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A MESSAGE TO HYUNDAI BATTERY TRACTOR OPERATORS

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

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

- **Operator not properly trained**
- **Operator not experienced with battery tractor operation**
- **Basic safety rules not followed**
- **Battery tractor not maintained in safe operating condition**

For these reasons, HYUNDAI wants you to know about the safe operation and correct maintenance of your battery tractor.

This manual is designed to help you operate your battery tractor safely.
This manual shows and tells you about safety inspections and the important general safety rules and hazards of battery tractor operation. It describes the special components and features of the battery tractor 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 battery tractor mechanic.

The operator's manual is not a training manual. It is a guide to help trained and authorized operators safely operate their battery tractor 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 battery tractor. Practice safe operation every time you use your battery tractor. Let's join together to set high standards in safety.

Remember, before you start operating this battery tractor, be sure you understand all driving procedures. It is your responsibility, and it is important to you and your family, to operate your battery tractor 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 battery tractors; It is also an (OSHA) requirement that a machine inspection be performed before every shift. If you need training in operating or inspecting your battery tractor, ask your supervisor.**

HYUNDAI battery tractors are built to take hard work, but not abuse. They are built to be dependable, but they are only as safe and efficient as the operator and the persons responsible for maintaining them. Do not make any repairs to this battery tractor unless you have been trained in safe battery tractor 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 battery tractors. 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 battery tractor. It has been specially prepared to help you use and maintain your HYUNDAI battery tractor in a safe and correct manner.

Your HYUNDAI battery tractor 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, parking brake and horn are standard equipment.

Safe, productive operation of a battery tractor 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 battery tractor 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 battery tractor is not only important for economy and utilization reasons; it is essential for your safety. A faulty battery tractor is a potential source of danger to the operator, and to other personnel working near it. As with all quality equipment, keep your battery tractor in good operating condition by following the recommended schedule of maintenance.

Operator Daily Inspection - Safety and Operating Checks

A battery tractor 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 and safety inspection program(PM) 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 battery tractor. Necessary adjustments and repairs can be done during the PM, which will increase the lift or components and reduce unscheduled downtime and increase safety. The PM can be scheduled to meet your particular application and battery tractor 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 battery tractor 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 battery tractor. This manual is organized into six major parts:

Section 1. General Safety Rules, reviews and illustrates accepted practices for safe operation of a battery tractor.

Section 2. Know your tractor, describes operating components, systems, controls, and other features of your truck and tells how they function.

Section 3. Operating procedures, discusses specific instructions on the safe, efficient operation of your battery tractor.

Section 4. Battery and charger, presents details on how to perform the charging and maintaining battery system.

Section 5. Maintenance and inspection, discusses specific instructions on maintenance and how to check out the battery tractor.

Section 6. Specifications, provides reference information and data on features, components, and tightening torque.

※The descriptions and specifications included in this manual were in effect at the time of printing. HYUNDAI reserves the right to make improvents 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 battery tractor operator and take full advantage of the capabilities and safety features of your new battery tractor.

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 battery tractor. Next, you will find descriptions of the components of your specific battery tractor model and how the instruments, gauges, and controls operate. Then, you will find a discussion of safe and efficient operating procedures, followed by instructions on how to tow a disabled battery tractor. The later sections of the manual are devoted to maintenance and battery tractor specifications.

Take time to carefully read the **Know Your Tractor** section. By acquiring a good basic understanding of your battery tractor'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 tractor, 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 battery tractor's features, operation, or manuals.

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

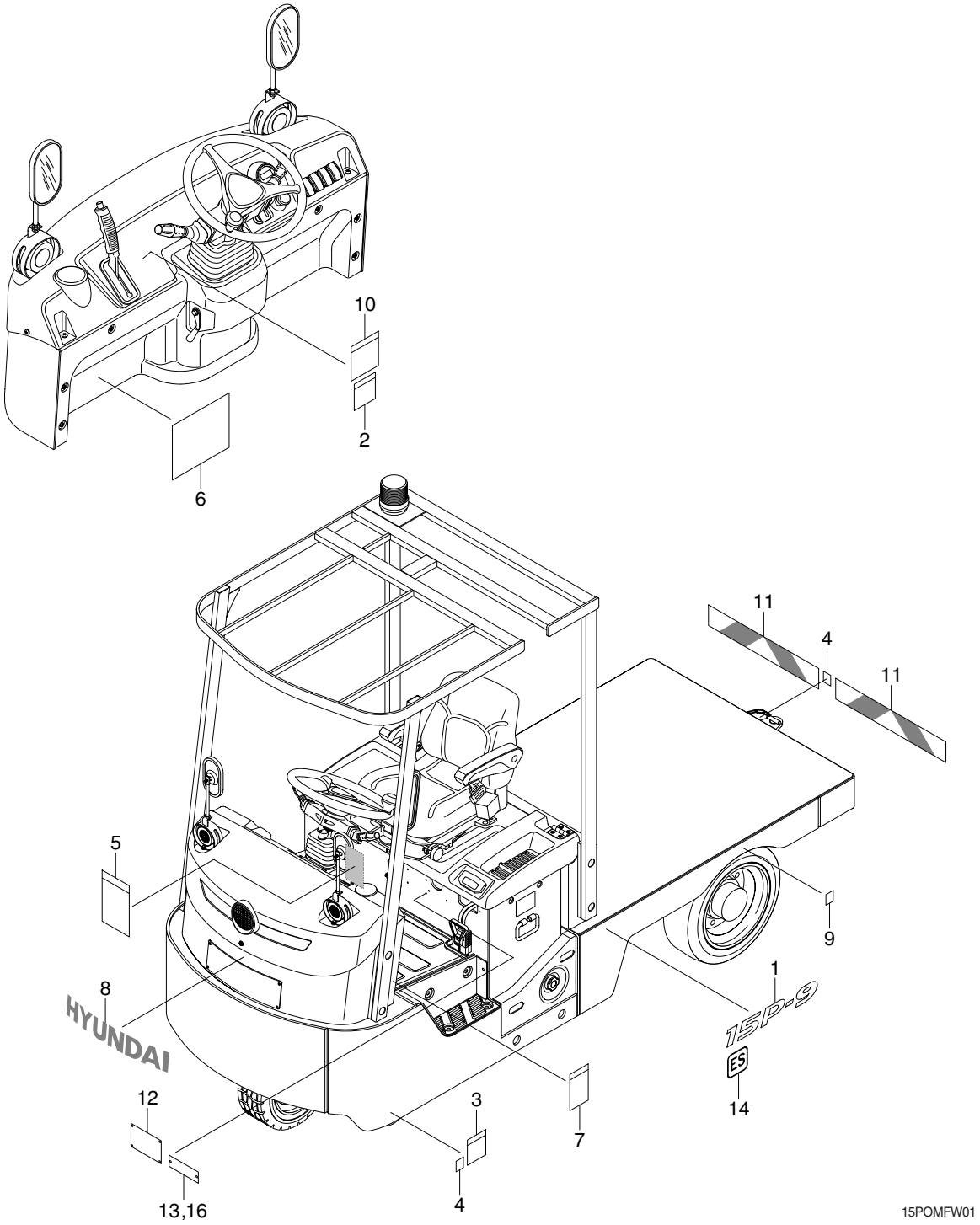
This manual is intended to be a permanently attached part of your battery tractor. Keep it on the tractor as a ready reference for anyone who may drive or service it. If the battery tractor you operate is not equipped with a manual, ask your supervisor to obtain one and have it attached to the tractor.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

SAFETY LABELS

1. LOCATION

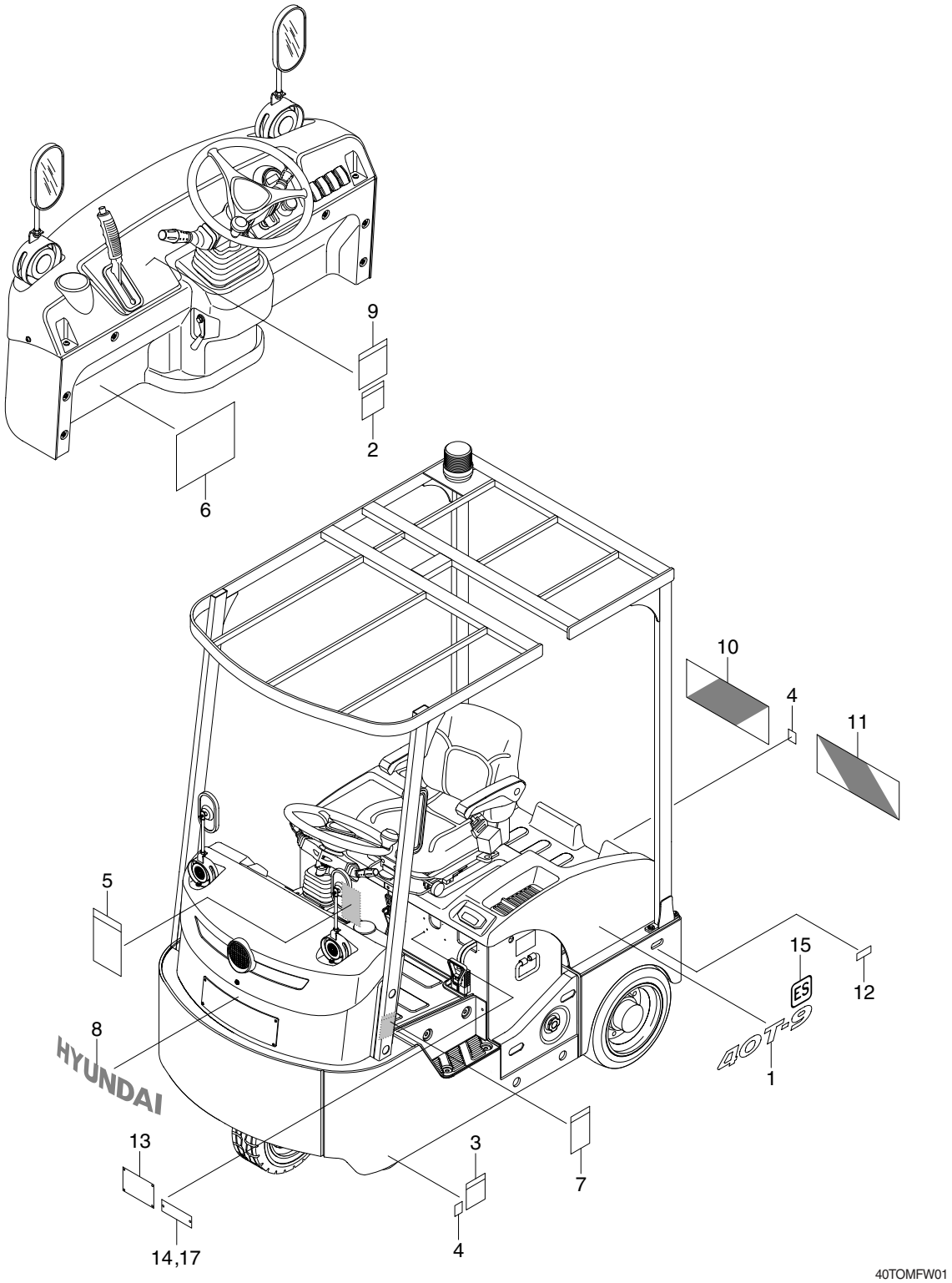
Always keep these labels clean. If they are lost or damaged, attach them again or replace them with new labels.

1) 15P-9



1	Model name	6	Circuit diagram (non-UL or UL)	11	Reflective sheet
2	Parking brake	7	Battery handling	12	Name plate
3	Hanger	8	Hyundai logo	13	Label-UL "ES"
4	Hook	9	Tire (rear)	14	ES mark
5	Maintenance instructions	10	For safety	16	Round

2) 40T-9



40TOMFW01

1	Model name	6	Circuit diagram (non-UL or UL)	12	Inching switch
2	Parking brake	7	Battery handling	13	Name plate
3	Hanger	8	Hyundai logo	14	Label-UL "ES"
4	Hook	9	For safety	15	ES mark
5	Maintenance instructions	10	Reflective sheet	17	Round

2. DESCRIPTION

There are several specific warning labels on this machine please become familiarized with all warning labels. The item numbers are based on the 15P-9.
Replace any safety label that is damaged, or missing.

1) PARKING BRAKE (item 2)

This warning plate is located on the dashboard cover at right side of the parking brake lever.

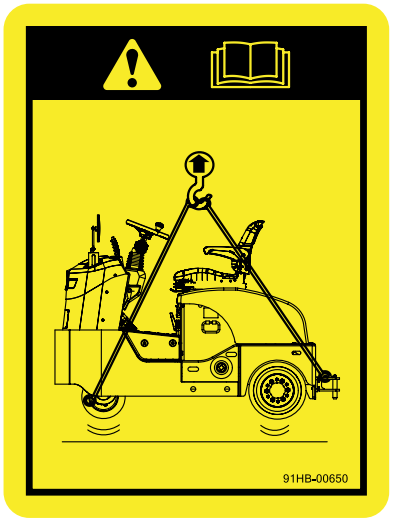
⚠ Pull by sufficient tension for constant parking ability.

25L7A0OM06

2) HANGER (item 3)

This warning label is positioned on the front left side of the main frame.

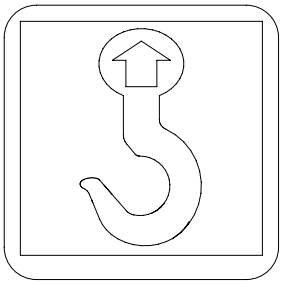
⚠ Refer to page 1-9 for safe loading procedures.



91HB-00650

3) HOOK (item 4)

This labels are positioned respectively on the front both sides of the main frame and rear side of the platform near the towing assy.



50DEOM35

4) BATTERY HANDLING (item 7)

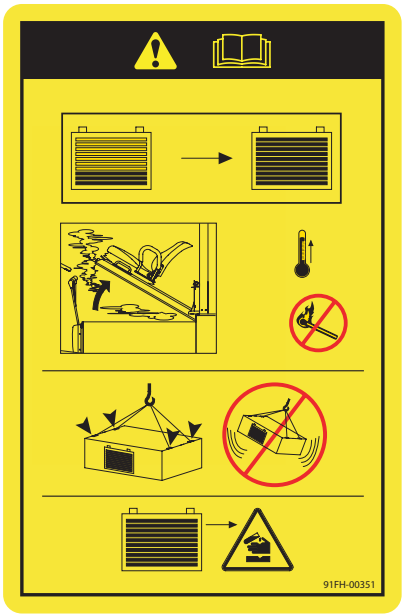
This battery handling is located on the left side of the dashboard.

※ Refer to page 5-4 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 (H_2SO_4).
Be careful not to drop on clothes and mechanical parts.



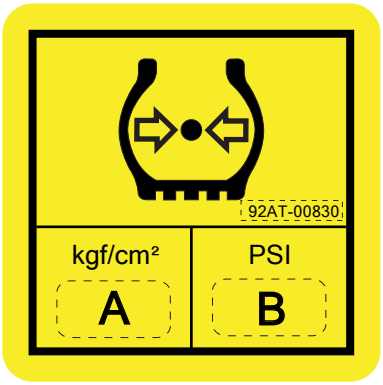
91FH-00351

5) REAR TIRE (item 9)

This label is positioned on the both sides of the platform near the rear tires.

※ Tire pressure must be checked in accordance with the specifications.

※ Refer to page 7-3 for the regulated tire air pressure (A and B).



25L7A0OM08

6) FOR SAFETY (item 10)

This warning plate is located on the dashboard cover at right side of the parking brake lever.

(1) Before attempting to operate this battery tractor, carefully read and understand the operating procedures.

(2) Do not carry or draw the load exceeded rated capacity.
Pay attention to the bulky load, although it does not exceed rated capacity.

(3) Rapid turn in dangerous especially, do not rapid turn in a downward slope.

91HB-00310

7) INCHING SWITCH (item 12, 40T-9, OPT)

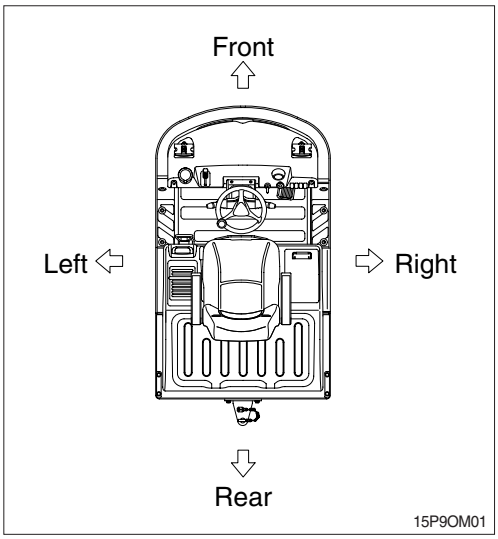
This label is positioned on the left side of the platform near the inching switches.

※ Refer to page 2-11 for the inching switches.

91HB-00710

1. DIRECTION

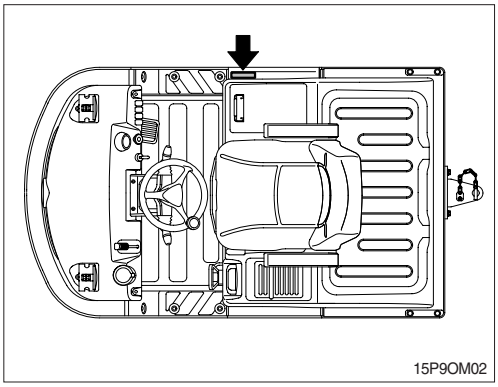
The direction of this machine indicate forward, backward, right and left when machine is in the travelling direction.



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 right side of the frame.



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.

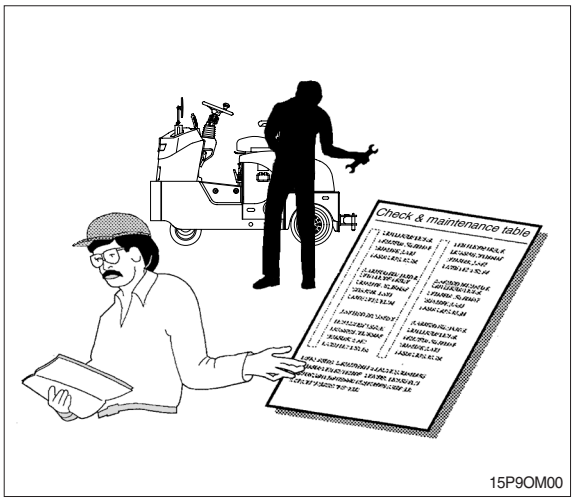
1. DAILY INSPECTION

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

Check for damage and maintenance problems.

Have repairs made before you operate the battery tractor.

Do not make repairs yourself. Battery tractor mechanics are trained professionals. They know how to make repairs safe.



2. DO'S AND DON'TS

Do watch for pedestrians.

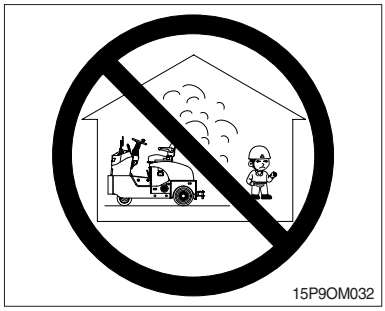
Do wear safety equipment when required.

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.

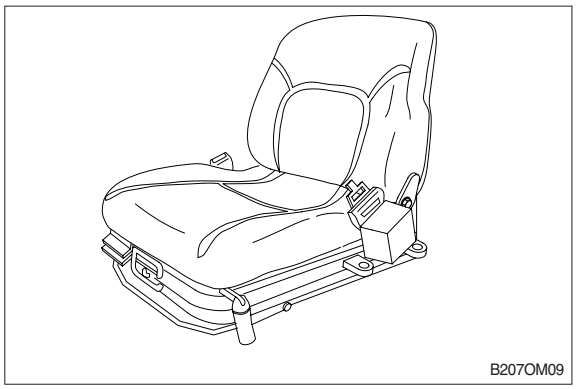
Don't operate the truck outdoors in rainy day.



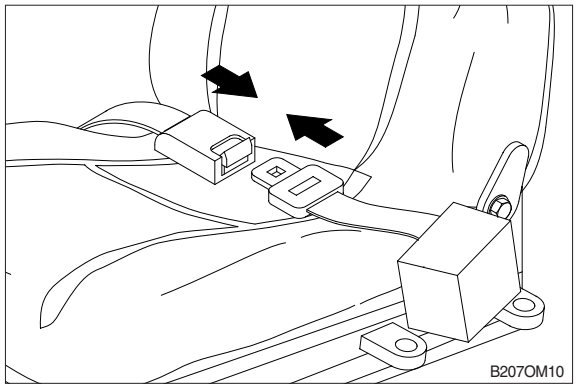
Don't perform battery charging service in the room without adequate ventilation.

3. SEAT BELTS

⚠ Always buckle up for the machine equipped with safety belt.

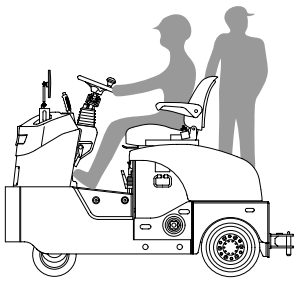


⚠ Seat belts can reduce injuries.



4. NO RIDERS

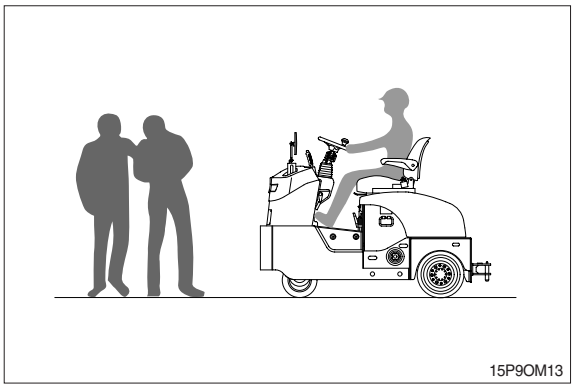
1) The operator is the only one who should be on a battery tractor.



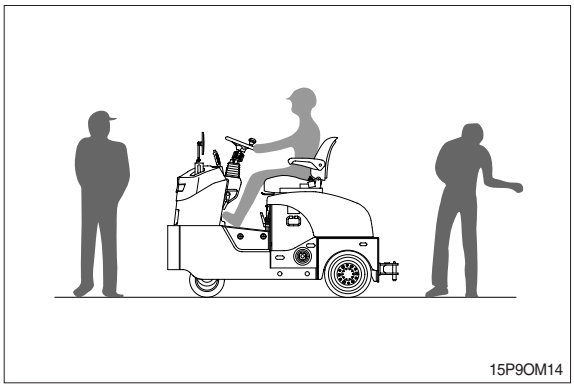
15P9OM11

5. PEDESTRIANS

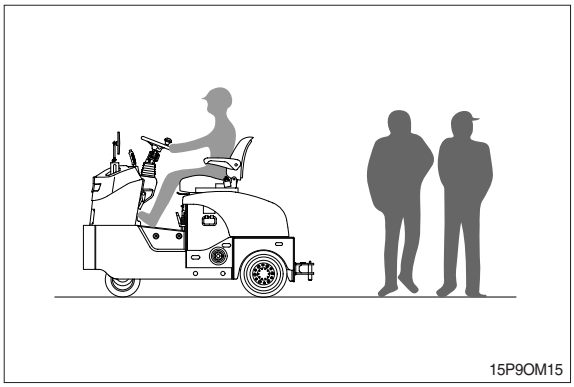
1) Watch where you are going. Look in the direction of travel. Pedestrians may use the same roadway you do. Sound your horn at all intersections or blind spots.


15P9OM13

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


15P9OM14

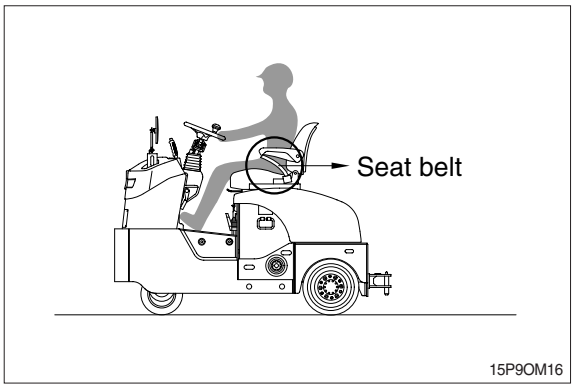
3) Make people stand back, even when you are parked.


15P9OM15

6. OPERATOR PROTECTION

1) Always keep your body within the confines of the tractor.

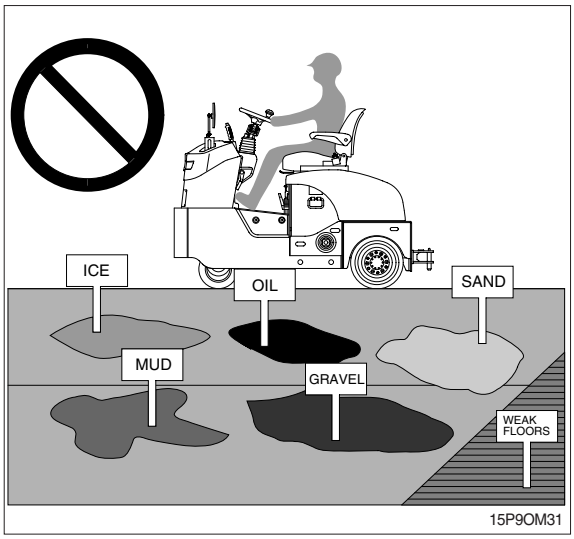
⚠ **Always buckle up for the machine equipped with safety belt.**



7. SURFACE AND CAPACITY

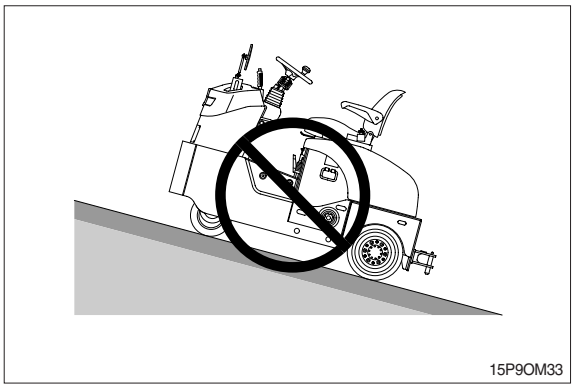
Avoid such as icy surface, oily surface or uneven ground, etc.. They can lose traction for braking or driving.

⚠ **Know the weight of your tractor and load. Especially when using towing, know the capacity of the towing you intend to use. Do not overload.**

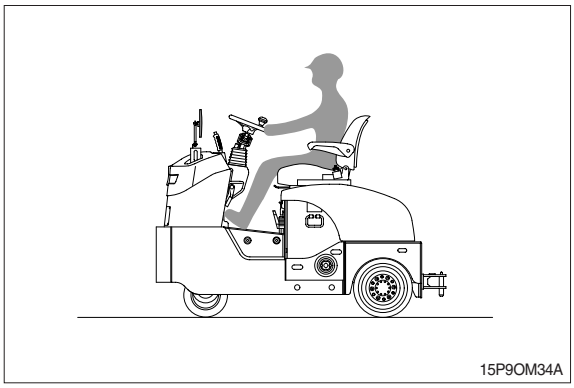


8. PARKING

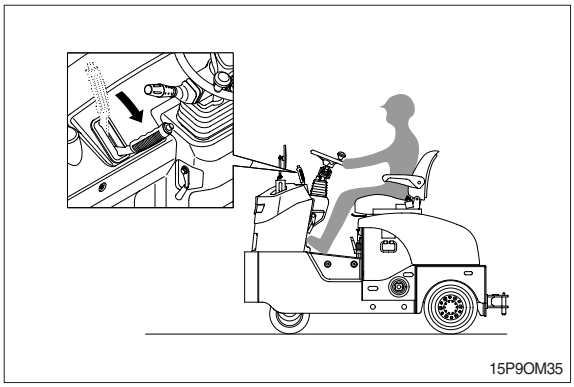
1) Never park on a grade.



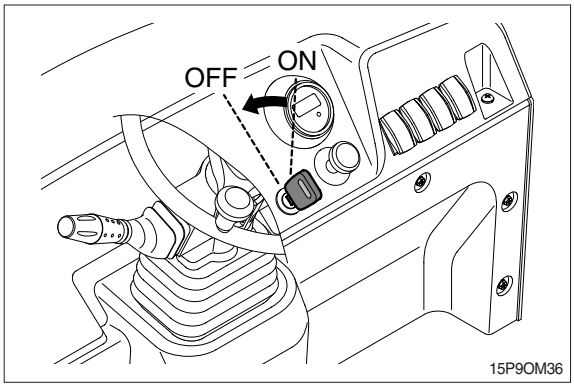
2) Always come to a complete stop before leaving tractor. Put the directional control lever in the neutral position.



3) Put the parking brake lever to the lock position.



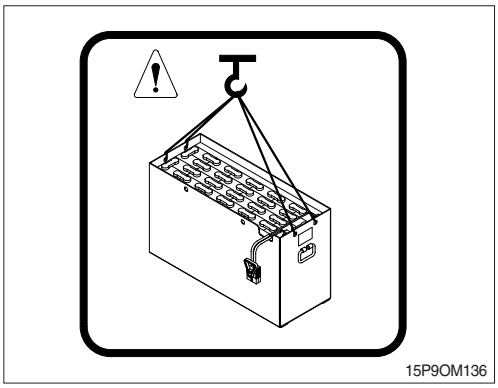
4) Turn start switch to OFF position.



9. LOADING AND UNLOADING BY CRANE

1) Check the weight, length, width and height of the truck referring to the chapter 8, specifications when you are going to hoist the tractor.

⚠ **Before loading the tractor, battery must be removed. Refer to page 5-4 for a safe battery removal.**



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

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

4) Place crane on the proper place.

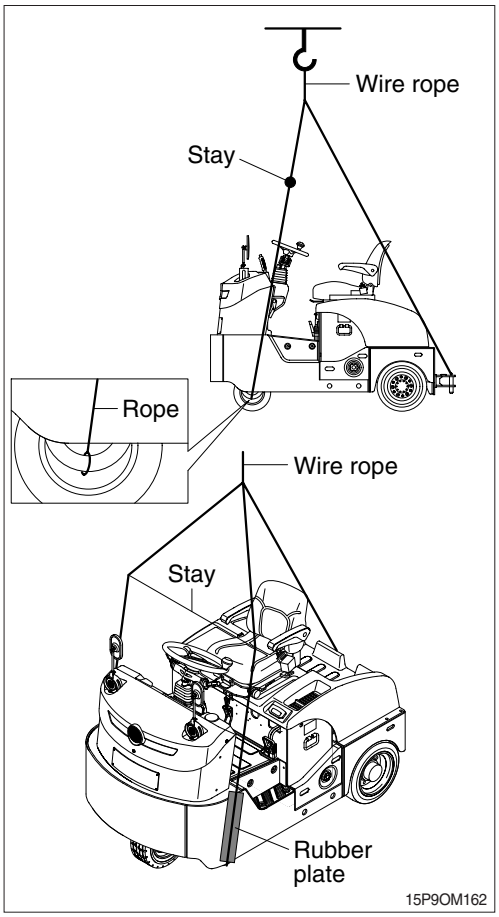
5) Install the wire rope and stay like the illustration.

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

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

⚠ **Do not load abruptly.**

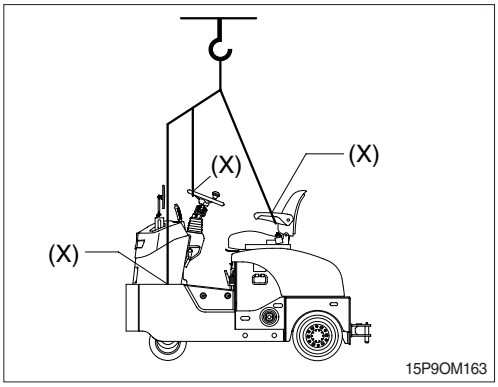
⚠ **Keep area clear of personnel.**



⚠ **Do not install the wire to unsafe position such as seat, steering wheel, front cover, etc.. It can cause a serious damage to driver and tractor.**

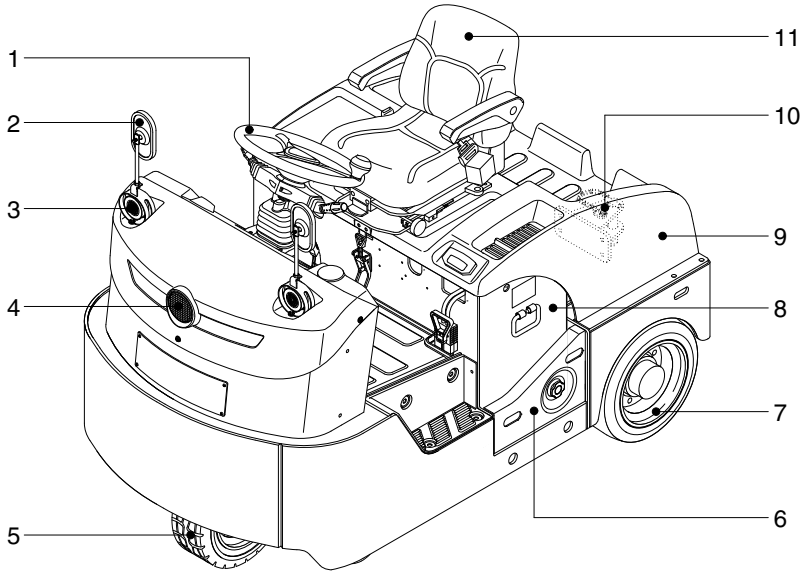
⚠ **If there is any problem to lift a tractor, please contact your dealer.**

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



2. KNOW YOUR TOW TRACTOR

1. GENERAL LOCATIONS

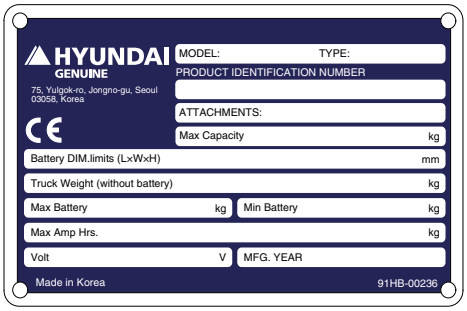


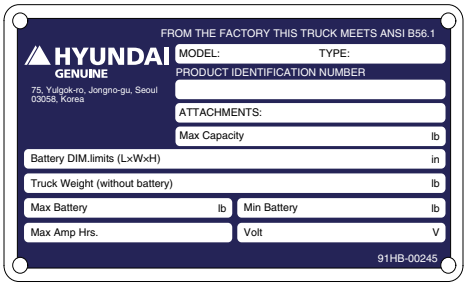
15P9GEN01

1	Steering wheel	5	Front wheel	9	Battery cover
2	Rear view mirror	6	Battery support	10	Hook
3	Flasher lamp	7	Rear wheel	11	Seat
4	Head lamp	8	Battery		

2. DATA/SAFETY PLATES AND DECALS

1) TRACTOR DATA AND CAPACITY PLATE





2) SAFETY

(1) Before attempting to operate this battery tractor, carefully read and understand the operating procedures.

(2) Do not carry or draw the load exceeded rated capacity.
Pay attention to the bulky load, although it does not exceed rated capacity.

(3) Rapid turn is dangerous, especially, do not rapid turn in a downward slope.

91HB-00310

3) BATTERY HANDLING

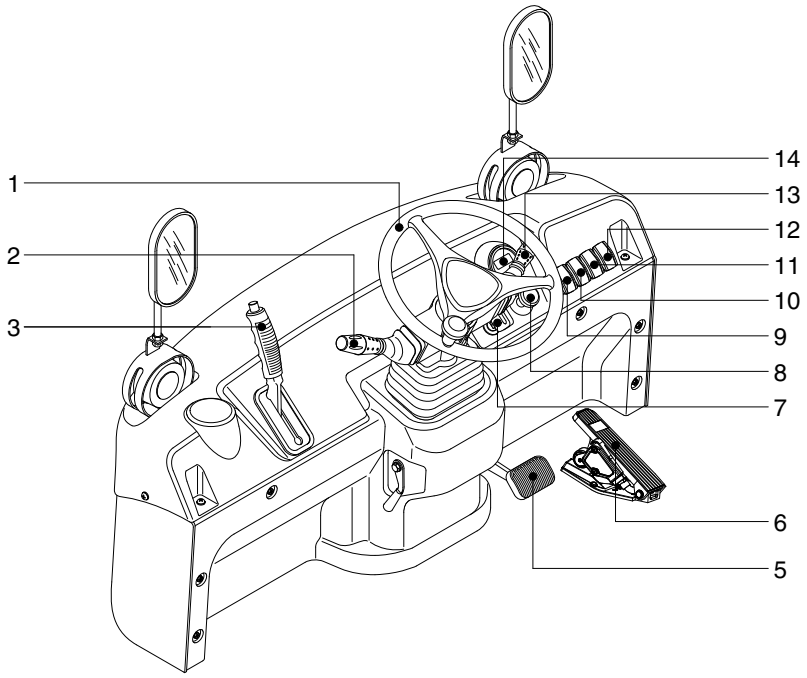
(1) Open the battery cover when charging battery being charged, not only heat but also inflammable hydrogen gas is produced.
Keep fire away.

(2) Hoisting the battery case, use 4 wires with hook and handle carefully, not to shock.

(3) The electrolyte solution of battery is dilute sulfuric acid (H_2SO_4).
Be careful not to drop on clothes and mechanical parts.

91FH-00351

3. INSTRUMENTS AND CONTROLS

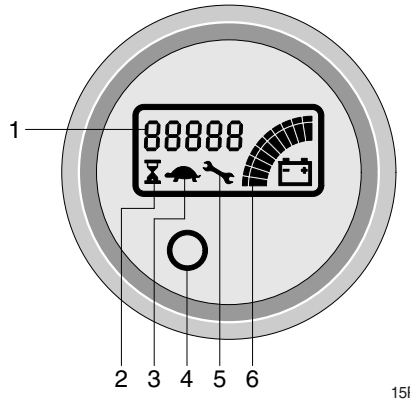


15P9OM62

1	Steering wheel	9	Hazard switch
2	Direction control lever	10	Head lamp switch
3	Parking brake lever	11	Beacon lamp switch
5	Brake pedal	12	Turtle mode switch
6	Accelerator pedal	13	Flasher lamp switch
7	Start key switch	14	MDI CAN
8	Emergency switch		

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

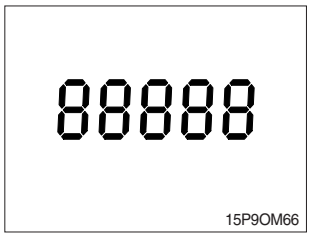
4. DISPLAY



1 Letter indicator
2 Hourmeter indicator
3 Speed reduction indicator
4 Alarm LED
5 Maintenance indicator
6 Battery charge indicator

The MDI-CAN has only a LED. This LED is red and lights and blinks when an alarm is present.
When the key switch is ON, the MDI-CAN makes a general test lighting all the display liquid crystals, the LED and the backlight.

1) LETTER INDICATOR



(1) Hour meter

An alpha-numeric liquid crystal diaplay is fitted in the center of the unit that shows the hours worked. The display is backlight (the backlight is normally lighted).

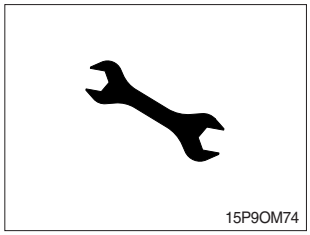
(2) Alarms

The same display can also indicate the alarm state, showing a code corresponding to the type of alarm. To attract attention, the red LED will start blinking when an alarm is generated.

(3) Software version

When the key switch is initially ON, the display shows the EPROM version for a few seconds (EPXXX where XXX represents the version) : MDI-CAN and then traction controller EPROM version appears, each one for 2 seconds.
Simultaneously the maintenance indicator appears.

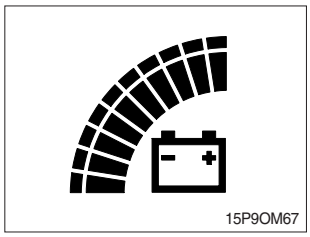
2) MAINTENANCE INDICATOR



(1) It is normally off; when it appears (fixed) it shows the request of programmed maintenance or the alarm state.

(2) In this case the relative code will be displayed. The information supplied by the MDI-CAN can be extremely useful. Failures can be quickly identified by the operator or service technician thereby finding the fastest solution to the problem.

3) BATTERY CHARGE INDICATOR

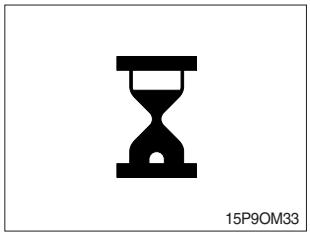


(1) The battery's state of charge indication is integrated in the LCD display; it is shown by ten notches.

(2) Each notch represent the 10% of the battery charge. As the battery becomes discharged, the notches turn off progressively, one after the other, in proportion to the value of the residual battery charge. This value, sent to the MDI-CAN by the controller via CAN-BUS, is displayed in the tester menu of the Zapi console connected to the controller.

(3) When battery low alarm appears in the controller, the battery symbol which is under the notches blinks.

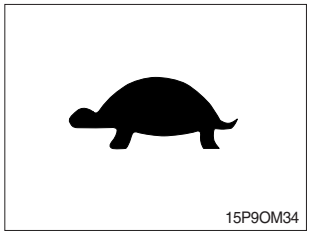
4) HOUR METER INDICATOR



(1) It is normally off; it blinks when the hour meter is working.

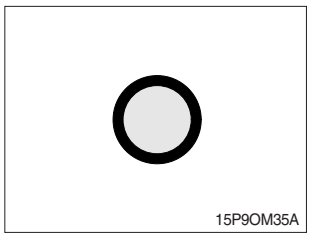
(2) When the key switch is ON, the MDI-CAN makes a general test lighting all the display liquid crystals, the LED and the backlight.

5) SPEED REDUCTION INDICATOR



(1) It is normally off; when it appears (fixed) it shows activation of the "soft" mode of the tractor, in which maximum speed and acceleration are reduced;

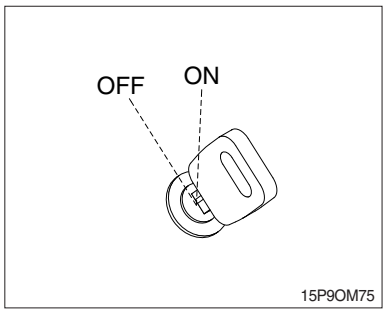
6) ALARM LED



(1) This red alarm LED will start blinking when an alarm is generated.

5. OPERATING SWITCHES AND LEVERS

1) KEY SWITCH

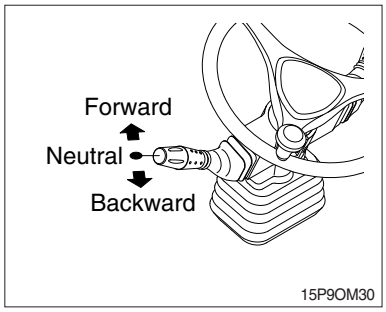


(1) Power is supplied to the control circuit through this switch, which is placed on OFF→ ON clockwise.

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



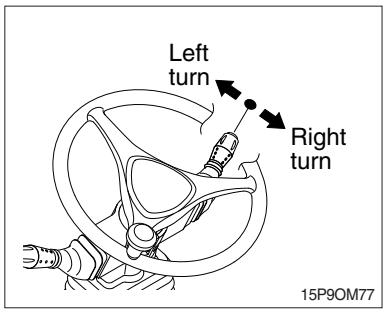
(1) This lever serves to make forward/backward directional changes. For the forward directions, place the lever on the FORWARD position.

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

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

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

3) FLASHER SWITCH

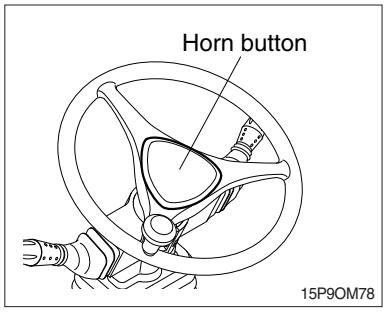


(1) When making a left or right turn, use this switch to flash the flash lamp to indicate which direction the vehicle is turning to.

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

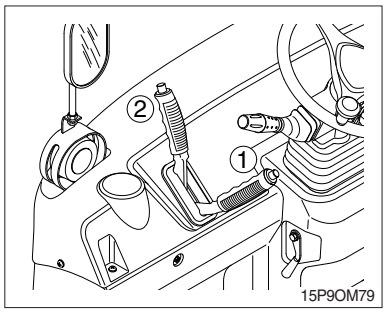
(3) For a left turn, place the switch on the FORWARD position.

4) HORN BUTTON



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

5) PARKING BRAKE LEVER

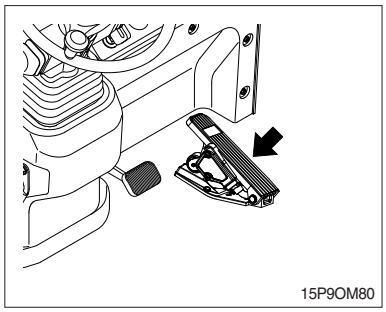


(1) Position ①
Parking brake is applied and front wheel is locked.

(2) Position ②
Parking brake is released.

※ **Before the tractor starts, confirm the parking brake is released position.**

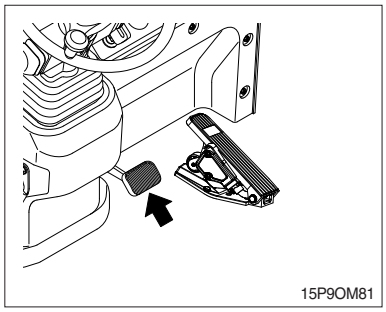
6) ACCELERATOR PEDAL



(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.

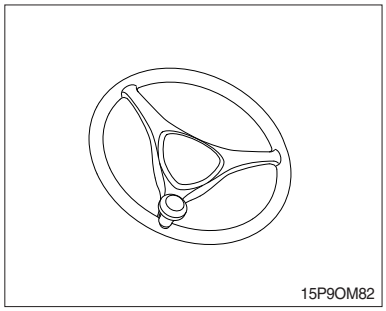
7) BRAKE PEDAL



(1) When this pedal is pressed, the mechanical brake will be activated. While the braking lamps attached on the rear light.

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

8) STEERING WHEEL

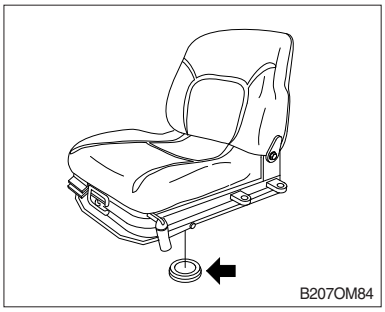


(1) The steering wheel of the vehicle is provided with the knob to allow steering with one hand.

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

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

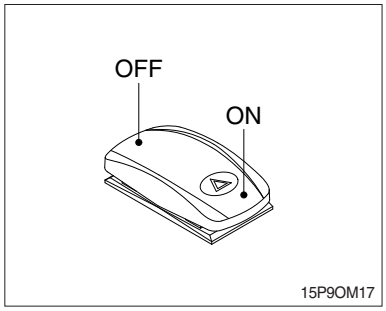
9) SEAT SWITCH



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

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

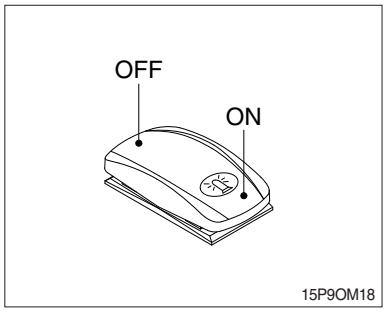
10) HAZARD SWITCH



(1) Use for parking or loading machine.

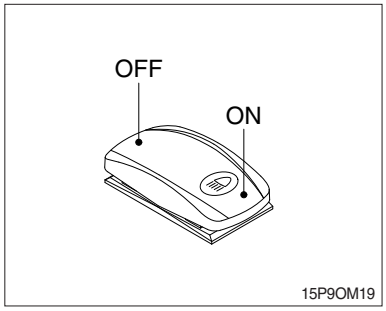
※ **If the switch is left ON for a long time, the battery may be discharged.**

11) BEACON SWITCH



(1) This switch turns ON the rotary light on the cab.

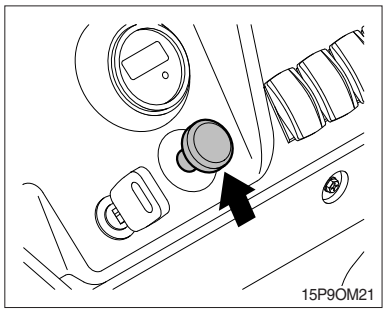
12) HEAD LAMP SWITCH



(1) This switch is used to operate work lamps.

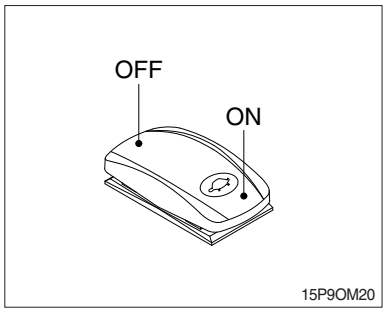
(2) Press this switch to turn on work lamps.

13) EMERGENCY SWITCH



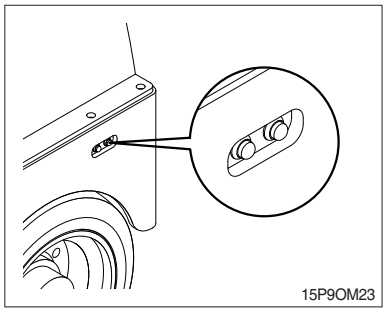
(1) When pressing the emergency switch downward, the electric circuit is broken, all electrical function switches are off.

14) TURTLE MODE SWITCH



(1) This switch used to limit the tow tractor speed below 5 km/hr.

15) INCHING SWITCH (40T-9)



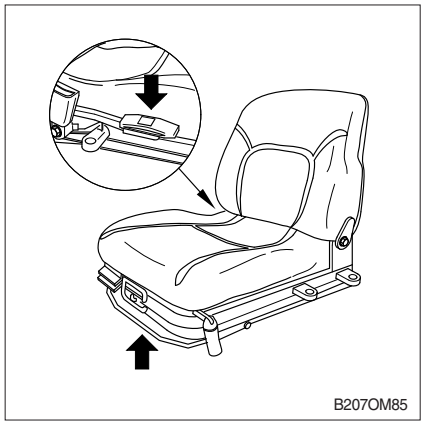
(1) This switch used to control the inching operation.
① Push the FWD button for the forward moving.
② Push the BWD button for the reverse moving.

6. SEAT ADJUSTMENT

1) SEAT ADJUSTMENT

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

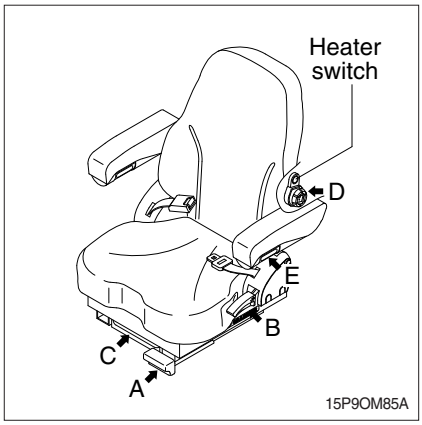
Hanil seat (std)



(1) The seat adjustment lever is located on the front side under the seat. To unlock, pull the lever up and adjust the seat so that all controls may be comfortably reached. Then release the lever.

(2) Be sure that the seat locking mechanism is engaged. The seat mounting base provides an 3 inch fore-and-after adjustment of its slide.

Grammer seat (option)



(1) Forward/Backward adjustment (A)
Pull lever A to adjust seat forward or back ward.

(2) Reclining adjustment (B)
Pull lever B to adjustment seat back rest.

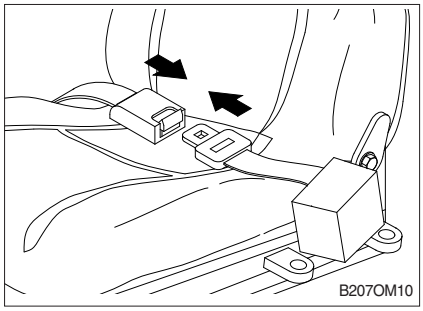
(3) Weight adjustment (C)
Pull the handle C to adjust weight.

(4) Lumbar adjustment (D)
Turn line knob D to adjust lumbar support up and down.

(5) Armrest angle adjustment (E)
Turn knob E to adjust armrest angle.

(6) Heater 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.

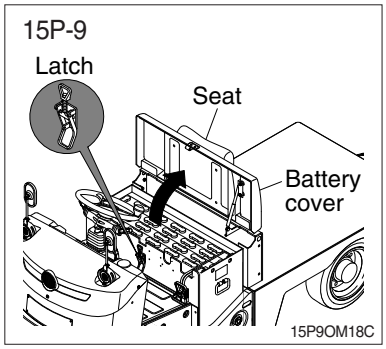
⚠ Always wear your seat belt when operating a lift truck. Failure to wear seat belt will result in injury or death in an event of an accident.

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

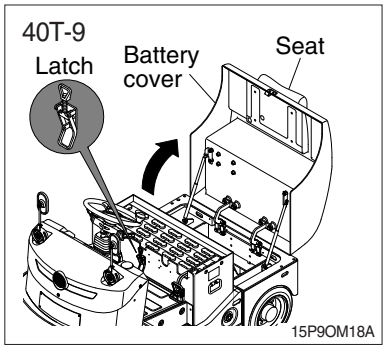
⚠ Replace the seat belt at least once every three years, regardless of appearance.

7. BATTERY

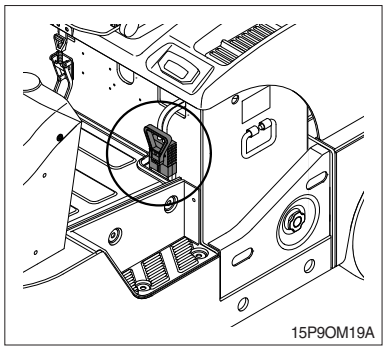
1) COMPARTMENT ACCESS



(1) Pull the latch to release the cover.
(2) The cover is held closed by weight of seat located on the battery cover.



2) BATTERY CONNECTOR



(1) Be sure to connect the connector for the battery and body.

8. SUPPORT AND SAFETY PARTS

1) OVERHEAD GUARD

(1) The head guard is of rugged construction that serves to ensure the safety of the operator.

3. DAILY SAFETY INSPECTION

1. INSPECTING YOUR TRACTOR

Before using a battery tractor, **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 tractor. Unusual noises or problems must be reported immediately to your supervisor or other designated authority.

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

⚠ **Do not operate a tractor 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 tractor becomes unsafe in any way while you are operating it, stop operating the tractor, report the problem immediately, and have it corrected.**

Tractor 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.

2. VISUAL CHECKS

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

1) Walk around your tractor 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 battery connector for safe condition.
4) Lock for any external leakage around drive unit.
5) 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.
6) Check all of the critical components that handle or carry the load.
7) Carefully inspect the towing assy for cracks, breaks, bending, twists, and wear. Be sure that the towing pin are correctly installed and locked in their proper position.
8) Inspect the wheels and tires for safe mounting, wear condition.

3. FUNCTIONAL CHECKS

Check the operation of the tractor 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 tractor on, check the diagnostic display, or the hour meter and battery discharge indicator (depending on which tractor 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) Accelerator control
 (3) Directional control
 (4) Steering system

· **When the functional checks are completed :**
 ① Bring tractor to complete stop. (Release brake pedal completely)
 ② Put directional control lever in the NEUTRAL position.
 ③ Turn the starting switch to the OFF position.

· **If you are going to leave the tractor unattended :**
 ④ Remove the key.
 ⑤ Block the wheels, if the tractor is parked on an incline or has the possibility of moving.

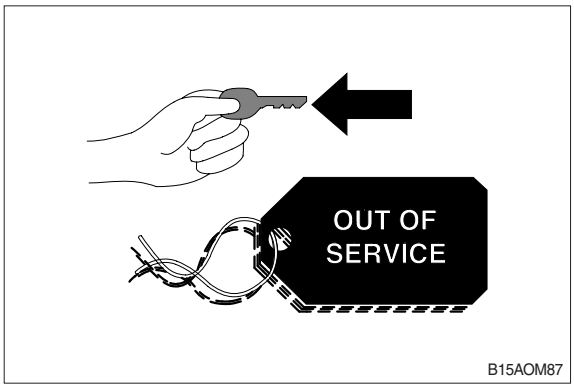
4. CONCLUDING THE INSPECTION

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

Do not operate a tractor 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 tractor.

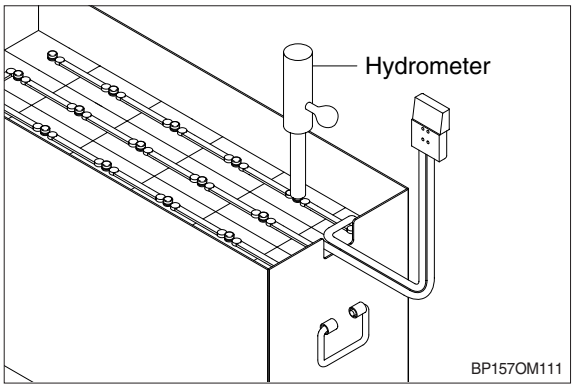
If all of the Daily Inspection checks were normal or satisfactory, the tractor can be operated.



4. OPERATING PROCEDURES

1. CHECKS PRIOR TO TRACTOR

1) Inspection of battery make sure that the battery has been fully charged.
   · Voltage : 48V
   · Specific gravity of electrolyte :
   1.28 (at 20˚C)
   Make sure that the electrolyte level is satisfactory.
   Make sure that there is no loose connecting plug. For handling refer to "Instruction manual for battery".



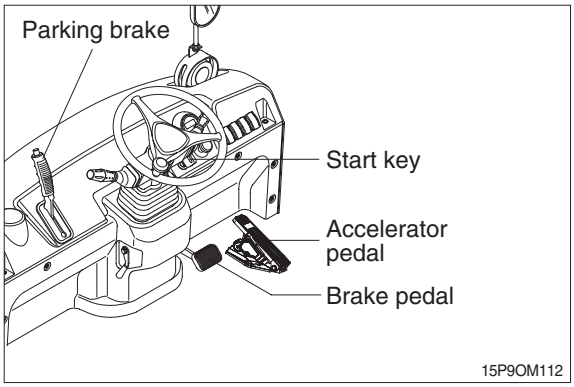
2) Check the tightness on bolts of drive/idle wheels.

3) **Check of brake**
   Check the brake pedal for pedaling allowance, and the parking brake for braking efficiency.

4) Check of steering system
   Check that the steering wheel has no play.

2. OPERATION

1) STARTING/TRAVELLING/STOPPING

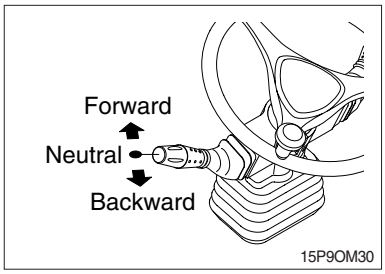


(1) With the direction control lever placed to the neutral position, make sure the parking brake is located at the operating position.
(2) With the accelerator pedal released insert the start key into the key switch.
(3) When the start key turned to "ON" position, the drive control circuit of the F.E.T (Field Effect Transistor) is connected.
(4) Place the direction control lever to the "Forward" position, and release the parking brake lever, thereby the starting preparations are complete.
(5) Step on the accelerator pedal slowly to start the battery tractor.
(6) The travelling speed can be obtained optionally from almost zero-speed to the full-speed according to the degree of the pedal stepped on.
(7) Even if the accelerator pedal is stepped on suddenly, the tractor will start smoothly without applying any notable shock.
(8) The fine movement and inching operations are also readily available, therefore, neither the resistor will be heated and burnt, nor the electric power be wasted as in the case with the battery tractor of resistance system even if the tractor is operated for a long time.

(9) When stopping the tractor, release the accelerator pedal, and step on the brake pedal at the same time to stop the tractor at the desired place.

(10) In parking the tractor, turn the direction control lever to the neutral position.
Be sure to pull out the ignition key, and apply the parking brake before leaving the tractor.

2) ELECTRIC BRAKING



(1) Turn the direction control lever to the direction opposite to the travelling one to apply the electric brake.

(2) The electric braking efficiency is varied by the degree of the accelerator pedal stepped on. Bear in mind that fully stepping on the accelerator pedal will cause the brake to apply suddenly.

(3) When applying the electric brake while descending a downward slope, turn the direction control lever to the direction opposite to the travelling one at a place where the tractor arrives at the slope, and step on the accelerator pedal slightly to descend the slope, while adjusting the pedaling condition of the accelerator pedal.

(4) If the accelerator pedal is stepped on further more continuously after stopping the tractor by the electric brake, the tractor will run in the opposite direction. This operation allows the tractor to turn quickly.

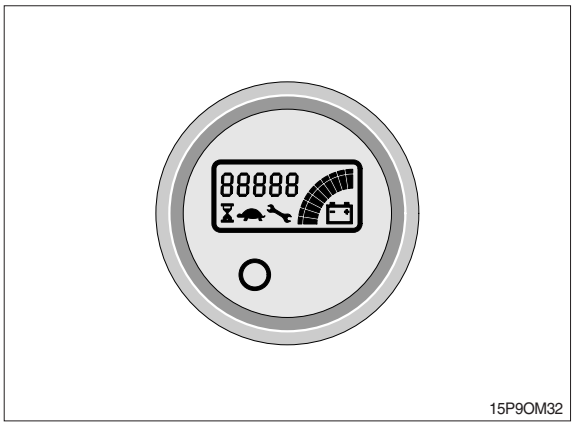
3) REGEN BRAKE

(1) Regen brake provides vehicle braking by controlling the motor as a generator and returning the generated energy back to the battery.

(2) A direction change of joystick will initiate regen braking at a level set by the direction brake current level. Braking effort is proportional to the position of joystick movement.

3. PRECAUTIONS ON OPERATION

1) OPERATION OF DISPLAY



(1) Being a communication device, it will be operated with user intervention based on signals received from a motor controller.

(2) Upon initial power-up, the instrument will go through a self-diagnostic routine.
And then, the LCD will display "Battery charge level" and "Hour meter" normally.

(3) The hour meter does not use a battery to retain the accumulated time.
Rather, it detects when power has been removed and stores the accumulated time in non-volatile memory.
The memory will store the accumulated time without power.

2) PRECAUTIONS ON OPERATION

(1) If the tractor has become inoperative during travelling, turn the start key to the stop position, and restart the tractor by turning the start key to "ON" position.
If this procedure fails to travel the tractor, contact the service shop.

(2) Pay constant caution to the braking efficiency.

(3) Also, pay caution to the vibration, change in weight, etc. of the steering wheel.

(4) Care must be taken to the sound generated from the motor and the accelerator system.

(5) Travelling the tractor continuously with some doubtful things uncorrected may result in a serious accident. When any doubtful thing is suspected, stop the operation immediately to examine the cause.

(6) Working on electrical systems in potentially dangerous.
You should protect yourself against uncontrolled operation, high current arcs, and outgassing from lead acid batteries.

- **Uncontrolled operation**
  Some conditions could cause the motor to run out of control.
  Disconnect the motor or jack up the vehicle and get the drive wheels off the ground before attempting any work on the motor control circuitry.
- **High current Arcs**
  Batteries can supply very high power, and arcing can occur if they are short circuited.
  Always open the battery circuit before working on the motor control circuit.
  Wear safety glasses, and properly insulated tools to prevent shorts.
- **Lead Acid batteries**
  Charging or discharging generates hydrogen gas, which can build up in and around the batteries.
  Follow the battery manufacture's safety recommendations.
  Always wear safety glass.

4. 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, and drop-offs.**

(2) Do not allow anyone to stand or pass between the tractor and towing load.
Watch for people in your work area even if your tractor 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 tractor up to anyone standing in front of the tractor.

2) Protect yourself and those around you...

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

※ **An overhead guard is intended to offer protection to the operator from falling objects, but cannot protect against every possible impact.**

3) No riders...

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

4) Always be in full control of your tractor...

(1) Never operate a tractor if you are not in the designated operator's position.

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

(3) Always pick the smoothest travel route for your tractor. Avoid bumps, holes, slick, spots, and loose objects or debris in your path that may cause the tractor 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.
Start, stop, travel, steer, and brake smoothly.

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

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) 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 tractor...

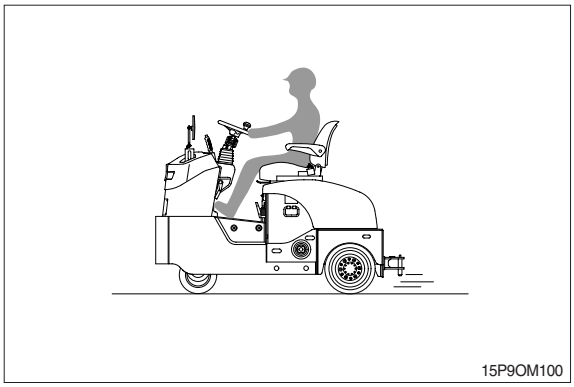
(1) Careful driving and operation is your responsibility. Be completely familiar with all the safe driving and towing techniques in this Operator's Manual. Use common sense. Drive carefully;do not indulge in stunt driving or horseplay. Observe traffic rules. Watch for people and hazards. Slow down, be in full control of your tractor at all times.

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

(3) During your work, observe all functions of your tractor. This allows you to immediately recognize a problem or irregularity that could affect the safe operation of your tractor.

(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 tractor that has a malfunction. Stop and have it fixed.



5. SHUT DOWN PROCEDURE

※ **Always leave your tractor in a safe condition.**

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

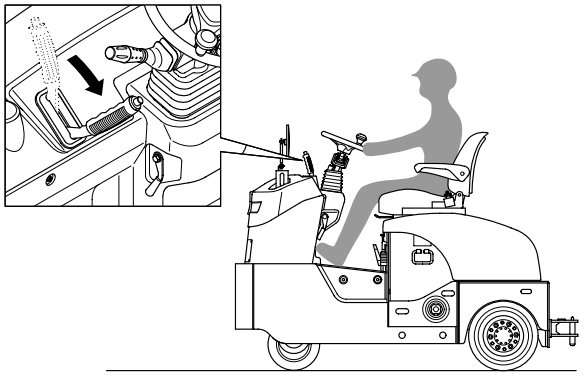
(1) Park in a safe area away from normal traffic.
(2) Never park on a grade.
(3) Never park in areas that block emergency routes or equipment, access to fire aisles, or stairways and fire equipment.

2) Before leaving the operator's position

(1) Bring the tractor to a complete stop.
(2) Put the directional control lever in the NEUTRAL position.
(3) Pull the parking brake lever to the LOCK position.

3) In addition, when leaving the tractor unattended

(1) Turn the starting switch to the OFF position and remove the key.
(2) Block the wheels, if the tractor must be left on an incline or you have any doubt about the tractor moving from a safe position.



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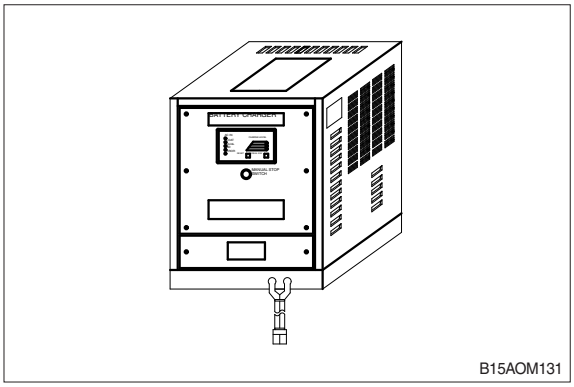
6. SOLID TIRE

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)
5) In case of a tow truck do not continue to travel further than 2 km (1.25 miles).

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

1. 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.

Before starting to charge the battery, inspect all cable joints and connections for visible damage.

Do not place any metallic objects on the battery.

There must be no flammable substances or spark-generating materials around truck parking for the purpose of battery charging.

The area in which the battery is charged must be well-ventilated and have appropriate fire protection equipment. Battery being charged not only heat but also inflammable hydrogen gas is produced. Keep fire away.

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˚C stop charging.
⑤ During charging, as an inflammable gas is generated out of the battery, particular care should taken for fire and ventilation.

2. BATTERY HANDLING

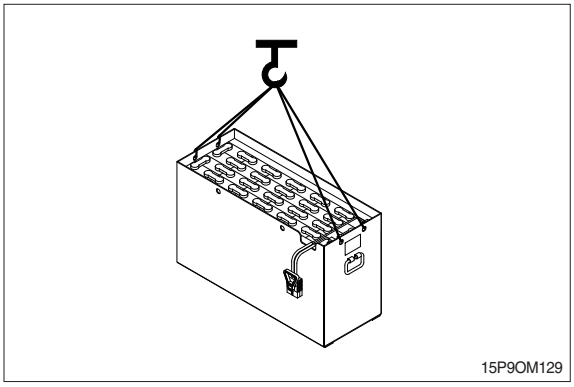
1) Change (remove) or service storage batteries only in an area designated for this purpose.

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.

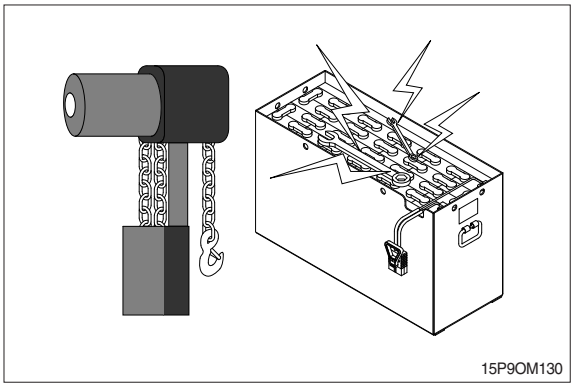
4) Always use a special lifting device such as an insulated spreader bar to attach the hoist to the battery. The width of the spreader bar hooks must be the same as the lifting eyes of the battery, to prevent damage to the battery. If the spreader bar hooks are movable, carefully adjust the position (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.



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.



⚠ Open the battery cover when charging. Battery being charged, not only heat, but also inflammable hydrogen gas is produced. So keep fire away.

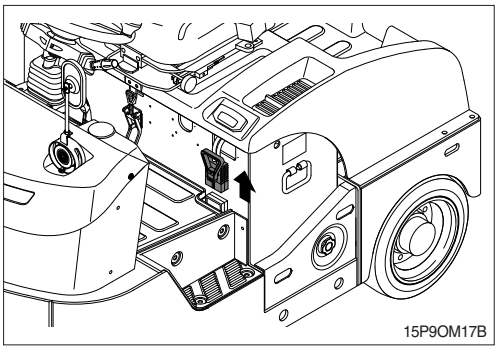
⚠ Hoisting the battery case, use 2 or 4 wires with hook and handle carefully, not to shock.

⚠ The electrolyte solution of battery is dilute sulfuric acid (H_2SO_4). Be careful not to drop on clothes and mechanical parts.

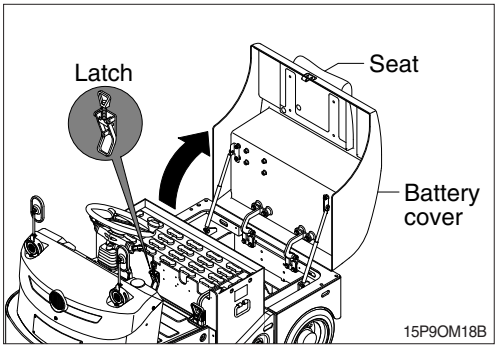
3. BATTERY REMOVAL FROM TRACTOR

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:

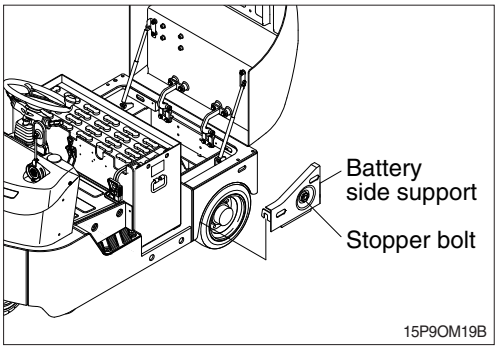
1) Disconnect the battery connector.



2) Open the battery cover.

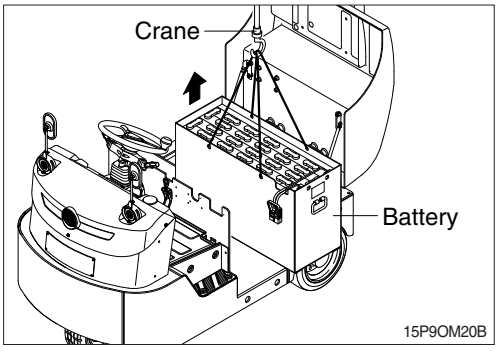


3) Loosen the stopper bolt with hand and remove the battery support.

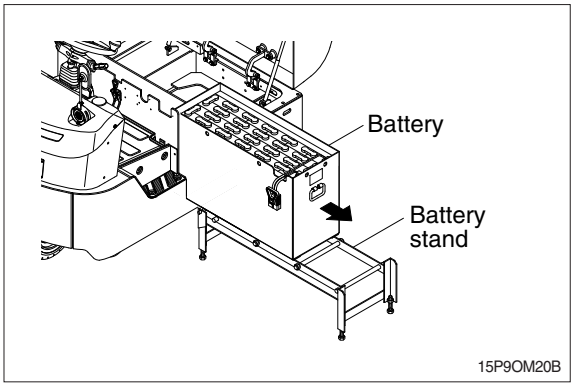


4) Using a battery hanger, carefully raise the battery assembly.

※ **Be careful not to damage control system.**

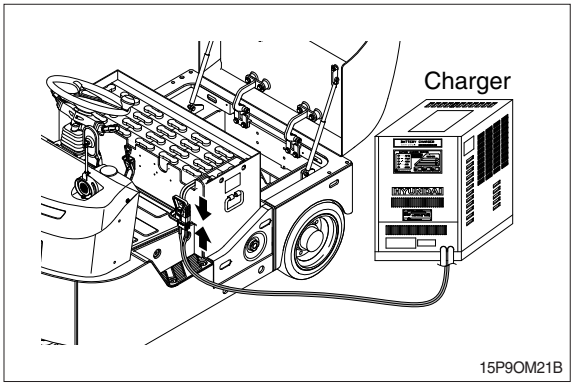


5) Adjust the height of the roller of the stand to that of the roller of the vehicle. (option)

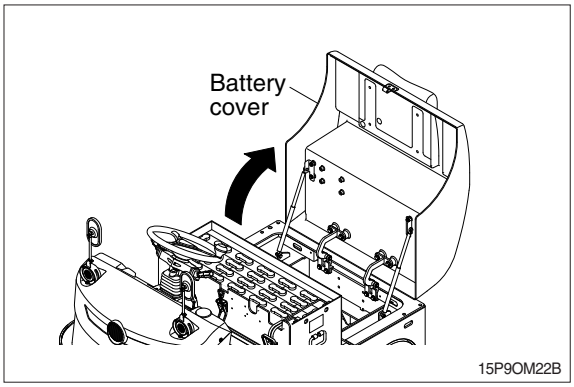


6) NOTICES

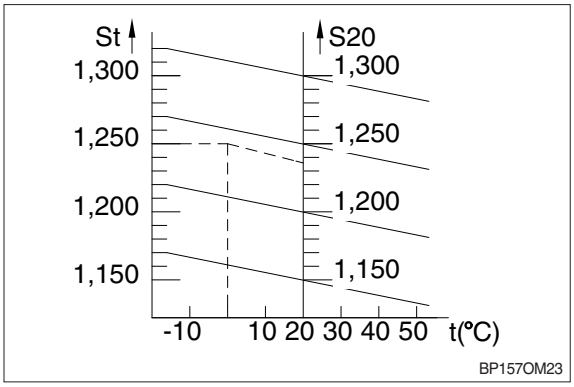
(1) Charge the battery through removing the battery connector and connecting the charging connector of the stationary charger to the battery connector.



(2) Be sure to open the battery cover during charging.



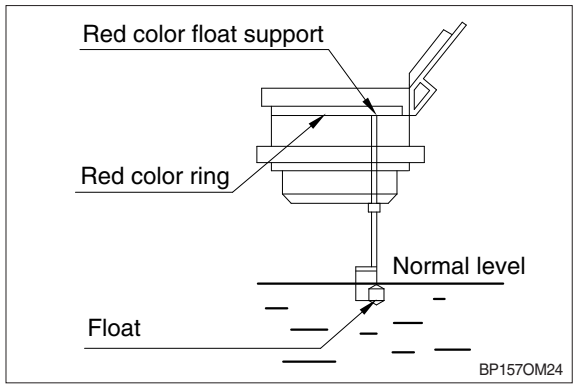
(3) Check specific gravity and electrolyte level once a week. Specific gravity at a temperature of 20˚C is as follows :
At charged (completion of charge) : 1.280
At discharged (Charging required) : 1.17



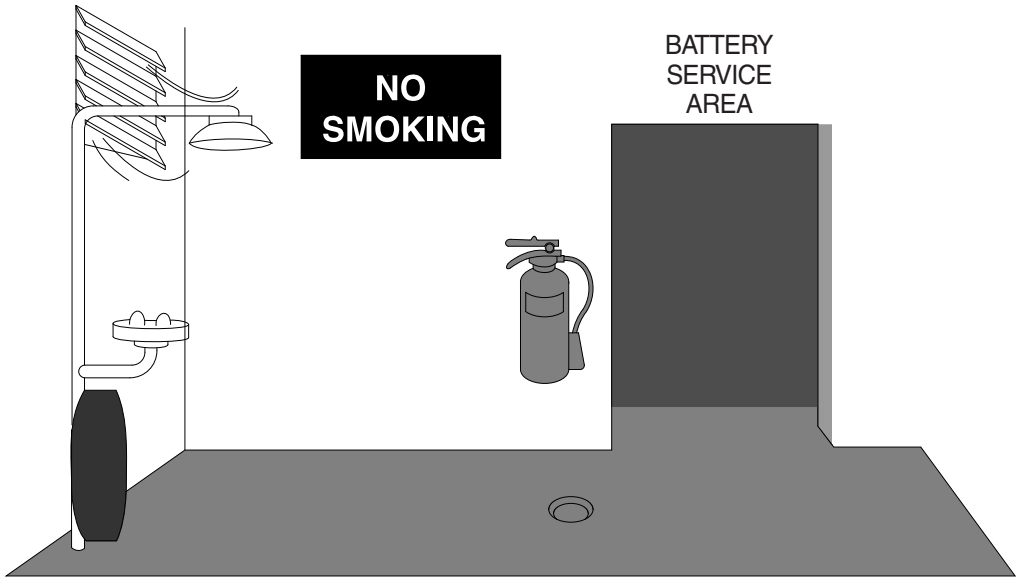
(4) Check electrolyte level, and if it is insufficient, refill distilled water to the specified level.

Distilled water should be refilled to get the red color ring the stopper or come the red color float support out.

The installation of the battery is followed the reverse order for the battery removal.



4. ELECTRIC TRACTOR BATTERY MAINTENANCE



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Battery charging and 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.

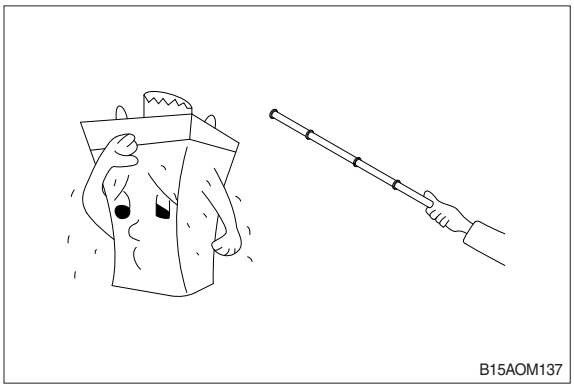
A conveyor, overhead hoist or equivalent material handling equipment must be provided for handling batteries.

⚠ **Electric tractor 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.**

5. BATTERY CLEANING AND CARE

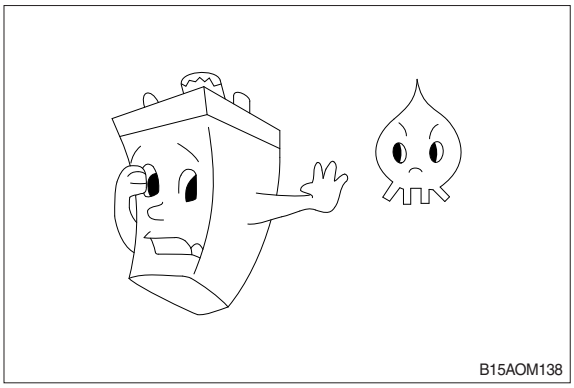
1) AVOID OVER-DISCHARGE

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.



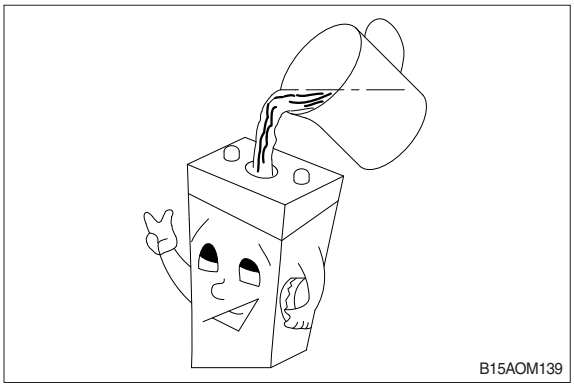
2) INFLAMMABLE

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



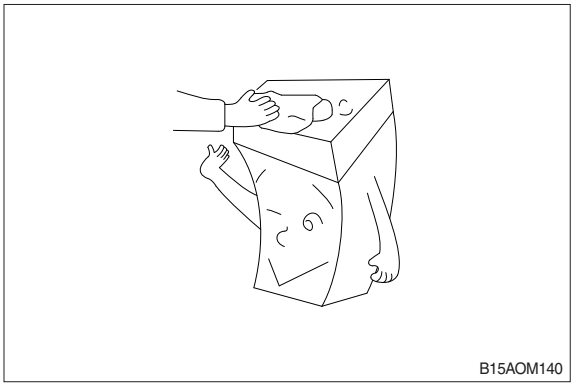
3) REFILLING DISTILLED WATER

Refill distilled water to maintain the electrolyte level to the specified height before starting 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.



4) KEEP THE BATTERY CLEAN

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



6. STORAGE

※ CAUTIONS

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

1) DAILY STORAGE

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

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

2) LONG-TERM STORAGE

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

3) CAUTION DURING STORAGE

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

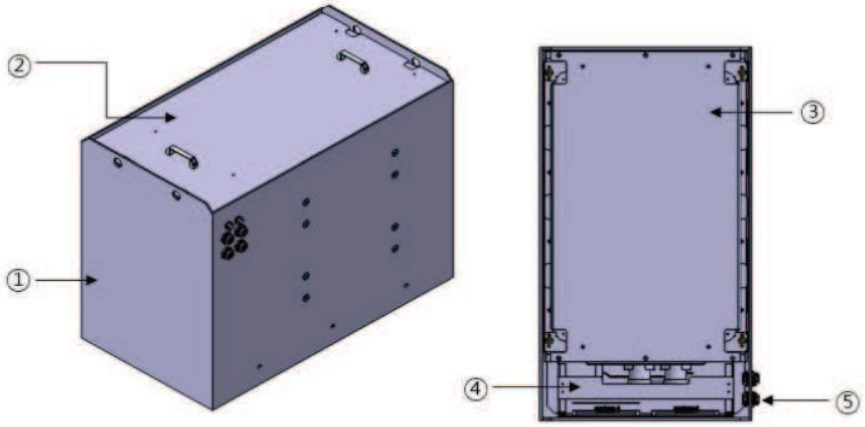
4) CAUTION AFTER STORAGE

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

7. LITHIUM ION BATTERY (OPT)

1) STRUCTURE

(1) Battery pack



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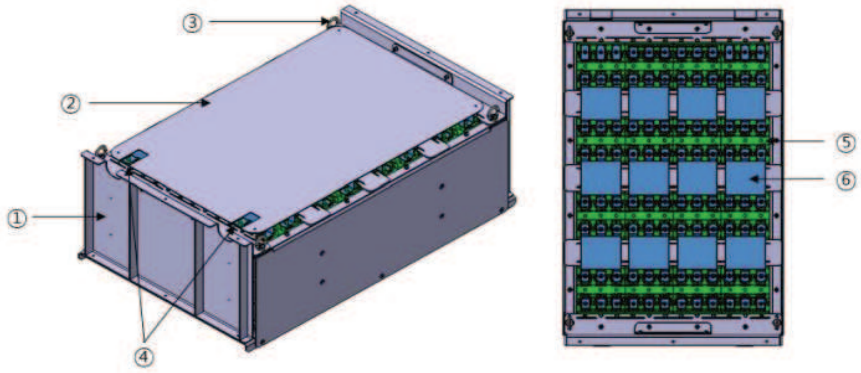
1	Housing	3	Module	5	Cable
2	Top case	4	BPU		

(2) Battery module



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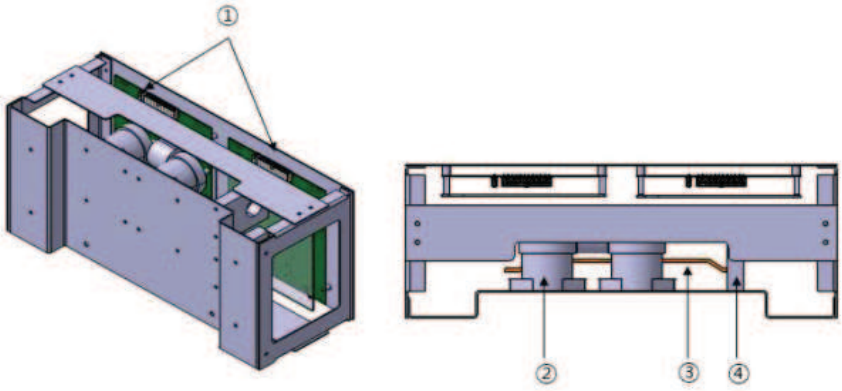
1	Module frame	3	Eye-cut	5	Cell
2	PC cover	4	+: Anode terminal, -: Cathode terminal	6	Module bus bar

(3) BMS and BPU



25BX7PM16

1 BMS 3 Grounding bus bar 4 Current sensor
2 Relay

2) INSPECTION PROCEDURE

(1) Daily inspection before starting

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

(2) Measures for abnormality before starting

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

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

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

(3) Inspection for defects after start stopping

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

(4) Measure for defects after start stopping

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

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

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

8. LITHIUM ION BATTERY CHARGER (OPTION)

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

CHARGER2

1) USE AND OPERATION

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

2) WARNING ON INSTALLATION AND SAFETY

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

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

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

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

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

⑤ Shut power off before connecting or disconnecting the battery.

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

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

The battery charger should be connected to grounded receptacle/socket for preventing shock.

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

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

⑩ Do not extent existing power connection with additional cable.

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

3) POWER CONNECTION

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

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

4) BATTERY CONNECTION

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

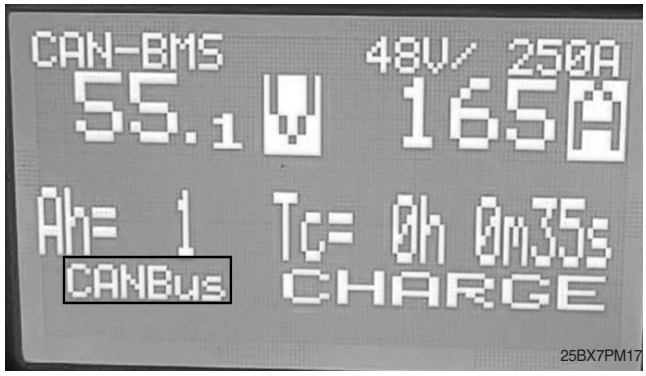
※ USB port should only be used for programming charging variables, and downloading history data and graphs. To prevent the EMI noise from causing interference to the charging process to have unexpected result on the battery charger and battery, separate the USB cable from the charger while charging.

5) PRECAUTION DURING CHARGING

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

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

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

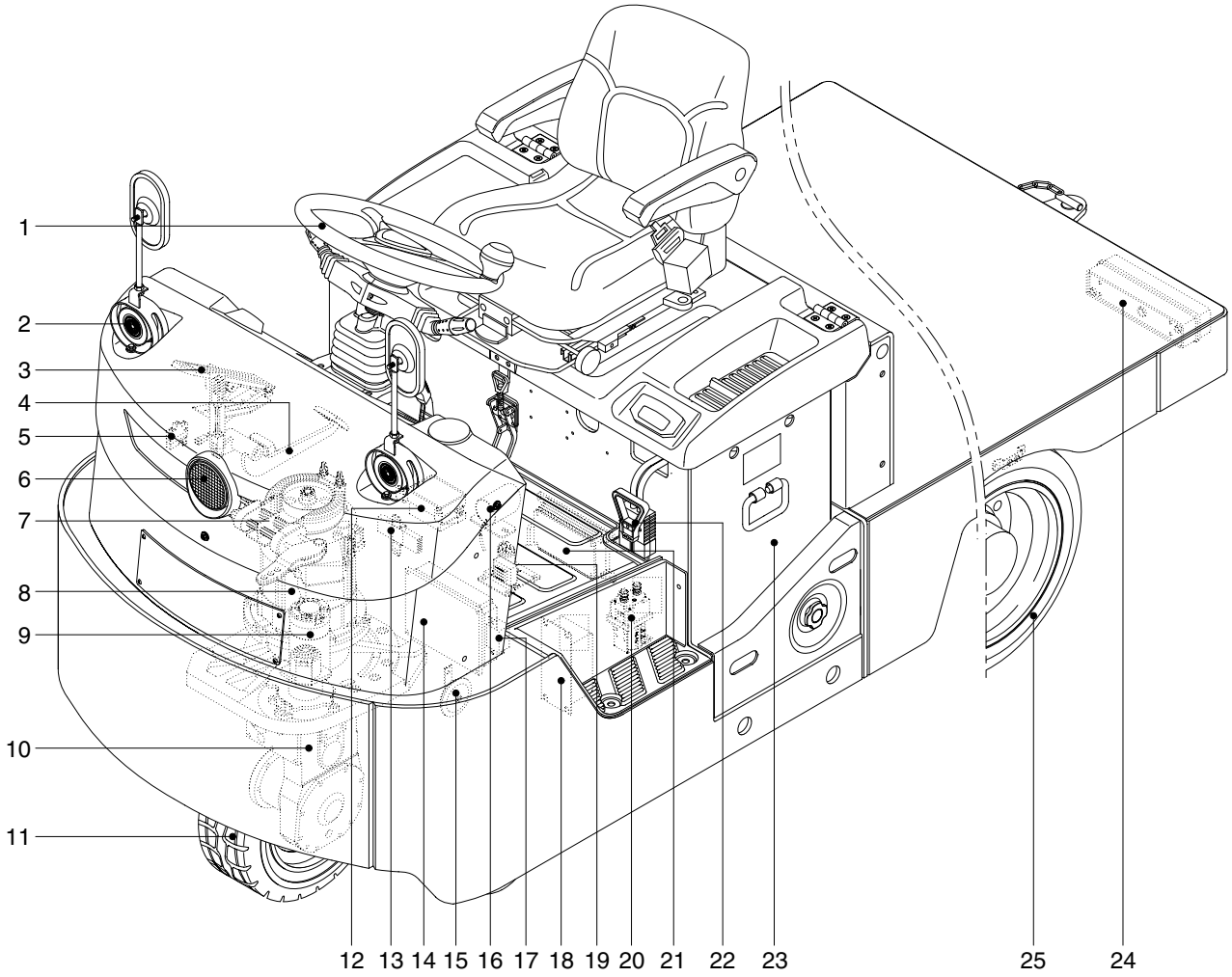


6. MAINTENANCE AND INSPECTION

1. MAJOR COMPONENT LOCATIONS

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

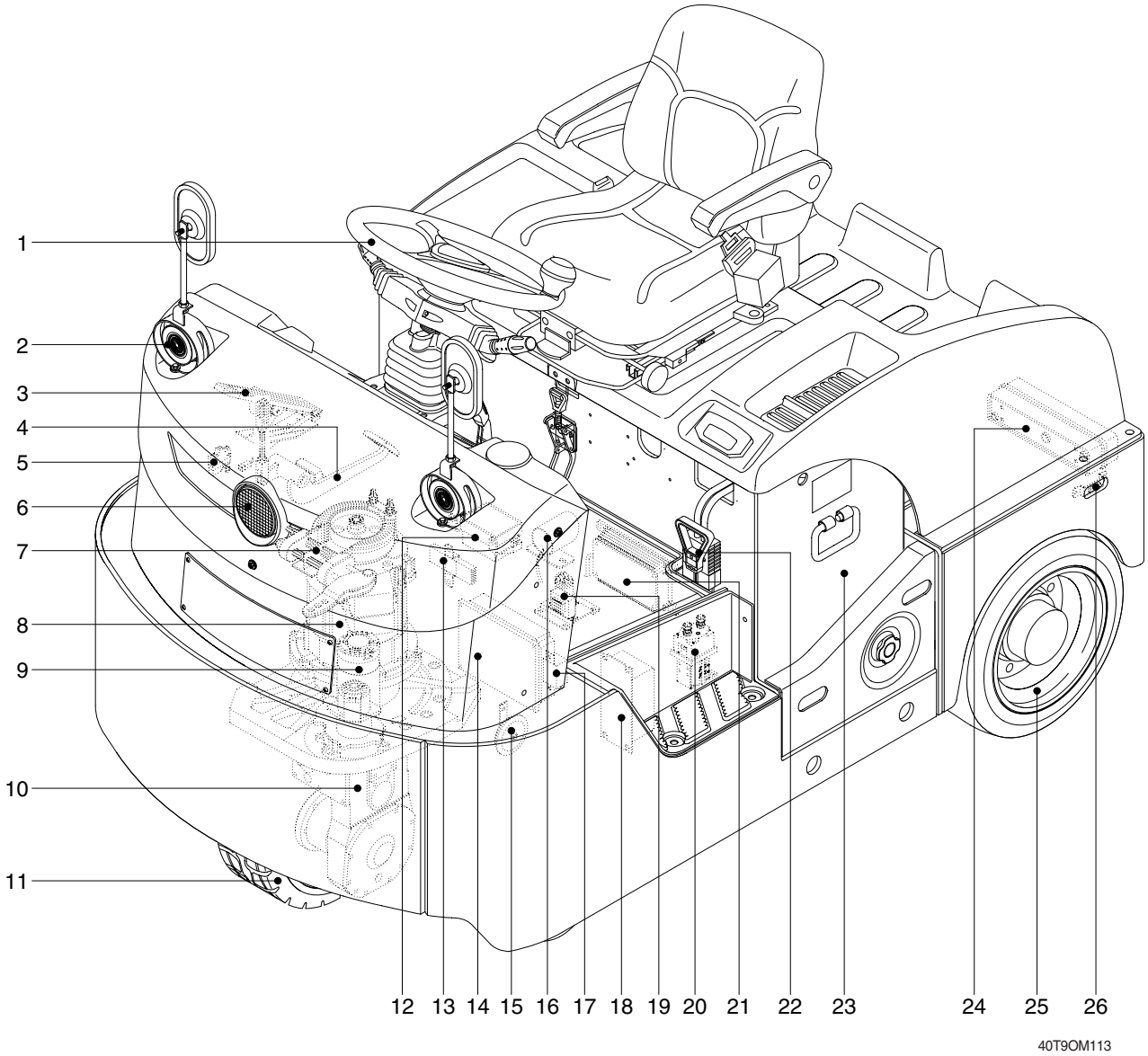
1) 15P-9



15P9OM113

1	Steering wheel	10	Drive unit	18	DC-DC converter
2	Flasher position lamp	11	Front wheel	19	EPS filter
3	Accelerator	12	Fuse box	20	Contactor
4	Brake pedal	13	Can tiller card	21	EPS controller
6	Head lamp	14	Inverter	22	Battery connector
7	Brake system	15	Horn	23	Battery
8	Drive motor	16	Back buzzer	24	Combination lamp
9	EPS actuator	17	Flasher unit	25	Rear wheel

2) 40T-9



1	Steering wheel	10	Drive unit	19	EPS filter
2	Flasher position lamp	11	Front wheel	20	Contactor
3	Accelerator	12	Fuse box	21	EPS controller
4	Brake pedal	13	Can tiller card	22	Battery connector
5	Foot switch	14	Inverter	23	Battery
6	Head lamp	15	Horn	24	Combination lamp
7	Brake system	16	Back buzzer	25	Rear wheel
8	Drive motor	17	Flasher unit	26	Inching switch
9	EPS actuator	18	DC-DC converter		

2. PERIODIC REPLACEMENT

For operation safety, never fail to perform periodic maintenance or make periodic replacement of the consumable parts listed in the following.

These parts may deteriorate in time and are susceptible to wear. It is difficult to estimate the degree of wear at time of periodic maintenance; therefore, even if no apparent wear is found, always replace with new parts within the prescribed period of replacement (Or earlier if trouble is found).
Note that periodic replacement has nothing to do with guarantee service.

※ **Replacement of consumable service parts is not covered under warranty.**

No.	Description	Period of replacement
1	Brake fluid	Every 1 year
2	Drive unit gear oil (15P/40T-9)	Every 1 year
3	EPS motor gear oil	Every 1 year
4	Wheel bearing grease	Every 1 year

3. DAILY MAINTENANCE CHECKS

The PM intervals depend on hour meter records of operation.

PM interval
A : 8 hours or daily
B : 50 hours or every week (Typical PM interval)
C : 250 hours or every 1 months
D : 1000 hours or every 6 months
E : 2000 hours or every year

Daily maintenance checks	A	B	C	D	E
Check tractor for obvious damages and leaks.	○				
Check capacity, warning plates and decals.	○				
Check condition of tires and wheels.	○				
Check for missing or loose wheel nuts.	○				
Check for steering wheel.	○				
Check gauges, instruments and switches.	○				
Check warning lights.	○				
Check directional and speed controls operation.	○				
Check for accelerator operation.	○				
Check optional safety equipment. (Alarms, Lights etc.)	○				
Check for head lamp and flasher operation.	○				
Check for flasher unit operation.	○				
Check battery connector's cleanliness.	○				
Check battery electrolyte level.	○				
Check for service brake drum, lining and cam.	○				
Check for harness, cables.	○				
Check for contactors. (Replace contactor tips if roughness is remarkable)	○				
Check for EPS filter.	○				
Check for controllers.	○				
Check for brake pedal condition and wear.	○				
Check for brake fluid (80T-9 only)	○				

○ : Check

4. PERIODIC MAINTENANCE CHECKS

The PM intervals depend on hour meter records of operation.

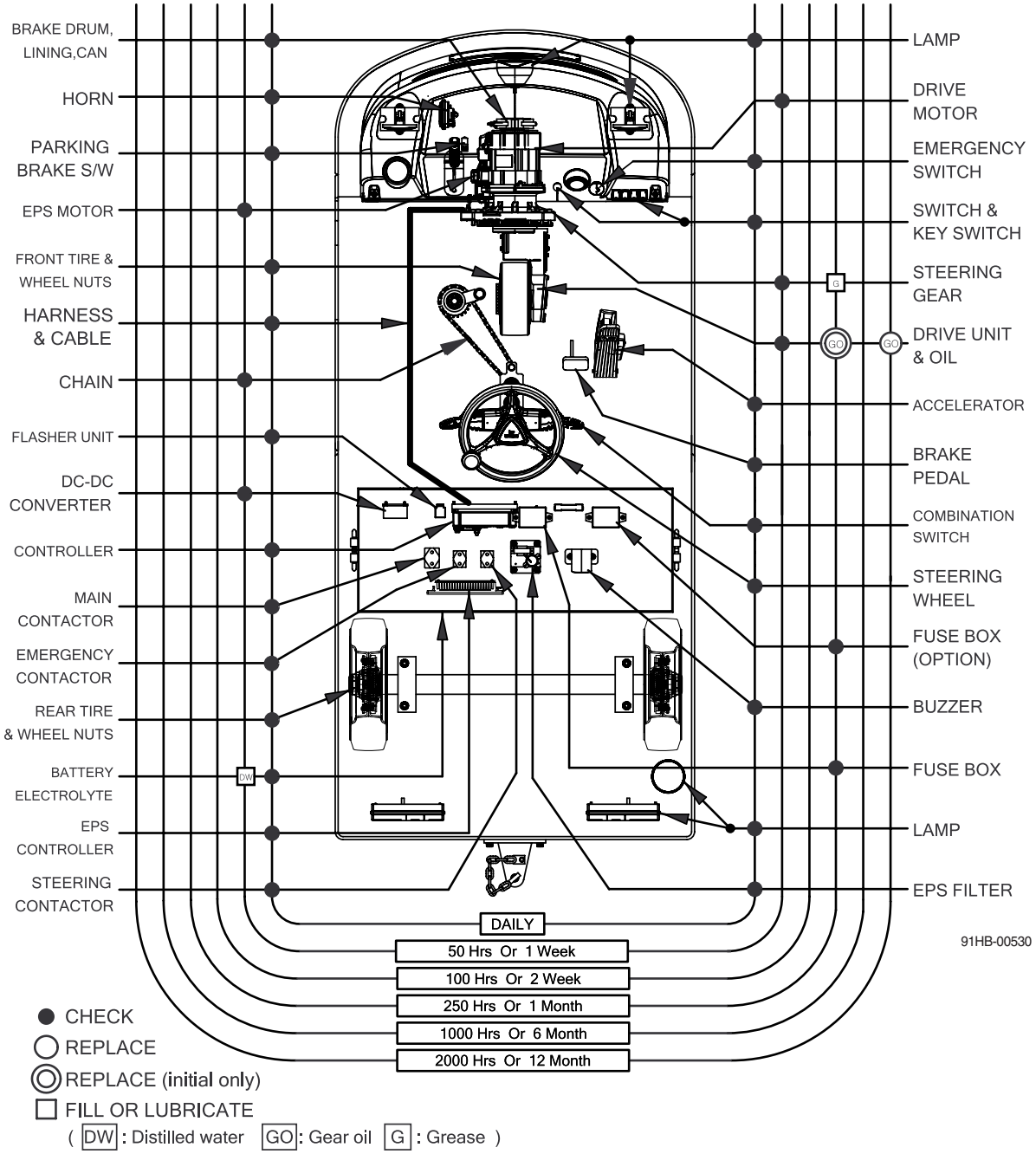
PM interval
A : 8 hours or daily
B : 50 hours or every week(Typical PM interval)
C : 250 hours or every 1 months
D : 1000 hours or every 6 months
E : 2000 hours or every year

Periodic checks and planned maintenance (PM)	A	B	C	D	E
Check tractor visually and inspect components.		○			
Test drive truck/check functional performance.		○			
Check torque on critical fasteners.		○			
Check/Clean battery terminals.		○			
Refill battery electrolyte.		■			
Check battery cables/truck receptacle		○			
Perform battery load test.		○			
Check drive motor.		○			
Check drive unit fluid level.		○	▲		●
Check chain condition and deflection		○			
Check battery connector.		○			
Check DC-DC converter.		○			
Lubricate steering gear and steering bearing of drive unit.		■			
Lubricate drive motor		○			
Check/lubricate steering column and wheel bearing.		○			
Check EPS motor and gear oil		○			●
Check EPS motor brushes			○		
Check for steering chain condition		○			
Check for fuse box		○			

* : Replace as required
○ : Check ● : Replace ■ : Refill or lubrication ▲ : Replace (Only for the first time)

5. MAINTENANCE CHART

1) 15P/40T-9



※ Service intervals are based on the hourmeter reading.

※ Turn the start switch to OFF position when servicing.

※ Always keep the surface of control & instrument panels clean in case of damage or malfunction detected in panel, replace it with a new one.

※ For other details, refer to the service manual.

6. SAFE MAINTENANCE PRACTICES

The following instructions have been prepared from current industry and government safety standards applicable to industrial tractor operation and maintenance. These recommended procedures specify conditions, methods, and accepted practices that aid in the safe maintenance of industrial tractor. 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 tractor 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 tractor 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 tractor 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 tractor:

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

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

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

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

※ **Refer to the page 4-4 for proper procedures.**

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

10) Before starting to operate the tractor:

(1) Put the directional control in NEUTRAL.

(2) Turn the start switch to the ON position.

(3) Check functioning of, direction and speed controls, steering, brakes and warning devices.

11) Before leaving the tractor:

(1) Stop the tractor.
(2) Put the directional control lever in NEUTRAL.
(3) Turn the start switch to the OFF position.
(4) Put blocks at the wheels if the tractor must be left on an incline.

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

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

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

15) 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.

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

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

18) Modifications and additions that affect capacity and safe tractor operation must not be done without the manufacturer's prior written approval. Capacity, operation and maintenance instruction plates, tags or decals must be changed accordingly.

19) 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.

20) Use special care when removing heavy components. Be sure that lifting and handling equipment is of the correct capacity and in good condition.

7. MAINTENANCE GUIDE

1) DRIVE WHEELS

(1) Pay constant caution to see that the set bolts of the power axle are not loosened.
(2) Make sure that the wheel tightening nuts are not loosened.
When tightening the nuts, be sure to tighten the nuts located at diagonal position sequentially so that they should not be tightened in deviant way.
(3) Make sure that there is no oil leakage from the drive gear case.
Also, check that the tightening bolts are not loosened.

2) REAR WHEELS

(1) Be sure to pay caution constantly so that the wheel tightening bolts are not loosened as in the case with the drive wheels.
(2) When reassembling the idle wheels after disassembling them for alignment, be sure to reassemble them just in the reverse of disassembling.

3) STEERING SYSTEM

(1) Since the steering system is particularly an essential part, be sure to check each part of the system for alignment, damage, deformation, etc., so that it can be always kept under the optimum condition.
(2) Check the deflection of the chain with a finger press at a point midway.
· Chain deflection : 10 mm (under load of 5 kg)

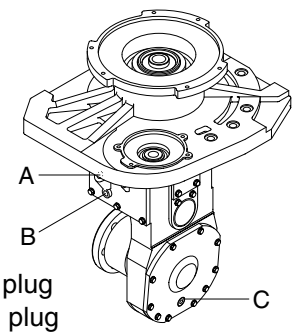
4) BRAKE

(1) Check the brake pedal for "play" and pedaling allowance when it is stepped on, and looseness of each part, etc.
(2) If the tractor slides laterally when the brake is applied suddenly, the brake is applied unevenly.
In this case, adjust the brake so that it can be applied evenly.
(3) Check and adjust the gap between the parking brake lining and the drum, and the braking efficiency.
(4) Parking brake
Adjust the parking brake to such an extent that there still remains some pulling allowance when the brake lever is fully pulled. Make sure that the brake is held in a condition not to be applied at all when the lever is returned.

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

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

15P/40T-9



A : Oil filler plug
B : Oil level plug
C : Oil drain plug

15P9OM119B

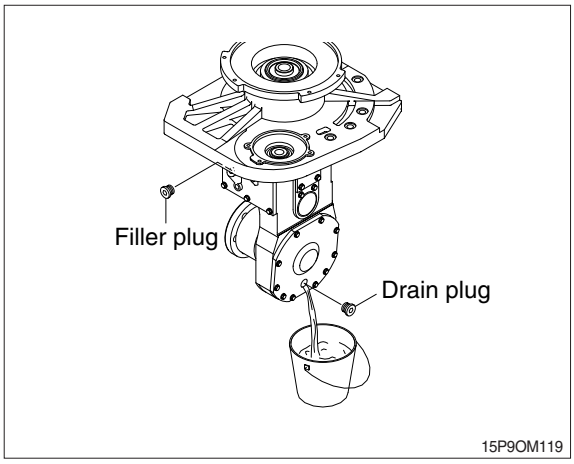
6) OIL CHANGE & FILL OF DRIVE UNIT

(1) Oil change

⚠ Do not drain drive unit oil into the soil or the sewerage system.
Pay attention to the type and quantity of debris.

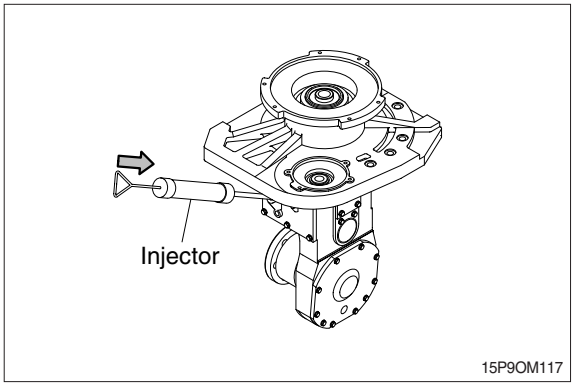
⚠ High oil temperatures are to be expected after continuous operation of the drive unit.
Wear temperature-resistant gloves!

- Position the vehicle on even ground and lock the wheels for safety purposes.
- Carefully clean the area around the oil filler and oil drain plug.
- Place a suitable big oil collecting vessel under the oil drain plug.
- Loosen the oil filler plug with a allen wrench. Remove the oil filler plug.
- Loosen the oil drain plug with a allen wrench. Remove the oil drain plug.
- Have the oil drained into the vessel completely.



(2) Fill in the drive unit oil

- Clean magnet on the oil drain plug.
- Fill in the drive unit oil. (Refer to page 6-18)
- For filling use a suction and pressure injector. This allows an easy and rapid filling of the drive unit with oil.
- The correct oil level and the correct oil quantity is achieved when the oil level is at the lower edge of the oil level plug, at least when oil penetrates at the level plug.
- Attach the oil filler plug.



7) EXTERNAL APPEARANCE CHECK OF THE VEHICLE

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

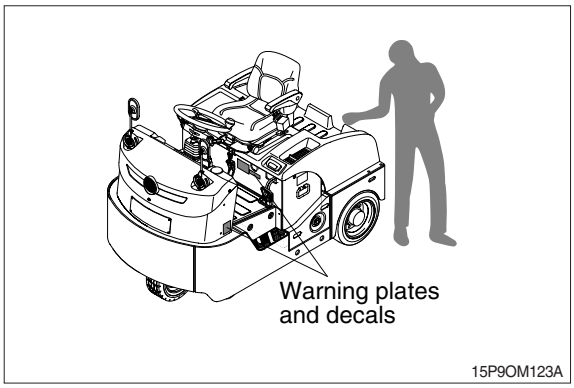
8. VISUAL INSPECTION

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

1. Walk around the tractor and take note of any obvious damage and maintenance problems. Check for loose fasteners and fittings.
2. Check to be sure all capacity, safety, and warning plates or decals are attached and legible.

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

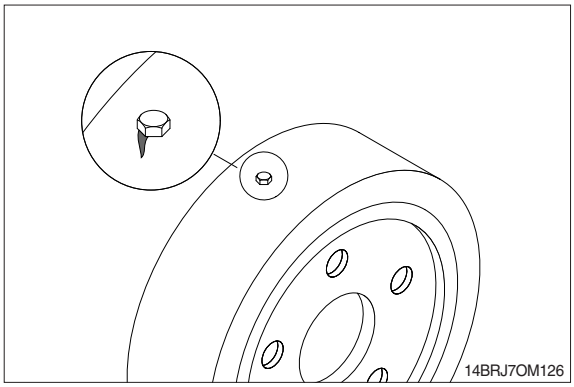
3. Inspect the tractor for any sign of external leakage: drive axle fluid etc.
4. Be sure that the driver's overhead guard, and safety devices are in place, undamaged and attached securely.



5. WHEELS AND TIRES

1) 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 nuts or bolts to be sure none of them is loose or missing. Replace missing bolts or nuts. Torque loose or replaced items to specifications.

※ **Refer to the page 7-3.**



9. AIR CLEANING THE TRACTOR

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

Tractor 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 : drive unit; battery; cables; switches and wiring harness; drive motors; and suspension, linkage.

10. ELECTRICAL SYSTEM

1) TRACTION CONTROLLER

(1) Periodically cleaning the controller exterior will help protect it against corrosion and possible electrical control problems created by dirt, grime, and chemicals that are part of the operating environment and that normally exist in battery powered systems.

(2) When working around any battery powered system, proper safety precautions should be taken. These include, but are not limited to : proper training, wearing eye protection, and avoiding loose clothing and jewelry.

(3) Use the following cleaning procedure for routine maintenance. Never use a high pressure washer to clean the controller.

① Remove power by disconnecting the battery.

② Discharge the capacitors in the controller by connecting a load (such as a contactor coil) across the controller's B^+ and B terminals.

③ Remove any dirt or corrosion from the power and signal connector areas. The controller should be wiped clean with a moist rag. Dry it before reconnecting the battery.

④ Make sure the connections are tight.

2) BATTERY

(1) The maintenance of the battery is very important to obtain efficient truck operation and maximum battery life.

(2) Leakage voltage from battery terminals to battery case can cause misleading trouble symptoms with the truck electrical system.

(3) Because components of the truck electrical system are insulated from truck frame, leakage voltage will not normally affect truck operation unless a short circuit or breakdown of circuit wire.

(4) A voltage check from battery connector terminal to battery case should be indicated near zero voltage. Typically, however, the sum of the voltages at both terminals will equal the battery volts.

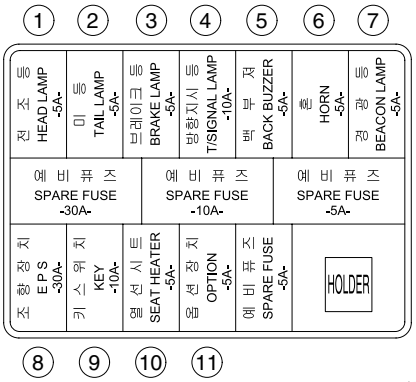
(5) This leakage voltage will discharge the battery. As battery cleanliness deteriorates, the usable charge of the battery decreases due to this self discharge.

(6) Although a leakage voltage reading of zero volts may not be possible, a cleaner battery will have more usable charge for truck operation and not affect operation of electric devices on the unit.

3) FUSE BOX

(1) Fuse box assy 1

No.	Capacity	Related electrical component
①	5A	Head lamp
②	5A	Tail lamp
③	5A	Brake lamp
④	10A	Turn signal lamp
⑤	5A	Back buzzer
⑥	5A	Horn
⑦	5A	Beacon lamp
⑧	30A	EPS
⑨	10A	Start switch
⑩	5A	Seat heat
⑪	5A	Option

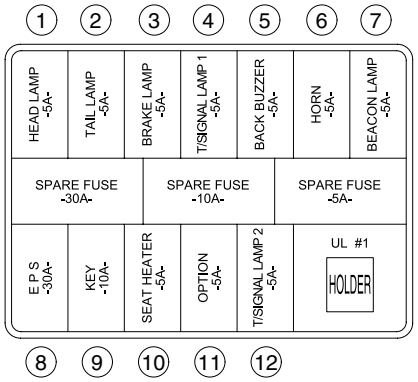


15P9OM121

(2) Fuse box assy 2 (UL)

①UL #1

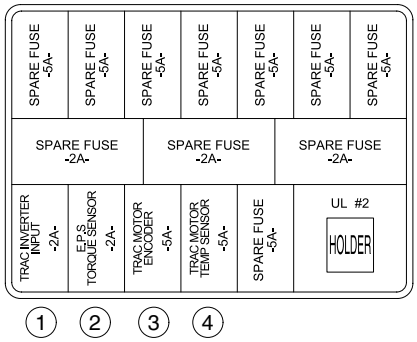
No.	Capacity	Related electrical component
①	5A	Head lamp
②	5A	Tail lamp
③	5A	Brake lamp
④	10A	Turn signal lamp 1
⑤	5A	Back buzzer
⑥	5A	Horn
⑦	5A	Beacon lamp
⑧	30A	EPS
⑨	10A	Start switch
⑩	5A	Seat heat
⑪	5A	Option
⑫	5A	Turn signal lamp 2



15P9OM122

②UL #2

No.	Capacity	Related electrical component
①	5A	Traction inverter input
②	5A	EPS torque sensor
③	5A	Traction motor encoder
④	10A	Traction motor temp sensor



15P9OM123

① Turn the starting switch OFF.

② Open the cover of the fuse box, and replace fuses inside (To open the cover of the fuse box, push the side of the cover lightly with a finger, and pull the cover forward to remove it.)

⚠ **When replacing the fuse, check the relationship between the fuse and the electrical components it protects. Always replace fuses with a fuse of the same capacity. Always turn the starting switch OFF before replacing any fuse.**

11. LUBRICATION

Since the life of vehicle is dependent upon the quality of lubrication, be sure to perform the lubrication with utmost care so that the tractor will not fall in trouble due to insufficient or improper lubrication oil.

(1) In supplying the oil, be sure to clean the lubrication port so that the oil should not be contaminated.

(2) Sine the oil viscosity will be decreased under high temperature, resulting in decreased lubrication efficiency, be sure to use the oil of high viscosity in summer (for normal temperature of over 32˚C) and that of low viscosity in winter (for normal temperature of under 0˚C).

12. NEW TRACTOR OILS

New machine uses following lubricants and oils.

Description	Specification
Gear oil (GO)	SAE 80W-90/API GL-5

· API : American Petroleum Institute

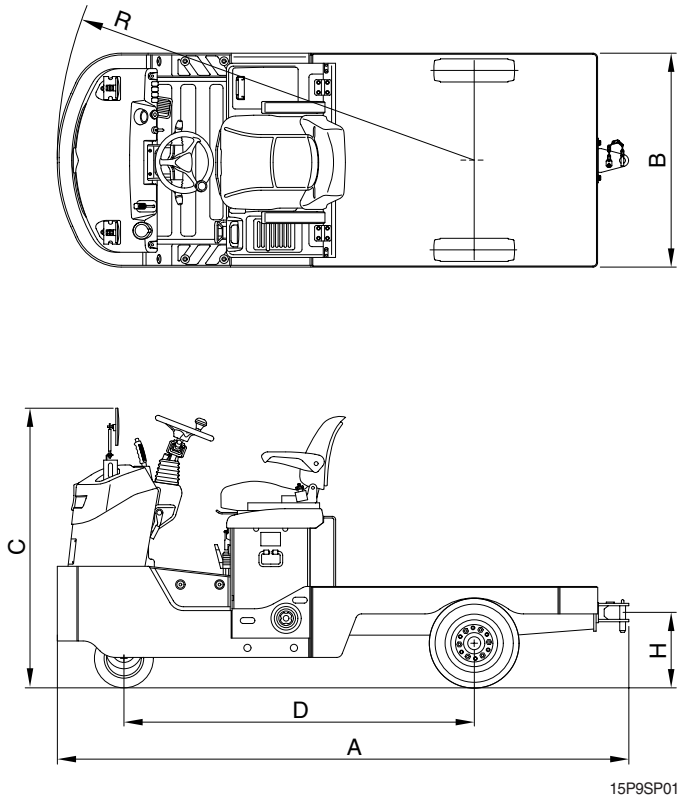
· SAE : Society of Automotive Engineers

13. RECOMMENDED LUBRICANTS

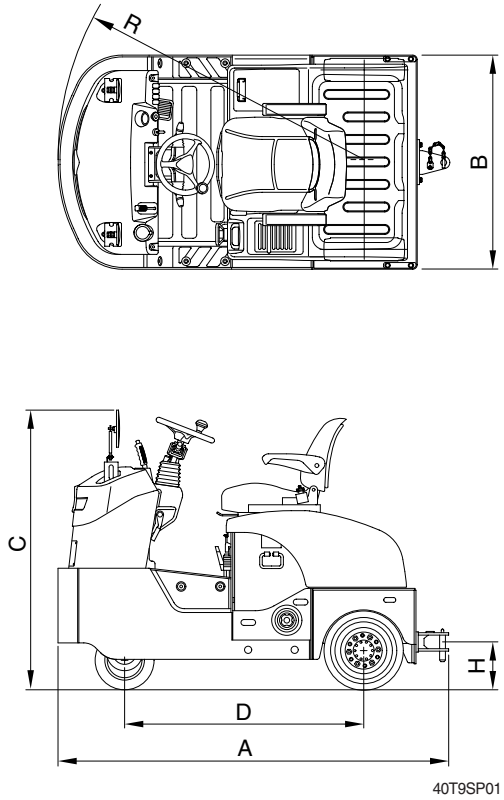
Service point	Kind of fluid	Capacity ℓ (U.S. gal)	-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)	40 (104)
		15P-9 40T-9							
Drive unit	Gear oil	1.6 (0.42)	SAE 80W-90/API GL-5						
	Brake fluid	-	Azolla ZS 32/ SAE 10W						
EPS Actuator	Gear oil	0.175 (0.05)	SAE 80W-90/API GL-5						

1. SPECIFICATIONS

1) 15P-9



2) 40T-9



Model			Unit	15P-9	40T-9
Capacity			kg	1500 (3310)	4000 (8820)
Travel speed	Loaded		km/h (mph)	8 (5)	←
	Unloaded		km/h (mph)	10 (6.2)	←
Min. turning radius		R	mm (in)	2143 (7' 0")	1573 (5' 2")
Overall length		A	mm (in)	2939 (9' 8")	2012 (6' 7")
Overall width		B	mm (in)	1100 (3' 7")	←
Overall height		C	mm (in)	1430 (4' 8")	←
Wheel base		D	mm (in)	1800 (5' 11")	1230 (4' 0")
Hook height		H	mm	326/ 381	179/234/ 289/344
Weight (Unloaded)			kg (lb)	1247 (2749)	1236 (2725)
Drive motor			kW	4.0	←
Wheel tread	Front		mm (in)	-	-
	Rear		mm (in)	900 (2' 11")	←
Ground clearance			mm (in)	150 (5.9")	←
Tire	FR		-	ø 305 × 127	←
	RR		-	5.00-8-8PR	4.00-8

2. SPECIFICATION FOR MAJOR COMPONENTS

1) DRIVE MOTOR CONTROLLER

Item	Unit	15P/40T-9
Model	-	ACE2 36-48V 300A
Type	-	MOSFET
Current limit	A	300
Dimension	mm (in)	200 × 160 × 95 (7.9 × 6.3 × 3.7)
Operation temperature	˚C	-40~80
Communication	-	CAN

2) EPS CONTROLLER

Item	Unit	15P/40T-9
Model	-	30DS-CR12-002
Type	-	DC 48V
Current limit	A	25
Dimension	mm (in)	124 × 234 × 50
Operation temperature	˚C	-20 ~ +60

3) DRIVE MOTOR

Item	Unit	15P/40T-9
Model	-	AMBS 4001
Type	-	AC
Rated voltage	Vac	30
Output	kW	4
Insulation class	-	F

4) EPS MOTOR

Item	Unit	15P/40T-9
Model	-	30DS-HT01-002
Type	-	DC
Rated voltage	Vac	48
Output	kW	0.3
Insulation class	-	F

5) DRIVE UNIT

Item	Unit	15P/40T-9
Type	-	Vertical
Max wheel load	kg (lb)	750 (1653)
Gear ratio	-	20.125
Weight without fluid	kg (lb)	100 (220)

6) WHEELS

Item		Unit	15P/40T-9
Type	Front	-	Cushion (std), Urethane, Non-marking
	Rear	-	Pneumatic (15P-9, std), Solid (40T-9, std), Solid, Non-marking
Quantity	Front	-	1
	Rear	-	2
Tire	Front	-	ø 305×127
	Rear	-	5.00-8-8PR (15P-9) 4.00-8 (40T-9)
Tire pressure	Front	psi	-
	Rear	psi	114 (15P-9)

7) STEERING

Item	Unit	15P/40T-9
Type	-	Electric power steering
Steering angle	-	90˚ to both right and left angle, respectively

8) SERVICE BRAKE

Item	Unit	15P/40T-9
Type	-	Drum

9) PARKING BRAKE

Item	Unit	15P/40T-9
Type	-	Ratchet

10) BATTERY

Item	Unit	15P/40T-9
Voltage	V	48
Capacity	AH/hr	230/5 (std) 280/5 (opt)
Type	-	VCl230 (std) VCF280 (opt)
Dimension (W x L x H)	mm (in)	965×380×580 (38"×15"×22.8")
Weight	kg (lb)	400 (880) (std) 470 (1040) (opt)

11) CHARGER

Item	Unit	15P/40T-9
Voltage	-	IUIa
Capacity	V-AH/hr	48-201~230/5 (std) 48-280~365/5 (opt)
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	-	SB 350

3. TIGHTENING TORQUE FOR MAJOR COMPONENTS

No.	Items		Size	kgf · m	lbf · ft
1	Electric system	EPS motor assy	M 8×1.25	3.9±0.2	28.2±1.4
2	Power train system	Drive unit mounting bolt	M16×2	29.7±3.0	215±21.7
3		Drive motor mounting bolt	M 8×1.25	3.9±0.2	28.2±1.4
4		Rear axle mounting bolt, nut	M14×2.0	20.0±2.0	145±14.4
5		Front wheel mounting bolt	M16×1.5	20.0±1.5	145±10.8
6		Rear wheel mounting nut	M12×1.5	10.0±1.0	72.3±7.2
7	Others	Seat mounting nut	M 8×1.25	2.5±0.5	18.1±3.6