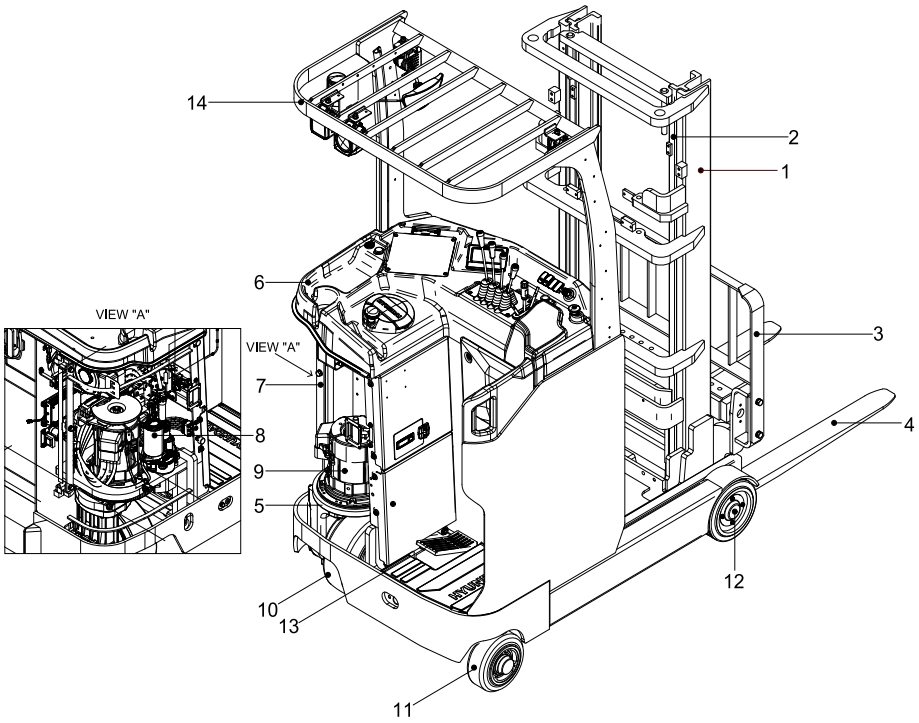
**· Harsh operation**

- Continuous heavy load operation
- High or low temperature working environment
- Working environment with sharp change in temperature
- Dusty or sandy working environment
- Highly corrosive chemical working environment
- Working environment with high humidity level
- Overall workplace with harsh environment compared to the general workplace

**※ Since the operating environment of lift trucks varies widely, the above descriptions are highly generalized and should be applied as actual conditions dictate.**

## 4. MAJOR COMPONENT LOCATIONS

The locations of each functional parts for maintenance during the periodic inspection are as follows.

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| | | | | | |
|---|---|---|---|---|---|
| 1 | Mast | 6 | Cluster | 11 | Caster wheel |
| 2 | Lift cylinder | 7 | Frame | 12 | Road wheel |
| 3 | Carriage and backrest | 8 | EPS motor | 13 | Brake pedal |
| 4 | Forks | 9 | Driving motor | 14 | Overhead guard |
| 5 | Driving unit | 10 | Driving wheel | | |

## 5. DAILY MAINTENANCE CHECKLIST

Service intervals are based on the hourmeter reading.

| DAILY (OR EVERY 8 HOURS) CHECK LIST | |
|---|---|
| 1 | Damage of truck and oil leak |
| 2 | Cleanness of battery connector |
| 3 | Battery electrolyte level |
| 4 | Capacity, warming plate and label |
| 5 | Check tire and wheel condition, removal of foreign substances and tire pressure check |
| 6 | Wheel lug nut loosening and detachment checking |
| 7 | Oil amount check on the hydraulic tank |
| 8 | Inspection of the gauge and indicator lamp |
| 9 | Warning lamp and hourmeter check |
| 10 | Overhead guard conditions, and bolts |
| 11 | Horn operation and other alarming devices |
| 12 | Check steering device operation |
| 13 | Check service brake operation |
| 14 | Gear selector, and speed adjustment |
| 15 | Check lift, tilt and reach operation |
| 16 | Mast, lift chain fastening torque |
| 17 | Check carriage, or attachment and forks |
| 18 | Check additional safety devices (horn, and alarm lamp) |

## 6. PERIODICAL CHECKLIST

Service intervals are based on the hourmeter reading.

| | Inspection item | | Oil symbol | Service interval hours | | | | | | | | Initial hours | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 50 | 250 | 500 | 1000 | 1500 | 2000 | 3000 | 4000 | 50i | 100i | 250i |
| 1 | Tightening | Tilt cylinder, pin, rod eye | | | | T | | | | | | | | T |
| 2 | | Hydraulic pump | | | | | | | T | | | | | T |
| 3 | | Main control valve | | | | | | | T | | | | | T |
| 4 | | Lift, tilt, attachment cylinder | | | | | | | T | | | | | T |
| 5 | | Mast | | | | T | | | | | | | | |
| 6 | | Drive motor and unit | | | | T | | | | | | | | |
| 7 | | Drive and steering wheel | | T | | | | | | | | | | |
| 8 | | Overhead guard | | T | | | | | | | | | | |
| 9 | Lubrication | Mast roller | G | | | L | | | | | | | | L |
| 10 | | Lift chain | GO, G | | | | | | | | | | | L |
| 11 | | Free bar sliding part (V MAST) | G | | L | | | | | | | | | |
| 12 | | Attachment cylinder rod & tube connector | | | L | | | | | | | | | |
| 13 | | Steering U-JOINT | G | | | L | | | | | | | | |
| 14 | | Driving motor and unit connector | G | | | L*1 | L*2 | | | | | | | |
| 15 | | Pump motor and pump connector | G | | | L*1 | L*2 | | | | | | | |
| 16 | | Tilt cylinder and rod connector | G | | L*1 | L*2 | | | | | | | | |
| 17 | | Manual lever, hinge - Bushing | G | | | | | | L | | | | | |
| 18 | | Under carriage mounting part | G | | L | | | | | | | | | |
| 19 | Oil leakage | Hydraulic tank | | | | I | | | | | | | | I |
| 20 | | Main control valve | | | | I | | | | | | | | I |
| 21 | | Pump | | | | I | | | | | | | | I |
| 22 | | Lift, tilt, attachment cylinder | | | I (harsh) | I (normal) | | | | | | | | I |
| 23 | Operation test | Steering wheel | | | | I | | | | | | | | I |
| 24 | | Manual lever | | | | I | | | | | | | | |
| 25 | | Natural lowering and front deflection of the fork | | | | | | | I | | | | | |
| 26 | | Mast angle | | | | | | | M | | | | | |
| 27 | | Weight measurement sensor (option) | | | | | | | I | | | | | |
| 28 | Periodical replacement parts | Drive axle air vent | | | | | | | | | | | | |
| 29 | | Drive axle oil | | | | | | | | | | | | |
| 30 | | Hydraulic tank air breather element | | | | | R | | | | | | | |
| 31 | | Hydraulic oil return filter | | | | | | | | | | | | |
| 32 | | Hydraulic oil absorption strainer | | | | | | | clean | | | | | |
| 33 | | Hydraulic oil | HO | | A | | | | R*3 | | R*4 | | | |

*1 Harsh condition *2 Normal condition *3 Conventional hydraulic oil *4 Hyundai genuine long life hydraulic oil

A : Add C: Checking L: Lubrication R: Replacement T0: Retightening

I : Visual inspection (repair or replace if required) M : Measurement (repair or adjust if required)

※ **Oil symbols**

G : Grease GO : Gear oil HO : Hydraulic oil MO : Transmission oil

## 7. VISUAL INSPECTION

First, perform a visual inspection of the lift truck and its functional parts.

· Walk around the truck and take note of any obvious parts damage or maintenance problems.
· Check various capacity and safety·warning signs.

**※ Nameplates and labels : Nameplates and labels are recorded with important instructions. Do not operated when the nameplates and labels are damaged or detached, and replace immediately.**

To check the leakage of water and oil such as the driving unit and hydraulic oil, etc., inspect the oil leakage before and after starting the truck, and loosening of the fittings.

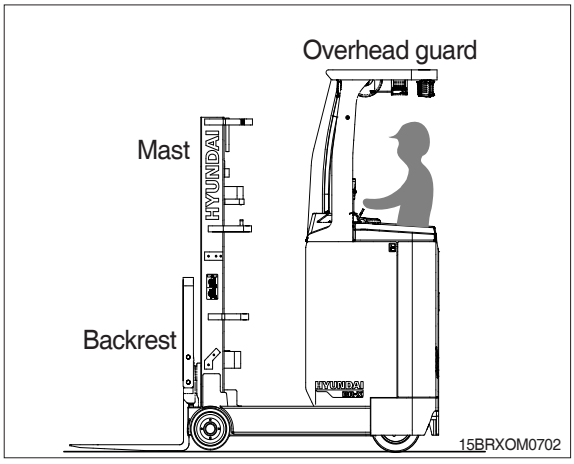
**⚠ Oil pressure and temperature : Do not use bare hands when checking the oil leakage. High temperature and pressure oil can penetrate your skin and cause serious injury.**

### 1) OVERHEAD GUARD

Check whether the overhead guard and safety devices are not damaged and mounted safely in the original position.

### 2) ATTACHMENT COMPONENTS

Mast, backrest, rail, lift roller, lift chain, lift cylinder and tilt cylinder must be inspected. Look for obvious wear and maintenance problems and damaged or missing parts. Loose parts, leakage, damage or loose roller and rail abrasion must be inspected.




Carefully check the lift chain for wear, rust, corrosion, bending or broken parts, and scratched parts, etc.

Check whether the lift chain and the carriage chain are adjusted with the same tension. Check whether the lift chain and the fixtures are set firmly in the original position. Check for oil leakage on all parts connected with the hydraulic oil.

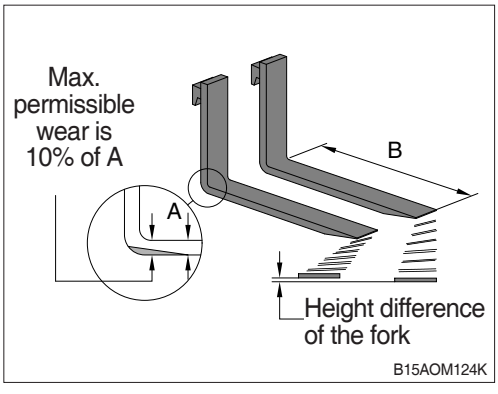
**⚠ Special caution and maintenance are required on the mast and lift chain for safe operation. For details, refer to 「Lift chain maintenance」.**

### 3) FORKS

Inspect the load forks for cracks, breaks, bending, and wear.

The fork top surfaces should be level and even with each other. The height difference between both fork tips refer to below table.

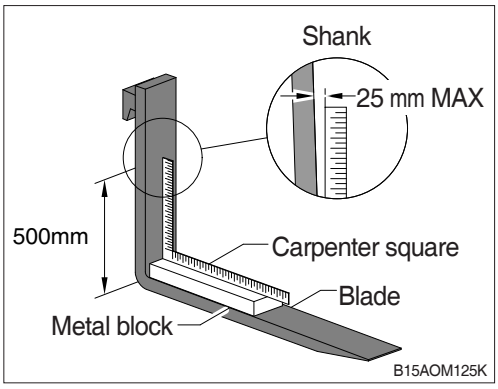
| Applicable model | Fork length (mm) | Height difference (mm) |
|---|---|---|
| All Model | 1500 or lower | 3 |
| | More than 1500 | 4 |



⚠ **When the fork blade is worn out of 10% or more, reduce the load amount and replace the fork.**

Fork bending or distortion must be inspected.
Place the metal bar of 100 mm in width, 600 mm in length and 50 mm in thickness on top of the fork, and check that in the 500 mm position of the square, it is not bent more than maximum of 25 mm or more.

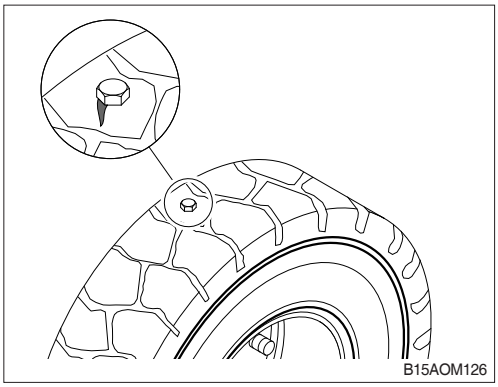
If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person before operating the truck. Inspect the fork locking pins for cracks or damage. Inspect for appropriate installation.




**4) WHEEL AND TIRES**

Check the condition of the wheels and tires before operation. Remove objects that are embedded in the tread.
Inspect the tire wear, crack or attachment of foreign substances.

Check all wheel lug nuts or bolts to be sure none are loose or missing. Replace missing bolts or lug nuts.
Loose or replaced parts must be installed with proper torque according to the specification.



## 8. HOW TO PERFORM PLANNED MAINTENANCE

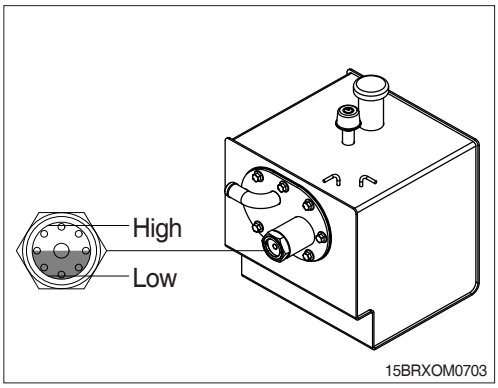
### 1) SUPPLEMENTATION OF HYDRAULIC OIL

Check the oil amount in the hydraulic tank. There must be proper amount of oil to operate the hydraulic system. Low oil amount can result in damage to the pump, and excessive oil can cause oil leakage and fault in lift truck operation.

Oil is expanded when the temperature increased, and it is appropriate to inspect the oil amount in appropriate temperature (45 degrees).

To check the oil amount, park the lift truck first on the flat surface, and lower the fork completely to the floor to be horizontal to the ground.

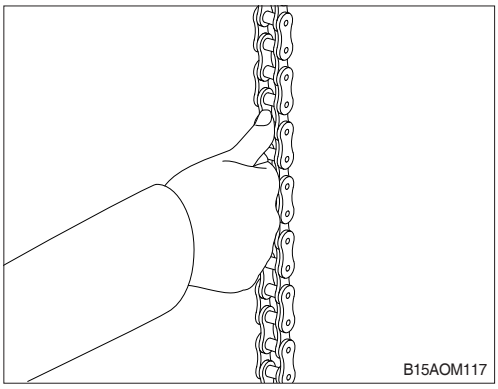
Check the oil amount through the gauge outside the tank. Add oil to have appropriate amount of oil filled above the "LOW" mark. Do not add oil excessively.




### 2) CHECKING AND ADJUSTING LIFT CHAIN TENSION

Stop the truck at level ground, lift forks kept horizontal 20-30 cm above the ground, and push the chain with the both hands.

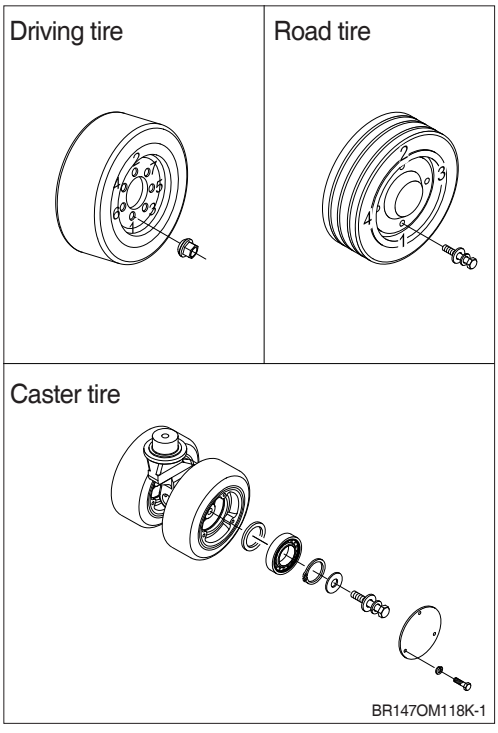
If any side of the chain shows excessively high or low tension, adjust the chain with the anchor bolt.




### 3) CHECKING HUB NUT

Tightening the hub nut firmly.

Tighten the hub nut in alternate directions for even tightening.



### 4) GREASE REFUELING ON EACH PARTS

Clean and wipe the parts for refueling.

(1) Lift chain : Apply the grease after wiping with the oil of SAE 30~40.

(2) Working surface of mast guide rail roller : Apply grease.

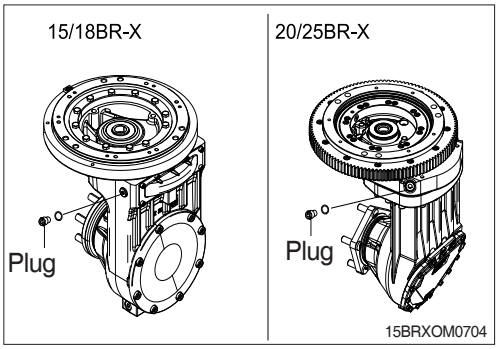
(3) Slide guide and slide rail : Apply grease evenly.

(4) Sliding section between inner and outer masts : Apply grease evenly.

(5) Sliding section between the fork and finger bar : Apply grease.

### 5) OIL CHECK ON THE DRIVING GEAR CASE

Remove the plug on the front of the driving gear case to check the oil level.

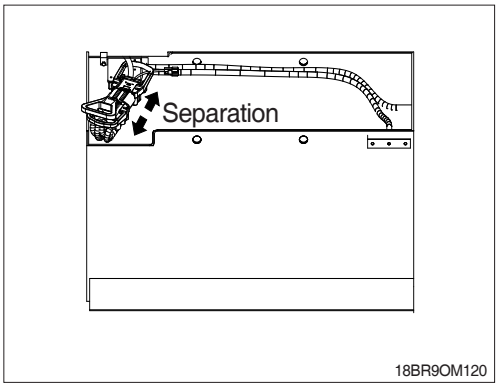


### 6) TRUCK BODY INSPECTION

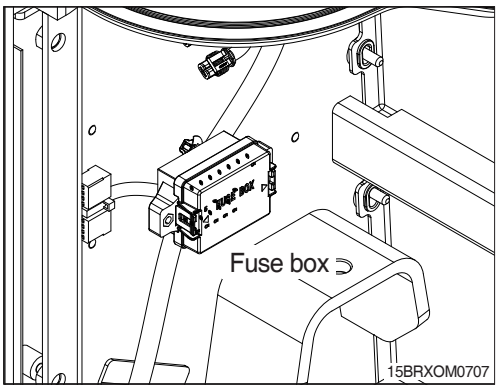
Inspect the truck body, and immediately consult with the shop for any defects, if any.

### 7) FUSE EXCHANGE

(1) Separate the battery connector.




(2) Remove the existing fuse, and install new fuse.

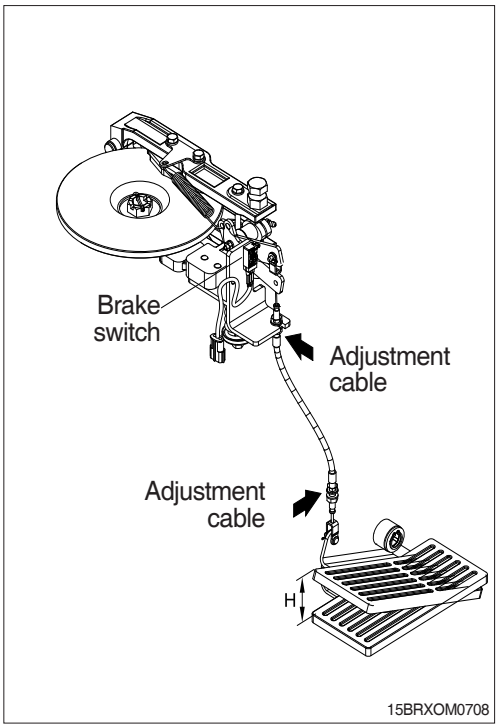



※ Product with the same capacity must be used when exchanging the existing fuse. Request inspection to the designated repair shop when the fuse is disconnected frequently. Use of conductors such as the copper wire, etc. instead of the fuse are prohibited.

## 8) INSPECTION AND ADJUSTMENT OF THE SERVICE BRAKE SYSTEM

(1) Check the pedal height (H), and adjust the cable adjustment nut when the height is too high or low.
· Adjustment range (H) : 64 $^{+5}_{0}$ mm

(2) While the pedal pressure is released, check the normal state of the brake switch.



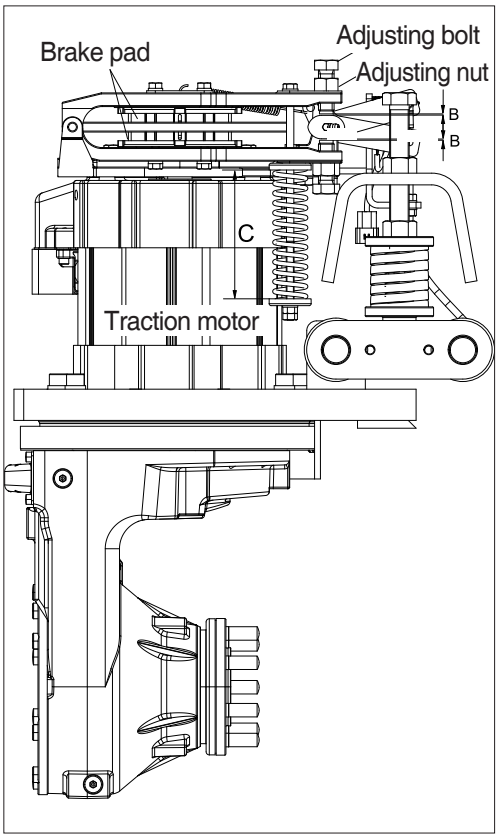

(3) Check the clearance between the brake cam and adjusting bolt (B).
· B : 0.1~0.5 mm
Adjust the adjusting bolt when the clearance is too big or small.
· Adjusting nut tightening torque :
11.4~12.6 kgf·m
Check the operation of the cam and bolt, and lubricate with grease.

(4) Check the abrasion or damage on the brake pad. When the brake pad is slanted to one side or when the thickness is 4.5 mm or less, the brake pad must be replaced.
· Brake pad bolt tightening torque : 1.8~2.7 kgf·m

(5) Check the height (C) of the brake spring, and adjust the spring.

| Model | Height(mm) |
|---|---|
| 15/18BR-X | 118±1.0 |
| 20/25BR-X | 104±1.0 |

· Spring nut tightening torque : 1.8~2.7 kgf·m



### 9) LIFT CHAIN MAINTENANCE

The chain system on the mast was designed for safe, efficient, and reliable transmission of lifting force from hydraulic cylinder to the forks. Safe use of your truck with minimum down time depends on the correct care and maintenance of the lift chains. Most of the issues related to the chain operation are result of inappropriate maintenance. Periodic inspection is essential to long use of the chain.

**⚠ When the chain is worn out and damaged, the chain must be replaced instead of repairing. The chain must not be connected together for use.**

#### (1) Inspection and measurement of lift chain

Perform inspection and lubrication on the lift chain during the periodic inspection (every 500 hours) period. When operating in corrosive environments, inspect the chains in shorter period.

During inspection, check for the following conditions.

① Rust and corrosion, cracked plates, raised or turned pins, excessively tight joints, wear and worn pins or holes.

② When the pins or holes become worn, the chain becomes longer.
When a section of chain is 3% longer than a section of new chain, the chain is worn and must be discarded.

③ Chain wear can be measured by using a chain scale or a steel tape measure. When checking chains, be sure to measure a segment of chain that moves over a sheave. Do not repair chains by cutting out the worn section and joining in a new piece. If part of a chain is worn, replace all the chains of both sides on a truck.

#### (2) Lift chain lubrication

Lift chain lubrication is a very important part of your maintenance program. The lift chains operate more safely and have longer life if they are regularly and correctly lubricated. HYUNDAI genuine chain lubricant is recommended; it is easily sprayed on and provides superior lubrication. Heavy motor oil may also be used as a lubricant and corrosion inhibitor.

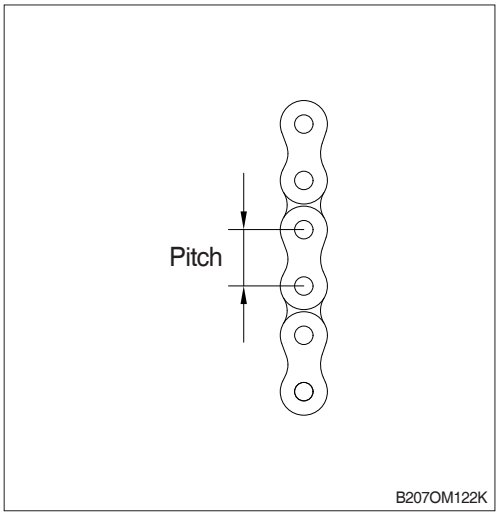
#### (3) Lift chain wear and replacement criteria

Degree of wear on the chain can be identified through the distance from the center of one pin to the center of the next pin.

For the length, when the distance from the center of one pin to the center of the next pin is worn out 3% or more, or when damages are discovered during the inspection, replace all chains.

Follow the instructions from the local HYUNDAI dealer for replacement of the chain. Do not remove factory lubrication or paint new chains. Replace anchor pins and worn or broken anchors when installing new chains. Adjust tension on new chains.

Lubrication is required when installing the chain to the mast.



## 10) CHANGE OF HYDRAULIC OIL AND CONSUMABLES

### (1) Change the hydraulic oil

① Battery reach-out is performed to secure the drain space.

② Perform reach-out of the mast as much as possible to the front, and lower the fork to the ground.

③ Prepare a suitable drain pan (40L or more) and loosen the drain plug.

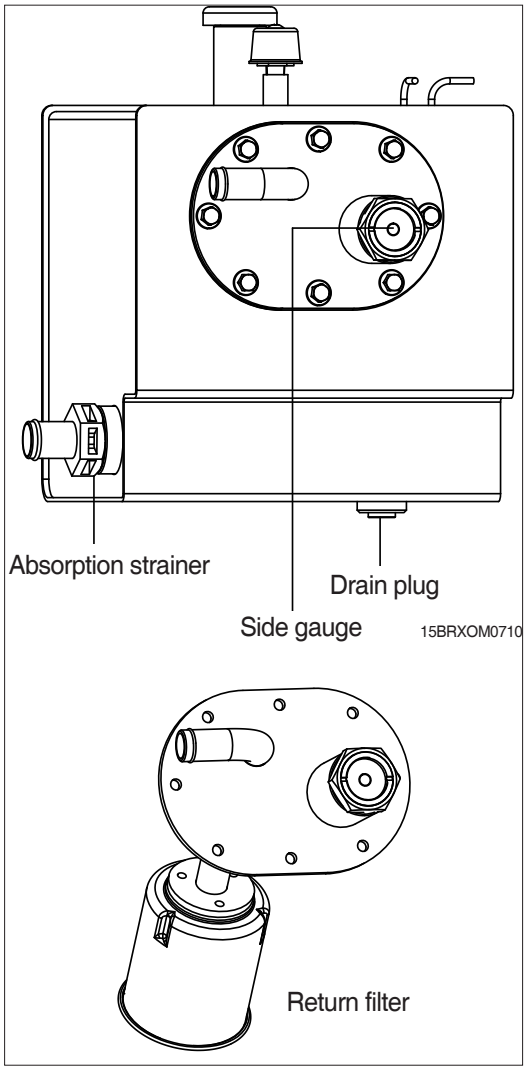
④ After draining oil, tighten the drain plug.
- Tightening torque : 5 kgf.m

⑤ Remove the absorption strainer for cleaning, and mount the strainer again.

⑥ Refer to the defined oil refueling amount for add the oil.

⑦ Turn the engine on, and operate the operating lever completely to performing bleeding.

※ **The oil must be free of bubbles. When there are bubbles in the oil, air may penetrate into the hydraulic system. Check for damage on the suction hose and clamp, and for any oil leakage.**




### (2) Hydraulic return filter exchanging

① Procedure for oil exchange is performed to remove the oil inside the tank.

② Remove the flange on the front of the tank.
- Tightening torque : 4kgf.m

③ Remove the return filter tightening bolt, and exchange and mount with new product
- Tightening torque : 1.05 kgf.m

④ Remove any foreign substances inside the tank, and perform re-assembly.

## 9. BOLT TIGHTENING TORQUE INSPECTION

Truck may occur with faults or accidents when the parts receiving the load is loosened, and damage can be caused to the parts.
All parts applied with the load must maintain the accurate torque for safety and to prevent truck damage.

Critical items include the following.

Steering axle mounting
- Drive axle mounting
- Overhead guard
- Tilt cylinder mounting and yokes
- Mast mounting and components

See 「**CHAPTER 8 SPECIFICATIONS**」 for tightening torque.

## 10. AIR CLEANING

Always maintain a lift truck in a clean condition. Prevent foreign substances, dust or other pollutants from building up on top of the truck. Leakage of oil or grease from the truck must be prevented. Wipe up all oil spills. The control device and operating room floor must be maintained safely in a clean and dry condition. A clean truck makes it easier to see leakage and loose, missing, or damaged parts, and helps prevent fires. Operating environment of the lift truck is the standard for determining the maintenance interval and range.
For example, the truck performing work in the place with high amount of dust or pollutants in the air, floor or ground must be cleaned more frequently. If the compressed air cannot remove the grease and oil, etc. use steam or liquid spray cleaner for removal.

**※ Perform air cleaning on each periodic inspection, and more frequently cleaning is performed depending on the truck condition.**

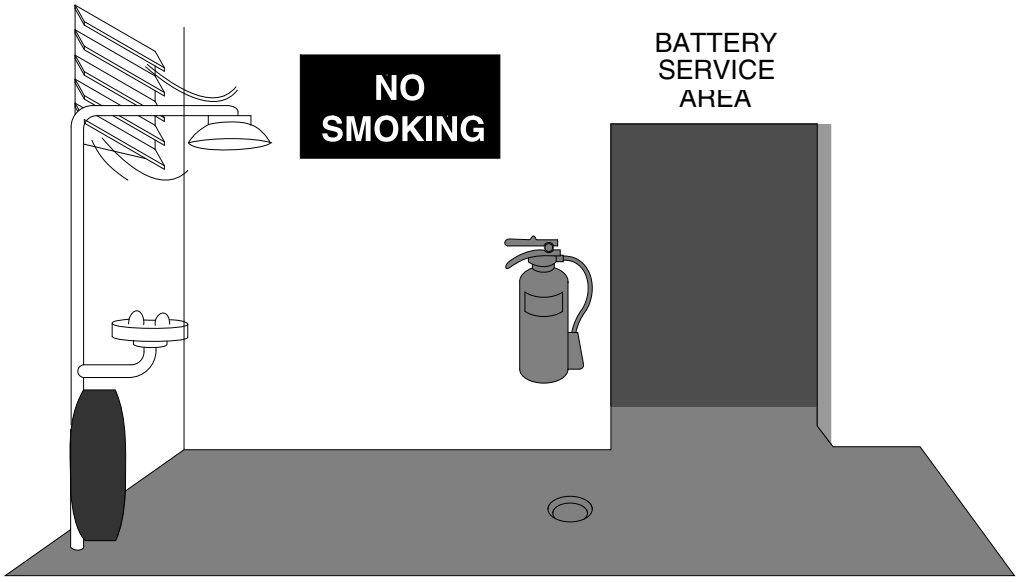
Use special connecting strand control valve and nozzle, etc. on the air hose to perform air cleaning more efficiently. Use clean, dry and low-pressure compressed air. Air pressure is limited up to 2 $kgf/cm^2$.

**⚠ Wear proper safety glasses and protective clothing during the air cleaning. Take caution on not pointing the air nozzle on others.**

Air cleaning must be performed on the overall parts of the truck including the mast, driving unit, battery accessories, driving line and related parts, sterring axle and cylinder, etc.

## 11. BATTERY MAINTENANCE

### 1) GENERAL

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Battery charging, replacement and removing should be performed at designated battery shop only. The shop should be free of inflammable materials or combustibles.

Facilities mandatory for the shop :

- Electrolyte cleaning facility
- Fire preventing and fire-fighting facility
- Facility protecting battery from systems
- Ventilation facility for gas from battery

Protection goggles should be worn when handling strong-acid solution of concentration of of 50% or higher, and washing bowl should be provided for emergency.

Transportation facilities such as conveyor and crane should be provided for handling the batteries.

**⚠ Battery of the lift truck is very heavy and dangerous when handling, so special caution is required. The battery is filled with toxic chemical solutions and hydrogen and oxygen are generated during charging. These gases may be mixed and explodes. Read and understand the manual before removing, servicing or installing batteries, and comply with the cautions.**

## 2) BATTERY HANDLING

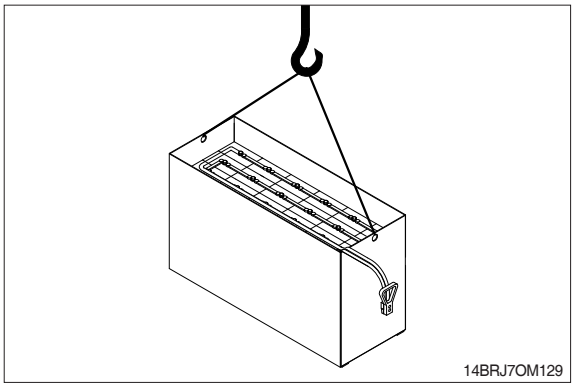
(1) Battery charging, replacement and removing should be performed at designated battery shop only.

(2) The battery shop should operate electrolyte cleaning facility, battery gas ventilation facility, and fire-preventing and fire-fighting facilities.

(3) Transportation facilities such as conveyor or crane should provided at the shop for removing and installing batteries. Lifting hook with safety locking device should be used.

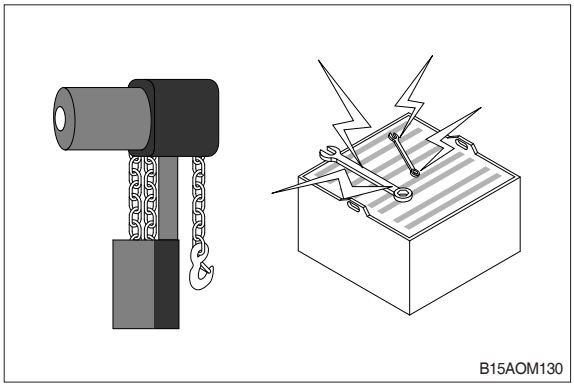
(4) Always use specific lifting tools including insulated cable for lifting batteries. Lifting hook of insulated cable should be compatible with lifting hook of battery to prevent damage to batteries. Battery can be damaged when the lifting cable is slanted to one side, so the lifting hook must be adjusted appropriately to maintain the balance.

(5) If there is no battery cover, or terminal or connector is exposed, cover the battery with wooden sheet or thick cardboard to make insulation.



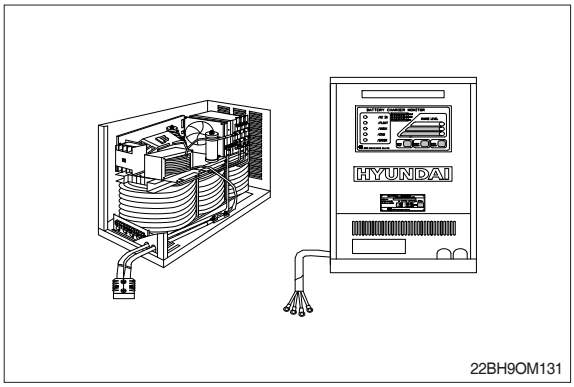

(6) Chain container should be mounted on chain crane or motor-driven crane for accommodating excessive length of chain.

(7) Any tool or other metal object should not make contact with terminal.



### 3) BATTERY CHARGING

This charger uses automatic method, and continuous observation is not required after connecting the plug.




#### (1) How to use charger

① Connecting the plug and the battery connector lights up the input power lamp, and the normal charging indicator lamp, and charging starts few seconds later.
**Once charging is complete, power is automatically shut down.**

② **Functions of indicator lamps and switches**

- **Input power indicator lamp** : Lighted when the power plug of the charger is connected. If the lamp is not lighting up, check the plug or the input power.
- **Battery connection indicator lamp** : Lighted when the battery is connected to the charger. If not lighting up, check the connector.
- **75% charging indicator lamp** : Green lamp is lighted when the current charging state is 75%.
- **Charging complete indicator lamp** : Lighted when the charging is complete.
- **Input power shutoff indicator lamp** : Lighted when the power input connection is blocked. When lighting up, check input power.
- **Overvoltage indicator lamp** : Lighted when the manual stop button is pressed, or when the charging voltage is 66V or higher. In such a case, remove the battery from the charger cable.
- **Overcurrent indicator lamp** : Lighted when the current is flowing excessively. In such a case, shut power down, open the charger door and press temperature relay button of the electromagnetic switch plug. If this lamp lights up five minutes later again, contact the charger service center.
- **Normal/Equal charging conversion switch** : In normal charging, the switch is operated to the left, and the switch is operated to the right during equal charging.
- **Manual stop button** : Pressing this button during charging stops charging.
- **Release switch** : Pressing Recovery button after stopping charging manually or pressing manual switch resumes charging.
- **Voltage/Current check button** : Battery voltage is displayed at all times, and current is indicated when the button is pressed.

### (2) Installation of charger

① Installation place
The charger should be installed at a place of well ventilation, low temperature/humidity, and free from dusts.

② Before using the charger, adjust to the voltage appropriate for the service area.

③ Check grounding line of the charging cable for well grounding of the grounding line.

### (3) Normal charging

① The charging procedures are as follows:
- Connect the charger input power.
- Be sure the switch is in the normal charge position.
- Connect the battery connector to the charge connector.
- Make sure that the indicator lamps normally light up.

② The procedures after charging are as follows.
- Make sure that CHARGE COMPLETE indicator lamp lights up.
- Remove the battery connector from the charger connector.

③ The procedures of stopping during charging are as follows.
- Press the manual switch during charging.
- Remove the battery connector from the charger connector.

### (4) Equal charging

① Repeated normal charging causes difference of capacity among cells. In such a case over-charging is often performed to keep capacities of cells uniform; this is called equal charging.
Equal charging should be performed in any of the cases listed below.
- When battery charging and discharging are repeated every day, equal charging should be performed once a month:
- Battery discharged below specified capacity;
- Recharging not performed after discharging; and
- Equal charging method is same as normal charging. All you have to do is press EVEN switch when starting charging.

**⚠ Excessive equal charging may reduce service life of the battery.**

### (5) Makeup charging

If daily charged capacity is not sufficient for a day's work, normal charging should be performed during idling time.

### (6) PRECAUTION

① Check input power when installing the charger, and use the charger compatible with the voltage of region.

② Charge the battery immediately after exhaustively using it. Charge the battery once a month when the battery is kept in standby mode for an extended period of time.

③ Prevent drop of density of the battery, particularly, in winter.

④ Immediately stop charging the battery if temperature of electrolyte exceeds 50˚C during charging.

⑤ Combustible gases are generated from the battery during charging. Pay special attention to fire prevention, and ventilation.

## 4) BATTERY REMOVAL AND MOUNTING

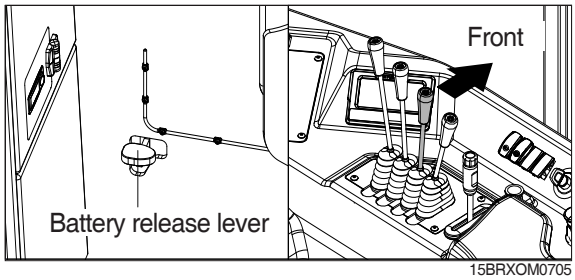
### (1) Battery removal

When spare battery is used for continuous work, or when inspecting the battery and the motor, etc., remove the battery in the following order.

① Switch ON the starting key.

② Press the battery release lever to release the fixing device.

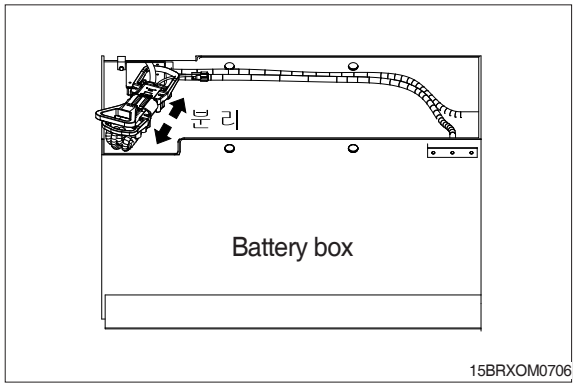
③ Push the reach lever forward until the battery is removed from the frame.



15BRXOM0705

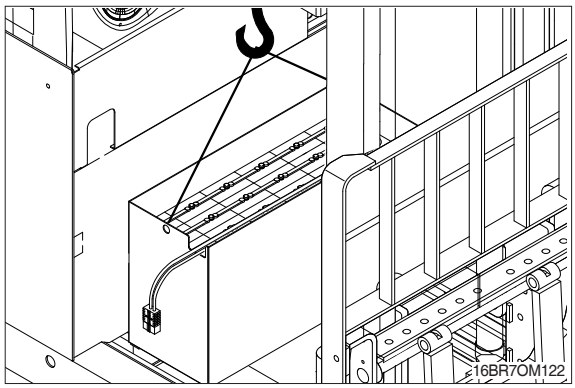
④ Switch OFF the starting key.

⑤ Separate the battery connector.



15BRXOM0706

⑥ Use the battery lifting device to lift the battery carefully.

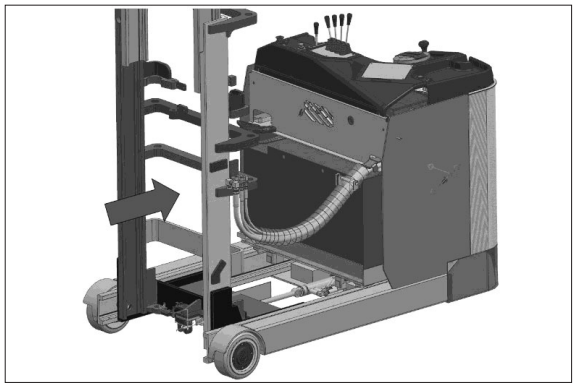

16BR7OM122

### (2) Battery mounting

**※ Battery mounting is performed in the reverse order of battery removal. Caution is taken for safety to perform the procedure slowly.**

Among the movement of pulling the reach lever to fix the battery, when the hose bundle connected to the mast is deviating from the guide roller, stop the operation to move the hose to the guide roller. Afterwards, insert the battery again into the truck.

**※ Take caution from others touching the operating lever while touching the hose.**

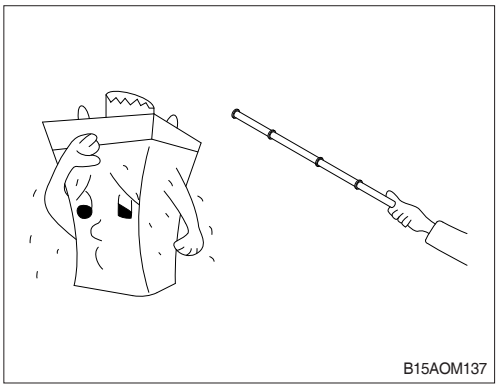


## 5) BATTERY MAINTENANCE

### (1) Prohibition of over-discharge

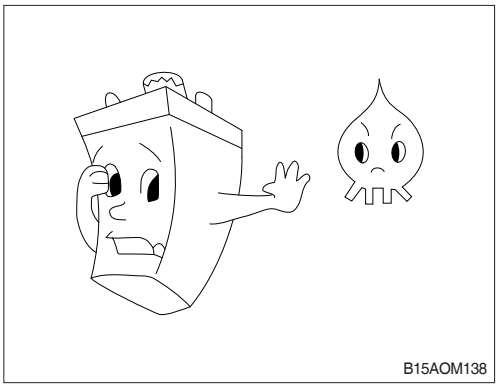
If the battery is so exhaustively consumed that the truck can not move anymore, the service life of the battery is reduced.

When turning the starting switch to ON position, and the battery charging indicator bar blinks, immediately charge the battery.


B15AOM137

### (2) Strict prevention of open flame

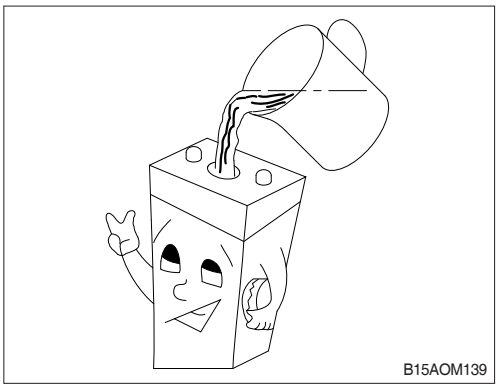
The battery contains inflammable gas. Never let open fame get near the battery.


B15AOM138

### (3) Makeup with distilled water

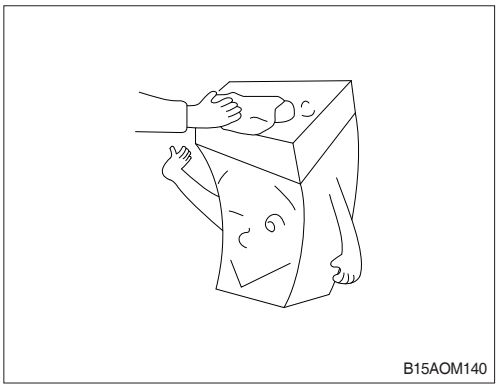
Electrolyte is reduced from decomposition and natural evaporation while charging, and after the charging is complete, distilled water is added to enable the electrolyte to be up to the defined level.

It is not required to make up with thin sulfuric acid except overflow of electrolyte.


B15AOM139

### (4) Keeping battery clean

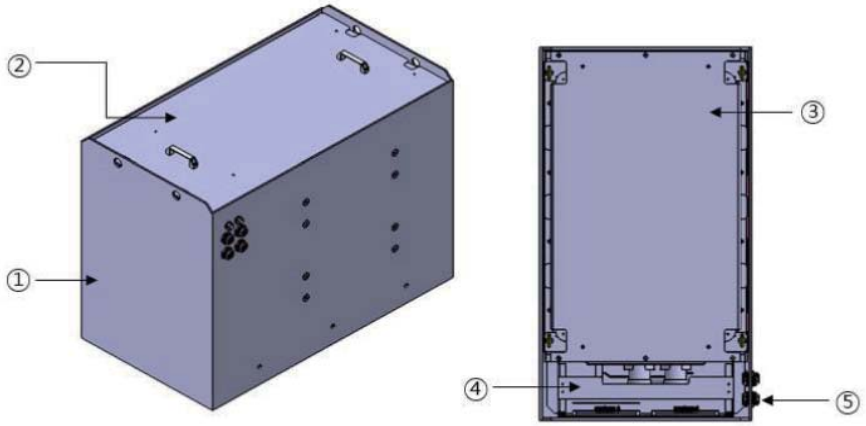
Keep the top of the battery clean and dry. Securely tighten the stopper of the solution port.


B15AOM140

## 12. LITHIUM ION BATTERY (OPT)

### 1) STRUCTURE

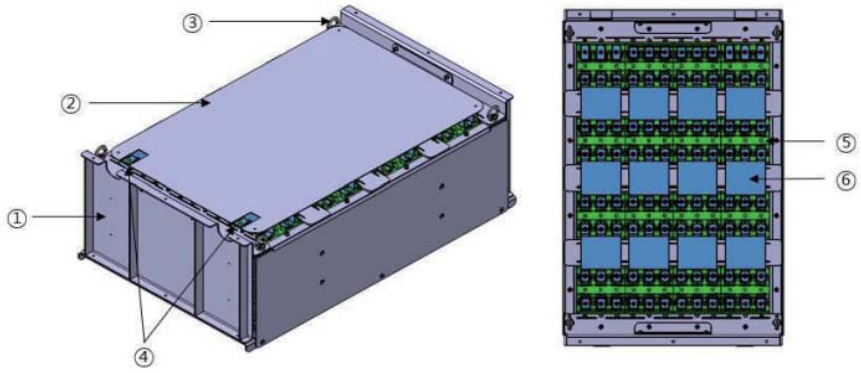
#### (1) Battery pack




25BX7PM14

| | | | | | |
|---|---|---|---|---|---|
| 1 | Housing | 3 | Module | 5 | Cable |
| 2 | Top case | 4 | BPU | | |

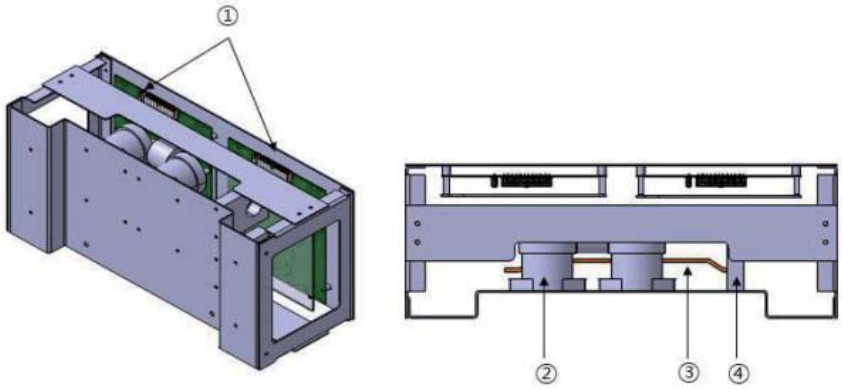
#### (2) Battery module




25BX7PM15

| | | | | | |
|---|---|---|---|---|---|
| 1 | Module frame | 3 | Eye-cut | 5 | Cell |
| 2 | PC cover | 4 | +: Anode terminal, -: Cathode terminal | 6 | Module bus bar |

### (3) BMS and BPU




25BX7PM16

1 BMS 3 Grounding bus bar 4 Current sensor
2 Relay

## 2) INSPECTION PROCEDURE

### (1) Daily inspection before starting

· Make sure that the battery pack charging terminal (DIN320 connector) is disconnected on the charge.
· Check the battery pack charging terminal for fixed state.
· Check the battery pack charging terminal for damage.
· Check the battery pack charging terminal and system load for fixed state.

### (2) Measures for abnormality before starting

① Voltage on charging and discharging terminals of battery pack
· Servicing is required for troubleshooting of failure by molten relay, short on both ends of relay.
· Servicing is required in cases of function failure of BMS, or power supply to BMS.

② Measures for poor stationary conditions of charging and discharging terminals of battery pack
· Check tightening status of bolts of charging/discharging terminals.
· Fasten the bolt at specified torque.

③ Damage of battery pack charging terminal
· Replace with specified connector (DIN320).

### (3) Inspection for defects after start stopping

· Check if starting is stopped before connecting charging terminal on battery pack charging terminal.
· Check if voltage is detected before connecting charging terminal on battery pack charging terminal.
· Check the battery pack charging terminal for damage.

### (4) Measure for defects after start stopping

① When starting is not stopped
· Starting should be stopped.

② Voltage detected on the charger terminal
· Make sure that starting is stopped. If so, take servicing action.
· Failure by molten relay is suspected. Take servicing action.

③ Charging terminal of charger or battery pack damaged
· Replace with specified connector (DIN320).

## 13. LITHIUM ION BATTERY CHARGER (OPTION)

**※ Please read and familiarize yourself with the following instructions before connecting the battery charger to the power and battery.**

### 1) USE AND OPERATION

1) When using battery charger, safety requirements should be satisfied pursuant to the local laws and regulations, and regulations stipulated by local authorities.
2) The user must use the charger according to the regulation. Actions that may threaten the lives and health of the user and others must be avoided, and property damage must be prevented.

CHARGER2

### 2) WARNING ON INSTALLATION AND SAFETY

(1) Read and understand the following instructions before connecting battery charger to power source and battery.

① For proper function and efficient use, position the battery charger in the proper direction on the wall, and fix with the plug through the slot. Take caution on not blocking the ventilation slot hole.

② Authorized skilled experts are only allowed of opening battery charger.

③ Vent insulation sections of power cable and battery connector before operating the battery charger.

④ Skilled engineers are only allowed of performing works on electric apparatus.

⑤ Shut power off before connecting or disconnecting the battery.

⑥ The battery under charging generates explosive gases. Do not smoke in the vicinity of the truck. Avoid open flame and spark, and prevent access of other truck that may cause risky situations on human beings and properties.

⑦ The battery charger contains electric components generating electric arc and spark, and should be positioned on place adequate for functions of the charger when using it in confined space. Every standard battery charger should be used on hard and flat floor in contained space of well ventilation and free from rainwater and/or water splash. In particular, place of dusty environment, or with water or heat source, or high humidity should be avoided. Do not place the battery charger on floor or shelf made of wooden material or other inflammable materials, or do not stack objects around the charger. Never put solution container on the lid of the charger.
The battery charger should be connected to grounded receptacle/socket for preventing shock.

⑧ In addition, receptacle/socket for connecting with the battery charger should compliant with the charger capacity, and should be protected by proper electric devices pursuant to the standards (e.g., fuse and auto switch). Protection system should have calibration margin of 10% or higher based on current absorption ratio of the truck for sufficient selectivity.

⑨ Always use special bipolar connector (DIN 320 REMA).

⑩ Do not extent existing power connection with additional cable.

⑪ The charger is free from maintenance except routine cleaning. Cleaning should be performed regularly dependent upon working environments. Disconnect power cable and battery connection cable from power source before cleaning the charger.

### 3) POWER CONNECTION

The battery charger should be connected to power receptacle compatible with capacity of installed battery charger. Correctly connect the charger to grounding line. It is desirable to verify that main power of 3-phase is supplied on place for operating the battery charger while installing the charger (or moving the batteries).

| Battery voltage (V) | Charger current (A) | Module power (kw) | Active input power (kw) | Input LAC norm (A) | Fuse AC (A) | DC fuse code |
|---|---|---|---|---|---|---|
| 48 | 200 | 12 | 12.26 | 19.98 | 25 | LMT250 |
| 48 | 250 | 16 | 15.32 | 24.97 | 32 | LMT315 |

### 4) BATTERY CONNECTION

It is recommended to use bipolar connector compliant with the specification pursuant to the standards to prevent inverse connection of the polarity of the battery. Check the cable connection of the connector contact. This work must be performed by a skilled engineer.

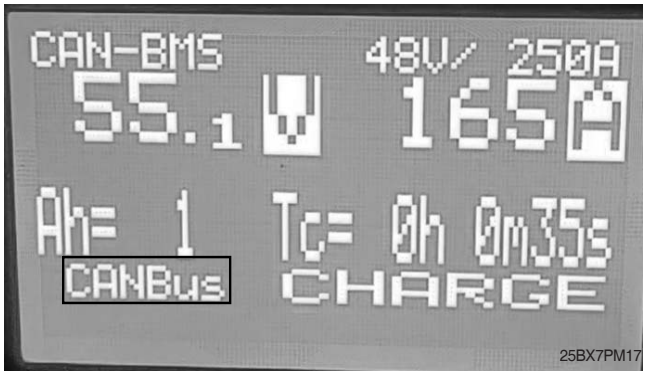
**※ USB port should only be used for programming charging variables, and downloading history data and graphs. To prevent the EMI noise from causing interference to the charging process to have unexpected result on the battery charger and battery, separate the USB cable from the charger while charging.**

### 5) PRECAUTION DURING CHARGING

Shut down starting switch, and emergency stop switch of the truck before battery charging.

Completely connect the battery charger to the battery connector for charging. Check texts of CAMBus on the bottom left of the charger monitor after beginning charging.

Do not disconnect the connector during charging. (Never forget to press the ON/OFF switch of the charger to stop operation of the charger before disconnecting the connector.)



## 14. STORAGE

### ※ CAUTIONS

Improper storage of the truck may cause damage and corrosion of major functional parts, or damage and discharging of the battery. The battery of the lift truck should be stored in indoor environment to prevent damage by rainfall.

### 1) DAILY STORAGE

Follow the instructions below when storing the lift truck in a warehouse.

(1) Place the lift truck in dry and clean environment of well ventilation, and free from frost.
(2) Make sure parking brake is applied.
(3) Make sure that the forks have been lowered on the floor, and the mast vertically inclined.
(4) Turn both of the starting switch and the emergency stop switch to OFF position to shut off power to the battery.

### 2) LONG-TERM STORAGE

(1) Caution on storage
① Clean the truck clear.
② Check the functions of the brake, the mast, motor starting, steering, horn, and electric parts.
③ Check the hydraulic oil level, and makeup the oil, if required (See Table Recommended Lubricants).
④ Apply thin film of oil or grease on all of surfaces not coated with paint.
⑤ Supply grease to the lift truck at injection points specified in 'Regular Checklist.'
⑥ Coat all of exposed electric connections with adequate spray.l
⑦ Disconnect the battery cable, and then clean the battery. When the lift truck is to stored for a month or longer, remove the battery from the truck, and store it in indoor place.
- Refer to 'Battery Maintenance' on Page 7-22 for further information of maintenance of the battery.

### 3) CAUTION DURING STORAGE

(1) Move short distance and operate the attachments.
(2) Check exposed parts for rust once a month.
(3) Check voltage of the battery once a month, and recharge the battery, if required.

### 4) CAUTION AFTER STORAGE

(1) Clean the lift truck clear.
(2) Reconnect the battery cable, and check the battery voltage.
- Recharge the battery, if required, and then check specific gravity of electrolyte.
(3) Lubricate the lift truck with grease at injection points specified in 'Regular Checklist.'
(4) Check whether condensed water is included in the hydraulic oil, gear oil, brake oil, drive axle oil and driving device oil,
(5) and (if required), drain the water or exchange the oil.
(6) Start the truck, and check for all of functions and oil leak.
To operate the attachments, operate in ultra-low speed for 10 or more times until the final cylinder stroke to remove air from the tank.
- Points and electric parts of operation, steering, and noise
- Leak from cylinder, MCV,pump, powertrain part, tube and hose

## 15. OIL

### 1) NEW TRUCK

The following oil is used when releasing the new truck.

| Item | Spec. |
|---|---|
| Gear oil | SAE 80W-90 |
| Hydraulic oil | ISO VG32, VG46, VG68, Hyundai long life hydraulic oil, ISO VG15★ |
| Grease | NLGI No.2 |

· API : American Petroleum Institute
· SAE : Society of Automotive Engineers
· ISO : International Organization for Standardization
· NLGI : National Lubricating Grease Institute
★ : Cold area (Russia, Mongolia, CIS)

### 2) RECOMMENDED LUBRICANT

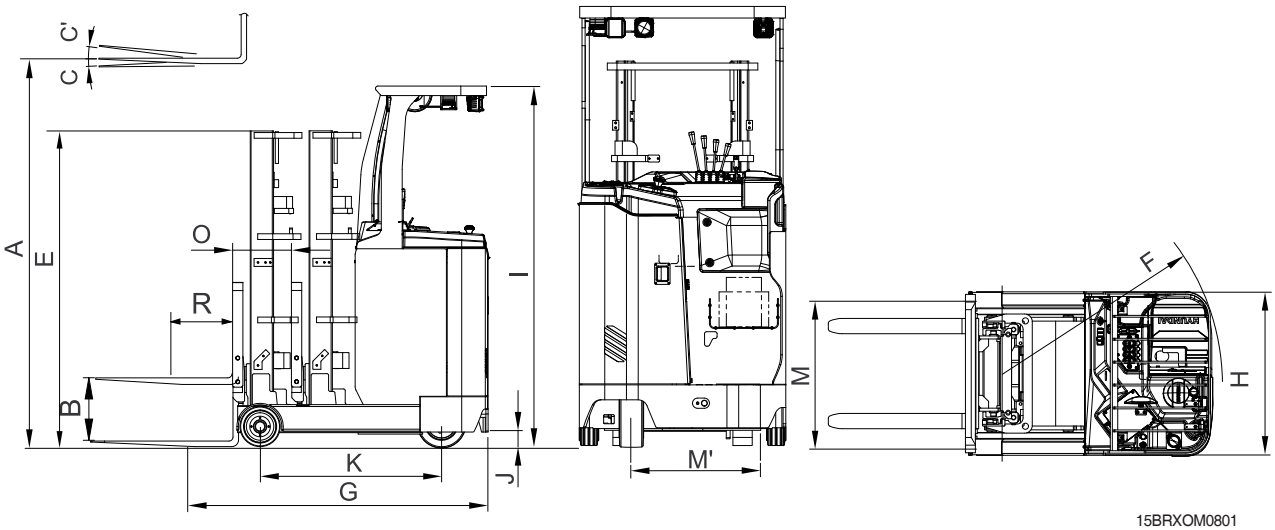
| Item | Lubricant Type | Capacity l | | Outdoor temperature˚C |
|---|---|---|---|---|
| | | 15/18BR-X | 20/25BR-X | -50 -30 -20 -10 0 10 20 30 40 |
| Driving unit | Gear oil | 3.5 | 4 | SAE 80W-90 |
| Hydraulic oil tank | Hydraulic oil | 18 | 24 | ISO VG 15★<br>ISO VG 32<br>ISO VG 46<br>ISO VG 68 |
| Grease feeding unit | Grease | 0.1 | 0.1 | NLGI No.1<br>NLGI No.2 |

★ : Cold area (Russia, Mongolia, CIS)

# CHAPTER 7 SPECIFICATIONS

## 1. DIMENSIONS AND PERFORMANCE

### 1) 15/18BR-X

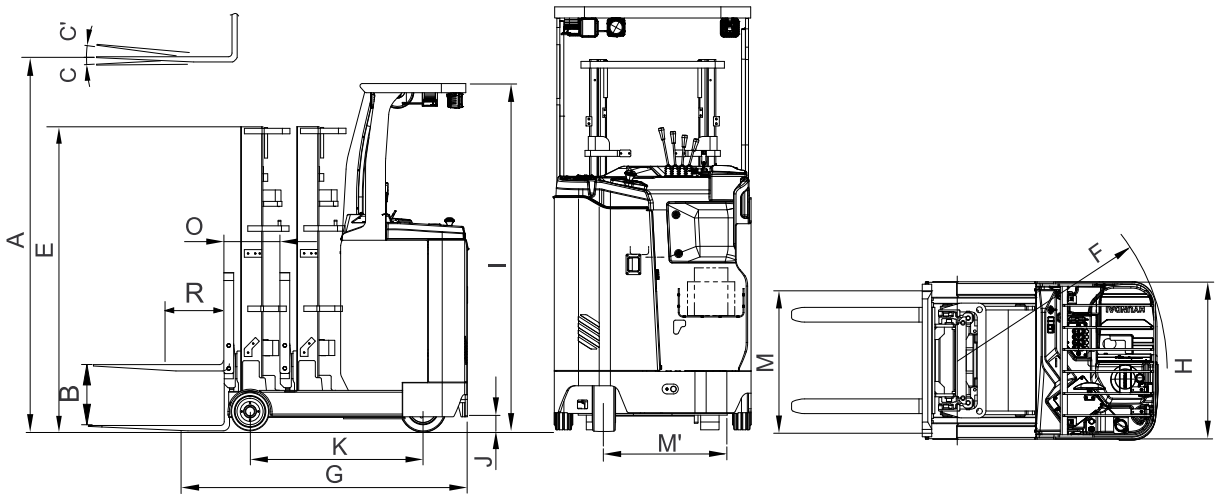



15BRXOM0801

| Item | | | Unit | 15BR-X | 18BR-X |
|---|---|---|---|---|---|
| Rated load | | | kg | 1500 | 1800 |
| Load Center | | R | mm | 500 | ← |
| Weight (Non-load, battery included) | | | kg | 2310 | 2334 |
| FORKS | Lifting height | A | mm | 3000 | ← |
| | Free lift | B | mm | 210 | ← |
| | Ascending speed (non-load/load) | | mm/sec | 460/340 | 460/320 |
| | Descending speed (non-load/load) | | mm/sec | 450/500 | ← |
| | L×W×T | L,W,T | mm | 900×100×35 | ← |
| Mast | Tilt angle (forward/backward) | C/C' | degree | 5/5 | ← |
| | Max. height | D | mm | 4025 | ← |
| | Min. height | E | mm | 1991 | ← |
| Body | Driving speed (non-load) | | km/h | 10.0 | 10.0 |
| | Gradeability (non-load/load) | | % | 14/23 | 21/14 |
| | Min. turning radium (outside) | F | mm | 1596 | 1775 |
| Others | Max. hydraulic force | | kgf/cm$^2$ | 180 | ← |
| | Hydraulic oil tank | | ℓ | 18 | ← |
| Overall length (including fork, reach retracted) | | G | mm | 2149 | 2150 |
| Overall width (Load wheel standard) | | H | mm | 1070 | ← |
| Overhead guard height | | I | mm | 2275 | ← |
| Ground clearance | | J | mm | 94 | ← |
| Distance between axles | | K | mm | 1340 | 1525 |
| Distance between wheels (front/rear) | | M/M' | mm | 970 *1070/639 | 994 *1094/613 |
| Reach distance | | O | mm | 482 | 665 |

* Wide frame

## 2) 20/25BR-X




15BRXOM0801

| Item | | | Unit | 20BR-X | 25BR-X |
|---|---|---|---|---|---|
| Rated load | | | kg | 2000 | 2500 |
| Load Center | | R | mm | 500 | ← |
| Weight (Non-load, battery included) | | | kg | 2657 | 2862 |
| FORKS | Lifting height | A | mm | 3000 | ← |
| | Free lift | B | mm | 248 | ← |
| | Ascending speed (non-load/load) | | mm/sec | 460/300 | 470/280 |
| | Descending speed (non-load/load) | | mm/sec | 450/500 | ← |
| | L×W×T | L,W,T | mm | 1050×100×45 | ← |
| Mast | Tilt angle (forward/backward) | C/C' | degree | 5/5 | ← |
| | Max. height | D | mm | 4030 | ← |
| | Min. height | E | mm | 2025 | ← |
| Travel speed (load/ non-load) | Driving speed (non-load) | | km/h | 10.5 | ← |
| | Gradeability (non-load/load) | | % | 14/21 | 14/18 |
| | Min. turning radium (outside) | F | mm | 1790 | 1980 |
| Others | Max. hydraulic force | | kgf/cm$^2$ | 190 | ← |
| | Hydraulic oil tank | | l | 25 | ← |
| Overall length (including fork, reach retracted) | | G | mm | 2380 | 2378 |
| Overall width (Load wheel standard) | | H | mm | 1200 | ← |
| Overhead guard height | | I | mm | 2294 | ← |
| Ground clearance | | J | mm | 85 | ← |
| Distance between axles | | K | mm | 1510 | 1705 |
| Distance between wheels (front/rear) | | M/M' | mm | 994 *1094/690 | 1060 *1180/690 |
| Reach distance | | O | mm | 610 | 807 |

* Wide frame

## 2. SPECIFICATION FOR MAJOR COMPONENTS

### 1) 15/18BR-X

#### (1) Motor

| Item | Unit | Drive motor | Pump motor |
|---|---|---|---|
| Model | - | AMDU6005 | ABDK4001 |
| Type | - | AC | ← |
| Rated voltage | Vac | 30V 3Ø | ← |
| Output | kW | 4.5 | 9 |
| Insulator | - | Class F | ← |

#### (2) Battery

| Item | Unit | 15BR-X | 18BR-X |
|---|---|---|---|
| Type | - | VCF 280 | VCI 300 |
| Rated voltage | V | 48 | ← |
| Capacity | AH/hr | 280/5 | 300/5 |
| Electrolyte | - | WET | ← |
| Spec. (W×D×H) | mm | 994×378×581.7 | ← |
| Connector | - | SB350 | ← |
| Weight | kg | 480 | 507 |

#### (3) Charger

| Item | Unit | 15/18BR-X |
|---|---|---|
| Method | - | Static current, static voltage |
| Capacity of battery for charging | V-AH | 48-280~ 365 |
| AC input | V | 3-Phase, 410 |
| | | Single phase, 220 |
| | | 3-Phase, 220/ 380 |
| | | 3-Phase, 440 |
| DC output | V | 64±1 |
| Charging time | hr | 6±2 |
| Connector | - | SB350 |

### (4) Gear pump

| Item | Unit | Spec. |
|---|---|---|
| Type | - | Fixed capacity-type gear pump |
| Capacity | cc/rev | 18.4 |
| Working pressure | bar | 210 |
| Rated rotation rate (max/min) | rpm | 3500/500 |

### (5) Main control valve

| Item | Unit | Spec. |
|---|---|---|
| Type | - | 3 spools, 4 spools |
| Operating mode | - | Mechanical |
| Primary relief valve pressure | bar | 180 |

### (6) Driving unit

| Item | Unit | Spec. |
|---|---|---|
| Gear ratio | - | 20.2 |
| Oil capacity | ℓ | 3.3 |

### (7) Wheel

| Item | 15/18BR-X |
|---|---|
| Type (Load/Driving/Caster) | Urethane/Rubber/Rubber |
| Quantity (Load/Driving/Caster) | 2 / 1 / 2 |
| Load wheel | 254×100 |
| Driving wheel | 345×140 |
| Caster wheel | 178×73 |

### (8) Brake

| Item | Spec. |
|---|---|
| Brake (driving and parking) | Disk brake |

## 2) 20/25BR-X

### (1) Motor

| Item | Unit | Drive motor | Pump motor |
|---|---|---|---|
| Model | - | AMDG9001B | ABDD4002 |
| Type | - | AC | ← |
| Rated voltage | Vac | 30V 3Ø | ← |
| Output | kW | 6 | 14 |
| Insulator | - | Class F | ← |

### (2) Battery

| Item | Unit | 20/25BR-X |
|---|---|---|
| Type | - | VCI 335 |
| Rated voltage | V | 48 |
| Capacity | AH/hr | 335/5 |
| Electrolyte | - | WET |
| Spec. (W×D×H) | mm | 994×378×581.7 |
| Connector | - | SB350 |
| Weight | kg | 560 |

### (3) Charger

| Item | Unit | 20/25BR-X |
|---|---|---|
| Method | - | Static current, static voltage |
| Capacity of battery for charging | V-AH | 48-280~ 365 |
| AC input | V | 3-Phase, 410 |
| | | Single phase, 220 |
| | | 3-Phase, 220/ 380 |
| | | 3-Phase, 440 |
| DC output | V | 64±1 |
| Charging time | hr | 6±2 |
| Connector | - | SB350 |

### (4) Gear pump

| Item | Unit | Spec. |
|---|---|---|
| Type | - | Fixed capacity-type gear pump |
| Capacity | cc/rev | 18.4 |
| Working pressure | bar | 210 |
| Rated rotation rate (max/min) | rpm | 3500/500 |

### (5) Main control valve

| Item | Unit | Spec. |
|---|---|---|
| Type | - | 3 spools, 4 spools |
| Operating mode | - | Mechanical |
| Primary relief valve pressure | bar | 190 |

### (6) Driving unit

| Item | Unit | Spec. |
|---|---|---|
| Gear ratio | - | 20.8 |
| Oil capacity | ℓ | 4.0 |

### (7) Wheel

| Item | 20/25BR-9 |
|---|---|
| Type (Load/Driving/Caster) | Urethane/Rubber/Rubber |
| Quantity (Load/Driving/Caster) | 2 /1 /2 |
| Load wheel | 267×114 |
| Driving wheel | 382×142 |
| Caster wheel | 204×76 |

### (8) Brake

| Item | Spec. |
|---|---|
| Brake (driving and parking) | Disk brake |

## 3. FASTENING TORQUE

### 1) 15/18BR-X

| Sequences | Item | | Screw specifications | kgf·m | lbf·ft |
|---|---|---|---|---|---|
| 1 | Electric systems | Pump motor mounting bolt | M10×1.5 | 6.9±1.4 | 50±10 |
| 2 | | Drive motor mounting bolt | M8×1.25 | 2.0±0.2 | 14.4±1.4 |
| 3 | | Steering motor mounting bolt | M10×1.5 | 6.9±1.4 | 50±10 |
| 4 | Hydraulic systems | hydraulic pump mounting bolt | M10×1.5 | 6.9±1.4 | 50±10 |
| 5 | | MCV mounting bolt, nut | M8×1.25 | 2.5±0.5 | 18.1±3.6 |
| 6 | Power transmission device | Drive unit mounting bolt | M12×1.75 | 14.3±1.0 | 103.4±7.2 |
| 7 | | Driving wheel mounting nut | M14×1.5 | 14±1.5 | 101.2±10.8 |
| 8 | | Load wheel mounting bolt | M40×1.5 | 5±0.5 | 36.2±3.6 |
| 9 | | Caster wheel mounting bolt | M12×1.75 | 12.0±1.0 | 86.8±7.2 |
| 10 | Others | Head guard mounting bolt | M14×2.0 | 19±3.0 | 137.4±21.7 |

### 2) 20/25BR-X

| Sequences | Item | | Screw specifications | kgf·m | lbf·ft |
|---|---|---|---|---|---|
| 1 | Electric systems | Pump motor mounting bolt | M10×1.5 | 6.9±1.4 | 50±10 |
| 2 | | Drive motor mounting bolt | M8×1.25 | 2.0±0.2 | 14.4±1.4 |
| 3 | | Steering motor mounting bolt | M10×1.5 | 6.9±1.4 | 50±10 |
| 4 | Hydraulic systems | hydraulic pump mounting bolt | M10×1.5 | 6.9±1.4 | 50±10 |
| 5 | | MCV mounting bolt, nut | M8×1.25 | 2.5±0.5 | 18.1±3.6 |
| 6 | Power transmission device | Drive unit mounting bolt, nut | M12×1.75 | 14.3±1.0 | 103.4±7.2 |
| 7 | | Driving wheel mounting nut | M14×1.5 | 14±1.5 | 101.2±10.8 |
| 8 | | Load wheel mounting nut | M50×1.5 | 5±0.5 | 36.2±3.6 |
| 9 | | Caster wheel mounting bolt | M12×1.75 | 12.0±1.0 | 86.8±7.2 |
| 11 | Others | Head guard mounting bolt | M14×2.0 | 19±3.0 | 137.4±21.7 |