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A MESSAGE TO HYUNDAI FORK LIFT TRUCK OPERATORS

Fork lift trucks are specialized for machines with unique operating characteristics, designed to perform a specific job. Their function and operation are not like a car or ordinary truck. They required specific instructions and rules for safe operation and maintenance.

Safe operation of fork lift trucks is of primary importance to HYUNDAI.
Our experience with fork lift truck accidents has shown that when accidents happen and people are killed or injured, the causes are:

- Operator is not properly trained
- Operator is not experienced with fork lift truck operation
- Basic safety rules are not followed
- Fork lift truck is not maintained in safe operating condition

For these reasons, HYUNDAI wants you to know about the safe operation and correct maintenance of your fork lift truck.

This manual is designed to help you operate your fork lift truck safely.
This manual shows and tells you about safety inspections and the important general safety rules and hazards of fork lift truck operation. It describes the special components and features of the truck and explains their function. The correct operating procedures are shown and explained. Illustrations and important safety messages are included for clear understanding. A section on maintenance and lubrication is included for the fork lift truck mechanic.

The operator's manual is not a training manual. It is a guide to help trained and authorized operators safety operate their fork lift truck by emphasizing and illustrating the correct procedures. However, it cannot cover every possible situation that may result in an accident. You must watch for hazards in your work areas and avoid or correct them. It is important that you know and understand the information in this manual and that you know and follow your company safety rules.
Be sure that your equipment is maintained in a safe condition. Do not operate a damaged or malfunctioning truck. Practice safe operation every time you use your fork lift truck. Let's join together to set high standards in safety.

Remember, before you start operating this fork lift truck, be sure you understand all driving procedures. It is your responsibility, and it is important to you and your family, to operate your fork lift truck safely and efficiently.

△ Be aware that the Federal Occupational Safety and Health Act(OSHA) and state laws require that operators be completely trained in the safe operation of fork lift trucks. It is also an (OSHA) requirement that a machine inspection be performed before every shift. If you need training in operating or inspecting your fork lift truck, ask your supervisor.

HYUNDAI fork lift trucks are built to take hard work, but not abuse. They are built to be dependable, but they are only safe and efficient as the operator and the persons responsible for maintaining them. Do not make any repairs to this truck unless you have been trained in safe fork lift truck repair procedures and are authorized by your employer.

This manual describes procedures for operation, handling, lubrication, maintenance, checking and adjustment. It will help the operator realize peak performance through effective, economical and safe machine operation.

INTRODUCTION

HYUNDAI welcomes you to the growing group of professionals who own, operate and maintain HYUNDAI fork lift trucks. We take pride in the long tradition of quality products and superior value the HYUNDAI name represents. This manual familiarizes you with safety, operating, and maintenance information about your new fork lift truck. It has been specially prepared to help you use and maintain your HYUNDAI fork lift truck in a safe and correct manner.

Your HYUNDAI fork lift truck has been designed and built to be as safe and efficient as today's technology can make it. As manufactured, for some models, it meets all the applicable mandatory requirements of ANSI B56.1-1988 Safety Standard for Powered Industrial Trucks. Some trucks are also furnished with equipment to help you operate safely. For example, load back rest, parking brake and horn are standard equipment.

Safe, productive operation of a fork lift truck requires both skill and knowledge on the part of the operator. The operator must know, understand, and practice the safety rules and safe driving and load handling techniques described in this manual. To develop the skill required, the operator must become familiar with the construction and features of the fork lift truck and how they function, the operator must understand its capabilities and limitations, and see that it is kept in a safe condition.

Routine Servicing and Maintenance

Regular maintenance and care of your fork lift truck are not only important for economy and utilization reasons. It is essential for your safety. A faulty fork lift truck is a potential source of danger to the operator, and to other personnel working near it. As with all quality equipment, keep your fork lift truck in good operating condition by following the recommended schedule of maintenance.

Operator Daily Inspection - Safety and Operating Checks

A fork lift truck should always be examined by the operator, before driving, to be sure it is safe to operate. The importance of this procedure is emphasized in this manual with a brief illustrated review and later with more detailed instructions. HYUNDAI dealers can supply copies of a helpful Drivers Daily Checklist. It is an OSHA requirement.

Planned Maintenance

In addition to the daily operator inspection, HYUNDAI recommends that a planned maintenance(PM) and safety inspection program be performed by a trained and authorized mechanic on a regular basis. The PM will provide an opportunity to make a thorough inspection of the safety and operating condition of your fork lift truck. Necessary adjustments and repairs can be done during the PM, which will increase the lift or components lifecycle and reduce unscheduled downtime and increase safety. The PM can be scheduled to meet your particular application and fork lift truck usage.

The procedures for a periodic planned maintenance program that covers inspections, operational checks, cleaning, lubrication, and minor adjustments are outlined in this manual. Your HYUNDAI dealer is prepared to help you with a Planned Maintenance Program by trained service personnel who know your fork lift truck and can keep it operating safely and efficiently.

Service Manual

In-depth service information for trained service personnel is found in Service Manual.

HOW TO USE THIS MANUAL

This manual is a digest of essential information about the safe operation, the features and functions and explains how to maintain your fork lift truck. This manual is organized into eight major parts:

Section 1. General Safety Rules, reviews and illustrates accepted practices for safe operation of a fork lift truck.

Section 2. Operating Hazards, warns of conditions that could cause damage to the truck or injury to the operator or other personnel.

Section 3. Know Your Truck, describes the major operating components, systems, controls, and other features of your truck and tells how they function.

Section 4. Daily Safety Inspection, presents details on how to perform the operator's daily safety inspection and refuel the fork lift truck.

Section 5. Operating Procedures, discusses specific instructions on the safe, efficient operation of your fork lift truck.

Section 6. Emergency Towing, gives instructions for towing your truck in an emergency and for using battery jumper cables to start your truck in an emergency.

Section 7. Planned Maintenance, describes the PM(Planed Maintenance) program.

Section 8. Specifications, provides reference information and data on features, components, and maintenance items.

※ The descriptions and specifications included in this manual were in effect at the time of printing. HYUNDAI reserves the right to make improvements and changes in specifications or design, without notice and without incurring obligation. Please check with your authorized HYUNDAI dealer for information on possible updates or revisions.

The examples, illustrations, and explanations in this manual should help you improve your skill and knowledge as a professional fork lift truck operator and take full advantage of the capabilities and safety features of your new fork lift truck.

The first section of the manual is devoted to a review, with illustrations and brief messages, of general safety rules and the major operating hazards you can encounter while operating a fork lift truck. Next, you will find description's of the components of your specific fork lift truck model and how the instruments, gauges, and controls operate. Then, you will find a discussion of safe and efficient operating procedures, followed by instruction's on how to tow a disabled fork lift truck. The later sections of the manual are devoted to maintenance and truck specifications.

Take time to carefully read the 3. Know Your Truck section. By acquiring a good basic understanding of your truck's features, and how they function, you are better prepared to operate it both efficiently and safely.

In Planned Maintenance, you will find essential information for correct servicing and periodic maintenance of your truck, including charts with recommended maintenance intervals and component capacities. Carefully follow these instructions and procedures.

Each major section has its own table of contents, so that you can find the various topics more easily.

We urge you to first carefully read the manual from cover to cover. 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 fork lift truck's features, operation, or manuals.

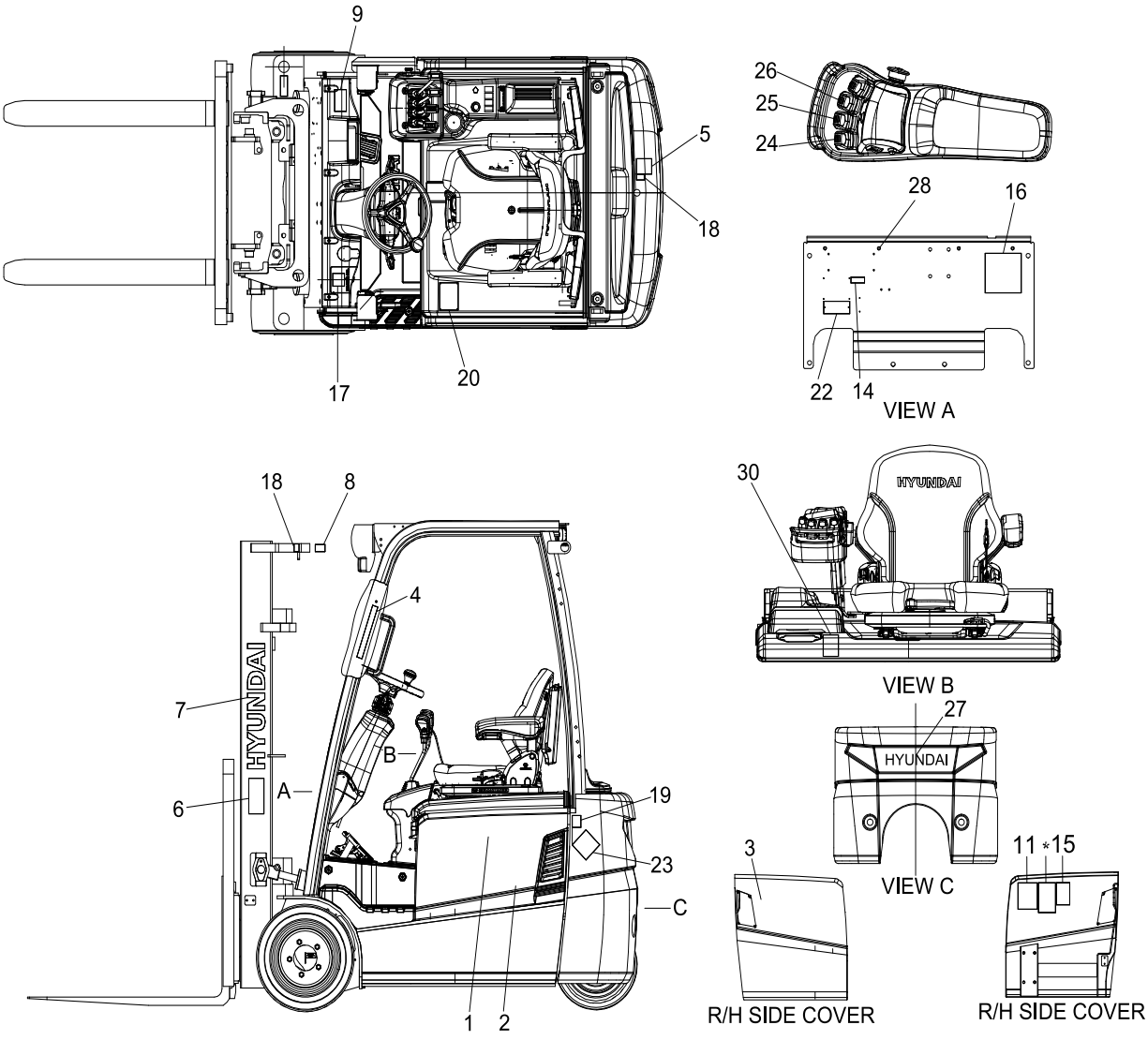
Operate your fork lift truck safely. Careful driving is your responsibility.
Drive defensively and think about the safety of people who are working nearby. Know your truck's capabilities and limitations. Follow all instructions in this manual, including all symbols (⚠ △ ※) messages to avoid damage to your fork lift truck or the possibility of any harm to yourself or others.

This manual is intended to be a permanently attached part of your fork lift truck. Keep it on the truck as a ready reference for anyone who may drive or service it. If the truck you operate is not equipped with a manual, ask your supervisor to obtain one and have it attached to the truck. And, remember, your HYUNDAI dealer is pleased to answer any questions about the operation and maintenance of your fork lift truck and will provide you with additional information should you require it.

SAFETY LABELS

1. LOCATION

Always keep these labels clean. If they are lost or damaged, attach them again or replace them with new labels.



15BT9UOM0001

1	Model name	14	EMC	24	Fork Lift
2	Side cover LH	15	Caution BAT.Handling	25	Fork Tilt
3	Side cover RH	16	Safety Warning	26	Side Shift
4	Warning O.H.G	17	Brake Fluid wet	27	HYUNDAI Logo
5	Hanger	18	Hook	28	Tape Marking
6	Mast Warning	19	Temperature	30	Seat Warning
7	HYUNDAI Logo	20	Name plate(ANSI or CE)	31	Brake
8	Hand caution	22	UL Label-EE or ES Type	*	Battery Instruction manual
9	Start Warning	23	EE or ES Label		
11	Maintenance Export				

2. DESCRIPTION

There are several specific warning labels on this machine please become familiarized with all warning labels. Replace any safety labels if those are damaged, or missing.

1) MAST WARNING (Item 6)

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

⚠ Never stand or work under the raised forks even if the hydraulic safety lock lever is applied.

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

15BT9UOM0002

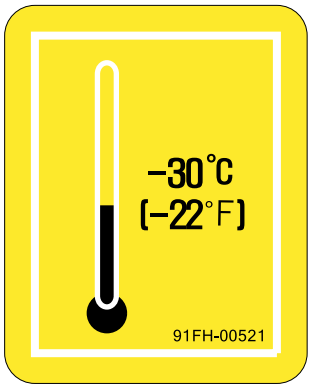
2) TEMPERATURE (Item 19)

This warning label is positioned on the Counter Weight.

⚠ If working in the cold storage, a label for the cold storage option(OL03) is required.

⚠ Continuous operation time in the cold storage must not exceed 30 minutes.

⚠ After waiting or working outside the cold storage more tan the work hours, you can resume work.



15BT9UOM0003

3) HAND CAUTION (Item 8)

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

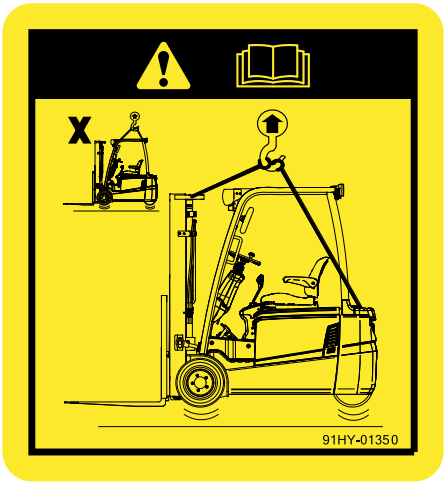
⚠ It warns of the danger of injury from movement between rails, chains, sheaves, fork carriage, and other parts of the mast assembly. Do not climb on or reach into the mast. Personal injury will result if any part of your body is put between moving parts of the mast.

15BT9UOM0004

4) **HANGER** (Item 5)

This warning label is positined on the Counter Weight.

⚠ **Refer to page 1-20 for safe loading procedures.**



15BT9UOM0005

5) **BRAKE FLUID WET**(Item 17)

This warning label is located on the left side of dashboard.

※ **Use only brake fluid DOT 3**

15BT9UOM0006

6) **WARNING OVER HEAD GUARD** (Item 4)

This warning label is positioned on the inside of overhead guard.

① Refer to operator's manual in detail.

② Always buckle up the seat belt for safety operation.

③ When the operator get off the machine, always confirm the parking brake so that the machine can keep with stopping condition.

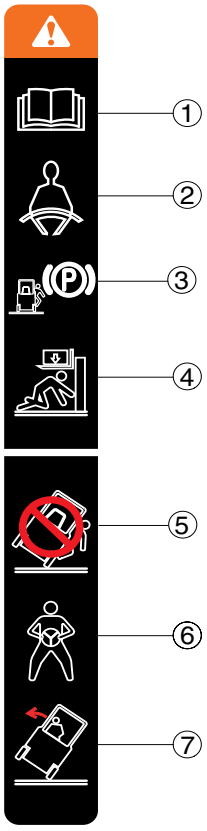
④ The people should not pass through under forks and other attachments which are lifted or being lifted.

⑤ Do not jump down from the machine. It can be caused that the operator have severe injury or death in the event of a tip over.

⑥ Outstretch the legs as widely as possible and grasp firmly the steering handle.

⑦ Lean the body to the opposite direction in order to avoid severe injury or death when the machine is tipped over.

※ **Refer to page 3-3 for details.**



15BT9UOM0007

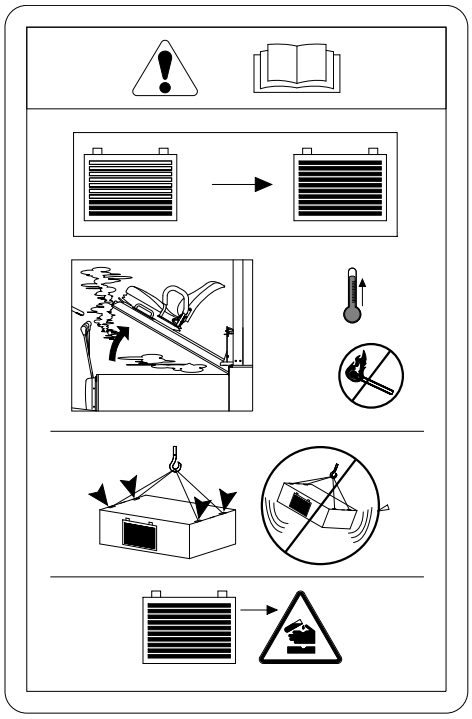
7) **BATTERY HANDLING** (Item 15)
This battery handling is located on the left side of the bonnet.

⚠ **Refer to page 7-22 for a safe battery removal.**

※ **Open the battery cover when charging. Battery being charged not only heat, but also inflammable hydrogen gas is produced. Keep fire away.**

※ **Hoisting the battery case, use 2 or 4 wires with hook and handle carefully, not to shock.**

※ **The electrolyte solution of battery is dilute sulfuric acid (H2SO4). Be careful not to drop on clothes and mechanical parts.**



15BT9UOM0008

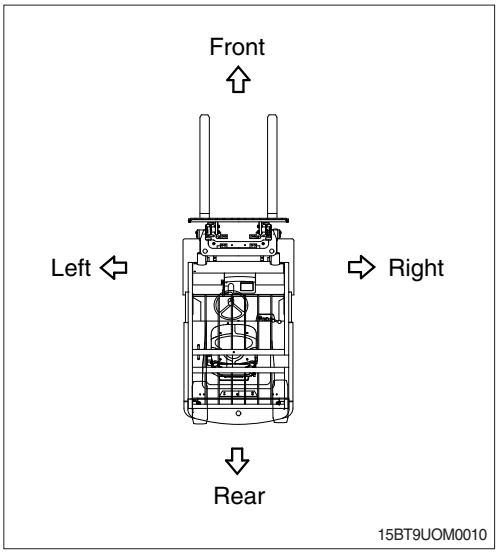
8) WARNING SAFETY (Item 16)

This warning safety is located on the left side of the dashboard cover.

15BT9UOM0009

1. DIRECTION

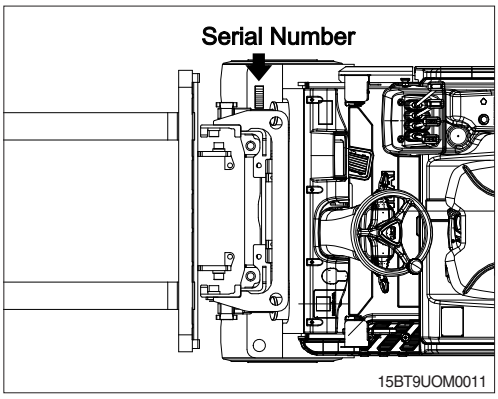
The direction of this machine indicate forward, backward, right and left when machine is in the travelling direction.



2. SERIAL NUMBER

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

1) MACHINE SERIAL NUMBER
It's shown of the front-right side of the fork lift.



3. SYMBOLS

⚠ Important safety hint.

△ It indicates matters which can cause the great loss on the machine or the surroundings.

※ It indicates the useful information for operator.

4. WHOLE BODY VIBRATION

The whole body vibration level is measured according to standard EN13059 which contains specific test criteria (load, speed, roadway surface, etc.). Worksite vibration levels may vary depending on actual operating and surface conditions.

- Measured whole body vibration at the operator position, based upon standard production truck with full suspension seat.
- Declared whole body vibration emission value is in accordance with EN13059.

  · 15/18/20BT-9U : 0.7 m/s^2

  · Uncertainty, K= 0.2 m/s^2

1. DAILY INSPECTION

At the beginning of each shift, inspect your battery fork lift truck and fill out a check, maintenance and lubrication table.

Check for damage and maintenance problems.

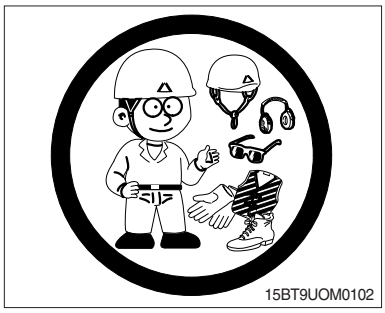
Have repairs made before you operate the battery fork lift truck.

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

15BT9UOM0100

2. DO'S AND DON'TS

Do watch for pedestrians.



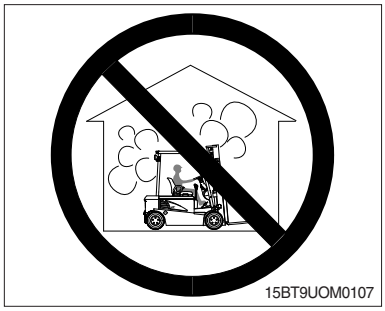
Do wear safety equipment when required.

Don't mix drugs or alcohol with your job.

Don't block safety or emergency equipment.

Don't smoke in NO SMOKING areas or when charging.

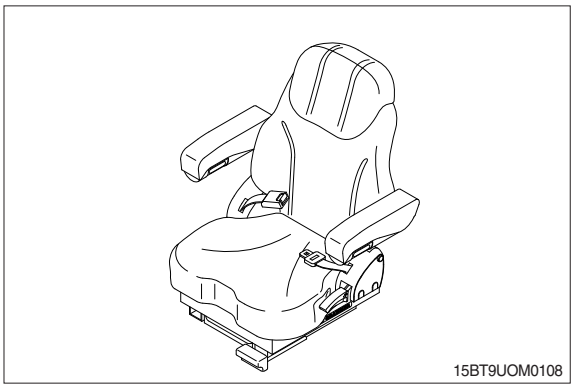
Don't operate the truck outdoors in rainy day.



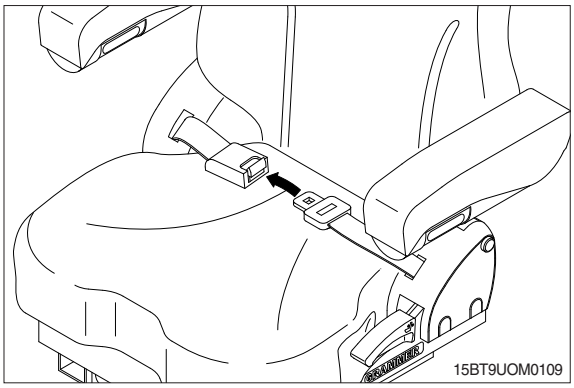
Don't perform battery charging service in the room without adequate ventilation.

3. SEAT BELTS

⚠ Always wear a seat belt when operate the truck.

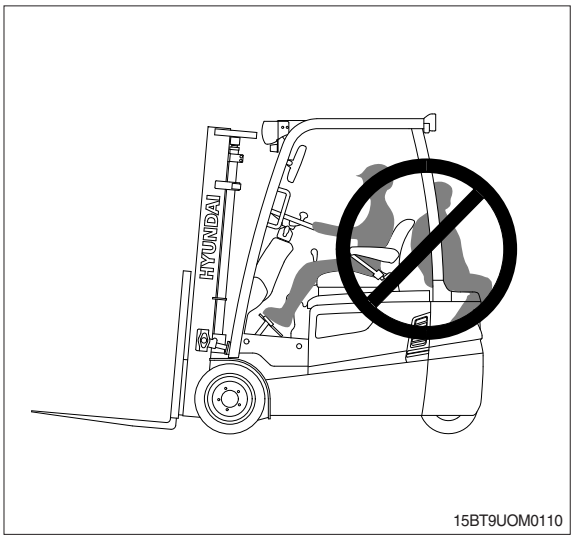


⚠ Seat belts can reduce injuries.

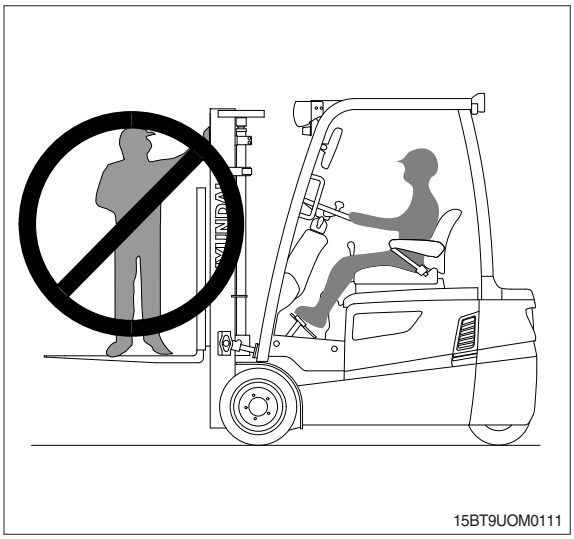


4. NO RIDERS

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

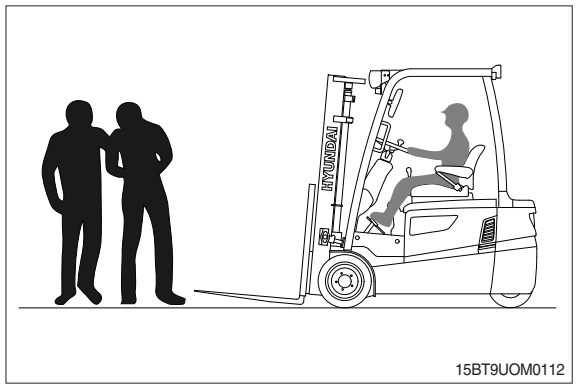


2) Never transport personnel on the forks of a lift truck.

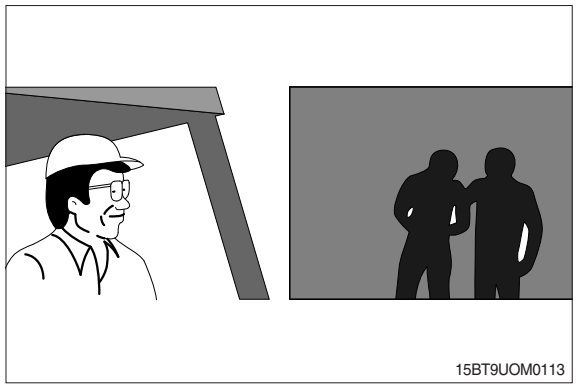


5. PEDESTRIANS

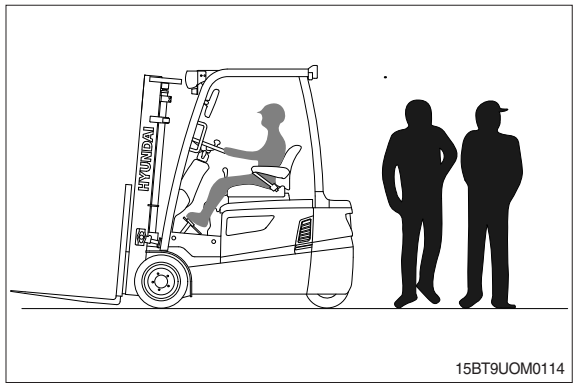
1) Watch where you are going. Look in the direction of travel. Pedestrians may use the same roadway you do. Sound your horn at all intersections or blind spots.



2) Watch for people in your work area even if your battery tractor has warning lights or alarms. People may not watch for you.

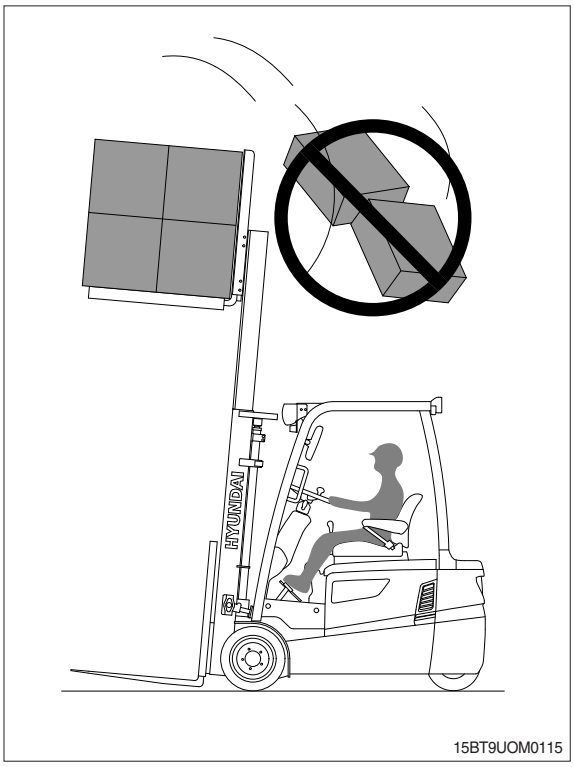


3) Make people stand back, even when you are parked.



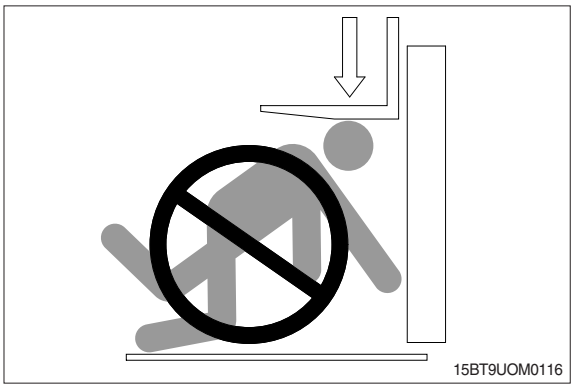
6. OPERATOR PROTECTION

1) Keep under the overhead guard.
2) Always keep your body within the confines of the truck.



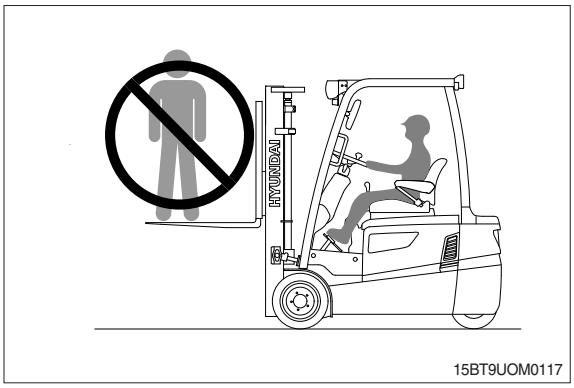
7. FORK SAFETY

Never allow anyone to walk under raised forks.



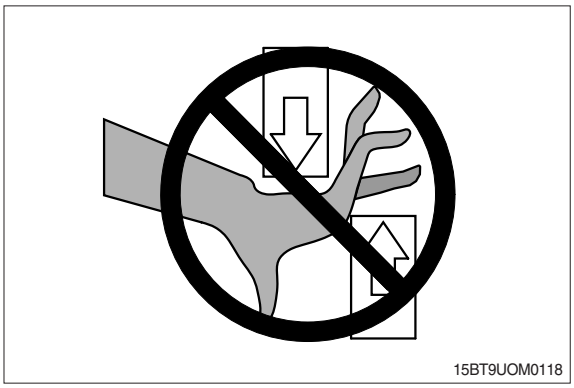
There is special equipment to raise people for overhead work.

⚠ **Don't use Fork lift trucks to lift personnel.**

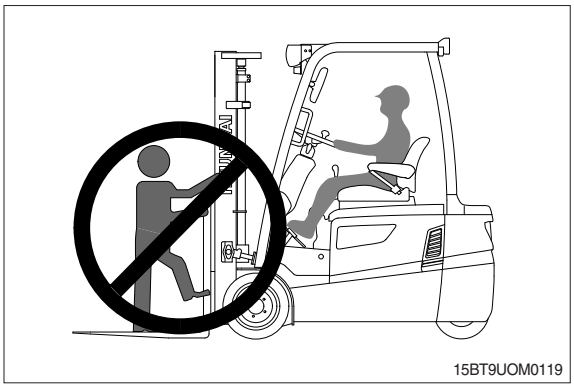


8. PINCH POINTS

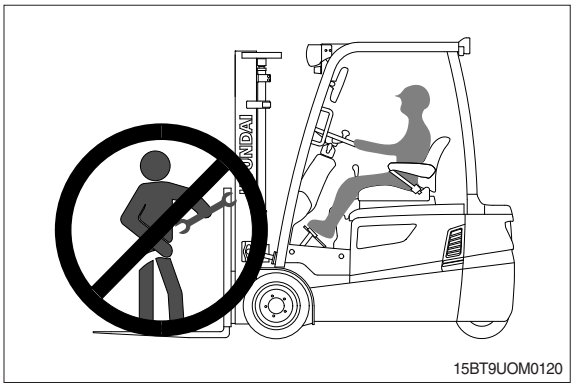
⚠ Keep hands, feet and legs out of the mast.



⚠ Don't use the mast as a ladder.



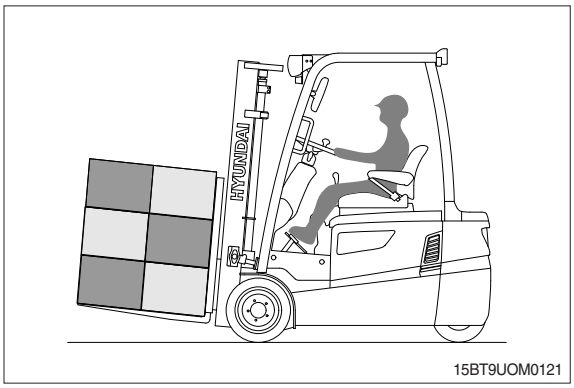
⚠ Never try to repair the mast, carriage, chain, or attachment yourself. Always get a trained mechanic.



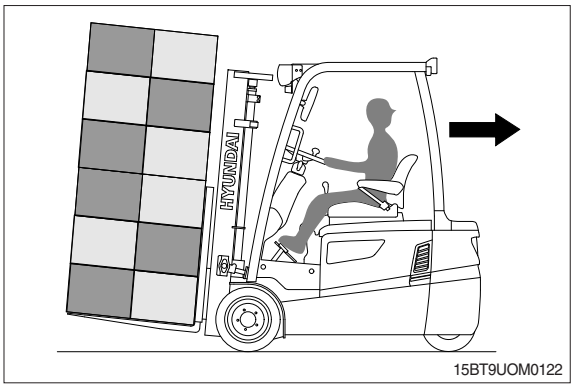
9. TRAVEL

1) Travel with the load near the floor/ground with mast tilted back to cradle the load whenever possible.

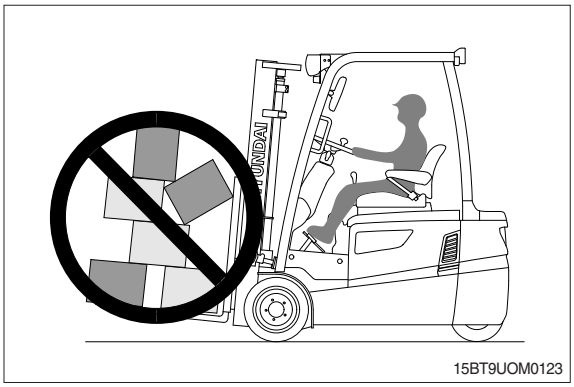
⚠ **Never lift or lower the load when the truck is in motion.**



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.



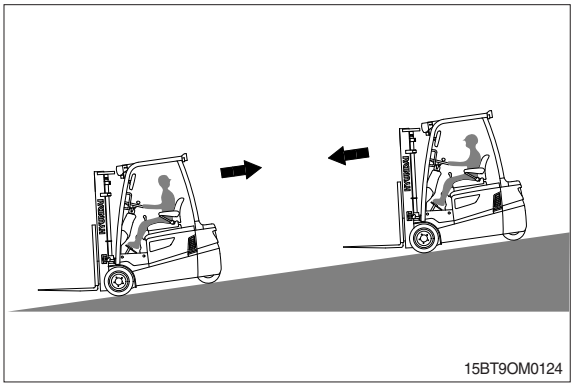
3) Unstable loads are a hazard to you and to your fellow workers. Always make certain that the load is well stacked and evenly positioned across both forks. Never attempt to lift a load with only one fork.



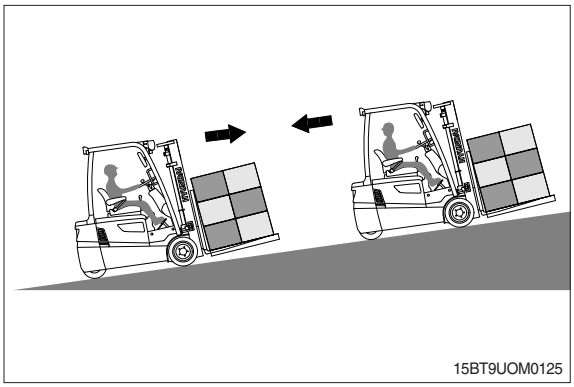
10. GRADES, RAMPS, SLOPES AND INCLINES

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

1) UNLOADED - Forks downgrade



2) Loaded - Forks upgrade



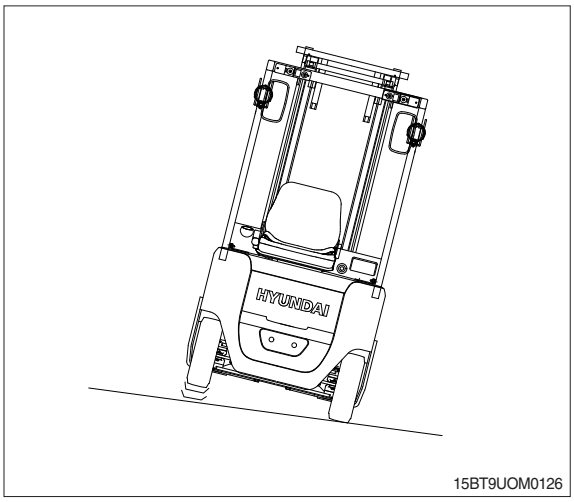
11. TIP OVER

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.



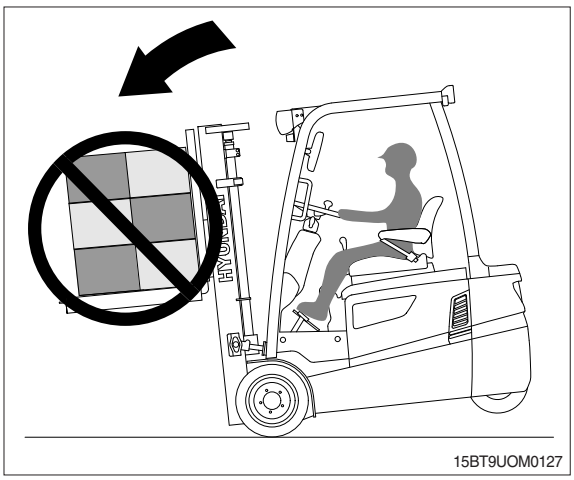
2) LONGITUDINAL TIP OVER

(1) Longitudinal tip over can occur with combination of overloading and load elevated also with capacity load and elevated. This combination will exceed the stability of the truck. 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.



⚠ 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.

3) WHAT TO DO IN CASE OF A TIP OVER

⚠ If your truck starts to tip over, Do not jump.

⚠ Brace yourself as illustrated right.

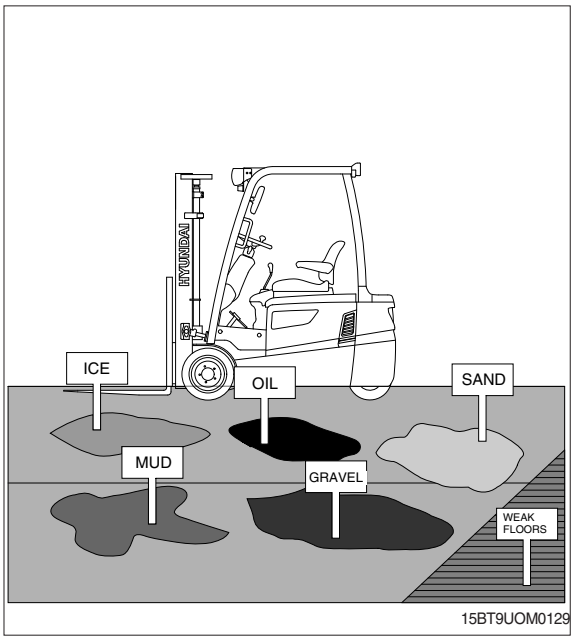
1 Make sure your seat belt is fastened securely, if the truck is equipped with seat belt.
2 Stay in your seat.
3 Grip the wheel.
4 Brace your feet.

⚠ Your chances for survival in a tip-over are better if you stay with the truck, in your seat.

12. SURFACE AND CAPACITY

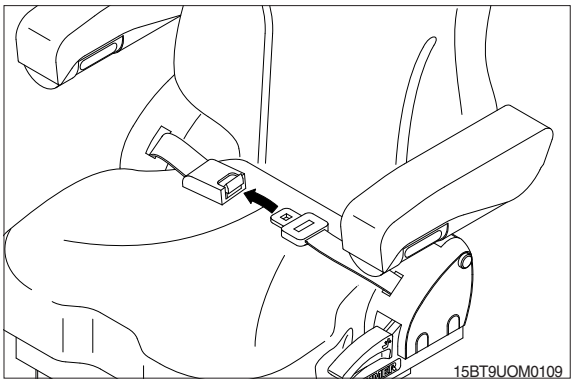
Avoid these conditions. They can cause a truck to tip over or lose traction for braking or driving.

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



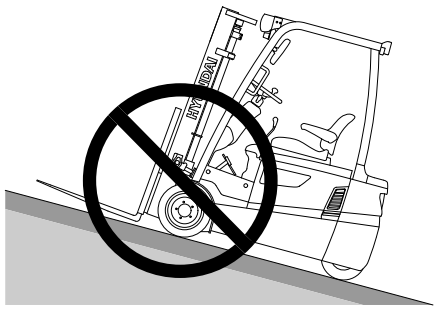
TIP OVER

⚠ **Always buckle up.**
Seat belts can reduce injuries.



13. PARKING

1) Never park on a grade.



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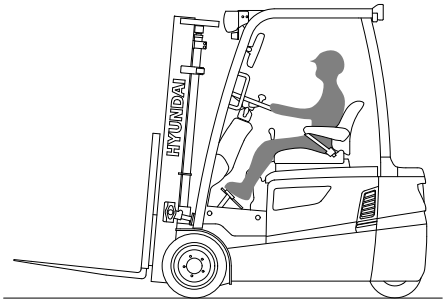
2) Always come to a complete stop before leaving truck. Be sure travel control is in NEUTRAL.



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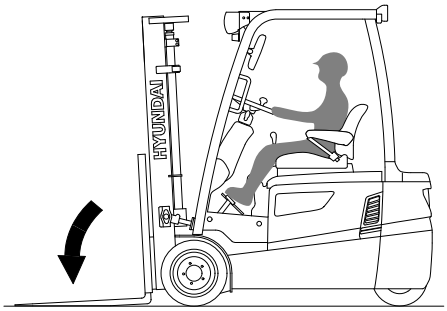
3) Lower forks fully to floor and tilt forward.



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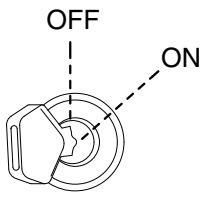
4) Turn key to OFF position.



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14. LIFTING, JACKING AND BLOCKING

⚠ Lifting or jacking any large piece of equipment such as forklift truck presents obvious hazards. It must be done with great care and forethought.

1) SAFE PARKING

Before working on truck :

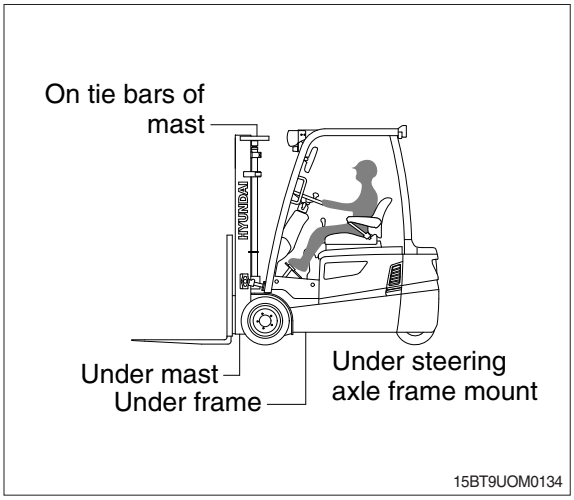
(1) Park truck on a hard, level and solid surface, such as a concrete floor with no gaps or breaks.
(2) Put mast in vertical position and fully lower the forks or attachment.
(3) Put all controls in neutral. Turn key switch OFF and remove key.
(4) Apply the parking brake and block the wheel.

⚠ Defective equipment can cause accidents. All tools and lifting equipment must be in good condition, meet the load capacity requirements and have OSHA labels when required. Tools with defects have failures cause severe injury or death.

2) LIFTING, BLOCKING AND JACKING POINTS

Use the following illustration to locate general lifting, blocking and jacking points on the truck. Read the procedures for raising, blocking or jacking specific components of the truck to make sure you understand the correct, safe procedures.

⚠ Do not attempt to lift the truck by the overhead guard or the counterweight. Severe injury may result and the truck can be damaged.



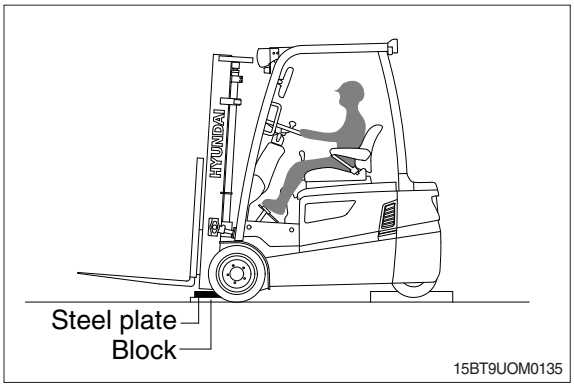
3) RAISING DRIVE WHEELS OFF FLOOR

This procedure uses the mast as a lever to lift the drive wheels off the floor and prevent accidents due to inadvertent powering of the drive wheels.

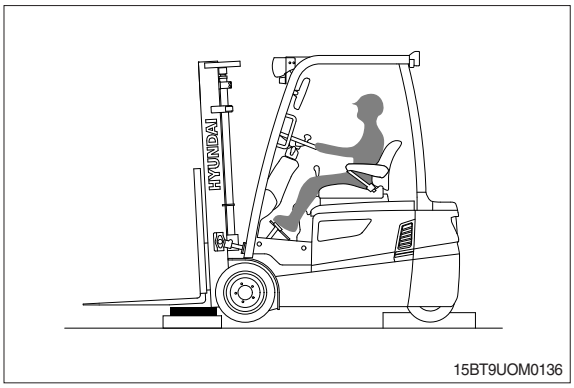
(1) Park truck safely as described in "Safe Parking". Block rear steer wheels.
(2) Be sure mast mounting pin bolts are tightened.

Model	kfg · m	lbf · ft
15/18/20BT-9U	16.7~22.5	121~163

(3) Turn the key switch ON. Tilt the mast fully back. Adjust upright height as necessary to put blocking underneath the lower end of the mast.
(4) Put a solid 100 mm (4.4 in) hardwood block under the front section of each mast rail. Put a 3-6 mm (1.25~2.50 in) steel plate on top of each block.

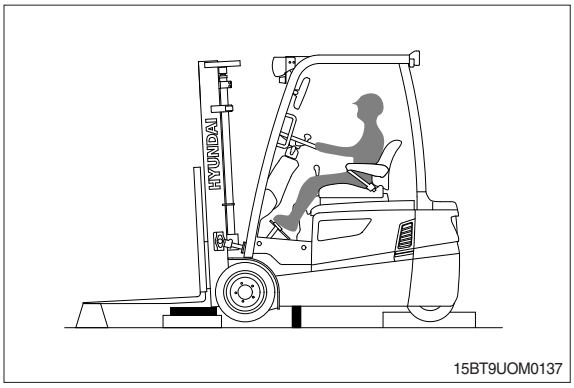


(5) Tilt mast fully forward. This raises the drive wheels off the floor. Release the tilt control lever and turn engine OFF.



(6) Insert blocking under the frame behind the drive wheels or slip wheel cradles under the drive wheels. If using blocking, check for safe clearance between drive wheels and floor and blocks.

※ **When forks are raised as in illustration above, use shop rags, paper, or bright tape on fork tips to signal the danger of tripping.**



(7) Check for stable condition of the truck. Be sure that the blocks are located securely under the truck frame before operating the drive or working on truck.

(8) Lower the drive wheels to the floor and remove the blocks by reversing the above procedure.

4) RAISING TRUCK WITH A HOIST

When suitable equipment is available, the front of the truck may be raised by means of a hoist, with wheel cradles placed under the wheels or blocking placed under the frame.

△ **When lifting the front of the truck, watch truck for signs of lateral instability. It may tip side ways. You may have to support or guide the side of the truck or overhead guard to prevent tipping.**

(1) Park truck safely as described in "Safe Parking". Block rear steer wheels.

(2) Check mounting pin bolts to make sure they are tightened to correct torque.

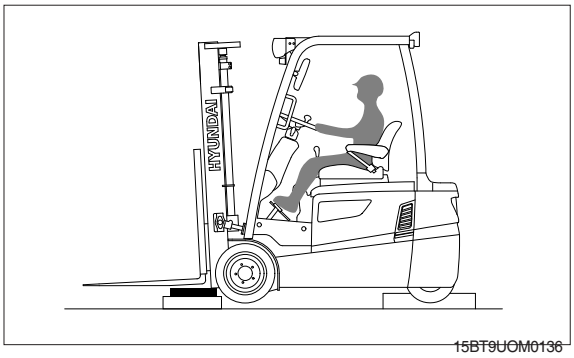
Model	kfg · m	lbf · ft
15/18/20BT-9U	16.7~22.5	121~163

(3) To raise the front of the truck using the mast, spread two chains on the outer rail tie bar the mast.

⚠ **Chain and hoist used to lift truck should be checked to make sure they are of safe lifting capacity. See the truck data plate for information.**

(4) Slowly lift truck and lower drive wheels onto the cradles or place blocking under frame prop points.

(5) When maintenance work is completed, lower the truck to the floor by reversing the lifting procedure. Check to be sure no tools or equipment are under the truck or wheels.



5) BLOCKING THE MAST IN RAISED POSITION

This procedure is used to safely provide clearance for access from the front of truck to components on or near the drive axle. Illustrations show mast with forks removal, however, fork removal is not necessary.

(1) Park truck safely as described in "Safe Parking".

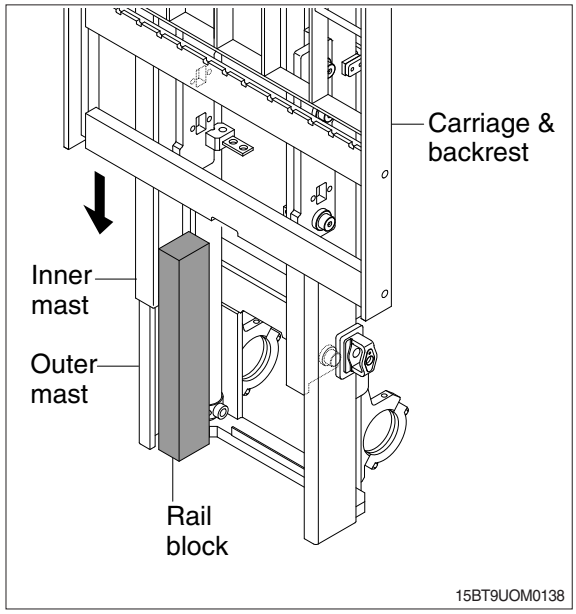
(2) Put blocks in front of and behind drive wheels.

(3) Put wooden support blocks conveniently near mast rails before raising the mast. Use two 1118 mm (44 in) hardwood blocks or equal, of about 305 mm (12 in) and 610 mm (24 in) length.

※ **For standard masts, block may need length cut to suit. For triple stage masts the carriage may be blocked up, as shown.**

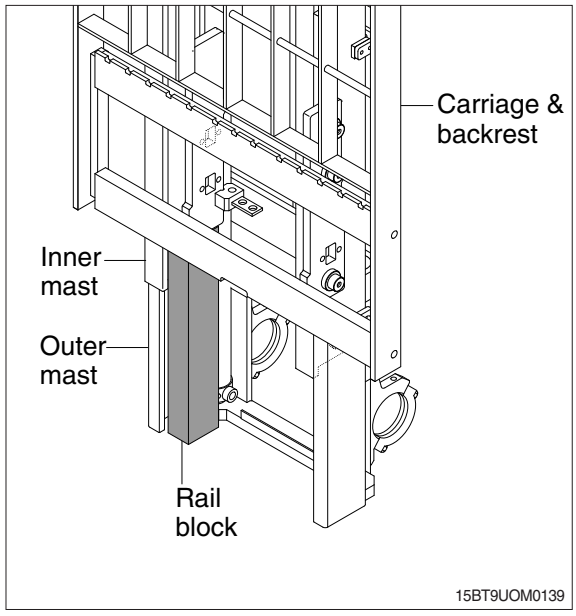
(4) Start truck and raise the mast carriage.

(5) Hold the taller block against inner rail and lower the mast until carriage rests on block.



(6) Hold the shorter block against the outer rail and lower the mast until inner rail rests on the block.

(7) Reverse the procedure to remove blocking.



6) RAISING REAR OF TRUCK

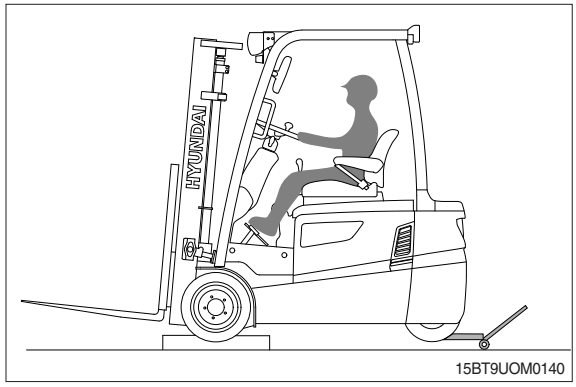
The truck may be raised at the rear by jacking and blocking under the center of the frame member at either the front or rear steer axle mounting, or under the center section of the steering axle.
Refer to truck data plate for truck weights.

(1) Park truck safely as described in "Safe Parking". Put blocks at front and rear or drive wheels.

(2) Put a floor jack under the steering axle mounting frame member, centered between the two wheels.

※ **If there is insufficient clearance under frame for your jack, the truck may first be driven onto shims, to increase the ground clearance.**

(3) Raise the truck only as high as necessary to perform the maintenance work.



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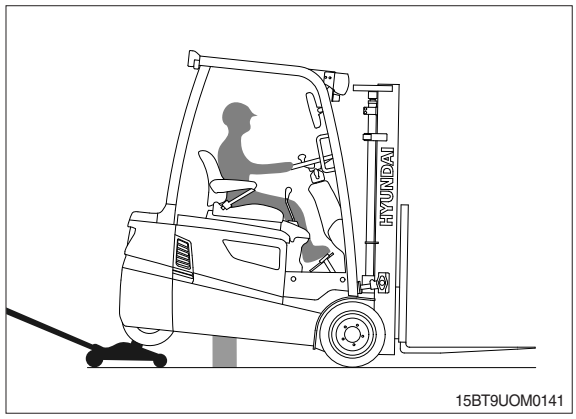
(4) Put blocks at both sides of the truck, fully under the frame main side structure. Put the blocks in front of butt close to the counterweight and rear wheels for the best truck stability.

(5) Put an equal amount of blocks under each side of the truck to provide a level working position.
Lower the truck onto the blocks and remove the jack.



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△ **Before performing any maintenance work, check the truck for stable condition on the blocking.**

(6) When maintenance work is completed, lower the rear side of the truck to the floor by reversing the above procedure and lowering each side of the truck 50 mm (2 in) at a time :
- Put jack under frame and raise truck.
- Carefully remove blocks and lower truck.
- Remove jack and blocks from drive wheels.

7) RAISING ENTIRE TRUCK

Refer to truck data plate for truck weights.

(1) Park truck safely as described in "Safe Parking". Lower mast fully.

(2) If necessary, drive truck onto boards to increase ground clearance.

⚠ **LATERAL TIP OVER. When jacking side of truck, be sure mast is lowered fully and do not raise one side of the truck more that about 50 mm (2 in) higher than the other, to avoid tipping truck over laterally.**

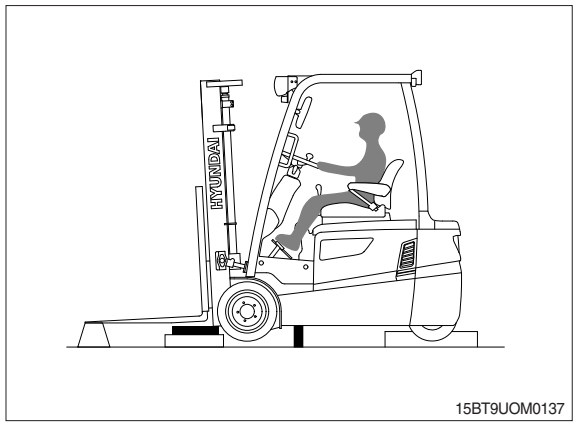
LONGITUDINAL TIP OVER. If the mast and the transaxle are removed while the truck is blocked up, the truck will tip backwards due to the heavy counterweight. Both mast and counterweight must be removed before attempting to raise the truck for transaxle removal. The back of the truck must be supported by blocking under the steer axle to prevent movement.

The reverse is also true. If the counterweight is removed while the truck is up on blocks, the weight of the mast and transaxle will cause the truck to tip on the front blocks and forward.

(3) Put the jack under side frame near the center of the truck.

※ **Be sure to put the jack squarely and fully under the main side structure of the frame. Do not put the jack under the outer covers which enclose the fuel and hydraulic sump tanks.**

(4) Carefully raise the truck one side at a time, only as high as necessary to do the maintenance work and more than a maximum of 150 mm (6 in) total.



(5) Put blocks under the side frame at each side of the jack. Spread the blocks close to the steer and drive wheels for maximum stability.

(6) If using one jack, lower the truck onto the blocks and move the jack to the opposite side. Repeat the lifting procedure.

(7) Put the same size blocks under each side of the truck so it will be level.

△ **Be sure to put the jack squarely and fully under the main side structure of the frame. Do not put the jack under the outer covers which enclose the fuel and hydraulic sump tanks.**

(8) When maintenance work is completed, lower the entire truck to the floor by reversing the lifting procedure. Lower the truck one side at a time, while carefully removing the blocks. Check to be sure no tools or equipments are under the truck or wheels.

※ **Depending on jack height, shims under the tires may be needed for clearance to allow removal of jack.**

8) SHIPPING TIE-DOWN INSTRUCTIONS

(1) Front of Truck

① With mast and Carriage Installed

a. Lower the carriage fully.

b. Put a tie down (e.g., chain) between the carriage fork bars.

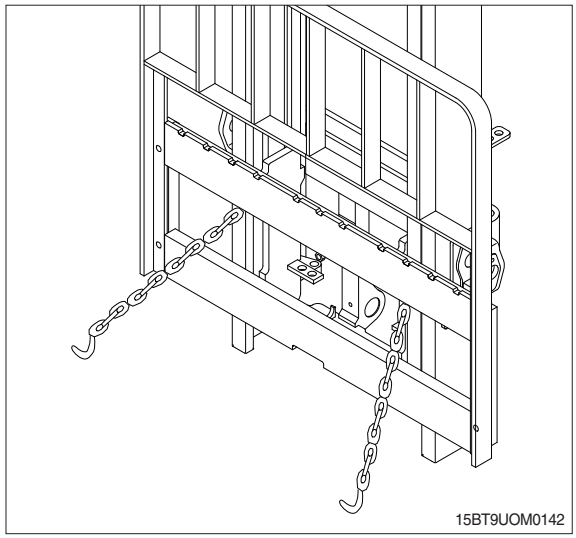
② Without a mast and Carriage Installed

a. Put a chain across the truck floor plate.

※ **Protect truck from chain damage by using covered chain or protective material under the chain at contact points.**

(2) Rear of Truck

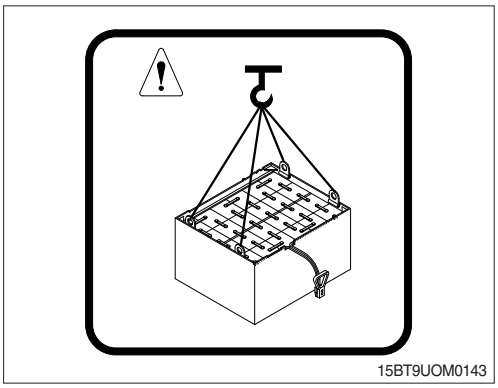
① Attach the tie down to pocket in bottom of counterweight.



15. LOADING AND UNLOADING BY CRANE

1) Check the specification of the truck when you are going to hoist the truck.

⚠ **Before loading the truck, battery must be removed. Refer to page 7-21 for a safe battery removal.**



2) Use long wire rope and stay to keep the distance with the machine as it should avoid touching with the truck body.

3) Put a rubber plate where the wire rope contact with the truck's body to prevent damage.

4) Place crane on the proper place.

5) Install the wire rope and stay like the illustration.

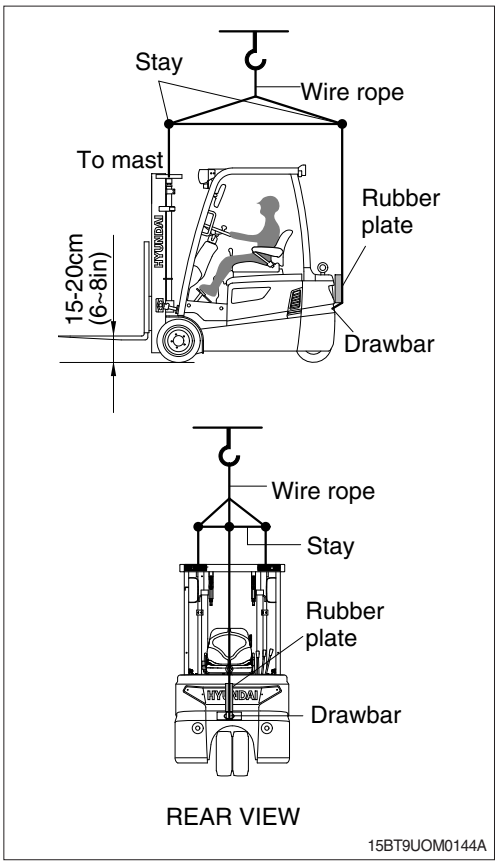
⚠ **Make sure wire rope is proper size.**

⚠ **The wrong hoisting method or installation of wire rope can cause damage to driver and truck.**

⚠ **Do not load abruptly.**

⚠ **Keep area clear of personnel.**

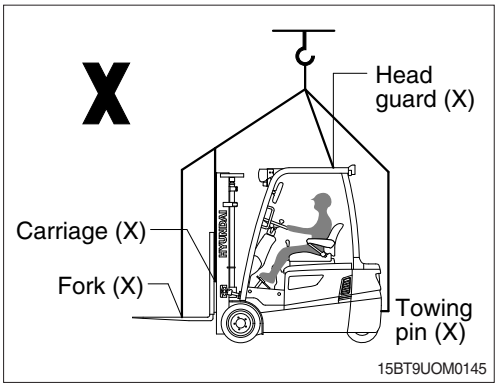
⚠ **Recommend to manufacture the stays separately as per lifting conditions.**



⚠ **Do not install the wire to unsafe position such as forks, carriage, head guard, counterweight, lifting hole or towing pin, etc.. It can cause serious damage to driver and truck.**

⚠ **If there is any problem to lift a truck, please contact your dealer.**

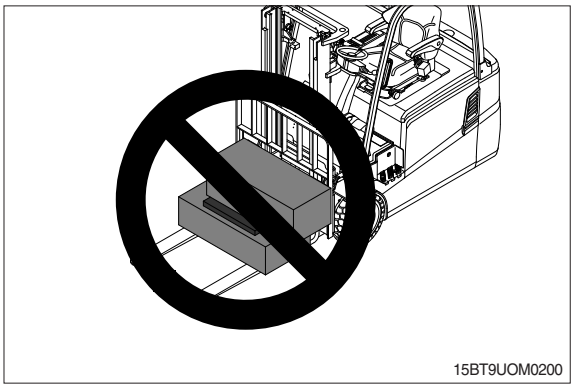
⚠ **Perform the lifting service with skilled service man.**



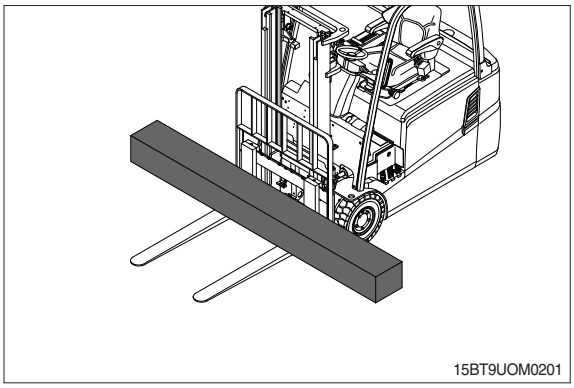
1. LOOSE LOADS

⚠ Loose or unbalanced loads are dangerous. Observe these precautions.

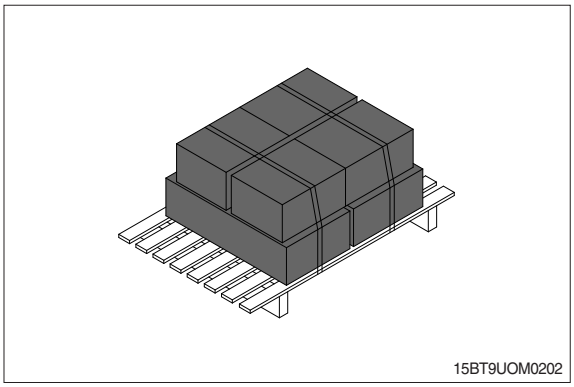
Never carry loose or uneven material.



Place the wide loads in the middle of the forks.



Stack and band loose material.

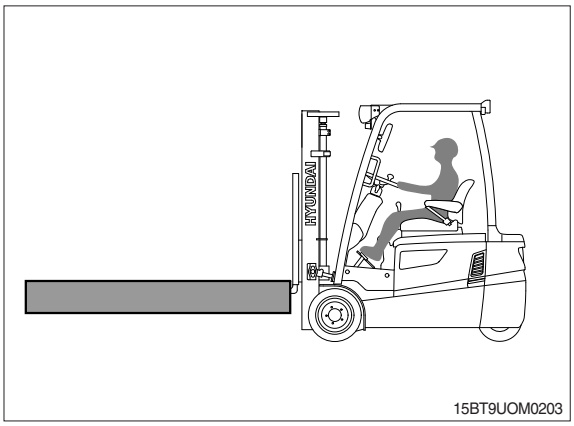


2. LONG AND WIDE LOADS

⚠ With long or wide loads, you need more room. So slow down and watch your clearance.

When extra-long material makes it necessary to travel with the load elevated, do so with extreme care and be alert to load end-swing when turning.

⚠ A long load reduces the capacity of the truck. Know and understand your truck load rating.



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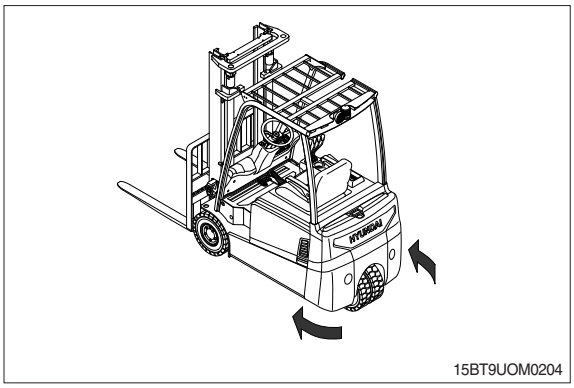
3. REAR SWING

⚠ When turning, be sure the rear end of the truck does not swing into racks, posts, etc. Watch for pedestrians beside the truck.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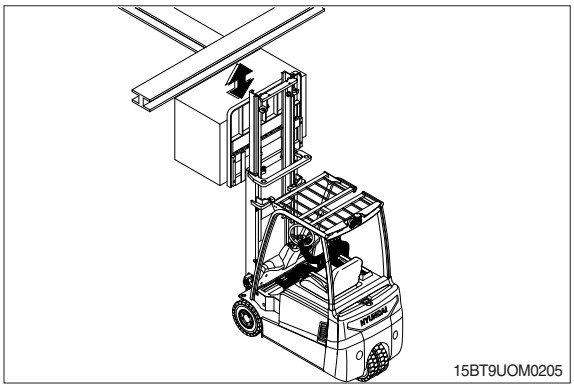
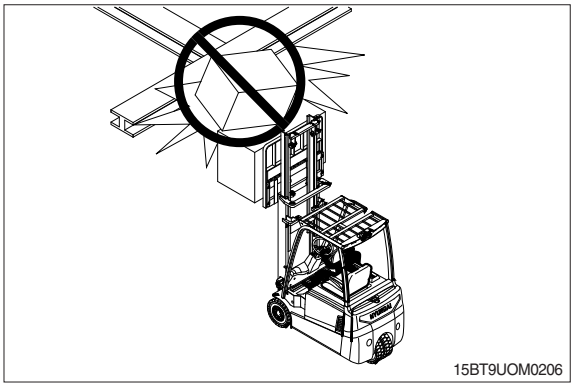
4. LOW OVERHEAD CLEARANCE

⚠ Know the height of your truck, with and without a load. Check your clearances. Keep the load low and tilted back.

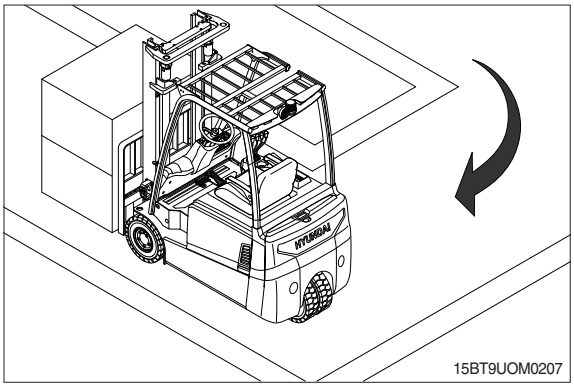


⚠ Watch overhead clearance :
Moving into overhead structures can tip a truck over, or spill a load.

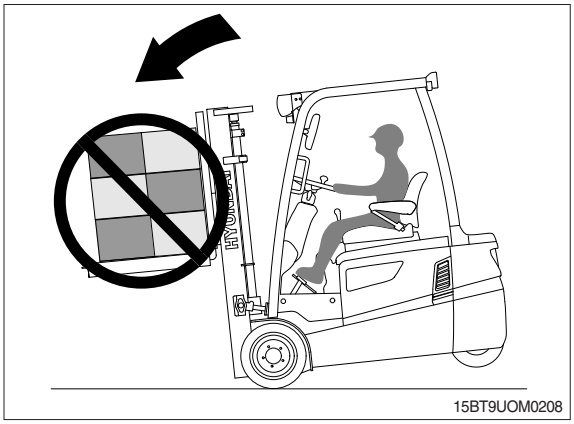


5. FAST TURNS AND HIGH LOADS

⚠ 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. Travel with a load raised only when removing or depositing a load.

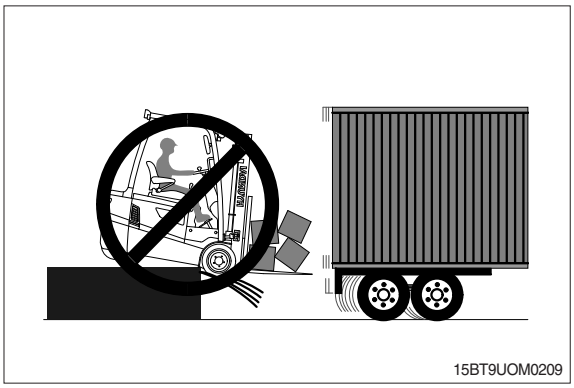


6. DROP-OFFS

⚠ **To avoid these hazards, you must :**

1) Talk to the truck driver yourself : make sure the driver does not move the trailer until you are done.
2) Apply trailer brakes.
3) Use wheel chocks.
4) Use trailer-to-dock locking system if available.

⚠ **The impact of moving in and out of a trailer may cause the trailer to creep or move.**



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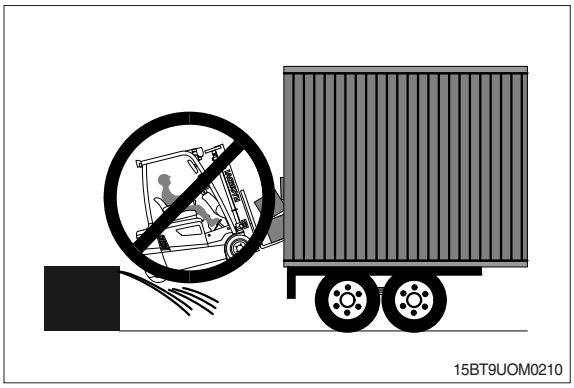

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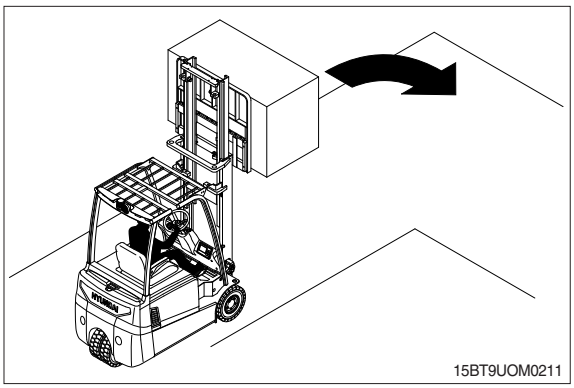
7. RIGHT ANGLE STACKING

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



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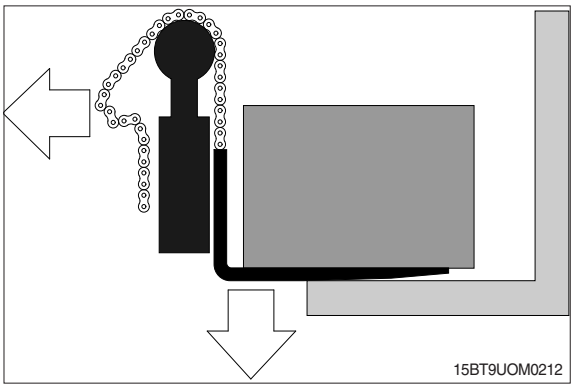
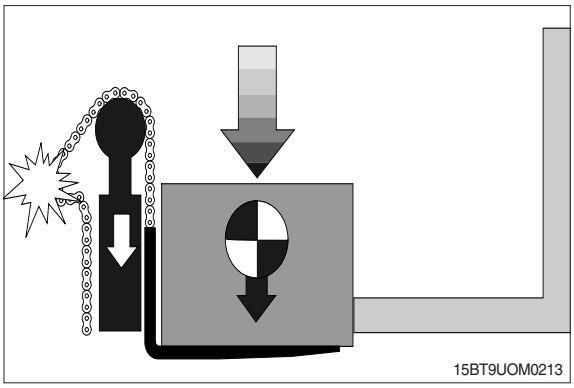
8. CHAIN SLACK

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

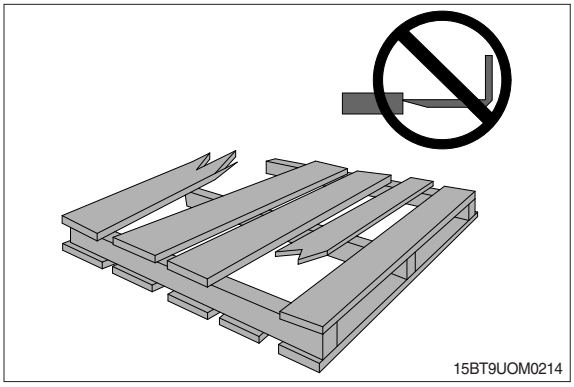




9. PALLETS AND SKIDS

⚠ Do not move or store materials on damaged pallets or skids. Items can fall through them causing severe injury or death.

⚠ Be sure the pallet or skid you are using is in good condition and does not have defective or missing components and fasteners.

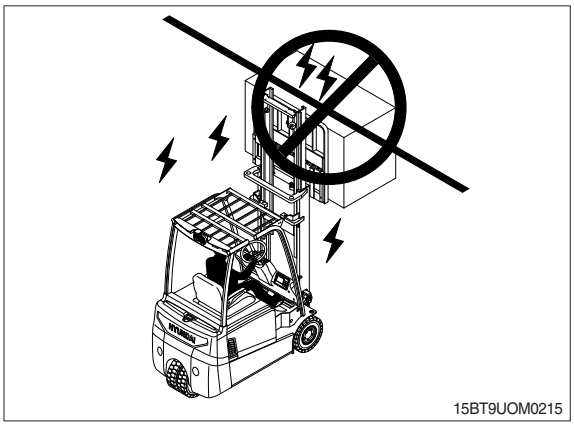


10. CAUTION FOR ELECTRICAL LINES

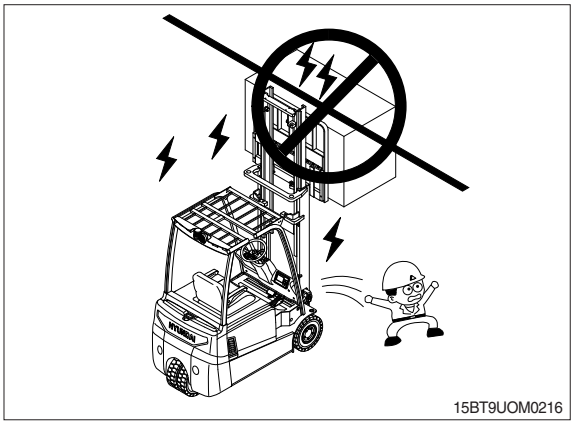
⚠ When moving the machine with the mast raised, watch out electrical lines over the machine.

⚠ The operation near the electrical lines is very dangerous.
Operate within safe working permitted as below.

Supply voltage	Min safe separation
6.6 kV	3 m (10 ft)
33.0 kV	4 m (13 ft)
66.0 kV	5 m (16 ft)
154.0 kV	8 m (26 ft)
275.0 kV	10 m (33 ft)


15BT9UOM0215

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


15BT9UOM0216

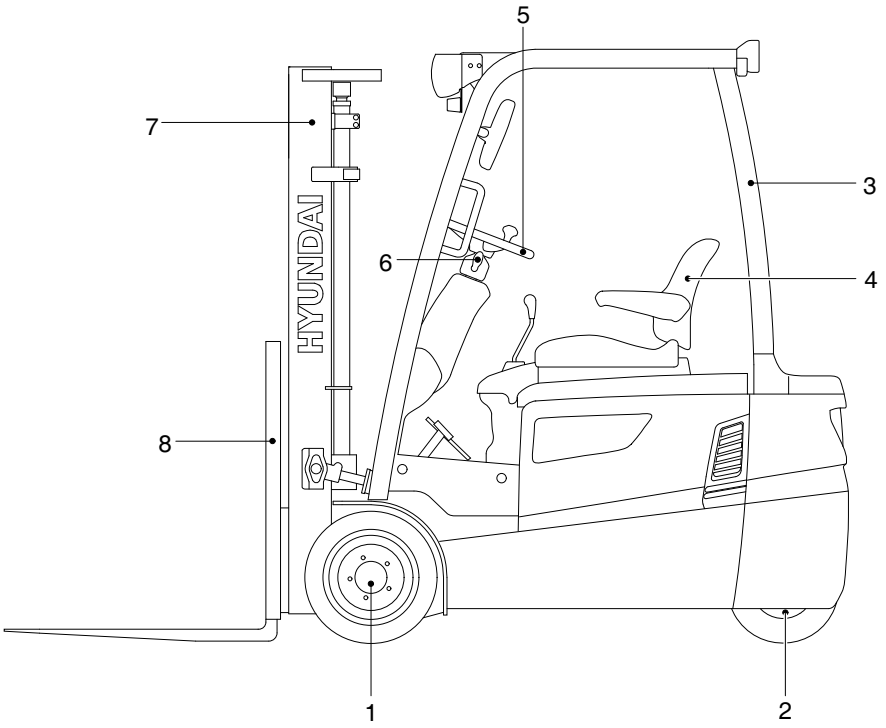
11. SOLID TIRE

1) Do not travel more than 25 km/hr (16 mph).
2) Do not travel further than 8 km (5 miles) in an hour.
3) Do not drive on the road for automobile.
4) After continuous traveling radiates enough the heat of tire. (e.g. 1 hour radiation of the heat after 2 hours continuous traveling)

⚠ **Our warranty does not cover any damages caused by excessive driving.**

3. KNOW YOUR TRUCK

1. GENERAL LOCATIONS



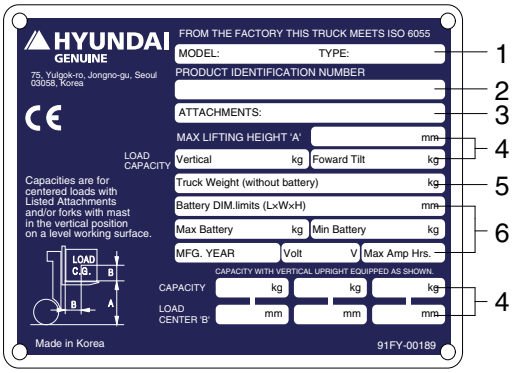
15BT9UOM0301

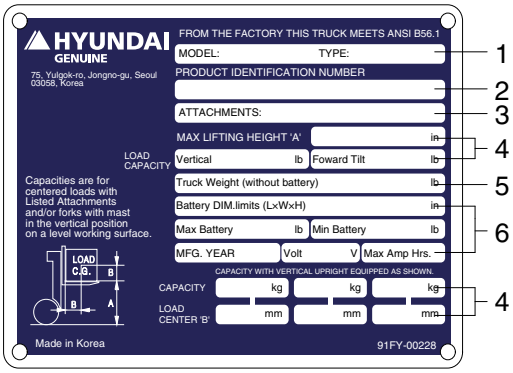
TRUCK TYPE : Electric Sit-Down Rider, 48 Volt.

1	Drive axle, tires and wheels	5	Steering wheel
2	Steering axle, tires and wheels	6	Directional control lever
3	Overhead guard	7	Mast
4	Seat	8	Carriage and backrest

2. DATA/SAFETY PLATES AND DECALS

1) TRUCK DATA AND CAPACITY PLATE





(1) Truck model number or registered name

(2) Truck serial number

An identification number assigned to this particular truck and should be used when requesting information or ordering service parts for this truck from your authorized HYUNDAI dealer. The serial number is also stamped on the frame.

(3) Attachment description (If any installed)

The user must see that the truck is marked to identify the attachment (s), including the weight of the truck/attachment combination and truck capacity with the attachment.

(4) Capacity rating, load center, and lifting height data

Shows the maximum load capacity of this truck with relation to load centers and fork heights (See diagram on plate). Personal injury and damage to the truck can occur if these capacities are exceeded.

Do not exceed the maximum capacity specified.

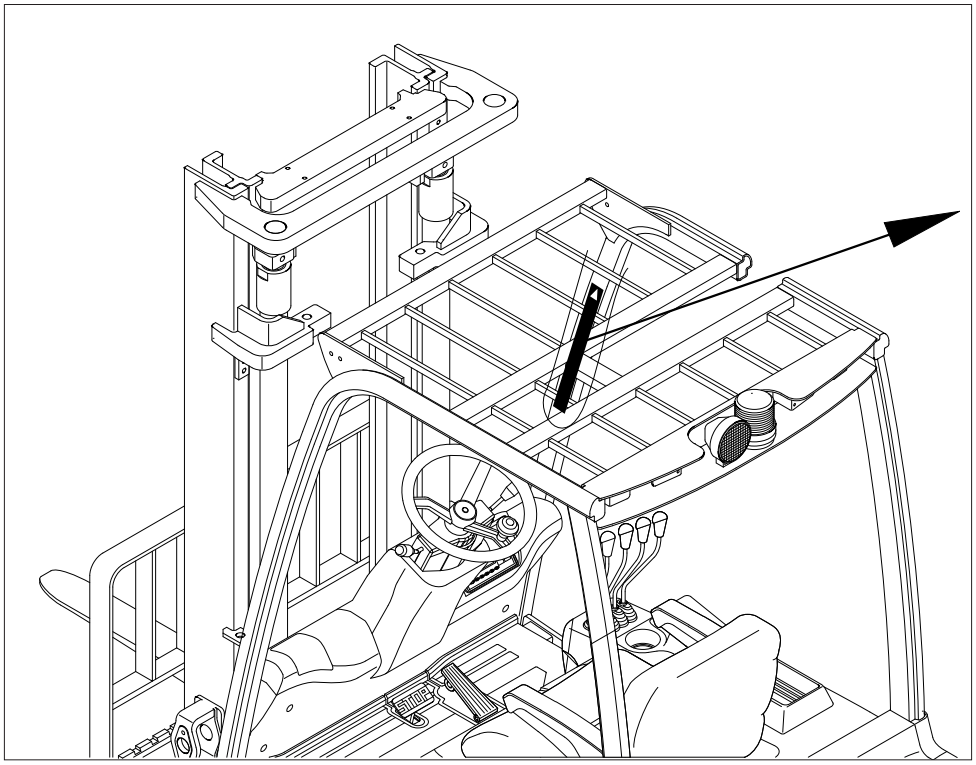
(5) Truck weight

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

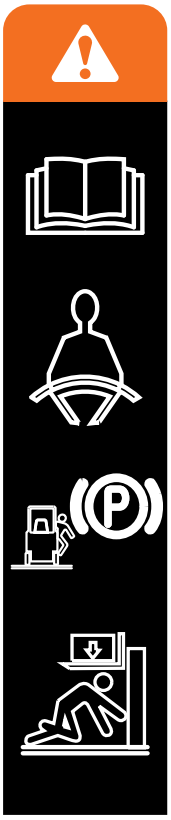
(6) Battery weight and system voltage

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

2) OPERATOR SAFETY WARNING DECAL



15BT9UOM0303



15BT9UOM0304

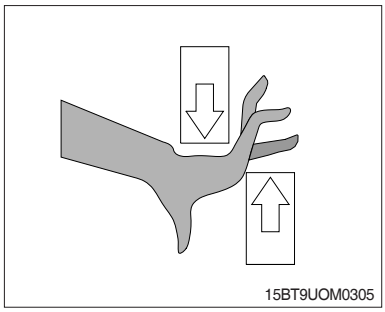
⚠ **Safety and warning decals are placed in conspicuous locations on the truck to remind you of essential procedures or to prevent you from making an error that could damage the truck or possibly cause personal injury.**

You should know, understand, and follow these instructions. Safety and warning decals should be replaced immediately if missing or defaced (Damaged or illegible). Refer to your parts manual for the location of all decals.

⚠ **Operator/Tip-over warning decal**

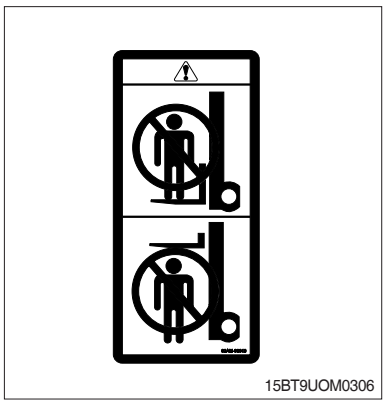
This decal is located on the front right hand leg of the driver's overhead. Its purpose is to remind the operator that staying in the seat provides the best chance of avoiding injury in the event of a truck-tipping or driving off a dock mishap.

Lift trucks can be tipped over if operated improperly. Experience with lift truck accidents has shown that the driver cannot react quickly enough to jump clear of the truck and overhead guard as the truck tips. To protect operators from severe injury or death in the event of a tip over, it is best to be held securely in the seat. So, please, always buckle up when driving your lift truck.



⚠ Mast warning decal

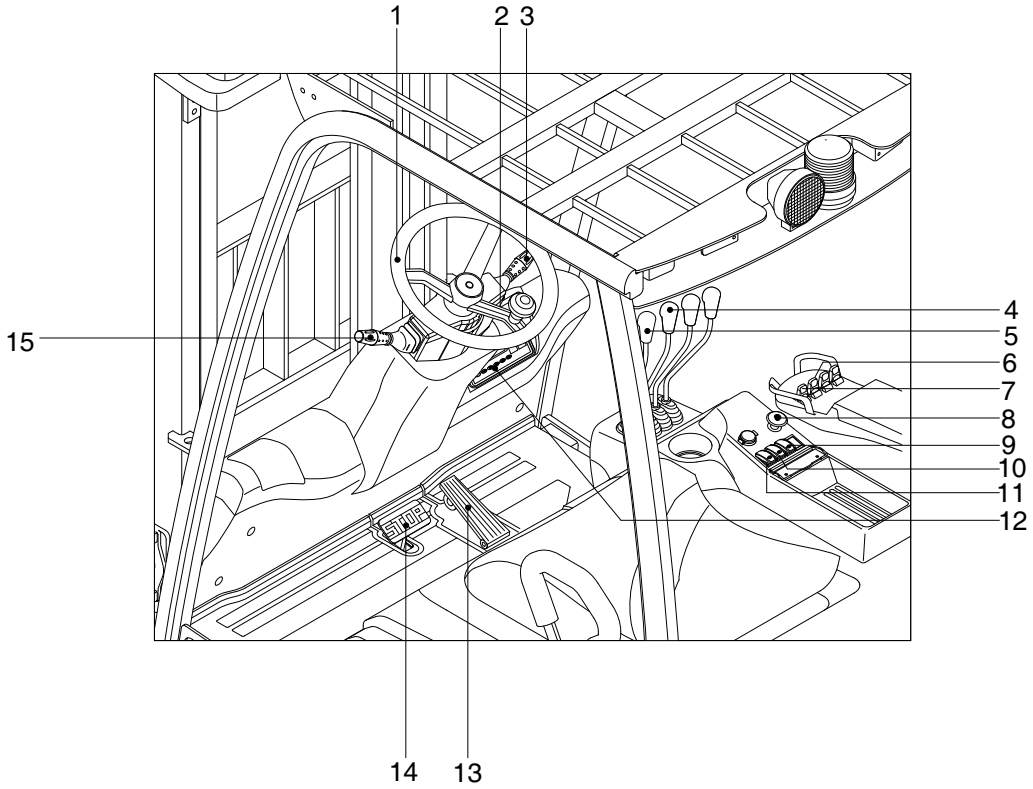
This safety decal is placed on the mast to warn of the danger of injury from movement between rails, chains, sheaves, fork carriage, and other parts of the mast assembly. Do not climb on or reach into the mast. Personal injury will result if any part of your body is put between moving parts of the mast.



⚠ Keep away from forks decal

This safety decal is placed on the mast to warn of the danger of injury from forks when they are in the raised position. Do not ride on or stand under forks or attachments. The forks can fall and cause injury or death. Always make sure that the forks are in the fully lowered position when they are not handling a load.

3. INSTRUMENTS AND CONTROLS



15BT9UOM0307

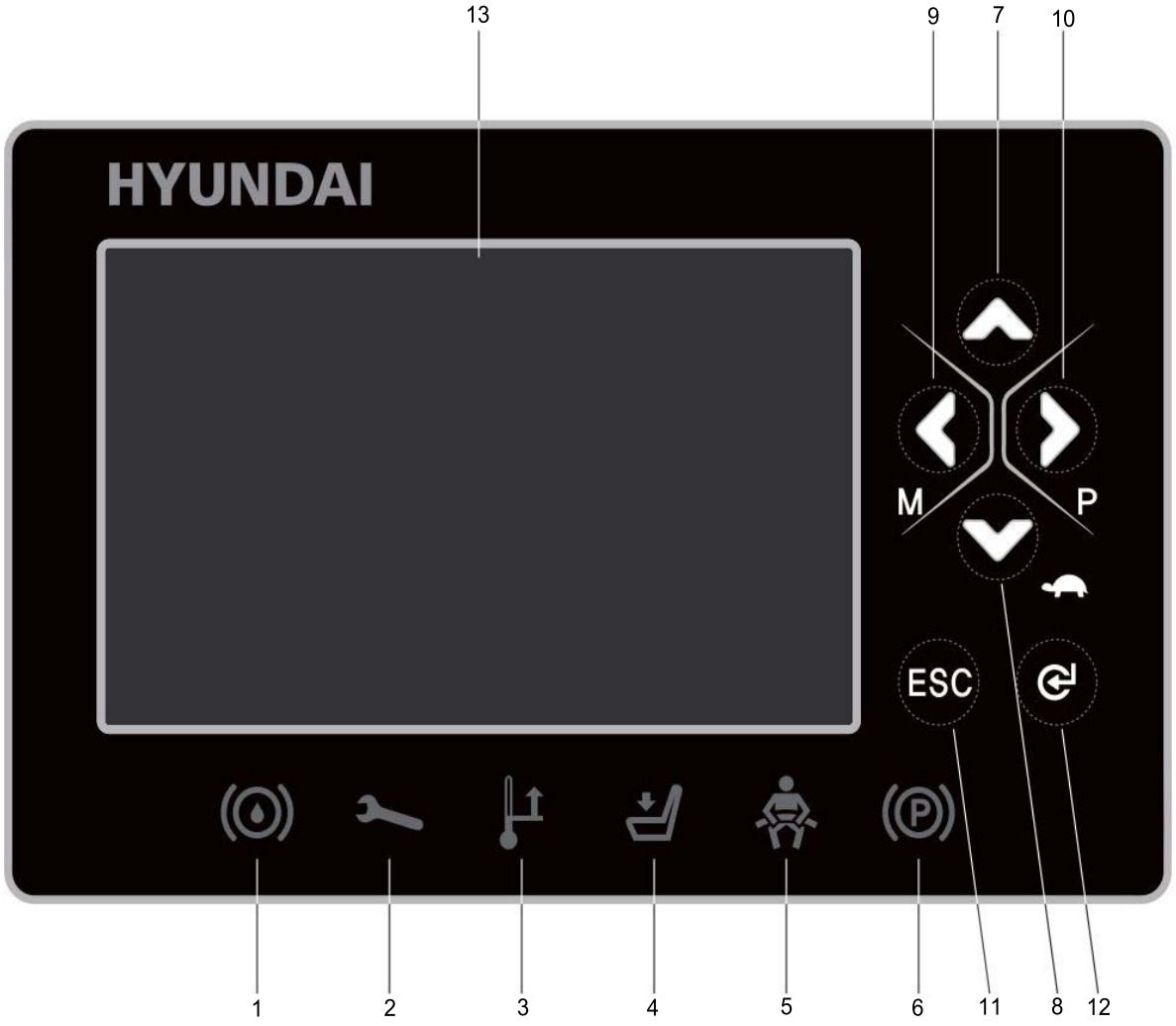
1	Steering wheel	6	Tilt fingertip lever(opt)	11	Head lamp switch
2	Key switch	7	Lift fingertip lever(opt)	12	Display
3	Turn signal lever	8	Emergency switch	13	Accelerator pedal
4	Tilt lever	9	Beacon lamp switch	14	Brake pedal
5	Lift lever	10	Rear work lamp switch	15	Directional control lever

※ Familiarize yourself with the controls and follow safe operating procedures.

4. INSTRUMENT PANEL (15BT-9U : ~#303, 18BT-9U : ~#449, 20BT-9U : ~#782)

1) STRUCTURE

The instrument panel (Display) has six built-in red LED, which provide the operator with an easy information about the status of some truck devices.

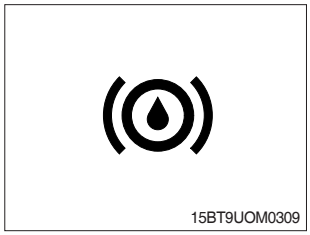


15BT9UOM0308

1	Oil level warning lamp	6	Parking brake warning lamp	11	ESC button
2	Wrench warning lamp	7	Up button	12	Enter button
3	Thermometer warning lamp	8	Down/turtle button	13	LCD function
4	Seat warning lamp	9	Left/menu button		
5	Seat belt warning lamp	10	Right/performance button		

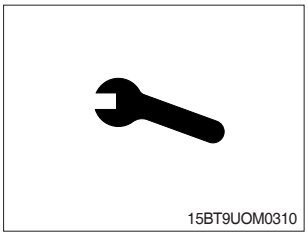
2) WARNING LAMP

(1) Brake oil level warning lamp



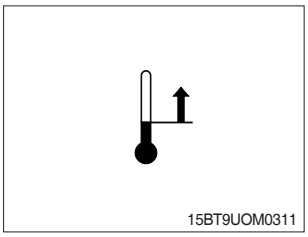
This LED lights when measured level of brake oil stored in reservoir tank is below the minimum acceptable mark.

(2) Wrench warning lamp



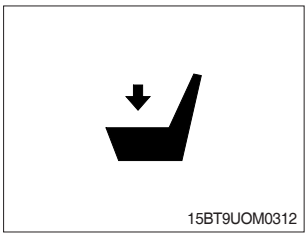
This LED lights when an electric device (controller, motor, cable, etc.) is in abnormal condition.

(3) Thermometer warning lamp



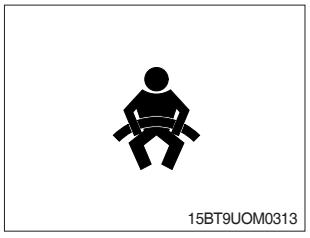
This LED lights when the controller or motor temperature is high.

(4) Seat warning lamp



This LED lights when the operator is not on the seat.

(5) Seat belt warning lamp

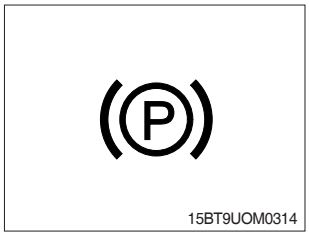


(1) This LED blinks in following 2 cases.

① When operator starts the truck, LED blinks for 5 seconds, which means initial diagnosis is on going, and buttons on display will work properely just after the diagnosis is completed.

② LED blinks when the seat belt is not correctly fastened.

(6) Parking brake warning lamp

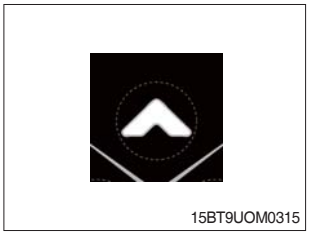


(1) This LED lights when the parking brake is activated.

3) BUTTON

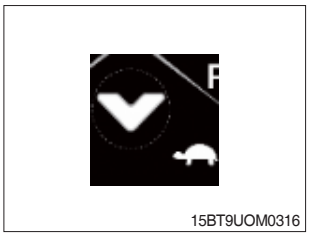
These buttons are used to select or change the menu and input value of the LCD function and display menu.

(1) Up button



Press to select upward move.

(2) DOWN/TURTLE button



Press to select downward move.
TURTLE MODE ON/OFF

(3) LEFT/MENU button

Press to select leftward move.
Go into the menu.

(4) RIGHT/PERFORMANCE button

Press to select rightward move.
POWER MODE H/N/E

(5) Cancel (ESC) button

Press to select cancel.
Keep pressing this button shows PASSWORD entry field.

(6) ENTER button

Press to select Enter.

4) LCD FUNCTION

15BT9UOM0321

1	Current time	6	Hour meter
2	Turtle mode	7	Wheel position and running direction
3	Truck speed pointer	8	Power mode
4	Speed level	9	BDI (Battery Discharge Indicator)
5	Truck speed	10	Load weight (option)

(1) Current time

The number shows the current time according to the setting, which can be changed by display setting at page 3-11.

(2) Turtle mode

The turtle symbol is normally off. When this symbol appears, the turtle mode is activated regardless of the power mode of the truck to reduce the maximum speed to the set-point. This mode can be activated by pressing the button.

(3) Truck speed pointer

The speed of the truck is indicated with a pointer.

(4) Speed level

It indicates the speed level by 2 km.

(5) Truck speed

The truck speed is shown in number. The unit can be km/h or mph according to the display setting (see 3-11 page).

(6) Hour meter

The number shows the hours worked. The letter present beside the hour meter number shows which hour meter is displayed.

– hK : the Key Hour shows the truck Key ON time;

– hT : the Traction Hour shows the Gate ON (driven) time of the traction motor.

– hP : the Pump Hour shows the Gate ON (driven) time of the pump motor.

(7) Wheel position and running direction

The arrow point is up when the truck is forward running and points down when the truck is reverse running. The arrow points the direction of the steering angle.

(8) Power mode

The letter H, N, or E, shows the power mode which is being used in the controller. The mode can be scrolled by pressing the  button sequentially. When a mode is selected, the related information will be sent via CAN-BUS to traction and pump controllers that will manage this data.

H (High) – corresponds to the highest performance

N (Normal) – corresponds to normal performance

E (Economic) – corresponds to economic performance

(9) BDI (battery's state of charge)

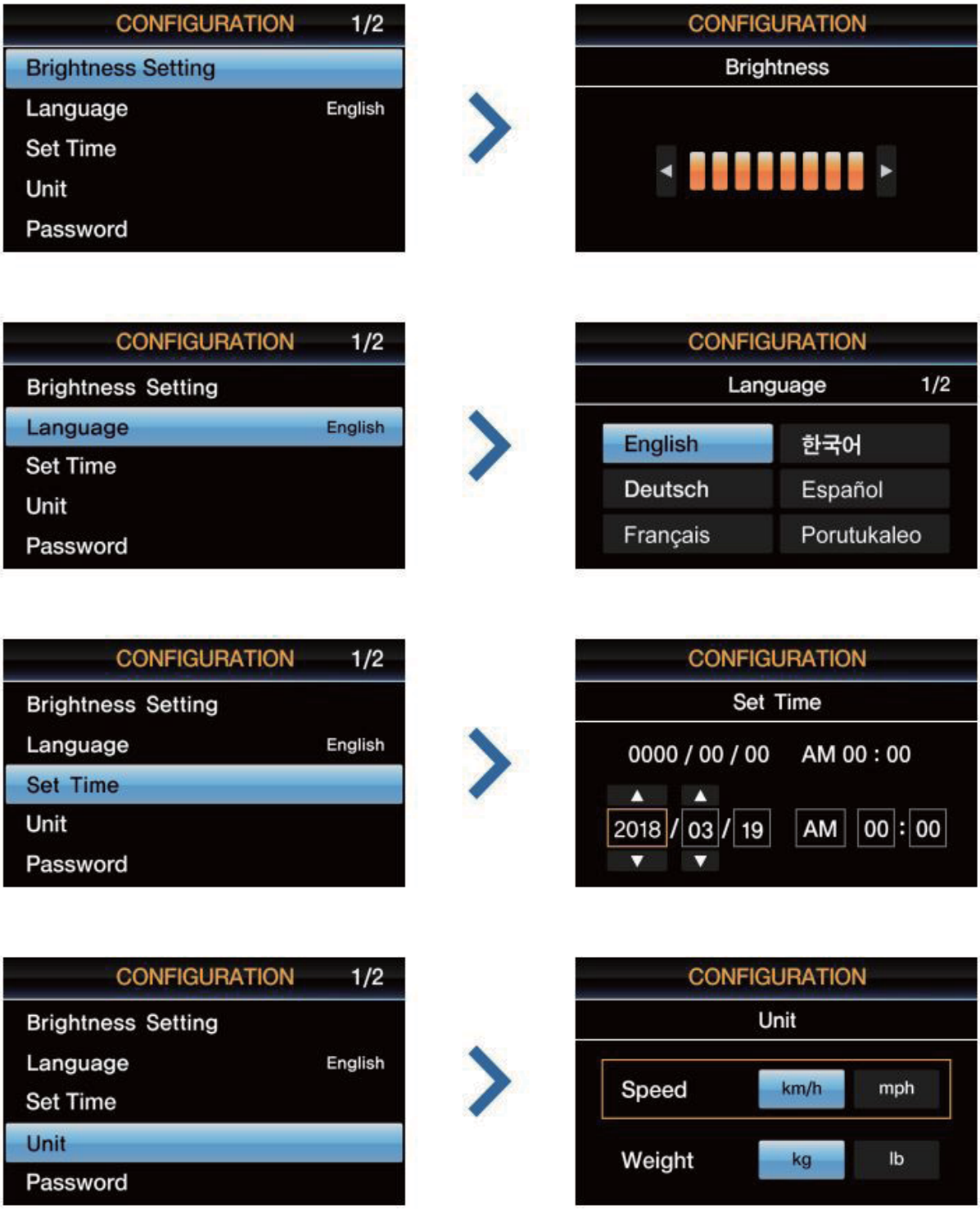
The battery's state of charge is shown by ten bars. Each bar represents the 10% of the battery charge. As the battery becomes discharged, the bars turn off progressively, one after another, in proportion to the value of the residual battery charge. When the residual battery charge is 20% or under, the bars displayed become red.

(10) Load weight (option)

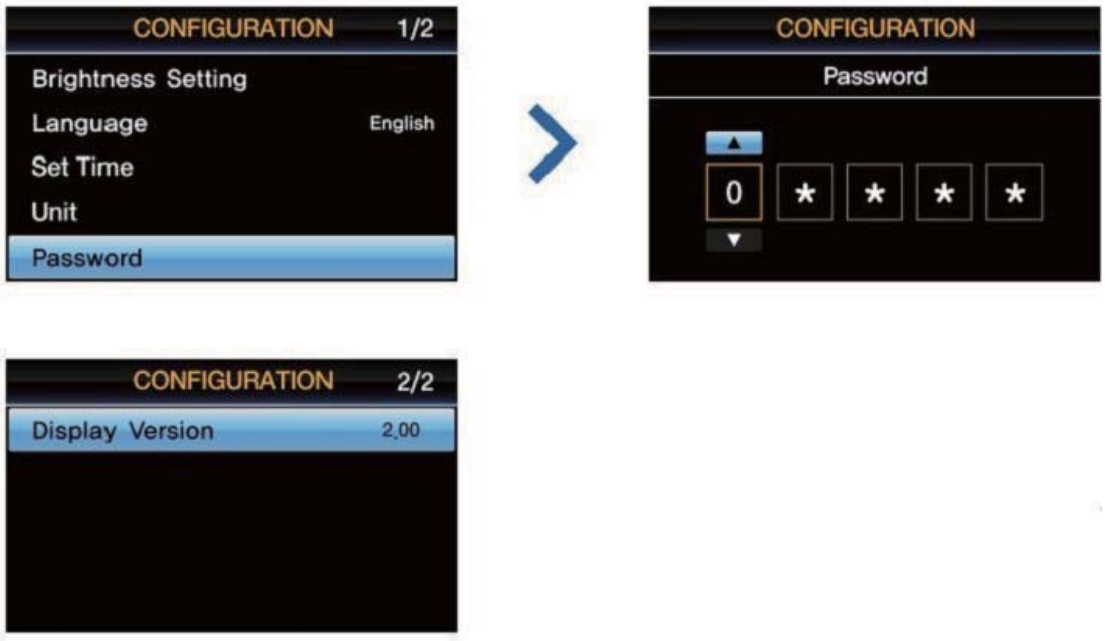
The indicator shows the weight the machine carrying at load.

- Indicator range : 0~6375 kg

5) HOW TO SET THE DISPLAY MENU



15BT9UOM0322

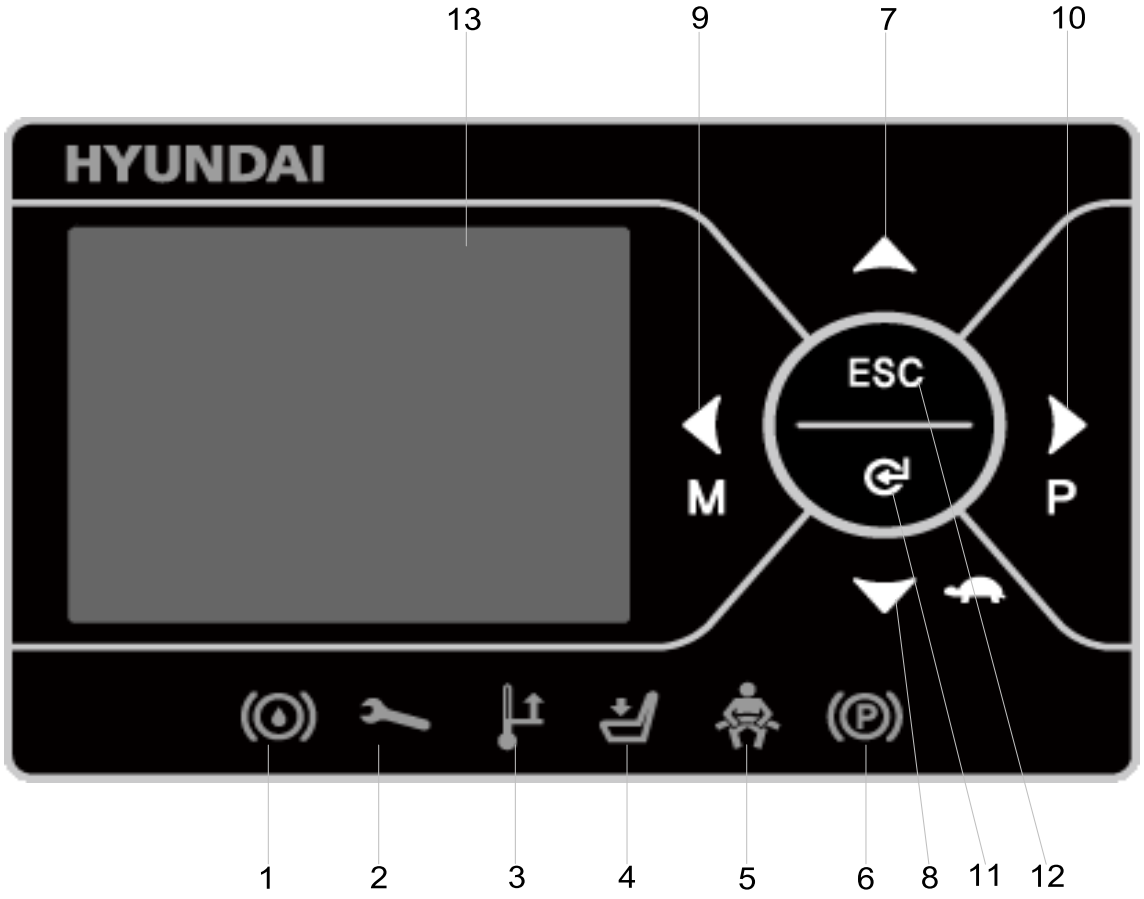


15BT9UOM0323

4. INSTRUMENT PANEL : DISPLAY (15BT-9U : #304~, 18BT-9U : #450~, 20BT-9U : #783~)

1) STRUCTURE

The instrument panel (display) has six built-in red LED, which provide the operator with an easy information about the status of some truck devices.



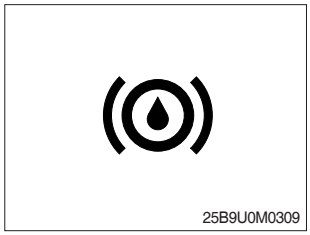
25B9U0M0308-1

· LCD : TFT 3.5 inch IPS

1	Oil level warning lamp	6	Parking brake warning lamp	11	Enterbutton
2	Wrench warning lamp	7	Up button	12	ESC button
3	Thermometer warning lamp	8	Down/turtle button	13	LCD function
4	Seat warning lamp	9	Left/menu button		
5	Seat belt warning lamp	10	Right/performance button		

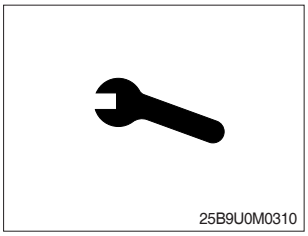
2) WARNING LAMP

(1) Brake oil level warning lamp



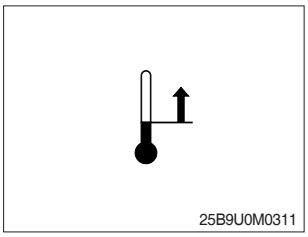
This LED lights when measured level of brake oil stored in reservoir tank is below the minimum acceptable mark.

(2) Wrench warning lamp



This LED lights when an electric device (controller, motor, cable, etc.) is in abnormal condition.

(3) Thermometer warning lamp

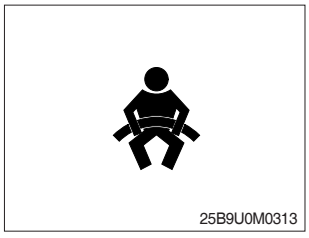


This LED lights when the controller or motor temperature is high.

(4) Seat warning lamp

This LED lights when the operator is not on the seat.

(5) Seat belt warning lamp

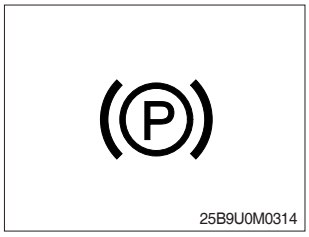


(1) This LED blinks in following 2 cases.

① When operator starts the truck, LED blinks for 5 seconds, which means initial diagnosis is on going, and buttons on display will work properely just after the diagnosis is completed.

② LED blinks when the seat belt is not correctly fastened.

(6) Parking brake warning lamp



(1) This LED lights when the parking brake is activated.

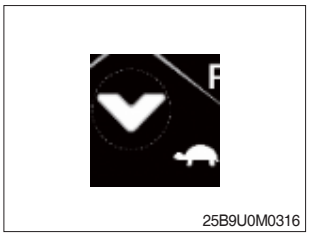
3) BUTTON

These buttons are used to select or change the menu and input value of the LCD function and display menu.

(1) Up button

Press to select upward move.

(2) DOWN/TURTLE button

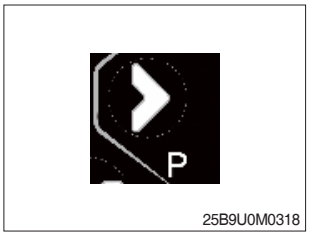


Press to select downward move.
TURTLE MODE ON/OFF

(3) LEFT/MENU button

Press to select leftward move.
Go into the menu.

(4) RIGHT/PERFORMANCE button



Press to select rightward move.
POWER MODE H/N/E

(5) Cancel (ESC) button

Press to select cancel.
Keep pressing this button shows PASSWORD entry field.

(6) ENTER button

Press to select Enter.

4) LCD FUNCTION

1 Current time
2 Turtle mode
3 Truck speed pointer
4 Speed level
5 Truck speed
6 BDI (Battery Discharge Indicator)
7 Hour meter
8 Load weight (option)
9 Wheel position and running direction
10 Power mode

(1) Current time

The number shows the current time according to the setting, which can be changed by display setting at page 7-58.

(2) Turtle mode

The turtle symbol is normally off. When this symbol appears, the turtle mode is activated regardless of the power mode of the truck to reduce the maximum speed to the set-point. This mode can be activated by pressing the button.

(3) Truck speed pointer

The speed of the truck is indicated with a pointer.

(4) Speed level

It indicates the speed level by 2 km.

(5) Truck speed

The truck speed is shown in number. The unit can be km/h or mph according to the display setting (see 7-66 page).

(6) Hour meter

The number shows the hours worked. The letter present beside the hour meter number shows which hour meter is displayed.

– hK : the Key Hour shows the truck Key ON time;

– hT : the Traction Hour shows the Gate ON (driven) time of the traction motor.

– hP : the Pump Hour shows the Gate ON (driven) time of the pump motor.

(7) Wheel position and running direction

The arrow point is up when the truck is forward running and points down when the truck is reverse running. The arrow points the direction of the steering angle.

(8) Power mode

The letter H, N, or E, shows the power mode which is being used in the controller. The mode can be scrolled by pressing the button sequentially. When a mode is selected, the related information will be sent via CAN-BUS to traction and pump controllers that will manage this data.

H (High) – corresponds to the highest performance

N (Normal) – corresponds to normal performance

E (Economic) – corresponds to economic performance

(9) BDI (battery's state of charge)

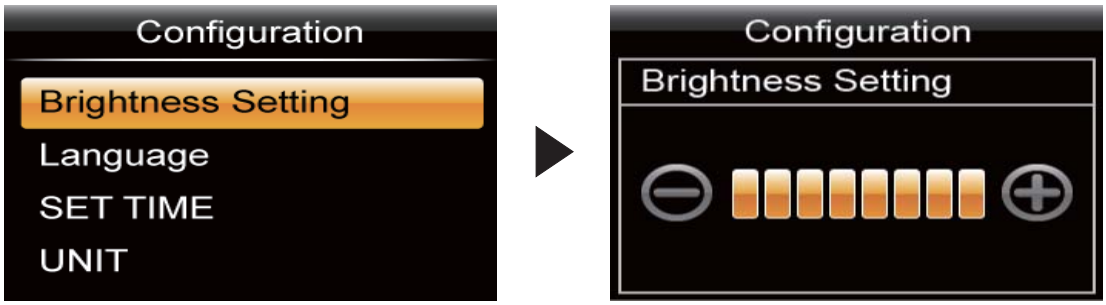
The battery's state of charge is shown by ten bars. Each bar represents the 10% of the battery charge. As the battery becomes discharged, the bars turn off progressively, one after another, in proportion to the value of the residual battery charge. When the residual battery charge is 20% or under, the bars displayed become red.

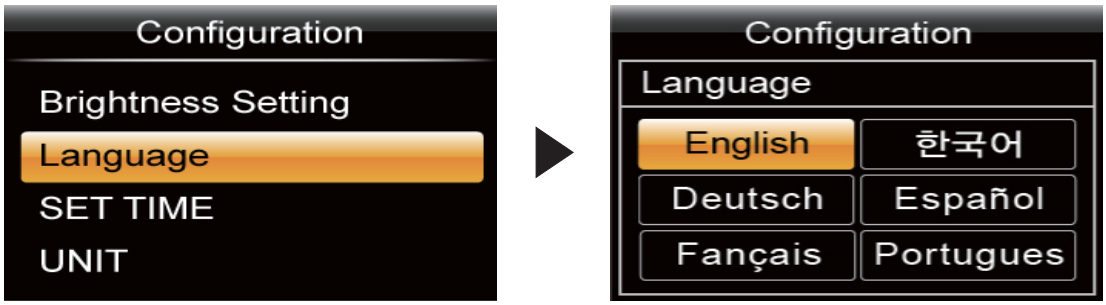
(10) Load weight (option)

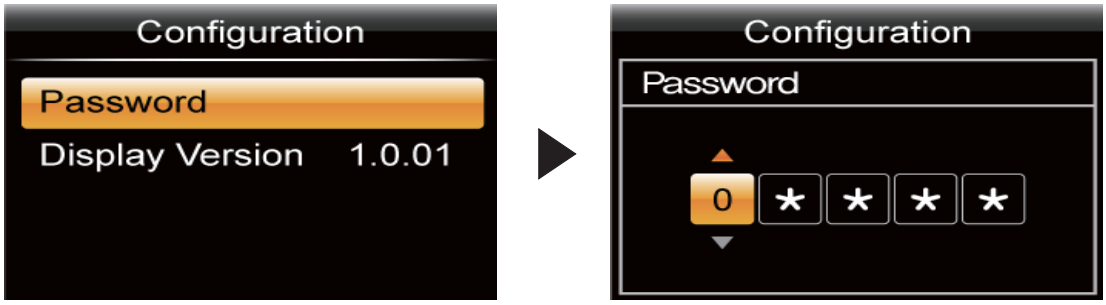
The indicator shows the weight the machine carrying at load.

- Indicator range : 0~6375 kg

5) HOW TO SET THE DISPLAY MENU

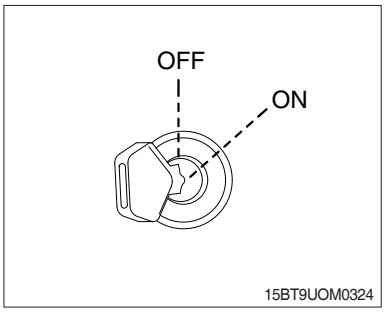






5. OPERATING SWITCHES AND LEVERS

1) KEY SWITCH

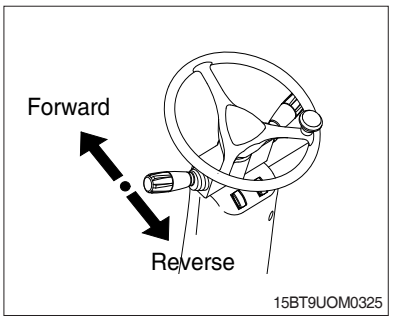


(1) Power is supplied to the control circuit through this switch, which is placed on OFF → ON clockwise.

① OFF : The key can be removed or inserted and power is turned off.

② ON : Both control circuits for hydraulics and running can be activated.

2) DIRECTIONAL CONTROL LEVER



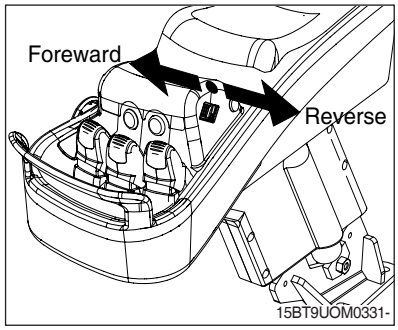
(1) This lever serves to make forward/backward directional changes. For the forward directions, place the lever on the FORWARD position.

(2) In the neutral, the running control circuits is turned off.

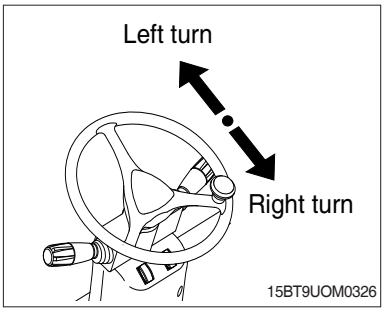
(3) For the backward direction, place the lever on the REVERSE position.

(4) The electrical brake will be applied by shifting the lever to the opposite position of running direction.

FINGER TIP LEVER(OPTION)



3) FLASHER SWITCH(STANDARD)

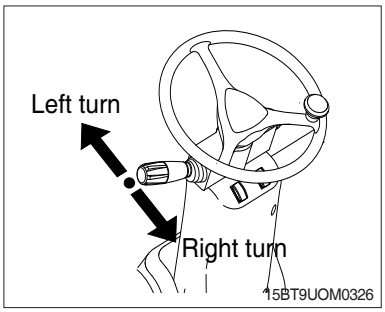


(1) When making a left or right turn, use this switch to flash the flash lamp to indicate which direction the vehicle is turning to.

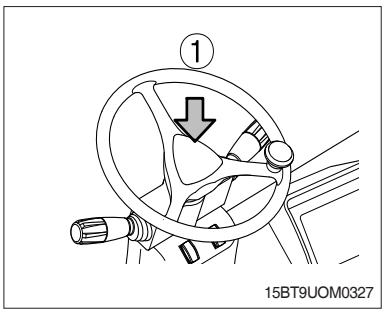
(2) For a right turn, place the switch on the BACKWARD position.

(3) For a left turn, place the switch on the FORWARD position.

FLASHER SWITCH(OPTION-IF FINGER TIP INSTALLED)

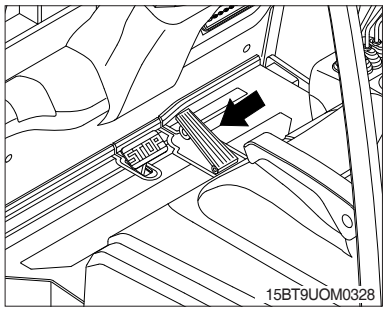


4) HORN BUTTON



(1) When the button (①) is pressed, the horn will sound.

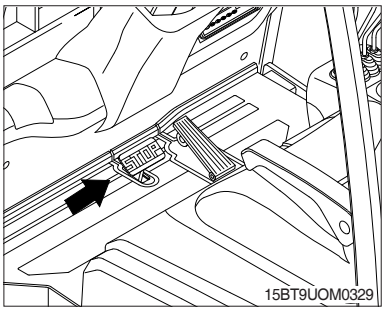
5) ACCELERATOR PEDAL



(1) This pedal is used to vary running speed, which depends upon how far the pedal is depressed.

(2) In running, the electrical brake will be smoothly applied by shifting the direction lever to the position opposite to the direction of vehicle advanced, and if the pedal is further depressed, the vehicle will run to the opposite direction after stopping once.

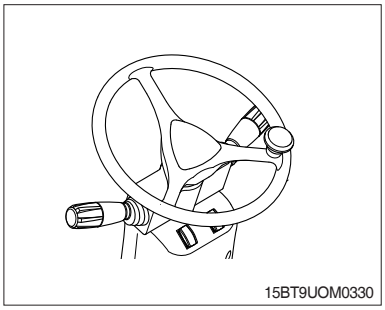
6) BRAKE PEDAL



(1) When this pedal is depressed, the vehicle is braked, while the braking lamps attached on the rear light.

⚠ Special care should be required for the operation of the brake at loading.

7) STEERING WHEEL



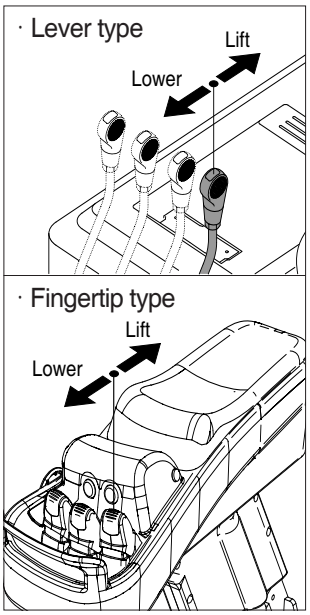
(1) The steering wheel of the vehicle is provided with the knob to allow steering with one hand.

(2) Perform the loading operation with the right hand and operate the steering wheel with the left hand.

(3) Adjustable steering column enables selection of the best driving position.

⚠ Particular care should be taken for the rapid operation of the steering wheel.

8) LIFT LEVER / LIFT FINGERTIP (OPTION)



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(1) LIFT

PULL the lever (fingertip) BACK to LIFT the load.

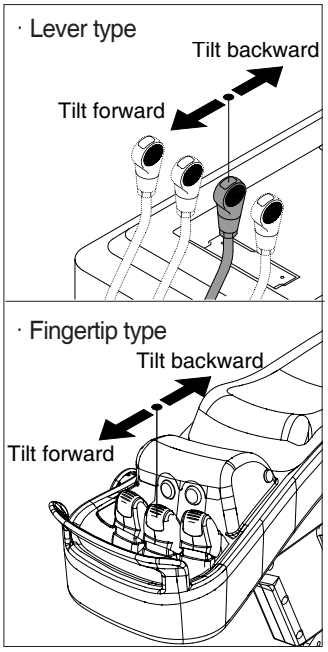
(2) LOWER

PUSH the lever (fingertip) FORWARD to LOWER the load.

(3) HOLDING

When the lever (fingertip) is released, the lifting or lowering action stops.

9) TILT LEVER / TILT FINGERTIP (OPTION)



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(1) TILT FORWARD

PUSH the lever (fingertip) FORWARD to tilt mast FORWARD.

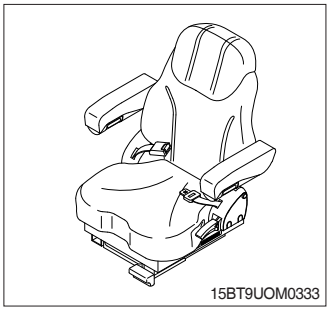
(2) TILT BACK

PULL the lever (fingertip) BACK to tilt mast BACKWARD.

(3) HOLDING

When the lever (fingertip) is released, tilting action stops.

10) SEAT SWITCH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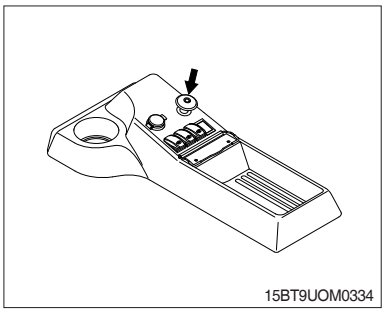
(1) This switch is closed automatically when an operator sits down on the seat.

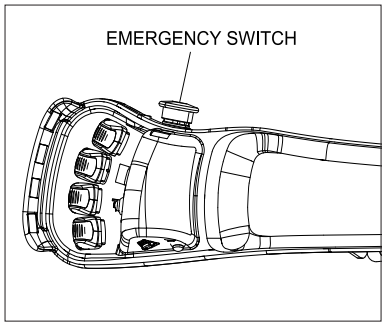
⚠ Before starting the truck seat switch must be closed, otherwise the truck cannot be started.

11) EMERGENCY SWITCH

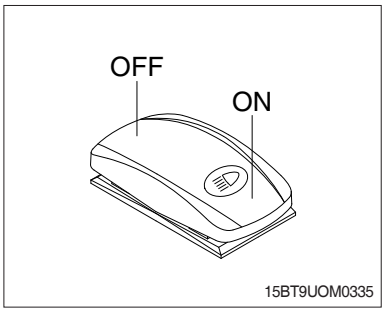


(1) When pressing the emergency switch downward the electric circuit is broken, all electrical function switch is off.

EMERGENCY SWITCH(OPTION, IF FINGER TIP INSTALLED)

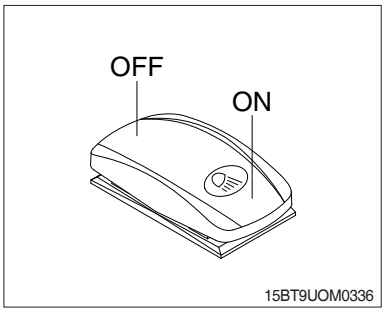


12) HEAD LAMP SWITCH



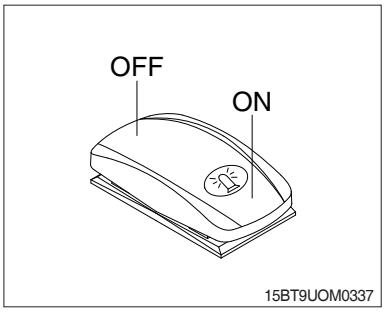
(1) This switch is used to operate head lamps.
Press this switch to turn on head lamps.

13) WORK LAMP SWITCH



(1) This switch is used to operate work lamps.
Press this switch to turn on work lamps.

14) BEACON SWITCH



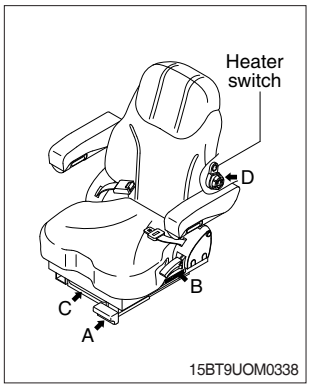
(1) This switch is used to operate beacon lamp.
Press this switch to turn on beacon lamp.

6. SEAT ADJUSTMENT

1) SEAT ADJUST MENT

The seat adjustable to fit the contours of the operator's body. It will reduce operator fatigue due to long works hours and enhance work efficiency.

Grammer seat



(1) Forward/Backward adjustment (A)

① Pull lever A to adjust seat forward or back ward.

② The seat can be moved forward 120 mm and backward 90 mm (stroke : 210 mm).

(2) Reclining adjustment (B)

Pull lever B to adjustment seat back rest.

(3) Weight adjustment (C)

Adjustment range : 45~170 kg

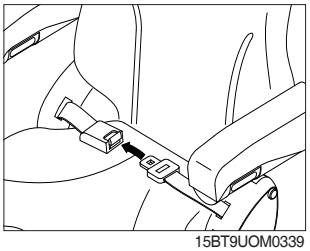
(4) Lumbar adjustment (D)

Turn line knob D to adjust lumbar support up and down.

(5) Heated seat switch (option)

Press this switch in order to heat the seat.

2) BUCKLING UP



(1) Buckling up. Be sure that you put on the seat belt. Connect and adjust the seat belt strap to a snug, comfortable position.

⚠ Always wear your seat belt when operating a lift truck. Failure to wear seat belt will result in injury or death in an event of an accident.

⚠ Always check the condition of the seat belt and mounting hardware before operating the machine.

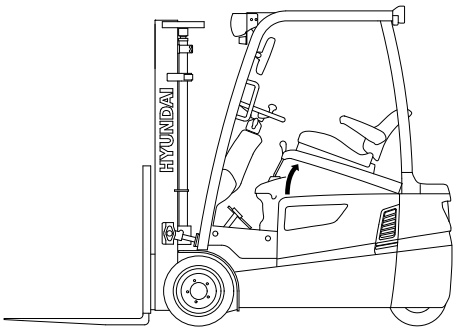
⚠ Replace the seat belt at least once every three years, regardless of appearance.

7. BATTERY COMPARTMENT ACCESS

The combination seat deck/battery compartment cover pivots mast to provide access to the battery compartment.

※ **You must tilt the steering column & lever forward before raising the cover.**

The cover is closed by a spring latch located at the front edge. Pull the latch to release the cover. A gas spring helps you pivot the cover upward and hold it in the raised position.



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4. DAILY SAFETY INSPECTION

1. INSPECTING YOUR FORK LIFT TRUCK

Before using a fork 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 fork 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.**

Fork 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 pages.

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

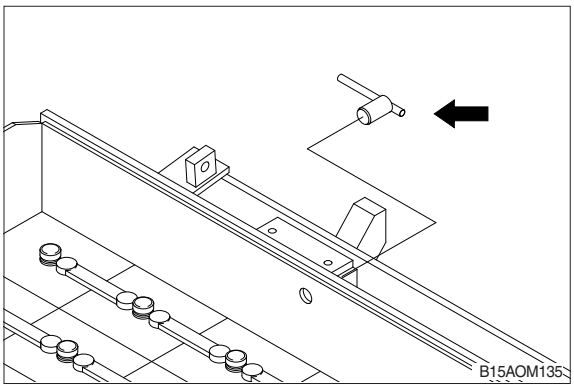
2. VISUAL CHECKS

First, perform a visual inspection of the truck and its major components :

1) Walk around your lift truck and take note of obvious damage that may have been caused by operation during the last shift.

2) Check that all capacity, safety, and warning plates or decals are attached and legible.

3) Check that the battery is installed and secured in position correctly. Check that the battery stopper is installed properly to restrict the battery displacement horizontally and vertically including overturn as right the picture. Check the battery connector for safe condition.



4) Lock for any external leakage around drive axle.

5) Check for hydraulic oil leaks and loose fittings.

⚠ Do not use bare hands to check. Oil may be hot or under pressure.

6) Be sure that the driver's overhead guard and all other safety devices are in place, securely fastened and undamaged. Inspect for damaged or missing parts, corrosion, cracks, breaks etc.

7) Check all of the critical components that handle or carry the load.

8) Look the upright and lift chains over. Check for obvious wear and maintenance problems such as damaged or missing parts, leaks, slack or broken chains, rust, corrosion, bent parts, cracks 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 sump oil level.

3. FUNCTIONAL CHECKS

Check the operation of the truck as follows.

※ **Before performing these checks, familiarize yourself with the operating procedures in Section 5.**

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

2) With the truck on, check the diagnostic display, or the hour meter and battery discharge indicator (depending on which truck you have). The diagnostic display should show the charge remaining on the battery or a fault code. If the fault code is not an operator fault code call a service technician.

3) Be sure all controls and systems operate freely and return to neutral properly. Check the :
 (1) Service and parking brakes
 (2) Hydraulic controls : lift, tilt and auxiliary (If installed)
 (3) Accelerator control
 (4) Directional control
 (5) Steering system
 (6) Lift mechanism and any attachments

· **When the functional checks are completed :**
 ① Bring truck to complete stop.
 ② Put directional control lever in the NEUTRAL position.
 ③ Apply the parking brake.
 ④ Lower the lift mechanism fully.
 ⑤ Turn the starting switch to the OFF position.

· **If you are going to leave the truck unattended :**
 ⑥ Remove the key.
 ⑦ Block the wheels, if the truck is parked on an incline or has the possibility of moving.

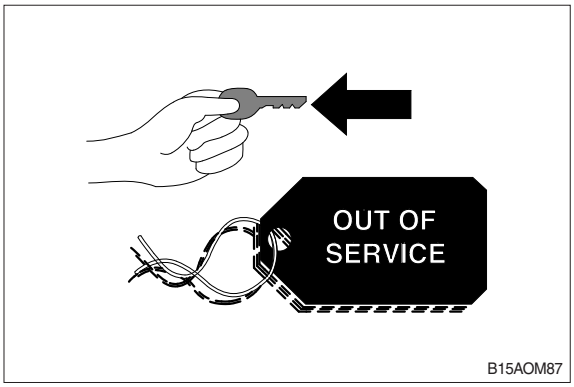
4. CONCLUDING THE INSPECTION

Make a record on the "Driver's Daily Checklist" of all the operating and truck problems that you find. Review the checklist to be sure it has been completed and turn it into the person responsible for fork lift truck maintenance. Be sure any unusual noises or problems are investigated immediately.

Do not operate a fork lift truck that has a maintenance problem, or is not safe to operate.

Remove the key from the starting switch and put an "**OUT OF SERVICE**" tag on the truck.

If all of the Daily Inspection checks were normal or satisfactory, the truck can be operated.



5. OPERATING PROCEDURES

1. BEFORE OPERATING THE TRUCK

Be sure that you have read and understand the information in this Operator's Manual and are trained and authorized before operating the lift truck.

⚠ **This equipment can be dangerous if not used properly. 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.**

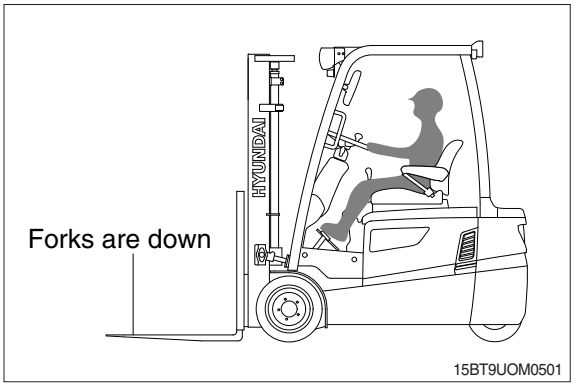
⚠ **Inspect your lift truck before operating or shift at the start of day. Before putting your truck to use, check the operation of the controls and all systems.**

⚠ **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

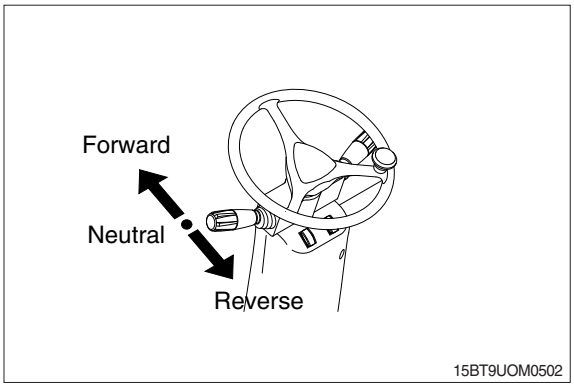
Always start from a safe condition. Before operating a lift truck, make sure that:

1) The parking brake is applied.
2) The forks are fully lowered to the floor or ground.
3) You are familiar with how all the controls function.



4) All controls are in neutral or other correct position.
5) A fork lift truck has received its daily inspection and is ready to operate.

   Put the direction control lever in the NEUTRAL position, before turning the key switch to ON. The truck should start only in the NEUTRAL position.

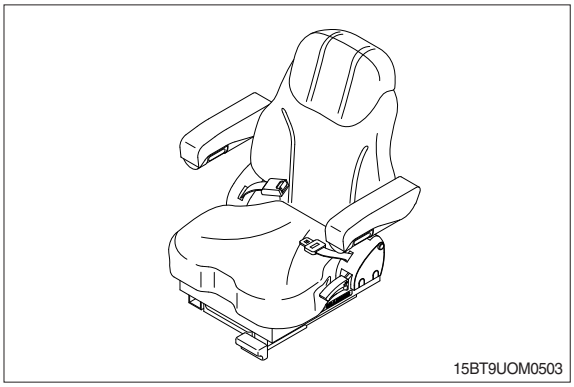


3. ADJUSTING THE SEAT

1) Adjust the seat to a comfortable position for you. Adjust the seat by moving and holding the release lever at the front edge of the seat.

2) Put the seat in a position that will provide easy reach to all controls.

⚠ **Never adjust the driver's seat while the truck is moving, to avoid the possibility of loss of control and of personal injury.**



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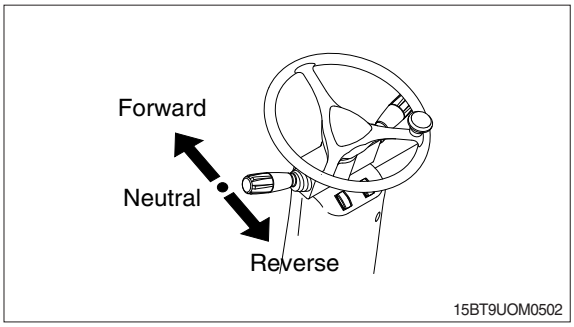
4. STARTING THE TRUCK

Before you start the truck, make sure that you have taken all the above mentioned precautions and that the directional control lever is in NEUTRAL. Also you must sit down on the seat before starting the truck. To start the truck, turn the key switch clockwise to the ON position.

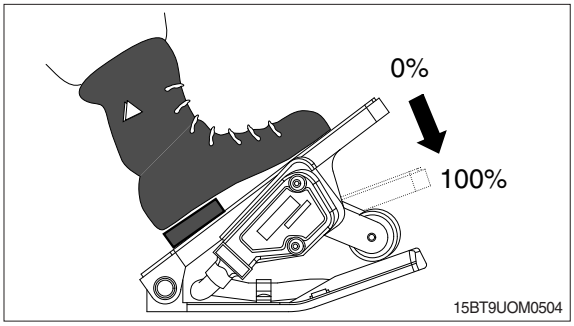
1) RUNNING

(1) Place the directional control lever on the FORWARD position (or the REVERSE position) and gradually step on the accelerator pedal.

(2) The vehicle will start forward (or reverse).



(3) The speed can be controlled from zero to top speed by varying the amount of accelerator pedal depression .

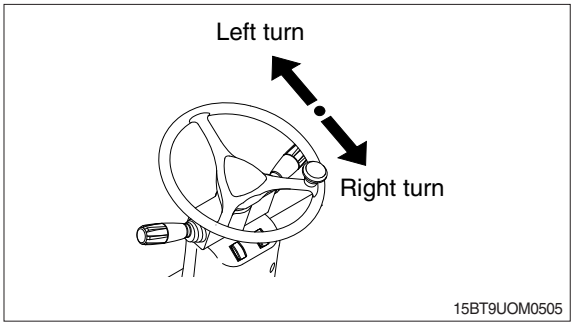


2) TURNING

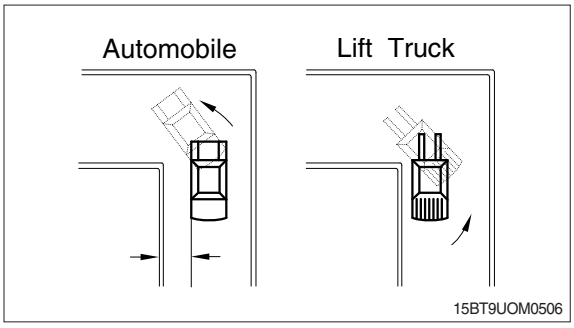
(1) Hold the steering wheel or knob with the left hand to operate the steering.

(2) Forklift trucks are steered by the rear wheels.

(3) So when travelling FORWARD, keep to the inside and when travelling in REVERSE, keep to the outside when turning.

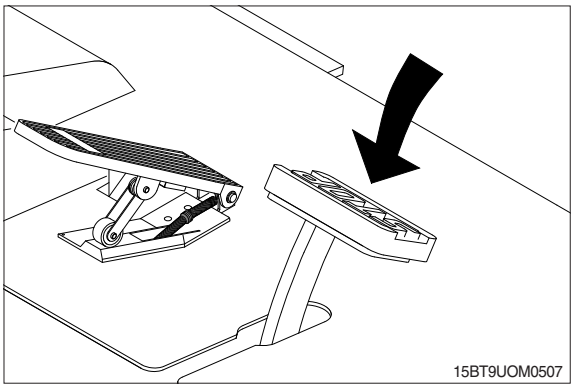


(4) When turning, do not let the outside of the counterweight touch anything.

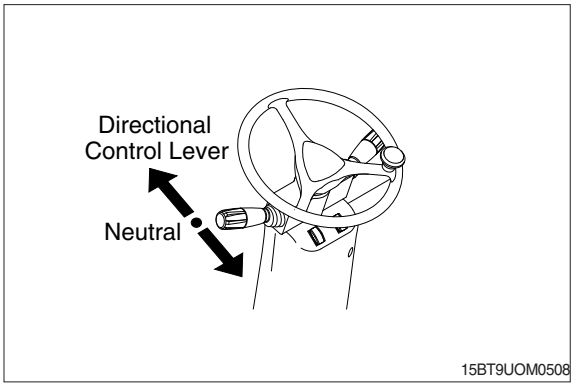


3) STOPPING AND PARKING

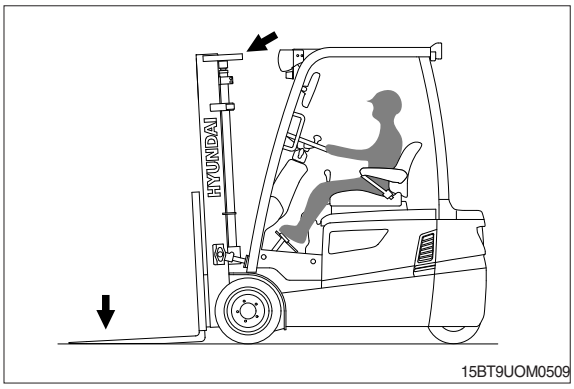
(1) Release the foot from the accelerator pedal beforehand and allow the speed to drop before stepping on the brake pedal.



(2) When the vehicle is parked, return the directional control lever to the neutral.



(3) Next, Confirm the parking brake is applied then, Lower the fork to the lowest position. Tilt the mast forward a little.



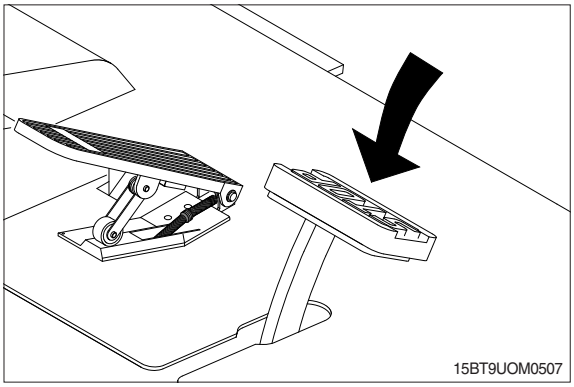
5. CONTROLLING SPEED

With the directional control lever in FORWARD or REVERSE, put your foot on the accelerator pedal and push down smoothly until the truck is moving at the desired speed.

6. BRAKING

To stop the truck, lift your foot from the accelerator pedal and put it on the brake pedal. Push down on the brake pedal in a smooth, firm motion until the truck is stopped.

⚠ Stop a lift truck as gradually as practical. Hard braking and wheel sliding are dangerous, increase wear and can cause you to lose a load and damage to the lift truck. It can cause tip-over.



7. PLUGGING

1) You can change direction, without braking, by "**plugging**". As you are traveling, move the directional control lever to the opposite direction and keep the accelerator pedal depressed. The truck should be slow to a smooth, controlled stop and then accelerate in the opposite direction.
2) You can control the plugging distance with the accelerator pedal:
   The farther the accelerator is depressed, the shorter the reversal distance.

⚠ Be careful when plugging. Any sudden change in direction can cause the load to move or fall off the forks.

8. OPERATING SAFELY

Safe operation is the responsibility of the operator.

1) Watch where you are going. Don't go if you can't see.

(1) Before driving, check all around to be sure that your intended path of travel is clear of obstructions and pedestrians.

⚠ **LOOK WHERE YOU DRIVE. Watch out for pedestrians, other vehicles, obstructions (especially overhead), and drop-offs. 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.
Watch for people in your work area even if your truck has warning lights or alarms. They may not watch for you.

(3) Sound horn at intersections and wherever vision is obstructed.
Do not drive a truck up to anyone standing in front of an object.

2) Protect yourself and those around you...

(1) Operate the truck only from the designated operator's position. Stay within the confines of the lift truck profile dimensions. Keep all body parts inside the operator's compartment and away from the danger of passing obstructions. Keep under overhead guard.

※ **An overhead guard is intended to offer protection to the operator from falling objects, but cannot protect against every possible impact. Therefore, it should not be considered a substitute for good judgement and care in loading, handling, storage, etc.**

⚠ **Keep clear of the mast and lift mechanism. NEVER reach into or put hands, arms, legs, or head into or through the mast structure or near the carriage or lift chains. Never put any part of your body between the mast and the truck.**
Don't use the mast as a ladder.
Keep all other persons clear of the load and mast mechanism while attempting to handle a load.

3) No riders...

(1) Do not carry passengers. The operator is the only one who should be on the truck.

4) Always be in full control of your fork lift truck...

(1) Never operate a lift truck or its attachments if you are not in the designated operator's 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. Avoid bumps, holes, slick, spots, and loose objects or debris in your path that may cause the truck to swerve or tip. If these conditions are unavoidable, slow down and carefully drive past them. Slow down for wet or slippery surfaces.

(4) Avoid any sudden movement, it can cause the machine to tip-over.
Start, stop, travel, steer, and brake smoothly.

(5) Operate your lift truck under all conditions at a speed that will permit it to be brought safely to a stop.

(6) Travel with the fork carriage tilted back and raised only enough to fully clear the ground or obstacles. When the carriage(load) is in an elevated position the stability of the truck is reduced.

(7) Do not elevate the load except during stacking.

5) Grades, ramps, and inclines.

(1) Use special care when operating on ramps, inclines, and uneven areas. Travel slowly. Travel straight up and down. 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 upgrade. When the truck is empty, travel with lifting mechanism(mast) downgrade.

(3) Always brake with the right foot pedal(Not with the inching pedal) when travelling down incline.

6) Practice safe operation every time you use your 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. Use common sense. Drive carefully;do not indulge in stunt driving or horseplay. Observe traffic rules. Watch for people and hazards. Slow down, be in full control of your lift truck at all times.

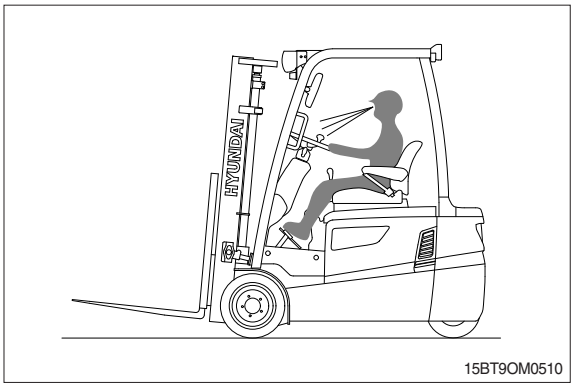
(2) Follow the instructions in this manual to avoid damage to your truck or the possibility of injury to yourself or others.

(3) 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.

(4) Periodically check the gauges and warning indicator lights in the instrument panel to be sure they indicate a normal condition. If an abnormal condition appears bring the machine 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.

⚠ Always wear your seat belt when operating your truck.



9. LOAD HANDLING

1) GENERAL

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 of 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 correctly stack and hand loose items. Center the load on the forks.

Do not lift anything that might fall on the operator or a bystander. Do not handle loads that are higher than the fork carriage unless the load is secured so that no part of it can fall backward.

Keep the load back against the LBR. Loads placed out on the ends of the forks can make the lift truck less stable and more likely to tip up.

Lift and lower with the mast vertical or tilted slightly back-never tilted forward.

Operate lift and tilt controls slowly and smoothly. Never tilt the mast forward when the carriage(load) is raised, except to pick up or deposit a load over a rack or stack.

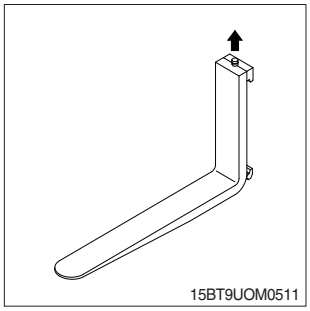
⚠ **Slack chains mean rail or carriage hang-up. Raise the mast before you move. If the mast malfunctions in any way or becomes stuck in a raised position, operate the lift control to eliminate any slack chains by raising the carriage. Do not go under a raised mast or forks to attempt repairs. Do not climb the mast or 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. Therefore, always carry the load as close to the front wheels as possible(Back and flush against the face of the forks.)

The capacity load shown on the name plate represented by a cube in weight is evenly distributed, with the center of gravity located a standard distance from the face of the forks. If the weight of the actual load to be handled is not evenly distributed, put the heaviest part closest to the carriage.

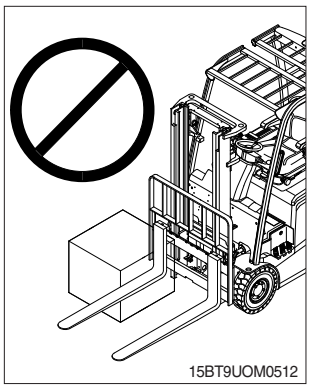
2) ADJUSTING THE LOAD FORKS



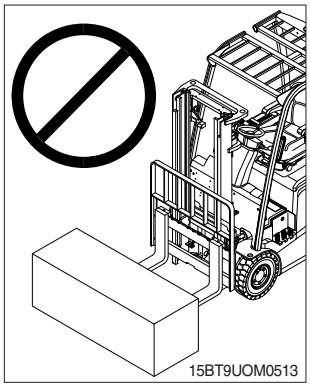
The load forks are adjustable on the hanger, carriage. Forks should be spaced as far apart as the load will allow. Both forks should always be the same distance from the center of the fork carriage. To adjust the forks, raise the carriage slightly. Tilt the mast fully forward to reduce friction and make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

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

3) LOAD ON FORKS



(1) Do not elevate the load with one fork.
Loading with one fork cause the tip over, serious injury or death of operator. The work can cause the height difference between both fork tips.



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

4) TRAVELING WITH LOAD

Travel with load or carriage as low as possible and tilted back. Never travel with the load or carriage raised (elevated) in a high position. Do not elevate the load except during stacking.

Observe all traffic regulations and watch for other traffic, pedestrians, and safe clearances. 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).

Avoid sudden movements when carrying a load-start, stop, travel, steer, and brake smoothly. Steer clear of bumps, holes, and loose materials or debris on the ground. Lift and tilt slowly and smoothly. Go slowly when turning. Cross railroad tracks slowly and at an angle wherever possible.

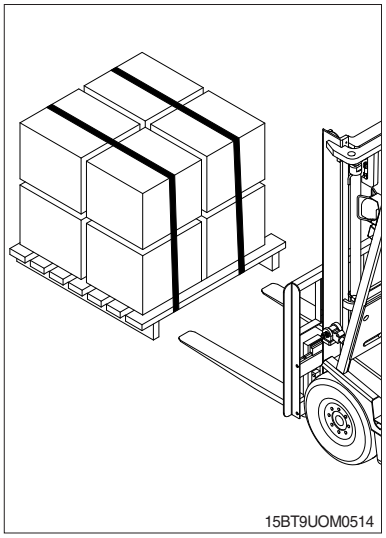
Use special care when handling and traveling with long, high, or wide loads-to avoid losing the load, striking bystanders or obstructions, or tipping the truck.

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. Accordingly, you need to become accustomed to tail swing and always check the tail swing area of the counterweight to be sure i is clear before you turn.

Always be concerned about the stability of your lift truck. When attachments are used, extra care should be taken in securing, manipulating, positioning, and transporting the load. Because attachments 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 picking up a load from the ground, approach the load slowly and carefully align the truck square with the load. The forks should be adjusted to fit the load or pallet being handle and spread as wide as possible to provide good stability and balance. Before lifting, be sure the load is centered and the forks are fully under and supporting the load. Fork length should be at least 2/3 of load length. With the lift and tilt controls, adjust the forks to the correct height and angle for freely engaging the load pallet. 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.

Raise the load from the ground or stack by tilting the mast back just enough to lift the load from the surface. When stacking or tiering, use only enough backward tilt to stabilize the load.

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.

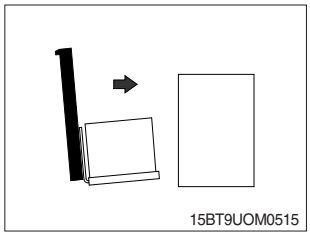
Adjust the fork height and tilt the mast forward slightly, as necessary, for smooth removal of the forks from the load (Pallet).

Carefully back away to clear the forks from the load.

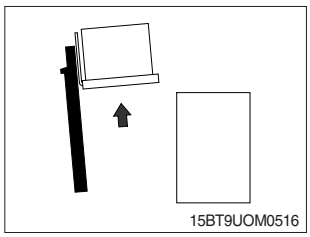
Raise the forks to traveling height and tilt forks to a level position 150~200 mm (6~8 in) off the floor.

7) STACKING

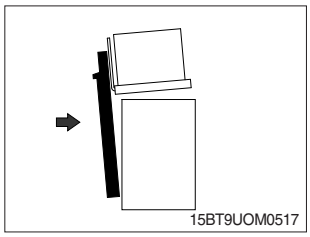
(1) To put a load on a stack



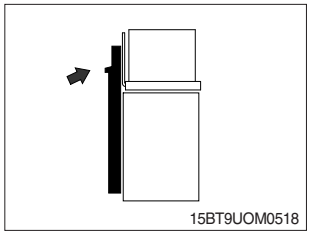
① Approach slowly and align the lift truck and load squarely with the stack.



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

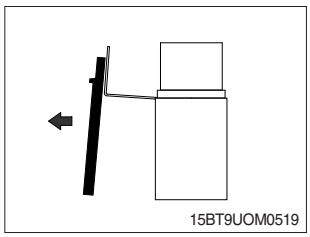


③ Move forward slowly until the load almost touches the stack. The leading edge and sides of the load pallet should line up exactly with the near edge and side of the load or rack on which you are stacking.

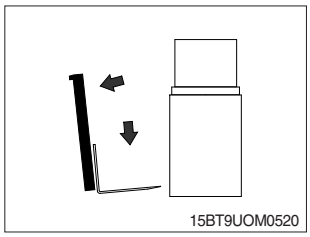


④ Stop close to the stack and further lift the load high enough to clear the top of the stack. Slowly move the load into position. Use care not to damage or move adjacent loads.

⑤ When the load is aligned with the stack beneath it, tilt the mast to the vertical position and carefully lower the load onto the 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 (6~8 in) above the ground], then tilt back for travel.

(2) To move a load from a stack

Approach the stack carefully, truck lined up squarely with the load. With mast vertical, raise the forks to the correct height for freely engaging the load pallet. Adjust fork angle as necessary to fit squarely under the load. Move (inch) forward until the forks are 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 under surface. Back out several inches, then set the load down and move forward until the front face of the forks contacts the load. Be careful that the fork tips now clear the adjacent load or material behind the load being moved.

Raise the load from the stack by tilting the mast back just enough to lift the load from the surface. Or, with the mast still vertical, raise the forks until they begin to lift the load. 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 (6~8 in) off the ground]. Tilt full back to travel (Except for certain loads that may have to be transported as level as possible). 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.**

10. SHUT DOWN PROCEDURE

※ Always leave your lift truck in a safe condition.

1) When you leave your truck, or park it, follow these safety rules

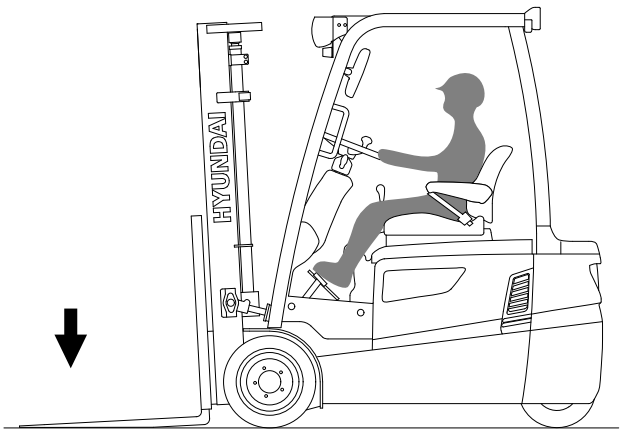
(1) Park in a safe area away from normal traffic.
(2) Never park on a grade.
(3) Never park in areas that block emergency routes or equipment, access to fire aisles, or stairways and fire equipment.

2) Before leaving the operator's position

(1) Bring the truck to a complete stop.
(2) Put the directional control lever in the NEUTRAL position.
(3) Apply the parking brake.
(4) Lower the lifting mechanism-carriage and forks or attachment fully to the ground.

3) In addition, when leaving the truck unattended

(1) Tilt the mast forward until the forks are level and flat on the ground.
(2) Turn the starting switch to the OFF position and remove the key.
(3) Block the wheels, if the truck must be left on an incline or you have any doubt about the truck moving from a safe position.



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6. EMERGENCY TOWING

1. TOWING PRECAUTIONS

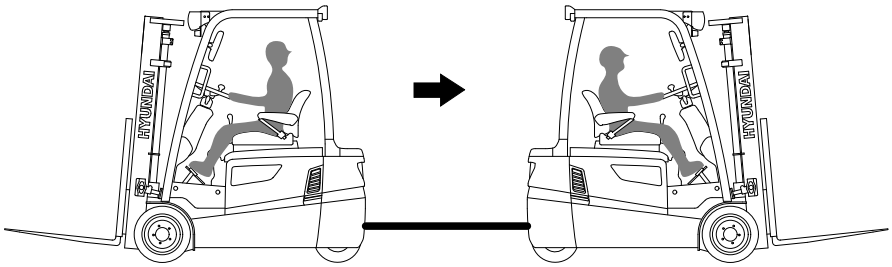
If your lift truck becomes disabled but it can be moved freely on its own wheels without further damage, use the following procedures to tow it safely to a repair area.

※ **It is important for your safety and the care of your lift truck to use the proper equipment and carefully follow these recommendations for safe towing.**

⚠ **Do not tow a lift truck if there is a problem with the brakes or tires or the steering cannot be operated. Do not tow up or down ramps and steep inclines. Do not attempt to tow a lift truck if traction or weather conditions are poor.**

2. TOWING PROCEDURES

1) Be sure to apply the parking brake or block the drive wheels on the disabled truck while working around it.
2) When possible, raise the carriage (forks) on the disabled truck about 12 inches (300 ㎜) from the floor or ground. Secure the carriage with a chain.
3) Obtain another lift truck of equal or larger size carrying a partial load for traction.
4) Check that the counterweight bolts are in place and installed with proper torque. (This bolt is made of a special high tensile steel and is not commercially available. Replace it, when necessary, only with a genuine HYUNDAI replacement part).
5) Use an approved, solid metal tow bar with towing couplers that connect to the towing pins in the counterweights.
6) To release the parking brake, assemble the two M5 X 0.8 X 30 bolts in holes which are located at the top of the electric parking brake.
7) Directional control lever is in the neutral.



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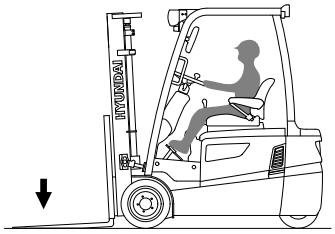
8) Tow the disabled truck backward. **An operator must be on the towed truck.**
Tow the truck slowly. Careful towing is necessary to prevent injury to personnel or damage to the truck. The truck should be towed at a speed of less than 5 mph (8 ㎞/h) with a driver in the seat.
Do not lift the truck or any wheels off the floor or ground while the truck is being towed.

⚠ The power steering will not operate on the disabled truck when the electric power steering motor is not running.

9) Park the disabled truck in authorized areas only. Fully lower the forks to the floor, put the directional control lever in the NEUTRAL position and turn the starting switch to the OFF position. Engage the parking brake by releasing two M5 X 0.8 X 30 bolts on electric parking brake. Remove the key and when necessary, block the wheels to prevent the truck from rolling.

LIFT TRUCK PARKING



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⚠ Always engage the parking brake when parking a lift truck. The truck can move and cause injury or death to personnel near it.

7. PLANNED MAINTENANCE

1. INTRODUCTION

※ **ONLY TRAINED AND AUTHORIZED PERSONNEL should perform Planned Maintenance. Local HYUNDAI dealers are prepared to help customers put in place a Planned Maintenance program for checking and maintaining their lift trucks according to applicable safety regulations.**

2. LIFT TRUCK MAINTENANCE

Regular maintenance and care of your lift truck is not only important for full and efficient truck life also essential for your safety. The importance of maintaining your lift truck in a safe operating condition by servicing it regularly and, when necessary, repairing it promptly cannot be emphasized too strongly. Experience has shown that powered industrial trucks can cause injury if improperly used or maintained. In the interest of promoting safety, several current industry and government safety standards specify that any powered industrial truck not in safe operating condition be removed from service and that all repairs be made by trained and authorized persons.

To assist you in keeping your lift truck in service and in good operating condition, this section outlines maintenance procedures that should be done at regular intervals. This planned approach is considered essential to the life and safe performance of your truck.

It is your responsibility to be alert for any indication that your truck may need service and have it attended to promptly. You play an important part in maintenance. Only you can make sure that your lift truck regularly receives the care it needs.

△ **Powered industrial truck may become hazardous if maintenance is neglected.**

3. PLANNED MAINTENANCE

As outlined in Section 4, **Daily safety inspection** the operator should make a safety inspection of the lift truck before operating it. 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 to the operators daily inspection, HYUNDAI recommends that the owner set up and follow a periodic planned maintenance (PM) and inspection program. 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 Section 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 capacities, and settings for the truck are found in Section 8.

If you need for more information on the care and repair of your truck, see you HYUNDAI dealer.

4. PLANNED MAINTENANCE INTERVALS

Time intervals between maintenance are largely determined by operating conditions. For example, operation in sandy, dusty locations requires shorter maintenance intervals than operation in clean ware-houses. The indicated intervals are intended for **normal** operation. The operating condition classifications are:

1) Normal operation

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

2) Harsh operation

(1) All harsh working environment

(2) Long term heavy load operation

(3) High and low temperature working environment

(4) Sudden change in temperature

(5) Dusty or sandy working environment

(6) Highly corrosive chemical working environment

(7) Damp working environment

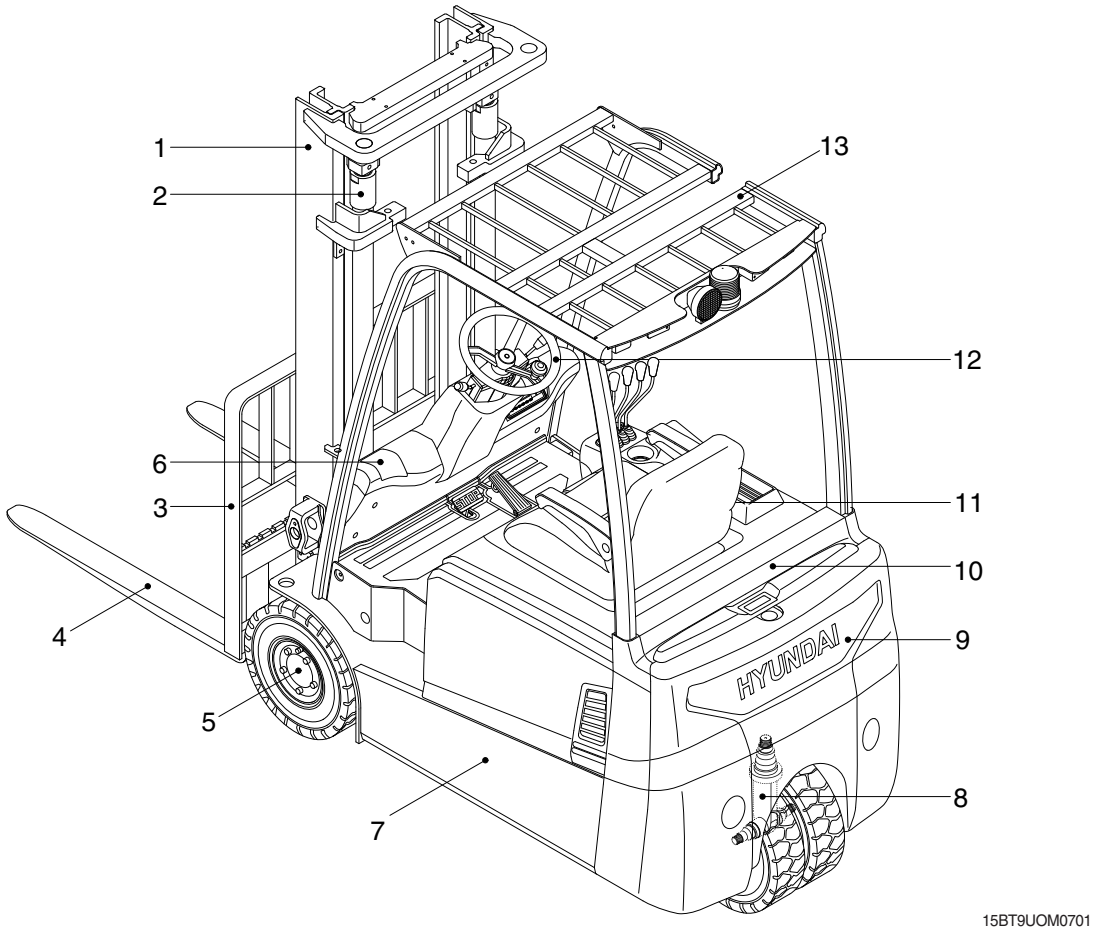
If the lift truck is used in severe or extreme operating conditions, you must shorten the maintenance intervals accordingly.

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

The maintenance time intervals referred to in this manual relate to truck operating hours as recorded on the hourmeter, and are based on experience which HYUNDAI has found to be convenient and suitable under typical(normal or average) operating conditions.

5. MAJOR COMPONENT LOCATIONS

Use the illustration below to locate components included in the PM procedures.



1	Mast	6	Dash board	11	Seat
2	Lift cylinder	7	Frame	12	Steering wheel
3	Carriage and backrest	8	Steering axle	13	Overhead guard
4	Forks	9	Counterweight		
5	Drive unit	10	Battery cover		

6. DAILY MAINTENANCE CHECKS

The PM intervals are depend on hour meter records of operation.

Daily (or every 10 hours) maintenance check list	
1	Check truck for obvious damages and leaks.
2	Check clean battery terminals.
3	Check electrolyte level.
4	Check capacity, warning plates and decals.
5	Check condition of tires and wheels. Remove embedded objects.
6	Check for missing or loose wheel lug nuts.
7	Check hydraulic sump oil level.
8	Check display.
9	Check warning lights and hourmeter.
10	Check overhead guard condition and bolts.
11	Check horn operation and other warning devices.
12	Check steering operation.
13	Check service brake operation.
14	Check parking brake operation.
15	Check directional and speed controls operation.
16	Check accelerator.
17	Check lift, tilt and auxiliary operation.
18	Check mast, lift chains and fasteners.
19	Check carriage or attachments and forks.
20	Check seat deck holddown latch for correct locking.
21	Check optional safety equipment. (Alarms, Lights etc.)

7. PERIODIC MAINTENANCE CHECKS

The PM intervals are depend on hour meter records of operation.

Service item		Service interval hours				Initial hours	
		250	500	1000	2000	50i	250i
Tightening	Torque on critical fasteners		T				T
	Drive axle mounting		T				
	Hydraulic hoses, fittings and clamps				T		
Lubrication	Lubricate truck. (see component)		L				
	Steering axle linkage (linkage, kingpin, trunnion)	L					
	Hydraulic pump spline, steerig unit spline				L		
	Tilt cylinder rod ends	L*1	L*2				
	Mast fittings		L				L
	Lift chains		L				L
	Mast rollers		L				L
Function	Check truck visually and inspect components.		I				
	Truck drive and functional performance		I				
	Battery load test		M				
	Test ground			M			
Periodic replacement parts	Battery cables and truck receptacle			C			
	DC-DC converter			C			
	Check controllers.		C				
	Drive axle air vent		Clean				
	Drive axle fluid		A	R			R
	Brake condition and wear		C				
	Hydraulic tank breather		R*1	R*2			
	Clean hydraulic tank breather.	Clean*1	Clean*2				
	Hydraulic oil return filter			R			
	Hydraulic tank suction strainer				R		
	Hydraulic oil (conventional)				R		
	Hydraulic oil (HYUNDAI genuine)				5000 hours		
	Lift chain adjustment and wear.		C				C
	Check contactor. (Replace contactor tips if roughness is remarkable.)	C					
	Brake fluid				R		

*1 Harsh condition *2 Normal condition

I : Visual inspection (repair or replace if required)

C : Checking (repair or replacement if required) L : Lubrication

M : Measurement (repair or adjustment if required)

A : Aid (check and aid if required) R : Replacement T : Retightening

8. SAFE MAINTENANCE PRACTICES

The following instructions have been prepared from current industry and government safety standards applicable to industrial truck operation and maintenance. These recommended procedures specify conditions, methods, and accepted practices that aid in the safe maintenance of industrial trucks. They are listed here for the reference and safety of all workers during maintenance operations. Carefully read and understand these instructions and the specific maintenance procedures before attempting to do any repair work. When in doubt of any maintenance procedure, please contact your local HYUNDAI dealer.

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

2) Maintenance and inspection of all powered industrial 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 industrial 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 and keep shop clean and floors dry.

7) Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check for fluid or electrolyte levels.

8) Before starting work on truck:

(1) Raise drive wheels free of floor and use wooden blocks or other positive truck positioning devices.

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

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

(4) Disconnect the battery connector before working on the electrical system.

※ **Refer to the 1-15 "Jacking and Blocking" section for proper procedures.**

9) Operation of the truck to check performance must be conducted in an authorized, safe, clear area.

10) Before starting to operate the truck :

(1) Be seated in a safe operating position.

(2) Make sure parking brake is applied.

(3) Put the directional control lever in NEUTRAL.

(4) 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) Stop the truck.
(2) Fully lower the load-engaging means : mast, carriage, forks or attachments. Tilt mast forward.
(3) Put the directional control lever in NEUTRAL.
(4) Confirm the parking brake is applied.
(5) Turn the key switch to the OFF position.
(6) Put blocks at the wheels if the truck must be left on an incline.

12) Brakes, steering mechanisms, control mechanisms, warning devices, lights, lift overload devices, lift and tilt mechanisms, articulating axle stops, load backrest, overhead guard and frame members must be carefully and regularly inspected and maintained in a safe operating condition.

13) Special trucks or devices designed and approved for hazardous area operation must receive special attention to insure that maintenance preserves the original approved safe operating features.

14) All hydraulic systems must be regularly inspected and maintained in conformance with good practice. Tilt and lift cylinders, valves and other parts must be checked to assure that drift or leakage has not developed to the extent that it would create a hazard.

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

⚠ Always put blocks under the carriage and mast rails when it is necessary to work with the mast in an elevated position.

16) The truck manufacturer's capacity, operation, and maintenance instruction plates, tags, or decals must be maintained in legible condition.

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) Industrial trucks must be kept in a clean condition to minimize fire hazards and help in detection of loose or defective parts.

20) Modifications and additions that affect capacity and safe truck operation must not be done without the manufacturer's prior written approval. This is an OSHA requirement. Capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly.

21) Care must be taken to assure that all replacement parts, including tires, are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment. Parts, including tires are to be installed per the manufacturer's procedures. Always use genuine HYUNDAI or HYUNDAI-approved parts.

22) When removing tires follow industry safety practices. Most importantly, deflate pneumatic tires completely prior to removal. Following assembly of tires on multi-piece rims, use a safety cage or restraining device while inflating.

23) Use special care when removing heavy components, such as counterweight, mast, etc.
Be sure that lifting and handling equipment is of the correct capacity and in good condition.

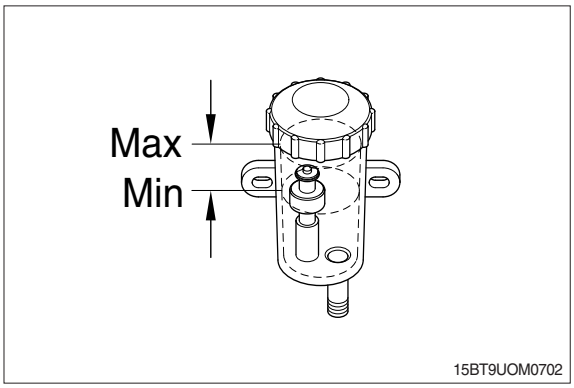
1) SUPPLYING BRAKE FLUID

A hydraulically operated brake is employed. Check the level of brake fluid in the reservoir tank. When the level is low, refill.

(1) Do not mix with different kinds of brake fluid.

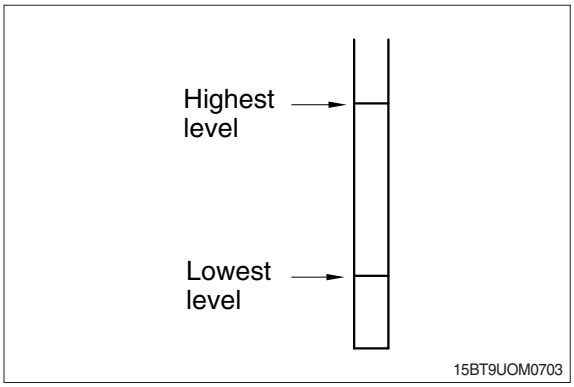
(2) Be careful not to allow external dust to enter through the reservoir cap vent hole and clog it.

(3) Brake fluid change needs a special technique. When the change is necessary, go to the service station and ask for the change.



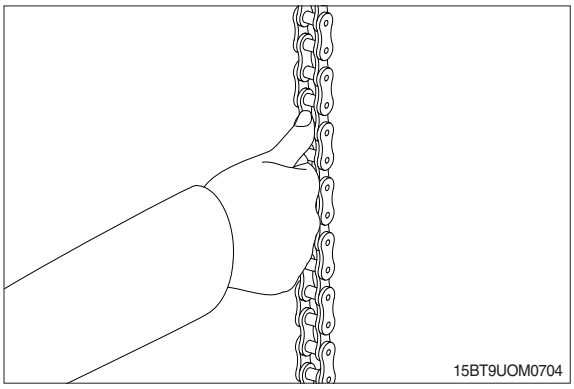
2) SUPPLYING HYDRAULIC OIL

Lower the fork in its lowest position on an even ground. Check for the hydraulic oil level with the oil level gauge. When the level is low, refill.



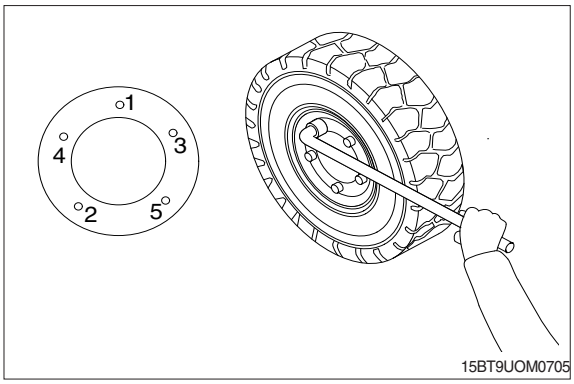
3) CHECKING AND ADJUSTMENT OF LIFT CHAIN TENSION

Set the fork in its horizontal position on an even ground. Raise it up to 20~30 ㎝ from the ground and push the chain with both hands. If the tension is too high or too low on one side, adjust it with the chain anchor bolt.



4) CHECKING OF HUB NUT TIGHTENING CONDITION

Make sure that the hub nut is firmly tightened. T ightening and checking should be made in a diagonal order to prevent unbalanced tightening. (See the figure.)



5) GREASING UP

Clean the following fittings with brushes or waste and apply grease to them.

△ **Be careful not to supply too much grease.**

Model	Fittings	Greasing points
15/18/20BT-9U	Mast pin mounting	2 spots
	Mast roller bearing	4 spots (V, VF), 8 spots (TF, TS)

6) GREASING OF EACH PARTS

Clean the following parts before greasing.

(1) Lift chain : Clean the chain with a brush greased with SAE 20~30 (Brush over the gear oil low viscosity).

(2) Rolling part of mast guide rail roller : Brush over grease.

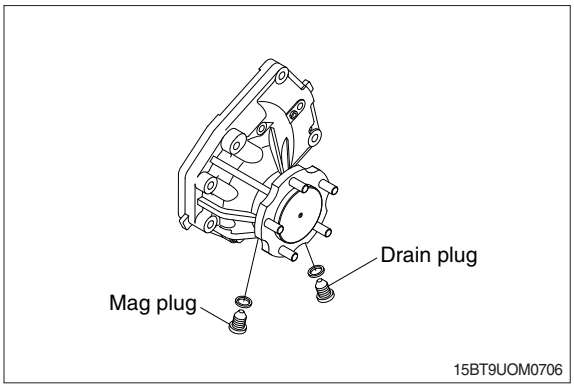
(3) Slide guide and slide rail : Brush over leaked oil.

(4) Sliding parts of inner mast and outer mast : Brush over leaked oil.

(5) Sliding parts of fork and finger bar : Brush over grease.

7) CHECK FOR THE OIL LEVEL OF THE DRIVING GEAR CASE

Check for the oil level by taking out the plug provided front side of the gear case.

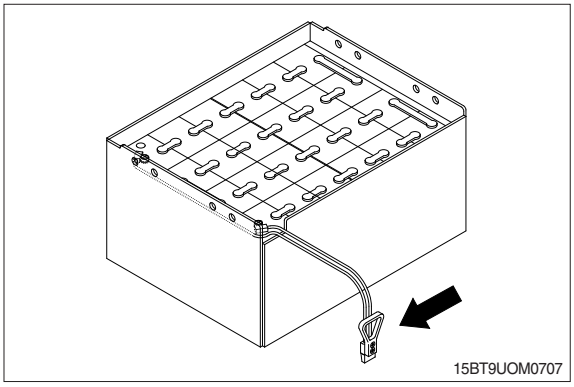


8) EXTERNAL APPEARANCE CHECK OF THE VEHICLE

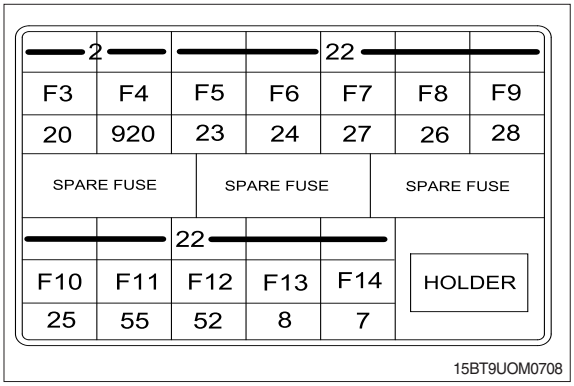
Check for the external appearance of vehicles. If any defect is found immediately contact the service station.

9) FUSE REPLACEMENT

(1) Disconnect the battery connector.



(2) Remove the blown fuse and replace with a new one.



※ The blown fuse must be replaced with a fuse of the same capacity. When the fuses are blown out often, contact the service station for inspection. Never use a conductor as a fuse.

10) 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 complaints of unacceptable chain performance are a result of poor maintenance. Chains need periodic maintenance to give maximum service life.

⚠ Do not attempt to repair a worn chain. Replace worn or damaged chains with a set (LH & RH). Do not piece chains together.

11) LIFT CHAIN INSPECTION AND MEASUREMENT

Inspect and lubricate the lift chains every PM (500 hours). When operating in corrosive environments, inspect the chains at short intervals. During the inspection, check for the following conditions :

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

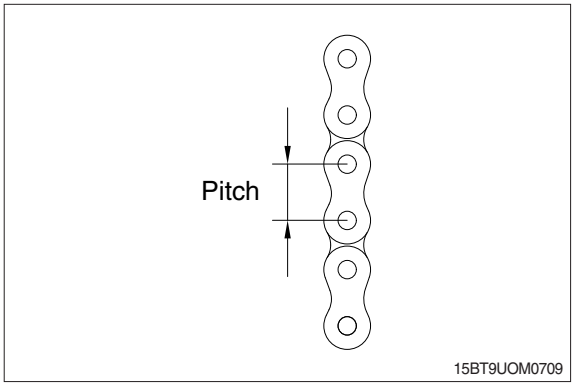
(2) When the pins or holes become worn, the chain becomes longer. When a section of chain is 3% longer than a section of new chain, the chain is worn and must be discarded.

(3) Chain wear can be measured by using a chain scale or a steel tape measure. When checking chain wear, 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.

12) LIFT CHAIN LUBRICATION

Lift chain lubrication is an important part of your maintenance program. The lift chains operate under heavy loadings and function more safely and have longer lift if they are regularly and correctly lubricated. HYUNDAI 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.

13) LIFT CHAIN WEAR AND REPLACEMENT CRITERIA



All chains must be replaced if any link has wear of 3% or more, or if any of the damaged conditions noted above are found during inspection. Order replacement chains from your HYUNDAI dealer.
Replace all chains as a set. 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. Lubricate chains when they are installed on the mast.

※ Please refer to your Service Manual for additional information on lift chain measurement and maintenance.

10. VISUAL INSPECTION

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

· Walk around the truck and take note of any obvious damage and maintenance problems. Check for loose fasteners and fittings.

· Check to be sure all capacity, safety, and warning plates or decals are attached and legible.

※ NAMEPLATES AND DECALS : Do not operate a lift truck with damaged or lost decals and nameplates. Replace them immediately. They contain important information.

· Inspect the truck for any sign of external leakage : drive axle fluid etc.

· Check for hydraulic oil leaks and loose fittings.

⚠ HYDRAULIC FLUID PRESSURE: Do not use your hands to check for hydraulic leakage. Fluid under pressure can penetrate your skin and cause serious injury.

· Be sure that the driver's overhead guard, load backrest extension and safety devices are in place, undamaged and attached securely.

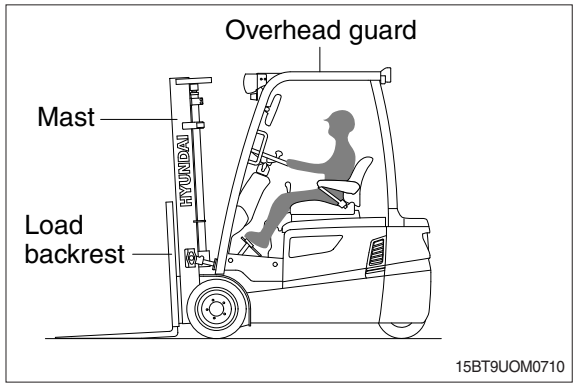
Then check all of the critical components that handle or carry the load.

1) OVERHEAD GUARD

Check the O.H.G for damage. Be sure that it is properly positioned, all mounting fasteners are in place and tight.

2) LOAD BACKREST

Check the load backrest for damage.
Inspect the welds on the carriage and load backrest for cracks.
Be sure that the mounting fasteners are all in place and tight.



3) MAST ASSEMBLY

Inspect the mast assembly : Rails, carriage rollers, lift chains, lift cylinders and tilt cylinders. Look for obvious wear and maintenance problems and damaged or missing parts. Check for any loose parts or fittings. Check for leakage, any damaged or loose rollers and rail wear (metal flaking).
Inspect all lift line hydraulic connections for leakage.

4) LIFT CHAIN

Carefully check the lift chains for wear, rust, corrosion, cracked or broken links, stretching, etc. Check that the lift and carriage chains are adjusted to have equal tension. Check that the lift chain anchor fasteners and locking means are in place and tight.

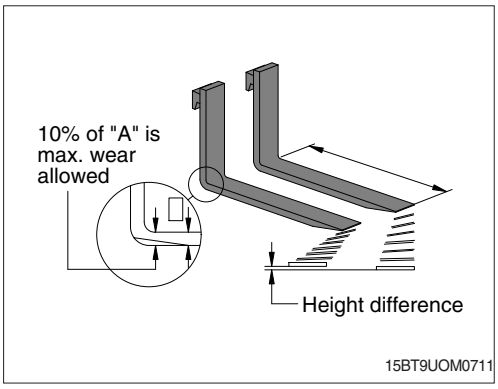
△ Masts and lift chains require special attention to maintain them in safe operating condition.

- **Mast can drop suddenly. Look at the mast, but keep hands out.**
- **Lift chain repairs and adjustments should be made by trained service personnel.**

5) FORKS

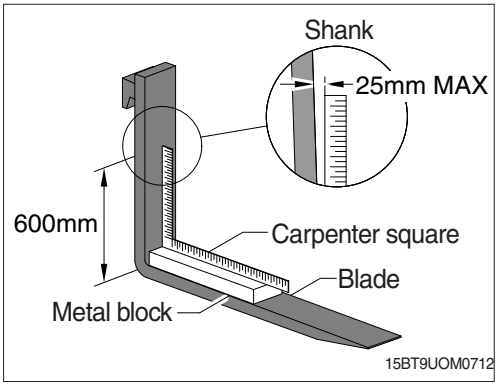
Inspect the load forks for cracks, breaks, bending, and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips refer to below table.

Model	Fork length (mm)	Height difference (mm)
15/18/20BT-9U	equal or below 1500	3
	above 1500	4



⚠ If the fork blade at the heel is worn down by more than 10%, the load capacity is reduced and the fork must be replaced.

Inspect the forks for twists and bends.
Put a 50 mm (2 in) thick metal block, at least 100 mm (4 in) wide by 600 mm (24 in) long with parallel sides, on the blade of the fork with the 100 mm(4 in) surface against the blade. Put a 600 mm (24 in) carpenter's square on the top of the block and against the shank. Check the fork 500 mm (20 in) above the blade to make sure it is not bent more than 25 mm (1 in) maximum.



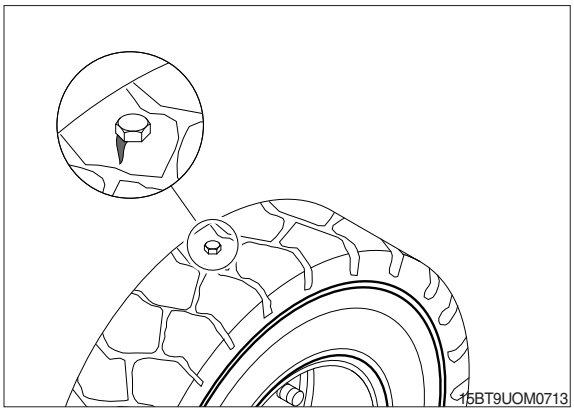
※ If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person before operating the truck.

Inspect the fork locking pins for cracks or damage. Reinsert them and note whether they fit properly.

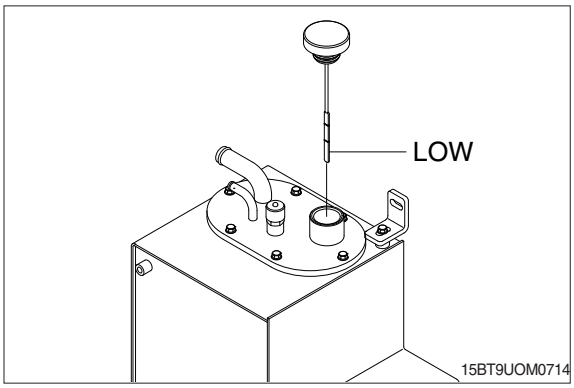
6) WHEELS AND TIRES

Check the condition of the drive and steering wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear and breaks or **chunking out.**

Check all wheel lug nuts or bolts to be sure none of them is loose or missing. Replace missing bolts or lug nuts. Torque loose or replaced items to specifications.



11. CHECKING THE HYDRAULIC FLUID



Check the hydraulic sump tank fluid level.
Correct fluid level is important for proper system operation. Low fluid level can cause pump damage.

Hydraulic fluid expands as its temperature rises. Therefore, it is preferable to check the fluid level at operating temperature (after approximately 30 minutes of truck operation). To check the fluid level, first park the truck on a level surface and confirm the parking brake is applied.

Put the mast upright in a vertical position and lower the fork carriage fully down. Pull the dipstick out(under the sump breather), wipe it with a clean wiper, and reinsert it. Remove dipstick and check oil level. Keep the oil level above the LOW mark on the dipstick by adding recommended hydraulic fluid only, as required. **Do not overfill.**

※ **When checking hydraulic oil, make sure you use a clean wiper and do not let contaminants get on the dipstick or in the sump.**

Check the condition of the hydraulic fluid. (age, color or clarity, contamination)
Change (replace) the oil as necessary.

12. CRITICAL FASTENER CHECKS

Fasteners in highly loaded (critical) components can quickly fail if they become loosened. Also, loose fasteners can cause damage or failure of the component. For safety, it is important that the correct torque be maintained on all critical fasteners of components that directly support, handle or control the load and protect the operator.

Check critical items, including :

- Drive axle mounting
- Drive and steering wheel mounting
- Counterweight mounting
- Load backrest extension
- Overhead guard
- Tilt cylinder mounting & yokes
- Mast mounting & components

Refer to「8. SPECIFICATIONS」for critical tightening torque value.

13. AIR CLEANING THE TRUCK

Always maintain a lift truck in a clean condition. Do not allow dirt, dust, lint or other contaminants to accumulate on the truck. Keep the truck free from leaking oil and grease. Wipe up all oil spills. Keep the controls and floorboards clean, dry and safe. A clean truck makes it easier to see leakage and loose, missing or damaged parts. A clean condition helps prevent fires and helps the truck run cooler.

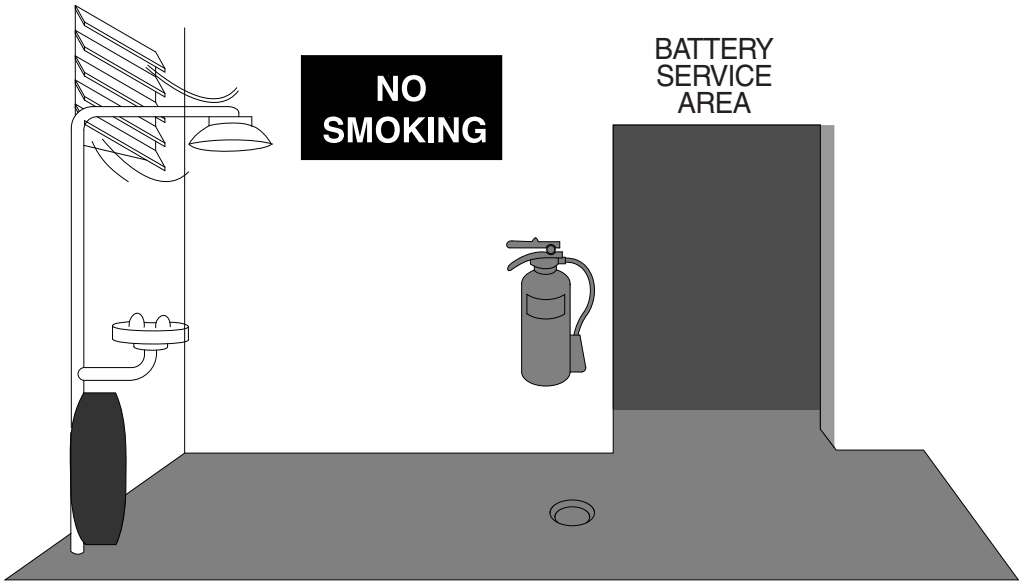
Lift trucks should be air cleaned at every PM interval and more often if needed.

Use an air hose with special adapter or extension having a control valve and a nozzle to direct the air properly. Use clean, dry, low pressure, compressed air. Restrict air pressure to 30 psi (207 kPa), maximum. (OSHA requirement.)

⚠ Wear suitable eye protection and protective clothing.

Air clean : mast assembly, drive axle, battery, cables, switches and wiring harness, drive and hydraulic motors, and steering axle, steering cylinder and linkage.

14. ELECTRIC TRUCK BATTERY MAINTENANCE



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Battery charging installations must be located in areas designated for that purpose. These areas must be kept free of all non-essential combustible materials.

Facilities must be provided for :

- Flushing spilled electrolyte.
- Fire protection.
- Protecting charging apparatus from damage by trucks.
- Adequate ventilation for dispersal of fumes from gassing batteries.

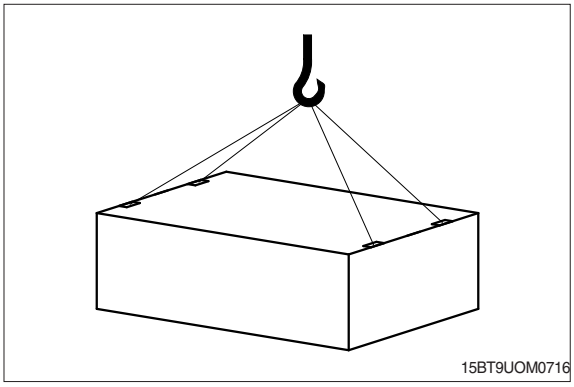
When handling acid concentrates greater than 50 percent acid (above 1,400 specifics gravity), an eye wash fountain must be provided.

A conveyor, overhead hoist or equivalent material handling equipment must be provided for handling batteries.

⚠ Electric truck batteries are heavy and awkward to handle. They are filled with a very hazardous chemical solution. On charge, they give off hydrogen and oxygen which, in certain concentrations, are explosive and they are costly. Before you remove, service or install a truck battery, carefully read the following recommendations and instructions.

15. BATTERY HANDLING

1) Change (remove) or service storage batteries only in an area designated for this purpose.
2) Be sure this area has provisions to flush and neutralize spillage, to ventilate fumes from gassing batteries and for fire protection.
3) This area should be equipped with material-handling tools designed for removing and replacing batteries, including a conveyor or overhead hoist. Use lift hooks that have safety latches.
4) Always use a special lifting device such as an insulated spreader bar to attach the hoist to the battery. The width of the spreader bar hooks must be the same as the lifting eyes of the battery, to prevent damage to the battery. If the spreader bar hooks are movable, carefully adjust the position (width) of the hooks so that the pull is directly upward (vertical) and no side load or force (pressure) is exerted on the battery case. Be sure the lift hooks are the correct size to fit the lifting eyes of the battery.
5) If the battery does not have a cover of its own or has exposed terminals and connectors, cover the top with a non-conductive (insulating) material, e.g., a sheet of plywood or heavy cardboard, prior to attaching the lifting device.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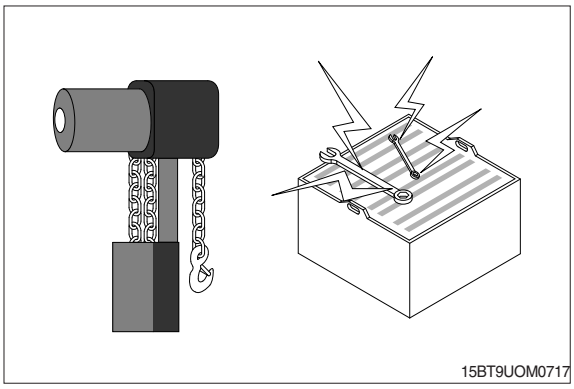
6) Chain hoists or power battery hoists must be equipped with loadchain containers to accumulate the excess lifting chain.
7) Keep all tools and other metallic objects away from the terminals.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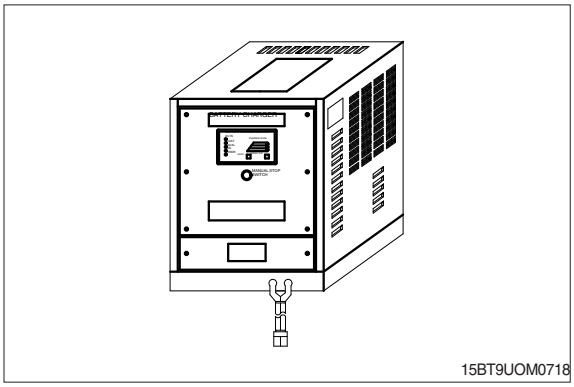
16. BATTERY CHARGING

The charger is of the automatic type so that only requirement for charging is to insert the plug, there being no need for maintaining watch .



1) INSTRUCTION

(1) When inserting the plug and connecting the battery connector, the input power lamp and the battery connection lamp light on and charge is started after a few seconds.
The power is automatically cut off after completion of charge.

(2) Functions

The function of indication lamps and switches.

① **Input power lamp** : Only lighting on during charge. Check the plug and input power if the lamp does not light on.

② **Battery connection lamp** : Lighting on when the charger and the battery are connected. Check the connector if the lamp does not light on.

③ **75% charge lamp** : Lighting on from 75% charge to completion.

④ **Full charge lamp** : Lighting on when charging is completed.

⑤ **Input disconnect lamp** : Lighting on when the input supply line is disconnected. At this time, check the input power.

⑥ **Over voltage lamp** : Lighting on when the manual stop button is pushed or charger voltage is above 66. At this time, unplug and disconnect the battery and charger connectors.

⑦ **Over current lamp** : Lighting on when the current is overload. At this time, unplug, open charger door and push the thermal relay button on the electro-magnetic switch plug again after about 5 minutes and if this lamp lights on again stop charging and call A/S.

⑧ **Ordinary/Equalizing charge convert switch** : Place the switch to left side for ordinary charge and to right side for equalizing charge.

⑨ **Manual stop button** : During charge, push this button to stop charging.

⑩ **Reversion button** : After stop charging artificially or push the manual stop button, use this button to revert to charging.

⑪ **Voltage/current confirming button** : The indicator always show battery voltage and when push this button, the current is displayed in the indicator.

2) INSTALLATION OF THE CHARGER

(1) Place for installation
Install the charger at a place with good ventilation, no excessive temperature, low humidity and little dust.

(2) For the primary of the transformer, use the taps corresponding to the power voltage difference.
For example, 218V (measured value) - 220V (primary).

(3) Confirm the earth line of charging cable wire and make sure the earth line connects the earth of building.

3) ORDINARY CHARGE

(1) The procedure for charging is as follows :
① Remove the key of vehicle.
② Confirm the convert switch at ordinary charge position.
③ Connect the battery connector and the charging connector.
④ Make sure the pilot lamp lights.
(2) The procedure after completion of charging is as follows:
① Ensure that the full charge lamp lights on.
② Disconnect the battery connector from the charge connector.
(3) The procedure for stopping charging halfway is as follows :
① Push the manual stop button.
② Disconnect the battery connector from the charge connector.

4) EQUALIZING CHARGE

(1) Continual repetition of ordinary charge will create a certain amount of performance difference among the cells. For this reason, the battery is slightly overcharged from time to time to equalize the performance among the cells, that is, given equalizing charge.
Equalizing charge should be given in the following cases:
① A battery that is subject to daily repetition of charge and discharge. For the battery, equalizing charge should be performed once a month.
② When discharged over the designated capacity.
③ When recharge had been delayed after discharge.
④ When a short-circuit has occurred.
Equalizing charge is performed in the same way as in ordinary charge. However, place the ordinary/equalizing charge convert switch on the equalizing charge position.

△ **Excessive equalizing charge may shorten the life of the battery.**

5) SUPPLEMENTARY CHARGE

If one day operation cannot be completed with single charge, rest period should be utilized to charge and it is performed in almost the same way as ordinary charge.

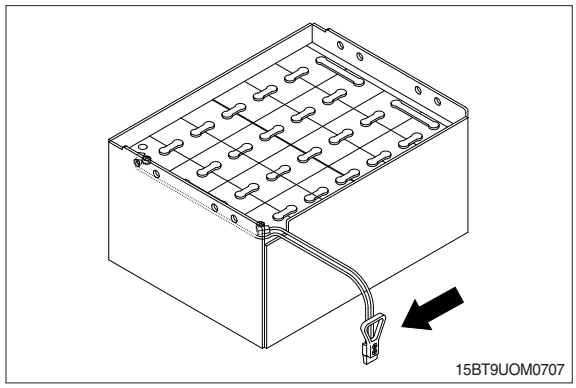
6) NOTICES

① When installing the charger confirm the input voltage and use the tops corresponding to the poser voltage in the area.
② Charge the battery immediately after use and once a month even in storage.
③ Take care not to let the battery specific gravity lower in winter time especially.
④ During charging, if electrolyte temperature of the battery in above 50℃ stop charging.
⑤ During charging, as an inflammable gas is generated out of the battery, particular care should taken for fire and ventilation.

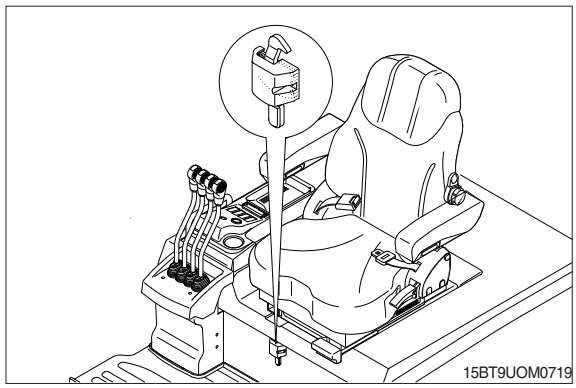
17. BATTERY REMOVAL FROM TRUCK

When the spare battery is used for continuous operation or it is required to check the battery, motor, etc., remove the battery through the following procedure :

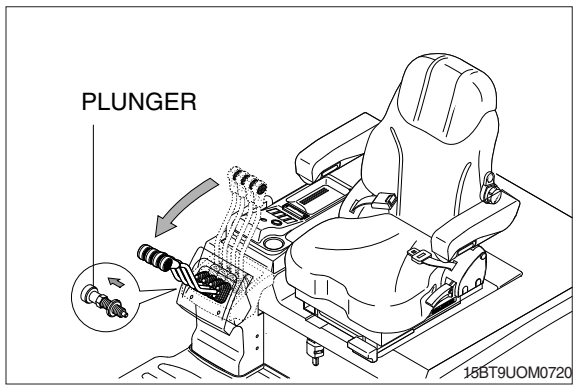
1) Disconnect the battery connector.



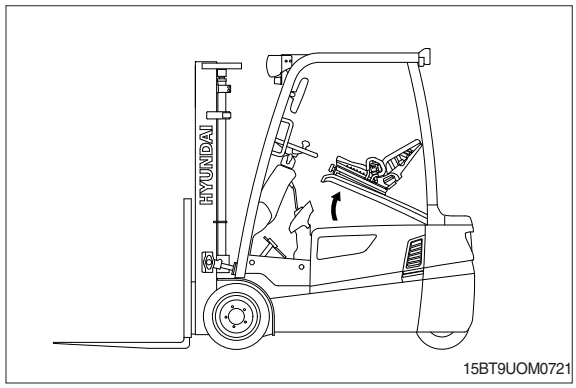
2) Release the battery cover latch.



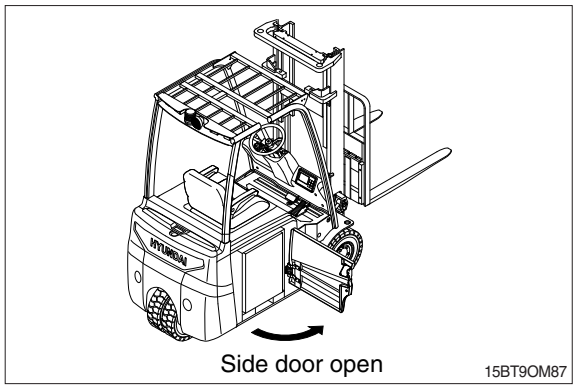
3) Pull the plunger and tilt the levers forward.



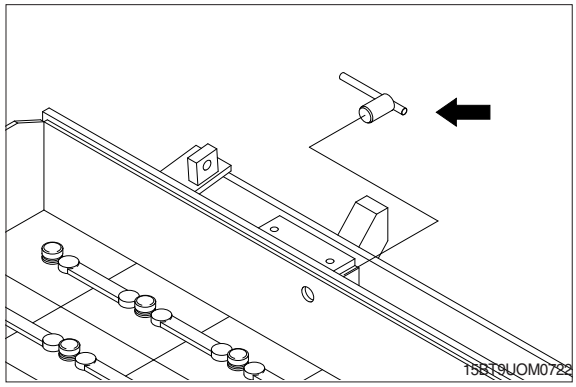
4) Open the battery cover.



4-1) Open the side door. (SBR Type, Option)

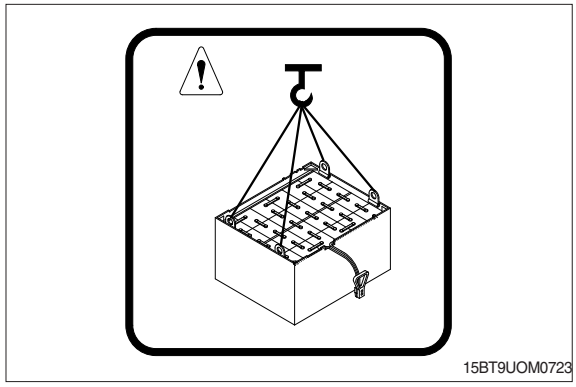


5) Remove the battery stopper.



6) Put down the battery with fork lift or chain block by hang up hook at 4 links which located in right and left of the battery.

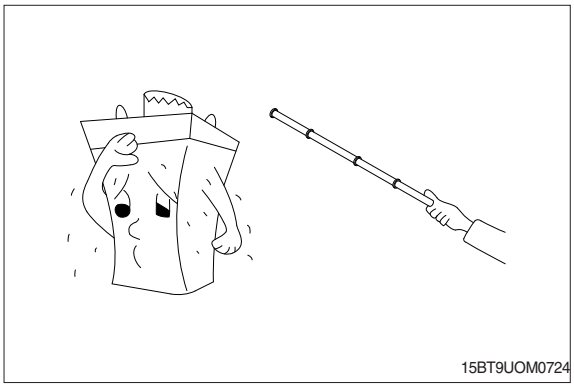
※ **When installing the battery, follow the above steps in reverse order.**



18. BATTERY CLEANING AND CARE

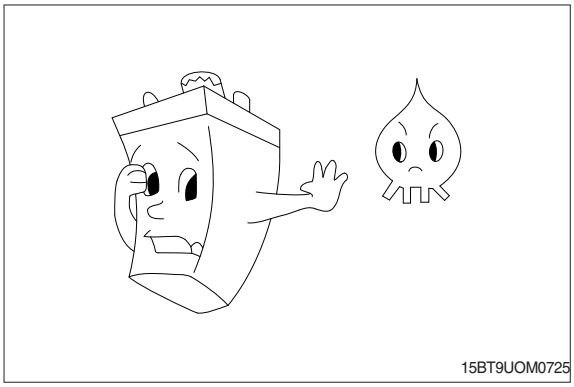
1) AVOID OVER-DISCHARGE

If used until the vehicle can no longer run, battery life will be shortened. If the battery capacity indicator's red lamps turns on at on load lift, stop operation and charge the battery without delay.



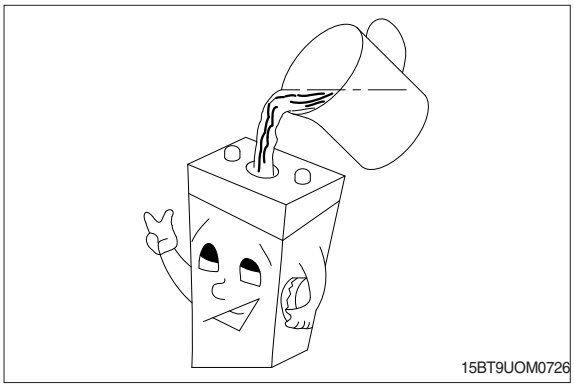
2) INFLAMMABLE

In any case, keep fire away from the battery because it contains an inflammable gas.



3) REFILLING DISTILLED WATER

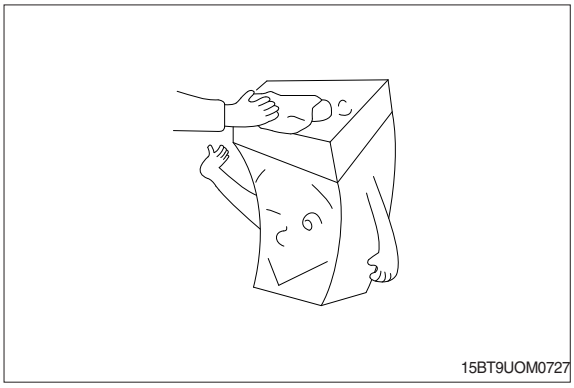
Refill distilled water to maintain the electrolyte level to the specified height after finished equalizing charge, because electrolyte is lost through decomposition during charge and also through natural evaporation. It is unnecessary to refill dilute sulfuric acid into the battery except the case of losing electrolyte by running over.



⚠ Periodically inspect the electrolyte level and replenish it up to normal, if necessary.
In case the electrolyte level is above the normal, it can be overflew and cause the battery and machine damage.

4) KEEP THE BATTERY CLEAN

Keep the battery, in particular the upper surface, clean and dry and keep the filler plugs tightly screwed.



7. PLANNED MAINTENANCE

1. INTRODUCTION

※ **ONLY TRAINED AND AUTHORIZED PERSONNEL should perform Planned Maintenance. Local HYUNDAI dealers are prepared to help customers put in place a Planned Maintenance program for checking and maintaining their lift trucks according to applicable safety regulations.**

2. LIFT TRUCK MAINTENANCE

Regular maintenance and care of your lift truck is not only important for full and efficient truck life also essential for your safety. The importance of maintaining your lift truck in a safe operating condition by servicing it regularly and, when necessary, repairing it promptly cannot be emphasized too strongly. Experience has shown that powered industrial trucks can cause injury if improperly used or maintained. In the interest of promoting safety, several current industry and government safety standards specify that any powered industrial truck not in safe operating condition be removed from service and that all repairs be made by trained and authorized persons.

To assist you in keeping your lift truck in service and in good operating condition, this section outlines maintenance procedures that should be done at regular intervals. This planned approach is considered essential to the life and safe performance of your truck.

It is your responsibility to be alert for any indication that your truck may need service and have it attended to promptly. You play an important part in maintenance. Only you can make sure that your lift truck regularly receives the care it needs.

△ **Powered industrial truck may become hazardous if maintenance is neglected.**

3. PLANNED MAINTENANCE

As outlined in Section 4, **Daily safety inspection** the operator should make a safety inspection of the lift truck before operating it. 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 to the operators daily inspection, HYUNDAI recommends that the owner set up and follow a periodic planned maintenance(PM) and inspection program. Performed on a regular basis **by trained personnel**, the program provides thorough inspections and checks of the safe operating condition of the lift 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 Section 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 capacities, and settings for the truck are found in Section 8.

If you have need for more information on the care and repair of your truck, see your HYUNDAI dealer.

4. PLANNED MAINTENANCE INTERVALS

Time intervals between maintenance are largely determined by operating conditions. For example, operation in sandy, dusty locations requires shorter maintenance intervals than operation in clean ware-houses. The indicated intervals are intended for **normal** operation. The operating condition classifications are:

1) Normal Operation

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

2) Severe Operation

Prolonged operating hours or constant usage.

3) Extreme Operation

(1) In sandy or dusty locations, such as cement plants, lumber mills and coal dust or stone crushing sites.
(2) High-temperature locations, such as steel mills and foundries.
(3) Sudden temperature changes, such as constant trips from buildings into the open air or in refrigeration plants.

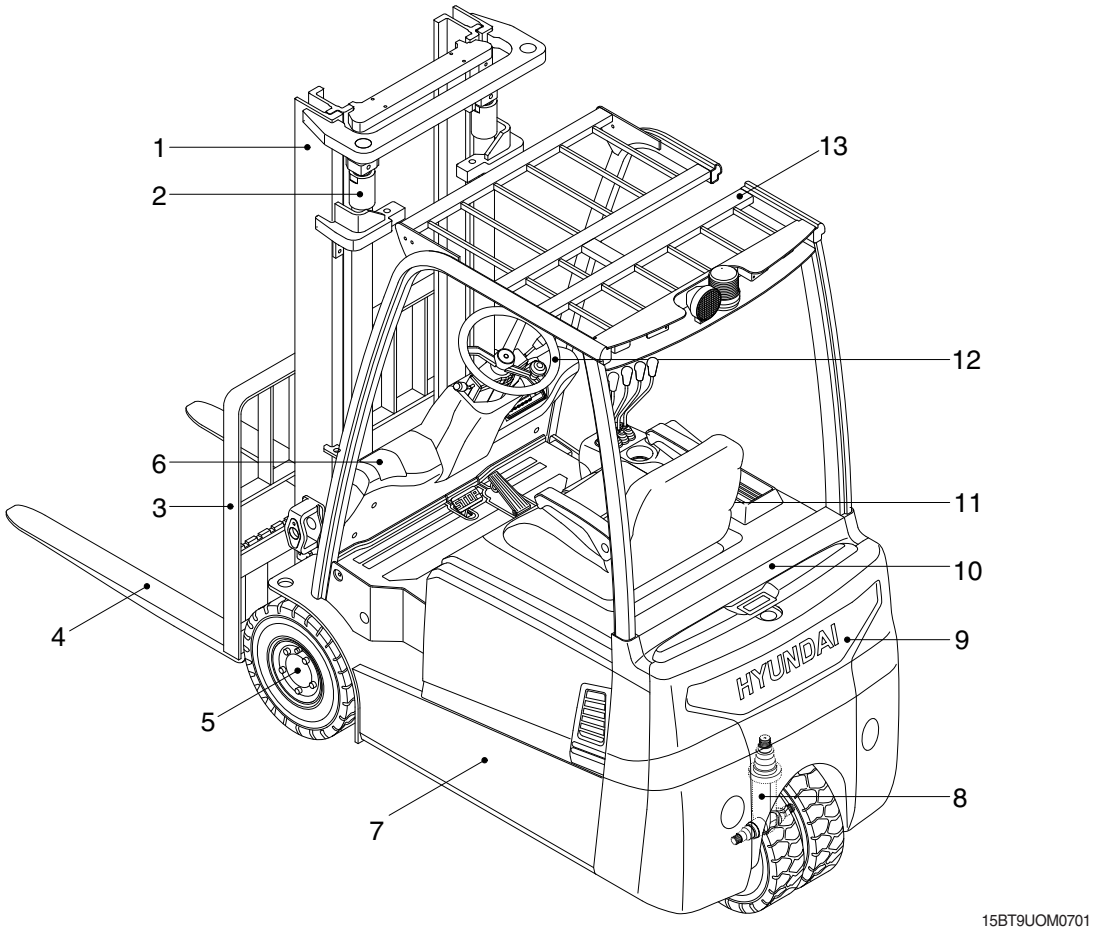
If the lift truck is used in severe or extreme operating conditions, you must shorten the maintenance intervals accordingly.

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

The maintenance time intervals referred to in this manual relate to truck operating hours as recorded on the hourmeter, and are based on experience which HYUNDAI has found to be convenient and suitable under typical(normal or average) operating conditions.

5. MAJOR COMPONENT LOCATIONS

Use the illustration below to locate components included in the PM procedures.



1	Mast	6	Dash board	11	Seat
2	Lift cylinder	7	Frame	12	Steering wheel
3	Carriage and backrest	8	Steering axle	13	Overhead guard
4	Forks	9	Counterweight		
5	Drive unit	10	Battery cover		

6. DAILY MAINTENANCE CHECKS

The PM(Periodic Maintenance) intervals are depend on hour meter records of operation.

PM interval
A : 8~10 hours or daily
B : 50~250 hours or every month (Typical PM interval)
C : 450~500 hours or every 3 months
D : 900~1000 hours or every 6 months
E : 2000 hours or every year

Daily maintenance checks	A	B	C	D	E
Check truck for obvious damages and leaks.	●				
Check clean battery terminals.	●				
Check electrolyte level.	●				
Check capacity, warning plates and decals.	●				
Check condition of tires and wheels. Remove embedded objects.	●				
Check for missing or loose wheel lug nuts.	●				
Check hydraulic sump oil level.	●				
Check display.	●				
Check warning lights and hourmeter.	●				
Check overhead guard condition and bolts.	●				
Check horn operation and other warning devices.	●				
Check steering operation.	●				
Check service brake operation.	●				
Check parking brake operation.	●				
Check directional and speed controls operation.	●				
Check accelerator.	●				
Check lift, tilt and auxiliary operation.	●				
Check mast, lift chains and fasteners.	●				
Check carriage or attachments and forks.	●				
Check seat deck holddown latch for correct locking.	●				
Check optional safety equipment.(Alarms, Lights etc.)	●				

7. PERIODIC MAINTENANCE CHECKS

The PM intervals are depend on hour meter records of operation.

PM interval
A : 8~10 hours or daily
B : 50~250 hours or every month (Typical PM interval)
C : 450~500 hours or every 3 months
D : 900~1000 hours or every 6 months
E : 2000 hours or every year

Periodic checks and planned maintenance (PM)	A	B	C	D	E
Check truck visually and inspect components.		●			
Test drive truck/check functional performance.		●			
Check torque on critical fasteners.		●			
Lubricate truck. (See component)		●			
Clean/Check battery terminals, electrolyte level.		●			
Check battery cables/truck receptacle		●			
Perform battery load test.		●			
Test ground.		●			
Clean drive axle air vent.		●			
Check drive axle fluid level.		●			
Drain and replace drive axle fluid.				●	
Drain and replace drive axle fluid. (initial)		●			
Check drive axle mounting and fasteners.		●			
Check brake condition and wear.		●			
Lubricate steering axle linkage.		●			
Check/lubricate steering axle wheel bearings.					●
Replace hydraulic sump fluid and strainer.					●
Replace hydraulic sump filter.				●	
Replace hydraulic sump breather.				●	
Lubricate tilt cylinder rod ends.		●			
Lubricate mast fittings.		●			
Check lift chain adjustment and wear.		●			
Check/lubricate lift chains.		●			
Lubricate mast rollers.		●			
Check contactor (Replace contactor tips if roughness is remarkable)		●			
Check, retighten, replace (Hydraulic hoses, fittings and clamps)					●

8. SAFE MAINTENANCE PRACTICES

The following instructions have been prepared from current industry and government safety standards applicable to industrial truck operation and maintenance. These recommended procedures specify conditions, methods, and accepted practices that aid in the safe maintenance of industrial trucks. They are listed here for the reference and safety of all workers during maintenance operations. Carefully read and understand these instructions and the specific maintenance procedures before attempting to do any repair work. When in doubt of any maintenance procedure, please contact your local HYUNDAI dealer.

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

2) Maintenance and inspection of all powered industrial 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 industrial 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 and keep shop clean and floors dry.

7) Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check for fluid or electrolyte levels.

8) Before starting work on truck:

(1) Raise drive wheels free of floor and use wooden blocks or other positive truck positioning devices.

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

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

(4) Disconnect the battery connector before working on the electrical system.

※ **Refer to the 1-15 "Jacking and Blocking" section for proper procedures.**

9) Operation of the truck to check performance must be conducted in an authorized, safe, clear area.

10) Before starting to operate the truck :

(1) Be seated in a safe operating position.

(2) Make sure parking brake is applied.

(3) Put the directional control lever in NEUTRAL.

(4) 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) Stop the truck.
(2) Fully lower the load-engaging means : mast, carriage, forks or attachments. Tilt mast forward.
(3) Put the directional control lever in NEUTRAL.
(4) Confirm the parking brake is applied.
(5) Turn the key switch to the OFF position.
(6) Put blocks at the wheels if the truck must be left on an incline.

12) Brakes, steering mechanisms, control mechanisms, warning devices, lights, lift overload devices, lift and tilt mechanisms, articulating axle stops, load backrest, overhead guard and frame members must be carefully and regularly inspected and maintained in a safe operating condition.

13) Special trucks or devices designed and approved for hazardous area operation must receive special attention to insure that maintenance preserves the original approved safe operating features.

14) All hydraulic systems must be regularly inspected and maintained in conformance with good practice. Tilt and lift cylinders, valves and other parts must be checked to assure that drift or leakage has not developed to the extent that it would create a hazard.

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

⚠ Always put blocks under the carriage and mast rails when it is necessary to work with the mast in an elevated position.

16) The truck manufacturer's capacity, operation, and maintenance instruction plates, tags, or decals must be maintained in legible condition.

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) Industrial trucks must be kept in a clean condition to minimize fire hazards and help in detection of loose or defective parts.

20) Modifications and additions that affect capacity and safe truck operation must not be done without the manufacturer's prior written approval. This is an OSHA requirement. Capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly.

21) Care must be taken to assure that all replacement parts, including tires, are interchangeable with the original parts and of a quality at least equal to that provided in the original equipment. Parts, including tires are to be installed per the manufacturer's procedures. Always use genuine HYUNDAI or HYUNDAI-approved parts.

22) When removing tires follow industry safety practices. Most importantly, deflate pneumatic tires completely prior to removal. Following assembly of tires on multi-piece rims, use a safety cage or restraining device while inflating.

23) Use special care when removing heavy components, such as counterweight, mast, etc.
Be sure that lifting and handling equipment is of the correct capacity and in good condition.

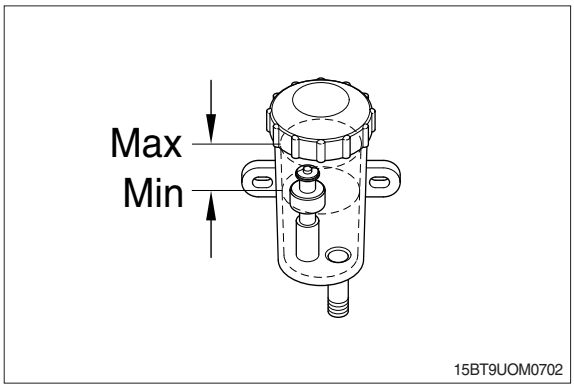
1) SUPPLYING BRAKE FLUID

A hydraulically operated brake is employed. Check the level of brake fluid in the reservoir tank. When the level is low, refill.

(1) Do not mix with different kinds of brake fluid.

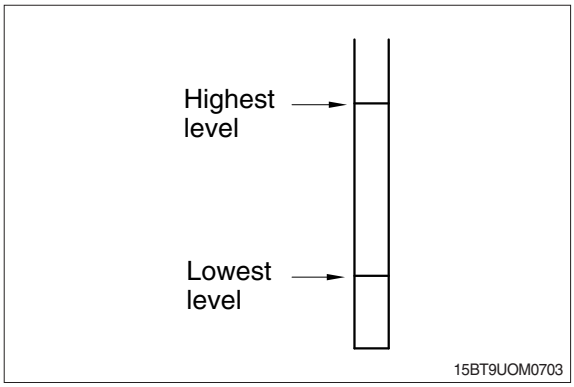
(2) Be careful not to allow external dust to enter through the reservoir cap vent hole and clog it.

(3) Brake fluid change needs a special technique. When the change is necessary, go to the service station and ask for the change.



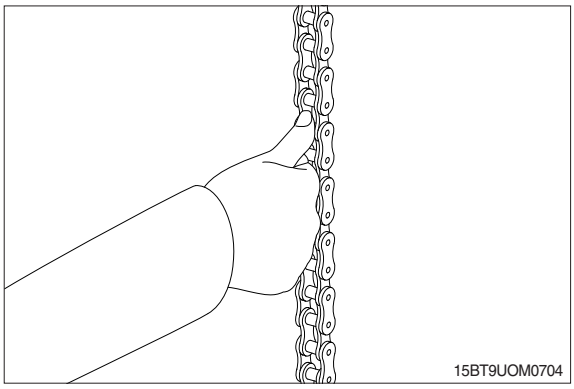
2) SUPPLYING HYDRAULIC OIL

Lower the fork in its lowest position on an even ground. Check for the hydraulic oil level with the oil level gauge. When the level is low, refill.



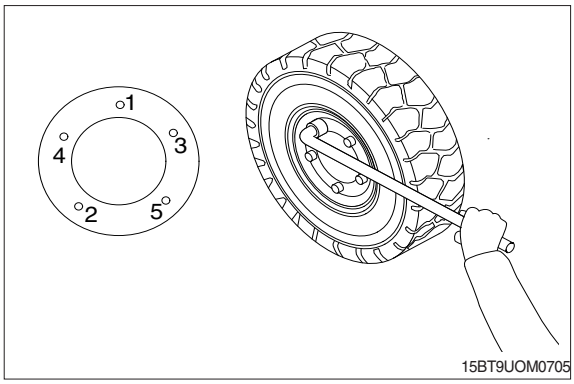
3) CHECKING AND ADJUSTMENT OF LIFT CHAIN TENSION

Set the fork in its horizontal position on an even ground. Raise it up to 20~30 ㎝ from the ground and push the chain with both hands. If the tension is too high or too low on one side, adjust it with the chain anchor bolt.



4) CHECKING OF HUB NUT TIGHTENING CONDITION

Make sure that the hub nut is firmly tightened. T ightening and checking should be made in a diagonal order to prevent unbalanced tightening. (See the figure.)



5) GREASING UP

Clean the following fittings with brushes or waste and apply grease to them.

△ **Be careful not to supply too much grease.**

Model	Fittings	Greasing points
15/18/20BT-9U	Mast pin mounting	2 spots
	Mast roller bearing	4 spots (V, VF), 8 spots (TF, TS)

6) GREASING OF EACH PARTS

Clean the following parts before greasing.

(1) Lift chain : Clean the chain with a brush greased with SAE 20~30 (Brush over the gear oil low viscosity).

(2) Rolling part of mast guide rail roller : Brush over grease.

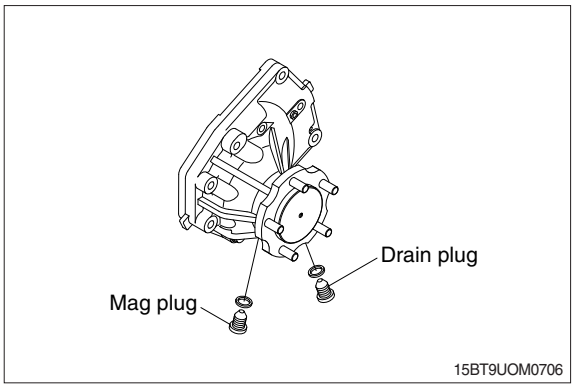
(3) Slide guide and slide rail : Brush over leaked oil.

(4) Sliding parts of inner mast and outer mast : Brush over leaked oil.

(5) Sliding parts of fork and finger bar : Brush over grease.

7) CHECK FOR THE OIL LEVEL OF THE DRIVING GEAR CASE

Check for the oil level by taking out the plug provided front side of the gear case.

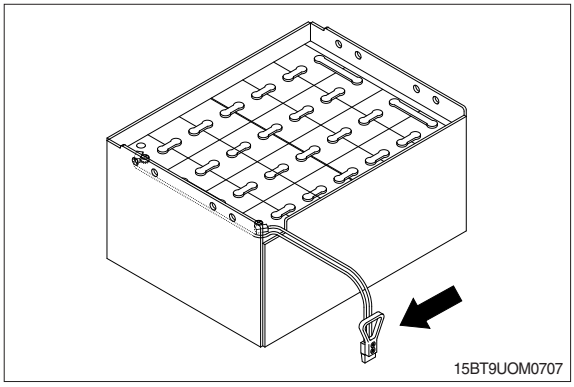


8) EXTERNAL APPEARANCE CHECK OF THE VEHICLE

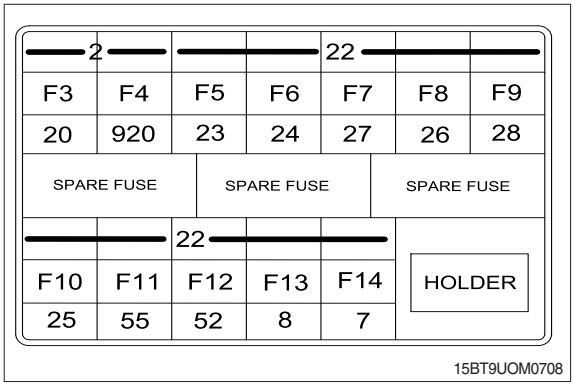
Check for the external appearance of vehicles. If any defect is found immediately contact the service station.

9) FUSE REPLACEMENT

(1) Disconnect the battery connector.



(2) Remove the blown fuse and replace with a new one.



※ The blown fuse must be replaced with a fuse of the same capacity. When the fuses are blown out often, contact the service station for inspection. Never use a conductor as a fuse.

10) 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 complaints of unacceptable chain performance are a result of poor maintenance. Chains need periodic maintenance to give maximum service life.

⚠ Do not attempt to repair a worn chain. Replace worn or damaged chains with a set (LH & RH). Do not piece chains together.

11) LIFT CHAIN INSPECTION AND MEASUREMENT

Inspect and lubricate the lift chains every PM(50~250 hours). When operating in corrosive environments, inspect the chains every 50hours. During the inspection, check for the following conditions :

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

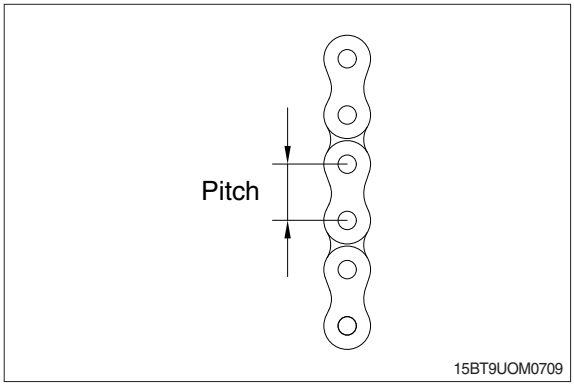
(2) When the pins or holes become worn, the chain becomes longer. When a section of chain is 3% longer than a section of new chain, the chain is worn and must be discarded.

(3) Chain wear can be measured by using a chain scale or a steel tape measure. When checking chain wear, 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.

12) LIFT CHAIN LUBRICATION

Lift chain lubrication is an important part of your maintenance program. The lift chains operate under heavy loadings and function more safely and have longer lift if they are regularly and correctly lubricated. HYUNDAI 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.

13) LIFT CHAIN WEAR AND REPLACEMENT CRITERIA



All chains must be replaced if any link has wear of 3% or more, or if any of the damaged conditions noted above are found during inspection. Order replacement chains from your HYUNDAI dealer.
Replace all chains as a set. 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. Lubricate chains when they are installed on the mast.

※ Please refer to your Service Manual for additional information on lift chain measurement and maintenance.

10. VISUAL INSPECTION

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

· Walk around the truck and take note of any obvious damage and maintenance problems. Check for loose fasteners and fittings.

· Check to be sure all capacity, safety, and warning plates or decals are attached and legible.

※ NAMEPLATES AND DECALS : Do not operate a lift truck with damaged or lost decals and nameplates. Replace them immediately. They contain important information.

· Inspect the truck for any sign of external leakage : drive axle fluid etc.

· Check for hydraulic oil leaks and loose fittings.

⚠ HYDRAULIC FLUID PRESSURE: Do not use your hands to check for hydraulic leakage. Fluid under pressure can penetrate your skin and cause serious injury.

· Be sure that the driver's overhead guard, load backrest extension and safety devices are in place, undamaged and attached securely.

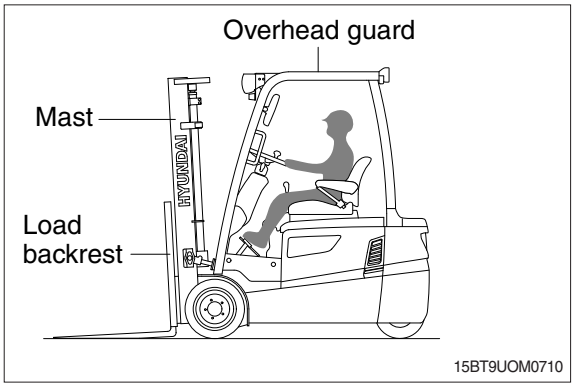
Then check all of the critical components that handle or carry the load.

1) OVERHEAD GUARD

Check the O.H.G for damage. Be sure that it is properly positioned, all mounting fasteners are in place and tight.

2) LOAD BACKREST

Check the load backrest for damage.
Inspect the welds on the carriage and load backrest for cracks.
Be sure that the mounting fasteners are all in place and tight.



3) MAST ASSEMBLY

Inspect the mast assembly : Rails, carriage rollers, lift chains, lift cylinders and tilt cylinders. Look for obvious wear and maintenance problems and damaged or missing parts. Check for any loose parts or fittings. Check for leakage, any damaged or loose rollers and rail wear (metal flaking).
Inspect all lift line hydraulic connections for leakage.

4) LIFT CHAIN

Carefully check the lift chains for wear, rust, corrosion, cracked or broken links, stretching, etc. Check that the lift and carriage chains are adjusted to have equal tension. Check that the lift chain anchor fasteners and locking means are in place and tight.

△ Masts and lift chains require special attention to maintain them in safe operating condition.

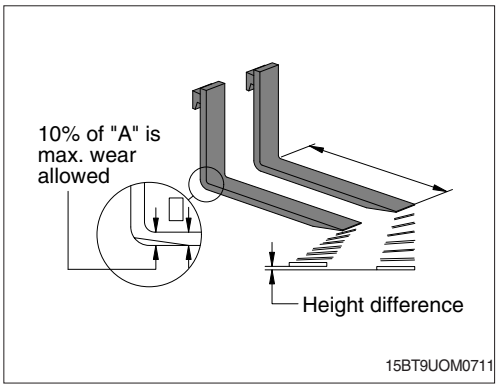
· Mast can drop suddenly. Look at the mast, but keep hands out.

· Lift chain repairs and adjustments should be made by trained service personnel.

5) FORKS

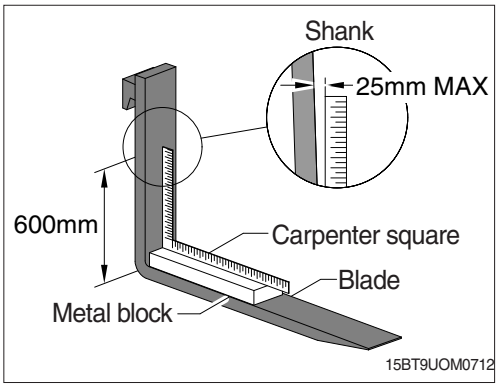
Inspect the load forks for cracks, breaks, bending, and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips refer to below table.

Model	Fork length (mm)	Height difference (mm)
15/18/20BT-9U	equal or below 1500	3
	above 1500	4



⚠ If the fork blade at the heel is worn down by more than 10%, the load capacity is reduced and the fork must be replaced.

Inspect the forks for twists and bends.
Put a 50 mm (2 in) thick metal block, at least 100 mm (4 in) wide by 600 mm (24 in) long with parallel sides, on the blade of the fork with the 100 mm(4 in) surface against the blade. Put a 600 mm (24 in) carpenter's square on the top of the block and against the shank. Check the fork 500 mm (20 in) above the blade to make sure it is not bent more than 25 mm (1 in) maximum.



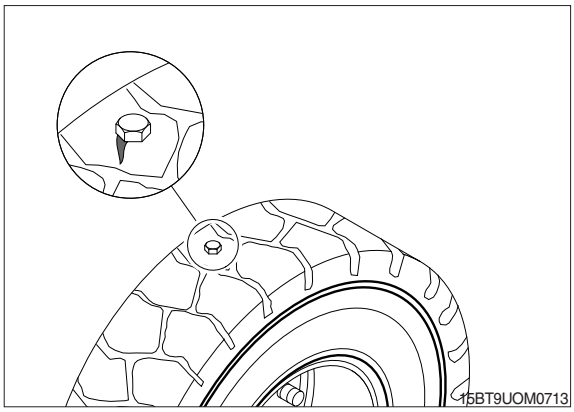
※ If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person before operating the truck.

Inspect the fork locking pins for cracks or damage. Reinsert them and note whether they fit properly.

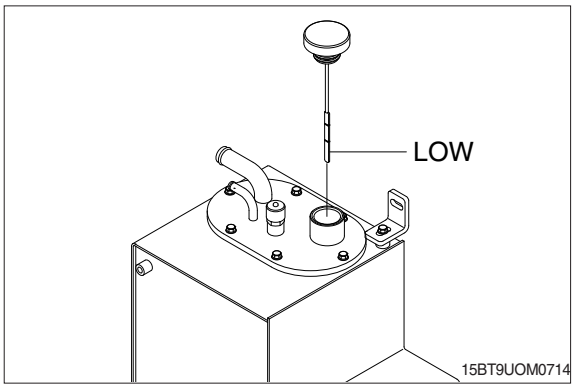
6) WHEELS AND TIRES

Check the condition of the drive and steering wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear and breaks or **chunking out.**

Check all wheel lug nuts or bolts to be sure none of them is loose or missing. Replace missing bolts or lug nuts. Torque loose or replaced items to specifications.



11. CHECKING THE HYDRAULIC FLUID



Check the hydraulic sump tank fluid level.
Correct fluid level is important for proper system operation. Low fluid level can cause pump damage.

Hydraulic fluid expands as its temperature rises. Therefore, it is preferable to check the fluid level at operating temperature (after approximately 30 minutes of truck operation). To check the fluid level, first park the truck on a level surface and confirm the parking brake is applied.

Put the mast upright in a vertical position and lower the fork carriage fully down. Pull the dipstick out(under the sump breather), wipe it with a clean wiper, and reinsert it. Remove dipstick and check oil level. Keep the oil level above the LOW mark on the dipstick by adding recommended hydraulic fluid only, as required. **Do not overfill.**

※ **When checking hydraulic oil, make sure you use a clean wiper and do not let contaminants get on the dipstick or in the sump.**

Check the condition of the hydraulic fluid. (age, color or clarity, contamination)
Change (replace) the oil as necessary.

12. CRITICAL FASTENER CHECKS

Fasteners in highly loaded (critical) components can quickly fail if they become loosened. Also, loose fasteners can cause damage or failure of the component. For safety, it is important that the correct torque be maintained on all critical fasteners of components that directly support, handle or control the load and protect the operator.

Check critical items, including :

- Drive axle mounting
- Drive and steering wheel mounting
- Counterweight mounting
- Load backrest extension
- Overhead guard
- Tilt cylinder mounting & yokes
- Mast mounting & components

Refer to「8. SPECIFICATIONS」for critical tightening torque value.

13. AIR CLEANING THE TRUCK

Always maintain a lift truck in a clean condition. Do not allow dirt, dust, lint or other contaminants to accumulate on the truck. Keep the truck free from leaking oil and grease. Wipe up all oil spills. Keep the controls and floorboards clean, dry and safe. A clean truck makes it easier to see leakage and loose, missing or damaged parts. A clean condition helps prevent fires and helps the truck run cooler.

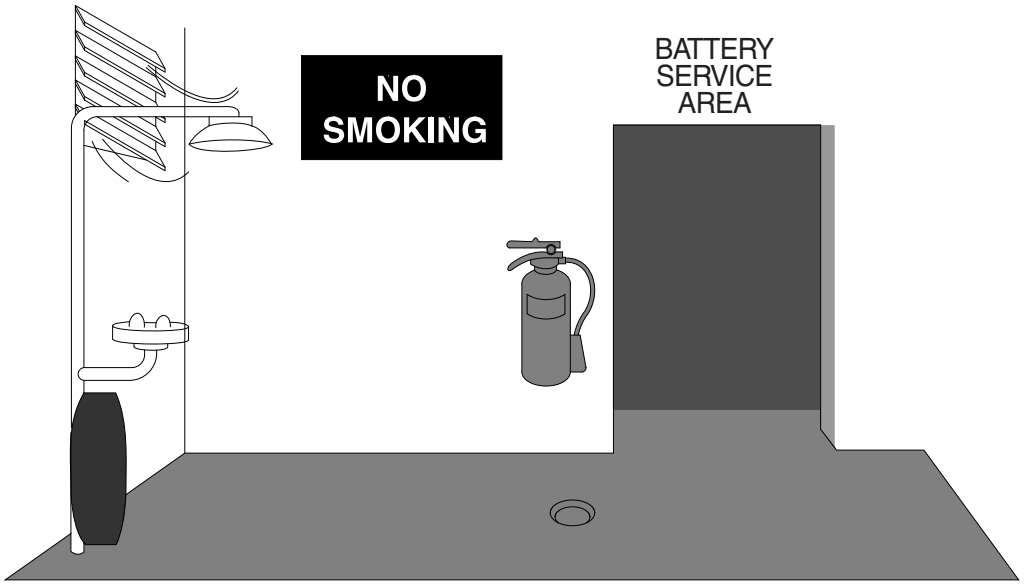
Lift trucks should be air cleaned at every PM interval and more often if needed.

Use an air hose with special adapter or extension having a control valve and a nozzle to direct the air properly. Use clean, dry, low pressure, compressed air. Restrict air pressure to 30 psi (207 kPa), maximum. (OSHA requirement.)

⚠ Wear suitable eye protection and protective clothing.

Air clean : mast assembly, drive axle, battery, cables, switches and wiring harness, drive and hydraulic motors, and steering axle, steering cylinder and linkage.

14. ELECTRIC TRUCK BATTERY MAINTENANCE



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Battery charging installations must be located in areas designated for that purpose. These areas must be kept free of all non-essential combustible materials.

Facilities must be provided for :

- Flushing spilled electrolyte.
- Fire protection.
- Protecting charging apparatus from damage by trucks.
- Adequate ventilation for dispersal of fumes from gassing batteries.

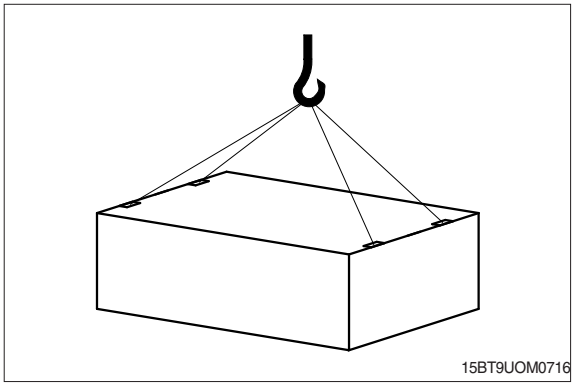
When handling acid concentrates greater than 50 percent acid (above 1,400 specifics gravity), an eye wash fountain must be provided.

A conveyor, overhead hoist or equivalent material handling equipment must be provided for handling batteries.

⚠ Electric truck batteries are heavy and awkward to handle. They are filled with a very hazardous chemical solution. On charge, they give off hydrogen and oxygen which, in certain concentrations, are explosive and they are costly. Before you remove, service or install a truck battery, carefully read the following recommendations and instructions.

15. BATTERY HANDLING

1) Change (remove) or service storage batteries only in an area designated for this purpose.
2) Be sure this area has provisions to flush and neutralize spillage, to ventilate fumes from gassing batteries and for fire protection.
3) This area should be equipped with material-handling tools designed for removing and replacing batteries, including a conveyor or overhead hoist. Use lift hooks that have safety latches.
4) Always use a special lifting device such as an insulated spreader bar to attach the hoist to the battery. The width of the spreader bar hooks must be the same as the lifting eyes of the battery, to prevent damage to the battery. If the spreader bar hooks are movable, carefully adjust the position (width) of the hooks so that the pull is directly upward (vertical) and no side load or force (pressure) is exerted on the battery case. Be sure the lift hooks are the correct size to fit the lifting eyes of the battery.
5) If the battery does not have a cover of its own or has exposed terminals and connectors, cover the top with a non-conductive (insulating) material, e.g., a sheet of plywood or heavy cardboard, prior to attaching the lifting device.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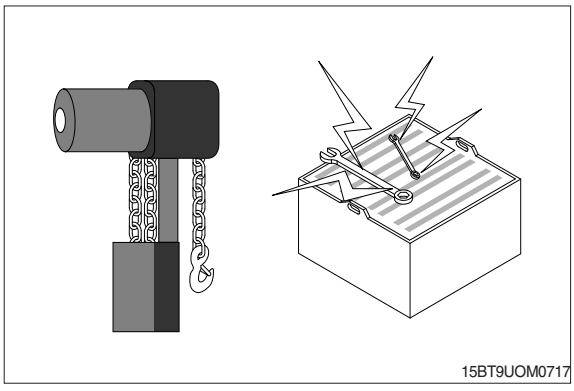
6) Chain hoists or power battery hoists must be equipped with loadchain containers to accumulate the excess lifting chain.
7) Keep all tools and other metallic objects away from the terminals.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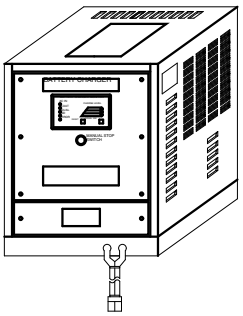
16. BATTERY CHARGING

The charger is of the automatic type so that only requirement for charging is to insert the plug, there being no need for maintaining watch .



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1) INSTRUCTION

(1) When inserting the plug and connecting the battery connector, the input power lamp and the battery connection lamp light on and charge is started after a few seconds.
The power is automatically cut off after completion of charge.

(2) Functions

The function of indication lamps and switches.

① **Input power lamp** : Only lighting on during charge. Check the plug and input power if the lamp does not light on.

② **Battery connection lamp** : Lighting on when the charger and the battery are connected. Check the connector if the lamp does not light on.

③ **75% charge lamp** : Lighting on from 75% charge to completion.

④ **Full charge lamp** : Lighting on when charging is completed.

⑤ **Input disconnect lamp** : Lighting on when the input supply line is disconnected. At this time, check the input power.

⑥ **Over voltage lamp** : Lighting on when the manual stop button is pushed or charger voltage is above 66. At this time, unplug and disconnect the battery and charger connectors.

⑦ **Over current lamp** : Lighting on when the current is overload. At this time, unplug, open charger door and push the thermal relay button on the electro-magnetic switch plug again after about 5 minutes and if this lamp lights on again stop charging and call A/S.

⑧ **Ordinary/Equalizing charge convert switch** : Place the switch to left side for ordinary charge and to right side for equalizing charge.

⑨ **Manual stop button** : During charge, push this button to stop charging.

⑩ **Reversion button** : After stop charging artificially or push the manual stop button, use this button to revert to charging.

⑪ **Voltage/current confirming button** : The indicator always show battery voltage and when push this button, the current is displayed in the indicator.

2) INSTALLATION OF THE CHARGER

(1) Place for installation
Install the charger at a place with good ventilation, no excessive temperature, low humidity and little dust.

(2) For the primary of the transformer, use the taps corresponding to the power voltage difference.
For example, 218V (measured value) - 220V (primary).

(3) Confirm the earth line of charging cable wire and make sure the earth line connects the earth of building.

3) ORDINARY CHARGE

(1) The procedure for charging is as follows :
① Remove the key of vehicle.
② Confirm the convert switch at ordinary charge position.
③ Connect the battery connector and the charging connector.
④ Make sure the pilot lamp lights.
(2) The procedure after completion of charging is as follows:
① Ensure that the full charge lamp lights on.
② Disconnect the battery connector from the charge connector.
(3) The procedure for stopping charging halfway is as follows :
① Push the manual stop button.
② Disconnect the battery connector from the charge connector.

4) EQUALIZING CHARGE

(1) Continual repetition of ordinary charge will create a certain amount of performance difference among the cells. For this reason, the battery is slightly overcharged from time to time to equalize the performance among the cells, that is, given equalizing charge.
Equalizing charge should be given in the following cases:
① A battery that is subject to daily repetition of charge and discharge. For the battery, equalizing charge should be performed once a month.
② When discharged over the designated capacity.
③ When recharge had been delayed after discharge.
④ When a short-circuit has occurred.
Equalizing charge is performed in the same way as in ordinary charge. However, place the ordinary/equalizing charge convert switch on the equalizing charge position.

△ **Excessive equalizing charge may shorten the life of the battery.**

5) SUPPLEMENTARY CHARGE

If one day operation cannot be completed with single charge, rest period should be utilized to charge and it is performed in almost the same way as ordinary charge.

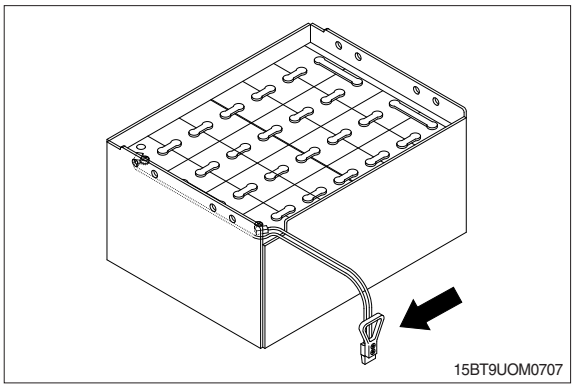
6) NOTICES

① When installing the charger confirm the input voltage and use the tops corresponding to the poser voltage in the area.
② Charge the battery immediately after use and once a month even in storage.
③ Take care not to let the battery specific gravity lower in winter time especially.
④ During charging, if electrolyte temperature of the battery in above 50℃ stop charging.
⑤ During charging, as an inflammable gas is generated out of the battery, particular care should taken for fire and ventilation.

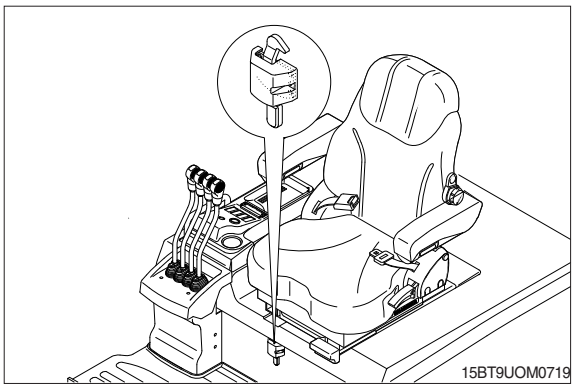
17. BATTERY REMOVAL FROM TRUCK

When the spare battery is used for continuous operation or it is required to check the battery, motor, etc., remove the battery through the following procedure :

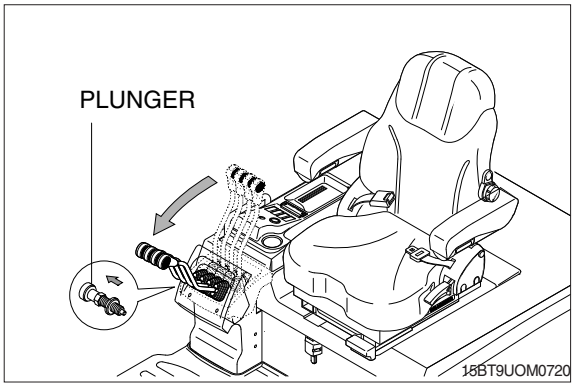
1) Disconnect the battery connector.



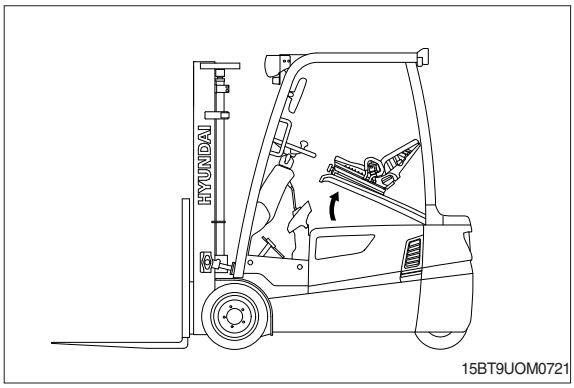
2) Release the battery cover latch.



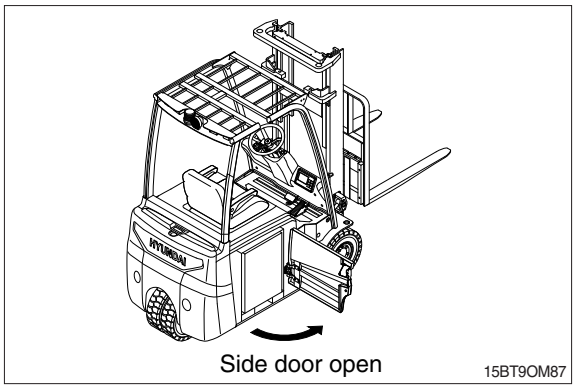
3) Pull the plunger and tilt the levers forward.



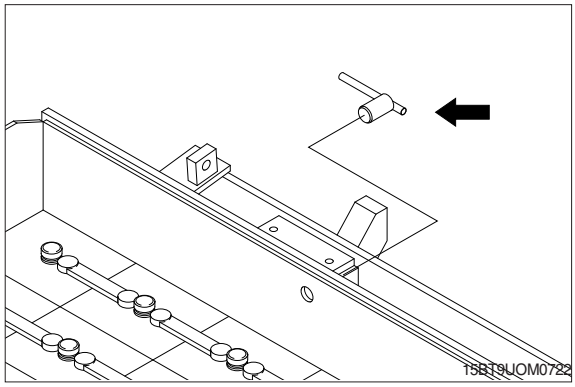
4) Open the battery cover.



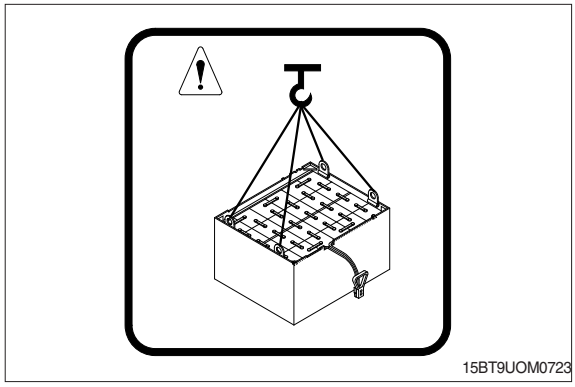
4-1) Open the side door. (SBR Type, Option)



5) Remove the battery stopper.



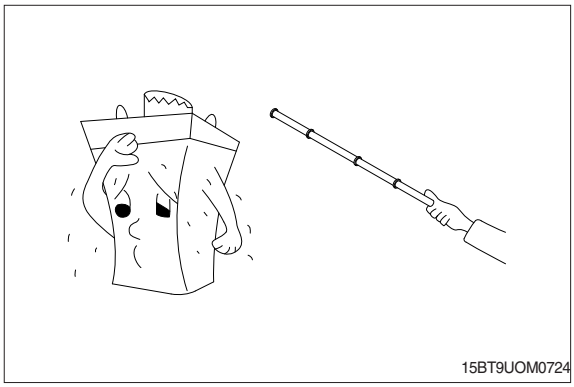
6) Put down the battery with fork lift or chain block by hang up hook at 4 links which located in right and left of the battery.



18. BATTERY CLEANING AND CARE

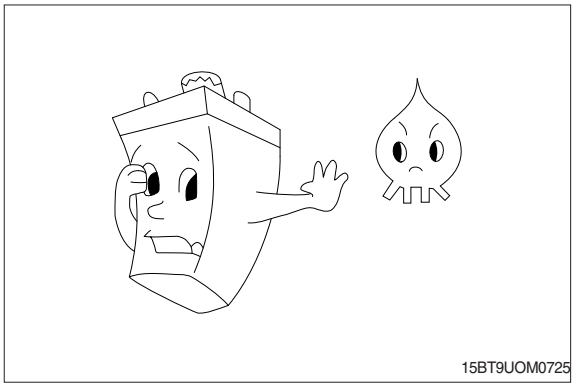
1) AVOID OVER-DISCHARGE

If used until the vehicle can no longer run, battery life will be shortened. If the battery capacity indicator's red lamps turns on at on load lift, stop operation and charge the battery without delay.



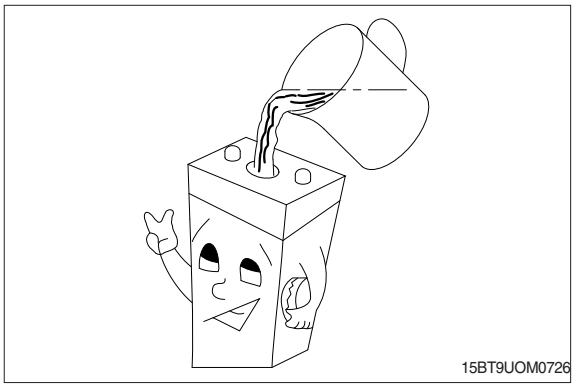
2) INFLAMMABLE

In any case, keep fire away from the battery because it contains an inflammable gas.



3) REFILLING DISTILLED WATER

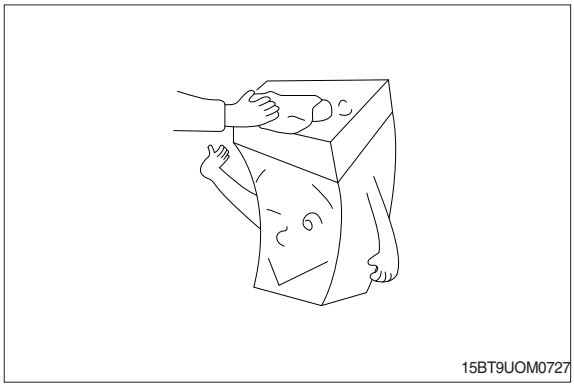
Refill distilled water to maintain the electrolyte level to the specified height after finished equalizing charge, because electrolyte is lost through decomposition during charge and also through natural evaporation. It is unnecessary to refill dilute sulfuric acid into the battery except the case of losing electrolyte by running over.



⚠ Periodically inspect the electrolyte level and replenish it up to normal, if necessary.
In case the electrolyte level is above the normal, it can be overflew and cause the battery and machine damage.

4) KEEP THE BATTERY CLEAN

Keep the battery, in particular the upper surface, clean and dry and keep the filler plugs tightly screwed.



19. LITHIUM ION BATTERY (OPTION)

1) Characteristics and Information

(1) This Lithium-Ion battery is a designed for the power supply of electric forklifts.

(2) It can be used on the charger or forklift when the battery pack is active.

(3) For recharging batteries, proper management may have a long useful life, but not in use for long periods of time may reduce capacity.

(4) Do not expose the battery to extremely high or low temperatures above 55°C and below -25°C. Use within -25 ~ 55°C to maintain maximum capacity.

(5) When the battery is used at low temperatures, the battery capacity is reduced.

(6) Battery charger is used at temperatures between 0 and 45°C.

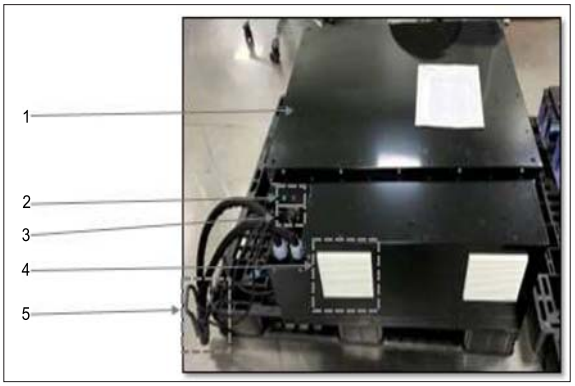
(7) Battery Management System(BMS) within the battery pack maintains a constant voltage difference between cell voltages and safely controls current and voltage.

(8) If the temperature rises above 60°C, the charging/discharge function will automatically stop.

(9) When Battery pack voltage falls below 37.8v, the protection function is activated and automatically shuts down the discharge.

※ The explanation of lithium batteries described in this manual, read carefully and understand . Refer to this manual at all times properly.

※ If you have any questions or technical problems, contact HYUNDAI dealer.

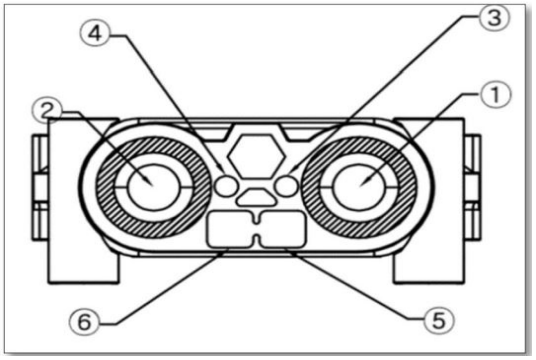


① Battery pack ② Status indicator
③ Monitoring connector ④ Cooling fan
⑤ Battery pack connector

COLOR	FUNCTION	OFF	FLICKERING	ON
GREEN	CHARGING/ DISCHARGING STATUS	STANDBY	CHARGING	DISCHARGING
RED	BATTERY STATUS	NORMAL	CAUTION	PROTECTION MODE

* Meaning of status indicator *

PIN No	Pin Name
1	Battery +
2	Battery -
3	CAN H
4	CAN L
5	Wake-Up
6	Wake-Up



* Structure & function
of battery pack connector*

2) Lithium Ion Battery Safety Matters

※ Proper handling and inspection are required for safe use of lithium-ion batteries.

※ Follow the instrustions to avoid accident. The explanations are in threee steps as below.

◈ Danger, ◆ Warning, ◇ Caution. Read the contents carefully and check the risk factors to prevent safety accidents.

⑴ Electric shock caused by contact with conducting agent (◈ Danger - Electric shock)

① The lithium battery pack has high voltage, so if the body contacts the conducting agent during installation, repair, and inspection, it will be electrocuted.

② Maintenance and inspection shall be carried out by qualified professional personnel.

③ Wear protective gear such as rubber gloves and rubber boots for inspection and use insulated tools.

⑵ Damage caused by organic solvent electrolyte (◈ Danger - electrolyte)

① Damages or incorrect use of the battery pack may result in excessive pressure in the internal cells.

② Each cell in the battery pack has a Vent that can't be reset. When the increases pressure of the battery cell, it is dangerous as the Vent may release flammable electrolytes.

③ Avoid smoking and stay away from sources of ignition, such as sparks.

④ Do not incinerate the battery pack. Do not drill or shock.

⑤ Do not solder or weld the battery pack..

⑶ Safe handling of lithium battery packs (◈ Danger - Explosion, Electric shock)

① Do not throw the cell into fire. Do not heat the cell. It causes leakage, fever and rupture.

② If the battery smells strange, temperature is high, connection with the wire is damaged, terminals of the part are corroded, plug is deformed and finds trace of heating, Do not use it as it is due to may cause ignition, heat and flammable explosions. Ask your dealer or specialist for diagnosis.

③ Do not attach contaminants and foreign substances to the surface and connections of the battery. It may cause explosions and fires.

④ Clean contaminants and foreign substances with a wet cloth and keep them dry.

⑤ Be careful not to touch the battery by children.

⑥ The battery packs that has been in use for a long time are exchanged with new battery packs according to inspection result. If the exchange is delayed, internal aging can cause the explosion.

⑦ Do not arbitrarily disassemble or repair battery packs. It causes fever and ignition.

⑧ Do not overcharge or discharge when charging.

⑨ Do not allow lithium battery pack temperature to exceed 55℃ .

⑩ Keep the lithium battery pack surface clean and dry always.

⑷ Precautions prior to commencement of use (◆ Warning - Unpackage, Check / ◇ Caution - Installation, Connection)

① Check that the battery is free from leakage, heat, etc. when receiving. This will result in corrosion, fire and short circuit.

② Check the plug, cable for damage. This causes the fire.

③ Ensure that the actual battery type matches the specified battery in the forklift.
If the unsuitable battery is used, it can cause poor performance or damage to the truck during operation.

④ The battery pack is shipped with a charge of 30% to 50%, so charge it fully before use.

⑤ Do not install or connect except for professional technicians who have been sufficiently trained in handling methods and risks.

⑥ Please contact your dealer for battery module replacement. Incorrect replacement operation may cause battery damage.

⑦ Do not reverse or drop the battery pack.

(5) **Maintenance (◆ Warning - Discharge, Charge)**

① Do not use the battery current that exceeds twice the rated capacity.
The battery Internal damage caused by abnormal use may cause an explosion.

② Charge the battery pack with a charger dedicated to the lithium-ion battery. If use different type charger will not charge enough, Battery may leak, short circuit.

③ Make sure that the lithium battery pack temperature is not above 55℃ during charging. A rise in temperature causes fire and explosion. Take extra care when charging during the summer and under the direct sunlight.

④ Do not change the maximum voltage of the charger without consulting the battery manufacturer. An excessive high input voltage will overcharge the battery, increasing the temperature and shortening battery life.

⑤ Don't charge in areas with poor ventilation, high temperature and high humidity, rainy areas, and corrosive gases.

⑥ Do not use firearm (lighter, cigarette, grinder, welding flame, etc.) during charging. It causes an explosion.

⑦ Do not overcharge. The battery can overheat. It can be dangerous and shorten its life.

⑧ Keep the battery below 55℃. It will shorten the life cycle when used at high temperatures. If the battery exceeds 55℃ during charging, the charge must be stopped.

⑨ Make sure that there is sufficient ventilation when charging indoors. Even if Battery is stored indoors, enough ventilation is needed.

⑩ Do not charge the battery below -25℃. Because it can be increased battery internal resistance at low temperature. Low temperature will reduce the efficiency of the charge and require adjustment of the charge volume. Therefore, a charging room with a temperature of 5 to 10℃ required at low temperatures.

(6) **Environment of use (◇ Caution - Cleaning, ◆ Warning - Organic solvent)**

① Contaminants and debris on the top or connections of the battery may cause a short circuit and fire. Clean with a wet cloth and keep the area clean and dry.

② Do not use organic solvents or chemicals such as benzene, thinner and gasoline for battery cleaning. It may cause damage to the battery.

③ Do not flush the battery. It may causes damage.

④ If it is not used for a long time, keep it in a well ventilated and fire-free place to prevent explosion.

⑤ To prevent deformation and damage caused by freezing and overheating, the recommended use temperature is -25 ~ 55℃. Avoid contact with rainwater or sea water to prevent damage and fire.

(7) **Handling method (◈ Danger - Explosion, ◇ Caution - Others)**

① Turn off both key switch and charger switch when unplugging. When the key is removed from the ON state, sparks are generated and cause fire and explosion.

② Check + and - thoroughly when connecting cables. Causes damage to electronic parts. If cables and plugs are open due to corrosion or heat, contact your HYUNDAI dealer to replace them.

③ Do not modify the plug or connector arbitrarily. It may cause heat and explosion.

④ When connecting the plug, make sure it is in full contact and remove any foreign substances to prevent heating.

⑤ To prevent short circuit, do not place tools, such as spanners, on top of the battery.
Secure cables and battery terminals properly to prevent short circuit and performance degradation.

⑥ Do not use it for purposes other than forklift power sources. It may cause damage to the battery.

⑦ Do not spray water in case of fire. It may cause an explosion. Use a special powder fire extinguisher.

⑧ Follow the battery manufacturer's instructions on how to dispose of the battery at the end of its life.

20. LITHIUM ION BATTERY CHARGER (OPTION)

※ Before connecting the battery charger to the power supply and the battery, carefully read the instructions below.

1) Use and Operation

(1) To use this battery charger you must comply with safety requirements contained in laws and regulations and in the provisions set out by the local authorities.

(2) The user should make sure that the use of charging equipment complies with current regulations and that any action that may endanger the life and health of the user or any third party is avoided, as well as avoiding any damage to property.

2) Installation and Safety warnings

(1) Before connecting the battery charger to the power supply and the battery, carefully read the instructions below.

① For correct functioning and improved yield, the battery charger must be positioned on the wall in the correct direction and fixed with plugs through the relative slots; Pay attention not to obstruct the ventilation slots holes.

② Only specialised and authorised staff can carry out jobs that require the battery charger to be opened.

③ Before operating the battery charger, the insulation of mains connection cables and of the battery connectors must be verified

④ It is necessary to intervene on electrical equipment, thoroughly trained personnel only.

⑤ Disconnect the mains connection before connecting or disconnecting the battery.

⑥ The battery being charged generates explosive gases, therefore it is prohibited to smoke in proximity of the machinery; avoid naked flames and or sparks and proximity with other machinery that lead to hazardous circumstances for people or property.

⑦ This battery charger contains electrical components which can generate electric arcs and sparks, so if used in enclosed areas it must be positioned in a site suitable to its function; anyhow the standard battery charger must be used in enclosed and well ventilated areas and not exposed to rain and/or splashing water, placed on sound, levels floors. Dusty areas or areas with water sources, sources of heat and humidity should be particularly avoided. DO NOT place the battery charger on surfaces and/or shelves made with wood or other flammable materials or accumulate various materials near the battery charger and place any items or containers with liquids on the lid.

⑧ To prevent dangers of electrocution, the battery charger must be connected to a current socket connected to earth. Moreover, the current socket to which the battery charger will be connected must be proportionate to the power of the same and must be protected by appropriate electric equipment in compliance with Standards (fuses automatic switch). For sufficient selectivity, the protection must have calibration of at least 10 % over the equipment current absorption.

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

⑩ DO NOT use additional cables to extend the existing electrical connections.

⑪ The charging appliance is maintenance-free, except for routine cleaning that must be performed regularly and periodically according to the type of work environment. Before starting to clean the appliance, disconnect the power supply cable from the mains and the connection cables to the battery.

3) Connection to power supply

It is essential to connect to a current socket proportioned to the power of the installed battery charger. Ensure to also correctly connect the earth conductor. It is good practice during installation (or successively if the battery charger is moved), to check the mains voltage and the presence of all 3 phases present on the position where the battery charger works.

Battery Voltage	Charger Current	Module Power	Active Input Power	INPUT Iac Nom	FuseAC	DC Fuse
V	A	KW	kW	A	A	Code
48	250	16	15, 32	24, 97	32	LMT315

4) Battery connection

It is recommended to use relevant bi-polar connectors in compliance with Standards without the possibility of inversion of the polarity on the battery. Also check the current connection of the cables in the connector contacts. This operation has to be performed by skilled personnel only.

※ The USB port is a service port to be used only for programming the charging parameters and downloading of historical data and graphs. You must disconnect the charger from USB cable during charging, to prevent EMI noise from interference with the charging process with unpredictable consequences for the battery charger and battery.

21. NEW MACHINE OILS

New machine uses following lubricants and oils.

Description	Specification
Gear oil	ATF-Dextron Ⅲ
Hydraulic oil	ISO VG46/VG68, Hyundai genuine long life hydraulic oil ISO VG15, Conventional hydraulic oil★1
Brake oil	Brake Fluid DOT 3
Grease	NLGI No.2

· ATF : Automatic Transmission Fluid
· API : American Petroleum Institute
· SAE : Society of Automotive Engineers
· ISO : International Organization for Standardization
· NLGI : National Lubricating Grease Institute

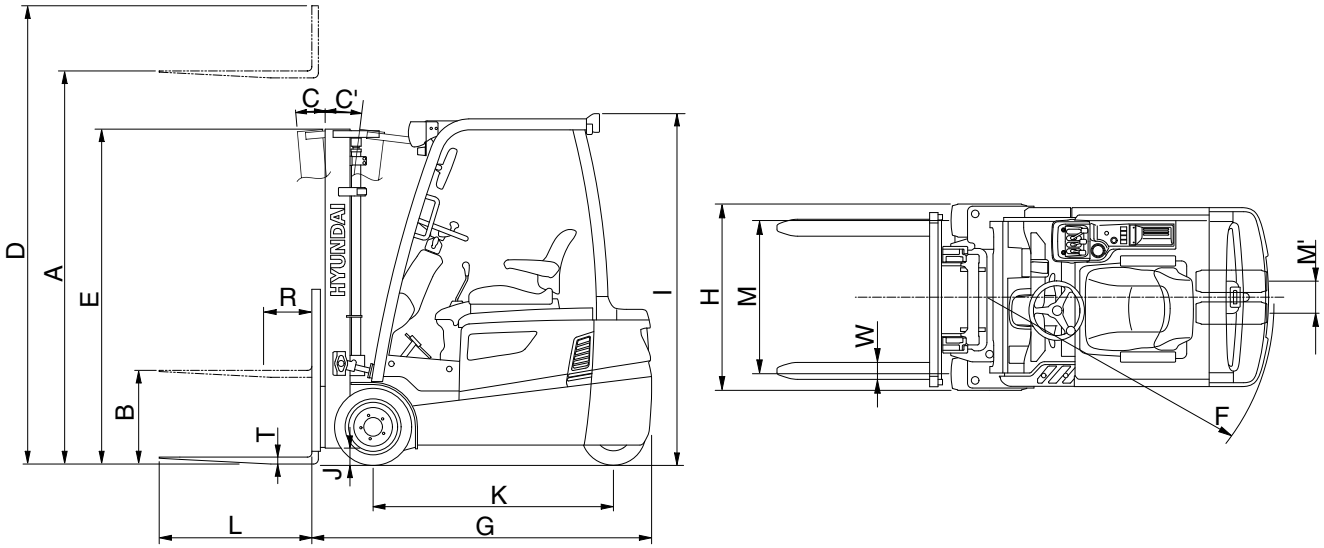
★1 : Cold region
Russia, CIS, Mongolia

22. RECOMMENDED LUBRICANTS

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature °C (°F)
			-50 (-58) / -30 (-22) / -20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104)
Axle	Gear oil	0.35 (0.1)	ATF-Dextron Ⅲ
Hydraulic oil tank/ Steering system	Hydraulic oil	20(5.2)/ 0.65(0.17)	★ISO VG 15 ISO VG 46 ISO VG 68
Brake system	Brake oil	0.5 (0.13)	DOT 3
Fitting (Grease nipple)	Grease	0.1 (0.03)	★NLGI No.1 NLGI No.2

★ : Cold region
Russia, CIS, Mongolia

1. SPECIFICATION



15BT9UOM0801

Model			Unit	15BT-9U	18BT-9U	20BT-9U
Capacity			kg (lb)	1500 (3000)	1800 (3500)	2000 (4000)
Load center		R	mm (in)	500 (24")	←	←
Weight			kg (lb)	3143 (6929)	3427(7555)	3561 (7850)
Fork	Lifting height	A	mm (ft-in)	3330 (10' 11")	←	←
	Free lift	B	mm (in)	40 (1.6")	←	←
	Lifting speed [Load/Unload]		mm/sec	400/550	←	←
	Lowering speed [Load/Unload]		mm/sec	550/450	←	←
	L×W×T	L,W,T	mm (in)	900×100×40 (35.4×4×1.6)	←	←
Mast	Tilt angle forward/backward	C/C'	degree	5/7	←	←
	Max height	D	mm (ft-in)	4320 (14' 2")	←	←
	Min height	E	mm (ft-in)	2120 (6' 11")	←	←
Body	Travel speed [Unload]		km/h	16	←	←
	Gradeability [1.6kph]		%	29.5	27.5	24.5
	Min turning radius [Outside]	F	mm (ft-in)	1540 (5' 1")	1630 (5' 4")	1660 (5' 5")
ETC	Max hydraulic pressure(sys/attach)		kgf/cm²	190/130	←	←
	Hydraulic oil tank		ℓ (usgal)	20(5.28)	←	←
Length to face of Forks		G	mm (ft-in)	1900 (6' 3")	1990 (6' 6")	2025 (6' 8")
Overall width		H	mm (ft-in)	1074 (3' 6")	1105 (3' 8")	←
Overhead guard height		I	mm (ft-in)	2065 (6' 9")	←	←
Ground clearance (Mast)		J	mm (in)	87 (3.4")	89(3.5")	←
Wheel base		K	mm (ft-in)	1345 (4' 5")	1430 (4' 8")	←
Wheel tread front/Rear		M	mm (ft-in)	895/184 (2' 11"/0' 7")	905/184 (3' 0"/0' 7")	←

2. SPECIFICATION FOR MAJOR COMPONENTS

1) CONTROLLER

Item	Unit	Traction motor controller	Pump motor controller
Model	-	ACE2	ACE2
Control Type	-	AC Zapi patented control	←
Dimension	mm	200×150×120	200×200×120
Max. Output Current	Arms / min	350 / 3	450 / 3
Communication	-	CAN	←

2) MOTOR

Item	Unit	Traction	Pump
Model	–	TSA200-100-269	TSA170-210-063
Type	–	AC	AC
Rated voltage	Vac	32	32
Output	kW	5.4	14.9
IP Grade	–	54	43

3) BATTERY

Item	Unit	15BT-9U	18/20BT-9
Rated voltage	V	48	←
Rack Dimension (W×L×H)	mm	983×553×650	983×638×650
Battery weight(STD)	kg	820	1000
Connector (CE spec)	–	SB 350 or SR350 (SBE 320)	

4) CHARGER

Item	Unit	15BT-9U	18/20BT-9U
Type	-	Constant current, constant voltage	
Battery capacity for charge	V-AH	48-440~520	48-530~600
AC input	V	Triple phase 410	
		Single phase 220	
		Triple phase 220/380	
		Triple phase 440	
DC output	V	64±1	
Charge time	hr	6±2	
Connector (CE spec)	-	SB 350 or SR350 (SBE 320)	

5) GEAR PUMP

Item	Unit	Specification
Type	–	Gear type hydraulic pump
Capacity	cc/rev	18.4
Rated Pressure	MPa	21.0
Speed (max/min)	rpm	3500/500

6) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	2, 3, 4 Spool
Operating Force	kgf	Max 27
Main relief valve pressure	bar	190
Rated Flow	ℓ /min	65

7) DRIVE UNIT

Item	Unit	Specification
Max. axle load	kg/lb	3850/8818
Max. input speed	rpm	5000
Max. output torque (wheel)	N · m	1320
Gear ratio	-	26.75
Weight without fluid	kg/lb	31/ 68
Oil quantity	ℓ /U.S · qt	0.35/0.37

8) WHEELS

Item	15BT-9U	18BT-9U	20BT-9U
Type (STD/OPT)	SOLID/Non-marking		
Quantity (front/rear)	2/2		
Front-drive	18×7 - 8	200 / 50 -10	←
Rear-steering	15×4.5 - 8	←	←

9) BRAKES & STEERING

Item		Specification
Brakes	Travel	Front wheel, wet disc brake
	Parking	Electric Auto parking (2EA)
Steering	Type	Electric power steering
	Steering angle	90° to both right and left angle, respectively

3. TIGHTENING TORQUE

NO	Items		Size	kgf · m	lbf · ft
1	Electric system	Hyd pump motor mounting bolt	M 8 ×1.25	2.5±0.5	18.1±3.6
2		Traction motor mounting bolt	M 8 ×1.25	2.5±0.5	18.1±3.6
3	Hydraulic system	Hydraulic pump mounting bolt	M 8 ×1.25	2.5±0.5	18.1±3.6
4		MCV mounting bolt, nut	M 8 ×1.25	2.5±0.5	18.1±3.6
5		Steering unit mounting bolt	M10×1.5	5±1	36±7.2
6		Brake cylinder mounting bolt	M10×1.5	5±1	36±7.2
7		Hydraulic oil tank mounting bolt	M 8 ×1.25	2.5±0.5	18.1±3.6
8	Power train system	Drive axle mounting bolt, nut	M14×2.0	13.8±1.2	99.8±8.7
9		Steering axle mounting bolt, nut	M16×2.0	35.6±5.3	257.4±38.3
10		Front wheel mounting nut	M14×1.5	14±1.5	101±10.8
11		Rear wheel mounting nut	M14×1.5	14±1.5	101±10.8
12	ETC	Counterweight mounting bolt	M30×3.5	199±15	1439±108
13		Seat mounting bolt	M 8 ×1.25	2.5±0.5	18.1±3.6
14		Head guard mounting bolt	M12×1.75	12.8±3.0	93±22