Version number:v1.3

CONTENTS

FOREWORD

This manual contains a number of instructions and safety recommendations regarding driving, handling, lubrication, maintenance, inspection and adjustment of the excavator.
The manual is to promote safety maintenance and enhance machine performance.

Keep this manual handy and have all personnel read it periodically.

If you sell the machine, be sure to give this manual to the new owners.

This machine complies with EC directive "2006/42/EC".

1. **Read** and **understand** this manual before operating the machine.

   This operator's manual may contain attachments and optional equipment that are not available in your area. Please consult your local Hyundai distributor for those items you require.

   Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.

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

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

2. **Inspect** the jobsite and **follow** the safety recommendations in the **safety hints** section before operating the machine.

3. Use **genuine Hyundai spare parts** for the replacement of parts.
   We expressly point out that Hyundai will not accept any responsibility for defects resulting from non-genuine parts or non workmanlike repair.
   In such cases Hyundai cannot assume liability for any damage.

Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Hyundai or your Hyundai distributor for the latest available information for your machine or for questions regarding information in this manual.

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.

BEFORE SERVICING THIS MACHINE

It is the responsibility of the owner and all service and maintenance personnel to avoid accidents and serious injury by keeping this machine properly maintained.

It also is the responsibility of the owner and all service and maintenance personnel to avoid accidents and serious injury while servicing the machine.

No one should service or attempt to repair this machine without proper training and supervision.

All service and maintenance personnel should be thoroughly familiar with the procedures and precautions contained in this manual.

All personnel also must be aware of any federal, state, provincial or local laws or regulations covering the use and service of construction equipment.

The procedures in this manual do not supersede any requirements imposed by federal, state, provincial or local laws.

Hyundai can not anticipate every possible circumstance or environment in which this machine may be used and serviced.

All personnel must remain alert to potential hazards.

Work within your level of training and skill.

Ask your supervisor if you are uncertain about a particular task. Do not try to do too much too fast.

Use your common sense.

EC REGULATION APPROVED

· Noise level (EN474-1 : 2006 and 2000/14/EC) are as followings.

LWA : 99dB (EU only)

LPA : 76dB

· The value of vibrations transmitted by the operator's seat are lower than standard value of (EN474-1 : 2006 and 2002/44/EC)

CE

EC Declaration of Conformity

1. Hyundai Construction Equipment Europe N.V Hyundailaan 4, 3980 Tessenderlo (Belgium), as authorized representative in the European Community of HYUNDAI CONSTRUCTION EQUIPMENT Co. Ltd.(Korea) certifies that the construction equipment machinery.

   Machine Type : *******

   Brand : HYUNDAI

   Model : *****
   Serial No : ***
   Year of Manufacturing : 20**

2. Manufacturer

   HYUNDAI CONSTRUCTION EQUIPMENT CO., LTD.
   12th Fl., Hyundai Bldg. 75, Yulgok-ro, Jongno-gu,
   Seoul 03058, Korea

   Authorized representative :
   Owner of the technical file for machine production

   HYUNDAI CONSTRUCTION EQUIPMENT EUROPE N.V.
   Hyundailaan 4, 3980 Tessenderlo
   Belgium

3. Harmonized European directives :

   2006/42/EC (Machinery), 97/68/EC (Exhaust Gas Emission), 2004/108/EC (Electromagnetic Compatibility), 2000/14/EC (Noise Emission)

4. Engine Manufacturer : ********

   Engine Type : **********
   Gross Power : *** kW / **** rpm (SAE J1995)
   Net Power : *** kW / **** rpm (SAE J1349)

5. Noise level (Noise Emission Directive 2000/14/EC)

   Certificate No : **********
   Issue Date : DD/MM/YYYY
   Conformity Assesment Procedure : **********
   Notified Body Involved : **********
   ****
   ****
   Measured Sound Power Level : ** dB(A)
   Guaranteed Sound Power Level : ** dB(A)

6. EMC Certification (EMC Directive 2004/108/EC)

   Certificate No : *********
   Issued Date : DD/MM/YYYY
   Notified Body Involved : **********
   ****
   Standard(s) : *******

7. Remarks

   J. H. CHUN
   MANAGING DIRECTOR
   Place and date of issue :

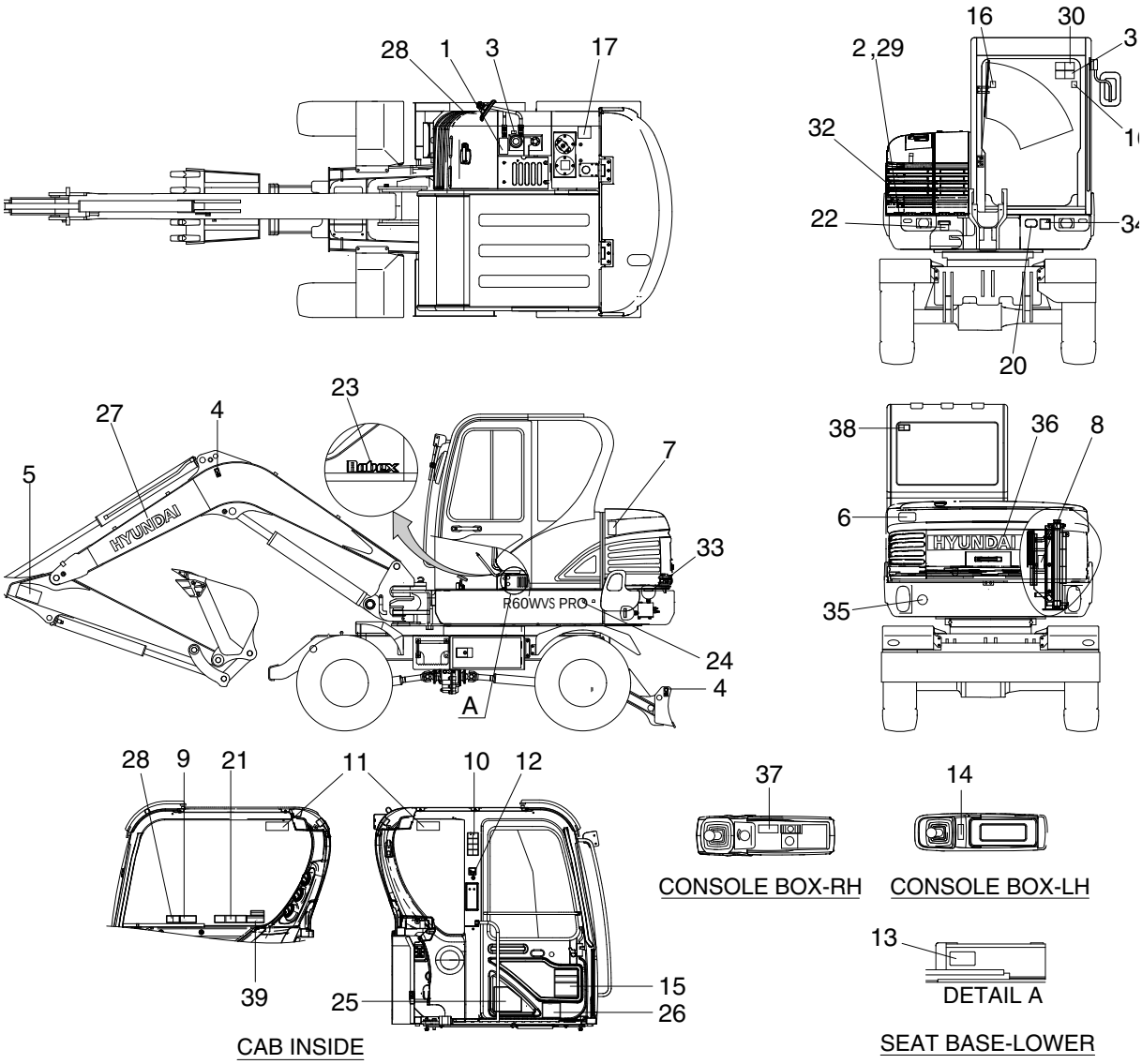
TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine Serial No.	
Engine Serial No.	
Manufacturing year	
Manufacturer Address	HYUNDAI CONSTRUCTION EQUIPMENT CO., LTD. 12th Fl., Hyundai Bldg. 75, Yulgok-ro, Jongno-gu, Seoul 03058, Korea
Distributor for U.S.A Address	HYUNDAI CONSTRUCTION EQUIPMENT U.S.A, Inc. 6100 Atlantic Boulevard Norcross GA 30071 U.S.A
Distributor for Europe Address	HYUNDAI CONSTRUCTION EQUIPMENT EUROPE N. V. Hyundailaan 4 3980 Tessenderlo Belgium
Dealer Address	

SAFETY LABELS

1. LOCATION

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



1	Fueling	14	Console tilting	28	Boom wing lock
2	Battery accident	15	Machine control-CAB	29	Electric welding
3	Ultra low sulfur fuel	16	Stay fix-cab	30	Warning front window
4	Lifting point ideogram	17	Hydraulic oil lubrication	31	Sliding caution
5	Keep clear-boom/arm	18	Falling	32	Battery position
6	Keep clear-rear	20	Name plate	33	Accumulater
7	Keep clear-side	21	General warning-frame	34	Noise level L_{WA}
8	Engine room caution	22	Indicate-grease	35	Reflecting
9	Control ideograms-swivel	23	ROBEX	36	Trade mark-CWT
10	General caution-cab	24	Model name	37	Control ideogram-dozer
11	Safety front window	25	Service instruction	38	Beacon lamp
12	Hammer	26	Lifting chart	39	Water separator
13	Air conditioner filter	27	Trade mark-boom		

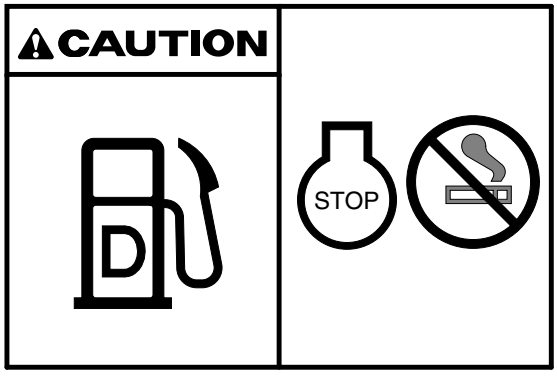
2. DESCRIPTION

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) FUELING (item 1)

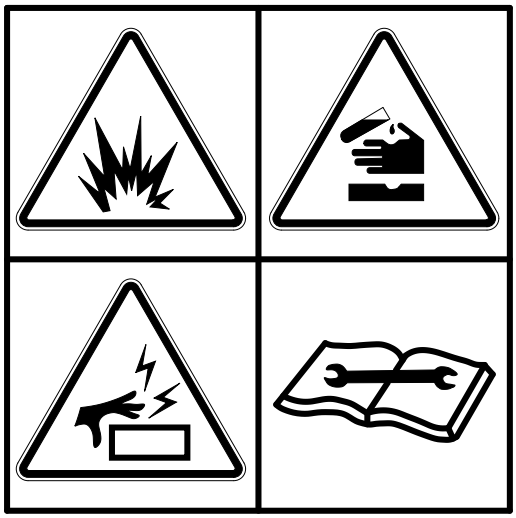
This warning label is positioned on the right side of fuel filler neck.



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

2) BATTERY ACCIDENT (item 2)

This warning label is positioned on the battery cover.



⚠ Electrolyte containing sulfuric acid cause severe burns. Avoid being in contact with skin, eyes or clothes. In the event of accident flush with sufficient water, call a physician immediately.

※ Maintain the electrolyte at the recommended level. Add distilled water to the battery only when starting up, never when shutting down.

With electrolyte at proper level, less space may cause the gases to be accumulated in the battery.

⚠ Extinguish all smoking materials and open flames before checking the battery.

⚠ Do not use matches, lighters or torches as a light source near the battery for the probable presence of explosive gas.

⚠ Do not allow unauthorized personnel to change the battery or to use booster cables.

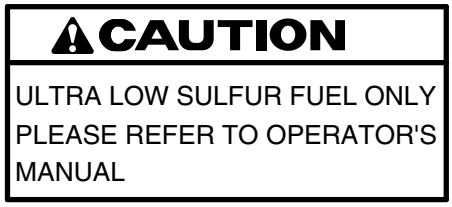
⚠ For safety from electric shock, do not battery terminals with a wet hand.

3) ULTRA LOW SULFUR FUEL (item 3)
This warning label is positioned on the left side of the fuel filler neck.

※ **Use ultra low sulfur fuel only.**

※ **Ultra low sulfur fuel**
sulfur content ≤ 15 ppm

※ **If ultra low sulfur diesel is not used, the aftertreatment diesel particulate filter can be damaged.**



4) KEEP CLEAR-BOOM/ARM (item 5)
This warning label is positioned on both side of the boom.

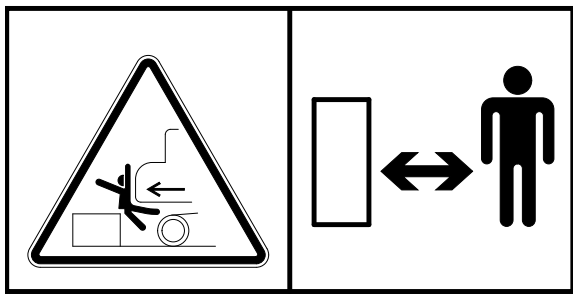
⚠ **Serious injury or death can result from falling of the attachment.**

⚠ **To prevent serious injury or death, keep clear the underneath of attachment.**

5) KEEP CLEAR-REAR (item 6)
This warning label is positioned on the rear of engine hood.

⚠ **To prevent serious personal injury or death keep clear of machine swing radius.**

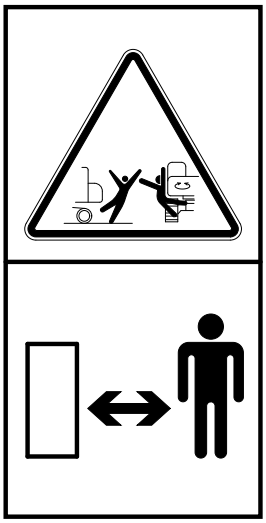
⚠ **Do not deface or remove this label from the machine.**



6) KEEP CLEAR-SIDE (item 7)
This warning label is positioned on the side of engine hood.

⚠ **To prevent serious personal injury or death keep clear of machine swing radius.**

⚠ **Do not deface or remove this label from the machine.**



7) ENGINE ROOM CAUTION (item 8)
This warning label is positioned on the side of radiator.

⚠ Do not open the engine hood during the engine's running.

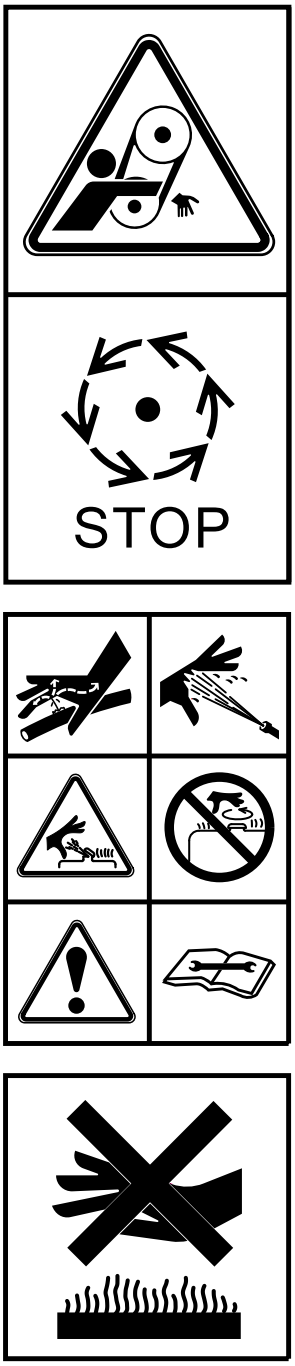
⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ Study the service manual before service job.

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

⚠ Study the operator's manual before starting and operating machine.

⚠ Do not touch exhaust pipe or it may cause severe burn.

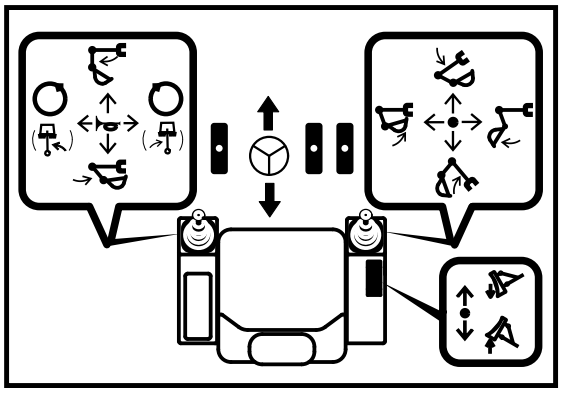


8) CONTROL IDEOGRAM-SWIVEL (item 9)
This warning label is positioned in right window of the cab.

⚠ Check the machine control pattern for conformance to pattern on this label. If not, change label to match pattern before operating machine.

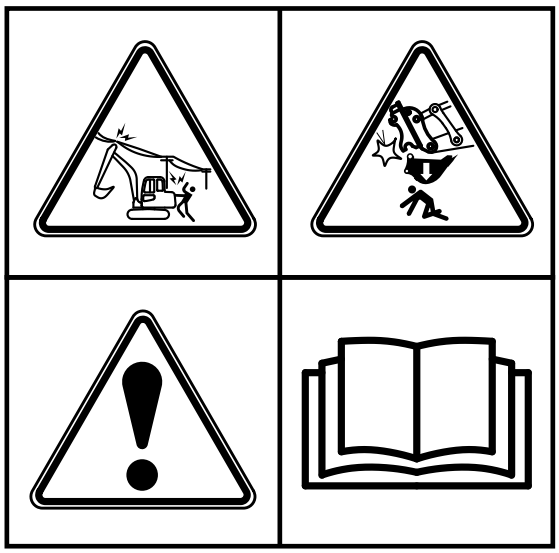
⚠ Failure to do so could result in injury or death.

※ See page 4-7 for details.



9) GENERAL CAUTIONS-CAB (item 10)

This warning label is positioned on the right side window of the cab.



⚠ Serious injury or death can result from contact with electric lines.

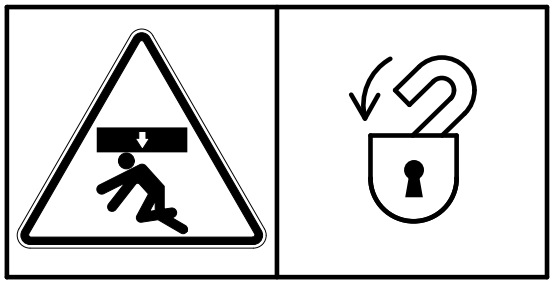
An electric shock being received by merely coming into the vicinity of an electric lines, the minimum distance should be kept considering the supply voltage as page 1-7.

⚠ Serious injury or death can result from dropping bucket.

⚠ Operating the machine with quick clamp switch unlocked or without safety pin of moving hook can cause the bucket to drop off.

10) SAFETY FRONT WINDOW (item 11)

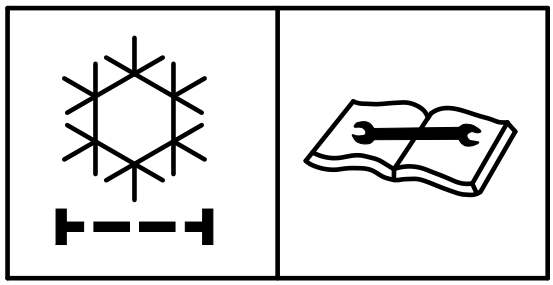
This warning label is positioned on the both side window of the cab.



⚠ Be careful that the front window may be promptly closed.

11) AIRCON FILTER (item 13)

This warning label is positioned on the lower seat base.

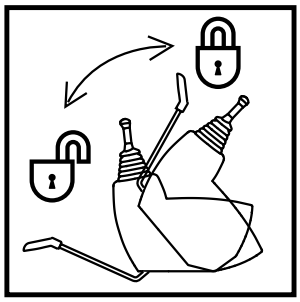


※ Periodic and proper inspection, cleaning and change of filter prolong air conditioner life time and maintain good performance.

12) **CONSOLE TILTING** (item 14)

This warning label is positioned on the LH console box.

※ **Before you get off the machine be sure to tilt the LH console box.**

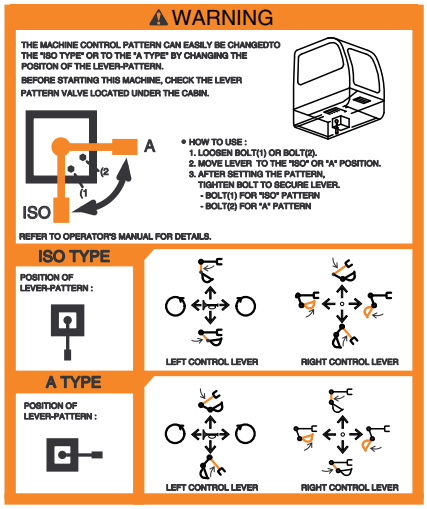


13) **MACHINE CONTROL-CAB** (item 15)

This warning label is positioned on the right side window of the cab.

⚠ **Check the machine control pattern for conformance to pattern on this label. If not, change label to match pattern before operating machine.**

⚠ **Failure to do so could result in injury or death.**



14) **STAY FIX-CAB** (item 16)

This warning label is positioned on the front window of the cab.

⚠ **Be sure to support the stay when the window needs to be opened.**

⚠ **Be careful that the opened window may be closed by the externel or natural force.**

15) **HYDRAULIC OIL LUBRICATION** (item 17)

This warning label is positioned on the right side of air breather.

※ **Do not mix with different brand oils.**

⚠ **Never open the filler cap while engine running or at high hydraulic oil tempera-ture.**

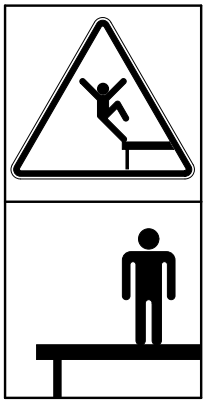
⚠ **Loosen the cap slowly and release inter-nal pressure completely.**

16) FALLING (item 18)

This warning label is positioned on the top of the hydraulic tank.

⚠ Falling is one of the major cause of personal injury.

⚠ Be careful of slippery conditions on the platforms, steps and handrails when standing on the machine.



17) NO STEP-ENGINE HOOD (item 19)

This warning label is positioned on the engine hood.

⚠ Do not step on the engine hood.

18) GENERAL WARNING-FRAME (item 21)

This warning label is positioned on the right side window of the cab.

⚠ Study the operator's manual before transporting the machine, if provided and tie down arm and track to the carrier with lashing wire.

※ See page 5-7 for details.

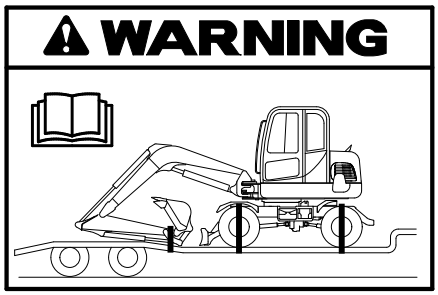
⚠ Make sure wire rope is proper size and keep correct hoisting method.

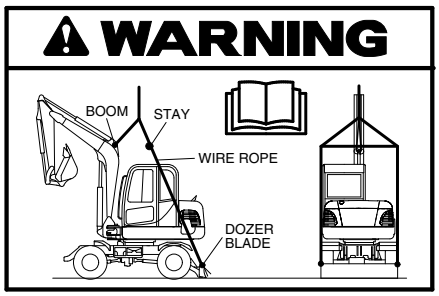
※ See page 5-8 for details.

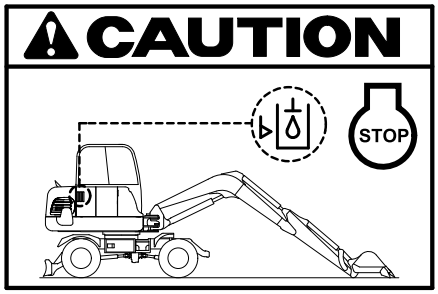
⚠ Place the bucket on the ground whenever servicing the hydraulic system.

※ Check oil level on the level gauge.

※ Refill the recommended hydraulic oil up to specified level if necessary.



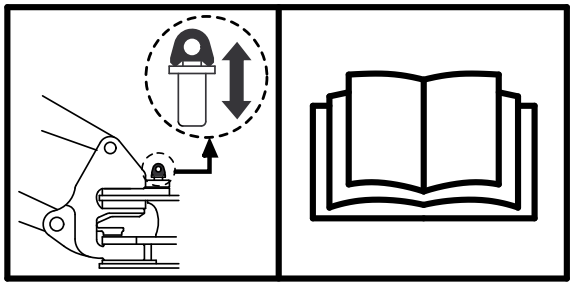




19) **BOOM SWING LOCK** (item 28)

This warning label is positioned on the right side window of the cab.

⚠ **Before operating the machine, be sure to release the swing lock device in the tool box.**



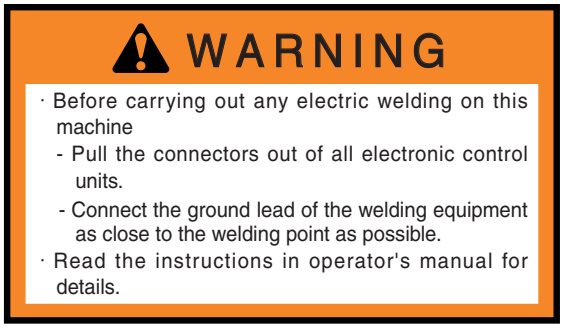
20) **ECM CONNECTOR** (item 29)

This warning label is positioned on the battery cover.

⚠ **Before carrying out any electric welding on this machine follow the below procedure.**

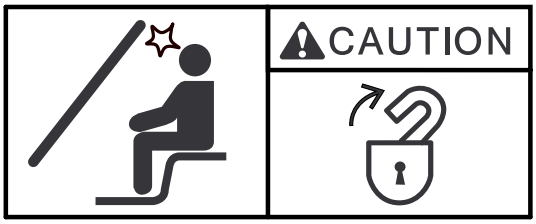
- **Pull the connectors out of all electric control units.**
- **Connector the ground lead of the welding equipment as close to the welding point as possible.**

※ **See page 6-40 for detail.**



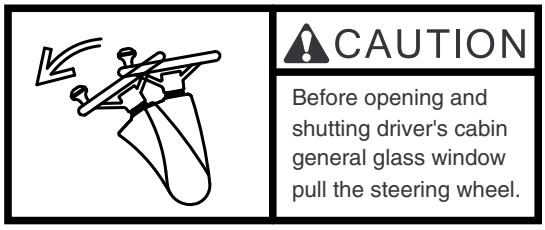
21) **WARNING FRONT WINDOW** (item 30)

This warning label is positioned on the front window of the cab.



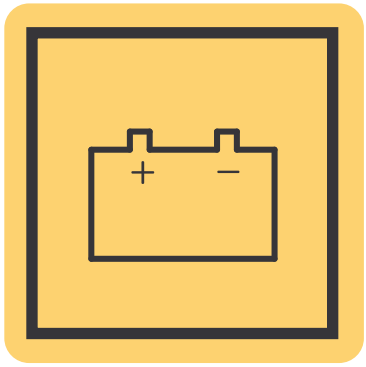
22) **SLIDING CAUTION** (item 31)

This warning label is positioned on the front window of the cab.



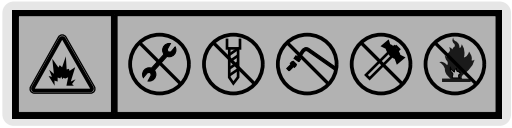
23) **BATTERY POSITION** (item 32)

This warning label is positioned right side of tool box.



24) **ACCUMULATOR** (item 33)

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.**

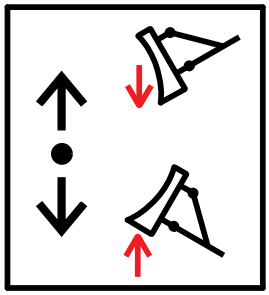
25) CONTROL IDEOGRAM-DOZER (item 37)

This warning label is positioned on the RH console box.

※ See page 4-12 for details.

※ Guidlines for using the general dozer blade.

- Be careful not to apply an excessive load when using a blade.
- Avoid impacts and loads on the bottom due to machine modification or excessive working conditions.
- Check the BLADE UP status before traveling the machine.
- Avoid any collision with the upper working device and the blade.
- Do not move machine in the blade jack up state.
- When using blade jack up, use it in an environment where the ground is not rough and the machine and ground are same level.



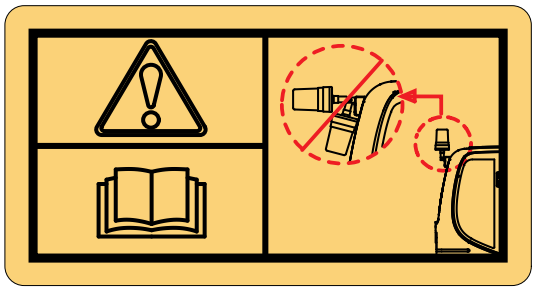
26) BEACON LAMP (item 38)

This warning label is positioned on the rear outside of the cab.

※ Make sure the beacon lamp maintains a vertical position.

A horizontal position can result in a decrease in life time of the lamp due to the infiltration of foreign substances such as dust or water.

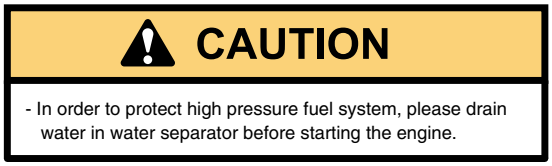
※ While the machine transfer, the beacon lamp is easy to break. In the case, change the position of the lamp to the horizontal.



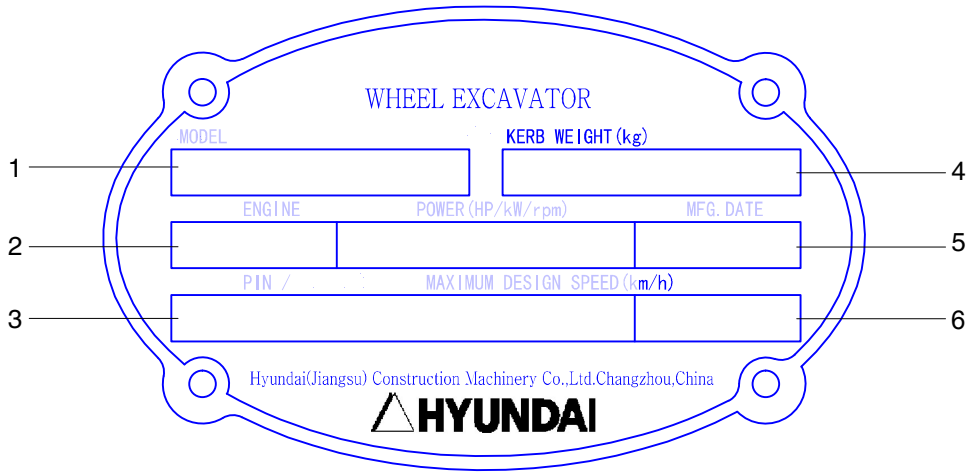
27) WATER SEPARATOR (item 39)

This warning label is positioned on the right side window of the cab.

※ In order to protect high pressure fuel system, please drain water in water separator before starting the engine.



MACHINE DATA PLATE



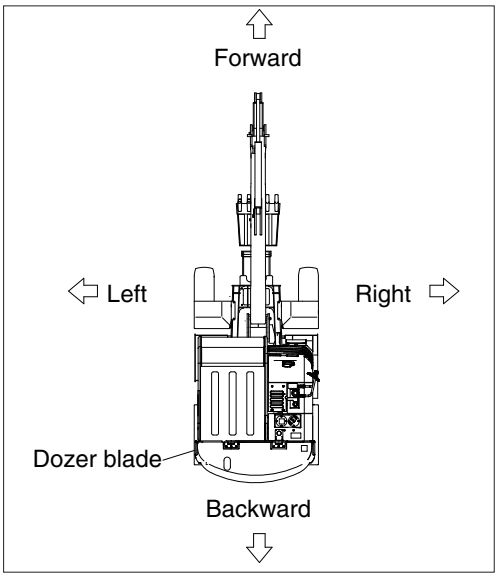
1 Equipment
2 Engine power
3 Serial number
4 Operating weight
5 Manufacture date
6 Maximum design speed

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

GUIDE

1. DIRECTION

The direction of this manual indicate forward, backward, right and left on the standard of operator when the travel motor is in the rear and machine is on the traveling direction.

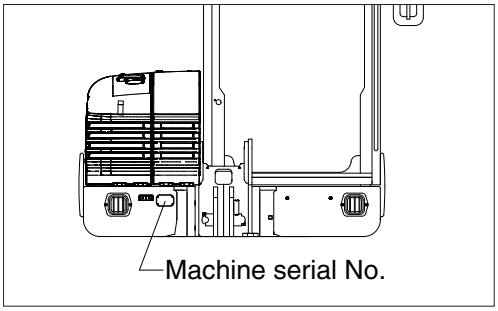


2. SERIAL NUMBER

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

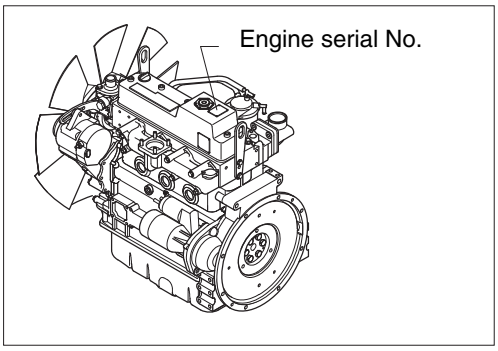
1) MACHINE SERIAL NUMBER

The numbers are located below the front window of the operator's cab.



2) ENGINE SERIAL NUMBER

The numbers are located on the engine name plate.



3. INTENDED USE

This machine is designed to be used mainly for the following work.

- Digging work
- Loading work
- Smoothing work
- Ditching work

※ Please refer to the section 4 (efficient working method) further details.

4. SYMBOLS

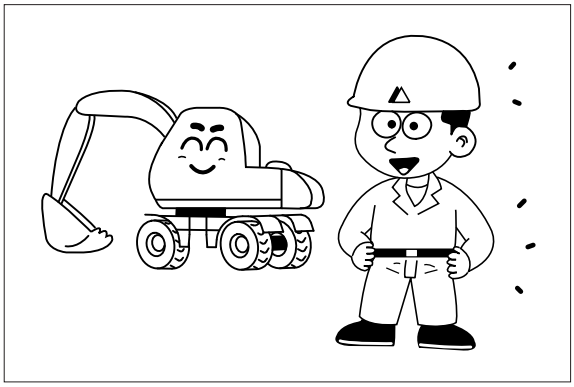
⚠ Important safety hint.

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

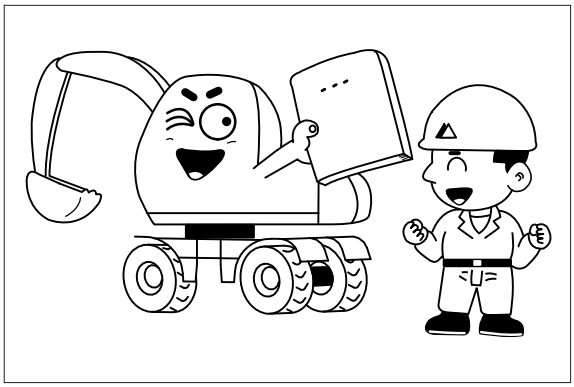
※ It indicates the useful information for operator.

1. BEFORE OPERATING THE MACHINE

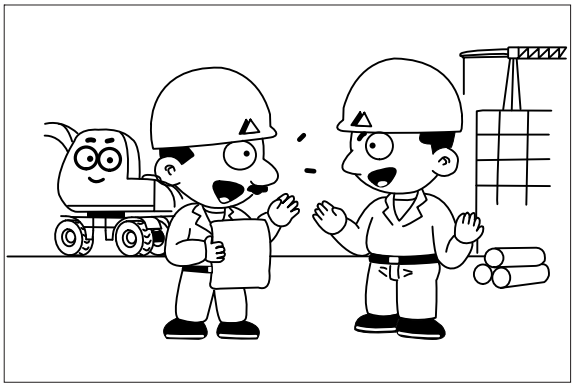
Think-safety first.
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition.
Almost every accident is caused by disregarding the simple and fundamental safety hints.



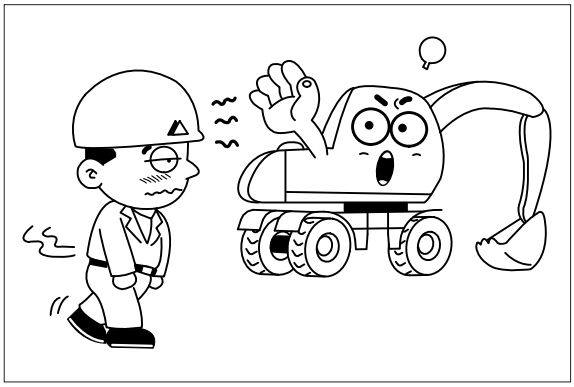
Be sure to understand thoroughly all about the operator's manual before operating the machine.
Proper care is your responsibility.



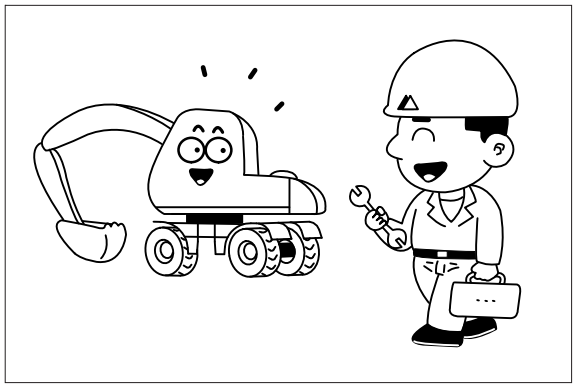
Fully understand the details and process of the construction before starting the work.
If you find anything dangerous on the job, consult with the job supervisor for the preventive measures before operating the machine.



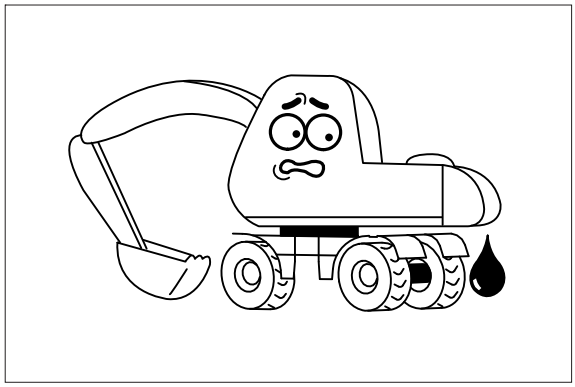
Do not operate when tired, or after drinking alcoholic beverages or any type of drugs.



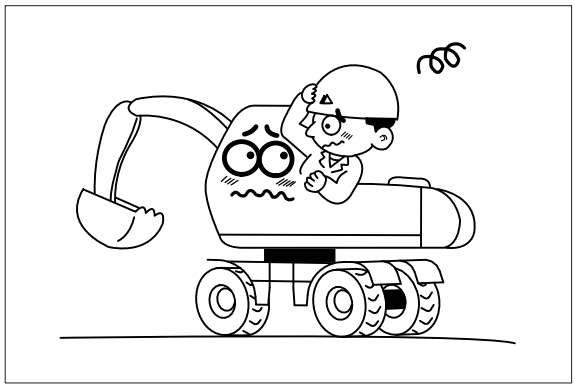
Check daily according to the operation manual.
Repair the damaged parts and tighten the loosened bolts.



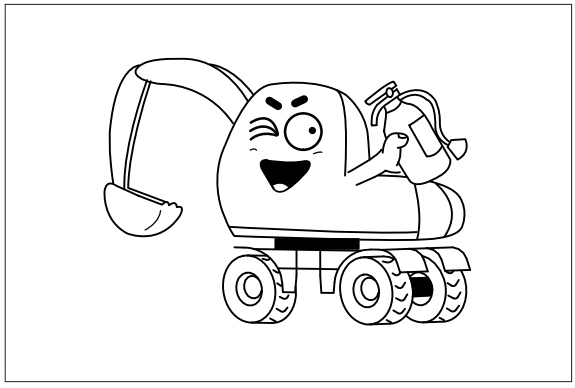
Check for leakage of engine oil, hydraulic oil, fuel and coolant.
Keep machine clean, clean machine regularly.



Do not operate the machine if it requires repairs.
Operate after complete repair.



Be prepared if a fire starts.
Keep a fire extinguisher handy and emergency numbers for a fire department near your telephone.



UNAUTHORIZED MODIFICATION

Any modification made without authorization from Hyundai can create hazards.

Before making a modification, consult your Hyundai distributor. Hyundai will not be responsible for any injury or damage caused by any unauthorized modification.

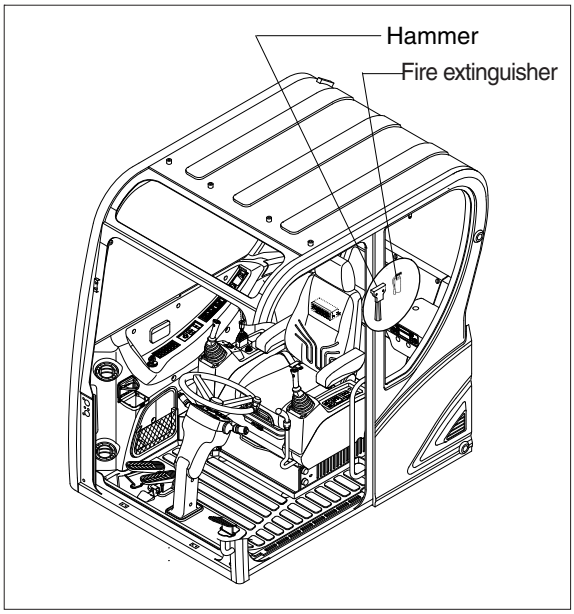
PREPARE FOR EMERGENCY

Only in case of emergency, use the installed hammer for breaking the windshield of the cab, and then exit carefully.

Have a fire extinguisher and first aid kit ready for emergencies such as fires or accidents.

Learn how to use the fire extinguisher.

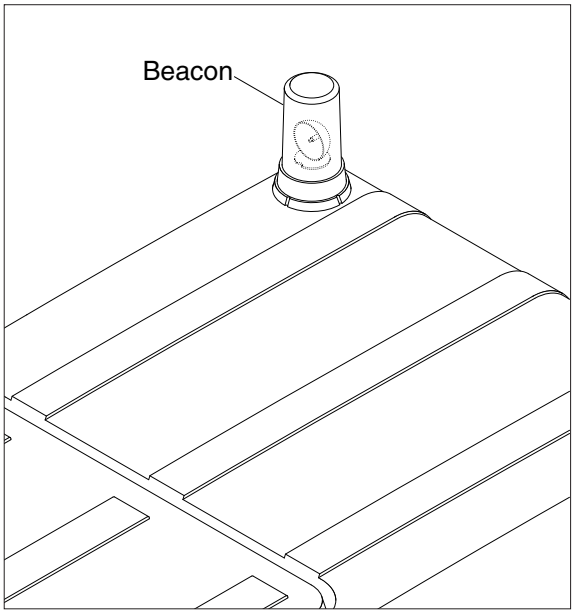
Be sure you know the phone numbers of persons you should contact in case of an emergency.



ROTATING BEACON

When you operate a machine on a road or beside a road, a rotating beacon is required to avoid any traffic accident.

Please contact your Hyundai distributor to install it.



PRECAUTIONS FOR ATTACHMENTS

When installing and using an optional attachment, read the instruction manual for the attachment and the information related to attachments in this manual.

Do not use attachments that are not authorized by Hyundai or your Hyundai distributor. Use of unauthorized attachments could create a safety problem and adversely affect the proper operation and useful life of the machine.

Any injuries, accidents, product failures resulting from the use of unauthorized attachments are not the responsibility of Hyundai.

The stability of this machine is enough to be used for general work. When you operate this machine, allow for the lifting capacity tables. If you want to use other special applications (not covered in this manual), you have to attach additional counterweight or be cautious while running the machine.

SAFETY RULES

Only trained and authorized personnel can operate and maintain the machine.
Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
When working with another operator or a person on worksite traffic duty, be sure all personnel understand all hand signals that are to be used.

SAFETY FEATURES

Be sure all guards and covers are in their proper position. Have guards and covers repaired if damaged.
Use safety features such as safety lock and seat belts properly.
Never remove any safety features. Always keep them in good operating condition.
Improper use of safety features could result in serious bodily injury or death.

MACHINE CONTROL PATTERN

Check machine control pattern for conformance to pattern on label in cab.
If not, change label to match pattern before operating machine.
Failure to do so could result in injury.

CALIFORNIA PROPOSITION 65

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

This product contains or emits chemicals known to the State of California to cause cancer or birth defects or other reproductive harm.

Battery posts, terminals and related accessories contain lead and lead compounds.
WASH HANDS AFTER HANDLING

Do not load the machine with the lifting eyes on the counterweight.

⚠ **The wrong loading method can result in serious bodily injury or death.**

FIRE PREVENTION AND EXPLOSION PREVENTION

Regeneration

The exhaust gas temperatures during regeneration will be elevated. Follow proper fire prevention instructions and use the disable regeneration function when appropriate.

General

All fuels, most lubricants, and some coolant mixtures are flammable.

To minimize the risk of fire or explosion, the following actions are recommended.

Always perform a Walk-Around Inspection, which may help you identify a fire hazard.
Do not operate a machine when a fire hazard exists. Contact your dealer for service.

Understand the use of the primary exit and alternative exit on the machine.

Do not operate a machine with a fluid leak. Repair leaks and clean up fluids before resuming machine operation. Fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire. A fire may cause personal injury or death.

Do not weld on or drill holes in the engine cover. Flammable material such as leaves, twigs, papers, trash may accumulate in engine compartment.

Remove flammable material such as leaves, twigs, papers, trash and so on. These items may accumulate in the engine compartment or around other hot areas and hot parts on the machine.

Keep the access doors to major machine compartments closed and access doors in working condition in order to permit the use of fire suppression equipment, in case a fire should occur.

Clean all accumulations of flammable materials such as fuel, oil, and debris from the machine.

Do not operate the machine near any flame.

Keep shields in place. Exhaust shields (if equipped) protect hot exhaust components from oil spray or fuel spray in a break in a line, in a hose, or in a seal. Exhaust shields must be installed correctly.

Do not weld or flame cut on tanks or lines that contain flammable fluids or flammable material. Empty and purge the lines and tanks. Then clean the lines and tanks with a nonflammable solvent prior to welding or flame cutting. Ensure that the components are properly grounded in order to avoid unwanted arcs.

Dust that is generated from repairing nonmetallic hoods or fenders may be flammable and/or explosive. Repair such components in a ventilated area away from open flames or sparks. Use suitable Personal Protection Equipment (PPE).

Inspect all lines and hoses for wear or deterioration. Replace damaged lines and hoses. The lines and the hoses should have adequate support and secure clamps. Tighten all connections to the recommended torque. Damage to the protective cover or insulation may provide fuel for fires.

Store fuels and lubricants in properly marked containers away from unauthorized personnel. Store oily rags and flammable materials in protective containers. Do not smoke in areas that are used for storing flammable materials.

Use caution when you are fueling a machine.
Do not smoke while you are fueling a machine. Do not fuel a machine near open flames or sparks. Always stop the engine before fueling. Fill the fuel tank outdoors. Properly clean areas of spillage.

Never store flammable fluids in the operator compartment of the machine.

Battery and battery cables

The following actions are recommended to minimize the risk of fire or an explosion related to the battery.

Do not operate a machine if battery cables or related parts show signs of wear or damage. Contact your dealer for service.

Follow safe procedures for engine starting with jump-start cables. Improper jumper cable connections can cause an explosion that may result in injury.

Do not charge a frozen battery. This action may cause an explosion.

Gases from a battery can explode. Keep any open flames or sparks away from the top of a battery. Do not smoke in battery charging areas.

Never check the battery charge by placing a metal object across the terminal posts. Use a voltmeter in order to check the battery charge.

Daily inspect battery cables that are in areas that are visible. Inspect cables, clips, straps, and other restraint for damage. Replace any damaged parts. Check for signs of the following, which can occur over time due to use and environmental factors :

- Fraying
- Abrasion
- Cracking
- Discoloration
- Cuts on the insulation of the cable
- Fouling
- Corroded terminals, damaged terminals, and loose terminals

Replace damaged battery cable (s) and replace any related parts. Eliminate any fouling, which may have caused insulation failure or related component damage or wear. Ensure that all components are reinstalled correctly.

An exposed wire on the battery cable may cause a short ground if the exposed area comes into contact with a grounded surface. A battery cable short produces heat from the battery current, which may be a fire hazard.

An exposed wire on the ground cable between the battery and the disconnect switch may cause the disconnect switch to be bypassed if the exposed area comes into contact with a grounded surface. This action may result in an unsafe condition for servicing the machine. Repair components or replace components before servicing the machine.

⚠ Fire on a machine can result in personal injury or death. Exposed battery cables that come into contact with a grounded connection can result in fires. Replace cables and related parts that show signs of wear or damage. Contact your Hyundai Heavy Industries dealer.

Wiring

Check electrical wires daily. If any of the following conditions exist, replace parts before you operate the machine.

- Fraying
- Signs of abrasion or wear
- Cracking
- Discoloration
- Cuts on insulation
- Other damage

Make sure that all clamps, guards, clips, and straps are reinstalled correctly. This action will help to prevent vibration, rubbing against other parts, and excessive heat during machine operation.

Attaching electrical wiring to hoses and tubes that contain flammable fluids or combustible fluids should be avoided.

Consult your Hyundai Heavy Industries dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes, and Hoses

Do not bend high-pressure lines. Do not strike high-pressure lines. Do not install any lines that are bent or damaged. Use the appropriate backup wrenches in order to tighten all connections to the recommended torque.

Check lines, tubes, and hoses carefully. Wear Personal Protection Equipment (PPE) in order to check for leaks. Always use a board or cardboard when you check for a leak. Leaking fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. A pin hole leak can cause severe injury. If fluid is injected into your skin, you must get treatment immediately. Seek treatment from a doctor that is familiar with this type of injury.

Replace the affected parts if any of the following conditions are present :

- End fittings are damaged or leaking.
- Outer coverings are chafed or cut.
- Wires are exposed.
- Outer coverings are swelling or ballooning.
- Flexible parts of the hoses are kinked.
- Outer covers have exposed embedded armoring.
- End fittings are displaced.

Make sure that all clamps, guards, and heat shields are installed correctly. During machine operation, this action will help to prevent vibration, rubbing against other parts, excessive heat, and failure of lines, tubes, and hoses.

Do not operate a machine when a fire hazard exists. Repair any lines that are corroded, loose, or damaged. Leaks may provide fuel for fires. Consult your Hyundai Heavy Industries dealer for repair or for replacement parts.

Ether

Ether (if equipped) is commonly used in cold weather applications. Ether is flammable and poisonous.

Do not spray ether manually into an engine if the machine is equipped with a thermal starting aid for cold weather starting.

Use ether in ventilated areas. Do not smoke while you are replacing an ether cylinder or while you are using an ether spray.

Do not store ether cylinders in living areas or in the operator compartment of a machine. Do not store ether cylinders in direct sunlight or in temperatures above 49˚C(120.2 ˚F). Keep ether cylinders away from unauthorized personnel.

Fire Extinguisher

As an additional safety measure, keep a fire extinguisher on the machine.

Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher regularly. Follow the recommendations on the instruction plate.

Consider installation of an aftermarket Fire Suppression System, if the application and working conditions warrant the installation.

Fire Safety

※ Locate secondary exits and how to use the secondary exits before you operate the machine.
※ Locate fire extinguishers and how to use a fire extinguisher before you operate the machine.

If you find that you are involved in a machine fire, your safety and that of others on site is the top priority. The following actions should only be performed if the actions do not present a danger or risk to you and any nearby people. At all times you should assess the risk of personal injury and move away to a safe distance as soon as you feel unsafe.
Move the machine away from nearby combustible material such as fuel/oil stations, structures, trash, mulch and timber.

Lower any implements and turn off the engine as soon as possible. If you leave the engine running, the engine will continue to feed a fire. The fire will be fed from away damaged hoses that are attached to the engine or pumps.

If possible, turn the battery disconnect switch to the OFF position. Disconnecting the battery will remove the ignition source in the event of an electrical short. Disconnecting the battery will eliminate a second ignition source if electrical wiring is damaged by the fire, resulting in a short circuit.

Notify emergency personnel of the fire and your location.

If your machine is equipped with a fire suppression system, follow the manufacturers procedure for activating the system.

※ Fire suppression systems need to be regularly inspected by qualified personnel. You must be trained to operate the fire suppression system.

Use the on-board fire extinguisher and use the following procedure :
1. Pull the pin.
2. Aim the extinguisher or nozzle at the base of the fire.
3. Squeeze the handle and release the extinguishing agent.
4. Sweep the extinguisher from side to side across the base of the fire until the fire is out.

Remember, if you are unable to do anything else, shut off the machine before exiting. By shutting off the machine, fuels will not continue to be pumped into the fire.
If the fire grows out of control, be aware of the following risks :
- Tires on wheeled machines pose a risk of explosion as tires burn. Hot shrapnel and debris can be thrown great distances in an explosion.
- Tanks, accumulators, hoses, and fittings can rupture in a fire, spraying fuels and shrapnel over a large area.

Remember that nearby all of the fluids on the machine are flammable, including coolant and oils. Additionally, plastics, rubbers, fabrics, and resins in fiberglass panels are also flammable.

Fire extinguisher Location

Make sure that a fire extinguisher is available. Be familiar with the operation of the fire extinguisher. Inspect the fire extinguisher and service the fire extinguisher. Obey the recommendations on the instruction plate.

Mount the fire extinguisher in the accepted location per local regulations.

If your machine is equipped with a ROPS structure, strap the mounting plate to the ROPS in order to mount the fire extinguisher. If the weight of the fire extinguisher exceeds 4.5 kg (10 lb), mount the fire extinguisher near the bottom of the ROPS. Do not mount the fire extinguisher at the upper one-third area on the ROPS.

Do not weld the ROPS structure in order to install the fire extinguisher. Also, do not drill holes in the ROPS structure in order to mount the fire extinguisher on the ROPS.

Consult your Hyundai Heavy Industries dealer for the proper procedure for mounting the fire extinguisher.

THE EUROPEAN UNION PHYSICAL AGENTS (VIBRATION) DIRECTIVE 2002/44/EC

Vibration Data for Earth-moving Machines

Information Concerning Hand/Arm Vibration Level

When the machine is operated according to the intended use, the hand/arm vibration of this machine is below 2.5 m/s^2.

Information Concerning Whole Body Vibration Level

The highest root mean square value of weighted acceleration to which the whole body is subjected, is less than 0.5 m/s^2.

This section provides vibration data and a method for estimating the vibration level for earth moving machines.

Vibration levels are influenced by many different parameters. Many items are listed below.

- Operator training, behavior, mode and stress
- Job site organization, preparation, environment, weather and material
- Machine type, quality of the seat, quality of the suspension system, attachments and condition of the equipment

It is not possible to get precise vibration levels for this machine. The expected vibration levels can be estimated with the information in below Table in order to calculate the daily vibration exposure. A simple evaluation of the machine application can be used.

Estimate the vibration levels for the three vibration directions. For typical operating conditions, use the average vibration levels as the estimated level. With an experienced operator and smooth terrain, subtract the Scenario Factors from the average vibration level. For aggressive operations and severe terrain, add the Scenario Factors to the average vibration level in order to obtain the estimated vibration level.

※ **All vibration levels are in meter per second squared.**

ISO Reference Table A – Equivalent vibration levels of whole body vibration emission for earthmoving equipment.

Machine family	Machine kind	Typical operating condition	Vibration Levels			Scenario Factors		
			X axis	Y axis	Z axis	X axis	Y axis	Z axis
Excavator	Compact crawler excavator	Excavating	0.33	0.21	0.19	0.19	0.12	0.10
		Hydraulic breaker app.	0.49	0.28	0.36	0.20	0.13	0.17
		Transfer movement	0.45	0.39	0.62	0.17	0.18	0.28
	Crawler excavator	Excavating	0.44	0.27	0.30	0.24	0.16	0.17
		Hydraulic breaker app.	0.53	0.31	0.55	0.30	0.18	0.28
		Mining application	0.65	0.42	0.61	0.21	0.15	0.32
		Transfer movement	0.48	0.32	0.79	0.19	0.20	0.23
	Wheeled excavator	Excavating	0.52	0.35	0.29	0.26	0.22	0.13
		Transfer movement	0.41	0.53	0.61	0.12	0.20	0.19

ISO Reference Table A – Equivalent vibration levels of whole body vibration emission for earthmoving equipment.

Machine family	Machine kind	Typical operating condition	Vibration Levels			Scenario Factors		
			X axis	Y axis	Z axis	X axis	Y axis	Z axis
Loader	skid steer loader (tracks)	V-shaped motion	1.21	1.00	0.82	0.30	0.84	0.32
	Wheel backhoe loader	Excavating	0.28	0.26	0.20	0.09	0.16	0.06
	Wheel loader	Load and carry motion	0.84	0.81	0.52	0.23	0.20	0.14
		Mining application	1.27	0.97	0.81	0.47	0.31	0.47
		Transfer movement	0.76	0.91	0.49	0.33	0.35	0.17
		V-shape motion	0.99	0.84	0.54	0.29	0.32	0.14

※ **Refer to "ISO/TR 25398 Mechanical Vibration-Guideline for the assessment of exposure to whole body vibration of ride on operated earthmoving machines" for more information about vibration. This publication uses data that is measured by international institutes, organizations and manufacturers. This document provides information about the whole body exposure of operators of earthmoving equipment.**

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

Properly adjust machines. Properly maintain machines. Operate machines smoothly. Maintain the conditions of the terrain. The following guidelines can help reduce the whole body vibration level :

1. Use the right type and size of machine, equipment, and attachments.
2. Maintain machines according to the manufacturer's recommendations.
   a. Tire pressures
   b. Brake and steering systems
   c. Controls, hydraulic system and linkages
3. Keep the terrain in good condition.
   a. Remove any large rocks or obstacles.
   b. Fill any ditches and holes.
   c. Provide machines and schedule time in order to maintain the conditions of the terrain.
4. Use a seat that meets "ISO 7096". Keep the seat maintained and adjusted.
   a. Adjust the seat and suspension for the weight and the size of the operator.
   b. Inspect and maintain the seat suspension and adjustment mechanisms.
5. Perform the following operations smoothly.
   a. Steer
   b. Brake
   c. Accelerate
   d. Shift the gears.
6. Move the attachments smoothly.
7. Adjust the machine speed and the route in order to minimize the vibration level.
   a. Drive around obstacles and rough terrain.
   b. Slow down when it is necessary to go over rough terrain.
8. Minimize vibrations for a long work cycle or a long travel distance.
   a. Use machines that are equipped with suspension systems.
   b. Use the ride control system on machines.
   c. If no ride control system is available, reduce speed in order to prevent bounce.
   d. Haul the machines between workplaces.
9. Less operator comfort may be caused by other risk factors. The following guidelines can be effective in order to provide better operator comfort:
   a. Adjust the seat and adjust the controls in order to achieve good posture.
   b. Adjust the mirrors in order to minimize twisted posture.
   c. Provide breaks in order to reduce long periods of sitting.
   d. Avoid jumping from the cab
   e. Minimize repeated handling of loads and lifting of loads.
   f. Minimize any shocks and impacts during sports and leisure activities.

Sources

The vibration information and calculation procedure is based on "ISO/TR 25398 Mechanical Vibration-Guideline for whole body vibration exposure of operators of earthmoving equipment. The method is based on measured vibration emission under real working conditions for all machines.

You should check the original directive. This document summarizes part of the content of the applicable law. This document is not meant to substitute the original sources. Other parts of these documents are based on information from the United Kingdom Health and Safety Executive.

MODIFICATIONS

Modifications to the machine, including use of unauthorized accessories and spare parts, may affect the machine's condition and its ability to function as it was designed. No changes of any kind may be performed without first obtaining written approval from Hyundai Heavy Industries. Hyundai Heavy Industries reserves the right to refuse all warranty claims that have resulted due to or can be attributed to unauthorized modifications.

Never modify the operator's cabin by welding, grinding, drilling holes or adding attachments unless instructed by Hyundai Heavy Industries in writing. Changes to the cabin can cause loss of operator protection from roll-over and falling objects, and result in death or serious injury.

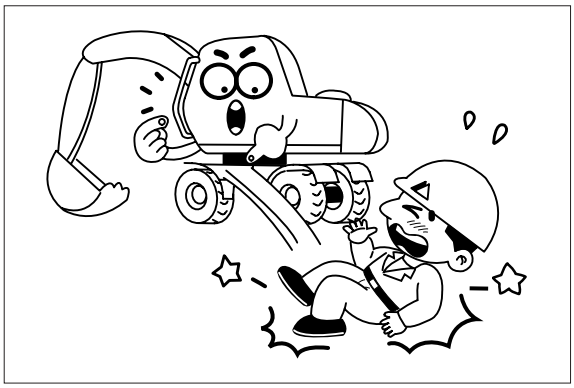
The person who performs unauthorized modifications assumes all responsibility for consequences that arise due to the modification or can be attributed to the modification, including damage to the machine.

Modifications may be considered to be officially approved, if at least one of the following conditions has been met :

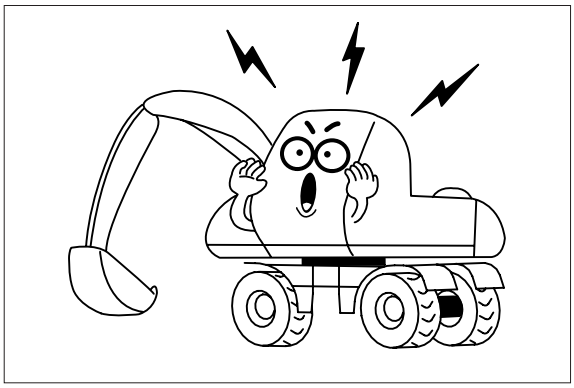
1. The attachment, the accessory, or the spare part has been made or distributed by Hyundai Heavy Industries and has been installed according to approved methods described in a publication available from Hyundai Heavy Industries; or
2. The modification has been approved in writing by the Engineering Department at each product company within Hyundai Heavy Industries.

2. DURING OPERATING THE MACHINE

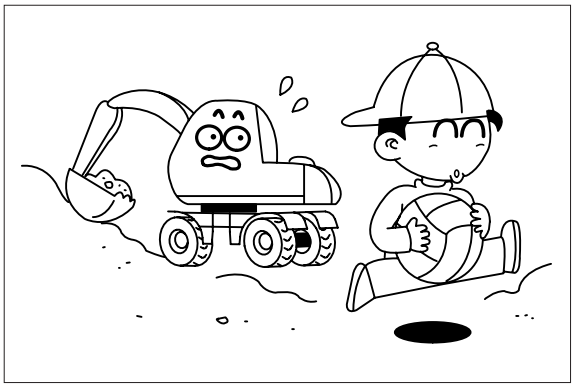
Use the handle and footstep when getting on or off the machine.
Do not jump on or off the machine.



Sound the horn to warn nearby personnel before operating the machine.
Remove all the obstacles like frost on the window before operating the machine for the good visibility.

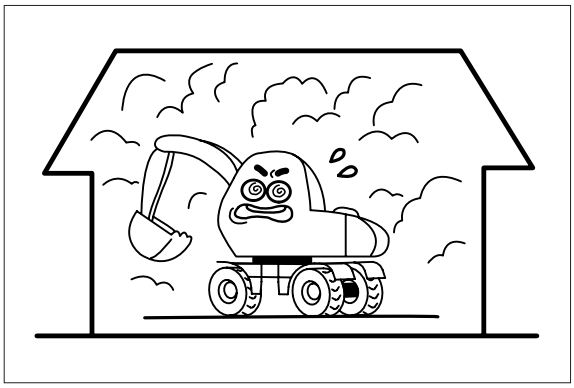


Operate carefully to make sure all personnel or obstacles are clear within the working range of the machine.
Place safety guards if necessary.

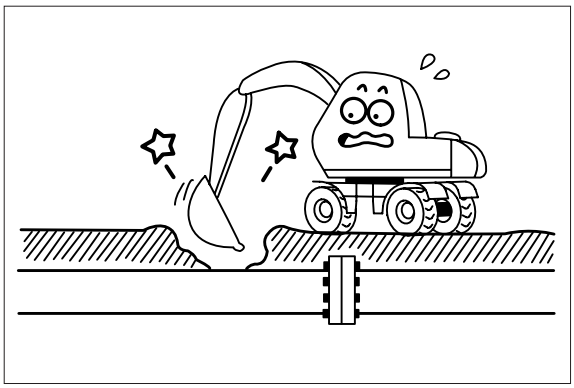


When using the work equipment, pay attention to job site.

Provide proper ventilation when operating engine in a closed area to avoid the danger of exhaust gases.

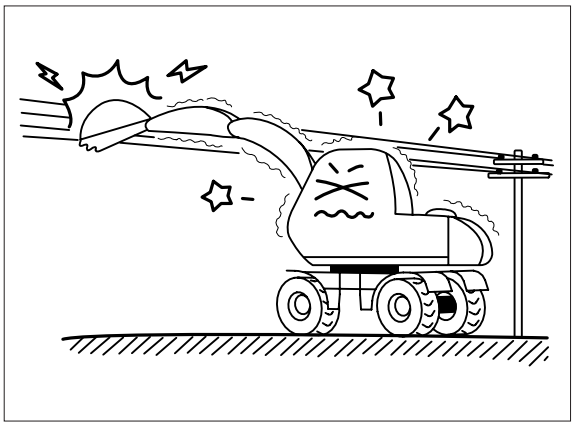


Check the locations of underground gas pipes or water line and secure the safety before operation.

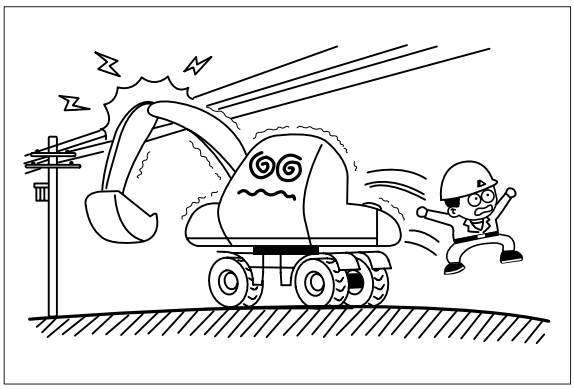


The operating near the electrical lines is very dangerous.
Operate within safe working range permitted as below.

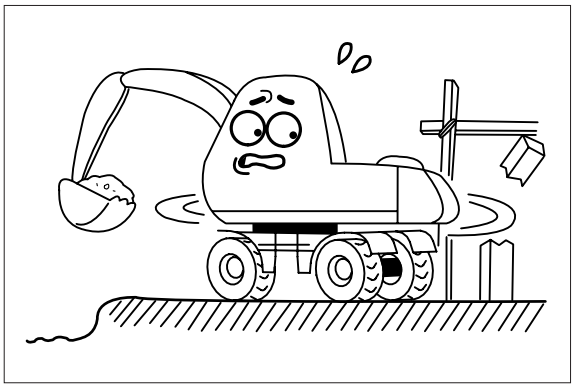
Supply voltage	Min safe separation
6.6 kV	3 m (10 ft)
33.0 kV	4 m (13 ft)
66.0 kV	5 m (16 ft)
154.0 kV	8 m (26 ft)
275.0 kV	10 m (33 ft)



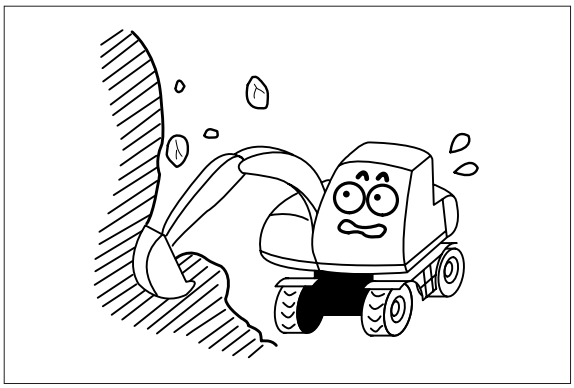
If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current. Jump off the machine without contacting the machine when you need to get off.



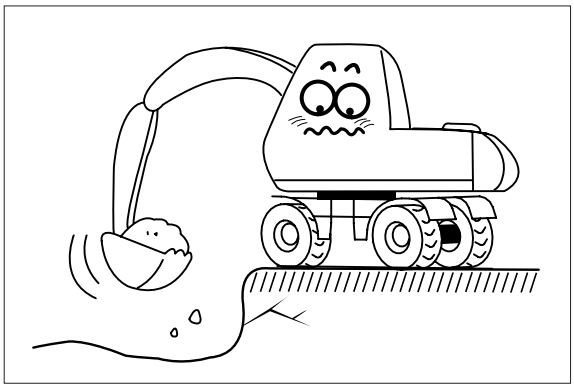
Watch out for obstacles.
Be particularly careful to check the machine clearance during the swing.



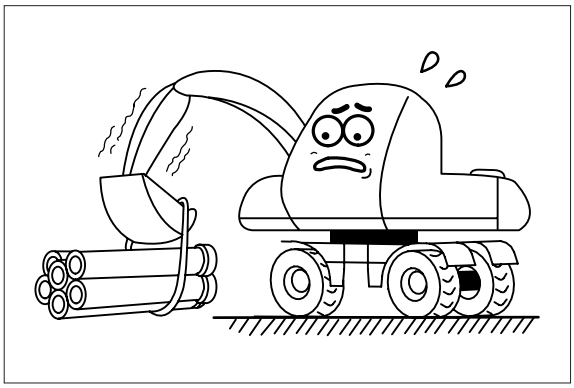
When using the machine as breaker or working in a place where stones may fall down, cab roof guard and head guard should be provided for proper protection.



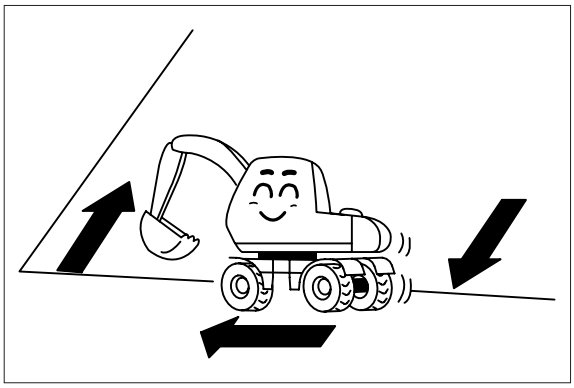
Avoid operating on a cliff or soft ground as there is danger of rolling over.
Make sure to get off easily as keeping the track at a right angle and putting the travel motor into the backward position when working on a cliff or soft ground inevitably.



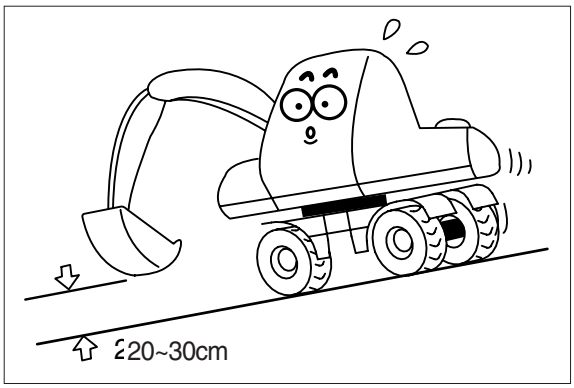
Operate for the lifting work considering the capacity of machine, weight and width of the load.
Be careful not to lift exceeding the machine capacity as it can be the cause of machine damage and safety accident.



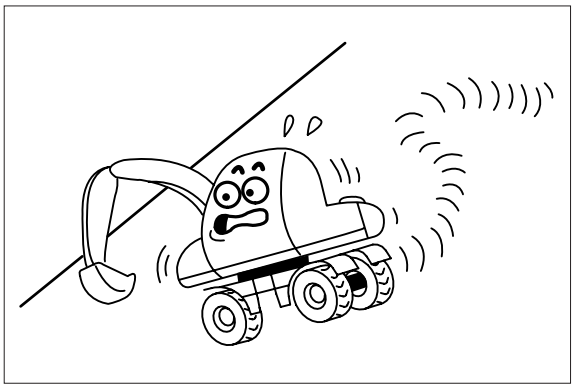
Avoid traveling in a cross direction on a slope as it can cause the danger of rolling over and sliding.



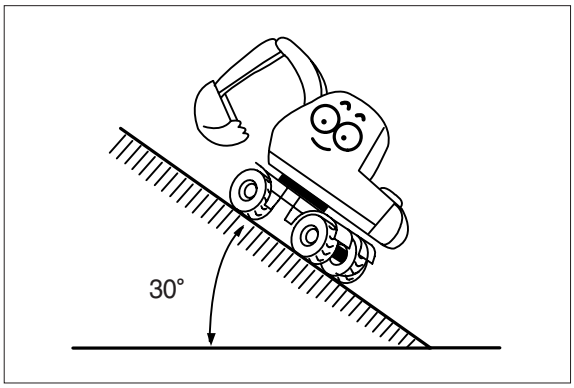
Traveling on a slope is dangerous.
Be sure to operate slowly when traveling down a slope and maintain the bucket at a height of 20~30 ㎝ (1 ft) above the ground so that it can be used as brake in an emergency.



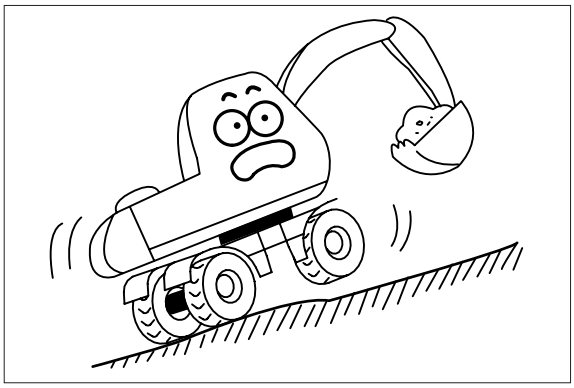
Steering of the machine while traveling on a slope is dangerous.
When an inevitable turning of direction is required, turn on the flat and solid ground.



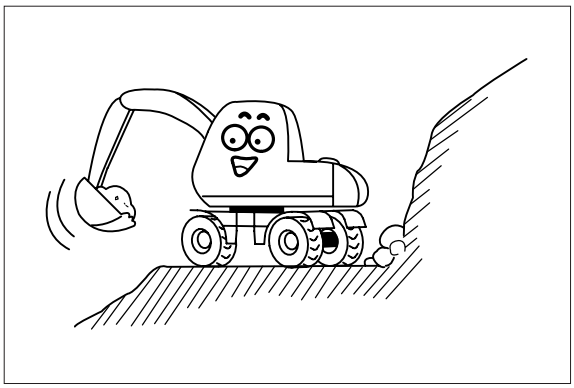
The engine angularity limits are 30 degree.
Do not operate by more than the engine limits in any case.



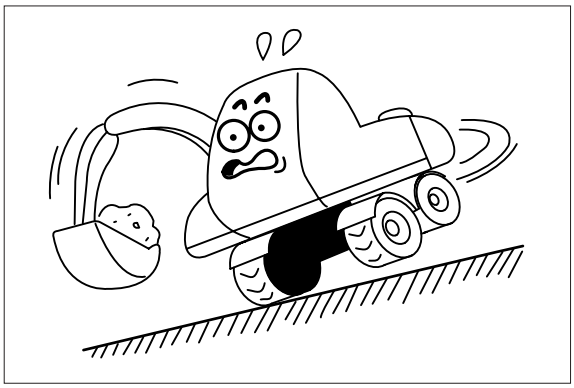
The operation on a slope is dangerous.
Avoid operating the machine on a slope of over 10 degree.



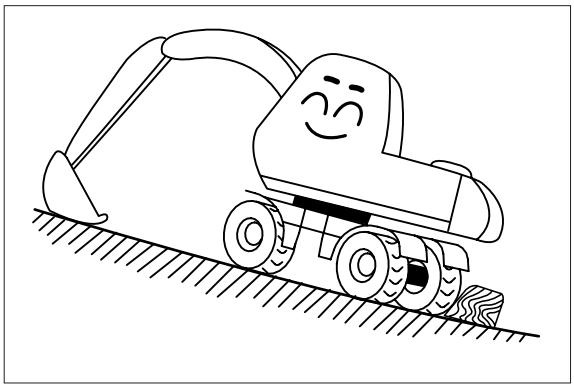
Operate the machine after making ground flat when operation is required on a slope.



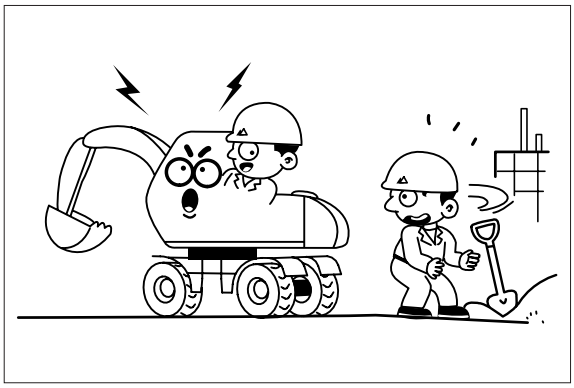
The swing on the slope can be danger of rolling over.
Do not operate to swing the machine with the bucket loaded on a slope since the machine may lose its balance under such an instance.



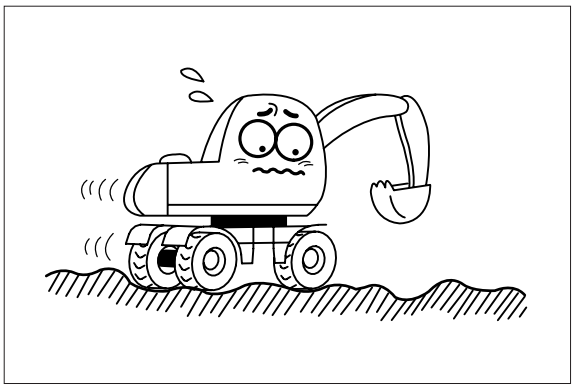
Avoid parking and stopping on a slope.
Lower the bucket to the ground and block the tires when parking.



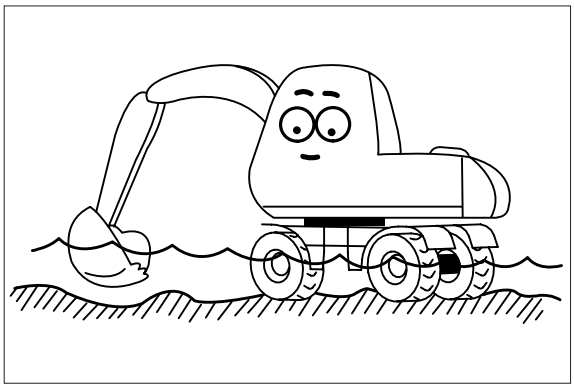
Before traveling the machine, sound the horn to warn nearby personnel.
Operate forward and backward correctly with confirming the location of the travel motor.



Slow down when traveling through obstacles or uneven ground.



When operating in water or when crossing shallow, check the bed soil condition and depth and flow speed of water, then proceed taking care that water is not above axle center.



MOUNTING AND DISMOUNTING

Never jump on or off the machine. Never get on or off a moving machine.

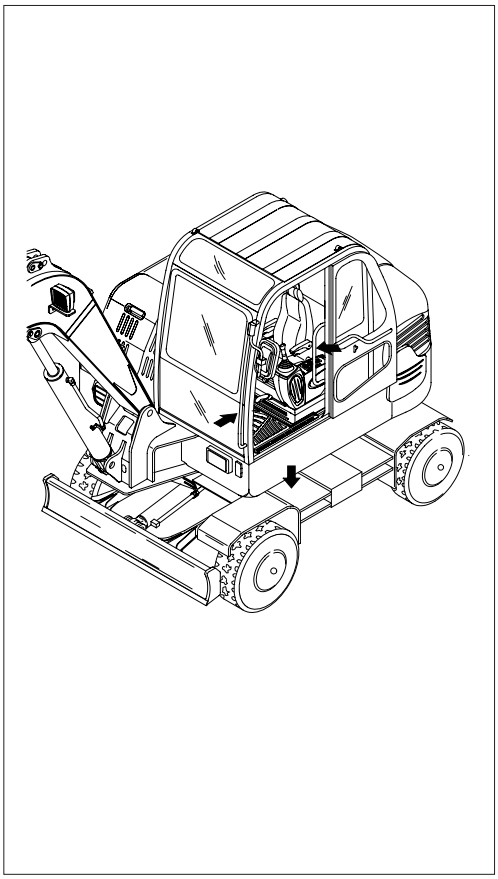
When mounting or dismounting, always face the machine and use the handrails, machine or foot steps. In this case please contact your Hyundai distributor.

Do not hold any control levers when getting on or off the machine.

Ensure safety by always maintaining at least three-point contact of hands and feet with the handrails, foot steps.

Always remove any oil or mud from the handrails, foot steps. If they are damaged, repair them and tighten any loose bolts.

If grasping the door handrail when mounting or dismounting or moving on the tires, open and lock the door securely in the open position. Otherwise, the door may move suddenly, causing you to lose balance and fall.



KEEP RIDERS OFF MACHINE

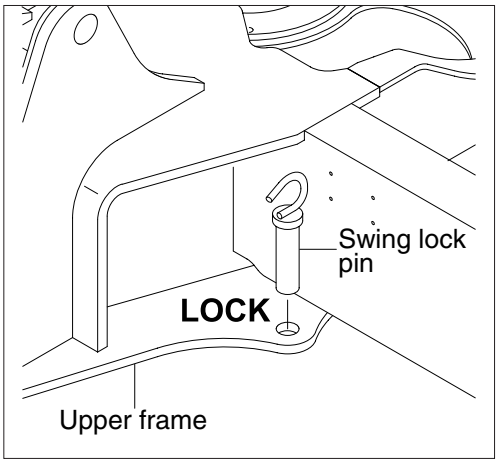
Riders on a machine are subject to injury such as being struck objects and being thrown off the machine.

Only allow the operator on the machine. Keep riders off.

ALWAYS APPLY LOCK WHEN LEAVING MACHINE

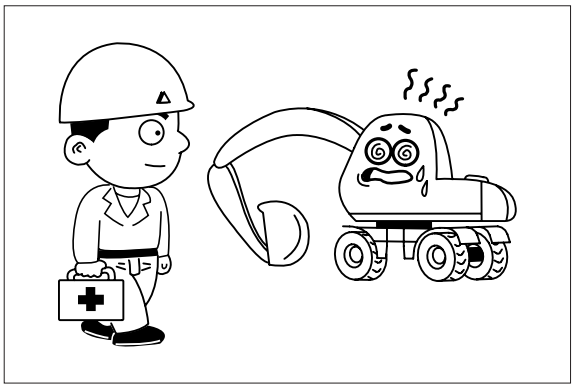
When leaving the machine, always place the swing lock pin securely in the LOCK position.
If you accidentally touch the travel or swing lever when they are not locked, the work equipment may suddenly move and cause serious injury or damage.

When leaving the machine, lower the work equipment completely to the ground, stop the engine and use the key to lock all the equipment. Then set the swing lock pin to the lock position. Always take the key with you.

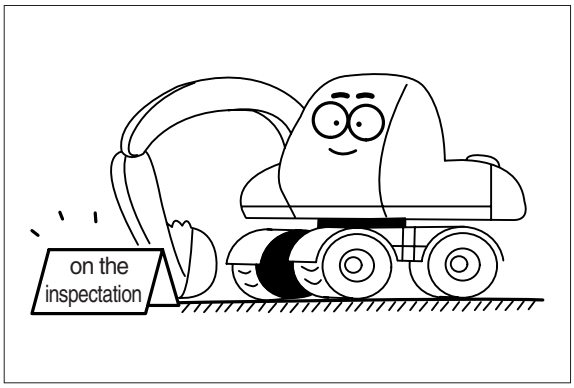


3. DURING MAINTENANCE

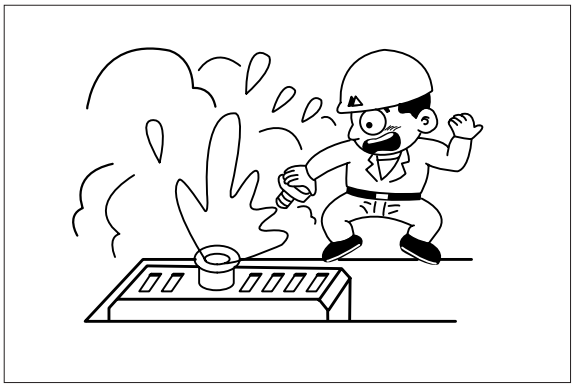
Stop the engine immediately when the trouble of the machine is found.
Inspect immediately the cause of trouble such as vibration, overheating and trouble in the cluster then repair.



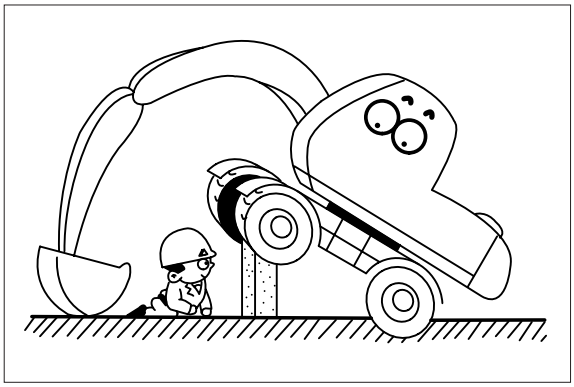
Park on a flat place and stop the engine for inspecting and repairing. Properly TAG machine is not operational. (remove start key)
Extreme care shall be taken during maintenance work. Parts may require additional safe guard.
Lower the dozer blade and/or outrigger to the ground.



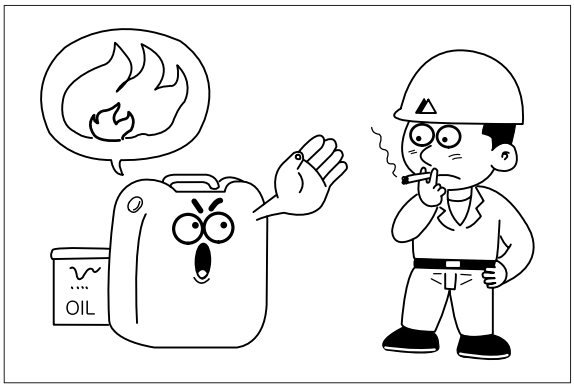
Do not remove the radiator cap from hot engine.
Open the cap after the engine cools, below 50˚C (122˚F) to prevent personal injury from heated coolant spray or steam.



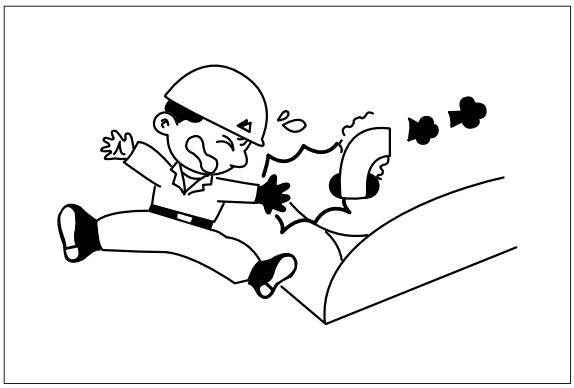
Do not work below the machine.
Be sure to work with proper safety supports.
Do not depend on the hydraulic cylinders to hold up the equipment and attachment.



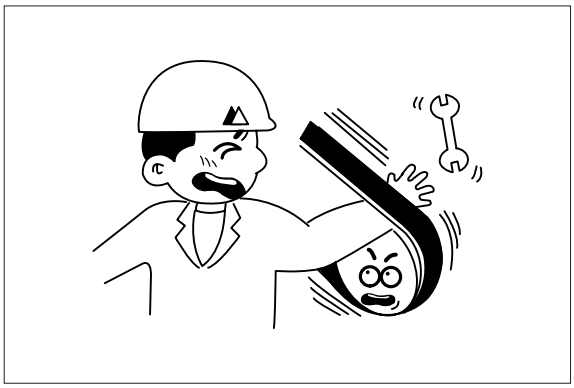
There is the danger of fire in fuel and oil.
Store in cool and dry area, away from any open flames.



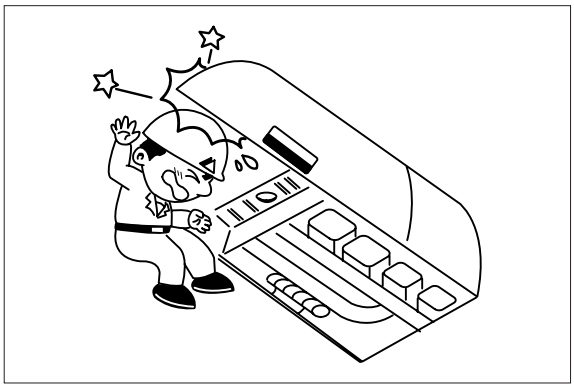
Do not touch exhaust pipe, or may cause severe burn.



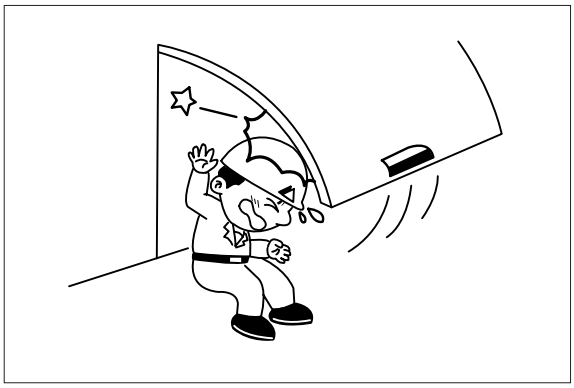
Do not open the engine hood and covers while the engine is running.



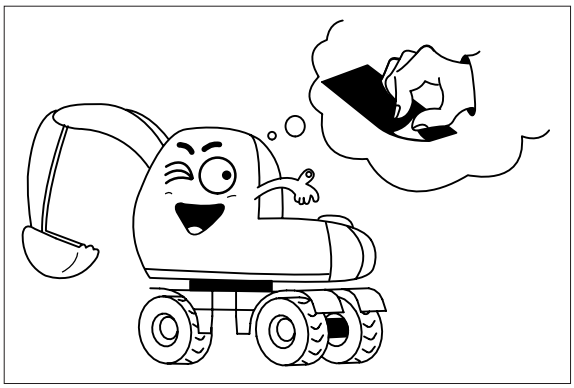
Be careful of not hitting the edges when you service engine.



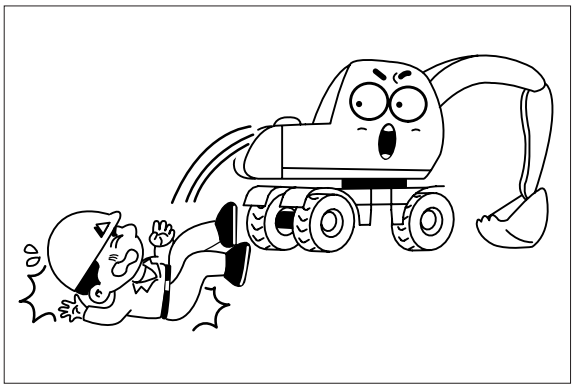
Be careful that the front window may be promptly closed.
Be sure to support stay, when the side door needs to be opened.
Be careful that the open side door may closed by the external or natural force like strong wind.



The antislip protection should be replaced if they have become worn or have been printed over.
Be sure to free of oil, water and grease etc.

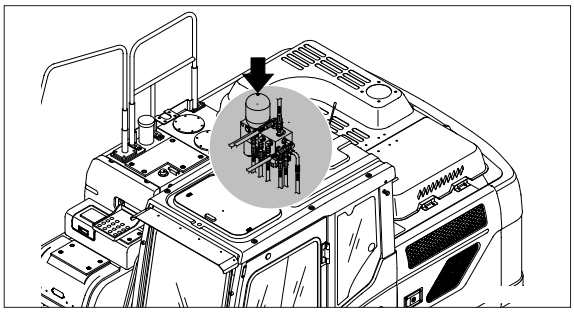


Be careful of not touching slip, fall down etc., when you work at the upper frame to service engine and/or other component.



HIGH PRESSURE GAS

Contain high pressure gas.
To avoid explosion and personal injury, do not expose to fire, do not weld, do not drill.
Relieve pressure before discharging.

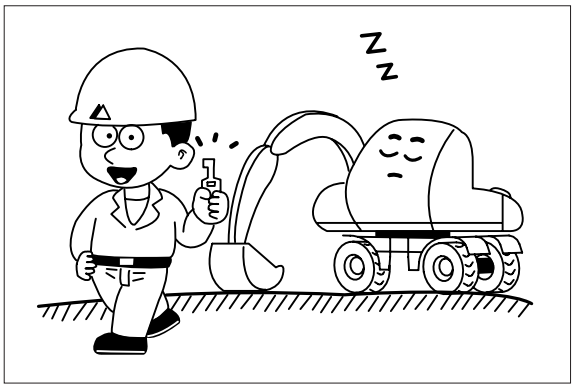


LIFT EYES CAN FAIL

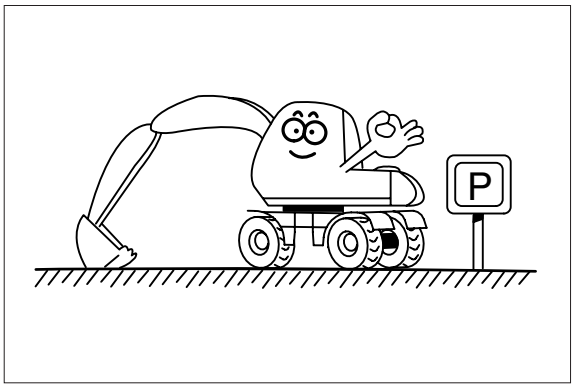
Lift eyes or tank can fail when lifting tank containing fluids resulting in possible personal injury.
Drain tank of all fluids before lifting.

4. PARKING

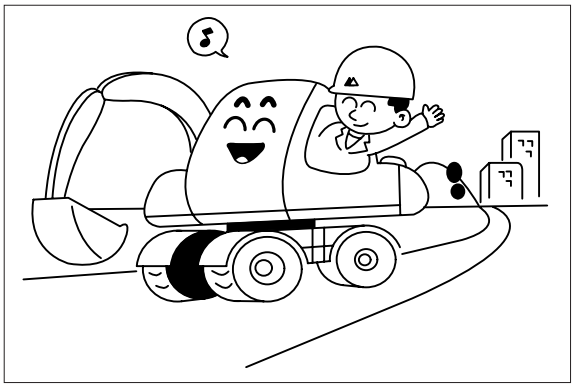
When leaving the machine after parking, lower the bucket to the ground completely and put the safety lever at parking position then remove the key.
Lock the cab door.



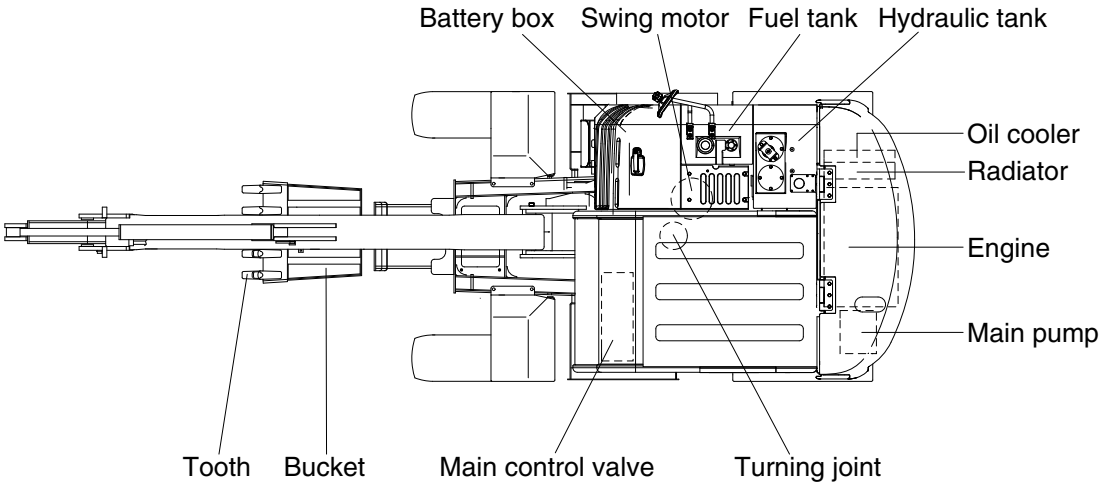
Park the machine in the flat and safe place.

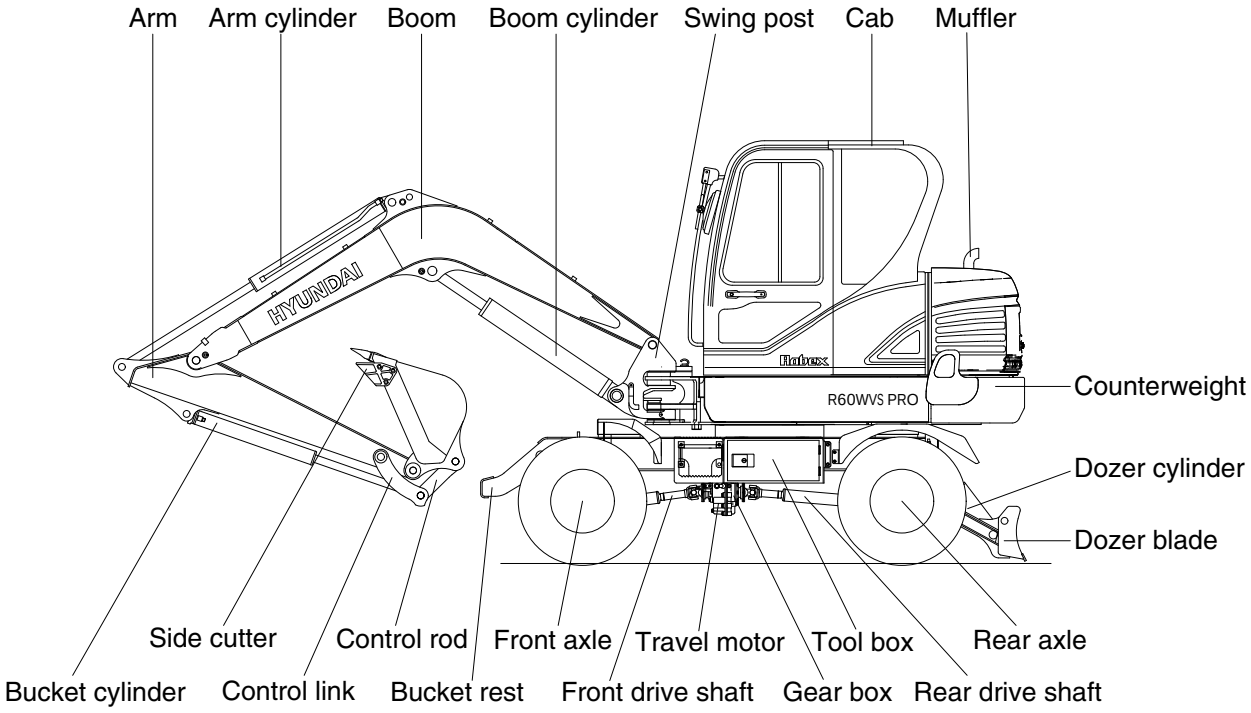


Hope you can work easily and safely observing safety rules.
For safe operation, observe all safety rules.



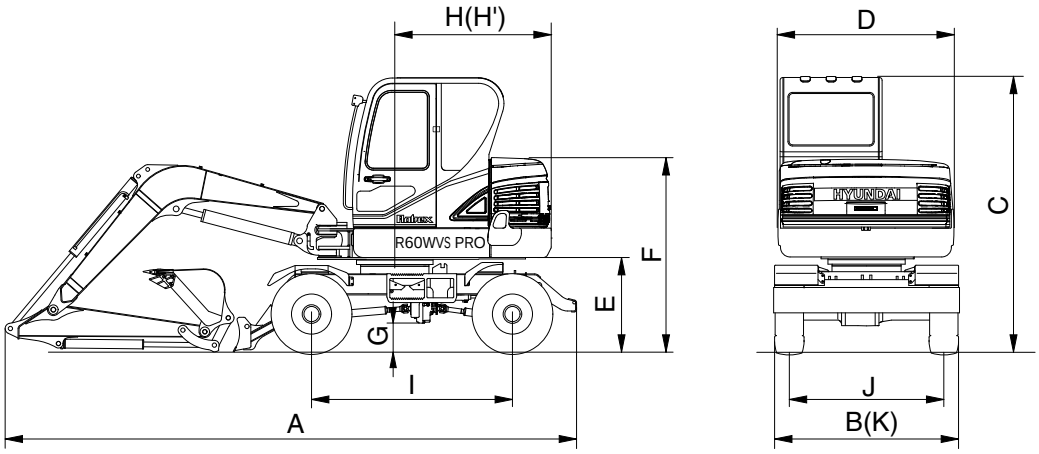
1. MAJOR COMPONENTS





2. SPECIFICATIONS

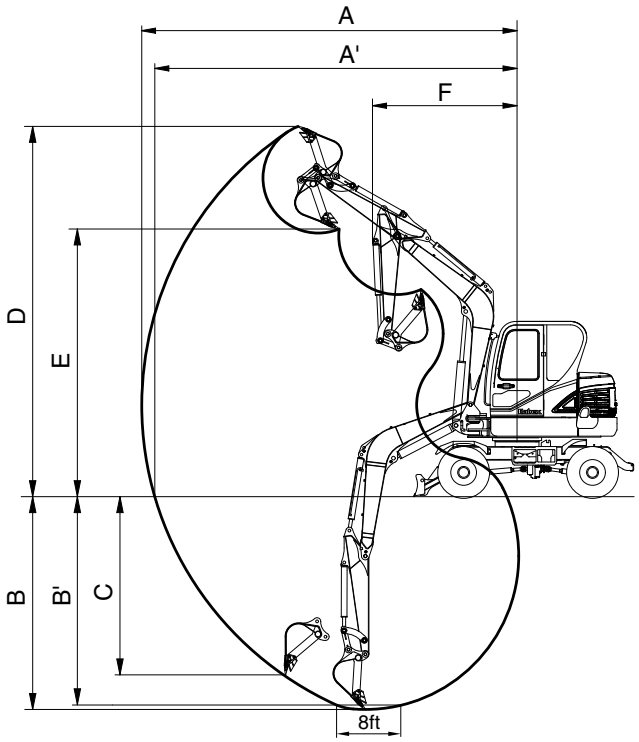
1) 3.0 m (9'10") MONO BOOM, 1.6 m (5' 3") ARM WITH BOOM SWING SYSTEM



Description		Unit	Specification
Operating weight		kg	5520
Bucket capacity(SAE heaped), standard		m^3	0.21
Overall length	A	mm (ft-in)	5970 (19' 6")
Overall width	B		1925 (6' 4")
Overall height	C		2850 (9' 4")
Upperstructure width	D		1850 (6' 1")
Ground clearance of counterweight	E		986 (3' 3")
Engine cover height	F		1970 (6' 6")
Minimum ground clearance	G		290 (11.4")
Rear-end distance	H		1650 (5' 5")
Rear-end swing radius	H'		1650 (5' 5")
Wheel base	I		2100 (6'11")
Tread	J		1600 (5' 3")
Dozer blade width	K		1925 (6' 4")
Travel speed	Low	km/hr (mph)	11.6 (7.2)
	High		30 (18.7)
Swing speed		rpm	7.8
Gradeability		Degree (%)	35 (70)
Max traction force		kg (lb)	3400 (7500)

3. WORKING RANGE

1) 3.0 m (9'10") MONO BOOM WITH BOOM SWING SYSTEM



Description		1.6 m (5' 3") Arm
Max digging reach	A	6150 mm (20' 2")
Max digging reach on ground	A'	5980 mm (19' 7")
Max digging depth	B	3500 mm (11' 6")
Max digging depth (8 ft level)	B'	3100 mm (10' 2")
Max vertical wall digging depth	C	2960 mm (9' 9")
Max digging height	D	6070 mm (19' 11")
Max dumping height	E	4340 mm (14' 3")
Min swing radius	F	2350 mm (7' 9")
Boom swing radius (left/right)		80˚/50˚
Bucket digging force	SAE	46.7 kN
		4762 kgf
		10499 lbf
	ISO	52.5 kN
		5356 kgf
		11810 lbf
Arm crowd force	SAE	27.5 kN
		2808 kgf
		6186 lbf
	ISO	30.89 kN
		3154 kgf
		6948 lbf

4. WEIGHT

Item	R60WVSPRO	
	kg	lb
Upperstructure assembly	2680	5910
Main frame weld assembly	600	1320
Engine assembly	280	620
Main pump assembly	30	70
Main control valve assembly	40	90
Swing motor assembly	75	165
Hydraulic oil tank assembly	90	200
Fuel tank assembly	60	130
Boom swing post	110	240
Counterweight	210	460
Cab assembly	350	770
Lower chassis assembly	2080	4590
Lower frame weld assembly	550	1210
Swing bearing	90	200
Travel motor assembly	40	90
Turning joint	30	70
Gear box	94	207
Front axle assembly	280	617
Rear axle assembly	200	440
Dozer blade assembly	200	440
Front attachment assembly (3.0 m boom, 1.6 m arm, 0.21 m^3 SAE heaped bucket)	790	1740
3.0 m boom assembly	240	530
1.6 m arm assembly	130	290
0.21 m^3 SAE heaped bucket assembly	170	370
Boom cylinder assembly	70	155
Arm cylinder assembly	60	130
Bucket cylinder assembly	35	80
Bucket control link assembly	40	90
Boom swing cylinder assembly	40	90
Blade cylinder assembly	30	70

5. LIFTING CAPACITIES

1) 3.0 m (9'10") boom, 1.6 m(5' 3") arm equipped with 0.21m³ (SAE heaped) bucket and the dozer blade down.

·  : Rating over-front ·  : Rating over-side or 360 degree

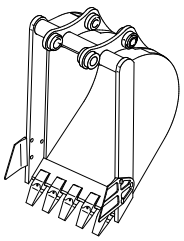
Load point height		Load radius								At max. reach		
		2.0m (6.6ft)		3.0m (9.8ft)		4.0m (13.1ft)		5.0m (16.4ft)		Capacity		Reach
												m(ft)
5.0m 16.4ft	kg lb											
4.0m 13.1ft	kg lb					*1110 *2450	1090 2400			*1100 *2430	870 1920	4.54 (14.9)
3.0m 9.8ft	kg lb					*1250 *2760	1060 2340	*1220 *2690	720 1590	*1090 *2400	700 1540	5.05 (16.6)
2.0m 6.6ft	kg lb			*2100 *4630	1580 3480	*1550 *3420	1000 2200	1260 2780	700 1540	1150 2540	630 1390	5.28 (17.3)
1.0m 3.3ft	kg lb			*2770 *6110	1460 3220	1760 3880	950 2090	1240 2730	670 1480	1130 2490	610 1340	5.28 (17.3)
0.0m 0.0ft	kg lb	*2490 *5490	*2490 *5490	2790 6150	1400 3090	1720 3790	910 2010	1220 2690	650 1430	1200 2650	640 1410	5.05 (16.6)
-1.0m -3.3ft	kg lb	*3950 *8710	2740 6040	2780 6130	1400 3090	1710 3770	910 2010			1400 3090	750 1650	4.55 (14.9)
-2.0m -6.6ft	kg lb	*3830 *8440	2810 6190	*2350 *5180	1430 3150					*1760 *3880	1070 2360	3.65 (12.0)

2) 3.0 m (9'10") boom, 1.6 m (5' 3") arm equipped with 0.21m³ (SAE heaped) bucket and the dozer blade up.

Load point height		Load radius								At max. reach		
		2.0m (6.6ft)		3.0m (9.8ft)		4.0m (13.1ft)		5.0m (16.4ft)		Capacity		Reach
												m(ft)
5.0m 16.4ft	kg lb									*1460 *3220	1410 3110	3.54 (11.6)
4.0m 13.1ft	kg lb					*1350 *2980	1180 2600			*1410 *3110	980 2160	4.48 (14.7)
3.0m 9.8ft	kg lb			*1670 *3680	*1670 *3680	*1480 *3260	1160 2560			*1360 *3000	820 1810	4.99 (16.4)
2.0m 6.6ft	kg lb			*2430 *5360	1680 3700	*1770 *3900	1110 2450	1370 3020	800 1760	1280 2820	750 1650	5.22 (17.1)
1.0m 3.3ft	kg lb			2980 6570	1580 3480	1880 4140	1070 2360	1340 2950	780 1720	1260 2780	730 1610	5.22 (17.1)
0.0m 0.0ft	kg lb	*2070 *4560	*2070 *4560	2930 6460	1540 3400	1850 4080	1040 2290			1340 2950	770 1700	4.99 (16.4)
-1.0m -3.3ft	kg lb	*4030 *8880	2940 6480	2930 6460	1550 3420	1840 4060	1040 2290			1560 3440	890 1960	4.49 (14.7)
-2.0m -6.6ft	kg lb	*3590 *7910	3010 6640	*2280 *5030	1580 3480					*1720 *3790	1250 2760	3.56 (11.7)

Note 1. Lifting capacity are based on SAE J1097 and ISO 10567.
2. Lifting capacity of the ROBEX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The load point is a hook located on the back of the bucket.
4. *indicates load limited by hydraulic capacity.

6. BUCKET SELECTION GUIDE



0.21 m^3 SAE
heaped bucket

Capacity		Width		Weight	Recommendation
					3.0 m (9' 10") boom
SAE heaped	CECE heaped	Without side cutter	With side cutter		1.6 m (5' 3") arm
0.21 m^3	0.15 m^3	705 mm	770 mm	170 kg	Applicable for materials with density of 1600 kgf/m^3 (2700 lb/yd^3) or less

7. SPECIFICATIONS FOR MAJOR COMPONENTS

1) ENGINE

Item	Specification
Model	Yanmar 4TNV98-EPHYBU
Type	4-cycle diesel engine, low emission
Cooling method	Water cooling
Number of cylinders and arrangement	4 cylinders, in-line
Firing order	1-3-4-2
Combustion chamber type	Direct injection type
Cylinder bore × stroke	98 × 110 mm (3.85" × 4.33")
Piston displacement	3319 cc (203 cu in)
Compression ratio	18.5 : 1
Rated gross horse power(SAE J1995)	58.2 Hp at 2400 rpm (42.5 kW at 2400 rpm)
Maximum torque at 1550rpm	20.5 kgf · m (148 lbf · ft)
Engine oil quantity	11.6 ℓ (3.1 U.S. gal)
Dry weight	270 kg (595 lb)
High idling speed	2200+ 50 rpm
Low idling speed	1050 ± 100 rpm
Rated fuel consumption	176 g/Hp · hr at 2400 rpm
Starting motor	12V-3.0 kW
Alternator	12V-100 A
Battery	1 × 12V × 100Ah

2) MAIN PUMP

Item	Specification
Type	Variable displacement tandem axis piston pumps
Capacity	63 cc/rev
Maximum pressure	240 kgf/cm^2 (3480 psi)
Rated oil flow	151.2 ℓ /min
Rated speed	2400 rpm

3) GEAR PUMP

Item	Specification
Type	Fixed displacement gear pump single stage
Capacity	8cc/rev
Maximum pressure	204 kgf/cm^2 (2958 psi)
Rated oil flow	19.2 ℓ/min

4) MAIN CONTROL VALVE

Item	Specification
Type	8 spools sectional block
Operating method	Hydraulic pilot system
Main relief valve pressure	240 kgf/cm^2(3480 psi)
Overload relief valve pressure	265 kgf/cm^2(3842 psi)

5) SWING MOTOR

Item	Specification
Type	Two fixed displacement axial piston motor
Capacity	28.87cc/rev
Relief pressure	220 kgf/cm^2 (3130 psi)
Braking system	Automatic, spring applied hydraulic released
Braking torque	14 kgf·m (101 lbf·ft)
Brake release pressure	20~40 kgf/cm^2 (284~570 psi)
Reduction gear type	2 - stage planetary

6) TRAVEL MOTOR

Item	Specification
Type	Bent axis design variable displacement axial piston motor
Relief pressure	220 kgf/cm^2 (3130 psi)
Counterbalance valve	Applied
Capacity	80 cc

7) POWER TRAIN

Item	Description		Specification
Gear box	Type		2 speed hydrostatic
	Gear ratio	1st	4.06
		2nd	1.31
	Clutch pressure		26~32 kgf/cm^2 (370~455 psi)
Parking brake	Type		Multi disc brake integrated in rear axle
	Maximum braking power		945 kgf · m (6835 lbf · ft)
Axle	Type		4 wheel drive with differential
	Gear ratio		8.67
	Brake		Multi disc brake
	Brake pressure		52 kgf/cm^2 (740 psi)
	Steering pressure		140 kgf/cm^2 (1990 psi)

8) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	ø 110 × ø 65 × 715mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	ø 90 × ø 55 × 850mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	ø 80 × ø 50 × 660mm
	Cushion	Extend only
Dozer cylinder	Bore dia × Rod dia × Stroke	ø 110 × ø 60 × 219mm
	Cushion	-
Boom swing cylinder	Bore dia × Rod dia × Stroke	ø 95 × ø 50 × 535mm
	Cushion	-

※ **Discoloration of cylinder rod can occur when the friction reduction additive of lubrication oil spreads on the rod surface.**

※ **Discoloration does not cause any harmful effect on the cylinder performance.**

9) BUCKET

Item		Capacity		Tooth quantity	Width	
		SAE heaped	CECE heaped		Without side cutter	With side cutter
R60WVS PRO	STD	0.21 m^3 (0.28 yd^3)	0.15 m^3 (0.20 yd^3)	5	705 mm (27.5")	770mm (30.1")

8. RECOMMENDED OILS

HYUNDAI genuine lubricating oils have been developed to offer the best performance and service life for your equipment. These oils have been tested according to the specifications of HYUNDAI and, therefore, will meet the highest safety and quality requirements.

We recommend that you use only HYUNDAI genuine lubricating oils and grease officially approved by HYUNDAI.

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature ˚C(˚F) -50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil	11.6 (3.1)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Swing drive	Grease	0.2 (0.1)	★NLGI NO.1 NLGI NO.2
	Gear oil	1.5 (0.4)	★SAE 75W-90 SAE 85W-140
Gear box case	Gear oil	1.8 (0.5)	
Front axle		Center: 4.5 (1.19) Hub: 0.4×2 (0.11×2)	SAE 85W-90 LSD(GL-5)
Rear axle		Center:4.5 (1.19) Hub: 0.4×2 (0.11×2)	
Hydraulic tank	Hydraulic oil	Tank; 70 (18.5) System; 120 (31.7)	★ISO VG 15 ISO VG 32 ISO VG 46, HBHO VG 46★3 ISO VG 68
Fuel tank	Diesel fuel★1	117 (30.9)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and water★2	9.5 (2.5)	Ethylene glycol base permanent type (50 : 50) ★Ethylene glycol base permanent type (60 : 40)

SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Material

★ : Cold region (Russia, CIS, Mongolia)
★1 : Ultra low sulfur diesel
- sulfur content ≤ 15 ppm
★2 : Soft water
City water or distilled water
★3 : Hyundai Bio Hydraulic Oil

※ Using any lubricating oils other than HYUNDAI genuine products may lead to a deterioration of performance and cause damage to major components.

※ Do not mix HYUNDAI genuine oil with any other lubricating oil as it may result in damage to the systems of major components.

※ For HYUNDAI genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact HYUNDAI dealers.

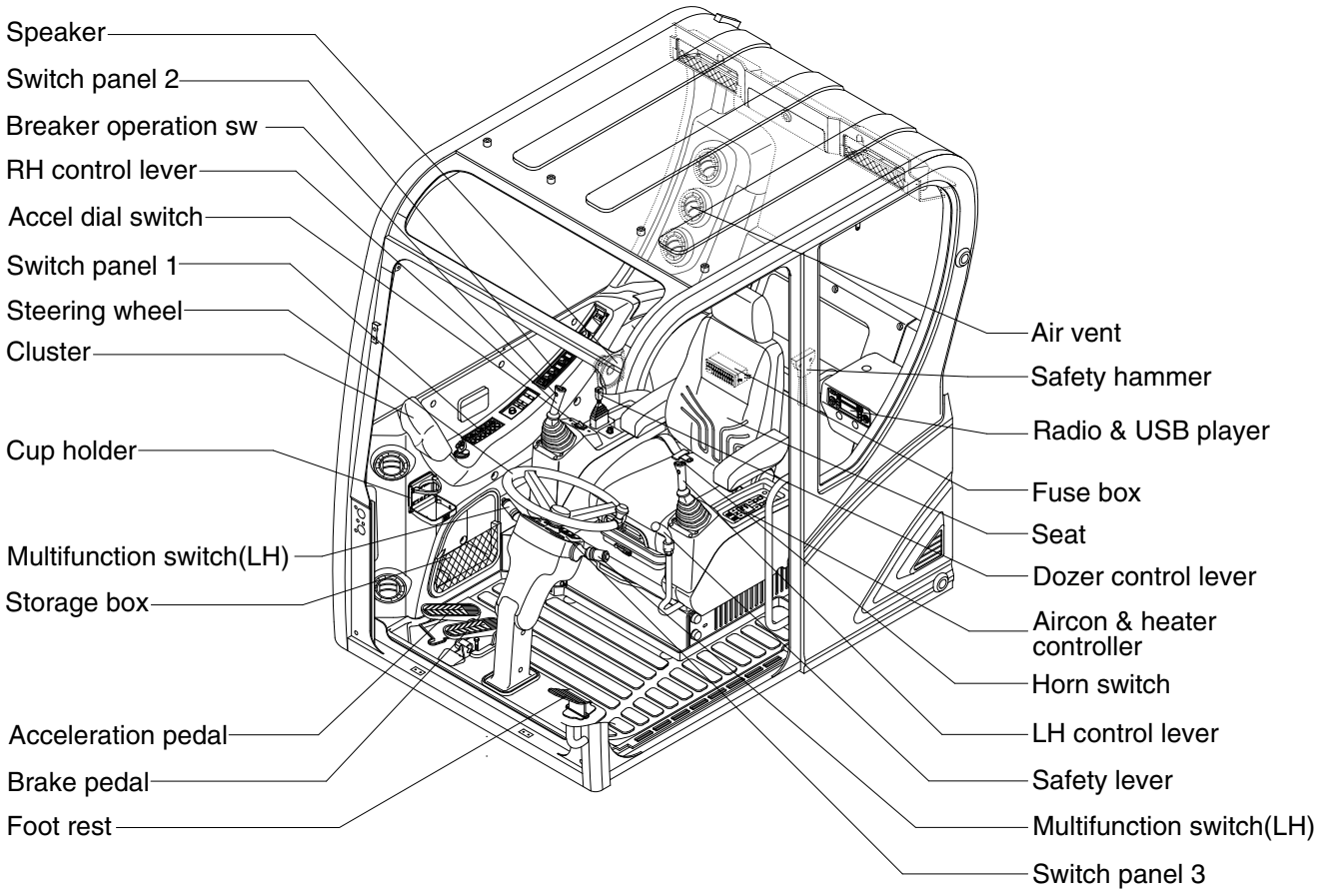
1. CAB DEVICES

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 machine to be monitored at a glance.

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



2. CLUSTER

1) STRUCTURE

The cluster consists of LCD and switches as shown below. The LCD is to warn the operator in case of abnormal machine operation or conditions for the appropriate operation and inspection.
Also, The LCD is to set and display for modes, monitoring and utilities with the switches.
The switches or touch screen are to set the machine operation modes.

※ **The cluster installed on this machine does not entirely guarantee the condition of the machine. Daily inspection should be performed according to chapter 6, Maintenance.**

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

※ **The warning lamp pops up, lights ON (on the left-top side) and the buzzer sounds when the machine has a problem.**
The warning lamp lights ON until the problem is cleared. Refer to page 3-5 for details.

2) GAUGE

(1) Operation screen

When you first turn starting switch ON, the operation screen will appear.

Default (A type)

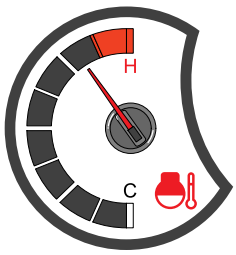
Option (B type)

Option (C type)

1	Engine coolant temp gauge	3	Fuel level gauge	5	Accel dial
2	Hydraulic oil temp gauge	4	Engine rpm		

※ Operation screen type can be set by the screen type menu of the display.
Refer to page 3-19 for details.

(2) Engine coolant temperature gauge

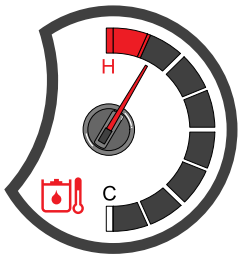


① This gauge indicates the temperature of coolant.
- Black range : 40-115˚C (104-239˚F)
- Red range : Above 115˚C (239˚F)

② If the indicator is in the red range or lamp lights ON in red, turn OFF the engine and check the engine cooling system.

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

(3) Hydraulic oil temperature gauge

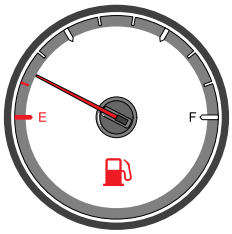


① This gauge indicates the temperature of hydraulic oil.
- Black range : 40-105˚C (104-221˚F)
- Red range : Above 105˚C (221˚F)

② If the indicator is in the red range or lamp lights ON in red, reduce the load on the system. If the gauge stays in the red range, stop the machine and check the cause of the problem.

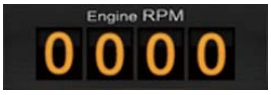
※ If the gauge indicates the red range or lamp lights ON in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

(4) Fuel level gauge



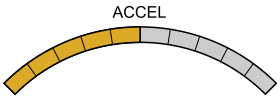
① This gauge indicates the amount of fuel in the fuel tank.
② Fill the fuel when the red range, or lamp lights ON in red.
※ **If the gauge indicates the red range or lamp lights ON in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.**

(5) Engine rpm display



① This displays the engine speed.

(6) Accel dial display



① This displays acceleration dial level from 0 to 10 step.

3) COMMUNICATION ERROR AND LOW VOLTAGE WARNING POP-UP

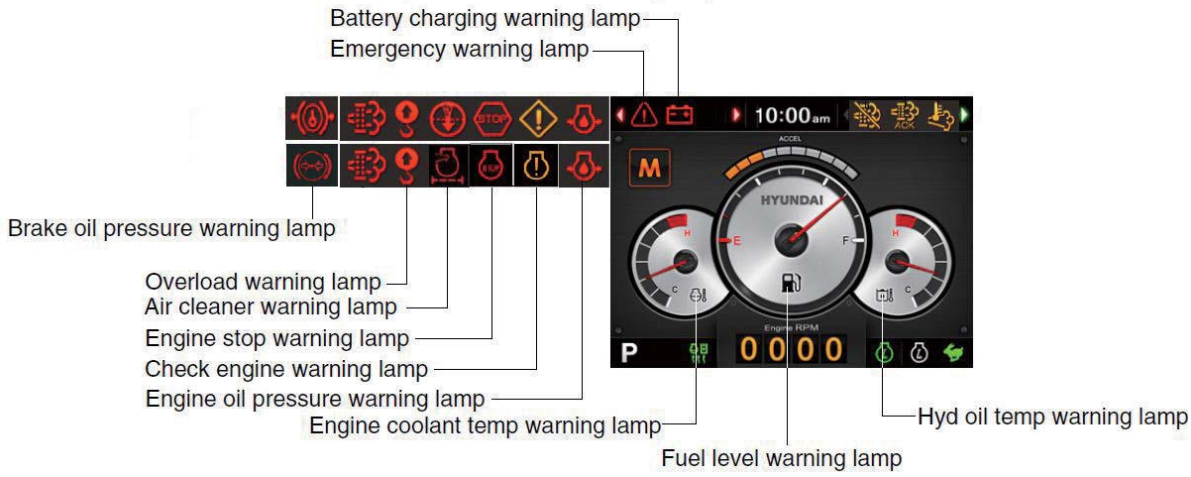
(1) Communication error pop-up

① Cluster displays this communication error pop-up when it has communication error with MCU.
② Communication error pop-up displays at operation screen only. Just buzzer alarm at the other screen.
③ If communication with MCU become normal state, it will disappear automatically.

(2) Low voltage warning pop-up

① Cluster displays this low voltage warning pop-up when the battery voltage is low.
② Low voltage warning pop-up displays at operation screen only. Just buzzer alarm at the other screen.
③ This pop-up will disappear with using touch screen or buzzer stop switch. While the battery voltage is low, buzzer sounds every minute.
④ When the battery voltage is higher than 11.5 V, the pop-up off.

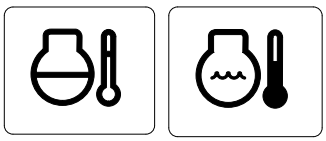
4) WARNING LAMPS



※ **Each warning lamp on the left-top of the LCD pops up on the center of LCD and the buzzer sounds when the each warning is happened. The pop-up warning lamp moves to the original position and lights ON when the buzzer stop switch is pushed or the pop-up is touched. And the buzzer stops. Refer to page 3-11 for the switch.**

※ **When the warning lamps light ON more than 4, you can check all lamps with next page button(◀ , ▶) near the warning lamps.**

(1) Engine coolant temperature warning lamp

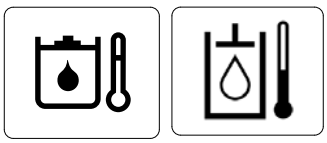


① The ⚠ lamp pops up on the center of LCD and the buzzer sounds when the engine coolant temperature is over 115˚C.

② The pop-up ⚠ lamp moves to the original position and lights ON when the buzzer stop switch is pushed or pop-up is touched. Also, the buzzer stops and lamp keeps ON.

③ Check the cooling system when the lamp keeps ON.

(2) Hydraulic oil temperature warning lamp

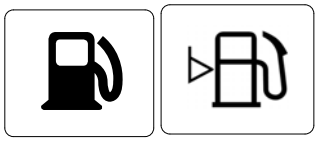


① The ⚠ lamp pops up on the center of LCD and the buzzer sounds when the hydraulic oil temperature is over 105˚C.

② The pop-up ⚠ lamp moves to the original position and lights ON when the buzzer stop switch is pushed or pop-up is touched. Also, the buzzer stops and lamp keeps ON.

③ Check the hydraulic oil level and hydraulic oil cooling system.

(3) Fuel level warning lamp



① This warning lamp lights ON and the buzzer sounds when the level of fuel is below 10%.

② Fill the fuel immediately when the lamp is ON.

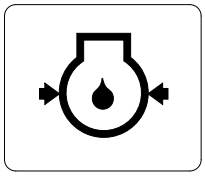
(4) Emergency warning lamp

① This lamp pops up and the buzzer sounds when each of the below warnings are happened.
- Engine coolant overheating (over 115˚C)
- Hydraulic oil overheating (over 105˚C)
- MCU input voltage abnormal
- Accel dial circuit abnormal or open

※ The pop-up warning lamp moves to the original position and lights ON when the buzzer stop switch is pushed or pop-up is touched. Also the buzzer stops.
This is same as following warning lamps.

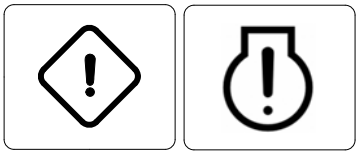
② When this warning lamp lights ON, machine must be checked and serviced immediately.

(5) Engine oil pressure warning lamp



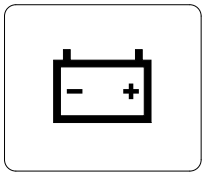
① This lamp lights ON when the engine oil pressure is low.
② If the lamp lights ON, shut OFF the engine immediately. Check oil level.

(6) Check engine warning lamp



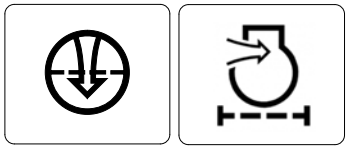
① This lamp lights ON when the communication between MCU and engine ECM on the engine is abnormal, or if the cluster received any fault code from engine ECM.
② Check the communication line between them.
If the communication line is OK, then check the fault codes on the cluster.

(7) Battery charging warning lamp



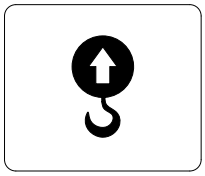
① This lamp lights ON when the battery charging voltage is low.
② Check the battery charging circuit when this lamp is ON.

(8) Air cleaner warning lamp



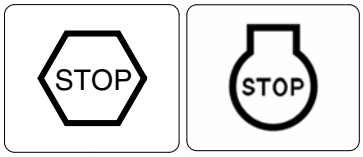
① This lamp lights ON when the filter of air cleaner is clogged.
② Check the filter and clean or replace it.

(9) Overload warning lamp (opt)



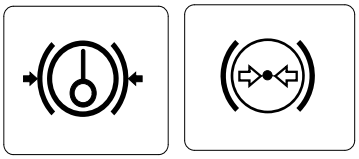
① When the machine is overload, the overload warning lamp lights ON during the overload switch is ON. (if equipped)
② Reduce the machine load.
Initiate a manual regeneration

(10) Stop engine warning lamp



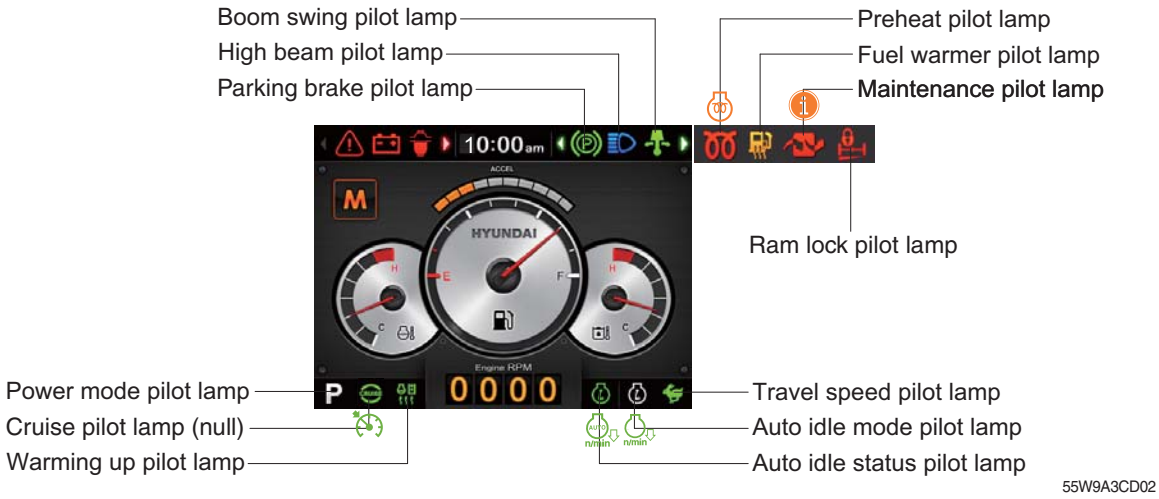
① If the lamp lights ON, stop the engine immediately and check the engine.
② Check the fault codes on the monitor.
※ **Please contact your Hyundai service center or local dealer.**

(11) 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 any problems are corrected.**

5) PILOT LAMPS

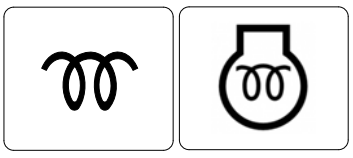


※ **When the pilot lamps light ON more than 3, you can check all lamps with next page button (◀, ▶).**

(1) Mode pilot lamps

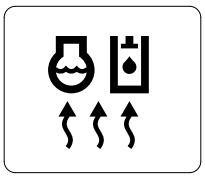
No	Mode	Pilot lamp	Selected mode
1	Power mode	P	Heavy duty power work mode
		S	Standard power mode
2	Travel mode		Low speed traveling
			High speed traveling
3	Auto idle mode		Auto idle status
			Auto idle mode

(2) Preheat pilot lamp



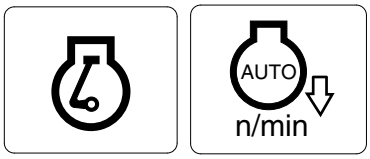
① Turning the start key switch ON position starts preheating in cold weather.
② Start the engine after this lamp is OFF.

(3) Warming up pilot lamp



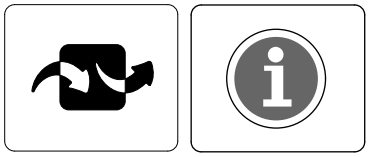
① This lamp is turned ON when the coolant temperature is below 30˚C(86˚F).
② The automatic warming up is cancelled when the engine coolant temperature is above 30˚C, or when 10 minutes have passed since starting the engine.

(4) Auto idle status/ mode pilot lamp



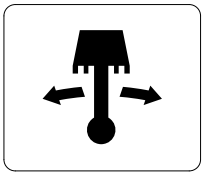
① The auto idle pilot lamp will be ON when the idle mode is selected.
② The auto idle status pilot lamp will be ON when all levers and pedals are at neutral position, and the auto idle mode is selected.

(5) Maintenance pilot lamp



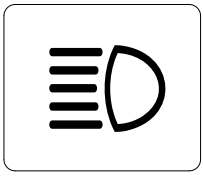
① This lamp will be ON when the consuming parts are needed to change or replace. It means that the change or replacement interval of the consuming parts remains below 30 hours.
② Check the message in maintenance information of main menu. Also, this lamp lights ON for 3 minutes when the start switch is ON position.
※ Refer to the page 3-17.

(6) Boom swing pilot lamp



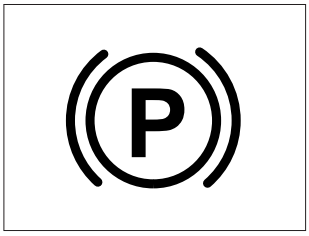
① This lamp is ON when the boom swing pedal is operated.

(7) High beam pilot lamp



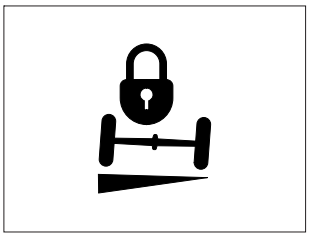
① This lamp works when the illuminating direction is upward.
② This lamp comes ON when the dimmer switch is operated, e.g, when passing another vehicle.

(8) Parking brake pilot lamp



① When the parking brake is actuated, the lamp lights ON.
※ Check the lamp is OFF before driving.

(9) Ram lock pilot lamp

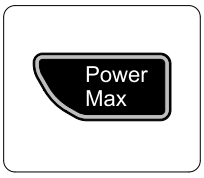


① This pilot lamp lights ON when ram lock switch is rear position.
② Also, the pilot lamp lights ON when the parking switch is ON or service brake is applied.

6) SWITCHES

※ **When the switches are selected, the pilot lamps are displayed on the LCD. Refer to the page 3-10 for details.**

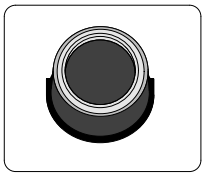
(1) Power mode switch



① This switch is to select the machine power mode and selected power mode pilot lamp is displayed on the pilot lamp position.
- P : Heavy duty power work.
- S : Standard power work.

② The pilot lamp changes S → P → S in order.

(2) Select switch

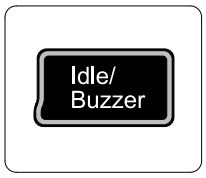


① This switch is used to select or change the menu and input value.

② Knob push
- Long (over 2 sec) : Return to the operation screen
- Medium (0.5~2 sec) : Return to the previous screen
- Short (below 0.5 sec) : Select menu

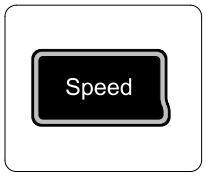
③ Knob rotation
This knob changes menu and input value.
- Right turning : Down direction / Increase input value
- Left turning : Up direction / Decreased input value

(3) Auto idle/ buzzer stop switch



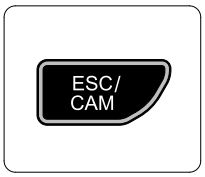
① This switch is used to activate or cancel the auto idle function.
② The buzzer sounds when the machine has a problem.
In this case, push this switch and buzzer stops, but the warning lamp blinks until the problem is cleared.

(4) Travel speed control switch



① This switch is used to select the travel speed alternatively.
· : Low speed
· : High speed

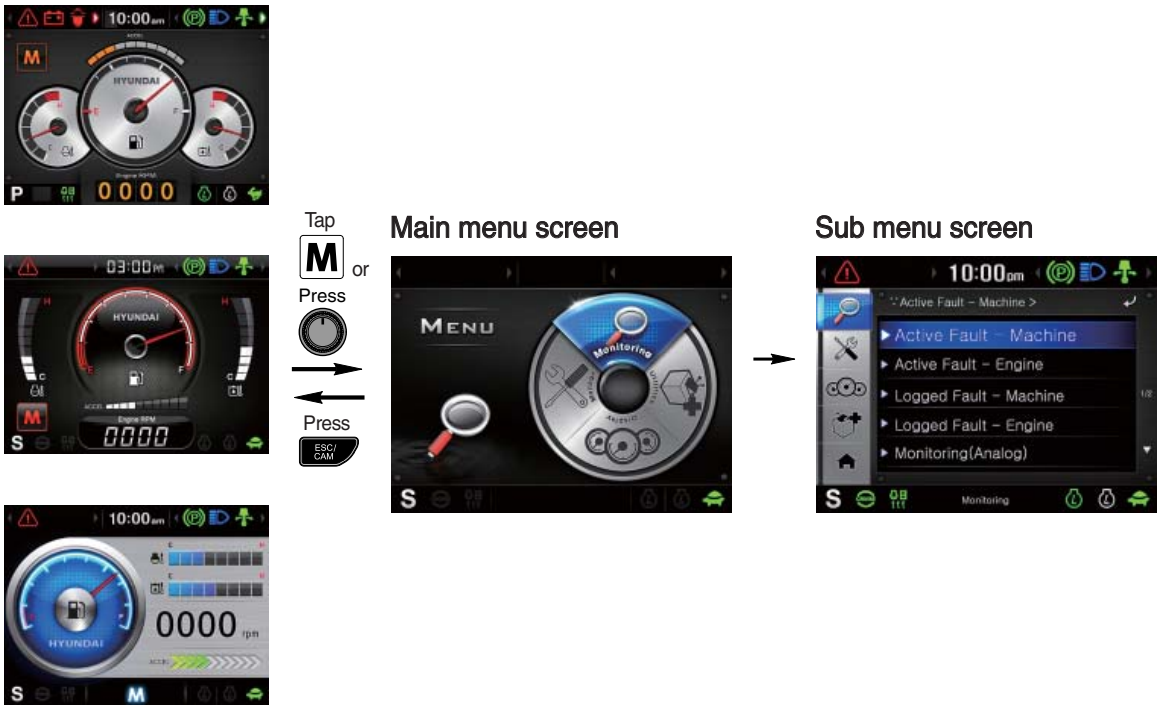
(5) Escape/ Camera switch



① This switch is used to return to the previous menu or parent menu.
② In the operation screen, pushing this switch will display the view of the camera on the machine (if equipped).
Please refer to page 3-21 for the camera.
③ If the camera is not installed, this switch is used only ESC function.

7) MAIN MENU

· Operation screen



※ Please refer to select switch, page 3-12 for selection and change of menu and input value.

(1) Structure

No	Main menu	Sub menu	Description
1	 Monitoring	Active fault - Machine Active fault - Engine Logged fault - Machine Logged fault - Engine Monitoring (Analog) Monitoring (Digital) - Input Monitoring (Digital) - Output	MCU ECU MCU ECU Machine information Switch status Output status
2	 Management	ESL mode setting Change password Maintenance information Machine Information A/S phone number Service menu	ESL mode setting Password change Replacement, Change interval oils and filters Cluster, MCU, Engine, Machine A/S phone number, A/S phone number change Delete logged faults, Software download, Operating hour, power shift
3	 Display	Clock Screen type Brightness setting Unit setting Language Calibration	Clock A type, B type, C type Manual, Auto Temperature, Pressure 12 language Calibrating the touch screen
4	 Utilities	Camera setting Mode Video	Number of active, Display order, Camera No. Operation mode select Play music and video file

(2) Monitoring

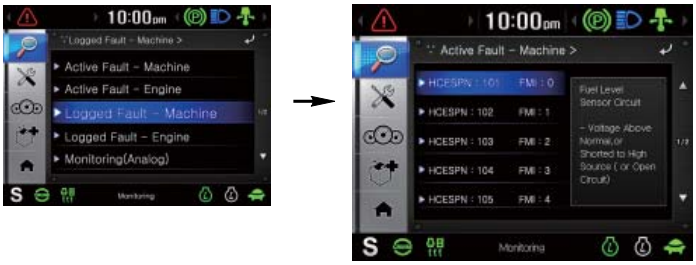
① Active fault - Machine

· The active faults of the MCU can be checked by this menu.

② Active fault - Engine

· The active faults of engine ECU can be checked by this menu.

③ Logged fault - Machine/ Engine



· The logged faults of the MCU or engine ECU can be checked by this menu.
· Only for the service person.

④ Monitoring (Analog)

· The machine status such as the engine rpm, oil temperature, voltage and pressure etc. can be checked by this menu.

⑤ **Monitoring** (Digital) - **Input**

· The switch status can be confirmed by this menu.
· The activated switchs are blue light ON.

⑥ **Monitoring** (Digital) - **Output**

· The output status can be confirmed by this menu.
· The output pilot lamps are blue light ON.

(3) Management

① ESL mode setting

· **ESL mode setting**

- ESL : Engine Starting Limit
- ESL mode is desingned to be a theft deterrent or will prevent the unauthorized operation of the machine.
- If the ESL mode was selected Enable, the password will be required when the start switch is turned ON.
- **Disable** : Not used ESL function

Enable (always) : The password is required whenever the operator starts engine.

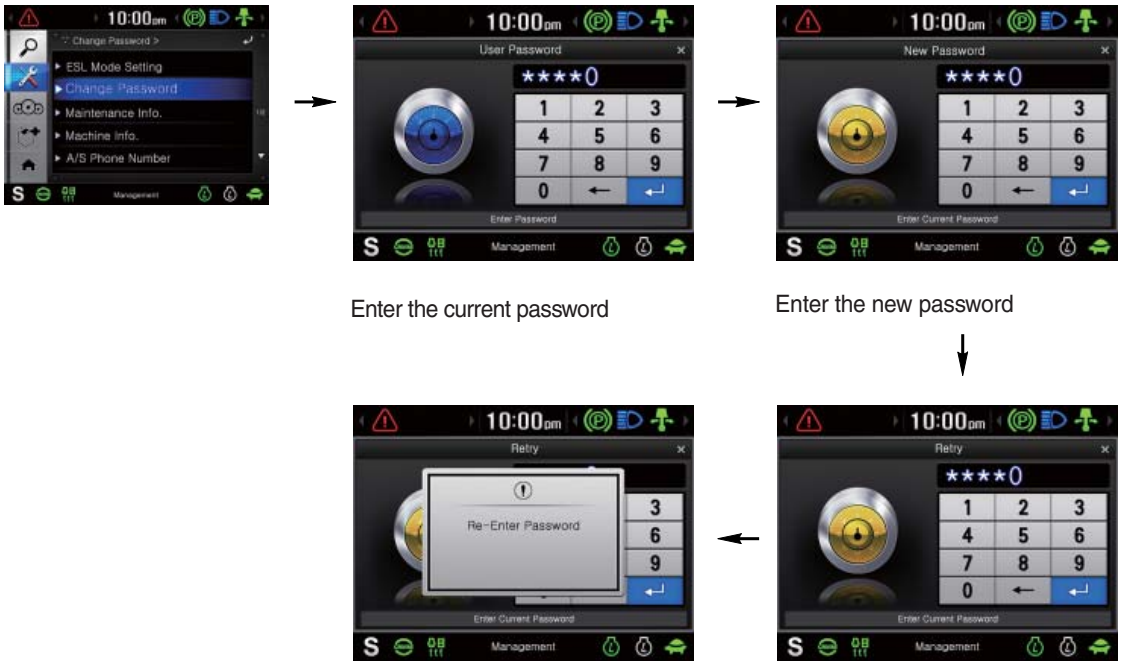
Enable (Interval): The password is required when the operator starts engine first.
But the operator can restart the engine within the interval time without inputting the password.
The interval time can be set maximum 2 days.

※Default password : 00000

※Password length : 5~10 digit

② Change password

- The password is 5~10 digits.



Enter the current password

Enter the new password

The new password is stored in the MCU.

Enter the new password again

③ Maintenance information

- Elapse : Maintenance elapsed time.
- Interval : The change or replace interval can be changed in the unit of 50 hours.
- History-Hour : Maintenance replacement history.
- Replacement : The elapsed time will be reset to zero (0).
- **Change or relpace interval**

No	Item	Interval
1	Engine oil	500
2	Final gear oil	1000
3	Swing gear oil	1000
4	Hydraulic oil	5000
5	Pilot line filter	1000
6	Hydraulic oil return filter	1000
7	Engine oil filter	500
8	Fuel filter	500
9	Pre-filter	500
10	Hydraulic tank breather	1000
11	Air cleaner	500
12	Radiator coolant	2000
13	Swing gear pinion grease	1000

④ Machine Information

- This can confirm the identification of the cluster, MCU, engine and machine.

⑤ **A/S phone number**

· The A/S phone number can be checked and changed.

⑥ **Service menu**

Enter the password

· Delete logged fault : Logged faults of MCU or engine ECU can be deleted.
· S/W download : Update and display software about operating system, application, image and font.
· Operating hours : Operating hours since the machine line out can be checked.
· Power shift : Set power shift mode (standard/option)

(4) Display

① **Clock**

· The first line's three spots "****－**－**" represent Year/Month/Day each.
· The second line shows the current time. (AM, PM/0:00~12:59)

② Screen type

· The screen type (A,B,C) of the LCD can be selected by this menu.

③ Brightness setting calibration

Manual (1st~10th step)

Auto (day/night) Auto (time)

· If "Auto" is chosen, brightness for day and night can be differently set up. Also, users can define which day time interval. (Set day starting time and ending time)

④ Unit setting

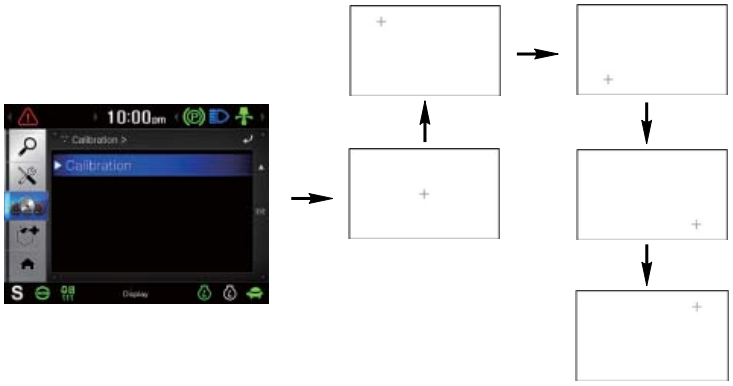
· Temperature : ˚C ↔ ˚F
· Pressure : bar ↔ MPa ↔ kgf/cm² ↔psi

⑤ Language

· User can select preferable language and all displays are changed the selected language.

⑥ Calibration

· When touch awareness goes wrong, this function use.
Fall in the next step if touches the middle point of cross with fingernail.
If touches total five points as follows, the setting is completed.



(5) Utilities

① Camera setting

- Three cameras can be installed on the machine and the display order can be set by this menu.
- If the camera was not equipped, this menu is not useful.

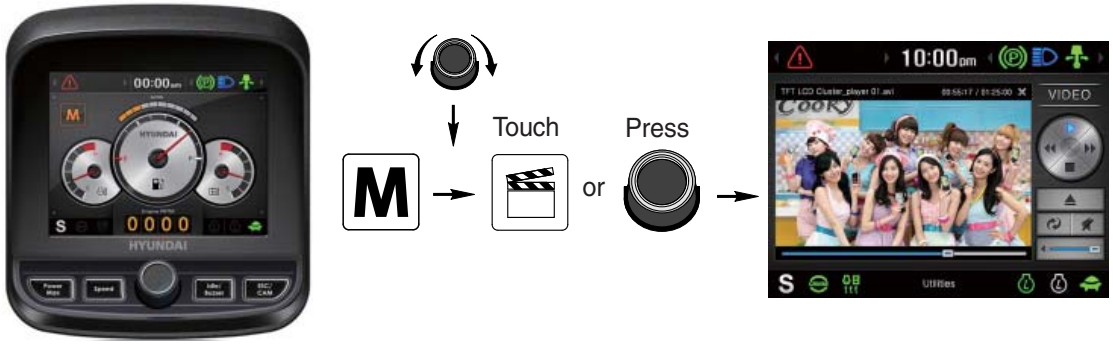
- In the operation screen, if the ESC/CAM switch is pushed, rear view camera display or stop.
- Turnning the select switch in clockwise direction, the next ordered will be shown and in counter-clockwise direction, the previously ordered will be shown. Also, you can change camera channel using touch the screen.
- Push the select switch or touch the screen, the displayed screen will be enlargement.

② Mode

- When this cluster's buttons are not work, you can control using touch screen instead of these buttons.
- You can only control in this mode screen.

③ Video

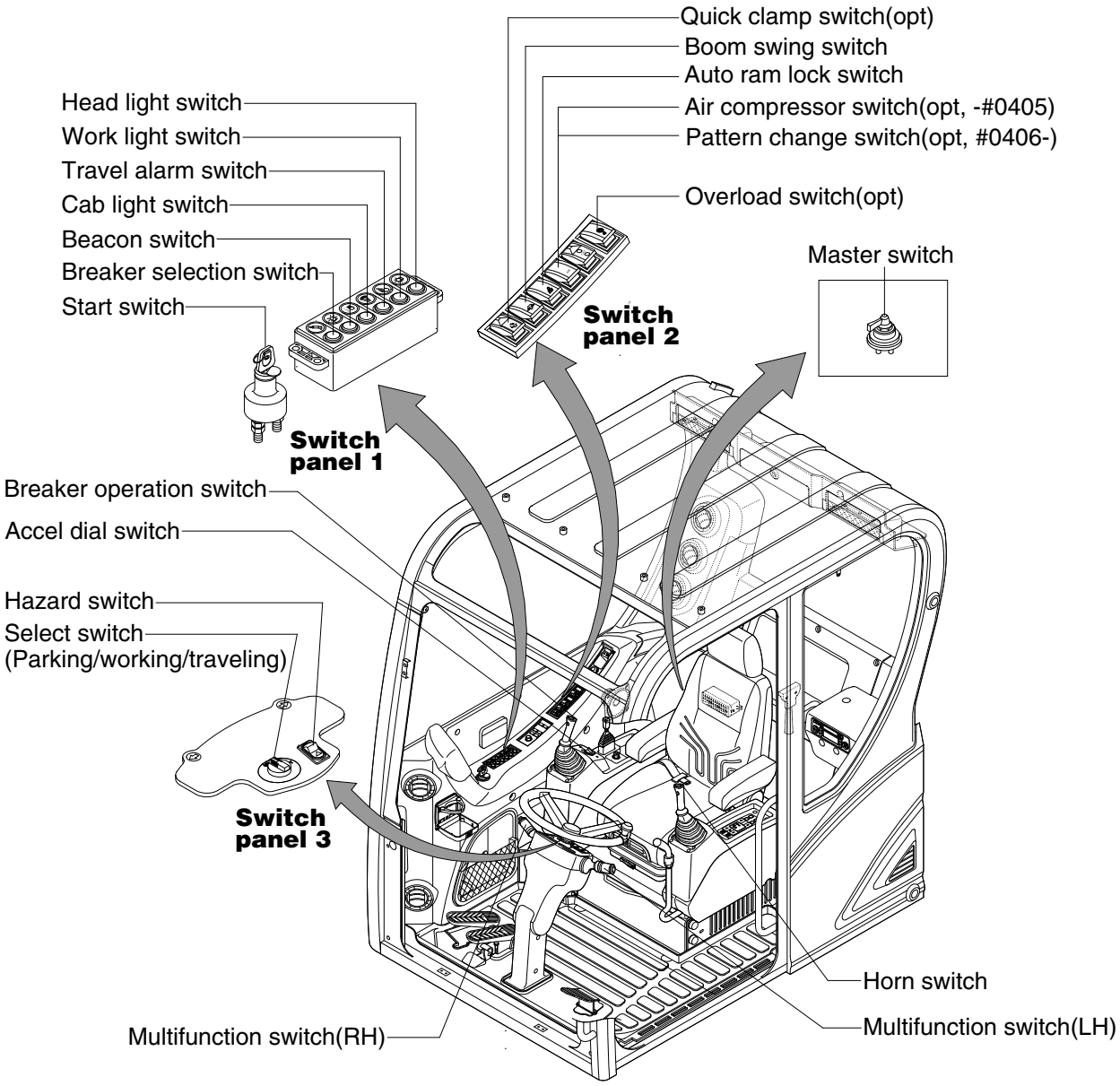
· Play MP4 or codec file of external hard disk through USB port.
· The USB port is located under the cluster.



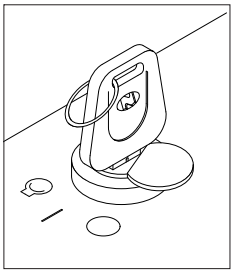
· Over 1100 engine rpm, the screen turns into the operation screen with MP4 or codec file playing for the safety.

No.	Function	Control	No.	Function	Control
1	Previous track	Power mode switch or touch	7	Sound volume	Speed switch or touch
2	Next track	Speed switch or touch	8	Stop	ESC/CAM button or touch
3	Play	Touch	9	File name	-
4	Pause	Touch	10	Current time/ Total time	-
5	Contents display	Touch	11	Current playing time	-
6	Mute	Touch	-	-	-

3. SWITCHES



1) STARTING SWITCH

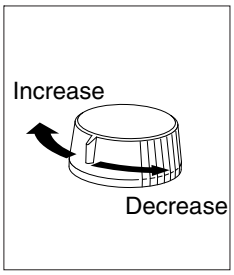


(1) There are three positions, OFF, ON and START.

- (OFF) : None of electrical circuits activate.
- (ON) : All the systems of machine operate.
- (START) : Use when starting the engine.
  Release key immediately after starting.

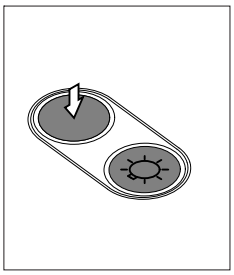
※ **Key must be in the ON position with engine running to maintain electrical and hydraulic function and prevent serious machine damage.**

2) ACCEL DIAL



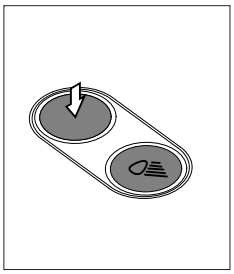
(1) There are 10 dial setting.
(2) Setting 1 is low idle and setting 10 is high idle.
- By rotating the accel dial to right : Engine speed increased.
- By rotating the accel dial to left : Engine speed decreased.

3) HEAD LIGHT SWITCH



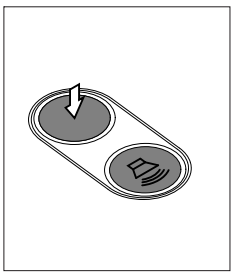
(1) This switch is used to operate the head light.
- Press the switch once, the head light comes ON and the pilot lamp ON.
- Press the switch once more, the head light and pilot lamp turn off.

4) WORK LIGHT



(1) This switch is used to operate the work light.
- Press the switch once, the work light comes ON and the pilot lamp ON.
- Press the switch once more, the work light and pilot lamp turn off.

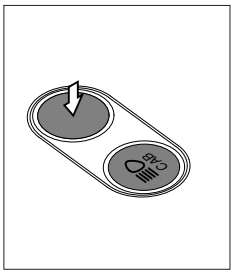
5) TRAVEL ALARM SWITCH



(1) This switch is used to alarm surroundings when the machine travels to forward and backward.

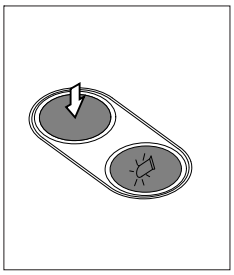
(2) On pressing this switch, the alarm operates only when the machine is traveling.

6) CAB LIGHT SWITCH



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

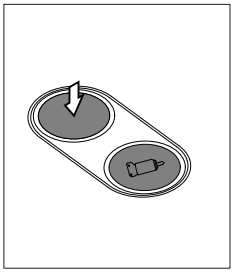
7) BEACON SWITCH (option)



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

(2) The below indicator lamp is turned ON when operating this switch.

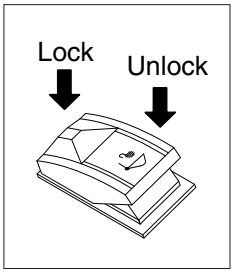
8) BREAKER SELECTION SWITCH (option)



(1) This switch is used to operate breaker.

※ **The breaker operates only when this switch is pressed.**

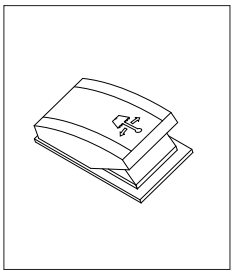
9) QUICK CLAMP SWITCH (option)



(1) This switch is used to engage or disengage the moving hook on quick clamp.

※ **Refer to the page 8-6 for details.**

10) BOOM SWING SWITCH

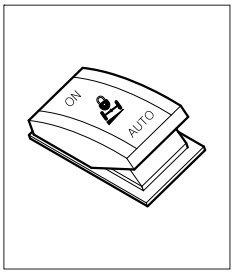


(1) This switch is used to swing the boom to the right or left direction.

(2) The indicator lamp turned ON when selected this switch.

※ **Refer to the page 4-7 for the operation.**

11) AUTO RAM LOCK SWITCH



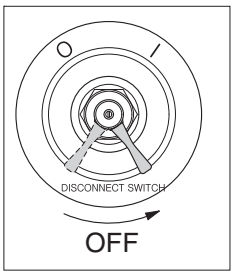
(1) This switch activate front axle oscillation cylinder to locking position for increase of stability.

- ON : Set front axle to locking position for excavation work or travels even ground. Also, the ram lock pilot lamp comes ON at the travel pilot lamp.
- AUTO : Set front axle to locking or unlocking as table.

※ **Refer to page 3-31 for select switch.**

Select switch (parking/working/ traveling)	Ram lock	Conditions
Parking (P)	Locking	· Always
Traveling (T)	Unlocking	· Always
Working (W)	Locking	· FNR lever in neutral position · Service brake pedal is depressed.
	Unlocking	· FNR lever in forward/reverse position and service brake pedal is not depressed. · 2 way pedal is equipped and service brake pedal is not depressed.

12) MASTER SWITCH

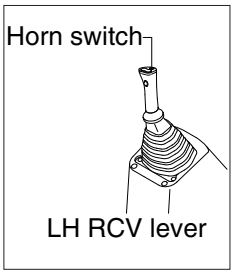


(1) This switch is used to shut off the entire electrical system.

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

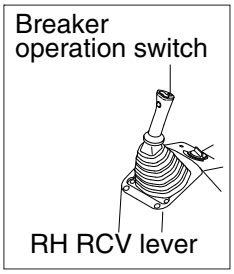
※ **Never turn the master switch to O (OFF) with the engine running. It could result in engine and electrical system damage.**

13) HORN SWITCH



(1) This switch is at the top of left side control lever.
On pressing, the horn sounds.

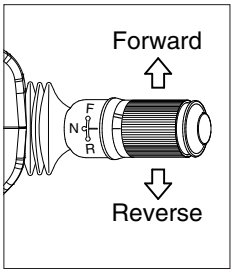
14) BREAKER OPERATION SWITCH



(1) On pressing this switch, the breaker operates only when the breaker selection switch on the switch panel is selected.

15) RH MULTI FUNCTION SWITCH

(1) FNR lever



① This lever changes travel direction of machine.
- **F** : Machine moves forward
- **N** : Neutral position
- **R** : Machine moves backward

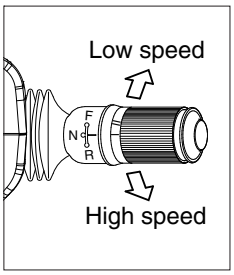
⚠ **Travel direction will be reversed if lower structure is positioned with dozer in front.**

② The warning buzzer sounds when the lever is in the reverse position.

⚠ **If this lever is not in the neutral position, engine does not started.**

⚠ **Be sure to stop the machine when changing the direction forward or backward while traveling.**

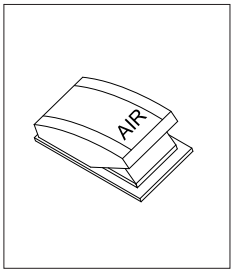
(2) Travel speed switch



① This switch is for selecting travelling speed between high and low.
- Low speed(🐢) : 11.3 km/hr (7.0 mph), turtle mark
- High speed(🐇) : 30 km/hr (19.0 mph), rabbit mark

⚠ **In case of changing the travel speed, be sure to stop the machine completely.**

16) AIR COMPRESSOR SWITCH (option, -#0405)



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

(2) The indicator lamp turned ON when selected this switch.

17) PATTERN CHANGE SWITCH (option, #0406-)

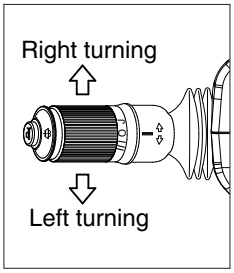
① The pattern change can be operated easily using this switch.
- Position ISO : ISO type pattern
- Position A : A type pattern

※ Before starting the machine, check switch position.

※ Refer to the page 4-26 for the details.

18) LH MULTI FUNCTION SWITCH

(1) Direction indication lamp switch

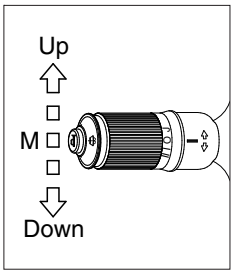


① This switch is used to warn or signal the turning direction of the machine to other machines or equipment.

② Push the lever to forward for turning right (⇧), pull the lever to backward for turning left (⇩).

③ The turning pilot lamp comes ON at the travel pilot lamp on the steering column.

(2) Dimmer switch



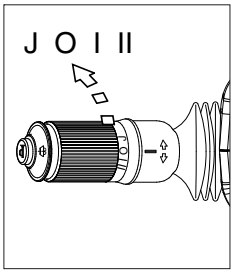
① This switch is used to turn the head lights direction.

② Switch positions.

- Up ( ) : To flash for passing
- Middle ( ) : Head lights low beam ON
- Down ( ) : Head lights high beam ON

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

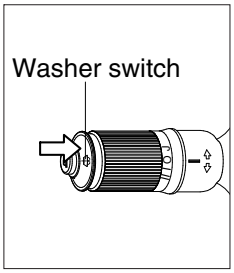
(3) WIPER SWITCH



① When the switch is in J position, the wiper moves intermittently.

② When placed in I or II position, the wiper moves continuously.

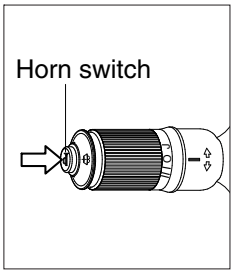
(4) WASHER SWITCH



① If you push the grip of the lever, washer liquid will be sprayed and the wiper will be activated 2-3 times.

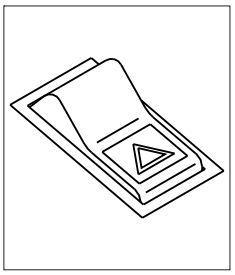
※ Check the quantity of washer liquid in the tank. If the level of the washer liquid is LOW, add the washer liquid (in cold, winter days) or water. The capacity of tank is 1.5 liter.

(5) HORN SWITCH



① This switch is at the end of left side multifunction switch. On pressing, the horn sounds.

19) HAZARD SWITCH

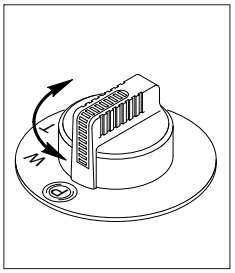


(1) Use for parking, or roading machine.

(2) LH and RH turn signal lamps come ON at the same time by this switch.

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

20) SELECT SWITCH (parking / working / traveling)

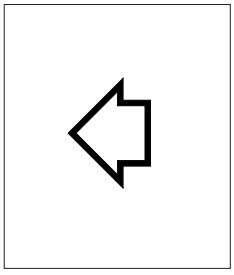


(1) This switch is used to select the operation mode as below.

- Parking (Ⓟ) : The parking brake is applied.
- Working (W) : The machine needs to be working.
- Traveling (T) : The machine needs to be traveling.

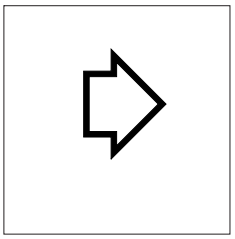
21) TURNING PILOT LAMP

(1) Left turning pilot lamp



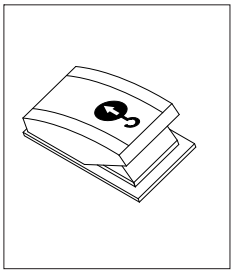
(1) This lamp flashes with sound when the LH multifunction switch is move to backward position.

(2) Right turning pilot lamp



① This lamp flashes with sound when the LH multifunction switch is
② move to forward position.

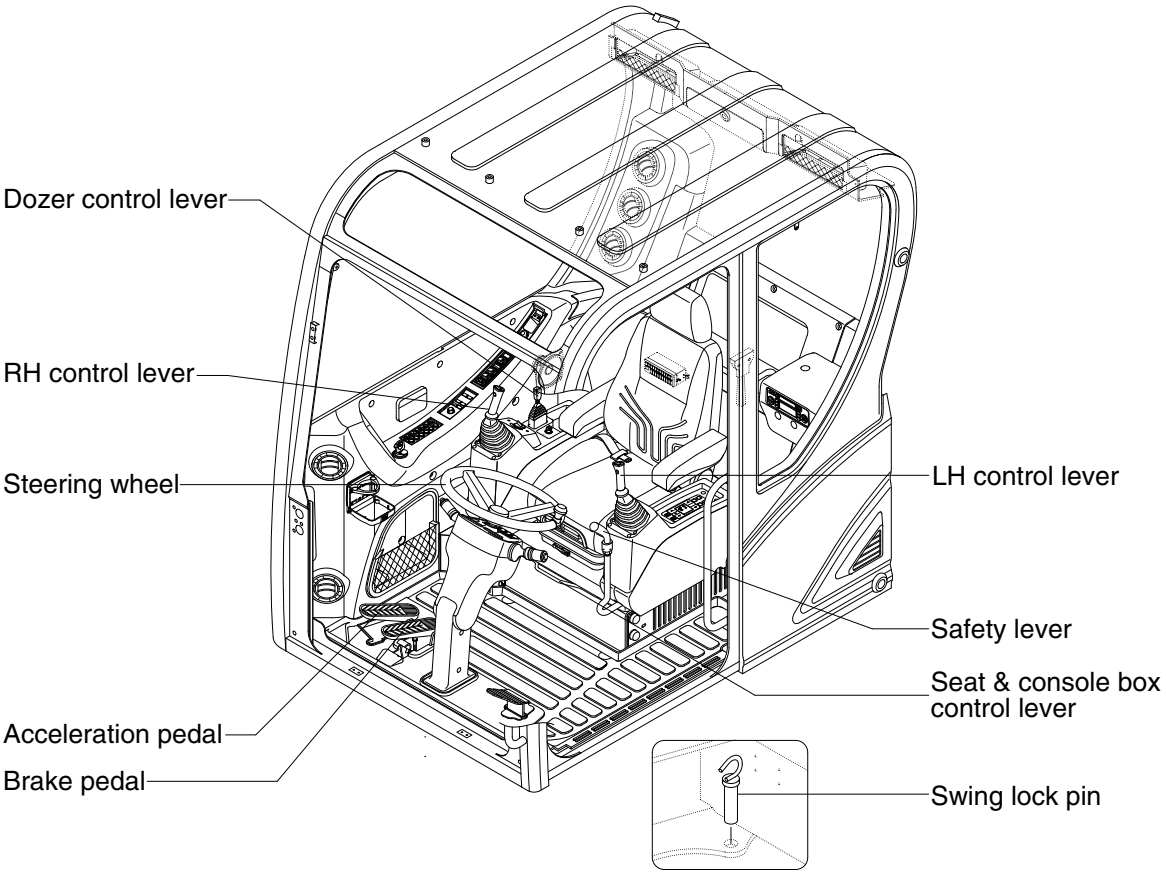
22) OVERLOAD SWITCH (option)



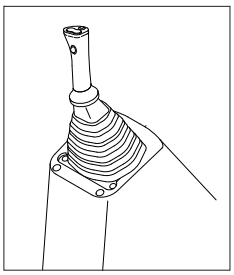
(1) When this switch pressed ON position, buzzer makes sound and overload warning lamp comes ON in case that the machine is overload.

(2) When it pressed OFF position, buzzer stops and warning lamp goes out.

4. LEVERS AND PEDALS



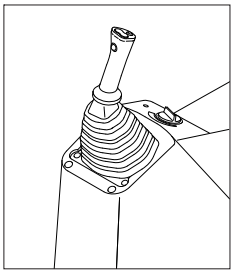
1) LH CONTROL LEVER



(1) This joystick is used to control the swing and the arm.

(2) Refer to **operation of working device** in chapter 4 for details.

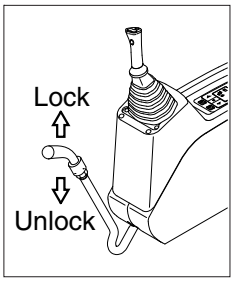
2) RH CONTROL LEVER



(1) This joystick is used to control the boom and the bucket.

(2) Refer to **operation of working device** in chapter 4 for details.

3) SAFETY LEVER



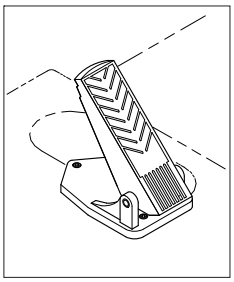
(1) All control levers and pedals are disabled from operation by locating the lever to lock position as shown.

※ **Be sure to raise the lever to LOCK position and tilt LH console box when leaving from operator's seat.**

(2) By pushing lever to UNLOCK position, machine is operational.

※ **Do not use the safety lever for handle when getting on or off the machine.**

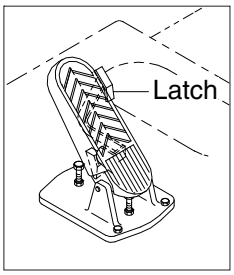
4) ACCELATION PEDAL



(1) When this pedal is stepped, the machine starts traveling.

⚠ **Before starting the machine with stepping on the pedal, check if the underframe is certainly in the traveling direction.**

5) BRAKE PEDAL



(1) Pedal and latch provide two kinds of service brake function.

(2) To operate service brake, push pedal with latch by foot.

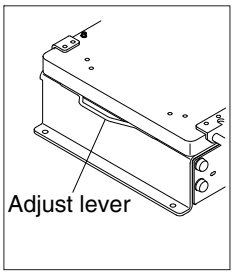
⚠ **Push pedal and latch at once to avoid unexpected locking of pedal in traveling condition.**

⚠ **During travel, do not push pedal only in full stroke. It is dangerous due to the locking of service brake.**

(3) If you want to choose working brake, just push pedal in full stroke without latch then the latch locks pedal and service brake is working continuously until you push the latch to release the pedal.

(4) Push latch to release working brake.

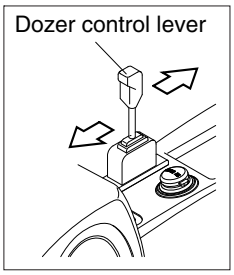
6) SEAT AND CONSOLE BOX ADJUST LEVER



(1) This lever is used to move the seat and console box to fit the contours of the operator's body.

(2) Pull the lever to adjust forward or backward over 90 ㎜ (3.5").

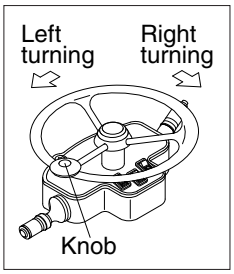
7) DOZER CONTROL LEVER



(1) This lever is used to operate the dozer blade.

(2) If the lever is pushed forward, the dozer blade will be going down.
If the lever is pulled back, the dozer blade will be going up.

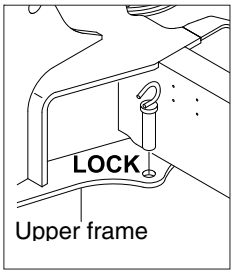
8) STEERING WHEEL



(1) If the steering wheel is turned to left, the machine will move to the left and turn it to the right, the machine will move to the right.

(2) As the handle is equipped with a knob, it is convenient to operate with one hand or quickly.

9) SWING LOCK PIN



(1) This is the system to lock the swing by connecting the upper swing part and the lower frame mechanically.

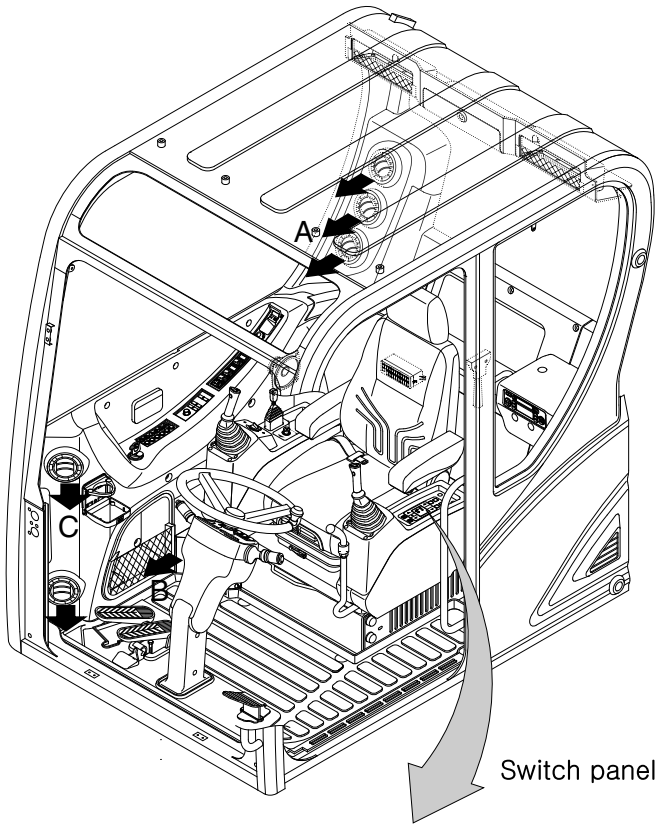
(2) The swing is locked when the lever is down and released when the lever is up.

※ **Before operating the machine, be sure to release the swing lock device.**

5. FULL AUTO AIR CONDITIONER AND HEATER

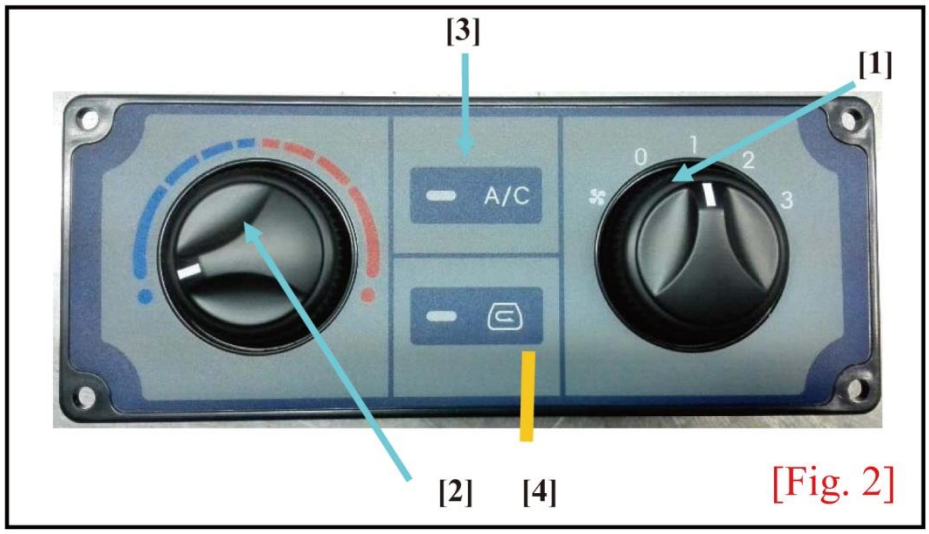
Full auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.

· **Location of air flow ducts**



5. Start of air-conditioner

The air conditioner is started by operating the controller inside the vehicle. The main structure and function of the controller are as follows:



5. Start of air conditioner

No.	Name	Main Function
1	Air volume adjustment switch	Adjust the air volume of the unit in the cooling or heating mode (3 levels: LOW/MIDDLE/HIGH).
2	Internal temperature adjustment switch	This is used by the operator to set the internal temperature in the cooling mode. ► Turn this switch left to the maximum. The internal temperature will be set to 30℃ (until the power switch of the compressor clutch is turned on or off). ► Turn this switch right to the maximum. The internal temperature will be set to 15℃.
3	Cooling start LED	This LED indicates the clutch action in the cooling mode.
4	Internal/external air circulation switch	Enable the internal/external air circulation (this function is not available at present).

5-1 Operation order of air conditioner

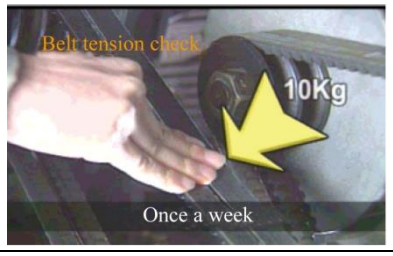
No.	Operation Switch	Start Order and Method
1	Engine	Start the engine of the vehicle.
2	Cooling operation	► Close the heating water valve [13] shown in Fig. 1 to prevent the engine cooling water from flowing into the HVAC unit.
		► Turn the internal temperature setting switch in Fig. 2 right to the maximum in the cooling mode. (2) Internal temperature setting: right to the maximum = 15℃ middle position = 22-24℃ left to the maximum = 30℃ ※ Note: If there is a “click” sound within the OFF range when this switch is turned left to set the temperature, it indicates that the compressor power switch is engaged but the compressor clutch is OFF. Thus, the clutch must not be turned OFF when this switch is turned left.
3	Air volume adjustment switch	► Turn the air volume adjustment switch [1] in Fig. 2 to the Level 1 (LOW) position. The compressor will be powered on and start working. At the same time, the motor of the HVAC unit will work and cold air will be supplied into the vehicle. ► During the initial start of the air conditioner, turn the air volume adjustment switch right to the Level 3 (HIGH) position to quickly reduce the internal temperature.

No.	Operation Switch	Start Order and Method
4	Internal temperature setting switch (in cooling mode)	► As shown in Fig. 2, when the internal temperature setting switch [2] is set in the middle "(A)" position, the air conditioner will continue working. If the internal temperature reaches 22-24℃, the power supply of the compressor clutch will be automatically turned on/off, to maintain the internal temperature. ※ Note: The above functions are available only in the cooling mode. In the heating mode, the switch must be turned left to the maximum and kept in the OFF state.

5-1 Operation order of air conditioner

No.	Operation Switch	Operation Order and Method
1	Heating	► For heating, open the heating water valve in Fig. 1, making the engine cooling water flow into the HVAC unit.
2	Internal temperature setting switch	► Turn the temperature setting switch left to the maximum until there is a "click" sound in the OFF range, and keep this state. ※ Note: If the temperature setting switch turned right, the compressor clutch will be driven to work, which will obviously affect heating and cause compressor failure.
3	Air volume adjustment switch	► Turn the air volume adjustment switch in Fig. 2 to the Level 1 (LOW) position or any desired position, the motor of the HVAC unit will be driven to work, and hot air will be supplied into the vehicle.

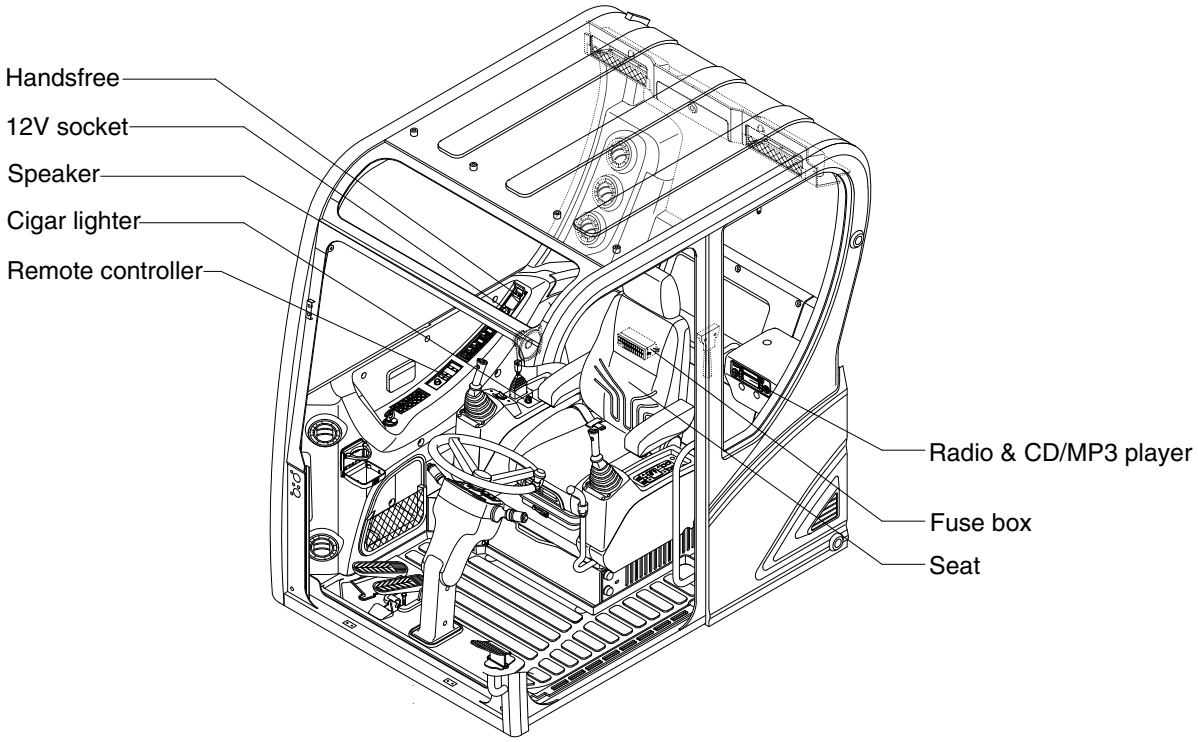
5-2 Installation and precaution of air conditioner

Item	Installation Method and Precaution
Compression installation	► Compressor installation: The compressor is installed with the vehicle engine and auxiliary bracket, and must be secured with more than three bolts. (The strength of fixing bolts must be 9.8T or above.) ► Parallelism of V-belt: The deviation of parallelism between the engine pulley and compressor clutch pulley must be within ±1.0 mm. ► Tension of V-belt: The tension of the V-belt refers to the tension measured at about 10 mm away from the belt center when the force of about 10 Kg is applied, as shown in the figure. The belt tension must be checked and adjusted once a week. 
Condenser installation	► The condenser is secured on the frame with at least 4 bolts of 8T or above (torque: 2Kg/m). ► If the condenser is in front of and also far from the radiator and air does not pass through the condenser, an additional air cutoff device should be installed.
Dryer installation	► The dryer is secured vertically with at least two bolts.
HVAC unit installation	► The HVAC unit is secured on the frame with at least 4 bolts of 8T or above (torque: 2Kg/m). ► The air duct cannot be connected without sealing measures, in order to prevent air leakage.
Hose and wire	► Avoid interference by protrusions in the surrounding environment during hose and wire connection. The parts that may be subject to friction due to vehicle vibration should be secured with clips onto the frame.

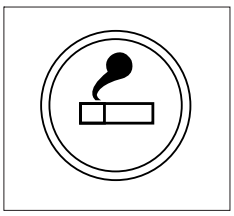
5-3 Refrigerant filling and commissioning

<table>
<tr><th>Item</th><th>Use Method and Precaution</th></tr>
<tr><td>Seal check</td><td>► After hose and wire connection, check seals for air leakage. (Mark hose connections with a marker.)
► Check seals with nitrogen. Apply the pressure of 20 Kg/☒ (use the same high or low pressure) via the pressure gauge. Observe the change in the reading of the pressure gauge in about 15 minutes, and check air leakage.
※ Note: Use nitrogen only in seal check.
► Completely drain residual nitrogen after seal check.</td></tr>
<tr><td>Vacuum operation</td><td>► Connect the vacuum pump and pressure gauge, and carry out vacuum operation (about 10-15 minutes) with the vacuum pump when vacuum conditions are met.
► Close the instrument valve after vacuum operation. Observe the change in the reading of the instrument in about 10 minutes.
※ Note: The pressure gauge used in air leakage check and vacuum operation should be inspected and calibrated on a regular basis.</td></tr>
<tr><td>Refrigerant filling</td><td>► If no air leakage is found, connect the refrigerant to the pressure gauge with an inspected and calibrated scale, to drain residual air in the gauge tube via the refrigerant.
► Align the pointer of the scale with 0, and fill a specified amount of gaseous refrigerant through the high-pressure gauge tube.</td></tr>
<tr><td>Commissioning</td><td>► After filling the refrigerant, start the engine with the attached pressure gauge, check the pressure indicated by the pressure gauge via the air conditioner controller, and inspect the system.
► In principle, the system pressure should be checked at the ambient temperature above 25 ℃.
<table>
<tr><th>Ambient Temperature</th><th>Low Pressure (Kg/cm^2)</th><th>High Pressure (Kg/cm^2)</th><th>Condition</th></tr>
<tr><td>25-30 ℃</td><td>1.0-2.5</td><td>11-15</td><td rowspan="2">►Speed: 1,800 rpm
►Internal temperature: 25-28 ℃</td></tr>
<tr><td>30-35 ℃</td><td>1.8-3.5</td><td>13-18</td></tr>
</table>
※ Note: The above results vary with the ambient temperature changing, so they cannot be used as a basis of judgment.</td></tr>
</table>

6. OTHERS



1) CIGAR LIGHTER

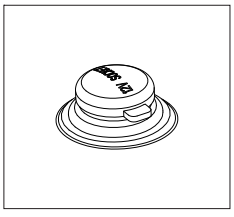


(1) This can be used when the engine starting switch is ON.

(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 12V, 120W.

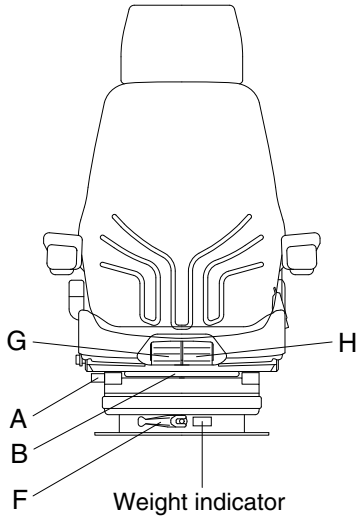
2) 12V SOCKET (option)

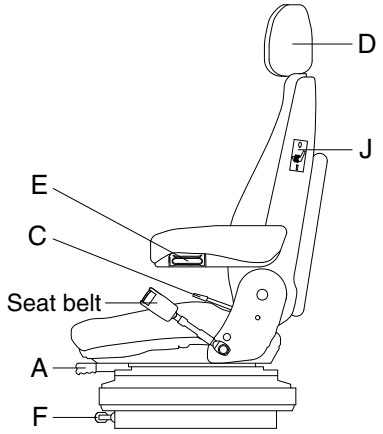


(1) Utilize the power of 12V as your need and do not exceed power of 12V, 120W.

3) SEAT

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 (A)

① Pull lever A to adjust seat forward or backward.

② The seat can be moved forward and backward over 130 mm (5.1") in 13 steps.

⚠ Do not lift the locking lever with you leg or calf.

(2) Upward/Downward adjustment (B)

① Pull lever B to adjust seat upward or downward over 60 mm (2.4").

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

(3) Reclining adjustment (C)

Pull lever C to adjust seat back rest.

(4) Armrest adjustment (E)

This can be adjusted by pushing the button E to right and left.

(5) Headrest adjustment (D)

This is adjustable vertically and forward or rearward to fit operator's requirements.

(6) Weight adjustment (F)

Adjust the lever with the seat empty to the operator's weight.

(7) Seat depth adjustment (G)

① The depth of the seat pan can be individually adjusted.

② To adjust the depth of the seat cushion, pull the right handle upward. By moving the seat cushion backwards or forwards the desired seating position can be reached.

(8) Seat pan angle adjustment (H)

① The angle of the seat pan can be individually adjusted.

② To adjust the angle of the seat pan, pull the left handle upwards. By exerting pressure on or off the front or rear part of the seat pan it can be moved to the desired position.

(9) Seat heater (J)

The seat heater can be turned on/off by pressing the switch.

0 = Seat heater OFF

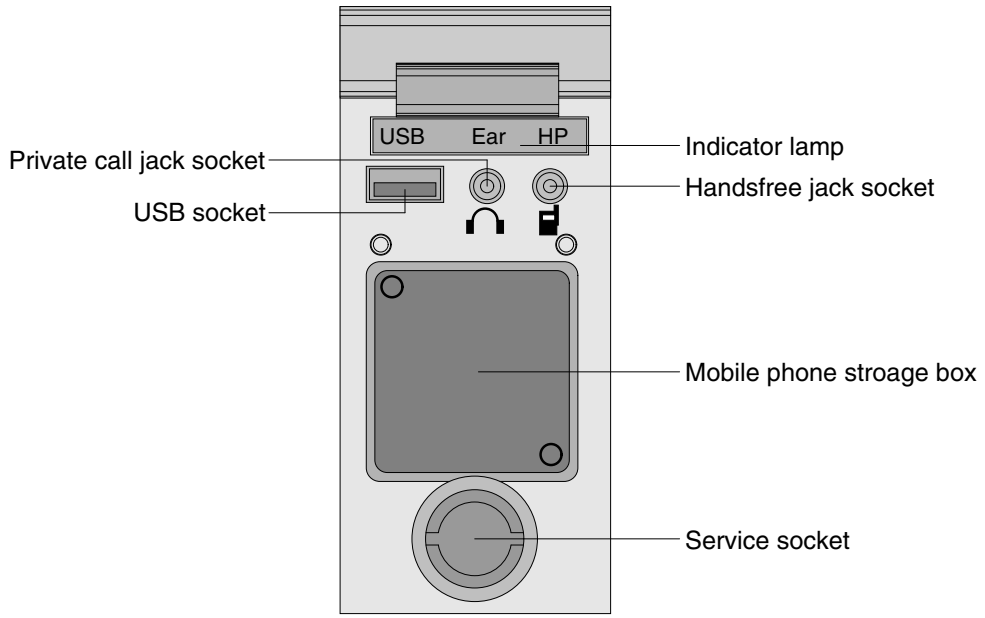
I = Seat heater ON

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

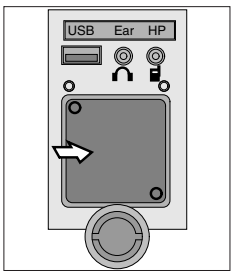
⚠ Replace the seat belt at least once every three years, regardless of appearance.

4) HANDSFREE

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.

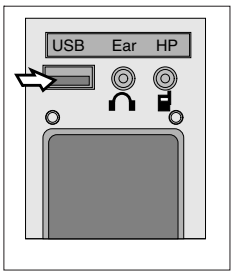


(1) Mobile phone storage box



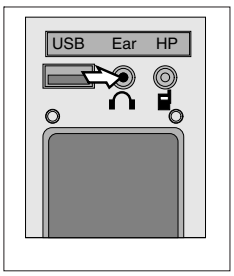
① Mobile phone can be stored when call by handsfree.

(2) USB socket



① This socket is used to charging the mobile phone.

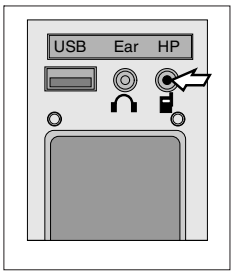
(3) Private call jack socket



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

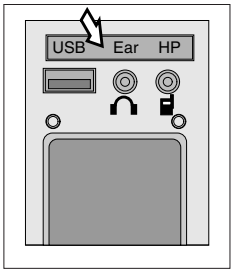


① Connect the jack cable when call by handsfree.

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

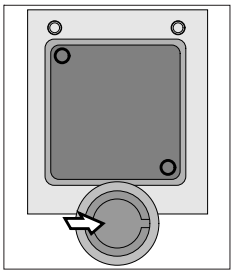
③ Check the jack type of mobile phone before use.

(5) Indicator lamp



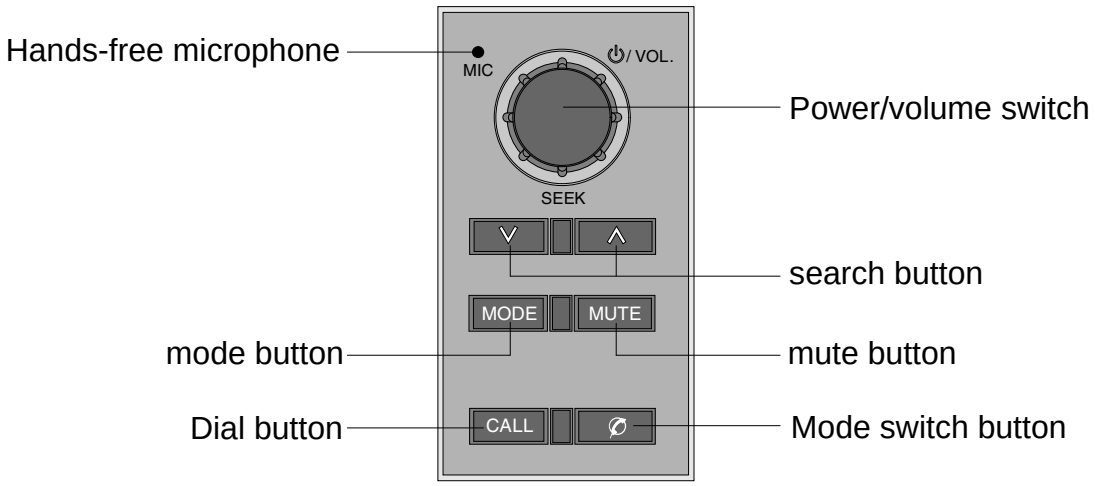
① This lamp is turned ON when the handsfree mode selected.

(6) Service socket



① Utilize the power of 12 V as your need and do not exceed power of 12 V, 30 W.

5) REMOTE CONTROL



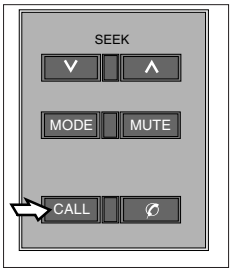
(1) Power/volume switch

① This switch is used to turn on or off audio or hands-free
② Switch to the right, increase the hands-free volume, up to 7 level
③ The switch turns to the left and the volume drops
※ When audio mode is selected, the switch adjusts the audio volume

(2) Mode switch button

① This button is used to select hands-free or audio mode
- light on: Hands-free mode
- light off: Audio mode

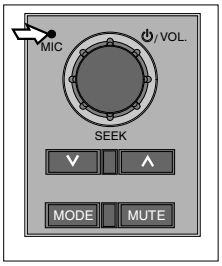
(3) Dial button



① This button is used to answer、redial the last phone number and hang up the phone

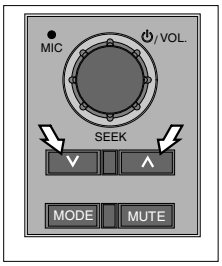
② If you want to make a call, press this button to guide you to hear the beep

(4) Hands-free microphone



① When making a hands-free call, the microphone transmits t he user's voice to the caller

(5) search button

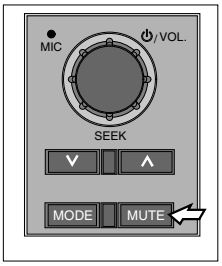


① Press this key and the radio automatically searches for and stays on the next broadcast channel

② press ∧ Search for high frequency

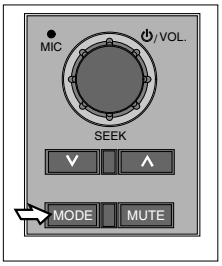
press ∨ Search for low frequency

(6) mute button



① Press this button to mute or unmute while listening to the broadcast

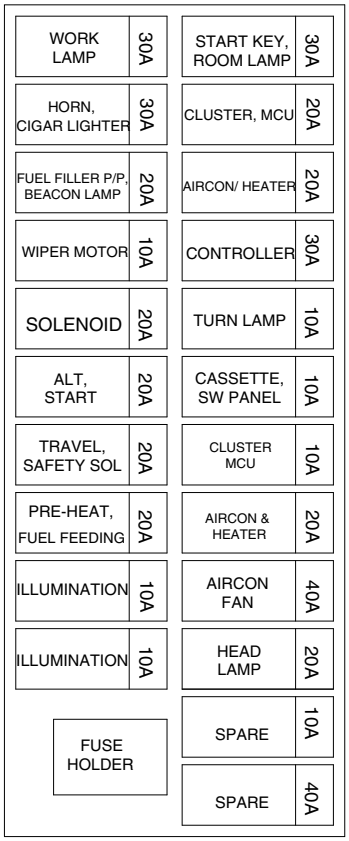
(7) mode button



① Press this key to cycle between modes. If a USB drive is connected, you can enter the next mode directly

② RADIO mode、BT PLAY mode、USB mode and AUX IN mode。

6) FUSE BOX



55W9A3CD29

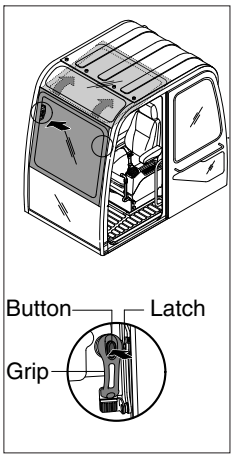
(1) The fuses protect the electrical parts and wiring from burning out.

(2) The fuse box cover indicates the capacity of each fuse and circuit it protects.

※ **Replace a fuse with another of the same capacity.**

⚠ **Before replacing a fuse, be sure to turn OFF the starting switch.**

7) UPPER WINDSHIELD



(1) Perform the following procedure in order to open the upper windshield.

① Release both latches in order to release the upper windshield.

② Hold both grips that are located at both side the windshield frame push the windshield upward.

③ Hold both grips that are provided on the windshield frame and back into the storage position until auto lock latch is engaged.

⚠ **When working, without having locked the windshield by the auto lock (by pushing the windshield to the rear untill it's completely fixed), please be careful as it can cause personal injury if the windshield is not fixed or falls off.**

(2) Perform the following procedure in order to close the upper windshield.

Reverse step ① through step ③ in order to close the upper windshield.

8) RADIO AND USB PLAYER

Technical Specifications

FM Section
Frequency range 87.5MHz-108MHz
Search up long 100KHz
Lock sensitivity 23±8dB
Signal to noise ratio ≥48dB

MP3 part
Frequency response 20Hz-20KHz
Signal to noise ratio 60dB

AM FM section
Frequency range 522KHz-1620KHz
Lock sensitivity 36±10dB
Signal to noise ratio ≥43dB

The device supports the function of charging mobile phone with USB data cable.

Note: It is not advisable to charge for a long time, and the battery may be damaged because there is no battery saturation detection function during charging.

Function for radio

Td-650 is a knob-type car audio system, including FM, AM tuning radio, Bluetooth, MP3 (USB/SD) clock sound adjustment, external audio input, loudness and other functions.

Ⅰ. System configuration: digital tuned radio, USB/SD-MP3 player, electronic clock display.

Ⅱ. Radio function: support FM (87.5~108MHz), AM (522~1620KHz), can store 24 stations.

Ⅲ. AUX function: Supports the play of MP3 files in U disk or SD card, and supports the input of audio from mobile phone and MP3.

Ⅳ. Sound function: support POP/ROCK/Classic/Flat sound.

Ⅴ. Bluetooth function: Support bluetooth phone connection and bluetooth music playback function.

Radio button

(1) PWR: switch machine

(2) BND: band rotation

(3) LOU/: loudness control, hang up the phone

(4) 1/□ /Ⅱ, 2/INT, 3/RPT, 4/RDM, 5/D-DN, 6/D-LP: radio/storage keys, MP3 player keys

(5) AS/PS: Automatic presets of radio/songs

(6) MOD: Mode selection

(7) : Manual/automatic search radio button; Select previous/Next song button, fast forward/fast back button

(8) MOD: short press to switch from USB/SD to FM, then short press to switch FM1/FM2/FM3 long press to automatically search and save

(9) CLK: clock display/Settings

Radio operation

1. Basic setting

1.1 Mode switch: Press "PWR" to make the product in working state. Press the "MOD" button to loop through each mode in turn. If the USB flash drive is connected, the product directly enters the next mode. This productconsists of RADIO mode, BT PLAY mode, USB mode and AUX IN mode

1.2 Radio Settings: Press the "PWR" button, and then press the "BND" button to select the desired band from FM1, FM2, FM3, AM1 and AM2.

Short press the "⏶" button or"⏷"button to start automatic radio search. Long press the "⏶" button or"⏷"button for more than 2S to manually search the radio station.

Long press the "AS/PS" button for more than 2S to automatically preset the radio. Long press any of the "1" to "6" buttons for more than 2S, and the current radio will be preset to the corresponding button

2. MP3(USB/SD/MMC) play

2.1 In the radio working mode, after inserting the USB flash drive /SD, it will automatically switch to the USB flash drive /SD playback mode

Press the button to play the previous/next song in USB /SD

Long press the button to rewind/forward the current song

When the USB flash drive /SD is played, the corresponding USB flash drive /SD icon blinks

2.2 In MP3 playing mode: play/pause control keys, browse, repeat, random, -10/+10 song selection operation

1/□ /Ⅱ: Play/pause control 2/INT: Preview play/scan play 3/RPT: Repeat/All

4/RDM: Random/All 5/D-DN: tune number minus 10 tune selection control key

6/D-LP: tune number plus 10 tune selection control key

Turn the knob counterclockwise to reduce the current volume and turn the button clockwise to increase the current volume

Radio operation

3. Clock setting

3.1 Operation in radio /MP3 playing mode

3.2 Short press MUTE/CLK to switch the MUTE switch

3.3 Long press the key to display the clock, and then long press the key again to adjust the hour value byturning the knob against/clockwise after beating for hours, and long press the key again to adjust the value of minutes by turning the knob against/clockwise after beating for minutes. 5 consecutive beats will automatically quit the clockwise setting

Note: The clock will continue to cycle when the BAT power is off after the setting

4. Sound settings

4.1 Operation in radio /MP3 mode: Short press the knob, successively appear BS O/TE O/BL O/EQOF

4.2 appear BS O display (Bass), reverse/clockwise turn the button to select the low value

4.3 appear TE O display (Treble), Turn the reverse/clockwise button to select the high tone value of the BL O display (Balance)

4.4 Turn the reverse/clockwise button to select the balance value of left and right speakers after the appearance

4.5 Turn the reverse/clockwise button only after the appearance of the EQOF display. Will produce the JAZZ/POP/ROCK/CLASSIC/FLAT/EQOF sound, will not be able to manually during the electronic sound bass and treble values

5. The bluetooth Settings

5.1 Open the bluetooth of the mobile phone and search for the new "device" function. When the system gets signal contact with the mobile phone, it will prompt whether the mobile phone is connected to the device. Select "Yes" to start the connection. After the connection is successful "■"is displayed on the LCD screen of the system, indicating that the connection is successful. If you are not in BT PLAY mode after bluetooth pairing, press the "MOD" button to switch to BT PLAY mode

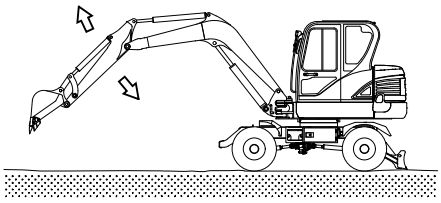
1. SUGGESTION FOR NEW MACHINE

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 machine and shorten lifetime of the machine.**



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 machine fully before operation.

(5) Check the gauges occasionally during the operation.

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

4) Replace followings after initial operation hours.

Checking items	Hours
Engine oil	50
Engine oil filter element	
Prefilter (water, element)	
Fuel filter	
Transmission gear oil	100
Front axle differential gear oil	
Rear axle differential gear oil	
Axle planetart gear oil	
Hydraulic oil return filter element	250
Line filter element	

2. CHECK BEFORE STARTING THE ENGINE

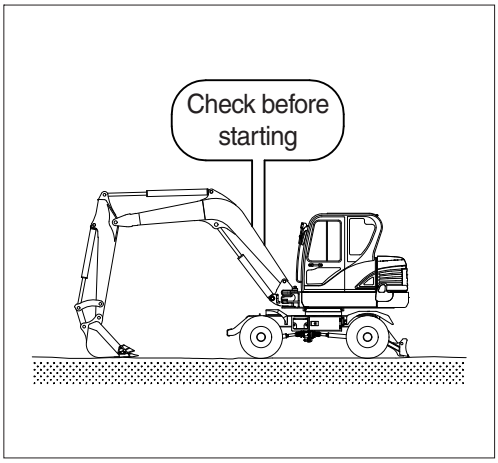
1) Look around the machine and under the machine to check for loosen nut or bolts, collection of dirt, or leakage of oil, fuel or coolant and check the condition of the work equipment and hydraulic system. Check also loosen wiring, and collection of dust at places which reach high temperature.

※ **Refer to the daily check on the chapter 6, maintenance.**

2) After checking air pressure of tire, make sure that around the machine is clear.

3) Adjust seat to fit the contours of the operator's body for the pleasant operation.

4) Adjust the rear view mirror.



3. STARTING AND STOP THE ENGINE

1) CHECK INDICATOR LIGHTS

(1) Check if all the operating levers are in the neutral position.

(2) Turn the starting switch to the ON position. Buzzer sounding for 4 seconds with HYUNDAI logo on cluster.

※ **If the ESL mode is set to the enable, enter the password to start engine.**

※ **If the password has failed 5 times, please wait 30 minutes before re-attempting to enter the password.**

※ **Refer to page 3-18 for ESL mode.**

(3) After initialization of cluster, the operating screen is displayed on LCD (1).
Also, self-diagnostic function is carried out.

2) STARTING ENGINE IN NORMAL TEMPERATURE

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

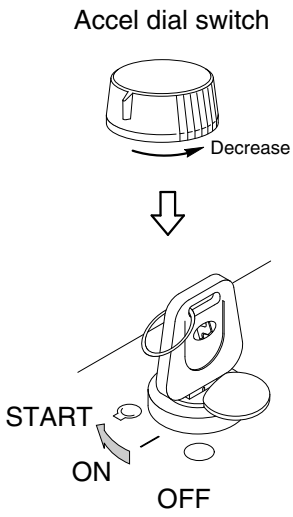
(1) Turn the accel dial switch to low idle position.

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

※ **Do not hold the starting switch in the START position for longer than 20 seconds.**
The start system may be seriously damaged.

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

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



3) STARTING ENGINE IN 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 2-10.**

※ **Fill the anti-freeze solution to the coolant as required.**

※ **If you turn ON the starting switch, the fuel warmer is automatically operated to heat the fuel by sensing the coolant temperature.**

(1) Check if all the levers are in the neutral position.

(2) Turn the accel dial switch to low idle position.

(3) Turn the starting switch to the ON position, and wait 1~2 minutes. More time may take according to ambient temperature.

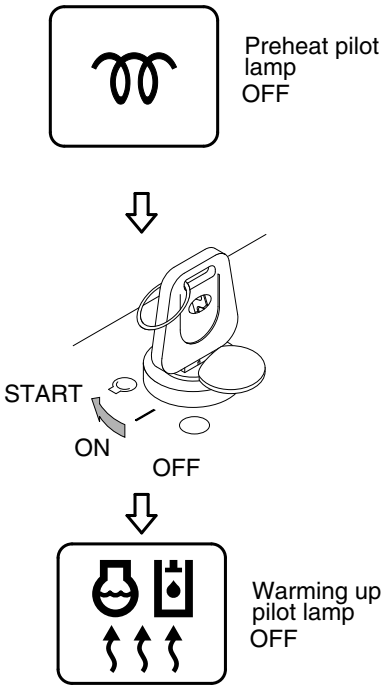
(4) Wait for five minutes to warm up the engine after the preheating pilot lamp off, and than turn the starting switch to the START position to start the engine.

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

(5) Release the starting switch immediately after starting engine.

(6) If the temperature of the coolant is lower than 30˚C the warming up automatically starts.

※ **Do not operate the working devices, or convert the operation mode into other mode during the warming up.**



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 turned OFF (1)?

(4) Are the indicator of water temperature gauge (2) and hydraulic temperature gauge (3) in the operating range?

(5) Are the engine sound and the color of exhaust gas normal?

(6) Are the sound and vibration normal?

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

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

5) WARMING-UP OPERATION

※ The most suitable temperature for the hydraulic oil is about 50˚C (122˚F).
It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25˚C (77˚F).
Then 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) Operate bucket lever for 5 minutes.

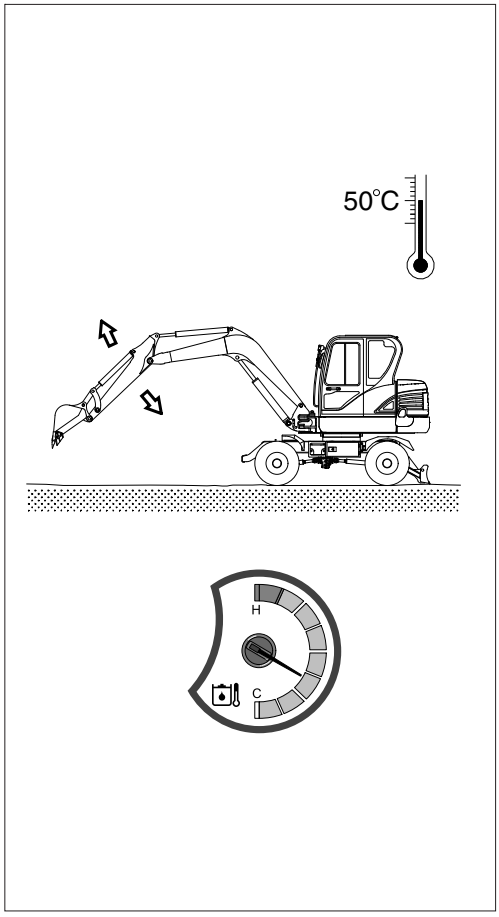
※ **Do not operate anything except bucket lever.**

(4) Run the engine at the high speed and operate the bucket lever and arm lever for 5-10 minutes.

※ **Operate only the bucket lever and arm lever.**

(5) This warming-up operation will be completed by operation of all cylinders several times, and operation of swing and traveling.

※ **Increase the warming-up operation during winter.**



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 FNR lever in the neutral.

(2) Down the bucket and dozer blade on the ground then put all the levers in the neutral position.

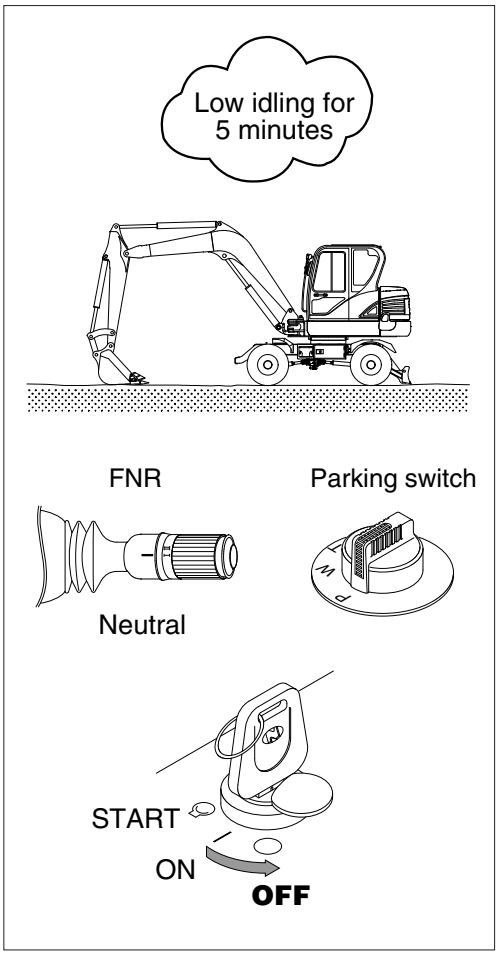
(3) Put the parking switch in the parking position.

(4) Run the engine at low idling speed for about 5 minutes.

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

(6) Remove the key to prevent other people using the machine and LOCK safety lever.

(7) Lock the cab door.



4. OPERATION OF WORKING DEVICE

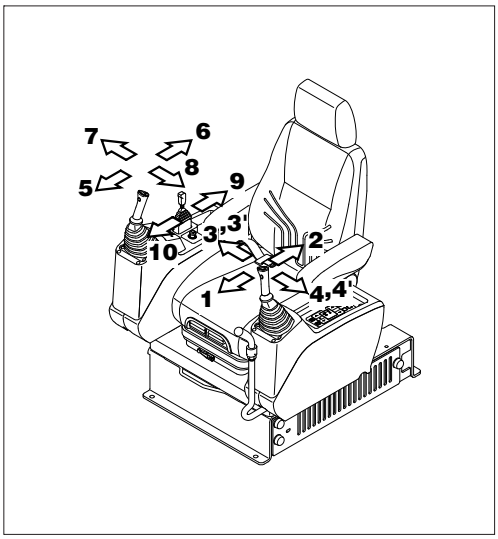
※ **Confirm the operation of control lever and working device.**

1) Left control lever controls arm and swing.

2) Right control lever controls boom and bucket.

3) When you release the control lever, control lever returns to neutral position automatically.

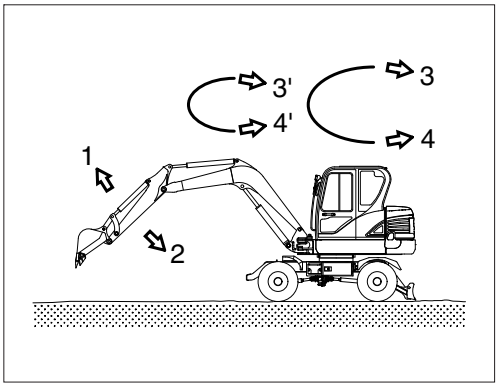
※ **When operating swing, consider the swing distance by inertia.**



※ **Left control lever**

1 Arm roll-out
2 Arm roll-in
3 Swing right
4 Swing left
3' Boom right (boom swing switch selected)
4' Boom left (boom swing switch selected)

※ **Refer to page 3-26 for boom offset switch.**

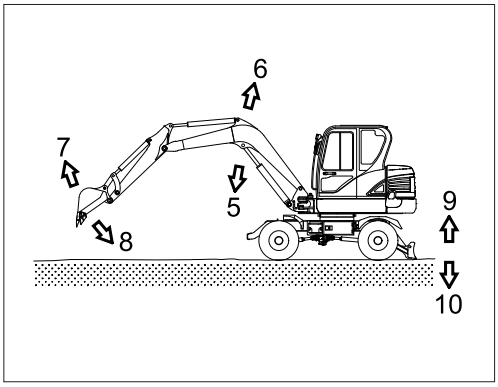


※ **Right control lever**

5 Boom lower
6 Boom raise
7 Bucket roll-out
8 Bucket roll-in

※ **Dozer control lever**

9 Dozer blade up
10 Dozer blade down



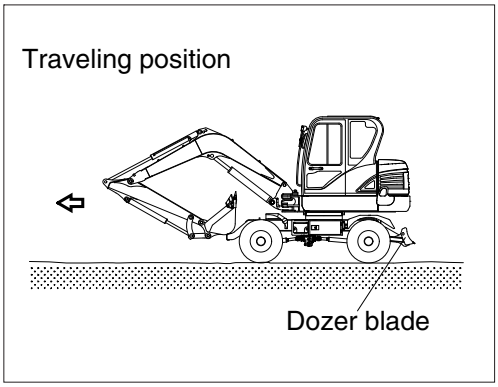
5. TRAVELING OF THE MACHINE

1) BASIC OPERATION

(1) Traveling position

It is the position which the dozer and rear axle is in the rear and the working device is forward.

⚠ Travel directions will be reversed if lower structure is positioned with dozer in front.



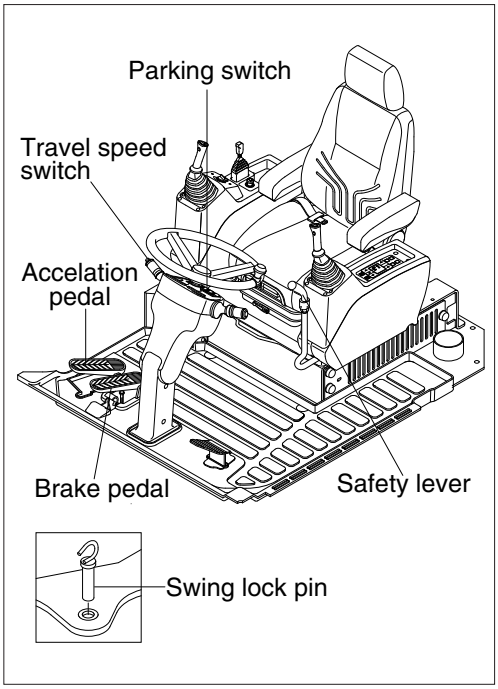
(2) Traveling operation

When warm-up operation is completed after the engine is started, move the machine according to the following procedure.

① Set the swing lock pin to release position.
② Release the safety lever.
③ Put the parking switch in the traveling position.
④ Lift up the dozer blade.
⑤ Select traveling direction.
⑥ Place the travel speed switch in low speed.
⑦ Press gently the acceleration pedal to move the machine.

※ When speed up on a slope, a noise for valve of travel motor may occur. It is not out of order in machine but peculiar sound.

※ Be sure that the brake works normally on the safe place before fast traveling.

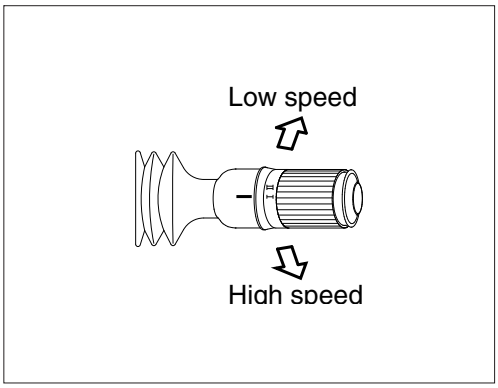


(3) Changing speed

If you want to change the speed, select the travel speed switch desired position.

※ Foot operated park brake needs to be fully applied before machine will allow change from low speed to high speed or opposite.

⚠ Do not start the machine abruptly after changing speed.



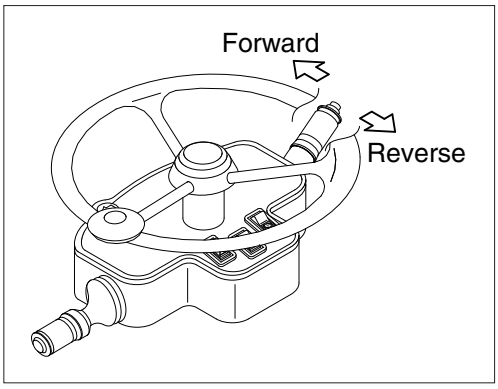
(4) Changing direction (forward/reverse)

① **Be sure to stop the machine** when changing the direction forward or backward while traveling.

② Put the levers in the desired position to change direction.

※ **When changing direction, check beforehand there is no obstacle in the direction you will be headed.**

※ **It could be cause of machine failure to change the direction forward or backward while traveling.**



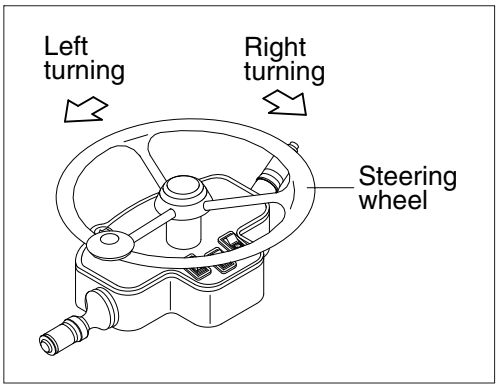
(5) Turning the machine

① Turn the machine by moving the steering wheel into the desired direction.

② You can turn the machine to the left or right.

※ **Do not turn the machine abruptly when traveling at high speed and avoid turn on a slope.**

⚠ **Steering does not function with engine OFF.**



(6) Precautions when driving

The operators must be familiar with the following precautions including general safety hints.

① If the warning lamp lights up on the cluster, stop the machine immediately and check carefully whether the relevant parts are out of order or not.

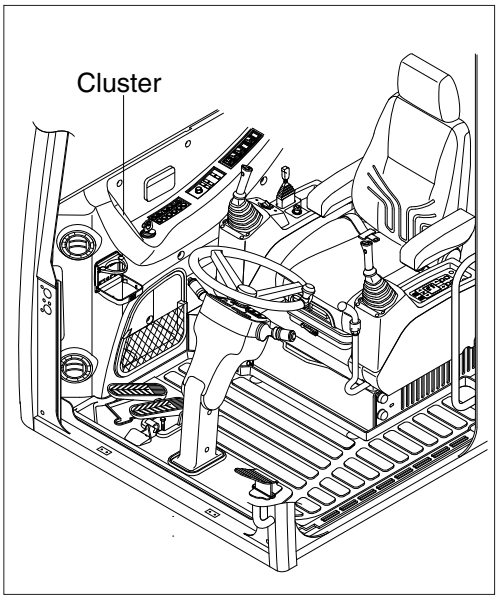
② Do not allow the engine to run at overload.

③ Stop the engine and check as soon as finding out abnormal noise or smell.

④ Check the gauges frequently.

⑤ Do not allow passengers or riders on the machine while it is running or in operation.

⑥ Never get on or off the machine while it is moving.



2) TRAVELING ON A SLOPE

(1) Never travel down a slope in neutral.

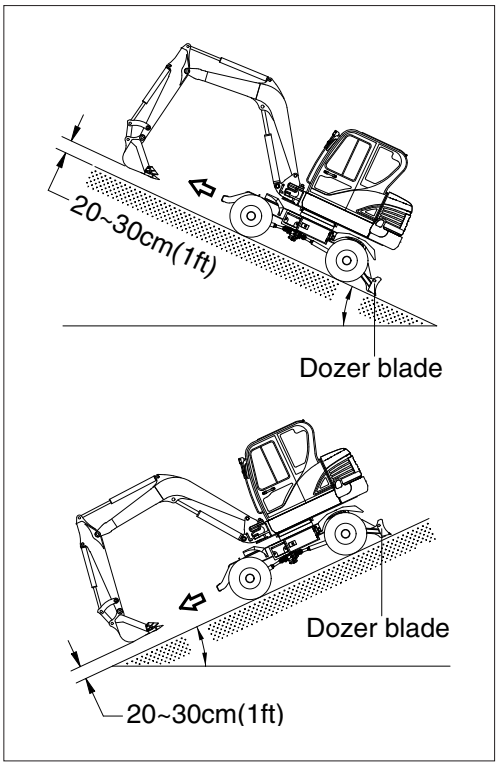
(2) Lower the bucket 20 to 30 ㎝ (1 ft) to the ground so that it can be used as a brake in an emergency.

(3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.

(4) When parking on a slope, use the bucket as a brake and place blocks behind the tires to prevent sliding.

※ **Machine 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 machine to lose its balance and turn over.**



3) PARKING THE MACHINE

To park the machine, keep the steps below.

(1) Release the acceleration pedal slowly.

(2) Depress the brake pedal.

(3) Place the FNR lever in the neutral.

(4) Put the parking switch in the parking position and release the brake pedal.

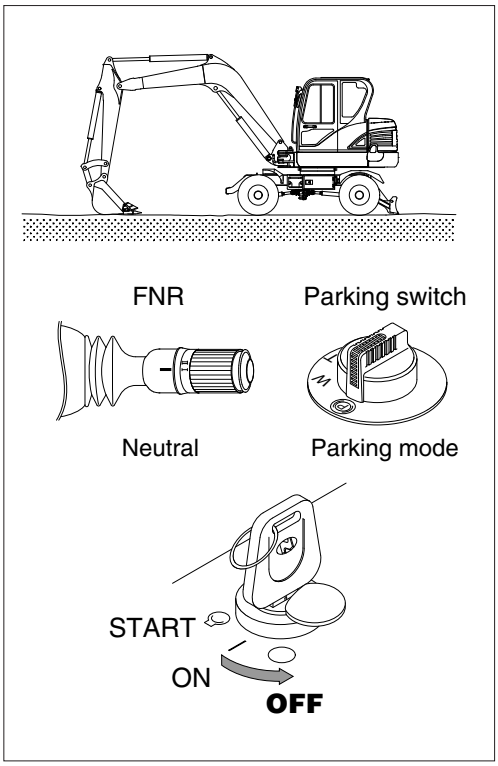
(5) Lower the bucket and dozer blade to the ground.

(6) Stop the engine, place the start key switch in the OFF and remove the key.

(7) Lock the swing lock pin and the cab door.

※ **Whenever parking on s slope, always block the tires after lowering the bucket to the ground.**

※ **Contain the swing lock pin in the tool box to avoid loss.**



4) TOWING THE MACHINE

Except for an emergency, do not tow this machine.
If it is inevitable to tow this machine, observe the following.

(1) General

① Parking brake cylinder of the machine is operated by the spring force and released by hydraulic pressure.
If the engine does not operate, the brake will be operated to stop the machine.

② When the machine is towed move it for a repair to nearby place at the low speed.
Transport it on a trailer, if it has to be moved for a long distance.

③ When the steering device and the brake of the machine to be towed can not be operated, transport by trailer.

⚠ Injury or death could result if a disabled machine is towed incorrectly.

⚠ If your machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity.

⚠ NEVER allow a disabled machine to be towed on a slope.

⚠ When connecting up a towing machine, do not let anyone enter the area between the towing machine and the equipment being towed.

⚠ Set the towing machine and the towing connection of the equipment being towed in a straight line when connecting it.

⚠ Never tow machine using a light-duty towing hook.

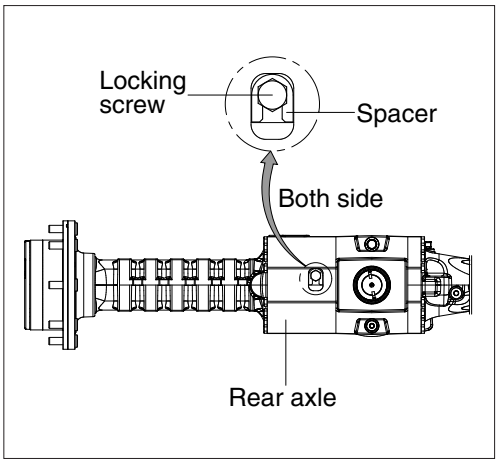
(2) Towing the machine

① When moving the machine or in case of an emergency towing, the power flow between final drive (spur gear drive) and travel motor will be interrupted.

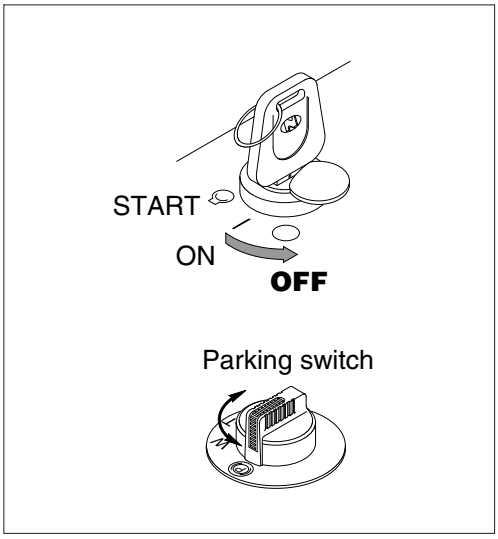
② For this purpose, loosen the locking screw and remove the spacer of rear axle.

③ Tighten locking screw both side.

⚠ **Both sides of locking screw must be tightened more and more by turns.**



④ Turn start key ON position, place parking switch at traveling position to release brake.

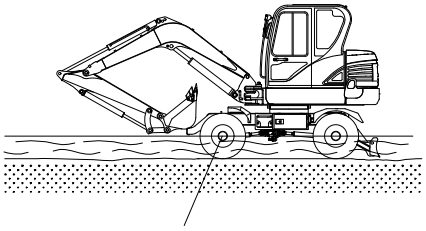


5) PRECAUTIONS FOR OPERATION

(1) Permissible water depth

① Do not immerse the machine in water by more than the permissible depth (axle center).

② For parts that have been immersed in water for a long time, pump in grease until the old grease comes out from the bearings.

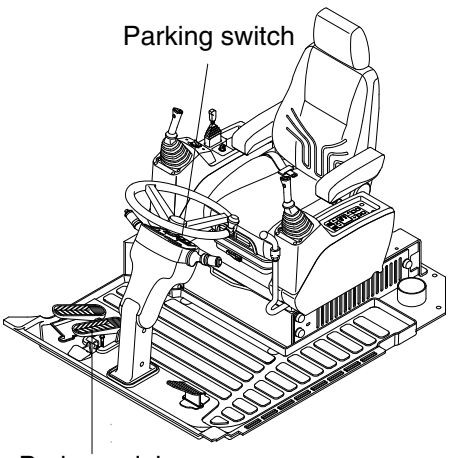


(2) When the brake does not operate

① If the machine does not stop even though the brake pedal is applied, use the parking brake to activate the emergency brake by parking switch.

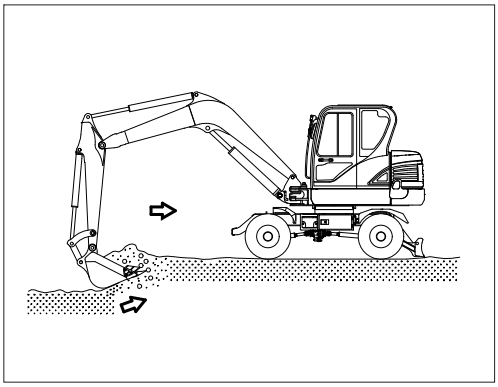
※ **After using the parking brake as an emergency brake, ask Hyundai dealer to check complete brake system.**

⚠ **Never use emergency brake, except when the service brake fails.**

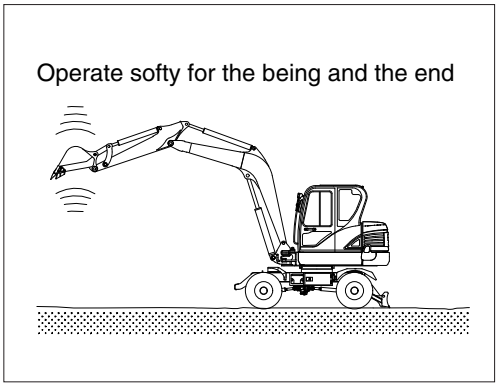


6. EFFICIENT WORKING METHOD

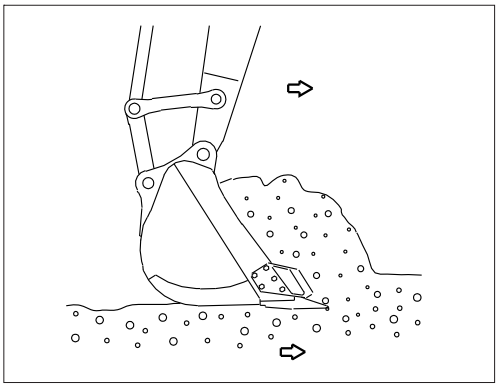
1) Do the digging work by arm.
   Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.



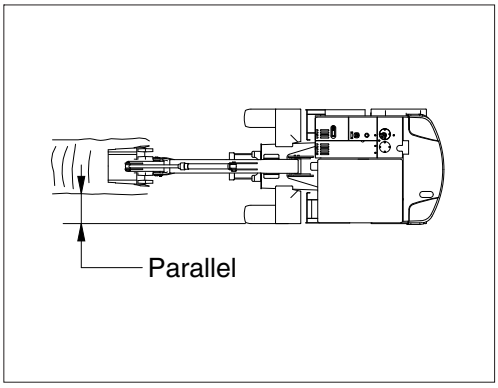
2) When lowering and raising the boom operate softly for the beginning and the end.
   In particularly, sudden stops while lowering the boom may cause damage to the machine.



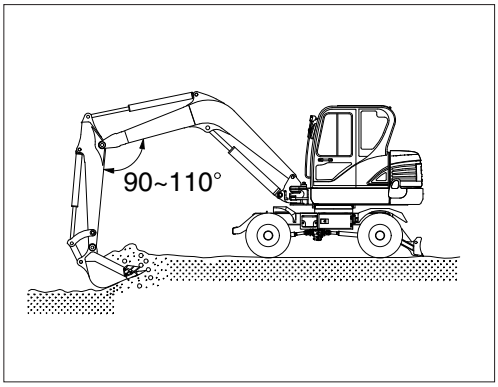
3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



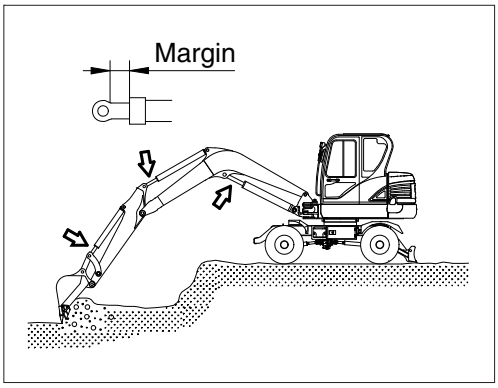
4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



5) Dig slowly with keeping the angle of boom and arm, 90-110 degree when maximum digging force is required.

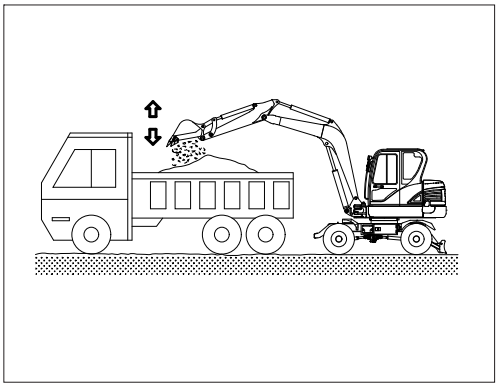


6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

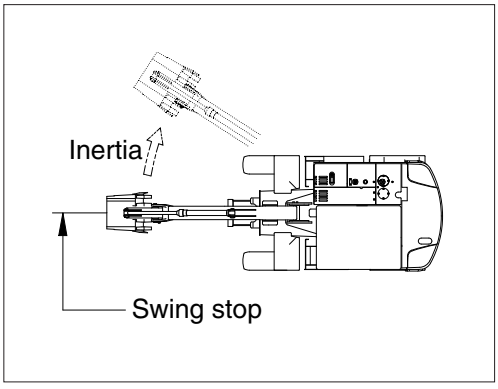


7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

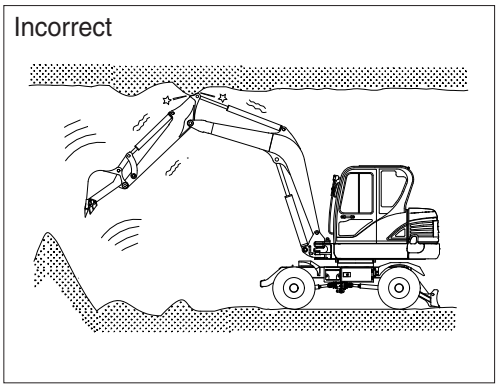
※ **Do not use the impact of bucket tooth when dumping.**



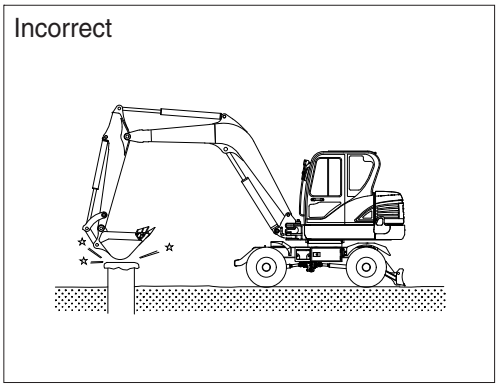
8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



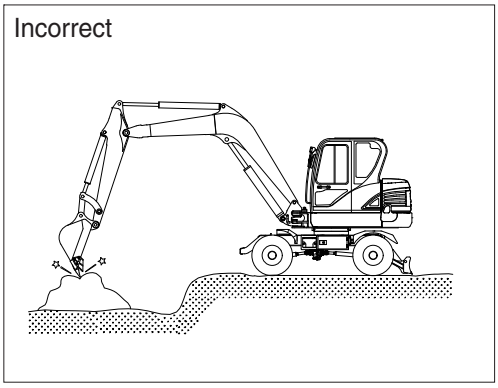
9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



10) Do not use the dropping force of the work equipment for digging.
The machine can be damaged by the impact.



11) Do not use the bucket to crack hard objects like concrete or rocks.
This may break a tooth or pin, or bend boom.



12) NEVER CARRY OUT EXCESSIVE OPERATIONS

Operation exceeding machine performance may result in accident or failure.

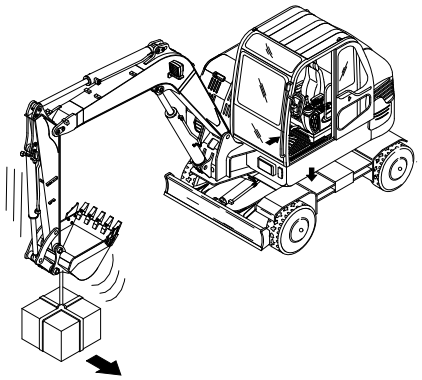
Carry out lifting operation within specified load limit.

Never carry out operations which may damage the machine such as overload or over-impact-load.

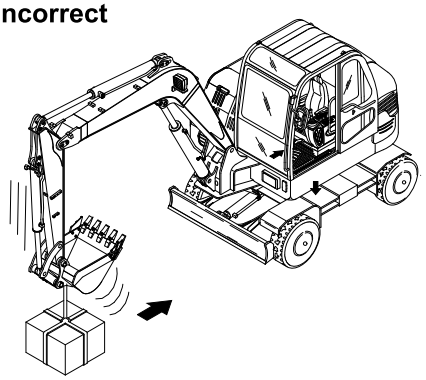
Never travel while carrying a load.

In case you need installing over load warning device for object handling procedure, please contact Hyundai distributor.

Incorrect



Incorrect



13) BUCKET WITH HOOK

When carrying out lifting work, the special lifting hook is necessary.

The following operations are prohibited.
·Lifting loads with a wire rope fitted around the bucket teeth.
·Lifting loads with the wire rope wrapped directly around the boom or arm.

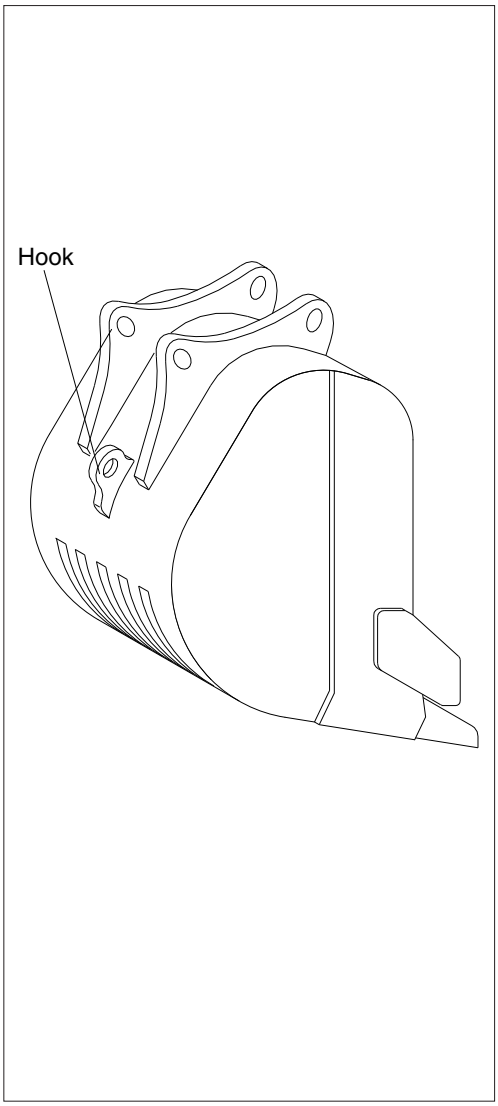
When performing lifting operation, securely hook the wire rope onto the special lifting hook.

When performing lifting operation, never raise or lower a person.

Due to the possible danger of the load falling or of collision with the load, no persons shall be allowed in the working area.

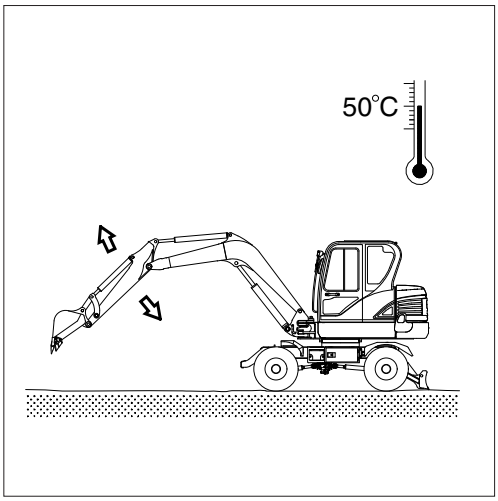
Before performing lifting operation, designate an operation supervisor.
Always execute operation according to his instructions.
·Execute operating methods and procedures under his direction.
·Select a person responsible for signaling. Operate only on signals given by such person.

Never leave the operator's seat while lifting a load.



7. OPERATION IN THE SPECIAL WORK SITES

1) OPERATION THE MACHINE IN A COLD WEATHER



(1) Use proper engine oil and fuel for the weather.

(2) Fill the required amount of antifreeze in the coolant.

(3) Refer to the starting engine in cold weather. Start the engine and extend the warming up operation.

(4) Be sure to open the heater cock when using the heater.

(5) Always keep the battery completely charged.

※ **Discharged batteries will freeze more easily than fully charged.**

(6) Clean the machine and park on the wood plates.

2) OPERATION IN SANDY OR DUSTY WORK SITES

(1) Inspect air cleaner element frequently. Clean or replace element more frequently, if warning lamp comes ON and buzzer sounds simultaneously, regardless of inspection period.

※ **Replace the inner and outer element after 4 times of cleaning.**

(2) Inspect radiator, oil cooler and condenser frequently, and keep cooling fins clean.

(3) Prevent sand or dust from getting into fuel tank and hydraulic tank during refilling.

(4) Prevent sand or dust from penetrating into hydraulic circuit by tightly closing breather cap of hydraulic oil tank. Replace hydraulic oil filter and air breather element frequently. Also, replace the fuel filter frequently.

(5) Keep all lubricated part, such as pins and bushings, clean at all times.

(6) If the air conditioner and heater filters clogged, the heating or cooling capacity will drop. Clean or replace the filter element more frequently.

(7) Clean electrical components, especially the starting motor and alternator to avoid accumulation of dust.

3) SEA SHORE OPERATION

(1) Prevent ingress of salt by securely tightening plugs, cocks and bolts of each part.

(2) Wash machine after operation to remove salt residue.
Pay special attention to electrical parts, and hydraulic cylinders and track tension cylinder to prevent corrosion.

(3) Inspection and lubrication must be carried out more frequently.
Supply sufficient grease to replace all old grease in bearings which have been submerged in water for a long time.

4) OPERATION IN MUD, WATER OR RAIN WORK SITES

(1) Perform a walk around inspection to check for any loose fittings, obvious damage to the machine or any fluid leakage.

(2) After completing operations, clean mud, rocks or debris from the machine. Inspect for damage, cracked welds or loosened parts.

(3) Perform all daily lubrication and service.

(4) If the operations were in salt water or other corrosive materials, make sure to flush the affected equipment with fresh water.

5) OPERATION IN ROCKY WORK SITES

(1) Check for damage to the undercarriage and for looseness, flaws, wear and damage in bolts and nut.

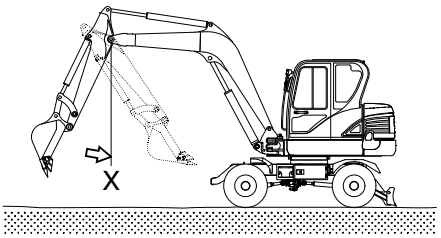
(2) Loosen the track tension a little when working in such areas.

(3) Do not turn the undercarriage directly over the sharp edge rock.

8. NORMAL OPERATION OF EXCAVATOR

Followings may occur during operation due to the nature of a hydraulic excavator.

1) When rolling in the arm, the roll-in movement stop momentary at point X in the picture shown, then recovers speed again after passing point X.
   The reason for this phenomenon is that movement by the arm weight is faster than the speed of oil flow into the cylinder.
2) When lowering the boom, one may hear continuous sound.
   This is caused by oil flow in the valve.
3) Overloaded movement will produce sound caused by the relief valves, which are for the protection of the hydraulic systems.
4) When the machine is started swing or stopped, a noise near the swing motor may be heard. The noise is generated when the brake valve relieves.



9. ATTACHMENT LOWERING (when engine is stopped)

1) On machines equipped with an accumulator, for a short time (within 2 minutes) after the engine is stopped, the attachment will lower under its own weight when the attachment control lever is shifted to LOWER. That is happen only starting switch ON position and safety lever UNLOCK position. After the engine is stopped, set the safety lever to the LOCK position.

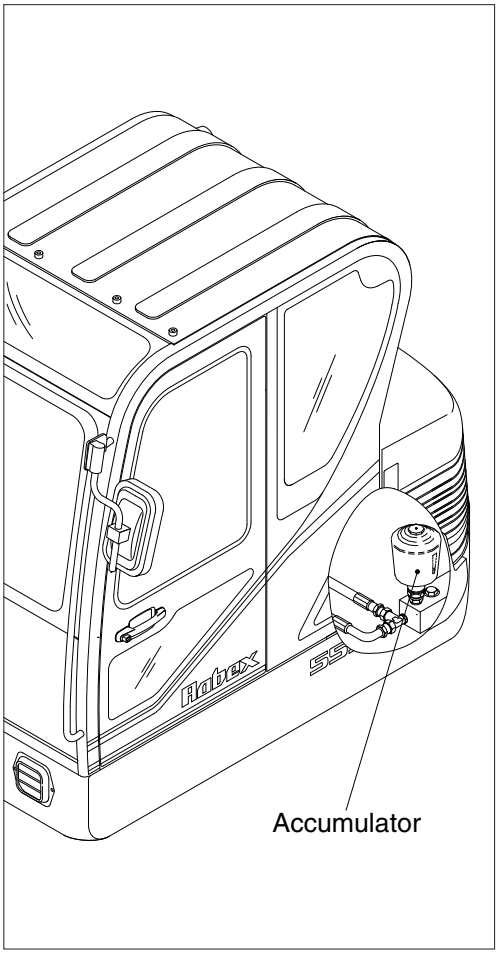
⚠ **Be sure no one is under or near the attachment before lowering the boom.**

2) 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.**



10. STORAGE

Maintain the machine taking care of following to prevent the deterioration of machine when storing the machine for a long time, over 1 month.

1) BEFORE STORAGE

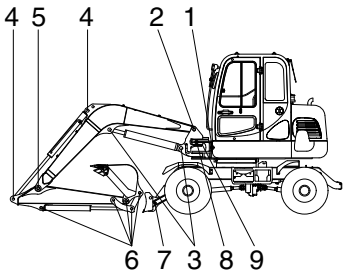
(1) Cleaning the machine

Clean the machine and dried.
Grease each lubrication part.

(2) Lubrication position of each part

Change all oil.

※ Be particularly careful when you reuse the machine.
As oil can be diluted during storage.
Apply an anticorrosive lubricant on the exposed part of piston rod of cylinder and in places where the machine rusts easily.

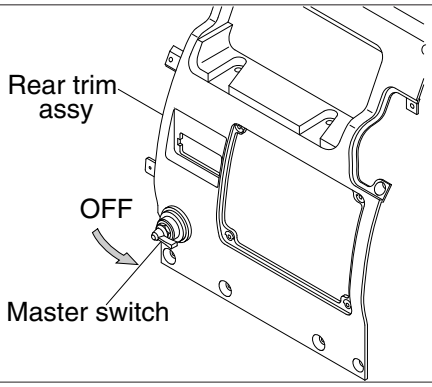


1 Lubricating manifold(4EA)
2 Boom connection pin(2EA)
3 Boom cylinder pin(2EA)
4 Arm cylinder pin(2EA)
5 Boom and arm connection pin(1EA)
6 Arm and bucket(5EA)
7 Dozer blade and cylinder(4EA)
8 Boom swing post pin(2EA)
9 Boom swing cylinder pin(1EA)

(3) Master switch

Turn OFF the master switch mounted in the rear trim assy of the cab.

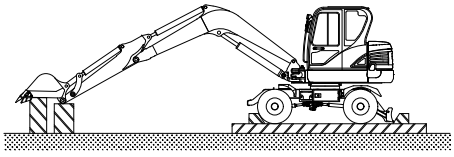
(4) Be sure to mix anticorrosive antifreezing solution in the radiator.



(5) Prevention of dust and moisture

Keep machine dry. Store the machine setting wood on the ground.

※ Cover exposed part of piston rod of cylinder.
※ Lower the bucket to the ground and set a support under track.



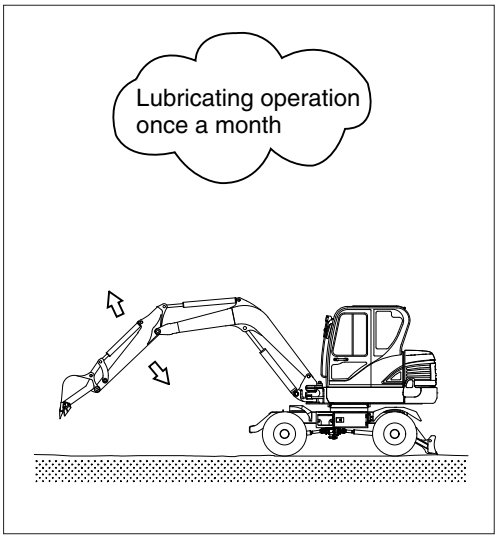
2) DURING STORAGE

Start engine and move the machine and work equipment once a month and apply lubrication to each part.

※ Check the level of engine oil and coolant and fill if required when starting engine.

※ Clean the anticorrosive on the piston rod of cylinder.

※ Operate the machine such as traveling, swing and work equipment operation to make sure enough lubrication of all functional components.



※ BATTERY

① Once a month, start the engine for 15 minutes (or use a charger) to charge the battery.

② Every 2 months, check the battery voltage and keep battery voltage over 12.54V.

③ If the machine stock period is over 6 months, disconnect the battery negative (-) terminal.

3) AFTER STORAGE

Carry out the following procedure when taking out of a long time storage.

(1) Wipe off the anticorrosive lubricant on the hydraulic piston rod.

(2) Completely fill fuel tank, lubricate and add oil.

(3) When storage period is 6 months over

If the machine stock period is over 6 months, carry out the following procedure.

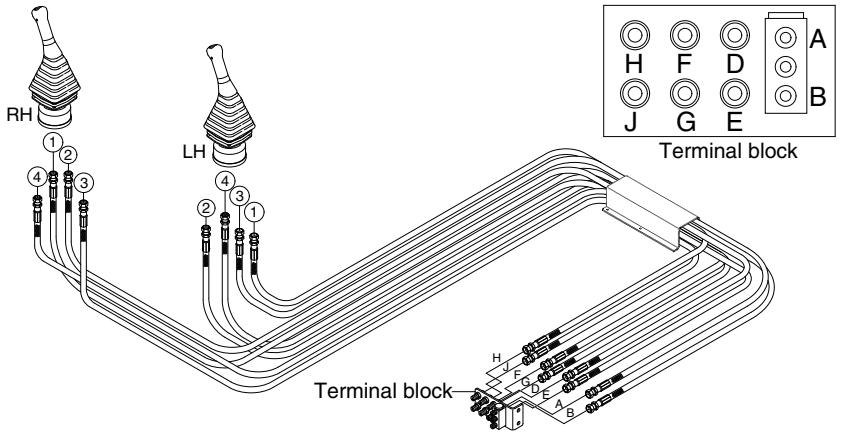
This procedure is to drain condensation water for the swing reduction gear durability.

※ Remove the drain port plug and drain the water until the gear oil comes out and then tighten the drain plug.

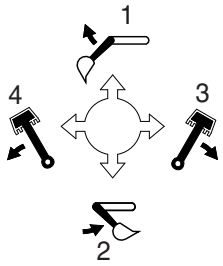
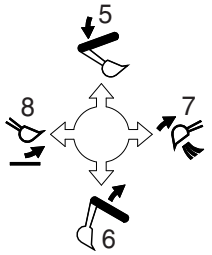
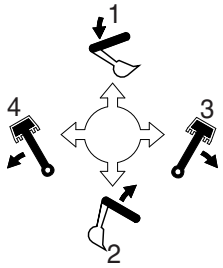
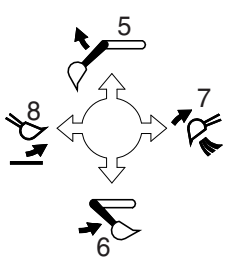
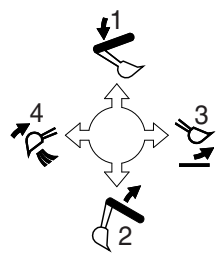
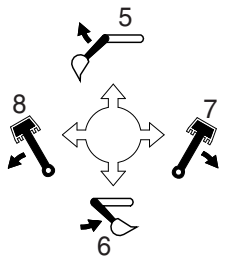
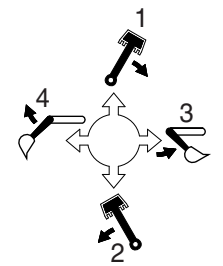
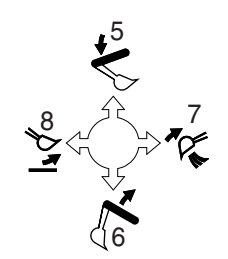
※ Refer to the service instruction, section 6 for the drain plug location.

※ If the machine is stored without carrying out the monthly lubricating operation, consult your Hyundai dealer for service.

11. RCV LEVER OPERATING PATTERN



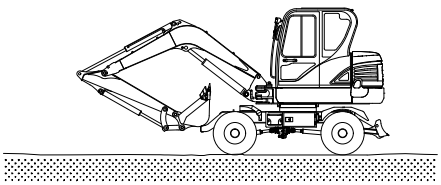
※ Whenever a change is made to the machine control pattern also exchange the pattern label in the cab to match the new pattern.

Pattern	Operation		Control function		Hose connection (port)		
	Left	Right			RCV lever	Change of Terminal block	
						From	To
ISO Type Hyundai			Left	1Arm out	②	D	-
				2Arm in	④	E	-
				3Swing right	③	B	-
				4Swing left	①	A	-
			Right	5Boom lower	④	G	-
				6Boom raise	②	F	-
				7Bucket out	①	H	-
				8Bucket in	③	J	-
A Type			Left	1Boom lower	②	D	J
				2Boom raise	④	E	H
				3Swing right	③	B	-
				4Swing left	①	A	-
			Right	5Arm out	④	G	D
				6Arm in	②	F	E
				7Bucket out	①	H	-
				8Bucket in	③	J	-
B Type			Left	1Boom lower	②	D	J
				2Boom raise	④	E	H
				3Bucket in	③	B	F
				4Bucket out	①	A	G
			Right	5Arm out	④	D	D
				6Arm in	②	F	E
				7Swing right	①	H	B
				8Swing left	③	J	A
C Type			Left	1 Swing right	②	D	J
				2 Swing left	④	E	H
				3 Arm in	③	B	F
				4 Arm out	①	A	G
			Right	Same as **ISO** type			

1. ROAD TRAVELING

As this machine can run at the maximum speed of 30.5km/h, it is not necessary to transport the machine on trailer in a short distance.
But the transportation by the trailer is convenient in a long distance.

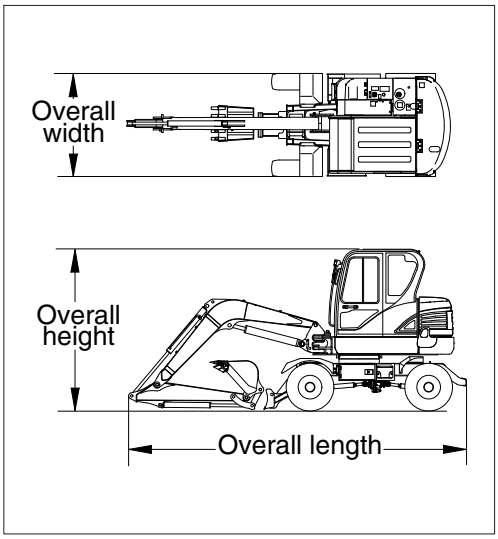
If it is necessary to travel on a road, observe the followings.



1) Comply with regulations regarding this machine for the sake of safety.
2) Perform daily inspection before starting the machine.
3) Cross the bridge after checking that it will safely support the machine weight. If the bridge can not support, a detour must be prepared or the bridge must be reinforced.
4) When traveling for a long distance, stop every hour to allow tires and other components to cool down and check any abnormality.
5) Drive with the bucket empty.

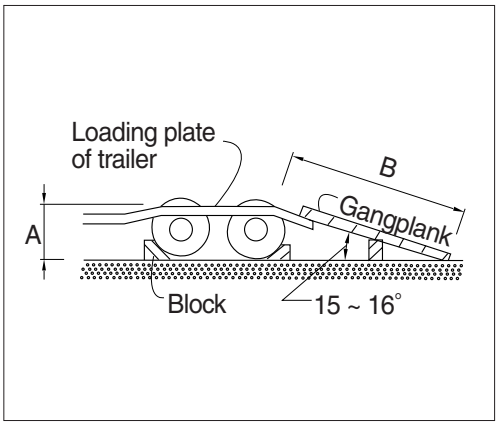
2. PREPARATION FOR TRANSPORTATION

1) When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc.
2) Select proper trailer after confirming the weight and dimension from the chapter 2, specification.
3) Check the whole route such as the road width, the height of bridge and limit of weight and etc., which will be passed.
4) Get the permission from the related authority if necessary.
5) Prepare suitable capacity of trailer to support the machine.



6) Prepare gangplank for safe loading referring to the below table and illustration.

A	B
1.0	3.65 ~ 3.85
1.1	4.00 ~ 4.25
1.2	4.35 ~ 4.60
1.3	4.75 ~ 5.00
1.4	5.10 ~ 5.40
1.5	5.50 ~ 5.75

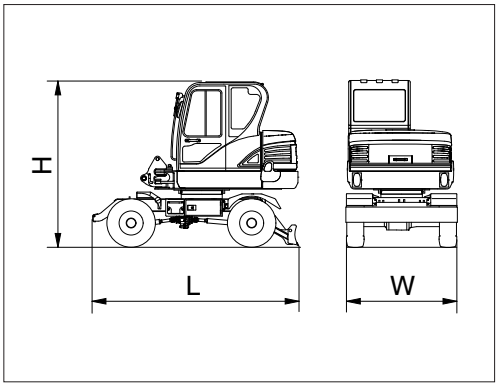


3. DIMENSION AND WEIGHT

1) Base machine

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3580 (11' 9")
H	Height	mm (ft-in)	2850 (9' 4")
Wd	Width	mm (ft-in)	1925 (6' 4")
Wt	Weight	kg (lb)	4760 (10490)

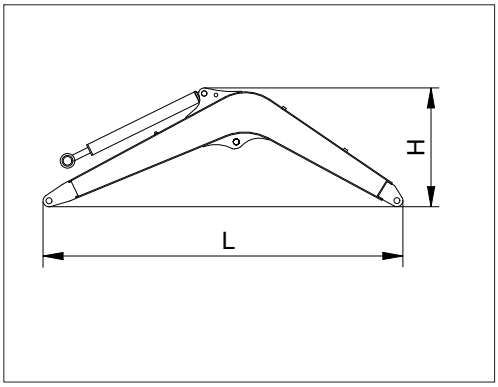
※ With 210 kg (460 lb) counterweight.



2) Boom assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3120 (10' 3")
H	Height	mm (ft-in)	1140 (3' 9")
Wd	Width	mm (ft-in)	250 (0'10")
Wt	Weight	kg (lb)	300 (660)

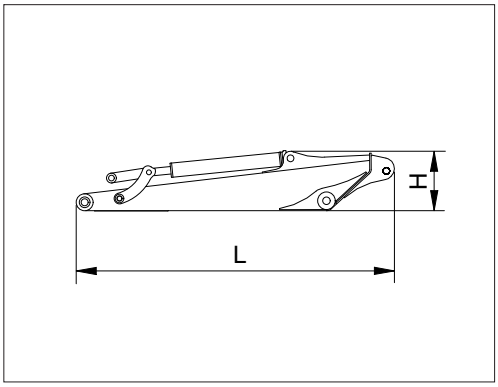
※ 3.0 m (9'10") boom with arm cylinder (included piping and pins).



3) Arm assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2130 (6'12")
H	Height	mm (ft-in)	450 (1' 6")
Wd	Width	mm (ft-in)	170 (0' 7")
Wt	Weight	kg (lb)	205 (450)

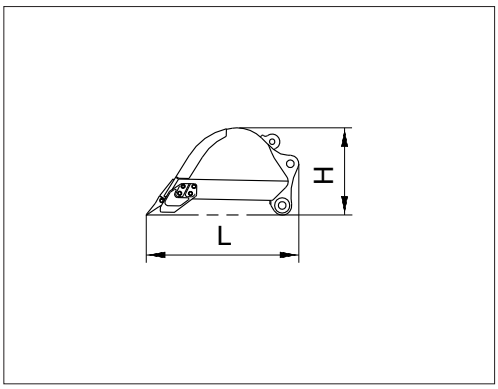
※ 1.6 m (5' 3") arm with bucket cylinder (included linkage and pins).



4) Bucket assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1020 (3' 4")
H	Height	mm (ft-in)	570 (1' 10")
Wd	Width	mm (ft-in)	740(2' 5")
Wt	Weight	kg (lb)	170 (380)

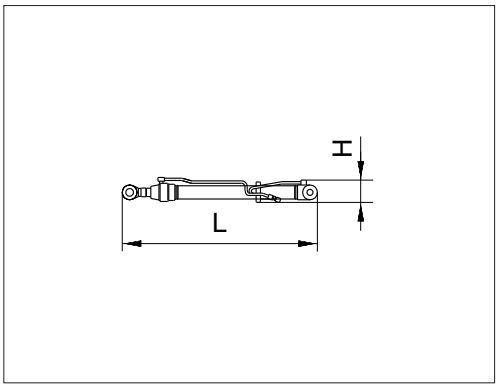
※ 0.18 m^3 (0.24 yd^3) SAE heaped bucket (Included tooth and side cutters).



5) Boom cylinder

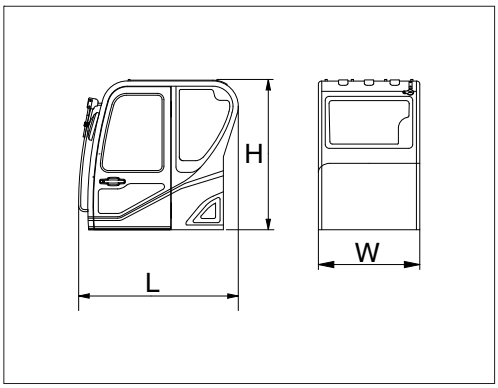
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1210 (3'12")
H	Height	mm (ft-in)	150 (0' 6")
Wd	Width	mm (ft-in)	280 (0'11")
Wt	Weight	kg (lb)	70 (155)

※ Included piping.



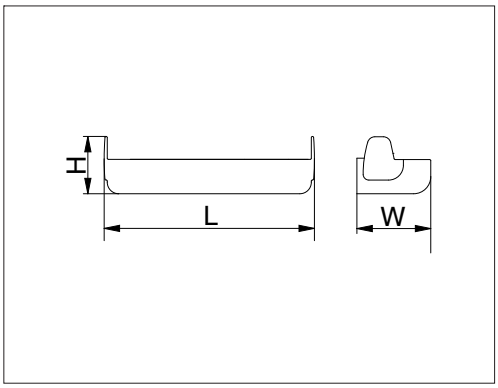
6) Cab assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1650 (5' 5")
H	Height	mm (ft-in)	1530 (5' 0")
Wd	Width	mm (ft-in)	1060 (3' 6")
Wt	Weight	kg (lb)	350 (770)



7) Counterweight

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1850 (6' 1")
H	Height	mm (ft-in)	420 (1' 5")
Wd	Width	mm (ft-in)	645 (2' 1")
Wt	Weight	kg (lb)	210 (460)



4. LOADING THE MACHINE

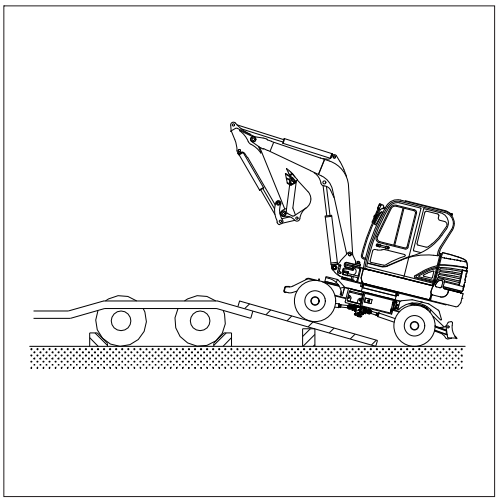
1) Load and unload the machine on a flat ground.

2) Use the gangplank with sufficient length, width, thickness and gradient.

3) Place block tires of the truck and the trailer not to move the trailer.

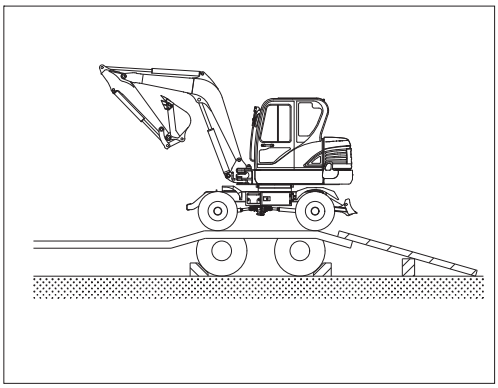
4) Place the swing lock device to the **LOCK** position before fixing the machine at the bed of trailer and confirm if the machine parallels the bed of trailer.

5) Drive straight and depress the acceleration pedal slowly on the gangplank with the two speed switch positioned as low speed.

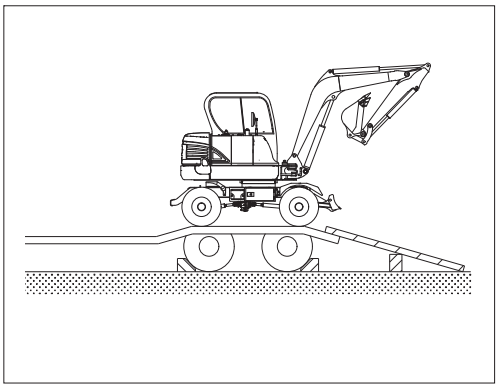


6) Do the following after loading the machine to the trailer.

(1) Stop loading when the machine is located horizontally with the rear wheel of trailer.



(2) Place the swing lock device to the **LOCK** position after the swing the machine 180 degree.



(3) Lower the working equipment gently after the location is determined.

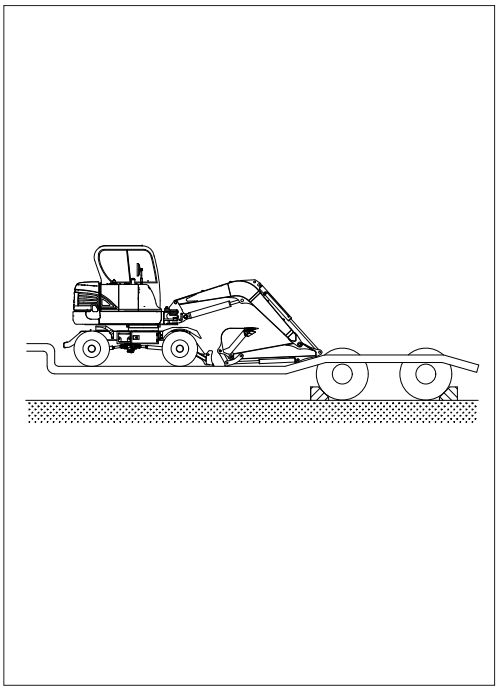
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

⚠ **Be sure to keep the travel speed switch on the low speed while loading and unloading the machine.**

⚠ **Avoid using the working equipment for loading and unloading since it will be very dangerous.**

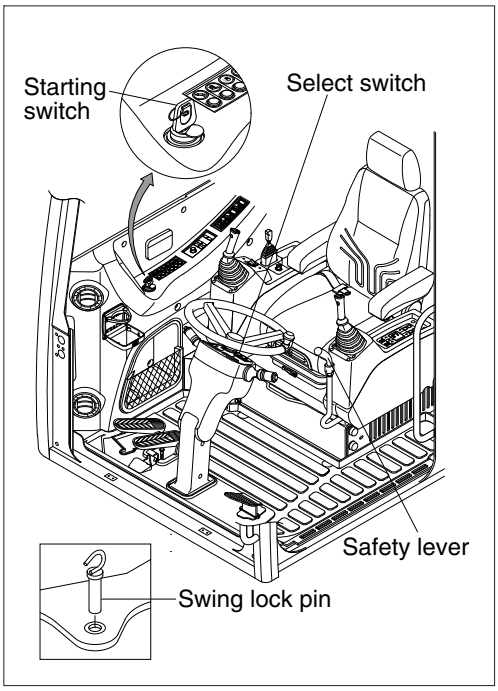
⚠ **Do not operate any other device when loading.**

⚠ **Be careful on the boundary place of loading plate or trailer as the balance of machine will abruptly be changed on the point.**

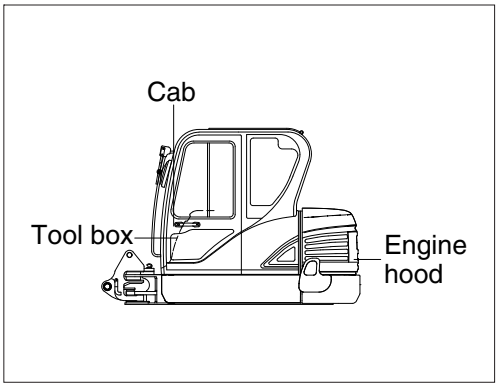


5. FIXING THE MACHINE

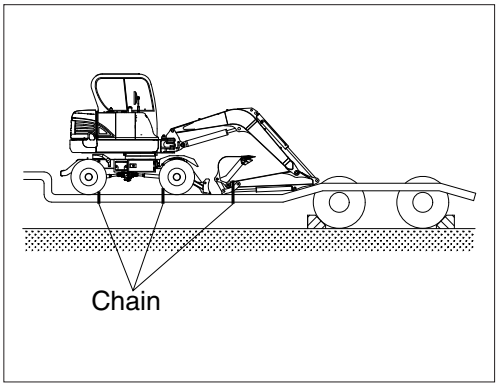
1) Place the swing lock pin on the LOCK position.
2) Place the parking switch to the parking position.
3) Keep the safety lever on the SAFETY position.
4) Turn OFF all the switches and remove the key.



5) Secure all locks.



6) Place timber underneath of the tires and fix firmly with wire rope to prevent the machine from moving forward, backward, right or left.



6. LOADING AND UNLOADING BY CRANE

1) Check the weight, length, width and height of the machine referring to the chapter 2, specification when you are going to hoist the machine.
2) Use long wire rope and stay to keep the distance with the machine as it should avoid touching with the machine.
3) Put a rubber plate contact with wire rope and machine to prevent damage.
4) Place crane on the proper place.
5) Install the wire rope and stay like the illustration.

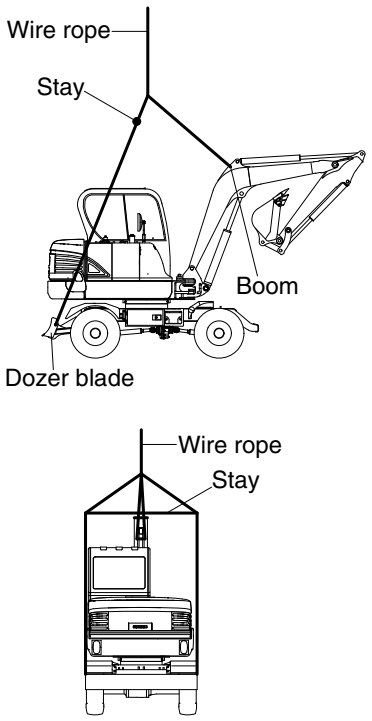
⚠ **Make sure wire rope is proper size.**

⚠ **Place the safety lever to LOCK position to prevent the machine moving when hoisting the machine.**

⚠ **The wrong hoisting method or installation of wire rope can cause damage to the machine.**

⚠ **Do not load abruptly.**

⚠ **Keep area clear of personnel.**



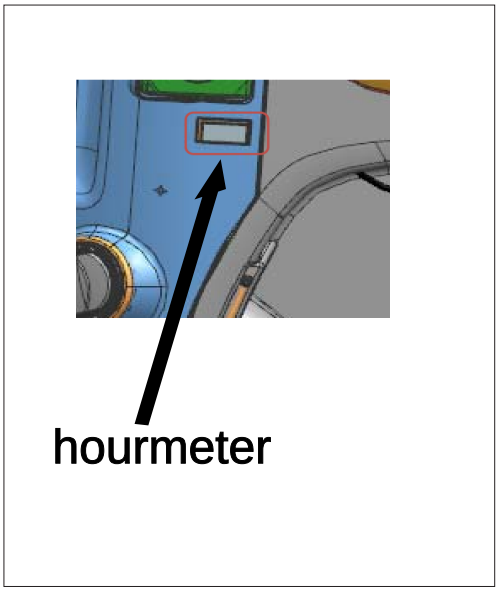
1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

(1) You may inspect and service the machine by the period as described at page 6-11 based on hour meter at cluster.

(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 100hours, carry out all the maintenance 「Each 100hours, each 50 hours and daily service」 at the same time.



2) PRECAUTION

(1) Start to maintenance after you have the full knowledge of machine.

(2) The monitor installed on this machine does not entirely guarantee the condition of the machine.
Daily inspection should be performed according to clause 4, maintenance check list.

(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 the maintenance advice if 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 bucket tooth, side cutter, filter and etc., regularly.

Replace damaged or worn parts at proper time to keep the performance of machine.

(2) Use 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.

Stop the engine when you fill the oil.

(7) Relieve hydraulic system of the pressure before repairing the hydraulic system.

(8) Confirm if the cluster is in the normal condition after completion of service.

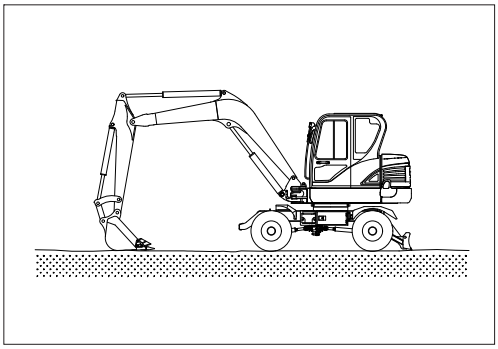
(9) For more detail information of maintenance, please contact local Hyundai dealer.

※ **Be sure to start the maintenance after fully understand the chapter 1, safety hints.**

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

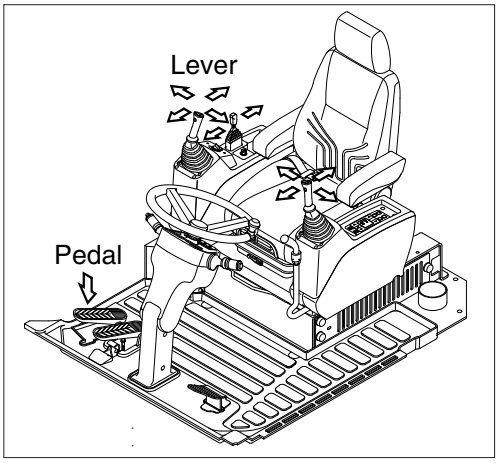
⚠ Spouting of oil can cause the accident when loosening the cap or hose right after the operating of machine as the machine or oil is on the high pressure on the condition.
Be sure to relieve the pressure in the system before repairing hydraulic system.

(1) Place machine in parking position, and stop the engine.

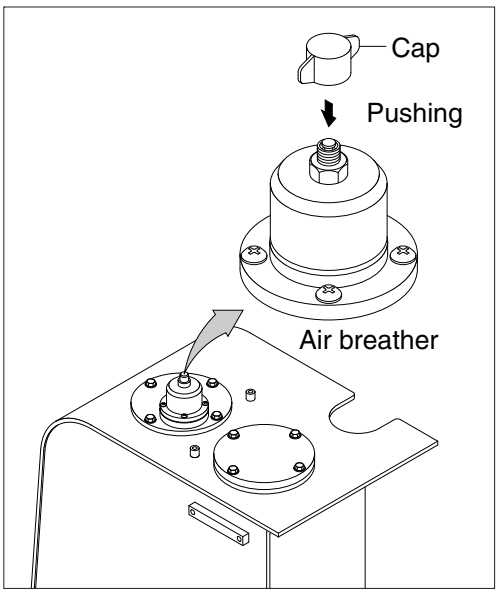


(2) Set the safety lever completely in the release position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ This does not completely release the pressure, so when serving hydraulic component, loosen the connections slowly and do not stand in the direction where the oil spurt out.



(3) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.



5) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPES

(1) Be particularly careful that the joint of hose, pipe and functioning item are not damaged. Avoid contamination.

(2) Assemble after cleaning the hose, pipe and joint of functioning item.

(3) Use genuine parts.

(4) Do not assemble the hose in the condition of twisted or sharp radius.

(5) Keep the specified tighten torque.

6) PERIODICAL REPLACEMENT OF SAFETY PARTS

(1) It is desirable to do periodic maintenance the machine for using the machine safely for a long time.
However, recommend to replace regularly the parts related safety not only safety but maintain satisfied performance.

(2) These parts can cause the disaster of life and material as the quality changes by passing time and it is worn, diluted, and gets fatigued by using repeatedly.
These are the parts which the operator can not judge the remained lifetime of them by visual inspection.

(3) Repair or replace if an abnormality of these parts is found even before the recommended replacement interval.

Periodical replacement of safety parts			Interval
Engine		Fuel hose(tank-engine)	Every 2 years
		Heater hose (heater-engine)	
Hydraulic system	Main circuit	Pump suction hose	Every 2 years
		Pump delivery hose	
		Swing hose	
	Working device	Boom cylinder line hose	Every 2 years
		Arm cylinder line hose	
		Bucket cylinder line hose	
	Brake line	Service brake line hose	Every 2 years
		Parking brake line hose	
		Steering line hose	

※1. Replace O-ring and gasket at the same time when replacing the hose.

2. Replace clamp at the same time if the hose clamp is cracked when checking and replacing the hose.

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8T		10T	
	kg·m	lb·ft	kg·m	lb·ft
M 6 × 1.0	0.85 ~ 1.25	6.15 ~ 9.04	1.14 ~ 1.74	8.2 ~ 12.6
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.7 ~ 4.1	19.5 ~ 29.7
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.5	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

(2) Fine thread

Bolt size	8T		10T	
	kg·m	lb·ft	kg·m	lb·ft
M 8 × 1.0	2.2 ~ 3.4	15.9 ~ 24.6	3.0 ~ 4.4	21.7 ~ 31.8
M10 × 1.2	4.5 ~ 6.7	32.5 ~ 48.5	5.9 ~ 8.9	42.7 ~ 64.4
M12 × 1.25	7.8 ~ 11.6	56.4 ~ 83.9	10.6 ~ 16.0	76.7 ~ 116
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 131	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 195	26.6 ~ 36.0	192 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 391	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 516	70.7 ~ 95.7	511 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 665	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1339	182 ~ 248	1314 ~ 1796
M36 × 3.0	192 ~ 260	1390 ~ 1880	262 ~ 354	1894 ~ 2562

2) PIPE AND HOSE (FLARE type)

Thread size (PF)	Width across flat (mm)	kgf·m	lbf·ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

3) PIPE AND HOSE (ORFS type)

Thread size (UNF)	Width across flat (mm)	kgf·m	lbf·ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130
1-7/16-12	41	21	152
1-11/16-12	50	35	253

4) FITTING

Thread size	Width across flat (mm)	kgf·m	lbf·ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

4) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-Bracket)	M10 × 1.5	6.9±1.0	50±7.2
2		Engine mounting bolt (bracket-Frame)	M16 × 2.0	25±2.5	181±18.1
3		Radiator mounting bolt, nut	M10 × 1.5	6.9±1.4	50±10.0
4		Cooling fan mounting bolt	M 8 × 1.25	1.8±0.2	13±1.4
5		Coupling mounting socket bolt	M14 × 2.0	14±1.0	101±7.2
		Coupling mounting clamp bolt	M16 × 2.0	11±1.0	79.6±7.2
6	Hydraulic system	Main pump mounting bolt	M12 × 1.75	12.3±3.0	92±22.0
7		Main control valve mounting bolt	M 8 × 1.25	2.5±0.5	18±3.6
8		Travel motor mounting bolt	M12 × 1.75	14.7±2.2	106±15.9
9		Fuel tank mounting bolt	M16 × 2.0	29.7±4.5	215±33
10		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7±4.5	215±33
11		Turning joint mounting bolt, nut	M12 × 1.75	14.7±2.2	106±16.0
12	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
13		Swing bearing upper mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
15		Swing bearing lower mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
16		Front axle mounting bolt, nut	M16 × 2.0	29.7±4.5	215±33.0
17		Rear axle mounting bolt, nut	M16 × 2.0	29.7±4.5	215±33.0
18		Gear box mounting bolt	M14 × 2.0	19.6±2.9	142±21.0
19		Oscillating cylinder mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
20		Oscillating cylinder support bolt	M12 × 1.75	12.8±3.0	92.6±22.0
21		Wheel nut	M18 × 1.5	46.0±3.0	333±22.0
22		Front drive shaft mounting bolt, nut	M10 × 1.25	7.4±1.5	53.5±11.0
23		Rear drive shaft mounting bolt, nut	M10 × 1.25	7.4±1.5	53.5±11.0
24	Others	Counterweight mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
25		Cab mounting bolt, nut	M12 × 1.75	12.8±3.0	92±22.0
26		Operator's seat mounting bolt	M 8 × 1.25	1.17±0.1	8.5±0.7

3. FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil	SAE 15W-40 (API CI-4)
Hydraulic oil	Conventional hydraulic oil (ISO VG3 2, VG 46, VG 68)
Swing reduction gear oil	SAE 80W-90 (API GL-4/GL-5)
Transmission gear oil	SAE 85W-90 LSD (API GL-5)
Axle gear oil	SAE 85W-90 LSD (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2, ★2 Ultra low sulfur fuel
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 Society of Testing and Material

★1 Cold region
- Russia, CIS, Mongolia

★2 Ultra low sulfur diesel
- Sulfur content ≤ 15 ppm

2) RECOMMENDED OILS

HYUNDAI genuine lubricating oils have been developed to offer the best performance and service life for your equipment. These oils have been tested according to the specifications of HYUNDAI and, therefore, will meet the highest safety and quality requirements.

We recommend that you use only HYUNDAI genuine lubricating oils and grease officially approved by HYUNDAI.

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature ˚C(˚F) -50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil	11.6 (3.1)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Swing drive	Grease	0.2 (0.1)	★NLGI NO.1 NLGI NO.2
	Gear oil	1.5 (0.4)	★SAE 75W-90 SAE 80W-90
Gear box case	Gear oil	1.8 (0.5)	
Front axle		Center: 4.5 (1.19) Hub: 0.4×2 (0.11×2)	SAE 85W-90 LSD(GL-5)
Rear axle		Center:4.5 (1.19) Hub: 0.4×2 (0.11×2)	
Hydraulic tank	Hydraulic oil	Tank; 70 (18.5) System; 120 (31.7)	★ISO VG 15 ISO VG 32 ISO VG 46, HBHO VG 46★3 ISO VG 68
Fuel tank	Diesel fuel★1	117 (30.9)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and water★2	9.5 (2.5)	Ethylene glycol base permanent type (50 : 50) ★Ethylene glycol base permanent type (60 : 40)

SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Material

★ : Cold region (Russia, CIS, Mongolia)
★1 : Ultra low sulfur diesel
- sulfur content ≤ 15 ppm
★2 : Soft water
City water or distilled water
★3 : Hyundai Bio Hydraulic Oil

※ Using any lubricating oils other than HYUNDAI genuine products may lead to a deterioration of performance and cause damage to major components.

※ Do not mix HYUNDAI genuine oil with any other lubricating oil as it may result in damage to the systems of major components.

※ For HYUNDAI genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact HYUNDAI dealers.

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-25
Hydraulic oil level	Check, Add	6-27
Engine oil level	Check, Add	6-18
Coolant level	Check, Add	6-20
Control panel & pilot lamp	Check, Clean	6-39
Prefilter (water, element)	Check, Drain	6-25
Fan belt tension	Check, Adjust	6-23
★Attachment pin and bushing	Lubricate	6-39
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		

★ Lubricate every 10 hours or daily for initial 100 hours.

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water sediment)	Drain	6-25
Drive shaft joint (flange bearing)	Check, Add	6-31
Swing reduction gear oil	Check, Add	6-30
Swing gear & pinion	Check, Add	6-30
Gear box case oil	Check, Add	6-36
Wheel nut	Check, Tight	6-33
Tire air pressure	Check, Inflate	6-33
Axle oil	Add, Lubricate	6-34, 35
Bucket linkage & blade pins	Lubricate	6-37
· Bucket cylinder rod end		
· Arm + Bucket connecting		
· Arm + Bucket control link		
· Bucket control rod		
· Bucket link connecting		
· Boom swing cylinder head and rod		
· Boom swing post pin		
· Dozer blade cylinder (rod end, tube end)	Lubricate	6-32
· Dozer blade pivot pin	Lubricate	6-32
· Drive shaft (front and rear)	Lubricate	6-31
· Axle pivot	Lubricate	6-32
· Hub pivot	Lubricate	6-32
· Steering links	Lubricate	6-33
Front axle steering bushing	Lubricate	

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Attachment pins · Boom cylinder tube end · Boom foot · Boom cylinder rod end · Arm cylinder tube end · Arm cylinder rod end · Boom + Arm connecting · Bucket cylinder tube end	Check, Lubricate	6-8
Boom cylinder(rotation type)	Check, Lubricate	
Attachment pins(rotation type)	Check, Lubricate	

Service the above items only for the new machine, and thereafter keep the normal service interval.

4) EVERY 200 HOURS SERVICE

Check items	Service	Page
★ Return filter	Replace	6-35
★ Pilot line filter	Replace	6-36
★ Drain filter cartridge	Replace	6-36

★ Replace 3 filters for continuous hydraulic breaker operation only.

5) INITIAL 250 HOURS SERVICE

Check items	Service	Page
☆ Engine oil	Change	6-18, 19
☆ Engine oil filter	Replace	6-18, 19
Prefilter (water ,element)	Replace	6-25
Fuel filter element	Replace	6-26
Gear box case oil	Change	6-36
Axle oil	Change	6-34, 35
Swing reduction gear oil	Change	6-30
Swing reduction gear grease	Check	6-30
★Pilot line filter element	Replace	6-29
★Hydraulic return filter element	Replace	6-28

★ Replace 2 filters for continuous hydraulic breaker operation only.

☆ **If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.**

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Battery (voltage)	Check	6-40
Front axle steering case grease	Lubricate	6-32
Swing bearing grease	Lubricate	6-30
Attachment pin & bushing	Lubricate	6-39
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		
Boom cylinder(rotation type)	Check, Lubricate	
Attachment pins(rotation type)	Check, Lubricate	

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
★ Engine oil	Change	6-18, 19
★ Engine oil filter	Replace	6-18, 19
Prefilter (water ,element)	Replace	6-25
☆ Air cleaner element (primary)	Inspect, Clean	6-24
Fuel filter element	Replace	6-26
Radiator, cooler fin and charge air cooler	Check, Clean	6-23

★ If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.

☆ Clean the primary element only after 500 hours operation or when the air cleaner warning lamp blinks. Replace primary element and safety element after 4 times cleanings of primary element.

8) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Swing reduction gear oil	Change	6-29
Swing reduction gear grease	Add,Lubricate	6-29
Axle gear oil	Change	6-35
Transmission gear oil	Change	6-36
Hydraulic oil return filter element	Replace	6-28
Pilot line filter element	Replace	6-28
Hydraulic tank air breather element	Replace	-

9) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Hydraulic tank suction strainer	Check, Clean	6-28
Coolant	Change	6-20, 21, 22, 23

※ Change oil every 600 hours of continuous hydraulic breaker operation.

10) EVERY 5000 HOURS SERVICE

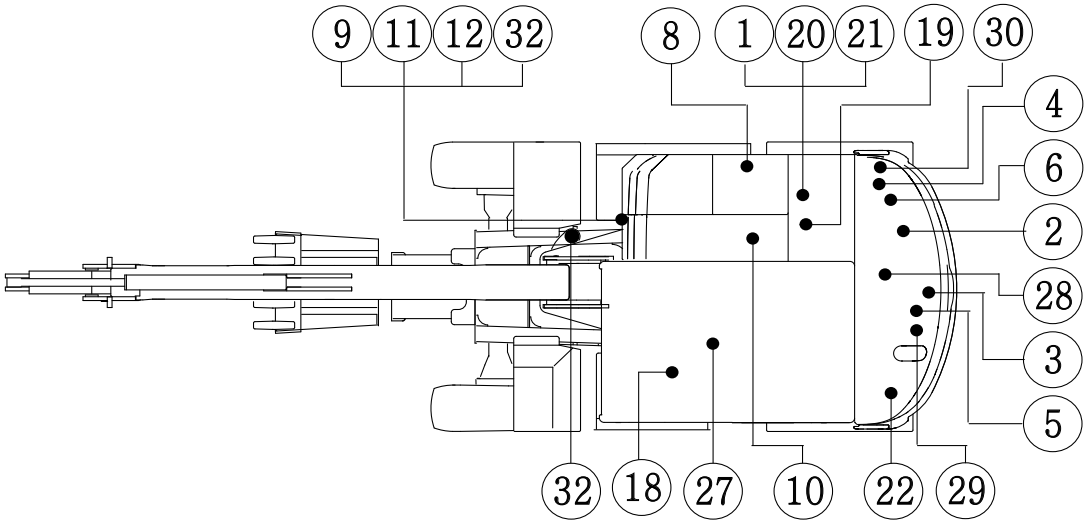
Check items	Service	Page
Hydraulic oil	Change	6-27

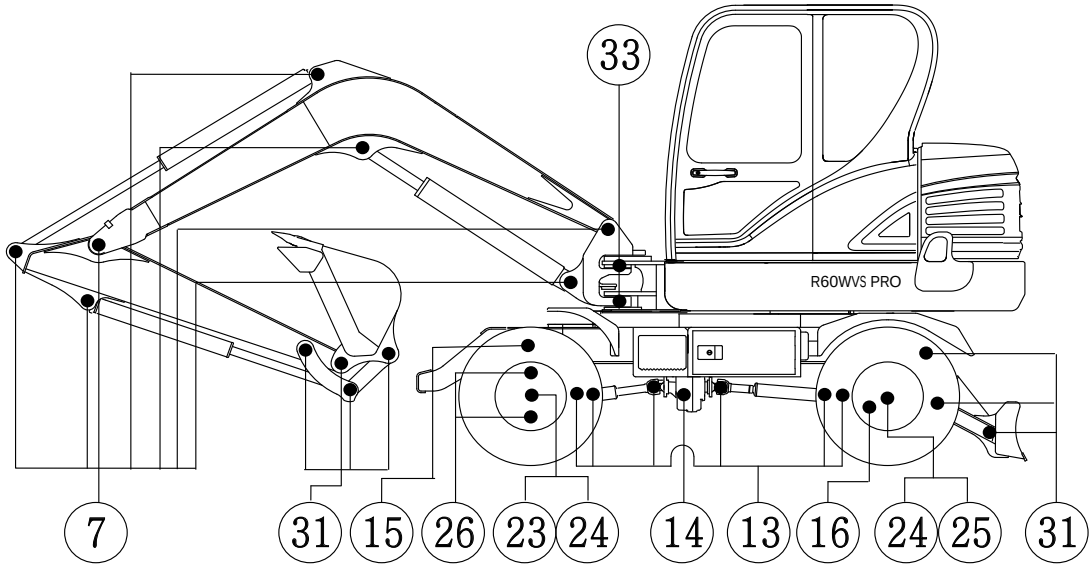
11) WHEN REQUIRED

Whenever you have trouble in the machine, you must perform the service of related items, system by system.

Check items	Service	Page
Fuel system		
· Fuel tank	Drain or Clean	6-25
· Prefilter	Clean or Replace	6-25
· Fuel filter element	Replace	6-26
Engine lubrication system		
· Engine oil	Change	6-18, 19
· Engine oil filter	Replace	6-18, 19
Engine cooling system		
· Coolant	Add or Change	6-20, 21, 22, 23
· Radiator	Clean or Flush	6-20, 21, 22, 23
· Charge air cooler	Check	6-23
Engine air system		
· Air cleaner element (primary, safety)	Replace	6-24
Hydraulic system		
· Hydraulic oil	Add or Change	6-27
· Return filter	Replace	6-28
· Pilot line filter	Replace	6-29
· Element of breather	Replace	6-29
· Suction strainer	Clean	6-28
Tire pressure	Check, Inflate	6-33
Bucket		
· Tooth	Replace	6-38
· Side cutter	Replace	6-38
· Linkage	Adjust	6-37
· Bucket assy	Replace	6-37
Air conditioner and heater		
· Fresh air filter	Clean, Replace	6-43
· Recirculation filter	Replace	6-43

5. MAINTENANCE CHART





Caution

1. Service intervals are based on the hour meter reading.
2. The number of each item shows the lubrication point on the machine.
3. Stop engine while filling oil, and use no open flames.
4. For other details, refer to the service manual.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
10Hours or daily	1	Hydraulic oil level	Check, Add	HO	70 (18.5)	1
	2	Engine oil level	Check, Add	EO	11.6 (3.1)	1
	4	Radiator coolant level	Check, Add	C	9.5 (2.5)	1
	5	Prefilter (water, element)	Check, Clean	-	-	1
	6	Fan belt tension and damage	Check, Adjust	-	-	1
50 hours or weekly	8	Fuel tank (water, sediment)	Check, Clean	-	-	1
	10	Swing reduction gear oil	Check, Add	GO	1.5 (0.4)	1
	12	Swing gear and pinion	Lubricate	PGL	-	1
	13	Drive shaft(flange bearing)	Lubricate	PGL	-	6
	14	Transmission gear oil	Check, Add	GO	1.84 (0.5)	1
	15	Front axle pivot pin bushing	Check, Add	PGL	-	1
	16	Wheel nut	Check, Tighten	-	-	40
	17	Tire air pressure	Check, Add	-	-	8
	23	Front axle differential gear oil	Check, Add	GO	4.5 (1.19)	1
	24	Rear axle differential gear oil	Check, Add	GO	4.5 (1.19)	1
	25	Axle planetary gear oil(Front, rear)	Check, Add	GO	0.4 (0.11)	4
	31	Bucket linkage & blade pins	Lubricate	PGL	-	8
250 Hours	7	Attachment pins (swivel type)	Lubricate	PGL	-	7
	9	Swing bearing	Lubricate	PGL	-	3
	18	Battery(Electrolyte, Voltage)	Check	-	-	1
	26	Front axle steering case	Lubricate	PGL	-	4
	27	Air conditioner filter (outer)	Clean	-	-	1
	32	Boom swing cylinder (swivel type)	Lubricate	PGL	-	2
	33	Attachment pins (swivel type)	Lubricate	PGL	-	2
500 Hours	2	Engine oil	Change	EO	11.6(3.1)	1
	3	Engine oil filter	Replace	-	-	1
	5	Prefilter (water, element)	Replace	-	-	1
	28	Air cleaner element (primary)	Check, Clean	-	-	1
	29	Fuel filter element	Replace	-	-	1
	30	Radiator, cooler fin and charge air cooler	Check, Clean	-	-	3
1000 Hours	10	Swing reduction gear oil	Change	GO	1.5(0.4)	1
	11	Swing reduction gear grease	Change	PGL	0.35 (0.09)	1
	14	Transmission gear oil	Change	GO	1.84(0.49)	1
	19	Hydraulic oil return filter	Replace	-	-	1
	20	Air breather element	Replace	-	-	1
	22	Pilot line filter element	Replace	-	-	1
	23	Front axle differential gear oil	Change	GO	4.5 (1.19)	1
	24	Rear axle differential gear oil	Change	GO	4.5 (1.19)	1
	25	Axle planetary gear oil(Front, rear)	Change	GO	0.4 (0.11)	4
2000 Hours	4	Radiator coolant	Change	C	9.5 (2.5)	1
	21	Hydraulic oil suction strainer	Check, Clean	-	-	1
5000 hours	1	Hydraulic tank oil	Change	HO	70 (18.5)	1
As required	27	Air conditioner filters	Check, Replace	-	-	2
	28	Air cleaner element(Primary, safety)	Check, Replace	-	-	2

★1 Conventional hydraulic oil

★ Severely dusty area operation only.

※ Oil symbol

Please refer the recommended lubricants for specification.

DF : Diesel fuel GO : Gear oil HO : Hydraulic oil

C : Coolant PGL : Grease EO : Engine oil

1) CHECK ENGINE OIL LEVEL

Check the oil level with the machine on a flat ground before starting engine.

(1) Pull out the dipstick and wipe with a clean cloth.

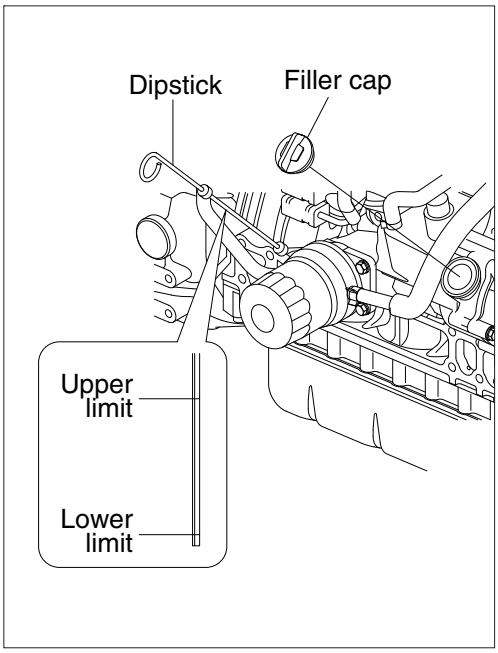
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

(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.**

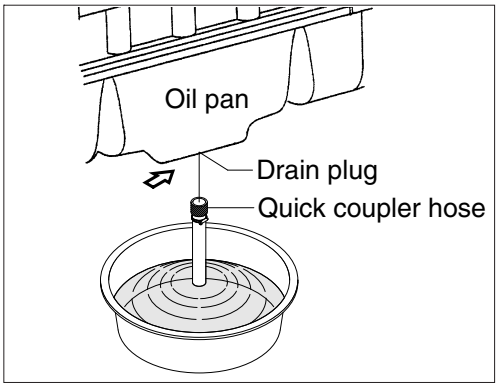


2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

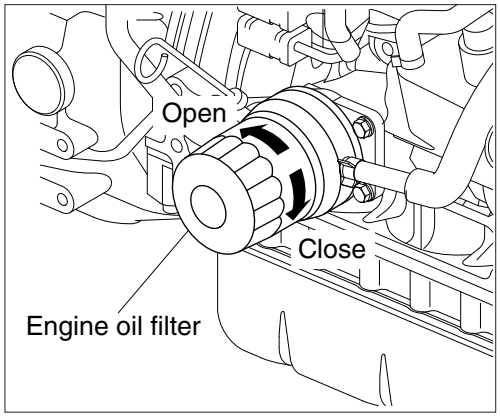
(1) Warm up the engine.

(2) Remove the cover of drain plug and connect the quick coupler hose.

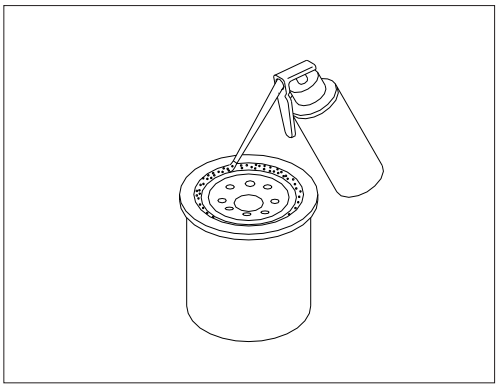
※ **A drain pan with a capacity of 20 liters (5 U.S. gallons) will be adequate.**



(3) Clean around the filter head, remove the filter with a filter wrench and clean the gasket surface.

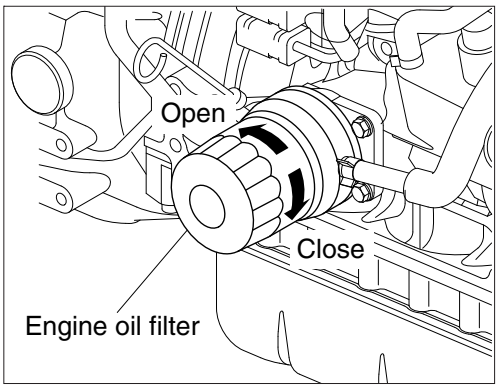


(4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filters.

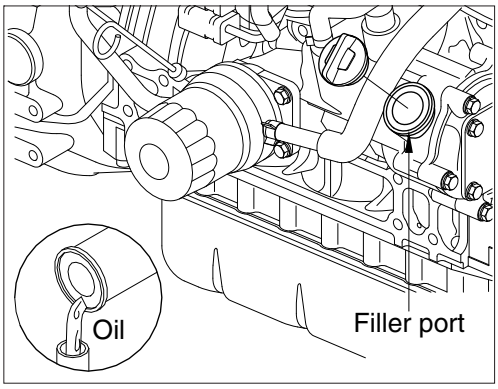


(5) Install the new filter manually by turning it clockwise until if contacts the filter head.
Tighten to 2.0~2.4 kgf·m (14~17 lbf·ft) or one additional turn using the filter wrench.
Remove the quick coupler hose.

※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**

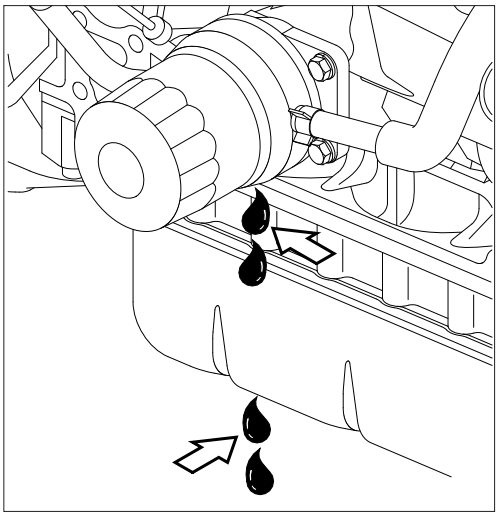


(6) Fill the engine with clean oil to the proper level.
·Quantity : 11.6ℓ(3.1 U.S.gallons)



(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 15minutes for oil to drain down before checking.

(8) Reinstall the oil filler cap. If any engine oil is spilled, wipe it away with a clean cloth.



3) CHECK COOLANT

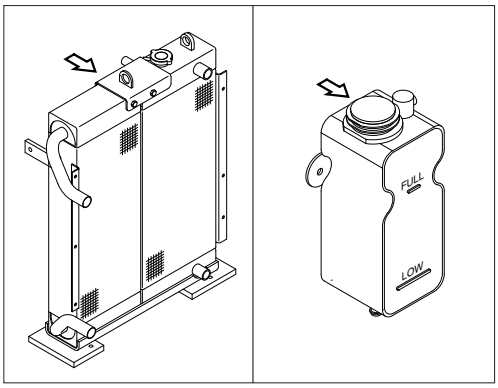
(1) Check if the level of coolant in reservoir tank is between FULL and LOW.

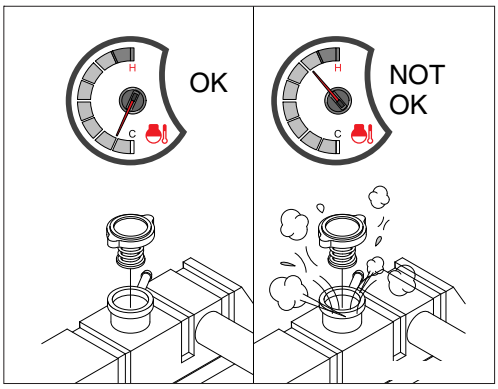
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

(3) Be sure to add the coolant by opening the cap of radiator when coolant level is below LOW.

(4) Replace gasket of radiator cap when it is damaged.

⚠ **Hot coolant can spray out if radiator cap is removed while engine is hot. Remove the cap after the engine has cooled down.**



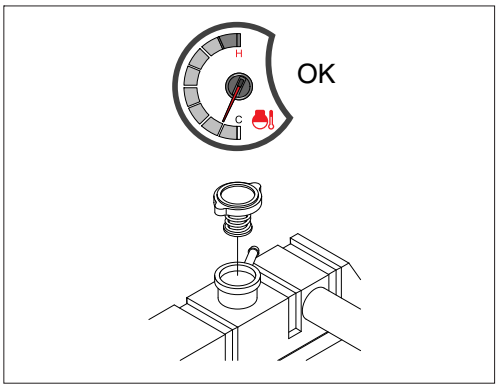


4) FLUSHING AND REFILLING OF RADIATOR

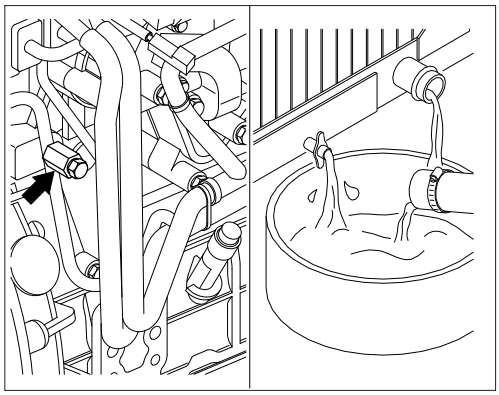
(1) Change coolant

⚠ **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 removing the plug in the bottom of the water inlet. Drain the coolant from engine block. A drain pan with a capacity of 20 liters (5 U.S.gallons) will be adequate in most applications.

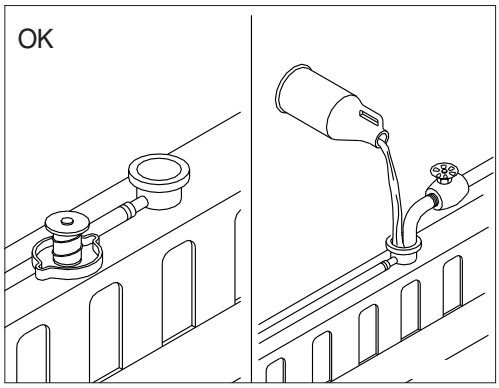


(2) Flushing of cooling system

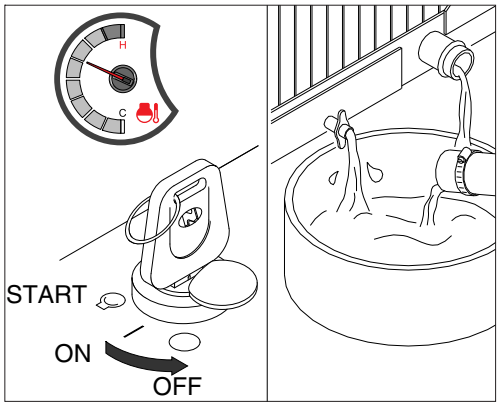
① Fill the system with a mixture of sodium carbonate and water(or a commercially available equivalent).

※ **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 radiator cap. The engine is to be operated without the cap for this process.**



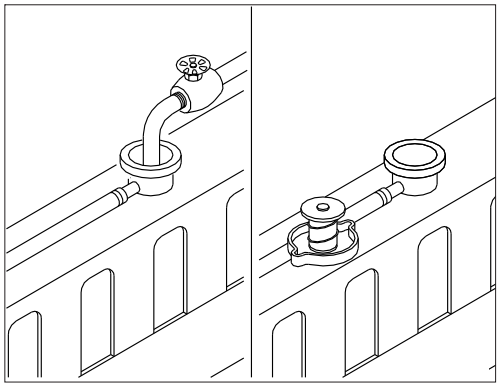
② Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F) .
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

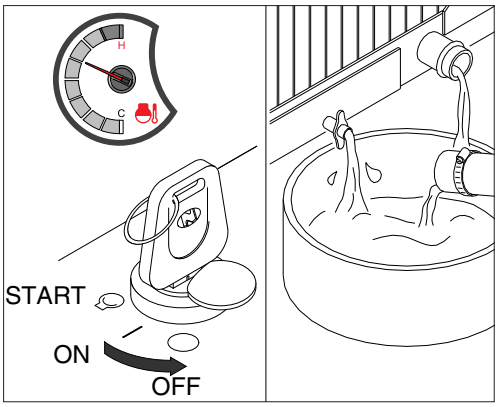
※ **Be sure to vent the engine and aftercooler for complete filling.**

※ **Do not install the radiator cap or the new coolant filter.**



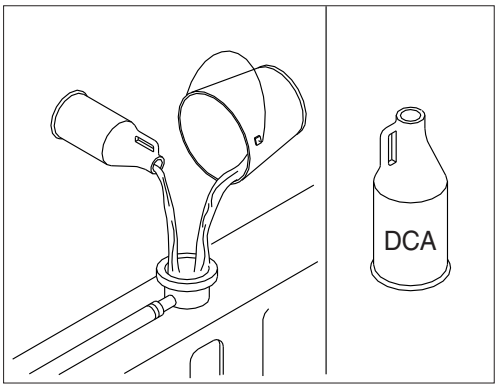
④ Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F) .
Shut the engine off, and drain the cooling system.

※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**



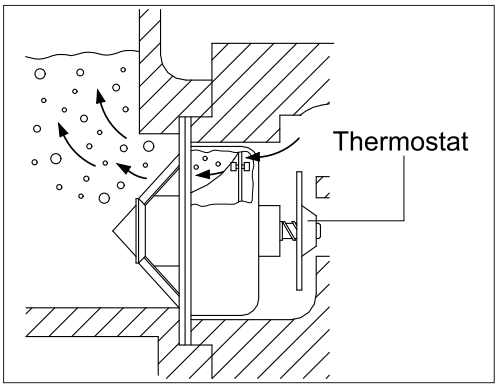
(3) Cooling system filling

① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.
Coolant capacity (engine only) : 4.2 ℓ (1.1 U.S. gallons)

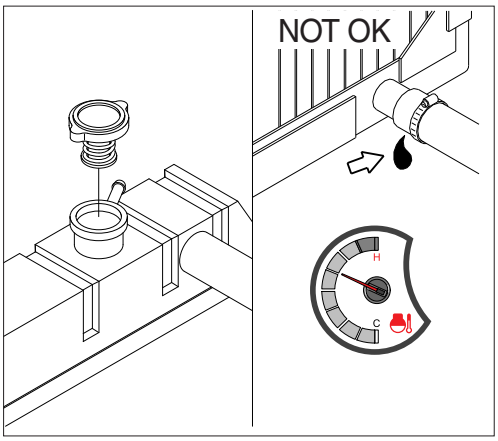


② The system has a maximum fill rate of 14 liters (3.5 U.S. gallons) per minute.
Do not exceed this fill rate.

※ **The system must be filled slowly to prevent air locks.**
During filling, air must be vented from the engine coolant passage.



③ Install the pressure 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.

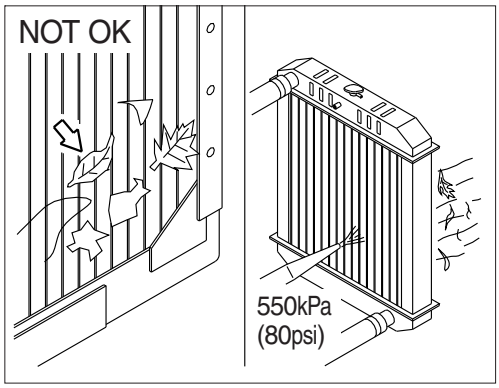


5) CLEAN RADIATOR AND OIL COOLER

Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

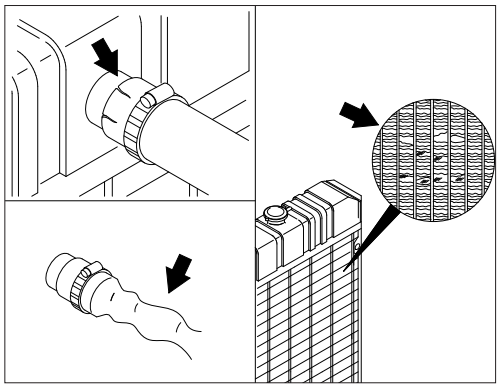
(1) Visually inspect the radiator for clogged radiator fins.

(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.**

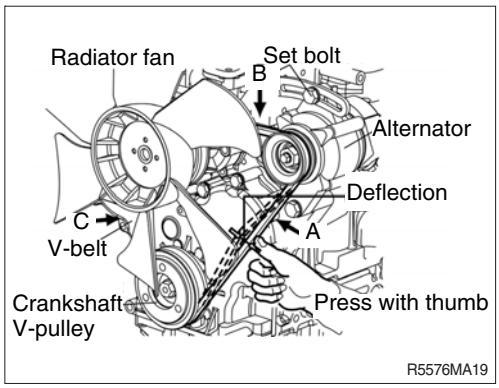


(4) Visually inspect the radiator for core and gasket leaks.

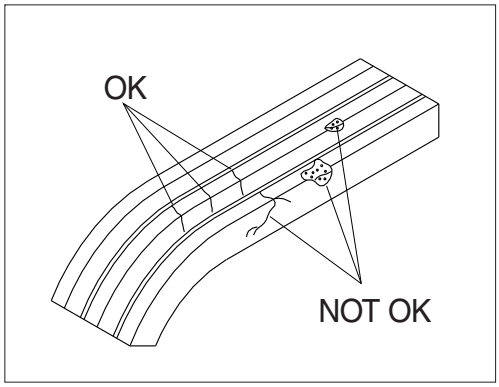
6) FAN BELT TENSION

(1) Measure the belt deflection at the longest span of the belt.
·Deflection

	A	B	C
Used belt	10~14	7~10	9~13
New belt	8~12	5~8	7~11



(2) Inspect the drive for damage (cracks, oil or wear).
If any of these conditions exist, replace.



7) INSPECTION OF COOLING FAN

⚠ **Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade and cause fan failure.**

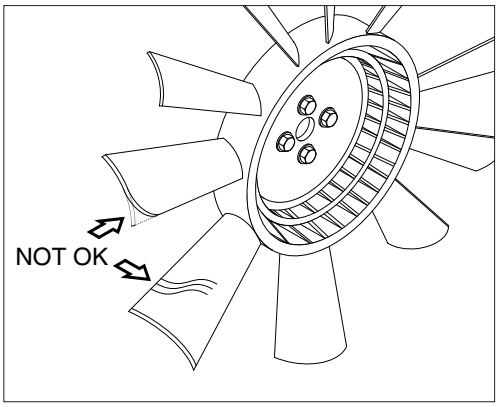
※ **Rotate the crankshaft by using the engine barring gear.**

※ **A visual inspection of the cooling fan is required daily.**

Check for cracks, loose rivets, and bent or loose blades.

Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.

Replace any fan that is damaged.



8) CLEANING OF AIR CLEANER

(1) Primary element

① Open cover and remove the element.

② Clean the inside of the body.

③ Clean the element with pressurized air.

·Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.

④ Inspect for cracks or damage of element by putting a light bulb inside of the element.

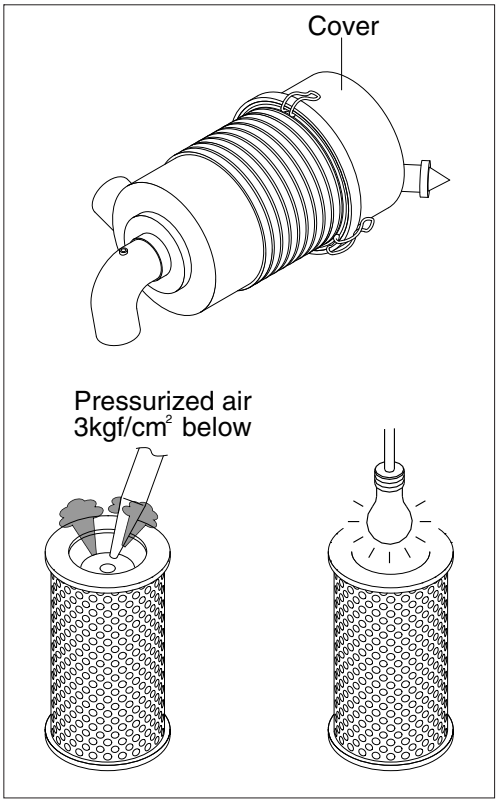
⑤ Insert element and close cover.

※ **Replace the primary element after 4 times cleanings.**

(2) Safety element

※ **Replace the safety element only when the primary element is cleaned for the 4 times.**

※ **Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.**



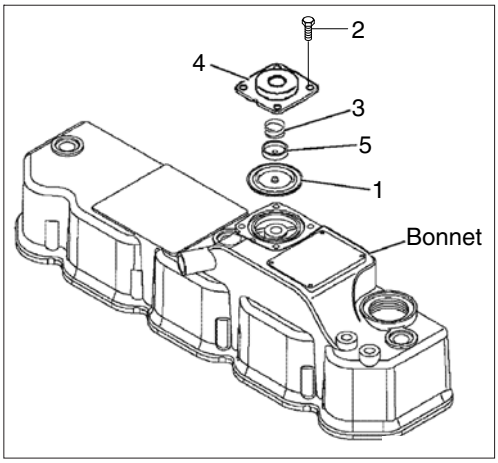
9) CRANKCASE BREATHER

(1) Remove the bolts (2) retaining the diaphragm cover.

(2) Remove the diaphragm cover (4), spring (3), diaphragm plate (5) and diaphragm (1).

(3) Inspect the diaphragm for tears. Inspect the spring for distortion. Replace components if necessary.

(4) Reinstall the diaphragm, diaphragm plate, spring and diaphragm cover. Tighten the bolts.



10) FUEL TANK

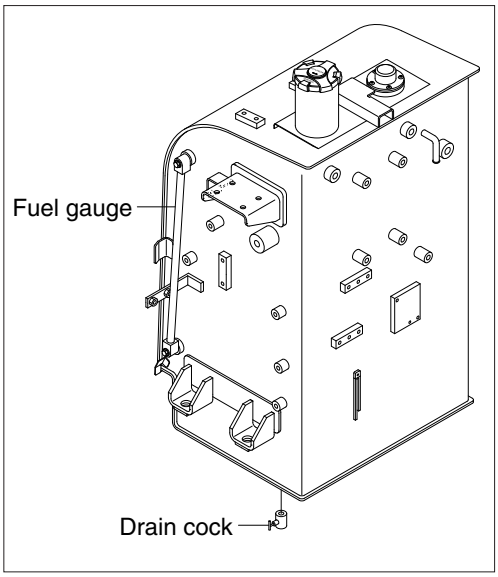
(1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.

(2) Drain the water and sediment in the fuel tank by opening the drain cock.

※ **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.



11) PREFILTER

※ **Inspect or drain the collection bowl of water daily and replace the element after first 250 hours of operation or rebuild, then every 500 hours thereafter.**

(1) Drain water

① Close the fuel cock.

② Loosen the drain cock at the bottom of the fuel prefilter. Drain any water collected inside.

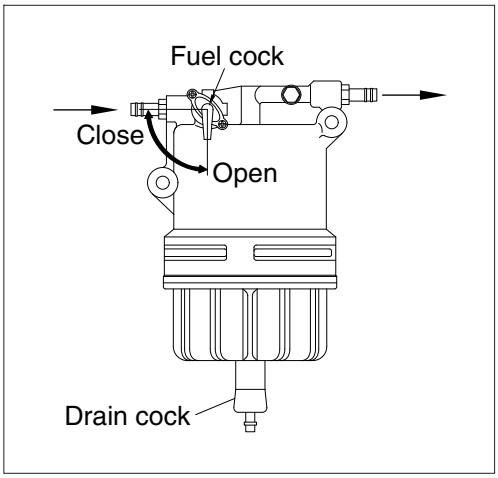
③ Hand-tighten the drain cock.

· Tightening torque : 0.15±0.05 kgf · m
(1.1±0.37 lbf · ft)

④ Open the fuel cock.

⑤ Be sure to prime the diesel fuel system when you are finished. See priming the fuel system on page 6-26.

⑥ Check for leaks.



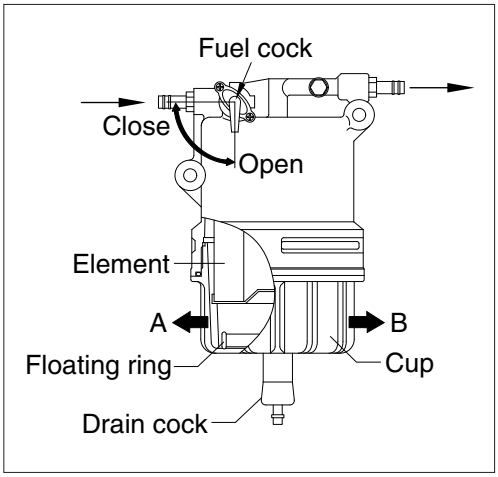
(2) Replace element

① Close the fuel cock.

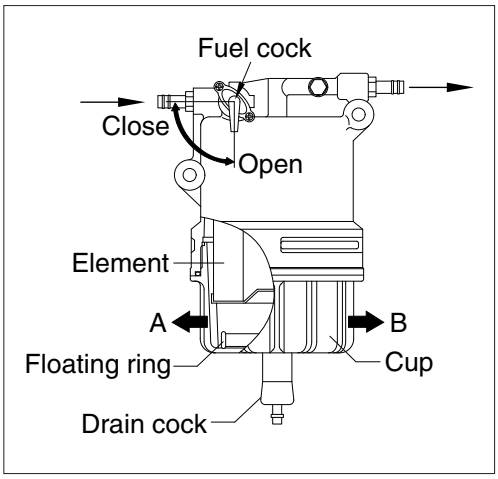
② Turn the retaining ring to the left (A) and remove the cup.

③ Carefully hold the cup to prevent fuel from spilling. If you spill any fuel, clean up the spill completely.

④ Remove the float ring from the cup. Pour the contaminants into the container and dispose of it properly.



⑤ Replace the new element into the top of filter.
⑥ Install the new O-ring in the cup.
⑦ Position the floating ring in the cup.
⑧ Check the condition of the cup. Replace if necessary.
⑨ Install the cup to the bracket by tightening the retaining ring to the right (B) to a torque of 2.8~3.4 kgf·m (20.3~24.6 lbf·ft).
⑩ Close the drain cock.
⑪ Open the fuel cock.
⑫ Prime the fuel system.
⑬ Check for leaks.



12) REPLACEMENT OF FUEL FILTER

(1) Stop the engine and allow it to cool.

(2) Close the fuel cock of the fuel prefilter.

(3) Remove the fuel filter with a filter wrench, turning it to the left. When removing the fuel filter, carefully hold it to prevent the fuel from spilling. Wipe up all spilled fuel.

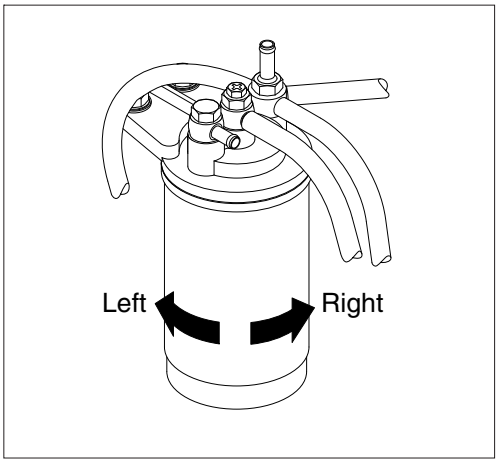
(4) Clean the filter mounting surface and apply a small amount of diesel fuel to the gasket of the new fuel filter.

(5) Install the new fuel filter. Turn to the right and hand-taghten if only until it comes in contact with the mounting surface. Tighten to 2.0~2.4 kgf·m (14.5~17.4 lbf·ft) or one additional turn using the filter wrench.

(6) Open the fuel cock of the prefilter.

(7) Prime the fuel system.

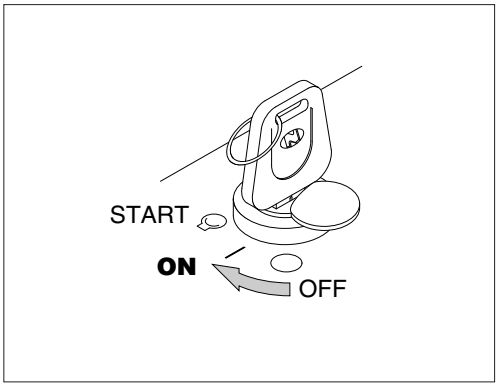
(8) Check for leaks.



13) PRIMING THE FUEL SYSTEM

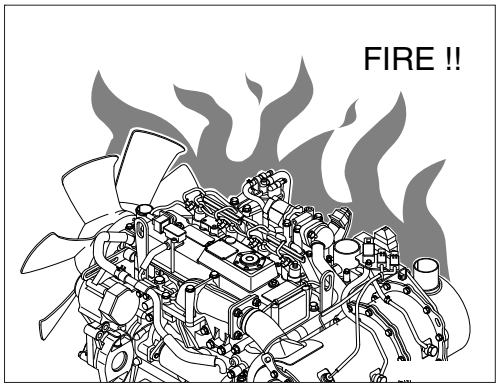
(1) Turn the starting switch to the ON position for 10~15 seconds. This will allow the electric fuel pump to prime the fuel system.

※ **Never use the starter motor to crank the engine in order to prime the fuel system. This may cause the starter motor to overheat and damage the coils, pinion and/or ring gear.**



14) 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.**

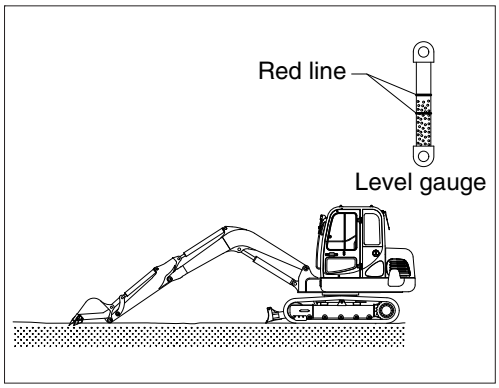


15) HYDRAULIC OIL CHECK

(1) Stop the engine after retract the arm and bucket cylinders, then lower the boom and set the bucket on the ground at a flat location as in the illustration.

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

(3) The oil level is normal if between the red lines.



16) FILLING HYDRAULIC OIL

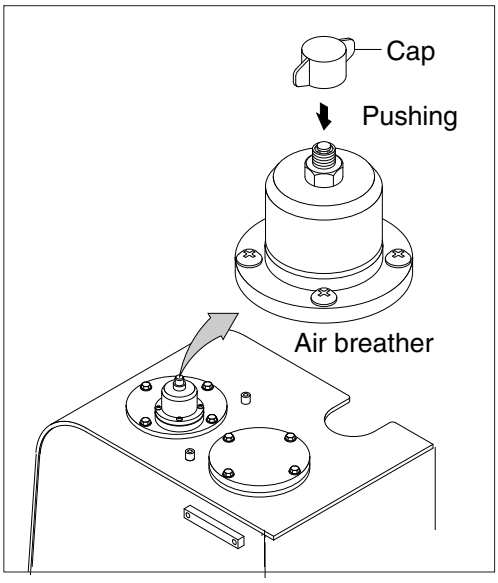
(1) Stop the engine to the position of level check.

(2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.

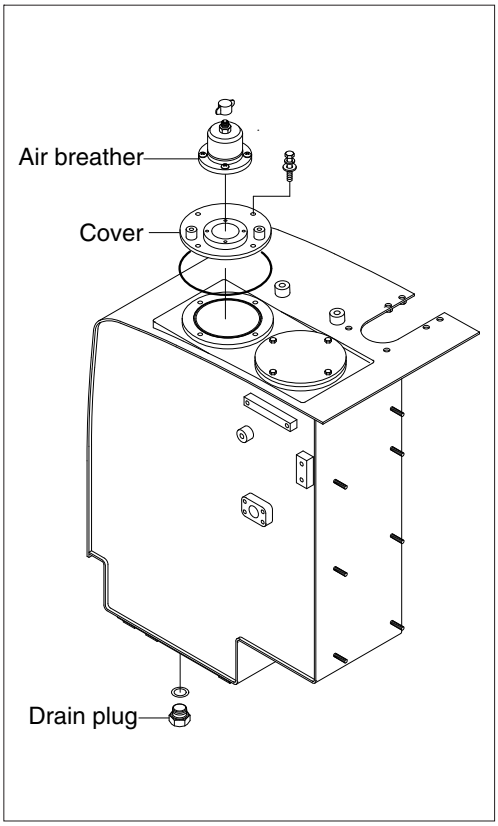
(3) Remove the breather on the top of oil tank and fill the oil to the specified level.
· Tightening torque : 1.44±0.3 kgf·m
(10.4±2.1 lbf·ft)

(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.



17) CHANGE HYDRAULIC OIL



(1) Lower the bucket on the ground pulling the arm and bucket cylinder to the maximum.

(2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.

(3) Remove the cover.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

(4) Prepare a suitable container.

(5) To drain the oil loosen the drain plug at the bottom of the oil tank.

(6) Fill proper amount of recommended oil.

(7) Put the breather in the right position.

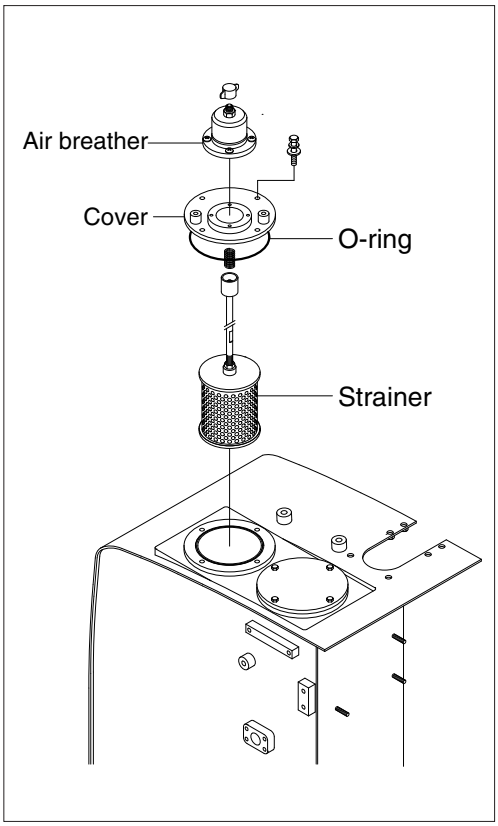
(8) Bleed air hydraulic pump loosen the air breather at top of hydraulic pump assembly.

(9) Start engine and run continually. Release the air by full stroke of each control lever.

※ Incase of injecting HBHO (Hyundai Bio Hydraulic Oil) to machines that have formerly used different hydraulic oil, the proportion of residual oil must not exceed 2 %

※ Do not mix any other Bio oil, use only HBHO as bio oil.
If changing to Bio oil, contact HYUNDAI dealer.

18) CLEAN SUCTION STRAINER



Clean suction strainer as follows paying attention to the cause to be kept during oil filling.

(1) Remove the cover on the top of the oil tank.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

(2) Pull out the strainer in the tank.

(3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.

(4) Replace the suction strainer if it is damaged.

(5) Assemble with reverse order of disassembly. Be sure to install a new O-ring and reinsert in the oil tank.

※ Loosen the bolt slowly at the cover can be spring out by the spring when removing it.

19) REPLACEMENT OF RETURN FILTER

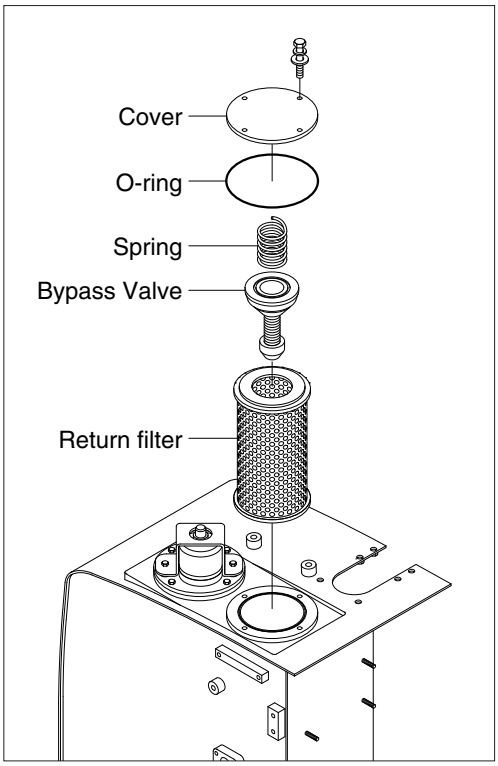
Replace as follows paying attention to the cause to be kept during the replacement.

(1) Remove the cover.

· Tightening torque : 6.9±1.4 kgf·m
(50±10 lbf·ft)

(2) Remove the spring, by-pass valve, and return filter in the tank.

(3) Replace the element with new one.

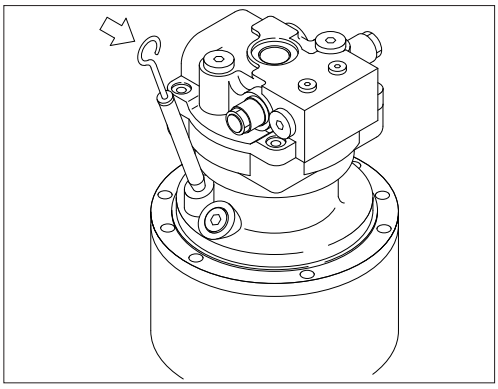


20) CHECK THE SWING REDUCTION GEAR OIL

(1) Pull out the dipstick and clean it.

(2) Insert it again.

(3) Pull out one more time to check the oil level and fill the oil if the level is not sufficient.



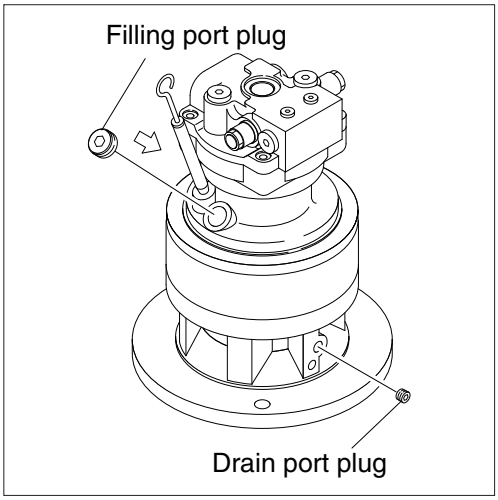
21) CHANGE SWING REDUCTION GEAR OIL

(1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.

(2) Loosen the plug of the drain port.

(3) Drain into a proper container.

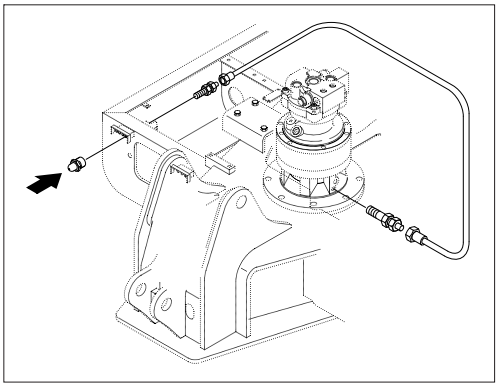
(4) Wash the drain plug and reinstall it with sealing tape.
Fill proper amount of recommended oil.
·Amount of oil : 1.5ℓ(0.4 U.S.gal)



22) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

(1) Grease at fitting.

※ **Lubricate every 50 hours.**

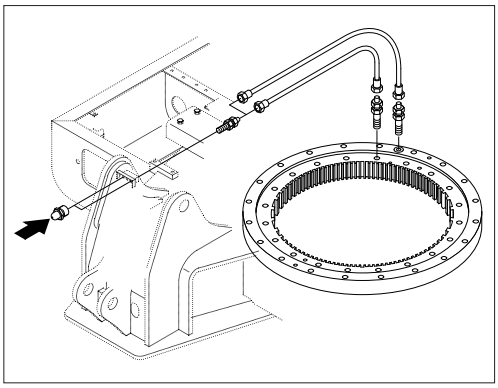


23) MANIFOLD

(1) Swing bearing

Grease at 2 fitting.

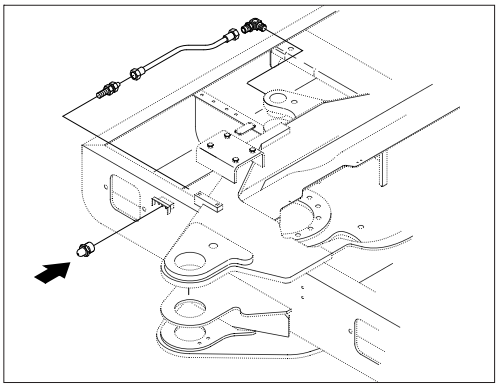
※ **Lubricate every 250 hours.**



(2) Boom swing cylinder

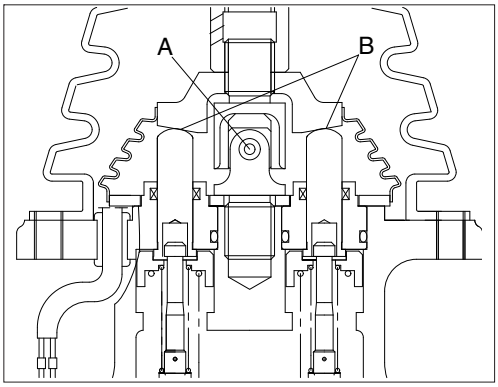
Grease at fitting.

※ **Lubricate every 50 hours.**



24) LUBRICATE RCV LEVER

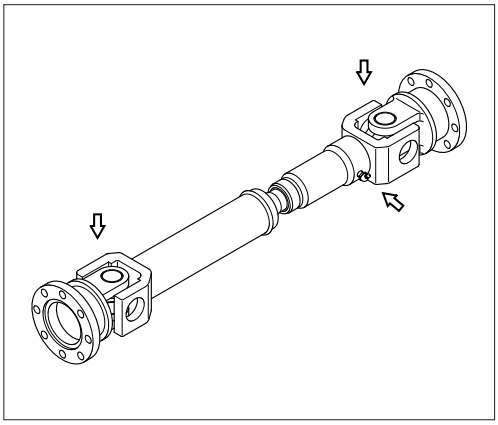
Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



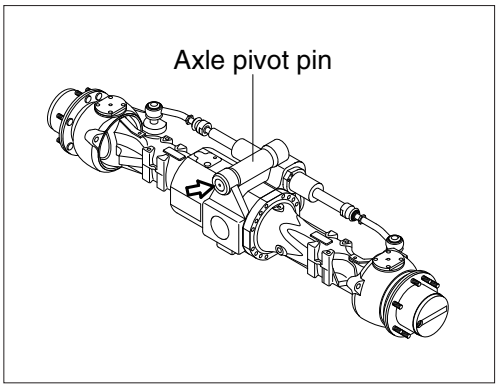
25) LUBRICATE

(1) Drive shaft

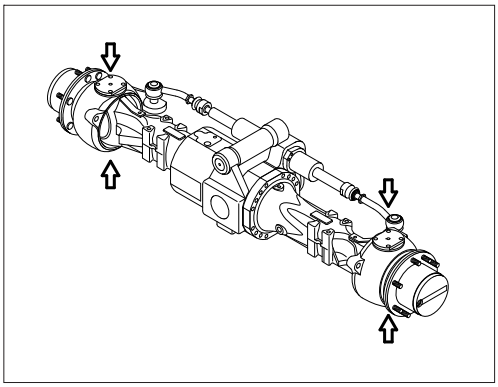
① Front drive shaft : 3 point
② Rear drive shaft : 3 point



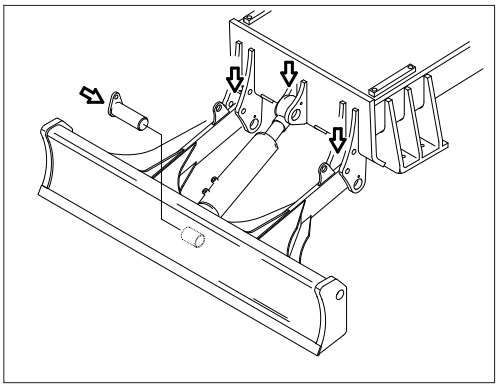
(2) Front axle : 1 point



(3) Steering link : 4 point



(4) Dozer blade : 4 point



26) TIRE

(1) Air pressure

It is important to keep air pressure properly for maximizing tire life. Both excessive and insufficient air pressure of tires should be avoided not to damage tires.

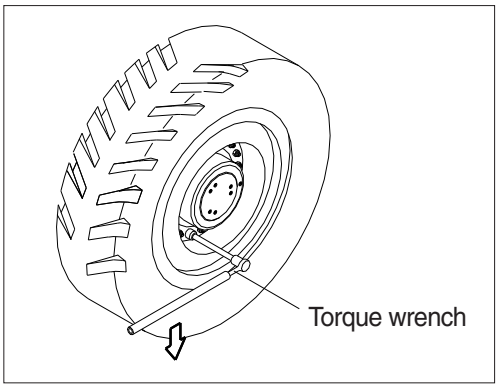
·Specification : 5.25 kgf/cm^2 (75 psi)

(2) Handling of tire

① Removal of tire

· Lift the main body until a tire separate from the ground, and place the block under front and rear axle.

· Loosen wheel nut with torque wrench and remove tire.

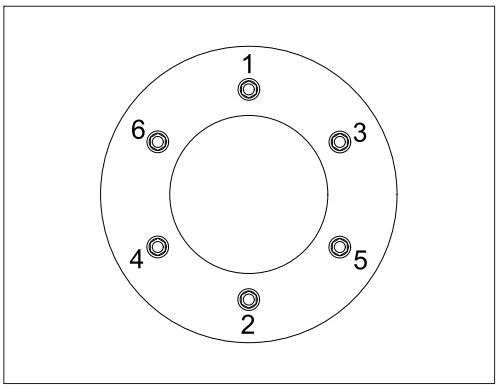


② Installation of tire

· Coat some grease on wheel stud and nut screw.

· Install the tires and tighten a nut slightly and get down a tire on the ground, and then tighten the torque in the order as figure.

·Tightening torque : 43~49 kgf·m
(311~354 lbf·ft)

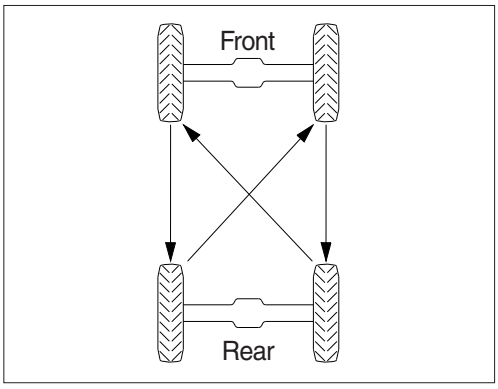


③ Position change of tire

· Tire is worn out differently part by part according to installing position, so change position regularly as figure.

Keep air pressure at standard.

Use same pattern of groove and same maker's tire.



27) CHECK PLANETARY GEAR OIL LEVEL

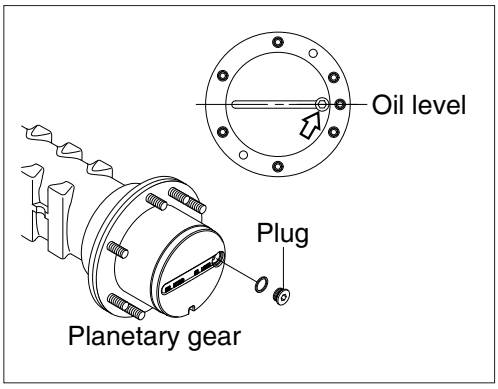
(1) Move the machine to flat ground.

(2) Remove the plug and check the oil amount.

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

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

(4) After checking, install plug.



28) CHECK AND SUPPLYING AXLE OIL

(1) Move the machine to flat ground.

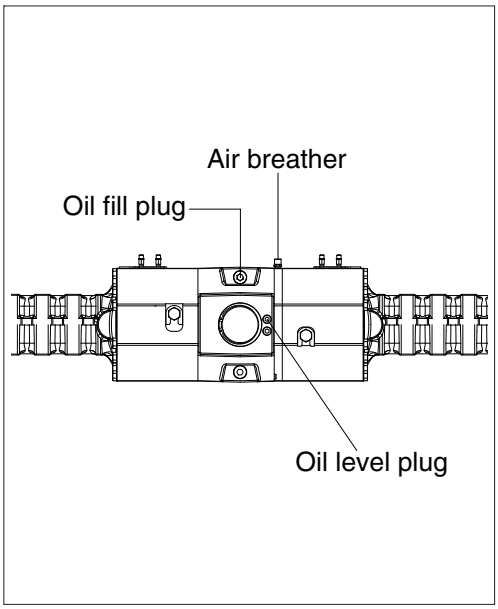
(2) Open the axle air breather to relieve internal air pressure.

(3) Remove the oil level 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 oil fill plug hole.

⚠ **When checking the oil level, press the service brake.**

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



29) CHANGE THE AXLE OIL

(1) Place a drain box under drain plug to catch oil.

(2) Remove the air breather to relieve internal pressure.

(3) Drain oil into the differential gear

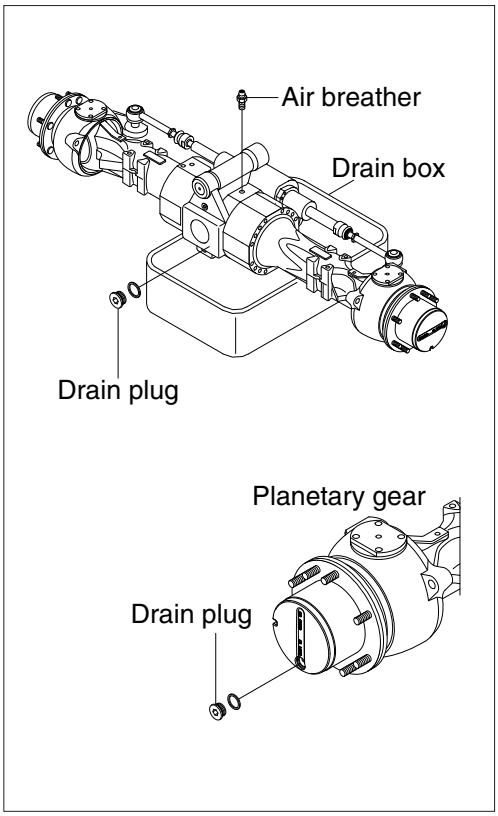
① Remove the drain plug to drain oil off.

② Wash drain plug and install it.

(4) Drain oil into the planetary gear

① Drain oil by removing drain plug.

※ **The drain plug should be facing to the ground.**



(5) Supply oil into the differential gear and the planetary gear.

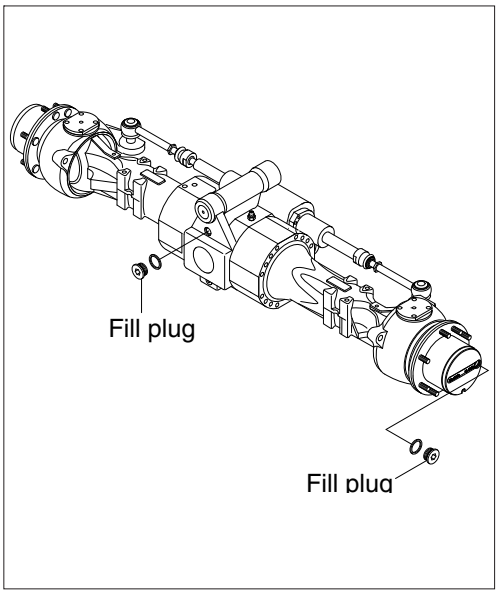
· Oil amount

Description	Capacity
Front axle differential gear	4.5 ℓ (1.19 U.S. gal)
Rear axle differential gear	4.5 ℓ (1.19 U.S. gal)
Planetary gear case (each)	0.4 ℓ (0.11 U.S. gal)

(6) Supply oil until it overflows from the oil filler, then install the plug.

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

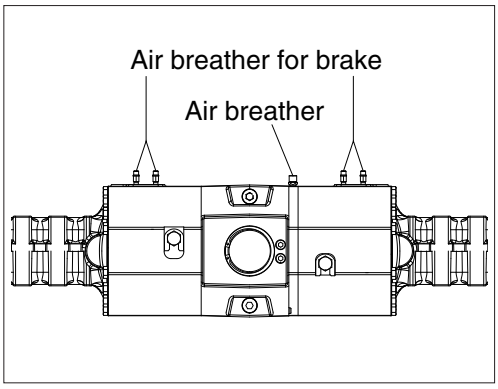
※ **If a work requires frequent use of brake, replace it earlier than normal change interval.**



30) CLEANING AXLE BREATHER

(1) Remove dust or debris around the breather.

(2) Remove the breather and wash it with cleaning oil.



31) CHECK AND SUPPLYING T/M GEAR OIL

(1) Move the machine to flat ground.

(2) Open the transmission air breather to relieve internal air pressure.

(3) Remove the level & fill 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.

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

32) CHANGE THE T/M GEAR OIL

(1) Place a drain transmission under drain plug to catch oil.

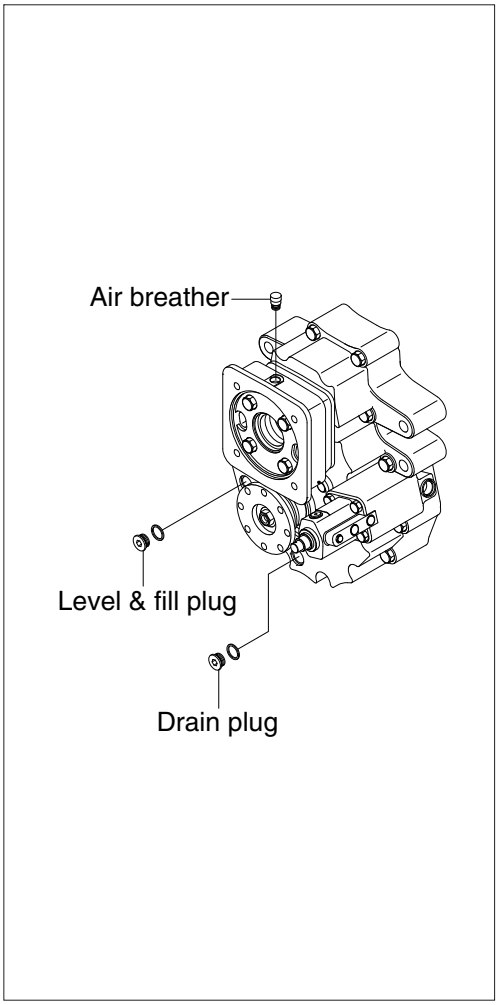
(2) Open transmission air breather to relieve internal air pressure.

(3) Remove the drain plug to drain oil.

(4) Wash drain plug and install it.

(5) Supply oil into the transmission case.

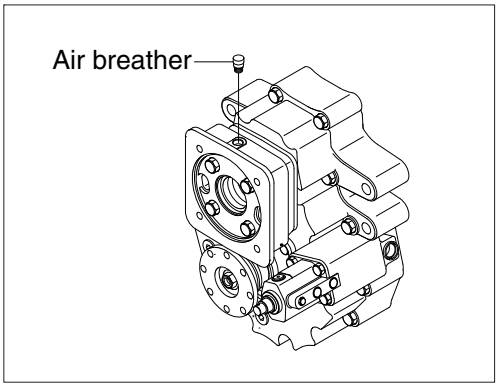
- Oil amount : 1.8 ℓ (0.49 U.S. gal)



33) CLEANING T/M AIR BREATHER

(1) Remove dust or debris around the air breather.

(2) Remove the air breather and wash it with cleaning oil.



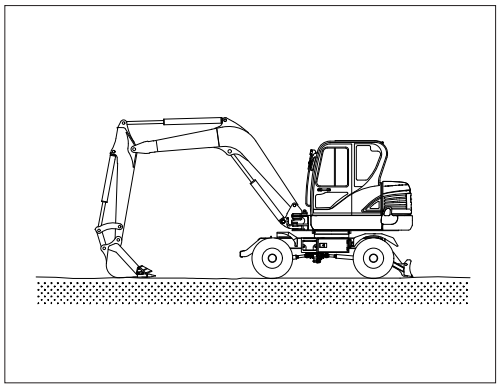
34) REPLACEMENT OF BUCKET

⚠ When knocking the pin in with a hammer, metal particles may fly and cause serious injury, particularly if they get into your eyes. When carrying out this operation, always wear goggles, helmet, gloves, and other protective equipment.

※ When the bucket is removed, place it in a stable condition.

※ When performing joint work, make sure signals to each other and work carefully for safety's sake.

(1) Lower the bucket on the ground as the picture shown in the right.

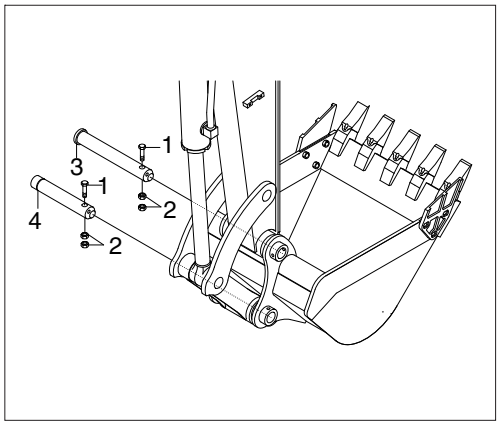


(2) Lock the safety lever to the LOCK position and stop the engine.

(3) Remove the stopper bolts (1) and nuts (2), then remove pins (3, 4) and remove the bucket.

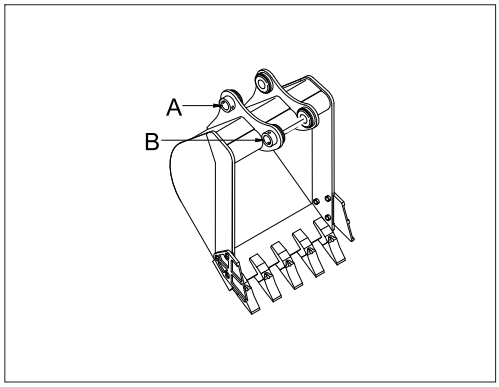
※ When removing the pins, place the bucket so that it is in light contact with the ground.

※ If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.



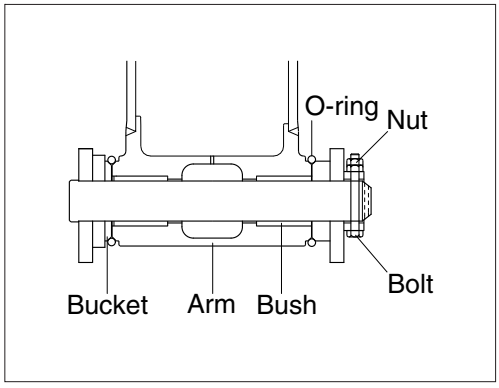
※ After remove the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.

(4) Align the arm with holes (A) and the link with holes (B), then coat with grease and install pins (3, 4)

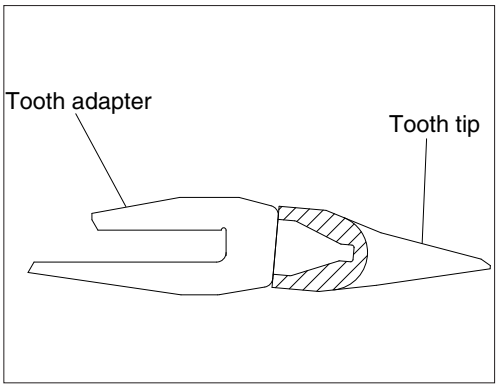


※ When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the bucket as shown in the picture. After knocking the pin, move the O-ring down to the regular groove.

(5) Install the stopper bolt (1) and nuts (2) for each pin, then grease the pin.



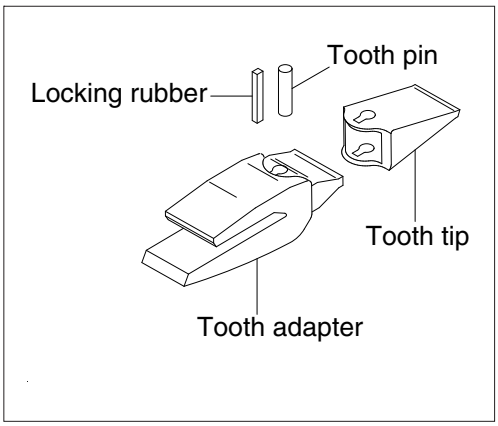
35) REPLACEMENT OF BUCKET TOOTH



(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth tip before adapter starts to wear.

② If excessive use, tooth adapter has worn out, replacement may become impossible.



(2) Instructions for replacement

① Pull out pin by striking pin with punch or hammer, avoiding damage to locking rubber.

② Remove dust and mud from surface of tooth adapter by using knife.

③ Place locking rubber in its proper place, and fit tooth tip to adapter.

④ Insert pin until locking rubber is positioned at tooth pin groove.

⚠ Personal injury can result from bucket falling.

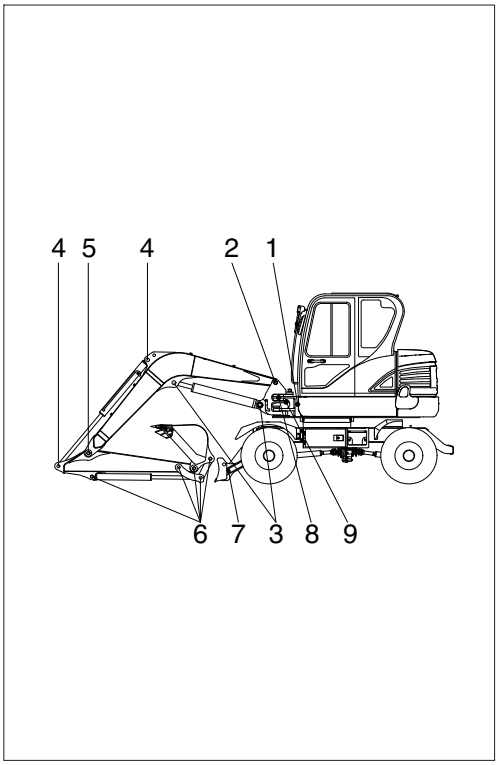
⚠ Block the bucket before changing tooth tips or side cutters.

36) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device

Lubricate the grease to the grease nipple according to the lubricating interval.

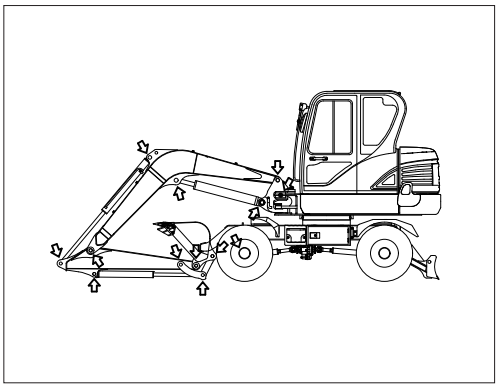
No.	Description	Qty
1	Lubrication manifold at upper frame	4
2	Boom connection pin	2
3	Boom cylinder pin	2
4	Arm cylinder pin	2
5	Boom and arm connection pin	1
6	Bucket cylinder pin(Head and rod)	2
	Bucket link(Control rod)	1
	Arm and bucket connection pin	1
	Arm and control link connection pin	1
7	Dozer connection pin	2
	Dozer cylinder pin	2
8	Boom swing post pin	2
9	Boom swing cylinder pin	1



※ **Shorten lubricating interval when working in the water or dusty place.**

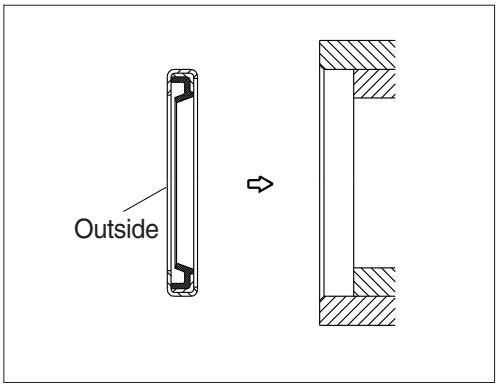
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ **Mount the lip to be faced outside 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.**

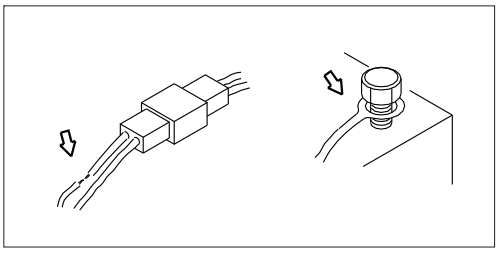
※ **Assemble the seal same direction with picture and use with plastic hammer when replace.**



7. ELECTRICAL SYSTEM

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

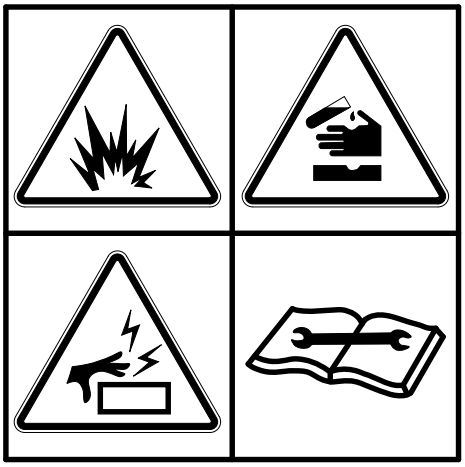
(1) Clean

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.



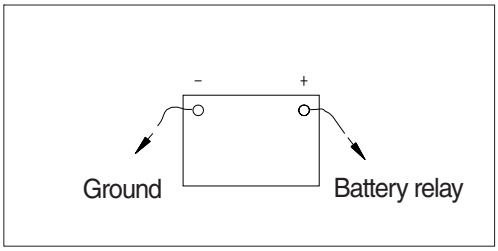
(2) Recycle

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) Method of removing the battery cable

Remove the cable from the ground connection first (⊖terminal side) and reconnect it last when reassembling.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

※ **Use the same capacity of battery for starting.**

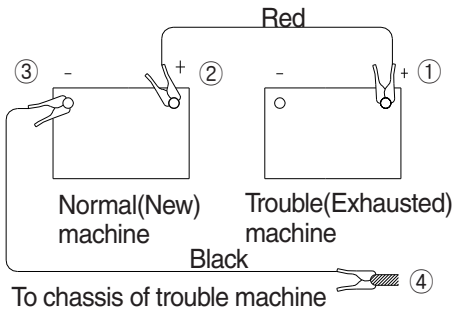
① Make sure that the starting switches of the normal machine and trouble machine are both at the OFF position.

② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.

③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.

※ **Keep firmly all connection, the spark will be caused when connecting finally.**

Connection of booster cable



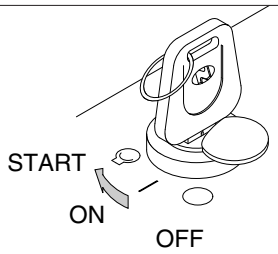
Connection order : ①→②→③→④

(2) Starting the engine

① Starting the engine of the normal machine and keep it to run at high idle.

② Start engine of the trouble machine with starting switch.

③ If you can not start it by one time, restart the engine after 2 minutes.



(3) Taking off the booster cable

① Take off the booster cable(black).

② Take off the booster cable(red) connected to the (+) terminal.

③ Run engine with high idle until charging the exhausted battery by alternator, fully.

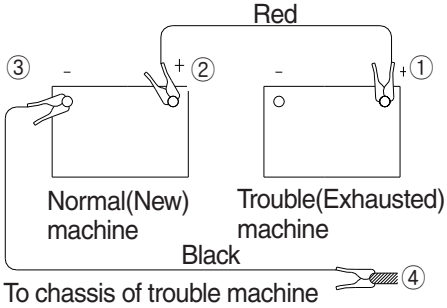
⚠ **Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.**

※ **Charge the battery in the well ventilated place.**

※ **Place the machine on the earth or concrete. Avoid charging the machine on the steel plate.**

※ **Do not connect (+) terminal and (-) terminal when connecting booster cable because it will be shorted.**

Disconnection of booster cable



Disconnection order : ④→③→②→①

(4) Welding repair

Before start to welding, follow the below procedure.

① Shut off the engine and remove the starting switch.

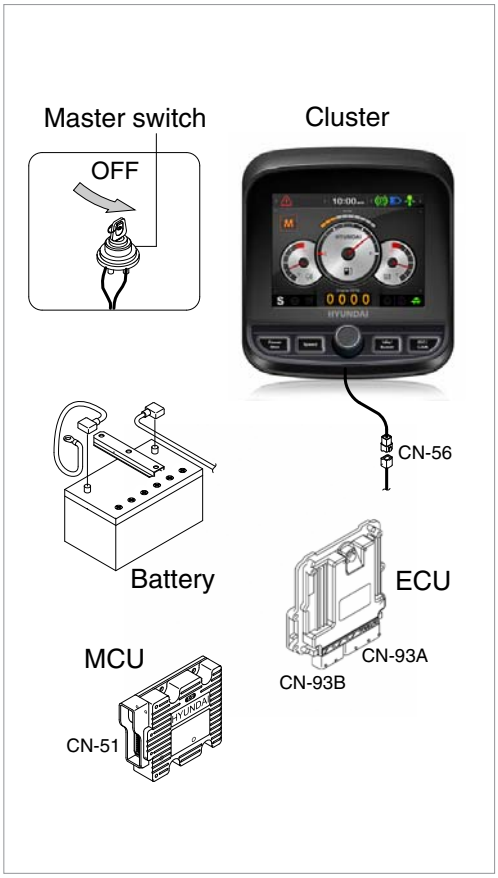
② Disconnect ground cable from battery by master switch.

③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (MCU, ECU, cluster etc).

④ Connect the earth (ground) lead of the welding equipment as close to the welding point as possible.

※ **Do not 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.



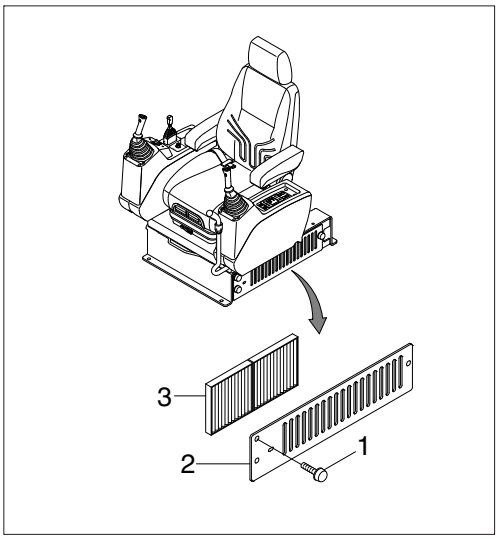
8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF THE CIRCULATION FILTER

※ **Always stop the engine before servicing.**

(1) Remove the screw (1) and cover (2) on the seat base.

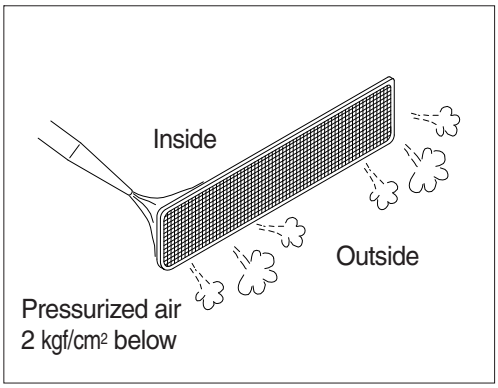
(2) Remove the circulation filter (3).



(4) Clean the filter using a pressurized air (Below 2 kgf/cm², 28psi).

△ **When using pressurized air, be sure to wear safety glasses.**

(5) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.

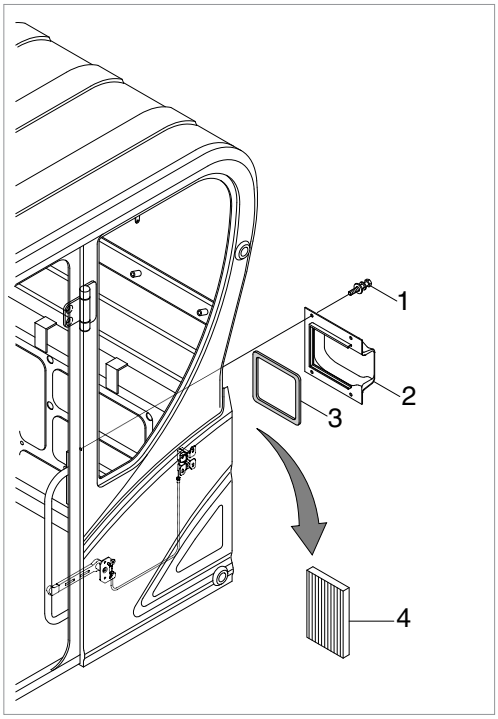


2) CLEAN AND REPLACE OF THE RECIRCULATION FILTER

※ **Always stop the engine before servicing.**

(1) Remove the screw (1), cover (2) and pad (3).

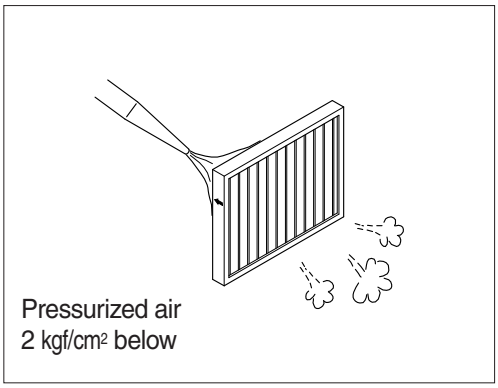
(2) Remove the recirculation filter (4).



(3) Clean the recirculation filter using a pressurizes are (Below 2 kgf/cm², 28psi) or washing with water.

△ **When using pressurized air, be sure to wear safety glasses.**

(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



3) 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.

4) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

5) 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.

6) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP
R60WVSPRO	HFC-134a	700g ± 25g	1359 CO_2 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) Environmental precautions

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.

1. ENGINE

※ **This guide is not intended to cover every conditions, however many of the more common possibilities are listed.**

Trouble	Service	Remark
The engine oil pressure lamp lights ON when engine speed is raised after completion of warm up.	· Add the oil to the specified level. · Replace the oil filter cartridge. · Check oil leakage from the pipe or the joint. · Replace the monitor.	
Steam is emitted from the top part of the radiator (the pressure valve). Coolant level warning lamp lights ON.	· Supply the coolant and check leakage. · Adjust fan belt tension. · Wash out inside of cooling system. · Clean or repair the radiator fin. · Check the thermostat. · Tighten the radiator cap firmly or replace the packing of it. · Replace the monitor.	
The engine does not start when the starting motor is turned over.	· Add fuel. · Repair where air is leaking into fuel system. · Check the injection pump or the nozzle. · Check the valve clearance. · Check engine compression pressure.	
Exhaust gas is white or blue.	· Adjust to specified oil quantity. · Replace with specified fuel.	
Exhaust gas occasionally turns black.	· Clean or replace the air cleaner element. · Check the nozzle. · Check engine compression pressure. · Clean or replace the turbocharger.	
Combustion noise occasionally changes to breathing sound.	· Check the nozzle.	
Unusual combustion noise or mechanical noise.	· Check with specified fuel. · Check over-heating. · Replace the muffler. · Adjust valve clearance.	

2. ELECTRICAL SYSTEM

Trouble	Service	Remark
Lamp does not glow brightly even when engine runs at high speed. Lamp flickers while engine runs.	· Check for loose terminals and open-circuit wiring. · Adjust belt tension.	
Battery charging lamp does not go out even when engine runs at high speed.	· Check the alternator. · Check and repair wiring.	
Unusual noise is emitted from the alternator.	· Check the alternator.	
Starting motor does not turn when starting switch is turned ON.	· Check and repair the wiring. · Charge the battery. · Check the starting motor. · Check the safety relay.	
The pinion of the starting motor keeps going in and out.	· Charge the battery. · Check the safety relay.	
Starting motor turns the engine sluggishly.	· Charge the battery. · Check the starting motor.	
The starting motor disengages before the engine starts up.	· Check and repair the wiring. · Charge the battery.	
The engine warming up lamp does not go ON.	· Check and repair wiring. · Check the monitor.	
The engine oil pressure lamp does not light up when engine is stationary (when the starting switch is in ON position.)	· Check the monitor. · Check the caution lamp switch.	
Battery charging lamp does not light up when the engine is stationary. (when the starting switch is in ON position.)	· Check the monitor. · Check and repair the wiring.	

3. OTHERS

Trouble	Service	Remark
Track slip out of place. Excessive wear of the sprocket.	· Adjust tension of track.	
Bucket either rises slowly or not at all.	· Add oil to specified level.	
Slow speed of travel, swing, boom, arm and bucket.	· Add oil to specified level.	
Unusual noise emitted from pump.	· Clean the hydraulic tank strainer.	
Excessive oil temperature rise of hydraulic oil.	· Clean the oil cooler. · Adjust fan belt tension. · Add oil to specified level.	

1. SELECTING HYDRAULIC BREAKER

1) Become familiar with the manual and select breakers suitable to machine specifications.
2) Make careful selection in consideration of oil quantity, pressure and striking force, to enable satisfied performance.
3) When apply a breaker to the machine, consult your local dealer of Hyundai for further explanation.

2. CIRCUIT CONFIGURATION

1) As for breaker oil pressure line, use extra spool of main control valve.
2) Set proper breaker pressure on load relief valve.
3) The pressure of the ROBEX55W-9A system is 220 kgf/cm^2 (3130 psi).
4) The accumulator should be used to the breaker charging and return line.
   If the accumulator is not used, it will be damage as the input wave is delivered.

※ **Keep the pressure pulsation of pump below 60 kgf/cm^2 (853 psi) by installing the accumulator.**

5) Do not connect the breaker return line to the main control, but connect to the return line front of the cooler.
6) Do not connect the breaker return line to drain lines, such as of swing motor, travel motor or pump, otherwise they should be damaged.
7) One of spool of the main control valve should be connected to the tank.
8) Select the size of pipe laying considering the back pressure.
9) Shimless tube should be used for the piping. The hose and seal should be used Hyundai genuine parts.
10) Weld the bracket for pipe clamp to prevent damage caused by vibration.

3. MAINTENANCE

1) MAINTENANCE OF HYDRAULIC OIL AND FILTER

(1) As machine with an hydraulic breaker provides the hydraulic oil becomes severely contaminated.

(2) So, unless frequently maintained, the machine may easily go out of order.

(3) Inspect and maintain hydraulic oil and 3 kinds of filter elements in particular, in order to prolong machine life.

(4) Replace when the breaker work is used for short time according to the standard of right graph.

2) RELEASE THE PRESSURE IN BREAKER CIRCUIT

When breaker operating is finished, stop engine and push pedal or switch for breaker to release pressure in breaker circuit.

If pressure still remains, the lifetime of the diaphragm in the accumulator will be shortened.

3) Be careful to prevent contamination by dust, sand and etc.

If such pollution become mixed into the oil, the pump moving parts will wear abnormally, shorten lifetime and become damaged.

4) When operating breaker, bolts and nuts of main equipment may be loosened by vibration. So, it must be inspected periodically.

Service interval unit : hours

Attachment	Operating rate	Hydraulic oil	Filter element
Breaker	100 %	600	200

★1 : Conventional hydraulic oil

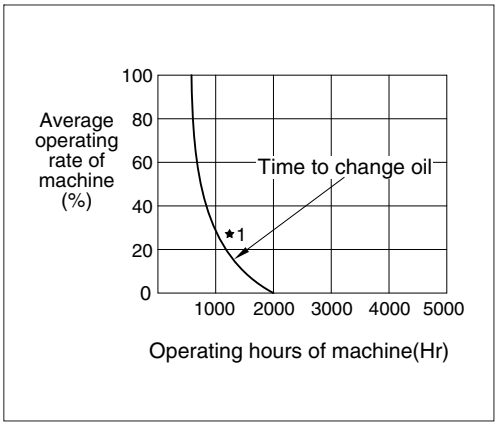
● Replace following filter same time

·Hydraulic return filter : 1 EA

·Pilot line filter : 1 EA

·Element in hydraulic tank breather : 1 EA

Hyd oil change guide for hydraulic breaker



★1 : Conventional hydraulic oil

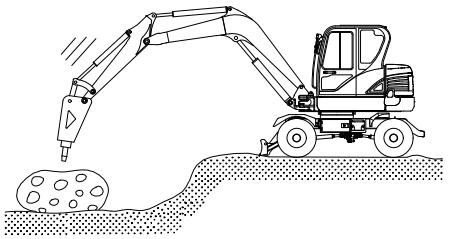
4. PRECAUTIONS WHILE OPERATING THE BREAKER

1) DO NOT BREAK ROCK WHILE LOWERING

As the breaker is heavy in comparison with bucket, it must be operated slowly.

If breaker is rapidly pushed down, working device may be damaged.

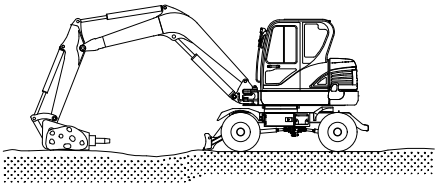
Incorrect



2) DO NOT USE BREAKER TO CARRY BROKEN STONE OR ROCK BY SWING OPERATING

This may damage the operation device and swing system.

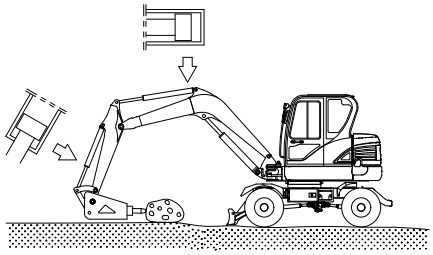
Incorrect



3) OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

If breaker is operated with the end tip, the cylinder may be damaged.

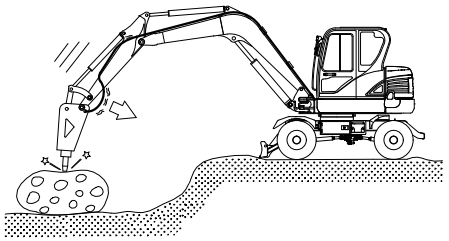
Incorrect



4) IF THE HYDRAULIC HOSES VIBRATE EXCESSIVELY

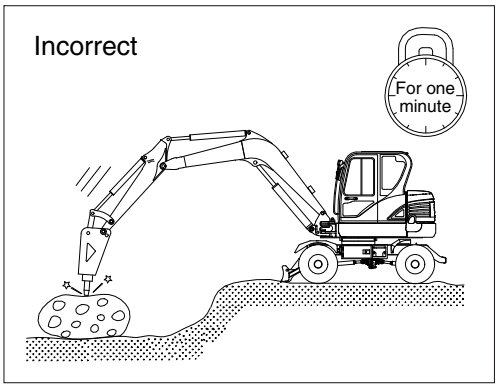
If the machine used in this condition continuously this will effect badly on the machine such as loosening bolt, oil leakage, damage of pump pipe and etc.

Incorrect



5) DO NOT CONTINUE TO WORKING OVER ONE MINUTE AT SAME POSITION OF BOOM AND ARM

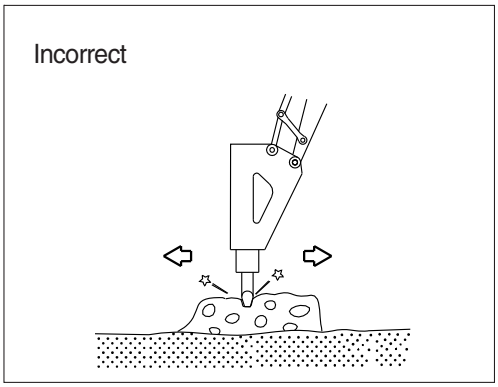
This will increase the temperature of the oil, and cause problem in the accumulator and seals.



6) DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING

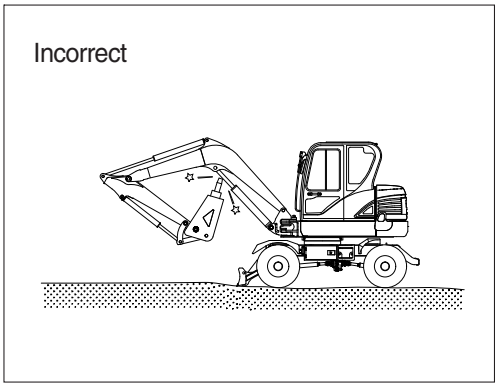
Do not move hammer while striking.

This will cause damage to the working device and the swing system.

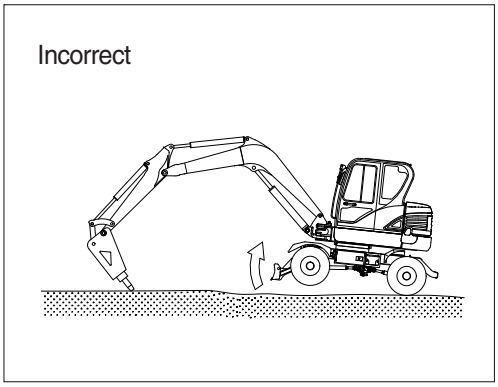


7) TAKE CARE OF CHISEL AND BOOM INTERFACE

Make sure of the arm and bucket control lever operation.



8) Do not extend the bucket cylinder fully and thrusting to raise the machine off the ground.

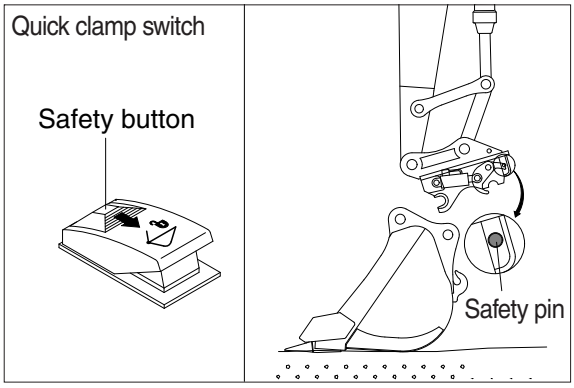


5. QUICK CLAMP

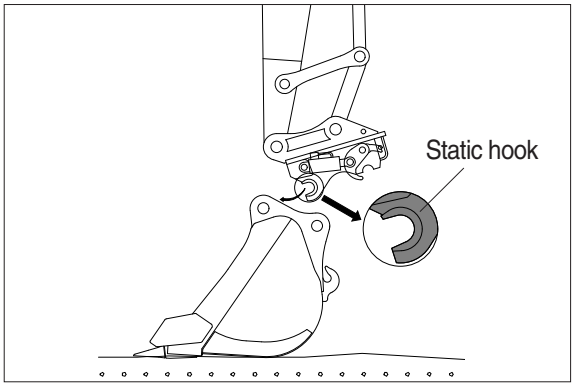
1) FIXING BUCKET WITH QUICK CLAMP

(1) Before fixing bucket, remove safety pin of the moving hook.

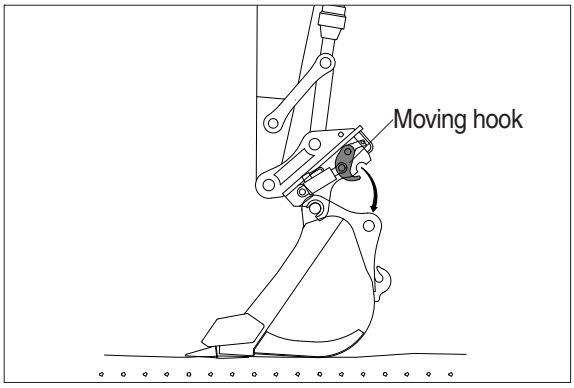
(2) Pulling safety button, press the quick clamp switch to unlock position. Then, the moving hook is placed on release position.



(3) Aligning the arm and bucket, insert static hook of quick clamp to the bucket pin.

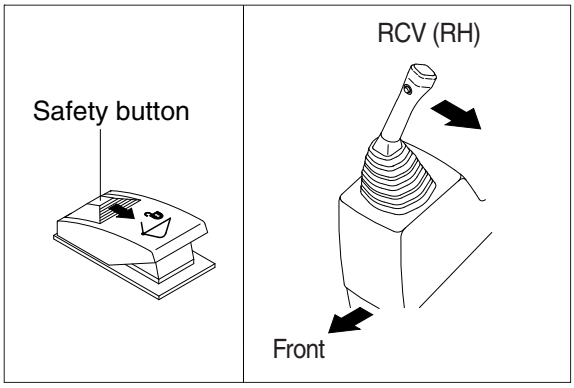


(4) Operate RCV lever to bucket-in position. Then, the moving hook is coupled with the bucket link pin.
Make sure that the moving hook is completely contacted with bucket link pin.

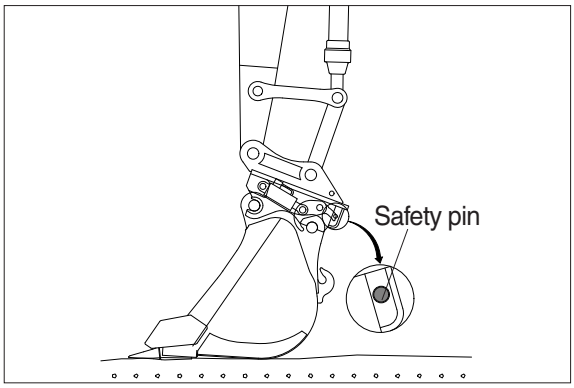


(5) Press quick clamp switch to lock position.
Operate RCV lever to bucket-in position.

※ **Be sure to check connection status between bucket pins and hooks of quick clamp**



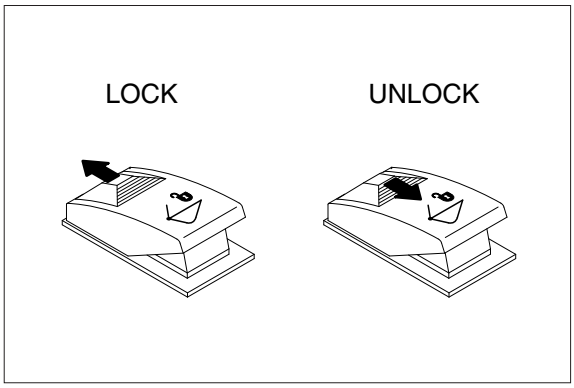
(6) After checking the connection status between bucket pins and hooks of quick clamp, **insert safety pin of moving hook to lock position.**



2) REMOVE BUCKET FROM QUICK CLAMP

Removing procedure is reverse of fixing.

3) PRE-CAUTION OF USING QUICK CLAMP



⚠ **When operating the machine with quick clamp, confirm that the quick clamp switch is lock position and safety pin of moving hook is inserted.**
Operating the machine with quick clamp switch unlocked and without safety pin of moving hook can cause the bucket to drop off and bring about the accident.

⚠ **Serious injury or death can result from this accident.**

⚠ **Be careful to operate the machine equipped with quick clamp. The bucket may hit cab, boom and boom cylinders when it reaches vicinity of them.**

※ **HYUNDAI will not be responsible for any injury or damage in case that safety pin is not installed properly.**