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A MESSAGE TO HYUNDAI LIFT TRUCK OPERATORS

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

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

- **Operator not properly trained**
- **Operator not experienced with lift truck operation**
- **Basic safety rules not followed**
- **Lift truck not maintained in safe operating condition**

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

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

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

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

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

HYUNDAI lift trucks 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 truck unless you have been trained in safe lift truck repair procedures and are authorized by your employer.

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

INTRODUCTION

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

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

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

Routine Servicing and Maintenance

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

Operator Daily Inspection - Safety and Operating Checks

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

Planned Maintenance

In addition to the daily operator inspection, HYUNDAI recommends that a planned maintenance 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 lift truck. 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 lift truck usage.

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

Service Manual

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

HOW TO USE THIS MANUAL

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

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

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

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

Section 4. Operator Maintenance and Care, presents details on how to perform the operator's daily safety inspection and refuel the lift truck.

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

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

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

Section 8. Specifications, provides reference information and data on features, components, and tightening torques.

Section 9. Troubleshooting, provides trouble symptoms, causes and methods of remedy.

Section10. Testing and Adjusting, gives instructions for testing and adjusting.

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

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

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

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

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

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

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

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

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

※ **Illustrations may differ from your truck, but they are applicable to your truck.**

EC REGULATION APPROVED

· Noise level (2000/14/EC and EN 12053) are as followings.

Model	LWA (EU only)	LPA
110D/130D/160D-9	105 dB	75 dB

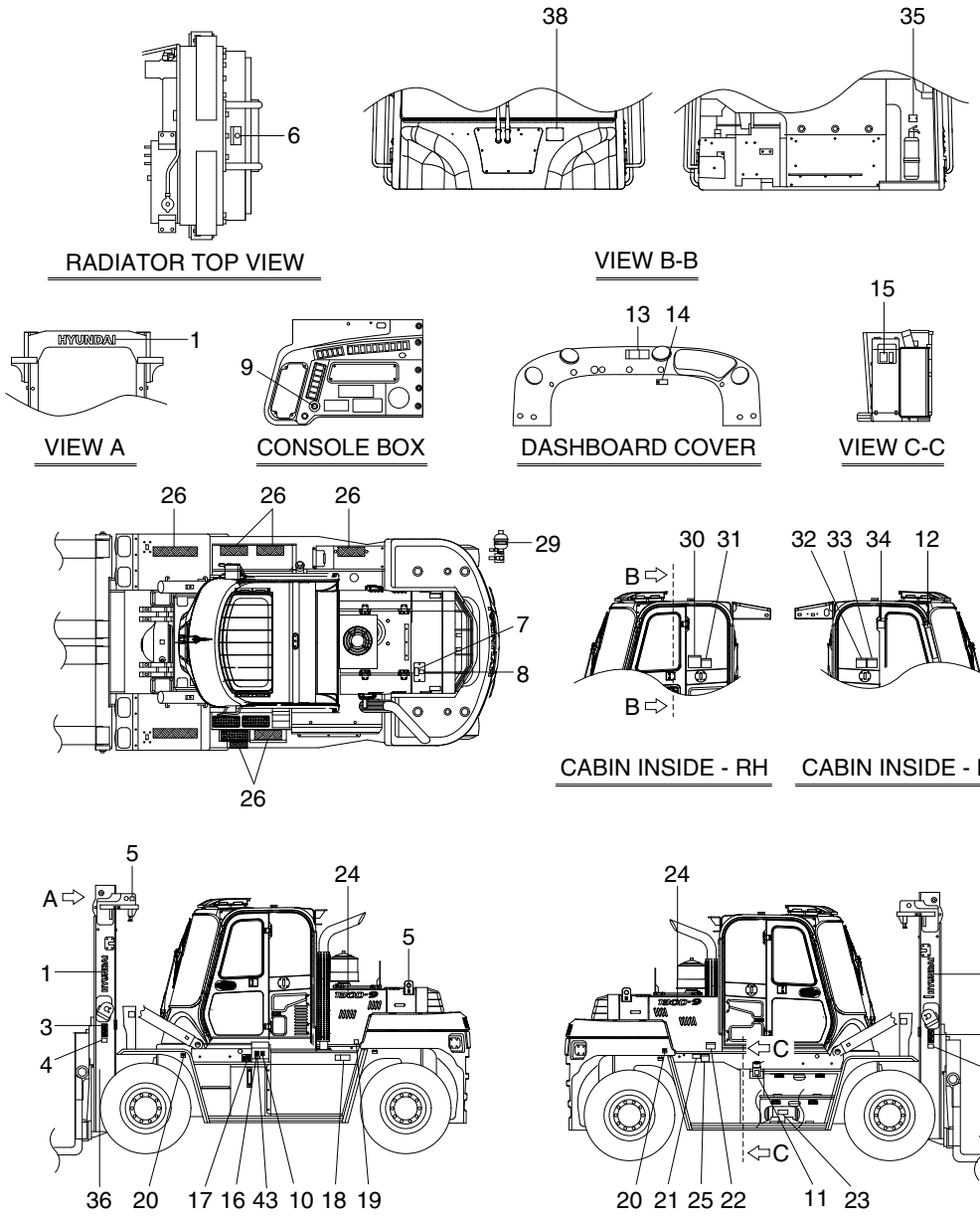
· The value of vibrations transmitted by the operator's seat are lower than standard value of (2005/88/EC)

CE

SAFETY LABELS

1. LOCATION

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



1	Logo (HYUNDAI)	14	Solid tire	26	Safety work
3	Mast warning	15	DEF/AdBlue®	29	Accumulator
4	Hand caution	16	Cab tilt (Up/Down)	30	Start procedure
5	Hook	17	Tilt cabin warning	31	Load capacity
6	Radiator fan	18	SCR	32	Air compressor-cab
7	Radiator	19	Engine wash	33	Safety instruction (OPSS)
8	Temperature	20	Tire pressure	34	Hammer
9	Start key	21	Brake cooling oil	35	Fire extinguisher
10	Hydraulic oil	22	Noise level	36	Grease
11	Diesel fuel	23	Air compressor-tank	38	Name plate
12	Operator safety	24	Model name	43	Tilt warning
13	Start warning	25	ECU/TCU caution		

2. DESCRIPTION

There are several specific warning labels on this machine please become familiarized with all warning labels.

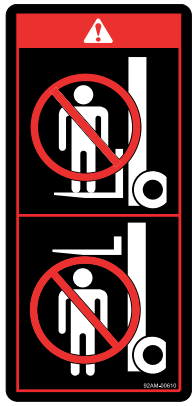
Replace any safety label that is damaged, or missing.

1) MAST WARNING (Item 3)

This warning label is positioned on the left and right side of the mast.

⚠ **Never stand or work under the raised forks at any circumstances without supporting with block.**

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

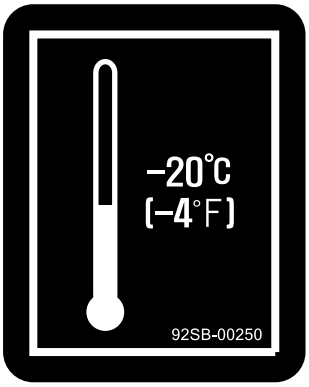


25L7A0OM06

2) TEMPERATURE (Item 8)

This warning label is positioned on the top side of engine hood rear cover.

⚠ **Coolant must be checked as specified in the maintenance chart.**



25L7A0OM10

3) RADIATOR (Item 7)

This warning label is positioned on the top side of engine hood rear cover.

⚠ **It forbids to open the filler cap of the surge tank because operator might get scalded due to spouting of hot water when the engine is running.**

⚠ **Never open the filler cap while engine running or at high coolant temperature.**

93HS-00110

4) **RADIATOR FAN** (Item 6)

This warning label is positioned on the top side of cooling fan shroud.

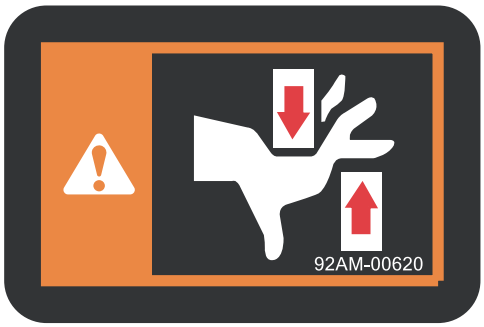
⚠ **It warns of the danger or injury from spinning fan blades when the engine is running. Be sure that you keep your hands, fingers, arms and clothing away from a spinning fan.**
Don't stand in line with a spinning fan. Fan blades can break at excessively high rpm and be thrown out of the engine compatment.

93HS-00120

5) **HAND CAUTION** (Item 4)

This warning label is positioned on the left and right side of the mast.

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



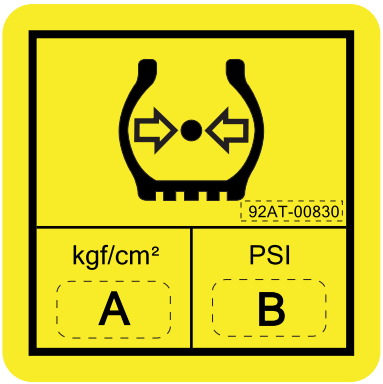
35DEOM103

6) **TIRE PRESSURE** (Item 20)

This label is positioned on the both of the front fender and the both of the counterweight.

⚠ **Tire pressure must be checked in accordance with the maintenance chart.**

⚠ **Refer to page 5-3 for the regulated tire air pressure (A and B).**

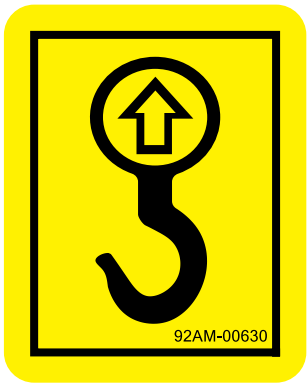


25L7A0OM08

7) **HOOK** (Item 5)

This warning label is positioned near the lifting bracket on the engine hood rear cover and the top side of mast (LH and RH).

※ **Refer to page 5-34 for safe loading procedures.**

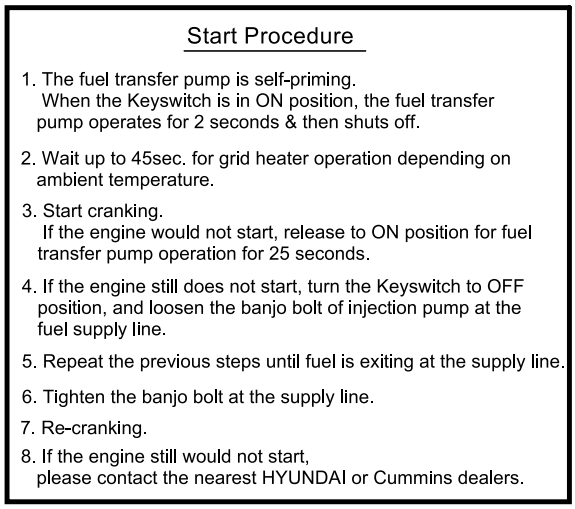


92AM-00630

8) START PROCEDURE (Item 30)

This warning label is positioned on the right window inside of cabin.

1. The fuel transter pump is self-priming.
   When the start switch is in ON position, the fuel transter pump operates for 2 seconds & then shuts off.
2. Wait up to 45 sec for grid heater operation depending on ambient temperature.
3. Start cranking.
   If the engine would not start, release the start switch to ON position for fuel transfer pump operation for 25 seconds.
4. If the engine still does not start, turn the start switch to OFF position, and loosen the banjo bolt of injection pump at the fuel supply line.
5. Repeat the previous steps until fuel is exiting at the supply line.
6. Tighten the banjo bolt at the supply line.
7. Re-cranking.
8. If the engine still would not start, please contact the nearest HYUNDAI or Cummins dealers.



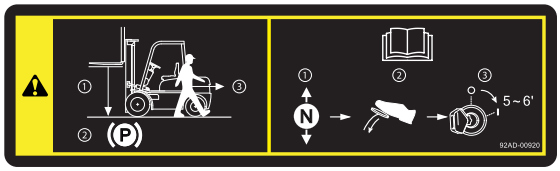
91LC-11170

9) START WARNING (Item 13)

This warning label is positioned on the middle top side of dashboard.

※ **Start key switch after 5~6 seconds from ON position. It needs approx 5~6 seconds to set correct position of throttle.**

1. Warnings before leaving the operator seat.
   - Be sure to lower the attachment to the ground.
   - Apply the parking brake.
2. Cautions before starting or operating the truck.
   - Put the gear selector lever in the neutral.
   - Apply the parking brake.
   - Read this operator's manual carefully.



50DEFW55

10) **SAFETY INSTRUCTION** (Item 33)

This warning label is positioned on the left window of cabin inside if the truck is for equipped with *OPSS.

⚠ **This forklift is equipped with an operator existence sensing system per ANSI/ ASME B56.1-7.21.10 / 7.21.11 or ISO 3691.**

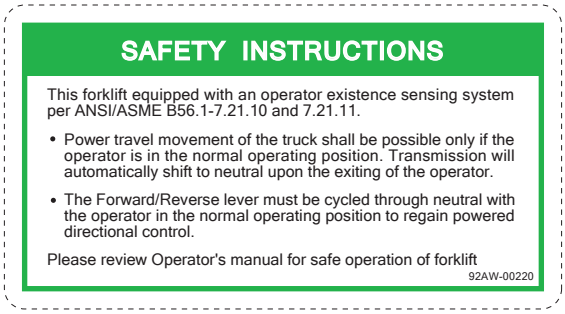
1. Powered travel movement of the truck shall be possible only if the operator is in the normal operating position. Transmission will automatically shift to neutral upon the exting of the operator.
2. The gear selector lever must be cycled through neutral with the operator in the normal operating position to regain powered direction control.
3. Control of mast tilting, lifting and lowering is not possible through operation of the appropriate control when the operator is not in the normal position.

11) **ECU/TCU CAUTION** (Item 25)

This warning label is located on the right side of the frame.

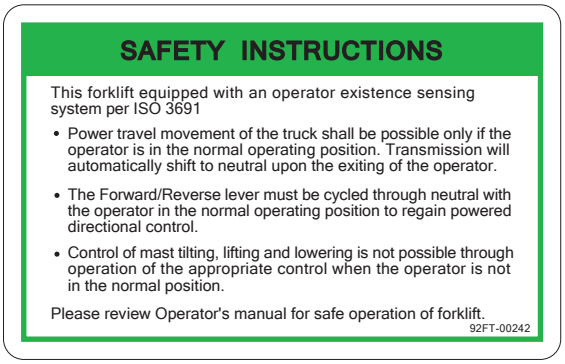
※ **Connector ①, ②, ③, ④ should be separated from ECU and TCU before any kind of welding.**

Truck for equipped with travel OPSS.



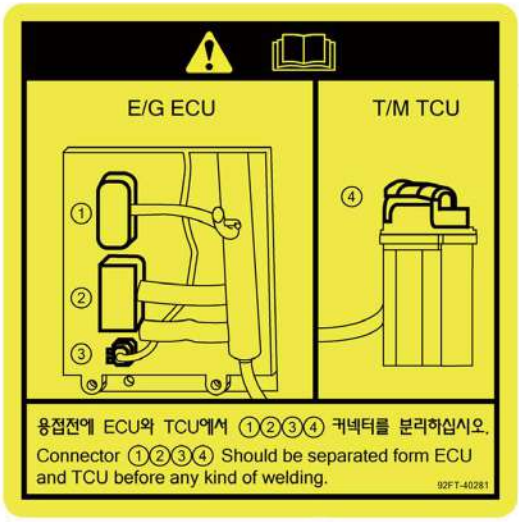
92AW-00221

Truck for equipped with travel and mast OPSS.



92FT-00242

*OPSS : Operator Presence Sensing System



92FT-40281

12) **ENGINE WASH** (Item 19)

This warning label is positioned on the both side of engine hood.

⚠ **Don't wash the engine room.**

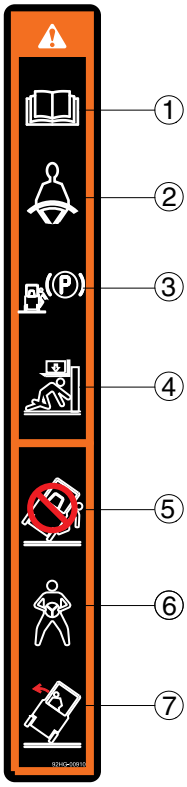
92HN-00261

13) **OPERATOR SAFETY** (Item 12)

This warning label is positioned on the left stay of cabin inside

(1) Refer to operator's manual in detail.
(2) Always buckle up the seat belt for safety operation.
(3) When the operator get off the truck, always turn the parking brake switch in LOCK position so that the truck can keep with stopping condition.
(4) The people should not pass through under forks and other attachments which are lifted or being lifted.
(5) Do not jump down from the truck. It can be caused that the operator have severe injury or death in the event of a tip over.
(6) Outstretch the legs as widely as possible and grasp firmly the steering handle.
(7) Lean the body to the opposite direction in order to avoid severe injury or death when the truck is tipped over.

※ **Refer to page 3-3.**



25L7A0OM09-1

14) **CABIN TILT (UP/DOWN)** (Item 16)

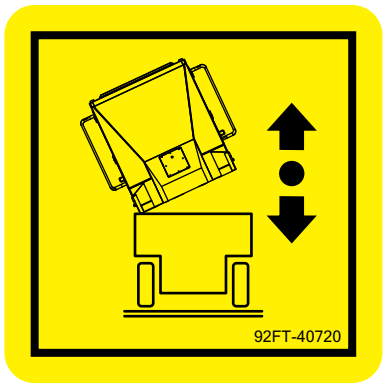
This warning label is positioned on the left side of frame.

When tilting cab for service, the cab must be fully extended up or down.

1. To raise cab, depress switch down until fully raised.
2. To lower cab, depress switch down until fully lowered.

⚠ To prevent cab from lowering unexpectedly, do not change the hand pump lever manually when opening cab.

※ **Refer to page 3-32 for cabin tilt switch.**

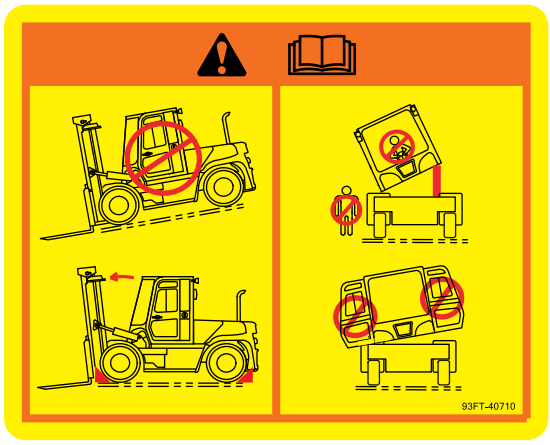


92FT-40720

15) **TILT CABIN WARNING** (Item 17)

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

⚠ **Refer to page 7-18 for safe tilting procedure.**

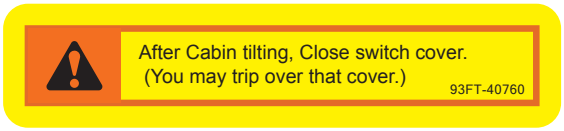


50D7EFW04

16) **TILT WARNING** (Item 43)

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

⚠ **After cabin tilting, close switch cover. You may trip over that cover.**



93FT-40760

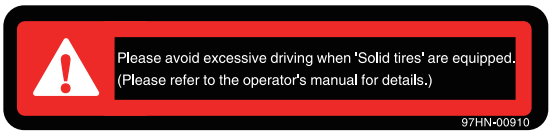
17) **SOLID TIRE** (Item 14)

This warning label is positioned on the center side of dashboard.

△ **Please avoid excessive driving when "solid tires" are equipped.**

※ **Do not drive on the road for automobile.**

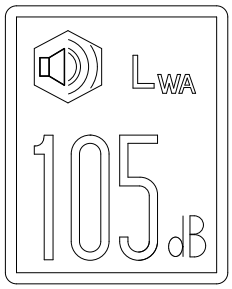
※ **Please refer to the page 2-8 for details.**



97HN-00910

18) **NOISE LEVEL** (Item 22)

This warning label is located on the right side of the engine hood.



91FU-00200

19) **FIRE EXTINGUISHER** (Item 35)

This label is located on the rear left of the cabin inside.

※ **Read and understand the instructions adhered decal on the fire extinguisher.**

91B1-01600

20) **DIESEL FUEL** (Item 11)

This warning label is positioned on the right side of the side cover.

※ **Fill only the diesel fuel.**
※ **Do not fill the gasoline.**

92AF-00320

21) **HYDRAULIC OIL** (Item 10)

This warning label is positioned on the left side of the side cover.

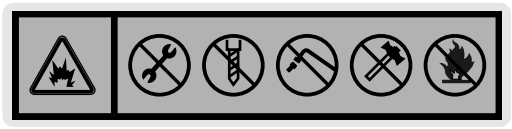
※ **Fill only the hydraulic oil.**
※ **Do not fill the diesel fuel.**

92AF-00310

22) **ACCUMULATOR** (item 29)

This warning label is positioned on the accumulator of the solenoid valve.

※ **The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.**
⚠ **Never make any hole in the accumulator expose it to flame or fire.**
⚠ **Do not weld anything to the accumulator.**
※ **When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator, it is necessary to release the gas from the accumulator. A special air bleed valve is necessary for this operation, so please contact your Hyundai distributor.**



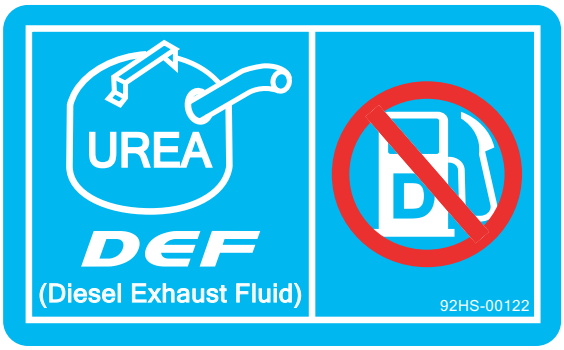
1107A0FW46

23) DEF / ADBLUE® (Item 15)

This label is positioned on the inside side of the right side cover.

※ **Fill the DEF / AdBlue® only.**

※ **Never use diesel oil.**



92HS-00122

24) AIR COMPRESSOR-CABIN (Item 32)

This warning label is positioned on the left side of cabin inside.

(1) Park on a flat place to use the air compressor.

(2) Be sure the engine working during the use of air compressor. After the use, make sure the compressor switch off.

(3) During the operation, do not use the other electrical devices (air conditioner, lights, stereo etc.)

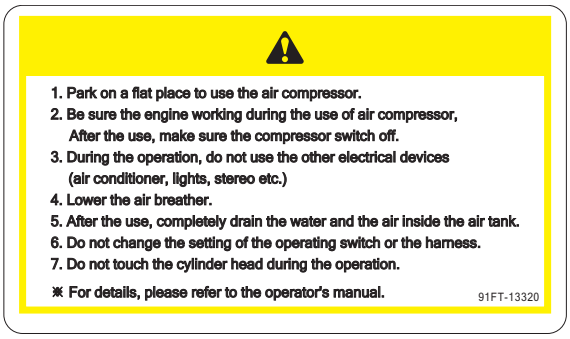
(4) Bleed the air breather.

(5) After the use, completely drain the water and the air inside the air tank.

(6) Do not change the setting of the operating switch or the harness.

(7) Do not touch the cabin tilting cylinder head during the operation.

※ **Refer to page 3-36 for air compressor switch.**



91FT-13320

25) AIR COMPRESSOR-TANK (Item 23)

This label is positioned on the top side of the air tank.

⚠ **Do not touch the cylinder head during the operation or it may cause severe burn.**

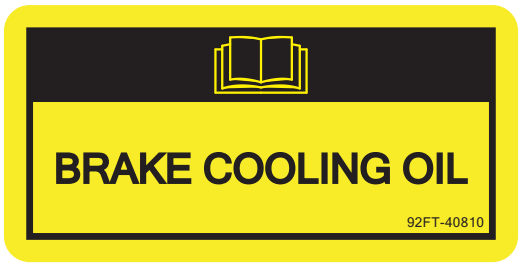
91Q4-13300

26) **BRAKE COOLING OIL** (Item 21)

This label is positioned on the right side of the frame.

※ **Fill only the DOANX TD only.**

※ **Never use others oil.**



92FT-40810

27) **HAMMER** (Item 34)

This label is located on the left stay of the cabin inside.

※ **The rear window serves as an alternate exit.**

※ **To remove rear window, pull the ring and push out the glass.**

91Q6-07280

28) **SCR** (Item 18)

This label is located on the left side of the frame

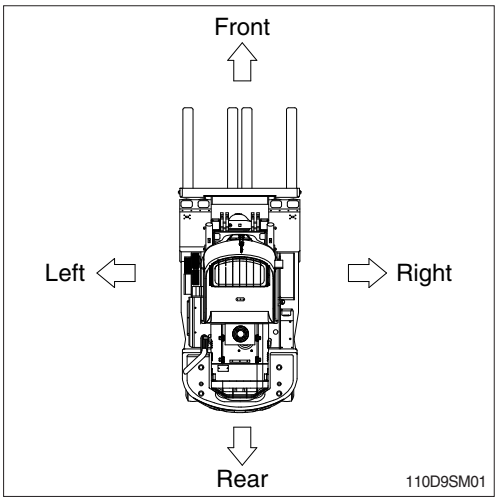
⚠ **Do not touch the aftertreatment device or it may cause severe burn. When the engine is running or immediately after engine shut down.**

※ **SCR : Selective Catalytic Reduction**

92HV-00170

1. DIRECTION

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

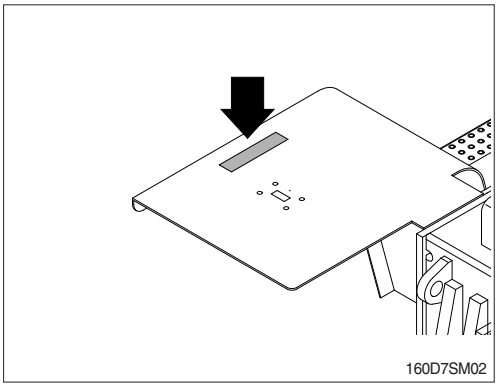


2. SERIAL NUMBER

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

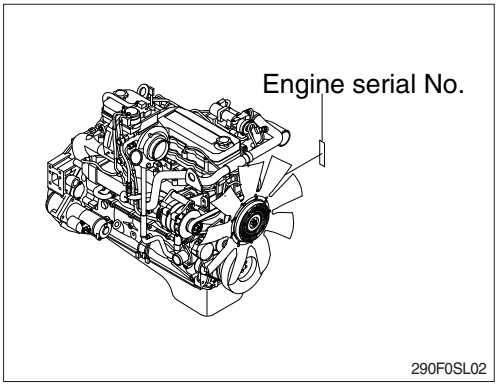
1) TRUCK SERIAL NUMBER

It's shown on front of the right side frame.



2) ENGINE SERIAL NUMBER

The numbers are located on the engine name plate.



3. SYMBOLS

⚠ Important safety hint.

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

※ It indicates the useful information for operator.

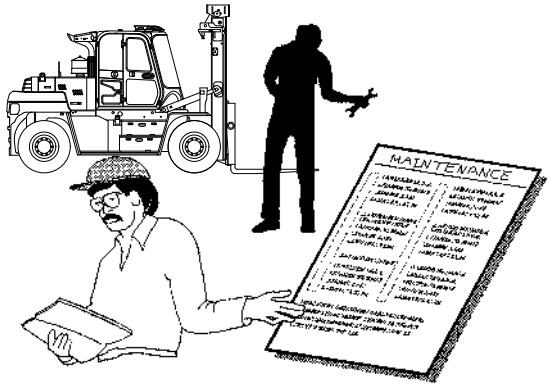
1. DAILY INSPECTION

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

Check for damage and maintenance problems.

Have repairs made before you operate the truck.

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



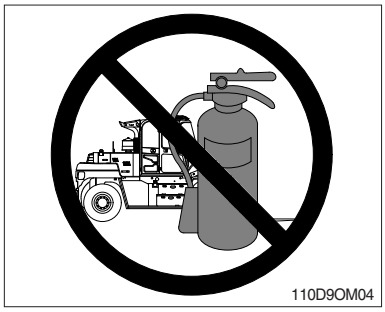
110D9OM02

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.

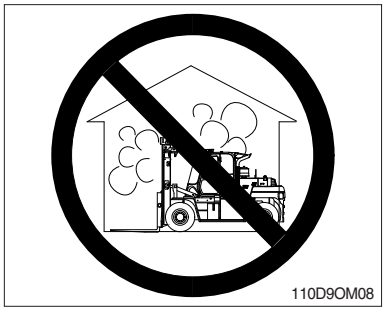


Don't block safety or emergency equipment.

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

Don't operate the truck outdoors in rainy day.

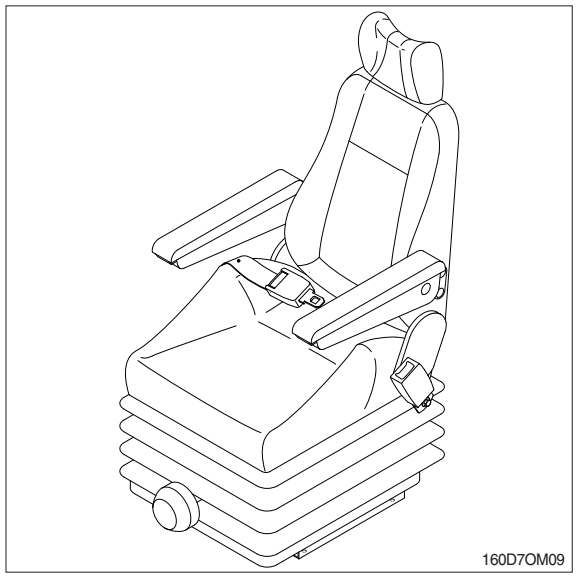
※ **Exclude the truck equipped cabin.**



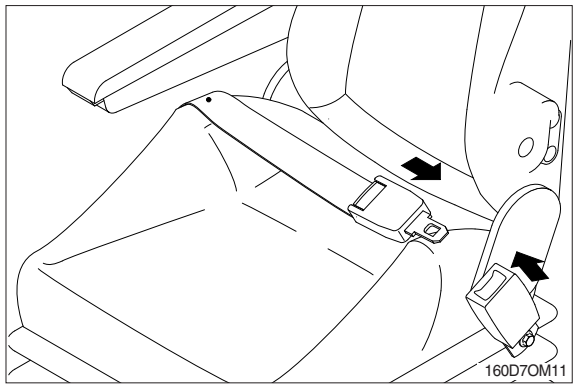
Exhaust gas is dangerous.
Do not operate the truck at the inhouse, if possible.
Provide adequate ventilation when working in a closed space.

3. SEAT BELTS

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

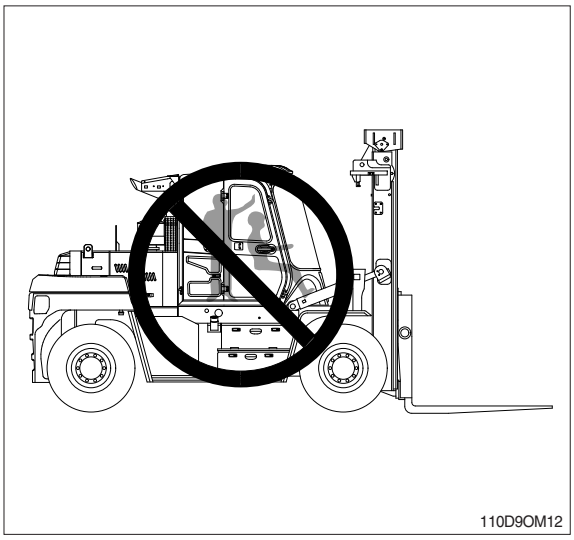


⚠ Seat belts can reduce injuries.



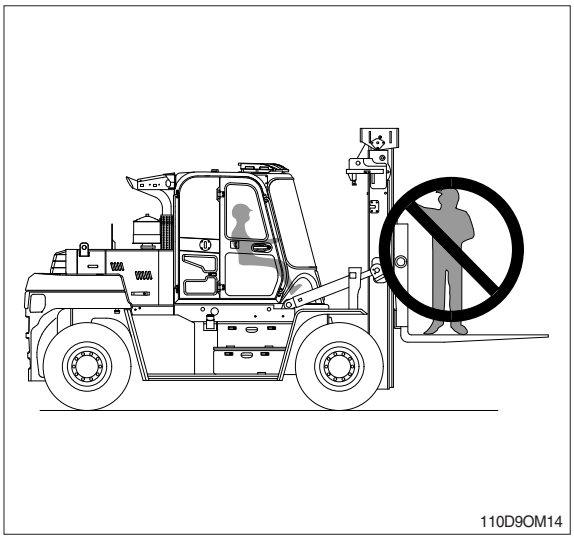
4. NO RIDERS

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



110D9OM12

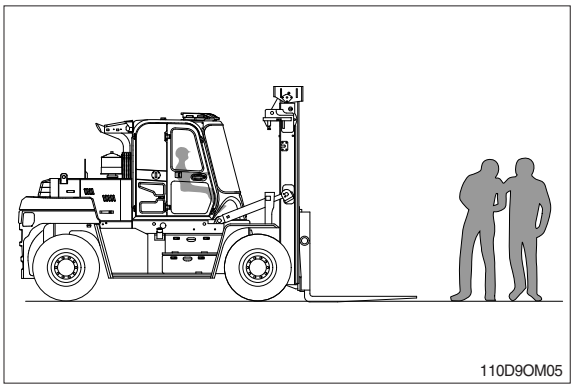
2) Never transport personnel on the forks of a lift truck.



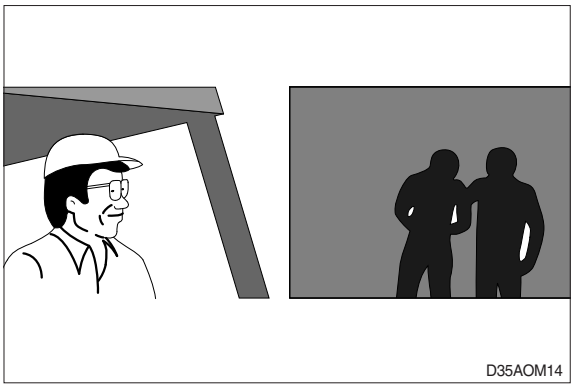
110D9OM14

5. PEDESTRIANS

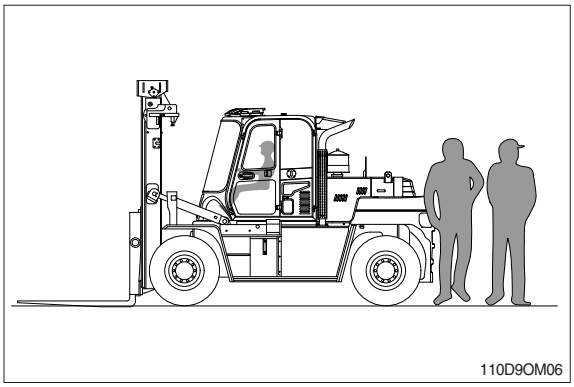
1) Watch where you are going. Look in the direction of travel. Pedestrians may use the same roadway you do. Sound your horn at all intersections or blind spots.



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



3) Watch for people standing back, even when you are parked.

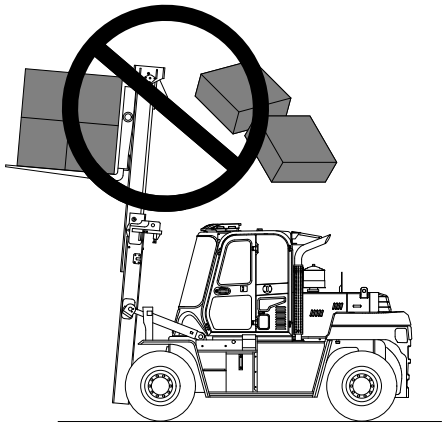


6. OPERATOR PROTECTION

1) Stay inside the cabin.

2) Always keep your body within the confines of the truck.

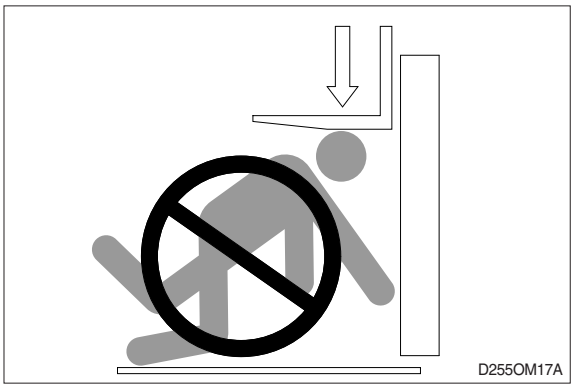
⚠ **Do not operate truck without cabin or overhead guard, unless condition prevent use of it.**



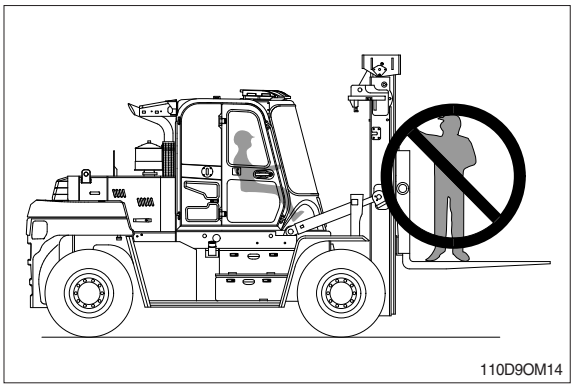
110D9OM16

7. FORK SAFETY

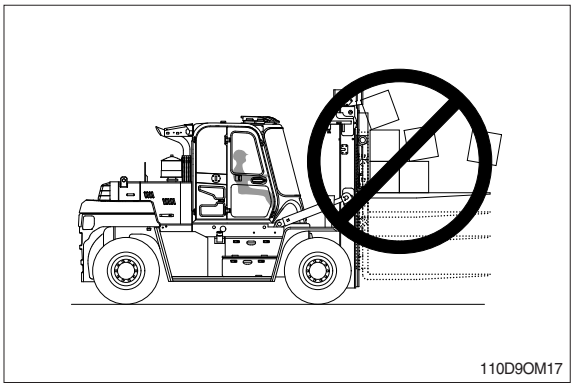
Never allow anyone to walk under raised forks.



There is special equipment to raise people for overhead work.
DO NOT USE LIFT TRUCKS.

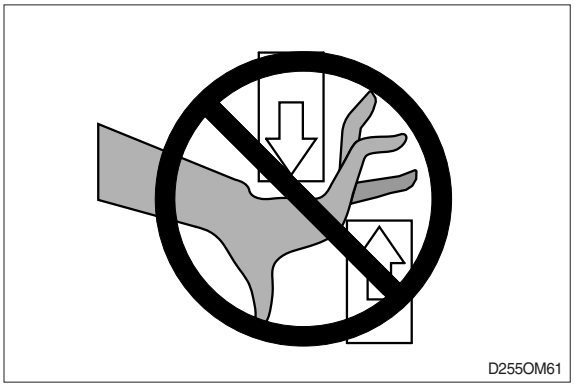


Always lower the load slowly.
Raise and lower with mast vertical or tilted slightly back(Never forward).

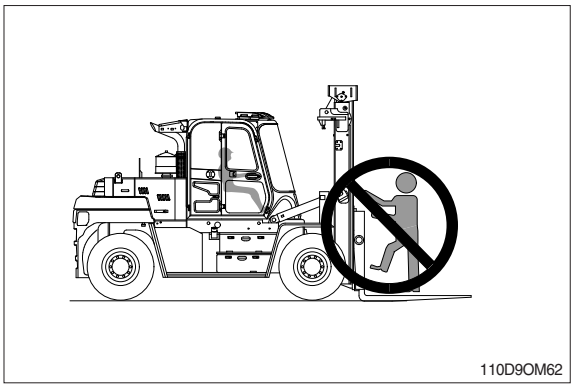


8. PINCH POINTS

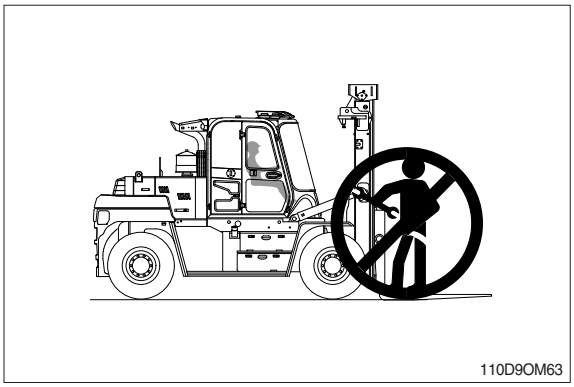
⚠ Keep hands, feet and legs out of the mast.



⚠ Don't use the mast as a ladder.



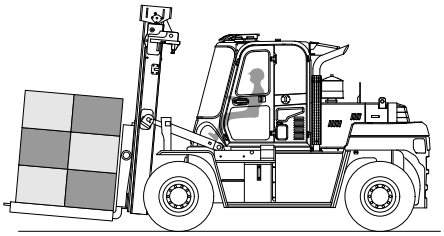
⚠ Never try to repair the mast, carriage, chain, or attachment by yourself. Always get a trained mechanic.



9. TRAVEL

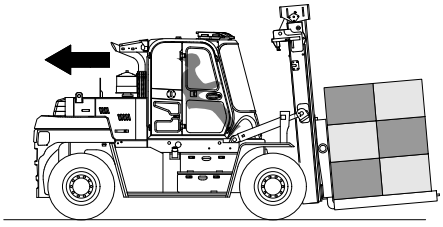
1) Travel with the load near the floor/ground, with mast tilted back to cradle the load whenever possible.

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



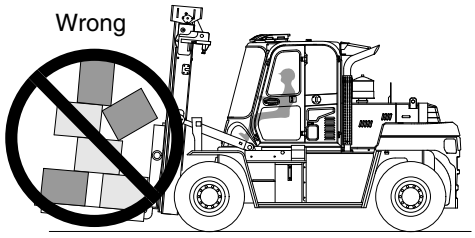
110D9OM18

2) When handling bulky loads that restrict your vision operate your truck in reverse to improve visibility. Be sure to pivot in the seat to give maximum visibility.



110D9OM25

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

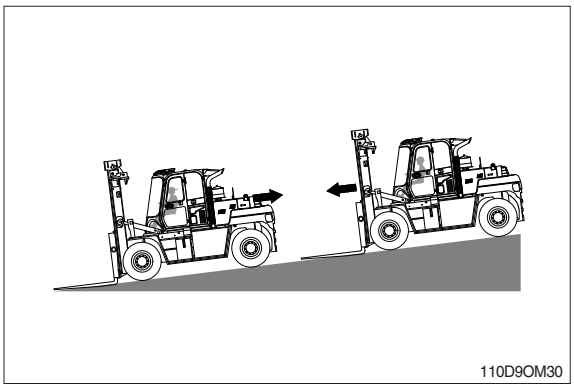


110D9OM26

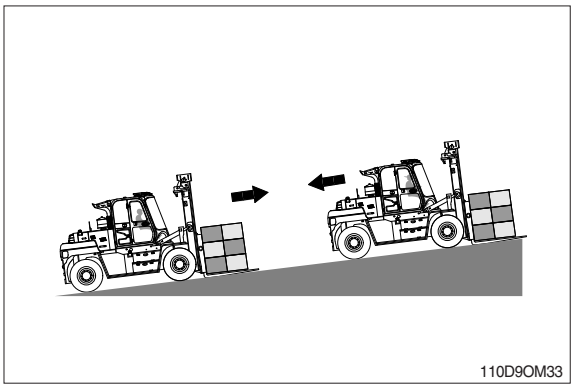
10. GRADES, RAMPS, SLOPES AND INCLINES

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

1) Unloaded-Forks downgrade



2) Loaded - Forks upgrade



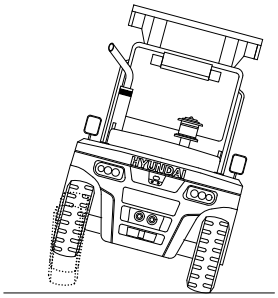
11. TIP OVER

1) LATERAL TIP OVER

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

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

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

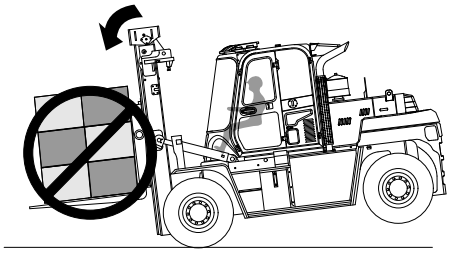


110D9OM38

2) LONGITUDINAL TIP OVER

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

(2) Longitudinal tip over can occur by driving with the load down slope on a steep grade.



110D9OM39

Lateral and longitudinal tip over can occur if the truck is driven over objects on the floor or ground, off the edge of improved surfaces, or into potholes in the road surface, or by running into overhead objects or collisions.

An off dock type of tip over can occur if the truck is steered too close to the dock edge, driven off the edge of the dock or ramp, or if the highway truck or trailer rolls away from the dock or is driven away during loading.

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

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

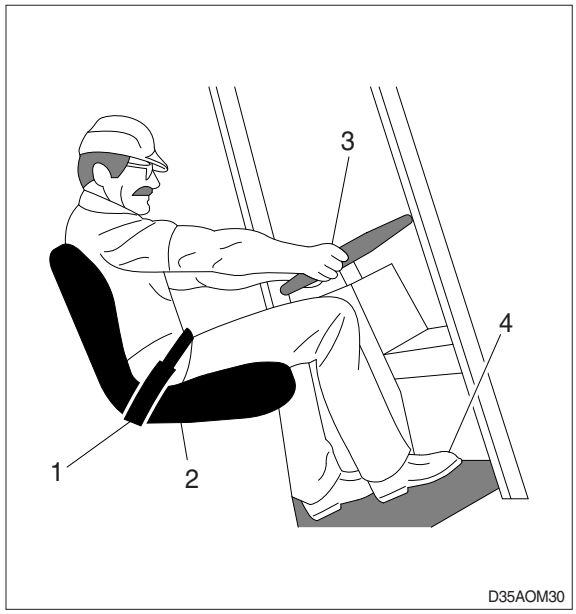
3) WHAT TO DO IN CASE OF A TIP OVER

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

⚠ Brace yourself as illustrated right.

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

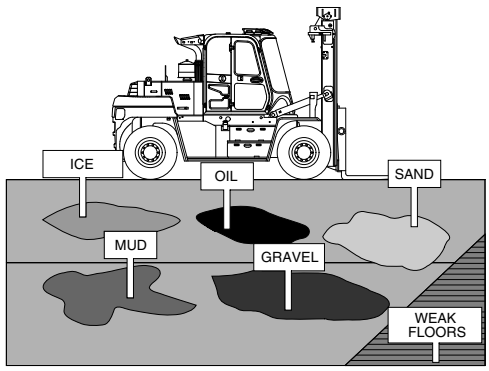
⚠ Your chances for survival in a tip-over are better if you stay with the truck, in your seat.



12. SURFACE AND CAPACITY

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

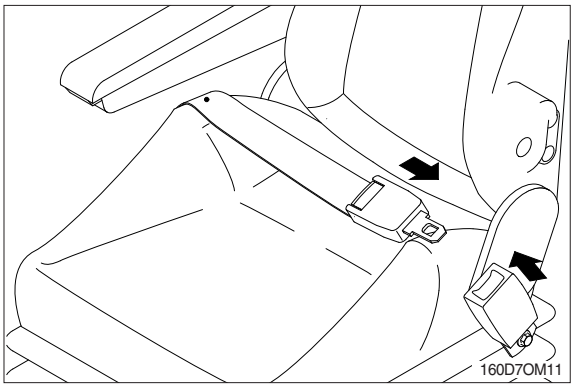
⚠ **Know the weight of your truck and load. Especially when using elevators, know the capacity of the elevator you intend to use. Do not overload.**



110D9OM40

TIPOVER

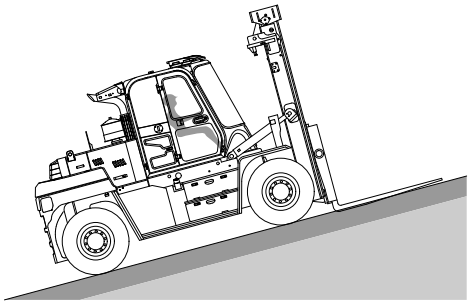
⚠ **Seat belts can reduce injuries. ALWAYS BUCKLE UP**



160D7OM11

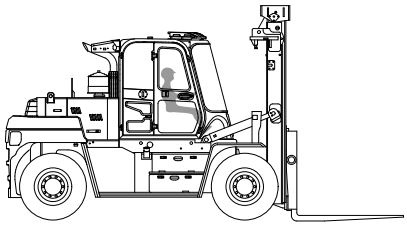
13. PARKING

1) Never park on a grade.



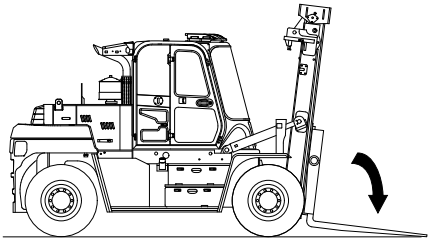
160D7AOM41

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



160D7AOM42

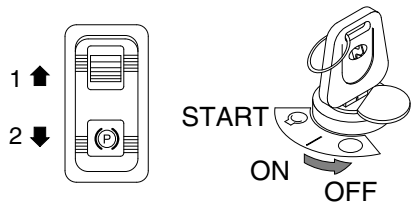
3) Lower forks fully to the floor and tilt forward.



160D7AOM44

4) Put the parking brake switch in LOCK position.
   Position 1 : Release
   Position 2 : Lock

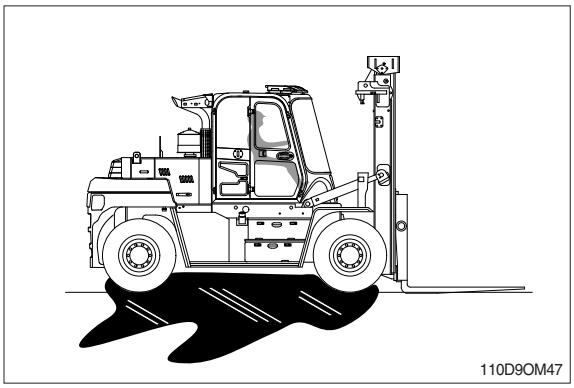
5) Turn start switch to OFF position.



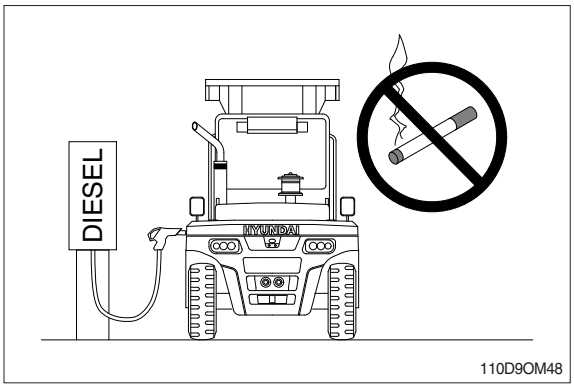
50D9OM37

14. REFUELING

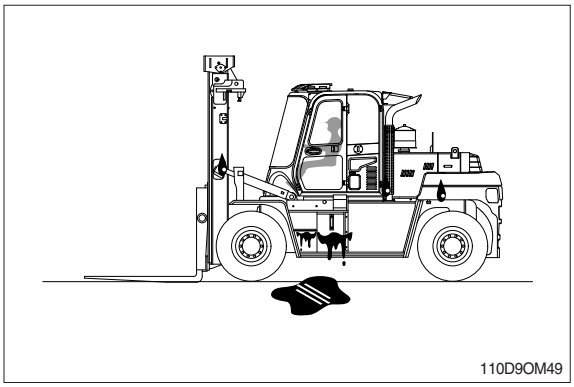
1) Before adding fuel, check around truck for oil leakage.



2) Keep away from fire when adding fuel or during operation.

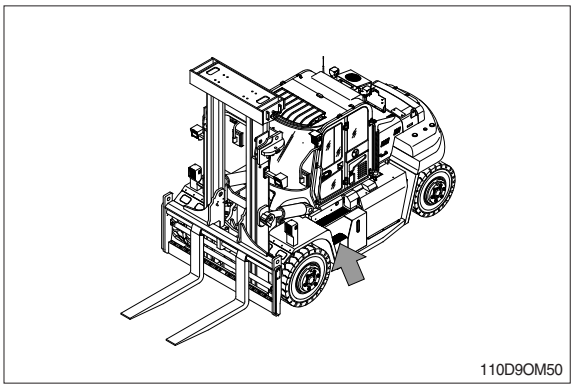


3) After adding fuel, wipe off any fuel spilled on the truck.

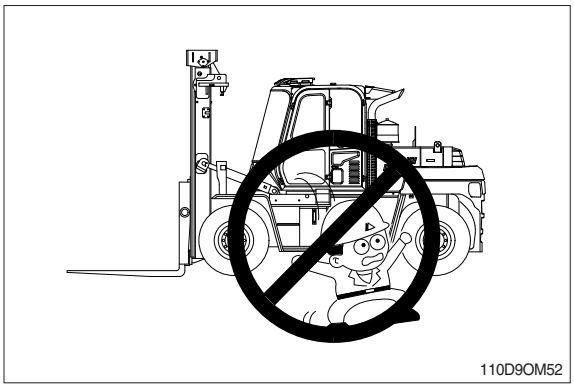


15. STEP

1) When getting on or off the truck, use the step provided.



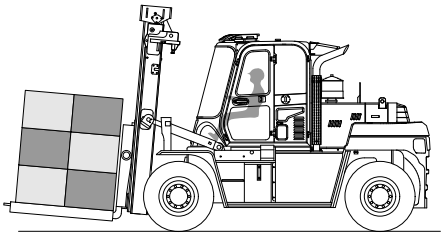
2) Do not jump up or down from the truck.



16. OPERATOR'S SAFETY RULES

1) All operational functions require that the operator be seated in the operator's seat.

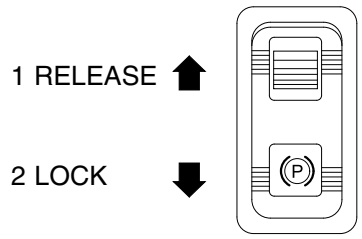
⚠ **Always buckle up if a seat belt is provided.**



110D9OM18

2) The parking brake must be locked in the LOCK POSITION before exiting from the truck.

⚠ **The parking brake must remain locked in the LOCK position except when an operator is in the normal operating position.**



300D9OM24

3) OPSS REGULATIONS

⚠ **This forklift truck is equipped with an Operator Existence Sensing System per ANSI/ASME B56.1~7.21.10 and 7.21.11 (travel OPSS) or ISO 3961 (travel and mast OPSS) as an option.**

*OPSS : Operator Presence Sensing System

(1) Traction safety warning

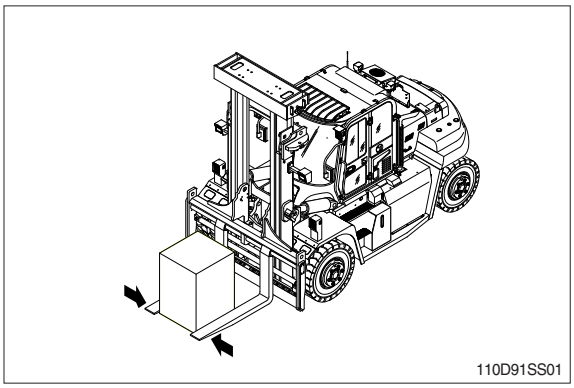
① This function works when the key switch is ON or START position.
② The transmission(power automatically cutoff) in 2 seconds from the driver's off the seat.
③ At the same time, the warning lamp ON and alarm will sound intermittently if drive lever was not returned to neutral.
④ To release the function, the gear selector lever must be cycled through neutral with the operator in the normal operating position to regain powered directional control.

(2) Parking brake warning

① This function works when the key switch is not only ON or START position but also OFF position.
② Alarm sounds in 2 seconds from the driver's off the seat with the parking brake released.
③ To release the function, the parking brake switch must be turned to LOCK position.
④ When the key switch is OFF position, alarm will sound only for 30 seconds .

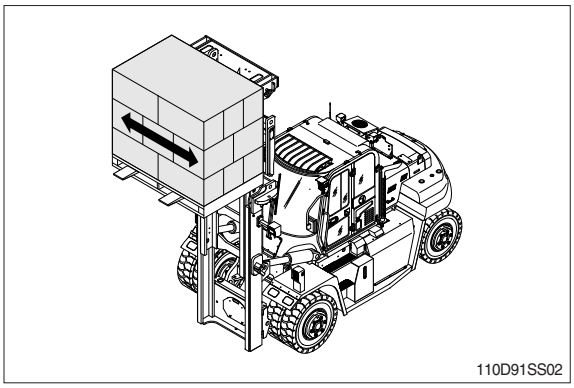
17. SIDE SHIFT

⚠ **Do not put side loads on the forks.**



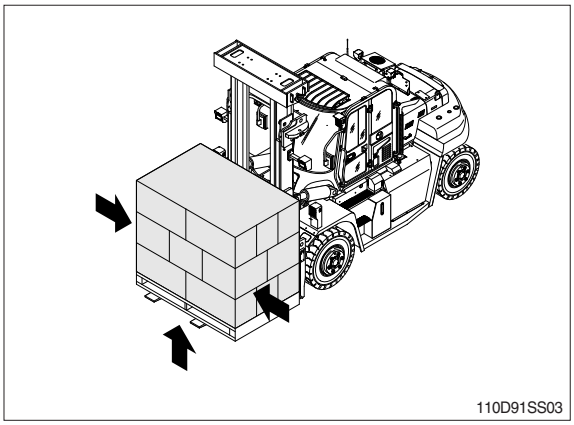
⚠ **Restrict the sideshift movement with raised load.**

Abrupt sideshifting under such condition will dramatically reduce the stability of truck and may cause over-turning.

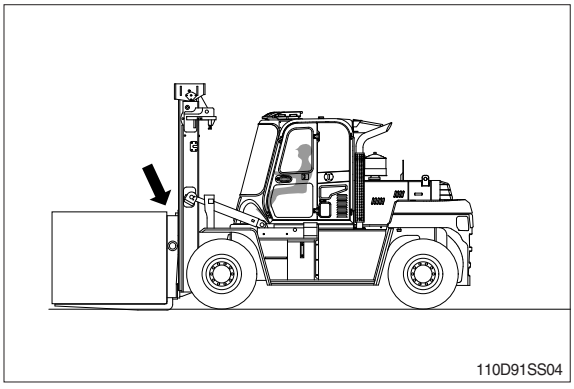


⚠ **Avoid overloading or uneven loading.**

Load on the forks according to load capacity mentioned on the truck name plate when sideshift is applied. Uneven loading will deteriorate the stability of the truck when the load is raised.



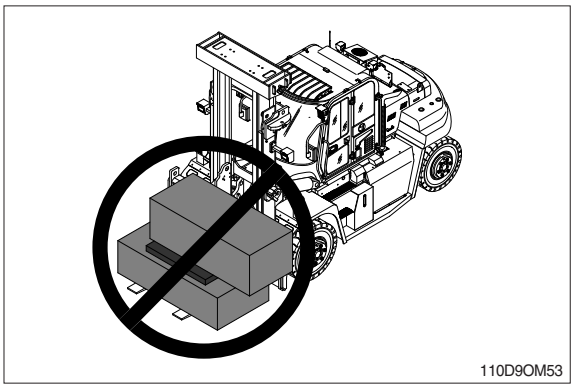
⚠ **Top of the load should not extend above the backrest.**



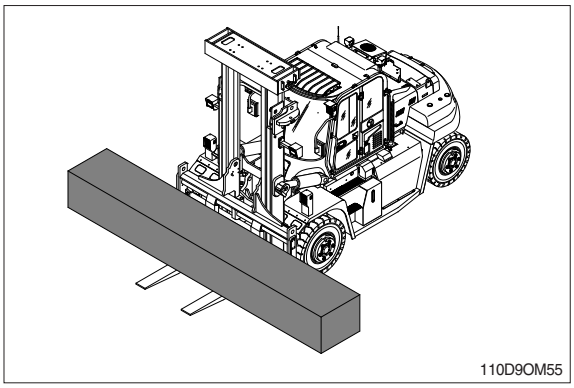
1. LOOSE LOADS

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

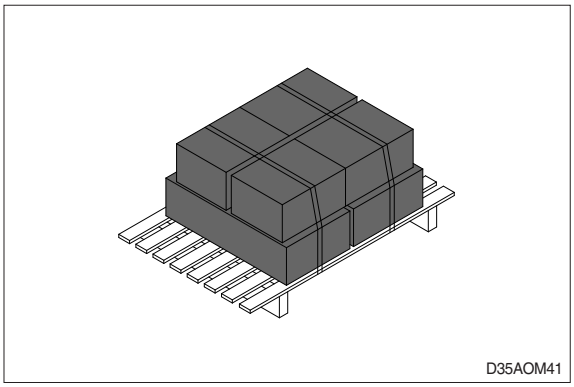
Never carry loose or uneven material.



Center wide loads.

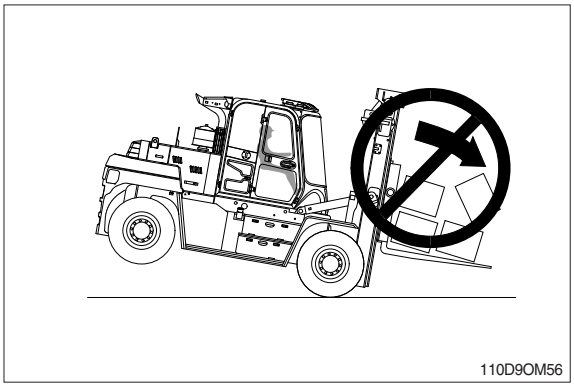


Stack and band loose material.



Avoid sudden braking or starting.

⚠ **When the truck is loaded, do not drive at maximum speed.**

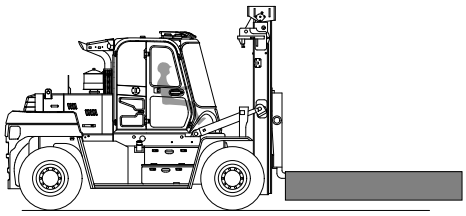


2. LONG AND WIDE LOADS

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

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

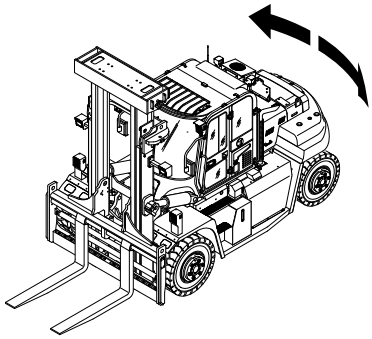
⚠ **A long load reduces the capacity of the truck. Know and understand your truck load rating.**



110D9OM57

3. REAR SWING

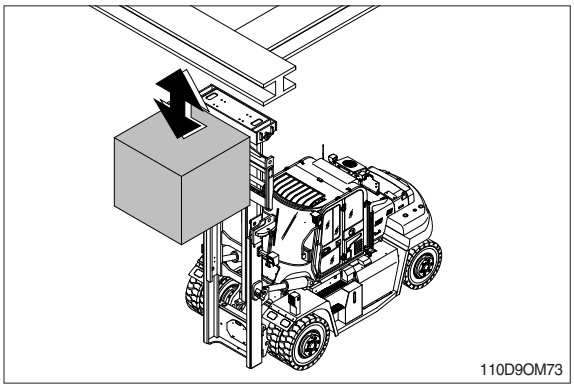
⚠ **When turning, be sure the rear end of the truck does not swing into racks, posts, etc. Watch for pedestrians beside the truck.**



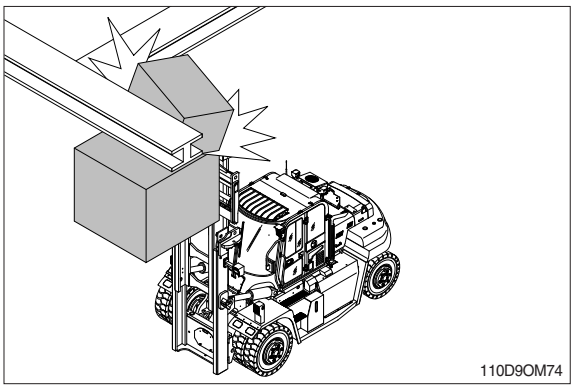
110D9OM43

4. LOW OVERHEAD CLEARANCE

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

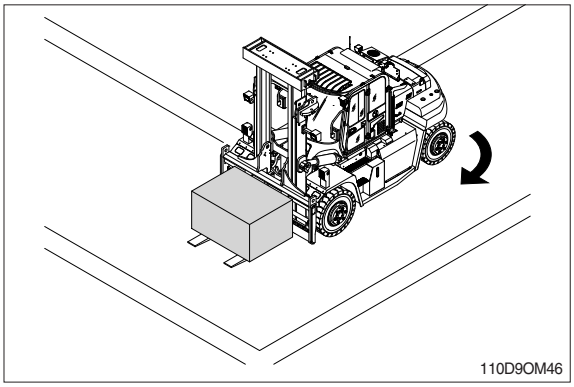


⚠ Watch overhead clearance:
Moving into overhead structures can tip a truck over, or spill a load.

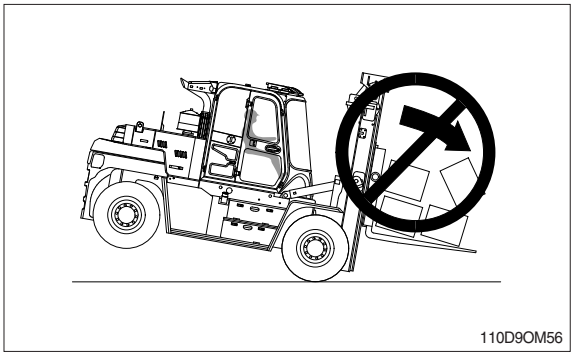


5. FAST TURNS AND HIGH LOADS

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

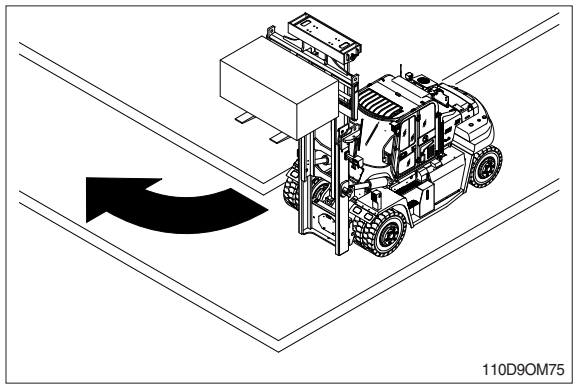


⚠ Turn too sharp with a raised load and your truck can tip even at slow speeds. Travel with a load raised only when removing or depositing a load.



6. RIGHT ANGLE STACKING

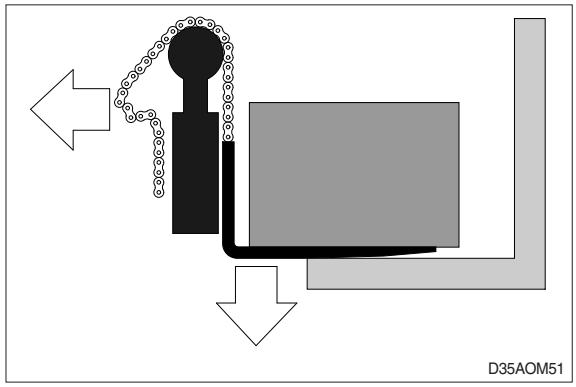
⚠ When right angle stacking or moving with a raised load to clear low objects, avoid sharp turns and move slowly.

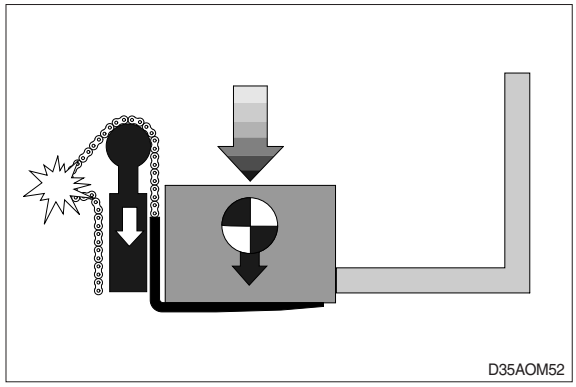


7. CHAIN SLACK

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

⚠ In case forks with loads are stuck while lowering the mast, lift the mast again and prevent chains from being slack.

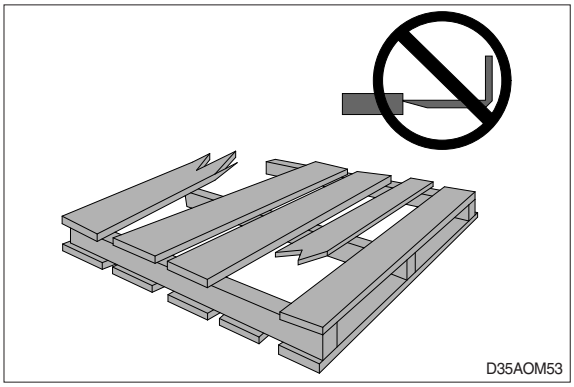




8. PALLETS AND SKIDS

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

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



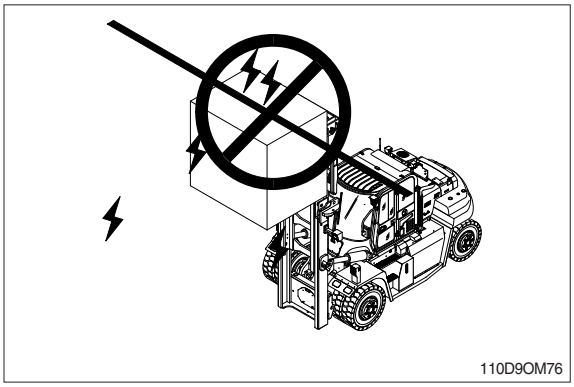
9. CAUTION FOR ELECTRICAL LINES

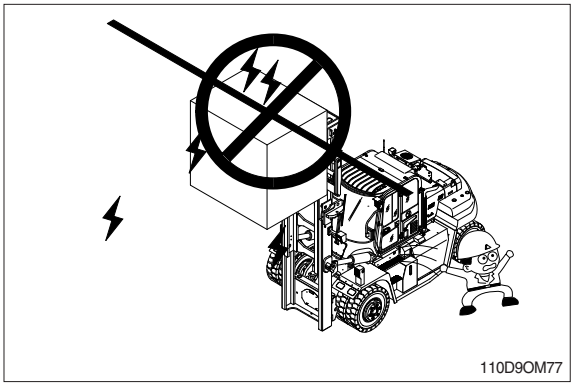
⚠ When moving the truck with the mast raised, watch out electrical lines over the truck.

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

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

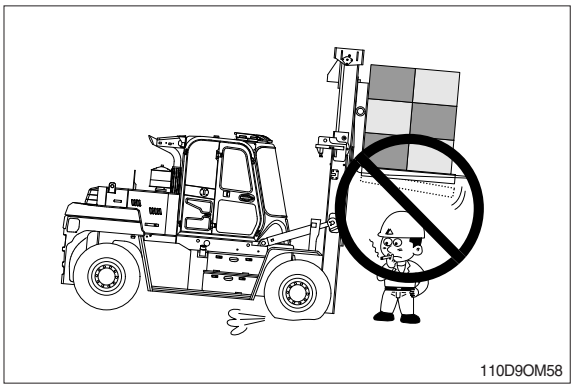
⚠ If the truck touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the truck until turning off the electric current.
Jump off the truck without contacting the truck when you need to get off.





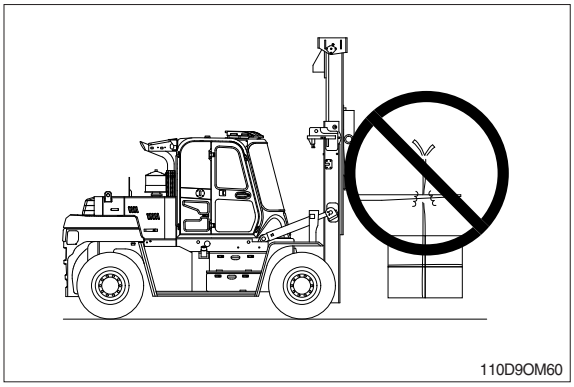
10. LIFTING LOADS

Never permit any persons to stand or pass under lifted load.



110D9OM58

Never use wire rope to lift a load.



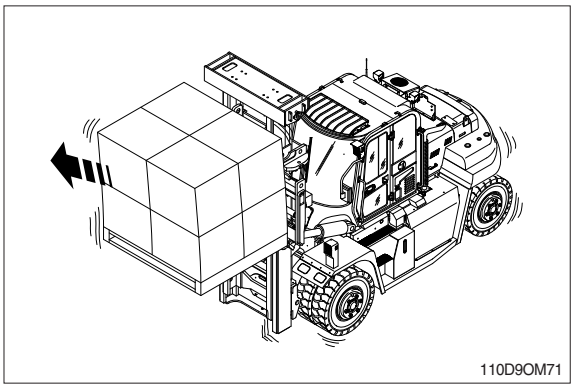
110D9OM60

11. SIDE SHIFT

Never operate the side shift while the forks are not equipped with supports such as a load table for the load.

Never travel the forklift while the side shift is moved with load.

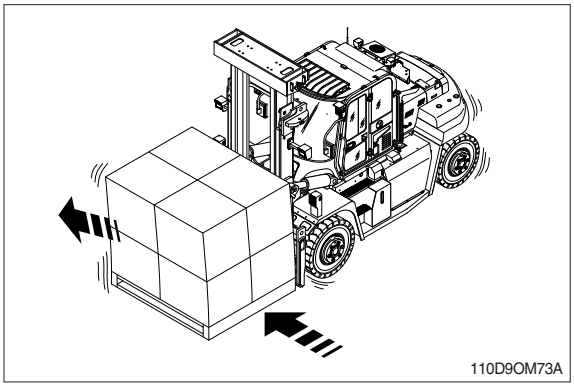
In case of moving the side shift with load, it can be caused load dropping or overturning of the forklift due to unbalanced weight.



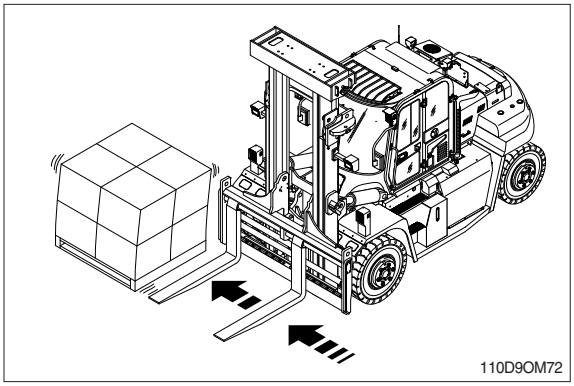
⚠ **The forklift can be overturned due to the unbalanced load.**

It should be observed that the side shift with load is operated in netural position before traveling.

When operating side shift with load, operate slowly so that it can not avoid from dropping of the load or overturning of the forklift.

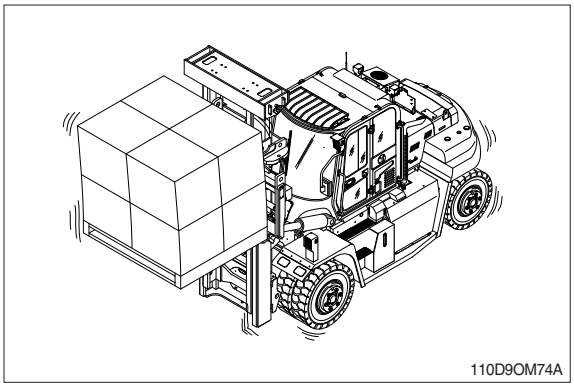


Never move the load to push or pull of it by the side shift.
It can be caused damaging of the loads or injuring of the people.



While traveling the forklift with the load on the side shift, if the operator lift or lower the load without shifting it in the netural position, it can be overturned the forklift due to unstabled load.

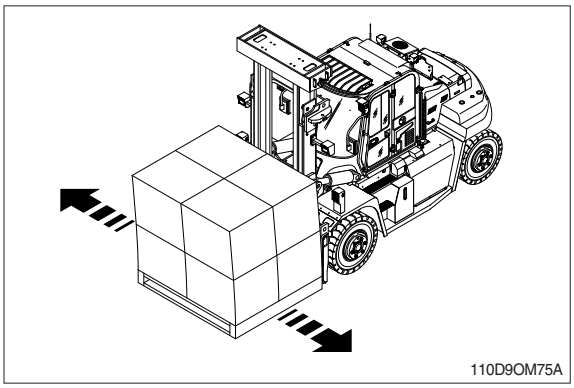
When lifting or lowering the side shift with load, it should be observed that the load is moved into the netural position.



12. FORK POSITIONER

Do not operate the fork positioner with a load, or with the fork arm on the ground.

⚠ **Never move the levers to operate the fork positioner suddenly and quickly.**
It can be caused to drop the load.

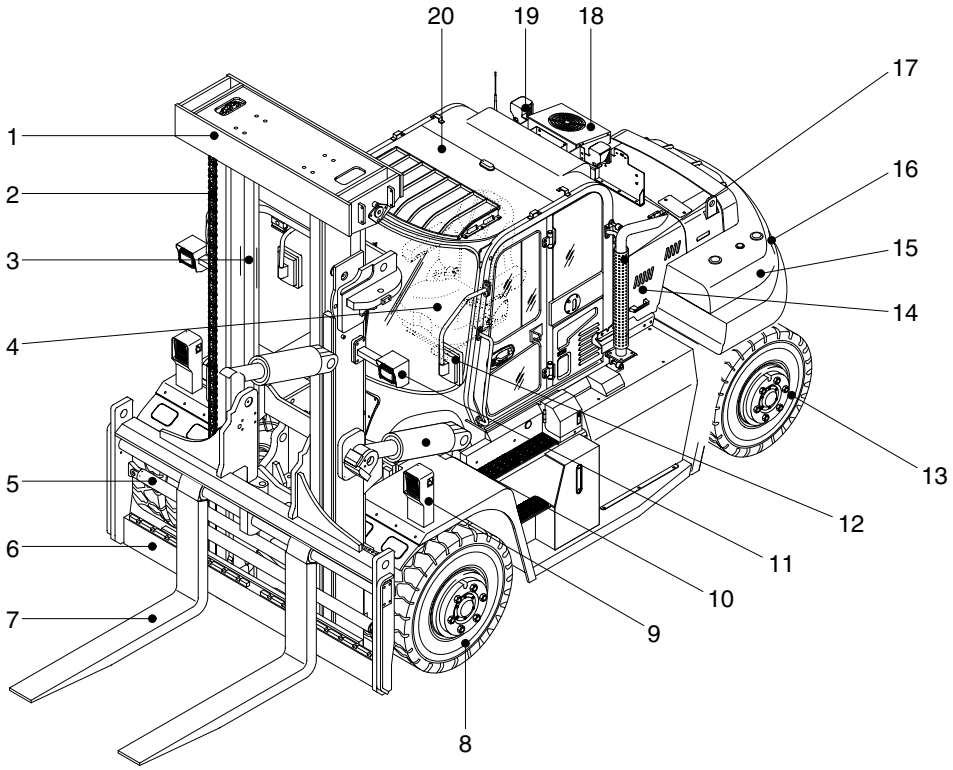


13. SOLID TIRE

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.

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

1. GENERAL LOCATIONS

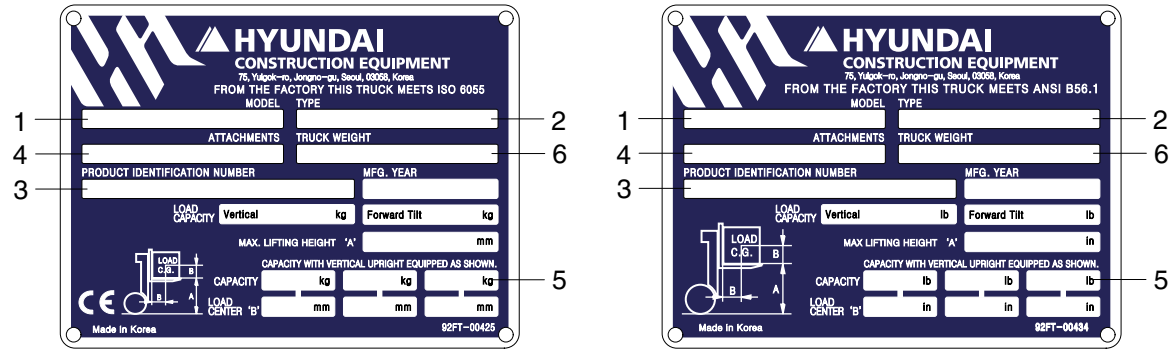


110D9OM54-1

1	Mast	8	Front wheel	15	Counterweight
2	Lift chain	9	Head lamp-fender	16	Rear combination lamp
3	Lift cylinder	10	Tilt cylinder	17	Silencer
4	Operator's seat	11	Work lamp-mast	18	Air conditioner (opt)
5	Fork positioner cylinder	12	Rear view mirror	19	Rear work lamp
6	Carriage	13	Rear wheel	20	Cabin
7	Forks	14	Bonnet		

2. NAME PLATE AND SAFETY WARNING DECAL

1) NAME PLATE



92FT-00425

(1) Truck model number or registered name

(2) Truck type

The type is indicated a type of the truck such as diesel, LPG or battery.

(3) Truck serial number

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

(4) Attachment description (If any installed)

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

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

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

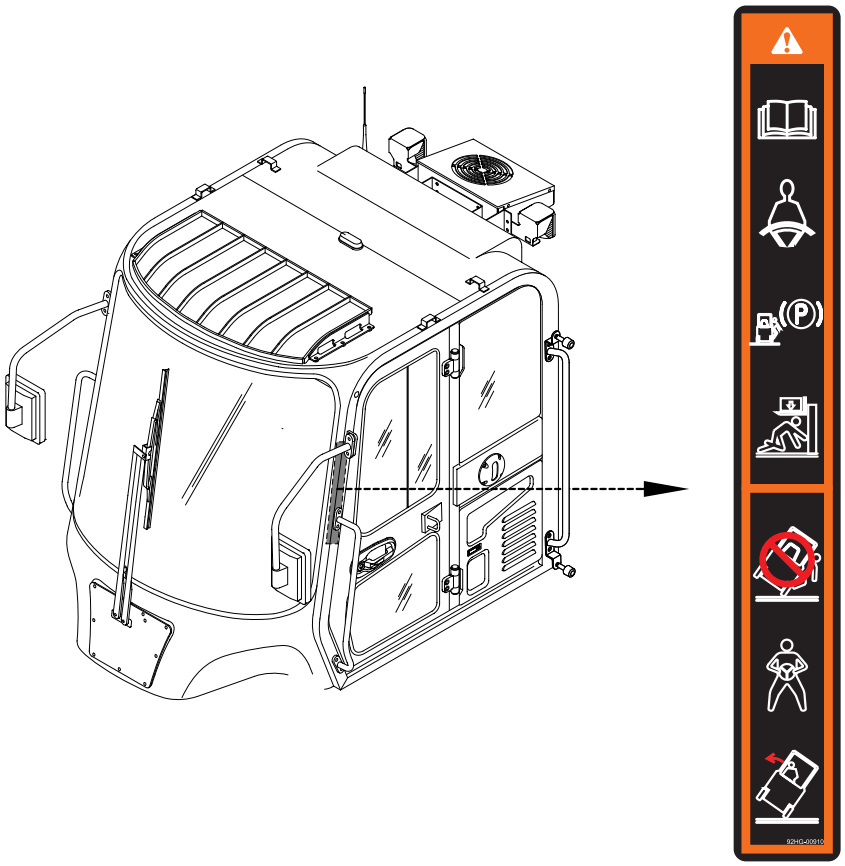
Do not exceed the maximum capacity specified.

(6) Truck weight

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

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

2) OPERATOR SAFETY WARNING DECAL



110D9OM59-1

⚠ Safety and warning decals are placed in conspicuous locations on the truck to remind you of essential procedures or to prevent you from making an error that could damage the truck or possibly cause personal injury. You should know, understand, and follow these instructions. Safety and warning decals. Should be replaced immediately if missing or defaced (Damaged or illegible). Refer to the page 0-6 for the location of all decals.

⚠ Operator/Tip-over warning decal

This decal is located on cabin's upper-left side frame. Its purpose is to remind the operator that staying in the seat provides the best chance of avoiding injury in the event of a truck-tipping or driving off a dock mishap.

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

3. CAB DEVICES

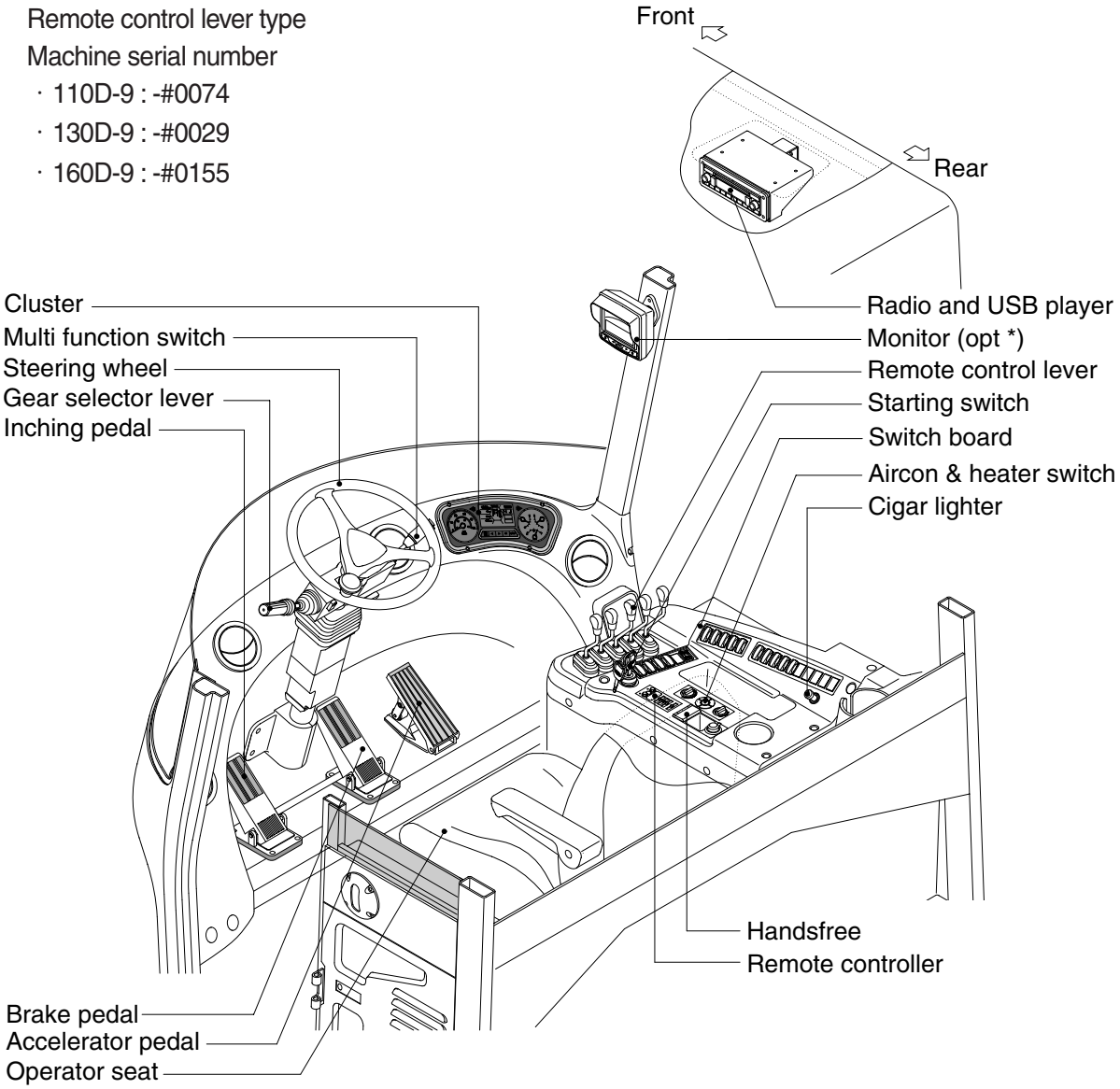
1) The ergonomically designed console box and suspension type seat provide the operator with comfort.

2) ELECTRONIC MONITOR SYSTEM

(1) The centralized electronic monitor system allows the status and conditions of the truck to be monitored at a glance.

(2) It is equipped with a safety warning system for early detection of truck malfunction.

Remote control lever type
Machine serial number
- 110D-9 : -#0074
- 130D-9 : -#0029
- 160D-9 : -#0155

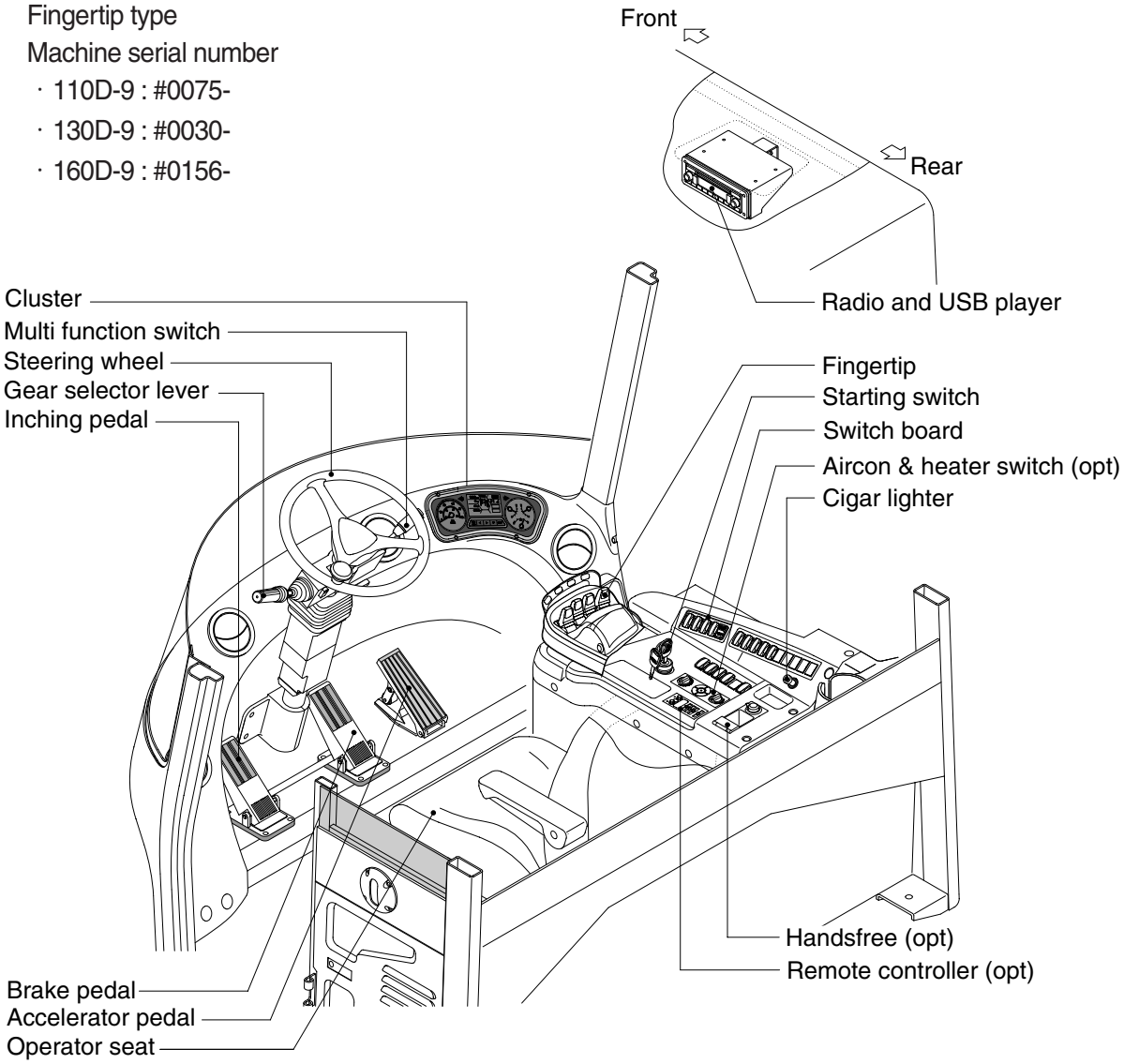


110D9CD01

Fingertip type

Machine serial number

- 110D-9 : #0075-
- 130D-9 : #0030-
- 160D-9 : #0156-



160D9LCD01-1

4. CLUSTER

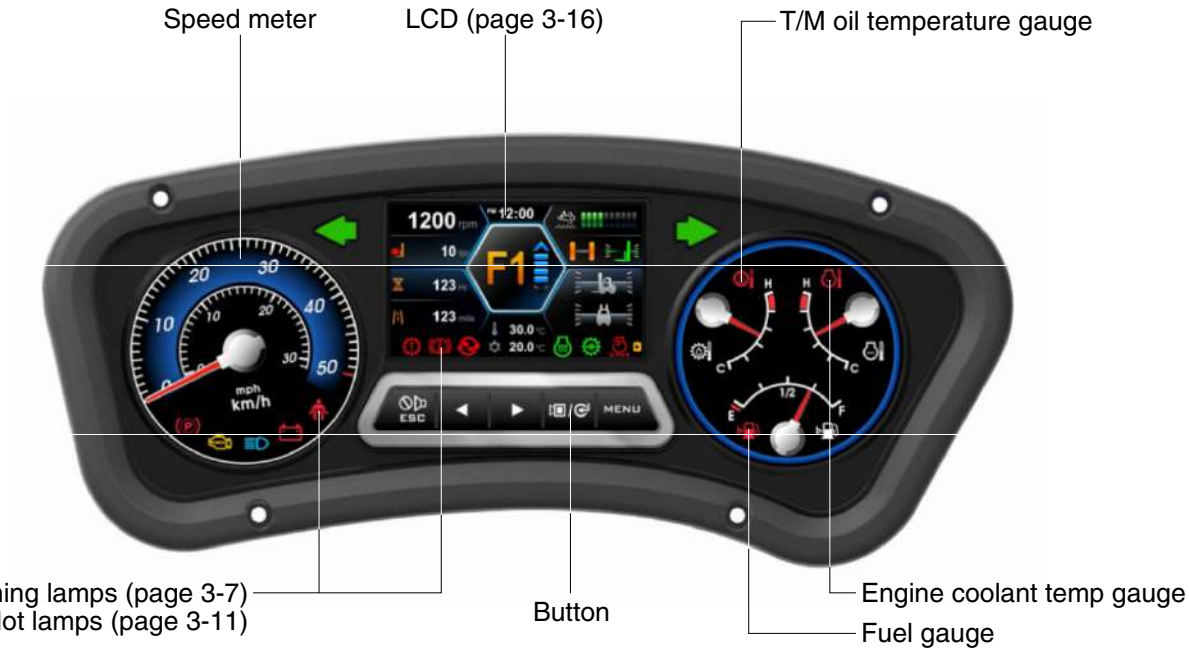
1) STRUCTURE

The cluster consists of gauges, lamps, buttons and LCD as shown below, to warn the operator in case of abnormal truck operation or conditions for the appropriate operation and inspection.

- Gauges : Indicate operating status of the truck.
- Warning lamps : Indicate abnormality of the truck.
- Pilot lamps : Indicate operating status of the truck.
- LCD : Display the truck model, error code and engine speed etc.
- Buttons : Select the truck model, error code and engine speed etc and stop the buzzer sound.

※ **The cluster installed on this truck does not entirely guarantee the condition of the truck. Daily inspection should be performed according to chapter 7. PLANNED MAINTENANCE AND LUBRICATION.**

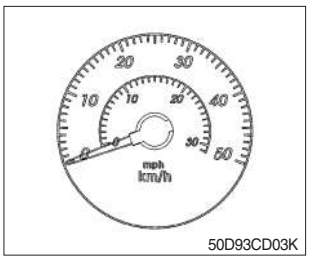
※ **When the cluster provides a warning immediately check the problem, and perform the required action.**



300D9CD03

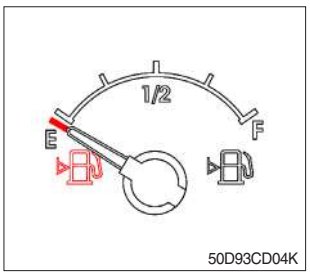
2) GAUGE

(1) Speed meter



① The speed meter displays the speed of truck in mph and km/h.
- 0~50 km/h
- 0~31 mph

(2) Fuel gauge

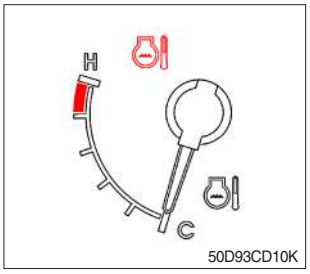


① This gauge indicates the amount of fuel in the fuel tank.

② Fill the fuel when the warning lamp lights ON or the indicator moves E point, refuel as soon as possible to avoid running out of fuel.

※ If the gauge indicates below E point even though the truck is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

(3) Engine coolant temperature gauge



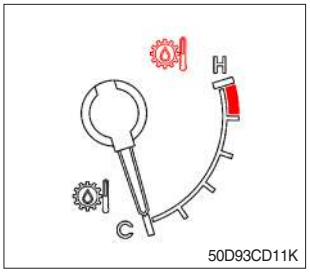
① This indicates the temperature of coolant.
- · White range : 40~104 ˚C (104~219 ˚F)
- · Red range : Above 104 ˚C (219 ˚F)

② Keep idling engine at low speed until the indicator is in the operating range.

③ If the indicator is in the red range, turn OFF the engine and check the radiator and engine.

※ If the gauge indicates red range even though the truck is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

(4) Transmission oil temperature gauge

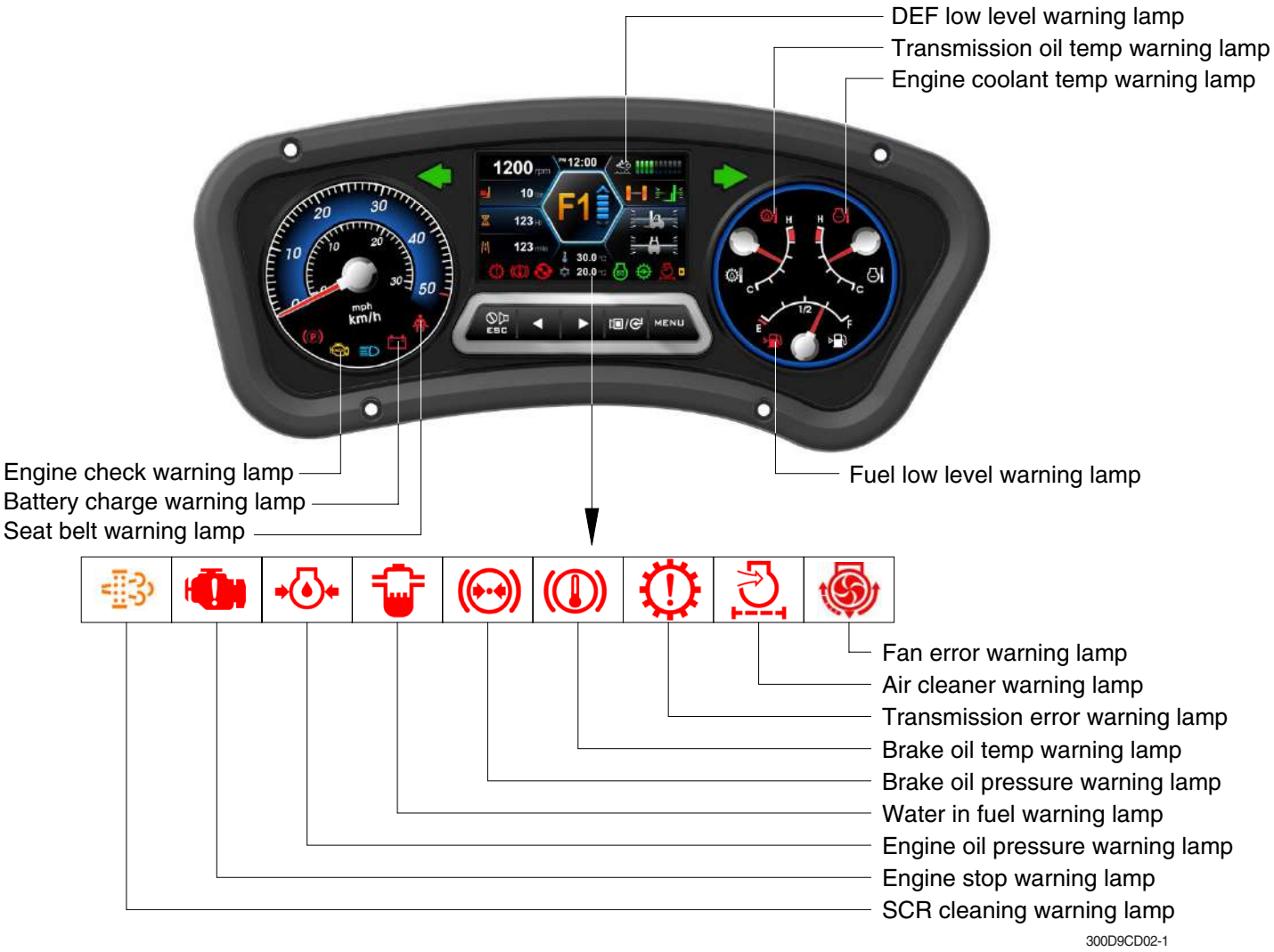


① This range indicates the temperature of transmission oil.
- · White range : 40~107 ˚C (104~225 ˚F)
- · Red range : Above 107 ˚C (225 ˚F)

② Keep idling engine at low speed until the indicator is in the operating range.

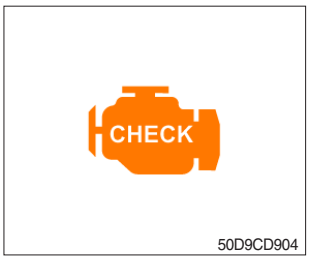
③ If the indicator is in the red range, it means the transmission is overheated. Be careful that the indicator does not move into the red range.

3) WARNING LAMPS



※ **When the warning and pilot lamps are illuminated more than display, you can display next lamps by push the button (▶).**

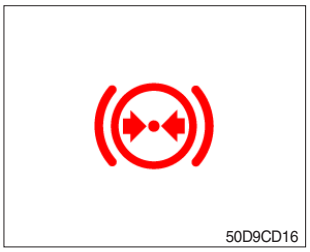
(1) Engine check lamp



① This lamp lights ON during a nonfatal engine system error.

② The engine can still be run, but the fault should be corrected as soon as possible.

(2) Brake oil pressure warning lamp

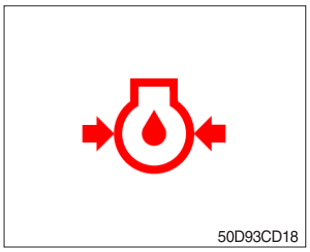


① The lamp lights ON when the oil pressure of service brake drops below the normal range.

② When the lamp is ON, stop the engine and check for its cause.

※ **Do not operate until the problems are corrected.**

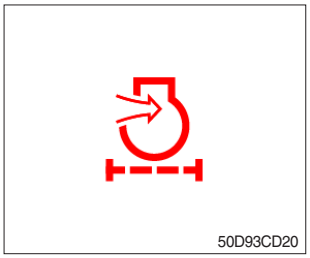
(3) Engine oil pressure warning lamp



① This lamp comes ON for a while after starting the engine because of the low oil pressure.

② If the lamp comes ON during engine operation, shut OFF engine immediately. Check oil level.

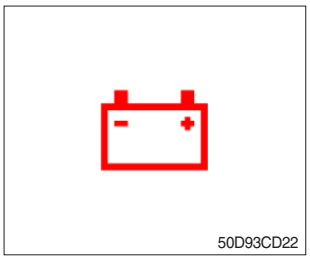
(4) Air cleaner warning lamp



① This lamp operates by the vacuum caused inside when the filter of air cleaner is clogged.

② Check the filter and clean or replace it when the lamp is ON.

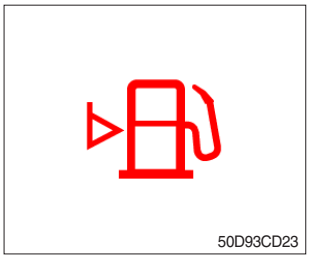
(5) Battery charging warning lamp



① This lamp is ON after key switch is turned ON, it is turned OFF after starting the engine.

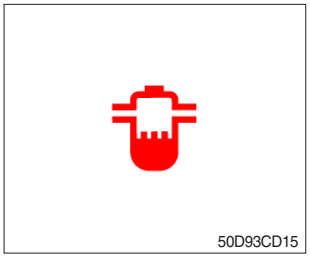
② Check the battery charging circuit when this lamp comes ON during engine operation.

(6) Fuel low level warning lamp



① Fill the fuel immediately when the lamp is turned ON.

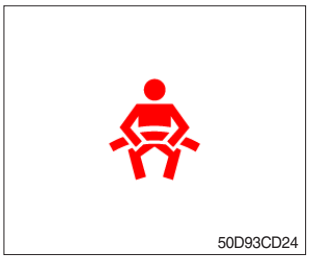
(7) Water in fuel warning lamp



① Light up when water in fuel.

② Stop the engine and please drain the water of the fuel prefilter.

(8) Seat belt warning lamp



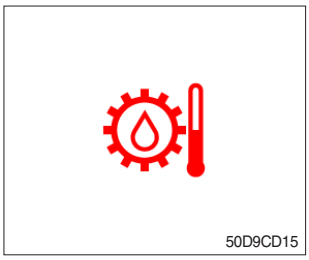
① This lamp lights ON for the first five seconds after starting the engine.

(9) Engine coolant temperature warning lamp

① This lamp is turned ON when the temperature of cooling water is over the normal temperature (104 °C, 209 °F).

② Check the cooling system when the lamp is ON.

(10) Transmission oil temperature warning lamp



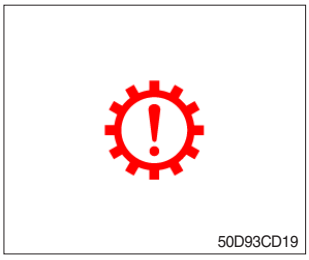
① This lamp informs the operator that transmission oil is above the specified temperature (107 ˚C, 225 ˚F).

· Lamp ON : Abnormal

· Lamp OFF : Normal

※ When this lamp lights up during operation, stop the engine and check the truck.

(11) Transmission error warning lamp



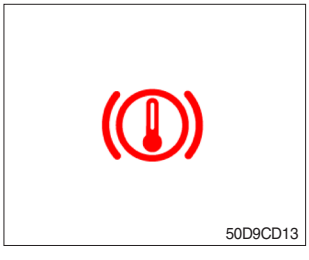
① This lamp lights ON and the information window of the LCD shows the error code when an error occur in the transmission.

② Immediately pull the truck to a convenient stop. Stop the engine. Investigate the cause.

※ Consult a HYUNDAI dealer to investigate the cause.

※ Do not operate until the cause has been corrected.

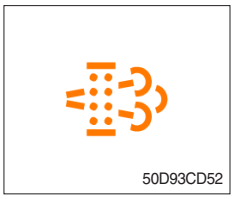
(12) Brake oil temperature warning lamp



① This lamp is turned ON when the brake oil temperature is too high.

② When the lamp is ON, stop the engine and check for its cause.

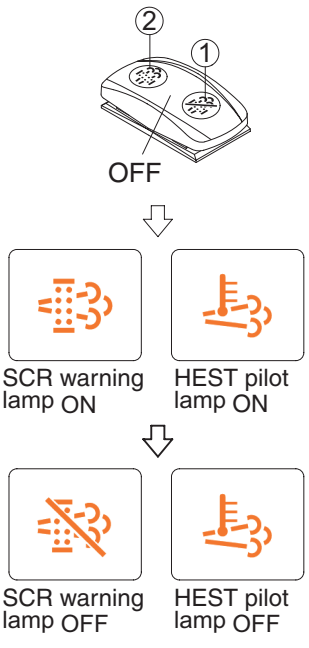
(13) SCR (Selective Catalytic Reduction) CLEANING WARNING LAMP



① This lamp lights ON when the SCR cleaning is needed and lamp flashes when manual SCR cleaning is activeted as table below.

Condition	Warning lamp				Remark
	SCR cleaning lamp	DEF Low Lamp	Engine Check Lamp	Engine Stop Lamp	
SCR needs to be cleaned	On	-	-	-	1. Change to a more challenging duty cycle. 2. Perform manual SCR cleaning.
SCR needs to be cleaned immediately	On	-	On	-	Manual SCR cleaning is required.
Stationary SCR cleaning status	Flash	-	-	-	-
DEF level initial warning	-	On	-	-	DEF level 10% Engine error code 3497
DEF level critical warning	-	Flash	-	-	DEF level 5% Engine error code 3498
DEF level initial warning	-	Flash	On	-	DEF level 2.5% Engine error code 1673, 25% derate
DEF level secondary derate warning	-	Flash	On	-	DEF level 0% Engine error code 3547,3714 50% derate, 30 min.
DEF level final derate warning	-	Flash	On	On	Engine error code 3712 Contact Hyundai service center or dealer.

※ Manual SCR cleaning method



300D9CD143

※ Manual SCR cleaning applies if the truck is in a fireproof area and there is no plan to turn off the truck during the SCR cleaning.

① Stop and park the truck.

② Push the switch to position ② to initiate the manual SCR cleaning.

※ Refer to the page 3-35 for the switch operation.

※ The engine speed may increase during SCR cleaning and it will take approximately 20~60 minutes depending on condition.

③ The SCR cleaning warning lamp flash and HEST pilot lamp will light on during the manual SCR cleaning function is operating.

④ The SCR cleaning warning and/or HEST pilot lamp will light OFF when the SCR cleaning function is completed.

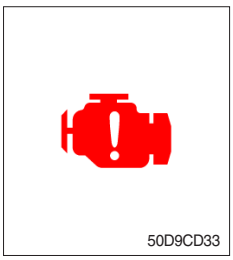
(14) DEF (Diesel Exhaust Fluid) low warning lamp

① This warning lamp indicates, when illuminated or flashing, that the diesel exhaust fluid level is low.

※ **Add the diesel exhaust fluid into DEF tank.**

※ **Refer to the page 3-10 for detail.**

(15) Engine stop warning lamp



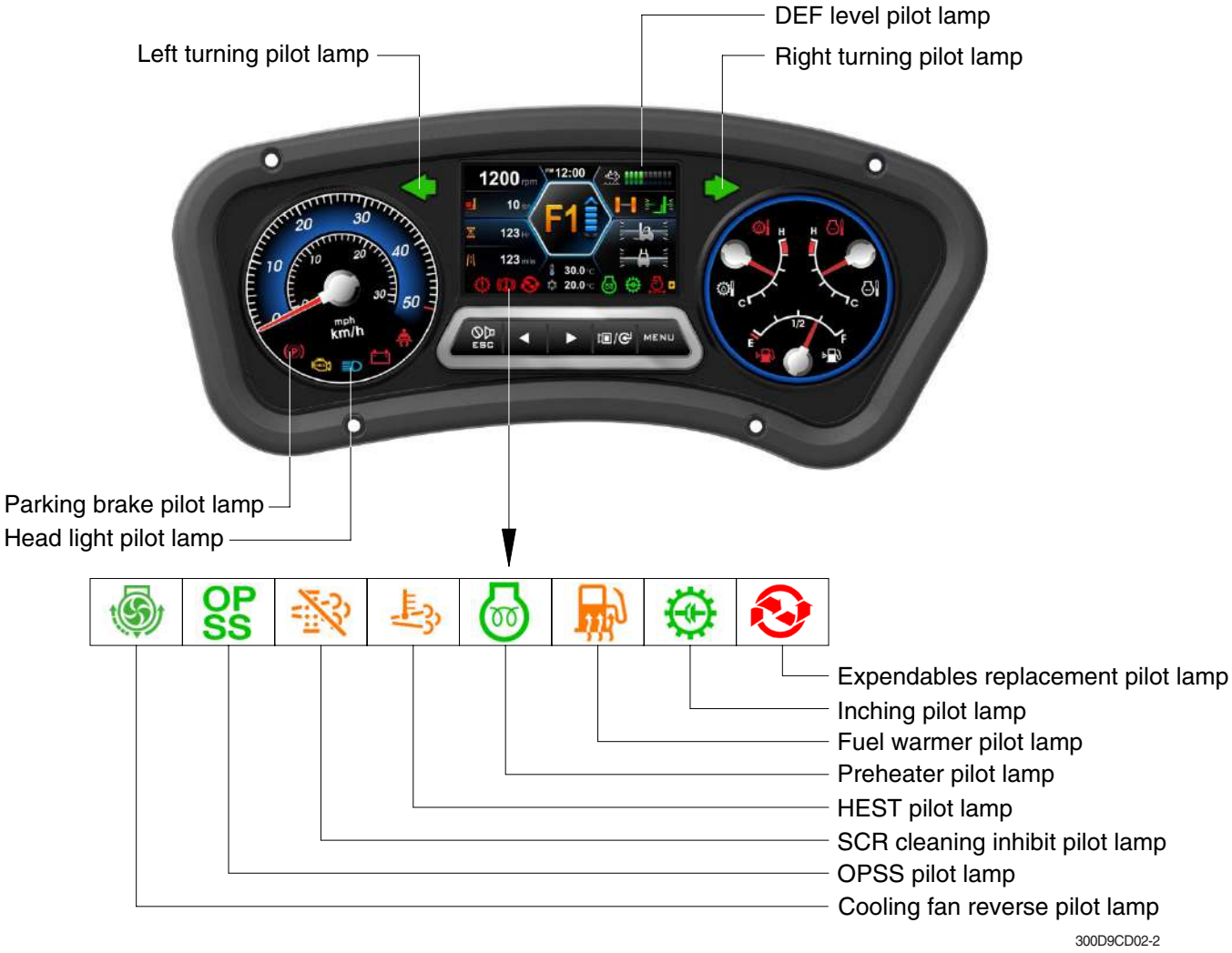
① When this warning lamp lights ON, stop the engine immediately and and check the DEF level and related parts of the engine.

※ **Please contact your Hyundai service center or local dealer.**

(16) Fan error warning lamp

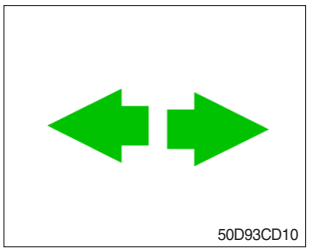
① This lamp is turned ON when the cooling fan error occurs.

4) PILOT LAMPS



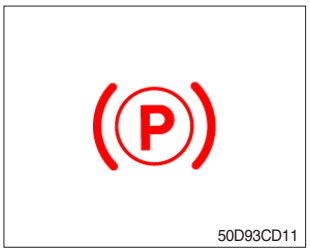
※ **When the warning and pilot lamps are illuminated more than display, you can display next lamps by push the button (▶).**

(1) Direction pilot lamp



① This lamp flashes when the signal indicator lever is moved.

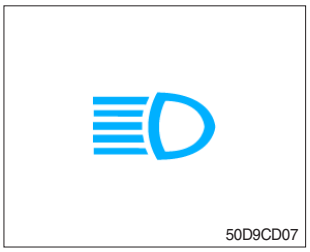
(2) Parking brake pilot lamp



① When the parking brake is actuated, the lamp lights ON.

※ **Check the lamp is OFF before driving.**

(3) Head light pilot lamp



① This lamp comes ON when the main light switch is operated to 2nd step.

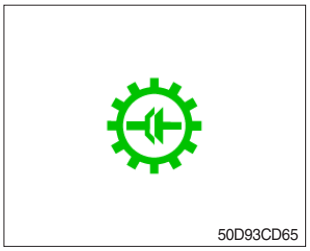
(4) Preheater pilot lamp

① This lamp lights ON when start switch is turned clockwise to the ON position. Light will turn off after approximately 15~45 seconds, depending on engine coolant temperature, indicating that preheating is completed.

② When the lamp goes out the operator should start cranking the engine.

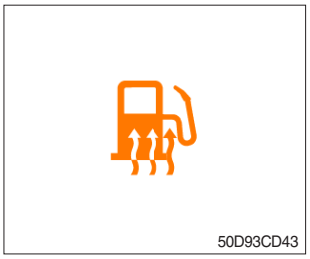
※ **Refer to page 5-12.**

(5) Inching pilot lamp



① When the inching switch is pressed, the lamp lights ON.

(6) Fuel warmer pilot lamp



① Illuminates when the hydraulic fluid temperature is below 20 °C (68 °F) or engine coolant temperature is below 10 °C (50 °F).

② If the engine coolant temperature is above 60 °C (140 °F) or hydraulic fluid temperature is above 45 °C (113 °F) the start switch is in the ON position, automatic fuel heating is canceled.

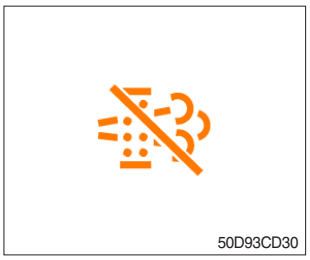
(7) OPSS pilot lamp

① This signal lamp lights ON when the operator leaves the seat.

② Powered travel movement of the truck shall be possible only if the operator is in the normal operating position. Transmission will automatically shift to neutral upon the exiting of the operator.

③ The gear selector lever must be cycled through neutral with the operator in the normal operating position to regain powered direction control.

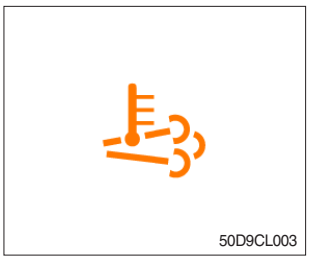
(8) SCR cleaning inhibit pilot lamp



① This pilot lamp lights ON when the SCR cleaning switch is pushed inhibit position, therefore automatic and manual SCR cleaning can not occur. It should inhibited, before caused fire due to the exhaust gas in high temperature.

※ **Refer to the page 3-35 for the SCR cleaning switch.**

(9) HEST (High exhaust system temperature) pilot lamp

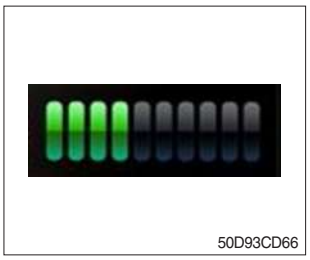


① This warning lamp indicates, when illuminated, that exhaust temperatures are high due to SCR cleaning.
② The lamp will also illuminate during a manual SCR cleaning.
③ When this lamp is illuminated, be sure the exhaust pipe outlet is not directed at any surface or material that can melt, burn, or explode.

⚠ **When this lamp is illuminated, the exhaust gas temperature could reach 800 ℃ [1500 ℉], which is hot enough to ignite or melt common materials, and to burn people.**

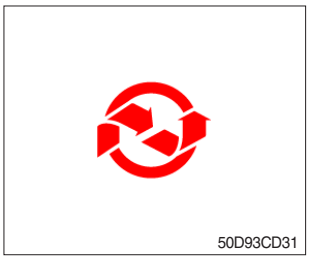
※ **The lamp does not signify the need for any kind of equipment or engine service; It merely alerts the equipment operator to high exhaust temperatures. It will be common for the lamp to illuminate on and off during normal equipment operation as the engine completes the SCR cleaning.**

(10) DEF (Diesel Exhaust Fluid) level pilot lamp



① This gauge indicates the level of DEF (10 steps).
② Fill the DEF when the level is low.

(11) Expendables replacement pilot lamp



① This lamp lights ON if expendables which must be replaced are exist.
② The lamp will light up only 3 minutes since KEY ON, and then light off.
③ Please check the expendables management list in maintenance menu.

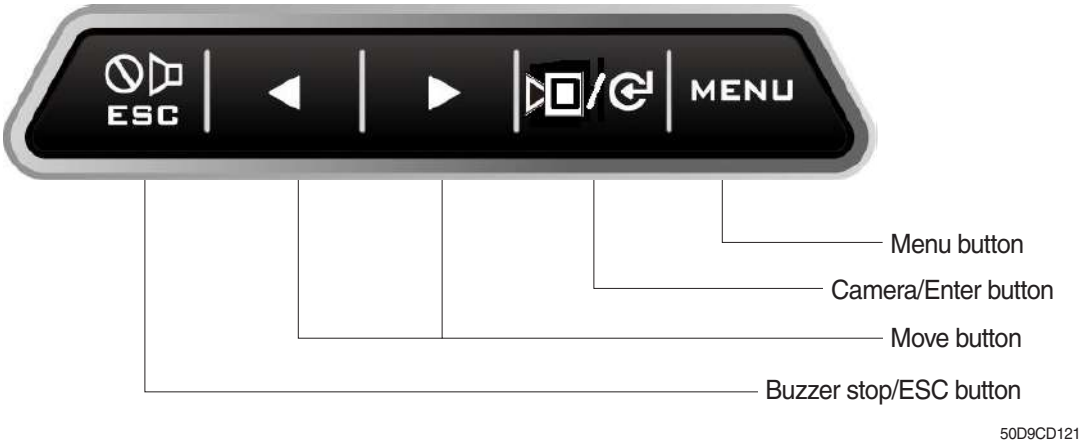
(12) Cooling fan reverse rotation pilot lamp

① This lamp lights ON when the cooling fan is operated to the reverse rotation.

※ **Refer to page 3-36 for the operation of the cooling fan.**

4) CLUSTER BUTTON

Each button has the following function.



50D9CD121

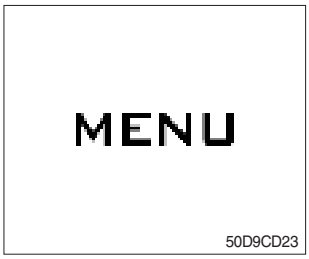
(1) Buzzer stop/ESC button

50D9CD22

① This button is used to stop the buzzer sound.

② If another alarm condition occurs after this button has been pressed, the alarm buzzer will re-sound.

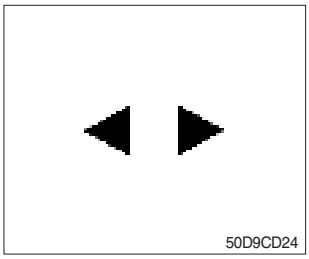
(2) Menu button



50D9CD23

① Move in menu (left, up / right, down).

(3) Move button



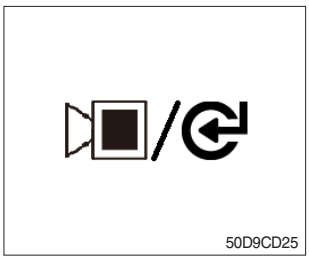
50D9CD24

① Move in menu (left, up / right, down).

② Decrease / Increase input value.

③ When the warning and pilot lamps occur over six, you can display next lamps by push the button (▶).

(4) Enter button



50D9CD25

① Change the camera screen on main

② This button is used to select menu.

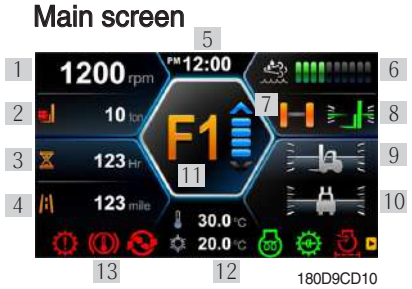
5) LCD

(1) Main screen

※ You can select or set the menu by the button of the cluster.

※ Please refer to the page 3-15 for the selection and change of the menu and input value.

Main screen



180D9CD10

MENU

Main menu screen

50D9CD11

Sub menu screen

300D9CD12

1	Engine rpm	8	Mast angle (opt)
2	Load indicator (opt)	9	Vehicle angle X (opt)
3	Hour meter	10	Vehicle angle Y (opt)
4	Odometer	11	T/M info (error code, gear, warning)
5	Current time	12	Temperature (outdoor temp., setting temp) (cabin opt)
6	DEF level gauge	13	Warning and pilot lamps
7	Rear wheel angle (opt)		

Communication error

180D9CD13

※ Main screen when occurred communication error between the cluster and TCU/ MCU / ECU

Occurrence of the truck fault

While illuminates the engine, transmission or air conditioner warning lamp, when you press right button (▶) in the cluster button for about 4 seconds, it directly connected to the current failure screen.

(Warning lamp : Engine ( ), Transmission (and Air conditioner ( ).

(2) Camera screen

① Depending on the gear, if the gear is rear position, screen is changed to camera screen.

② If the camera is not mounted or the camera signal is abnormal, the current screen remains.

(3) Main menu

No.	Main menu	Sub menu	Description
1	 Equipment 50D9CD14K	Model select Tilt setting Rear angle setting Weight sensor setting ESL setting Vehicle max speed limit AEB setting (R) MCU/cluster information Cooling fan control	Model select Tilt setting (mast and vehicle angle) Rear angle setting Cross-section, load weight adjust, weight display setting, load indicator buzzer ESL setting Vehicle max speed limit (10~30 km) AEB setting (R)MCU/cluster information Rotation direction, reverse interval and time
2	 Maintenance 50D9CD15K	Failure history Maintenance management Signal statue User password change Opening of communication	Current history, logged history and delete logged fault Replacement, Change interval oils and filters Display information of sensors User password change (5~10 digit) Orbcomm, GPS antenna
3	 Display setting 50D9CD16K	LCD adjustment Time setting Unit setting Language setting AS phone number ESL password change Maintenance management	LCD brightness setting Time setting Unit setting (temp, speed, weight, pressure) Language setting (13 languages) Check and change AS phone number ESL password change (5~10 digit) Maintenance information (cycle, elapsed time, change count, alarm info)

(3) Equipment

① Choose the equipment

180D9CD20

50D9CD21

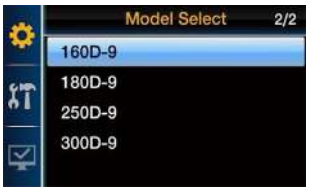
- To enter the menu, you must input user password.
- Default password is '00000'
- You should set password by five to ten digit.

② Model select

180D9CD22

300D9CD12

50D9CD23



300D9CD300

300D9CD301

50D9CD25

- Select the Model

※ **Turn the lift truck ON after turn it OFF when changing D-9 to D-9H or D-9H to D-9.**

※ **The initial model is selected at the factory, so don't change the different model.**

300D9CD302

300D9CD303

300D9CD304

300D9CD305

③ Tilt setting

180D9CD26 50D9CD27 180D9CD28

· Set the offset about mast angle sensors and vehicle angle sensors.

④ Setting for rear wheel angle

180D9CD29 180D9CD30-1 180D9CD31 180D9CD32 180D9CD33 180D9CD34-1

· The user revises a forklift truck steering angle.
· Display set to approve a condition.
  – Right set rear wheel calibration.
  – Center set rear wheel calibration.
  – Left set rear wheel calibration.

⑤ Weight sensor setting

a. Cross-section

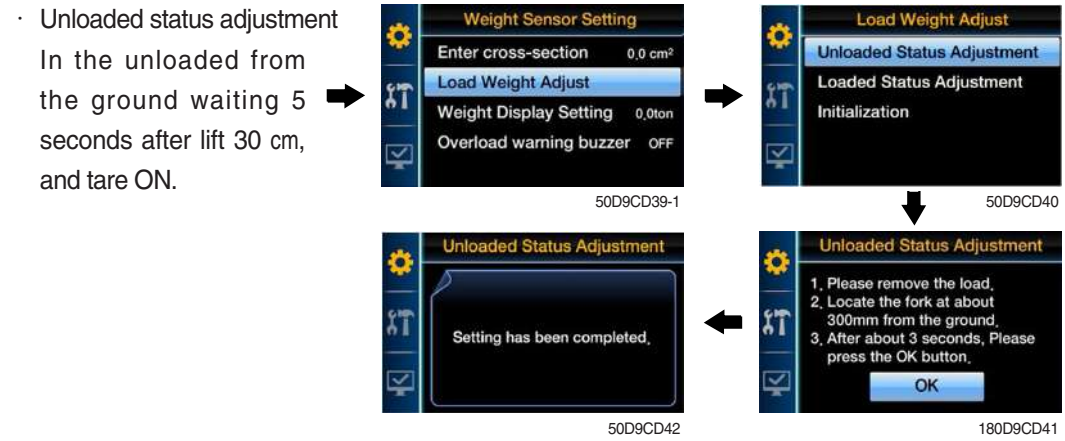
180D9CD35-1 180D9CD36-1 180D9CD37 180D9CD38

· Enter the designated cross-section (cm^2).

Mast spec	110/130D-9	160D-9
V-Mast	190.07	226.19
VS-Mast	226.19	265.46
TS-Mast	226.19	265.46

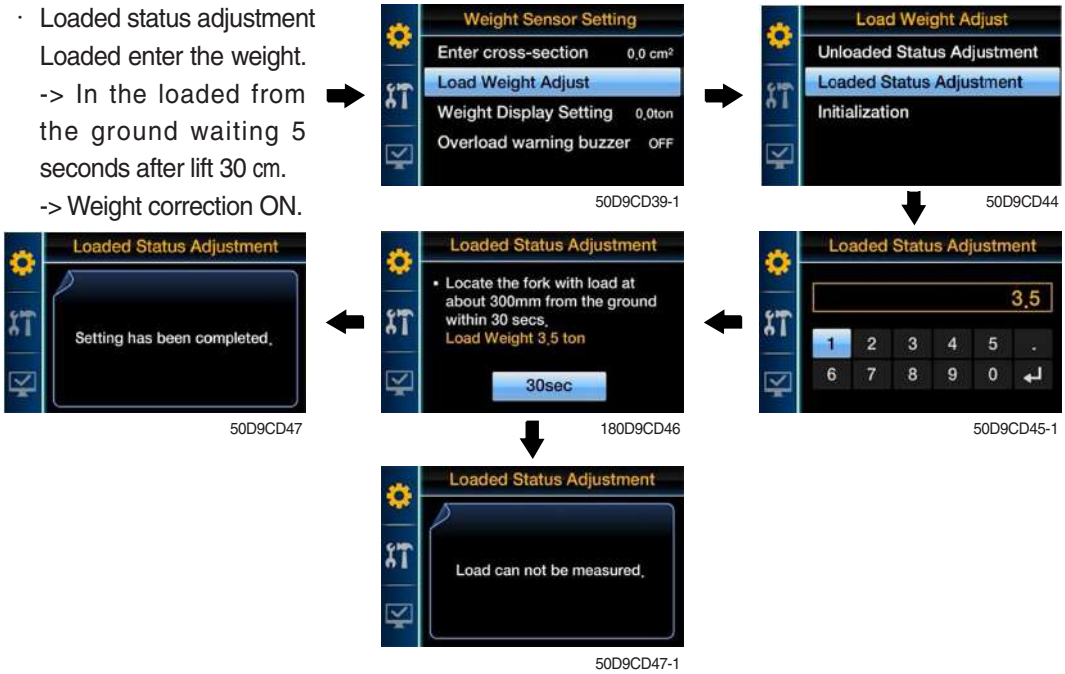
b. Load weight adjust

· Unloaded status adjustment
In the unloaded from the ground waiting 5 seconds after lift 30 ㎝, and tare ON.



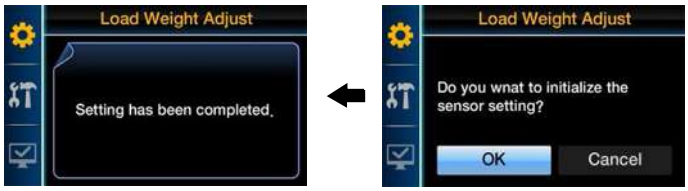
50D9CD39-1 50D9CD40 180D9CD41 50D9CD42

· Loaded status adjustment
Loaded enter the weight.
-> In the loaded from the ground waiting 5 seconds after lift 30 ㎝.
-> Weight correction ON.



50D9CD39-1 50D9CD44 50D9CD45-1 180D9CD46 50D9CD47 50D9CD47-1

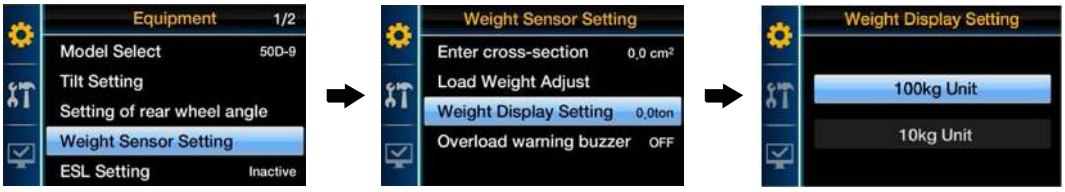
180D9CD35-1 50D9CD39-1 50D9CD49



50D9CD51-1 50D9CD50-1

· Initialization
It is initialized loaded status and unloaded status.

c. Weight display setting

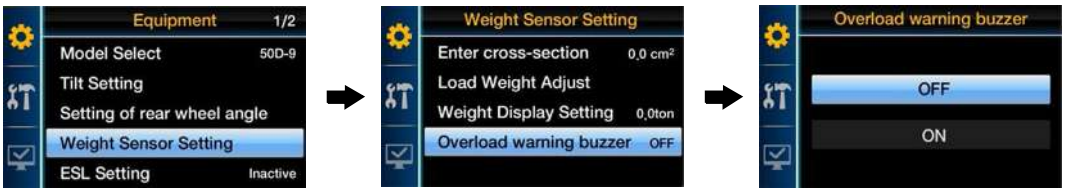


180D9CD35-1 50D9CD53-1 50D9CD54

50D9CD55

· Select the number of points of weight value display.

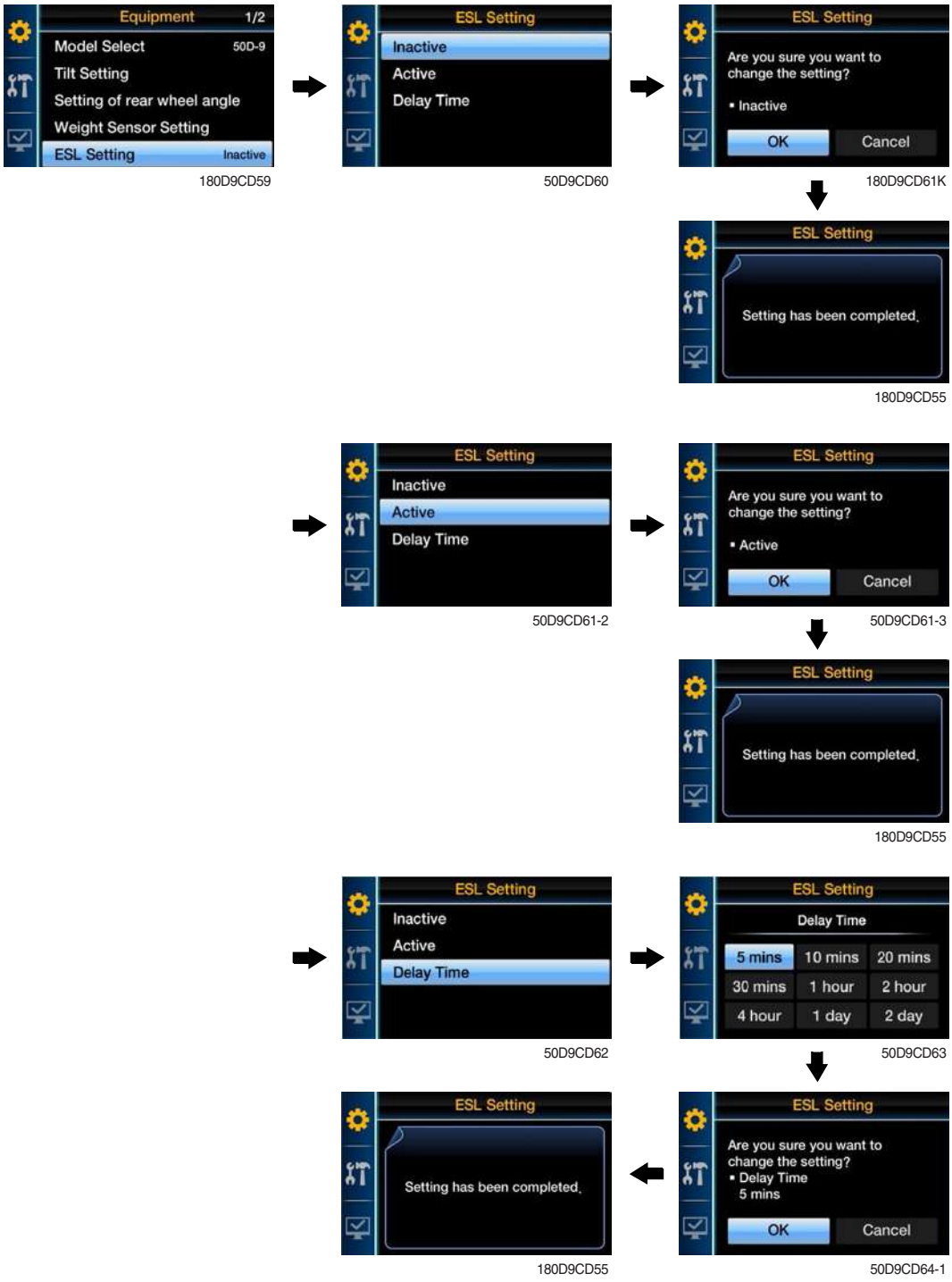
d. Overload warning buzzer



180D9CD35-1 50D9CD57-1 50D9CD58-1

· Choose using buzzer when over weight.

⑥ ESL setting

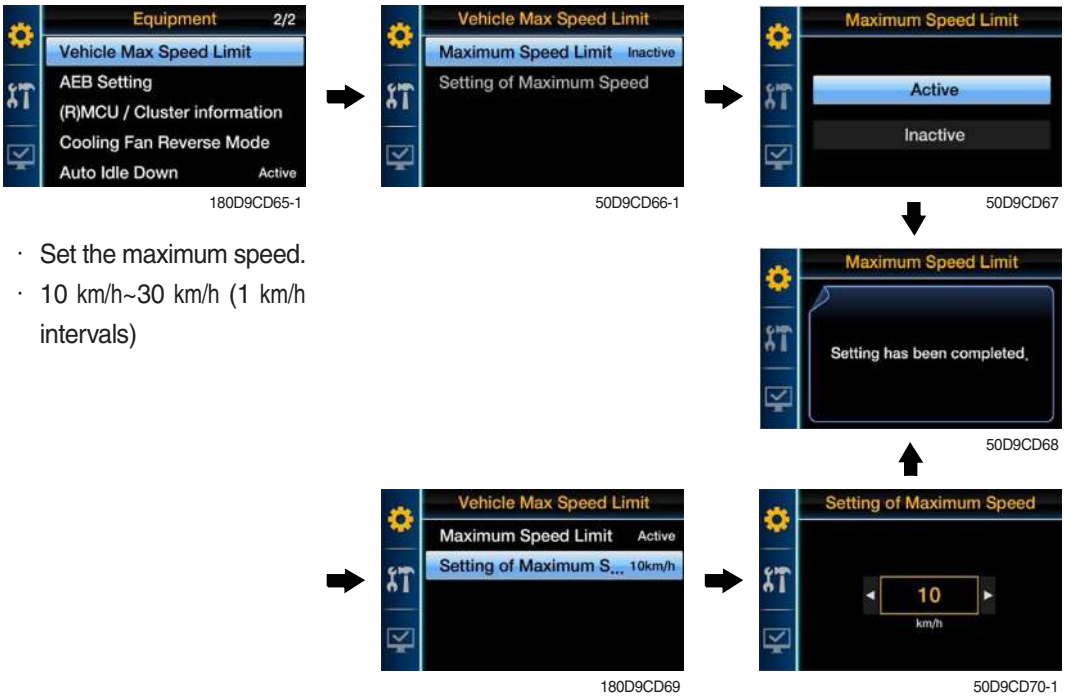


· Set ON/OFF function for using limitation of ignition and time for starting.

· Set time 5 minutes for starting :

In 5 minutes you can restart without password, but after 5 minutes, you should input password for starting.

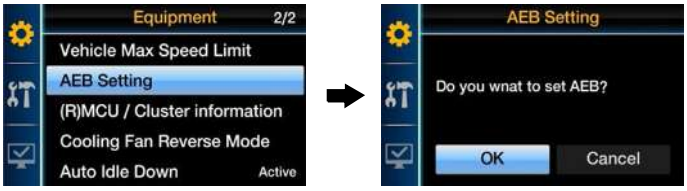
⑦ Vehicle max speed limit



180D9CD65-1 50D9CD66-1 50D9CD67 50D9CD68 180D9CD69 50D9CD70-1

- Set the maximum speed.
- 10 km/h~30 km/h (1 km/h intervals)

⑧ AEB setting



180D9CD71-1 180D9CD72

- Press OK button, then calibration will be started, for cancel, press Menu/ECS/Enter button.
- When it is finished (OK sign at gear box), Press Menu/ECS/Enter button.
- Start the engine : AEB start
- KEY ON : Brake pedal sensor calibration

⑨ (R) MCU / Cluster information

180D9CD73-1 50D9CD74-1

- Software version check for MCU/Cluster/RMCU.

⑩ Cooling fan reverse mode

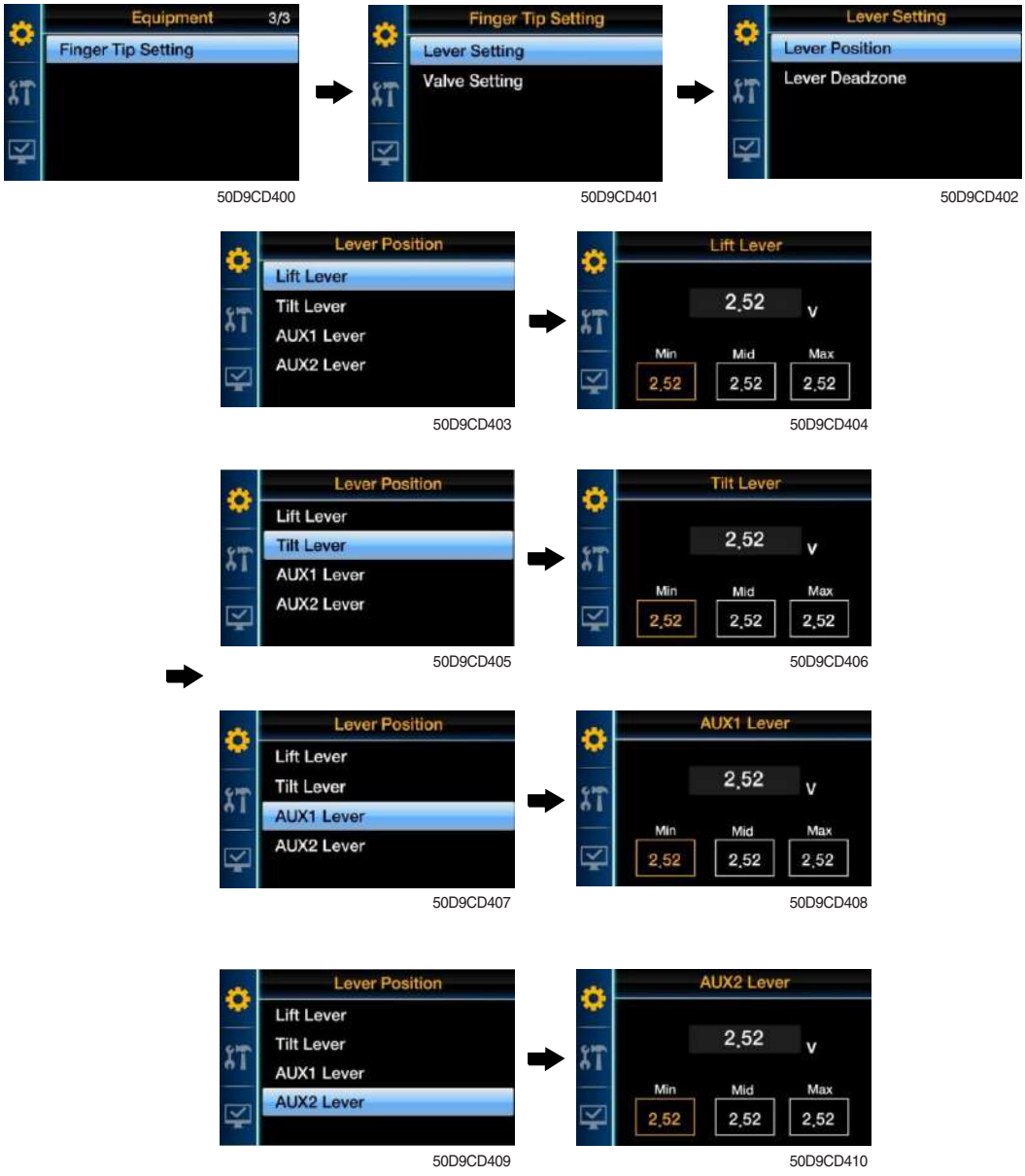
180D9CD101-1 180D9CD103-1

- Manual : The fan only rotate in reverse direction while you hold down the manual button.
- Automatic : The fan rotate in reverse direction at pre-set interval.
  - Interval : 30 minutes ~ 5 hours
  - Time : 30 seconds ~ 5 minutes

※ **Refer to the page 3-35 for the cooling fan control switch.**

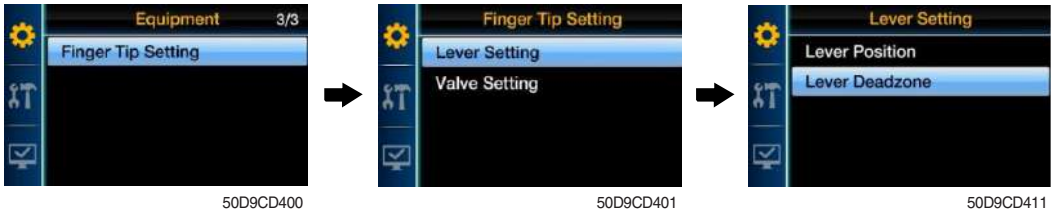
⑪ Finger tip setting

a. Lever position setting

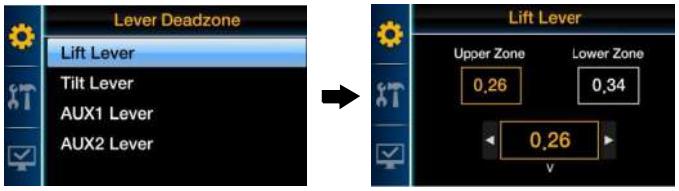


- Ability to set up the maximum Pull, Push (Min,Max) value and neutral value (Mid) of lever.
- Finger Tip lever set up about 0.5V~2.5V~4.5V.
  You must be to move with actual Lever. (Unit V)
  ex) Min 0.48, Mid 2.52, Max 4.52

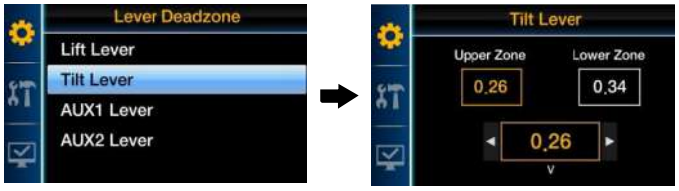
b. Lever deadzone setting



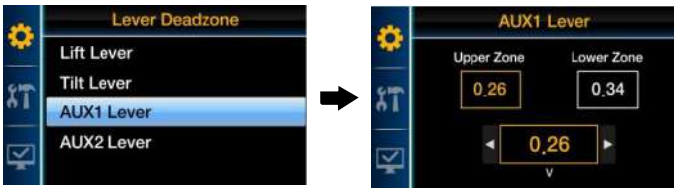
50D9CD400 50D9CD401 50D9CD411



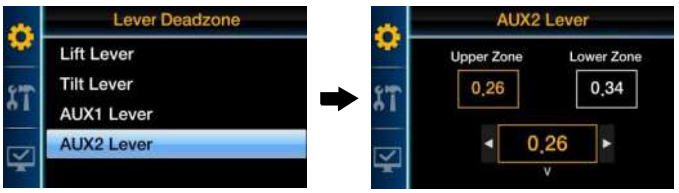
50D9CD412 50D9CD413



50D9CD414 50D9CD415



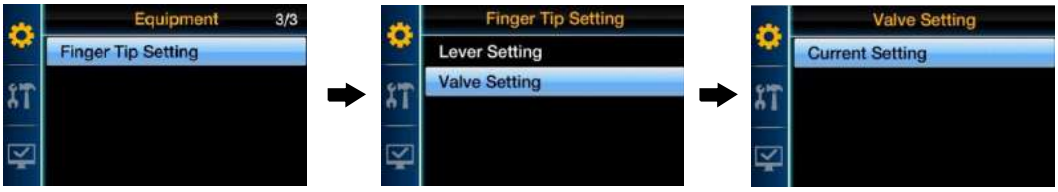
50D9CD416 50D9CD417



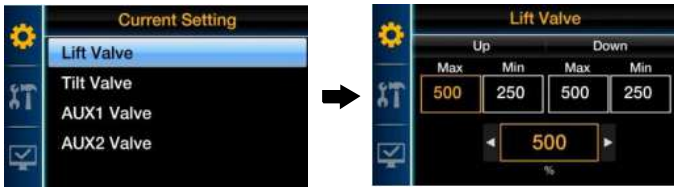
50D9CD418 50D9CD419

· Ability to prevent the Value output due to a tiny error of the neutral Lever state (2.5V)
ex) If you set up the Upper : 0.26, Lower : 0.24, Lever operating range will be
Upper zone : 2.76V (2.5+0.26) ~ 4.5V (Lever Max value)
Lower zone : 2.26V (2.5-0.24) ~ 0.5V (Lever Min value)

c. Valve setting



50D9CD400 50D9CD420 50D9CD421



50D9CD422 50D9CD423

50D9CD424 50D9CD425

50D9CD426 50D9CD427

50D9CD428 50D9CD429

· Current Setting : Current setting for input each Valve Coil, it is to set up each maximum value of movements according ot the current value (Unit % (Over 110D-9 only), mA (Under 80D-9 Only)

ex) If the Max value increase, the maximum speed will also increase.
If the Min value increase, the minimum speed will also increase.

(4) Maintenance

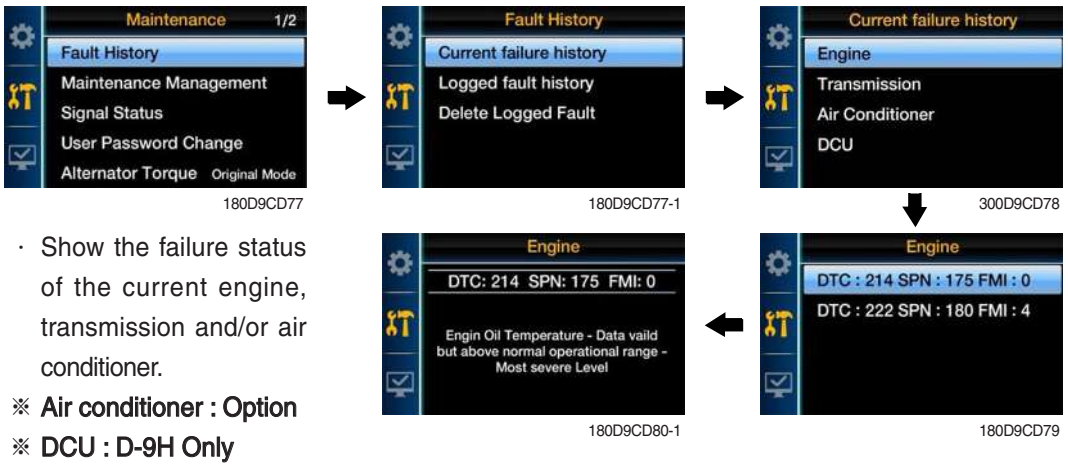
① Choose the maintenance

180D9CD75-1 180D9CD76

- To enter the Menu, you must input user password.
- Default password is '00000'
- You should set password by five to ten digit.

② Failure history

a. Current failure history



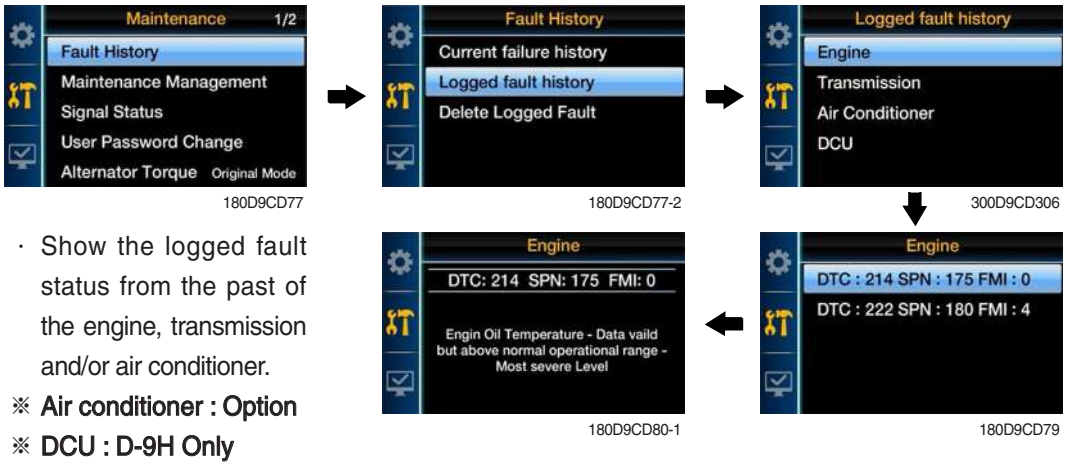
180D9CD77 180D9CD77-1 300D9CD78 180D9CD80-1 180D9CD79

- Show the failure status of the current engine, transmission and/or air conditioner.

※ Air conditioner : Option

※ DCU : D-9H Only

b. Logged fault history



180D9CD77 180D9CD77-2 300D9CD306 180D9CD80-1 180D9CD79

- Show the logged fault status from the past of the engine, transmission and/or air conditioner.

※ Air conditioner : Option

※ DCU : D-9H Only

c. Delete logged fault

180D9CD77 180D9CD77-3 300D9CD307

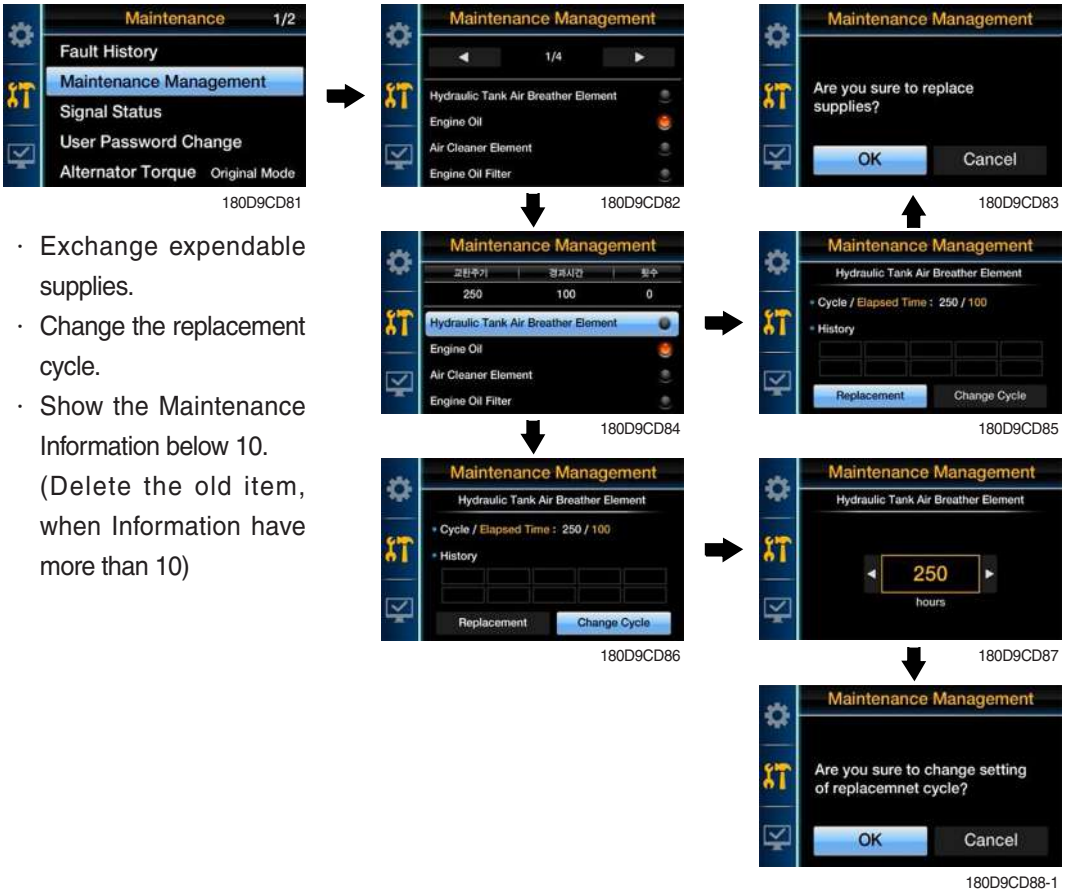
180D9CD79-1

- Initialize of the past logged fault history.

※ **Air conditioner : Option**

※ **DCU : D-9H Only**

③ Maintenance management



180D9CD81 180D9CD82 180D9CD83

180D9CD84 180D9CD85

180D9CD86 180D9CD87

180D9CD88-1

- Exchange expendable supplies.
- Change the replacement cycle.
- Show the Maintenance Information below 10. (Delete the old item, when Information have more than 10)

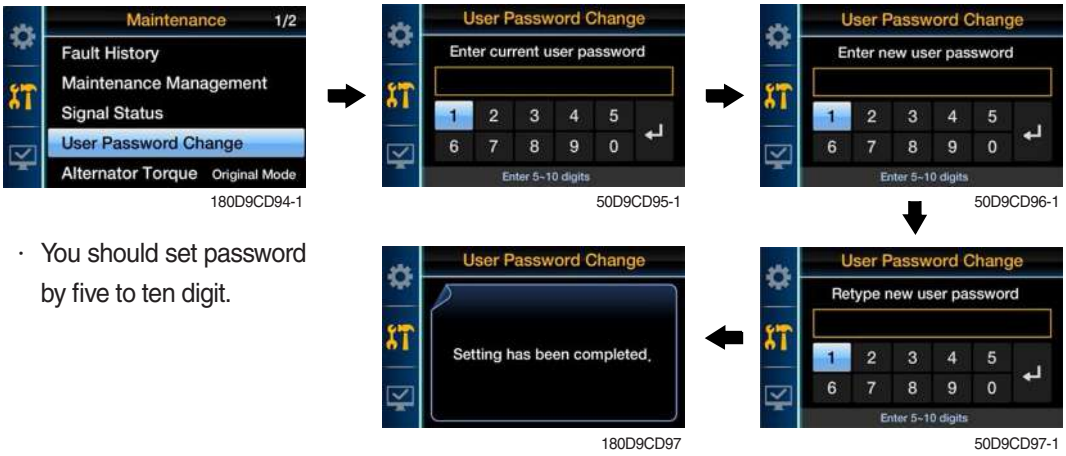
④ Signal status

180D9CD89-1 50D9CD90 180D9CD91

- Display information of each sensors.

50D9CD92 180D9CD93

⑤ User password change



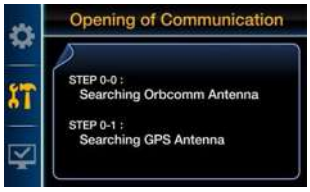
180D9CD94-1 50D9CD95-1 50D9CD96-1

- You should set password by five to ten digit.

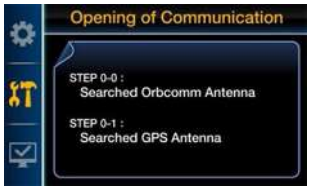
180D9CD97 50D9CD97-1

⑥ Opening of communication

180D9CD98-1



180D9CD99



180D9CD100

180D9CD101

180D9CD102-1

180D9CD102

- When successfully opened RMCU communication, except for the RMCU comm.

180D9CD104-1

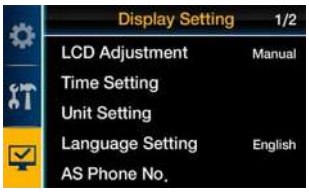
180D9CD105-1

180D9CD106

180D9CD107

(5) Display setting

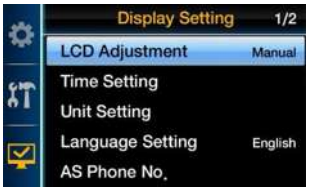
① Choose the display setting



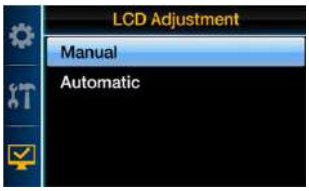
180D9CD108

· No password is required.

② LCD adjustment



180D9CD109



50D9CD110

180D9CD111

50D9CD112

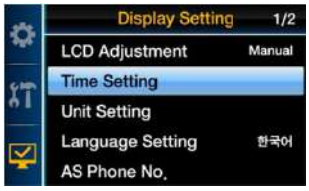
180D9CD113

180D9CD114

180D9CD115

· Manual : Manual setting for LCD brightness.
· Automatic : Automatic control of LCD brightness as set level of Day/Night.
· Setting day time : Set the time for daylight.
(If you set the time for daylight, the rest time will be night.)

③ Time setting



50D9CD116

180D9CD117

· Set the time (Year, Month, Day, Hour, Minute, AM/PM).

④ Unit setting

180D9CD118 50D9CD118-1 50D9CD119

· Change units of temperature / speed / wight / pressure.

⑤ Language setting

180D9CD120 180D9CD121 180D9CD122

50D9CD123

· Set the language used by your device.
(13 Multiple language)

⑥ A/S phone number

50D9CD124 50D9CD125 180D9CD126

· Check and change of contact information for customer service.

⑦ ESL password change

50D9CD127 180D9CD128 180D9CD129

· You should set password
by five to ten digit.

180D9CD130 180D9CD130-1

⑧ Maintenance management

50D9CD131 50D9CD132-1 50D9CD133-1

· Show the maintenance information (replacement cycle, elapsed time, change count, alarm information).

5.TRANSMISSION MESSAGE DISPLAY

1) FUNCTION

The display can be used with the gear selector (DW-3). It indicates speed and driving direction. When driving in the automatic mode, a bar indicator gives additionally also information about the selected driving range; The automatic range is symbolized by arrows above and below the bar indicator. In case of possible errors in the system, a wrench appears on the display, combined with indication of the error number. Also sporadically occurring errors can be indicated.

180D93ACD33

※ If it happens error codes, consult with Hyundai service center to repair the fault.

2) DISPLAY DURING AEB-MODE

Symbol	Meaning	Remarks
K1.....K3 KV, KR	Calibrating clutch K1...K3, KV or KR resp.	
_and Kx	Wait for start, initialization of clutch Kx, x : 1, 2, 3, V, R	
≡and Kx	Fast fill time determination of clutch Kx	
=and Kx	Compensating pressure determination of clutch Kx	
OK	Calibration for all clutches finished	Transmission stays in neutral, you have to restart the TCU(ignition off/on) after removing AEB-Starter
STOP	AEB canceled(activation stopped)	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
STOP and Kx	AEB stopped, clutch Kx can't be calibrated	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
Spanner and Kx	Kx couldn't be calibrated, AEB finished	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
△E	Engine speed too low → raise enging speed	
▽E	Engine speed too high → lower enging speed	
△T	Transmission oil temperature too low → heat up transmission	
▽T	Transmission oil temperature too high → cool down transmission	
FT	Transmission temperature not in defined range during calibration	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
FB	Operating mode not NORMAL or transmission temperature sensor defective or storing of Calibrated values to EEPROM-has failed.	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
FO	Output speed_not_zero	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
FN	Shift lever not in Neutral position	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
FP	Park brake_not_applied	Transmission stays in neutral, you have to restart the TCU(ignition off/on)
STOP	AEB-Starter was used incorrect or is defective. Wrong device or wrong cable used.	Transmission stays in neutral, you have to restart the TCU(ignition off/on)

3) INITIALIZING THE INCHING SENSOR

(1) Start engine after parking the truck on flat floor and blocking wheels.
(2) Release parking brake and keep neutral gear shift.
(3) Adjust the inching sensor linkage so that the regular voltage is supplied to inching sensor when operating the pedal.
※ Regular voltage ; Before pedal operation (1±0.1V), After pedal operation (3.5±0.1V).
(4) Stop the engine and then just KEY ON. (Release parking brake, keep neutral gear)
(5) Connect the AEB STARTER to the T/M controller.
(6) Push AEB STARTER over 3 seconds.
(7) If display shows "▼IP", Step on the pedal fully.
(8) If display shows "▲IP", release "OK"
(9) After the successful completion, it displays "OK".
(10) In case of abnormal running, it may display "STOP" with the appropriate error code.
(11) After troubleshooting, start the truck again to repeat above.
※ Above works are to be done with the parking brake released, so truck's wheels must be blocked for safety.

4) DISPLAY DURING INCHPEDAL CALIBRATION

Symbol	Meaning	Remarks
▼IP	Push down the pedal slowly until endposition is reached and hold this position	
▲IP	Release the pedal slowly until endposition is reached	
IP blinkt	A problem occurred, release the pedal slowly until endposition is reached	If the expected endposition could not be reached, release the pedal and try again
OK	Finished inchpedal calibration successful	
FN and Stop	Shift lever not in Neutral position	Calibrations is aborted
FS and Stop	Sensor supply voltage AU1 is out of the specified range	Calibrations is aborted
FO and Stop	Outputspeed_not_zero	Calibrations is aborted
SL and Stop	Sensor voltage below specified range	Calibrations is aborted
SU and Stop	Sensor voltage below specified range	Calibrations is aborted
IL and Stop	Sensor position for released pedal out of specified range	Calibrations is aborted
IU and Stop	Sensor position for released pedal out of specified range	Calibrations is aborted
TO and Stop	Time-out calibration, pedal not moved after calibration start	Calibrations is aborted
DL and Stop	Angle between pedal positions released and pressed to small	Calibrations is aborted
DU and Stop	Angle between pedal positions released and pressed to small	Calibrations is aborted
FI and Stop	Sensor signal 1 and 2 don't match together	Calibrations is aborted

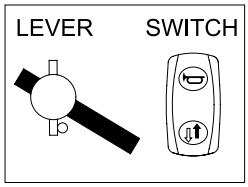
6. SWITCHES

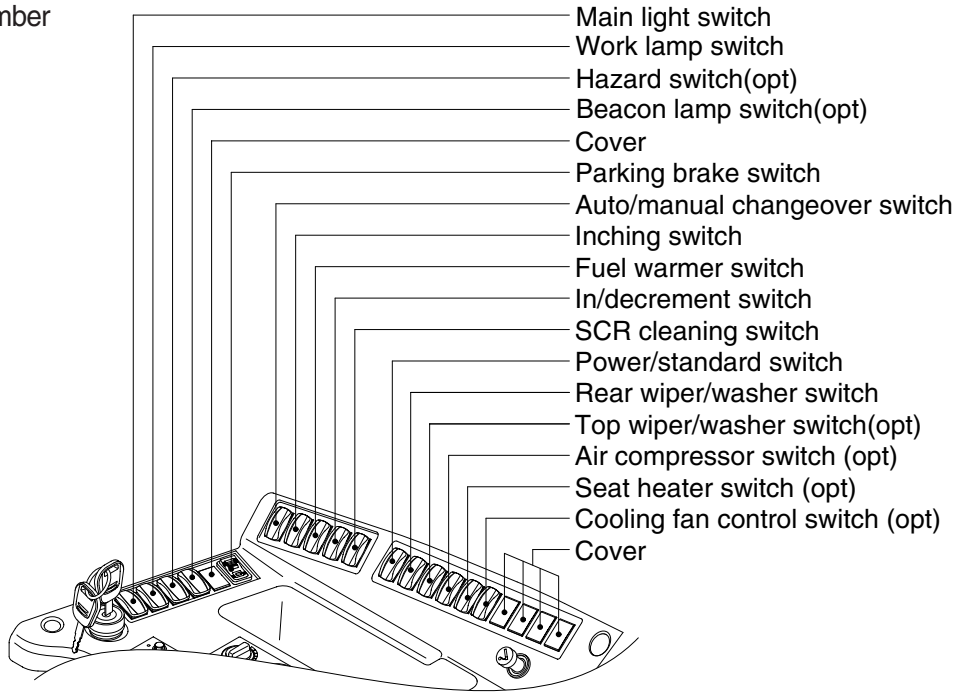
Remote control lever type

Machine serial number

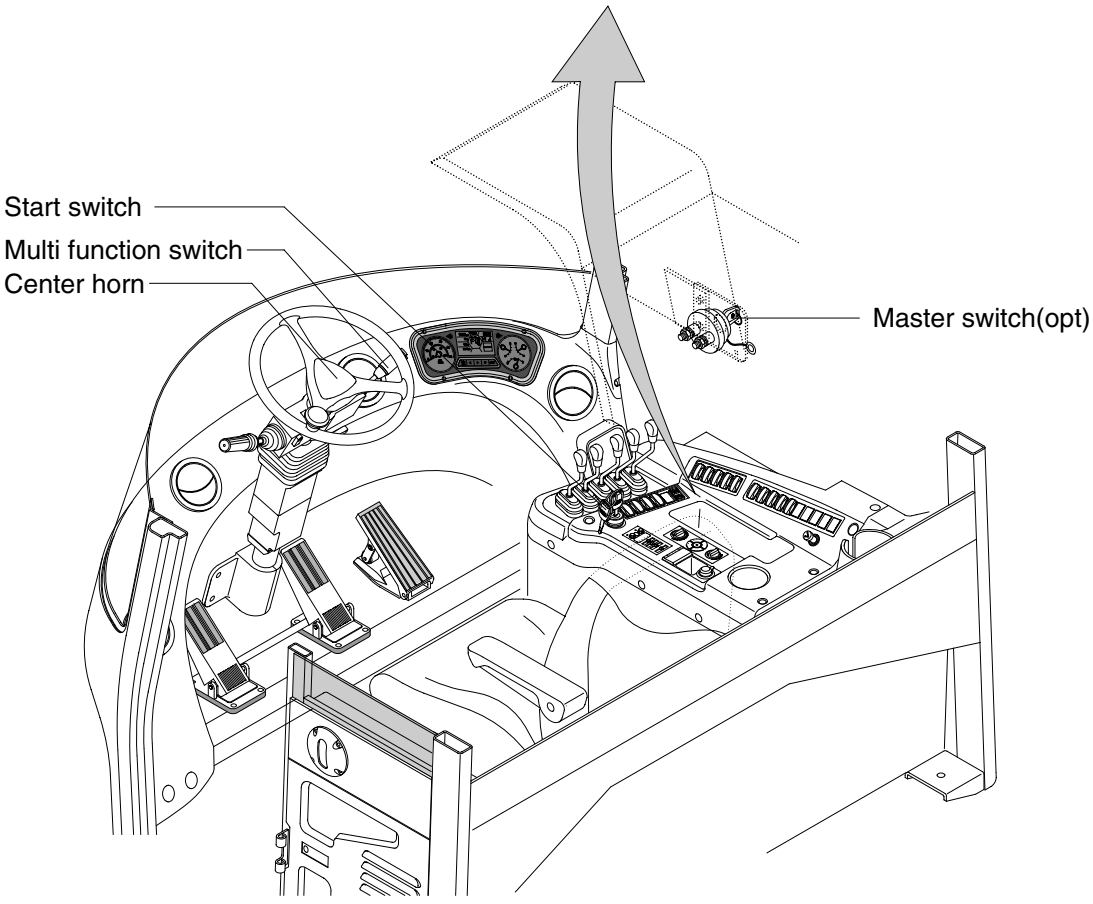
- 110D-9 : -#0074
- 130D-9 : -#0029
- 160D-9 : -#0155

CABIN TILT





Switch panel

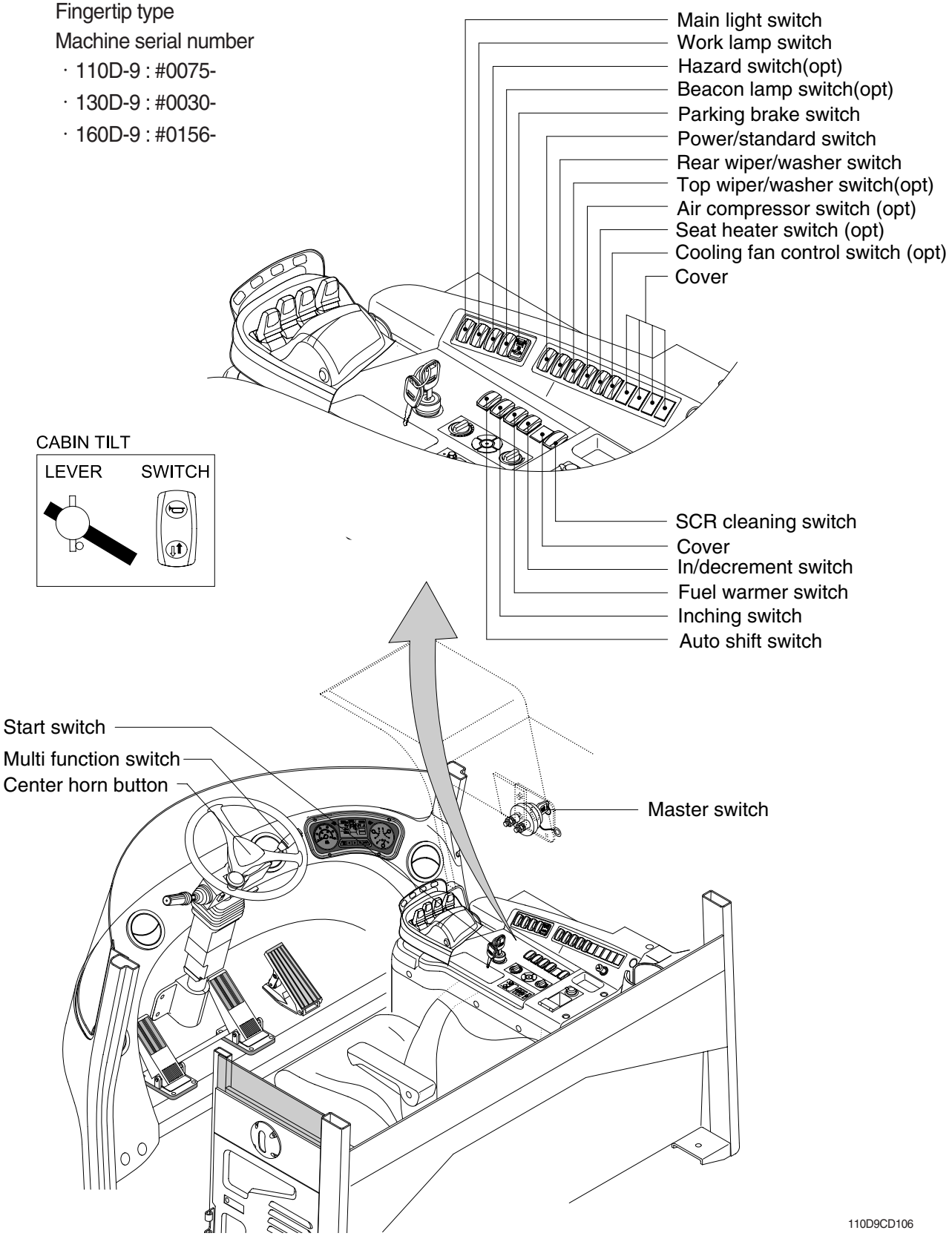


250D9CD06

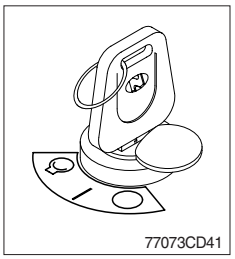
Fingertip type

Machine serial number

- 110D-9 : #0075-
- 130D-9 : #0030-
- 160D-9 : #0156-



1) START SWITCH



(1) There are three positions, OFF, ON and START.
- ◯ (OFF) : None of electrical circuits activate.
- | (ON) : All the systems of truck operate.
- (START) : Use when starting the engine.
  Release key immediately after starting.

※ **Before starting, set gear selector lever at NEUTRAL and place parking brake switch to LOCK position.**

※ **Key must be in the ON position with engine running to maintain electrical and hydraulic function and prevent serious truck damage.**

2) HAZARD SWITCH (OPTION)

(1) Use for parking, or loading truck.

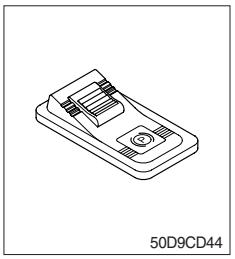
※ **If the switch is left ON for a long time, the battery may be discharged.**

3) INCHING SWITCH

(1) If this switch is pressed, inching operation is applied to inching pedal.

(2) Also, inching lamp on the cluster is illuminated.

4) PARKING BRAKE SWITCH

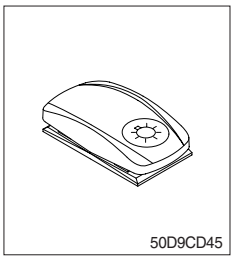


(1) This switch is used to parking brake lock or release.

(2) If this switch is pressed, the parking brake is applied and the warning lamp on the cluster will comes ON.

※ **When operating the gear selector lever, be sure to release the parking brake. If the truck is operated with the parking brake engaged, the brake will overheat and may cause the brake system to go out of order.**

5) MAIN LIGHT SWITCH



(1) This switch is used to operate the head light by one steps.

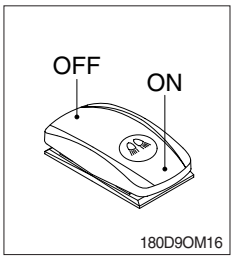
① First step : Clearance lamp and cluster illumination lamp comes ON. Also, all of the pilot lamps of switches come

② ON.

Second step : Head lamp comes ON.

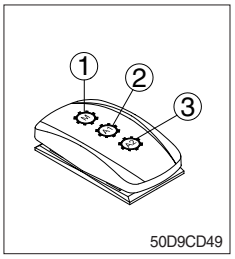
※ **Refer to page 3-34 for head lamp.**

6) WORK LAMP SWITCH



(1) This switch is used to operate the work lamps by two steps.
① First step : Front work lamp comes ON.
② Second step : Rear work lamp comes ON.

7) AUTO/MANUAL CHANGEOVER SWITCH



(1) Manual mode (①)

Press the top of the switch for the manual mode of the autoshift function. The operator selects the desired speed and the desired direction in the manual mode with the gear selector lever.

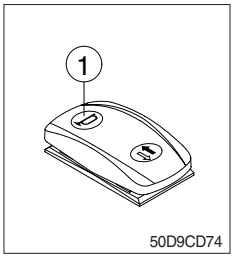
(2) Automatic 1st mode (②)

Place the switch in the middle position for the autoshift function changing from 1st to 3rd gear shift mode.

(3) Automatic 2nd mode (③)

Press the bottom of the switch fully for the autoshift function changing from 2nd to 3rd gear shift mode.

8) CABIN TILT SWITCH



(1) Horn ( )

By pressing position ①, the horn sounds and by releasing, the horn stops.

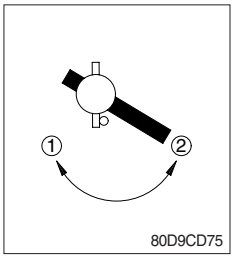
⚠ Sound the horn to warn near by personnel, before tilting the cabin.

(2) Tilting of the cabin (,)

Press the cabin tilt switch in order to tilt the cabin to right side or return to original location.

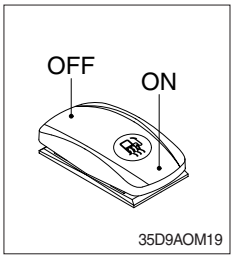
※ Refer to page 7-18 for the tilting method of the cabin.

9) HAND PUMP LEVER



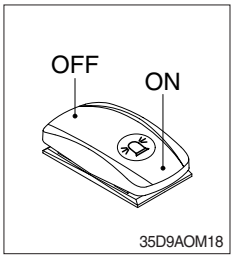
(1) This lever is used when tilting the cabin.
(2) Turn the hand pump lever to clockwise direction (①), the cabin shall be tilted to right side by the cabin tilt switch.
(3) Turn the hand pump lever to counterclockwise direction (②), the cabin shall be returned to original location by the cabin tilt switch.

10) FUEL WARMER SWITCH



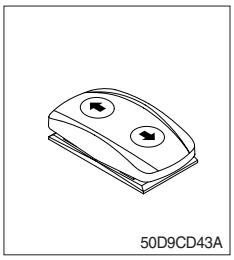
(1) This switch is used to heat the fuel of pre-heater.

11) BEACON LAMP SWITCH (OPTION)



(1) This switch turn ON the strobe light.

12) INC/DECREMENT SWITCH

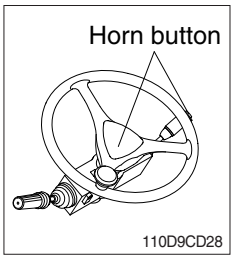


(1) When engine running, the low idle rpm of engine increase or decrease by 25 rpm by operating this switch.
(2) Engine low idle rpm returns to normal value when engine restarted.

13) TOP WIPER AND WASHER SWITCH (OPTION)

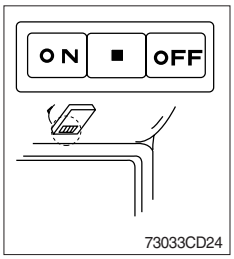
(1) This switch is used to operate the wiper and washer on the top of the cab.
(2) The washer liquid is sprayed and the wiper is operated only while pressing this switch.

14) HORN BUTTON



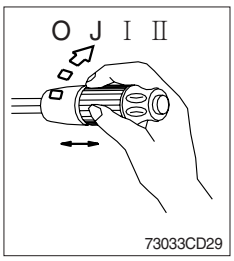
(1) If you press the button on the top of the multifunction switch and the center of the steering wheel, the horn will sound.

15) CAB LAMP SWITCH



(1) This switch turns ON the cab room lamp.

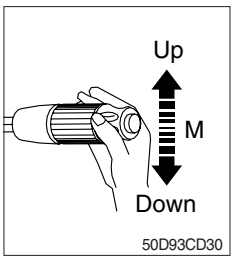
16) MULTI FUNCTION SWITCH



(1) Front wiper and washer switch

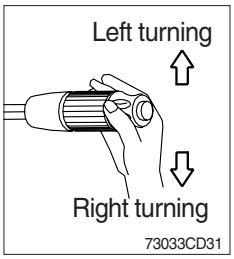
① When the switch is in J position, the wiper moves intermittently.
② When placed in Ⅰ or Ⅱ position, the wiper moves continuously.
③ If you push the grip of the lever, washer liquid will be sprayed and the wiper will be activated 2-3 times.

※ Check the quantity of washer liquid in the tank. If the level of the washer liquid is LOW, add the washer liquid (In cold, winter days) or water. The capacity of the tank is 1 liter.



(2) Dimmer switch

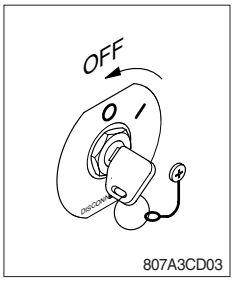
① This switch is used to turn the head light direction.
② Switch positions
· Up : To flash for passing
· Middle : Head light low beam ON
· Down : Head light high beam ON
③ If you release the switch when it's in up position, the switch will return to middle.



(3) Turning signal switch

① This switch is used to warn or signal the turning direction of the truck to other vehicles or equipment.
② Push the lever up for turning left, pull the lever down for turning right.

17) MASTER SWITCH (OPTION)

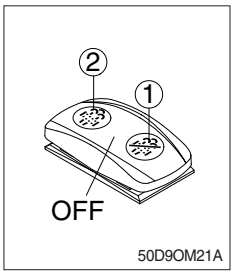


(1) This switch is used to shut off the entire electrical system.
When the truck is not operated for a long time, turn OFF the master switch for the safety purpose.

(2) Ⅰ : The battery remains connected to the electrical system.
O : The battery is disconnected to the electrical system.

※ Never turn the master switch to O (OFF) with the engine running. Engine and electrical system damage could result.

18) SCR (Selective Catalytic Reduction) CLEANING SWITCH



(1) This switch is used to select the cleaning function of the SCR.

(2) Inhibit position (①)

① The inhibit position disallows any automatic or manual SCR cleaning.

② This may be used by operator to prevent SCR cleaning when the truck is operating in a hazardous environment is concerned about high temperature.

③ It is strongly recommended that the this position is only activated when high temperatures may cause a hazardous condition.

(3) OFF position

This position will initate a automatic SCR cleaning when needed.

(4) Manual position (②)

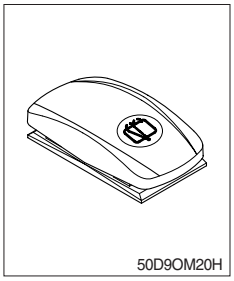
① This position will only initate a manual SCR cleaning and the SCR cleaning lamp is illuminated.

② HEST lamp will be illuminated during the entire SCR cleaning.

※ Refer to the page 3-10 for details.

※ This switch return to the OFF position when released the manual position (②).

19) REAR WIPER/WASHER SWITCH



(1) This switch is used to operate the wiper and washer on the rear of the cab.

(2) The washer liquid is sprayed and the wiper is operated only while pressing this switch.

20) ENGINE MODE SWITCH

(1) This switch offers two selectable operating mode.
The operator can adjust the truck's performance with this selection switch.

(2) Function

① STANDARD MODE : This mode provides maximum fuel efficiency for general loading.

② POWER MODE : This mode provides maximum power output for heavy loading or hill climb.

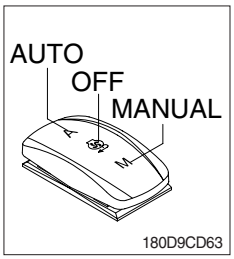
21) AIR COMPRESSOR SWITCH (option)

(1) This switch is used to activate the air compressor.

22) SEAT HEAT SWITCH (option)

(1) This switch is used to heat the seat.

23) COOLING FAN CONTROL SWITCH (option)



(1) This switch use to control the cooling fan.

(2) This switch has three positions.

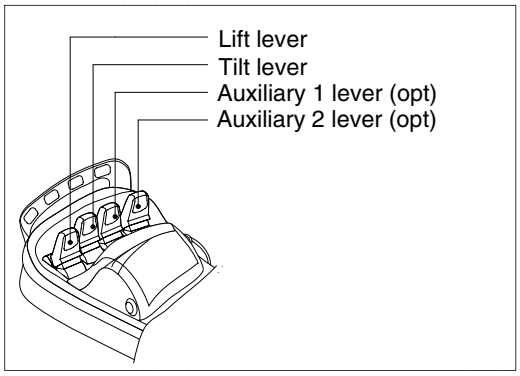
- AUTO : The fan automatically work in reverse according to set up interval and time of the cooling fan reverse mode.
  ※ **Refer to page 3-21-1 to set of the cluster.**
- OFF : Only forward rotation is possible.
- MANUAL : The fan rotates reverse only while pressing this position.

(3) If release the switch, return to the OFF position.

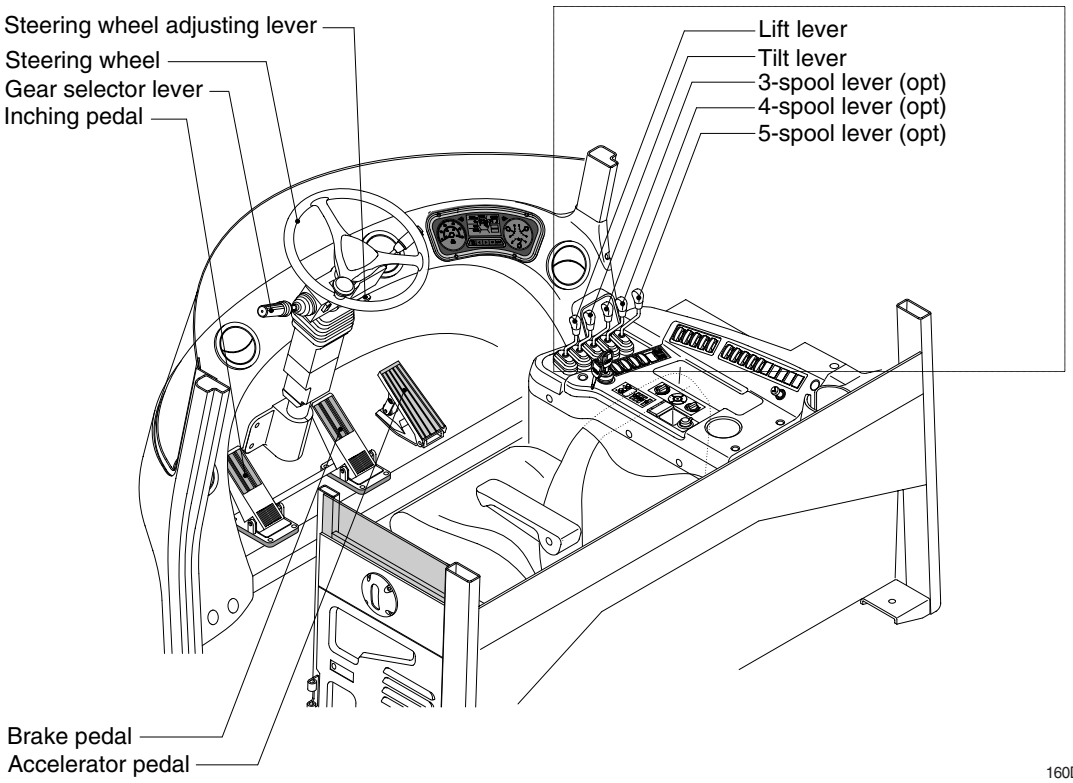
※ **The reverse rotation pilot lamp lights up on the area of the warning and pilot lamp of the LCD when the cooling fan is operated to the reverse rotation.**

7. CONTROL DEVICE

Fingertip type

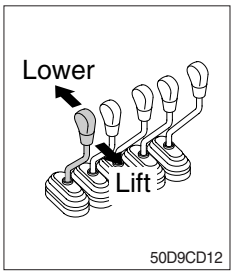


Remote control lever type



160D9LCD08

1) LIFT LEVER



(1) Lift

Pull the lever back to lift the forks.

(2) Lower

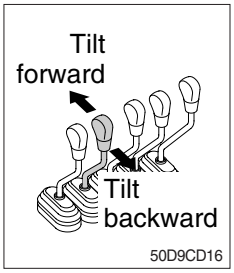
Push the lever forward to lower the load.

(3) Holding

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

※ Lifting speed is controlled by lift lever and accelerator pedal. Lowering speed is controlled by lever only.

2) TILT LEVER



(1) Tilt forward

Push the lever forward to tilt mast forward.

(2) Tilt backward

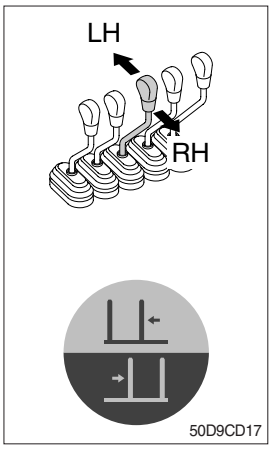
Pull the lever back to tilt mast backward.

(3) Holding

When the lever is released, tilting action stops.

※ Forward and backward tilting speeds are controlled by tilt lever and accelerator pedal.

3) LEVER FOR SIDE SHIFT



(1) LH movement

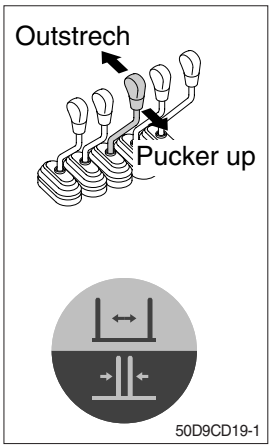
Push the lever forward to move the left hand for the side shift.

(2) RH movement

Pull the lever backward to move the right hand for the side shift.

4) LEVER FOR SIDE SHIFT WITH FORK POSITIONER

(1) Fork positioner (synchronizer type)



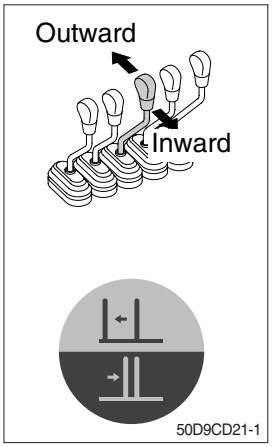
① **Outstrech the forks**

Push the lever forward to outstrech simultaneously outward of the both forks.

② **Pucker up the forks**

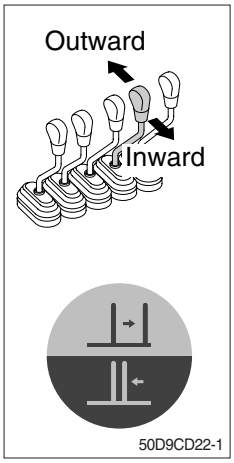
Pull the lever backward to pucker up simultaneously inward of the both forks.

(2) Fork positioner (independent type)



① **LH fork movement**

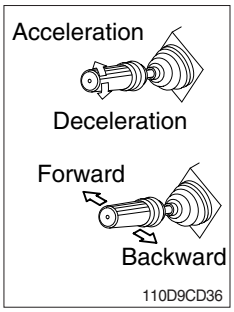
- Push the lever forward to move outward for the LH fork.
- Pull the lever backward to move inward for the LH fork.



② **RH fork movement**

- Push the lever forward to move outward for the RH fork.
- Pull the lever backward to move inward for the RH fork.

5) GEAR SELECTOR LEVER

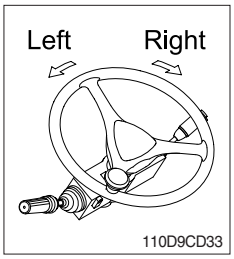


(1) This lever is used for gear selection, forward 3 stages and reverse 3 stages.

(2) If you push the gear selector lever, the truck moves forward, but pulling the gear selector lever, the truck moves backward.

(3) If you turn the gear selector lever forward, the truck increases the speed, but if you turn the gear selector lever backward, the truck reduces the speed.

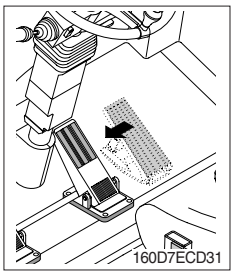
6) STEERING WHEEL



(1) A steering cylinder of the steering axle will operate the steering function.

(2) Turning the steering wheel left, the truck moves to the left side and turning it right, the truck moves to the right side.

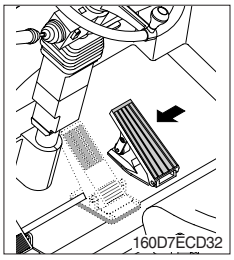
7) BRAKE PEDAL



(1) If the pedal is pushed, braking force is generated and bring the truck to a stop.

※ **Do not operate the truck with stepping on the brake pedal unnecessarily, or bring premature wear of brake disc.**

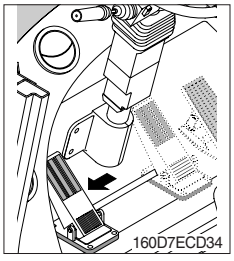
8) ACCELERATOR PEDAL



(1) This pedal controls the engine speed. The engine speed will increase in proportion to the degree of force applied to this pedal.

(2) Unless this pedal is pressed, the truck will run at low idling.

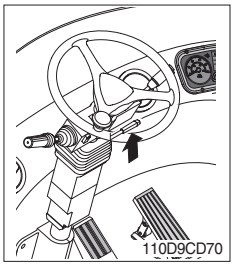
9) INCHING PEDAL

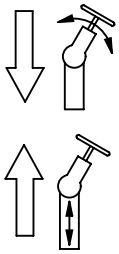


(1) Inching pedal is used for fine control of forward and reverse movement when lifting up or putting down loads.

※ **Do not put your foot on the inching pedal or brake pedal unless using it.**

10) STEERING WHEEL ADJUSTING LEVER





(1) By pulling down the lever, the wheel is adjustable to tilt.
- Tilting abgle : 40˚

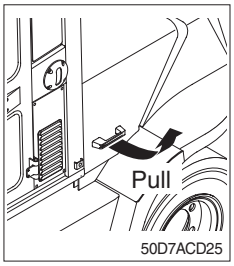
(2) By pulling up the lever, the wheel is adjustable to telescope.
- Telescopic stroke : 80 ㎜

(3) Release the lever to lock the steering wheel in the desired position.

※ After adjusting, try to move the steering wheel backward and forward to check that it is locked in the selected position.

⚠ Always carry out the adjustment with the truck stopped. Never try to adjust the steering wheel when the truck is moving.

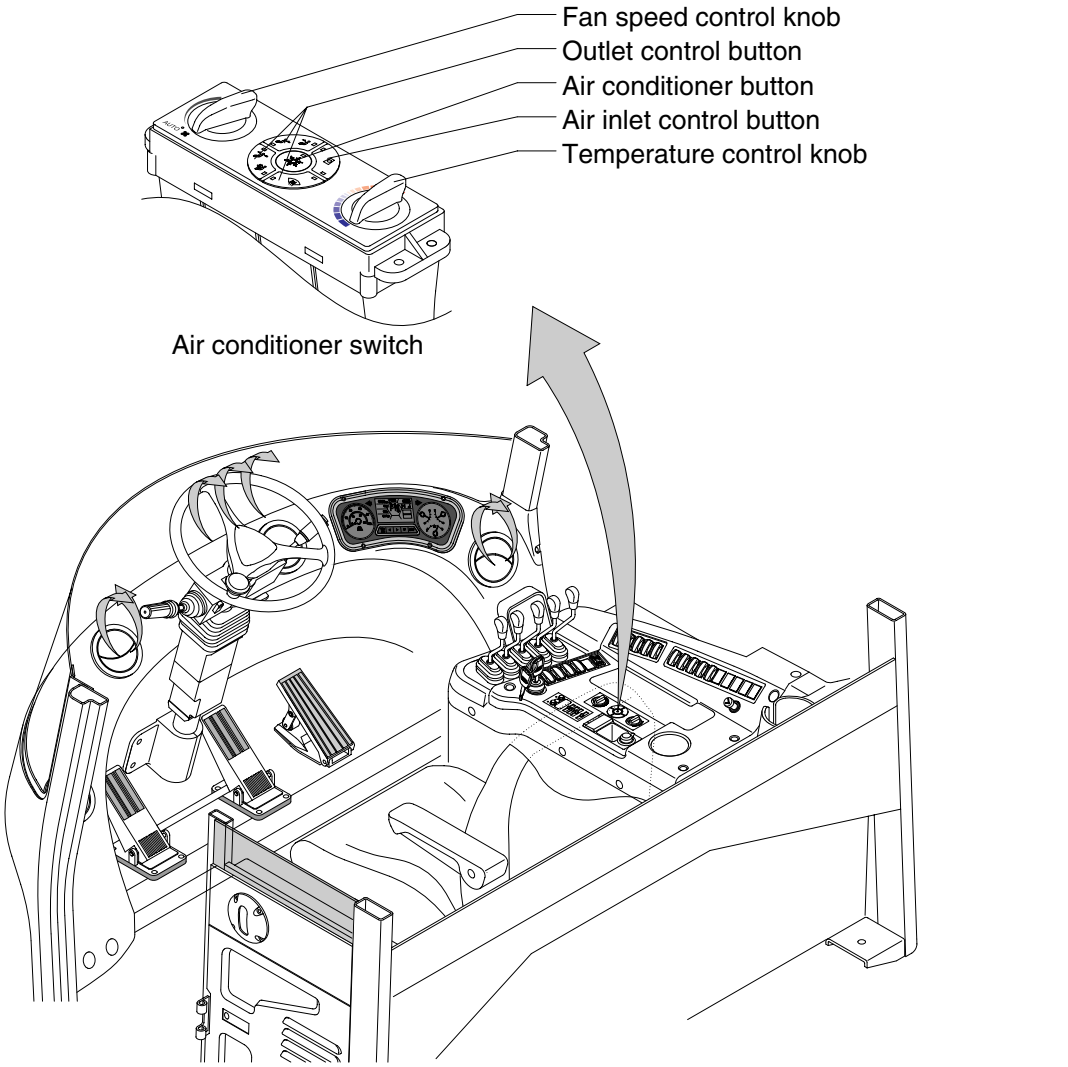
11) ENGINE HOOD



(1) Pull the handle attached on the bolt side of engine hood to open it.

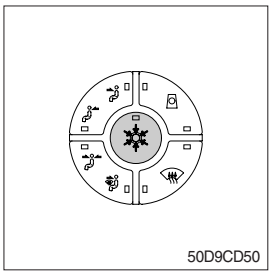
8. AIR CONDITIONER AND HEATER

Fuel auto air conditioner and heater are equipped for pleasant operation against outside temperature and defrost on window glass.



110D9CD90

1) AIR CONDITIONER BUTTON



50D9CD50

(1) When you push this button, air conditioner system is operated.

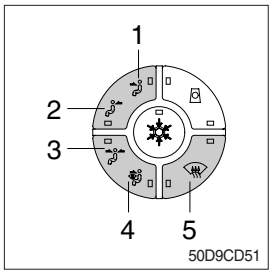
(2) Determines whether to perform a cooling function of air conditioner.

① Pilot lamp ON : Air conditioner operation

② Pilot lamp OFF : Fan only

※ **The AUTO pilot lamp ON when this button is pushed.**

2) OUTLET CONTROL BUTTON

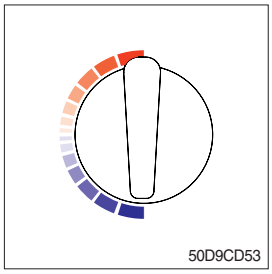


There are five kinds of air flow.

① Face
② Rear
③ Face and rear
④ Face and defrost
⑤ Defrost

※ **The pilot lamp is turned ON when the button is pushed.**

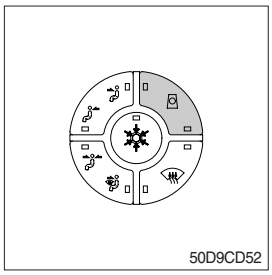
3) TEMPERATURE CONTROL KNOB



This knob regulates the temperature of air.

① Right side (red zone) : Cool down air temperature
② Left side (blue zone) : Heat up air temperature

4) AIR INLET CONTROL BUTTON

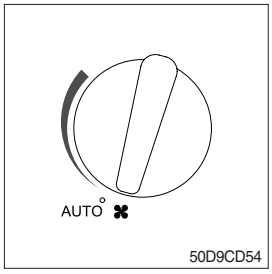


This button selects the inlet air.

① Pilot lamp ON : Fresh air intake.
② Pilot lamp OFF : The air circulates in the cab.

※ **The pilot lamp is turned ON when the button is pushed.**
※ **Check out the fresh air filter periodically to keep a good efficiency.**
※ **Change air occasionally when using recirculation for a long time.**
※ **Check out the recirculation filter periodically to keep a good efficiency.**

5) FAN SPEED CONTROL KNOB



① Fan speed is controlled automatically by set temperature.
※ **The AUTO pilot lamp ON when the air conditioner button is pushed.**

② This knob controls fan speed manually.
※ **The AUTO pilot lamp OFF when this knob is operated.**

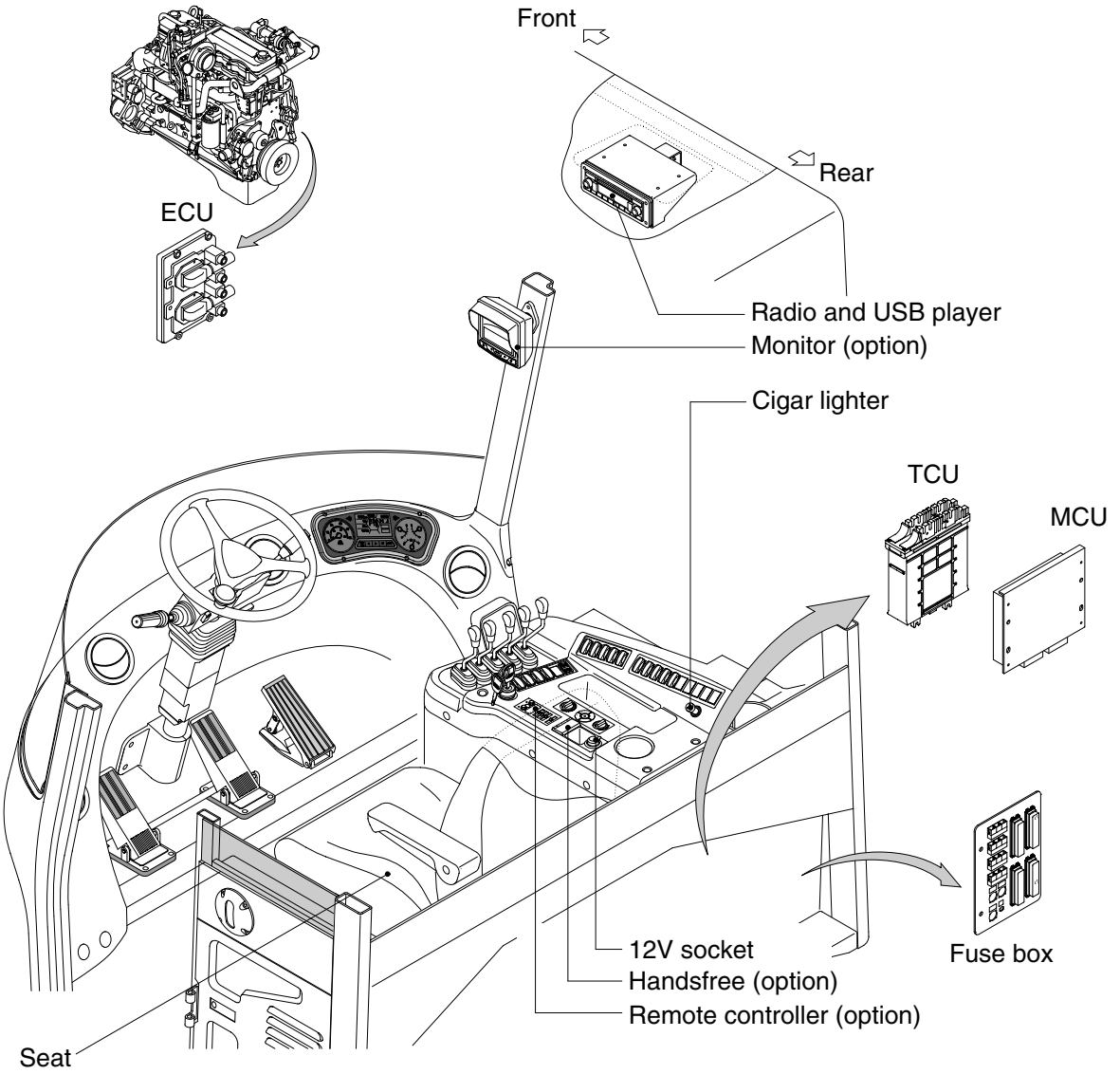
③ This knob makes the system ON.

④ The fan is stopped when this knob is pointed to the ✱ position.

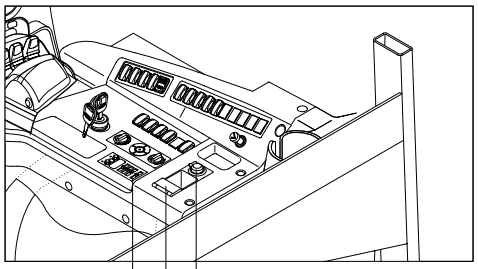
6) DIAGNOSIS AND MEASURES BY ERROR

Error	Meaning
Ambient sensor open	1. Check assembly status. 2. Ambient temperature sensor exchange after single item check.
Ambient sensor short	
In-cabin temperature sensor open	1. Check assembly status. 2. In-cabin temperature sensor exchange after single item check.
In-cabin temperature sensor short	
Evap. sensor open	1. Check assembly status. 2. Evap. sensor exchange after single item check.
Evap. sensor short	
Water Valve sensor open	1. Check assembly status. 2. Mix actuator exchange after single
G.P.S Circuit Error	1. Check assembly status. 2. Please refer to the type of fault diagnosis using gauge. 3. Failure diagnosis and measures. Failure diagnosis of gauge type.

9. OTHERS

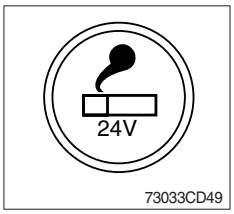


Machine serial number
- 110D-9 : #0075-
- 130D-9 : #0030-
- 160D-9 : #0156-



110D9CD109

1) CIGAR LIGHTER

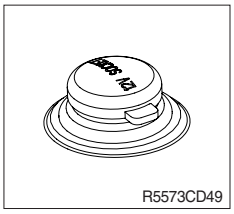


(1) This can be used when the engine starting switch is ON.

(2) The lighter can be used when it springs out in a short while after being pressed down.

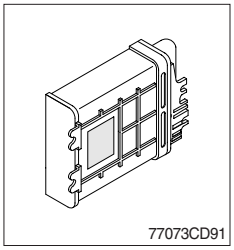
※ **Service socket**
Use cigar lighter socket when you need emergency power.
Do not use the lighter exceeding 24 V, 100 W.

2) 12V SOCKET



(1) Utilize the power of 12 V as your need and do not exceed power of 12 V, 120 W.

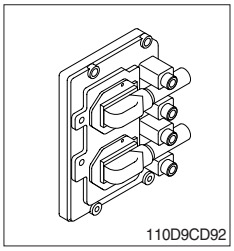
3) TRANSMISSION CONTROL UNIT (TCU)



(1) The control unit is shifting the required speeds fully-automatically under consideration of the following criteria.

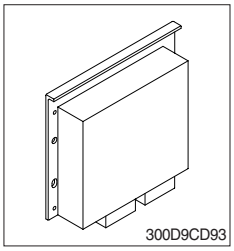
- Gear selector lever position
- Driving speed
- Load level

4) ENGINE CONTROL MODULE (ECM)



The engine control module (ECM) is the control center of the engine system.

5) MACHINE CONTROL UNIT (MCU)



It consists of electronic parts and controls all lamps and buzzers on cluster in accordance with signals transmitted from the switches, the ECM, TCU, the engine and the hydraulic pressure sensors.

6) RADIO AND USB PLAYER

■BASIC FUNCTIONS

75793CD62-2

■FRONT PANEL PRESENTATION

1 SEL ····· Audio selection button

····· Audio selection knob

2 ····· Power and volume button

3 MODE ····· Mode button
(select RADIO / USB / AUX)

4 ····· UP / DOWN tuning button

5 1 ····· Preset memory button 1
DISP ····· ID3 v2 display

6 2 ····· Preset memory button 2
SCN ····· File scan

7 3 ····· Preset memory button 3
RPT ····· Repeat play selector

8 4 ····· Preset memory button 4
RDM ····· Random play selector

9 5 ····· Preset memory button 5
D- ····· Directory down

10 6 ····· Preset memory button 6
D+ ····· Directory up

11 ····· Aux function

12 BSM ····· Preset scan (PS)
Best station memory (BSM)

13 MUTE ····· Audio mute button

14 AM/FM ····· AM / FM button (radio)

15 ····· Send

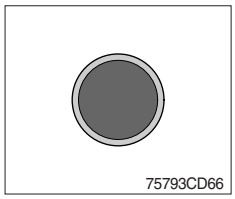
16 ····· End

17 MIC ····· MIC (microphone)

18 AUX ····· Aux connector

■GENERAL

(1) Power and volume button



① Power ON/OFF button

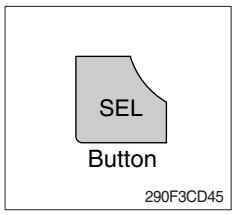
Press power button to turn the unit ON or OFF shortly.

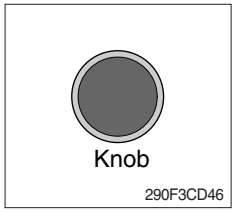
When the power is ON, the previous mode (last memory) will appear.

② Volume up / down control

Turn volume up / down button right to increase the volume level. The level will be shown in VOLUME xx on the LCD display. Turn it left to decrease the volume level. After 5 seconds of volume indication, display will return to the previous mode.

(2) Sound function selection button/knob (audio selection)





① This button is to adjust the sound. Each time you press SEL button shortly, LCD displays each mode as follows :

BASS → TREBLE → BAL → LOUD → EQ → BASS

※ When this button is pressed, LCD display shows selected function for 5 seconds and then returns back to the previous mode. On selected function, level can be controlled by turning this button. The display will automatically return to normal indication in 5 seconds after the last adjustment is made or when another function is activated.

② Bass control

To adjust the bass level, first select the bass mode by pressing the SEL button until BASS indication appears on the LCD display. Within 5 seconds of choosing the bass mode, turn selection knob right / left to adjust the bass level as desired.

The bass level will be shown on the LCD display from a minimum of BASS –10 to a maximum of BASS +10.

The display will automatically return to the normal indication in 5 seconds after the last adjustment or when another function is activated.

③ Treble control

To adjust the treble level, first select the treble mode by pressing the SEL button until TREBLE indication appears on the LCD display. Within 5 seconds of choosing the treble mode, turn selection knob right / left to adjust the treble level as desired.

The treble level will be shown on the LCD display from a minimum of TREBLE -10 to a maximum of TREBLE +10.

The display will automatically return to the normal indication in 5 seconds after the last adjustment or when another function is activated.

④ Balance control

To adjust the left-right speaker balance, first select the balance mode by pressing the SEL button until the BAL indication appears on the LCD display.

Within 5 seconds of choosing the balance mode, turn selection knob right / left to adjust the balance as desired.

The balance position will be shown on the LCD display from BAL 10L (full left) to BAL 10R (full right).

When the volume level between the left and right speakers is equal, BAL L=R will be shown on the LCD display panel.

The display will automatically return to the normal indication in 5 seconds after the last adjustment or when another function is activated.

⑤ Loud control

When listening to music at low volume levels, this feature will boost the bass and treble response.

This action will compensate for the reduction in bass and treble performance experienced at low volume.

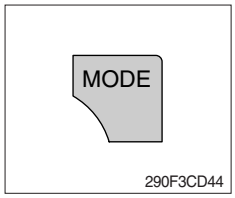
To select the loudness feature, press SEL button until LOUD ON or LOUD OFF is displayed, then turn selection knob left or right to activate or deactivate loudness.

⑥ Equalizer (EQ)

You can select an equalizer curve designed for 4 music types (POP, ROCK, CLASSIC, JAZZ).

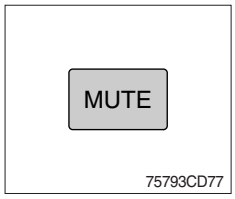
To select the desired curve, first select the EQ mode by pressing SEL button until the "EQ OFF" indication appears on the display panel. Within 5 seconds of choosing the EQ mode, turn selection knob to select an equalizer curve as desired.

(3) Mode button



① Press mode button to select RADIO / USB / AUX / BT audio.

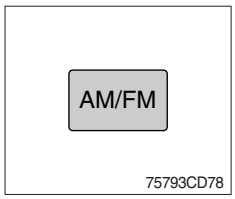
(4) Audio mute button



① Press mute button momentarily to mute volume and MUTE mark will blink on the LCD display.
Press the button again to return to the mode in use before the mute mode was activated.

■RADIO

(1) AM / FM / LW band selector

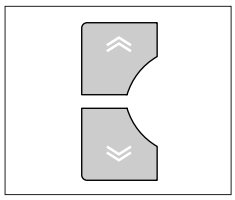


① Each time this button is pressed, the radio button is changed.
Each time this button is pressed, LCD displays each band as follows :

FM1 → FM2 → FM3 → AM → LW → FM1

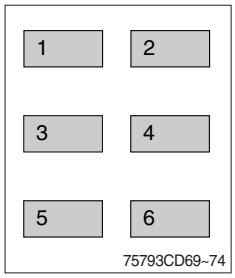
※ LW band is only available for Europe.

(2) Up / down tuning



① To automatically select a radio station, momentarily press the up tune seek button ⩓ or down tune seek button ⩔ for less than 3 seconds to search for the closest radio station.
To manually select a radio station, press the up tuning & down tuning button for longer than 3 seconds.
The radio frequency will move up or down step by step each time you press button.

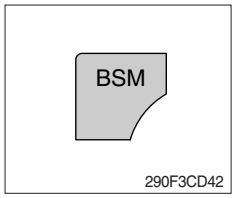
(3) Station pre-set button



① Pressing these buttons shortly will recall your favorite pre-set radio stations.
To store your favorite stations into any of the 6 pre-set memories in each band (AM/FM/LW), use the following procedure :

a. Turn the radio ON and select the desired band.
b. Select the first station to be pre-set using the manual up/down or automatic seek tuning control button.
c. Press the chosen pre-set button to store your selected station into and continue to hold it in. The beep sound will be momentarily heard and the pre-set number will apear on the LCD display indicating that the station is now set into that pre-set memory position and can be recalled at any time, by pressing that pre-set button.

(4) Pre-set scan (PS) / Best station memory (BSM) button



① **Pre-set scan (PS)**

Press BSM button shortly to scan the 6 pre-set station stored the memories on each band (AM/FM/LW).

The unit will stop at each pre-set station (the pre-set number on the LCD display will flash during pre-set scan operation) and remain on the selected frequency. Press the button momentarily again to remain on the station currently being heard.

② **Best station memory (BSM)**

Pressing BSM button for longer than 2 seconds will activate the BSM tuning feature which will automatically scan and enter each station into memory.

If you have already set the pre-set memories to your favorite stations, activating the BSM tuning feature will erase those stations and enter the new ones.

This BSM feature is most useful when traveling in a new area where you are not familiar with the local stations.

■USB PLAYER

75793CD81-1

(1) USB function

① Connect a USB device if you want to listen to MP3 file in a USB device.

② It will automatically play MP3 file in the USB device and the LCD display will show “READING USB”.

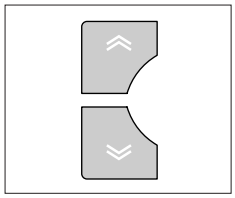
※ If there are no files on USB device, playback will revert back to the previous mode after displaying “NO FILE”.

(2) AUX function

① If you want to listen to music of a external audio device, connect a external audio device through AUX cable.

② Change AUX mode by pressing MODE button.
If audio file of Audio device is playing, you can listen to music through speaker.

(3) File selection & cue / review button



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① **File selection function**

This button is used to select file up / down.

Each time the forward file select ⩓ is pressed, file number is increased.

Each time the backward file select ⩔ is pressed, file number is decreased.

② **Cue / review functions**

High-speed audible search of file on a USB can be made by this button (the cue and review functions).

Press and hold the cue button ⩓ to advance rapidly in the forward direction or the review button ⩔ to advance rapidly in the backward direction.

(4) MP3 directory / file searching

① The D-, D+ button is used to select a particular directory and file.

Press and hold for more than 3 seconds while playing MP3 file.

Turn right / left the selection knob to search the directory. Press the button when you find the wanted directory.

For example, the directory search generally changes in two methods depending on the order of writing as follows.

· Method 1 : ROOT→Dir01→Dir02→Dir03→Dir04→Dir05→Dir06→Dir07→ROOT

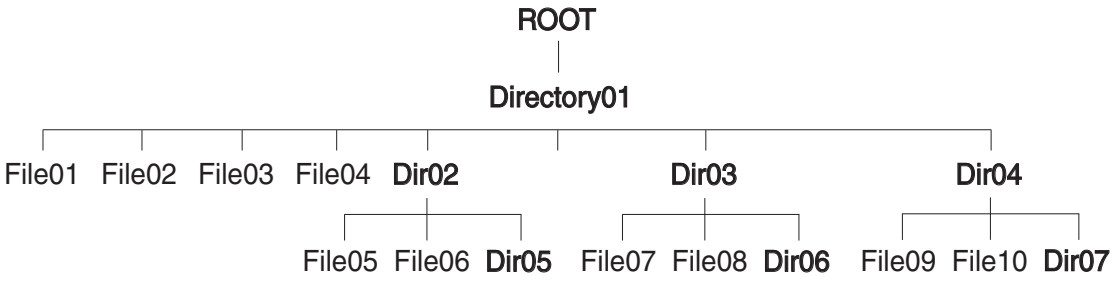
· Method 2 : ROOT→Dir01→Dir02→Dir05→Dir03→Dir06→Dir04→Dir07→ROOT

If you want to search the file in the located directory, turn right / left the selection knob consecutively. Press the button when you find the wanted file. The unit will then play the selected file.

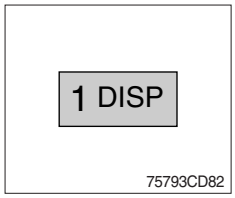
For instance, the file search changes in Dir01 as follows.

File01 → File02 → File03 → File04 → File01

※ MP3 directory / file configuration



(5) ID3 v2 display

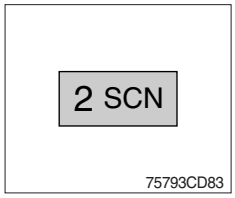


① Disp button is used to change the display information.
While playing an MP3 file, you can change the file information shown on the LCD display.
Each time you press DISP (display), the display changes to show the following.

※ If the MP3 disc does not have any ID3 information, the display will show NO ID3 on LCD display.

Directory name / file name (normal mode)
↓
Album name / performer / title
↓
File number / elapsed time
↓
Directory name / file name (normal mode)

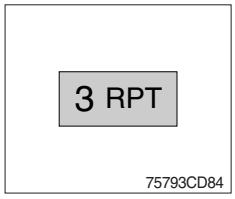
(6) File scan (SCN)



① During USB play, press SCN button to play the first 10 seconds of each file on the whole file on the USB (SCN mark will appear on the LCD display).
When a desired file is reached, press the SCN button again to cancel the function.
The unit will then play the selected file.

※ In case of playing MP3 file, when the SCN (scan) button is pressed and held for longer than 2 seconds, the SCN mark will blink on the LCD display and all files in the selected directory will be introduced until the file scan mode is cancelled by pressing the SCN button again or by activating the random or repeat functions.

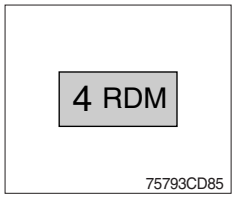
(7) Repeat play selector (RPT)



① During USB play, press RPT button to play the selected file repeatedly (RPT will appear on the LCD display).
Play of the file will continue to repeat until this button is pressed again and the RPT disappears from the LCD display.

※ In case of playing MP3 file, when the RPT button is pressed and held longer than 2 seconds, the RPT mark will blink on the LCD display and play all files in the selected directory and will be repeated until the directory repeat mode is cancelled by pressing the repeat button again or by activating the scan or random functions (RPT mark will disappear from LCD display).

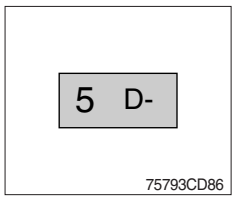
(8) Random play selector (RDM)



① During USB play, press RDM button to play the files on the USB in a random shuffled order (RDM will appear on the LCD display). The file select function will also select file in the random order instead of the normal process.
The random play mode can be cancelled by this button again.

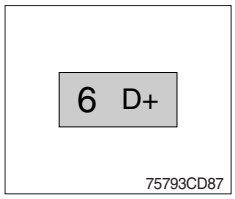
※ In case of MP3 file, when the random button is pressed and held longer than 2 seconds, the RDM mark will blink on the LCD display and play all files in directory randomly until the directory random mode is cancelled by pressing the random button again or by activating the scan or repeat functions (RDM mark will disappear from LCD display).

(9) Directory down



① Press D- button briefly while playing MP3. The previous directory is located each time you press this button.

(10) Directory up



① Press D+ button briefly while playing MP3 . The next directory is located each time you press this button.

※ If the MP3 file does not have a directory, the unit play MP3 at 10-file intervals.

※ If any MP3 file does not exist in USB, this button can not operate.

■BLUETOOTH

(1) Introduce

The bluetooth radio supports bluetooth wireless technology. Bluetooth technology provides a wireless link between a bluetooth mobile phone or bluetooth music player and the hyundai bluetooth radio.

The bluetooth radio features a hands-free system so that you may talk on the telephone without taking your eyes off the road or your hands off the wheel. A microphone built into the front of the radio receives your voice and the calling party can be heard through the speakers.

Additionally, a bluetooth music player can be wirelessly connected to be the bluetooth radio and playback music tracks in high quality sound through the speakers. Many bluetooth mobile phones include a music player and can provide both hands-free calling and music playback.

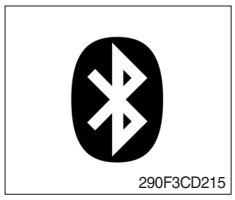
Check your mobile phone owner's manual for details.

※ When the starting switch is in the ON position, the bluetooth radio is on standby to connect with your mobile phone even if the radio is switched off. The truck battery may therefore become drained if the ignition switch remains in the ON position for an extended period of time.

※ Bluetooth technology uses low power radio transmission to connect to your bluetooth mobile phone or bluetooth music player. As radio signal strength reduces over distance, the quality of sound performance during phone calls and music playback may become poor if the distance between the radio and device widens. It is recommended that the mobile phone or music player is kept inside the cab for best results.

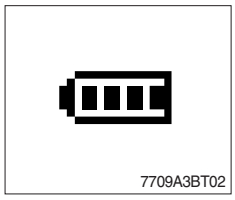
※ As a bluetooth wireless connection can extend to 10 meters, your bluetooth device may automatically connect to the bluetooth radio even if the device is not in the truck.

※ The bluetooth radio uses the latest digital noise & echo suppression system to provide the best sound clarity with little or no distortion, but in some conditions there may be some echo and noise experienced. It is recommended to keep the car windows closed during hands-free calls for best results.


290F3CD215

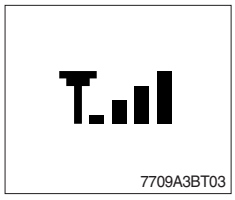
① Bluetooth indicator

The bluetooth logo is displayed when a bluetooth device is connected, and not displayed, when no bluetooth device is connected. If the bluetooth mobile phone is connected but the connection is not of satisfactory quality, the bluetooth logo is not displayed.


7709A3BT02

② Battery strength indicator

This is an indication of your mobile phone battery condition. If your mobile phone is unable to transmit battery condition level, the indicator is not displayed.


7709A3BT03

③ Single level indicator

This is an indication of the mobile phone network signal strength in your current location. If your mobile phone is not able to transmit signal level, the indicator is not displayed.

(2) Bluetooth function

① Pairing a bluetooth mobile phone or music player

A bluetooth connection must first be established between your bluetooth mobile phone or bluetooth music player and the bluetooth radio. The first step to connecting the bluetooth radio and bluetooth device is to introduce or "Pair" the bluetooth radio and bluetooth device together.

It is recommended that you have the instruction manual for your bluetooth mobile phone or music player with you during the pairing process described below to understand how to set your device to pair with the bluetooth radio.

※ It is recommended that all other bluetooth devices other than mobile phones are switched off during the registration or pairing process.

a. Connection method

a) Press SEND button for 2 seconds in any mode, **PAIRING** appears on the bluetooth radio display.
b) Browse your mobile phone or music player menu to find the **SETTINGS** or **CONNECTIVITY** section to find the bluetooth connection section.
c) Find the command that may be called search for bluetooth device or discovery mode so that your bluetooth device can locate all the bluetooth devices within range that may be connected.
d) After the search is complete, **HHI AUDIO** should appear on your mobile phone or music player screen.
e) Select **CONNECT** or **SELECT** on your mobile phone or music player.
f) The mobile phone or music player should now prompt you top enter a PIN code. Enter 0000 into your bluetooth device and select OK.
g) The mobile phone or music player should confirm that it has established a new paired connection with the bluetooth radio.
h) The connecting process is now complete.
i) If the connecting process is successful, the bluetooth logo appears on the radio display and paired phone name (e.g. Samsung or LG) and **CONNECTED** appear on the display for 2 seconds.
j) Your bluetooth device is now ready for use with the bluetooth radio.
k) If the pairing failed, **FAIL** appears on the bluetooth radio display.

※ (a) The bluetooth radio allows a maximum of 6 bluetooth devices to be paired.
(b) Bluetooth technology only allows one phone to be connected to your bluetooth radio at one time.
(c) If a bluetooth music player is to be connected together with a mobile phone, refer to the page 3-55, PLAYING MUSIC USING BLUETOOTH AUDIO.
(d) Bluetooth connection with a mobile phone is normally established using the Hands-Free Profile (HFP). However, in some cases, the connection may use Head Set Profile (HSP) and some functions may not be available.
(e) As each mobile phone or music player brand and model has a different menu structure and control names, you may need to refer to the user manual of your bluetooth device for the correct procedure to connect to another bluetooth device.
(f) Once the bluetooth pairing is complete, automatic connection between mobile phone and the bluetooth radio is possible whenever the starting switch is switched ON.
The mobile phone must be set to automatically connect to the bluetooth radio to allow this automatic connection.

(g) The bluetooth radio will give connection priority to the last connected mobile phone.
(h) It is recommended that all other bluetooth devices other than mobile phones are switched off during the registration or pairing process.

② Disconnecting a bluetooth device

If you need to disconnect your bluetooth mobile phone or music player with the bluetooth radio, follow the steps below.

a. Press END button for 2 seconds in any mode.
b. When the bluetooth connection is lost, bluetooth logo disappears and the previously connected device name (e.g. Samsung or LG) and **DISCONNECTED** appear on the display.

③ Select a bluetooth device

The bluetooth radio can pair up to 6 bluetooth devices. A previously paired mobile phone or music player can be selected for connection using the method described below. Refer to the table 2-1 for examples.

Preset No.	Bluetooth device name (for example)
1	Samsung
2	LG
3	Apple
4	Motorola
5	EMPTY
6	EMPTY

Table 2-1

a. Press SEND button, to select **BLUETOOTH** mode.
b. Press SEL button. **SELECT PHONE** will appear on the display.
c. Turn selection knob, until **SELECT PHONE** is displayed.
d. When **SELECT PHONE** appears on the display, press SEL button.
e. Press the preset button to display the name of the bluetooth device name of the mobile phones or music players previously paired. You may also turn selection knob to display the paired devices.

· Each time you turn or selection knob, the LCD displays as follows :

SAMSUNG → LG → APPLE → MOTOROLA → BACK → SAMSUNG

f. If the bluetooth mobile phone name is Samsung as in the example of table 2-1, then **Samsung** appears on the display. When preset button [1] is pressed or selection knob is turned 1 click to the right.
g. Once the name of the bluetooth device you wish to connect is displayed, in this example **Samsung**, press SEL button to have the Samsung device connected.
h. If the connection is successful, the bluetooth logo appears on the display and paired phone name **Samsung** and **CONNECTED** appears on the display for 2 seconds.

④ **Deleting a previously paired bluetooth device**

If you no longer need to use a paired bluetooth device with the bluetooth radio, it can be deleted. It is from the registration assignment for another mobile phone.
Refer to the example of paired devices shown table 2-1.

a. Press SEND button, to select **BLUETOOTH** mode.
b. Press SEL button and **SELECT PHONE** appears on the display.
c. Turn selection knob, until **DELETE PHONE** is displayed.
d. When **DELETE PHONE** appears on the display, press SEL button.
e. Press the preset button to display the name of the bluetooth device name of the mobile phones or music players previously paired. You may also turn selection knob to display the paired devices.
f. Once the name of the bluetooth device you wish to delete is displayed, in this example **Samsung**, press SEL button to have the Samsung device deleted.
g. The display will then show **DELETE NO** or if selection knob is turned, **DELETE OK** on the display.
h. To confirm your wish to delete the selected device, when **DELETE OK** appears on the display press SEL button.
i. If the bluetooth device being deleted (in this example) was connected, the display will show previous paired phone name “Samsung” and DISCONNECTED.
j. In the example above, the number of paired devices is now reduced to 3, leaving 3 vacant memory locations for additional devices. Table 2-2 shows the example.

Preset No.	Bluetooth device name (for example)
1	LG
2	Apple
3	Motorola
4	EMPTY
5	EMPTY
6	EMPTY

Table 2-2

⑤ **Basic telephone operation**

a. Using the bluetooth radio for hands-free calls

a) When an INCOMING call arrives at the bluetooth radio via your connected bluetooth mobile phone, **INCOMING CALL** appears on the display for 3 seconds then the calling telephone number is shown.
b) Press SEND button to answer the INCOMING call. **HANDSFREE** appears on the display.
c) To end the call, press END button and the call will end and **END CALL** is displayed.
d) If you wish to reject an INCOMING call, press END button.
e) To make an OUTGOING call use the keypad of the connected bluetooth mobile phone to enter a number and press the **OFF-HOOK** (SEND) button on your mobile phone.
f) **OUTGOING CALL** is displayed on the bluetooth radio and the call continues in hands-free mode.
g) The call can be ended by pressing END button the **ON-HOOK** (END) button of the connected mobile phone.
※ Some mobile phones may not reject an INCOMING call using the action of d) above. In this case, press the **ON-HOOK** button on the connected mobile phone to reject.

b. Last call number redials

Select **BLUETOOTH** mode by pressing SEND button. To making a call to the last dialed number, press SEND button again. **OUTGOING CALL** appears on the radio display for 1 second.

※ Some mobile phones may require an additional press of SEND button to start the last number redial call.

c. Switching to private (headset) mode during a call

During an INCOMING or OUTGOING call started in hands-free mode, it is possible to switch to the private call mode using the mobile phone handset to speak and to hear the calling party in private.

a) Press SEND button during the conversation ; **PRIVATE** appears on the display.

b) To switch back to hands-free mode using the bluetooth radio, press SEND button again during the private conversation ; **HANDSFREE** is shown on the display and hands-free call operation continues.

※ The above switching function may cause disconnection of the bluetooth link between the bluetooth radio and some mobile phones.
If SEND button is pressed during the private conversation, the bluetooth connection will return automatically.

(3) Funtion of bluetooth audio player

① Playing music using bluetooth audio

The bluetooth radio supports the bluetooth profile Audio Advanced Distribution Profile (A2DP). If your mobile phone or music player supports this profile then it is possible to listen to music tracks located on your bluetooth device through the bluetooth radio and speakers.
Additionally, the bluetooth radio supports the Audio Video Remote Control Profile (AVRCP).
If your bluetooth mobile phone or music player supports this profile then it is possible to advance to the next track or replay previous tracks on using the buttons on the front of the bluetooth radio your truck.

a. Press MODE button until **BT AUDIO** is displayed.
b. When **BT AUDIO** appears on the display, select the music player feature on your bluetooth device. And then bluetooth device play automatically to begin playback.
c. To pauses the bluetooth audio playback, press SEL button for 2 seconds. Press the knob again for 2 seconds to resume playback.
d. Press buttons (⩓,⩔) advance to the next or previous music track.

※ (a) Check your bluetooth device owner's manual for details of how to play music tracks via an external bluetooth audio system such as the bluetooth radio.
(b) Some bluetooth mobile phones cannot play music at all or may play music tracks in low-quality audio through the bluetooth radio.
(c) Some mobile phones require additional pairing to allow bluetooth audio playback.
(d) Information about songs (ID3) (e.g. the elapsed playing time, song titles, song index, etc.) playing using bluetooth audio profile cannot be displayed on this bluetooth radio.

② Connecting a bluetooth music player and mobile phone simultaneously

It is possible to connect a bluetooth mobile phone and a separate bluetooth music player to the bluetooth radio at the same time. Phone calls can be sent and received using the hands-free feature while music is playing using the bluetooth audio feature.

(4) Bluetooth setting

① Setting the automatic call answer feature

If this function is selected, the bluetooth radio automatically answers all INCOMING calls.
This feature enhances safety as the driver does not need to take their hands from the steering wheel to accept an INCOMING call.
Note that this feature cannot be set at different settings for each of the paired mobile phones.

a. Press SEND button to select BLUETOOTH mode.
b. Turn selection knob until **SETTINGS** is displayed.
c. Press SEL button until **AUTO ANSWERING** is displayed.
d. Press SEL button and turn selection knob. The LCD then displays as follows :

ANSWER OFF → ANSWER 5 SEC → ANSWER 10 SEC → RETURN → ANSWER OFF

- ANSWER OFF = Automatic answer function is not active.
- ANSWER 5 SEC = Automatic answers all INCOMING calls after a 5 second delay.
- ANSWER 10 SEC = Automatic answers all INCOMING calls after a 10 second delay.
- RETURN = Return to previous menu.

e. After making your selection, press SEL button to store the selection.
f. **SETTINGS** is then displayed for adjustment if required.
g. If you do not wish to adjust any further bluetooth settings, press END button to return to the last selected mode.

② Setting calling voice volume

This function is to set the level of the mobile phone's calling voice volume to be heard through the bluetooth radio and speakers.

a. Follow steps a. to c. of above setting below ①.
b. When **VOICE VOLUME** appears on the display, press SEL button to display the current level of the calling voice. Turn selection knob right or left to adjust the calling voice volume as desired. This is the level the calling voice volume will be set to each time the bluetooth radio is used after the stating switch is turned off and then on again.
c. After making your selection, press SEL button to store the selection.
d. **SETTINGS** is then displayed for adjustment if required.
e. If you do not wish to adjust any further bluetooth settings, press END button to return to the last selected mode.

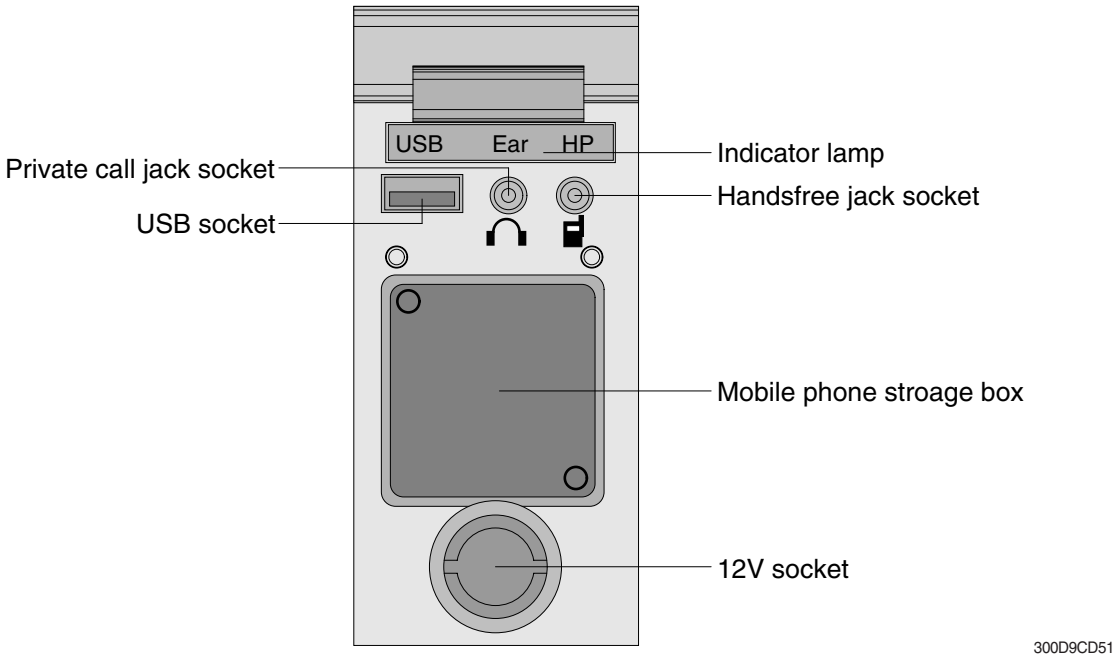
③ Setting the ring volume

This function is to set the level of the mobile phones ring tone volume to be heard through the bluetooth radio and speakers.

a. After making your selection, press SEL button to store the selection.
b. When **RING VOLUME** appears on the display, press the SEL button to display the current level of the ring tone. Turn selection knob right or left to adjust the ring tone volume as desired. This is the level the ringer volume will be set to each time the bluetooth radio is used after the starting switch is turned off and then on again.
c. After making your selection, press SEL button to store the selection.
d. The press END button to return to the last selected mode.

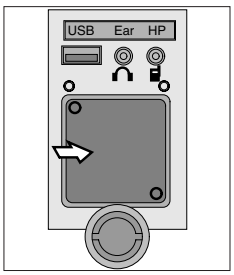
7) HANDSFREE (OPTION)

Allow you to dial a call or to have a conversation without holding your handset. Use the remote controller when making and answering a calls or ring off.



300D9CD51

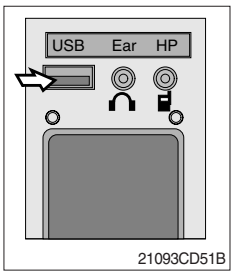
(1) Mobile phone storage box



21093CD51A

① Mobile phone can be stored when call by handsfree.

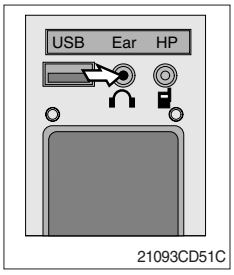
(2) USB socket



21093CD51B

① This socket is used to charging the mobile phone.

(3) Private call jack socket

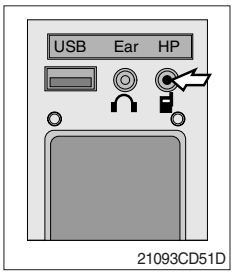


21093CD51C

① This can be used protect you privacy calling by using ear phone.

② The mobile phone must be connected handsfree jack socket.

(4) Handsfree jack socket

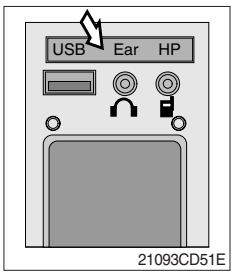


① Connect the jack cable when call by handsfree.

② Use the special adapter when jack cable is not interchangeable.

③ Check the jack type of mobile phone before use.

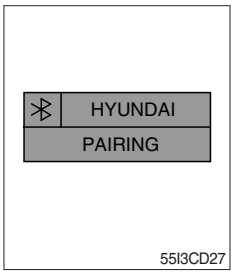
(5) Indicator lamp



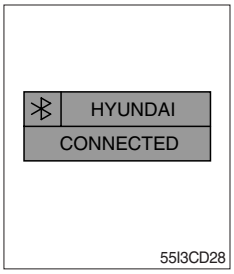
① This lamp is turned ON when the handsfree mode selected.

(7) Wireless handsfree

① Select the handsfree mode by pressing bluetooth button on the mobile phone.
Press the CALL button for more than 6 seconds for pairing (connection process of the mobile phone and handsfree), you can hear beep sounds three times.



② The mobile phone finds bluetooth named " HYUNDAI".
Select "HYUNDAI" and set "connect with Bluetooth on the mobile phone".
· Default password : 0000

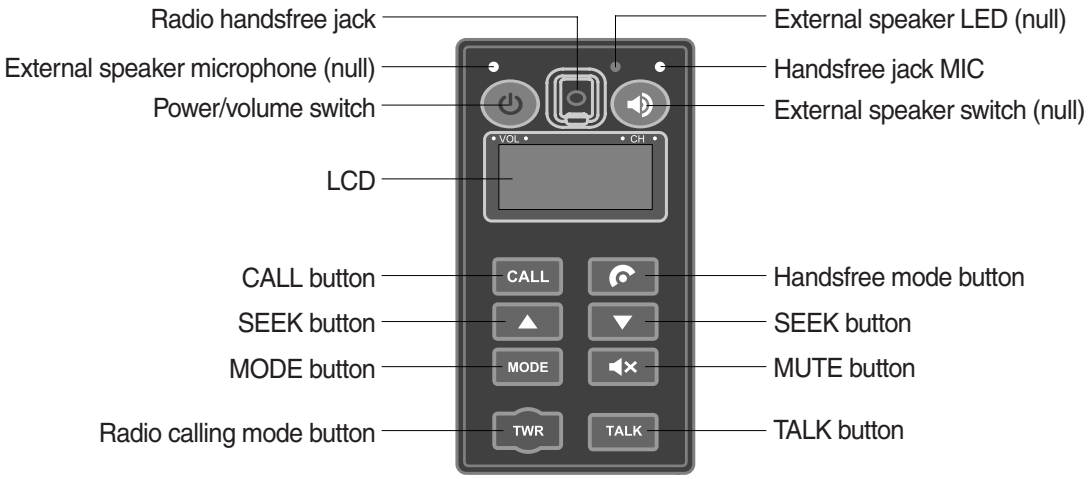


③ The Bluetooth pairing is made, the LCD screen shows "CONNECTED".

④ Once the Bluetooth pairing is made, they will be automatically connected after 20 seconds when start key ON.

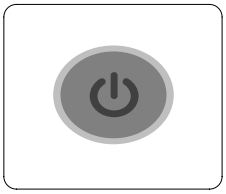
⑤ When you want to deactivate the pairing, press and hold the CALL button for more than 3 seconds then you can hear beep sounds twice and the function will be deactivated.

8) REMOTE CONTROLLER (OPTION)



55I3CD31

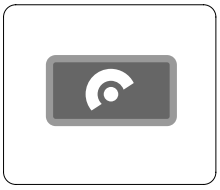
(1) Power and volume switch



55I3CD31A

① This switch is used to turn the audio or handsfree ON or OFF.
② This switch is turned to right, the handsfree volume is increased over 7 steps.
③ If it is turned to left, volume will be decreased.
※ **This switch adjust the audio volume when selected audio mode.**

(2) Mode change button



55I3CD31B

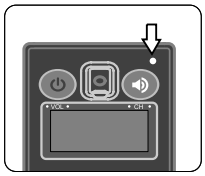
① This button is to select the handsfree mode or audio mode.
· Lamp ON : Handsfree mode ("TEL MUTE" displayed ON audio LCD)
· Lamp OFF : Audio mode

(3) Call button

55I3CD31C

① This button is used answer a call, last number radial, ring off.
② For calling, press the button 0.5~1.5 seconds until the beep sounds.
※ **This can be used when the starting switch is ON.**

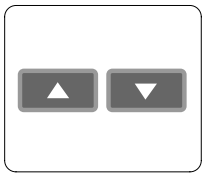
(4) Handsfree MIC



55I3CD31D

① This MIC transfers user voice to receiver of the call when making a call by handsfree.

(5) Seek button



55I3CD31E

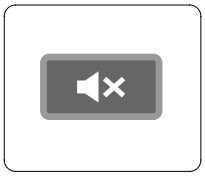
① If this button pressed, the radio automatically stops at the next frequency of broadcasting for your listening.

② This button enable to select the song of the MP3 from USB.

: Turn a station of higher frequency and the next song of the MP3.

: Turn a station of lower frequency and the previous song of the MP3.

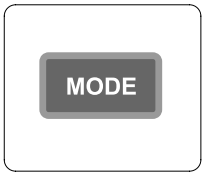
(6) Mute button



55I3CD31F

① Short press this button to mute or cancel the mute (silence) while broadcasting.

(7) Mode button



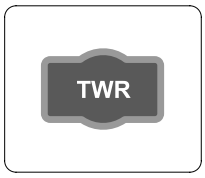
55I3CD31G

① Press the mode button to select the desired mode.

② Radio → MP3 → AUX

※ **The LCD displayed each mode.**

(8) Radio calling mode button



55I3CD31H

① Press this button, activated or deactivated the radio handsfree function.

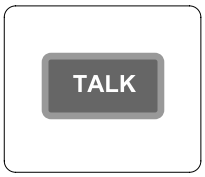
② As long as you do not press this button, you can hear the other party.

③ The LED is turned ON when this button is activated.
The LED turned OFF when the audio mode or the mobile phone handsfree calling mode is activated.

※ **Radio handsfree**

You can make a call to external worker without holding the radio by hand. (The radio is not installed to the truck).

(9) Talk button



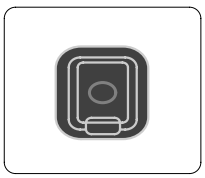
55I3CD31J

① The call is connected while pressing this button (when TALK button is activated).

※ **Unlike mobile phones, when you want to talk through the radio, you need to press the button (Push-to-talk method).**

While one is talking through the radio, the other party can only listen to him/her.

(10) Handsfree jack



55I3CD31K

① Connect the jack cable when call by radio handsfree.

7) MONITOR (OPTION)

※ **Truck serial number**

110D-9 : -#0008, 130D-9 : -#0004, 160D-9 : -#0067

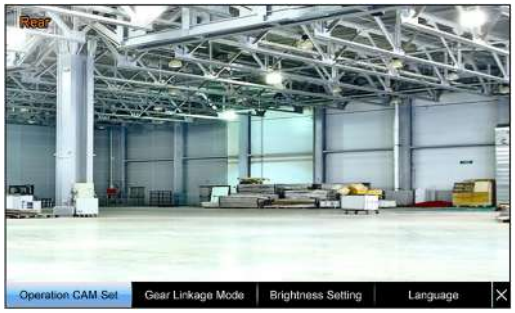
- **Adjusting the angle**

  Upwards and downwards up to 7˚, swivels left and right up to 15˚.

50D9CD211

No.	Symbol	Name	Description
1	◀	LEFT	- Move the Menu (left). Lower the value.
2	◯	MENU / ENTER	- Enter the OSD menu - Choose the menu
3	▶	RIGHT	- Move the Menu (right). Upper the value.

(1) Operation CAM set



50D9CD200

50D9CD201

· Set the number of camera channels on screen.

① 1 CH (standard)

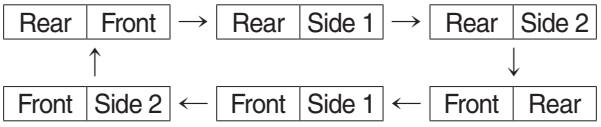
50D9CD202K

· Display one camera image on screen.
· Press left or right key to change the camera channel.

② 2 CH (dual)

50D9CD203K

· Display two camera images on screen.
· Press left or right key to change the camera channel.



③ 4 CH (quad)

50D9CD204K

· Display four camera images on screen.

Rear	Front
Side 1	Side 2

(2) Gear linkage mode

50D9CD205 50D9CD206

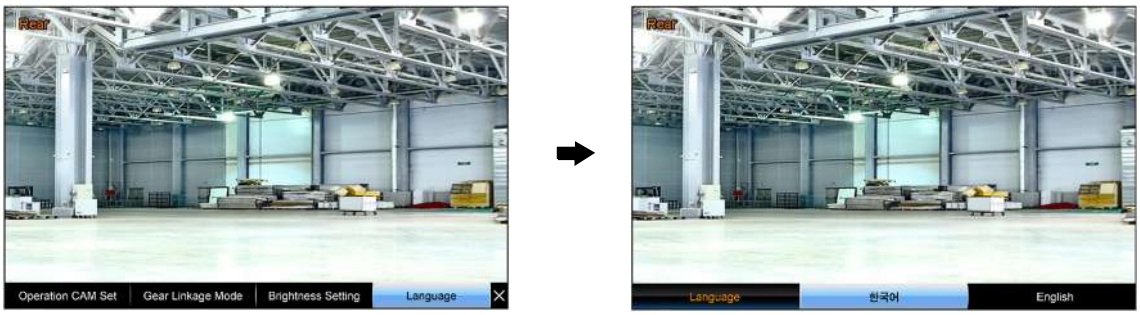
· Depending on the gear state (forward/ backward), camera channel is switched automatically.

(3) Brightness setting

50D9CD207 50D9CD208

· Adjust the display brightness.

(4) Language



50D9CD209 50D9CD210

· Set the language (13 multiple language).

4. OPERATOR MAINTENANCE AND CARE

1. DAILY SAFETY INSPECTION

Before using a lift truck, it is the operator's responsibility to check its condition and be sure it is safe to operate.
Check for damage and maintenance problems; have repairs made before you operate the truck. Unusual noises or problems must be reported immediately to your supervisor or other designated authority.
Do not make repairs yourself unless you are trained in lift truck repair procedures and authorized by your employer. Have a qualified mechanic make repairs using genuine HYUNDAI or HYUNDAI-approved parts.

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

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

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

1) VISUAL CHECKS

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

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

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

(3) Check before and after starting engine for leaking fuel, engine coolant, transmission fluid, etc.

(4) Check for hydraulic oil leaks and loose fittings.

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

(5) Be sure that the driver's cabin load back rest 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) Look the mast and lift chains over. Check for obvious wear and maintenance problems such as damaged or missing parts, leaks, slack or broken chains, rust, corrosion, bent parts, cracks, etc.

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

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

(10) Check the hydraulic sump oil level, engine oil level, and fuel level.

2) FUNCTIONAL CHECKS

Check the operation of the truck as follows.

※ **Before performing these checks, familiarize yourself with the starting, operating, and shutdown procedures in Section 5 of this manual. Also, know the safety rules given in Section 1 of this manual.**

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

(2) Start the engine and be sure all controls and systems operate freely and return to neutral properly. Check the:

① Gauges, meters, and indicator lights
② Service brakes, inching pedal, and parking brake
③ Hydraulic controls: lift, tilt, and auxiliary (If installed)
④ Accelerator pedal
⑤ Gear selector lever
⑥ Steering system
⑦ Lift mechanism and any attachments.

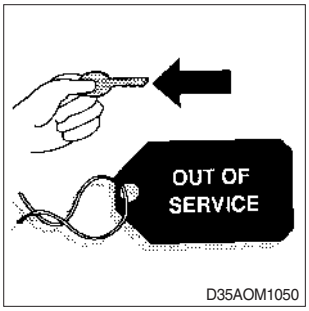
When the functional check are completed, follow the **standard shutdown procedures** given in Section 5, **Starting and operating procedures**.

3) CONCLUDING THE INSPECTION

⚠ **Do not operate a lift truck that has a maintenance problem or is not safe to operate.**

(1) Instead, remove the key from the starting switch and put an **Out of service tag** on the truck.

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



2. SUGGESTION FOR NEW TRUCK

1) It takes about 100 operation hours to enhance its designed performance.

2) Operate according to below three steps and avoid excessive operation for the initial 100 hours.

Service meter	Load
Until 10 hours	About 60%
Until 100 hours	About 80%
After 100 hours	100%

※ **Excessive operation may deteriorate the potential performance of truck and shorten lifetime of the truck.**

3) Be careful during the initial 100 hours operation.

(1) Check daily for the level and leakage of coolant, engine oil, hydraulic oil and fuel.

(2) Check regularly the lubrication and fill. Grease daily all lubrication points.

(3) Tighten bolts.

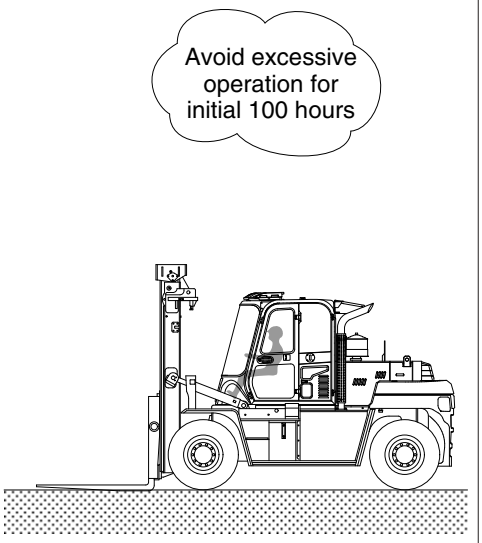
(4) Warm up the truck fully before operation.

(5) Check the gauges during operation.

(6) Check if the truck is operating normally during operation.

4) Replace following after initial hours of operation

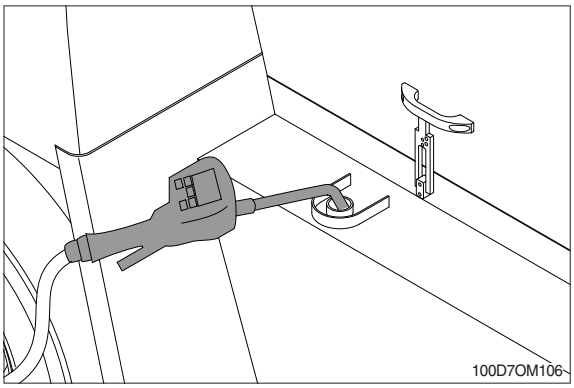
Checking items	Service
Engine oil	50
Engine oil filter element	
Pilot line filter	
Axle gear oil	100
Transmission oil	
Transmission oil filter	
Brake cooling oil	



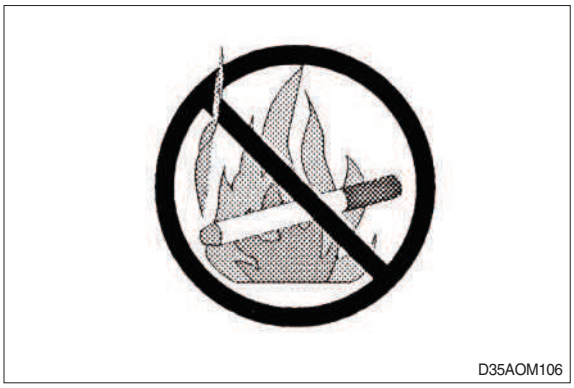
110D9OP01

3. FUEL SAFETY PRACTICES

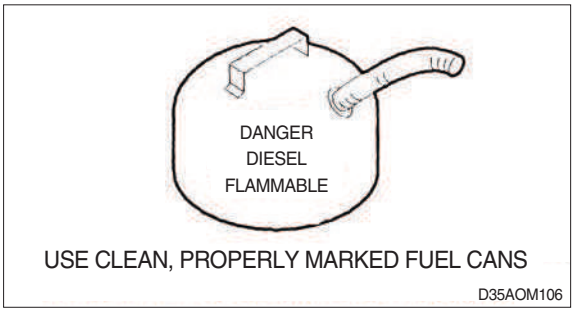
REFUELING DIESEL TRUCKS



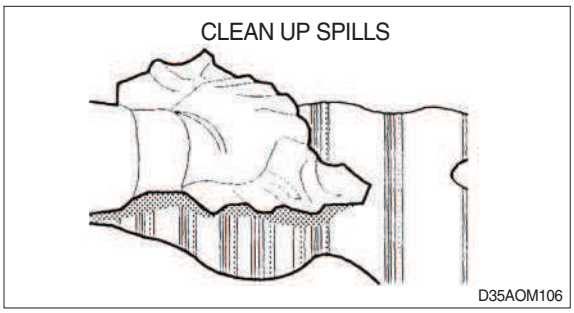
⚠ Stop the engine when refueling.
All lights and flames shall be kept at a safe distance while refueling.



⚠ Make sure that the fuel oil cans are kept cleaned and attached safety indication or letters on the can.



⚠ Wipe off the spilt fuel oil immediately.



5. STARTING AND OPERATING PROCEDURES

1. BEFORE OPERATING THE TRUCK

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

⚠ A lift truck can be dangerous if not used properly. Safe operation is the responsibility of the operator.

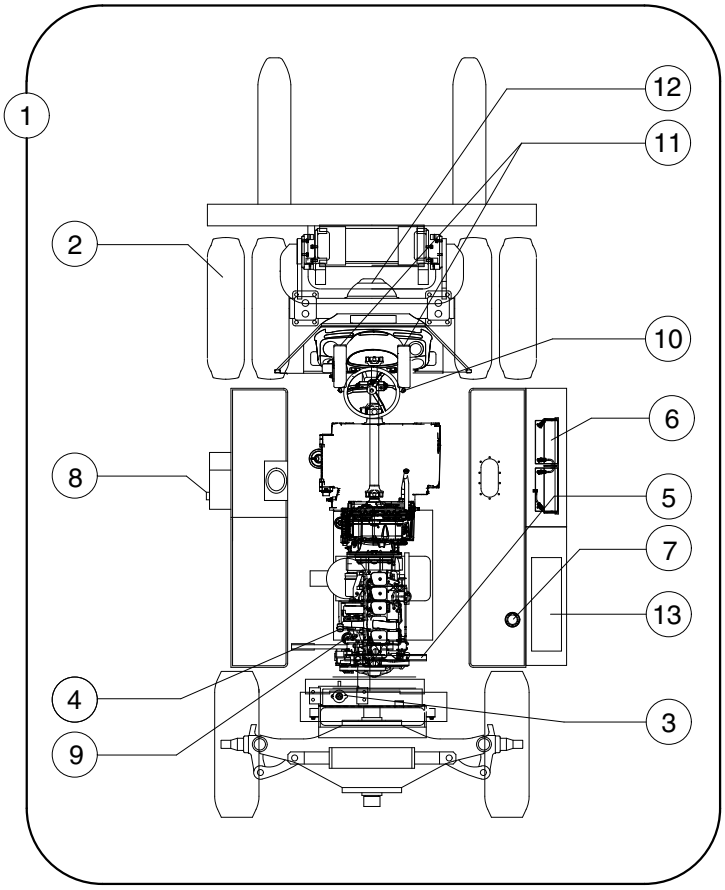
⚠ Do not start or operate the truck, or any of its functions or attachments, from any place other than the designated operator's position.

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

⚠ Protect yourself. Do not operate truck without closing the cabin door or without fastening seat belt unless conditions prevent its use.
Use special care if operation without these safety rules are required.

2. CHECK BEFORE OPERATION

1) The Occupational Safety and Health Act (OSHA) required that truck users examine their trucks before each shifts to be sure they are in safe working order. Defects when found shall be immediately reported and corrected. The truck shall be taken out of service until it has been restored to safe operating condition.



1 Oil leakage
2 Tire air pressure
3 Coolant level
4 Engine oil level
5 Fan belt tension
6 Battery
7 Brake cooling oil level
8 Hydraulic oil level
9 Prefilter
10 Multi function switch
11 Pedals
12 Axle oil level
13 DEF level

110D9OM51

2) A thorough walk-around check should be made BEFORE starting engine. This is required for your personal safety and to realize maximum service life for your truck.
① The numbers on the inspection chart show the order of inspection
② These numbers correspond to the check item numbers given on the next pages.
③ Hang a caution sign on the truck(for example, **Do not start** or **maintenance in progress**). This will prevent anyone from starting or moving the truck by mistake.

3. CHECK BEFORE STARTING ENGINE

1) CHECK FOR WATER OR OIL LEAKAGE

(1) Walk around your HYUNDAI truck and check for water, oil or hydraulic leakage. Examine truck for obvious damage.

(2) Check cabin, backrest and forks for crack or obvious damage.

(3) If any damage or leaks are detected contact your HYUNDAI dealer or tire repair shop.

2) CHECK TIRE AIR PRESSURE AND TIRE RIM

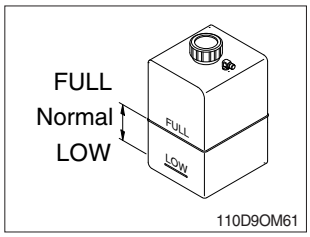
- **Air pressure and torque**

Item	Unit	Front tire / Rear tire	
		110/130D-9	160D-9
		10.00-20, 16PR	12.00-20, 18PR
Tire air pressure	kgf/cm^2	8.0	8.0
	psi	114	114
	bar	7.9	7.9
Hub nut tightening torque	kgf · m	83.2±10	
	lbf · ft	602±72.3	
	N.m	816±98.1	

⚠ **The tires are under high inflation pressure, so failure to follow the correct procedures when changing or servicing tires and rims could cause the tire to explode, causing serious injury or damage. The tires and rims should always be serviced or changed by trained personnel using the correct tools and procedures. For details of procedures, contact your HYUNDAI dealer or tire repair shop.**

⚠ **If there is any deformation, damage, or wear of the rim, or any doubt about the condition, always replace the rim. Never try repairing, welding, or heating.**

3) CHECK COOLANT LEVEL



(1) If the cooling water in the radiator reservoir tank is not within normal range when cool, add water to the FULL line.

※ **Always check the coolant level in the radiator reservoir tank prior to beginning of daily operation of the truck.**

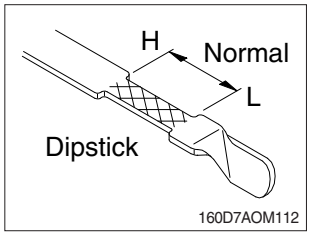
⚠ **In antifreeze is being used, pay careful attention to the ratio of antifreeze and water when adding coolant.**

⚠ **If the reservoir tank is completely empty, first add water directly to the surge tank. Then add water to the reservoir tank.**

Alway allow the radiator to cool down before adding water. At the operating temperature, the engine cooling water is at high temperature and pressure, so it is dangerous to try to open the surge tank cap. Wait until the radiator is cool enough to be touched by hand before opening the surge tank cap. Loosen the surge tank cap slowly to release the pressure, then loosen the cap.

※ **After filling the coolant into the surge tank, check for leakage for the radiator, radiator hoses and other parts of the cooling system and also for traces of water leakage under the engine.**

4) CHECK ENGINE OIL LEVEL



(1) Stop the engine, pull out the dipstick and check the oil level.

(2) The oil surface line on the dipstick should be between H and L. If below L, remove the filler cap and add engine oil through the oil level.

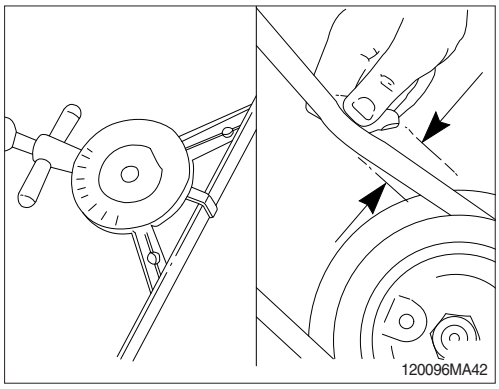
※ **Change the oil if it is marked dirty or discolored.**

⚠ **Oil level is to be checked with the truck placed at flat level and at least 3 minutes after the engine stopped.**

⚠ **Do not touch hot components or allow hot oil to contact your skin.**

5) CHECK FAN BELT

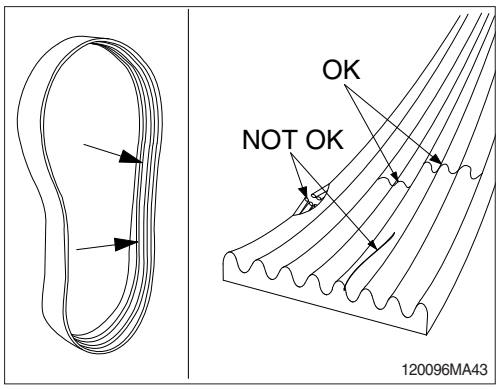
(1) An deflection method can be used to check belt tension by applying 11 kgf (25 lbf) force between the pulleys on V-belts. If the deflection is more than one belt thickness per foot of pulley center distance, the belt tension must be adjusted.



(2) Inspect the fan belt for damage.

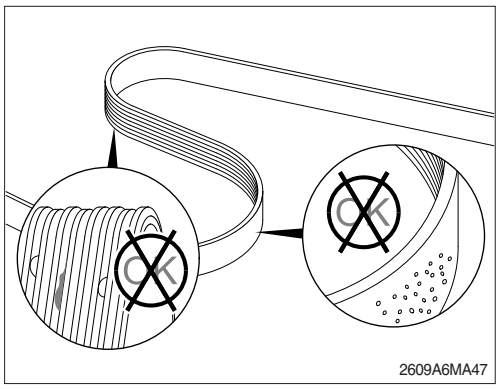
① Transverse (across the belt) cracks are acceptable.

② Longitudinal (direction of belt ribs) cracks that intersect with transverse cracks are not acceptable.



③ Inspect the belt
- Embedded debris
- Uneven/excessive rib wear
- Exposed belt cords
- Glazing (high heat)

※ **If any of the above conditions are present, the belt is unacceptable for reuse and must be replaced.**

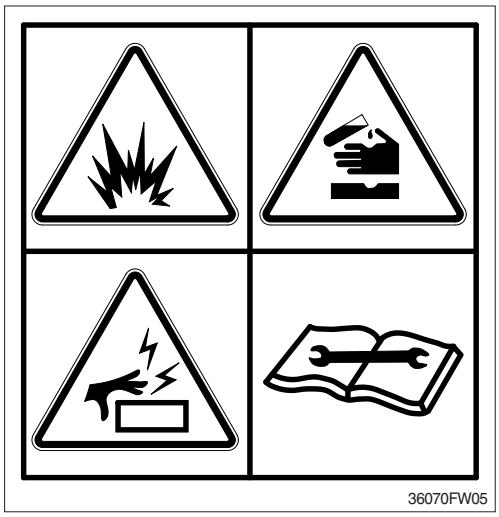


6) CHECK BATTERY

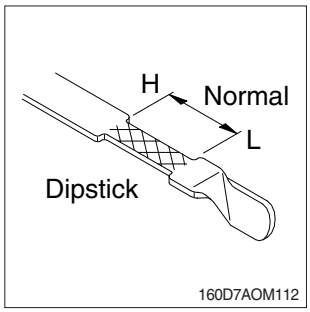
(1) Check battery and recharge or replace the battery if necessary.

⚠ **Battery maintenance need serious care and safety service.**

※ **Refer to 10. REPLACEMENT AND CHECK in SECTION 7 and always keep the safety rules.**



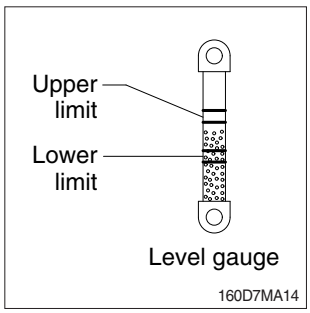
7) CHECK BRAKE COOLING OIL LEVEL



(1) Rest fork on ground and stop engine. Pull out dipstick and check oil level. If insufficient, add oil.

⚠ Hot oil and components can cause personal injury. Do not allow hot oil or components to contact skin.

8) CHECK HYDRAULIC OIL LEVEL



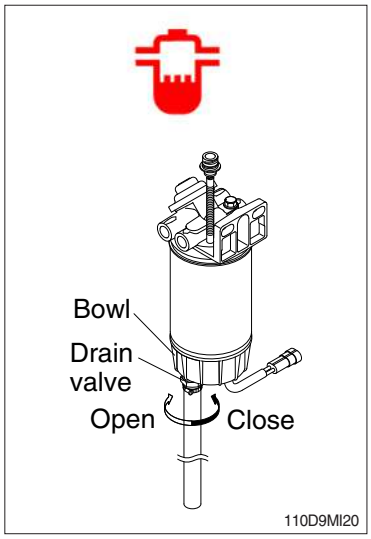
(1) Rest fork on ground and stop engine.

(2) Check the oil level from the level gauge of hydraulic oil tank.

(3) In accordance with the mast equipped, the oil level differs.

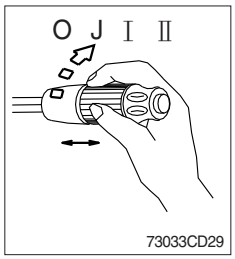
Model	Gauge	ℓ (U.S.gal)	V - mast	TF - mast
110D-9 130D-9	Lower limit	159 (42.3)	V300 ~ 700	TS395 ~ 750
	Upper limit	172 (45.4)	VS300 ~ 600	-
160D-9	Lower limit	179 (47.3)	V300 ~ 700	TS395 ~ 750
	Upper limit	193 (51.0)	VS300 ~ 600	-

9) CHECK PREFILTER



(1) WIF (Water in fuel) warning lamp.
If the warning lamp stays on, drain the water from the prefilter.

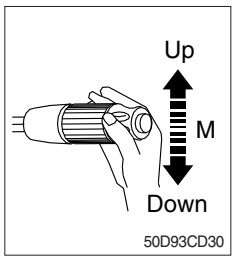
10) MULTI FUNCTION SWITCH



(1) Front wiper and washer switch

① When the switch is in J position, the wiper moves intermittently.
② When placed in Ⅰ or Ⅱ position, the wiper moves continuously.
③ If you push the grip of the lever, washer liquid will be sprayed and the wiper will be activated 2-3 times.

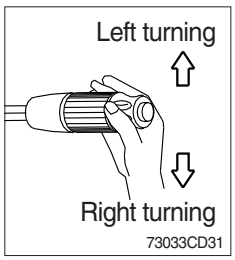
※ **Check the quantity of washer liquid in the tank. If the level of the washer liquid is LOW, add the washer liquid (In cold, winter days) or water. The capacity of the tank is 1 liter.**



(2) Dimmer switch

① This switch is used to turn the head light direction.
② Switch positions
- Up : To flash for passing
- Middle : Head light low beam ON
- Down : Head light high beam ON

③ If you release the switch when it's in up position, the switch will return to middle.



(3) Turning switch

① This switch is used to warn or signal the turning direction of the truck to other vehicles or equipment.
② Push the lever up for turning left, pull the lever down for turning right.

11) CHECK PEDALS

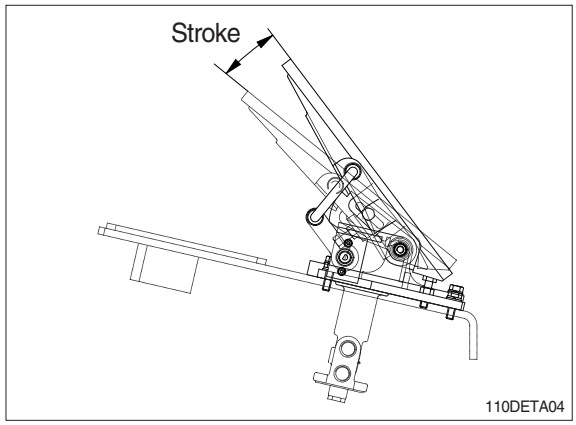
Check for any catching or abnormal heaviness when depressing the pedals.

(1) Inching pedal

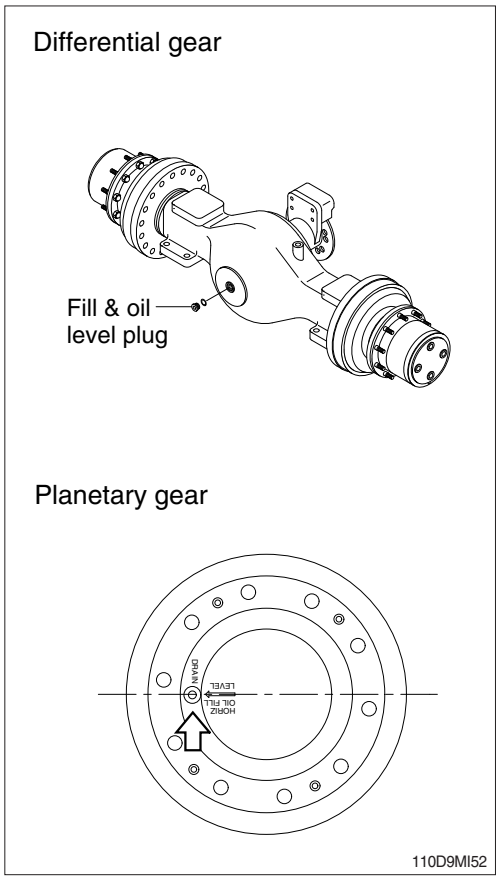
① Free play : Max 1°
② Interlock stroke with brake pedal : 7°

(2) Brake pedal

① Free play : Max 1°



12) CHECK AXLE OIL LEVEL



(1) Remove the plug and check the oil amount.
If the oil level is at the hole of the plug, it is normal.

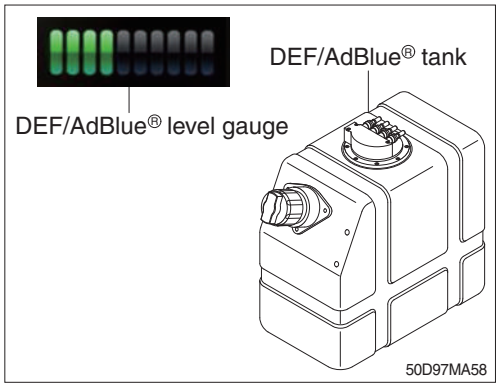
(2) If the oil level is below the plug hole, supply oil through the plug hole.

※ **Set the plug of planetary gear in parallel to the ground.**

⚠ **When checking the oil level, place the parking brake switch in the LOCK position and fix the tires with blocks.**

⚠ **As the truck is hot after operation, wait until the temperature has dropped.**

13) CHECK DEF LEVEL



(1) The DEF/AdBlue® tank level must be checked daily with DEF/AdBlue® level gauge.

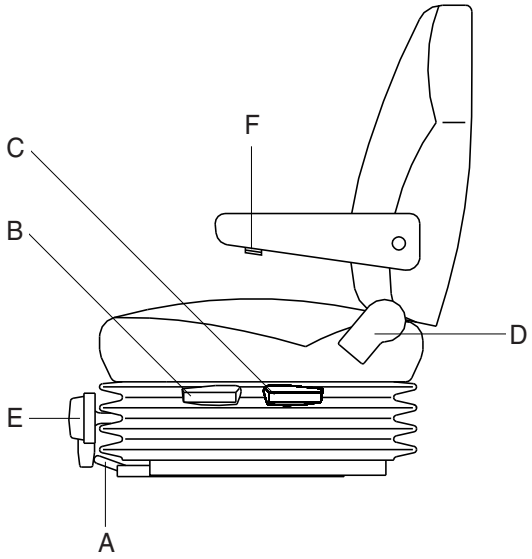
(2) If the DEF/AdBlue® level is found to below, DEF/AdBlue® must be added.

⚠ **Do not mix additives to DEF/AdBlue®.**

4. 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.



(1) Forward / Backward adjustment

① Pull lever A to adjust seat forward or backw-ard.

② The seat can be moved forward and backw-ard over 200 mm (8 in) in 10 steps.

(2) Upward / Downward adjustment

① Pull lever B and C to adjust seat upward or downward.

② Forward or backward side adjustment only can be made, tilting to one side, by moving lever B or C, respectively.

(3) Reclining adjustment

Pull lever D to adjust seat back rest.

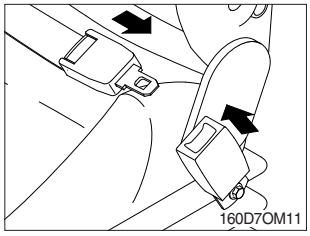
(4) Arm rest adjustment

This can be adjusted by turning the handle F to right and left.

(5) Cushion adjustment (E)

Adjusting handle to the operator's weight.

2) BUCKLING UP



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

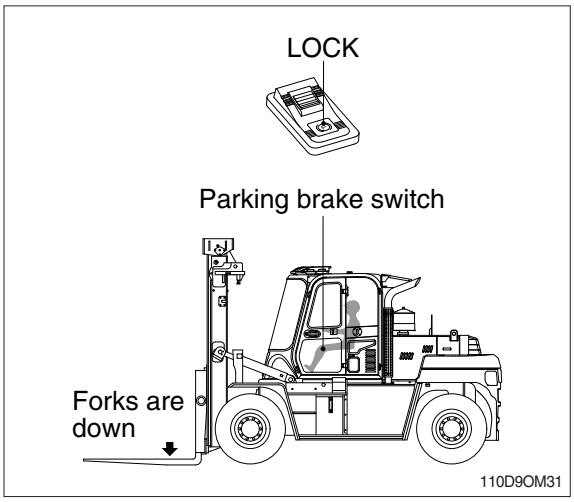
⚠ Always wear your seat belt when operating a lift truck. Failure to wear seat belt will result in injury or death in an event of an accident.

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

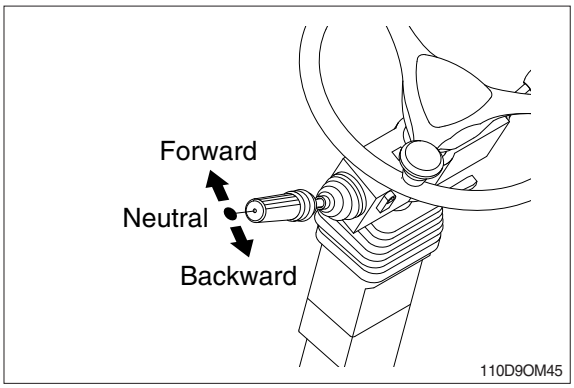
⚠ Replace the seat belt at least once every three years, regardless of appearance.

5. STARTING FROM A SAFE CONDITION

1) Always start from a safe condition.
   Before operating a lift truck, make sure that :
   - You are safely seated in the truck.
   - Seat belt is buckled up.
   - The parking brake is applied.
   - The forks are fully lowered to the floor or ground.
   - You are familiar with how all the controls function.
   - All controls are in neutral or other correct position.
   - The truck has received its daily inspection and ready and safe to operate.



2) Put the gear selector lever in the NEUTRAL position, before starting. The truck should start only in the NEUTRAL position. If it starts in gear, have the truck serviced.



6. GENERAL STARTING AND OPERATING TIPS

Before you start the truck, make sure that you have taken all the above-mentioned precautions, you have read this manual, you are starting from a safe condition, with the gear selector lever in NEUTRAL, the seat adjusted, and your seat belt buckled.

⚠ **INSPECT YOUR LIFT TRUCK BEFORE OPERATING at the start of each shift. Before you put your truck to use, check the operation of the controls and all systems.**

Turn off any lights or optional electrical equipment while you crank the engine. This reduces the electrical load on your battery.

Avoid excessive starter cranking (In excess of 30 seconds). To avoid starter overheating or damage, do not crank the starter continuously for more than 30 seconds at a time. If the engine fails to start, wait two to three minutes before again attempting to start your lift truck.

If your battery is **run down** (discharged) or becomes discharged while you try to start your truck, please refer to Section 6, **Emergency Starting and Towing**, in this manual.

To avoid damage to your truck or possible harm to yourself. Follow these recommendations :

- Warm the engine up before driving or applying a load. Idle engine at low idle rpm for a few minutes to circulate and warm the oil. Then increase speed to approximately half-throttle for a short period or until the engine coolant reaches approximately 38 ˚C (100 ˚F). This procedure helps prolong engine life.
- Let the engine run until the normal operating temperature is reached. Then operate the controls and check all gauges and warning indicators to be sure they are functioning properly. Stop the engine and make a visual inspection for oil, water, or fuel leaks.
- Do not operate the engine at speeds above idle for more than brief periods without a load.
- Do not run the engine at maximum power continuously until the engine is fully warmed up.
- Never operate the engine at more than the regular no-load governed speed. Excessive speeds are harmful.

※ **The governor is set at the factory and should need no adjustement.**

- Avoid extended (in excess of 10 minutes) and unnecessary idling of the engine. Turn off the engine instead.
- **Carbon monoxide** is colorless and odorless, but can be present with all other exhaust fumes.

⚠ **Exhaust gases are harmful and can cause serious injury or death. Proper ventilation is always necessary for safe inside operation or warm-up.**

⚠ **Due to the precise, tolerances of diesel injection systems, it is extremely important that the diesel fuel be kept clean and free of dirt or water. Dirt or water in the system can cause severe damage to both the injection pump and the injection nozzles.**

7. STARTING AND STOPPING THE ENGINE

1) CHECK INDICATOR LIGHTS

(1) Check if the parking brake switch is in the LOCK position.

(2) Check if the gear selector lever is in neutral position.

(3) Turn the key to the ON position, and check following.

① If all the lamps light ON after sounding buzzer for 3 seconds.

※ **If the lamps do not light or the buzzer is not sounded, check disconnection of wire.**

② Only below lamps will light ON and all the other light will be turned OFF after 3 seconds.

- Charging warning lamp (1)
- Engine oil pressure warning lamp (2)
- Brake oil pressure warning lamp (3)

※ **Start the engine after all of the lamps OFF. (Only above 3 lamps remain ON)**

2) STARTING ENGINE IN NORMAL TEMPERATURE

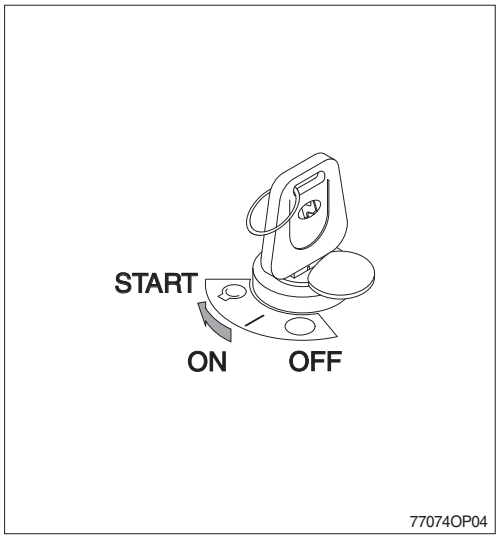
※ **Sound the horn to warn the surroundings after checking if personnel or obstacles are in the area.**

(1) Turn the starting switch to START position to start the engine.

※ **If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.**

(2) Release the starting switch instantly after the engine starts to avoid possible damage to the starting motor.

(2) The starting switch will automatically return to the ON position.



3) STARTING ENGINE IN A COLD WEATHER

※ **Sound horn to warn surroundings after checking if there are obstacles in the area.**

※ **Replace the engine oil and fuel referring to recommended oils at page 7-65.**
Fill the anti-freeze solution to the coolant as required.

(1) Check if the parking brake is switch is in the LOCK position.

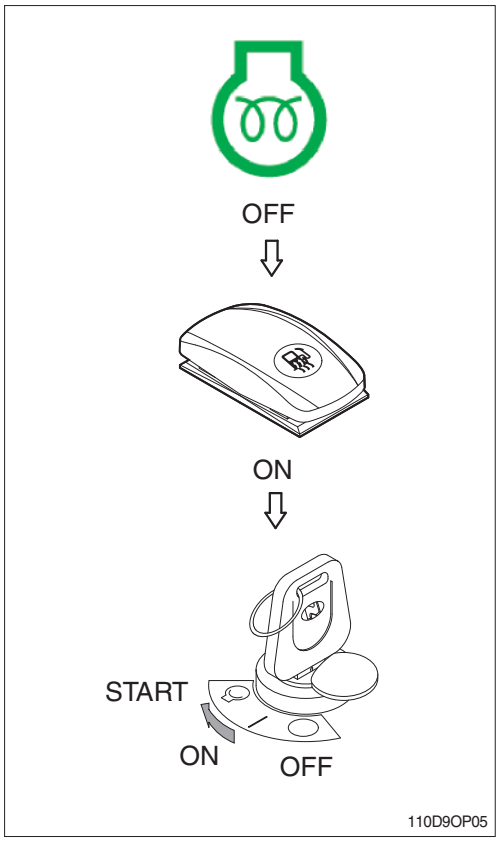
(2) Check if the gear selector lever is in the neutral position.

(3) Starting the engine while the ambient temperature is below 0 °C.

① Turn the start key switch to "ON" position.

② Wait until the gauge of the cluster should be set.

③ Push down the OK symbol ( ) on the fuel warmer switch so that it can heat the fuel oil after the heating pilot lamp ( ) on the cluster goes out and then wait for 5 minutes.



④ Turn the start key switch to "Start" position.

⑤ Release the start key switch when the engine is started.

⑥ Keep sufficiently idling condition after starting the engine.
Travelling the truck or operation of the attachments could be caused shut-down of the engine.

※ **In the event of the winter season, the fuel oil happens WAX from -6 °C.**
When the ambient temperature is below -6 °C, do not operate the truck under high load condition so that it can operate normally the fuel system of the engine, and operate the truck after keeping idle condition of the engine in a way.

(4) Starting the engine at freeze-up (severe cold winter season) condition.

① When the ambient temperature is below 0 °C, carry out the same method according to above procedure.

② Operate the engine in a way so that it can supply a sufficient oil to the engine and hydraulic system due to heating the oil under low speed and low load condition after starting the engine.

③ At the severe cold condition below -15 °C, do not operate the truck under the high load condition after starting the engine in a way.
Keep the idle condition of the engine for 20~30 minutes at the severe cold condition (freeze-up condition).

4) INSPECTION AFTER ENGINE START

Inspect and confirm the following after engine starts.

(1) Is the level gauge of hydraulic oil tank in the normal level?

(2) Are there leakages of oil or water?

(3) Are all the warning lamps OFF?

(4) Check the following after warming up operation.

① Is the indicator of engine coolant temperature gauge (1) in the operating range?

② Is the indicator of transmission oil temperature gauge (2) in the operating range?

③ Is the engine sound and the color of exhaust gas normal?

④ Are the sound and vibration normal?

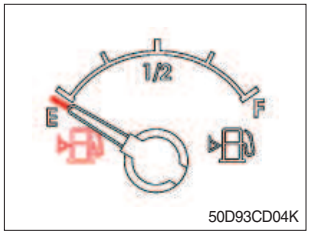
※ **Do not increase engine speed quickly after starting, it can make damage engine or turbocharger.**

※ **If there are problems in the control panel, stop the engine immediately and correct problem as required.**

(5) Check engine exhaust color.

Exhaust gas color	Criteria
Colorless, light blue	OK
Black	Check for incomplete combustion
White	Check for oil leakage

(6) Check fuel tank level.



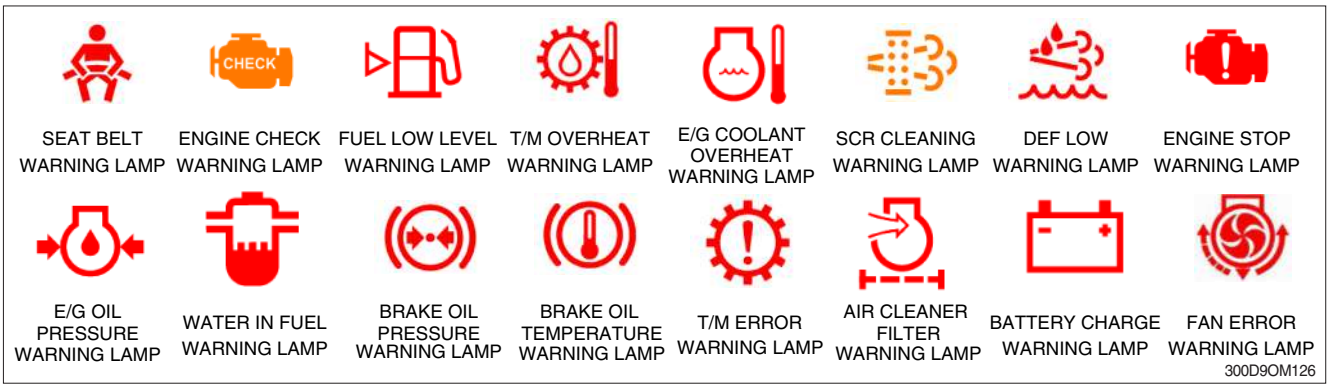
If the indicator points to F, the tank is full. If the indicator enters the E range, refill the fuel tank immediately. Do not operate the truck below this level. Do not use low quality fuel or fuel mixed with kerosene. Clean the area around the cap before adding fuel to prevent dirt from entering the tank.

Always fill the tank at the end of the day's operation. If air remains in the tank, the moisture in the air will condense inside the tank and form water in the fuel.

⚠ **Do not smoke or allow any flame near the truck when refueling. Refueling produces explosive fumes. The truck should be refueled only at the specified refueling point.**

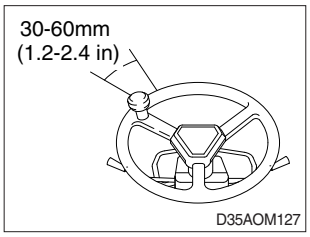
⚠ **Stop the engine and get off the truck when refueling.**

(7) Check warning lamps.



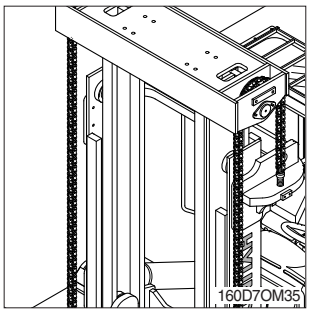
※ **These lamps light up to indicate an abnormality.**
So, if one of these lamps is lighted, take approriate service and maintenance.

(8) Check steering wheel play.



If the steering wheel play is over 30~60 mm (1.2-2.4 in), check or repair it.

(9) Check lift chain tension.



Raise forks 10 to 15 cm (4 to 6 in) from ground. Push with a rod to check that both chains have approximately same amount of slack.

· Adjusting lift chain

① Loosen locknut and turn the adjust nut.

② Equalize tension on the lift chain.

⚠ **Do not put hands into the mast.**

(10) Check steering wheel.

Check that steering wheel does not wobble or suddenly pull to one side. Check also for any abnormal heaviness in steering.

(11) Check rear view mirror.

Adjust the rearview mirror for best rearward visibility.

5) TRANSMISSION COLD STARTING

(1) At an oil temperature in the shifting circuit < -12 ˚C, the transmission must be warmed-up for some minutes.

(2) This must be carried out in neutral with an increased engine speed.

(3) Until this oil temperature is reached, the electronics remains in neutral, and the symbol of the cold start phase will be indicated on the display.

· Indication on the display : * *

(4) After the indication on the display is extinguished, the full driving program can be utilized out of NEUTRAL.

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6) TO STOP THE ENGINE

※ **If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.**

※ **In particularly if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.**

(1) Place the gear selector lever in neutral.

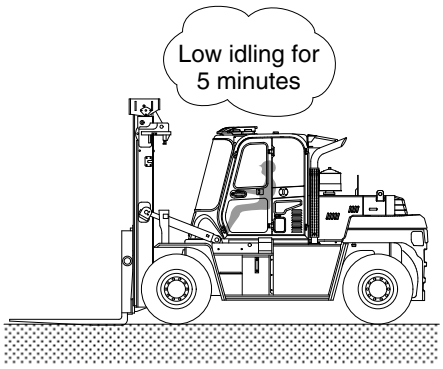
(2) Place the parking brake switch in the LOCK position.

(3) Run the engine for five minutes at low idle with no load.

(4) Return the key of starting switch to the OFF position.

(5) Remove the key to prevent other people using the truck.

(6) Lock the cab door.



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8. WARMING-UP OPERATION

※ The most suitable temperature for the hydraulic oil is about 50 ˚C (112 ˚F).
It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25 ˚C (77 ˚F).
The temperature must be raised to at least 25 ˚C (77 ˚F) before starting work.

1) Run the engine at low idling for 5 minutes.

2) Speed up the idling and run the engine at mid-range speed.

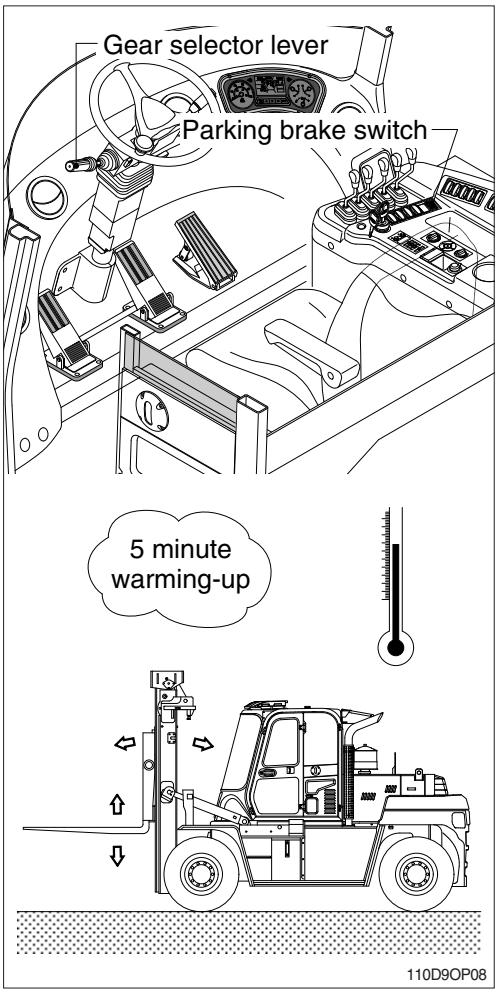
3) Lift the forks slightly and tilt the mast forward to the stroke end to relieve hydraulic pressure.

※ **Do not leave hydraulic pressure relieved for more than 30 seconds.**

4) Tilt back to the stroke end to relieve hydraulic pressure.

※ **Do not leave hydraulic pressure relieved for more than 30 seconds.**

5) Repeat the procedure 3) - 4) several times until warm-up operation is completed.

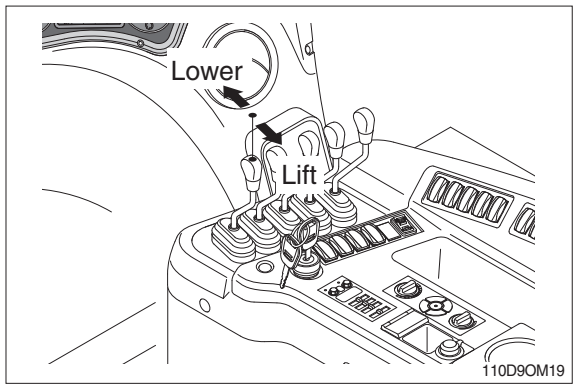


9. LEVERS AND PEDALS

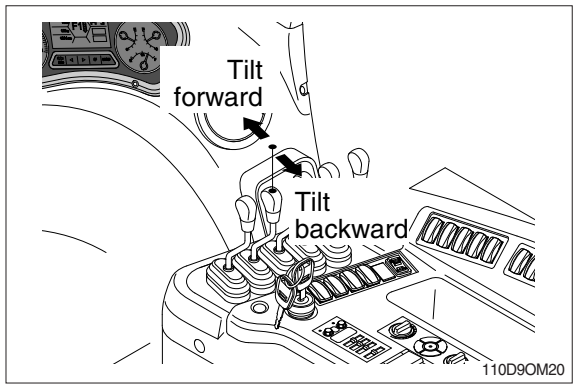
1) POSITIONING FORKS AND MAST

When driving, with or without a load, it is a good practice to always raise the forks slightly and tilt the mast backward. Raising the forks and tilting them back prevents the fork tips from catching on possible obstructions and reduce the wear on the fork blades from striking or dragging on the floor or ground. See safety messages on next page.

Pull back on the lift control lever and raise the forks 150 to 200 mm (6 to 8 inch) above the floor.



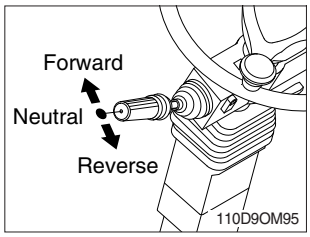
Then, using the tilt control, tilt the mast back slightly to raise the fork tips.
The mount of forward and backward tilt to be used is governed by the application.



⚠ **When the mast (carriage and/or load) is raised into a high (Elevated) position, the stability of the truck is reduced.**
Some of the other conditions that may affect stability are ground and floor conditions, grade, speed, loading, dynamic and static forces, and the judgement exercised by the operator. Trucks equipped with attachments behave as partially loaded trucks even when operated without a load on the attachment. Also, improper operation, faulty maintenance, or poor housekeeping may contribute to a condition of instability.

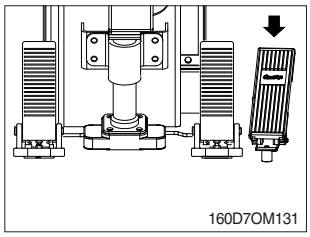
⚠ **For stability, do not travel with the load or carriage in a highly elevated position. Travel with the lift mechanism raised only enough to clear the ground or obstacles.**

2) SELECTING DIRECTION OF TRAVEL



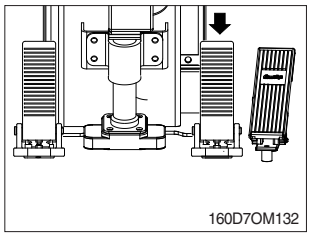
Push the gear selector lever forward, center it , or pull it back for FORWARD, NEUTRAL, or REVERSE, respectively.
Traction is disabled in NEUTRAL.

3) USING THE ACCELERATOR PEDAL



With the parking brake released and the gear selector lever in FORWARD or REVERSE, put your foot on the accelerator pedal and push down smoothly until the truck is moving at the desired speed.

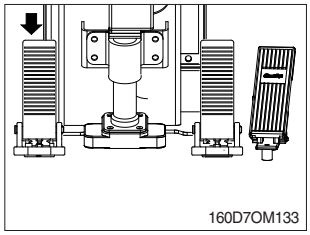
4) BRAKING PEDAL



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

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

5) INCHING PEDAL



Use the inching pedal and the accelerator pedal in combination to vary lift and travel speeds independently. The further you depress the inching pedal, the more the driving clutch slips, reducing travel motion. With the inching pedal fully depressed, the brakes fully engage. You operate the inching pedal with your left foot for precise control of travel speed, while you operate the accelerator pedal together with the lift control to vary lift speed.

※ In case of slipping the clutch, it can be caused to happen heating problem in the system due to excessive friction of the discs, and reduced a durability or a lifetime of the components as result.

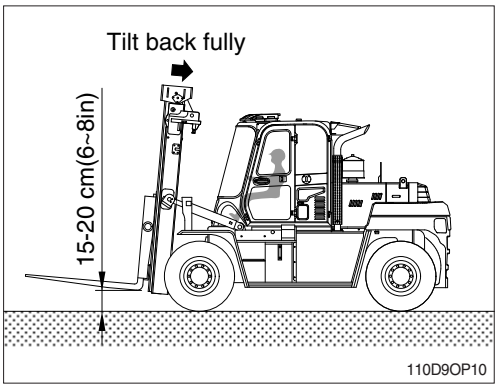
※ Pay particularly careful attention to do not press repeatedly the pedal and it is essential to cut off the power for travelling by pressing the pedal sufficiently to prevent from heating problem.

10. TRAVELING OF THE TRUCK

1) BASIC OPERATION

(1) Traveling posture

Lift the forks so that the forks are placed 15~20 ㎝ (6~8 in) above the ground and tilt back the mast fully.

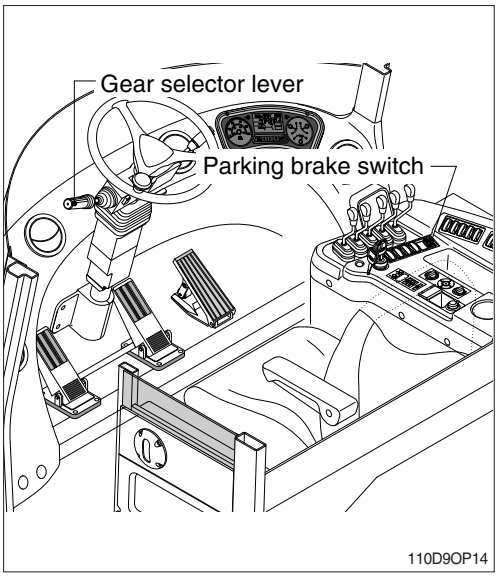


(2) Traveling operation

When warm-up operation is completed after the engine is started, move the truck according to the following procedure.

① Release the parking brake.

② Put the gear selector lever in the 1st stage of forward or backward direction and press gently the accelerator pedal to move the truck.



(3) Changing direction and speed

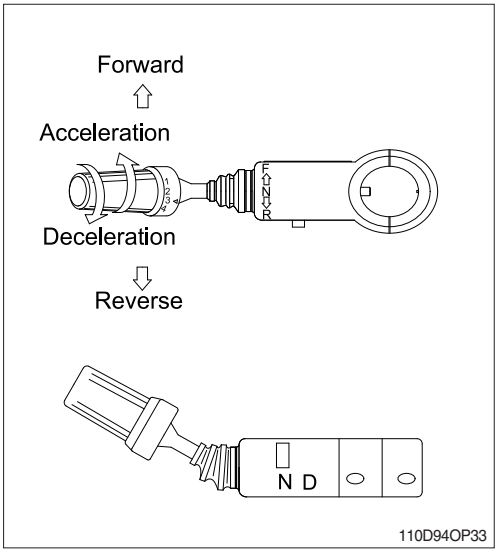
① The gear selector lever is designed for the mounting on the left side of the steering column.

② The positions (speeds) 1 to 3 are selected by a rotary motion, the driving direction Forward (F) - Neutral (N) - Reverse (R) by tilting the gear selector lever.

③ A neutral lock is installed as protection against inadvertent drive off.

- Position N - Gear selector lever blocked in this position
- Position D - Driving

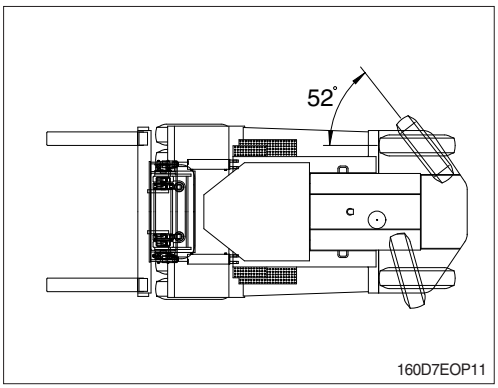
④ When doing work, run the truck in the 1st or 2nd speed.



⚠ When traveling at high speed, do not abruptly decelerate by using the gear selector lever, to slow down instead press the brake pedal.
⚠ When changing direction, check beforehand there is no obstacle in the direction you will be headed.
⚠ Avoid changing direction at high speed.

(4) Turning the truck

① Turn the truck by moving the steering wheel into the desired direction.
② You can turn the truck to the left or right by 52 degree.
※ Do not turn the truck abruptly when traveling at high speed and avoid turn on a slope.
⚠ Steering does not function with engine OFF.



(5) Precautions when driving

① If the monitor warning lamp lights up, put the gear selector lever in the neutral position and stop the truck. Stop the engine after running it at low idling. Then resolve any problems regarding operation of the truck.
② When operating the truck, if the load is lighten rapidly, the speed of the truck will increase. So, be careful.
③ When the truck travels on uneven ground, keep the truck traveling at low speed.

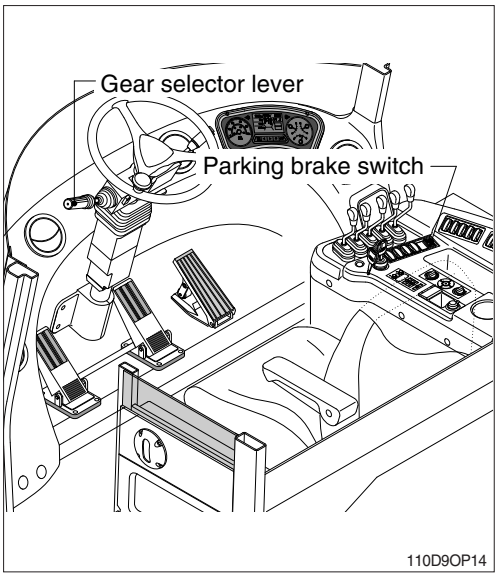
※ Do not drive the forklift more than 30 minutes without idling.
If the truck is driven 30 minutes, stop driving and keep it 10 minutes under idle condition.
Excessive driving may cause overheating of brake and tires and this may result in short life cycle of those parts.

(6) Stopping the truck

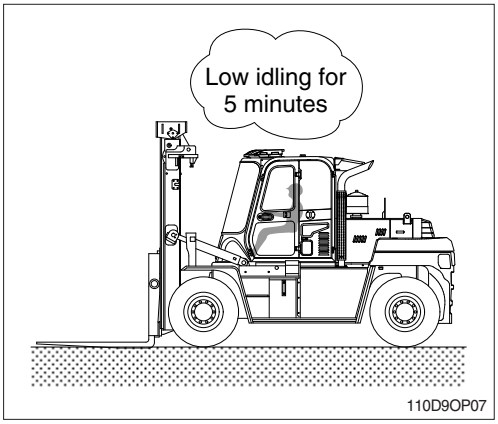
① Press the brake pedal to stop the truck.

② Put the gear selector lever in the neutral position.

③ Put the parking brake switch in LOCK position.



④ Lower the forks to the ground.



(7) Stopping engine

※ **If the engine is abruptly stopped before it has cooled down, its service life may be shortened. Avoid sudden stop except an emergency.**

※ **When the engine is overheated, do not stop immediately. Run the engine at a mid range speed to allow it to cool down, then stop it.**

① Check if the parking brake switch is in the lock position.

② Check if the gear selector lever is in the neutral position.

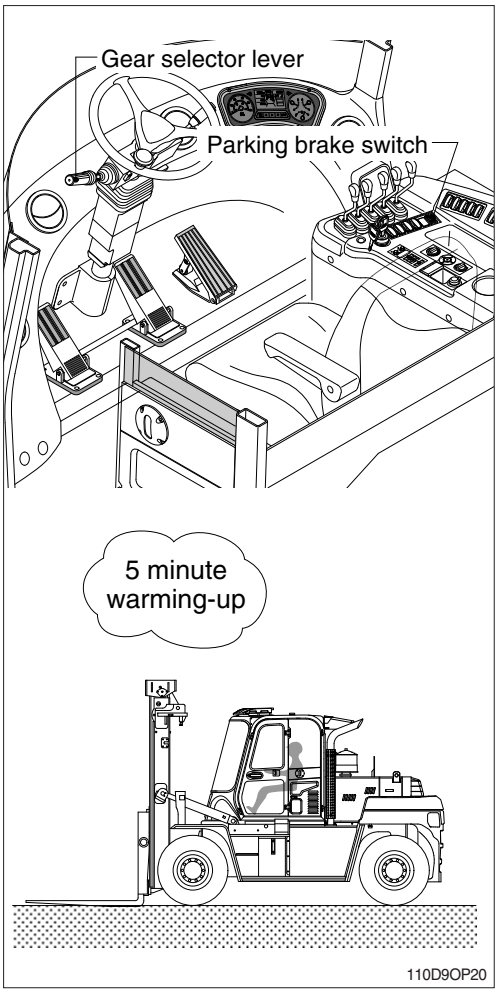
③ Run the engine at low speed without operating the equipment for about 5 minutes. Turn the starting key to the OFF position and remove the key.

(8) Checks after the engine stopped

① Check the leakage of oil and water, the work equipment and the exterior of the truck.

② Refill the fuel tank.

③ Remove any debris inside of the engine room and attached to the truck.



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2) TRAVELING ON A SLOPE

(1) Never travel down a slope in neutral.

(2) Lower the forks 15-20 ㎝ (6~8 in) to the ground.

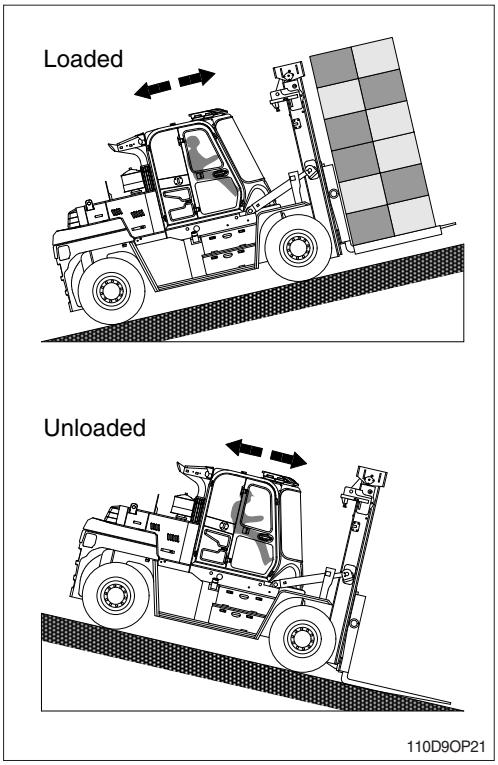
(3) Never turn on a slope, either loaded or unloaded.

(4) Never park on a slope.

(5) **Loaded** - move with **forks upgrade**
Unloaded - move with **forks downgrade**

⚠ **Truck cannot travel effectively on a slope when the oil temperature is low. Do the warming-up operation when it is going to travel on a slope.**

⚠ **Be careful when working on slopes. It may cause the truck to lose its balance and turn over.**



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11. OPERATING SAFELY

Safe operation is the responsibility of the operator.

1) WATCH WHERE YOU ARE GOING. DON'T GO IF YOU CAN'T SEE...

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

⚠ **LOOK WHERE YOU DRIVE. Watch out for pedestrians, other vehicles, obstructions (especially overhead), and drop-offs. If the load blocks your view, drive backwards, except up slopes.**

(2) Do not allow anyone to stand or pass under the load or raised forks.
Watch for people in your work area even if your truck has warning lights or alarms. They may not watch for you.

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

2) PROTECT YOURSELF AND THOSE AROUND YOU...

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

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

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

3) NO RIDERS...

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

4) ALWAYS BE IN FULL CONTROL OF YOUR LIFT TRUCK...

(1) Never operate a lift truck or its attachments if you are not in the designated operator's position.

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

(3) Always pick the smoothest travel route for your lift truck. Avoid bumps, holes, slick, spots, and loose objects or debris in your path that may cause the truck to swerve or tip. If these conditions are unavoidable, slow down and carefully drive past them. Slow down for wet or slippery surfaces.

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

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

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

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

5) GRADES, RAMPS, AND INCLINES...

(1) Use special care when operating on ramps, inclines, and uneven areas. Travel slowly. Travel straight up and down. Do not turn or drive at an angle across an incline or ramp. Do not attempt to operate on grades in excess of those specified and/or recommended by the manufacturer.

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

(3) Always brake with the right foot pedal (Not with the inching pedal) when travelling down incline. If you should travel down incline for long distance, apply the engine brake with lower gear. Brake malfunction such as preformance drop, excessive wear of friction material and disc stick can be caused by continuous brake operation making the oil overheating. In that case, stop traveling, apply parking brake with neutral gear position and stay during 10 minutes with engine idle speed.

⚠ Do not travel down incline with neutral gear state.
It makes the brake oil overheated due to excessive brake operation.

6) PRACTICE SAFE OPERATION EVERY TIME YOU USE YOUR TRUCK...

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

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

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

(4) Periodically check the gauges and warning indicator lights in the cluster to be sure they indicate a normal condition. If an abnormal condition appears bring the truck to a safe condition and safe location, shut off the starting switch immediately and report the problem.

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

⚠ Always wear your seat belt when operating your truck.

12. LOAD HANDLING

1) GENERAL

Handle only loads that are within the truck rated capacity as shown on the nameplate. This rating specifies the maximum load that should be lifted. However, other factors such as special load handling attachments, load having a high center of gravity, or uneven terrain may dictate that the safe working load be less than the rated capacity. Under these conditions, the operator must reduce the load carried so that the lift truck remains stable.

Handle only stable or safely arranged loads. Do not handle loads made up of loose, unevenly stacked, or unstable items that can easily shift and fall. Take the time to stack correctly and handle loose items. Center the load on the forks.

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

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

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

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

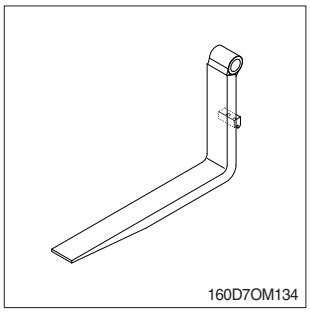
⚠ **Slack chains mean rail or carriage hang-up. Raise the mast before you move. If the mast malfunctions in any way or becomes stuck in a raised position, operate the lift control to eliminate any slack chains by raising the carriage. DO NOT go under a raised mast or forks to attempt repairs.**
DO NOT climb the mast or the truck.

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

The farther the load is carried from the pivot point (Center of front wheels), the less the weight on the steer wheels. Therefore, always carry the load as close to the front wheels as possible (Back and flush against the face of the forks.)

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

2) ADJUSTING THE LOAD FORKS

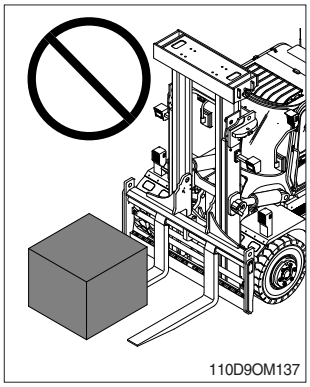


The load forks are adjustable on the hanger, carriage. Forks should be spaced as far apart as the load will allow. Both forks should always be the same distance from the center of the fork carriage. To adjust the forks, raise the carriage slightly. Tilt the mast fully forward to reduce friction and make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

Unlock the fork locking pins.

Position the forks by pushing them away from you. Secure the fork locking pins.

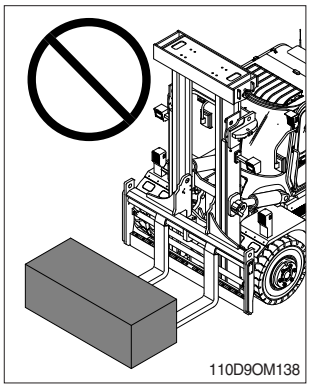
3) LOAD ON FORKS



(1) Do not elevate the load with one fork.

Loading with one fork cause the tip over, serious injury or death of operator.

The work can cause the height difference between both fork tips.



(2) Do not elevate the load with the ends of the forks.

This work can cause the height difference tips due to overload in the end of the forks.

The load should be loaded at least over 2/3 of fork length.

4) TRAVELING WITH LOAD

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

Observe all traffic regulations and watch for other traffic, pedestrians, and safe clearances. Always look in the direction of travel. Keep a clear view of the path of travel and when the load blocks your visibility, travel in reverse with load trailing (Except when climbing an incline).

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

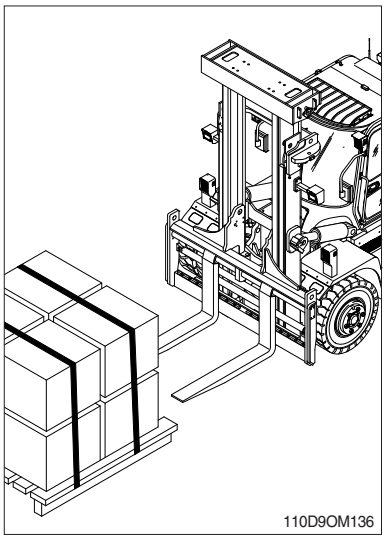
Use special care when handling and traveling with long, high, or wide loads-to avoid losing the load, striking bystanders or obstructions, or tipping the truck.

Watch clearances around the truck and load as you travel. Raise the forks or attachment only to pick up or stack a load. Look out for obstructions, especially overhead.

Be aware that exaggerated tail swing, when turning while traveling forward, is a characteristic of lift trucks that are steered by the rear wheels. Accordingly, you need to become accustomed to tail swing and always check the tail swing area of the counterweight to be sure it is clear before you turn.

Always be concerned about the stability of your lift truck. When attachments are used, extra care should be taken in securing, manipulating, positioning, and transporting the load. Because attachments generally add extra weight and complexity to the truck, operate trucks equipped with attachments as partially-loaded trucks when not handling load.

5) PICKING UP AND MOVING LOADS



When picking up a load from the ground, approach the load slowly and carefully align the truck square with the load. The forks should be adjusted to fit the load or pallet being handle and spread as wide as possible to provide good stability and balance. Before lifting, be sure the load is centered and the forks are fully under and supporting the load. Fork length should be at least 2/3 of load length. With the lift and tilt controls, adjust the forks to the correct height and angle for freely engaging the load pallet. Move forward until the forks are squarely and completely under the load.

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

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

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

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

6) UNLOADING

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

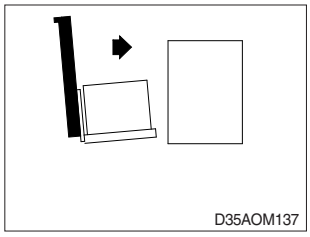
Adjust the fork height and tilt the mast forward slightly, as necessary, for smooth removal of the forks from the load (Pallet).

Carefully back away to clear the forks from the load.

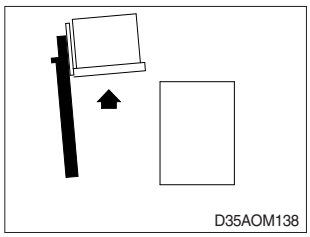
Raise the forks to traveling height and tilt forks to a level position 150~200 ㎜ (6~8 in) off the floor.

7) STACKING

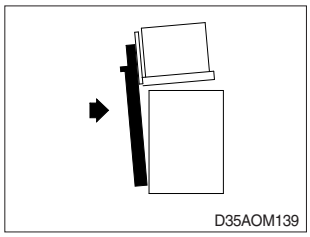
(1) To put a load on a stack



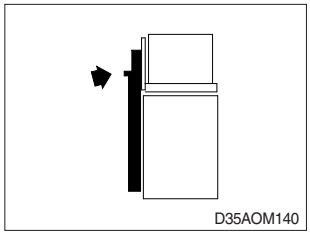
① Aproach slowly and align the lift truck and load squarely with the stack.



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

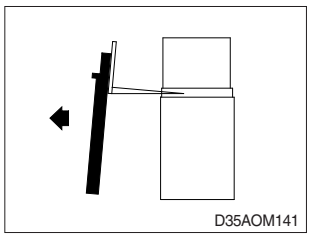


③ Move forward slowly until the load almost touches the stack. The leading edge and sides of the load pallet should line up exactly with the near edge and side of the load or rack on which you are stacking.

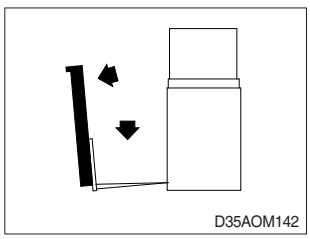


④ Stop close to the stack and further lift the load high enough to clear the top of the stack. Slowly move the load into position. Use care not to damage or move adjacent loads.

⑤ When the load is aligned with the stack beneath it, tilt the mast to the vertical position and carefully lower the load onto the top of the stack.



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



⑦ Check your travel path, then carefully back away until the forks are clear of the stack. Stop and lower the forks to the travel position [150~200 mm (6~8 in) above the ground], then tilt back for travel.

(2) To move a load from a stack

Approach the stack carefully, truck lined up squarely with the load. With mast vertical, raise the forks to the correct height for freely engaging the load pallet. Adjust fork angle as necessary to fit squarely under the load. Move (inch) forward until the forks are under the load.

Be sure that the forks do not extend beyond the load, causing damage or tipping of other adjacent loads or materials behind the load being moved. If the forks are longer than the load, move the tips partially under the load without extending beyond the load.
Raise the load to clear the under surface. Back out several inches, then set the load down and move forward until the front face of the forks contacts the load. Be careful that the fork tips now clear the adjacent load or material behind the load being moved.

Raise the load from the stack by tilting the mast back just enough to lift the load from the surface. Or, with the mast still vertical, raise the forks until they begin to lift the load. At this point, apply the minimum back tilt that will stabilize the load.

Check your travel path, slowly back up until clear of the stack, stop, and then lower the load to the travel position [150~200 mm (6~8 in) off the ground]. Tilt full back to travel (Except for certain loads that may have to be transported as level as possible). Be sure the load is back flush against the carriage or front face of the forks.

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

13. SHUT DOWN PROCEDURE

※ **Always leave your lift truck in a safe condition.**

1) WHEN YOU LEAVE YOUR TRUCK, OR PARK IT, FOLLOW THESE SAFETY RULES

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

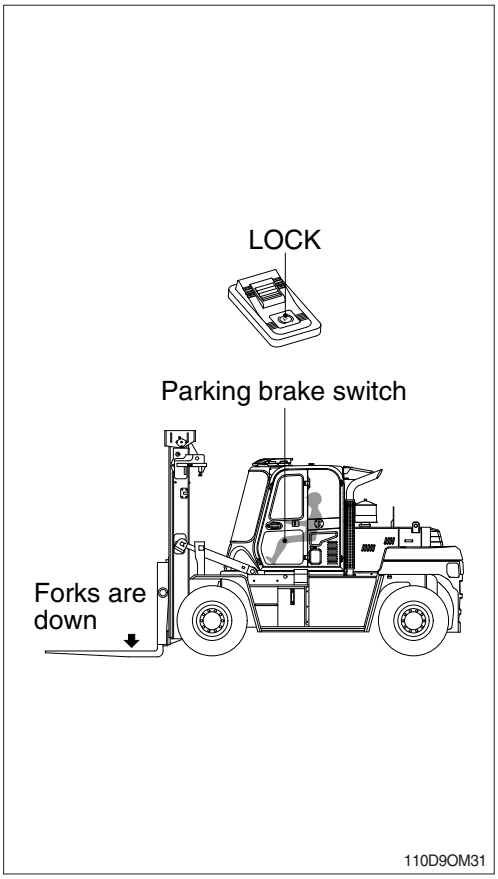
2) BEFORE LEAVING THE OPERATOR'S POSITION

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

3) IN ADDITION, WHEN LEAVING THE TRUCK UNATTENDED

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

※ **If the lift truck has been working hard, let the engine idle a few minutes before shutting it off.**



⚠ CAUTION FOR TURBOCHARGER PROTECTION

In order to prevent turbocharger failure, please let the engine idle for more than 5 minutes before shutting it off.

14. STORAGE

1) BEFORE STORAGE

When you keep your forklift truck in storage for an extended period of time, observe the following safeguard instruction:

(1) Wash and tidy the truck and house it in a dry building.

(2) When the truck has to be placed outdoors, park it on a even ground and cover it securely with canvas.

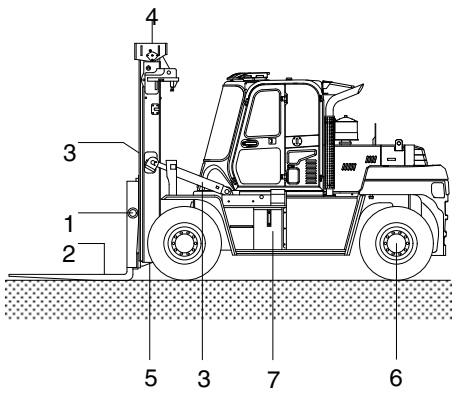
(3) Give enough fuel, grease, lubricant and oil.

(4) Coat exposed piston rods of all hydraulic cylinders fully with grease.

(5) Cover batteries after removing terminals, or remove battery from the truck and store separately.

(6) When the atmospheric temperature is anticipated to drop below 0 ˚C, add antifreeze.

※ **Refer to COLD WEATHER OPERATION about ratio of water and antifreeze.**



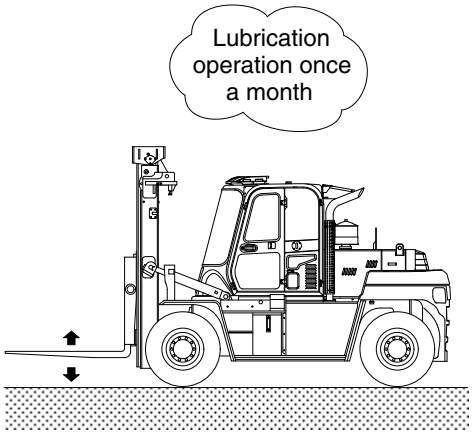
1 Fork adjust cylinder (2EA)
2 Fork (2EA)
3 Tilt cylinder (Left/Right, 2EA)
4 Lift chain (2EA)
5 Mast support (Left/Right, 2EA)
6 Steering axle (5EA)
7 Hyd pump drive spline (1EA)

110D9OP17

2) DURING STORAGE

(1) Operate the engine and move the truck for a short distance once a month so that a new oil film will be coated over movable parts and component surfaces. Remove and storage the battery at the same time.

⚠ **The above operations should be performed in the open. If they have to be performed inside a building, open the windows and doors to improve ventilation.**
This is to avoid the danger of gas poisoning.



110D9OP22

3) AFTER STORAGE

After storage (When it is kept without cover or the rust-preventive operation once a month is not carried out), you should apply the following treatment before operation.

(1) Remove the drain plugs from the oil pan and other cases and drain any water.

(2) Remove the rocker housing cover and lubricate the valves and rocker arms well. Inspect the valve operation.

(3) After the engine is started, run it at idling speed until it is warmed up completely.

15. TRANSPORT

1) PRECAUTIONS FOR LOADING AND UNLOADING

Contact your HYUNDAI forklift distributor for advice regarding transportation of the truck.

When loading or unloading the truck on or from a transporter, using loading ramp, the following precautions must always be observed.

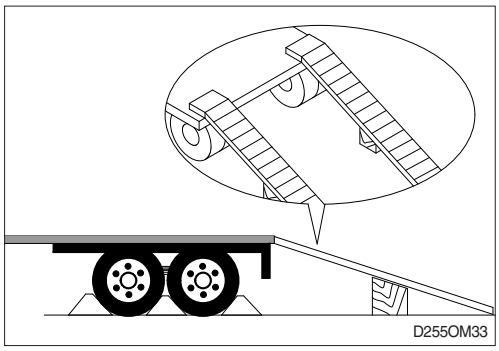
⚠ Check travel route for overpass clearance.

Make sure there is adequate clearance if the lift truck being transported is equipped with a high mast or cab.

Remove ice, snow or other slippy material from the shipping lift truck and the loading dock.

(1) Ensure that the transporter cannot move by applying the brake and putting blocks under the wheels. Put the gear selector lever in the NEUTRAL position.

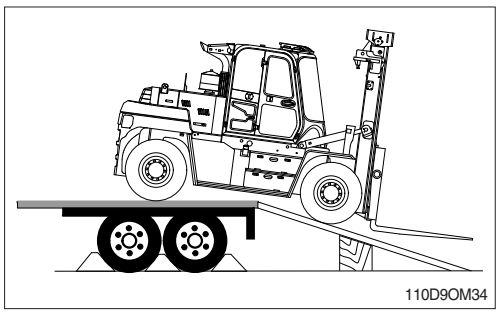
(2) Fix the loading ramps securely so that the centers of the transporter and truck are aligned. (The loading ramps should be of sufficient width, length and thickness to permit safe loading or unloading.)


D255OM33

(3) After checking that the truck is aligned with the loading ramps, back the truck slowly up the ramps to load it on the transporter.

⚠ When on the loading ramps, never change direction. If it is necessary to change direction, drive off the ramp and realign the truck.

Block the wheels and secure the lift truck with tiedowns.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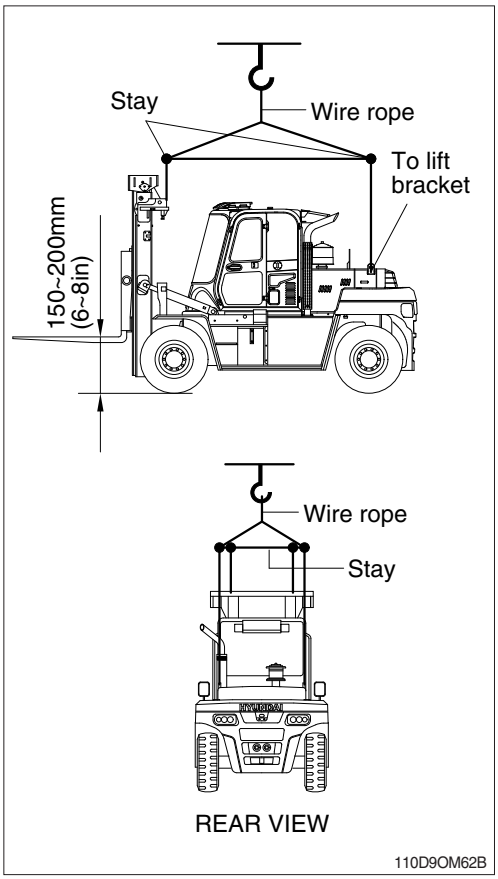
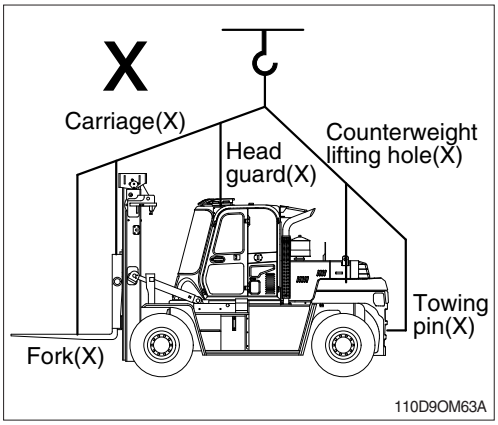
16. LOADING AND UNLOADING BY CRANE

1) Check the specification of the truck when you are going to hoist the truck.
2) Use long wire rope and stay to keep the distance with the truck as it should avoid touching with the truck body.
3) Put a rubber plate where the wire rope contact with the truck's body to prevent damage.
4) Place crane on the proper place.
5) Install the wire rope and stay like the illustration.



⚠ **Make sure wire rope is proper size.**
⚠ **Make sure that the truck is shut down before hoisting. Lifting the truck with engine running can cause serious accident.**
⚠ **The wrong hoisting method or installation of wire rope can cause damage to driver and truck.**
⚠ **Do not load abruptly.**
⚠ **Keep area clear of personnel.**
⚠ **Recommend to manufacture the stays separately as per lifting conditions.**

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



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

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

6. EMERGENCY STARTING AND TOWING

1. HOW TO TOW A DISABLED TRUCK

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

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

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

1) Be sure to apply the parking brake or block the drive wheels on the disabled truck while working around it.

2) When possible, raise the carriage (forks) on the disabled truck about 300 mm (12 in) from the floor or ground. Secure the carriage with a chain.

3) Obtain another lift truck of equal or larger size carrying a partial load for traction.

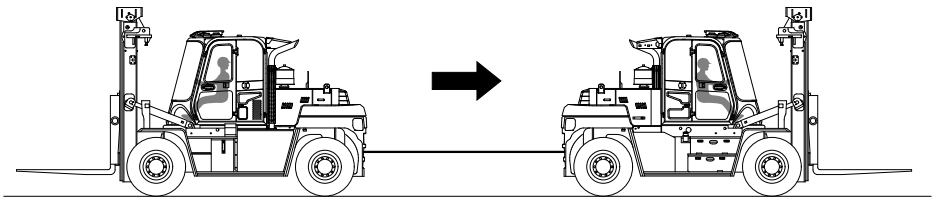
4) Check that the counterweight bolts are in place and properly torqued. (This bolt is made of a special high tensile steel and is not commercially available. Replace it, when necessary, only with a genuine HYUNDAI replacement part).

5) Use an approved, solid metal tow bar with towing couplers that connect to the towing pins in the counterweights.

6) Release the parking brake on the towed truck.

※ **Refer to page 6-3 for parking brake releasing.**

7) Put the gear selector lever in the NEUTRAL position.



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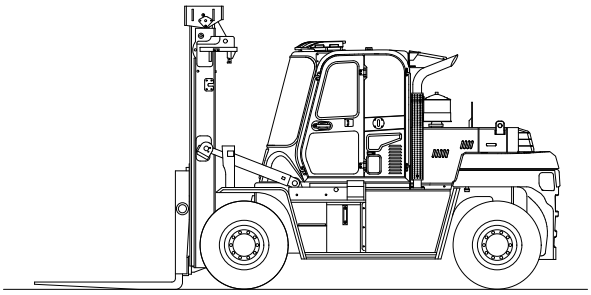
8) Tow the disabled truck backward. An operator must be on the towed truck.

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

⚠ **The power steering will not operate on the disabled truck when the engine is not running.**

9) Park the disabled truck in authorized areas only. Fully lower the forks to the floor, put the gear selector lever in the NEUTRAL position and turn the staring switch to the OFF position. Set the parking brake switch ON position. Remove the start switch and, when necessary, block the wheels to prevent the truck from rolling.

Lift truck parking



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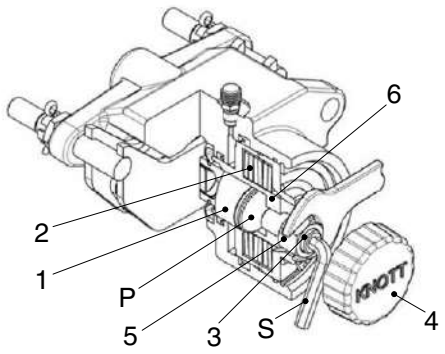
⚠ **Always apply the parking brake when parking a lift truck. The truck can move and cause injury or death to personnel near it.**

2. PARKING BRAKE RELEASE

Parking brake is operated by the spring force and released by hydraulic pressure.
If the engine or transmission does not operate, the parking brake will be operated to stop the truck.
For an emergency, the parking brake can be released as below.



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1	Thrust bolt	4	Screw cap	P	Even surface
2	Bank of cup springs	5	Lock nut	S	Socket wrench
3	Adjusting screw	6	Piston		

1) The truck has to be secured against rolling away.
2) Release the screw cap (4) and unscrew
3) Release the lock nut (5) and turn the adjusting screw (3) with socket wrench size 8 or 10 manually counter-clockwise until the brake disc is free.

⚠ **For the emergency release is an actuation torque of 40 Nm respectively 70 Nm required.**

4) Mount the lock nut (5) and the screw cap (4) and tighten both as far as possible manually. (protection against dirt)

⚠ **Now, the truck do not have any brake function. The truck must be secured against moving away with proper means. Before putting the truck into operation again, the brake has to be adjusted again. Refer to the service manual.**

3. HOW TO USE BATTERY JUMPER CABLES

If your lift truck battery is discharged (dead), you can start your lift truck by jumping it from another lift truck that has a 24V negative-ground electrical system. The "Booster" battery must be fully charged and in good condition. This section explains how to perform this procedure safely. To avoid damage to your lift truck and your battery or the possibility of harm to yourself, follow the instructions and warnings carefully. If you have any doubts, ask for help from an experienced mechanic.

If your truck has a battery with terminals on the side you will need a set of jumper cables with matching connector clamps or cable adapters for side mounted battery terminals.

△ **Use only a 24V NEGATIVE GROUND SYSTEM to jump your truck. You can injure yourself and permanetaly damage your truck's 24V starting motor and ignition system by connecting it to a 24V power supply or to a positive ground system.**

⚠ **BATTERIES CONTAIN SULFURIC ACID. Avoid acid contact with skin, eyes, or clothing. If acid contacts your eyes or skin, flush immediately with water and get medical assistance. Wear safety glasses when working near the battery to protect against possible splashing of the acid solution.**

1) If the discharged battery has filler caps, check the fluid level. Do not use an open flame to check and do not smoke. If low, add distilled water to the correct level. Be sure to install the caps before jump starting.

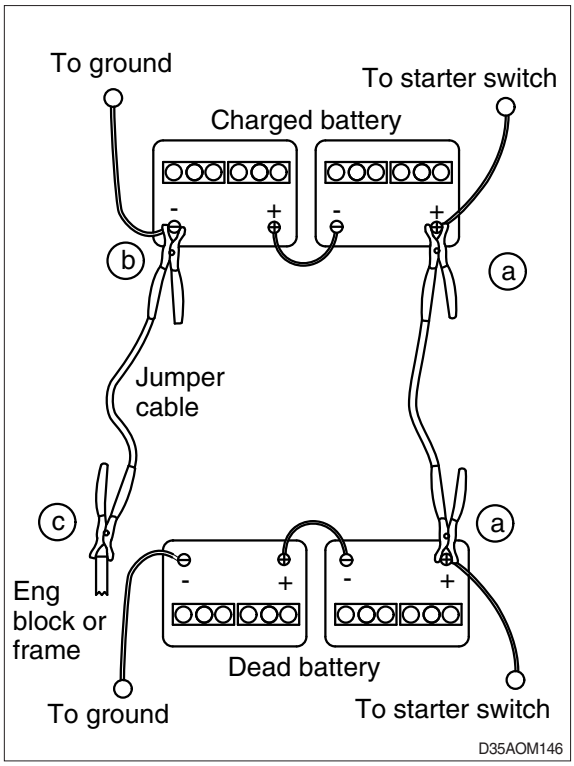
2) Do not jump start, charge, or test a sealed type battery if the test indicator looks illuminated or has a bright color. Install a new battery.

⚠ **BATTERIES EMIT EXPLOSIVE GAS. Do not smoke or have open flames or sparks in battery charging areas or near batteries. An explosion can result and cause injury or death.**
Hydrogen gas is produced during normal battery operation.
Hydrogen can explode if flames, sparks, or lighted tobacco are brought near the battery. When charging or using a battery in an enclosed space, always provide ventilation and shield your eyes. Wear safety glasses when working around batteries.

3) Put the truck with the booster battery as near to the other truck as necessary for the jumper cables to reach both batteries. Check and make sure that the trucks do not touch each other. Use particular care when connecting a booster battery to prevent sparks.

4) On both trucks:
   ① Put the parking brake switch in the LOCK position.
   ② Put the gear selector lever in the NEUTRAL position.
   ③ Turn the start switch to the OFF position.
   ④ Turn all accessories to the OFF position and leave them off until after the engine has been started and the jumper cables have been removed.

⚠ **To avoid short circuits, remove all jewelry and do not permit any metal tools to make contact between the positive battery terminal and other metal on the truck. When you connect jumper cable clamps to the positive terminals of the two batteries, make sure that neither clamp contacts any other metal. Injury can occur from electrical shock or explosion.**



5) Connect the jumper cables in the following sequence:
   ⓐ Connect a jumper cable from the positive (+; red) terminal on one battery to the positive (+; red) terminal on the other battery. Never connect positive (+; red) to negative (-; black), or negative to positive.
   ⓑ Connect one end of the second cable to the grounded negative (-; black) terminal of the jumper truck battery.
   ⓒ Connect the other end of the second cable to a stationary, solid metallic point on the engine of the stalled truck, not to the negative (-; black) terminal of its battery. Make this connection at a point at least 450 mm (18 in) away from the battery, if possible. Do not connect it to pulleys, fans or other parts that move. Do not touch hot manifolds that can cause sever burns.
6) Start the engine on the jumper truck and run the engine at a moderate speed for a minimum of five minutes.
7) Start the engine on the stalled truck. Follow the starting instructions in section 5, Starting and Operating Procedures in this manual. Be sure that the engine is at idle speed before disconnecting the jumper cables.
8) Remove the jumper cables by reversing the installation sequence exactly. Start by removing the last jumper cable from the stalled vehicle first. Remove the cable end from the engine block first, then the other end of the negative (-; black) cable.
9) Remove both ends of the positive (+; red) cable.

7. PLANNED MAINTENANCE AND LUBRICATION

1. INTRODUCTION

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

⚠ Powered industrial trucks may becomes hazardous if maintenance is neglected.

As outlined in section 4, **operator maintenance and care**, the operator should make a safety inspection of the lift truck before operating it. The purpose of this daily examination is to check for any obvious damage and maintenance problems, and to have minor adjustments and repairs made to correct any unsafe condition.

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

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

Specifications for selected components, fuel, lubricants, critical bolt torques, refill capacities, and settings for the truck are found in section 8.

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

2. SAFE MAINTENANCE PRACTICES

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

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

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

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

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

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

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

7) Avoid fire hazards and have fire protection equipment present in the work area. Do not use an open flame to check for level or leakage fuel, electrolyte, or coolant. Do not use open pans of fuel or flammable cleaning fluids for cleaning parts.

8) Before starting work on truck.

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

(4) Disconnect the battery ground cable (-) before working on the electrical system.

※ **Refer to the jacking and blocking section in the service manual for proper procedures.**

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

10) Before starting to operate the truck.

(1) Be seated in a safe operating position and fasten your seat belt.

(2) Put the parking brake switch in the LOCK position.

(3) Put the gear selector lever in NEUTRAL.

(4) Start the engine.

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

11) Before leaving the truck.

(1) Stop the truck.

(2) Fully lower the load-engaging means: mast, carriage, forks or attachments.

(3) Put the gear selector lever in NEUTRAL.

(4) Put the parking brake switch in the LOCK position.

(5) Stop the engine.

(6) Turn the key switch to the OFF position.

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

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

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

14) Fuel systems must be checked for leaks and condition of parts. Extra special consideration must be given in the case of a leak in the fuel system. Action must be taken to prevent the use of the truck until the leak has been corrected.

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

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

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

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

18) 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.

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

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

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

22) 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.

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

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

3. INSTRUCTIONS BEFORE MAINTENANCE

1) INTERVAL OF MAINTENANCE

(1) You may inspect and service the truck by the period as described at based on service meter of LCD.

(2) Shorten the interval of inspect and service depending on site condition.(Such as dusty area, quarry, sea shore and etc.)

(3) Practice the entire related details at the same time when the service interval is doubled.
For example, in case of 250 hours, carry out all the maintenance each 250hours, each 100hours and daily sevice at the same time.

Service meter

50D97CD131K

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

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

· **SEVERE OPERATION**
Prolonged operating hours or constant usage.

· **EXTREME OPERATION**

- In sandy or dusty locations, such as cement plants, lumber mills, and coal dust or stone crushing sites.
- High-temperature locations, such as steel mills and foundries.
- Sudden temperature changes, such as constant trips from buildings into the open air, or in refrigeration plants.
- If the lift truck is used in severe or extreme operating conditions, you must shorten the maintenance intervals accordingly.

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

2) PRECAUTION

(1) Start maintenance after you have the full knowledge of truck.

(2) The monitor installed on this truck does not entirely guarantee the condition of the truck.
Daily inspection should be performed according to maintenance.

(3) Engine and hydraulic components have been preset in the factory.
Do not allow unauthorized personnel to reset them.

(4) Ask to your local dealer or Hyundai for maintenance advise it unknown.

(5) Drain the used oil and coolant in a container and handle according to the method of handling for industrial waste to meet with regulations of each province or country.

3) PROPER MAINTENANCE

(1) Replace and repair of parts
It is required to replace the wearable and consumable parts such as fork, chain, hose, tube and filter etc., regularly. Replaced damaged or worn parts at proper time to keep the performance of truck.

(2) Use Hyundai genuine parts.

(3) Use the recommended oil.

(4) Remove the dust or water around the inlet of oil tank before supplying oil.

(5) Drain oil when the temperature of oil is warm.

(6) Do not repair anything while operating the engine.

(7) Stop the engine when you fill the oil.

(8) Relieve hydraulic system of the pressure by opening of breather when repairing the hydraulic system.

(9) Confirm if the cluster is in the normal condition after complation of service.

(10) For more detail information of maintenance, please contact local Hyundai dealer.

※ **Be sure to start the maintenance after fully understanding the section 1, safety hints.**

4) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPE.

(1) Be particularly careful that joint of hose, pipe and functioning item are not damaged.
Avoid contamination.

(2) Assemble after cleaning the hose, pipe and joint of function item.

(3) Use Hyundai genuine parts.

(4) Do not assemble the hose in the condition of twisted or sharp radius.

(5) Keep the specified tighten torque.

5) PERIODICAL REPLACEMENT OF SAFETY PARTS

(1) These are the parts which the operator cannot judge the remained lifetime of them by visual inspection.

(2) Repair or replace if an abnormality of these parts is found even before the recommended replacement interval.

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

Periodical replacement of safety parts		Interval
1	Fuel hose	Every 2 to 4 years
2	Hydraulic pump hose	Every 2 years
3	Power steering hose	Every 2 years
4	Packing, seal, and O-ring of steering cylinder	Every 2 to 4 years
5	Lift chain	Every 2 to 4 years
6	Lift cylinder hose	Every 1 to 2 years
7	Tilt cylinder hose	Every 1 to 2 years
8	Side shift cylinder hose	Every 1 to 2 years
9	Master cylinder and wheel cylinder caps dust seals	Every 1 years
10	Brake hose or tube	Every 1 to 2 years
11	Brake reservoir tank tube	Every 2 to 4 years
12	Intake air line	Every 2 years
13	Coolant hose and clamps	Every 2 years

※ **Replace the O-ring and gasket at the same time when replacing the hose.**

※ **Replace clamp at the same time if the hose clamp is cracked when checking and replacing hose.**

6) EMISSION-RELATED COMPONENTS WARRANTY (USA AND CANADA ONLY)

Hyundai shall have obligation under the EPA (Environmental Protection Agency) regulation of warranty about Emission-related components. This warranty shall exist for 3,000 hours or five years, whichever occurs first.

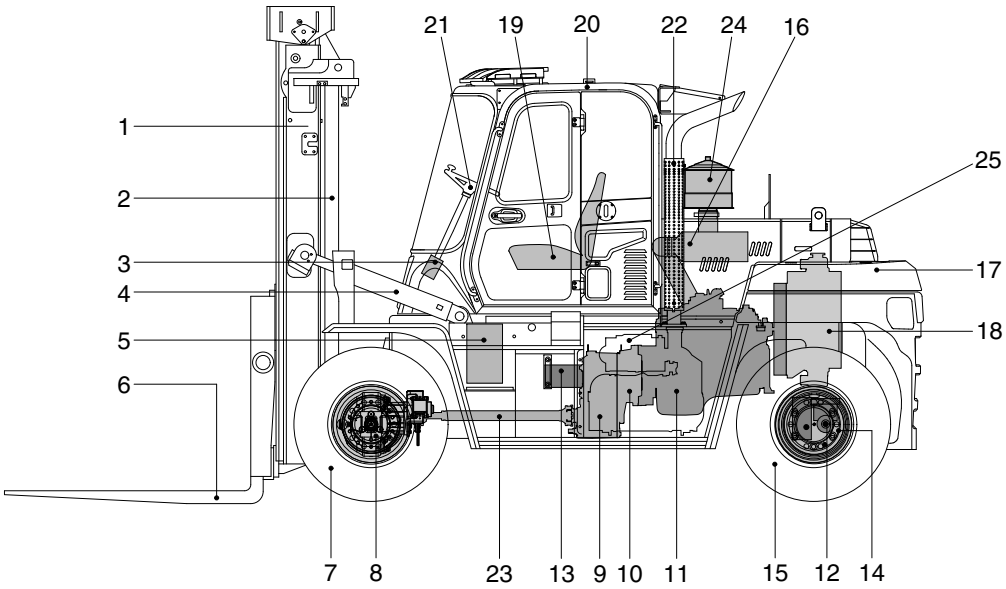
Naturally, this warranty does not cover to damage arising from accident, misuse or negligence, use of non-Hyundai parts, or from alterations not authorized by Hyundai.

※ **Emission-related components according to the EPA regulation.**

1. Air-induction system.
2. Fuel system.
3. Ignition system.
4. Exhaust gas recirculation systems.
5. After treatment devices.
6. Crankcase ventilation valves.
7. Sensors.
8. Electronic control units.

4. PLANNED MAINTENANCE INTERVALS

1) MAJOR COMPONENTS LOCATION



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1	Mast	10	Torque converter	19	Seat
2	Lift cylinder	11	Engine	20	Cabin
3	Steering unit	12	Steering cylinder	21	Steering wheel
4	Tilt cylinder	13	Hydraulic pump	22	Silencer
5	Main control valve	14	Steering axle	23	Drive shaft
6	Fork	15	Rear wheel	24	Precleaner
7	Front wheel	16	Air cleaner	25	Aftertreatment device
8	Drive axle	17	Counterweight		
9	Transmission	18	Radiator		

2) MAINTENANCE CHECK LIST

(1) EVERY 10 HOURS SERVICE

Check items	Service	Remarks
Visual inspection		
· Truck for obvious damage and leaks.	Check, Repair or Replace	7-15
· Warning plates and decals.	Check, Replace	7-15
· Condition of tires and wheels. Air pressure.	Check, Add or Replace	7-17
· Lift chain tension.	Check, Adjust	7-57
· Carriage, attachment and forks.	Check, Repair or Replace	7-45
· Fuel level	Check, Refill	3-6, 5-13
· Engine oil level	Check, Add	3-8, 7-20
· Coolant level(Radiator & reservoir tank).	Check, Add	7-22
· Prefilter.	Check, Drain	3-9, 7-28
· Hydraulic oil level.	Check, Add	7-34
· Fan belt tension and damage.	Check, Adjust, Replace	5-5
· DEF level	Check, Add	7-31
Function tests		
· Horn and lamp	Check, Repair or Replace	4-2, 7-53
· Gauges and instrument panel.	Check, Repair or Replace	4-2, 7-53
· Warning light.	Check, Repair or Replace	4-2, 7-53
· Service brake and inching operation.	Check, Repair or Replace	4-2, 7-53
· Parking brake operation.	Check, Repair or Replace	4-2, 7-54
· Accelerator and engine speed operation.	Check, Replace	10-4
· Directional and speed control operation.	Check, Repair or Replace	7-55
· Steering wheel operation.	Check, Repair or Replace	7-55
· Noise and vibration.	Check, Repair or Replace	5-13

(2) EVERY 50 HOURS SERVICE

Check items	Service	Remarks
Transmission oil level.	Check, Add	7-40
Hydraulic tank air breather element	Check, Clean	7-35
Lubrication		
· Steering axle linkage pin	Check, Clean, Lubricate	7-45
· Hydraulic pump drive spline.	Check, Clean, Lubricate	7-45
· Fan pulley drive	Check, Lubricate	-
Tightening torques		
· Pump mounting bolt	Check, Tight	8-6
· Drive axle mounting bolt	Check, Tight	8-6
· Tilt cylinder mounting and yoke bolt	Check, Tight	8-6
· Mast mounting bolt	Check, Tight	8-6
· Drive & steering axle wheel mounting bolt & nut	Check, Tight	8-6
· Counterweight mounting bolt	Check, Tight	8-6
· Cabin mounting bolt	Check, Tight	8-6
· Main pump & MCV mounting bolt	Check, Tight	8-6
· Engine & radiator mounting bolt	Check, Tight	8-6
· Transmission mounting bolt	Check, Tight	8-6
· Steering axle mounting bolt	Check, Tight	8-6

(3) INITIAL 50 HOURS SERVICE

Check items	Service	Remarks
Engine oil/filter	Change/Replace	7-20
Pilot line filter element	Replace	7-36

(4) INITIAL 100 HOURS SERVICE

Check items	Service	Remarks
Axle gear oil (differential + hub x 2)	Change	7-41
Transmission oil and filter	Replace	7-40
Brake cooling oil	Change	7-45

(5) EVERY 250 HOURS SERVICE

Check items	Service	Remarks
Axle gear oil (differential + hub x 2)	Check, Add	7-42
Brake line filter (strainer)	Check, Clean	7-36
Brake cooling oil	Check, Add	7-45
Hydraulic tank air breather element	Check, Replace	7-36
Air cleaner element	Check, clean	7-27
Air conditioner outer filter	Check, clean	7-48
Lubrication		
· Lift chain	Check, Lubricate	7-56
· Mast roller and pin	Check, Lubricate	7-56
· Lift cylinder rod end	Check, Lubricate	7-56
· Lift cylinder tube end	Check, Lubricate	7-56
· Tilt cylinder rod end	Check, Lubricate	7-56
· Tilt cylinder tube end	Check, Lubricate	7-56
· Steering cylinder rod end	Check, Lubricate	7-56
· Steering cylinder tube end	Check, Lubricate	7-56
· Attachment option cylinder rod end	Check, Lubricate	7-56
· Attachment option cylinder tube end	Check, Lubricate	7-56
· Steering axle wheel bearing	Check, Lubricate	7-56
· Pedal pivot	Check, Lubricate	7-56

(6) EVERY 500 HOURS SERVICE

Check items	Service	Remarks
Mast mounting bolt	Check, Tight	8-6
Drive axle mounting bolt and nut	Check, Tight	8-6
Battery	Check, Clean	7-49
Engine oil filter	Replace	7-20
Engine oil	Change	7-20
Fuel filter	Replace	7-29
Prefilter	Replace	7-28

(7) EVERY 1000 HOURS SERVICE

Check items	Service	Remarks
Air cleaner element (*1)	Replace	7-27
Hydraulic oil return filter	Replace	7-35
Transmission oil & filter	Change/Replace	7-40
Axle oil (differential + hub x 2)	Change	7-43
Fan belt tensioner	Check, Replace	7-26
Brake cooling oil	Change	7-45
Brake cooling oil strainer	Replace	7-45
Pilot line filter element	Replace	7-36
Air conditioner outer filter	Replace	7-48

*1 When the air cleaner warning lamp is ON, replace the air cleaner element.

(8) EVERY 2000 HOURS SERVICE

Check items	Service	Remarks
Hydraulic tank suction strainer	Replace	7-35
Radiator coolant	Replace	7-22
Hydraulic oil (*2)	Replace	7-35
Crankcase breather filter	Replace	7-32
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

*2 Conventional hydraulic oil

(9) EVERY 4000 HOURS SERVICE

Check items	Service	Remarks
Aftertreatment DEF dosing unit filter	Replace	7-30

(10) EVERY 5000 HOURS SERVICE

Check items	Service	Remarks
Hydraulic oil (*3)	Replace	7-35

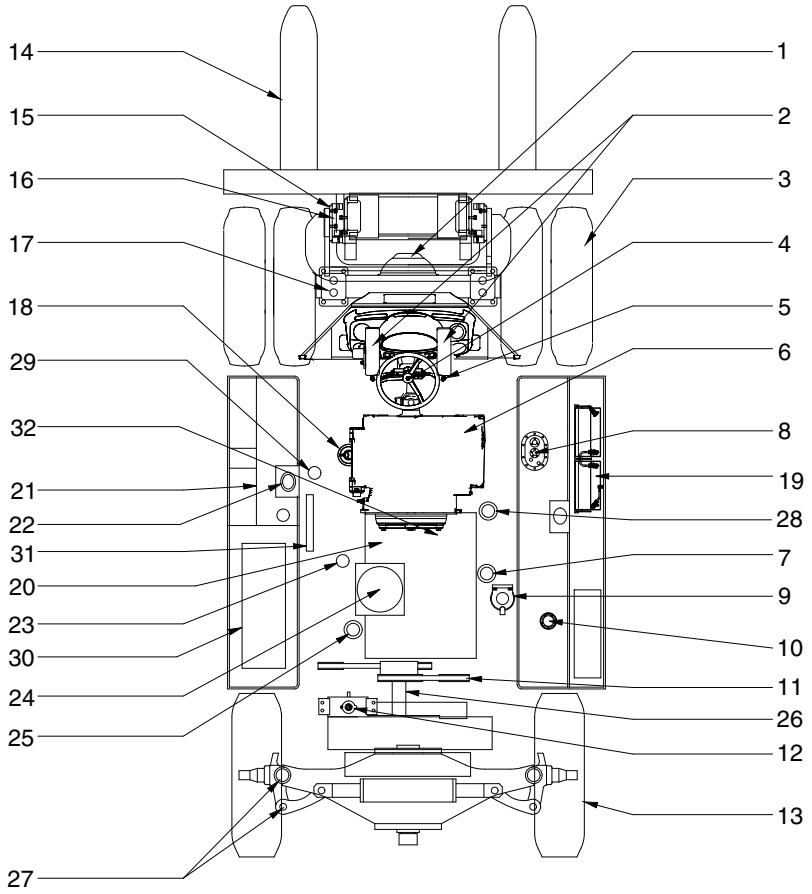
*3 Hyundai genuine long life hydraulic oil

(11)WHEN REQUIRED

Check items	Service	Remarks
Fuel system		
· Fuel tank	Drain or Clean	7-28
· Prefilter (water, sediment)	Check, Drain	7-28
· Fuel filter	Replace	7-29
Engine lubrication system		
· Engine oil	Change	7-20
· Engine oil filter cartrige	Replace	7-20
Engine cooling system		
· Coolant	Add, Change	7-22
· Radiator	Clean	7-25
Engine air intake and exhaust system		
· Air cleaner element	Replace	7-27
· DEF level	Check, Refill	7-31
Hydraulic tank		
· Hydraulic oil	Add or Change	7-35
· Hydraulic oil suction strainer	Check, Clean	7-35
· Return oil filter element	Replace	7-35
· Air breather element	Replace	7-36
Hand pump (cabin tilt)		
· Hydraulic oil	Add or Change	7-18
Tire air pressure	Check, Add	5-3

5. MAINTENANCE CHART

1) MAINTENANCE LOCATIONS



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CAUTION

※ Service intervals are based on the hourmeter reading.

※ Stop the engine when servicing.

※ Do not open the cap or drain plug to avoid injury by unexpected spouting of high temperature fluid or gas.

※ Open the cap slowly to relieve pressure.

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

※ For other details, refer to the service manual.

2) MAINTENANCE CHART

Service interval	Item No.	Description	Service Action	Oil symbol	Capacity (ℓ)		Service point No.
					110/130D-9	160D-9	
10 Hours or daily	2	Pedal linkage	Check, Adjust	-	-		2
	3	Drive rim & Tire air pressure	Check, Add	-	-		2
	4	Horn operation	Check, Replace	-	-		1
	5	Lamp operation	Check, Replace	-	-		1
	8	Fuel level	Check, Refill	DF	195	260	1
	9	Prefilter (water, sediment)	Check, Drain	-	-		1
	11	Fan belt tension and damage	Check, Adjust, Replace	-	-		1
	12	Radiator coolant	Check, Add	C	30		1
	13	Steer rim & Tire air pressure	Check, Add	-	-		2
	14	Carriage, attachment and forks	Check, Replace	-	-		1
	15	Lift chain tension	Check, Adjust, Replace	EO	-		2
	16	Tilt pin & Mast roller	Check, Replace	-	-		2
	20	Engine oil level	Check, Add	EO	14.2		1
	21	Hydraulic oil level	Check, Add	HO	*3159 (42.3)	179 (47.3)	1
	30	DEF level	Check, Add	DEF	37.8 (10.0)		1
Initial 50 Hours	20	Engine oil	Change	EO	14.2		1
	25	Engine oil filter	Replace	-	-		1
	29	Pilot line filter element	Replace	-	-		1
50 Hours or weekly	6	Transmission oil level	Check, Add	EO	16		1
	26	Fan pulley drive	Check, Lubricate	G	-		1
	27	Steering axle linkage	Check, Lubricate	G	-		2
	32	Hydraulic pump device	Check, Lubricate	G	-		1
Initial 100 Hours	1	Axle gear oil	Change	GO	19		3
	6	Transmission oil	Change	EO	16		1
	10	Brake cooling oil	Change	BO	22		1
	18	Transmission oil filter	Replace	-	-		1
250 Hours or monthly	1	Axle gear oil	Check, Add	GO	19		3
	10	Brake cooling oil	Check, Add	BO	22		1
	15	Lift chain	Check, Lubricate	EO	-		2
	16	Tilt pin & Mast roller	Check, Lubricate	G	-		2
	23	Hydraulic tank air breather element	Check, Replace	-	-		1
	24	Air cleaner element	Check, Clean	-	-		1
	28	Brake line filter (strainer)	Check, Clean	-	-		1
	31	Air conditioner outer filter	Check, Clean	-	-		1
500 Hours or 3 monthly	7	Fuel filter	Replace	-	-		1
	9	Prefilter	Replace	-	-		1
	17	Mast mounting bolt	Check, Tight	-	-		4
	17	Drive axle mounting bolt and nut	Check, Tight	-	-		8
	19	Battery	Check, Clean	-	-		2
	25	Engine oil and filter	Change/Replace	-	-		1
1000 Hours or 6 monthly	1	Axle gear oil	Change	GO	19		3
	6	Transmission oil	Change	EO	16		1
	10	Brake cooling oil and strainer	Change/Replace	BO	22		1
	11	Fan belt tensioner	Check, replace	-	-		1
	18	Transmission oil filter	Replace	-	-		1
	22	Hydraulic oil return filter	Replace	-	-		1
	24	Air cleaner element	Replace	-	-		1
	29	Pilot line filter element	Replace	-	-		1
	31	Air conditioner outer filter	Replace	-	-		1
2000 Hours	12	Radiator coolant	Replace	C	30		1
	20	Crankcase breather filter	Replace	-	-		1
	21	Hydraulic tank suction strainer	Check, Clean	-	-		1
	21	Hydraulic oil*1	Change	HO	*3159 (42.3)	179 (47.3)	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-	1
4000 Hours	30	Aftertreatment DEF dosing unit filter	Replace	-	-		1
5000 Hours	21	Hydraulic oil*2	Change	HO	*3159 (42.3)	179 (47.3)	1

*1 Conventional hydraulic oil *2 Hyundai genuine long life hydraulic oil *3 See page 5-6 for details.

※ Oil symbol

Refer to the recommended lubricants for specification.

DF : Diesel fuel HO : Hydraulic oil EO : Engine oil GO : Gear oil

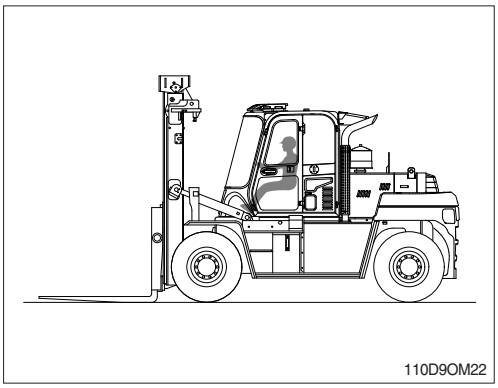
BO : Brake cooling oil C : Coolant G : Grease

6. HOW TO PERFORM PLANNED MAINTENANCE

1) VISUAL INSPECTION

First, perform a visual inspection of the lift truck and its components. Walk around the truck and take note of any obvious damage or maintenance problems.

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



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

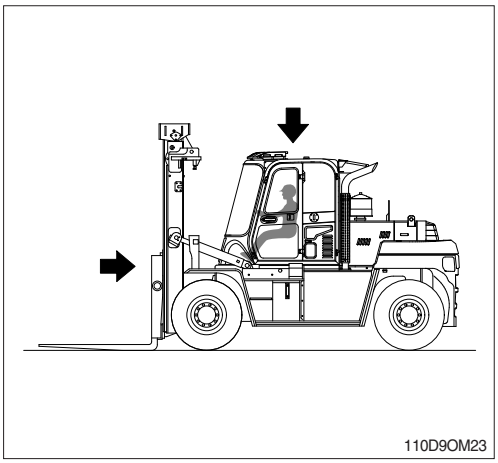
Inspect the truck, before and after starting the engine, for any sign of external leakage of fuel, engine coolant, transmission fluid, etc..

Check for hydraulic oil leaks and loose fittings.

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

2) CABIN

Be sure that the driver's cabin and any safety devices are in place, undamaged, and attached securely. Check the cabin for damage. Be sure that it is properly positioned and all mounting fasteners are in place and tight.



3) LOAD HANDLING COMPONENTS

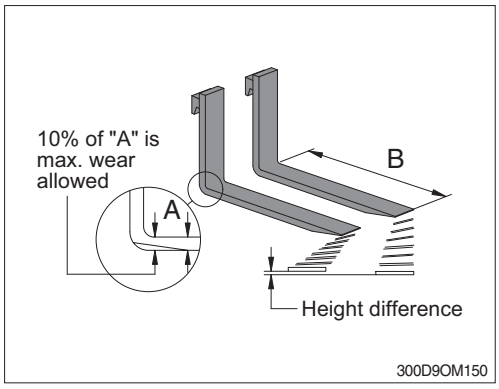
Inspect the mast assembly, load backrest, rails, carriage rollers, lift chains, and lift and tilt cylinders. Look for obvious wear and maintenance problems and damaged or missing parts. Check for any loose parts or fittings. Check for leaks, damaged or loose rollers, and rail wear (metal flaking). Carefully check the lift chains for wear, rust, corrosion, cracked or broken links, stretching etc.. Check that the lift and carriage chains are correctly adjusted to have equal tension. Check that the lift chain anchor fasteners and locking means are in place and tight. Inspect all lift line hydraulic connections for leaks.

△ **Mast and lift chains require special attention and maintenance to remain in safe operating condition. Refer to lift chain maintenance in this section for additional information.**

4) FORKS

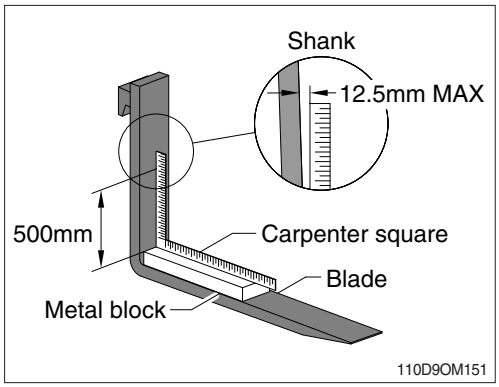
Inspect the load forks for cracks, breaks, bending, and wear. The fork top surfaces should be level and even with each other. The height difference between both fork tips refer to below table.

Model	Fork length (B) (mm)	Height difference (mm)
110/130/160D-9	below 1500	3
	above 1500	6



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

Inspect the forks for twists and bends. Put a 50 mm (2 in) thick metal block, at least 100 mm (4 in) wide by 600 mm (24in) long with parallel sides, on the blade of the fork with the 100 mm (4 in) surface against the blade. Put a 600 mm (24 in) carpenter's square on the top of the block and against the shank. Check the fork 500 mm (20 in) above the metal block to make sure it is not bent more than 12.5 mm (0.5 in) maximum.

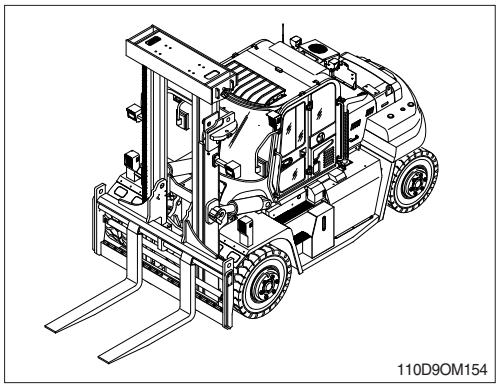


※ **If the fork blades are obviously bent or damaged, have them inspected by a trained maintenance person before operating the truck.**

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

5) SIDE SHIFT

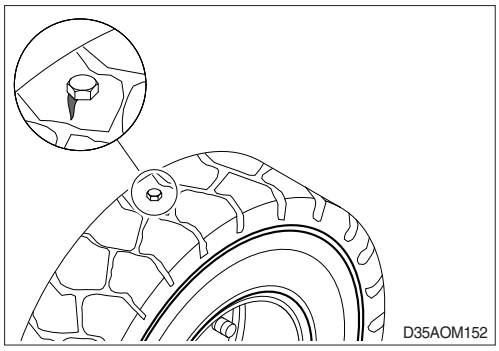
When operating the lever for the side shift and the hanger bar which the forks and the backrest are mounted on it, operator can accurately insert the forks under pallets or stack loads correctly without moving the fork lift.



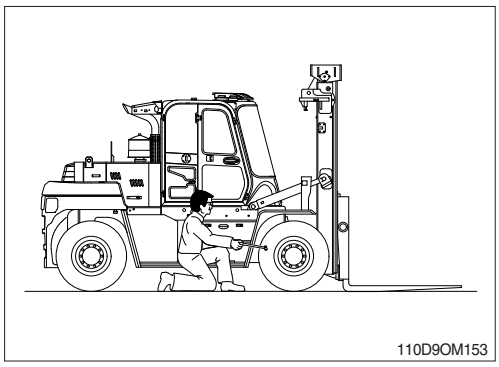
6) WHEEL AND TIRES

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

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



⚠ **Check tire pressure from a position facing the tread of the tire, not form the side. Use a long handled gauge to keep your body away from the side. If tires are low, do not operate and do not add air. Check with a mechanic. The tire may require removal and repair.**
Incorrect (low) tire pressure can reduce the stability of your lift truck. Do not operate truck with low tire pressure.



- **Proper cold inflation : Refer to attached decal.**

7) TILTING CABIN

⚠ Keep clearance of people except the operator before tilting the cabin.

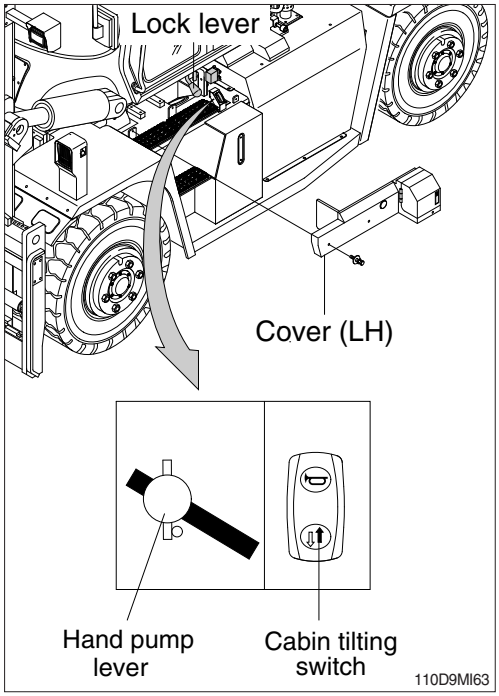
⚠ Before tilting the cabin, make sure that the mast is vertical or tilted forward. Otherwise, the operation could be blocked by mast tilt cylinders.

(1) Locate the truck on the plain and stable floor.

※ **Apply parking brake before servicing.**

(2) Turn the start switch to OFF position.
Remove the frame cover (LH) by removing the mounting bolts. The cabin tilt switch is located between cabin and side frame.

(3) By tilting the cabin, service of hydraulic and electric system such as hydraulic components, hydraulic pipings, electric components, and electric wirings can be easily performed. It is recommended that the service requiring tilting cabin must be carefully performed with a skilled service man.



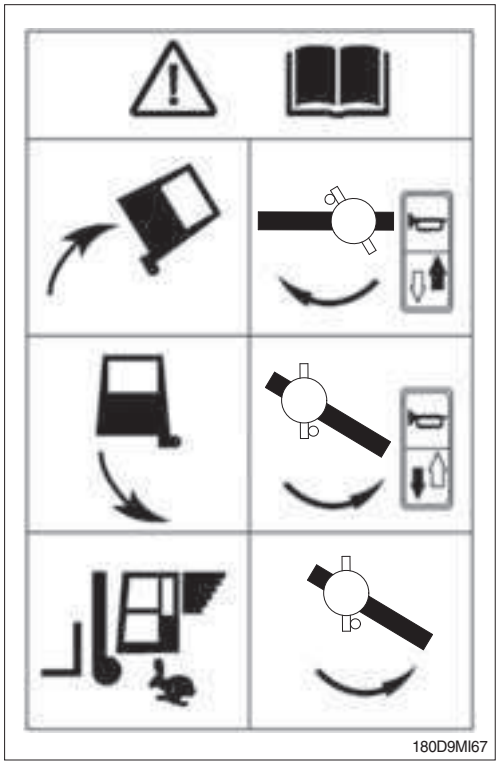
(4) Tilting and returning cabin

※ **Refer to page 3-32 for the cabin tilt switch and hand pump lever.**

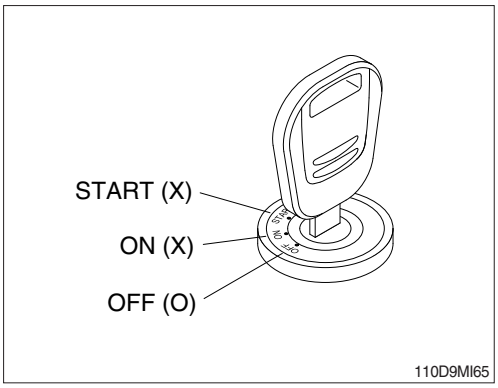
① **Tilting cabin**
After keeping clearance of the people except the operator along with sounding horn, turn the hand pump lever clockwise and then, continuously press the cabin tilt switch to tilt the cabin to right side.

② **Returning cabin**
After keeping clearance of the people except the operator along with sounding horn, turn the hand pump lever counterclockwise and then, continuously press the cabin tilt switch to return the cabin to original location.

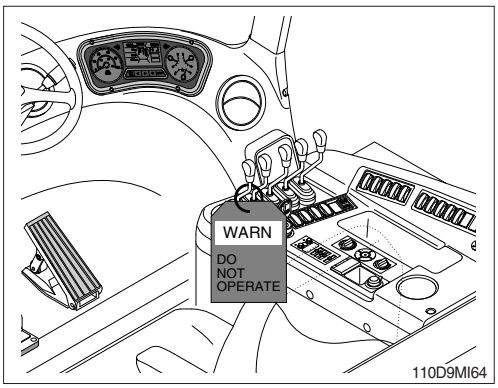
※ **Take care that it must perform by a trained people in order to prevent from abnormal operation.**



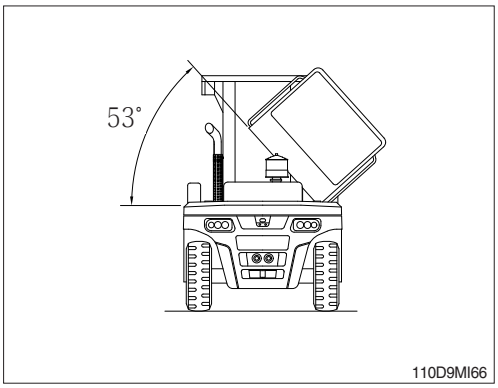
⚠ Do not operate cabin tilting function while the power is ON or engine is running.



⚠ Do not operate the tilt control switch or any control parts while servicing under the tilted cabin. It can cause severe injury or death.



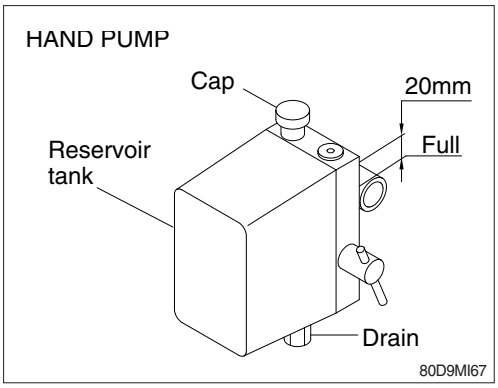
※ The angle of fully tilted cabin is 53°.



(5) Fill and check hydraulic oil for hand pump.

Open upper cap and fill 0.8 ℓ by using funnel. After filling, operate tilt cylinder 2~3 times and close the cabin completely to check the oil level in tank. If necessary, fill more oil to keep the level.

- Tank capacity : 0.7 ℓ
- System total capacity : 1.2 ℓ



1) CHECK ENGINE OIL LEVEL

Check the oil level with the truck on a flat ground before starting engine.

(1) Pull out the dipstick and wipe with a clean cloth.

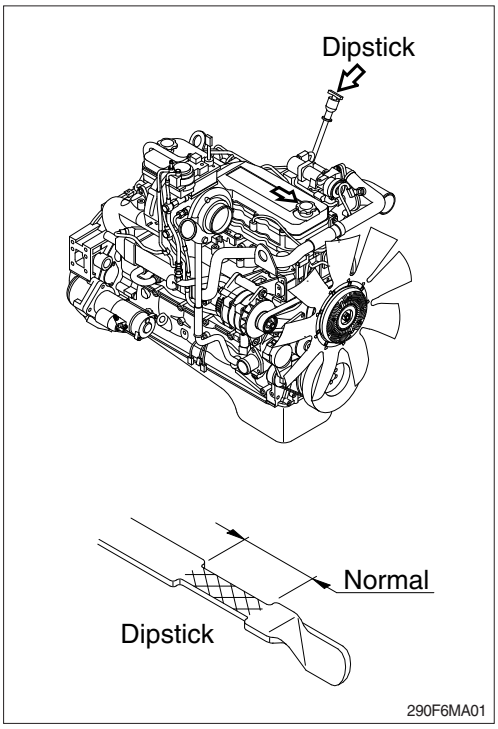
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

(3) If oil level is LOW, add oil and then check again.

※ **If the oil is contaminated or diluted, change the oil regardless of the regular change interval.**

※ **Check oil level after engine has been stopped for 15 minutes.**

⚠ **Do not operate unless the oil level is in the normal range.**

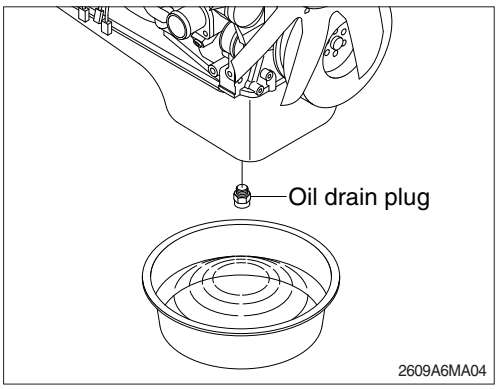


2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(1) Warm up the engine until the water temperature reaches 60 ˚C (140 ˚F).

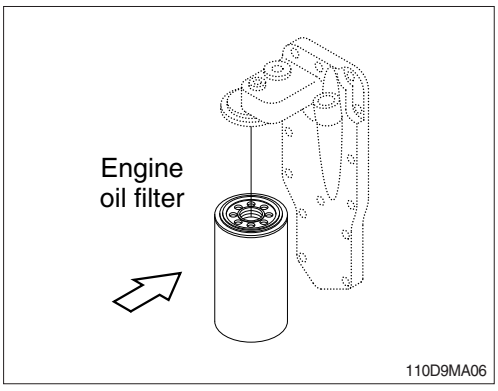
(2) Remove the oil drain plug. Drain the oil immediately to be sure all the oil and suspended contaminants are removed from the engine.

※ **A drain pan with a capacity of 30 liters (7.9 U.S. gallons) will be adequate.**



(3) Clean around the filter head, remove the filter by the filter wrench and clean the gasket surface.

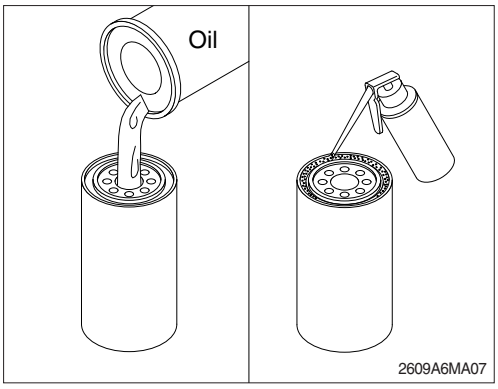
※ **The O-ring can stick on the filter head. Be sure it is removed before installing the new filter.**



(4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filter.

※ **Fill the filter with clean lubricating oil.**

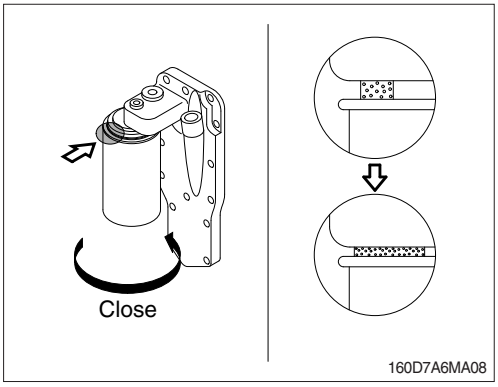
⚠ **The lack of lubrication during the delay until the filter is pumped full of the start-up can damage the engine.**



(5) Install the filter to the filter head.

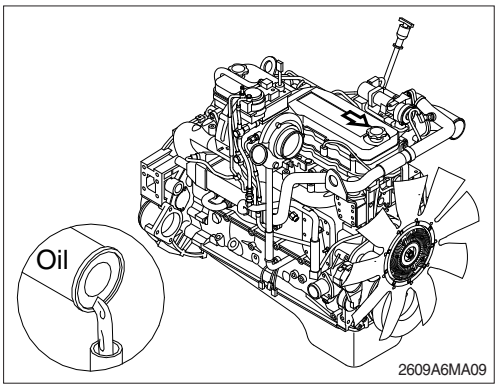
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**

· Install the filter as specified by the filter manufacturer.

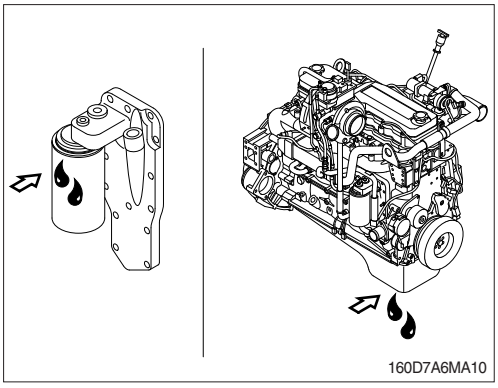


(6) Fill the engine with clean oil to the proper level.

· Quantity : 14.2 ℓ (3.7 U.S.gallons)



(7) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.
Shut the engine off and check the oil level with the dipstick. Allow 15 minutes for oil to drain down before checking.



3) CHECK COOLANT LEVEL

(1) Check the coolant level at reservoir tank when the engine is cooled.

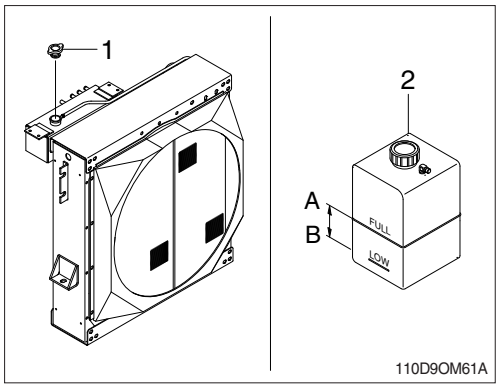
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

(3) The coolant level should indicate between FULL and LOW.

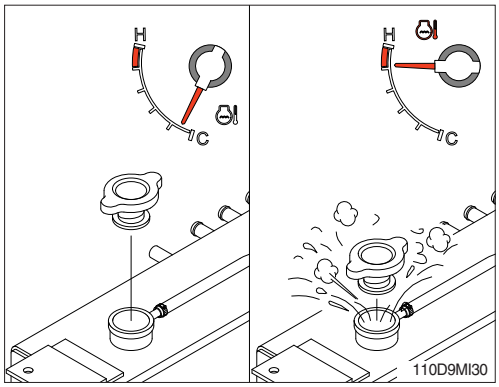
(4) Replace gasket of surge tank cap when it is damaged.

⚠ **Do not remove the surge tank cap from a hot engine. Wait until the coolant temperature is below 50 ˚C (120 ˚F) before removing the surge tank cap. Heated coolant spray or steam can cause personal injury.**

※ **Do not add cold coolant to a hot engine ; engine castings can be damaged. Allow the engine to cool to below 50 ˚C (120 ˚F) before adding coolant.**



1	Surge tank cap	A	FULL
2	Reservoir tank	B	LOW

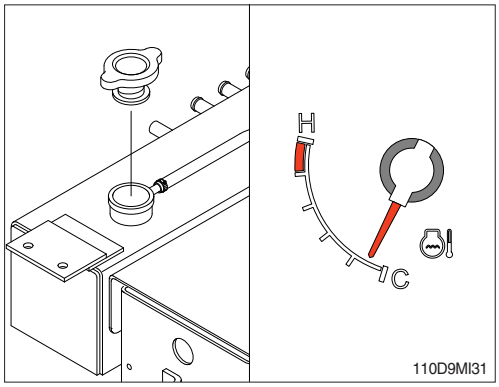


4) FLUSHING AND REFILLING OF RADIATOR

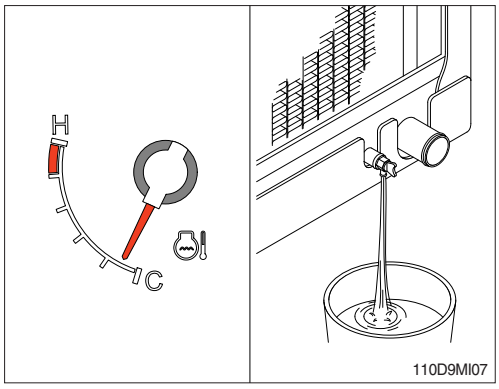
(1) Change coolant

⚠ **Avoid prolonged and repeated skin contact with used antifreeze. Such prolonged repeated contact can cause skin disorders or other bodily injury.**
Avoid excessive contact-wash thoroughly after contact.
Keep out of reach of children.

※ **Protect the environment : Handling and disposal of used antifreeze can be subject to federal, state, and local law regulation.**
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.
If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.



⚠ Wait until the temperature is below 50 ˚C (122 ˚F) before removing the coolant system pressure cap.
Failure to do so can cause personal injury from heated coolant spray.
Drain the cooling system by opening the drain valve on the radiator and opening the drain valve on the bottom of the engine oil cooler housing.
A drain pan with a capacity of 45 liters (11.9 U.S. gallons) will be adequate.

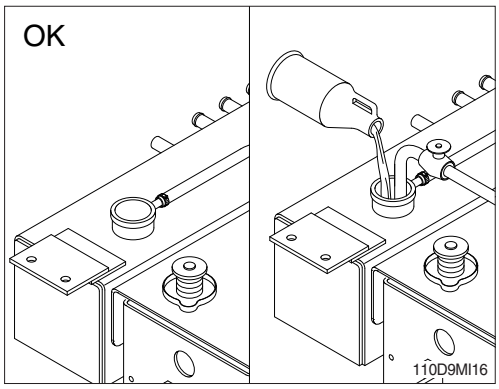


(2) Flushing of cooling system

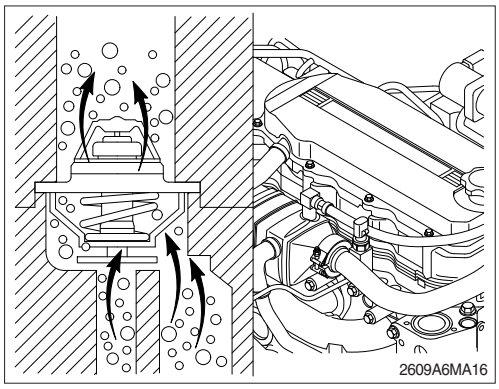
① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).

※ Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.

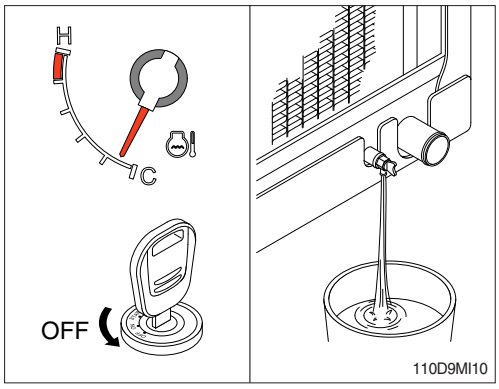
※ Do not install the surge tank cap. The engine is to be operated without the cap for this process.



※ During filling, air must be vented from the engine coolant passages.
The system must be filled slowly to prevent air locks or serious engine damage can result. Wait 2 to 3 minutes to allow air to be vented, then add mixture to bring the level to the top.



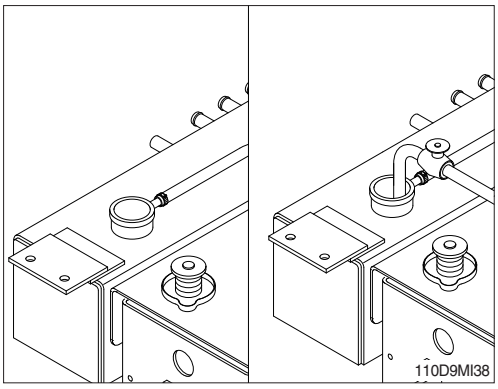
② Operate the engine for 5 minutes with the coolant temperature above 80 ˚C (176 ˚F).
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

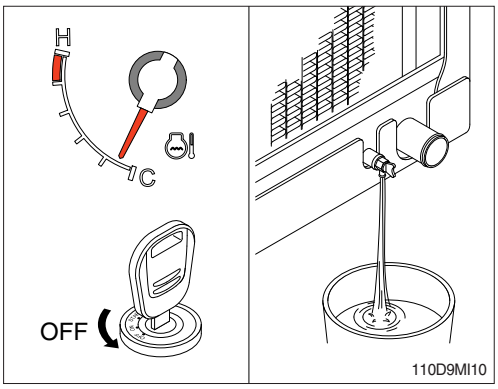
※ **Be sure to vent the engine and aftercooler for complete filling.**

※ **Do not install the surge tank cap or the new coolant filter.**



④ Operate the engine for 5 minutes with the coolant temperature above 80 ˚C (176 ˚F).
Shut the engine off, and drain the cooling system.

※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**

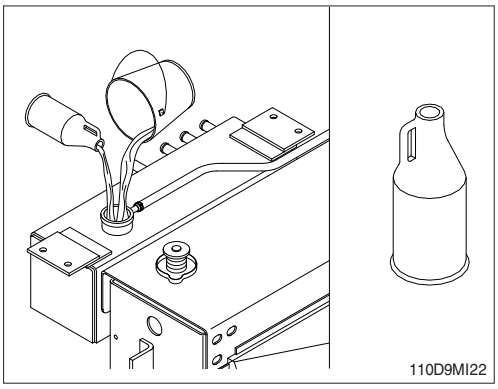


(3) Cooling system filling

① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 7-62.
Coolant capacity (engine only) : 10 ℓ (2.6 U.S. gallons)

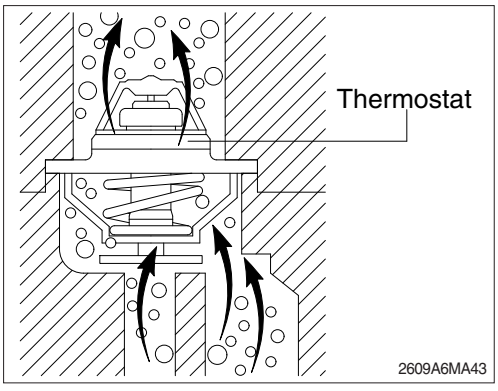
※ **Use the correct amount of DCA4 corrosion inhibitor to protect the cooling system.**

※ **Do not use hard water such as river water or well water.**

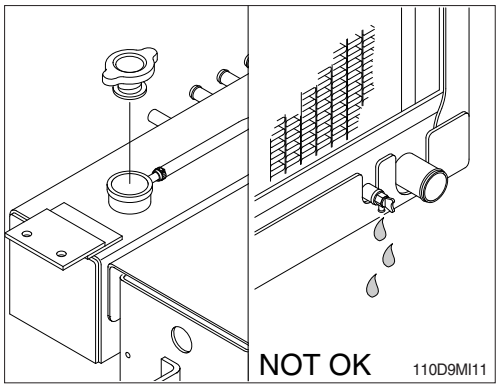


② The system has a maximum fill rate of 19 liters (5.0 U.S. gallons) per minute.
Do not exceed this fill rate.

※ **The system must be filled slowly to prevent air locks.**
During filling, air must be vented from the engine coolant passage.



③ Install the surge tank cap. Operate the engine until it reaches a temperature 80 ˚C (176 ˚F), and check for coolant leaks.
Check the coolant level again to make sure the system is full of coolant.

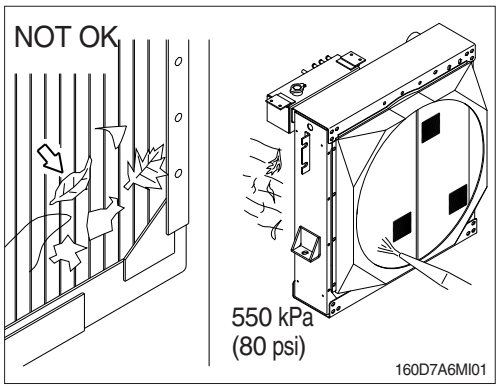


5) CLEAN RADIATOR AND OIL COOLER

Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

(1) Visually inspect the radiator for clogged radiator fins.

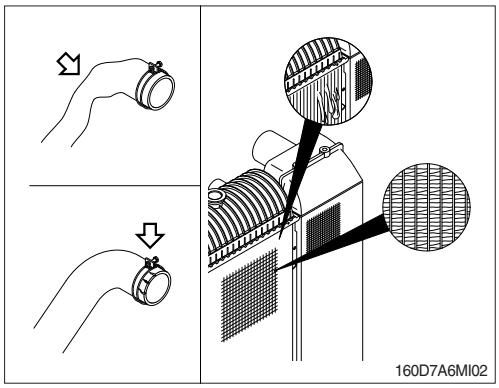
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



(3) Visually inspect the radiator for bent or broken fins.

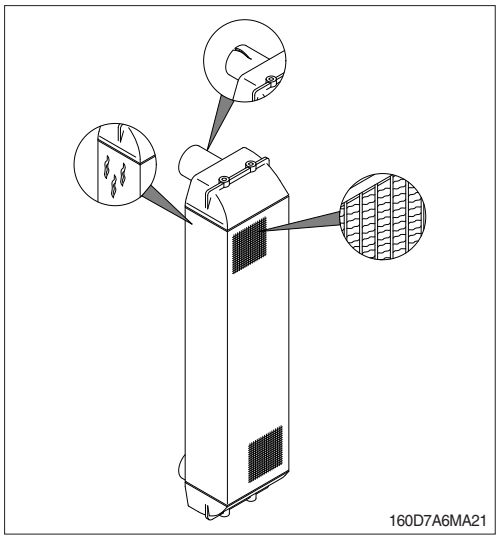
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

(4) Visually inspect the radiator for core leaks.



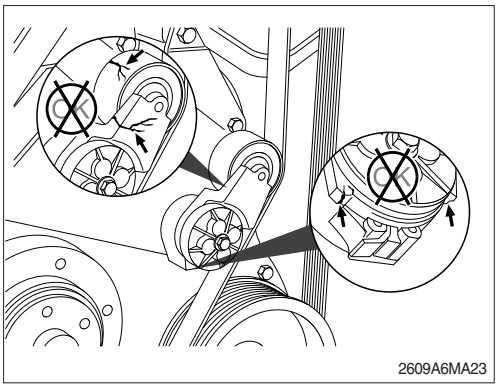
6) CHECK CHARGE AIR COOLER

Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact Hyundai distributor.

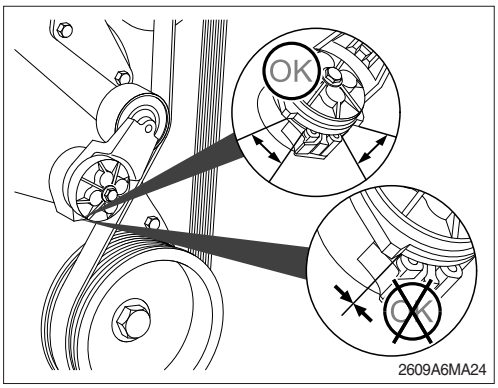


7) FAN BELT TENSIONER

(1) With the engine stopped, check the tensioner arm, pulley, and stops for cracks. If any cracks are found, the tensioner must be replaced.

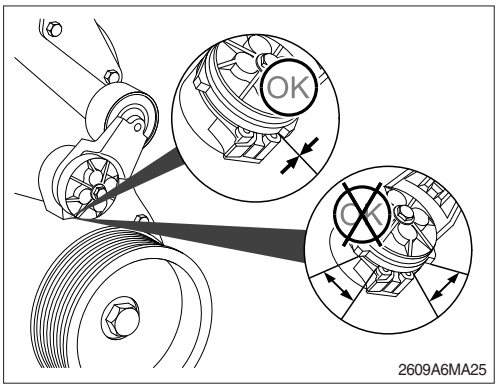


(2) With the belt installed, verify that neither tensioner arm stop is in contact with the spring case stop.
After replacing the belt, if the tensioner arm stops are still in contact with the spring case stop, replace the tensioner.

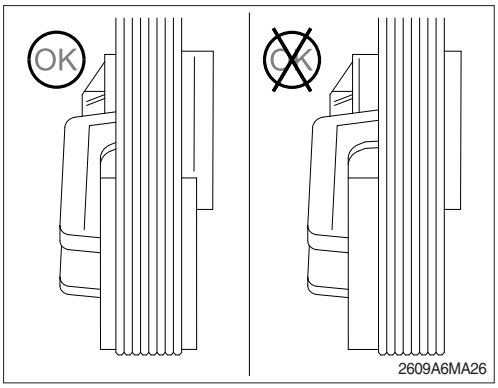


(3) With the belt removed, verify that the tensioner arm stop is in contact with the spring case stop.
If these two are not touching, the tensioner must be replaced.

※ **After replacing the belt, if the tensioner arm stop is still in contact with the spring case stop, the tensioner must be replace.**



(4) Check the location of the drive belt on the belt tensioner pulley. The belt should be centered on, or close to the middle of, the pulley. Misaligned belts, either too far forward or backward, can cause belt wear, belt roll-offs, or increase uneven tensioner bushing wear.



8) CLEANING OF AIR CLEANER

(1) Primary element

① Open the cover and remove the element.

② Wipe all contaminant and debris from inside the housing body.

③ Do not clean the filter element by striking or hitting the filter against any object to shake the debris from the filter element.

④ Clean the filter element with compressed air.

a. Remove dust from filter element by directing the compressed air into the opening of the air filter element.

b. Use 3 kg/cm^2 (40 psi) maximum air pressure and hold the compressed air nozzle at least 2.5 cm (1") away from the pleats while cleaning. Make sure to keep the clean side of air filter free of debris.

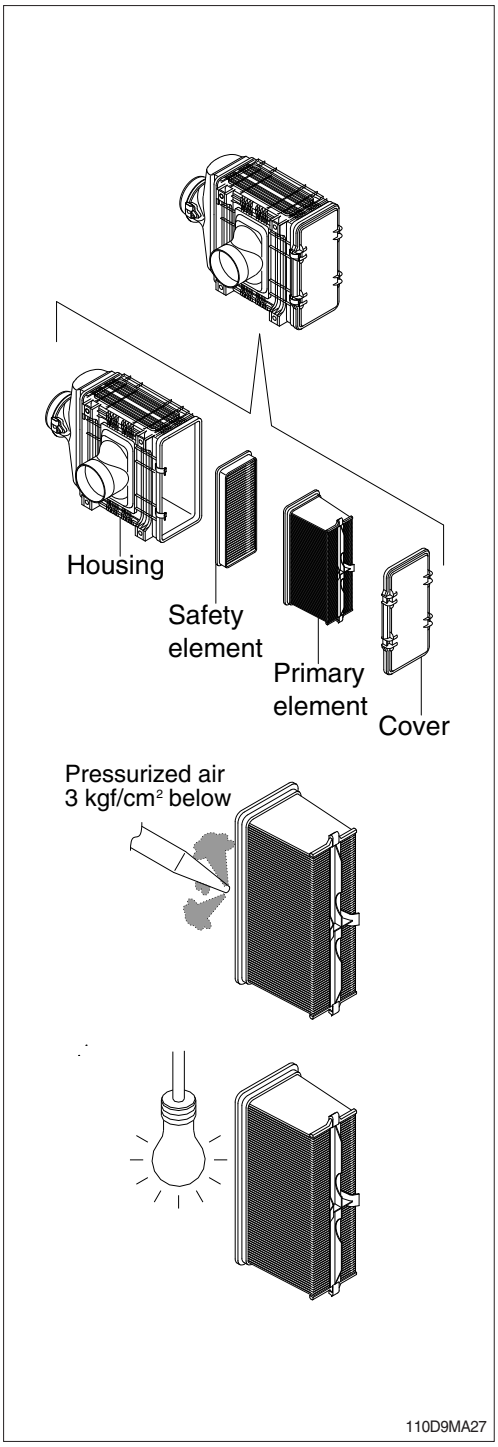
⑤ Visually inspect for damage to the filter elements and components. Use a light source to help identify any defects in the media. If any defects are observed discard the filter element and replace with a new primary filter element.

a. Before any type of cleaning, a visual inspection of the filter is needed. If there is any damage to the filter body, gaskets or endplates, do not clean or reuse; the filter should be discarded. Always clean filters in a clean environment, observe strict inspection procedures and repackage filters immediately after the cleaning process with appropriate materials.

b. Use observe proper safety precautions and dispose of waste materials in an environmentally compliant manner.

⑥ Re-install filter element into the air housing.

⑦ Replace the primary element at the fourth cleaning.



(2) Safety element

The safety filter element should never be cleaned since the safety filter is the last barrier to contaminant before it reaches engine.

The useful life of the safety filter is equivalent to that of the primary air filter only if the primary filter element is being regularly cleaned. If the primary filter element is not cleaned, the safety filter should be changed at every third primary air filter change or after one year of continuous service, whichever occurs first.

9) FUEL TANK

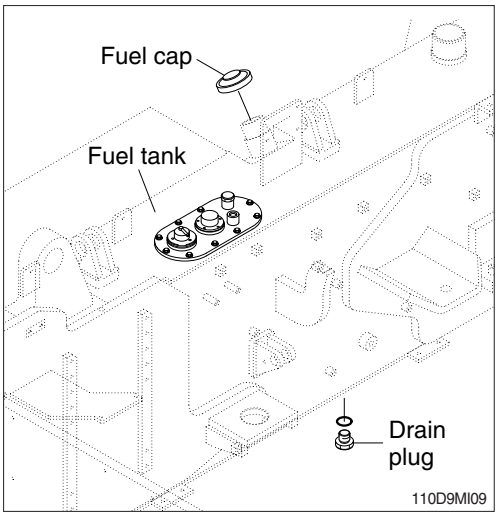
(1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the truck.

(2) Drain the water and sediment in the fuel tank by opening the drain plug.

※ **Be sure to LOCK the cap of fuel tank.**

※ **Remove the strainer of the fuel tank and clean it if contaminated.**

⚠ **Stop the engine when refueling.**
All lights and flames shall be kept at a safe distance while refueling.



10) PREFILTER

※ **Inspect or drain the collection bowl of water daily and replace the element every 500 hours.**

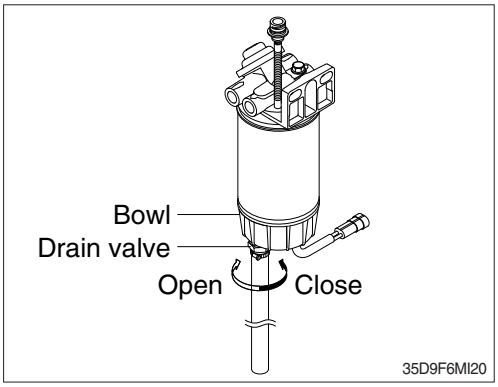
(1) Drain water

① Open bowl drain valve to evacuate water.

② Close drain valve.

※ **Don't tighten up a drain valve so strong.**

※ **Please inspect and drain water frequently for remain water volume to be less than 1/3 volume of a collection bowl.**



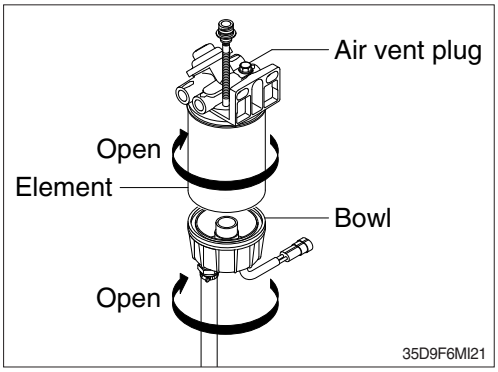
(2) Replace element

① Loosen the air vent plug and drain the fuel of the unit. Follow "Drain water" instructions above.

② Remove element and bowl from filter head.

※ **The bowl is reusable, do not damage or discard.**

③ Separate element from bowl. Clean bowl and seal gland.

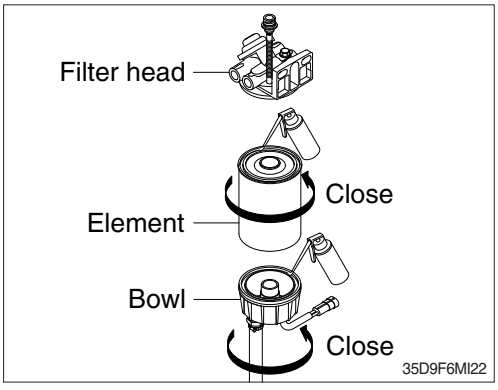


④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.

⑤ Attach bowl to new element firmly by hand.

⑥ Lubricate new element seal and place in element top gland.

⑦ Attach the element and bowl to the head.



11) REPLACEMENT OF FUEL FILTER

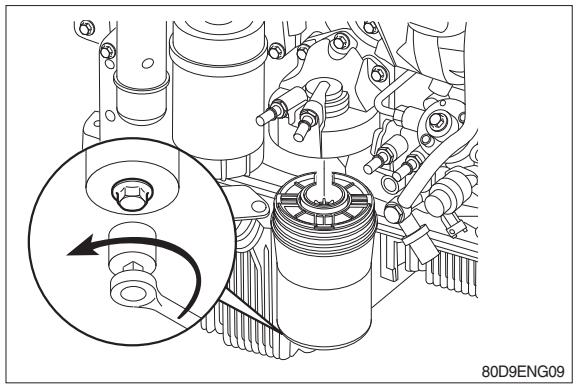
(1) Remove the fuel filter cartridge (1) with 32 mm hex wrench.

(2) Apply a thin layer of fuel to the surface of the new filter cartridge gasket before you put it on.

(3) Tighten the new cartridge by hand.

(4) Open the fuel valve and bleed the fuel system.

(5) Operate the engine for a while and check if there is not the fuel leakage from the filter.



1 Fuel filter cartridge

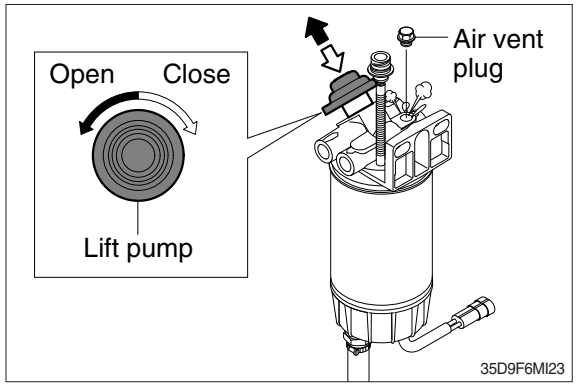
12) BLEEDING THE FUEL SYSTEM

(1) Loosen air vent plug at the outlet of prefilter.

(2) Do hand-priming the lift pump repeatedly until air bubbles comes out from air vent plug hole completely.

(3) Tighten air vent plug to its origin position.

⚠ The fuel pump, high-pressure fuel lines, and fuel rail contain very high-pressure fuel. Do not loosen any fittings while the engine is running. Personal injury and property damage can result. Wait at least 10 minutes after shutting down the engine before loosening any fittings in the high-pressure fuel system to allow pressure to do decrease to a lower level.



13) AFTERTREATMENT DIESEL EXHAUST FLUID DOSING UNIT FILTER

(1) Remove

※ **There may be residual DEF in the filter housing. A collection container placed below the DEF filter cap is recommended.**

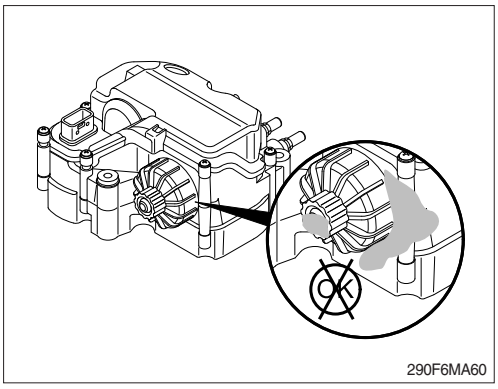
① Inspect the area around the seal and vent of DEF/AdBlue® supply module filter cap for signs of leakage.

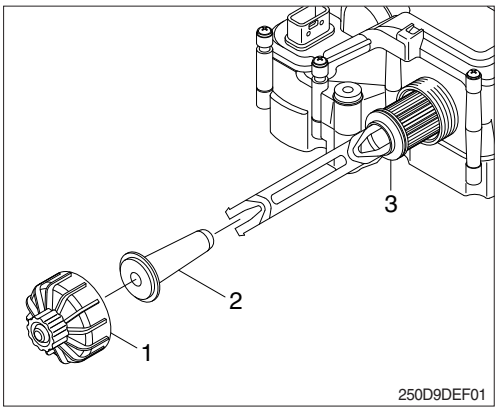
② Unscrew the DEF filter cap (1). A 27 mm wrench can be used on the cap to aid in removal.

③ Remove the aftertreatment DEF filter equalizing element (2).

④ Remove the old aftertreatment DEF dosing unit filter element (3). A disposable service tool is included with the filter to aid in filter removal.
Use the appropriate end of the tool, depending on the color of the plastic on the filter. When inserting the tool, a "click" sound can be heard which indicates proper engagement with the filter.

※ **If the filter element and equalizing element are removed from the aftertreatment DEF dosing unit, they must be discarded and replaced; regardless of condition.**





1 DEF dosing unit filter cap
2 DEF filter equalizing element
3 DEF dosing unit filter element

(2) Clean and inspect for reuse

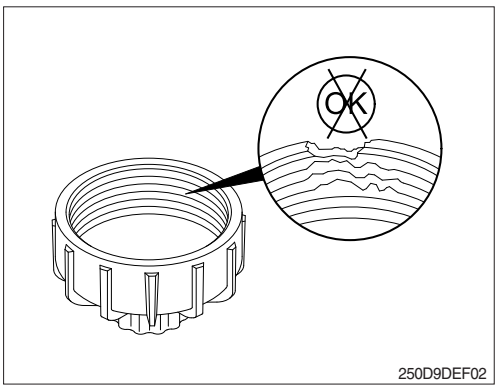
① Inspect the aftertreatment DEF dosing unit filter cap for cracks or holes that could create a DEF leak path.

② Check the condition of the threads on the aftertreatment DEF dosing unit cap.

※ **If the threads are damaged, replace the aftertreatment DEF dosing unit filter cap.**

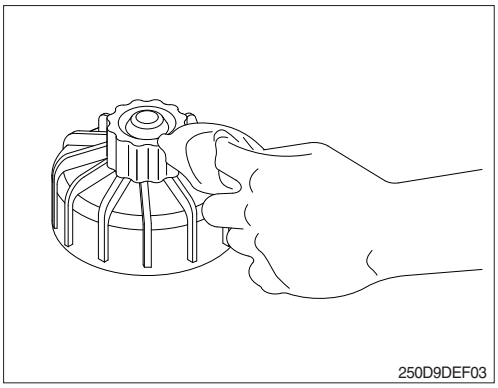
③ Inspect the aftertreatment DEF dosing unit threads. This is especially important if the aftertreatment DEF dosing unit cap was damaged.

※ **If the aftertreatment DEF dosing unit threads are damaged, replace the entire aftertreatment DEF dosing unit.**



④ Clean the aftertreatment DEF dosing unit cap and threads on the dosing unit with warm water and a clean cloth.

※ **Never operate the truck with the DEF cap removed.**



(3) Install

① Slide the DEF filter equalizing element (2) into the DEF filter cartridge (3).

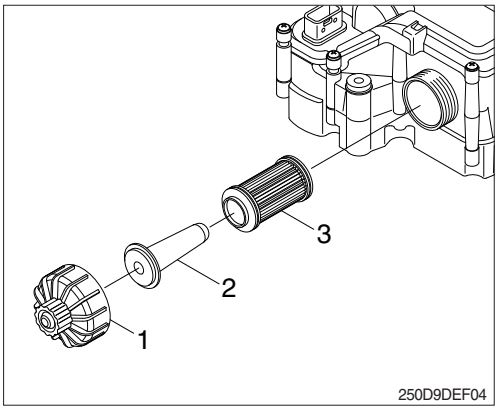
② Insert the assembly into the aftertreatment DEF dosing unit.

③ Install and tighten the cap (1). A 27 mm wrench can be used to install and tighten the filter cap.

· Tightening torque : 2.0 kgf · m (14.5 lbf · ft)

※ **Lubrication of the DEF filter O-rings is not required.**

※ **The aftertreament DEF dosing system will not prime until the correct SCR temperatures are reached. To verify that there are no DEF leaks, test drive the truck for a minimum of 15 mimutes to get the SCR system up to temperature.**

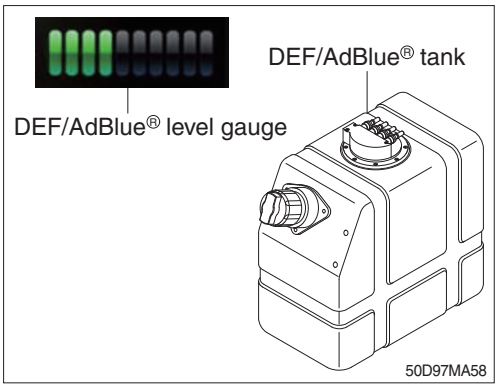


1 DEF dosing unit filter cap
2 DEF filter equalizing element
3 DEF dosing unit filter cartridge

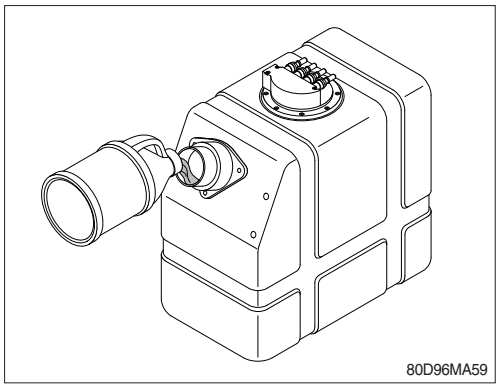
14) DEF/AdBlue® TANK

(1) The DEF/AdBlue® tank level must be checked daily with DEF/AdBlue® level gauge.

⚠ **It is unlawful to tamper with or remove any component of the aftertreatment system. It is also unlawful to use a catalyst solution that does not meet the specifications provided or the operate the truck with no catalytic solution.**



(2) If the DEF/AdBlue® level is found to below, DEF/AdBlue® must be added.



Before filling the tank

① Switch off the engine.

② Secure the truck against rolling away. Always fill the tank with at least 5 liters, as smaller amounts could cause malfuctions.

⚠ Do not allow diesel fuel to run into the DEF/AdBlue® tank. Otherwise, you could damage the exhaust gas aftertreatment system.

⚠ Do not mix additives to DEF/AdBlue®.

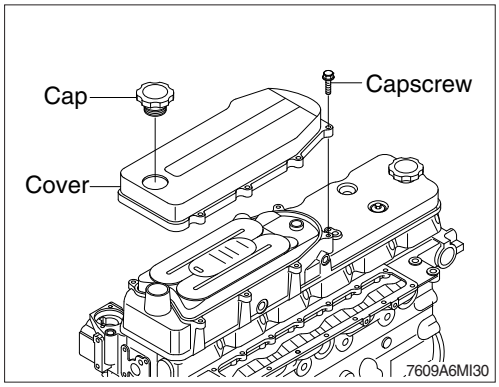
15) CRANKCASE BREATHER FILTER

※ Do not use pneumatic tools to remove the breather cover capscrews. Damage to the rocker cover can result.

(1) Remove the oil fill cap.

(2) Remove the crankcase breather filter cover capscrews.

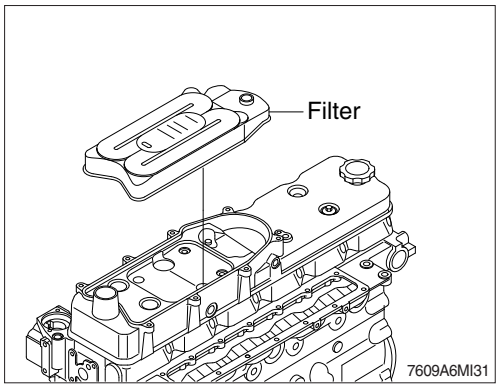
(3) Remove the filter cover.



(4) Remove the crankcase breather filter from the rocker lever cover.

※ Do not disturb the crankcase breather filter gasket located on the rocker lever cover.

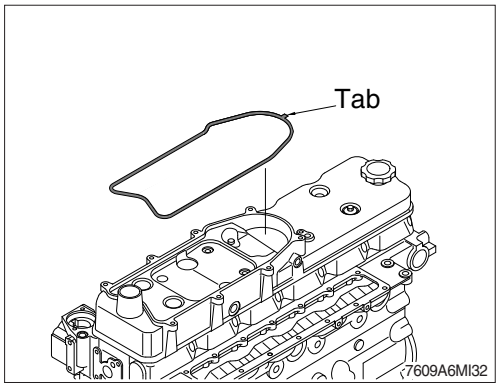
※ Exposure to oil can cause the gasket to swell, which can make it difficult to install the gasket back into groove. If the gasket comes out of the groove, do not attemp to install the gasket. Replace it with a new gasket.



(5) If the gasket is damaged, remove the gasket by grasping the tab on the gasket and pulling up.

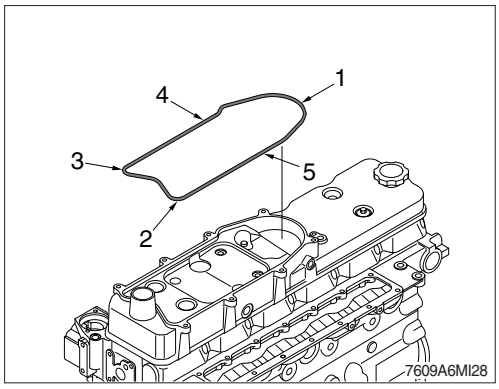
(6) Clean the crankcase breather filter mounting surface and O-ring sealing surfaces on the rocker lever cover.

(7) Clean the crankcase breather filter cover with warm soapy water.
Inspect the cover for cracks.
Replace the cover if damage is found.



(8) If the gasket was removed, install the gasket into the rocker lever cover groove starting with the tab end first. Then install the corners opposite the gasket tab end. Finish by pushing in the sides (see illustration).

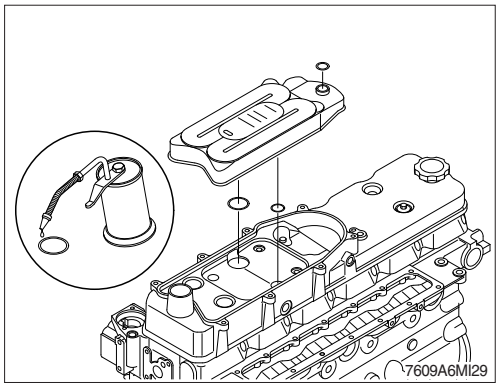
Gently push the gasket down into the groove. Do not used a finger to trace the gasket around into the groove during installation, as this will stretch the gasket, making it difficult to fully seat into the groove.



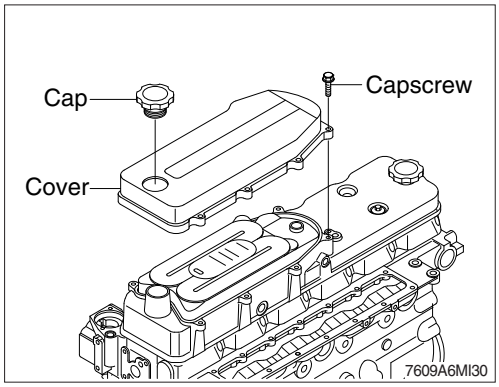
※ **Do not cut the gasket to make it fit into the groove, as this will result in an oil leak.**
The gasket must be fully seated around the entire perimeter of the rocker lever cover groove.

(9) Apply clean engine oil to the O-rings on the crankcase breather filter.

Install the filter onto the rocker lever cover.

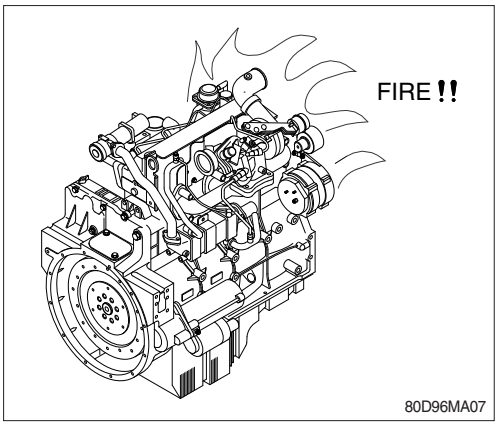


(10) Install the crankcase breather filter cover.
Install the filter cover capscrews.
Tighten the capscrews, starting with the inner-most capscrews and working outward in a circular manner.
· 0.71 kgf · m (5.16 lbf · ft)
Install the oil fill cap.



16) LEAKAGE OF FUEL

⚠ **Be careful and clean the fuel hose, injection pump, fuel filter and other connections as the leakage from these part can cause fire.**



17) HYDRAULIC OIL CHECK

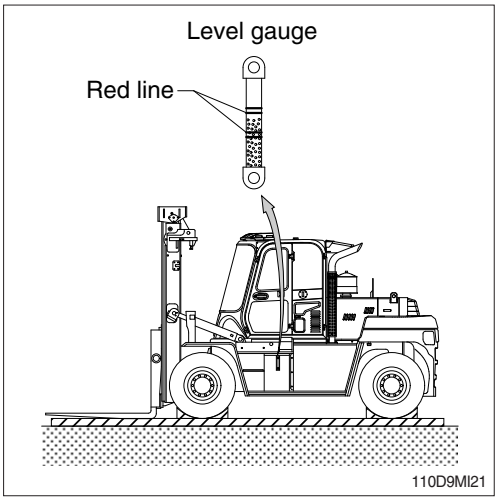
(1) Lower the forks on the ground at a flat location as in the illustration.
Stop the engine and then leave for about 5 minutes.

(2) Check the oil level at the level gauge. The level gauge is located on the left side of the hydraulic oil tank.

(3) The level gauge should indicate the middle position (between red lines).

※ **Add hydraulic oil, if necessary.**

※ **Refer to the page 5-6 for details.**



18) FILLING HYDRAULIC OIL

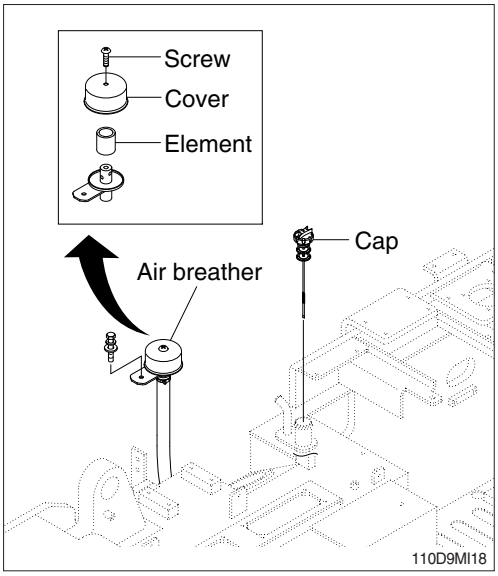
(1) Stop the engine to the position of level check.

(2) Check air breather element and replace it if necessary.

(3) Loosen cap and fill the oil to the specified level.

(4) Start engine after filling and operate the work equipment several times.

(5) Check the oil level at the level check position after engine stops.



19) CHANGE THE HYDRAULIC OIL

(1) Lower the forks on the ground and extend the tilt cylinder to the maximum.

(2) Loosen the cap and relieve the pressure in the tank.

(3) Prepare a suitable drain pan.

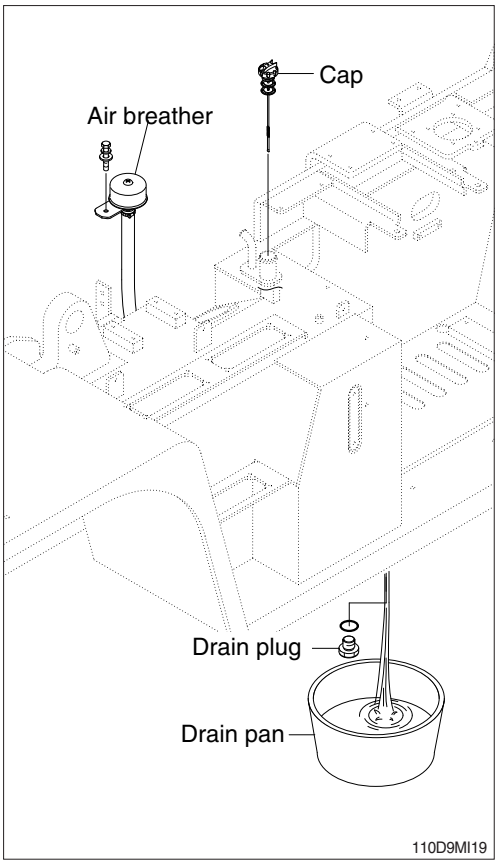
(4) To drain the oil loosen the drain plug.

(5) After draining oil, tighten the drain plug.

(6) Fill proper amount of recommended oil.

(7) Start engine and run continually. Release the air by full stroke of control lever.

※ **The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and hose clamps for leakage or damage.**



20) CLEAN SUCTION FILTER AND REPLACE RETURN FILTER

Clean and replace the return filter in the following manner.

(1) Remove the flange by loosening the mounting bolt.

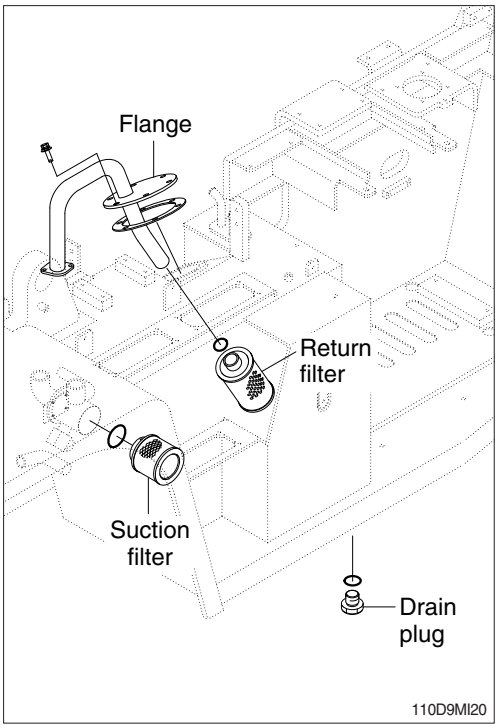
(2) Remove the return filter from the tank.

(3) Replace the return filter element with a new one.

(4) Remove the suction filter and clean it.

(5) Install the cover on the tank.

· Tightening torque : 3.4±0.7kgf · m
(24.6±5.0lbf · ft)



21) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

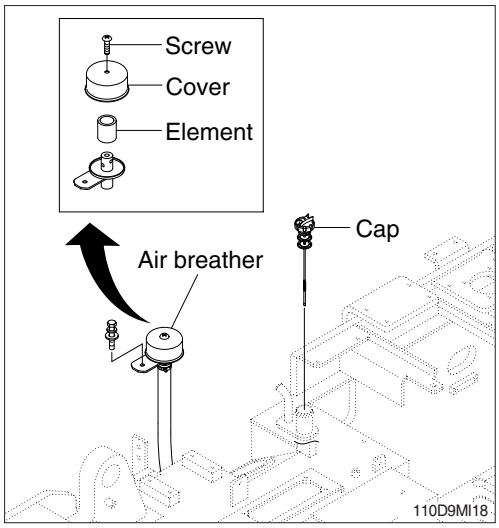
(1) Loosen the cap and relieve the pressure in the tank.

(2) Loosen the screw and remove the cover.

(3) Pull out the element.

(4) Replace the element with a new one.

(5) Reassemble by reverse order of disassembly.
· Tightening torque : 1.14~1.74kgf · m
(8.2~12.6lbf · ft)



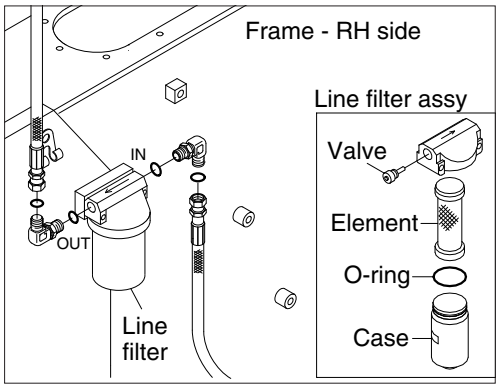
22) REPLACE OF PILOT LINE FILTER

(1) Loosen the filter case.

(2) Pull out the filter element and clean the filter case.

(3) Replace the filter element and O-ring with new parts.

(4) Reassemble the line filter.

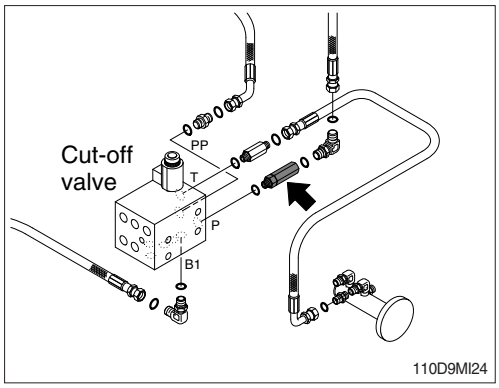


23) CLEANING BRAKE LINE FILTER

(1) Remove the strainer from the filter body.

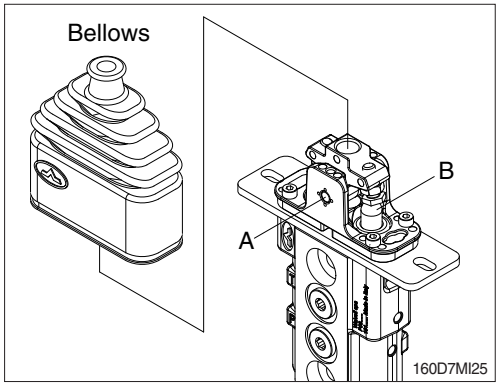
(2) Wash the strainer with cleaning oil.

(3) Install and tighten with specified torque.
· Tightening torque : 4.5~5.5 kgf · m
(32.5~39.8 lbf · ft)



24) LUBRICATE RCV LEVER

Remove bellows and grease the joint (A) and the sliding parts (B).



25) TIRE PRESSURE

(1) Inappropriate tire pressure is a primary cause for tire damage. Insufficient tire pressure will damage internal carcass of tire. Repeated excessive bending will damage or break the carcass. Excessive pressure will also cause premature damage of tire.

(2) Recommended tire pressure (When tire is cooled)

Model	Size	Pressure
110D/130D-9	10.00-20, 16PR	8.0 kgf/cm^2 (114 psi)
160D-9	12.00-20, 18PR	8.0 kgf/cm^2 (114 psi)

(3) Continuous operation will produce heat and increase pressure on tire. But such phenomenon was already taken into account when designing a tire. Do not try to remove normally increased air because tires may be crushed or overinflated.

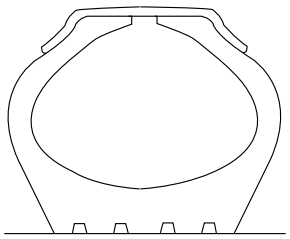
(4) The three major causes for excessive heat and pressure of tire are insufficient pressure, excessive load and overspeed. Avoid excessive load and overspeed in order to keep tires in good shape.

⚠ Do not inflate tires using flammable gases or alcohol injector.
This cause explosion or personal injury.

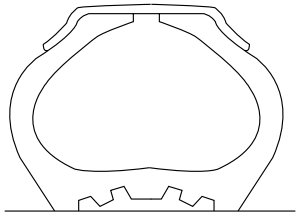
⚠ Inflate tires at the pressure level recommended by the manufacturer, and check periodically pressure and wear of tires.

⚠ When replacing the inflated tire, do not stand near the tire.

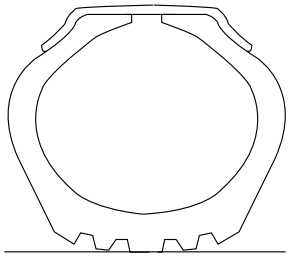
※ Check the tire when the tire is at normal temperature and the truck is not loaded.



Normal



Too low pressure



Excess pressure

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⚠ Do not use recycled wheel parts.

⚠ When removing lockering or inflating tire, use safety cable or chain to ensure safety.
Be sure to bleed air before removing lockering. Never inflate tires unless the lockering is assembled in its place.

※ Avoid the followings when traveling.

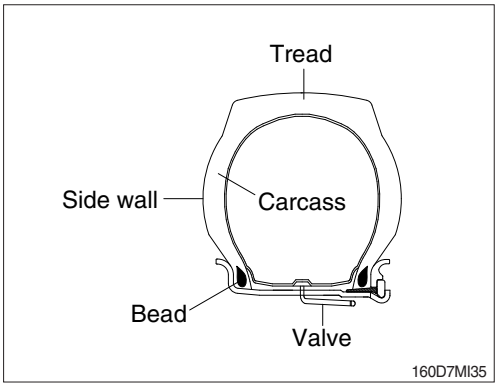
① Rubbing tires against road bank or rack at cargo-unloading spot.
② Tires slippage during working.
③ Abrupt starting of the truck.
④ When oil, grease or gasoline smeared on tire, clean those. Otherwise it may cause of permanent deformation.

26) REPLACEMENT OF TIRE

⚠ Disassembly, reassembly, replacement and repair of tire requires special skills and equipment. Contact a tire repair shop.

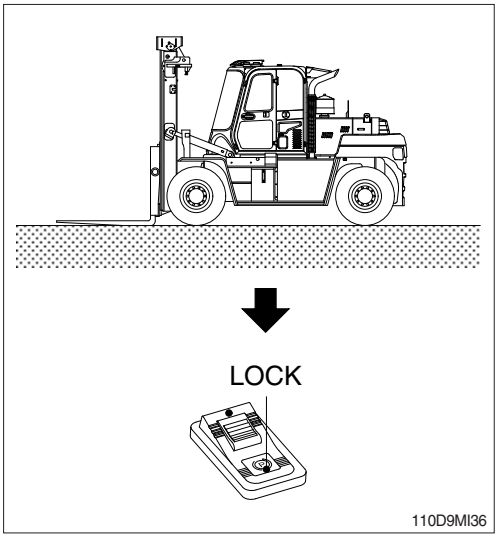
(1) Tires to be replaced

① Tires with broken or bent bead wires
② Tires exposed more than 1/4 of carcass fly.
③ Tires whose carcass is damaged more than 1/3 of the tire width.
④ Tires which show fly separation.
⑤ Tires which has a radial crack near the carcass.
⑥ Tires which are judged to be unsuitable for use because of deformation or damage.



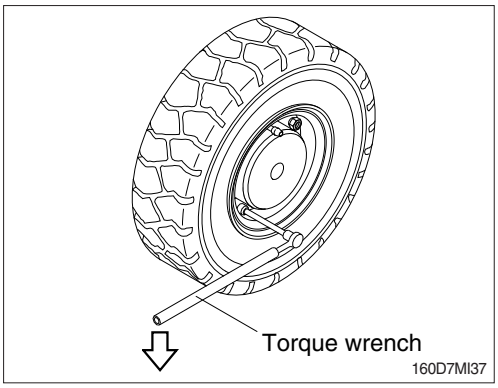
(2) Separation of tire

① After moving the truck to flat ground, lower the bucket to the ground and put the parking brake switch in LOCK position.



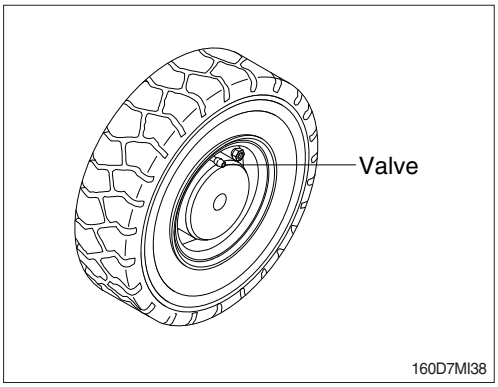
② Loosen slightly all wheel mounting.
- Tools : Socket 32 mm
  Torque wrench
  Extension bar

③ Lift the truck with a jack.
④ Loosen all wheel mounting nuts and replace the tire.



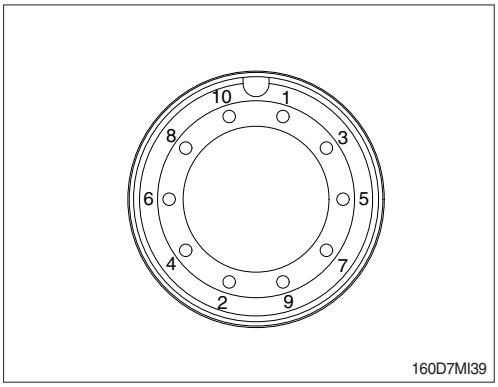
(3) Direction of tire to be installed

① Be careful that the valve should be facing the outside.



(4) Mounting of tire

① Lightly tighten nuts as shown in the illustration.
② Lower the jack after tire is replaced.
③ Tighten nuts according to the specified tighten torque.
- Tightening torque : 83.2±10.0 kgf · m
  (602±72.3 lbf · ft)

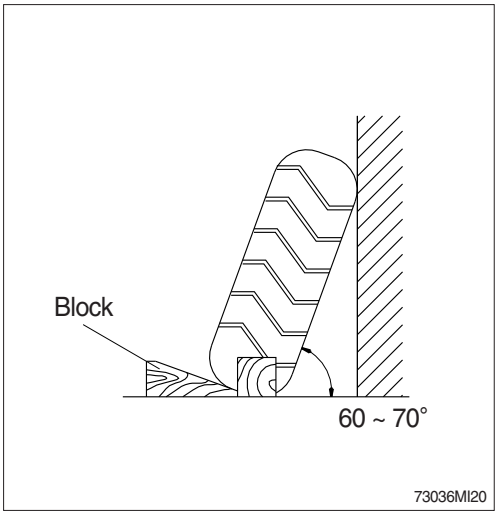


27) STORING TIRES AFTER REMOVAL

As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter. If the tire are stored outside, always erect a fence around the tires and put up "No Entry" and other warning signs that even young children can understand.

Stand the tire on level ground, and block it securely so that it cannot roll or fall over.

If the tire should fall over, get out of the way quickly. The tires for the industrial truck are extremely heavy, so trying to hold the tire may lead to serious injury.

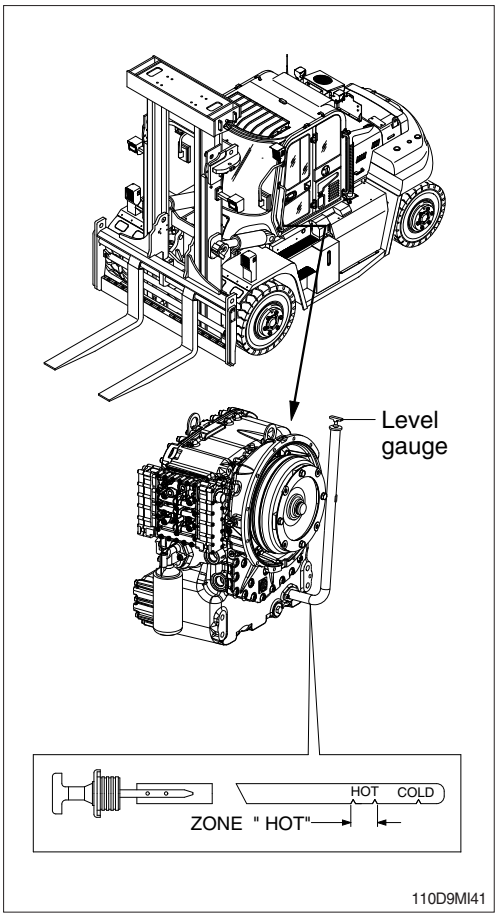


28) CHECK TRANSMISSION OIL LEVEL

The oil level check must be carried out as follows;

(1) Oil level check (weekly).
(2) At horizontally standing truck.
(3) Transmission in neutral position.
(4) In cold start phase, the engine must be running about 2~3 minutes at idling speed, and the marking on the oil level gauge must then be lying above the cold start mark COLD.
(5) Check oil level at operating temperature of the transmission (about 80~90˚C) and the engine idling speed.
① Loosen oil level gauge by counterclock wise rotation, remove and clean it.
② Insert oil level gauge slowly into the oil level tube until contact is obtained, and pull it out again.
③ On the oil level gauge, the oil level must be lying in the zone HOT.
④ Insert the oil level gauge again, and tighten it by clockwise rotation.

⚠ When checking, put the parking brake switch in the LOCK position and fix the tires with blocks.



29) REPLACEMENT OF TRANSMISSION OIL AND FILTER ELEMENT

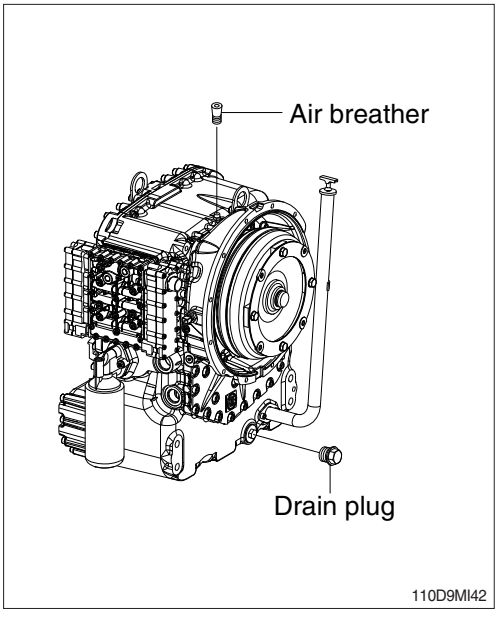
(1) Operate the truck for a few minutes in order to warm the transmission oil.

(2) Move the truck to flat ground. Lower the forks to the ground and slightly apply downward force.

(3) Put the parking brake switch in the LOCK position and stop the engine.

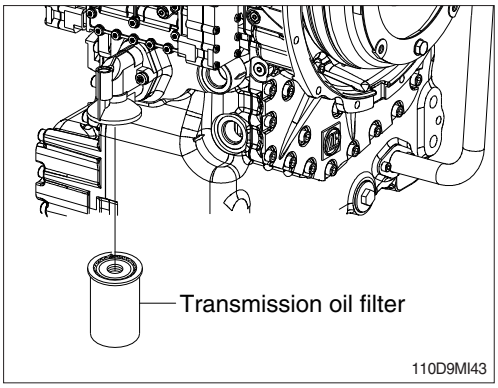
(4) Open transmission air breather to relieve internal air pressure.

(5) Remove the transmission drain plug. Allow the transmission oil to drain into a suitable container.



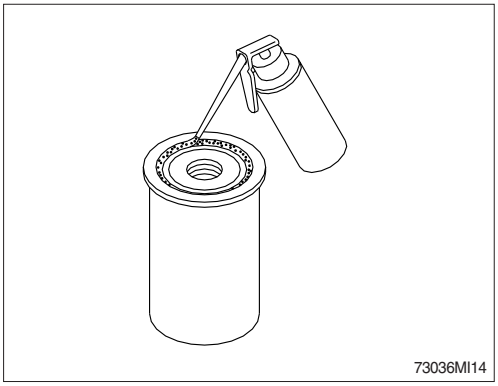
(6) Remove the transmission oil filter cartridge. Dispose of the used transmission oil filter cartridge properly.

(7) Clean the filter cartridge mounting base. Remove any part of the filter cartridge gasket that remains on the filter cartridge mounting base.



(8) Apply a light coat of oil to the gasket of a new transmission oil filter cartridge.

(9) Install the new transmission oil filter cartridge. Screw the filter in until contacts with the sealing surface is obtained and tighten it now by hand about 1/3 to 1/2 turn.



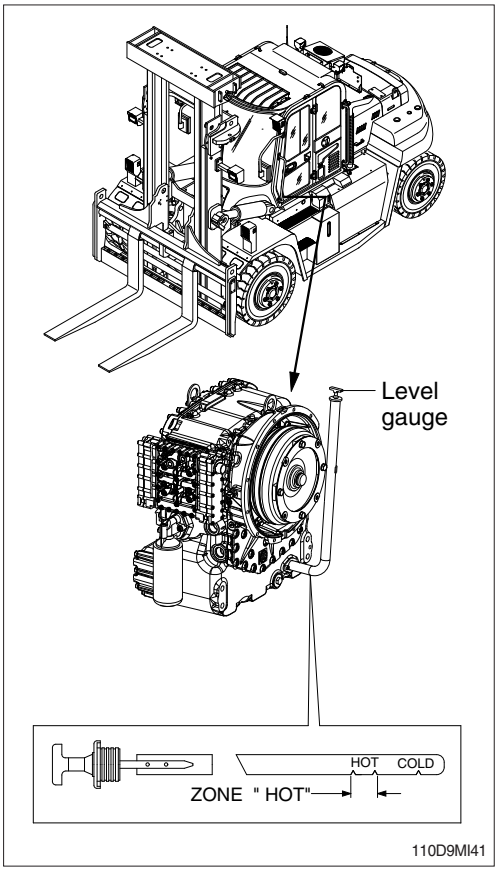
(10) Mount the drain plug of the transmission after cleaning it.

(11) Fill the oil through the level gauge inlet and check if the oil is at the appropriate level.

(12) The proper oil amount is 16 liters (4.2 U.S. gallons)

⚠ As the truck is hot after operation wait until the temperature has dropped.

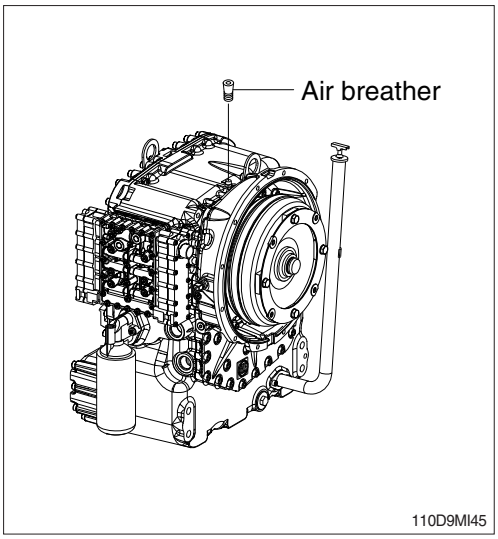
⚠ It is imperative to pay attention to absolute cleanliness of oil and filter.
Binding is in any case the marking on the oil level gauge.



30) CLEANING TRANSMISSION AIR BREATHER

(1) Remove dust or debris around the air breather.

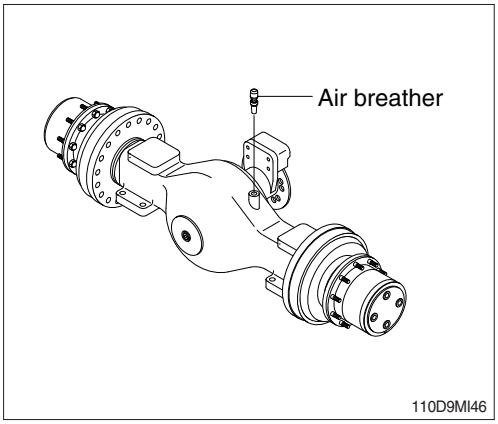
(2) Remove the air breather and wash it with a cleaning oil.



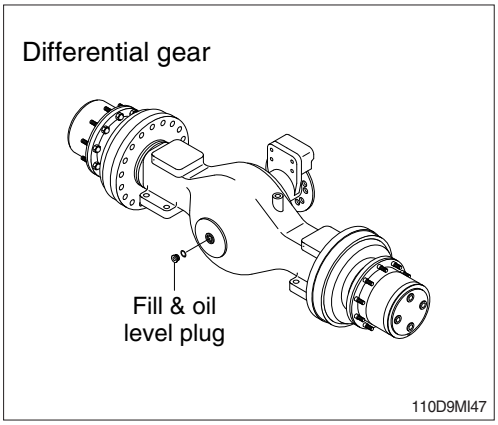
31) CHECK AND SUPPLYING AXLE OIL

(1) Move the truck to flat ground.

(2) Open the axle air breather to relieve internal air pressure.



(3) Remove the plug and check the oil amount.
If the oil level is at the hole of the plug, it is normal.

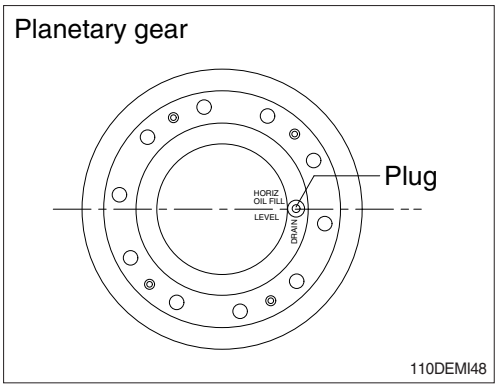


(4) If the oil level is below the plug hole, supply oil through a plug hole.

⚠ **When checking the oil level, engage the parking brake and fix the tires with blocks.**

⚠ **As the truck is hot after operation, wait until the temperature has dropped.**

※ **Set the plug of planetary gear in parallel to the ground.**



32) CHANGE THE AXLE OIL

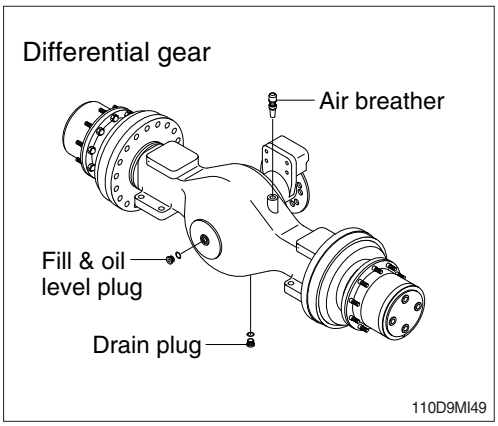
(1) Place a case under drain plug to catch oil.

(2) Remove the air breather to relieve internal pressure.

(3) Drain oil the differential gear.

① Remove the refilling plug and remove the drain plug to drain oil off.

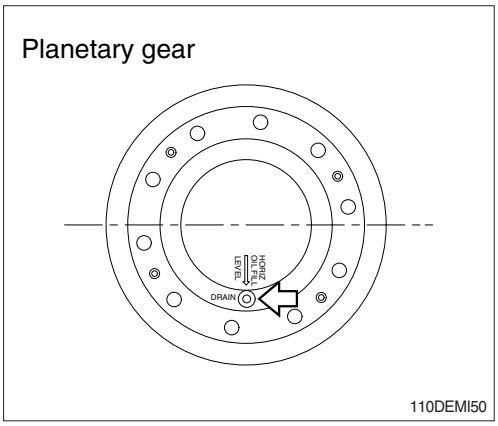
② Wash drain plug and install it.



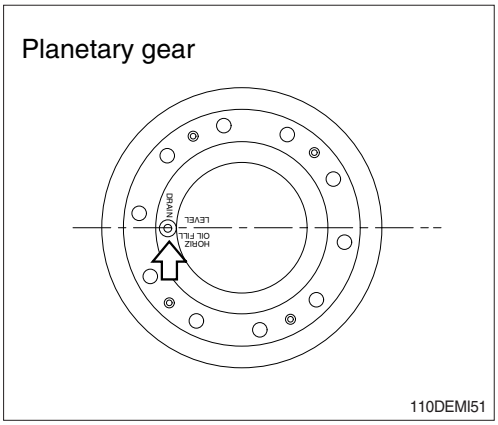
(4) Drain oil planetary gear.

① Drain oil by removing drain plug.

※ **The drain plug should be facing the ground.**



(5) After draining, put the drain plug of planetary gear in parallel to the ground.

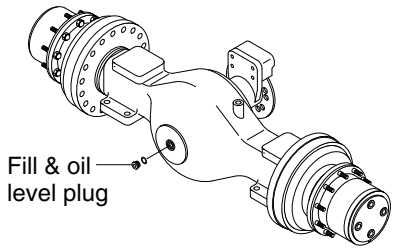


(6) Supply oil into the differential gear and the planetary gear.
 · Oil amount : 19 ℓ (5.0 U.S. gal)
(7) Supply oil until it overflows from the oil filler, then install the plug.

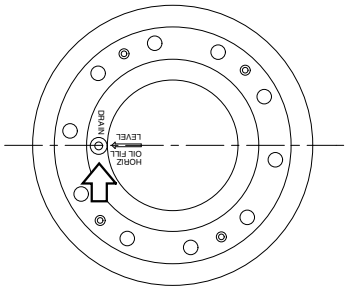
⚠ As the truck is hot after operation, wait until the temperature has dropped.

※ If a work requires frequent use of brake, replace it earlier than normal change interval.

Differential gear



Planetary gear



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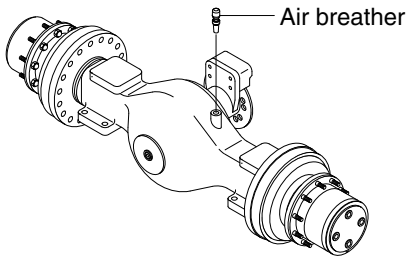
33) CLEANING AXLE BREATHER

(1) Remove dust or debris around the breather.

(2) Remove the breather and wash it with a cleaning oil.



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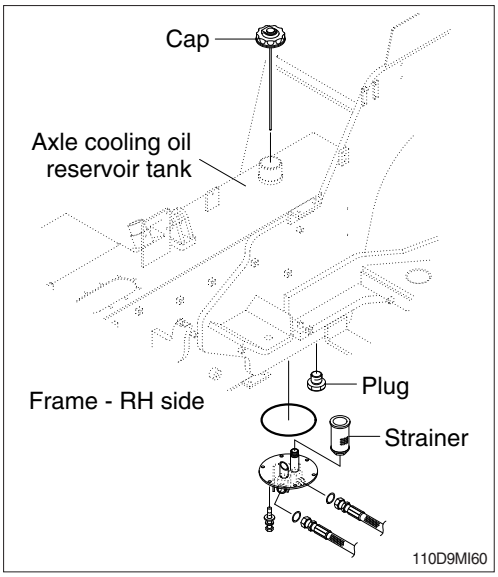
34) BRAKE COOLING OIL AND STRAINER

(1) Check the oil level.

(2) If oil level is near or under the lower limit, add oil immediately.

(3) Change oil and strainer completely every 1000 hours operation.



35) LUBRICATION

(1) Supply grease through the grease nipple, using grease gun.

(2) After lubricating, clean off spilled grease.

⚠ Put the parking brake switch in the LOCK position and fix front and rear tires with blocks.

⚠ Set the mast and forks in a stable position.

(3) Lubrication points

① Fork adjust cylinder : 2EA

② Forks : 2EA

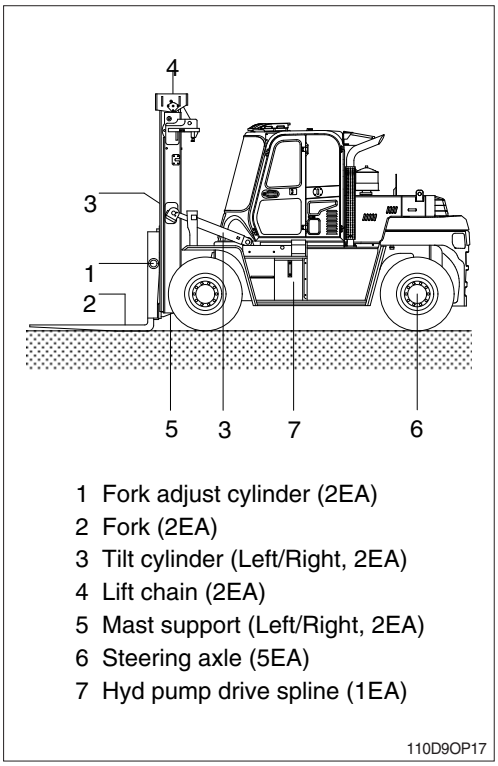
③ Tilt cylinder : Left/Right, 2EA

④ Lift chain : 2EA

⑤ Mast support : Left/Right, 2EA

⑥ Steering axle : 5EA

⑦ Hydraulic pump drive spline : 1EA



36) FORKS REPLACEMENT

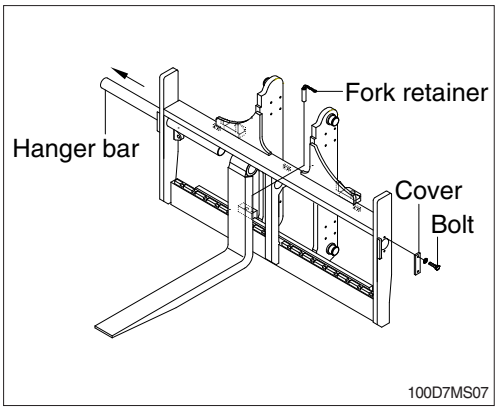
① Lower the fork carriage until the forks are approximately 25 mm (1 in) from the floor.

② Release the fork retainer and remove the cover. Slide one hanger bar at a time out of carriage assembly.

③ Remove only one fork at a time.

※ **On larger forks it may be necessary to use a block of wood.**

④ Reverse the above procedure to install the forks.

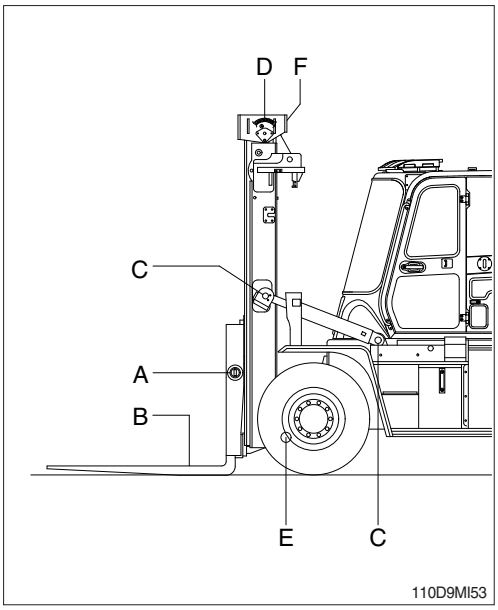


37) MAINTENANCE OF WORK EQUIPMENT

(1) Lubricate to each point of working device.
Lubricate the grease to grease nipple in accordance with lubrication intervals.

No.	Description	Qty
A	Fork adjustment cylinder pin	2
B	Fork shaft	1
C	Tilt cylinder pin	2
D	Load chain	2
E	Mast support pin	2
F	Chain sheave pin	2

※ **Shorten lubricating interval when working in the water or dusty place.**

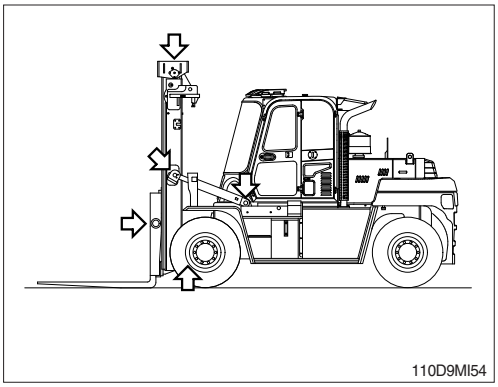


110D9MI53

(2) Check for wear and tear of work equipment pins and bushings.

(3) Check for damage of forks and mast linkage part.

※ **Check daily and lubricate the fork positioner hanger bar and bottom plate where the fork is contacted, or the forks may vibrate temporarily while positioning.**

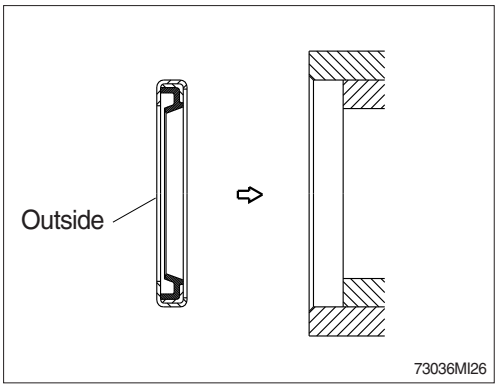

110D9MI54

(4) Dust seal are mounted on the rotating part of working device to extend the lubricating interval.

※ **Mount the lip to be faced out side when replace the dust seal.**

※ **If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.**

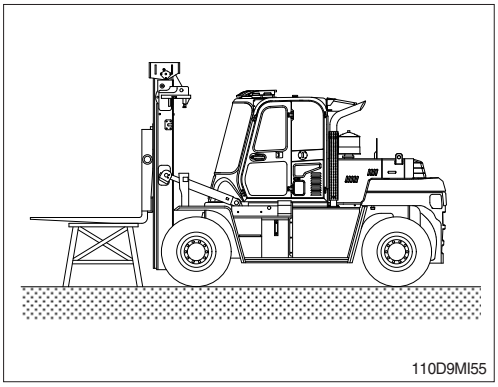
※ **Make sure the seals are not damaged or deformed.**



73036MI26

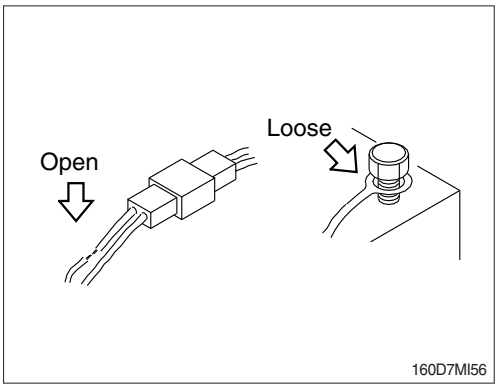
38) WORK EQUIPMENT SUPPORT

When carrying out inspection and maintenance with the forks raised, fit a stand under the forks securely to prevent the work equipment from coming down. In addition, set the work equipment control levers to the Hold position.


110D9MI55

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



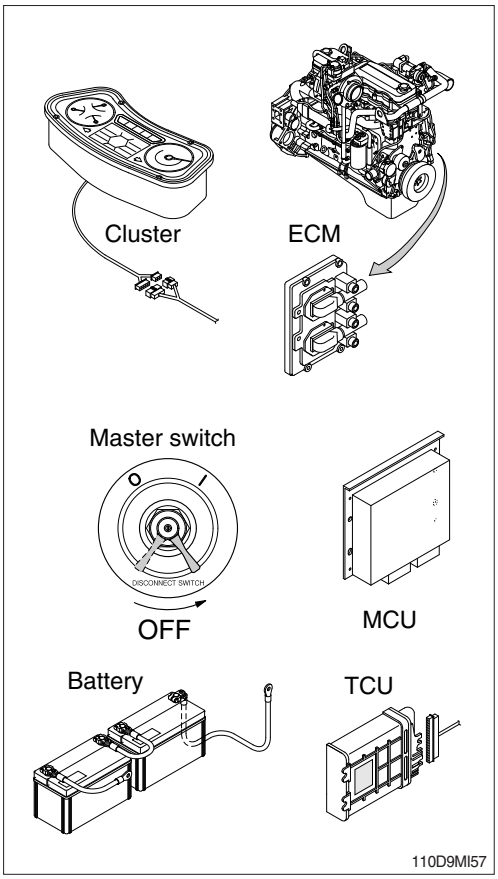
2) WELDING REPAIR

Before start to welding, follow the below procedure.

(1) Shut off the engine and remove the start switch.
(2) Disconnect ground cable from battery by master switch.
(3) Before carrying out any electric welding on the truck, the battery cables should be disconnected and the connectors pulled out of the electronic control units (MCU, ECM, TCU, cluster etc).
(4) Connect the earth (ground) lead of the welding equipment as close to the welding points as possible.

※ **Do net weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.**

⚠ **Do not attempt to welding work before carry out the above.**
If not, it will caused serious damage at electric system.

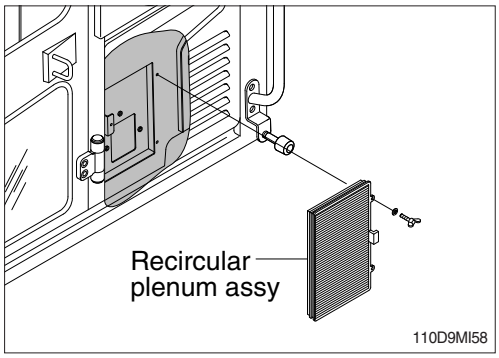


9. AIR CONDITIONER AND HEATER

1) CLEANING AND REPLACING FILTER

※ **Always stop the engine before servicing.**

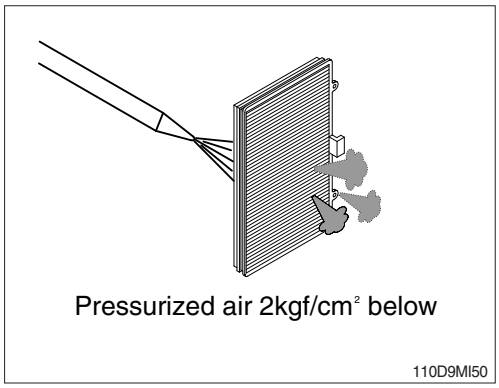
(1) Open the door, loosen the wing bolt and remove the recirculation plenum assembly.



(2) Clean the recircular plenum assy using a pressurized air (Below 2 kgf/cm², 28 psi).

△ **When using pressurized air, be sure to wear safety glasses.**

(3) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



2) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour.

(2) Be careful not to overcool the cab.

(3) The cab is properly cooled if the operator feels cool when entering there from outside (About 5°C lower than the outside temperature).

(4) When cooling, change air occasionally.

3) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

4) CHECK DURING OFF-SEASON

Operate the air conditioner 2 or 3 times a month (Each for a few minutes) to avoid loss of oil film in the compressor.

5) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP
110/130/160D-9	HFC-134a	0.55 kg (1.21 lb)	787 CO2 eq.

※ **GWP**

Global warming potential (GWP) is a measure of how much heat a gas traps in the atmosphere relative to that of carbon dioxide (CO2). GWP is calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO2.

(2) Envior

The air conditioning system of the machine is filled with HFC-134a refrigerant at the factory.
HFC-134a refrigerant is a flourinated greenhouse gas and contributes to global warming.
Do not release refrigerant into the environment.

(3) Safety precautions

Work on the air conditioning system must only be performed by a qualified service technician.
Do not attempt to preform work on the air conditioning system.
Wear safety goggles, chemical resistant gloves and appropriate personal protective equipment to protect bare skin when there is a risk of contact with refrigerant.

(4) Action in case of exposure

① Eye contact / Limited skin contact
Rinse with warm water and apply a light bandage. Seek medical attention immediately.

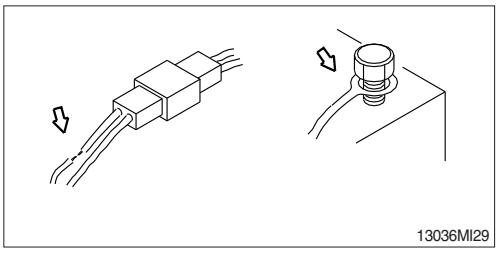
② Extensive skin contact
Rinse with warm water and carefully heat the area with warm water or warm clothing.
Seek medical attention immediately.

③ Inhalation
Leave the area and find fresh air. Seek medical attention immediately.

10. REPLACEMENT AND CHECK

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

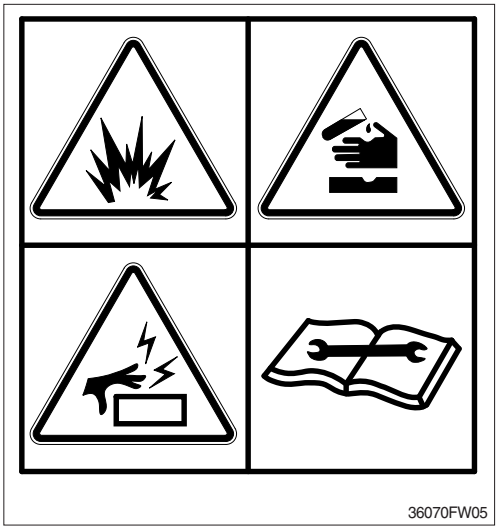
(1) Clean

① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.

⚠ Battery gas can explode. Keep sparks and flames away from batteries.

⚠ Always wear protective glasses when working with batteries.

⚠ Do not stain clothes or skin with electrolyte as it is acid.
Be careful not to get the electrolyte in eyes.
Wash with clean water and go to the doctor if it enters the eyes.



(2) Recycle

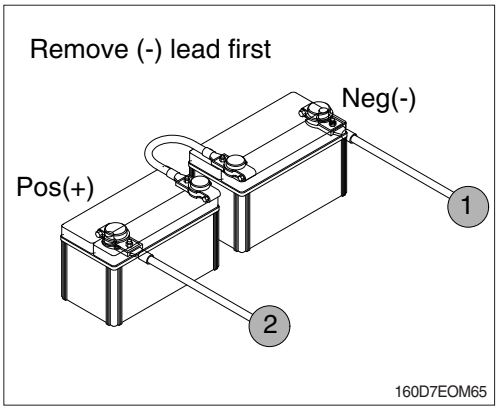
Never discard a battery.
Always return used batteries to one of the following locations.
·A battery supplier
·An authorized battery collection facility
·Recycling facility

(3) Removing and installing

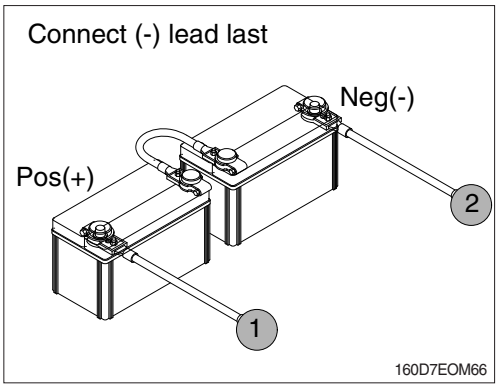
① Remove the lead from the ground side (Normally the (-) terminal side) of the battery. It is dangerous to let a tool, etc., touch the (+) terminal and the body at the same time, since this causes a spark.

② When remounting, connect the ground connection last

⚠ **Do not allow tools to touch the (+) terminal and the body of the truck at the same time. This can cause sparking and explosion.**
When reinstalling the cables after replaced the battery, pay close attention to maintaining the same alignment state of the cables as it was when supplied. Otherwise, the machine can be exposed to the fire hazards.



⚠ Prior to reinstall the cable, inspect in detail and confirm the condition of the cables and replace it when the cables possess any kind of abnormal damages such as cracking and wear out of the cable sheath that make you feel somedangerous to use it. Do consult an expert about this matter when you are not able to judge its condition. It is strongly recommended to keep the surroundings of the battery cables clean so that the machine can be freed from the risk of firing by eliminating the flammable contaminations such as oil, dust and etc. acting as a fire developer. Dispose of the old battery in locally approved manner.



3) TIRE REPLACEMENT

(1) Park the truck in a safe and level place suitable for changing the tire. Then lower the forks, stop the engine, and apply the parking brake.

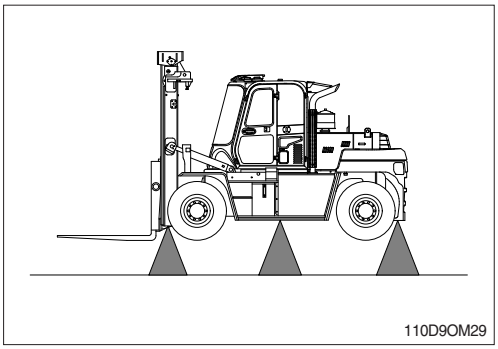
⚠ **The tires are under high inflation pressure, so failure to follow the correct procedures, when changing or servicing the tires and rims could cause the tire to explode, causing serious injury or damage. The tires and rims should always be serviced or changed by trained personal using the correct tools and procedures. For details of procedures, contact your HYUNDAI dealer. Wear safety glasses and a face shield when using compressed air.**

(2) Block the tire at the opposite corner from the tire to be replaced.
(3) Loosen the lug nuts slightly with a lug nut wrench.
(4) Jack up the truck to raise the tire from the ground, then remove the lug nuts and take off the tire.

(5) Points to fit jack when jacking up

① Front tires : Bottom of outer mast or bottom of the frame.
② Rear tires : Bottom of counterweight or bottom of the rear axle.

⚠ **When jacking up the truck, always check carefully that the jack does not come out of position. When jacking up the truck, never go under the truck. For wheels using a separate type rim, check first that the rim nut is not loose before loosening the lug nuts. Be careful not to mistake the rim nuts and lug nuts.**
When assembling separated type rims with bolts and nuts, check any damage and tighten them to the specified tightening torque. Change the bolts and nuts with new ones after using twice for your safety.



(6) Replace the tire and tighten the lug nuts partially. The mounting faces of the wheel, lug muts and wheels must be free from any dirt or lubricant of any kind.
(7) Tighten the lug nuts on opposite sides in turn,
and check that there is no play in the wheel.
(8) Lower the jack to lower the truck to the ground, then tighten the lug nuts to the specified tightening torque (For details, see service data).
(9) Check and adjust the inflation pressure.
Tire inflation pressure : For details, see page 5-3, 3. CHECK BEFORE STARTING ENGINE.

⚠ **Precautions for adjusting the inflation pressure when repairing a puncture.**

※ **The tires used on the forklift trucks have a high inflation pressure, so any cracks or deformation of the rim are extremely dangerous. When adjusting the inflation pressure, do not raise the pressure above the correct level under any circumstances. If the pressure of the compressor is not adjusted beforehand, the pressure inside the tire will rise to the maximum air pressure of the compressor, and this may cause a serious accident. Therefore, always be extermely careful when carrying out this work.**

4) FUSE AND RELAY REPLACEMENT

(1) Fuse box #1

COVER P/N : 21FT-20330

15A 30A

5A 5A 10A 10A 15A

FUSE BOX IG
퓨즈박스 IG

30A

DEF LINE HEATER 재생 라인 히터	DEF SUPPLY POWER 재생 전압	START KEY(B+) 시동키	TCU (B+) 티씨유	TURN LAMP(B+) 방향지시등		MP3 PLAYER (B+) 씨디플레이어	ROOM LAMP(B+) 실내등	CLUSTER/ MCU(B+) 클러스터/ 팬속도제어기	SERVICE TOOL 서비스 툴
15A	15A	10A	10A	10A		5A	5A	5A	5A
CABIN TILT 캐빈 틸트	MONITOR/ RMCU(B+) 모니터 알엠씨유	HORN (B+) 경음기	DEF SENSOR 재생 센서	AIRCON B+ 에어컨					
15A	5A	10A	10A	5A					
							RELAY NEUTRAL 중립 릴레이	ECM B+ 제어기 전원	
							10A	30A	

(2) Fuse box #2

COVER P/N : 21FT-20340

15A 30A

5A 5A 10A 10A 15A

FUSE BOX IG
퓨즈박스 IG

60A

BACK-UP 백업램프 부저	OPS SYSTEM 운전자 감지장치	CIGAR LIGHTER 시가 라이타	DC/DC CONVERTER 디씨 컨버터	MCU/ SENSOR 팬속도제어기	MP3/ HANDS FREE 씨디플레이어 핸즈프리	MONITOR 모니터	AIRCON MAIN 에어컨 전원	AIRCON IG 에어컨 상시전원	PARK SOLENOID 주차 솔레노이드
5A	10A	15A	15A	10A	15A	10A	20A	15A	10A
ILLUM LAMP 미등	HEAD LAMP 헤드램프	WORK LAMP FRONT 전방작업등	WORK LAMP REAR 후방작업등	F/R WIPER HORN 와이퍼 혼	F/WARMER 연료 예열	BEACON LAMP 경광등	CLUSTER/ RMCU 계기판 알엠씨유	BRAKE LAMP SELECTOR VALVE 브레이크램프 셀렉트 밸브	TCU IG 티씨유
10A	15A	20A	20A	15A	15A	5A	5A	10A	15A
ECM 제어기	E/G PREHEAT RELAY 엔진 예열	DEF SENSOR RELAY 재생 센서	TOP WIPER 상단와이퍼		SEAT HEATER 시트 히터				
10A	10A	5A	10A		15A				

(3) Relay box #1

COVER P/N : 21FT-20350

배선방향
WIRE DIRECTION

PREHEAT RELAY 작업장치 차단 CR-42	NEUTRAL RELAY 중립 CR-5	ANTI RESTART RELAY 재시동 방지 CR-36	AUTO PARK RELAY 자동 주차 CR-56	TRAVEL-CUT RELAY 주행 차단 CR-50

(4) Relay box #2

COVER P/N : 21FT-20360

배선방향
WIRE DIRECTION

DEF HEATER1 RELAY 재생 라인 히터1 CR-61	DEF HEATER2 RELAY 재생 라인 히터2 CR-62	DEF HEATER3 RELAY 재생 라인 히터3 CR-63		
ATTACH-CUT RELAY 작업장치 차단 CR-52	WIPER HI RELAY 와이퍼 고속 CR-4	WIPER LO RELAY 와이퍼 저속 CR-26	WASHER PUMP RELAY 와셔 펌프 CR-38	BACKUP RELAY 중립 시동 CR-39

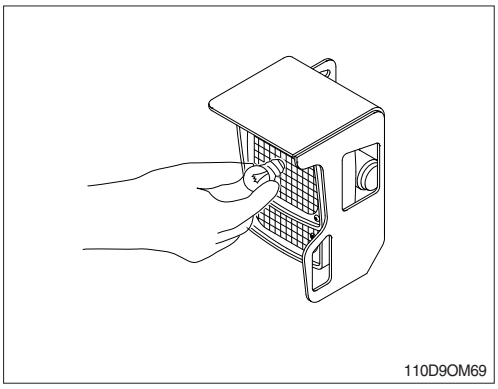
① Turn the starting swich OFF.

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

⚠ When replacing the fuse or relay, check the relationship between the fuse or relay and the electrical components it protects. Always replace fuses or relays with a same capacity. Always turn the start switch OFF before replacing any fuse or relay.

5) LAMP BULBS REPLACEMENT

Lamp	Spec (24V)
Head lamp	70W
Turn signal lamp	LED
Clearance lamp	LED
Stop lamp	LED
Backup lamp	10W
License lamp (option)	10W
Beacon lamp (option)	Strobe type
Work lamp (front/rear)	70W



⚠ **After checking that the fuse is not blown and that there is no disconnection in the wiring harness, replace the lamp bulb.**

6) FUNCTIONAL TESTS

You will start the engine to complete the functional tests, so be sure that:

- The parking brake switch is in LOCK position.
- The gear selector lever is in NEUTRAL.
- Forks are fully lowered to the floor or ground.
- All controls are in neutral or other correct position.
- You are familiar with the safety procedures given in section 5, **Starting and operating procedures**, in this manual.

As you test the following components, be sure they are properly mounted and working correctly.

(1) Horn

Press the horn button to check the horn function. If the horn or any other part does not operate, report the failure and have it repaired before the truck is put into operation.

(2) Hour meter

Start the engine and let it warm up until it runs evenly and accelerates smoothly when you push on the accelerator pedal. Check the hour meter for operation with the engine running. Write the hour meter reading on the PM report form. Report any malfunction or damage.

(3) Indicator lights

Check that all lights are functioning and indicate normal truck operation as described in section 3, **Know your truck**, in this manual.

(4) Service brakes and inching pedal

With the gear selector lever in NEUTRAL and the engine running, push the sevice brake pedal fully down and hold. The brakes should apply before the pedal reaches the floorplate. If the pedal continues to creep downward, report the failure immediately. Do not operate the truck until the brakes are repaired. Perform the same check with the inching pedal. (Additional braking/ inching checks will follow).

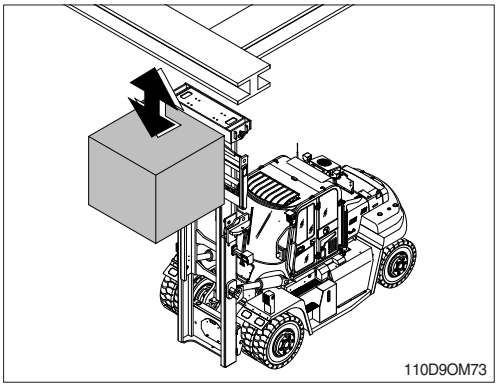
(5) Parking brake

Check the function of the parking brake. Release, then reapply. To check parking brake holding capability, park the lift truck on a grade and apply the parking brake. The parking brake should hold a lift truck with rated load on a 15% grade.

⚠ Do not operate a lift truck if the service or parking brakes are not operating properly.

(6) Lift mechanisms and controls

Pull back on the tilt control lever and hold until the mast reaches the full back tilt position. Push forward on the lever to return the mast to the vertical position. Release the lever.



⚠ Be sure that there is adequate overhead clearance before raising the mast.

Pull back on the lift control lever and raise the fork carriage to full height. Watch the mast assembly as it rises. Release the lever.

If the maximum fork height is not reached, this indicates there is an inadequate(low) oil level in the hydraulic sump tank or severe binding within the mast.

Push forward on the lift control lever. Watch the mast as it lowers. When the forks reach the floor, release the lever.

All movements of the mast, fork carriage, and lift chains must be even and smooth, without binding or jerking. Watch for chain wobble or looseness; the chains should have equal tension and move smoothly without noticeable wobble.

(7) Auxiliary controls (option)

If your lift truck is equipped with an attachment, test the control lever for correct function and briefly operate the attachment.

(8) Steering system

※ **The steering system, steering axle, and steering linkage on your truck should be inspected periodically for abnormal looseness and damage, leaking seals, etc.. Also, be alert for any changes in steering action. Hard steering, excessive freeplay (Looseness), or unusual sound when turning or maneuvering indicates a need for inspection or servicing.**

Check the steering system by moving the steering handwheel in a full right turn and then in a full left turn. Return the handwheel to the straight ahead position. The steering system components should operate smoothly when the handwheel is turned. Never operate a truck that has a steering system fault.

⚠ **Fasten your seat belt before driving the truck.**

(9) Direction control, braking and inching

※ **Be sure that the travel area is clear in front of the truck.**

① Push firmly on the brake pedal. Release the parking brake. Move the gear selector lever from NEUTRAL to FORWARD.

② Remove your right foot from the service brake pedal and put it on the accelerator pedal. Push down until the truck moves slowly forward. Remove your foot from the accelerator pedal and push down on the service brake pedal to stop the truck. The brakes should apply smoothly and equally.

※ **Be sure the travel area is clear behind the truck.**

③ Put the gear selector lever in the REVERSE travel position. Release the service brake and push down on the accelerator pedal until the truck moves slowly in the reverse direction. Remove your foot from the accelerator pedal and push down on the service brake pedal to stop the truck. The brakes should apply smoothly and equally.

④ Put the gear selector lever in FORWARD. Press the inching pedal fully down and hold. Depress the accelerator pedal. The truck should not move. Now, with the accelerator pedal still depressed, slowly release the inching pedal until the truck **Inches** forward smoothly and slowly.

※ **Report any problems.**

※ **When you have completed the operational tests, park and leave the truck according to standard shut down procedure as described in section 5 of this manual. Be sure to make a record of all maintenance and operating problems you find.**

7) LUBRICATION

(1) Truck chassis inspection and lubrication

Lubrication and inspection of the truck chassis components, including the steering wheels, steering axle linkage, steering cylinder, and wheel bearings are easier if the truck is raised and blocked up under the frame. Refer to page 7-51 for additional information on truck blocking and jacking. Also refer to page 7-45 for the location of grease fittings.

Inspect the steering cylinder piston rods, seals, and fasteners for damage, leaks, and looseness. Lubricate the steering axle linkage rod ends and linkage pivot points. Be sure to clean the grease fittings before lubricating, and remove the excess grease from all points after lubricating. Lubricate miscellaneous linkage as needed.

(2) Mast and tilt cylinder lubrication

Clean the fittings and lubricate the tilt cylinder rod end bushings (forward end) and both the base rod-end bushings (rear end). Clean and lubricate the mast mounting pin.

(3) Lift chains

Lubricate the entire length of the mast rail lift and carriage chains with HYUNDAI chain and cable lube.

8) AIR CLEANING

Always maintain a lift truck in a clean condition. Do not allow dirt, dust, lint, or other contaminants to accumulate on the truck. Keep the truck free from leaking oil and grease. Wipe up all oil spills. Keep the controls and floorboards clean, dry, and safe. A clean truck makes it easier to see leakage and loose, missing, or damaged parts, and helps prevent fires. A clean truck runs cooler. The environment in which a lift truck operates determines how often and to what extent cleaning is necessary.

For example, trucks operating in manufacturing plants that have a high level of dirt, dust, or lint (for example, cotton fibers or paper dust) in the air or on the floor or ground, require more frequent cleaning. The radiator especially may require daily air cleaning to ensure correct cooling.

If air pressure does not remove heavy deposits of grease, oil, etc., it may be necessary to use steam or liquid spray cleaner.

Lift trucks should be air cleaned at every PM interval, or more often if necessary.

Use an air hose with special adapter or extension, a control valve, and a nozzle to direct the air properly. Use clean, dry, low pressure, compressed air. Restrict air pressure to 2.0 kgf/cm^2 (30 psi), maximum (OSHA requirement).

⚠ Wear suitable eye protection and protective clothing when air cleaning. Never point the air nozzle at anyone.

Air clean the mast assembly, drive axle, radiator- from both counterweight and engine side, engine and accessories, drive line and related components, and steering axle and cylinder.

9) CRITICAL FASTENER TORQUE CHECKS

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

Critical items include:

- Drive axle mounting
- Cabin
- Drive and steering wheel mounting
- Tilt cylinder mounting and yokes
- Counterweight mounting
- Mast mounting and components

Refer to page 8-6 for torque specifications.

10) LIFT CHAIN MAINTENANCE

The chain system on the mast was designed for safe, efficient, and reliable transmission of lifting force from hydraulic cylinder to the forks. Safe use of your truck with minimum down time depends on the correct care and maintenance of the lift chains. Most complaints of unacceptable chain performance are a result of poor maintenance. Chains need periodic maintenance to give maximum service life.

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

(1) Lift chain inspection and measurement

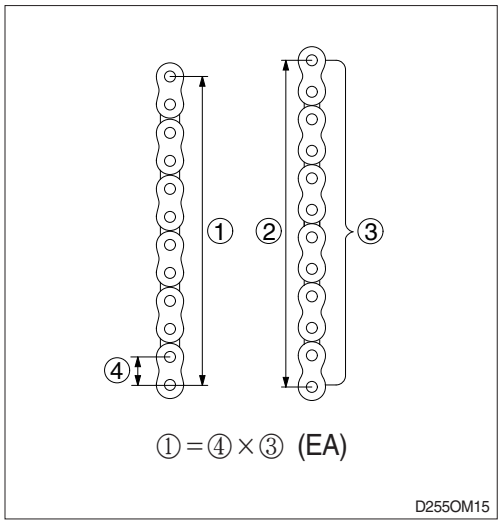
Inspect and lubricate the lift chains every 10 hours or daily and check tension every 250 hours or monthly. When operating in corrosive environments, inspect the chains every 50 hours. During the inspection, check for the following conditions:

- Rust and corrosion, cracked plates, raised or turned pins, tight joints, wear, and worn pins or holes.
- When the pins or holes become worn, the chain becomes longer. When a section of chain is 3% longer than a section of new chain, the chain is worn and must be discarded.
- Chain wear can be masured by using a chain scale or a steel tape measure. When checking chain wear, be sure to measure a segment of chain that moves over a sheave. Do not repair chains by cutting out the worn section and joining in a new piece. If part of a chain is worn, replace all the chains of both sides on a truck.

(2) Lift chain lubrication

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

(3) Lift chain wear and replacement criteria



① **New chain length**

The distance from the first pin counted to the last pin counted in a span while the chains are lifting a small load.

② **Worn chain length**

The distance from the first pin counted to the last pin counted in a span while the chains are lifting a small load.

③ **Span**

The number of pins in the length (segment) of chain to be measured.

④ **Pitch**

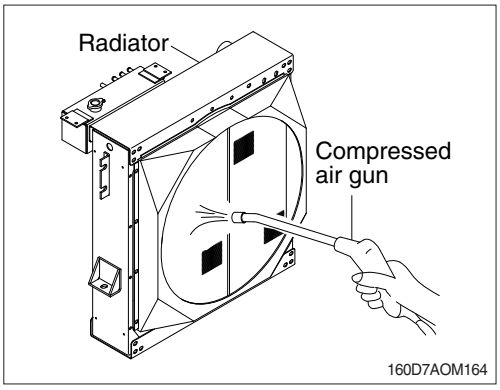
The distance from the center of one pin to the center of the next pin.

All chains must be replaced if any link has wear of 3% or more, or if any of the damaged conditions notes above are found during inspection. Order replacement chains from your HYUNDAI dealer. Replace all chains as a set. Do not remove factory lubrication or paint new chains. Replace anchor pins and worn or broken anchors when installing new chains. Adjust tension on new chains. Lubricate chains when they are installed on the mast.

※ **Please refer to your service manual for additional information on lift chain measurement and maintenance.**

11. HANDLING TRUCK IN EXTREMELY HOT PLACES

Pay careful attention particularly to the following points when handling the truck in extremely hot places.



1) Scale and rust form more easily in the cooling system, so wash with anticorrosion liquid. Always try to have clean and soft water circulating in the system.

2) Clogging of the radiator fins is one cause of overheating, so use air or water jets to clean the fins. When doing this, the air nozzle must be at right angles to the radiator.
   · Air pressure max : 2 kgf/cm² (30 psi)

3) Check the fan belt tension. If it is too slack, adjust the tension. (refer to the page 5-5.)

4) In case of overheating, do not stop the engine immediately.
   (1) Run the engine at low idling.
   (2) Open the hood to ventilate the engine compartment.
   (3) When the water temperature drops, stop the engine.
   (4) Check the cooling water level. If it is low, add more water.

⚠ **Wear safety glasses and a face shield when using compressed air. Never touch the radiator cap while the engine is hot. Steam may spurt out. Wait until the water temperature drops. It is extremely dangerous to try to check the fan belt tension while the engine is running. When inspecting the fan belt or other moving parts, or near such parts, always stop the engine first.**

12. COLD WEATHER OPERATION

1) PREPARATION FOR LOW TEMPERATURE

(1) Replace lubrication oil with oil of the prescribed viscosity.

(2) Fuel of low pour point must be used. ASTM D975 No.1 diesel fuel should be used at ambient temperature lower than -5 ˚C.

(3) Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 7-62.

⚠ Use ethylene glycol base antifreeze.
⚠ Use soft water (city water, etc.) as mixing water.
⚠ Cooling system must be thoroughly flushed before filling with antifreeze mixture.
⚠ Do not expose antifreeze to flame. It is inflammable.

※ **Dispose of old antifreeze mixture in locally approved manner.**

2) BATTERY

As the ambient temperature drops, the battery capacity will drop and the electrolyte may sometimes freeze if the battery charge is low. Maintain the battery at a charge level of over 75% and insulate it against cold temperature so that the truck can be readily started the next morning.

※ **When the electrolyte level is low, add distilled water in the morning before work instead of after the day's work. This is to prevent fluid from freezing at night.**

3) CARE AFTER DAILY OPERATION

(1) Drain water from the fuel system to prevent freezing.
(2) Fill the tank at the end of each day of operation to drive out moisture laden air to prevent condensation.
Do not fill the tank to top.

⚠ Explosive fumes may be present during refueling.

13. RECOMMENDATION TABLE FOR LUBRICANTS

1) NEW TRUCK

New truck uses following fuel, coolant and lubricant.

Description	Specification
Engine oil	SAE 10W-30/15W-40 (API CJ-4 class or better)
DEF/AdBlue®	ISO 22241 (32.5% high-purity urea and 67.5% deionized water)
Transmission oil	Engine oil SAE10W-30 (API CF4 class or better)
Drive axle gear oil	SAE 80W-90
Brake cooling oil	Donax TD
Hydraulic oil	ISO VG46/VG68, Hyundai genuine long life hydraulic oil ISO VG15, Conventional hydraulic oil★1
Grease	Lithium base grease NLGI No.2
Fuel	ASTM D975-No.2
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50% water

· SAE : Society of Automotive Engineers
· API : American petroleum Institute
· ISO : International Organization for Standardization
· NLGI : National Lubricating Grease Institute
· ASTM : American Sociery of Testing and Material
· DEF : Diesel Exhaust Fluid
DEF compatible with AdBlue®

★1 : Cold region
Russia, CIS, Mongolia

14. FUEL AND LUBRICANTS

Service point	Kind of fluid		Capacity ℓ (U.S. gal) 110D-9 130D-9	Capacity ℓ (U.S. gal) 160D-9	Ambient temperature ˚C (˚F) -50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil		14.2 (3.8)		★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
DEF/ AdBlue® tank	Mixture of urea and deionized water		37.8 (10.0)		ISO 22241 (High-purity urea + deionized water (32.5:67.5))
Torque converter transmission	Engine oil		16 (4.2)		SAE 10W-30 SAE 15W-40
Drive axle	Gear oil	STD	19 (5.0)		SAE 80W-90/API GL-5
		OPT 1	22.4 (5.9)		
		OPT 2	16.7 (4.4)		
Brake	Cooling oil		22 (5.8)		DONAX TD
Hydraulic tank	Hydraulic oil		115 (30.4)	124.3 (32.8)	★ISO VG 15 ISO VG 46 ISO VG 68
Cabin tilt hand pump	Hydraulic oil		0.7 (0.2)		
Fuel tank	Diesel fuel★1		195 (51.5)	260 (68.7)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (Grease nipple)	Grease		-	-	★NLGI NO.1 NLGI NO.2
Radiator	Antifreeze:Water 50:50		30 (7.9)		Ethylene glycol base permanent type ★Ethylene glycol base permanent type (60 : 40)

NOTES :

① SAE numbers given to engine oil should be selected according to ambient temperature.

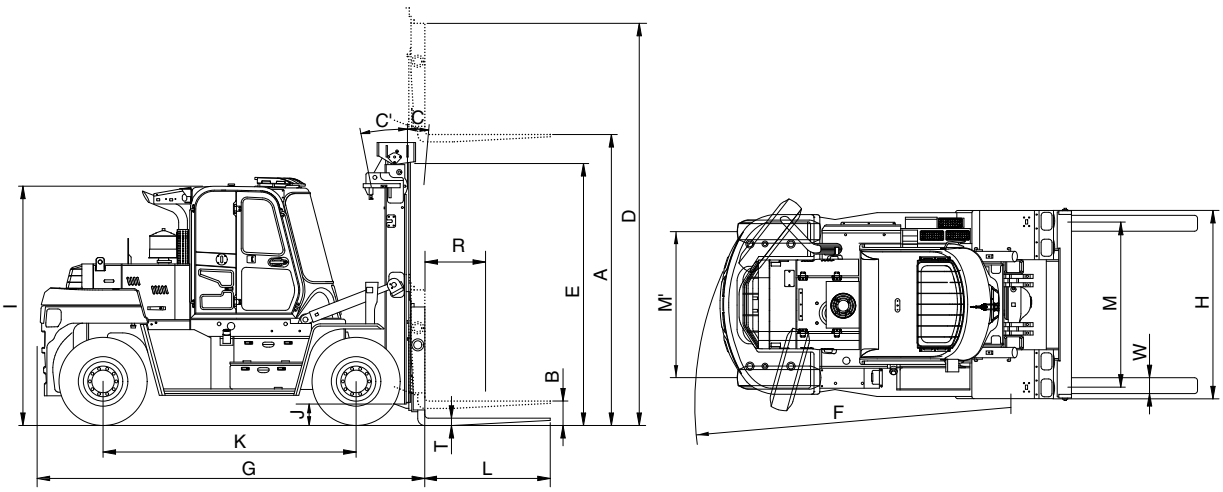
② For engine oil used in engine oil pan, use SAE 10W oil when the temperature at the time of engine start up is below 0 ˚C, even if the ambient temperature in daytime is expected to rise to 10 ˚C or more.

③ Use engine oil of API service class CJ-4.

★1 : Ultra low sulfur diesel
- sulfur content ≤ 15 ppm

★ : Cold region
Russia, CIS, Mongolia

1. SPECIFICATION TABLE



110D9SP011

Model			Unit	110D-9	130D-9	160D-9
Capacity			kg (lb)	11,000 (25000)	13,000 (29000)	16,000 (36000)
Load center		R	mm (in)	600 (24")	←	←
Weight(Unloaded)			kg	16274 (35880)	16991 (37460)	19842 (43740)
Fork	Lifting height	A	mm (ft·in)	3005 (9' 10")	3000 (9' 10")	3010 (9' 11")
	Free lift	B	mm (in)	0	←	←
	Lifting speed (Unload/Load)		mm/sec	510/440	510/430	450/350
	Lowering speed (Unload/Load)		mm/sec	460/510	←	410/430
	L×W×T	L,W,T	mm (in)	1350×200×75 (53.1×7.9×3.0)	1350×200×85 (53.1×7.9×3.3)	1350×200×90 (53.1×7.9×3.5)
Mast	Tilt angle (forward/backward)	C/C'	degree	15/12	←	←
	Max height	D	mm (ft·in)	4465 (14' 8")	←	4710 (15' 5")
	Min height	E	mm (ft·in)	3000 (9' 10")	←	3250 (10' 0")
Body	Travel speed (Unload)		km/h	39.5	←	33.3
	Gradeability (Load)		%	45.3	41.0	40.2
	Min turning radius (Outside)	F	mm (ft·in)	4350 (14' 3")	←	4895 (16' 1")
ETC	Max hydraulic pressure		kgf/cm²	210	←	←
	Hydraulic oil tank		ℓ (USgal)	115 (30.4)	←	124.3 (32.8)
	Fuel tank		ℓ (USgal)	195 (51.5)	←	260 (68.7)
Overall length		G	mm (ft·in)	4570 (15' 0")	4580 (15' 0")	5080 (16' 8")
Overall width		H	mm (ft·in)	2777 (9' 1")	←	2497 (8' 2")
Cabin height		I	mm (ft·in)	2890 (9' 6")	←	2930 (9' 7")
Ground clearance		J	mm (in)	250 (9.8")	←	←
Wheel base		K	mm (ft·in)	3050 (10' 0")	←	3450 (11' 4")
Wheel tread front/rear		M/M'	mm (ft·in)	1842 / 1910 (6' 1" / 6' 3")	←	1842 / 1960 (6' 1" / 6' 5")
Drawbar pull			kg (lb)	12356 (27240)	12500 (27560)	13243 (29200)

2. SPECIFICATION FOR MAJOR COMPONENTS

1) 110/130D-9

(1) ENGINE

Item	Unit	Specification
Model	-	Cummins QSB6.7
Type	-	4 cycle turbocharged, charger air cooled diesel engine
Cooling Method	-	Water cooling
Number of cylinders and arrangement	-	6 cylinders, In-line
Firing order	-	1-5-3-6-2-4
Combustion chamber type	-	Direct injection
Cylinder bore × stroke	mm (in)	107 × 124 mm (4.21" × 4.88")
Piston displacement	cc (cu in)	6690 (409)
Compression ratio	-	17.3 : 1
Rated gross horse power	ps/rpm	165.8/2300
Maximum gross torque at rpm	kgf · m/rpm	74.7/1500
Engine oil quantity	ℓ (U.S.gal)	14.2 (3.8)
Dry weight	kg (lb)	520 (1146)
High idling speed	rpm	2250 ± 50
Low idling speed	rpm	600~1200
Rated fuel consumption	g/ps.hr	168
Starting motor	V-kW	DENSO, 24-3.7
Alternator	V-A	24-70
Battery	V-AH	24-100

2) MAIN PUMP

Item	Unit	Specification
Type	-	Variable displacement axial piston pump
Capacity	cc/rev	74+63
Maximum operating pressure	bar	300
Rated speed (Max/Min)	rpm	2800/300

3) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	Sectional
Operating method	-	Hydraulic pilot
Main relief valve pressure	bar	210/165
Flow capacity	lpm	180

(4) STEERING UNIT

Item	Unit	Specification
Type	-	Load sensing/Non load reaction/Dynamic signal
Capacity	cc/rev	369
Rated flow	lpm	45.4

(5) POWER TRAIN DEVICES

Item			Specification		
Torque converter	Model		05 W 340 (ZF SACH)		
	Type		3 Element, 1 stage, 2 phase		
	Stall ratio		2.362 : 1		
Transmission	Type		Full auto, power shift		
	Gear shift (FR/RR)		3/3		
	Adjustment		Electrical single lever type		
	Overhaul ratio	FR	1 : 5.630	2 : 2.396	3 : 0.994
		RR	1 : 5.647	2 : 2.404	3 : 0.997
Axle	Type		Front-wheel drive type, fixed location		
	Gear ratio		11.73 : 1		
	Gear		Ring & Pinion gear type		
Wheels	Q'ty (FR/RR)		Double : 4/2		
	Front (drive)		10.00-20-16 PR		
	Rear (steer)		10.00-20-16 PR		
Brakes	Travel		Front wheel, wet disc brake		
	Parking		Axle pinion, Caliper brake, hydraulic released		
Steering	Type		Full hydraulic, power steering		
	Steering angle		76˚ to both right and left angle, respectively		

2) 160D-9

(1) ENGINE

Item	Unit	Specification
Model	-	Cummins QSB6.7
Type	-	4 cycle turbocharged, charger air cooled diesel engine
Cooling Method	-	Water cooling
Number of cylinders and arrangement	-	6 cylinders, In-line
Firing order	-	1-5-3-6-2-4
Combustion chamber type	-	Direct injection
Cylinder bore × stroke	mm (in)	107 × 124 mm (4.21" × 4.88")
Piston displacement	cc (cu in)	6690 (409)
Compression ratio	-	17.3 : 1
Rated gross horse power	ps/rpm	165.8/2300
Maximum gross torque at rpm	kgf · m/rpm	74.7/1500
Engine oil quantity	ℓ (U.S.gal)	14.2 (3.8)
Dry weight	kg (lb)	520 (1146)
High idling speed	rpm	2250 ± 50
Low idling speed	rpm	600~1200
Rated fuel consumption	g/ps.hr	168
Starting motor	V-kW	DENSO, 24-3.7
Alternator	V-A	24-70
Battery	V-AH	24-100

2) MAIN PUMP

Item	Unit	Specification
Type	-	Variable displacement axial piston pump
Capacity	cc/rev	74+63
Maximum operating pressure	bar	300
Rated speed (Max/Min)	rpm	2800/300

3) MAIN CONTROL VALVE

Item	Unit	Specification
Type	-	Sectional
Operating method	-	Hydraulic pilot
Main relief valve pressure	bar	210/165
Flow capacity	lpm	180

(4) STEERING UNIT

Item	Unit	Specification
Type	-	Load sensing / Non load reaction / Dynamic signal
Capacity	cc/rev	369
Rated flow	lpm	45.4

(5) POWER TRAIN DEVICES

Item			Specification		
Torque converter	Model		05 W 340 (ZF SACH)		
	Type		3 Element, 1 stage, 2 phase		
	Stall ratio		2.362 : 1		
Transmission	Type		Full auto, Power shift		
	Gear shift (FR / RR)		3/3		
	Adjustment		Electrical single lever type		
	Overhaul ratio	FR	1 : 5.630	2 : 2.396	3 : 0.994
		RR	1 : 5.647	2 : 2.404	3 : 0.997
Axle	Type		Front-wheel drive type, fixed location		
	Gear ratio		12.7 : 1		
	Gear		Ring & pinion gear type		
Wheels	Q'ty (FR / RR)		Double : 4/2		
	Front (drive)		12.00-20-18PR		
	Rear (steer)		12.00-20-18PR		
Brakes	Travel		Front wheel, Wet disk brake		
	Parking		Axle pinion, caliper brake, hydraulic released		
Steering	Type		Full hydraulic, power steering		
	Steering angle		76° to both right and left angle, respectively		

3. TIGHTENING TORQUE

NO	Item		Size	kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut (bracket-frame)	M24×3.0	100±15	723±109
2		Engine mounting bolt (engine-bracket)	M12×1.75	12.3±2.4	89.0±17.4
3		Radiator mounting bolt, nut	M12×1.75	12.8±3.0	92±21.7
4	Hydraulic system	Hydraulic pump mounting socket bolt	M12×1.75	14.7±2.2	10.6±26.0
5		MCV mounting bolt, nut	M10×1.5	6.9±1.4	49.9±10.1
6		Steering unit mounting bolt	M10×1.5	6.9±1.4	49.9±10.1
7	Power train system	Transmission mounting bolt, nut	M16×2.0	100±15	723±109
8		Torque converter mounting socket bolt	M10×1.5	4.5±0.6	32.5±4.3
9		Drive axle mounting bolt, nut	M24×2.0	100±15	723±109
10		Steering axle mounting bolt, nut	M24×3.0	100±15	723±109
11		Front/Rear wheel mounting nut	M22×1.5	83.2±10	602±72.3
12		Propeller shaft (To D/Axle & T/M)	1/2-20UNF	15.0±2.0	108±14.5
13	Others	Counterweight mounting bolt 1	M30×3.5	199±29.9	1440±216
		Counterweight mounting bolt 2	M24×3.0	100±15	723±109
14		Operator's seat mounting nut	M 8×1.25	3.4±0.7	24.6±5.1
15		Cab mounting nut	M16×2.0	7.5	54.2
16		Mast mounting pin fix bolt	M12×1.75	12.5±1.3	90.4±9.4

1. ENGINE SYSTEM

Trouble symptom	Probable cause	Remedy
Oil pressure warning lamp fails to go out.	· Low oil level in oil pan. · Oil filter element clogged. · Loose or worn oil pipe joint leaks oil.	· Add oil. · Replace element. · Check and repair.
Radiator pressure valve spouts steam.	· Lack of cooling water or water leakage. · Loosen fan belt. · Dust and scale accumulated in cooling system.	· Add water or repair. · Adjust belt. · Change water and clean the interior of cooling system.
Water temp gauge indicates red range, on right.	· Radiator fin clogged or fin damaged. · Thermostat or water temp gauge faulty. · Radiator filler cap loosening.	· Clean or repair. · Replace · Retighten cap or replace packing.
Water temp gauge indicates red range, on left.	· Thermostat faulty. · Water temperature gauge faulty.	· Replace · Replace
Engine fails to start.	· Lack of fuel. · Air mixed in fuel system. · Fuel injection pump or nozzle defective. · Starting motor rotates slowly. · Engine compression insufficient. · Valve clearance out of adjustment.	· Refill fuel. · Bleed air. · Replace. · See " Electrical system." · Contact dealer · Adjust clearance
Engine emits whitish or bluish smoke.	· Excessive quantity of oil in oil pan. · Poor quality of fuel.	· Reduce oil quantity. · Replace with specified fuel.
Abnormal sound heard. (Fuel combustion or mechanical sound)	· Poor quality of fuel. · Overheating · Muffler interior damaged. · Excessively large valve clearance.	· Replace with specified fuel. · See Symptom "Radiator pressure valve spouts steam". · Replace · Adjust clearance.

2. ELECTRICAL SYSTEM

Trouble symptom	Probable cause	Remedy
Lamps dimming even at maximum engine speed.	· Faulty wiring.	· Check for loose terminal and disconnected wire.
Lamps flicker during engine operation.	· Improper belt tension.	· Adjust belt tension.
Charge lamp does not light du-ring normal engine operation.	· Charge lamp defective. · Faulty wiring.	· Replace. · Check and repair.
Alternator makes abnormal sounds.	· Alternator defective.	· Replace
Starting motor fails to run.	· Faulty wiring. · Insufficient battery voltage.	· Check and repair. · Recharge battery.
Starting motor pinion repeats going in and out.	· Insufficient battery voltage.	· Recharge battery.
Excessively low starting motor speed.	· Insufficient battery voltage. · Starting motor defective.	· Recharge battery. · Replace
Starting motor comes to a stop before engine starts up.	· Faulty wiring. · Insufficient battery voltage.	· Check and repair. · Recharge battery.
Heater signal does not become red. * Heater functions only when the coolant temperature is below 0 ˚C	· Faulty wiring. · Glow plug damaged.	· Check and repair. · Replace
Engine oil pressure warning lamp does not light when enigne is stopped (with starting switch left in"ON" position).	· Caution lamp defective. · Caution lamp switch defective.	· Replace · Replace

3. TORQUE FLOW SYSTEM

Trouble symptom	Probable cause	Remedy
1. Excessive oil temperature rise 1) Torque converter	· Improper oil level.	· Check oil level. Add or drain oil as necessary.
	· Impeller interfering with surroundings.	· After draining oil from oil tank and transmission, check and replace interfering parts.
	· Stator and free wheel malfunctioning.	· Check enigne (stalling) speed. If necessary, replace.
	· Air sucked in.	· Check the inlet side joint or pipe. If necessary, retighten joint or replace gasket.
	· Water intruding into transmission case	· Check drained oil. If necessary, change oil.
	· Bearing worn or seizing.	· Disassemble, inspect, repair or replace.
	· Gauge malfunctioning.	· Check and, if necessary, replace.
2) Transmission	· Clutch dragging.	· Check to see whether or not truck moves even when transmission is placed in neutral position. If so, replace clutch plate.
	· Bearing worn or seized.	· Disassemble, check and replace.
2. Noise operation 1) Torque converter	· Cavitation produced.	· Change oil, replace parts leaking air.
	· Flexible plate damaged.	· Listen to rotating sound at lowspeed operation. If necessary, repacle flexible plate.
	· Bearing damaged or worn.	· Disassemble, check and replace.
	· Gear damaged.	· Disassemble, check and replace.
	· Impeller interfering with surroundings.	· Check impeller or check drained oil for mixing of foreign matter. If necessary, change oil.
	· Bolt loosening.	· Disassemble and check. If necessary, retighten or repalce.
	· Spline worn.	· Disassemble, check and replace.
	· Noise gear pump operation.	· Disassemble, check and replace.
2) Transmission	· Dragging caused by seizing clutch.	· Check to see whether or not truck moves even when transmission is in neutral position. If so, replace clutch plate.
	· Bearing worn or seizing.	· Disassemble, check and replace
	· Gear damaged.	· Disassemble, check and replace
	· Bolt loosening.	· Disassemble, check and retighten or replace
	· Spline worn.	· Disassemble, check and replace

Trouble symptom	Probable cause	Remedy
3.Low output power		
1) Torque converter	· Insufficient hydraulic pressure :	
	- Low oil level.	- Check oil level and add oil
	- Air sucked in.	- Check joints and pipes. If necessary, retighten joint or replace packing.
	- Oil filter clogging.	- Check and replace
	- Oil pump worn. (Low delivery flow)	- Check oil pressure. If necessary replace pump.
	- Regulator valve coil spring fatigued.	- Check spring tension. If necessary, replace.
	- Control valve spool malfunctioning.	- Disassemble, check and repair or replace.
	- Piston or O-ring worn.	- Disassemble, check measure and replace.
	· Stator free wheel cam damaged.	- Check stalling speed. (Increased engine load will cause excessive drop of stalling speed.)
		- Check oil temperature rise. If any, replace free wheel.
2) Transmission	· Flexile plate deformed	· Replace flexible plate
	· Stator free wheel seizing.	- Check temperature plate. (No-load will cause temperature rise)
		- Replace free wheel if a drop of starting output is found.
	· Impeller damaged for interfering with the surroundings.	- Check drained oil for foreign matter. If any, change oil.
	· Use of poor quality of oil or arising of air bubbles.	- Check and change oil.
	- Air sucked in from inlet side.	- Check joints and pipes. If necessary, retighten joint or replace packing.
	- Low torque converter oil pressure accelerates generation of air bebbles.	- Check oil pressure.
	- Oil mixing with water.	- Check drained oil and change oil.
	- Inching rod out of adjustment.	- Check and adjust.
	· Clutch slipping	
	- Lowering of weight.	- Check oil pressure.
	- Piston ring or O-ring worn.	- Disassemble, check, measure and replace.
	- Clutch piston damaged.	- Disassemble, check and replace.
	- Clutch plate seizing or dragging.	- Check to see whether or not truck moves even when transmission is in neutral position. If so, replace.

Trouble symptom	Probable cause	Remedy
4.Unusual oil pressure		
1) Oil pressure is high	· Control valve malfunctioning.	(1)Check for spool operation. If necessary, replace valve. (2)Check for clogging of small hole in valve body. If necessary, clean or repair.
	· Cold weather. (high oil viscosity)	· When atmospheric temp is below freezing point (when normal oil pressure is recovered if heated to 60 ~ 80˚C), change oil.
	· Use of improper oil.	· Check and change oil.
2) Oil pressure is low	· Gear pump malfunctioning(worn).	· Disassemble, check and replace.
	· Oil leaks excessively : (1)Control valve oil spring defective.	· Check spring tension (see spring specification). If necessary replace.
	(2)Control valve spool defective.	· Disassemble, check, and repair or replace valve.
	· Air sucked in.	· Check joints and pipes. If necessary, retighten joint or replace packing.
	· Low oil level.	· Check oil level and add oil.
	· Oil filter clogging.	· Check and replace.
3) Transmission	· Oil leaks excessively.	· Disassemble, check (piston ring and O-ring for wear and other defects), and replace.
5.Power is not transmitted		
1) Torque converter	· Clutch plate damaged.	· Check for damage by listening to abnormal sounds at a low converter speed and replace.
	· Low oil level.	· Check oil level and add oil
	· Oil pump driving system faulty.	· Disassemble and check for wear of pump gear, shaft and spline. Replace defective parts.
	· Shaft broken.	· Check and replace.
	· Lack of oil pressure.	· Check oil pump gear for wear and for oil suction force. If necessary, replace pump.
2) Transmission	· Low oil level.	· Check oil level and add oil.
	· Inching valve and link lever improperly positioned.	· Check measure and adjust.
	· Forward/reverse spool and link lever improperly positioned.	· Check and adjust.
	· Clutch fails to disengage : (1)Clutch case piston ring defective.	· Disassemble, check and replace
	(2)Main shaft plug slipping out.	· Disassemble, check and repair or replace
	· Clutch seizing.	· Check to see whether or not truck moves even then transmission is in neutral position. If so, replace.
	· Shaft broken off.	· Disassemble, check(main shaft, etc.), and replace.
	· Clutch drum damaged (spring groove).	· Disassemble, check and replace.
	· Clutch snap ring broken.	· Disassemble, check and repair or replace.

Trouble symptom	Probable cause	Remedy
5. Power is not transmitted (Continue)	· Foreign matter intruding into oil passage to clutch. · Shaft spline worn.	· Disassemble, check and repair or replace. · Disassemble, check and replace.
6. Oil leakage (Transmission and torque converter)	· Oil leaks from oil seal.	· Disassemble and check for wear of seal lips and mating sliding surfaces (pump boss, coupling etc.) Replace oil seal, pump boss, coupling, etc.
	· Oil leaks from case joining surfaces.	· Check and retighten or replace packing.
	· Oil leaks from joint or pipe.	· Check and repair or replace gasket.
	· Oil leaks from drain plug.	· Check and retighten or gasket.
	· Oil leaks from a crack.	· Check and replace cracked part.

4. STEERING SYSTEM

Trouble symptom	Probable cause	Remedy
1. Steering wheel drags.	· Low oil pressure. · Bearing faulty. · Spring spool faulty. · Reaction plunger faulty. · Ball-and-screw assembly faulty. · Sector shaft adjusting screw excessively tight. · Gears poorly meshing. · Flow divider coil spring fatigued.	· Check locknut. Repair. · Clean or replace. · Clean or replace. · Replace. · Clean or replace. · Adjust. · Check and correct meshing. · Replace.
2. Steering wheel fails to return smoothly.	· Bearing faulty. · Reaction plunger faulty. · Ball-and-screw assy faulty. · Gears poorly meshing.	· Clean or replace. · Replace. · Clean or replace. · Check and correct meshing.
3. Steering wheel turns unsteadily. Steering system makes abnormal sound or vibration.	· Locknut loosening. · Metal spring deteriorated. · Gear backlash out of adjustment. · Air in oil circuit.	· Retighten. · Replace. · Adjust. · Bleed air.
4. Abnormal sound heard when steering wheel is turned fully	Valve · Faulty. (Valve fails to open.) Piping · Pipe (from pump to power steering cylinder) dented or clogged.	· Adjust valve set pressure and check for specified oil pressure. · Repair or replace.
5. Piping makes abnormal sounds.	Oil pump · Lack of oil. · Oil inlet pipe sucks air. · Insufficient air bleeding.	· Add oil. · Repair. · Bleed air completely.
6. Valve or valve unit makes abnormal sounds.	Oil pump · Oil inlet pipe sucks air. Valve · Faulty. (Unbalance oil pressure) Piping · Pipe (from pump to power steering) dented or clogged. · Insufficient air bleeding.	· Repair or replace. · Adjust valve set pressure and check specified oil pressure. · Repair or replace. · Bleed air completely.
7. Insufficient or variable oil flow.	· Flow control valve orifice clogged.	· Clean.
8. Insufficient or variable discharge pressure.	Piping · Pipe (from tank to pipe) dented or clogged.	· Repair or replace.

5. BRAKE SYSTEM

Trouble symptom	Probable cause	Remedy
1. Insufficient braking force	· Hydraulic system leaks oil. · Hydraulic system sucks air. · Disk worn. · Brake valve malfunctioning · Hydraulic system clogged	· Repair and add oil. · Bleed air. · Replace · Repair or replace. · Clean.
2. Brake acting unevenly. (Truck is turned to one side during braking.)	· Tires unequally inflated. · Brake out of adjustment. · Disk surface roughened. · Wheel bearing out of adjustment. · Hydraulic system clogged.	· Adjust tire pressure. · Adjust. · Repair by polishing or replace. · Adjust or replace. · Clean.
3. Brake trailing.	· Pedal has no play. · Piston cup faulty. · Brake valve return port clogged. · Hydraulic system clogged. · Wheel bearing out of adjustment.	· Adjust. · Replace. · Clean. · Clean. · Adjust or replace.
4. Overheat	· Cooling oil insufficient. · Cooling system malfunctioning. · Excessive braking.	· Add. · Repair or replace. · Use engine brake.

6. HYDRAULIC SYSTEM

Trouble symptom	Probable cause	Remedy
1. Large fork lowering speed.	· Seal inside control valve defective. · Oil leaks from joint or hose. · Seal inside cylinder defective.	· Replace spool or valve body. · Replace. · Replace packing.
2. Large spontaneous tilt of mast.	· Tilting backward : Check valve defective. · Tilting forward : Tilt lock valve defective. · Oil leaks from joint or hose. · Seal inside cylinder defective.	· Clean or replace. · Clean or replace. · Replace. · Replace seal.
3. Slow fork lifting or slow mast tilting.	· Lack of hydruilc oil. · Hydrauic oil mixed with air. · Oil leaks from joint or hose. · Excessive restriction of oil flow on pump suction side. · Relief valve fails to keep specified pressure. · Poor sealing inside cylinder. · High hydraulic oil viscosity. · Mast fails to move smoothly. · Oil leaks from lift control valve spool. · Oil leaks from tilt control valve spool.	· Add oil. · Bleed air. · Replace. · Clean filter. · Adjust relief valve. · Replace packing. · Change to SAE10W, class CF engine oil. · Adjust roll to rail clearance. · Replace spool or valve body. · Replace spool or valve body.
4. Hydraulic system makes abnormal sounds.	· Excessive restriction of oil flow pump suction side. · Gear or bearing in hydraulic pump defective.	· Clean filter. · Replace gear or bearing.
5. Control valve lever is locked	· Foreign matter jammed between spool and valve body. · Valve body defective.	· Clean. · Tighten body mounting bolts uniformly.
6. High oil temperature.	· Lack of hydraulic oil. · High hydraulic oil viscosity. · Oil filter clogged.	· Add oil. · Change to SAE10W, class CF engine oil. · Clean filter.

7. MAST AND FORK

1) MAST

Problem	Cause	Remedy
Forks fail to lower.	· Deformed mast or carriage.	· Disassemble, repair or replace.
Fork fails to elevate	· Faulty hydraulic equipment.	· See troubleshooting hydraulic pump and cylinders in section 6, hydraulic system.
	· Deformed mast assembly.	· Disassemble mast and replace damaged parts or replace complete mast assembly.
Slow lifting speed and insufficient handling capacity.	· Faulty hydraulic equipment.	· See troubleshooting hydraulic pump and cylinders in section 6, hydraulic system.
	· Deformed mast assembly.	· Disassemble mast and replace damaged parts or replace complete mast assembly.
Mast fails to lift smoothly.	· Deformed masts or carriage.	· Disassembly, repair or replace.
	· Faulty hydraulic equipment.	· See Troubleshooting Hydraulic Cylinders, pump and control valve in section 6, hydraulic system.
	· Damaged load and side rollers.	· Replace.
	· Unequal chain tension between LH & RH sides.	· Adjust chains.
	· LH & RH mast inclination angles are unequal. (Mast assembly is twisted when tilted)	· Adjust tilt cylinder rods.
Abnormal noise is produced when mast is lifted and lowered.	· Broken load roller bearings.	· Replace.
	· Broken side roller bearings.	· Replace.
	· Deformed masts.	· Disassemble, repair or replace.
	· Bent lift cylinder rod.	· Replace.
	· Deformed carriage.	· Replace.
	· Broken sheave bearing.	· Replace.
Abnormal noise is produced during tilting operation.	· Insufficient lubrication of anchor pin, or worn bushing and pin.	· Lubricate or replace.
	· Bent tilt cylinder rod.	· Replace.

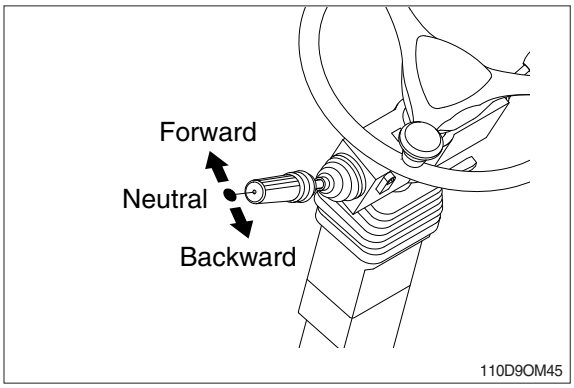
2) FORKS

<table>
<tr><th>Problem</th><th>Cause</th><th>Remedy</th></tr>
<tr><td>Abrasion</td><td>Long-time operations causes the fork to wear and reduces the thickness of the fork.
Inspection for thickness is needed.
· Wear limit : Must be 90% of fork thickness</td><td>If the measured value is below the wear limit, replace fork.</td></tr>
<tr><td>Distortion</td><td>Forks are bent out of shape by a number of reasons such as overloading, glancing blows against walls and objects, and picking up load unevenly.
· Difference in fork tip height
<table><tr><th>Fork length (mm)</th><th>Height difference (mm)</th></tr><tr><td>equal or below 1500</td><td>3</td></tr><tr><td>above 1500</td><td>6</td></tr></table></td><td>If the measured value exceeds the allowance, replace fork.</td></tr>
<tr><td>Fatigue</td><td>Fatigue failure may result from the fatigue crack even though the stress to fork is below the static strength of the fork. Therefore, a daily inspection should be done.
· Crack on the fork heel.
· Crack on the fork weldments.</td><td>Repair fork by expert.
In case of excessive distortion, replace fork.</td></tr>
</table>

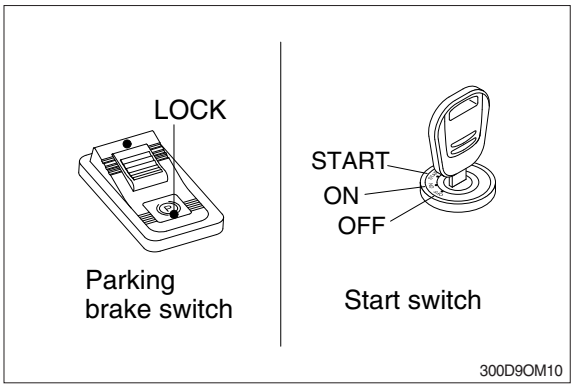
1. ENGINE SYSTEM

1) EASE OF STARTING, NOISE

(1) Set gear selector lever at NEUTRAL.

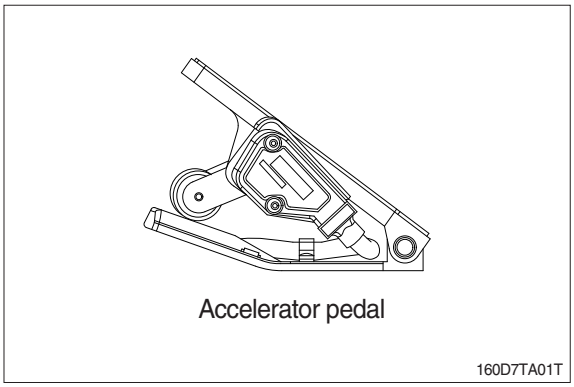


(2) Put the parking brake switch in LOCK position.
(3) Turn ON start switch, automatically heating operated.
(4) When preheater pilot lamp goes out, turn start switch to START, and start engine.
※ **When engine starts, check if it starts smoothly, and if it makes any abnormal noise.**



2) IDLING

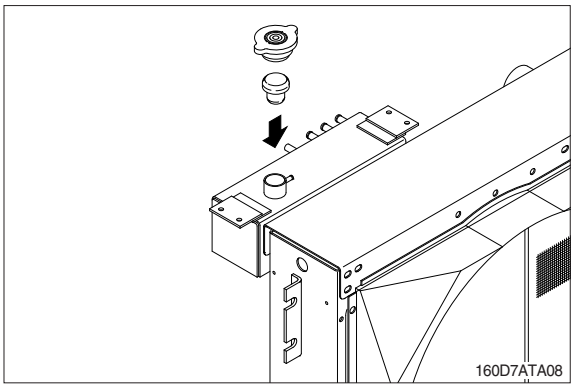
(1) After warming up engine, run at idling.
(2) Check that engine maintains steady, smooth rotation without gasping, abnormal noise, abnormal explosions, or irregular vibration.
(3) Check that idling speed is within specified range.
(4) Idle rpm : SEE 8. SPECIFICATION



3) WHEN ACCELERATOR PEDAL IS DEPRESSED

(1) Check that accelerator pedal does not catch when depressed.
(2) Check that engine speed increases in accordance with amount pedal is depressed.
(3) When doing this, check that engine speed changes without gasping, abnormal noise, abnormal explosions, or irregular vibration.
(4) Check that exhaust gas is colorless when the engine is idling, and a thin black color when accelerator pedal is depressed.
(5) Max speed : SEE SECTION 8. SPECIFICATIONS

4) SURGE TANK CAP



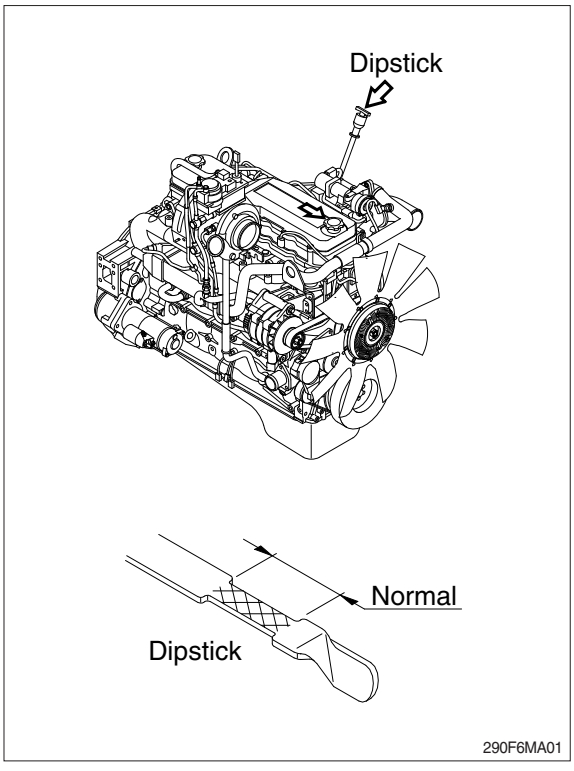
(1) Push pressure regulator spring with finger and check that tension is correct.
(2) Pull negative pressure valve, and check that it is closed when released.
(3) If packing is damaged, replace whole radiator cap assembly.

⚠ **While the coolant in the radiator is retained hot temperature, do not open the surge tank cap.**
It will gush out the hot water and someone might get scalded or severe injured.

5) FUEL FILTER (DIESEL)

(1) The fuel filter cartridge cannot be inspected from the outside, so replace it periodically (refer to SECTION 7. MAINTENENCE AND LUBRICATION).
(2) Always use HYUNDAI Forklift genuine parts when replacing the element.
(3) After replacing the element, run the engine and check for oil leakage from the filter mount.

6) ENGINE OIL



(1) Check oil level with dipstick and add oil if necessary.
(2) Check oil for discoloration or deterioration. Change oil if discolored or deteriorated.
(3) Engine oil quantity : 14.2 ℓ (3.8 U.S. gal)

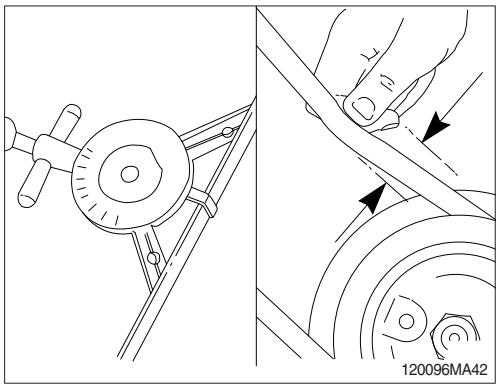
7) ENGINE OIL FILTER

The condition of the oil filter cartridge cannot be inspected from the outside so replace the engine oil filter (refer to section 7. Maintenence and lubrication).
Use a filter wrench and remove the whole cartridge assembly.

⚠ **If a spilt oil on the engine is left as it is after replacing the engine oil filter, there is dangerous material for a fire.**
Make sure that the spilt oil is wiped thoroughly away.

8) CHECK FAN BELT TENSION

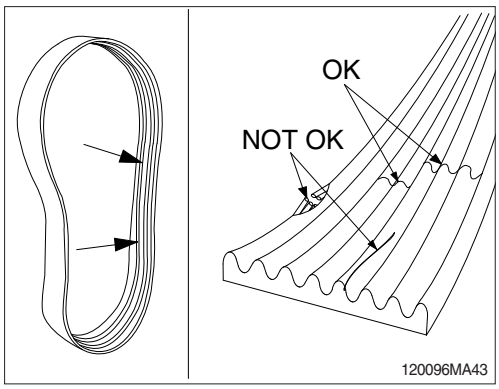
(1) An deflection method can be used to check belt tension by applying 11 kgf (25 lbf) force between the pulleys on V-belts. If the deflection is more than one belt thickness per foot of pulley center distance, the belt tension must be adjusted.



(2) Inspect the fan belt for damage.

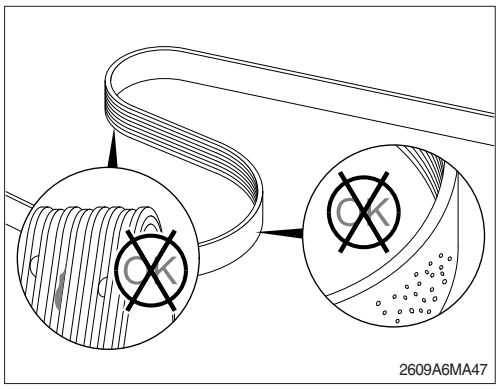
① Transverse (across the belt) cracks are acceptable.

② Longitudinal (direction of belt ribs) cracks that intersect with transverse cracks are not acceptable.



③ Inspect the belt
- Embedded debris
- Uneven/excessive rib wear
- Exposed belt cords
- Glazing (high heat)

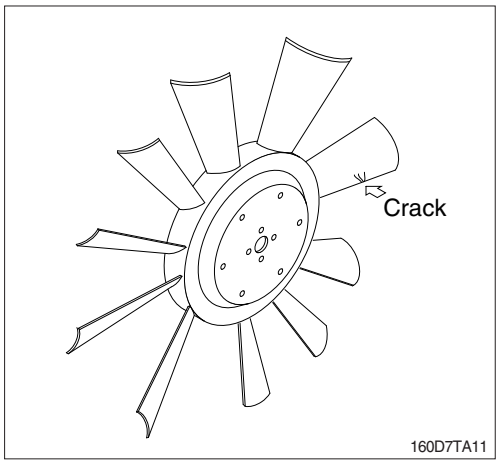
※ **If any of the above conditions are present, the belt is unacceptable for reuse and must be replaced.**



9) FAN

Move fan backwards and forwards by hand to check for looseness.

Tighten mounting bolt with a spanner.



2. DRIVE SYSTEM

1) GEAR SELECTOR LEVER

(1) Neutral starting

Engine can be started only when the gear selector lever is in neutral position.

(2) Shifting forward/reverse

① Forward

Push the lever forward then forward solenoid valve operates and oil comes to forward clutch thus the truck will run forward.

② Reverse

Pull the lever backward then reverse solenoid valve operates and oil comes to reverse clutch thus the truck will run backward.

2) OIL LEAKAGE

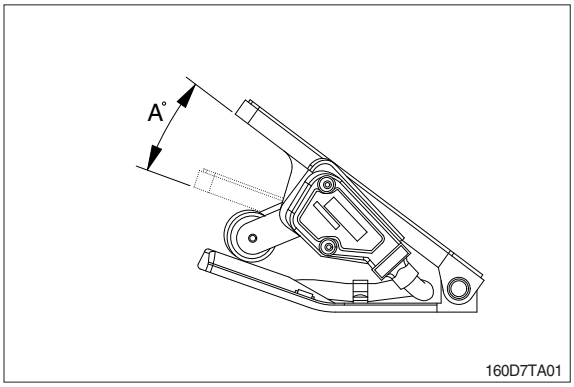
Check that there is no oil leakage from torque converter, transmission or control valve. If oil oozes out and forms drops, replace packing.

3) ADJUSTMENT OF PEDAL

(1) Accelerator pedal

Pedal operating range is "A". If the range is differ much from specification, replace the pedal immediately.

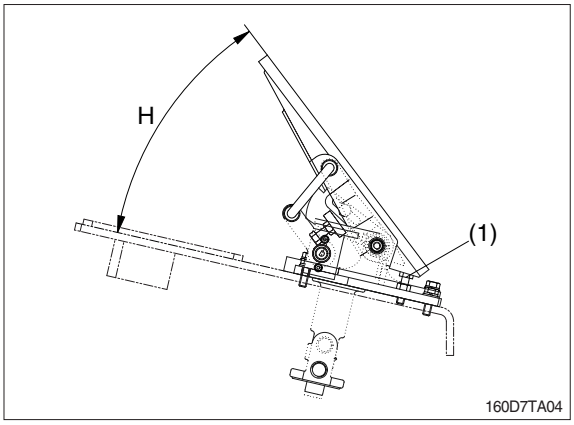
· Operating angle(A) : 17.5±2°



(2) Brake pedal

· Adjust stopper bolt (1) so that pedal angle is "H".

· Pedal angle (H) : 35±1°



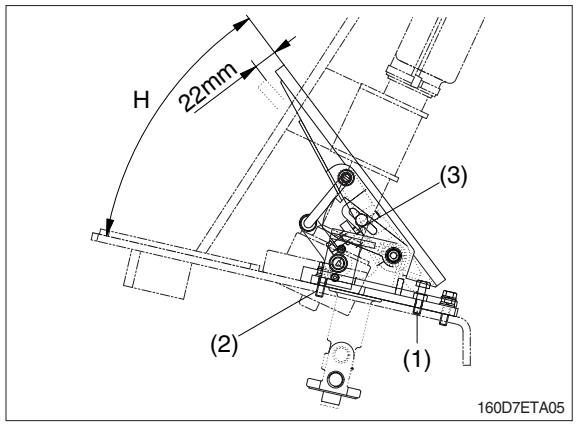
(3) Inching pedal

· Adjust stopper bolt (1) so that pedal angle is "H" (voltage : 1±0.1V).

- Pedal angle (H) : 35°

· When fully pedaled, voltage is controlled to 3.5±0.1V.

· Adjust bolt (3) so that brake pedal interconnects with inching pedal at inching pedal stroke, 22 mm (0.9 in).



3. TRAVEL SYSTEM

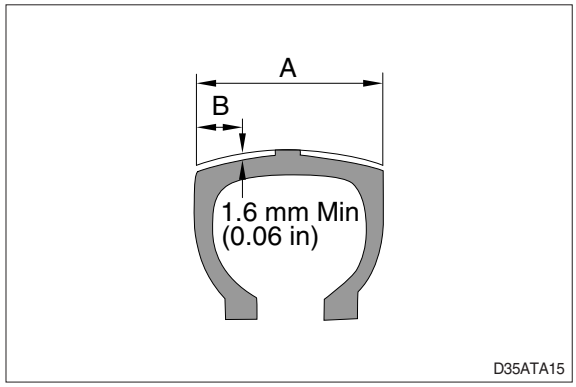
1) TIRES

(1) Check tire pressure using tire gauge : SEE page 5-3 CHECK BEFORE STARTING ENGINE.

(2) Check visually for cracks and damage to tread and side wall. If crack or damage is serious, replace tire.

(3) Wear
Measure tread of pneumatic tires (tires with air). Depth of tread must be at least 1.6 mm (0.06 in) at point 1/4 across width of tread. A/B≒4.

(4) Check tire visually for uneven wear, stepped wear or any other abnormal wear. Check also for pieces stuck in tire.



2) HUB NUTS

Use wrench to check for loose hub nuts.
Tighten any loose hub nuts to specified tightening torque : SEE SECTION 8. SPECIFICATIONS

3) RIM SIDE RING

Check rim side ring for deformation or cracks. Check visually or use crack detection method.
・Rear rim connecting nut torque : SEE SECTION 8. SPECIFICATIONS

4) STEERING AXLE

(1) Push axle in from one side or measure front to rear clearance with feeler gauge. Check that clearance is within 2mm. If clearance is more than 2mm, insert shim to reduce clearance to within 0.7 mm.
・Mounting bolt torque : SEE SECTION 8. SPECIFICATIONS

(2) Measure clearance between center pin and bushing. Check that clearance is within 0.5 mm (0.02 in) and that there is an oil groove on the bushing.

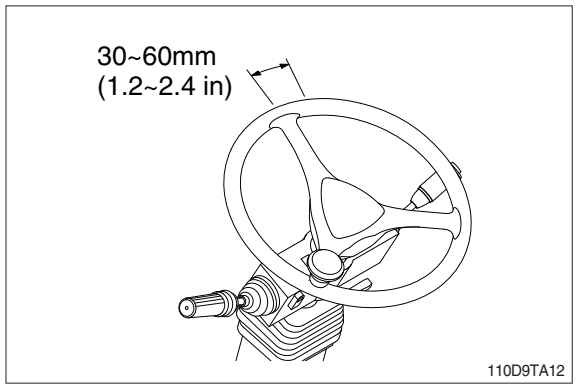
5) DRIVE AXLE

Check that there is no deformation or crack around mounting bolts of front axle and main frame and at welds. Check visually or use crack detection method.
Mounting bolt torque : SEE SECTION 8. SPECIFICATIONS

4. STEERING SYSTEM

1) STEERING WHEEL

Set rear wheels facing straight forward, then turn steering wheel to left and right. Measure range of steering wheel movement before rear wheel starts to move. Range should be 30 ~ 60 mm at rim of steering wheel. If play is too large, adjust at gearbox. Test steering wheel play with engine at idling.



2) KNUCKLE

Check knuckle visually or use crack detection method. If the knuckle is bent, the tire wear is uneven, so check tire wear.

3) STEERING AXLE

(1) Put camber gauge in contact with hub and measure camber. If camber is not within 1±0.5°, rear axle is bent.
(2) Ask assistant to drive truck at minimum turning radius.
(3) Fit bar and a piece of chalk at outside edge of counterweight to mark line of turning radius.
(4) If minimum turning radius is not within ±100 mm (±4 in) of specified value, adjust turning angle stopper bolt.