WARNING

CALIFORNIA PROPOSITION 65

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go the www.P65warnings.ca.gov/diesel.

91K4-07310-EN

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FOREWORD

This manual contains a number of instructions and safety recommendations regarding driving, handling, lubrication, maintenance, inspection and adjustment of the excavator.
This manual provides important instructions regarding the excavator, including important safety warnings and instructions for proper operation and maintenance of the excavator.

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

If you sell the machine, you must provide this manual with the excavator.

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 HD Hyundai Construction Equipment distributor for those items you require.

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

   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.

   Some illustrations in this manual show details or attachments that can be different from your machine. Covers and guards might have been removed for illustrative purposes. Never operate the machine without the proper covers and guards in place.

2. Inspect the jobsite and follow the safety recommendations in chapter 1, Safety hints before operating the machine.

3. Use genuine HD Hyundai Construction Equipment spare parts for the replacement of parts.
   HD Hyundai Construction Equipment will not accept any responsibility for defects resulting from non-genuine parts or non workmanlike repair.
   In such cases HD Hyundai Construction Equipment 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 HD Hyundai Construction Equipment or your HD Hyundai Construction Equipment 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)

HD Hyundai Construction Equipment 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-HD Hyundai Construction Equipment parts, or from alterations not authorized by HD Hyundai Construction Equipment.

※ 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.

HD Hyundai Construction Equipment 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 (Directive 2000/14/EC) is as following.
  - LwA(Guaranteed) : 99 dB

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

CE

EC Declaration of Conformity

(Original instruction)

This declaration of conformity is issued under the sole responsibility of manufacturer:

HD HYUNDAI CONSTRUCTION EQUIPMENT CO., LTD.
477 Bundangsuseo-ro, Bundang-gu,
Seongnam-si, Gyeonggi-do 13553, Korea

HD Hyundai Construction Equipment Europe N.V located at Hyundailaan 4, 3980 Tessenderlo, Belgium, as authorized repre sentative in the European Community is authorized to compile the technical construction file and declares that the product:

Type:	*********
Model:	******
Serial number (PIN):	**********

is in conformity with the relevant provisions of the Community harmonization legislation:

2006/42/EC - Machinery directive
2014/30/EU - Electromagnetic compatibility directive
2000/14/EC - Noise emission outdoor equipment directive
2002/44/EU - Exposure of workers to vibration risks directive
their amendments, and other applicable directives.

EMC (2014/30/EU)

Certificate number:	**********
Date:	DD/MM/YYYY
Notified body:	**********

Noise levels (2000/14/EC)

Certificate number:	**********
Date:	DD/MM/YYYY
Conformity assessment proc.:	Annex VIII Full Quality Assurance
Notified body:	**********
	**********
Measured sound power level:	nnn.n dB(A)
Guaranteed sound power level:	nnn.n dB(A)

Engine information

Manufacturer :	*********
Engine model name:	********
Type-approval number:	**********
Stage (Regulation) :	STAGE ** (**/**/**)
Gross Power (SAE J1995):	***kW / ****rpm
Net Power (SAE J1349):	***kW / ****rpm

Harmonized standards, other technical standards and specifications applied:

EN 474-1:2006+A*:**** (EMM - Safety - Part 1); EN 474-3:2006+A*:**** (EMM - Safety - Part 3); EN ISO 3471:2008 (EMM - ROPS: Lateral/Vertical/Longitudinal loads); EN ISO 3449:2008 (EMM - FOPS: Level II cabin); ISO 2631-1:1997 & ISO 2631-1:1997/Amd1 :2010 (Whole-body vibration); EN ISO 5349-1:2001 &EN ISO 5349-2:2001 & EN ISO 5349-2:2001/A1:2015 (Hand-arm vibration)

****
Managing Director

Place, date of issue:	Tessenderlo Belgium, DD MM YYYY

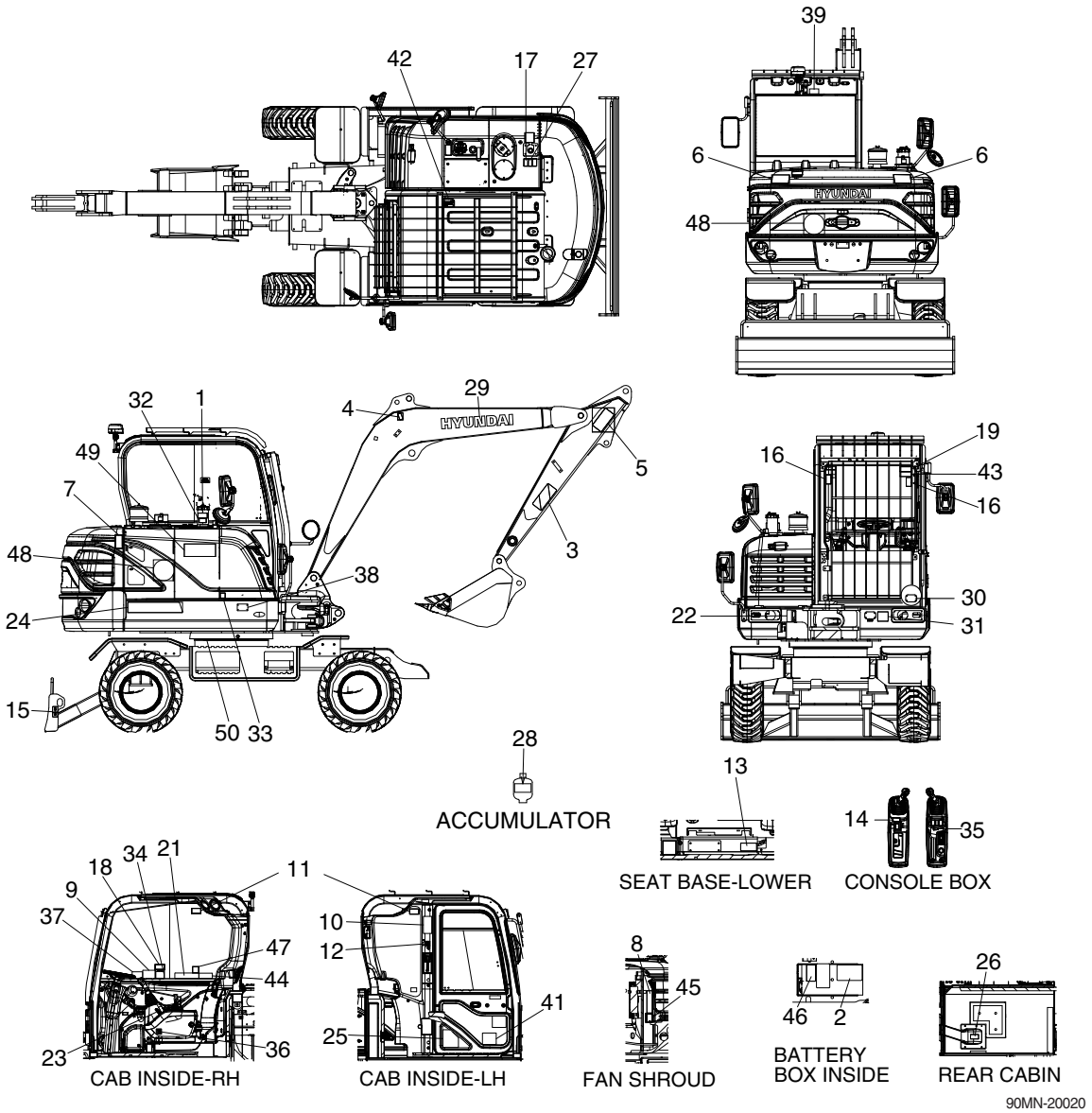
TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine Serial No.	
Engine Serial No.	
Manufacturing year	
Manufacturer Address	HD Hyundai Construction Equipment Co., Ltd 477 Bundangsuseo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13553, Korea
Distributor for U.S.A Address	HD Hyundai Construction Equipment U.S.A, Inc 6100 Atlantic Boulevard Norcross GA 30071 U.S.A
Distributor for Europe Address	HD 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	18	Boom swing lock (opt)	35	Control ideogram-dozer
2	Battery accident	19	Warning window (front)	36	Fire extinguisher
3	Reflecting	20	Tie	37	Key off caution
4	Lifting point ideogram	21	General warning-frame	38	Pin plate
5	Keep clear-boom/arm	22	Indicate-grease	39	Beacon lamp
6	Keep clear-rear	23	Safety knob	40	Band
7	Keep clear-side	24	Model name	41	Lifting chart
8	Engine room caution	25	Service instruction	42	ROPS FOG plate
9	Control ideograms-swivel	26	Turbocharger cover	43	Caution sliding
10	General cautions-cab	27	Fuel shut off	44	Caution (water separator, Turbocharger)
11	Safety front window	28	Accumulator		
12	Hammer	29	Trade mark	45	Refrigerant
13	Aircon filter	30	ROPS plate	46	Leftover fuel
14	Console tilting	31	Noise level LWA	47	Emergency exit
15	Lifting & Tie	32	Ultra low sulfur fuel	48	Speed limit - 20 km/h
16	Stay fix-cab	33	Battery position	49	Bio oil
17	Hydraulic oil lubrication	34	Joystick steering	50	Step trade

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

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

※ Use ultra low sulfur fuel only.

※ Ultra low sulfur fuel
sulfur content ≤ 10 ppm

91MT-01130

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.

91N6-02122

3) **REFLECTING** (item 3)
This label is positioned on the LH and RH side of the arm.

⚠ **To prevent serious personal injury or death keep clear of attachment working area.**

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

91M9-06030

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.**

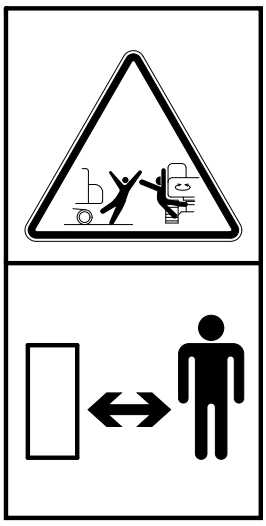
⚠ **To prevent serious injury or death, keep clear the underneath of attachment.**

R5570FW31

5) **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.**



R5570FW13

6) 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.

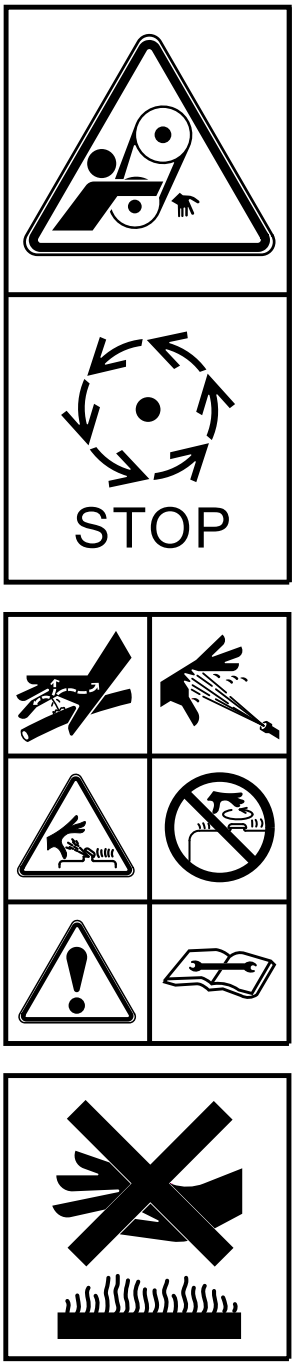
⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ 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.



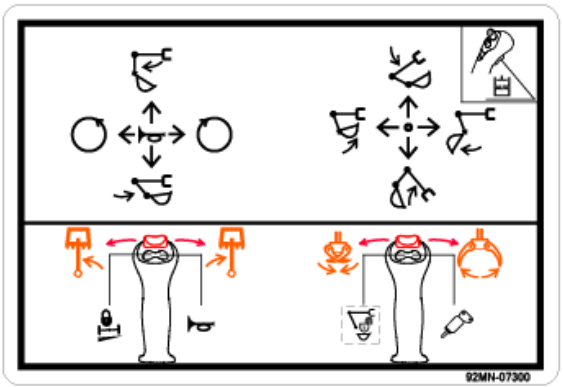
R5570FW14

7) 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.



92MN-07300

8) **GENERAL CAUTION-CAB** (item 10)

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

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

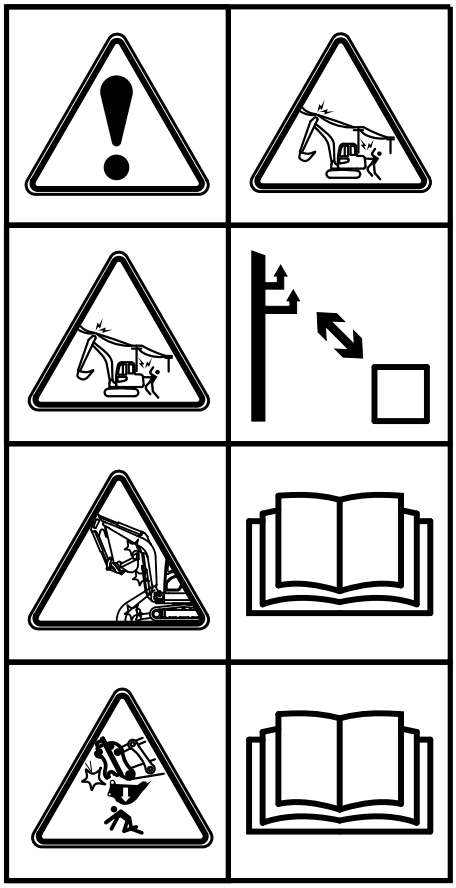
An electric shock being received by merely coming into the vicinity of an electric lines, the minimum distance should be kept considering the supply voltage as page 1-5.

⚠ **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.**

⚠ **Be careful to operate machine equipped with quick clamp or extensions.**

⚠ **Bucket may hit cab or boom, boom cylinders when it reached vicinity of them.**

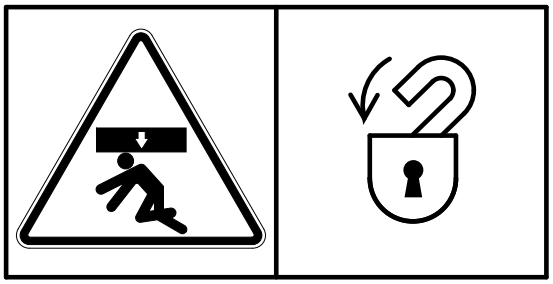


R25Z9A0FW11

9) **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.**



21070FW24

10) **HAMMER** (item 12)

This label is located inside the cab, on the center stay.

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

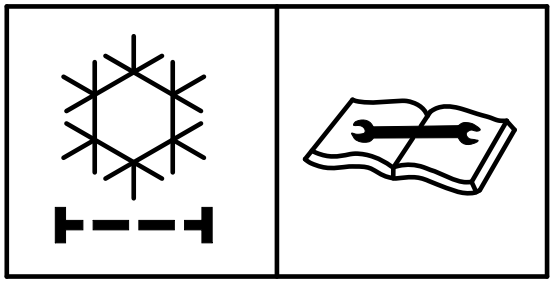
※ **In emergency, break out the window using the hammer and escape from the cabin.**

91Q6-07280

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.**

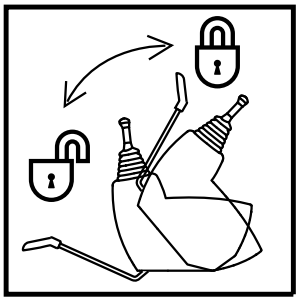


21070FW26

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.**



R5570FW17

13) **LIFT AND TIE** (item 15)

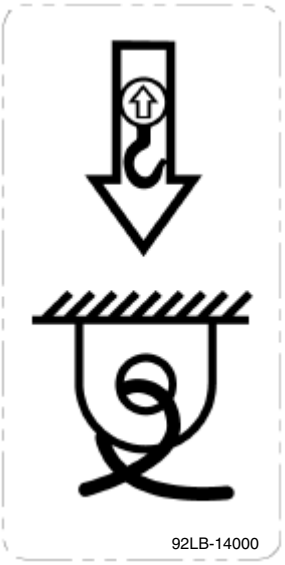
This label is positioned on the top side of the upper frame.

- **Lifting point**

  In order to lift the machine, attach the lifting devices to the lifting points.

- **Tying point**

  In order to tie down the machine, attach the tie-downs to the tying points.



92LB-14000

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.**

91M9-07112

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 temperature.**

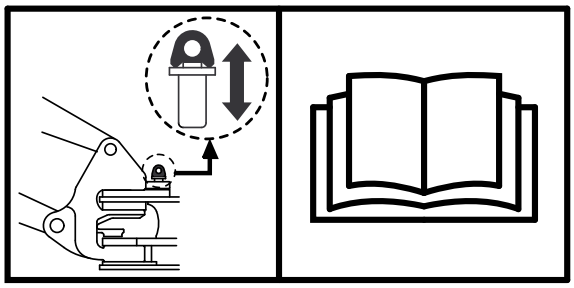
⚠ **Loosen the cap slowly and release internal pressure completely.**

21070FW08

16) **BOOM SWING LOCK** (item 18)

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

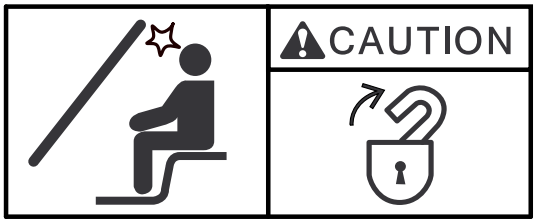
⚠ **Before operating the machine, be sure to release the swing lock device in the tool box.**



5591FW10

17) **WARNING FRONT WINDOW** (item 19)

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

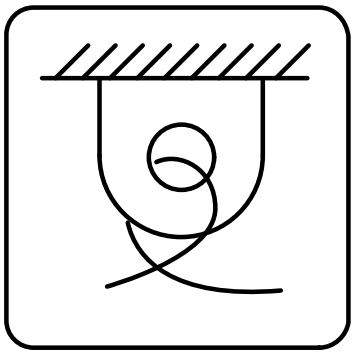


5591FW05

18) **TIE** (item 20)

This label is positioned on the right and left side of the front and rear dozer blade and top both side of the rear dozer blade.

⚠ **In order to tie down the machine, attach the tie-downs to the tying points.**



4507A0FW02

19) **GENERAL WARNING-FRAME** (item 21)

This warning label is positioned 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.**

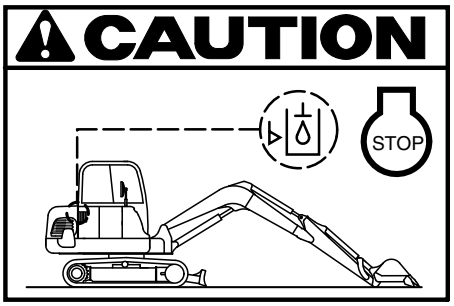
⚠ **Make sure wire rope is proper size and keep correct hoisting method.**

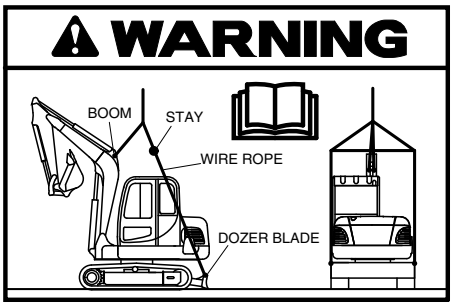
※ **See page 5-8 for details.**

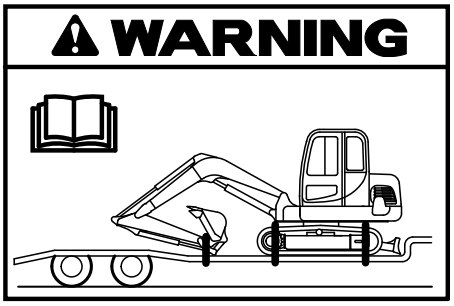
⚠ **Place the bucket on the ground whenever servicing the hydraulic system.**

※ **Check oil level on the level gauge.**

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







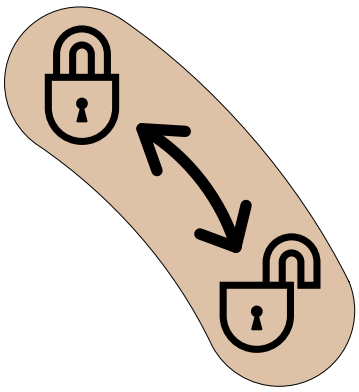
5591FW08

20) **SAFETY KNOB** (item 23)

This label is positioned on the cover of the safety knob, on the left side operators console.

⚠ **Before you get off the machine be sure to place the safety knob in the LOCKED position.**

※ **See page 3-42 for detail.**

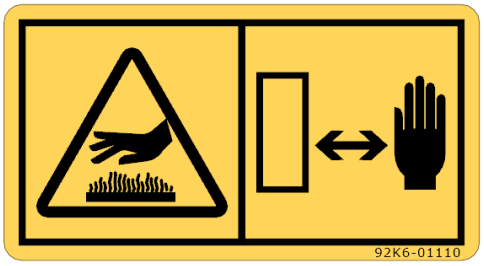


30007A1FW07A

21) **TURBOCHARGER COVER** (item 26)

This label is positioned on the exhaust hood.

⚠ **Do not touch turbocharger or it may cause severe burn, while the engine is running or immediately after the engine is shut down.**



92K6-01110

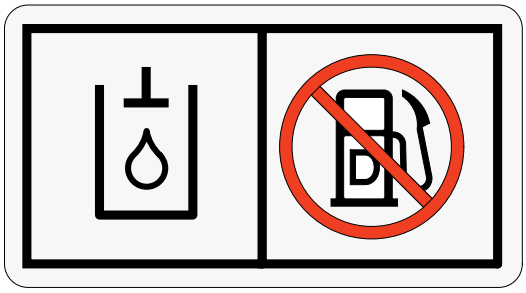
22) **FUEL SHUT OFF** (item 27)

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

※ **Fill only with hydraulic oil.**

※ **Do not fill with diesel fuel.**

⚠ **Relieve tank pressure with the engine off by removing the cap slowly to prevent burns from hot oil.**



140WH90FW51

23) ACCUMULATOR (item 28)

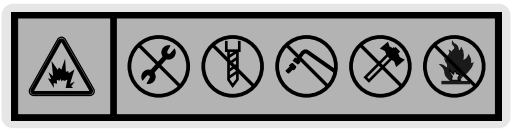
This warning label is positioned on the accumulator of the solenoid valve.

※ **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 HD Hyundai Construction Equipment distributor.**



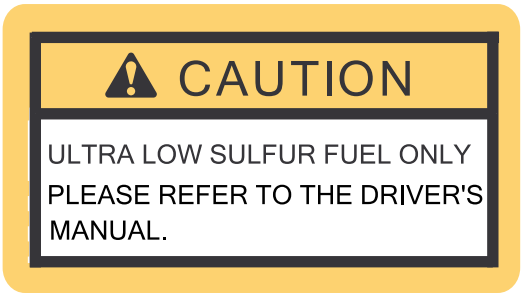
1107A0FW46

24) ULTRA LOW SULFUR DIESEL (item 32)

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

※ **Use ultra low sulfur fuel only.**

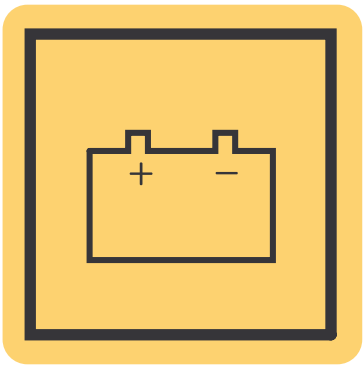
※ **Ultra low sulfur fuel**
sulfur content ≤ 10 ppm



2609A0SL03

25) BATTERY POSITION (item 33)

This warning label is positioned right side of tool box.



38090FW03

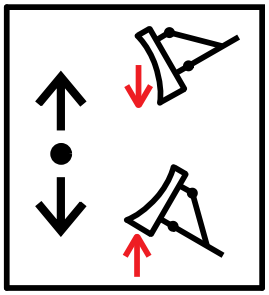
26) **CONTROL IDEOGRAM-DOZER** (item 35)

This warning label is positioned on the RH console box.

※ **See page 4-7 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.**



R25Z9A0FW06

27) **FIRE EXTINGUISHER** (item 36)

This label is located on the left rear stay, inside the cabin.

※ **Read and understand the instructions label on the fire extinguisher.**

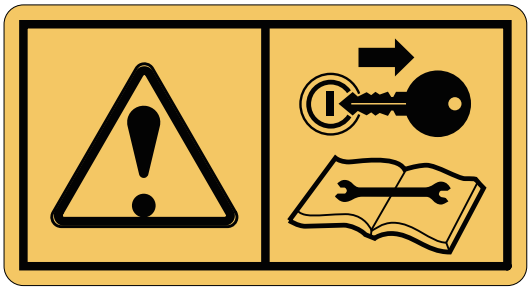
91Q6-07290

28) **KEY OFF CAUTION** (item 37)

This label is positioned on the right window of inside the cab.

※ **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.



290F0FW05

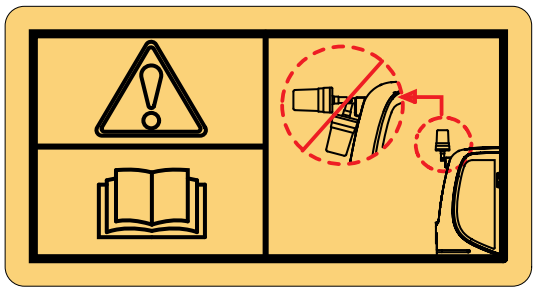
29) **BEACON LAMP** (item 39)

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.

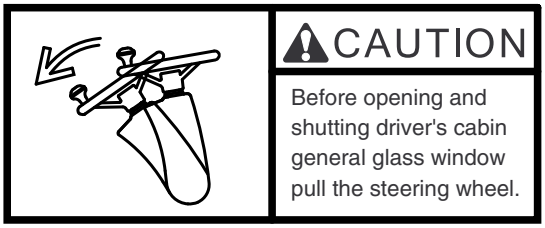
※ **While the machine transfer, the beacon lamp is easy to break. In the case, change the position of the lamp to the horizontal.**



140Z90FW49

30) **CAUTION-SLIDING** (item 43)

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



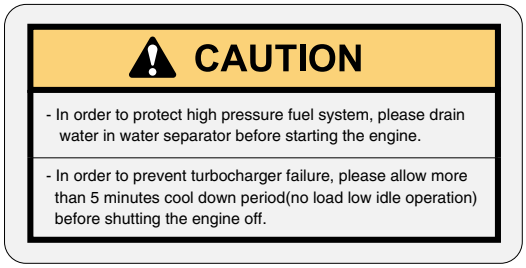
55W91FW04A

31) **CAUTION (W/SEPARATOR, TURBOCHARGER)** (item 49)

This label is positioned on the right window of inside the cab.

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

⚠ **In order to prevent turbocharger failure, please allow more than 5 minutes cool down period (no load low idle operation) before shutting the engine off.**



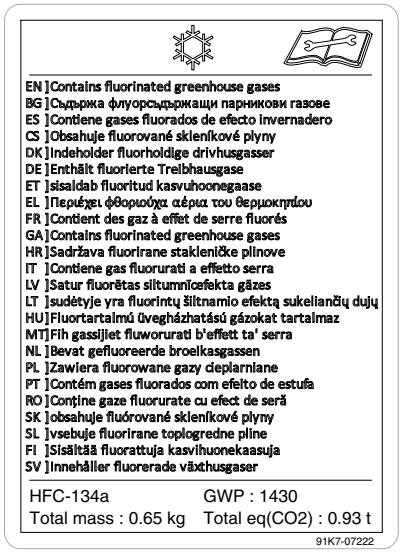
120090SL02

32) **REFRIGERANT** (item 45)

This label is positioned on the top side of the radiator support.

⚠ **Inhalation of A/C refrigerant gas in any form can result in serious injury or death.**

※ **Refer to page 4-65.**



91K7-07222

33) **LEFTOVER FUEL** (item 46)

This label is positioned right side of the hydraulic tank.

⚠ **Do not fuel a machine near open flames or sparks. Failure to comply may result in serious injury or death.**

⚠ **Properly clean areas of spillage.**

91K4-02700

34) **EMERGENCY EXIT** (item 47)

This label is positioned on the right window of inside the cab.

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

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

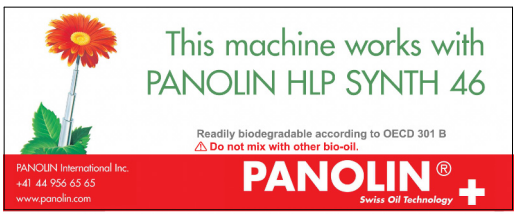
35) **BIO OIL** (item 49)

This label is positioned on the RH side door.

※ **This machine works with PANOLIN HLP SYNTH 46.**

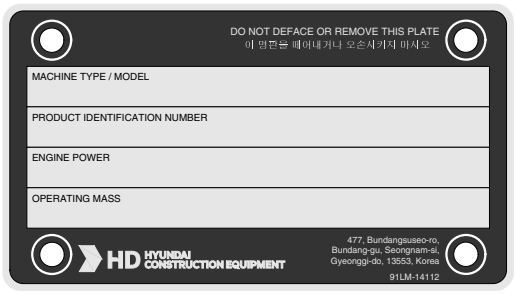
※ **Readily biodegradable according to OECD 301 B.**

⚠ **Do not mix with other bio-oil.**

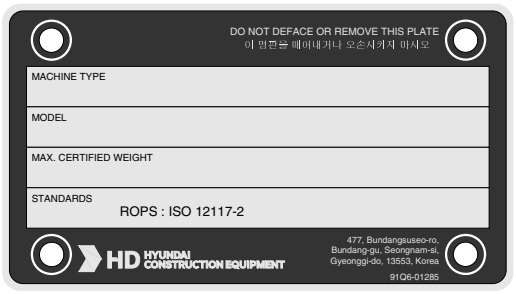


91WD-99110

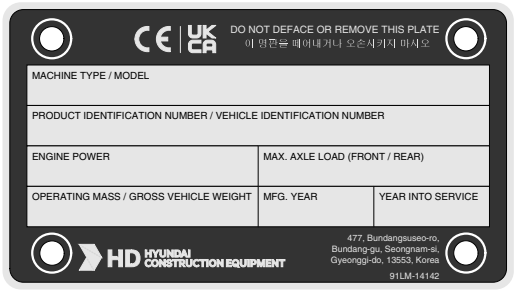
MACHINE DATA PLATE



For general

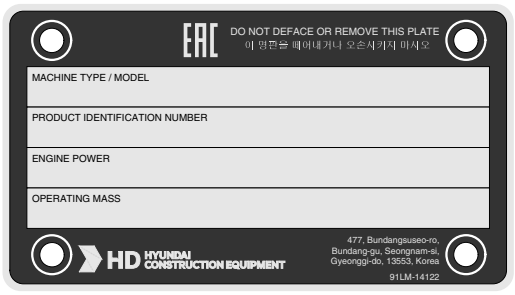


For ROPS



For EU only

For FOPS/FOG



For EAC only

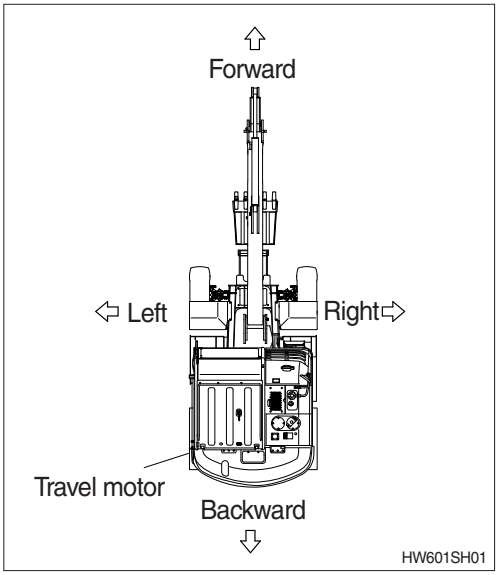
EX0MD01

※ The machine serial number assigned to this particular machine should be used when requesting information or ordering service parts for this machine from your authorized HD Hyundai Construction Equipment 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.

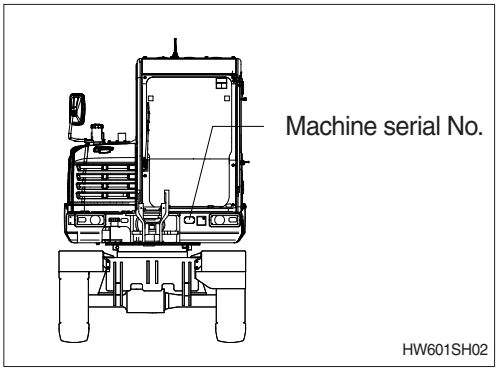


2. SERIAL NUMBER

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

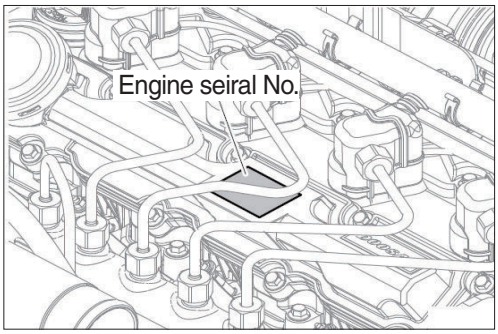
1) MACHINE SERIAL NUMBER

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. CALIFORNIA PROPOSITION 65

⚠ WARNING

CALIFORNIA PROPOSITION 65

Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an enclosed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65warnings.ca.gov/diesel.

2. SAFETY INSTRUCTIONS

Safety Message

Intended Use

Machines should be operated in accordance with the procedures described in the operator manual.
The products described in the operator manual are designed and manufactured mainly for the following purposes:

- Excavation work
- Loading work
- Leveling work
- Drainage work
- Lifting work
- Demolition work

Do not operate the machine for any purpose other than those stated above or in areas where potential hazards have been identified. Make sure that you comply strictly with all safety instructions at all times. Please contact HD Hyundai Construction Equipment Co., Ltd. or your local dealer for more information.

HD Hyundai Construction Equipment strictly prohibits the use or operation of the machine in any of the following circumstances:

- Operation by an unskilled worker
- Lifting a worker up
- Transporting flammable or dangerous materials
- Driving down or extracting piles with the bucket
- Towing damaged vehicles

Safety guidelines

Most safety accidents related to the operation, maintenance/ inspection, and repair of the machine result from a failure to comply with the safety instructions or to take adequate preventive measures. Safety accidents can be prevented by eliminating potentially hazardous situations. The operator should attend all mandatory training courses on the operation of the machine, and fully understand how to use the tools.

Improper operation, refueling, inspection or repair of this machine may cause serious injury or death.
Do not attempt to operate, refuel, inspect or repair this machine before reading and understanding the product information on such tasks.
This manual describes preventive measures and warnings about the product.
Failure to comply with the warnings about potential risks may result in serious injury or death.

General Safety Information

Unauthorized modification

Any attempt to modify the machine, including the use of unauthorized accessories or spare parts, may have adverse effects on the conditions of the machine and its ability to function as it was designed.
Do not attempt to modify the machine in any way without advanced written consent of the company.
Unauthorized modification will void the manufacturer's warranty.

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

The user is responsible for all damages and liabilities resulting from unauthorized modifications.
1. The attachment, the accessory, or the spare part has been made or distributed by HD Hyundai Construction Equipment and has been installed according to approved methods described in a publication available from HD Hyundai Construction Equipment.
2. Any modification must be approved by the company in writing.

ROPS/FOPS

The cabin is designed to provide sufficient space to minimize impacts pursuant to ISO 12117-2 of Rollover Protective Structures (ROPS). If any additional devices are installed that exceed the Max. certified weight indicated on ROPS name plate, the ROPS certification may be nullified. The protective structure of the cabin should be replaced immediately if it is permanently deformed or damaged.

Machines operated in areas where there is a risk of objects falling onto the cabin are fitted with a Falling Object Protective Structure (FOPS) pursuant to ISO 10262.

Fire and Explosion

Preventing fires

The following actions should be taken to minimize the risk of fire:

- Do a visual inspection before operating the machine to check for any risk of fire.
- Do not operate the machine if there is a risk of fire.
- Be sure to identify the primary exit and alternative exit of the machine, and fully understand how to use the exits in the event of a fire.
- Do not perform any welding or drilling work on the engine cover.
- Keep the engine compartment free from the build-up of flammable materials such as dead leaves, small branches, paper, and other types of trash.
- Keep the covers of the major parts of the machine closed. Make sure that the covers operate normally in order to be able to use firefighting equipment in the event of a fire.

- Be careful when handling fuel. Fuel is a highly flammable.
- Always stop the engine when refueling the machine.
- Refuel outdoors.
- Remove any build-up of flammable materials from the machine.
- Do not operate the machine near a flame.

- All fuels and most lubricant and coolant mixtures are flammable materials, so special care should be exercised when handling such materials to prevent fire and explosion.
- Keep all fuels and lubricant in adequate containers.
- Never smoke in the area where refueling is taking place or in the space for handling battery electrolytes and other flammable materials.
- Oil leaked to a hot surface or electronic component may cause a fire.
- Do not operate the machine if there is an oil leak. Repair the source of the oil leak, and wipe clean any leaked oil before operating the machine.
- Always clean all electrical lines, connectors, and clamps, and check whether they are securely connected on a regular basis.
- If any electrical wire or connector is loose or damaged, repair it immediately.

- Do not weld, cut or use a cutting torch through any tubes or lines in which flammable flows. Check all tubes and lines for signs of abrasion or deterioration and replace if damaged.
- Dust or particles generated when repairing the non-metallic hood or fender are flammable or explosive. Repair such parts in a well ventilated area well away from flames or sparks, and be sure to wear suitable PPE (Personal Protective Equipment).

Preventing explosions

The following actions should be taken to minimize the risk of explosion:

- Never use starting aid fluid in a low-temperature environment as it can have an adverse effect on the engine performance and may cause an explosion.
- Do not attempt to charge a frozen battery. Forcibly charging a frozen batte ry may result in an explosion.
- Use caution when handling the batteries. Never let a tool make contact with the positive battery post and the frame of the machine simultaneously.
  Sparks may be generated, resulting in an explosion.
- Only charge the battery with a charger of equal voltage. Incorrect voltage may cause overheating and explosion.
- Do not use or charge the battery if the level of electrolytes in the battery is low.
  Regularly check the electrolyte level, and refill with distilled water to the maximum level.

- Do not attempt to start the engine using an unsuitable booster cable as it may result in an explosion and serious injury or death.
  Only use the booster cable to start the engine in a well ventilated open space. Starting the engine with a booster cable may generate flammable gas.
- When hydraulic equipment and piping are overheated, flammable gas or airborne particles may explode. Protect and insulate such parts to prevent overheating.

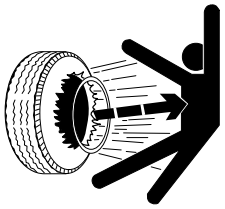
Corrective Actions Before and After a Fire

In the event of a fire in the machine, the top priority should be the safety of the operator and workers in the work area. In the event of a fire at a level that does not endanger the operator or workers, the following actions should be taken:

- Move the machine well away from any flammable materials (e.g., fuel, engine oil, clothes, and bits of wood) and adjacent buildings.
- If the engine is running, it may cause a persistent fire. Immediately stop the engine.
- In the event of an electric short, disconnect the batteries to eliminate the main ignition source.
  In the event of an electricity leak resulting from damage to the power wiring caused by fire, disconnect the batteries to eliminate the secondary ignition source.

If a fire becomes too large to control, assess the following risks:

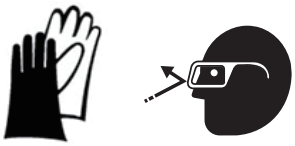
- If the machine is equipped with wheels, there is a risk of tire combustion and explosion. If exploded, high-temperature fragments may scatter.
- If the machine is mounted with wheels, the tires may be subject to a risk of combustion and explosion, and high temperature particles may splash into the air.



- The tank, accumulator, hose and fitting may burst into flames, splashing fuel and scattering particles throughout the surrounding area.

If you have to handle a machine that has been damaged by fire or one that is exposed to excessively high heat after extinguishing a fire, take the following precautions:

- Wear thick protective gloves and protective goggles.
- Never touch any materials left after combustion with your bare hands.
- Avoid contact with melted polymer materials (e.g., plastics).



Information on fire extinguisher

Fire extinguishers (if equipped) should be kept in a fully operable condition, and be inspected by a qualified person on a regular basis. Workers should complete a training course on the use of fire extinguishers in advance.

Use fire extinguishers in accordance with the following procedures, if required:

① Pull the safety pin of the fire extinguisher first.
② Extend the nozzle, and stand toward the fire.
③ Aim the nozzle at the flames, and firmly press the top and bottom handles.
④ Stand in a downwind position, and evenly spray the foam over the flames.

If the weight of the fire extinguisher exceeds 4.5 kg, mount the extinguisher in a location near the bottom of the cabin. Do not mount the fire extinguisher at a level higher than one third of the height of the cabin.

Do not weld or drill ROPS to mount a fire extinguisher. Contact your dealer or distributor for more information about the correct mounting of fire extinguishers.

Health and Safety

Personal protective equipment

The wearing of personal protective gear is mandatory for protecting the human body from hazardous chemicals and hazardous environments.

The wearing of personal protective gear is a means of preventing injury, and should not interfere with the performance of jobs. It is designed to protect the human body from hazardous environments and hazardous materials, and should be kept in an easily accessible place.

List of personal protection gear

Name	Symbol	Remarks
Safety helmet		Protects the head from falling objects, and reduces risks when falling down.
Dust mask		Air-purifying dust mask should not be worn in workplaces with an oxygen concentration of less than 18%.
Gas mask		Prevents the inhalation of mist, airborne particles, or protects against the spray of hazardous chemicals.
Welding helmet		Blocks airborne dust and slag, and shields the face from bright light during welding.
Protective clothing		Blocks dust, mist and hazardous chemicals, and protects against burns.
Protective gloves		Electric insulation gloves: Should be worn when working in areas with a high risk of electric shock. Chemical protective gloves: Should be worn when working in areas where there is a risk of contact with hazardous chemicals including materials leaked from batteries.
Protective goggles		Protects the eyes from dust, particles and airborne materials in work areas.
Earplugs and earmuffs		Wear earplug and earmuffs separately or in combination depending on the level and duration of noise.
Safety shoes		Protects the feet from falling objects, impacts, and sharp objects.

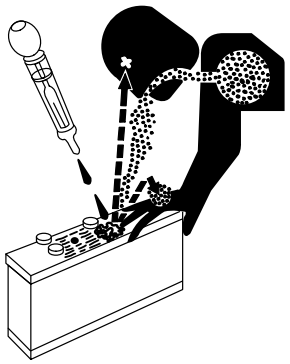
Health and safety instructions in hazardous environments

Comply with the following instructions during operation and maintenance of the machine.

When handling oil

Failure to wear personal protection may result in burns caused by contact with a high-temperature liquid. Make sure you wear protective goggles, protective gloves and protective clothing when handling oils such as hydraulic oils and engine oil.
If the eyes come into contact with oil, wash them with a sufficient quantity of water for 15 minutes or longer. If the skin comes into contact with oil, take off contaminated clothes and shoes, and wash the skin with soap and water for 15 minutes or longer.

When handling the battery



If battery electrolyte leaks while handling the battery, the sulfuric acid contained in the electrolyte may cause burns.
The lead components in battery electrolyte are toxic, so be sure to wear protective gloves and protective clothing.
Always wash your hands after handling the battery.
If a part of your body not protected by personal protective equipment comes into direct contact with battery electrolyte, immediately wash the affected part with flowing water for 20 minutes or more, and then see a doctor without delay.
If you accidentally swallow battery electrolyte, drink water, do not forcibly induce vomiting, and immediately seek medical help.

When handling refrigerant

Always wear protective goggles, protective gloves and other personal protective equipment when handling refrigerant to prevent direct contact of the skin with the refrigerant.
Wear protective gloves made of materials that are resistant to chemicals (such as neoprene and butyl rubber).
Never smoke when handing refrigerant.
If refrigerant comes into direct contact with the skin, wash the skin with warm water immediately.

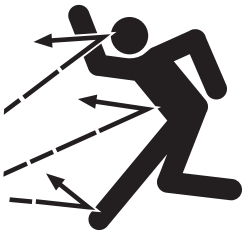
When handling coolants

Do not remove the radiator cap after operation of the machine until the engine has cooled and the pressure has dropped to a safe level. Failure to comply may result in serious burns.

Coolant contains toxic and combustible ethylene glycol, and should be handled in a cool, well-ventilated place only when wearing protective goggles, protective gloves, protective clothing, and a gas mask.
Avoid inhaling airborne particles or spray from coolant. If the substances make contact with skin or eyes, immediately wash the skin and eye with flowing water for 20 minutes or longer.

When working in a place subject to airborne particles and falling objects,

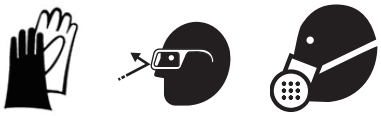
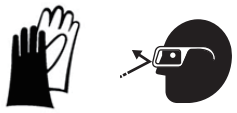
Always wear a safety helmet, protective goggles and safety shoes to prevent injury from airborne particles and thrown or falling objects. Earplugs or earmuffs may be necessary when working in a noisy place.



When working in places with a high level of noise

When the operator is exposed to the noise exceeding 90 dB (A) for 8 hours or longer, wear earplugs or earmuffs.

Personal protection gear for various situations

Situation	Symbol
Oil handling	
Battery handling	
Refrigerant handling	
Coolant handling	
Repair by welding	
Working in areas subject to airborne particles and falling objects	
Working in places with a high level of noise	
Handling machines damaged by fire or exposed to excessively high temperature	

Noise and Vibration

Information on vibration

This part describes the vibration data of the machine, and methods of calculating the vibration level.

The vibration level of the machine varies according to any of the following conditions:

- Driving habits of the operator
- Quality of seat and suspension
- Type of machine, attachments, and conditions of machine
- Conditions of work site, working environment, ground surface conditions, and weather

Vibration also varies according to the duration of operation.

Physical Agents Directive 2002/44/EC defines the exposure action value as 0.5 m/s^2, and the exposure limit value as 1.15 m/s^2. If the predicted value is near the exposure action value or exposure limit value, the predicted value should be assumed to exceed the two latter values, and necessary action should be taken.

Vibration levels are as followings.

- Whole body : $\leq$ 0.5 m/s^2 or $\leq$ 1.15 m/s^2 (Uncertainty K 0.07 m/s^2)

※ **Although the level of whole body vibration exceeds exposure action value, is less than the exposure limit value.**

- Hand/arm : $\leq$ 2.5 m/s^2 (Uncertainty K 0.21 m/s^2)

In regards to the actions taken according to the vibrations, refer to the following table:

Daily vibration exposure (A(8))	Vibration exposure range	Actions to be taken
$A(8) \leq 0.5\ m/s^2$	Exposure action value or lower	When approaching the exposure activity value, reasonable measures should be taken to minimize exposure to vibration. The relevant information and opportunities for training on vibration reduction should be provided to the operator.
$0.5\ m/s^2 < A(8) \leq 1.15\ m/s^2$	Exceeding the exposure action value, but not exceeding the exposure limit value	It is required to execute certain measures for reducing exposure to and risks of vibration to the minimum. The health of an operator who has been exposed to excessive vibration should be examined.
$1.15\ m/s^2 < A(8)$	Exceeding the exposure limit value:	Immediate action is required to reduce the vibration exposure level to below the exposure limit value.

※ **For futher information, please contatct your local HD Hyundai Construction Equipment dealer.**

The vibration level can be predicted based on the information in the following table which is used to calculate the daily level of vibration exposure.

Predict the vibration level in the three vibration directions of axes X, Y, and Z. The mean vibration level should be used under normal operation conditions. Scenario factors from mean vibration level based on operation by skilled operator and on smooth terrain are excluded. Scenario factors are included to obtain the mean vibration level based on aggressive operation and severe terrain to assess the expected vibration level.

※ **All vibration values are indicated in m/s^2.**

ISO Reference table - Vibration level equivalent to whole body vibration emission of the excavator (Unit : m/s^2)

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

Instructions on mitigating vibration

Machines should be correctly adjusted and maintained to ensure smooth operation. The terrain conditions should be observed. The following instructions will help reduce the whole body vibration level:

① Use the correct size attachments for your machine.

② Maintain the machines pursuant to the manufacturer's recommendations.
- Brake and steering systems
- Tire pressure

③ Maintain and provide good terrain conditions.
- Remove any large rocks or obstacles.
- Fill gutters or holes.
- Adjust speed and driving path as needed for the conditions.

④ Use a driver's seat that satisfies ISO 7096.
- Adjust the driver's seat and suspension for the weight and the size of the operator.
- Inspect the suspension and adjusting devices of the driver's seat.

⑤ Perform the following maneuvers without using excessive force :
- Steering
- Braking
- Accelerating
- Gear shifting

⑥ Move the attachments smoothly.

⑦ Adjust the speed and path of machine to keep the vibration level minimal.
- Operate the machine so as to avoid obstacles and rough terrain.
- Decelerate the machine when driving on rough terrain.

⑧ Keep the level of vibration minimal when working for a long time or driving for a long distance.
- Use a machine mounted with suspension system.
- Transport the machine when moving between worksites; do not drive the machine to get to another worksite.

⑧ Take the following actions for optimal operator comfort and convenience:

- Adjust the driver's seat adjustment device to allow a convenient posture.
- Adjust the angles of the mirrors to minimize awkward, compromised posture
- Avoid working for an excessively long time, and take regular breaks.
- Do not jump on or off the cabin.
- Minimize repeated handling of loads and lifting of loads.
- The vibration information and calculation procedures are based on <ISO/TR 25398> has been defined according to the emission of vibrations measured under the actual working conditions of the machines.

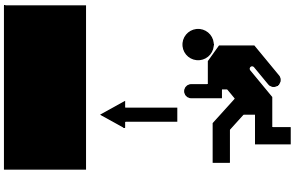
Information on noise

Noise level (Directive 2000/14/EC) is as followings.

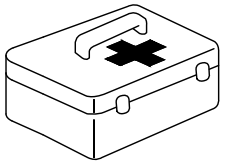
- LwA(Guaranteed) : 99 dB (Uncertainty K 1.0 dB(A))
- LpA(Measured) : 78 dB (Uncertainty K 1.0 dB(A))

Emergency situations

In the event of an emergency situation, use the emergency hammer installed inside the cabin to break the windshield of the cabin, and carefully escape from the cabin. The emergency hammer should always be kept inside the cabin for emergencies, and should not be removed or used for other purposes. If the emergency hammer is lost, replace it immediately.



Keep a first-aid kit inside the cabin or in another place at the worksite for safety accidents.



Keep contact information (e.g., phone number) to request help with an emergency situation or injury.

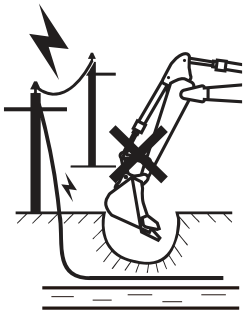
Safety Information on the Machines and Operation

Before Operating the Machine

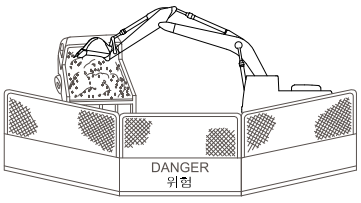
Carefully examine the following conditions and take any necessary actions to prevent risk factors before operating the machine:

Checking the worksite

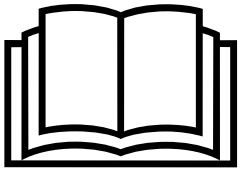
- Always be aware of weather conditions at your worksite. Fog or heavy rain may decrease visibility or render the machine inoperable. In the event of lightning, immediately put the bucket to the ground and evacuate to a safe place.
- Check the worksite for obstacles, and avoid collisions with such obstacles during operation. Check the surroundings of the machine for any obstacles that may hinder operation.
- Check the worksite for buried waterlines, telecommunication cables, power cables and oil pipelines in advance, and avoid damaging them.
- If the terrain of the worksite is too rough for normal operation of the machine, flatten the terrain before operating the machine. Make sure that the ground of the worksite is not soft as it may cause hazards during operation.



- If the worksite is a marshy place (e.g., shallow river, large or small lake, swamp, etc), check the conditions and the depth of marshy areas and the flow rate before driving or operating the machine. Do not operate the machine underwater.
- When operating the machine 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 upper rollers.
- Do not operate the machine on cliffs or at the end of a road on soft ground as the machine may overturn.
- When operating the machine in areas with pedestrian or vehicle traffic, or in a zone in the vicinity of such an area, appoint workers exclusively responsible for controlling the traffic, or install fences or blocking wall to separate the worksite from the traffic area. Prevent unauthorized workers or machines from accessing the worksite.



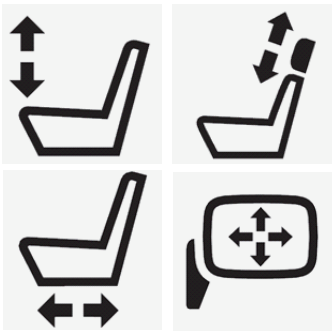
Instructions before operating the machine



- The machine shall be operated by authorized and skilled operators only.
- The operator should wear clothes and personal protection gear that are appropriate for the work environment.
- Do not operate the machine while under the influence of alcohol or drugs or while experiencing extreme fatigue or other conditions that may affect your awareness of your surroundings or your reaction time.
- The operator should read and fully understand the operator's manual before operating the machine.
- The operator should fully understand the details and procedures of the work to be performed.
- Do not perform work when a hazard is anticipated or encountered. Remove the hazard before beginning work. Failure to comply may result in serious injury or death.

Inspect the machine before operating the machine

- Check the machine for abnormal noise, vibration or heat, and for the leakage of engine oil, hydraulic oil, fuel or refrigerant.
- Remove any foreign substances from the engine and the battery. The buildup of such substances may cause a fire.
- Do not operate a machine until any necessary repairs are completed.
- Do not operate the machine until all regular inspection and service recommended in the operator's manual have been executed.

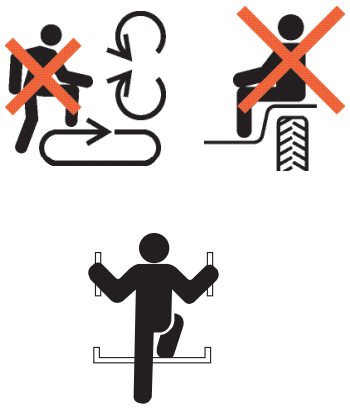


- Adjust the operator’s seat to suit the physical condition of the operator. Check the seatbelt for damage, and replace it if damaged. Do not store unnecessary objects or tools in the cabin.
- Keep clean all parts related to visibility, such as the windshield and rearview mirror. Adjust the rearview mirror to ensure that the operator’s field of vision is clear.
- Check the acoustic alarms (e.g., the horn and warning signal when driving backward or moving) for normal operation.

During Operation of the Machine

Getting on and off

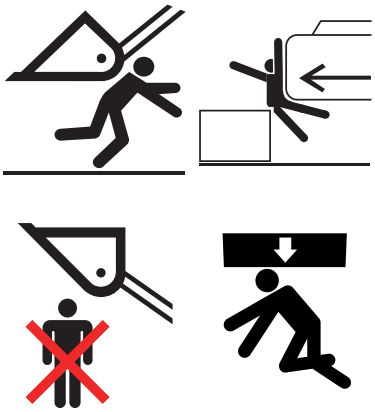
- Do not jump on or off the machine.
- Do not try to get on or off the machine while it is moving.
- Get on or off the machine using the handrail and step (or stepladder, if any). Always keep the handrail and step clean and free from mud or oil.
- Wear anti-slip shoes.
- Comply with the principle of three-point contact* by contacting the machine with either both hands and one foot or vice versa when getting on or off the machine.
- Do not sit on any part of the machine not intended for sitting.



※ **Three-point contact means making contact with the machine with both hands and one foot, or with one hand and both feet.**

During operation

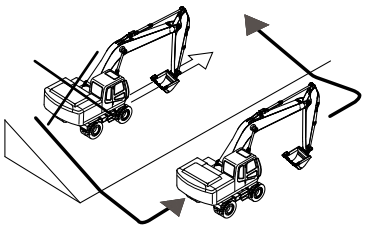
- The operator should start the engine only after sitting on the operator's seat. Make sure that all levers are shifted to the neutral position before starting the engine.
- Pay close to any obstacles when operating the machine, particularly when turning or moving backward, to prevent collision. Failure to comply may result in serious injury or death.
- Do not exceed the recommended size and weight of an object when lifting a load. Do not lift a heavy object with slings by suspending the slings on the tooth of the bucket.
- Do not allow anyone to stand under the bucket.



Operation on a slope

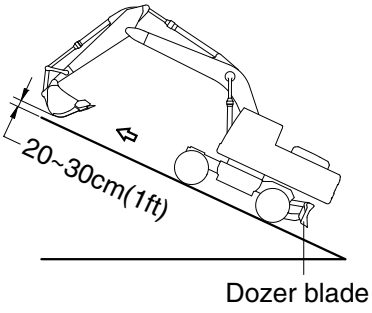
When operating the machine on a slope, failure to comply with these instructions could result in the machine tipping over, which may lead to serious injury or death.

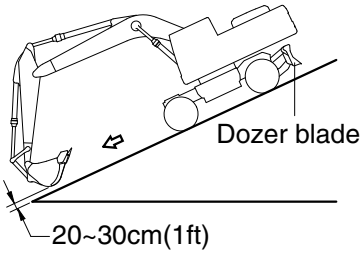
- Do not work on slopes of 10˚ or more.
- Do not exceed the maximum climbing angle of 30˚.
- If operation of the machine on a slope is unavoidable, perform the work after flattening the ground.
- When operating the machine laterally on a slope, there is a high risk of machine overturning or slipping. Do not operate the machine in such conditions.



- Do not operate the machine on a slope covered with wet grass or a thick layer of dead leaves, as the machine may slip.
- Do not park or stop the machine on a slope.
  If parking or stopping the machine on a slope is unavoidable, bring the bucket down to the ground, and support the wheels with wheel chocks.

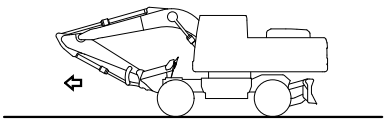
- When traveling up a slope, operate the machine at a slow speed with the attachment extended forward to keep the machine balanced, and with the bucket raised at least 20 ~30 cm (1 ft) from the ground.
- Never travle dwn a slope in neutral. Keep the bucket 20~30 cm (1 ft) above the ground, and use the bucket as a brake in an emergency situation.
- If the engine suddenly stalls, immediately bring the bucket to the ground.
- If the fuel gauge reaches the red zone while operating the machine, immediately refill with fuel. (If the machine operates on a slope under these conditions, air may be introduced into the engine, causing it to stall suddenly.)





Cautions to Be Taken When Driving the Machine

· If you operate the machine with the parking brake on, it may cause serious damage to the parking brake disk.
· Select the appropriate gear for the driving speed.
· Do not change direction when driving the machine at max. speed as this may cause serious damage to the transmission.



· Only drive the machine for short distances on the road.
· Make sure you fully comply with the local road traffic regulations and legislation of your country when driving on the road.
· Please note that the machine is wider and travels at a lower driving speed than other vehicles on the roads.
· Pay attention to any vehicles behind your vehicle, and allow them to overtake your vehicle safely.

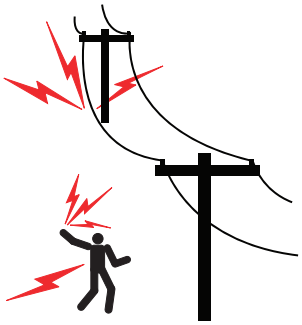
· Check the following conditions before driving the machine on the public road :
  - Remove any dirt and sand from the machine.
  - Empty the bucket and move it to the driving position (40~ 50 cm above the ground) and fix it.
  - Close the windshield. Turn the working light off.
  - Wear the seat belt.
  - Use the lighting devices, such as the headlights, emergency warning light and rotating beacon, pursuant to the local road traffic legislation.
  - Pay attention to people in the vicinity of the machine.
  - Do not operate the machine on roads or bridges where the machine exceeds the weight limit.
  - Familiarize yourself fully with the width, length and height of the machine.
  - Check the tire pressure.
  - When traveling for a long distance, stop the machine after every 40 km or on an hourly basis, and take a break.
  - Check the level of fuel and coolant.
  - Never shift the gear to the neutral position when driving down a slope.
  - Changing direction when operating the machine on a slope is dangerous.
  - Do not drive on a slope of 30˚ or more.
  - Drive slowly when traveling the machine on rough terrain or moving over obstacles.
  - Install chains on the tires when operating the machine on slippery roads covered with snow or rainwater, and do not attempt to start, stop or turn the machine suddenly.
  - Be sure to avoid any obstacles when traveling the machine on paths.

Operations to be avoided or prohibited

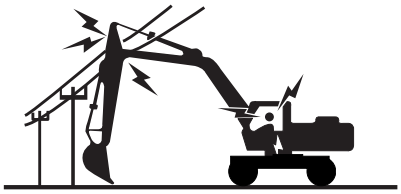
· Pay attention when operating the machine in an enclosed space as this may result in the risk of a buildup of hazardous gases.

· If the machine is operated in the vicinity of a high-voltage line, there is a risk of death or serious injury.
· Be aware of the height and working radius of the machine, and maintain the minimum safety distance.

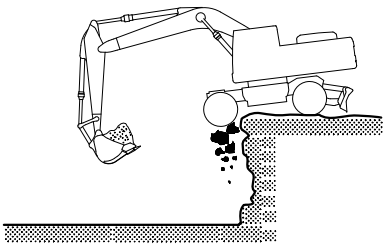
Voltage	Minimum safety distance
6.6 kV	3 m (10 ft)
33.0 kV	4 m (13 ft)
66.0 kV	5 m (16 ft)
154.0 kV	8 m (26 ft)
275.0 kV	10 m (33 ft)



· In the event of contact with a high-voltage line, keep sitting on the operator's seat until the electric current has been shut down.
· Warn any workers on the ground in the vicinity of the machine not to make contact with the machine.
· If leaving the machine is unavoidable, jump down to a place free from any contact with the machine.



· Avoid operating the machine on soft ground, a slope or cliff as there is a risk that it may overturn. Pay special attention when it is raining as the rainfall may soften the ground.
· When operating or driving the machine in water, check the floor conditions, depth of water and flow rate, and make sure that the top roller and axle housing are not immersed in water.
· Do not operate the machine under adverse weather conditions caused by overcast skies, snow and rainfall.
· Do not turn or travel with the machine when the bucket is stuck in the ground.

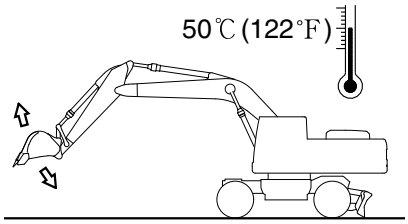


Cautions when operating in specific areas

Operating in extremely cold environments

· Do not attempt to start, stop or turn the machine suddenly as this may cause it to slip. There is potential for the machine to slip.
· Snow-covered or frozen ground may be slippery and dangerous.
· Idle operation of the machine may be required to elevate the engine temperature during startup.
· An impact resulting from a sudden movement of the boom or the attachments at an extremely low temperature may cause serious damage to the machine.
· The working cycle or loading weight might be reduced to lower than those under normal conditions.
· Follow these instructions when operation in cold environments:

- Warm up the engine for 3~4 seconds when starting up the engine.
- Always fully charge the battery. A discharged battery will freeze earlier than a fully charged battery.
- Use engine oil and fuel that are appropriate for the temperature.
- Keep the fuel tank full.
- Remove any moisture from the fuel tank, and change the fuel filter regularly.
- If the fuel filter is frozen, the flow of fuel may be blocked.
- Pour the proper volume of antifreeze into the coolant.
- Wait until the various parts of the machine reach the operating temperature after starting the engine.
- Make sure that every controller and function of the machine operates normally.
- Remove any dirt, snow and ice from the machine after completing the operation.



Operating in extremely hot environments

· Continuous operation of the machine for a long period of time may cause the machine to overheat. Pay special attention to prevent overheating of parts such as the engine and the hydraulic system. Stop the machine and take a break if necessary.

Check the following conditions frequently:
- Check the level of the coolant in the radiator.
- Check the radiator grill for clogging by any debris, and remove them, if any.
- Check the level of the battery electrolyte.
- If the battery will not be used for a long period of time, store it in a cool place.
- Check the hydraulic system for oil leakage.
- Check the lubrication oil on the respective parts, and lubricate as needed.
- If the paint coating of any parts has been effaced or damaged, coat the parts with paints or treat them with an anti-rust additive.
- Do not park the machine under direct light for a long period of time.
- When parking or storing the machine outdoors, use the proper cover to protect the machine from sunlight and dust.

Operating in dusty or sandy environments

- Check the radiator grill for clogging by any debris, and remove any debris.
- Check the fuel system, and protect it from dust or sand when refueling.
- Inspect the air cleaner regularly, and replace it if necessary.
- If the gauge lamp on the dashboard lights up and the buzzer sounds at the same time, clean or replace the air cleaner.
- Frequently check consumables such as hydraulic oil and lubrication oil, and change them if necessary. Protect against the introduction of dust or sand when changing the consumables.
- Check the air-conditioner and the heater filters regularly, and clean or replace them if necessary.
- When parking or storing the machine outdoors, use the proper cover to protect the machine from dust and sand.

Operating in rainy or humid environments

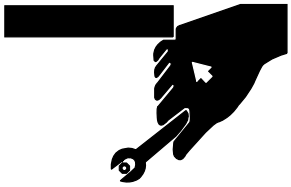
- Do not operate the machine in areas where there is heavy rainfall or thick fog.
- If operating the machine in such areas is unavoidable, perform operation after ensuring sufficient field of vision.
  - Use lighting devices such as the head lamp and working light.
  - Warn any workers within the radius of operation of the machine.
- Pay attention when operating the machine on smooth ground as there is a risk of it overturning.
- If the paint coating on any parts has been effaced or damaged, coat the parts with paint or treat them with an anti-rust additive.

Operating the machine in coastal areas

- Special care should be taken when operating the machine in coastal areas as exposed parts may be corroded easily.
- If the paint coating on any parts has been effaced or damaged, coat the parts with paint or treat them with an anti-rust additive.
- Perform inspection and maintenance of the parts promptly.

Cautions during maintenance

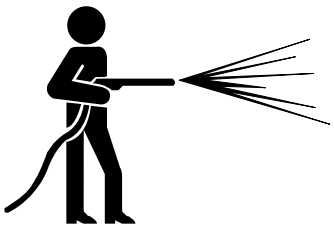
Tools



- Use the correct tools for each type of work.
- Using improper tools may damage the machine and its parts.
- Using deteriorated or damaged tools may result in bodily injury.

Inspection and servicing

- Prevent access to the machine by all unauthorized workers.
- Prior to inspection, park the machine in a flat area and attach a 'Under Inspection' sign.
- Clean the machine before inspection or maintenance.
  - When performing inspection or maintenance on a dirty machine, it may be difficult to diagnosis or detect the cause of a problem with the machine.
  - Dust or dirt accumulated on the machine may cause a worker to slip or fall.
  - Wear protective goggles and protective clothes when cleaning the machine using a compressed water.
  - Do not spray water directly on sensors or electric connectors (sensors or electrical connection units, etc.). If water gets into the electrical system, it can cause operational problems.



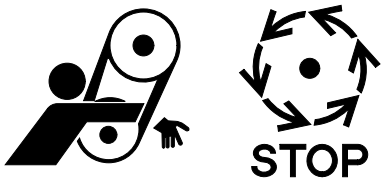
- Use proper lighting devices when operating the machine in a dark area.
- Use lighting devices that are explosion-proof when handling flammable materials such as fuel and hydraulic oil.
- Never attempt to use a direct flame such as a cigarette lighter in lieu of the lighting device.

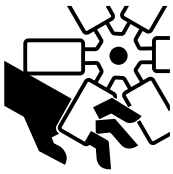
- Check the level of the cooling water after stopping and sufficiently cooling down the engine.
- Sufficiently relieve the inside pressure before opening the cooling water cap.
- The cooling system contains basic components. Use caution to prevent the skin or eyes from coming into contact with the basic materials.

- Exercise special care to protect the body from contact with hot fluid or parts.
- Replace the filters only after shutting off and sufficiently cooling down the engine.
- Slowly remove the operating oil filter plug to relieve the inside pressure.
- Relieve the pressure from the hydraulic system before disconnecting any lines and fittings.

Collision or cutting

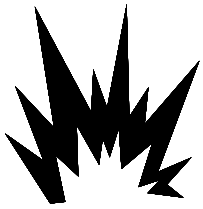
- Never perform a maintenance while the engine is running.
- Never open or remove the engine hood while the machine is in operation.
- If an inspection is required while the engine is running, two or more workers must perform the inspection.
- Keep areas in the vicinity of rotating or moving parts clean.
- Keep articles in the vicinity of the fan clean.
  - Wear safety gloves when handling the wire cables.
  - Wear protective goggles and protective clothes





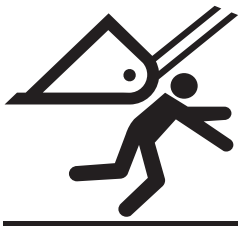
Preventing fire and explosion

- Use caution when handling fuels, lubrication oils, and coolant mixtures to prevent fire and explosion. Failure to comply may result in serious injury or death.
- Oil that leaks on to a hot surface or electronic components may cause a fire.
- Keep all fuels and lubrication oils in adequate containers.
- Do not smoke while refueling or while adding any fluids to the machine. Do not smoke near the fuel tank at anytime.
- Do not smoke in a space where battery electrolyte and other flammable materials are handled.
- Always keep all electrical lines, connectors, and clamps clean, and check whether they are securely connected on a regular basis.
- If any electrical wire or connector is loose or damaged, repair it immediately.
- Do not weld or cut with gas cutter pipes or tubes that contains flammable fluids.



Cautions on decoupling the attachments

- Do not allow unauthorized workers to access the machine.
- Place the machine in a safe position.
- Install safety fences around the machine.

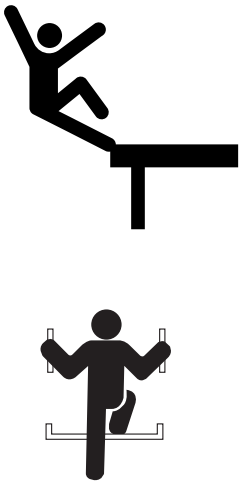


Repair by welding

- Only weld in an area where adequate facilities for welding are available.
- Welding work may be subject to risks of gas leak, flame and electric shock.
  Welding should be performed only by a qualified welder.
- Take the following precautions when welding to avoid serious injury or death:
  - Separate and remove the battery to prevent battery explosion.
  - Perform direct heating in a place free from the risk of explosion.
  - Cover parts such as rubber hoses subject to damage by welding with flame-resistant materials.
  - Wear a welding helmet, protective clothes, protective gloves, and safety shoes.
  - Perform welding work in a well-ventilated place.
  - Remove all inflammable materials from areas in the vicinity of welding work.
  - Provide fire extinguishers.

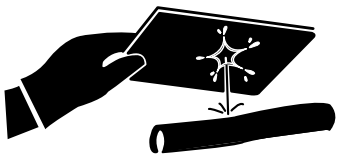
Precautions to take when working on the machine

- There is a risk of falling when working on the machine.
- Keep the area around the workers' feet clean and tidy.
- Do not spill oil or grease.
- Do not leave tools lying on the floor.
- Be careful on the floor when moving.
- Never jump from the machine.
- When getting off the machine, use the step or handrail and get off the machine while keeping to the principle of three-point contact.
- Wear protective clothes if necessary.
- Do not perform maintenance work in an area where no anti-slipping pads have been installed.
- Replace anti-slipping pads and step treads with new ones if they have deteriorated or no longer function.

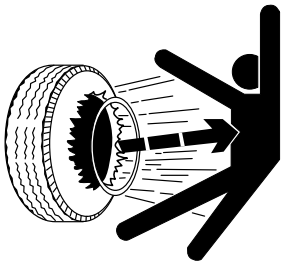


Cautions when working with the high-pressure line or hose

- Make sure that the internal pressure is released before replacing or checking the high-pressure line or hose.
- If the internal pressure is not released, serious injury may result.
- Take the following precautions to avoid serious injury or death:
  - Always check to make sure a working fire extinguisher is nearby
  - Leaked oil may penetrate the skin or cause serious injury.
  - Never check for oil leaks with your bare hands.
  - Check an oil leak using a wooden plate or cardboard.
  - Never bend or hit the high-pressure line hard.
  - Do not install a bent or damaged line or hose.
  - Make sure that all of the clamps and protective devices are properly installed.
- Check the pipes and hoses regularly and replace any damaged parts if necessary.



Cautions on inspecting the tire

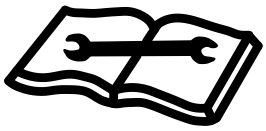


- Always keep the tires inflated to the proper pressure.
- Overheating or rupture of the tires may result in serious injury.
- Repairing or changing the tires requires exclusive facilities and expertise. Please contact a professional tire repair shop if repairs are necessary.

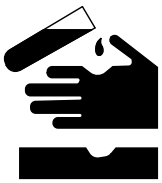
Cautions on inspecting the counterweight

- Failure to comply with these instructions may lead to serious injury or death.
- Never stand beneath the counterweight when installing or removing it.
- Make sure the condition of the lifting device is rated for the weight being lifted.
- Make sure lifting device is in good working order and free of damage or defects.

Battery

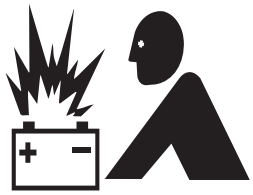


- The battery contains flammable materials.
- Never smoke in the vicinity of the battery.
- The battery electrolyte is strong acid. Pay attention to prevent the skin and eyes from coming into contact with the electrolyte.



- If the battery electrolyte accidentally comes into contact with the body or clothes, immediately wash off the electrolyte with water.
- If the battery electrolyte is frozen, do not use other devices to start the engine up.
- Always wear protective goggles and protective gloves when working on the battery.
- Always keep the switch in the 'OFF' position when working on the battery.
- Securely fasten the battery cap.
- Always disconnect the battery from the machine before charging the battery.
- Disconnect the cathode (-) first when removing the battery.
- Connect the anode (+) first when connecting the battery.
- Follow the safety procedures when jump starting or charging the battery. Improper connection of the cable may result in an explosion and serious injury.

- Use a voltmeter when inspecting the charging system.
- Regularly inspect the battery cable, and replace it if damaged.
- A battery cable with exposed wires may cause a short if it comes into contact with the grounding surface.
- A short circuit of the battery cable may cause heat from the battery current and result in a fire.



- If the wires of the ground cable are exposed between the battery and the master switch, the exposed wires make contact with the grounding surface and the current may bypass to the master switch. This may destabilize the machine operation.
  Repair or replace the part before operating the machine.

Battery disconnection switch

- Do not turn off the battery disconnect switch while engine is running. There is a risk of damaging electrical system.
- The battery disconnect switch can be found under the left-hand door of the machine.
- Make sure to turn off the battery disconnect switch when welding or servicing electrical systems, and before clocking out.

Switchboard

- The relay and fuse can be found on the switchboard at the rear of the cab.
- Do not use the fuse that has a higher amperage than indicated on the decal. There is a risk of damaging electric circuits or catching fire.

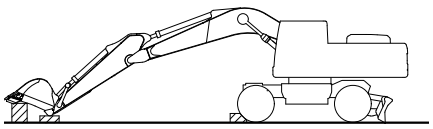
Parking and Storage

Cautions on parking

- Park the machine on flat ground.
- If parking the machine on a slope is unavoidable, use wheel chocks to prevent the machine from moving.
- Bring the bucket down and make firm contact with ground.
- Make sure that all of the switches are turned to the 'OFF' position.
- Do not turn off battery disconnect until led lamp at the disconnect goes off.
- Make sure that all of the controllers are turned to the neutral position.
- Activate the parking brake.
- Stop the engine, and withdraw the ignition key.
- Close and lock the windshield, door and all covers.
- Install fences around the machine when parking it on a public road, and put up a warning sign.

Cautions on storage for a long period of time

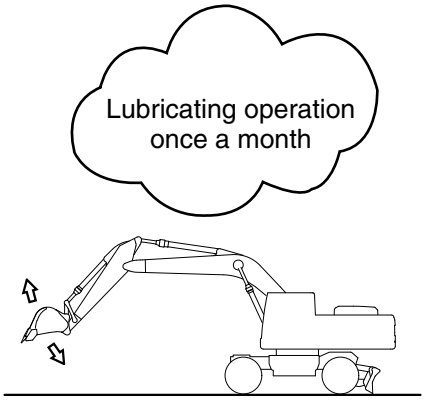
- Park the machine in accordance to any state and local laws.
- When storing the machine for a month or longer, follow these instructions to prevent deterioration of the machine performance :



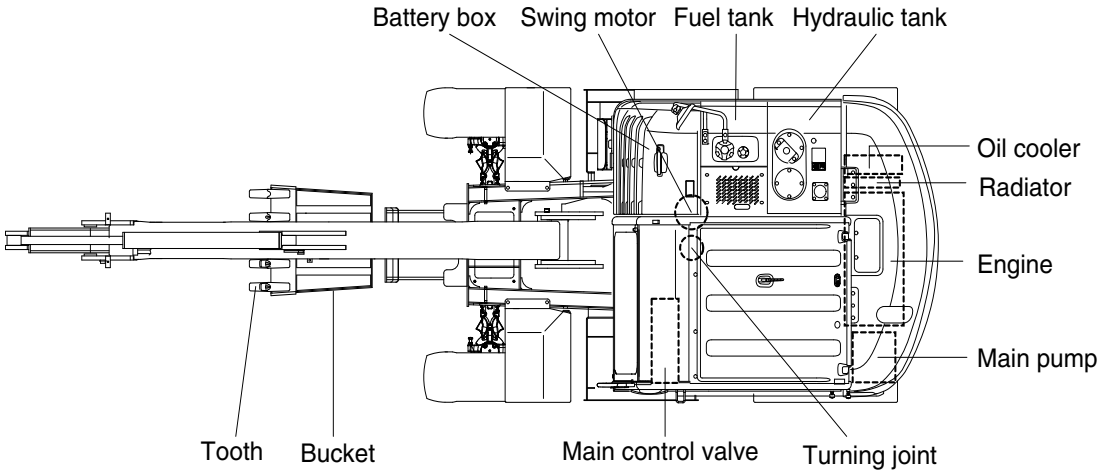
  - Thoroughly clean the machine before storing.
  - Inject sufficient lubrication oil and grease into the injection ports.
  - If any of the machines fluids are low top them off. If any fluids are close to or in need of changing, do so before storing.
  - Oils and coolant may deteriorate during storage based on the length of storage. Please take this into consideration before using the machine.
  - The density of the oil may drop during storage.
  - Apply an anti-rust additive to the exposed area of the piston rod of the cylinder in areas where it is likely to rust quickly.
  - Keep the master switch mounted in the power box (or the toolbox on the left of the rear frame of the machine) turned 'OFF'.
  - Keep the machine in a dry indoor environment.
    If storing the machine outdoors is unavoidable, store it on a wooden pallet.
  - Keep all cylinders collapse so that the cylinder rods are not exposed.
  - Bring the attachments right down to the ground, and keep the wheels immobile by placing wheel chocks.

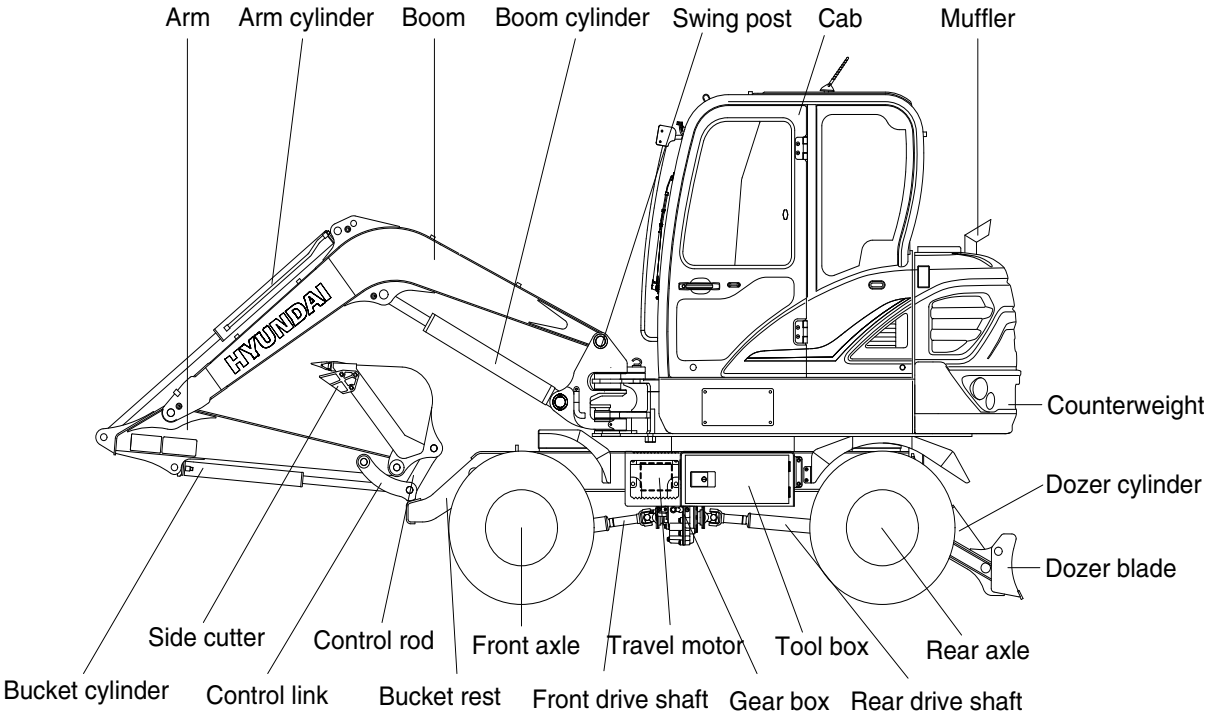
Regular lubrication (during storage)

- Breaking the lubrication film on parts may cause abnormal abrasion during the next operation.
- Check the level of the engine oil and coolant when starting the engine up, and top them up if necessary.
- Thoroughly wipe off any oil from cylinder rod before operating machine as it will attract dust and debris.
- Start up the engine once a month, perform all functions. Operate machine utilizing all functions for a minimum of 15 minutes. Apply lubrication oil to every part.
- Fully charge and store the battery.
- If storing the excavator for longer than 6 months, disconnect the battery negative (-) terminal.
- Check the tire pressure.



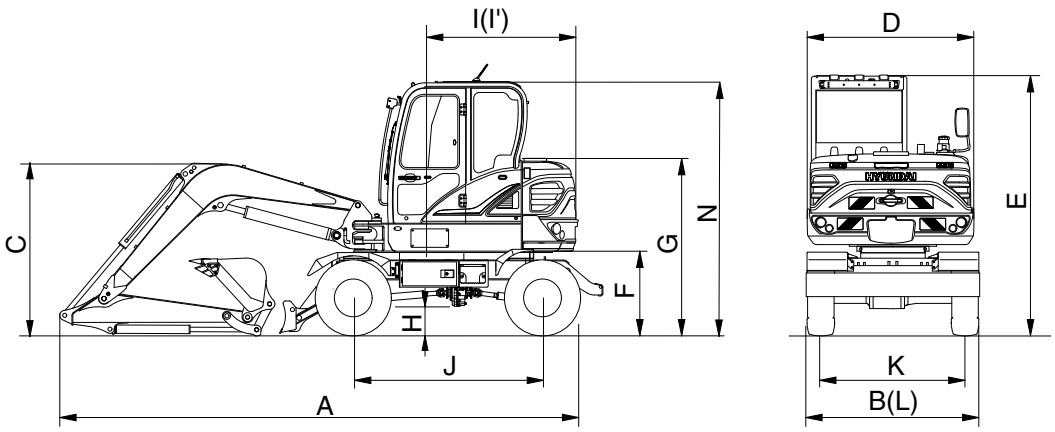
1. MAJOR COMPONENTS





HW602SP01A

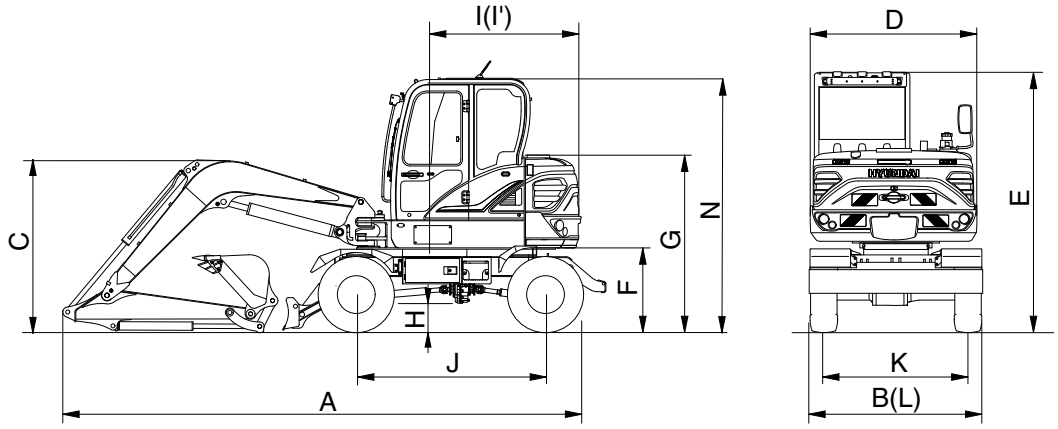
1) 3.0 m (9'10") MONO BOOM, 1.6 m (5' 3") ARM WITH BOOM SWING SYSTEM



HW65AH2SP02

Description		Unit		Specification	
		m (ft-in)	Boom	3.0 (9' 10")	
			Arm	1.60 (5' 3")	
		Tire		Single 1200	Double 700
		Axle		STD	HD
Operating weight		kg (lb)		6065 (13370)	6355 (14010)
Overall length (travel)	A	mm (ft-in)		6200 (20' 4")	6200 (20' 4")
Overall length (shipping)				6055 (19' 1")	6055 (19' 1")
Overall width	B			1925 (6' 4")	2100 (6' 11")
Overall height of boom (travel)	C			2800 (9' 2")	2800 (9' 2")
Overall height of boom (shipping)				2280 (7' 6")	2280 (7' 6")
Upperstructure width	D			1850 (6' 1")	1850 (6' 1")
Overall height of cab	E			2905 (9' 6")	2865 (9' 5")
Ground clearance of counterweight	F			1000 (3' 3")	960 (3' 2")
Overall height of engine hood	G			2005 (6' 7")	1965 (6' 5")
Minimum ground clearance	H			315 (1. 0")	275 (0.11")
Rear-end distance	I			1650 (5' 5")	1653 (5' 5")
Rear-end swing radius	I'			1650 (5' 5")	1650 (5' 5")
Wheel base	J			2100 (6' 11")	2100 (6' 11")
Tread	K			1600 (5' 3")	1660 (5' 5")
Dozer blade width	L			1925 (6' 4")	2100 (6' 11")
Height of blade	O			350 (1' 2")	350 (1' 2")
Ground clearance of blade up	P			430 (1' 5")	430 (1' 5")
Depth of blade down	Q			154 (0' 6")	154 (0' 6")
Travel speed	Low	km/hr (mph)		11 (6.8)	13.1 (8.1)
	High			32 (19.9)	30 (18.6)
Swing speed		rpm		8.26	8.26
Gradeability		Degree (%)		30 (58)	30 (58)
Max traction force		kg (lb)		3042 (6710)	3042 (6710)

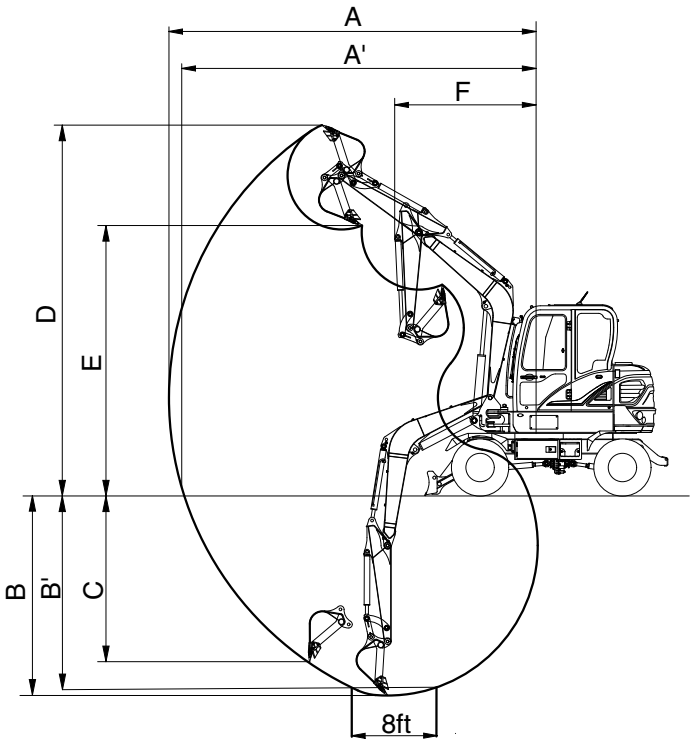
2) 3.0 m (9'10") MONO BOOM, 1.9 m (6' 3") ARM WITH BOOM SWING SYSTEM



Description		Unit		Specification	
		m (ft-in)	Boom	3.0 (9' 10")	
			Arm	1.90 (6' 3")	
		Tire		Single 1200	Double 700
		Axle		STD	HD
Operating weight		kg (lb)		6195 (13660)	6485 (14300)
Overall length (travel)	A	mm (ft-in)		6060 (19' 11")	6060 (19' 11")
Overall length (shipping)				6123 (20' 10")	6123 (20' 10")
Overall width	B			1925 (6' 4")	2100 (6' 11")
Overall height of boom (travel)	C			3070 (10' 1")	3070 (10' 1")
Overall height of boom (shipping)				2590 (8' 6")	2590 (8' 6")
Upperstructure width	D			1850 (6' 1")	1850 (6' 1")
Overall height of cab	E			2905 (9' 6")	2865 (9' 5")
Ground clearance of counterweight	F			1000 (3' 3")	960 (3' 2")
Overall height of engine hood	G			2005 (6' 7")	1965 (6' 5")
Minimum ground clearance	H			315 (1.0")	275 (0.11")
Rear-end distance	I			1675 (5' 6")	1675 (5' 6")
Rear-end swing radius	I'			1680 (5' 6")	1680 (5' 6")
Wheel base	J			2100 (6' 11")	2100 (6' 11")
Tread	K			1600 (5' 3")	1660 (5' 5")
Dozer blade width	L			1925 (6' 4")	2100 (6' 11")
Height of blade	O			350 (1' 2")	350 (1' 2")
Ground clearance of blade up	P			430 (1' 5")	430 (1' 5")
Depth of blade down	Q			154 (0' 6")	154 (0' 6")
Travel speed	Low	km/hr (mph)		11 (6.8)	13.1 (8.1)
	High			32 (19.9)	30 (18.6)
Swing speed		rpm		8.26	8.26
Gradeability		Degree (%)		30 (58)	30 (58)
Max traction force		kg (lb)		3042 (6710)	3042 (6710)

3. WORKING RANGE

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



HW65AH2SP03

Description	m (ft-in)	Boom	3.0 m (9' 10")	
		Arm	1.6 m (5' 3")	1.9 m (6' 3")
Max digging reach	mm (ft-in)	A	6150 mm (20' 2")	6450 mm (21' 2")
Max digging reach on ground		A'	5950 mm (19' 6")	6250 mm (20' 6")
Max digging depth		B	3490 mm (11' 5")	3790 mm (12' 5")
Max digging depth (8 ft level)		B'	3100 mm (10' 2")	3440 mm (11' 3")
Max vertical wall digging depth		C	3950 mm (13' 0")	3320 mm (10' 11")
Max digging height		D	6045 mm (19' 1")	6260 mm (20' 6")
Max dumping height		E	4290 mm (14' 1")	4490 mm (14' 1")
Min swing radius		F	2380 mm (7' 10")	2410 mm (7' 11")
Bucket digging force	kN	SAE	36.9 [40.2]	36.9 [40.2]
	kgf		3763 [4100]	3763 [4100]
	lbf		8295 [9039]	8290 [9039]
	kN	ISO	42.1 [45.9]	42.1 [45.9]
	kgf		4292 [4680]	4290 [4680]
	lbf		9461 [10318]	9462 [10318]
Arm crowd force	kN	SAE	27.3 [29.7]	24.3 [26.5]
	kgf		2779 [3030]	2476 [2476]
	lbf		6126 [6680]	5459 [5459]
	kN	ISO	28.3 [30.9]	25.1 [27.4]
	kgf		2886 [3150]	2561 [2790]
	lbf		6335 [6945]	5646 [6151]

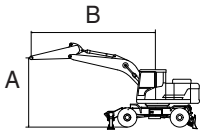
4. WEIGHT

Item	HW65AH	
	kg	lb
Upperstructure assembly		
Main frame weld assembly	764	1684
Engine assembly	264	582
Aftertreatment assy	11	25
Main pump assembly	35	77
Main control valve assembly	50	110
Swing motor assembly	76	168
Hydraulic oil tank assembly	95	208
Hydraulic oil (max)	61	135
Fuel tank assembly	67	148
Fuel oil (max)	106	233
Counterweight (STD)	210	463
Counterweight (Heavy)	330	728
Cab assembly	350	772
Lower chassis assembly		
Lower frame weld assembly (single tire)	753	1660
Lower frame weld assembly (double tire)	769	1695
Swing bearing	102	225
Travel motor assembly	43	95
Turning joint	60	132
Transmission assembly	100	220
Front axle assembly	280	617
Rear axle assembly	240	529
Dozer blade assembly (single tire)	230	507
Dozer blade assembly (double tire)	242	534
Front attachment assembly		
3.0 m boom assembly	247	545
1.6 m arm assembly	130	287
1.9 m arm assembly	135	298
0.18 m^3 SAE heaped bucket assembly	162	357
0.07 m^3 SAE heaped bucket assembly	110	243
Boom cylinder assembly	78	172
Arm cylinder assembly	65	143
Bucket cylinder assembly	37	82
Dozer cylinder assembly	31	68
Bucket control linkage total	46	102

5. LIFTING CAPACITIES

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	SINGLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1600	210	-	-	Down	-	-

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



Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
5.0 m (16.4 ft)	kg									*1310	*1310	3.51
	lb									*2890	*2890	(11.5)
4.0 m (13.1 ft)	kg					*1210	*1210			*1270	1100	4.45
	lb					*2670	*2670			*2800	2430	(14.6)
3.0 m (9.8 ft)	kg			*1490	*1490	*1320	1290			*1230	910	4.96
	lb			*3280	*3280	*2910	2840			*2710	2010	(16.3)
2.0 m (6.6 ft)	kg			*2140	1900	*1570	1240	*1350	890	*1260	840	5.19
	lb			*4720	4190	*3460	2730	*2980	1960	*2780	1850	(17.0)
1.0 m (3.3 ft)	kg			*2670	1790	*1810	1190	1340	870	1270	820	5.19
	lb			*5890	3950	*3990	2620	2950	1920	2800	1810	(17.0)
0.0 m (0.0 ft)	kg	*1930	*1930	*2820	1750	1840	1160			1340	860	4.96
	lb	*4250	*4250	*6220	3860	4060	2560			2950	1900	(16.3)
-1.0 m (-3.3 ft)	kg	*3740	3470	*2630	1750	*1800	1160			*1500	1000	4.46
	lb	*8250	7650	*5800	3860	*3970	2560			*3310	2200	(14.6)
-2.0 m (-6.6 ft)	kg	*3130	*3130	*2000	1790					*1520	1420	3.53
	lb	*6900	*6900	*4410	3950					*3350	3130	(11.6)

※ Note

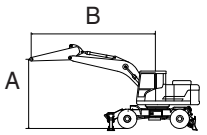
1. Lifting capacity are based on SAE J1097 and ISO 10567.
2. Lifting capacity of the HX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *indicates load limited by hydraulic capacity.

※ Lifting capacities are based upon a standard machine conditions.
Lifting capacities will vary with different work tools, ground conditions and attachments.
The difference between the weight of a work tool attachment must be subtracted.
Consult your HD Hyundai Construction Equipment dealer regarding the lifting capacities for specific work tools and attachments.

⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	SINGLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1600	210	-	-	Up	-	-

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



Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
5.0 m (16.4 ft)	kg									*1310	*1310	3.51
	lb									*2890	*2890	(11.5)
4.0 m (13.1 ft)	kg					*1210	1140			*1270	950	4.45
	lb					*2670	2510			*2800	2090	(14.6)
3.0 m (9.8 ft)	kg			*1490	*1490	*1320	1110			*1230	790	4.96
	lb			*3280	*3280	*2910	2450			*2710	1740	(16.3)
2.0 m (6.6 ft)	kg			*2140	1620	*1570	1060	*1350	760	*1260	720	5.19
	lb			*4720	3570	*3460	2340	*2980	1680	*2780	1590	(17.0)
1.0 m (3.3 ft)	kg			*2670	1510	*1810	1020	1340	740	1270	700	5.19
	lb			*5890	3330	*3990	2250	2950	1630	2800	1540	(17.0)
0.0 m (0.0 ft)	kg	*1930	*1930	*2820	1470	1840	990			1340	740	4.96
	lb	*4250	*4250	*6220	3240	4060	2180			2950	1630	(16.3)
-1.0 m (-3.3 ft)	kg	*3740	2810	*2630	1470	*1800	990			*1500	860	4.46
	lb	*8250	6190	*5800	3240	*3970	2180			*3310	1900	(14.6)
-2.0 m (-6.6 ft)	kg	*3130	2880	*2000	1510					*1520	1210	3.53
	lb	*6900	6350	*4410	3330					*3350	2670	(11.6)

※ Note

1. Lifting capacity are based on SAE J1097 and ISO 10567.
2. Lifting capacity of the HX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
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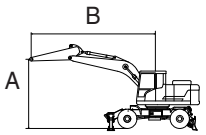
⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	SINGLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1600	330	-	-	Down	-	-

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



Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
5.0 m (16.4 ft)	kg									*1310	*1310	3.51
	lb									*2890	*2890	(11.5)
4.0 m (13.1 ft)	kg					*1210	*1210			*1270	1160	4.45
	lb					*2670	*2670			*2800	2560	(14.6)
3.0 m (9.8 ft)	kg			*1490	*1490	*1320	*1320			*1230	970	4.96
	lb			*3280	*3280	*2910	*2910			*2710	2140	(16.3)
2.0 m (6.6 ft)	kg			*2140	2000	*1570	1310	*1350	940	*1260	880	5.19
	lb			*4720	4410	*3460	2890	*2980	2070	*2780	1940	(17.0)
1.0 m (3.3 ft)	kg			*2670	1890	*1810	1260	1400	920	1330	870	5.19
	lb			*5890	4170	*3990	2780	3090	2030	2930	1920	(17.0)
0.0 m (0.0 ft)	kg	*1930	*1930	*2820	1850	*1920	1230			1410	920	4.96
	lb	*4250	*4250	*6220	4080	*4230	2710			3110	2030	(16.3)
-1.0 m (-3.3 ft)	kg	*3740	3660	*2630	1850	*1800	1230			*1500	1060	4.46
	lb	*8250	8070	*5800	4080	*3970	2710			*3310	2340	(14.6)
-2.0 m (-6.6 ft)	kg	*3130	*3130	*2000	1890					*1520	1500	3.53
	lb	*6900	*6900	*4410	4170					*3350	3310	(11.6)

※ Note

1. Lifting capacity are based on SAE J1097 and ISO 10567.
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3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
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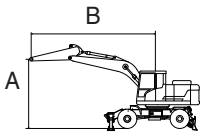
The difference between the weight of a work tool attachment must be subtracted.
Consult your HD Hyundai Construction Equipment dealer regarding the lifting capacities for specific work tools and attachments.

⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	SINGLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1600	330	-	-	Up	-	-

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



Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
5.0 m (16.4 ft)	kg									*1310	*1310	3.51
	lb									*2890	*2890	(11.5)
4.0 m (13.1 ft)	kg					*1210	1200			*1270	1000	4.45
	lb					*2670	2650			*2800	2200	(14.6)
3.0 m (9.8 ft)	kg			*1490	*1490	*1320	1180			*1230	840	4.96
	lb			*3280	*3280	*2910	2600			*2710	1850	(16.3)
2.0 m (6.6 ft)	kg			*2140	1710	*1570	1130	*1350	810	*1260	760	5.19
	lb			*4720	3770	*3460	2490	*2980	1790	*2780	1680	(17.0)
1.0 m (3.3 ft)	kg			*2670	1610	*1810	1080	1400	790	1330	750	5.19
	lb			*5890	3550	*3990	2380	3090	1740	2930	1650	(17.0)
0.0 m (0.0 ft)	kg	*1930	*1930	*2820	1560	*1920	1050			1410	790	4.96
	lb	*4250	*4250	*6220	3440	*4230	2310			3110	1740	(16.3)
-1.0 m (-3.3 ft)	kg	*3740	2980	*2630	1560	*1800	1050			*1500	910	4.46
	lb	*8250	6570	*5800	3440	*3970	2310			*3310	2010	(14.6)
-2.0 m (-6.6 ft)	kg	*3130	3050	*2000	1600					*1520	1280	3.53
	lb	*6900	6720	*4410	3530					*3350	2820	(11.6)

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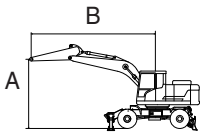
⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	SINGLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1900	210	-	-	Down	-	-

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



Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1180	*1180	3.97
	lb											*2600	*2600	(13.0)
4.0 m (13.1 ft)	kg							*1060	*1060			*1050	980	4.80
	lb							*2340	*2340			*2310	2160	(15.7)
3.0 m (9.8 ft)	kg							*1200	*1200	*1180	920	*1010	840	5.27
	lb							*2650	*2650	*2600	2030	*2230	1850	(17.3)
2.0 m (6.6 ft)	kg					*1930	*1930	*1460	1260	*1270	900	*1030	770	5.49
	lb					*4250	*4250	*3220	2780	*2800	1980	*2270	1700	(18.0)
1.0 m (3.3 ft)	kg					*2550	1820	*1740	1200	1340	870	*1110	760	5.49
	lb					*5620	4010	*3840	2650	2950	1920	*2450	1680	(18.0)
0.0 m (0.0 ft)	kg			*1860	*1860	*2810	1760	1840	1160	1320	850	1230	790	5.27
	lb			*4100	*4100	*6190	3880	4060	2560	2910	1870	2710	1740	(17.3)
-1.0 m (-3.3 ft)	kg	*2260	*2260	*3220	*3220	*2720	1740	1830	1150			*1400	900	4.81
	lb	*4980	*4980	*7100	*7100	*6000	3840	4030	2540			*3090	1980	(15.8)
-2.0 m (-6.6 ft)	kg	*3620	*3620	*3640	3500	*2260	1770					*1440	1180	3.98
	lb	*7980	*7980	*8020	7720	*4980	3900					*3170	2600	(13.1)
-3.0 m (-9.8 ft)	kg													
	lb													

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	SINGLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1900	210	-	-	Up	-	-

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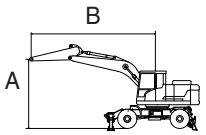

Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1180	1160	3.97
	lb											*2600	2560	(13.0)
4.0 m (13.1 ft)	kg							*1060	*1060			*1050	850	4.80
	lb							*2340	*2340			*2310	1870	(15.7)
3.0 m (9.8 ft)	kg							*1200	1130	*1180	790	*1010	720	5.27
	lb							*2650	2490	*2600	1740	*2230	1590	(17.3)
2.0 m (6.6 ft)	kg					*1930	1650	*1460	1080	*1270	770	*1030	660	5.49
	lb					*4250	3640	*3220	2380	*2800	1700	*2270	1460	(18.0)
1.0 m (3.3 ft)	kg					*2550	1540	*1740	1030	1340	750	*1110	650	5.49
	lb					*5620	3400	*3840	2270	2950	1650	*2450	1430	(18.0)
0.0 m (0.0 ft)	kg			*1860	*1860	*2810	1480	1840	990	1320	730	1230	680	5.27
	lb			*4100	*4100	*6190	3260	4060	2180	2910	1610	2710	1500	(17.3)
-1.0 m (-3.3 ft)	kg	*2260	*2260	*3220	2790	*2720	1470	1830	980			*1400	770	4.81
	lb	*4980	*4980	*7100	6150	*6000	3240	4030	2160			*3090	1700	(15.8)
-2.0 m (-6.6 ft)	kg	*3620	*3620	*3640	2850	*2260	1490					*1440	1010	3.98
	lb	*7980	*7980	*8020	6280	*4980	3280					*3170	2230	(13.1)
-3.0 m (-9.8 ft)	kg													
	lb													

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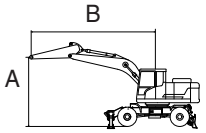
Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	SINGLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1900	330	-	-	Down	-	-

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



Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1180	*1180	3.97
	lb											*2600	*2600	(13.0)
4.0 m (13.1 ft)	kg							*1060	*1060			*1050	1040	4.80
	lb							*2340	*2340			*2310	2290	(15.7)
3.0 m (9.8 ft)	kg							*1200	*1200	*1180	970	*1010	890	5.27
	lb							*2650	*2650	*2600	2140	*2230	1960	(17.3)
2.0 m (6.6 ft)	kg					*1930	*1930	*1460	1320	*1270	950	*1030	820	5.49
	lb					*4250	*4250	*3220	2910	*2800	2090	*2270	1810	(18.0)
1.0 m (3.3 ft)	kg					*2550	1920	*1740	1270	*1390	920	*1110	800	5.49
	lb					*5620	4230	*3840	2800	*3060	2030	*2450	1760	(18.0)
0.0 m (0.0 ft)	kg			*1860	*1860	*2810	1860	*1900	1230	1390	900	*1270	840	5.27
	lb			*4100	*4100	*6190	4100	*4190	2710	3060	1980	*2800	1850	(17.3)
-1.0 m (-3.3 ft)	kg	*2260	*2260	*3220	*3220	*2720	1840	*1870	1220			*1400	950	4.81
	lb	*4980	*4980	*7100	*7100	*6000	4060	*4120	2690			*3090	2090	(15.8)
-2.0 m (-6.6 ft)	kg	*3620	*3620	*3640	*3640	*2260	1870					*1440	1250	3.98
	lb	*7980	*7980	*8020	*8020	*4980	4120					*3170	2760	(13.1)
-3.0 m (-9.8 ft)	kg													
	lb													

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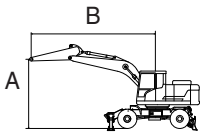
Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	SINGLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1900	330	-	-	Up	-	-

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



Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1180	*1180	3.97
	lb											*2600	*2600	(13.0)
4.0 m (13.1 ft)	kg							*1060	*1060			*1050	900	4.80
	lb							*2340	*2340			*2310	1980	(15.7)
3.0 m (9.8 ft)	kg							*1200	1190	*1180	840	*1010	770	5.27
	lb							*2650	2620	*2600	1850	*2230	1700	(17.3)
2.0 m (6.6 ft)	kg					*1930	1740	*1460	1140	*1270	820	*1030	710	5.49
	lb					*4250	3840	*3220	2510	*2800	1810	*2270	1570	(18.0)
1.0 m (3.3 ft)	kg					*2550	1630	*1740	1090	*1390	790	*1110	690	5.49
	lb					*5620	3590	*3840	2400	*3060	1740	*2450	1520	(18.0)
0.0 m (0.0 ft)	kg			*1860	*1860	*2810	1570	*1900	1050	1390	780	*1270	720	5.27
	lb			*4100	*4100	*6190	3460	*4190	2310	3060	1720	*2800	1590	(17.3)
-1.0 m (-3.3 ft)	kg	*2260	*2260	*3220	2960	*2720	1560	*1870	1040			*1400	820	4.81
	lb	*4980	*4980	*7100	6530	*6000	3440	*4120	2290			*3090	1810	(15.8)
-2.0 m (-6.6 ft)	kg	*3620	*3620	*3640	3010	*2260	1580					*1440	1070	3.98
	lb	*7980	*7980	*8020	6640	*4980	3480					*3170	2360	(13.1)
-3.0 m (-9.8 ft)	kg													
	lb													

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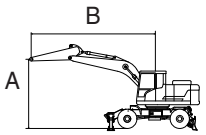
Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	DOUBLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1600	210	-	-	Down	-	-

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



Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
5.0 m (16.4 ft)	kg									*1310	*1310	3.48
	lb									*2890	*2890	(11.4)
4.0 m (13.1 ft)	kg					*1210	*1210			*1270	1190	4.43
	lb					*2670	*2670			*2800	2620	(14.5)
3.0 m (9.8 ft)	kg			*1480	*1480	*1320	*1320			*1230	990	4.95
	lb			*3260	*3260	*2910	*2910			*2710	2180	(16.2)
2.0 m (6.6 ft)	kg			*2130	2060	*1560	1340	*1340	960	*1260	910	5.19
	lb			*4700	4540	*3440	2950	*2950	2120	*2780	2010	(17.0)
1.0 m (3.3 ft)	kg			*2670	1950	*1800	1290	1400	940	1320	890	5.19
	lb			*5890	4300	*3970	2840	3090	2070	2910	1960	(17.0)
0.0 m (0.0 ft)	kg	*1890	*1890	*2820	1900	*1920	1260			1400	940	4.97
	lb	*4170	*4170	*6220	4190	*4230	2780			3090	2070	(16.3)
-1.0 m (-3.3 ft)	kg	*3690	*3690	*2640	1900	*1810	1260			*1500	1080	4.47
	lb	*8140	*8140	*5820	4190	*3990	2780			*3310	2380	(14.7)
-2.0 m (-6.6 ft)	kg	*3170	*3170	*2020	1940					*1520	1520	3.56
	lb	*6990	*6990	*4450	4280					*3350	3350	(11.7)

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	DOUBLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1600	210	-	-	Up	-	-

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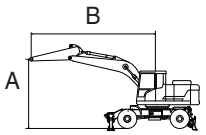

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
5.0 m (16.4 ft)	kg									*1310	*1310	3.48
	lb									*2890	*2890	(11.4)
4.0 m (13.1 ft)	kg					*1210	*1210			*1270	1050	4.43
	lb					*2670	*2670			*2800	2310	(14.5)
3.0 m (9.8 ft)	kg			*1480	*1480	*1320	1220			*1230	870	4.95
	lb			*3260	*3260	*2910	2690			*2710	1920	(16.2)
2.0 m (6.6 ft)	kg			*2130	1790	*1560	1170	*1340	840	*1260	790	5.19
	lb			*4700	3950	*3440	2580	*2950	1850	*2780	1740	(17.0)
1.0 m (3.3 ft)	kg			*2670	1680	*1800	1130	1400	820	1320	780	5.19
	lb			*5890	3700	*3970	2490	3090	1810	2910	1720	(17.0)
0.0 m (0.0 ft)	kg	*1890	*1890	*2820	1640	*1920	1100			1400	820	4.97
	lb	*4170	*4170	*6220	3620	*4230	2430			3090	1810	(16.3)
-1.0 m (-3.3 ft)	kg	*3690	3150	*2640	1640	*1810	1090			*1500	950	4.47
	lb	*8140	6940	*5820	3620	*3990	2400			*3310	2090	(14.7)
-2.0 m (-6.6 ft)	kg	*3170	*3170	*2020	1680					*1520	1320	3.56
	lb	*6990	*6990	*4450	3700					*3350	2910	(11.7)

※ Note

1. Lifting capacity are based on SAE J1097 and ISO 10567.
2. Lifting capacity of the HX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
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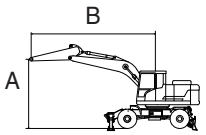
⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	DOUBLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1600	330	-	-	Down	-	-

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



Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
5.0 m (16.4 ft)	kg									*1310	*1310	3.48
	lb									*2890	*2890	(11.4)
4.0 m (13.1 ft)	kg					*1210	*1210			*1270	1250	4.43
	lb					*2670	*2670			*2800	2760	(14.5)
3.0 m (9.8 ft)	kg			*1480	*1480	*1320	*1320			*1230	1040	4.95
	lb			*3260	*3260	*2910	*2910			*2710	2290	(16.2)
2.0 m (6.6 ft)	kg			*2130	*2130	*1560	1410	*1340	1010	*1260	960	5.19
	lb			*4700	*4700	*3440	3110	*2950	2230	*2780	2120	(17.0)
1.0 m (3.3 ft)	kg			*2670	2050	*1800	1360	*1430	990	*1370	940	5.19
	lb			*5890	4520	*3970	3000	*3150	2180	*3020	2070	(17.0)
0.0 m (0.0 ft)	kg	*1890	*1890	*2820	2000	*1920	1330			*1440	990	4.97
	lb	*4170	*4170	*6220	4410	*4230	2930			*3170	2180	(16.3)
-1.0 m (-3.3 ft)	kg	*3690	*3690	*2640	2000	*1810	1330			*1500	1140	4.47
	lb	*8140	*8140	*5820	4410	*3990	2930			*3310	2510	(14.7)
-2.0 m (-6.6 ft)	kg	*3170	*3170	*2020	*2020					*1520	*1520	3.56
	lb	*6990	*6990	*4450	*4450					*3350	*3350	(11.7)

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	DOUBLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1600	330	-	-	Up	-	-

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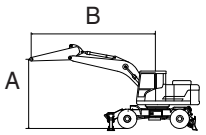

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
5.0 m (16.4 ft)	kg									*1310	*1310	3.48
	lb									*2890	*2890	(11.4)
4.0 m (13.1 ft)	kg					*1210	*1210			*1270	1110	4.43
	lb					*2670	*2670			*2800	2450	(14.5)
3.0 m (9.8 ft)	kg			*1480	*1480	*1320	1290			*1230	920	4.95
	lb			*3260	*3260	*2910	2840			*2710	2030	(16.2)
2.0 m (6.6 ft)	kg			*2130	1880	*1560	1240	*1340	890	*1260	840	5.19
	lb			*4700	4140	*3440	2730	*2950	1960	*2780	1850	(17.0)
1.0 m (3.3 ft)	kg			*2670	1780	*1800	1190	*1430	870	*1370	820	5.19
	lb			*5890	3920	*3970	2620	*3150	1920	*3020	1810	(17.0)
0.0 m (0.0 ft)	kg	*1890	*1890	*2820	1730	*1920	1160			*1440	870	4.97
	lb	*4170	*4170	*6220	3810	*4230	2560			*3170	1920	(16.3)
-1.0 m (-3.3 ft)	kg	*3690	3330	*2640	1730	*1810	1160			*1500	1000	4.47
	lb	*8140	7340	*5820	3810	*3990	2560			*3310	2200	(14.7)
-2.0 m (-6.6 ft)	kg	*3170	*3170	*2020	1770					*1520	1400	3.56
	lb	*6990	*6990	*4450	3900					*3350	3090	(11.7)

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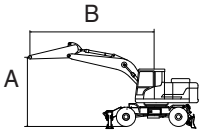
Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	DOUBLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1900	210	-	-	Down	-	-

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



Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1190	*1190	3.94
	lb											*2620	*2620	(12.9)
4.0 m (13.1 ft)	kg							*1060	*1060			*1050	*1050	4.78
	lb							*2340	*2340			*2310	*2310	(15.7)
3.0 m (9.8 ft)	kg							*1190	*1190	*1180	990	*1010	910	5.26
	lb							*2620	*2620	*2600	2180	*2230	2010	(17.3)
2.0 m (6.6 ft)	kg					*1910	*1910	*1460	1360	*1270	970	*1030	840	5.48
	lb					*4210	*4210	*3220	3000	*2800	2140	*2270	1850	(18.0)
1.0 m (3.3 ft)	kg					*2540	1970	*1730	1300	*1380	940	*1110	820	5.49
	lb					*5600	4340	*3810	2870	*3040	2070	*2450	1810	(18.0)
0.0 m (0.0 ft)	kg			*1830	*1830	*2800	1910	*1900	1260	1390	930	*1260	860	5.28
	lb			*4030	*4030	*6170	4210	*4190	2780	3060	2050	*2780	1900	(17.3)
-1.0 m (-3.3 ft)	kg	*2230	*2230	*3190	*3190	*2730	1890	*1870	1250			*1400	970	4.82
	lb	*4920	*4920	*7030	*7030	*6020	4170	*4120	2760			*3090	2140	(15.8)
-2.0 m (-6.6 ft)	kg	*3580	*3580	*3670	*3670	*2280	1920	*1450	1270			*1440	1270	4.01
	lb	*7890	*7890	*8090	*8090	*5030	4230	*3200	2800			*3170	2800	(13.1)
-3.0 m (-9.8 ft)	kg													
	lb													

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HW65AH	MONO BOOM	DOUBLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1900	210	-	-	Up	-	-

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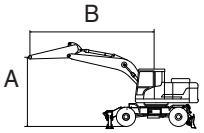

Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1190	*1190	3.94
	lb											*2620	*2620	(12.9)
4.0 m (13.1 ft)	kg							*1060	*1060			*1050	940	4.78
	lb							*2340	*2340			*2310	2070	(15.7)
3.0 m (9.8 ft)	kg							*1190	*1190	*1180	870	*1010	800	5.26
	lb							*2620	*2620	*2600	1920	*2230	1760	(17.3)
2.0 m (6.6 ft)	kg					*1910	1820	*1460	1190	*1270	850	*1030	730	5.48
	lb					*4210	4010	*3220	2620	*2800	1870	*2270	1610	(18.0)
1.0 m (3.3 ft)	kg					*2540	1700	*1730	1140	*1380	830	*1110	720	5.49
	lb					*5600	3750	*3810	2510	*3040	1830	*2450	1590	(18.0)
0.0 m (0.0 ft)	kg			*1830	*1830	*2800	1640	*1900	1100	1390	810	*1260	750	5.28
	lb			*4030	*4030	*6170	3620	*4190	2430	3060	1790	*2780	1650	(17.3)
-1.0 m (-3.3 ft)	kg	*2230	*2230	*3190	3130	*2730	1630	*1870	1090			*1400	850	4.82
	lb	*4920	*4920	*7030	6900	*6020	3590	*4120	2400			*3090	1870	(15.8)
-2.0 m (-6.6 ft)	kg	*3580	*3580	*3670	3190	*2280	1650	*1450	1110			*1440	1110	4.01
	lb	*7890	*7890	*8090	7030	*5030	3640	*3200	2450			*3170	2450	(13.1)
-3.0 m (-9.8 ft)	kg													
	lb													

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HW65AH	MONO BOOM	DOUBLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			3000	1900	330	-	-	Down	-	-

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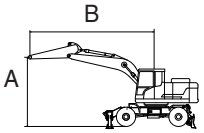

Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1190	*1190	3.94
	lb											*2620	*2620	(12.9)
4.0 m (13.1 ft)	kg							*1060	*1060			*1050	*1050	4.78
	lb							*2340	*2340			*2310	*2310	(15.7)
3.0 m (9.8 ft)	kg							*1190	*1190	*1180	1040	*1010	960	5.26
	lb							*2620	*2620	*2600	2290	*2230	2120	(17.3)
2.0 m (6.6 ft)	kg					*1910	*1910	*1460	1420	*1270	1020	*1030	880	5.48
	lb					*4210	*4210	*3220	3130	*2800	2250	*2270	1940	(18.0)
1.0 m (3.3 ft)	kg					*2540	2070	*1730	1370	*1380	1000	*1110	870	5.49
	lb					*5600	4560	*3810	3020	*3040	2200	*2450	1920	(18.0)
0.0 m (0.0 ft)	kg			*1830	*1830	*2800	2010	*1900	1330	*1440	980	*1260	910	5.28
	lb			*4030	*4030	*6170	4430	*4190	2930	*3170	2160	*2780	2010	(17.3)
-1.0 m (-3.3 ft)	kg	*2230	*2230	*3190	*3190	*2730	2000	*1870	1320			*1400	1030	4.82
	lb	*4920	*4920	*7030	*7030	*6020	4410	*4120	2910			*3090	2270	(15.8)
-2.0 m (-6.6 ft)	kg	*3580	*3580	*3670	*3670	*2280	2020	*1450	1340			*1440	1340	4.01
	lb	*7890	*7890	*8090	*8090	*5030	4450	*3200	2950			*3170	2950	(13.1)
-3.0 m (-9.8 ft)	kg													
	lb													

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HW65AH	MONO BOOM	DOUBLE TIRE	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
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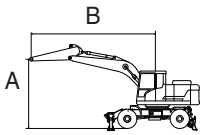

Load point height		Load radius										At max. reach		
		1.0 m (3 ft)		2.0 m (7 ft)		3.0 m (10 ft)		4.0 m (13 ft)		5.0 m (16 ft)		Capacity		Reach
														m (ft)
5.0 m (16.4 ft)	kg											*1190	*1190	3.94
	lb											*2620	*2620	(12.9)
4.0 m (13.1 ft)	kg							*1060	*1060			*1050	990	4.78
	lb							*2340	*2340			*2310	2180	(15.7)
3.0 m (9.8 ft)	kg							*1190	*1190	*1180	920	*1010	840	5.26
	lb							*2620	*2620	*2600	2030	*2230	1850	(17.3)
2.0 m (6.6 ft)	kg					*1910	*1910	*1460	1250	*1270	900	*1030	780	5.48
	lb					*4210	*4210	*3220	2760	*2800	1980	*2270	1720	(18.0)
1.0 m (3.3 ft)	kg					*2540	1800	*1730	1200	*1380	880	*1110	760	5.49
	lb					*5600	3970	*3810	2650	*3040	1940	*2450	1680	(18.0)
0.0 m (0.0 ft)	kg			*1830	*1830	*2800	1740	*1900	1160	*1440	860	*1260	800	5.28
	lb			*4030	*4030	*6170	3840	*4190	2560	*3170	1900	*2780	1760	(17.3)
-1.0 m (-3.3 ft)	kg	*2230	*2230	*3190	*3190	*2730	1720	*1870	1150			*1400	900	4.82
	lb	*4920	*4920	*7030	*7030	*6020	3790	*4120	2540			*3090	1980	(15.8)
-2.0 m (-6.6 ft)	kg	*3580	*3580	*3670	3360	*2280	1750	*1450	1180			*1440	1170	4.01
	lb	*7890	*7890	*8090	7410	*5030	3860	*3200	2600			*3170	2580	(13.1)
-3.0 m (-9.8 ft)	kg													
	lb													

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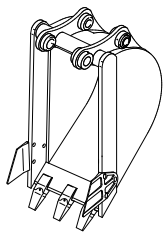
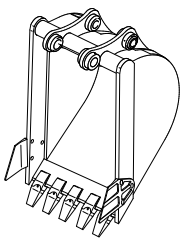
6. BUCKET SELECTION GUIDE

	
0.07m³ SAE heaped bucket	0.18 m³ 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
0.07 m³ (0.09 yd³)	0.06 m³ (0.08 yd³)	270 mm (10.6")	360 mm (14.2")	115 kg (255 lb)	Applicable for materials with density of 1600 kgf/m³ (2700 lb/yd³) or less
0.18 m³ (0.24 yd³)	0.15 m³ (0.20 yd³)	620 mm (24.4")	730 mm (28.7")	170 kg (375 lb)	

7. SPECIFICATIONS FOR MAJOR COMPONENTS

1) ENGINE

Item	Specification
Model	Hyundai DM02VB
Type	4-cycle, turbocharged, intercooled, electronic controlled diesel engine
Cooling method	Air cooled
Number of cylinders and arrangement	4 cylinders, in-line
Firing order	1-3-4-2
Combustion chamber type	Direct injection type
Cylinder bore × stroke	90 × 94 mm (3.5" × 3.7")
Piston displacement	2392 cc (145 cu in)
Compression ratio	16.9 : 1
Gross power	65.9 Hp (48.5 kW)
Net power	63.9 Hp (47 kW)
Max. power	65.9 Hp (485 kW)
Peak torque	25 kgf·m (183 lbf·ft)
Engine oil quantity	8.6 ℓ (2.3 U.S. gal)
Dry weight (wet weight)	253 kg (558 lb)
Starting motor	12 V - 2.5 kW
Alternator	13.5 V - 90 A

2) MAIN PUMP

Item	Specification
Type	AP2D28
Capacity	2 × 25 cc/rev
Maximum pressure	220 kgf/cm^2 (3130 psi)
Rated oil flow	2 × 60 ℓ/min (15.9 U.S. gpm / 13.2 U.K. gpm)
Rated speed	2400 rpm

3) GEAR PUMP

Item	Specification
Type	GSP2H-16
Capacity	16.2 cc/rev
Maximum pressure	200 kgf/cm^2 (2845 psi)
Rated oil flow	38.9 ℓ /min (10.2 / 8.5 U.S. gpm)

4) MAIN CONTROL VALVE

Item		Specification
Type		11 spools, two- block
Operating method		Hydraulic pilot system
Main relief valve pressure		220 kgf/cm^2 (3130 psi)
Port felief valve pressure	Boom	240 kgf/cm^2 (3420 psi)
	Arm	240 kgf/cm^2 (3420 psi)
	Bucket	240 kgf/cm^2 (3420 psi)

5) SWING MOTOR

Item	Specification
Type	Fixed displacement axial piston motor
Capacity	591.7 cc/rev
Relief pressure	230 kgf/cm^2 (3280 psi)
Braking system	Automatic, spring applied hydraulic released
Swing brake	Multi wet disc
Braking torque	272.5 kgf·m (1970 lbf·ft)
Brake release pressure	20~40 kgf/cm^2 (284~570 psi)
Swing bearing lubrication	Grease-bathed
Reduction gear type	2 - stage planetary

6) TRAVEL MOTOR

Item	Specification
Type	Variable displacement axial piston motor
Capacity	80 / 30.2 cc/rev
Relief pressure	235 kgf/cm^2 (3350 psi)

7) POWER TRAIN

Item	Description		Specification
Transmission	Type		2 Speed Powershift transmission
	Gear ratio	1st	4.06
		2nd	1.31
	Clutch pressure		26~32 kgf/cm^2 (370~455 psi)
Parking brake	Type		SAHR (Spring Applied Hydraulic Release)
	Maximum braking power		810 kgf · m (5856 lbf · ft)
Axle	Type		4 wheel drive with differential
	Gear ratio		13.65
	Brake		Wet Type Multiple disc
	Brake pressure		52 kgf/cm^2 (740 psi)
	Steering pressure		148 kgf/cm^2 (2210 psi)

8) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	Ø110 × Ø60 × 715 mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	Ø90 × Ø55 × 850 mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	Ø80 × Ø50 × 660 mm
	Cushion	-
Dozer cylinder	Bore dia × Rod dia × Stroke	Ø110 × Ø60 × 224 mm
	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
HW65AH	STD	0.18 m^3 (0.24 yd^3)	0.15 m^3 (0.20 yd^3)	5	620 mm (24.4")	730 mm (28.7")
	OPT	0.07 m^3 (0.09 yd^3)	0.06 m^3 (0.08 yd^3)	3	270 mm (10.6")	360 mm (14.2")

8. RECOMMENDED OILS

HD Hyundai Construction Equipment 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 HD Hyundai Construction Equipment and, therefore, will meet the highest safety and quality requirements.
We recommend that you use only HD Hyundai Construction Equipment genuine lubricating oils and grease officially approved by HD Hyundai Construction Equipment.

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature ˚C(˚F) -20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104)
Engine oil pan	Engine oil	8.6 (2.3)	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Swing drive	Gear oil	1.5 (0.4)	SAE 80W-90
	Grease	0.2 (0.1)	NLGI NO.1 NLGI NO.2
Gear box case	Gear oil	1.8 (0.5)	SAE 75W-90 SAE 85W-90
Front axle		Center: 5 (1.3) Hub: 0.4×2 (0.11×2)	
Rear axle		Center:5 (1.3) Hub: 0.4×2 (0.11×2)	
Hydraulic tank	Hydraulic oil	Tank; 70 (18.5) System; 120 (31.7)	ISO VG 15 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel★1	125 (33)	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	11 (2.9)	Ethylene glycol base permanent type (50 : 50)

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 : Ultra low sulfur diesel
- sulfur content ≤ 15 ppm

★2 : Soft water
City water or distilled water

※ Using any lubricating oils other than HD Hyundai Construction Equipment genuine products may lead to a deterioration of performance and cause damage to major components.
※ Do not mix HD Hyundai Construction Equipment genuine oil with any other lubricating oil as it may result in damage to the systems of major components.
※ Do not use any engine oil other than that specified above, as it may clog the diesel particulate filter(DPF).
※ For HD Hyundai Construction Equipment genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact HD Hyundai Construction Equipment dealers.

1. CAB DEVICES

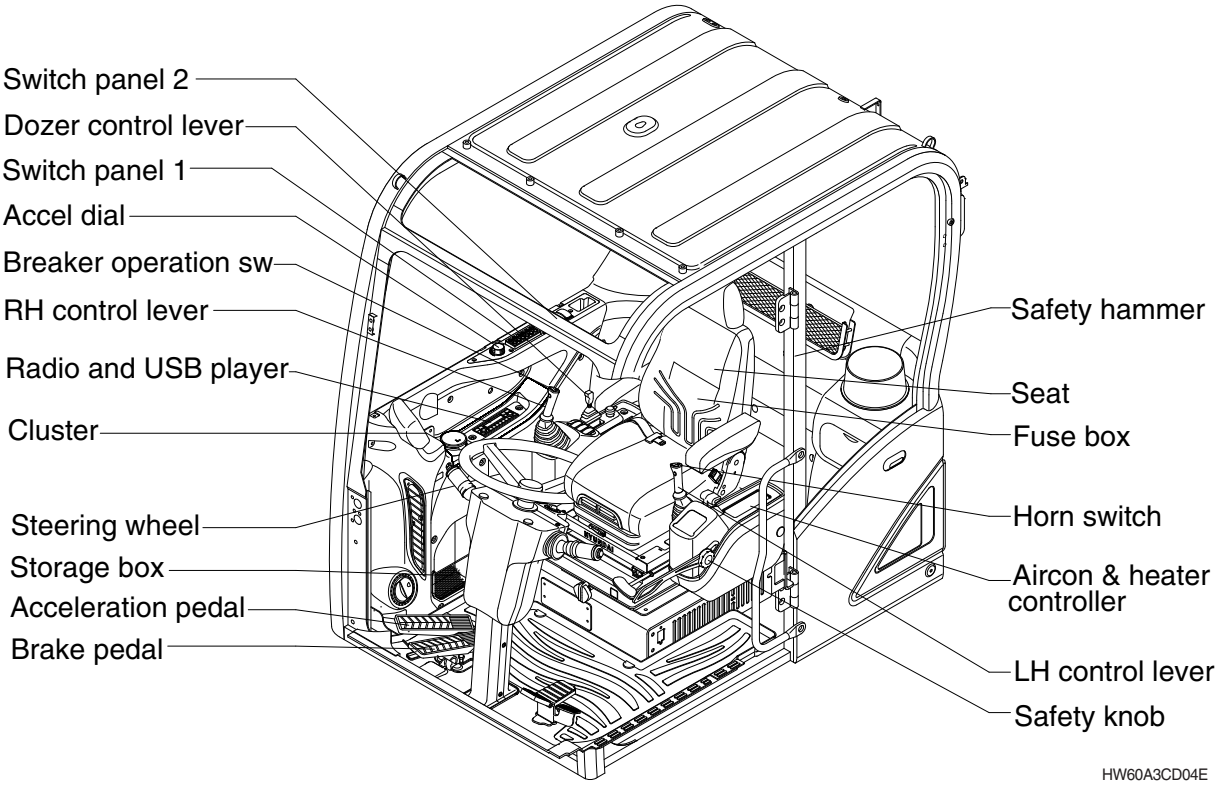
1) The ergonomically designed console box and suspension type seat provide the operator with comfort.

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.

(3) The maintenance work is vary convenient because you can check machine problems related to the electrical device by operating the cluster.



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.**

HW65AH3CD100D

※ **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.

HX60A3CD101A

1	Engine coolant temp gauge	3	Fuel level gauge	5	Accel dial
2	Hydraulic oil temp gauge	4	Engine rpm gauge	6	Clinometer

(2) Engine coolant temperature gauge

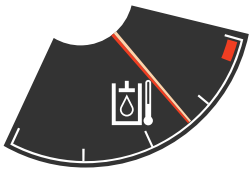
290F3CD53

① This gauge indicates the temperature of coolant.
- Black range : General state
- Red range : Engine overheated state

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 even though the machine is in the normal condition range, check the electric device as this can be caused by poor connection of sensor or connector, and poor grounding of the instrument, etc.

(3) Hydraulic oil temperature gauge



290F3CD54

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 in the normal condition range, check the electric device as this can be caused by poor connection of sensor.

(4) Fuel level gauge

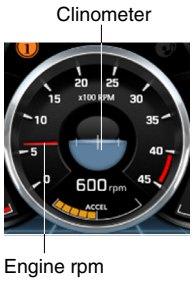
HX60A3CD55A

① This gauge indicates the amount of fuel in the fuel tank.
- Black range : 9% or more
- Red range : below 9%

② Fill the fuel when in 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 in the normal condition range, check the electric device as this can be caused by poor connection of sensor.**

(5) Engine rpm gauge and clinometer



HX60A3CD105K

① This displays the engine speed.

② This displays the tilt of machine.

(6) Accel dial gauge

290F3CD59

① This gauge indicates the level of accel dial from 0 to 10 step.

3) COMMUNICATION ERROR AND LOW VOLTAGE WARNING POP-UP

(1) Communication error pop-up

HX60A3CD107A

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

HX60A3CD108

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.

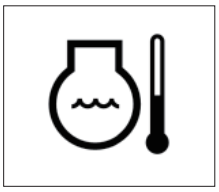
④ When the battery voltage is higher than 11.5 V, the pop-up off.

4) WARNING LAMPS

HW65AH3CD109C

※ 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 up when the buzzer stop switch is pushed or the pop-up is touched. And the buzzer stops. Refer to page 3-17 for the switch.

(1) Engine coolant temperature warning lamp



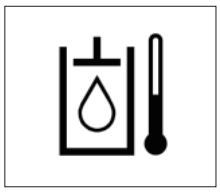
290F3CD61

① The warning light is turned ON and buzzer is sounded when the engine coolant temperature is overheated.

② The engine speed is also decreased unless the coolant temperature is reduced again. Here, do not turn OFF the engine. When the engine is turned OFF, the coolant temperature is overheated even more to cause engine rattle due to the surge.

※ Check the temperature gauge of the engine coolant. The coolant is overheated when the gauge in the red range. Here, the coolant temperature warning lamp is turned ON, and the engine speed is decreased automatically.
The engine performs 'low-speed idle" run until the gauge is returned to the black range. Even when the gauge returns to the black range, do not turn OFF the engine, and perform idle run additionally for 3~5 min. Ignoring this may cause surge from the heat to result in damage to the engine.
The reason for idle run of the engine is to disperse the overheated heat slowly to reduce the temperature.
After proper measures are finished check the coolant level again, and inspect whether the fan belt is loose, and whether there are any foreign substances around the radiator. When the coolant temperature returns to normal temperature, the engine speed is restored to normal speed again.

(2) Hydraulic oil temperature warning lamp



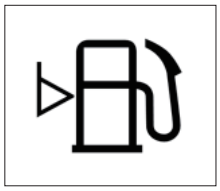
290F3CD62

① This warning 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



290F3CD63

① This warning lamp lights up and the buzzer sounds when the level of fuel is below 9%.
② Fill the fuel immediately when the lamp is ON.

(4) Emergency warning lamp

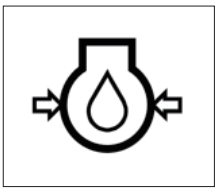
290F3CD64

① This warning lamp pops up and the buzzer sounds when each of the below warnings occurs.
- 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 will stop.
This is same as following warning lamps.

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

(5) Engine oil pressure warning lamp

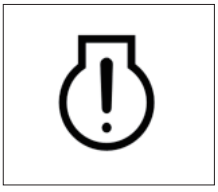


290F3CD65

① This warning lamp lights up when the engine oil pressure is low.
② If the lamp lights up, shut off the engine immediately. Check oil level.

※ Serious damage can be caused to the engine when the engine is operated continuously while the warning lamp is turned ON.

(6) Check engine warning lamp

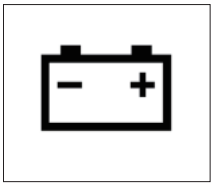


290F3CD66

① Warning lamp is turned ON when the engine must be checked.

※ When the warning lamp is turned ON, stop the machine and find the cause for repair.

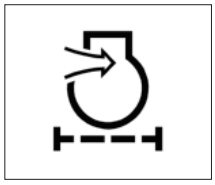
(7) Battery charging warning lamp



290F3CD67

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

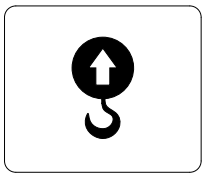
(8) Air cleaner warning lamp



290F3CD68

① This warning lamp lights up when the air cleaner is clogged.
② Check, clean or replace the filter.

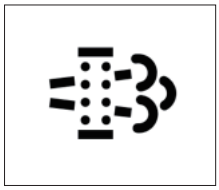
(9) Overload warning lamp (opt)



21093CD36

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

(10) DPF (Diesel Particulate Filter) Warning Lamp



290F3CD70

① This lamp is turned ON or OFF to inform that regeneration is required.
② For details, please refer to the after-treatment system below.

※ After-treatment System

The after-treatment system uses DOG and DPF to satisfy the exhaust regulations.
The oxidation catalyst of DOG reduces the emission of hydrocarbon and carbon monoxide through the catalyst, and the particle materials (PM) discharged from the engine are collected.
DPF regeneration is composed of "forced regeneration" during driving and "manual regeneration" performed by the driver.
When the regeneration is not performed successfully according to the procedure, warning lamp relevant to the each operating condition is turned ON.
When the warning lamp is turned ON, park the machine on a safe place, and perform the regeneration process manually according to the following procedure.
The warning lamp is turned OFF when the regeneration process is performed successfully.

DPF regeneration mode is classified into the following stages according to the soot accumulation level on the DPF.

- Soot level of 80% or less : Normal operating condition
- Soot level of 80~100% : AUTO regeneration during driving
- Soot level of 100~120% : Regeneration initiated by the driver (Manual Regeneration)
- Soot level of 120% or more : Inquiry to the Service Center or agent required
  (DPF warning lamp turned OFF, check engine warning lamp turned ON, engine power reduced)

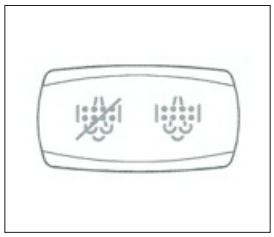
⚠ Engine power can be reduced when the regeneration process is not performed manually after the warning lamp is turned ON.

※ DPF Regeneration Procedure

Procedure	Soot Amount	DPF Warning Lamp	Check engine warning lamp	Decrease in Torque	Remark
1	Less than 99%	-	-	-	No action (Manual regeneration according to the equipment)
2	100~105%	-	-	-	Regeneration is started. Performed in high temperature (560~640˚C)
3	106~110%	Blinking slowly	-	-	Forced regeneration induced (Alarm)
4	111~120%	Blinking slowly	Turned ON	Torque reduced weakly	Forced regeneration induced (Decrease in Torque)
5	121% or more	Blinking quickly	Blinking	Torque reduced severely	Regeneration is inactivated. Inquire to the service center or to the agent to start the service regeneration to solve the decrease in torque

- DPF warning lamp is turned ON when the DPF soot exceeds 100%.
- DPF warning lamp is blinked when the DPF soot level exceeds 105%.
- When the DPF soot level exceeds 111%, the DPF warning lamp blinks slowly, and the check engine warning lamp is turned ON to reduce the engine power.
- When the DPF soot level exceeds 121%, the DPF warning lamp blinks slowly, and the check engine warning lamp is turned ON to reduce the engine power.
- DPF regeneration is composed of the active regeneration occurred during driving and forced regeneration activated manually by the driver.
- When the DPF soot level is less than 105%, active regeneration is activated automatically during driving.
  However, the system informs the driver to perform forced regeneration manually when the level is 105% or more.
  The check engine warning lamp is turned ON when the level is 120% or more, and engine power is reduced to 50%. The driver must inquire to the service center or to the agent.
- DPF soot level of 105% or less : Active regeneration
- DPF soot level of 105~120% : Forced regeneration + Engine power reduced
- DPF soot level of 105~120% : Driver is informed that forced regeneration is required.
- DPF soot level of 120% or more : Regeneration not possible, and inquiry required to the service center or to the agent

※ **Manual (Forced) DPF regeneration method**



HW65A3CD24K

DPF regeneration procedure is activated manually by the driver when the driver selects to initiate the regeneration procedure.
Because the operating condition is inappropriate for the hot engine exhaust temperature (Ex.: Work near the inflammable materials), manual regeneration may be required if the driver prohibited the active regeneration procedure for long period.

① Manual regeneration condition
- Coolant (Engine oil) temperature : 40 ˚C or more
- Engine RPM: Low-speed idle run
- Parking brake must be applied (Only relevant to the wheel-type machine)
- When the soot concentration is accumulated to 20% or more

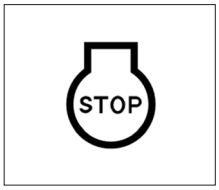
② Manual (Forced) regeneration procedure
Park the machine on a well-ventilated area, and keep away from inflammable materials to set the machine as shown below.
- Operate the machine until the engine coolant and oil temperature becomes 40˚C or more.
- Engine speed is set to low speed.
- Put the gear lever on neutral, and apply the parking brake. (Only relevant to wheel-type machine)
- Safety knob is placed on the locking position.
- When the regeneration mode is in "Prohibit", DPF switch is pressed to the manual regeneration position.

③ Regeneration switch is activated to initiate the regeneration procedure.

※ **DPF warning lamp is lighted on the monitor.**
While the engine speed is in low speed, the speed is increased gradually to 2000 RPM, and the regeneration procedure is initiated.
Manual regeneration can be continued for maximum of 30 min. or more according to the soot accumulation amount.
HEST lamp is lighted during the regeneration, and HEST lamp is turned OFF when regeneration is stopped.

※ **The driver can stop the manual regeneration by lifting the safety knob to the "Release Lock" position, or by pressing the DPF switch to the "Prohibit" position.**

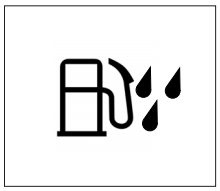
(11) Stop engine warning lamp



290F3CD252

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

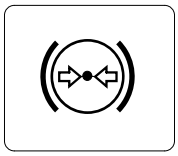
(12) Water in fuel warning lamp



HX60A3CD110

① This warning lamp lights up when the water separator is full of water or malfunctioning.
② When this lamp lights up, stop the machine and drain water from the water separator.

(13) Brake oil pressure warning lamp



55I3CD95A

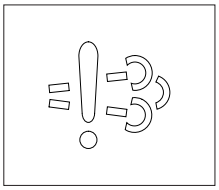
① This warning lamp lights up when the oil pressure of service brake drops below the normal range.
② When the lamp lights up, stop the engine and check for its cause.
※ **Do not operate until any problems are corrected.**

(14) Seat belt reminder warning lamp

300A3CD25

① When operator does not fasten the operator's seat belt, the seat belt reminder warning lamp pops up and the buzzer sounds.
② Fasten the seat belt.

(15) Exhaust System Failure Warning Lamp



HW60A3CD53A

① This warning lamp is turned ON in 3 cases such as when the quantitative distribution is stopped, poor reagent quality and monitoring malfunction, etc.

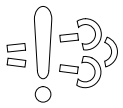
② Please refer to the exhaust gas control system below.

※ Exhaust Gas Control System

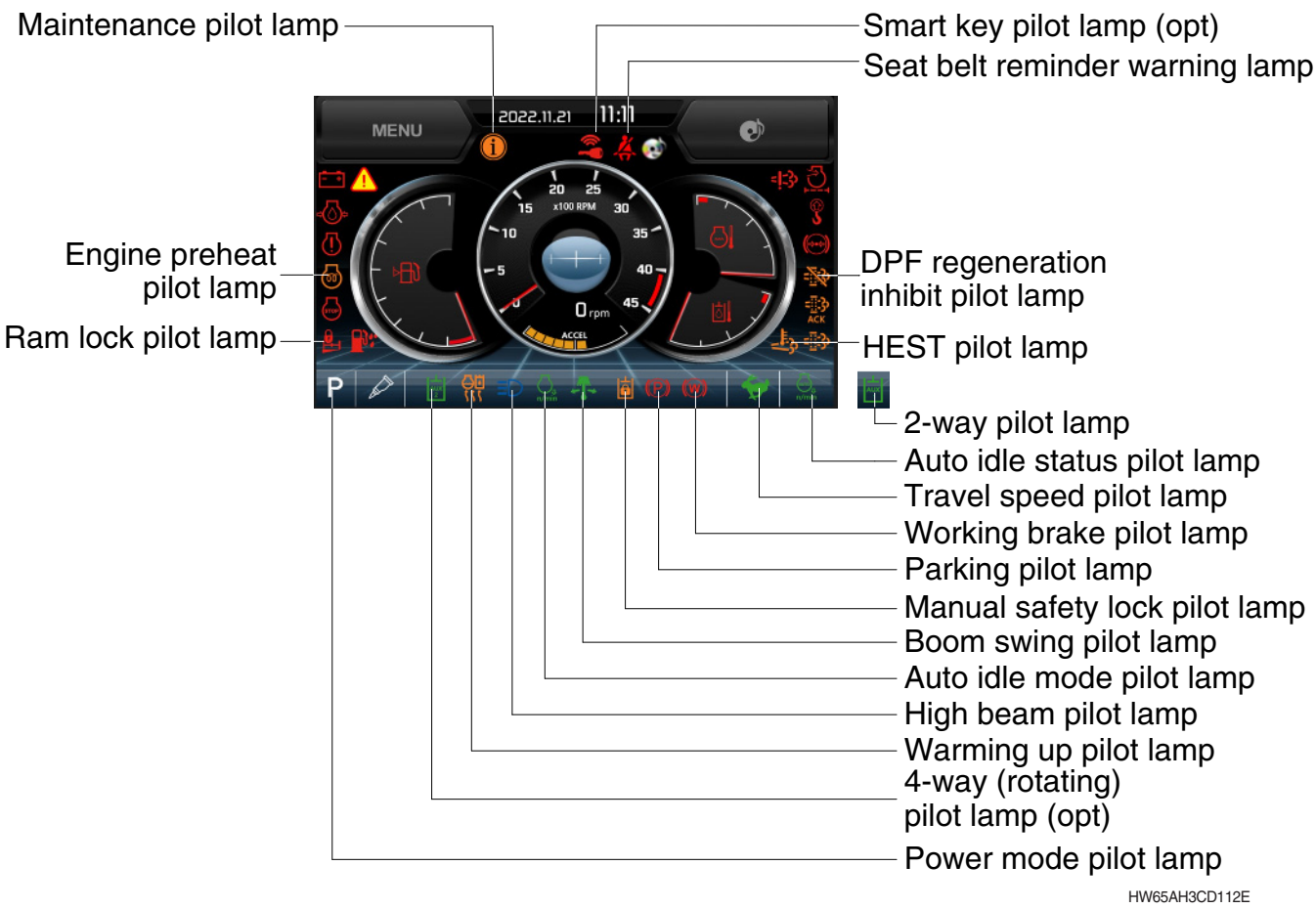
This machine is equipped with the engine exhaust gas emission control system that satisfies the exhaust gas emission regulations. The owner/driver has the responsibility of proper operation and maintenance on the exhaust control system provided in the guaranteed provisions related to emission.

The engine exhaust system is mounted on the DPF. DPF is a emission reduction device that reduces the diesel particulate matter or soot from the exhaust gas of the diesel engine. DPF is stored until the particulate matter is combusted. The process of combustion and elimination of the stored particulate matter is referred to as "Regeneration". After the regeneration process is completed, residue is remaining, and it must be removed from the DPF regularly.

⚠ The temperature of the exhaust gas and components of the exhaust system are in very high temperature during regeneration. There are risks of fire or burn, and it can also result in death, severe injury or property loss. Inflammable materials and explosive gas must be kept far away from the exhaust system during regeneration.

Item	Stage	Reducing Agent Level/Time	Notification Method	Decrease in Torque	Symbol
EGR Valve Problem	Warning	Immediately	Always	-	
	Level 1	+36 hours	Blinking slowly	Torque Limit : ~25%	
	Serious	+64 hours (100 hours)	Blinking quickly + Buzzer	Torque Limit : ~50% Speed Limit : 60%	

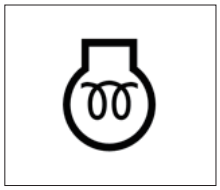
5) PILOT LAMPS



(1) Mode pilot lamps

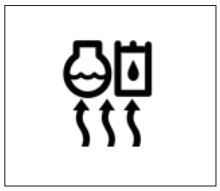
No	Mode	Pilot lamp	Selected mode
1	Power mode	P	Heavy duty power work mode
		S	Standard power mode
2	Travel mode		Low speed traveling
			High speed traveling
3	Auto idle mode		Auto idle mode
			Auto idle status

(2) Preheat pilot lamp


290F3CD79

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

(3) Warming up pilot lamp

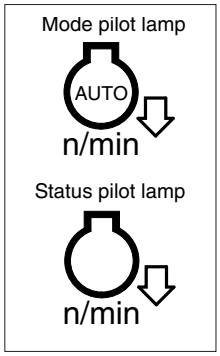


290F3CD80

① This lamp is lights up 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 (86˚F), or when 10 minutes have passed since starting the engine.

(4) Auto idle status/ mode pilot lamp



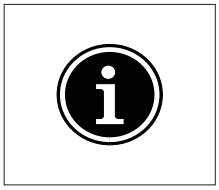
85A3CD106

① The auto idle mode pilot lamp will light up when the idle mode is selected.

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

③ One of the lever or pedal is operated, the status lamp will go OFF and the engine speed returns to the previous conditions.

(5) Maintenance pilot lamp



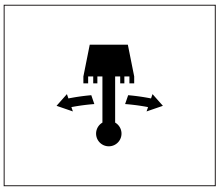
HX60A3CD116

① This lamp lights up when consumable parts are in need of replacement. It means that the change or replacement interval of parts is 30 hours from the required change interval.

② Check the message in maintenance information of main menu. Also, this lamp lights up for 3 minutes when the start switch is switched to the ON position.

※ **Refer to page 3-23.**

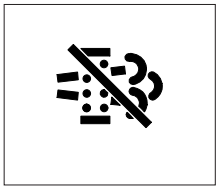
(6) Boom swing pilot lamp



HX603CD82

① This lamp lights up when the boom offset switch is pressed.

(7) DPF regeneration inhibit warning lamp

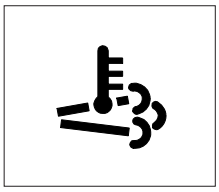


85A3CD107

① This warning lamp indicates, the DPF switch is pushed to the inhibit position, therfore automatic and manual regeneration can not occur.

※ **Refer to page 3-40 for the DPF switch.**

(8) HEST (High exhaust system temperature) warning lamp



85A3CD109

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

⚠ When this lamp is illuminated, the exhaust gas temperature could reach 600˚C [1112˚F], which is hot enough to ignite or melt common materials, and to burn people.

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

(9) Parking pilot lamp

210WF3CD05

① This lamp lights up when the the parking switch is set to the parking position.

※ Refer to the page 3-40.

(10) Working brake pilot lamp

210WF3CD07

① This lamp lights up when the working brake switch is set to working position.

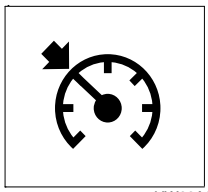
※ Refer to page 3-40.

(11) Ram lock pilot lamp

210WF3CD04

① This lamp lights up when the ram lock switch is set to the LOCK position.
② Also, this lamp lights up when the select switch is set to the parking position or the brake pedal is applied in the traveling.

(12) Cruise pilot lamp



HW60A3CD46

① This lamp lights up when the auto-cruise of panel switch is pressed.

※ **Refer to the page 3-39.**

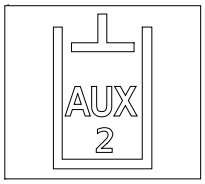
(13) High beam pilot lamp

210WF3CD06

① The lamp lights up when the head lamp switch is set to the high beam position or passing conditions.

② When passing other machines ahead, this lamp must be used for a few seconds to give other machines warning for a few seconds.

(14) 4-way (rotating) pilot lamp (opt)

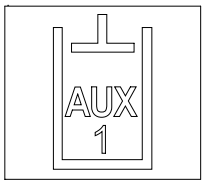


HW60A3CD48A

① This lamp lights up when the boom swing selection switch is set to the rotator (not used boom swing) and the 4-way operation switch on the LH control lever is pressed.

※ **Refer to the page 3-42.**

(15) 2-way pilot lamp



HW65A3CD49

① This lamp lights up when the option flow control function is activated in the cluster.

※ **Refer to the page 3-23.**

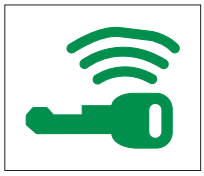
(16) Manual safety lock pilot lamp

140WA3CD37

① This lamp lights up when the safety knob is set to the LOCK position.

※ **Refer to page 3-47 for the safety knob.**

(17) Smart key pilot lamp (opt)



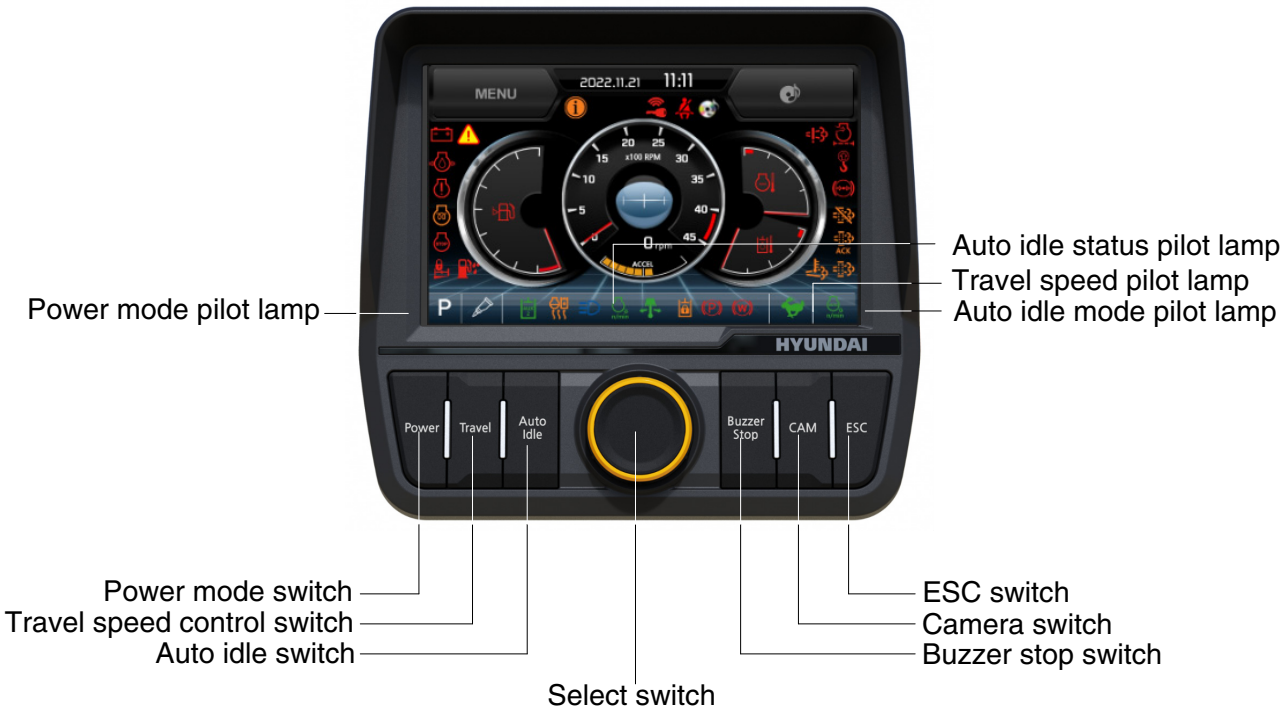
300A3CD36A

① This lamp lights up when the engine is started by the start button.

② This lamp is red when the a authentication fails, it will be green when it authentication is successful.

※ **Refer to the page 3-27.**

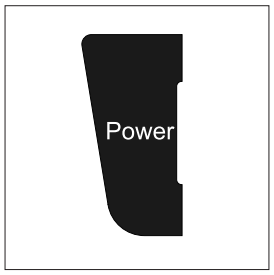
6) SWITCHES



HW65AH3CD117D

※ **When the switches are selected, the pilot lamps are displayed on the LCD. Refer to the page 3-12 for details.**

(1) Power mode switch

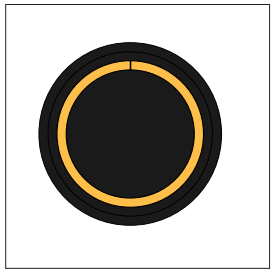


HX60A3CD118

① This switch is to select the machine power mode and when pressed, the power mode pilot lamp will be displayed on the section of the monitor.
- P : Heavy duty power work.
- S : Standard power work.

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

(2) Select switch



HX60A3CD119

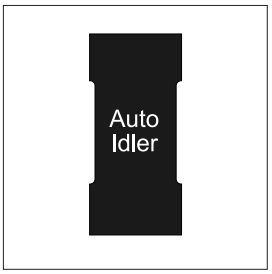
① This switch is used to select or change the menu or input value.

② Knob push
- 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 switch

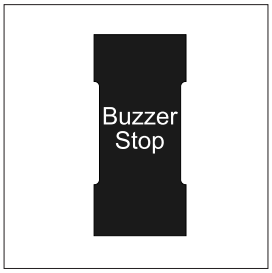


HX60A3CD120

① This switch is used to activate or cancel the auto idle function.

※ **Refer to the page 3-13 for details.**

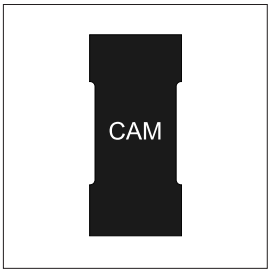
(4) Buzzer stop switch



HX60A3CD121

① The buzzer sounds when the machine has a problem.
In this case, push this switch and buzzer stops, but the warning lamp lights up until the problem is cleared.

(5) Camera switch

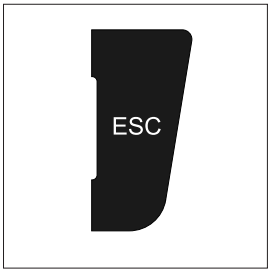


HX60A3CD122

① In the operation screen, pushing this switch will display the view of the camera on the machine (if equipped).

※ **Please refer to page 3-34 for the camera.**

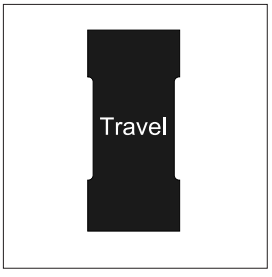
(6) Escape switch



HX60A3CD123

① This switch is used to return to the previous menu or parent menu.

(7) Travel speed control switch



HX60A3CD104

① This switch is used to select the travel speed alternatively.

- : Low speed
- : High speed

※ **Do not change the setting of the travel speed switch while machine is moving. Machine stability may be adversely affected.**

⚠ **Serious injury or death can result from sudden changes in machine stability.**

7) MAIN MENU

Main menu screen

HX60A3CD124A

Tap
MENU or
Press

Press

Sub menu screen

HW60AH3CD125A

※ Please refer to the select switch, page 3-17 for selection and change of menus and input values.
※ In the operation screen, tap MENU or press the select switch to access the sub-menu screen.

(1) Structure

No	Main menu	Sub menu	Description
1	 Monitoring 55I3CD51A	Active fault - Machine Active fault - Engine Logged fault - Machine/engine Delete logged fault Monitoring - Machine Monitoring - Switch Monitoring - Output	MCU ECU MCU, ECU MCU, ECU Engine rpm, oil temp, voltage and pressure etc. Digital switch status Digital output status
2	 Management 55I3CD51B	Maintenance information Option flow control ESL mode setting Change password Machine information A/S phone number Cluster update CAN update Service menu	Elapsed time, Change interval, Replacement etc. Opt attch set, Proportional flow control set, Confifirmation ESL mode setting Password change Cluster, MCU, Engine, Machine A/S phone number, A/S phone number change Application, System Program download, Update Power shift, Operating hour, Gauge type, Rpm, AVCU set, Language update etc
3	 Display 55I3CD51C	Clock Brightness Unit Language	Current time set Manual, Auto Temperature, Pressure, Flow, Distance, Volumn 22 kinds
4	 Utilities 55I3CD51D	Entertainment Camera setting Clinometer setting Manual Emergency mode Quick cooling mode	Video/music file playing Setup of number of active cameras, display sequences, and camera numbers Initializing slope sensor Display cluster manual Back-up switch for failed cluster switch and accel dial To maximize engine cooling performance

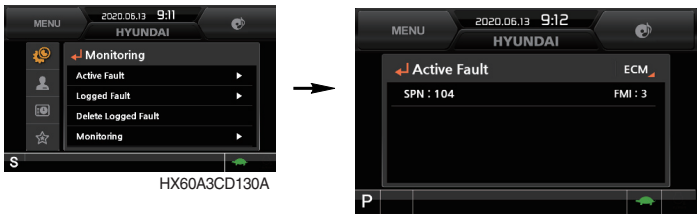
(2) Monitoring

① Active fault - Machine

HX60A3CD130A HX60A3CD131A

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

② Active fault - Engine



HX60A3CD130A HX60A3CD133A

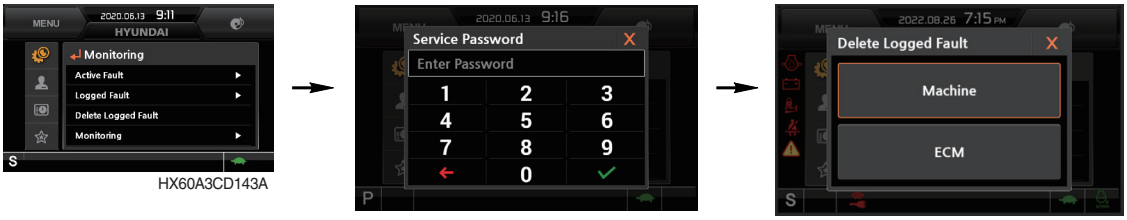
· The active faults of the engine ECU can be checked by this menu.

③ Logged fault - Machine/ Engine

HX60A3CD134A HX60A3CD135A HX60A3CD136A

· The logged faults of the machine MCU or engine ECU can be checked by this menu.
· This menu can be used only HCE service man.

④ Delete logged fault

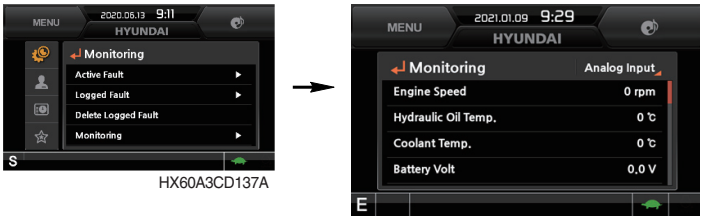


HX60A3CD143A HX60A3CD144A HW60AH3CD145A

HX60A3CD146A HW60AH3CD147A

· The logged faults of the MCU, engine ECU can be deleted by this menu.
(It is possible under the engine stop conditions)

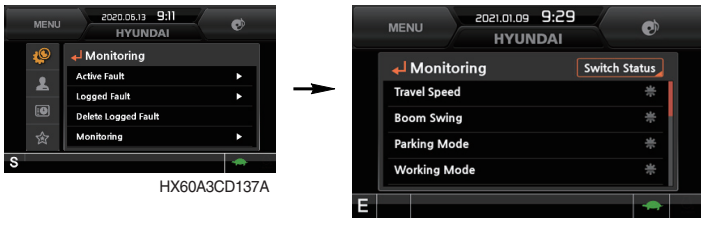
⑤ Monitoring (machine status)



HX60A3CD137A HX60A3CD138A

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

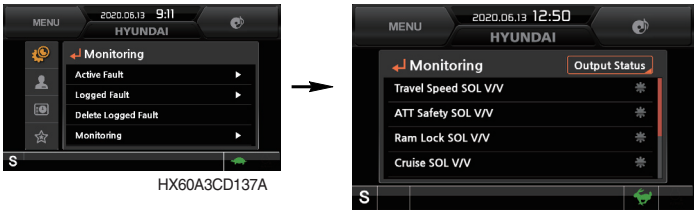
⑥ Monitoring (switch status)



HX60A3CD137A HX60A3CD140A

· The digital switch status of the machine can be checked by this menu.
· The activated switch will display in blue color.

⑦ **Monitoring** (output status)



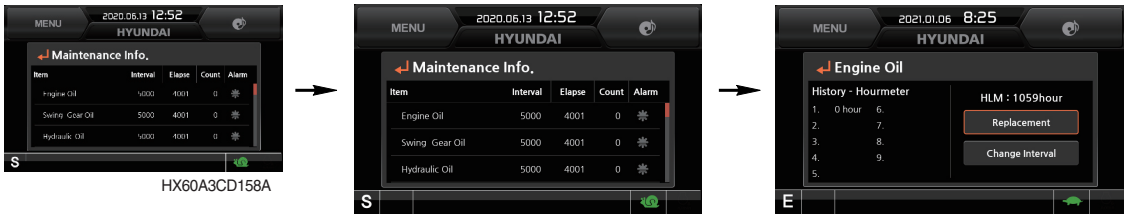
HX60A3CD137A

HX60A3CD142A

- The digital output status of the machine can be checked by this menu.
- The digital output status will display in blue color.

(3) Management

① Maintenance information



HX60A3CD158A HX60A3CD199K HX60A3CD157A

- Elapsed time : Display the elapsed time after the maintenance.
- Change interval : The change intervals can be changed in hour increments of 50.
- Change history : Display the change history for the maintenance.
- Replacement : The elapsed time will be reset to zero (0).
- Change or replace interval

※ **Refer to the page 6-16.**

② Option flow control

a. Option attach selection

HW60A3CD33OA HW60A3CD41OA HW60A3CD42O

- Three kinds of option attachment can be selected by this menu.
  - ⓐ Rotary grapple (4-way)
  - ⓑ Grapple (2-way)
  - ⓒ Auger (2-way)

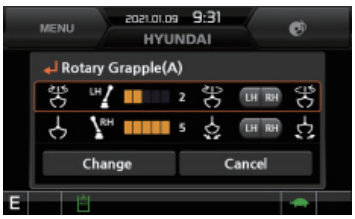
※ **There are two user modes (type A or B) in each option attachment.**

b. Proportional flow control setting

The preferable value of each option attachment can be set by this menu.

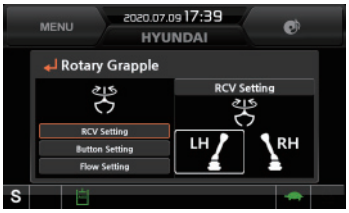
a) Rotary setting

HW60A3CD42O



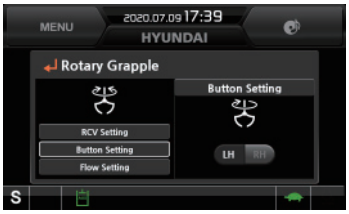
HW60A3CD51OA

· Select rotary
RCV, button and flow can be set by this menu



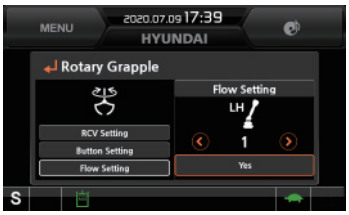
HW60A3CD52OA

· RCV setting
– Enable set LH or RH RCV for rotary operation.
– Select LH for rotary → RH set for grapple automatically



HW60A3CD53OA

· Button setting (CW rotation)
– Select LH for CW rotation → RH set for CCW rotation automatically

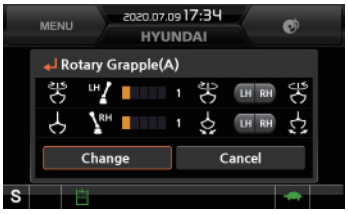


HW60A3CD54OA

· Flux setting
– Enable set from level 1 to level 5.

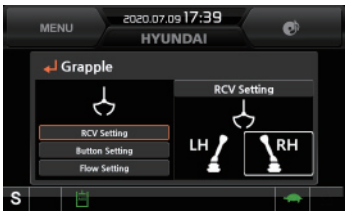
b) Grapple setting

HW60A3CD42O



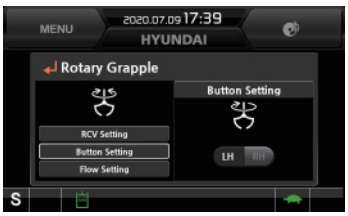
HW60A3CD61OA

· Select grapple
RCV, button and flow can be set by this menu



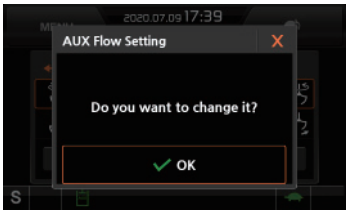
HW60A3CD62OA

· RCV setting
– Enable set LH or RH RCV for grapple operation.
– Select LH for grapple → RH set for rotary automatically



HW60A3CD63OA

· Button setting (Close)
– Select RH for Close → LH set for open automatically

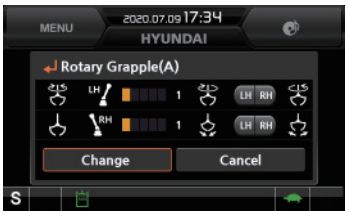


HW60A3CD72OA

HW60A3CD64OA

· Flow setting
– Enable set from level 1 to level 5.

HW60A3CD42O



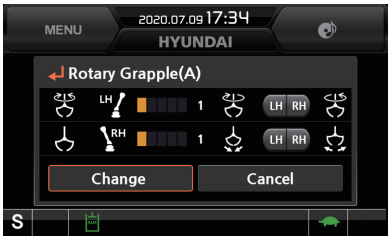
HW60A3CD71OA

· Flow setting value can be saved by pressing change button.

※ Setting value saved once, it memorized in each icon and the last setting value is activated.
※ Saved setting can be used by pressing Icon button only.
※ There are two kinds (A and B) in each option attach setting and six kinds of option attach setting can be saved totally (2 of 4-way, 4 of 2-way).

c) Confifirmation

HX60A3CD81OA



HW60A3CD71OA

※ Symbol ( ) is activated on the low side of main screen when option attach function is used.

※ Previous setting value can be checked by following procedure.

– Menu > Management > option attach

a) Rotary setting

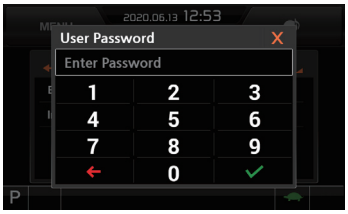
– Rotary RCV : LH
– Rotary flow level : 3
– CW rotation : LH
– CCW rotation : RH

b) Grapple setting

– Grapple RCV : RH
– Grapple flow level : 3
– Open : LH
– Close : RH

③ ESL mode setting

HX60A3CD148A



HX60A3CD149A

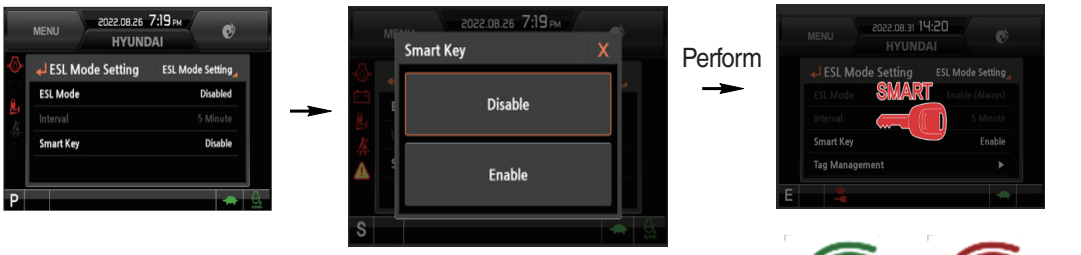
HW60AH3CD150A

– ESL : Engine Starting Limit
– ESL mode is designed to be a theft deterrent or will prevent the unauthorized operation of the machine.
– When you Enable the ESL mode, the password will be required when the starting switch is turned to the on position.
– Disable : ESL function is disabled and password is not required to start engine.
Enable (always) : The password is required whenever the operator starts engine.
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 to a maximum 4 hours.

※ Default password : 00000
Password length : 5~10 digits

Start Limit - Smart Key Setting (When smart key is installed)



- **Smart Key Exclusive**

  When the Smart key option (optional) is installed, Smart key menu is shown, and performance or non-performance of Smart key authentication can be set through the Smart key menu.

  When the Smart key is not in the cabin, the approval procedure is rejected, and password must be entered.

Start Limit - Tag Management

- The tag management menu is activated only when the Smart key menu is set through performance. Tag can be registered or deleted.
  - · When registering the tag : Locate only the tag preferred for registration inside the cabin.
  - · When deleting the tag : All registered tags are deleted.

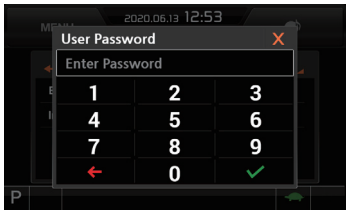
※ Engine Starting Condition

Case	ESL Mode	Smart Key	Condition
1	Disable	Disable	- With registered tag : Engine can be started without password input. - Without registered tag : Engine can be started without password input.
2	Disable	Enable	If Smart Key is enabled, ESL Mode is automatically enabled. This Case 2 work the same as the Case 4.
3	Enable	Disable	- With registered tag : Engine can be started with password input. - Without registered tag : Engine can be started with password input.
4	Enable	Enable	- With registered tag : Engine can be started without password input. - Without registered tag : Engine can be started with password input.

④ Password change

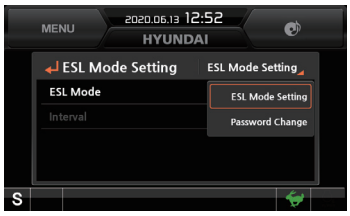
– The password is 5~10 digits.

HX60A3CD151A



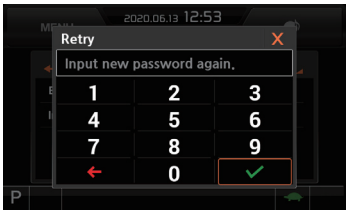
HX60A3CD149A

Enter the current password



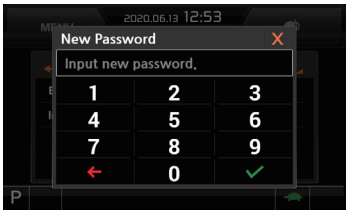
HX60A3CD153A

Select the password change



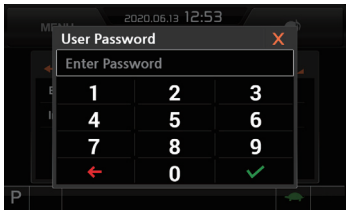
HX60A3CD156A

Saved the new password in the MCU



HX60A3CD155A

Enter the new password again

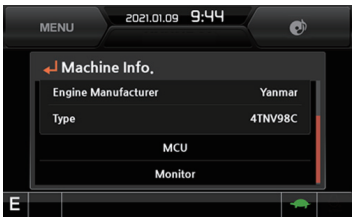


HX60A3CD149A

Enter the new password

⑤ Machine information

HX60A3CD160A



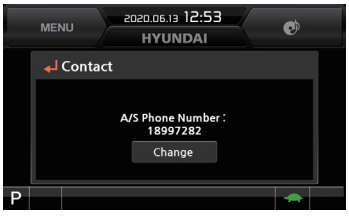
HX60A3CD161A

HX60A3CD162A

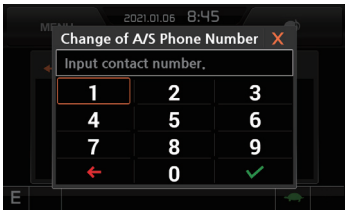
· The information of the cluster, machine MCU and engine and machine checked by this menu.

⑥ A/S phone number

HX60A3CD163A



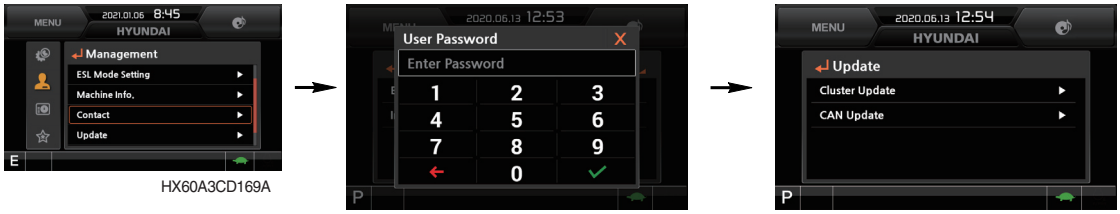
HX60A3CD164A



HX60A3CD165A

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

⑦ Cluster update



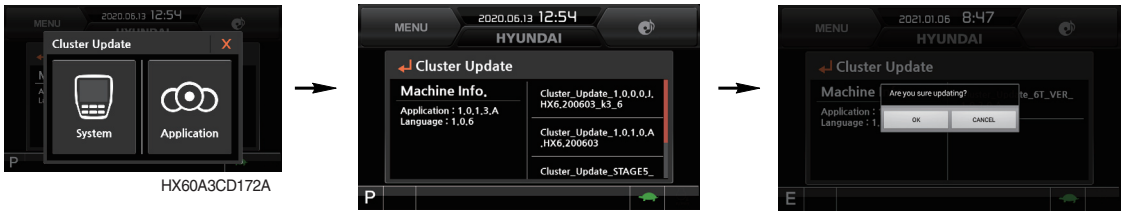
HX60A3CD169A HX60A3CD149A HX60A3CD170A

Enter the user password Select the cluster update

· The cluster and CAN device can be updated by this menu.

※ **Do not turn power off while updating.**

a. Application update



HX60A3CD172A HX60A3CD173A HX60A3CD174A

Select application item Select file to update Select OK

HX60A3CD176 HX60A3CD175A

Completed In process

b. System update

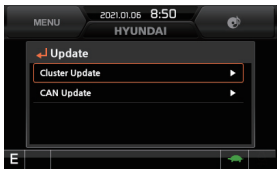
HX60A3CD177A HX60A3CD173A HX60A3CD174A

Select system item Select file to update Select OK

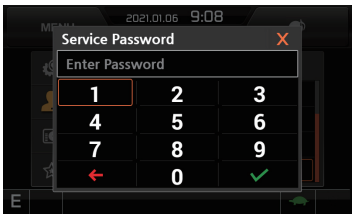
HX60A3CD176 HX60A3CD175A

Completed In process

⑧ CAN update

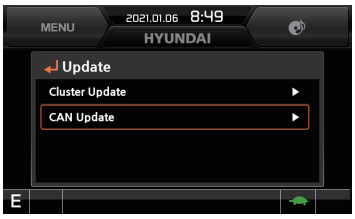


HX60A3CD169A



HX60A3CD149A

Enter the user password



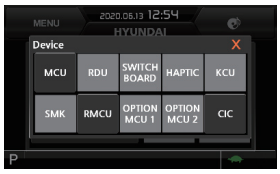
HX60A3CD179A

Enter the CAN password again

· The application program can be downloaded and updated by this menu.

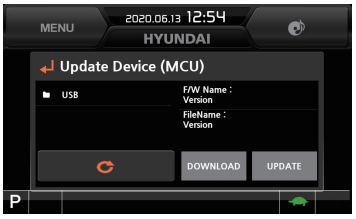
※ **Do not turn power off while updating.**

a. Download



HX60A3CD180A

Select update device

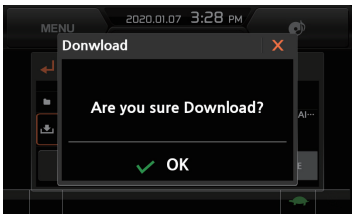


HX60A3CD181A

Select download

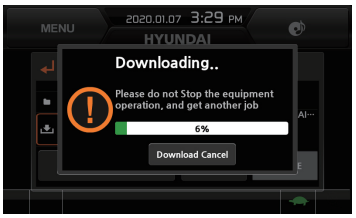
HX60A3CD182A

Select download after choose update file



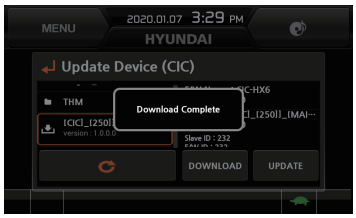
HX60A3CD183A

Confirm download



HX60A3CD184A

Stop download when select the cancel

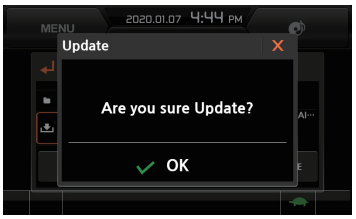


HX60A3CD185A

b. Update

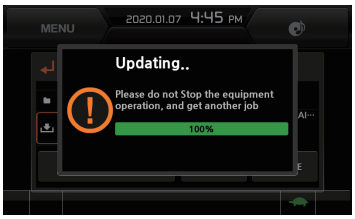
HX60A3CD186A

Select update after the download.



HX60A3CD187A

Confirm the update

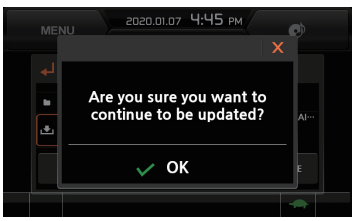


HX60A3CD188A

In process update

HX60A3CD175A

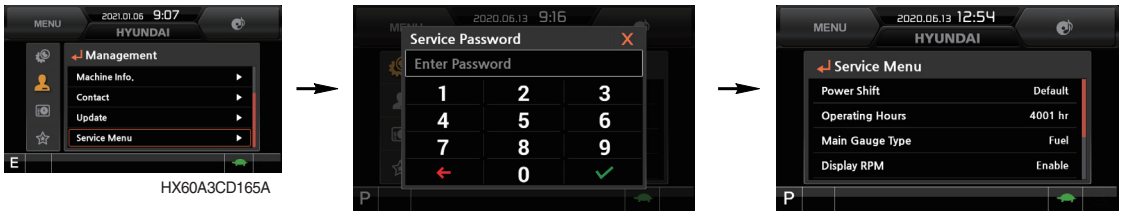
Completed update



HX60A3CD190A

Select the OK to update another application program

⑨ Service menu



HX60A3CD165A HX60A3CD144A HX60A3CD168A

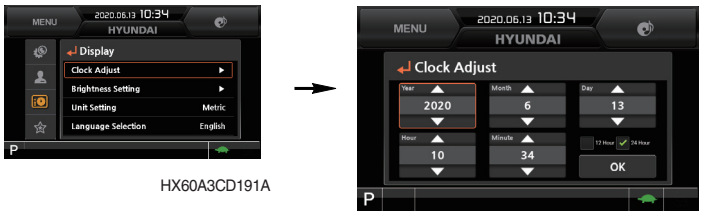
Enter the manager password

· Power shift : Power shift mode (default/option can be set by this menu.
· Operating hours : Operating hours in individual modes since the machine line out can be checked by this menu.
· Main gauge type : The engine rpm or fuel level gauge can be display on the main gauge of the main screen by this menu.
· Display RPM : Display the numeric value of engine rpm on the main gauge of the main screen can be set by this menu.
· AVCU setting : Standard, 2-Way or 4-Way dependent upon the machine options can be selected by this menu.
· Adding language : The language displayed on the cluster can be update by this menu when it is required to correct language.

※ This menu can be used only HCE service man. Do not attempt unauthorized adjustment.

(4) Display

① Clock adjust

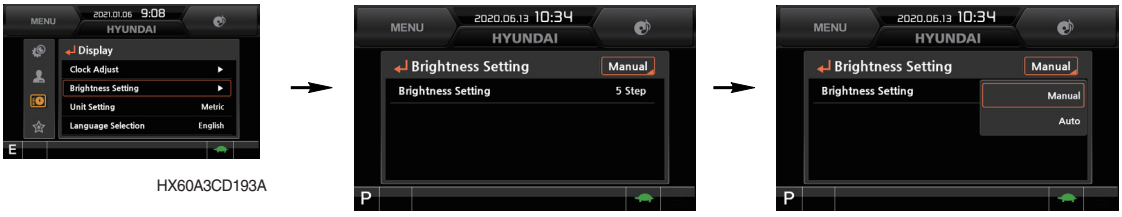


HX60A3CD191A

HX60A3CD192A

- The first row of boxes indicate Year/Month/Day.
- The second row shows the current time. (AM, PM/0:00~12:59)

② Brightness

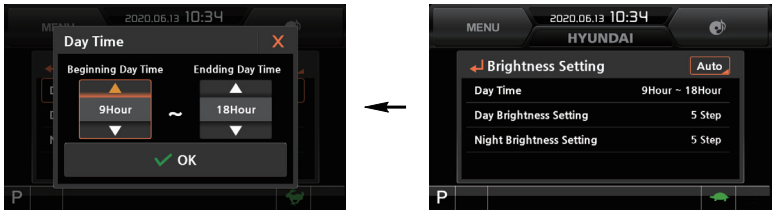


HX60A3CD193A

HX60A3CD194A

HX60A3CD195A

Manual (1st~10th step)



HX60A3CD197A

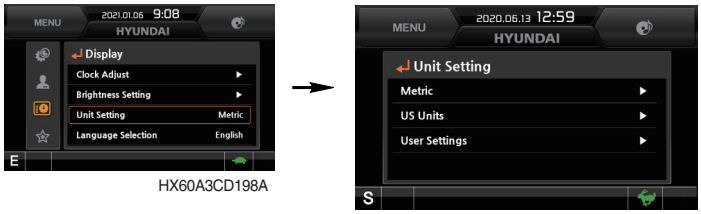
Auto (day/night)

HX60A3CD196A

Auto (day time)

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

③ Unit set



HX60A3CD198A

HX60A3CD199A

– Metric units : Units change to metric units.
– US units : Units change to U.S. units
– User setting : Units change to user setting units

Item	Metric units	U.S. units	User setting
Temperature	˚C	˚F	˚C, ˚F
Distance	km	mile	km, mile
Pressure	bar	Mpa	bar, Mpa, kgf/cm^2, psi
Flow	lpm	gpm	lpm, gpm
Volume	l	gal	l, gal

④ Language selection

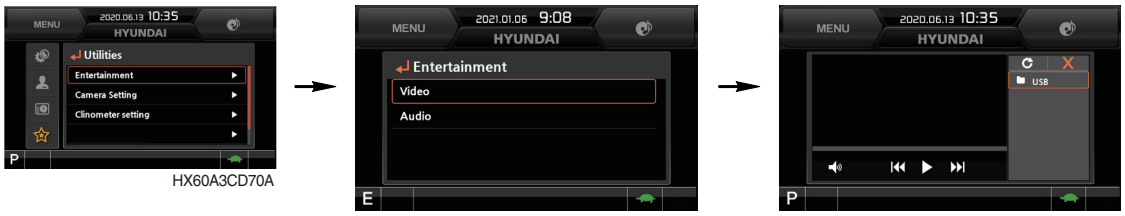
HX60A3CD200A

HX60A3CD201A

· User can select preferable language (22 languages) and all displays are changed the selected language.

(5) Utilities

① Entertainment

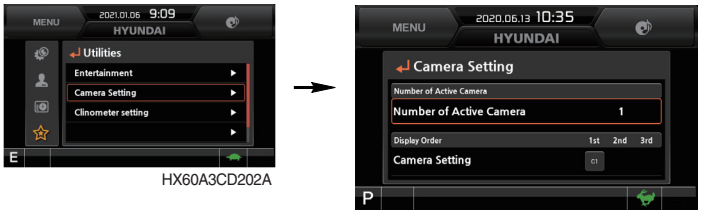


HX60A3CD70A HX60A3CD208A HX60A3CD209A

- Play MP4 or codec file of external hard disk through USB port.
- The USB port is located left side of the cluster.
- Over 1100 engine rpm, the screen turns into the operation screen with MP4 or codec file playing for the safety. The video is played again when the engine revolution is 1100 rpm or less.

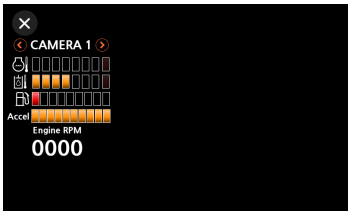
⚠ **The video play is prohibited for the safety reason when the machine is operated.**

② Camera setting



HX60A3CD202A HX60A3CD203A

- Three cameras can be installed on the machine and display order can be set by this menu.
- If the camera is not equipped, this menu is not useful.
- Turning the select switch in clockwise direction, the next ordered will be shown and in counter-clockwise direction, the previously ordered will be shown. Also, the camera channel can be changed by touching the screen.
- Display change to reduction size or display is not visible by pushing the select switch or touch the screen.
  (display reduction size → hiding → display)



HX60A3CD204

- The camera display is terminated by pressing the ESC switch or touch the X icon on the screen.

■ Rear / RH view camera UI setting (Option)

1) Camera control switch

– Select the CAM switch to activate Rear / RH view camera from the beginning screen.
– While in that mode, select the ESC switch to return to the home screen.

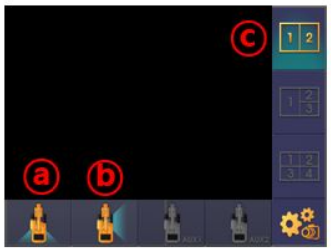
2) Cam image control (CIC) mode

– Touch ⓐ(Rear), ⓑ(RH) button on screen to set single-view camera mode.
– Touch ⓒ(2CH-split-view) button to set split-view camera mode.

ⓐ (Rear)

ⓑ (RH)

ⓒ (2CH Split-view)



Rear / RH view option

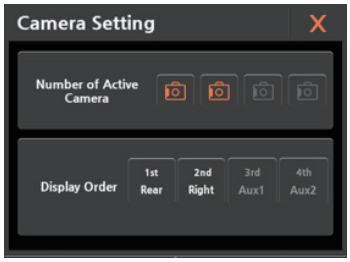
3) Split-view Camera order setting

– Touch ⓓ (camera setting) button to set split-view camera order.

ⓓ(Camera Setting)

Rear / RH view option

– You can change spilt-view camera order on display order menu.



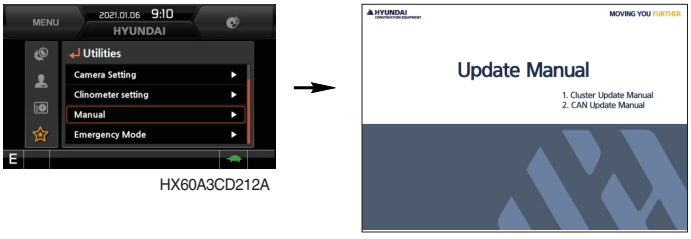
③ Clinometer setting

HX60A3CD210A

HX60A3CD211A

· When the machine is on the flatland, if you touch "initialization" on cluster, the values of X, Y will reset to "O".
· You can confirm tilt of machine in cluster's operating screen.

④ Manual

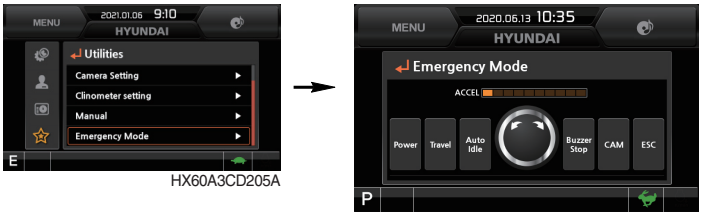


HX60A3CD212A

HX60A3CD213A

· Manual of the cluster can be read on the monitor.

⑤ Emergency mode



HX60A3CD205A

HX60A3CD206A

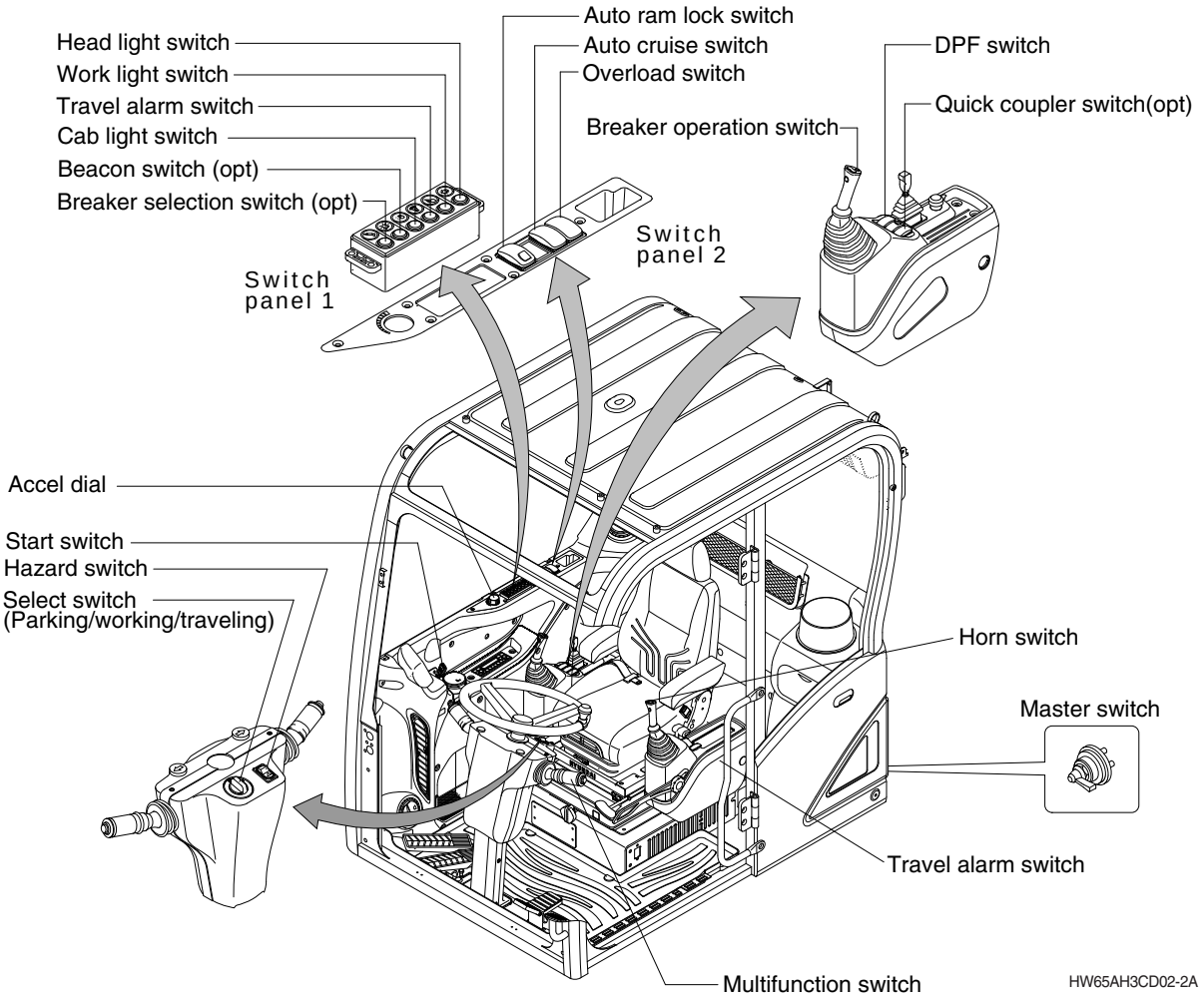
· When switches of the monitor and the accel dial fails, switches are displayed on LCD, and you are allowed to perform operation by touching the screen.
· Such operation is allowed only on this mode screen.

⑥ Quick Cooling Mode

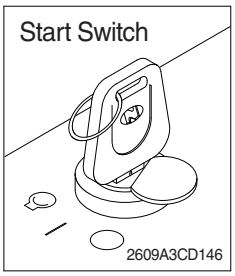
HW60AH3CD205A

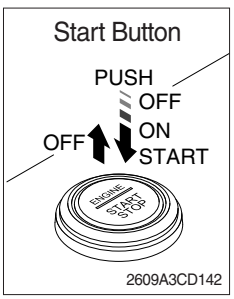
HW60AH3CD206A

· While the machine is stopped and discontinued with operation, engine can be operated in maximum RPM for maximum rotation of the radiator fan. (Max. for 5 minutes)
- Setting : When the machine is stopped, the safety knob is lowered to set the quick cooling mode in the locked state
- Release : Released when the operating time exceeds 5 minutes, when the safety knob is cleared, and when the quick cooling mode release button is pressed



1) START SWITCH AND BUTTON (OPTIONAL)





Start button and Smart key tag (Optional)

(1) There are 3 switches of OFF, ON and START.

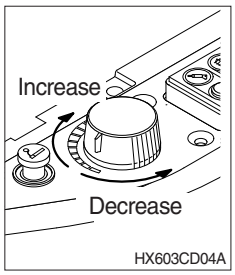
- ◯ (OFF) : As the position possible for inserting and removing the key, engine is stopped when the key is in the OFF position while the engine is operating.
- | (ON) : The overall machine system is operated.
- (START) : It is used to start the engine. Remove your hand after engine is started.

※ When the start switch is turned ON in the winter season, the coolant temperature is detected to operate the fuel heater automatically, and the fuel is heated.
When the start switch is turned ON, the engine is started in 1~2 minutes. More time may be required according to the outdoor temperature.

※ Starting switch contoller tries engine starting at least 3 seconds even if switch is released after driver's start trial (key switch : start position / starting button : long push) to prevent short-time cranking (which can not starting engine). If no-start conditions (unlock safety knob) are resolved (lock safety knob) during the 3 seconds of engine starting attempt, engine can be started.

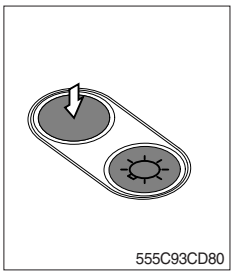
※ To maintain the electrical and hydraulic functions, and to prevent machine damage, the start switch is placed on the ON position when the engine is operating.

2) ACCEL DIAL



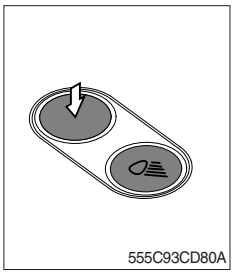
(1) There are 10 dial setting.
(2) Setting 1 is low idle and setting 10 is high idle.
- By rotating the accel dial to right : Engine speed increased.
- By rotating the accel dial to left : Engine speed decreased.

3) HEAD LIGHT SWITCH



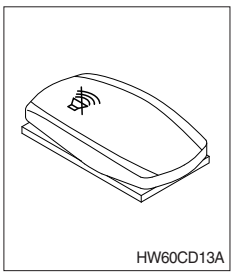
(1) This switch is used to operate the head light.
- Press the switch once, the head light comes ON and the pilot lamp ON.
- Press the switch once more, the head light and pilot lamp turn off.

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.

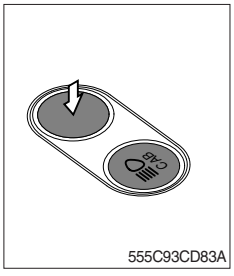
5) FORWARD TRAVEL ALARM SELECTION SWITCH



(1) Warning sound on forward travel of the machine can be selected. (ON/OFF)

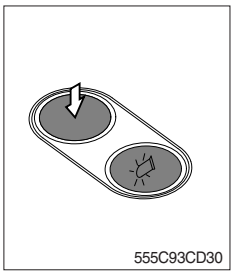
※ **Alarm is not sounded during forward travel when the switch is pressed forward.**

6) CAB LIGHT SWITCH



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

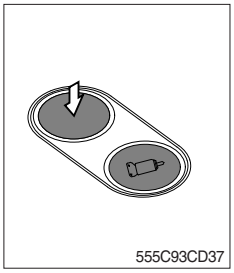
7) BEACON SWITCH (opt)



(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 (opt)



(1) This switch is used to operate breaker.

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

9) QUICK COUPLER SWITCH (opt)

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

※ **Refer to the page 8-10 for details.**

10) AUTO-CRUISE SWITCH

(1) When selected, this switch allows the user to drive at high speed with a constant pause at the speed selected by the uwer when selected.

(2) This switch is released when the brake pedal is pressed.

11) AUTO RAM LOCK SWITCH

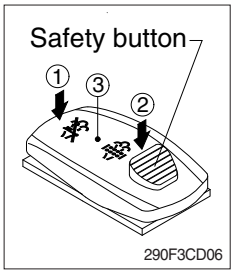
(1) This switch activate front axle oscillation cylinder to locking position for increase of stability.

· 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.

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) DPF (Diesel Particulate Filter) Switch



(1) This switch is used to select the regeneration function on DPF.

(2) Prohibit Switch (①)

① When set to the prohibit position, the AUTO or manual DPF regeneration is not allowed.

② It is used to prevent DPF regeneration when operating the machine in the environment that is dangerous in high temperature.

③ This position is recommended for operation limited to only when it becomes dangerous in high temperature.

④ Even when the DPF regeneration switch is in “Prohibit” position, initialization/forced regeneration can be requested according to the condition, and the warning lamp can be turned ON or OFF.

: The DPF regeneration indicating lamp can be blinking on the cluster.

: The DPF warning lamp may be turned ON or blinking.

(3) AUTO Position (③)

In this position, DPF regeneration is performed automatically.

(4) Manual Regeneration Position (②)

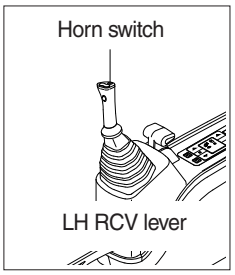
① In this position, the machine is not used while the engine is in low-speed idle run, and manual DPF regeneration is performed when the DPF soot level is in the sufficient level to permit regeneration.

② While the DPF regeneration is performed, the HEST lamp is turned ON.

※ For details, please refer to page 3-8.

※ The safety button must be pulled back to move to the manual position (②).
In addition, it is returned to AUTO position when released from the manual position (②).

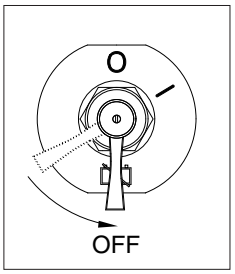
13) HORN SWITCH



HX603CD21

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

14) MASTER SWITCH



35Z9A3CD36

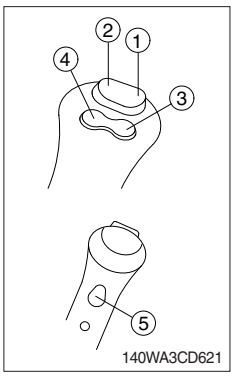
(1) This switch is used to shut off the entire electrical system.

(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.**

15) LH RCV LEVER SWITCH

(1) Proportional type



The switches on the LH RCV lever is function as below.

① CW rotating switch

When this switch is pressed, the boom swing or clockwise rotating will operate.

② CCW rotating switch

When this switch is pressed, the boom swing or counterclockwise rotating will operate.

③ Horn switch

When this switch is pressed, the horn will sound.

④ Ram lock switch

This switch activates only automatic mode.

When the control lever switch is pressed for 5 seconds, the front axle is locked.

The indicator lamp lights up when this switch is activated.

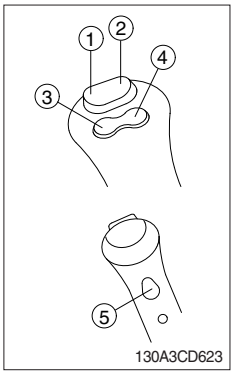
⑤ Boom swing/rotating switch (opt)

This switch is used to operate boom swing or rotation (if equipped rotating piping).

· Switch and flow can be set on cluster.

16) RH RCV LEVER SWITCH

(1) Proportional type



The switches on the RH RCV lever is function as below.

① 2-way clamp switch

When this switch is pressed, the clamp will only operate when the crusher operation mode is selected.

② 2-way release switch

When this switch is pressed, the release or breaker will operate when the crusher operation mode or breaker operation mode is selected.

③ Quick coupler switch

This switch is used to engage or disengage the moving hook on quick coupler.

Refer to page 8-10.

④ Breaker

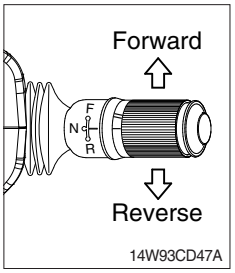
When this switch is pressed, the breaker will only operate when the breaker selection switch on the switch panel is selected.

⑤ Proportional type ON/OFF switch

The 4-way operation is activated only by turning on the proportional control ON/OFF switch located on the left control level.

17) 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

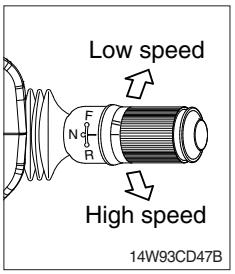
⚠ **Travel direction will be reversed if lower structure is positioned with dozer in front.**

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

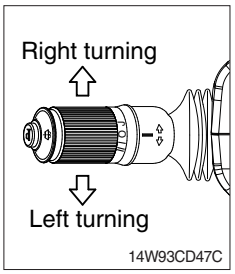


① This switch is for selecting travelling speed between high and low.
- Low speed (—) : 11.3 km/hr (7.0 mph), turtle mark
- High speed (=) : 30 km/hr (19.0 mph), rabbit mark

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

18) LH MULTI FUNCTION SWITCH

(1) Direction indication lamp switch

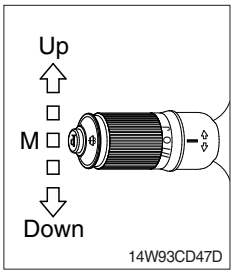


① This switch is used to warn or signal the turning direction of the machine to other machines or equipment.

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

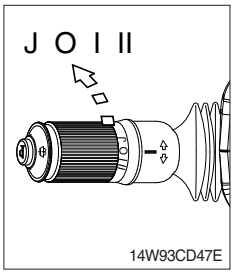


① This switch is used to turn the head lights direction.

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.

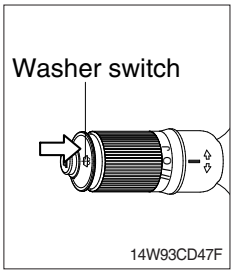
(3) WIPER SWITCH



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

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

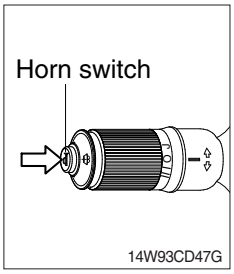
(4) WASHER SWITCH



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

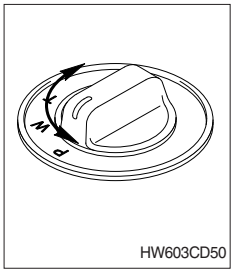
※ **Check the quantity of washer liquid in the tank. If the level of the washer liquid is LOW, add the washer liquid (in cold, winter days) or water. The capacity of tank is 1.5 liter.**

(5) HORN SWITCH



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

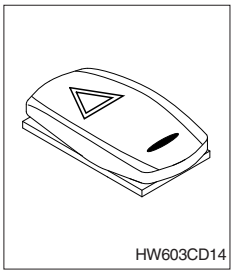
19) SELECT SWITCH (parking / working / traveling)



HW603CD50

(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.

20) HAZARD SWITCH


HW603CD14

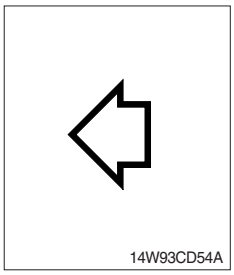
(1) Use for parking, or roading machine.

(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.**

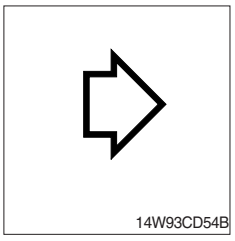
21) TURNING PILOT LAMP

(1) Left turning pilot lamp


14W93CD54A

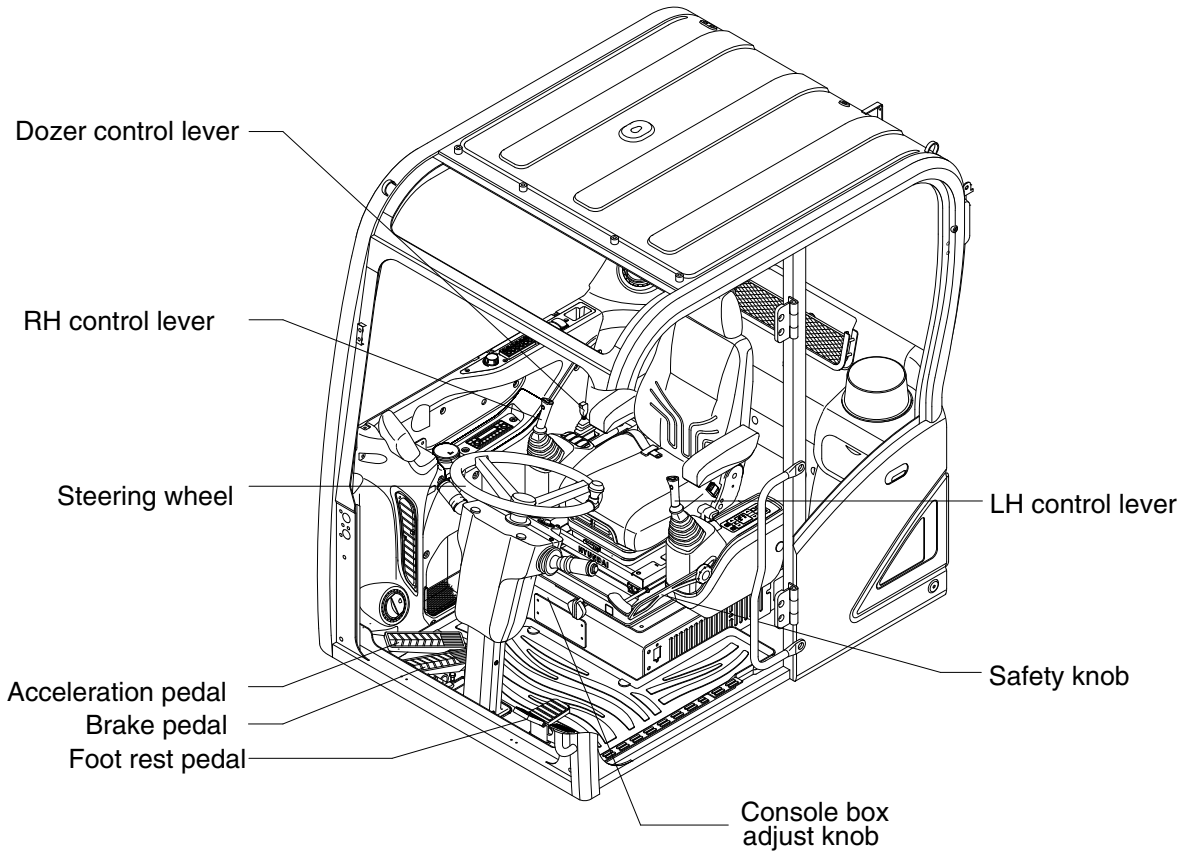
(1) This lamp flashes with sound when the LH multifunction switch is move to backward position.

(2) Right turning pilot lamp


14W93CD54B

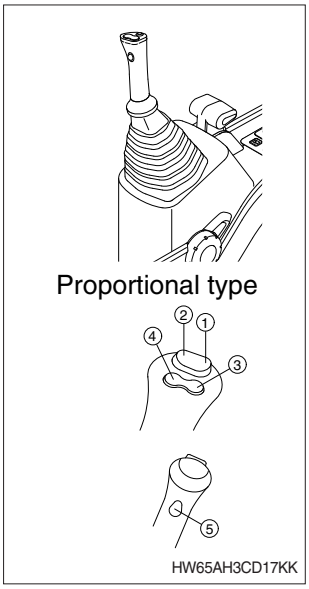
① This lamp flashes with sound when the LH multifunction switch is
② move to forward position.

4. LEVERS AND PEDALS



HW60A3CD03A

1) LH CONTROL LEVER



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

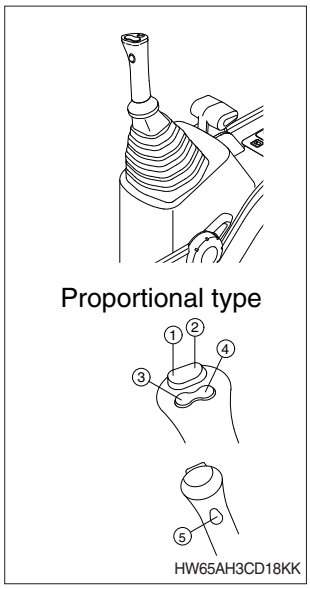
※ **Refer to operation of working device in chapter 2 for details.**

(2) The switch functions are as below.

No.	Proportional type
①	Boom swing/Rotating-CW
②	Boom swing/Rotating-CCW
③	Horn
④	Lam lock
⑤	Boom swing/rotating switch (opt)

※ **Refer to page 3-42 for the details of the switch function.**

2) RH CONTROL LEVER



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

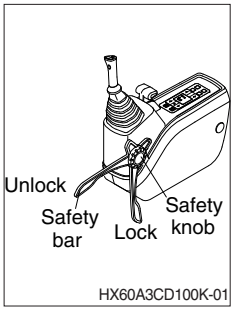
※ **Refer to operation of working device in chapter 2 for details.**

(2) The switch functions are as below.

No.	Proportional type
①	2-way clamp
②	2-way release
③	Quick coupler
④	Breaker
⑤	Proportional type ON/OFF

※ **Refer to page 3-42 for the details of the switch function.**

3) SAFETY KNOB



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

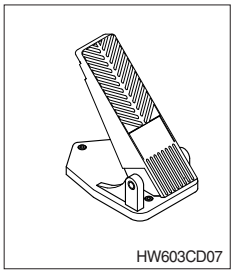
※ **Be sure to turn the safety knob to the LOCK position when entering or leaving the operators seat/cabin.**

(2) The machine is operational by turning the safety knob to the UNLOCK position.

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

⚠ **The machine is able to travel even the safety knob in the LOCK position.**

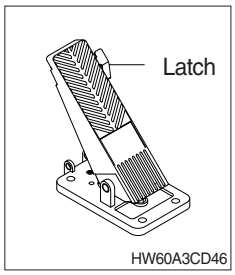
4) ACCELATION PEDAL



(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.

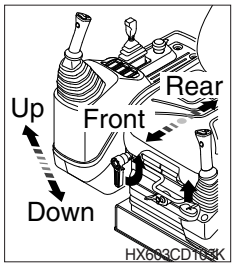
⚠ **Push pedal and latch at once to avoid unexpected locking of pedal in traveling condition.**

⚠ **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.

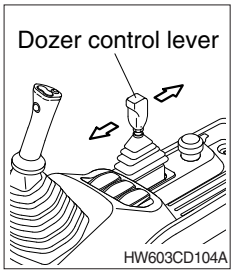
6) SEAT AND CONSOLE BOX ADJUST LEVER



(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 mm (3.5").

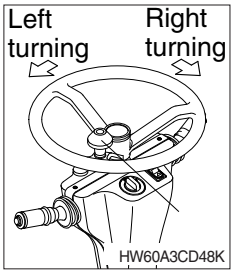
7) DOZER CONTROL LEVER



(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



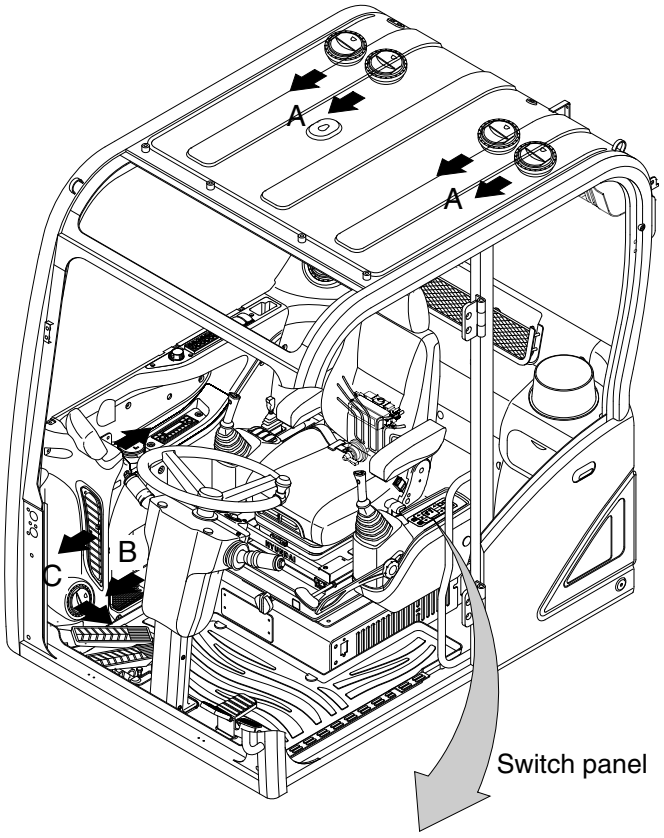
(1) If the steering wheel is turned to left, the machine will move to the left and turn it to the right, the machine will move to the right.

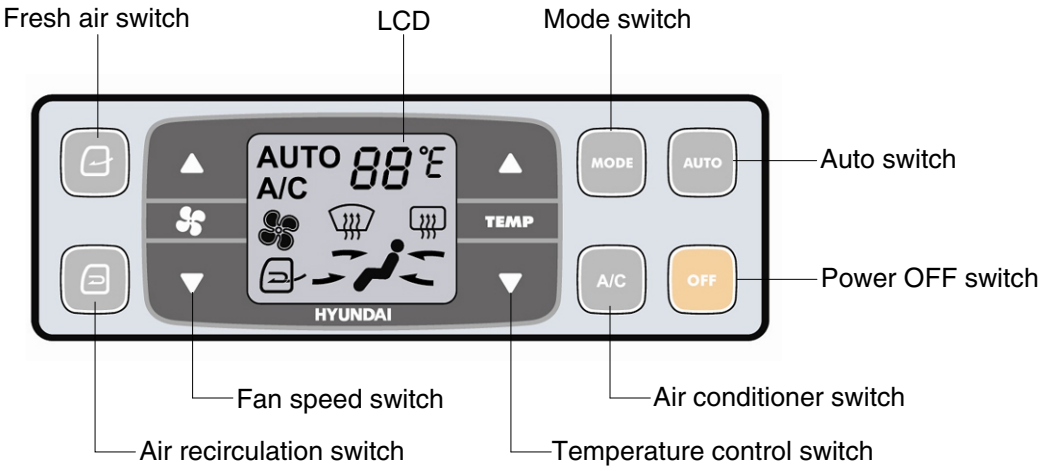
(2) As the handle is equipped with a knob, it is convenient to operate with one hand or quickly.

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.

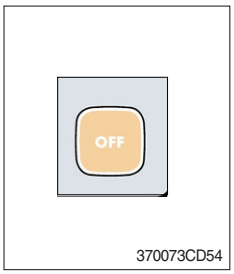
· **Location of air flow ducts**





HW60A3CD05B

1) POWER OFF SWITCH

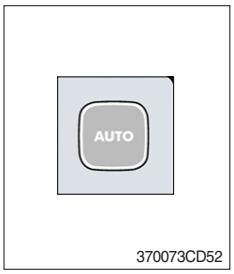


(1) This switch makes the system and the LED OFF.
Just before the power OFF, set values are stored.

(2) Default setting values

Function	Air conditioner	In/outlet	LCD	Temperature	Mode
Value	OFF	Inlet	OFF	Previous sw OFF	Previous sw OFF

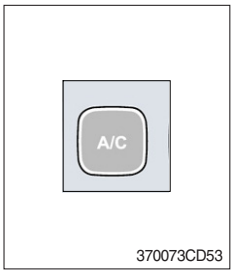
2) AUTO SWITCH



(1) Turn the starting switch to ON position, LCD lights ON.
Auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.

(2) This switch can restart system after system OFF.

3) AIR CONDITIONER SWITCH (compressor switch)

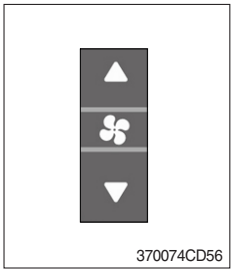


(1) This switch turns the compressor and the LCD ON.

(2) In accordance with the temperature sensed by duct (evaporator) sensor, compressor turns ON or OFF automatically.

※ **Air conditioner operates to remove vapor and drains water through a drain hose. Water can be sprayed into the cab in case that the drain cock at the ending point of drain hose has a problem.**
In this case, exchange the drain cock.

4) FAN SPEED SWITCH

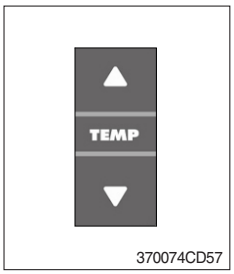


(1) Fan speed is controlled automatically by setted temperature.

(2) This switch controls fan speed manually.
- There are 8 up/down steps to control fan speed.
- The maximum step or the minimum step beeps 5 times.

(3) This switch makes the system ON.

5) TEMPERATURE CONTROL SWITCH



(1) Setting temperature indication (17~32˚C, scale : 1˚C)

(2) Max cool and max warm beeps 5 times.

(3) The max cool or the max warm position operates as following table.

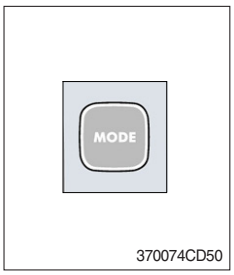
Temperature	Compressor	Fan speed	In/Outlet	Mode
Max cool	ON	Max (Hi)	Recirculation	Vent
Max warm	OFF	Max (Hi)	Fresh	Foot

(4) Temperature unit can be changed between celsius (˚C) and fahrenheit (˚F)

① Default status (˚C)

② Push Up/Down temperature control switch simultaneously more than 5 second displayed temperature unit change (˚C → ˚F)

6) MODE SWITCH



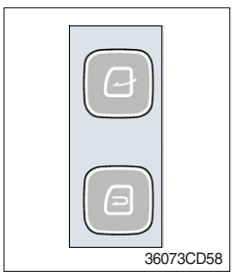
(1) Operating this switch, it beeps and displays symbol of each mode in order. (Vent → Vent/Foot → Foot → Foot/Def → Vent)

Mode switch		Vent	Vent/Foot	Foot	Foot/Def
					
Outlet	A	●	●		
	B		●	●	●
	C				●

(2) When defroster switch operating, FRESH AIR/AIR RECIRCULATION switch turns to FRESH AIR mode and air conditioner switch turns ON.

(3) When this switch ON, the system operates with previous configuration.

7) FRESH AIR/AIR RECIRCULATION SWITCH



(1) It is possible to change the air-inlet method.

① Fresh air ( )

Inhaling air from the outside.

※ Check out the fresh air filter periodically to keep a good efficiency.

② Air recirculation ( )

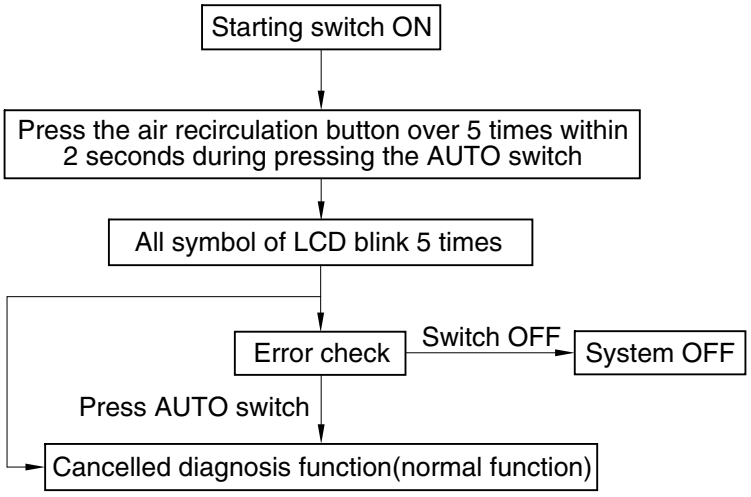
It recycles the heated or cooled air to increase the energy efficiency.

※ Change air occasionally when using recirculation for a long time.

※ Check out the recirculation filter periodically to keep a good efficiency.

8) SELF DIAGNOSIS FUNCTION

(1) Procedure



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(2) Error check

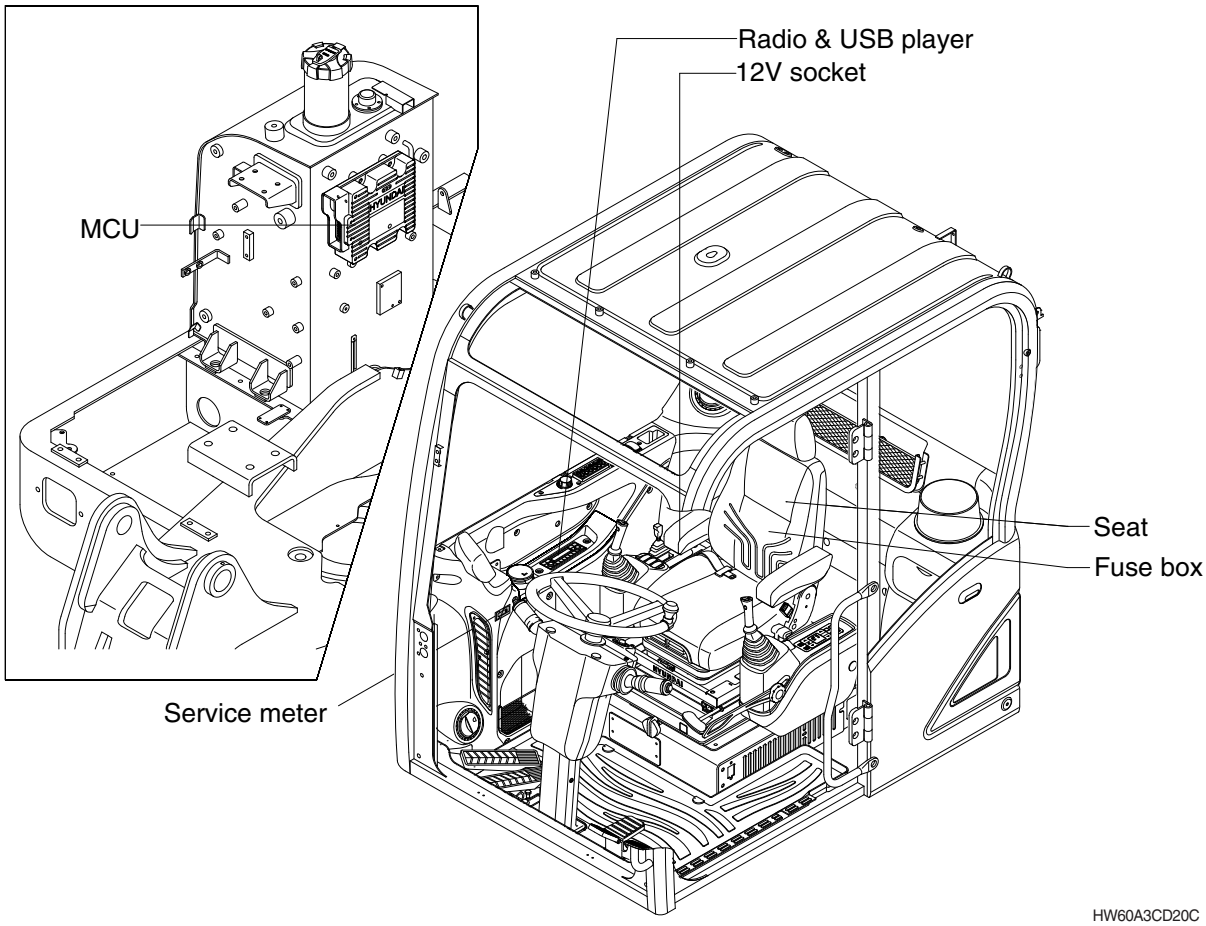
- The corresponding error code flickers on the setup temperature display panel, the other symbol bol will turn OFF.
- Error code flickers every 0.5 second.
- If error code is more than two, each code flickers 2 times in sequence.
- Error code

Error code	Description	Error code	Description
11	Cabin inside sensor	15	Temp actuator
12	Ambient sensor	16	Mode actuator 1
13	Coolant temp sensor	17	Mode actuator 2
14	Duct (evaporator) sensor	18	Intake actuator

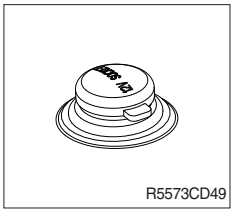
(3) Fail safe function

Error description	Fail safe function
Cabin inside sensor (11)	25˚C alternate value control
Ambient sensor (12)	20˚C alternate value control
Coolant temp sensor (13)	More than 10 minutes after engine start up, the alternate value is ON
Duct (evaporator) sensor (14)	1˚C alternate value control
Temp actuator (15)	If opening amount is 0 %, the alternate value is 0 %
	If not, the alternate value is 100 %
Mode actuator 1, 2 (16, 17)	The alternate value is Vent

6. OTHERS



1) 12V SOCKET (opt)

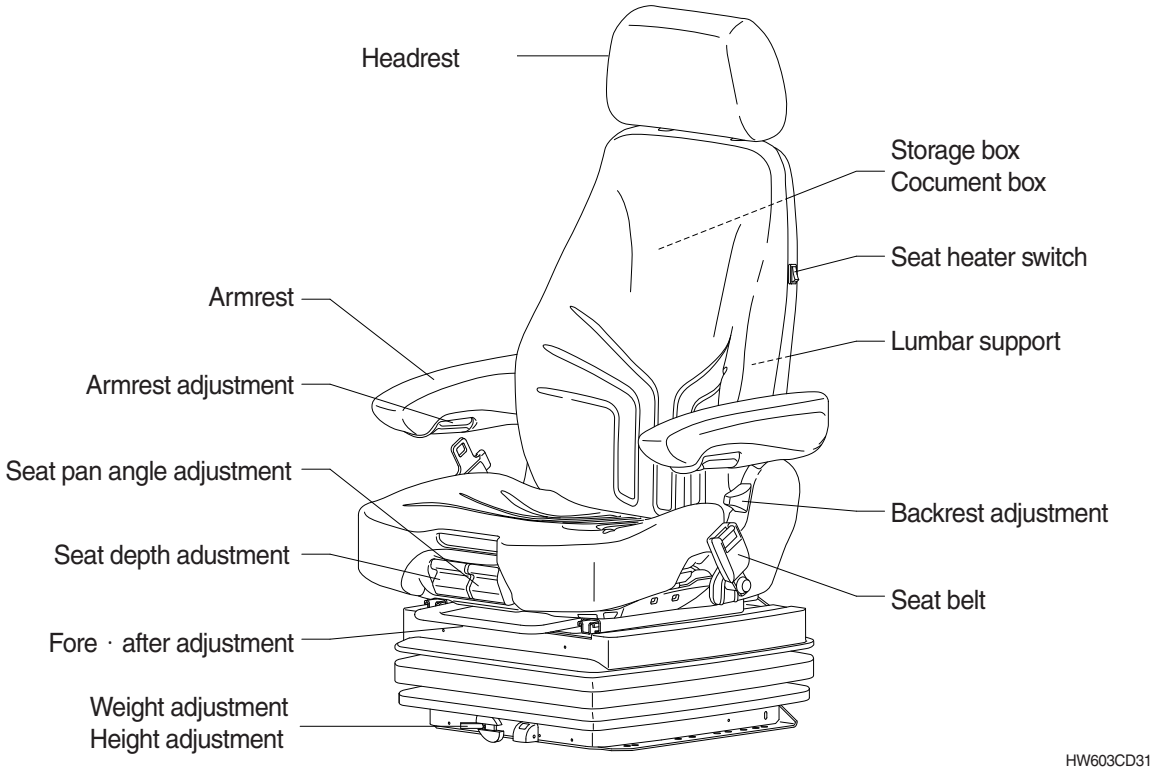


(1) Utilize the power of 12V as your need and do not exceed power of 12V, 120W.

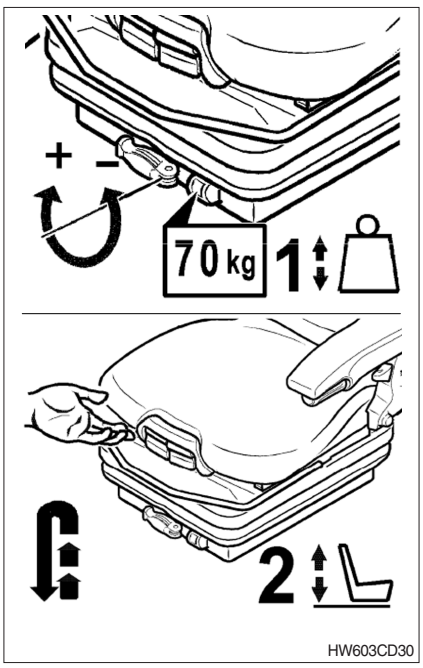
2) SEAT (SUSPENSION, STD)

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.

※ The seat belt reminder warning lamp pops up and the buzzer sounds until seat belt is fastened.

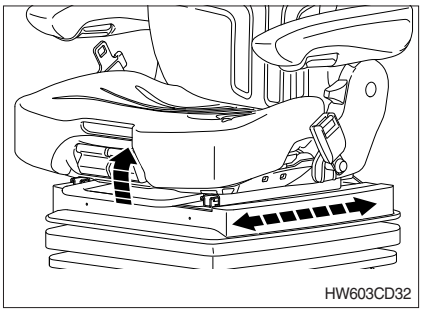


(1) Weight and height adjustment



① The seat has to be adjusted for the operator's weight and height by tilting the handle (+) up or down (-) with the operator not sitting on the seat.

(2) Fore/after adjustment



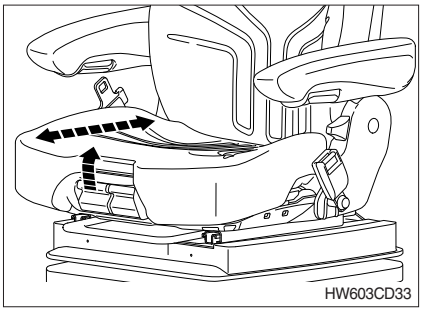
① The fore/after adjustment is released by lifting the locking lever.

⚠ Do not operate the locking lever while operating the machine.

※ After the adjustment, the locking lever must latch into the desired position with an audible click. It should not be possible to move the operator's seat into another position when it is locked.

※ Do not lift the locking lever with your leg.

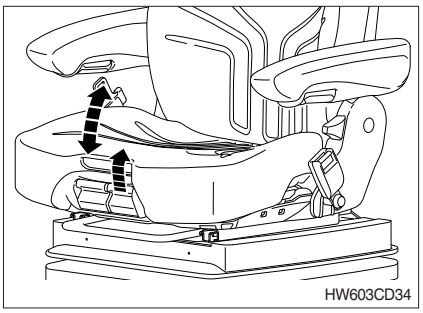
(3) Seat depth adjustment



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

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

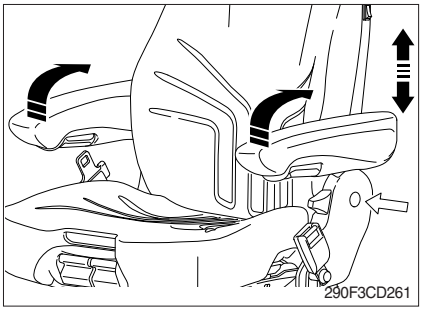
(4) Seat pan angle adjustment



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.

(5) Armrests

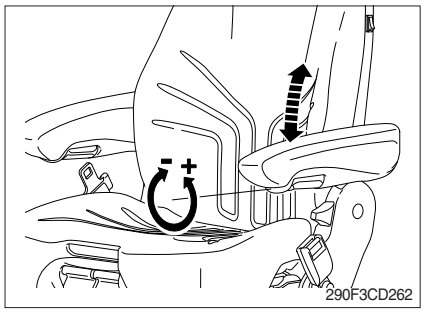


① The armrests can be folded up if desired and the height can be individually adjusted.

② To adjust the height of armrest, separate the round cap (see arrow) from the cover and loosen the hexagon nut (13 ㎜). Adjust the armrests to the desired position (5 steps) and retighten the nut. Reinstall the cap.

· Tightening torque : 2.6 ㎏f·m (18.8 ㎏f·m)

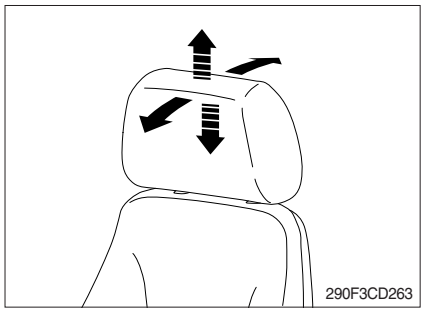
(6) Armrest adjustment



① The inclination of the armrest can be modified by turning the adjustment knob.

② When turning the knob to the outside (+), the front part of the armrest will be lifted; when turning the knob to the inside (-), it will be lowered.

(7) Headrest

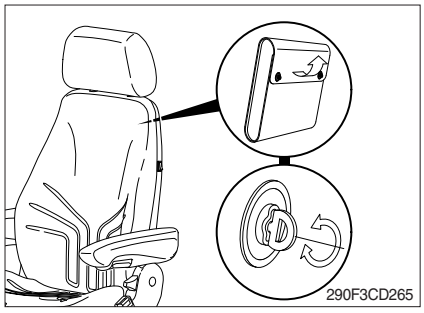


① The headrest can be individually adjusted for height by pulling it upward over the various increments up the end stop.

② By pushing forwards or rearwards the angle of the headrest can be adjusted individually.

③ To remove the headrest, pull it over the end stop.

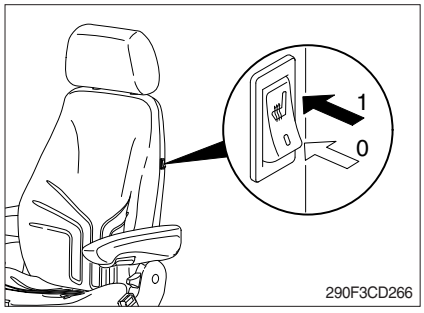
(8) Document box



① The document box is placed on the rear side of the backrest.

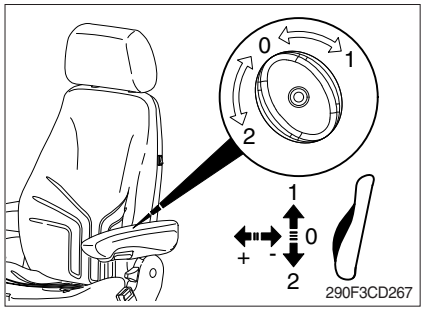
② To open the document box, first twist the turn lock closures 90° to the left or the right and then fold the cover of the document box upwards.

(9) Seat heater switch



① The seat heater can be turned on/off by pressing the switch.

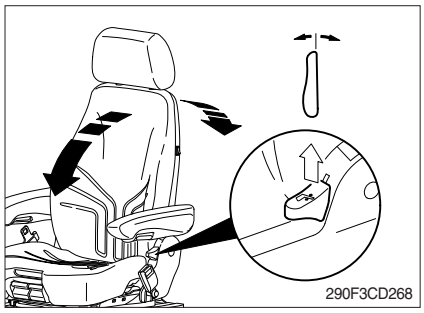
(10) Lumbar support



① By turning the adjustment knob to the left (2) or right (1), both the height and curvature of the backrest cushion can be individually adjusted.

② This increases both the seating comfort and should improve the performance of the operator.

(11) Backrest adjustment

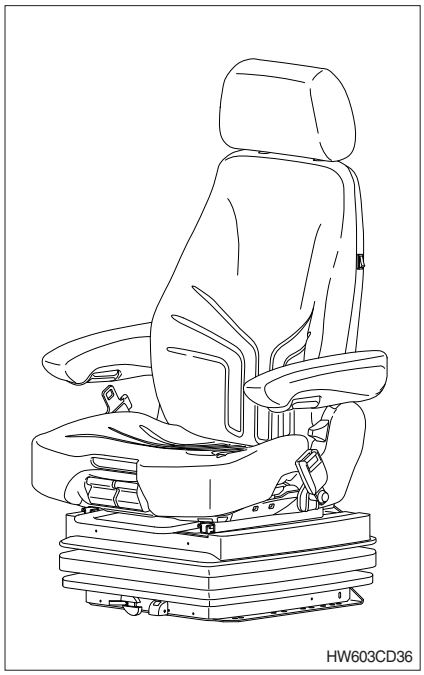


① Pull up the locking lever to release the backrest catch. When releasing the backrest, do not load the backrest by pressing against it.

② By exerting pressure on or off the front or rear part of the seat pan it can be moved to the desired position. Release the locking lever to lock the backrest.

※ **It should not be possible to move the backrest into another position after it has been locked.**

(12) Maintenance



Dirt can impair the function of the seat, so make sure you keep your seat clean.

Upholstery does not need to be removed from the seat frame for cleaning.

⚠ **Take care with the backrest - it may jerk forward and cause injury.**
When cleaning the backrest cushion, the backrest must be held in place when operating the backrest lever.

※ **Do not clean the seat with a pressure washer.**

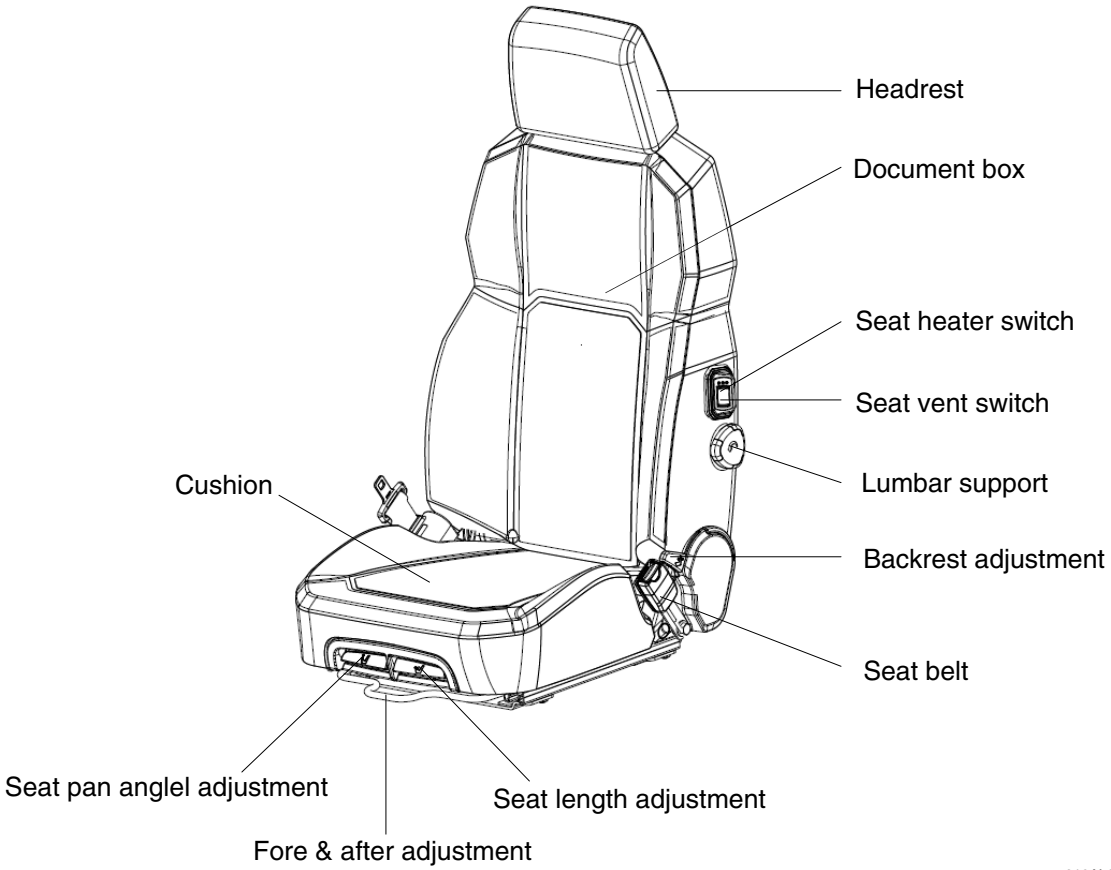
During cleaning, the upholstery should never be soaked.

Use standard commercially available upholstery or plastics cleaning agent. Test first for compatibility on a small, concealed area.

■ SEAT (HEAT & VENT, OPTION)

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

※ **The seat belt reminder warning lamp pops up and the buzzer sounds until the seat belt is fastened.**



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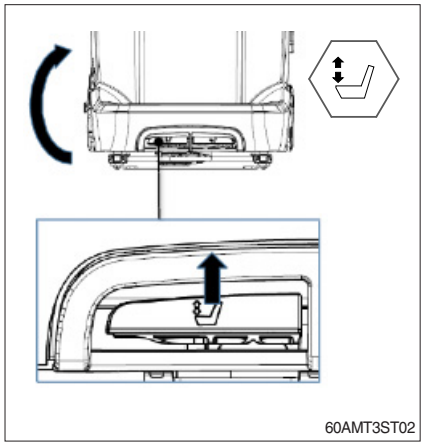
(1) Cushion tilt



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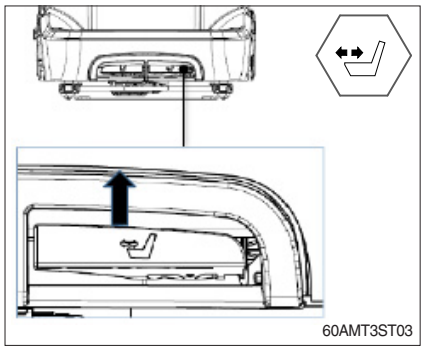
① The angle of the seat cushion can be individually adjusted. This optimises comfort, supporting your legs where they need it most.

- Pull and lift the handle upwards to raise cushion and set to one of three increments.
- Pull and lift handle and push down to lower seat cushion.

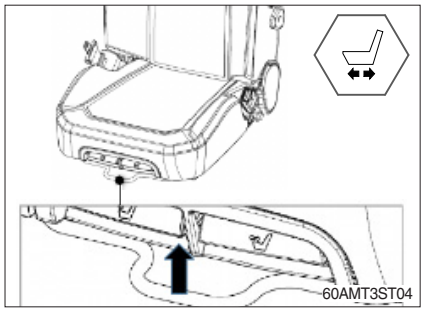
(2) Cushion extension



① The seat cushion can be extended as desired, until required seating position is reached. This optimises comfort for users of different heights.

- Pull and lift the handle upwards and pull seat cushion out to extend.
- Pull and lift handle upwards and push seat cushion back to reduce cushion depth.

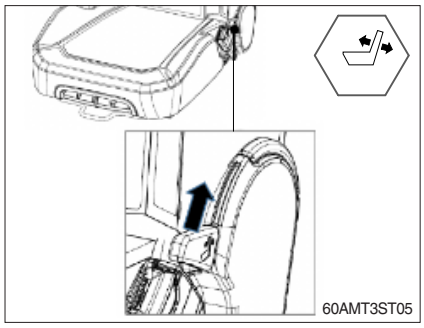
(3) Fore/after adjustment



① The seat upper can be forward / backward as desired, until required seating position is reached.
This optimises comfort for users of different positions.

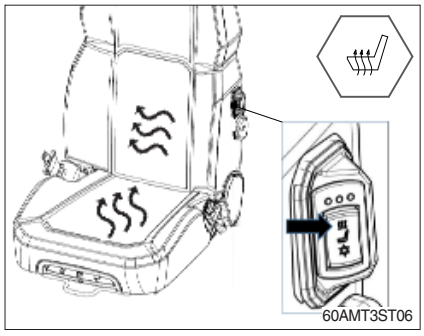
- Pull and lift the handle upwards and move seat forward / backward as desired.

(4) Backrest recliner



① To recline the seat, pull backrest recline lever upwards, whilst applying pressure on the backrest until desired angle is reached.
② Before releasing lever to lock position, take care that the seat offers sufficient clearance to the controls for operation.

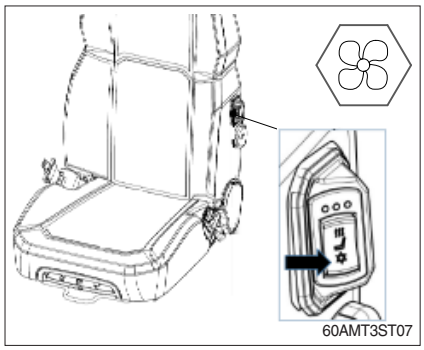
(5) Heater



① Operating the heater is important for maintaining driver comfort and alertness. 3heat settings are available.

- To turn on, press button once. This is the full power setting.
- To reduce heat, button can be pushed again for mid-lever heat and again for lowest heat setting. Press again to turn off.

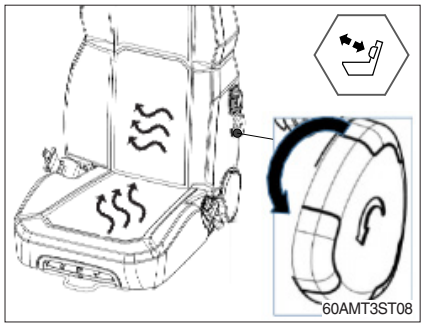
(6) Ventilation



① Air ventilation improves driver comfort and aletness, maintaining productivity. 3 cool settings are available.

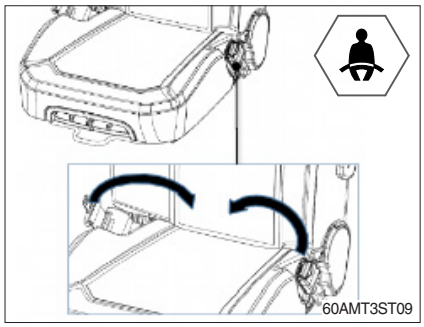
- To turn on, press button once. This is the full power setting.
- To reduce cooling, button can be pushed again for mid-level cool, and again for lowest cool setting. Press again to turn off.

(7) Mechanical lumbar



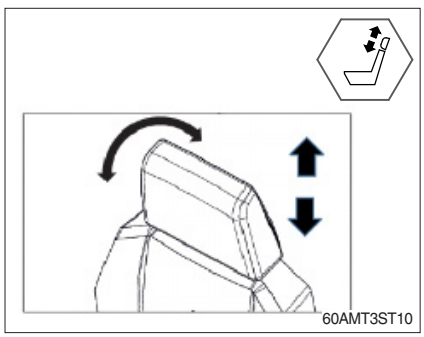
① The lumbar can be adjusted mechanically.
② Turn handle counterclockwise to achieve desired lumbar setting. Continuing to rotate the handle will return the lumbar to its initial position.

(8) Seat belt



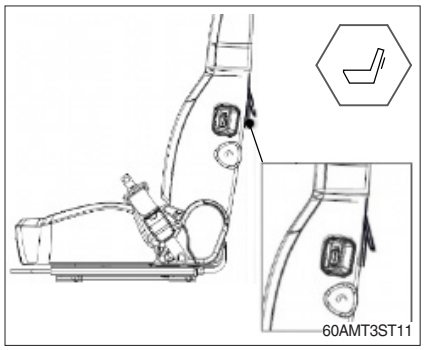
① A 2 point retractable seat belt is an available option to offer added driver security.
② Pull the belt to extend and push into buckle clip. An audible 'click' will sound once belt is securely fastened.

(9) Headrest



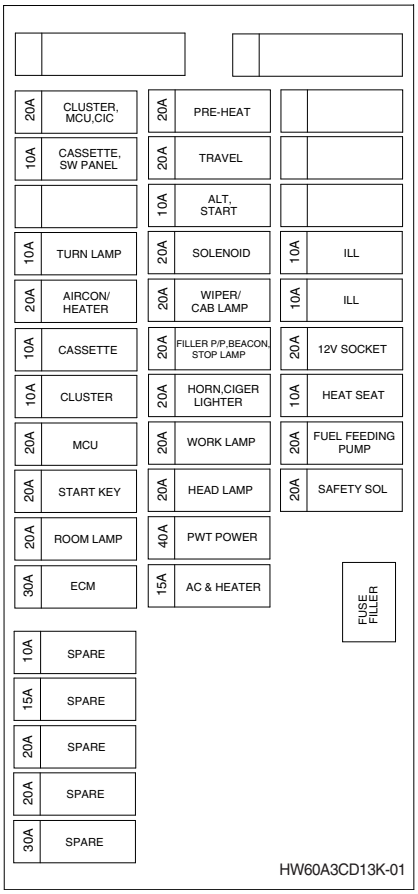
① The headrest provides extra upper back and head support when operating the vehicle. Pull firmly upwards to extend and push firmly downwards to lower.
② The headrest can be manually inclined forwards and reclined backwards to offer optimum head support.

(10) Document pouch



① Situated on the back of the seat, the document pouch offers an area to store paperwork.

3) FUSE BOX



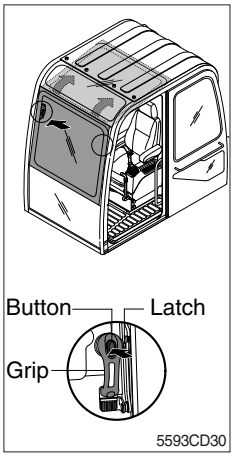
(1) The fuses protect the electrical parts and wiring from burning out.

(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.**

4) UPPER WINDSHIELD



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

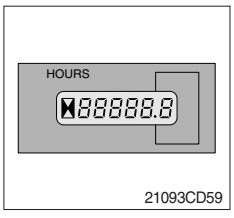
① Release both latches in order to release the upper windshield.

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.

(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.

5) SERVICE METER



(1) This meter shows the total operation hours of the machine.

(2) Always ensure the operating condition of the meter during the machine operation. Inspect and service the machine based on hours as indicated in chapter 6, maintenance.

6) RADIO AND USB PLAYER (MACHINE SERIAL NO. : -#0042)

■ WITH BLUETOOTH

9403CD100

■FRONT PANEL PRESENTATION

1 ····· Power ON/OFF,
Volume UP/DOWN button

2 ····· Manual UP/DOWN Tuning,
File search, SEL button

3 ····· Mode button,
Audio mute button

4 ····· Call & Pair button

5 ····· Call end button

6 ····· Station preset 1
DIS ····· Display button

7 ····· Station preset 2

8 ····· Station preset 3
RPT ····· Repeat play button

9 ····· Station preset 4
RDM ····· Random play button

10 ····· Station preset 5
DIR- ····· Directory down button

11 ····· Station preset 6
DIR+ ····· Directory up button

12 ····· Scan play button (SCAN)
Best station memory (BSM) button

13 ····· Auto tune up, Seek up button

14 ····· Auto tune down, Track down button

15 ····· USB connector

16 ····· AUX IN Jack

17 ····· MIC hole

■ WITHOUT BLUETOOTH

9403CD101

■FRONT PANEL PRESENTATION

1 ····· Power ON/OFF, Volume UP/DOWN button

2 ····· Manual UP/DOWN Tuning, File search, SEL button

3 ····· Mode button, Audio mute button

4 ····· Radio seek up button

5 ····· Radio seek down button

6 ····· Station preset 1
DIS ····· Display button

7 ····· Station preset 2

8 ····· Station preset 3
RPT ····· Repeat play button

9 ····· Station preset 4
RDM ····· Random play button

10 ····· Station preset 5
DIR- ····· Directory down button

11 ····· Station preset 6
DIR+ ····· Directory up button

12 ····· Scan play button (SCAN)
Best station memory (BSM) button

13 ····· Track up button

14 ····· Track down button

15 ····· USB connector

16 ····· AUX IN Jack

■GENERAL

(1) Power and volume button

① Power ON / OFF button

Press power button (1) to turn the unit on or off.

② Volume UP/DOWN control knob

Turn VOL knob (1) right to increase the volume level.
Turn VOL knob (1) left to decrease the volume.
After 5 seconds the display will return to the previous display mode.

③ Initial volume level set up

I-VOL is the volume level the unit will play at when next turned on. To adjust the I-VOL level, press and hold VOL button (1) for longer than 2 seconds. The current volume level displays on the display panel. Then turn button (1) right or left to set the volume level as the I-VOL level.

④ Clock ON/OFF control

The CLOCK was default at off status. To turn CLOCK ON, press and hold VOL button (1) for longer than 2 seconds to display I-VOL, then short press VOL again, turn VOL knob while CLOCK OFF display, then the CLOCK ON will be displayed.

※ Due to time tolerance, the clock display on the Audio unit might have little difference.

⑤ Clock adjustment

With CLOCK ON selected, press VOL knob again after CLOCK ON display, the hour will blink, turn VOL knob right or left to adjust hour. Simply press VOL again, the minute will blink, turn VOL knob to adjust minute. Then press VOL again to confirm the clock once finished.

(2) Menu Selection

① This button can adjust the sound effect and other things.
Each time you press this button (2), LCD displays as follows :

BAS → TREB → BAL L=R → FAD F=R → EQ → LOUD ON → BEEP 2ND

On each setting, the level can be controlled by turning TUNE knob (2). When the last adjustment is made, after 5 seconds, the display will automatically return to the previous display mode.

② Bass control

To adjust the bass tone level, first select the bass mode by pressing SEL button (2) repeatedly until BASS appears on the display panel. Then turn knob (2) right or left within 5 seconds to adjust the bass level as desired. The bass level will be shown on the display panel from a minimum of BASS-7 to a maximum of BASS+7.

③ Treble control

To adjust the treble tone level, first select the treble mode by pressing SEL button (2) repeatedly until TREB appears on the display panel. Then turn knob (2) right or left within 5 seconds to adjust the treble level as desired. The treble level will be shown on the display panel from a minimum of TREB -7 to a maximum of TREB +7.

④ Balance control

To adjust the left-right speaker balance, first select the balance mode by pressing SEL button (2) repeatedly until BAL indication appears on the display panel. Then turn knob (2) right or left within 5 seconds to adjust the balance as desired. The balance position will be shown by the bars on the display panel from BAL 10R (full right) to BAL 10L (full left).

⑤ Fader control

To adjust the front-rear speaker balance, first select the fader mode by pressing SEL button (2) repeatedly until FADER indication appears on the display panel. Then turn knob (2) right or left within 5 seconds to adjust the front-rear speaker level as desired. The fader position will be shown by the bars on the display panel from FAD 10F (full front) to FAD 10R (full rear).

⑥ EQ control

You can select an equalizer curve for 4 music types (CLASSIC, POP, ROCK, JAZZ). Press button (2) until EQ is displayed, then turn knob (2) right or left to select the desired equalizer curve. Each time you turn the knob, LCD displays as follows :

EQ OFF → CLASSIC → POP → ROCK → JAZZ

※ When the EQ mode is activated, the BASS and TREBLE modes are not displayed.

⑦ **Loud control**

When listening to music at low volume levels, this feature will boost the bass and treble response. This action will compensate for the reduction in bass and treble performance experienced at low volume.

To select the loudness feature, press button (2) until LOUD is displayed, then turn knob (2) right or left to activate or deactivate loudness.

⑧ **Beep control**

To adjust the BEEP mode, first select the BEEP mode by pressing button (2) repeatedly until BEEP indication appears on the display panel. Then turn knob (2) left or right within 5 seconds to select BEEP 2ND, BEEP OFF or BEEP ON.

- BEEP 2ND : You will only hear the beep sound when the buttons are held down for more than 2 seconds.
- BEEP OFF : You can not hear the sound beep when you press the buttons.
- BEEP ON : You can hear the beep sound each time you press the buttons.

(3) Mute control

① Press and hold MUTE button (3) for over 2 seconds to mute sound output and MUTE ON will blink on the LCD. Press the button again to cancel MUTE function and resume to normal playing mode.

(4) Mode selection

① Repeat press MODE button (3) to switch between FM1, FM2, AM, USB, AUX, BT MUSIC.

※ If there is no USB, AUX, Bluetooth Phone connected, it would not display USB, AUX, BT when you press button (3).

■RADIO

(1) Mode button

① Repeat press MODE button to select FM1, FM2 or AM.

(2) Manual tuning button

① To manually tune to a radio station, simply turn encoder TUNE (2) left or right to increase or decrease the radio frequency.

(3) Auto tuning button

① To automatically select a radio station, simply press Seek up or Track down button.

(4) Station preset button

① In radio mode, pressing buttons (6) to (11) will recall the radio stations that are memorized. To store desired stations into any of the 6 preset memories, in either the AM or FM bands, use the following procedure :

a. Select the desired station.
b. Press and hold one of the preset buttons for more than 2 seconds to store the current station into preset memory. Six stations can be memorized on each of FM1, FM2, and AM.

(5) Preset scan (PS) / Best station memory (BSM) button

① Press BSM button (12) momentarily to scan the 6 preset stations stored in the selected band. When you hear your desired station, press it again to listen to it.
Press BSM button (12) for longer than 2 seconds to activate the Best Station Memory feature which will automatically scan and enter each station into memory.

※ **If you have already set the preset memories to your favorite stations, activating the BSM tuning feature will erase those stations and enter into the new ones. This BSM feature is most useful when travelling in a new area where you are not familiar with the local stations.**

■USB PLAYER

(1) USB playback

① The unit was equipped with a front USB jack and also a rear USB Jack.
With a USB device plugged in the front USB jack, it will be detected as front USB mode. And with a USB device plugged in the rear USB jack, it will be detected as rear USB. To get to a USB mode, press MODE (3) button momentarily or insert the USB device in front or rear USB jack.

※ If no mp3 or wma files in USB device, it will convert to the previous mode after display NO FILE.

(2) Track Up / Down button

① Press SEEK up (13) or TRACK down (14) to select the next or previous track. Press and hold the buttons to advance the track rapidly in the forward or backward direction.

(3) MP3 directory / File searching

① Button (2) is used to select a particular directory and file in the device. Turn button (2) right or left to display the available directories. Press button (2) momentarily when the desired directory is displayed, then turn button (2) right or left again to display the tracks in that directory. Press button (2) to begin playback when the desired file is displayed.

(4) Directory Up / Down button

① During MP3/WMA playback, simply press DIR- button (10) to select the previous directory (if available in the device); simply press DIR+ button (11) to select the next directory (if available in the device).

※ If the USB device does not contain directories, it would play MP3/WMA tracks at 10- file when you press DIR- button (10), and play MP3/WMA tracks at 10+ file when you press DIR+ (11) button.

(5) Track Scan Play (SCAN) button

- SCAN playback : Simply press SCAN (12) button to play the first 10 seconds of each track.
- SCAN folder : Press and hold SCAN button for longer than 2 seconds to scan play the tracks in current folder.
- SCAN off : Simply press it again to cancel SCAN feature.

(6) Track Repeat Play (RPT) button

- REPEAT playback : Simply press RPT (8) button to play current track repeatedly.
- REPEAT folder : Press and hold RPT for longer than 2 seconds to repeat play the tracks in current folder.
- REPEAT off : Simply press it again to cancel REPEAT feature.

(7) Track Random Play (RDM) button

- RANDOM playback : Simply press RDM (9) button to play the tracks in the device in a random sequence.
- RANDOM folder : Press and hold RDM button for longer than 2 seconds to random play the tracks in current folder.
- RANDOM off : Simply press it again to cancel RANDOM feature.

(8) ID3 v2 (DISP)

① While a MP3 file is playing, press DISP button (6) to display ID3 information. Repeat push DISP button (6) to show directory name / file name and album name / performer / title.

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

* USB Information and Notice

a. Playback FILE SYSTEM and condition allowance.
   - FAT, FAT12, FAT16 and FAT32 in the file system.
   - V1.1, V2.2 and V2.3 in the TAG (ID3) version.

b. Display up to 32 characters in the LCD display.

c. No support any of MULTI-CAED Reader.

d. No high speed playback but only playing with normal full speed.

※ DRM files in the USB may cause malfunction to playback in the radio unit.

※ The temperature below -10 Celsius, the audio unit with USB hook up would be affected to play well.

■AUX OPERATION

It is possible to connect your portable media player to the audio system for playback of the audio tracks via the cab speakers.

To get the best results when connecting the portable media to the audio system, follow these steps :

- Use a 3.5 mm stereo plug cable to connect the media player headphone socket at each end as follows.
- Adjust the portable media player to approximately 3/4 volume and start playback.
- Press the MODE button (3) on the audio unit to change into AUX mode.
- The volume and tone can now be adjusted on the audio unit to the desired level.

※ The audio quality of your media player and the audio tracks on it may not be of the same sound quality as the audio system is CD Player.

※ If the sound of the media player is too low compared with the radio or CD, increase the volume of the player.

※ If the sound of the media player is too loud and/or distorted, decrease the volume of the player.

※ When in AUX mode, only the Volume, Bass, Treble, EQ and Mode functions of the audio unit can be used.

■BLUETOOTH (if equipped)

(1) Using a bluetooth wireless connection

① Your audio unit supports bluetooth wireless technology. You can set up a wireless link with bluetooth cellular phone.

② Keep PAIRING the cellular phone with audio unit in a few minutes as the phone are being switched on well enough.

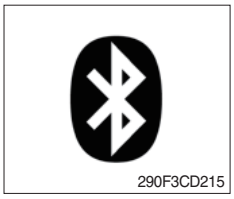
※ Since this audio unit is on standby to connect with your cellular phone via bluetooth wireless technology, using this audio unit without running the engine can result battery drainage.

※ This audio unit phone call reception is on standby when ignition switch is set to ACC OFF or ON.

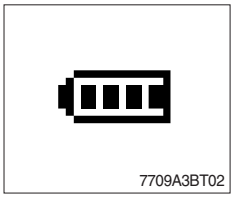
※ The line-of-sight distance between this audio unit and your cellular phone must be 10 meters or less for sending and receiving voice and data via bluetooth wireless technology. However the transmission distance may become shorter than the estimated distance depending on the environment in use.

※ Digital Noise & Echo suppression system provides the best sound clarity with little or no distortion (Echo & side tone will happen depending on cellular phone or service network).

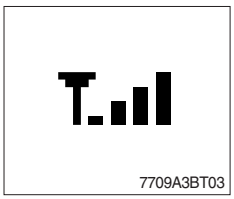
※ To ensure the quality of calling, you should select a proper bluetooth VR level. This audio unit has already set with the best bluetooth VR level.



a. Bluetooth icon
It will blink while establishing the bluetooth pairing.
It will light after a bluetooth device connected.



b. Battery icon
It indicates the battery status of the connected bluetooth device.



c. Single strength icon
It indicates the signal strength of the connected bluetooth device.

(2) **Pairing in hands free modes**

① Press and hold CALL button (4) for 2 seconds until you hear beep sound, then appears PAIR STR on the display.

② For the next procedure, go to cellular phone pairing mode.

③ If it is in pairing status with audio unit and cellular phone, PAIRING will show on the display.

④ If you want to exit pairing mode, press CALL END button (5) briefly while pairing, then it will show PAIR CLR on the display.

⑤ Bluetooth Icon and PAIR OK appear on the display when pairing is successful.

(3) **Cellular phone pairing mode**

① Browse your cellular phone menu and find the connectivity or bluetooth connection section.

② Select search for a new handsfree device function and allow the phone to find the mobile.

③ HYUNDAI should appear on your cellular phone screen.

④ Press connect menu among the handsfree option on your cellular phone.

⑤ The cellular phone should prompt for a pin code. Insert the pin code 1234.

⑥ The cellular phone should confirm that it has established a new paired connection.

⑦ Close the menu. The pairing is now completed. It appears PAIR FAIL on the display for 3 seconds.

※ Each cellular phone type has distinct phone menu so you may need to refer to your manufactures instruction for the correct procedure on how to connect a new bluetooth device.

※ Please retry to the pairing instruction if HYUNDAI does not appear on the cellular phone screen.

※ Please select authorized, if there is authorized menu in the menu of bluetooth connection in your cellular phone.

※ Once the bluetooth pairing is completed between your cellular pone and this audio unit, the both units will be automatically recognized on its paring and when you turn on the key in your car even though this audio unit is turned off.

※ This audio unit can store up to 6 phones pairings. If the memory is full, the first stored paired phone will be deleted.

※ The connecting priority will be given to the last connected cellular phone.

※ If you want to change the connecting priority, try to connect this audio unit from the cellular phone.

(4) **Bluetooth connection and disconnection**

① When established bluetooth connection between this audio unit and the cellular phone, bluetooth icon on the display appears and then the display shows HF/AV CONN when handsfree & AV profile connected.


9403CD118

② To disconnect bluetooth link
Press and hold CALL END button (4) for 2 seconds, it shows DIS CON and disappears bluetooth Icon on the display.


9403CD117

③ To disconnect bluetooth link
Press CALL button (3) briefly, it blinks bluetooth Icon on the display while bluetooth is being connected. If the connection is completed, it appears bluetooth Icon on the display.

※ When your cellular phone battery is at low charge, the bluetooth connection may occasionally be lost. To maintain good connectivity ensure that your phone battery is adequately charged.

※ In case of failure of bluetooth pairing :
- **Delete item in paired list on your phone.**
- **Reset both phone by power off/on and the audio unit by ACC off/on.**

※ Connecting priority of handsfree profile is higher than headset profile.

※ The headset mode does not support caller ID, reject call and call Transfer.

(5) **Using the audio unit as a handsfree device**

① When the audio unit is ringing, it shows CALL and follows with the phone number ********** on the display.


9403CD117/8

② To accept call
Press CALL button (4), it appears ANSWER CALL and follows TALKING on the display.

③ To end call
To end call, press CALL END button (5), it appears REJECT on the display.

※ If reject call is activated in your phone, then your cellular phone does not support reject call function.

(6) **Audio transfer between the audio unit and phone**

The audio transfer function is for switching the call from the audio unit to the cellular phone for private conversation.

① Press CALL button (4) briefly during conversation, it appears CALL TRANS on the display. To switch back to the audio unit, press button (4) briefly during private conversation, then it appears CALL TRANS on the display again.

※ **This function will be a cause of disconnection of bluetooth link in some nokia phones, but you do not worry just press button (4) during private conversation, then switch back to the audio unit automatically.**

※ **The quality of calling between cellular phone and audio unit is better than calling between one audio unit and another one.**

(7) **Last call number dialing**

① Press CALL button (4) briefly, it appears CALL TO, then simply press CALL button once again, it would make the last call with phone number display on LCD.
If Reject call is activated in your phone, then your cellular phone does not support Reject Call function.

※ **If you are using SAMSUNG phone, then you may need to press once more send button. First press button shows phone contact list in your phone, then second press make the last call.**

(8) **To make a call by cellular phone**

The audio transfer function is for switching the call from the audio unit to the cellular phone for private conversation.

① The audio unit activated automatically when you make a call by cellular phone.
② When you make a call processing by cellular phone, it shows CALLING on the display.
③ When you receive a call, the phone number ******** appears on the display.

(9) **Using the audio unit as bluetooth music**

The audio unit supports A2DP (Audio Advanced Distribution Profile) and AVRCP (Audio Video Remote Control Profile), and both profiles are available to listen music at the audio unit via cellular phone which is supporting the two profiles above.

① To play music, search the menu on your cellular phone as below :
i.e : Menu → File manager → Music → Option → Play via bluetooth.
It appears BT MP3 on the display.

② During BT MP3 playing, you could select the previous or next track by pressing SEEK up or TRACK down button on audio unit or operate via your cellular phone.

③ To stop music, press button (5) briefly and it will automatically switch into the previous mode.

④ To resume music playing, press the play button on your cellular phone.

※ This function maybe different depends on cellular phone. Please follow the cellular phone menu. Some kinds of phone need to pair once more for bluetooth MP3 connection.

※ This function will be caused to disconnect A2DP, AVRCP depends on cellular phone.

※ Information about songs (e.g.: the elapsed playing time, song title, song index, etc.) cannot be displayed on this audio unit.

■RESET AND PRECAUTIONS

(1) **Reset function**

Interfere noise or abnormal compressed files in the MP3 disc or USB instrument may cause extraordinary operation (or unit frozen/locking up). It's strongly recommended to use appropriate USB storage not cause any malfunction to the audio unit. In the unlikely event that the player fails to operate correctly, try out to reset unit by any of following two methods.

① Press and hold 

simultaneously for about 5 seconds. (without Bluetooth)

② Press and hold 


simultaneously for about 5 seconds. (with Bluetooth)

※ Take out the fuse for the audio system in the vehicle once and then plug again.

※ It will be necessary to re-enter the radio preset memories as these will have been erased when the microprocessor was reset.

After resetting the player, ensure all functions are operation correctly.

(2) **Precautions**

When the inside of the car is very cold and the player is used soon after switching on the heater, moisture may form on the disc or the optical parts of the player and proper playback may not be possible.

If moisture forms on the optical parts of the player, do not use the player for about one hour. The condensation will disappear naturally allowing normal operation.

① Operation voltage : 9~32 volts DC, negative

② Output power : 40 watts maximum (20 watts x 2 channels)

③ Tuning range

Area	Band	Frequency range	Step
USA	FM	87.5~107.9 MHZ	200K
	AM	530~1710 KHZ	10K
EUROPE	FM	87.5~108.0 MHZ	50K
	AM	522~1620 KHZ	9K
ASIA	FM	87.5~108.0 MHZ	100K
	AM	531~1602 KHZ	9K
LATIN	FM	87.5~107.9 MHZ	100K
	AM	530~1710 KHZ	10K

● AREA Selection :

- To select an area, press and hold related buttons at FM1 band for about 3 seconds.
- USA Area: Press and hold mode + 1DIS buttons for 3 seconds
- EUROPE Area: Press and hold mode + 2 buttons for 3 seconds
- ASIA Area: Press and hold mode + 3RPT buttons for 3 seconds
- LATIN Area: Press and hold mode + 4RDM buttons for 3 seconds.

④ USB version : USB 1.1

⑤ Bluetooth version : V2.1

⑥ Bluetooth supported profile :

- A2DP : Advanced Audio Distribution Profile
- AVRCP : Audio/Video Remote Control Profile
- HFP : Hands-Free Profile

6) RADIO AND USB PLAYER (MACHINE SERIAL NO. : #0043-)

■ WITH BLUETOOTH

19A3RD02

1 USB port with cover : Open the cover and connect the USB storage device.

2 ENTER/AST button with tune dial.

3 Display window for play / reception / menu state and information.

4 POWER button with VOLUME dial :
turns power on, mute function on/off or selects a menu item (press), control the volume level or menu item.

5 AUX port with cover : Open the cover and plugging the external audio device.

6 Call / call end button :
- when a call comes in : accepts a call (press); rejects a call (press and hold)
- during a call connection : ends a call (press) ; switches between hands-free and private call modes (press and hold)
- in standby mode: opens call list (press) ; makes a call a recently connected number (press and hold)

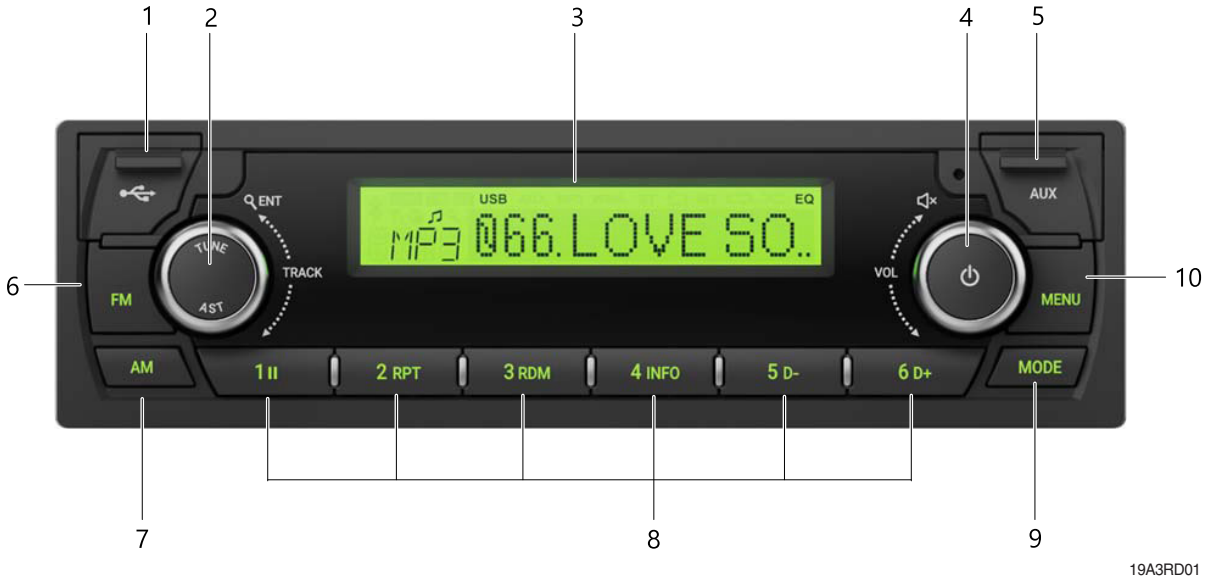
7 BAND button : enters Radio mode or changes the radio band (press).

8 Preset button :
- Radio: Recall each stored station (press) ; store each station (press and hold).
- USB : changes playback mode (press 1II, 2 RPT or 3 RDM buttons); shows available information about the current track (press 4 INFO button) ; move to folder down/up (press 5 D-/6 D+ buttons).
- Bluetooth audio : pause/resume playback (press 1II) ; shows information of the connected Bluetooth device (press 4 INFO button).

9 MODE button : selects USB, Bluetooth audio or AUX play mode (press).

10 MENU button : enters Menu setting mode or returns to the previous menu (press).

■ WITHOUT BLUETOOTH



1 USB port with cover : Open the cover and connect the USB storage device.

2 ENTER/AST button with tune dial.

3 Display window for play/reception/menu state and information.

4 POWER button with VOLUME dial : turns power on, mute function on/off or selects a menu item (press), control the volume level or menu item.

5 AUX port with cover : Open the cover and plugging the external audio device.

6 FM button : enters FM Radio mode.

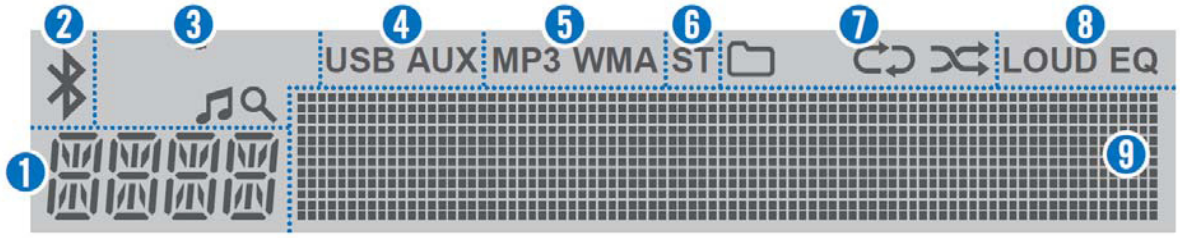
7 AM button : enters AM Radio mode.

8 Preset button :
- Radio : Recall each stored station (press) ; store each station (press and hold).
- USB : changes playback mode (press 1II, 2 RPT or 3 RDM buttons) ;
shows available information about the current track (press 4 INFO button) ; move to folder down/up (press 5 D-/6 D+ buttons).

9 MODE button : selects USB or AUX play mode (press).

10 MENU button : enters Menu setting mode or returns to the previous menu (press).

■ DISPLAY WINDOW (LCD)



19A3RD03

1 Function display area for showing the function mode.

2 Bluetooth indicator for the Bluetooth connection.

3 Search indicator for USB play list.

4 USB/AUX indicators for the USB or External device connection.

5 MP3/WMA indicators for USB's Audio Stream detections.

6 ST (Stereo) indicators for FM stereo reception.

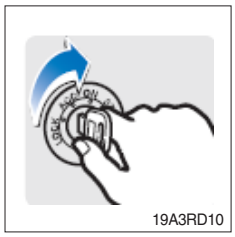
7 Playback mode indicators for USB playback mode.
: Folder mode.
: Repeat playback.
: Random playback.

8 LOUD/EQ indicators for sound effect.
LOUD : Loudness mode.
EQ : EQ mode.

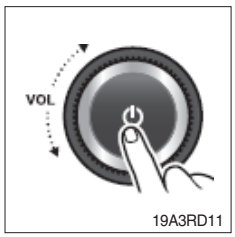
9 Multi-function display area for showing the play, reception or menu information.

■ GENERAL

(1) Power and volume button



① Turn the starting switch to ON position.



② Press the POWER button to turn the power on.
- If the source is ready, playback also starts.
- To turn on the power directly.

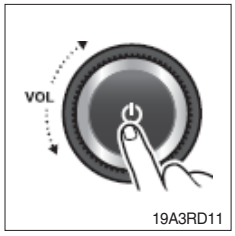
By connecting an USB into the USB port or pressing the BAND, MODE (while the USB is connected), you can also turn on the power and the unit then plays.

③ When power is on, press and hold the POWER button to turn power off.

(2) Adjusting volume directly

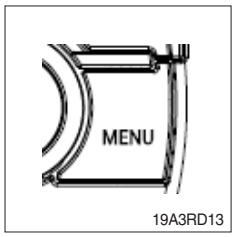
① Turn the VOLUME dial to control volume.
- Available volume range : 00 (mute)~41.

(3) Muting the sound quickly

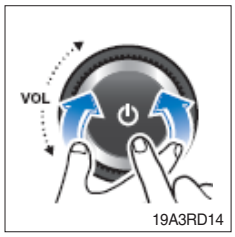


① Press the MUTE button to turn mute on.
- "MUTE" will flash on the display and mute the sound.
- Press the MUTE button again or turn VOLUME dial to restore sound.

(4) Setting the sound



① Press MENU button to enter the Settings menu mode.
- After entering MENU mode, press MENU button to return to the previous item.

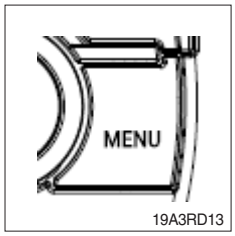


② Turn VOLUME dial to select the "SOUND" or "EQUALIZER" as below, then press this dial.
- SOUND : sets the sound mode.
- EQUALIZER : selects the equalizer style.

③ Turn VOLUME dial to select the desired Sound setting mode, then press this dial.
- BASS : sets the bass sound level (-5~+5).
- MIDDLE : sets the middle sound level (-5~+5).
- TREBLE : sets the treble sound level (-5~+5).
- BALANCE : sets the sound balance between the right and left speakers (LEFT 15~RIGHT 15).
- EQUALIZER : selects the one of the 7 EQ styles (EQ OFF, POP, ROCK, COUNTRY, VOICE, JAZZ, CLASSIC).
- PREVIOUS : Return to previous menu screen.

④ Turn VOLUME dial to adjust the value of the level, balance or style, then press this dial.

(5) Setting the system functions



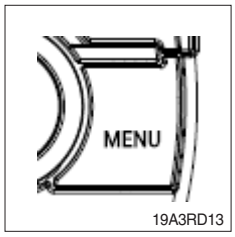
① Press MENU button to enter the Settings menu mode. Turn VOLUME dial to select "SYSTEM" as below, then press this dial.

② Turn the VOLUME dial to select the "BT ON/OFF", "SCROLL", “LOUD” or "BEEP" then press this dial.

- BT (Bluetooth) ON/OFF : activate (On) or deactivate (Off) the Bluetooth function. – (only ARA-9010HB).
- SCROLL : activate (On) or deactivate (Off) the text scroll feature for LCD display screen.
- LOUD : activate (On) or deactivate (Off) the loudness sound effect.
- BEEP : activate (On) or deactivate (Off) the beep sound feature.
- PREVIOUS : Return to previous menu screen.

③ Turn VOLUME dial to select ON or OFF, then press this dial.

(6) Setting the region



① Press MENU button to enter the Settings menu mode. Turn VOLUME dial to select "AREA" as below, then press this dial.

- AREA : sets the region for radio.

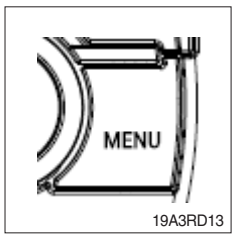
② Turn the VOLUME dial to select the desired area as below, then press this dial.

- If the region setting is not selected correctly to your country or region, the radio reception can not be received. Retry the setting the region of radio reception correctly.
- The region setting is required only for the first time.

· **ASIA/M.East**
FM : 87.5~108.0 MHz (100 kHz step)
AM : 531~1,602 kHz (9 kHz step)
· **AMERICA**
FM : 87.5~107.9 MHz (200 kHz step)
AM : 530~1,710 kHz (10 kHz step)
· **LATIN**
FM : 87.5~108.0 MHz (100 kHz step)
AM : 530~1,710 kHz (10 kHz step)

· **EUROPE**
FM : 87.5~108.0 MHz (50 kHz step)
AM : 531~1,620 kHz (9 kHz step)
· **JAPAN**
FM : 76~90 MHz (100 kHz step)
AM : 522~1,629 kHz (9 kHz step)
· **Russia (OIRT)**
FM : 65.0~74.0 MHz (30 kHz step)
AM : 522~1,602 kHz (9 kHz step)

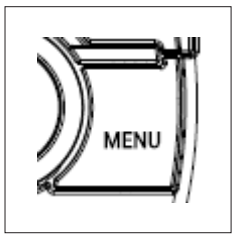
(7) Checking/updating the system Software



① Press MENU button to enter the Settings menu mode. Turn VOLUME dial to select "SOFTWARE" as below, then press this dial.
· SOFTWARE : check/update the system software.

② To check the system software, turn the VOLUME dial to select the "VERSION CHECK", then press this dial.
③ To update the system software, turn the VOLUME dial to select the "UPDATE", then press this dial.
· Download the latest system software to a USB device for update to this unit, then open the cover and plug the USB device to the USB port.
· Perform update with the start switch “ON” when the battery is sufficiently charged by driving the vehicle. When the battery is discharged while updating, the system may get damaged with the update stopped.

(8) Setting the Bluetooth mode (only ARA-9010HB)



① Press MENU button to enter the Settings menu mode. Turn VOLUME dial to select "BLUETOOTH" as below, then press this dial.
· Bluetooth : Bluetooth setting mode.

② Turn VOLUME dial to select the desired Bluetooth setting mode, then press this dial.
- PAIR : register a Bluetooth device.
- SELECT : selects/connects a device from registered Bluetooth devices.
- DELETE : removes a device from registered Bluetooth device.
- MIC VOL : adjusts the Bluetooth microphone.
- H/F VOL : adjusts the Bluetooth hands-free volume.
- Phone Book : activates/deactivates the phone book download feature from connected device.
- BT INFO : shows the Bluetooth information of this system.
- PREVIOUS : returns to previous menu screen.

③ To change the connected Bluetooth device, turn the VOLUME dial to select the "SELECT", then press this dial. Turn the VOLUME dial to select the desired device list, then press this dial.

④ To delete the Bluetooth device, turn the VOLUME dial to select the "DELETE", then press this dial. Turn the VOLUME dial to select the desired device list, then press this dial.
- If the currently connected device is delete, this unit attempts to connect with the following priority Bluetooth device automatically.

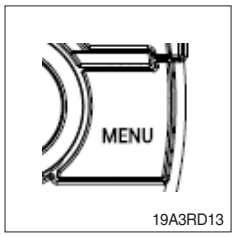
⑤ To adjust the Bluetooth microphone initial volume, turn the VOLUME dial to select the "MIC VOL", then press this dial. Turn the VOLUME dial to set desired Bluetooth microphone initial volume level, then press this dial.
- The default setting is 3, the volume range is 1~5.

⑥ To adjust the Bluetooth hands-free initial volume, turn the VOLUME dial to select the "H/F VOL", then press this dial. Turn the VOLUME dial to set desired Bluetooth hands-free initial volume level, then press this dial.
- The default setting is 15, the volume range is 6~32.

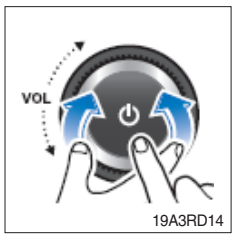
⑦ To download the phone book, turn the VOLUME dial to select the "phone book", then press this dial. Turn the VOLUME dial to select the "ENABLE", then press this dial.
- The phone book can download up to 1,000 phone numbers.

■ BLUETOOTH

(1) Pairing/Connecting your device



① Firstly, set up the Bluetooth device to be connected from the Bluetooth settings menu to enable other devices to search for the Bluetooth device.
Press MENU button to enter the Menu settings mode.



② Turn VOLUME dial to select the "BLUETOOTH" as below, then press this dial.

③ Turn the VOLUME dial to select the "PAIR", then press this dial.
- When you first register, appear the "BT Pairing" on the display window, then search the Bluetooth devices for connection.
- If a Bluetooth device is not connected, press and hold the button to enter the pairing mode directly.

④ Search and select device “Device Name” in your Bluetooth device, then confirm.
- The Bluetooth registration standby proceeds for 1 minute. If the registration is failed during 1minute, restart over from the beginning.
- After a while, the Bluetooth device is automatically registered. When pairing is successful, the "Connected" and "Device name" will be displayed 3 seconds.
- When your Bluetooth device is connected, appear on the display.
  If the Bluetooth device is disconnected, disappear.

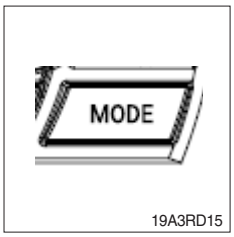
⑤ Repeat items 1~4 to register to add another Bluetooth device.
- Up to 5 devices can be paired to this unit.
- The last device connected to this unit is set to automatically connect to the highest priority.

(2) Playing the Bluetooth music

To play Bluetooth music

※ A2DP (Advanced Audio Distribution Profile) : This function only operates with Bluetooth devices that support A2DP version 1.2 or above.

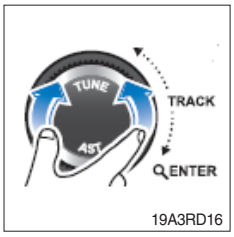
※ Should be set to Stereo Headset in Bluetooth device type menu of your device



① Press the MODE button repeatedly to select the BT Audio mode. Appears on display window and start playback.

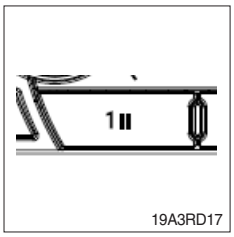
- If a Bluetooth device is not connected, you can not select.
- If music is not yet playing from your mobile device after switching to Bluetooth Music (streaming audio) mode or after pressing Play on the mobile device itself, try to start music playback by pressing the Play button again.
- The output music playback from Bluetooth devices with this unit.
- There will be music playback automatically play upon entering since once played. It stops automatically when you exit from the music.
- You can also phone or Bluetooth device other than the home screen mode, Bluetooth music play mode when entering and exiting, the device does not play automatically.

(3) Controlling the playback



① While playing, turn the TUNE/TRACK dial to moves to the previous or next track.

- Clockwise : move to the next file.
- Counter-clockwise : move to beginning of the current file or previous file.



② While playing, press the [1 II] button to pause the track with "PAUSE" indicator.

- Press this button again to play the current track.

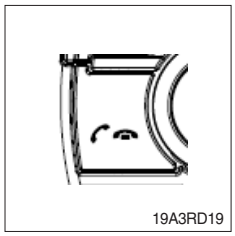
③ Press the [4 INFO] button to check the information of current connected device.

- About the music files are not displayed.
- During Bluetooth music playback, do not operate the music changes too quickly. Allow enough time for the machine-to-machine communication.

(4) Answering a call

※ When a call comes in, the audio source is muted, and display the call information with ring tone.

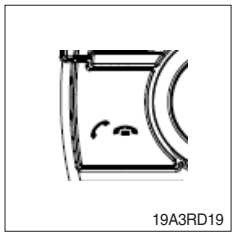
※ If the phonebook is not downloaded, only incoming phone number is displayed without the caller information.



① To answer a call, press the button or to reject a call press and hold the button.

- When a call comes in, the audio source is muted.
- When a call is ended, this unit returns to the previous state media playback.

(5) Making a call from recent number

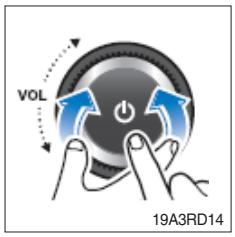


① To call the recent connected number, press the button to display recent call number.

- The recent calls list is displayed. Turn the VOLUME dial to select a recent call number, then press this dial to make a call.
- The recent calls list displays up to 10.

② To call the last connected number directly, press and hold the button.

(6) During a call …



① To adjust the a call volume, turn the VOLUME dial.

- The call volume works with Bluetooth devices, and operates separately from the volume of this unit.

② To deactivate the microphone, press the POWER button.

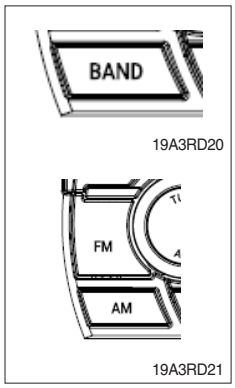
③ To switch from hands-free mode to the phone handset mode, press and hold the button.
To returns the phone conversation to hands-free mode, press and hold the button.

④ To end a call, press the button.

- End a call, then return to the playing state.

■ RADIO

(1) Tuning in a radio station



① Press the BAND or FM/AM button repeatedly to enter the radio band in order of FM1, FM2, FMA, AM1, AM2 or AMA.

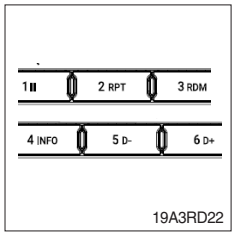
- You can select the FM1, FM2, FMA or AM1, AM2, AMA radio band. While the Auto Store stations(AST) are stored, you can select the AMA or FMA band by additional.
- The previously chosen broadcasting station will be received.

② Turn the TUNE/TRACK dial to select the station.

- Briefly turn this dial, plays previous/next frequency.
- Turn and hold this dial, automatically search for station with superior reception.
- Press this dial, starting from the current station, stations with superior reception are scanned for 5 seconds and the previous station is restored. During the seeking or scanning, if press or turn the dial left/right again, the selected station will begin playing.
- During the FM reception, the Stereo [ST] indicator is on.

(2) Saving radio stations manually

※ You can save up to 6 preset channels each for FM1, FM2, AM1,AM and AM2 band. If change the stations while driving, use preset button to prevent accidents.



① Press the BAND or FM/AM button repeatedly to select the band.

② After selecting the frequency, press and hold the PRESET [1II]~[6 D+] button.

③ The frequency is saved to the selected preset button.

- A total of 24 frequencies with 6 preset frequencies each forFM1/ FM2/AM1/AM2 modes can be saved.

(3) Saving radio stations automatically

※ You can save up to 6 preset channels automatically each for FMA and AMA band.

① Press the BAND or FM/AM button repeatedly to enter the radio band.

· The previously chosen broadcasting station will be received.

② Press and hold the AST button to automatically save receivable frequencies to Preset button.

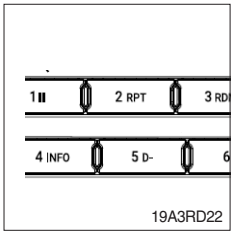
· Up to 6 stations can be stored in each of the FMA and AMA band.

(4) Listening to a preset station

① Press the BAND or FM/AM button repeatedly to enter the radio band in order of FM1, FM2, FMA, AM1, AM2 or AMA.

· You can select the FM1, FM2, FMA or AM1, AM2, AMA radio band. While the Auto Store stations(AST) are stored, you can select the AMA or FMA band by additional.

· The previously chosen broadcasting station will be received.



② Press the PRESET [1II]~[6 D+] button.

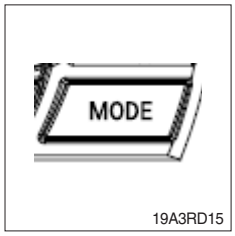
· From the 6 presets, select the frequency you want to listen to.

■ USB PLAYER

(1) Playing an USB device

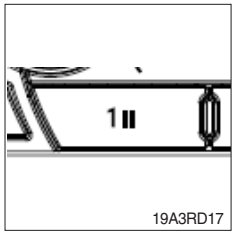
① Open the cover, plug the USB device(included MP3/WMA media file) to the USB port.

- Once a USB is connected, USB will automatically start playing from the first file within the USB.
- If a previously played USB is reconnected, then the file after the most recently played file is played.
- If a different USB is connected or the file information within the USB was changed, then the USB will start playing from the first song within the USB.



② When an USB device to be played is already connected, press the MODE button to play USB device.

- The previously selected file is played.



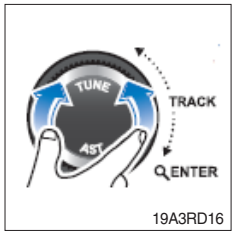
③ While playing, press the [1II] button to pause the file.

(2) Changing the song information

① Press the [4 INFO] button repeatedly to display information about the file being played.

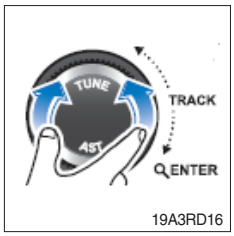
- The information displayed includes the file name, playing time, ID3 Tag or folder name information saved with the song.
- If there is no information on the playing file, the unit will display "NO INFO", and then file name.

(3) Controlling the playback



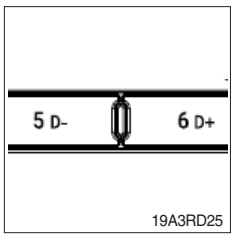
① While playing, turn the ▶▶I TRACK I◀◀ dial left/right to moves to the previous or next track.

- Clockwise : move to the next file.
- Counter-clockwise : move to the previous file.



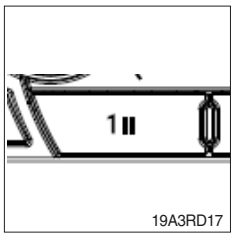
② While the ▶▶I TRACK I◀◀ dial is being turned and held, the file will rewind or fast forward at high speed. Once released, the file will begin playing at normal speed.

- Clockwise : fast forward.
- Counter-clockwise : fast rewind
- The search function works but search speed is not constant. While fast forwarding or rewinding, the playback sound is not output.



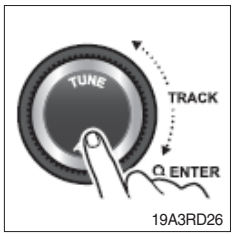
③ Press the [5 D-] or [6 D+] button to moves to the previous or next folder.

- [5 D-] press : move to previous folder.
- [6 D+] press : move to next folder.
- While folder moving, the folder name will be displayed briefly.



④ While playing, press the [1 II] button to pause the track.

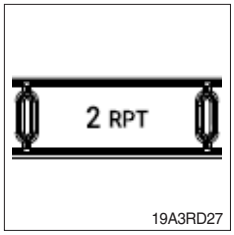
- Press the button again to play the current track.



④ To find the song you want to play directly, press the 🔍 (Search) button.

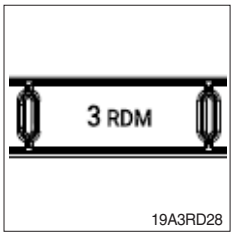
- Turn the ▶▶I TRACK I◀◀ dial to select the desired file name, then press this dial.

(4) Change the playback mode



① Press the [2 RPT] button to select the Repeat playback mode.

- 🔁 On : The current file plays repeatedly.
- 🗀 🔁 On : The current folder plays repeatedly.
- Off : Cancels repeat playback.



② Press the [3 RDM] button to select the Random playback mode.
- · 🗀 🔀 On : All files of current folder play in random order.
- · 🔀 On : All files of USB device play in random order.
- · Off : Cancels random playback.

(5) Handling precautions for USB device

① The device will only recognize USB devices formatted in FAT 16/32. When formatting the external USB device, the device may not properly recognize a Byte/Sector selection other than 512 Bytes or 2,048 Bytes.

② The amount of time required to recognize the external USB device may differ depending on the type, size, or file formats stored on the USB. Such differences in the required time are not indications of malfunction. Please wait the period of time required to recognize the device.

③ This unit can recognize maximum 9,999 files and 256 folders into the USB device.

④ The device may not recognize the USB device if separately purchased USB hubs and extension cables are being used.

⑤ The device may not support normal operation when using formats such as HDD Type, CF, or SD Memory.

⑥ The device will not support files locked by DRM (Digital Rights Management).

■ AUX PLAYER

(1) Listening to auxiliary audio equipment

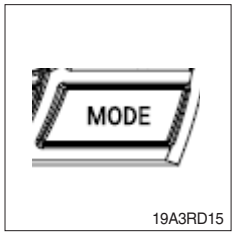
※ By connecting an optional portable audio device to the AUX input jack (stereo 3.5 pi) on the unit and then simply selecting the source, you can listen on your car speakers.

① Turn the VOLUME dial left to decrease the volume level.

· The AUX volume can also be controlled separately through the connected device.

② Turn the external audio equipment off. Open the cover, connect the audio output of the external audio equipment to AUX input terminal on the unit.

③ Turn the external audio equipment on. Start playback of the external audio equipment at a moderate volume.



④ Press the MODE button repeatedly to select the AUX function.

⑤ Set your usual listening volume by turn the VOLUME dial left/right on the unit.

· Once the connector is disconnected, the previous mode will be restored.

· AUX mode can be used only when an external audio player has been connected.

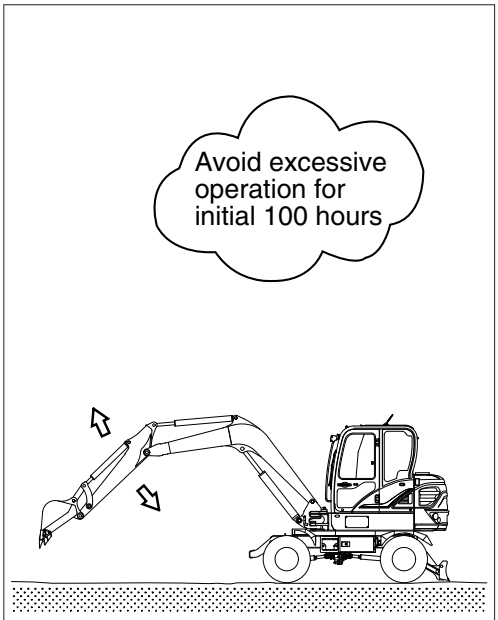
1. SUGGESTION FOR NEW MACHINE

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.**



HW604OP01A

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	250
Engine oil filter element	
Prefilter (water, element)	
Swing reduction gear case	
Swing reduction gear grease	
Transmission gear oil	
Pilot line filter element	
Front axle differential gear oil	
Rear axle differential gear oil	
Axle planetary gear case	
Fuel filter element	

2. CHECK BEFORE STARTING THE ENGINE

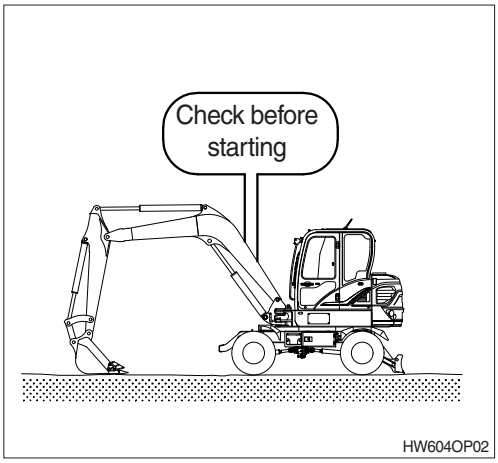
1) Look around the machine and under the machine to check for loosen nut or bolts, collection of dirt, or leakage of oil, fuel or coolant and check the condition of the work equipment and hydraulic system. Check also loosen wiring, and collection of dust at places which reach high temperature.

※ **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.

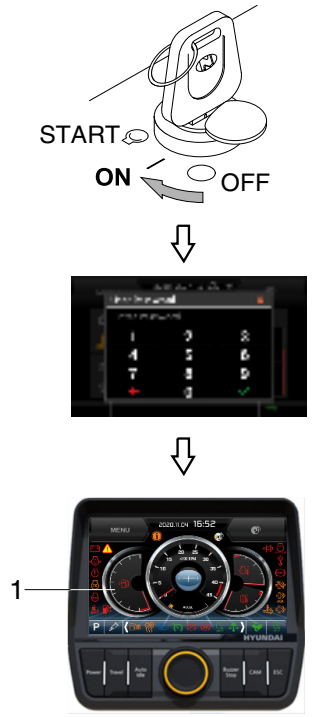
(2) Turn the starting switch to the ON position. Buzzer sounding for 4 seconds with HYUNDAI logo on cluster.

※ **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 3-20 for ESL mode.**

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



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2) STARTING ENGINE IN NORMAL TEMPERATURE

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

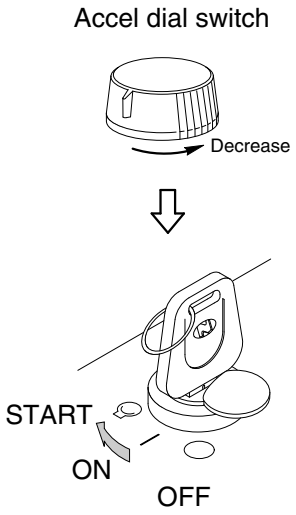
(1) Turn the accel dial switch to low idle position.

(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.



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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 2-15.**

※ **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.

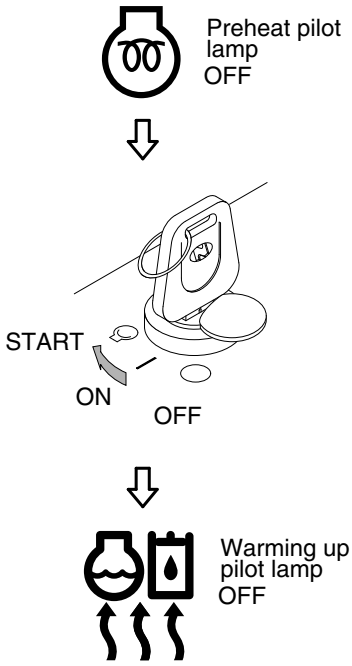
(4) Wait for five minutes to warm up the engine after the preheating pilot lamp off, and than turn the starting switch to the START position to start the engine.

※ **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.**



HX60A4OP03A

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.**

HX60A4OP06

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.

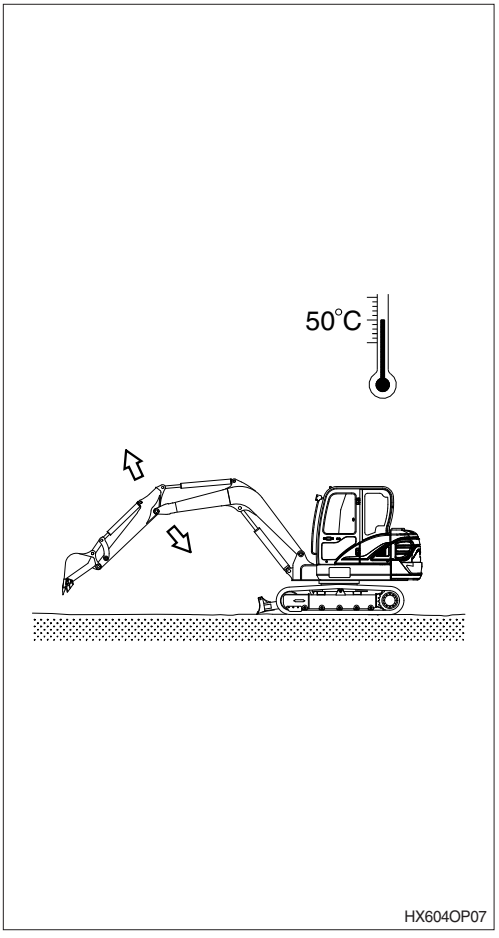
※ **Do not operate anything except bucket lever.**

(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.**



HX604OP07

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.

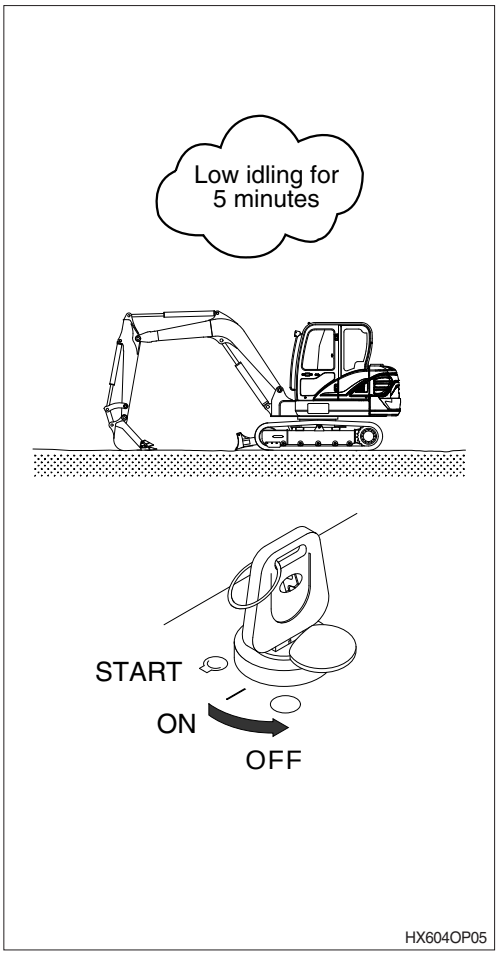
(3) Put the parking switch in the parking position.

(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 knob.

(7) Lock the cab door.



4. OPERATION OF WORKING DEVICE

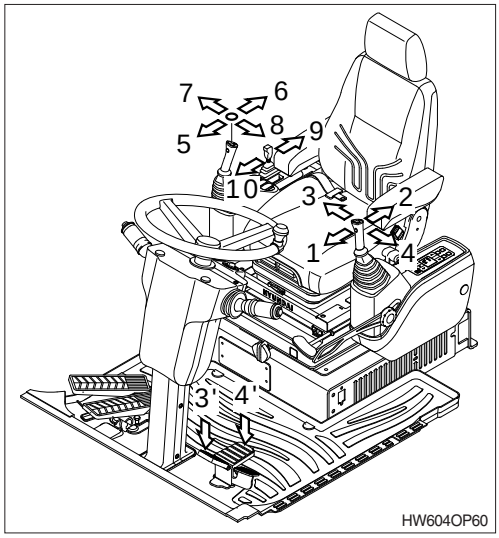
※ **Confirm the operation of control lever and working device.**

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.**

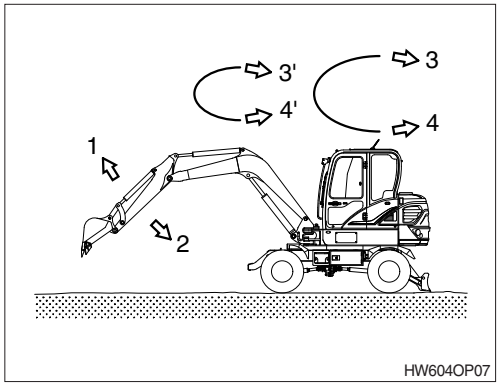


HW604OP60

※ **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 3-32 for boom offset switch.**



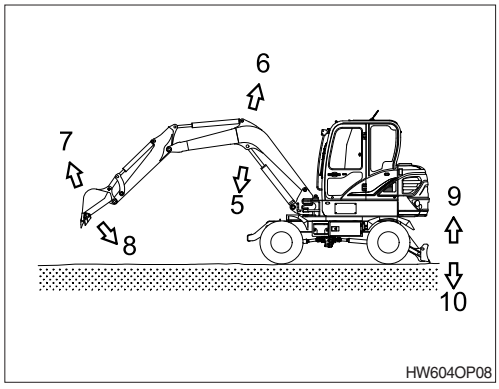
HW604OP07

※ **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



HW604OP08

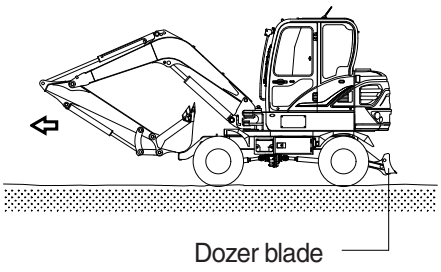
5. TRAVELING OF THE MACHINE

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.



HW604OP04

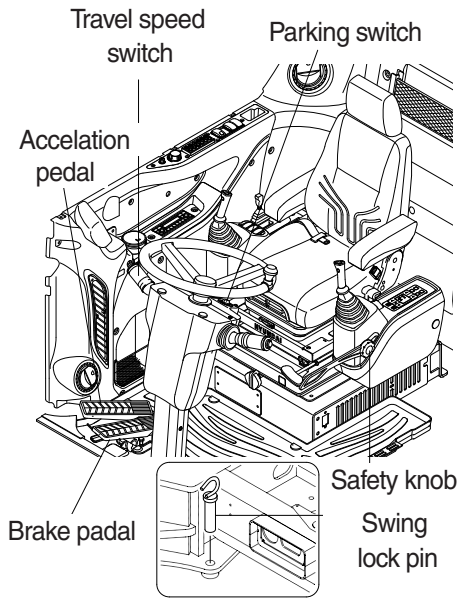
(2) Traveling operation

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 knob.
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.



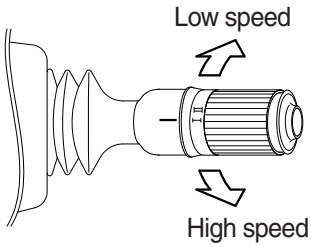
HW604OP10A

(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.



HW604OP11

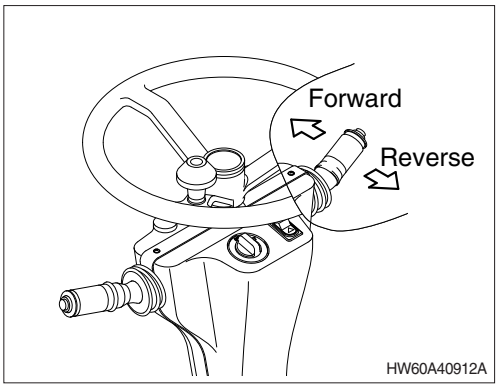
(4) Changing direction (forward/reverse)

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.**



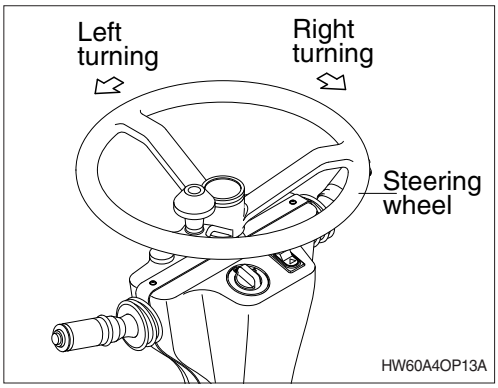
(5) Turning the machine

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.

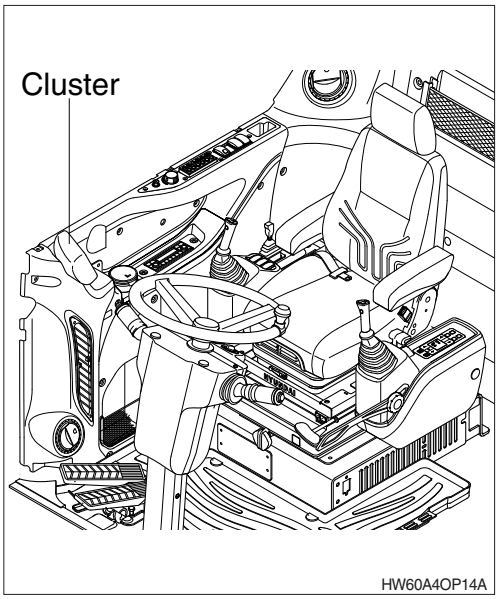
② Do not allow the engine to run at overload.

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.

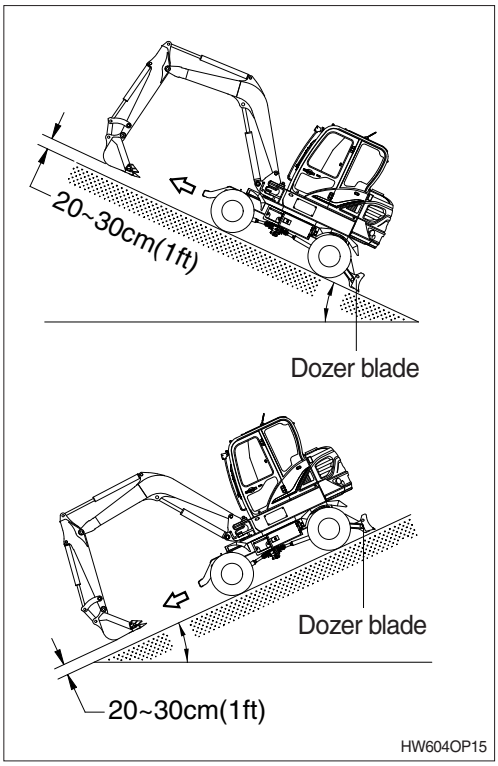
(2) Lower the bucket 20 to 30 ㎝ (1 ft) to the ground so that it can be used as a brake in an emergency.

(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.

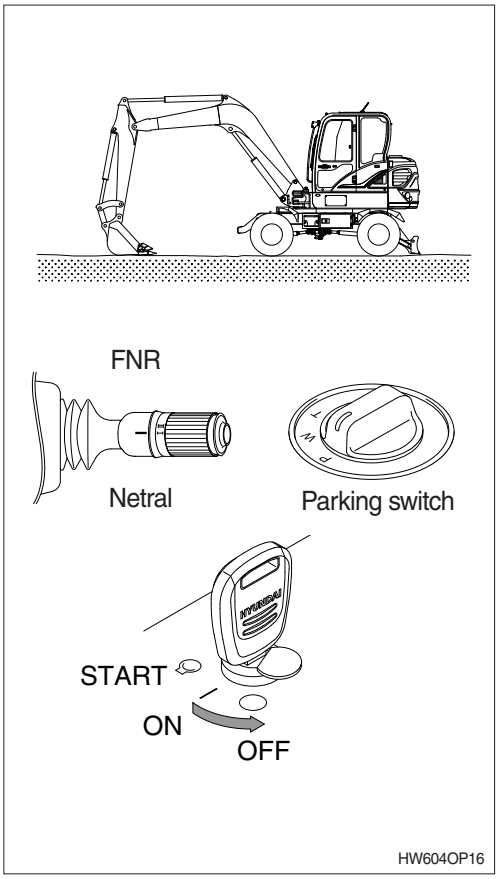
(5) Lower the bucket and dozer blade to the ground.

(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.

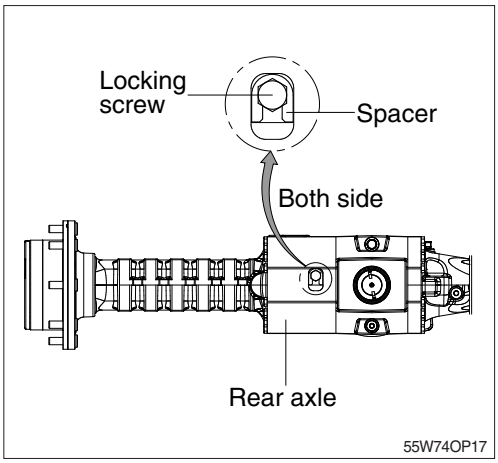
(2) Towing the machine

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.

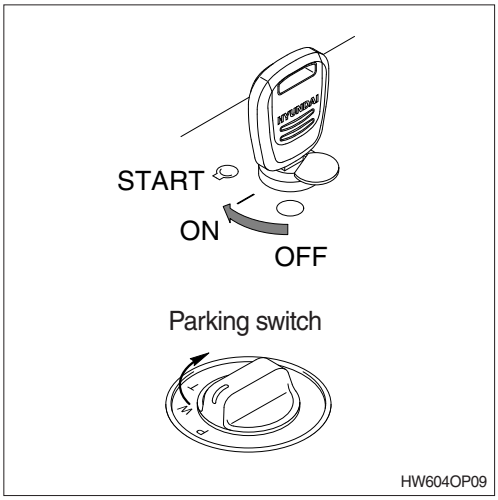
② For this purpose, loosen the locking screw and remove the spacer of rear axle.

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.

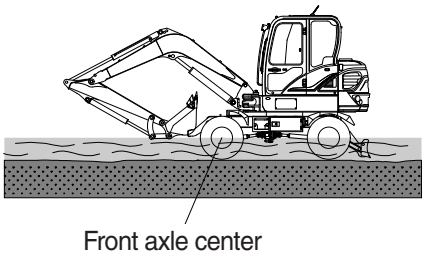


5) PRECAUTIONS FOR OPERATION

(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.



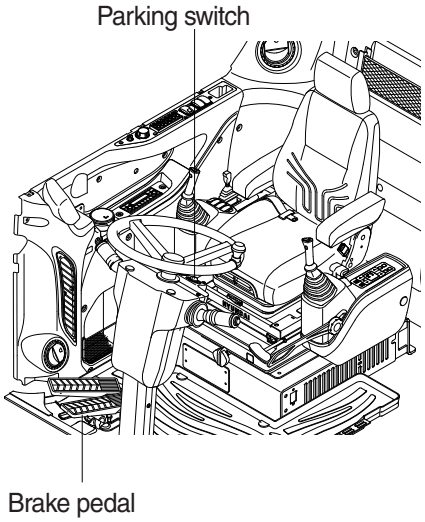
HW604OP18

(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 HD Hyundai Construction Equipment dealer to check complete brake system.**

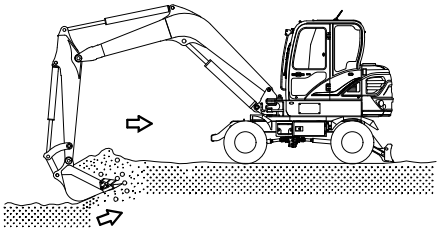
⚠ **Never use emergency brake, except when the service brake fails.**



HW604OP19

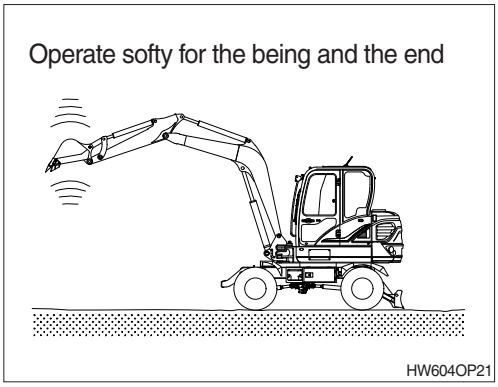
6. EFFICIENT WORKING METHOD

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.



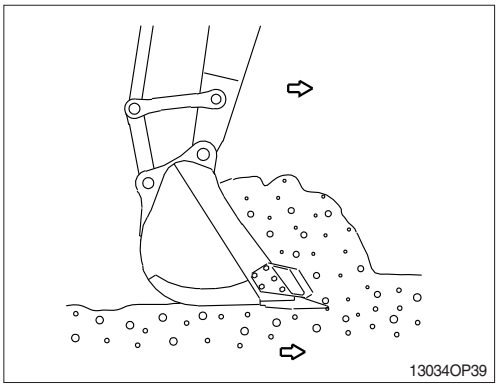
HW604OP20

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.



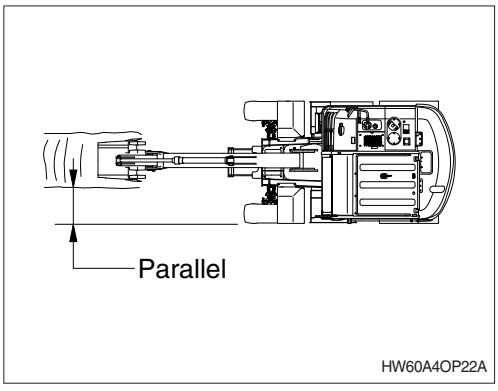
HW604OP21

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



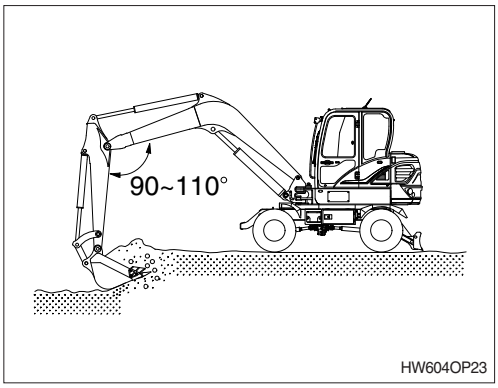
13034OP39

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

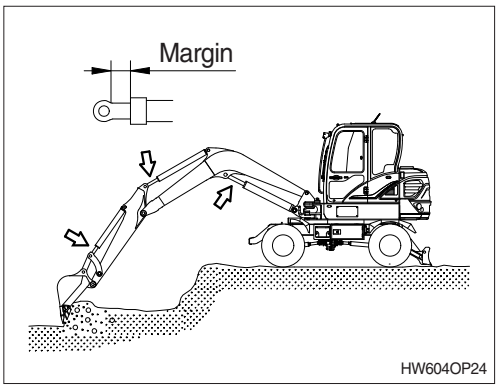


HW60A4OP22A

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

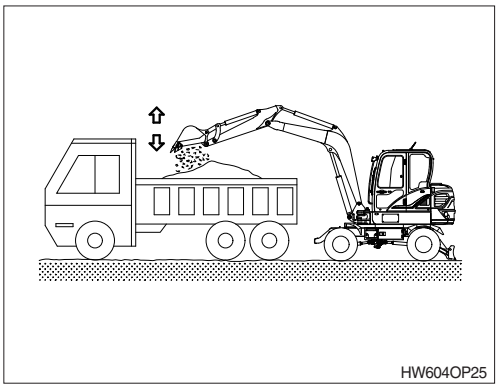


6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

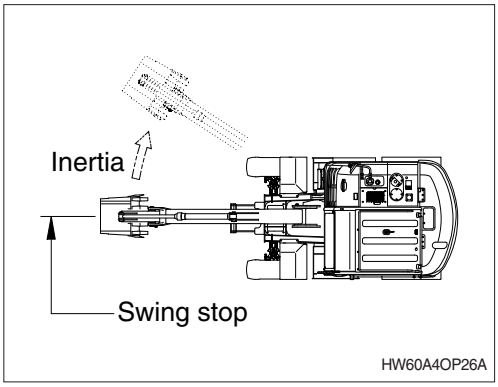


7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

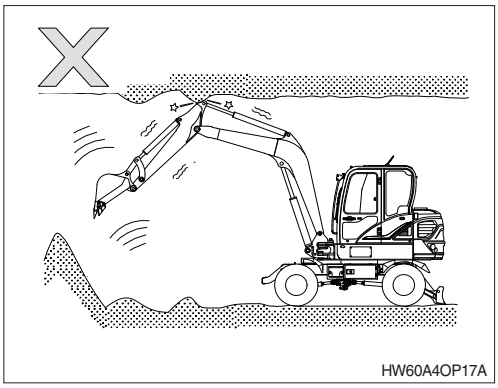
※ **Do not use the impact of bucket tooth when dumping.**



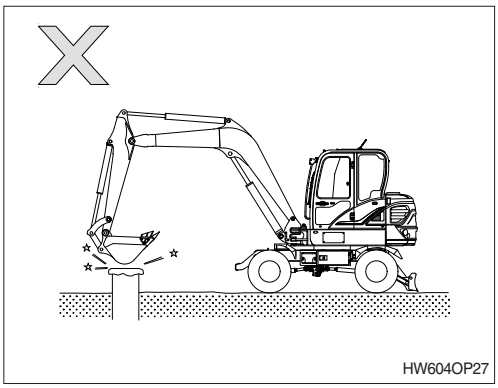
8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



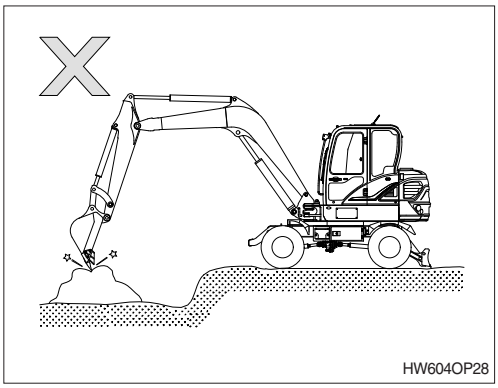
9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.


HW60A4OP17A

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


HW604OP27

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


HW604OP28

12) NEVER CARRY OUT EXCESSIVE OPERATIONS

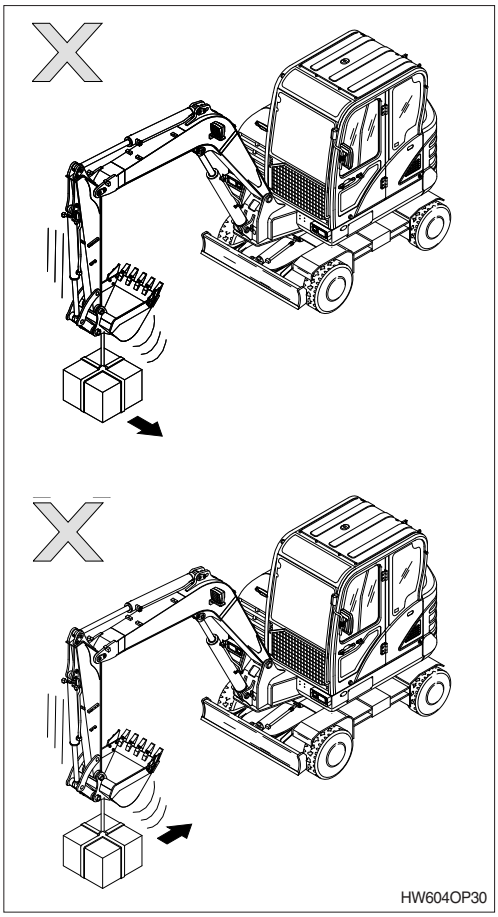
Operation exceeding machine performance may result in accident or failure.

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 HD Hyundai Construction Equipment distributor.



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.

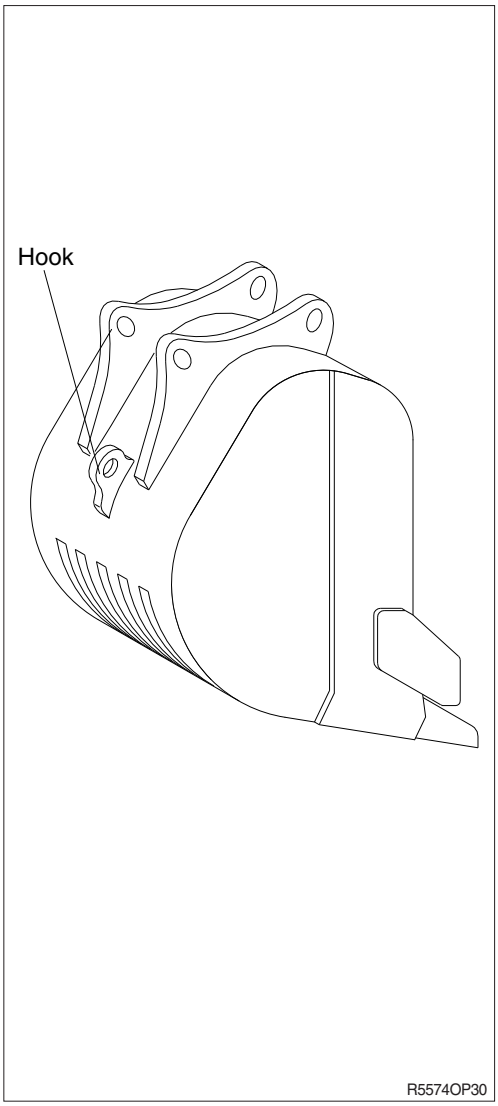
When performing lifting operation, never raise or lower a person.

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.

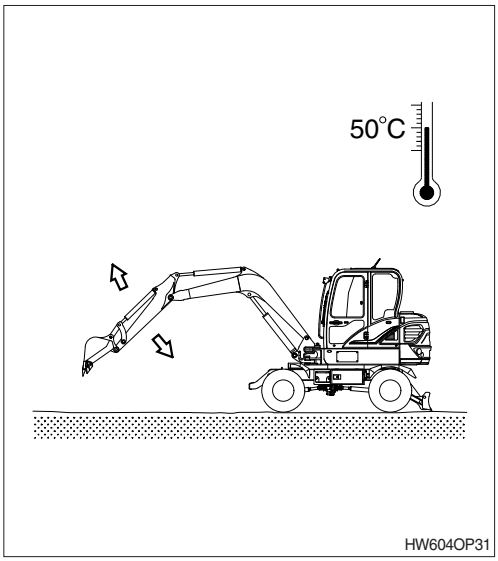
(3) Refer to the starting engine in cold weather. Start the engine and extend the warming up operation.

(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

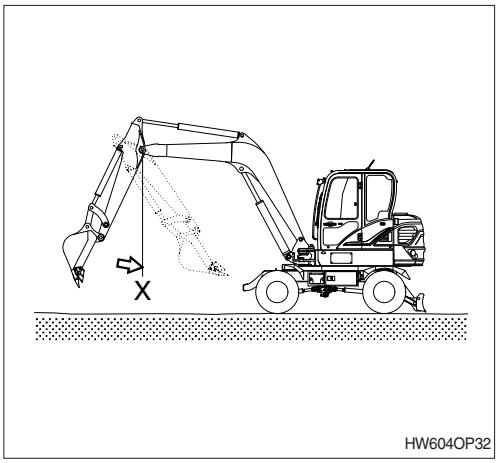
(1) Check for damage to the undercarriage and for looseness, flaws, wear and damage in bolts and nut.

(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 knob UNLOCK position. After the engine is stopped, set the safety knob to the LOCK position.

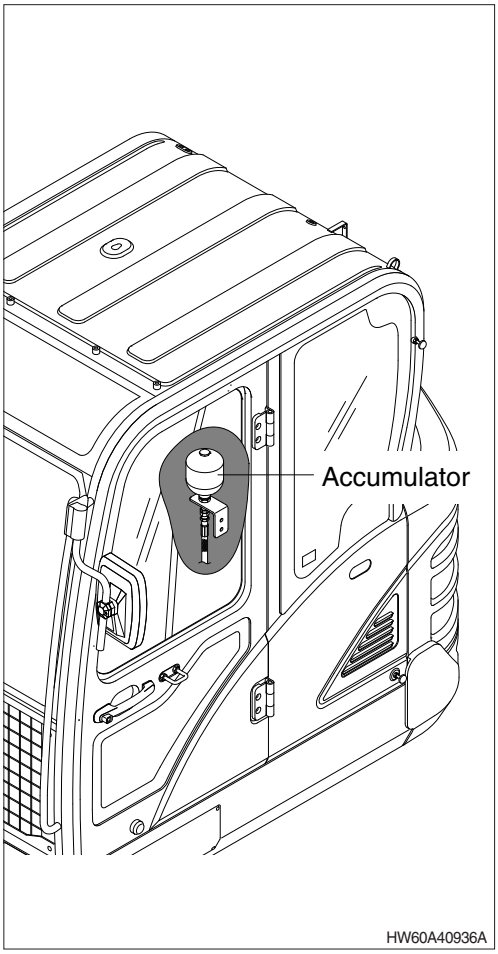
⚠ **Be sure no one is under or near the attachment before lowering the boom.**

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 HD Hyundai Construction Equipment 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

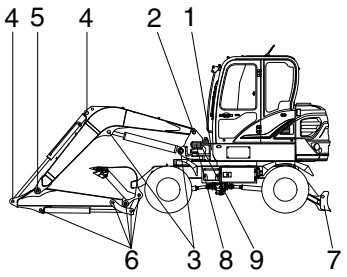
(1) Cleaning the machine

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.



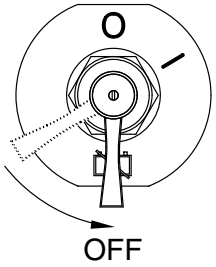
HW604OP33

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.



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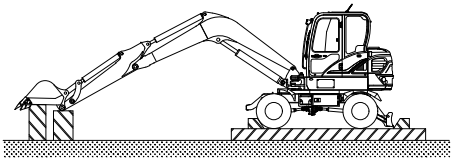
(5) Prevention of dust and moisture

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.



HW604OP34

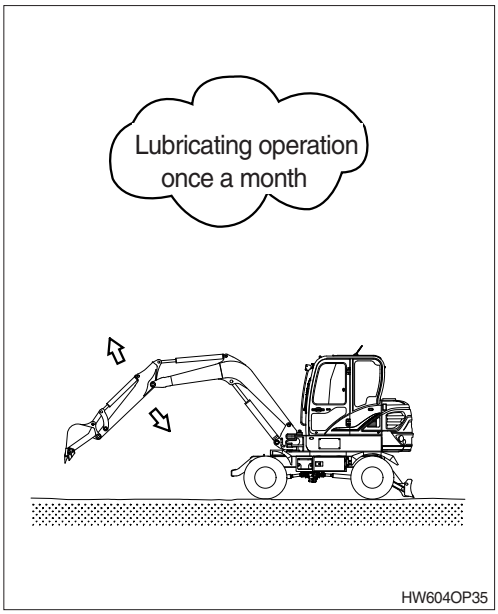
2) DURING STORAGE

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.**

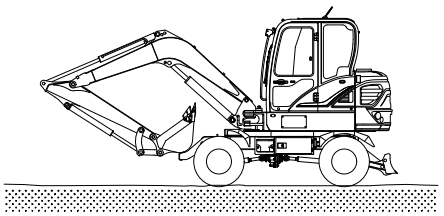
※ **If the machine is stored without carrying out the monthly lubricating operation, consult your HD Hyundai Construction Equipment dealer for service.**

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.

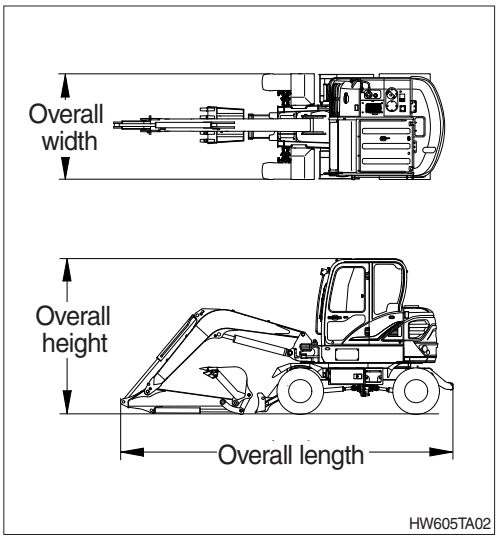
1) Comply with regulations regarding this machine for the sake of safety.
2) Perform daily inspection before starting the machine.
3) Cross the bridge after checking that it will safely support the machine weight. If the bridge can not support, a detour must be prepared or the bridge must be reinforced.
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.



HW605OP04A

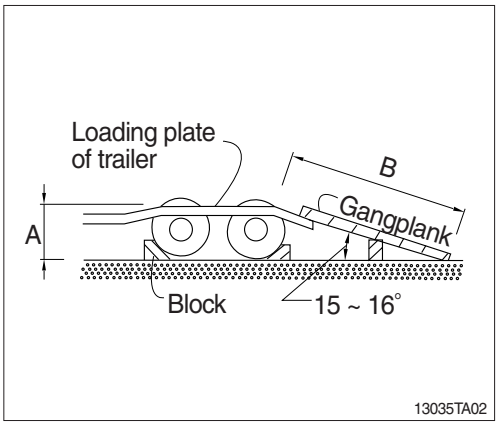
2. PREPARATION FOR TRANSPORTATION

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.



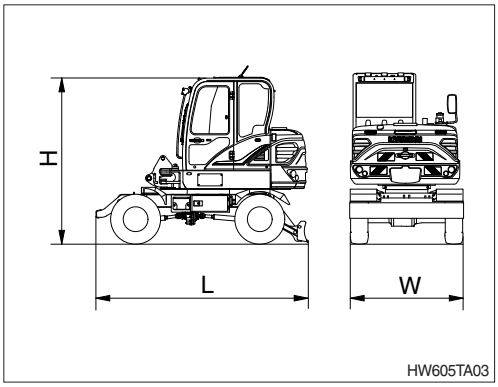
6) Prepare gangplank for safe loading referring to the below table and illustration.

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



(1) Single tire

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3685 (12' 1")
H	Height	mm (ft-in)	2905 (9' 6")
Wd	Width	mm (ft-in)	1925 (6' 4")
Wt	Weight	kg (lb)	5325 (11740)

※ With 330 kg (730 lb) counterweight.

(2) Double tire

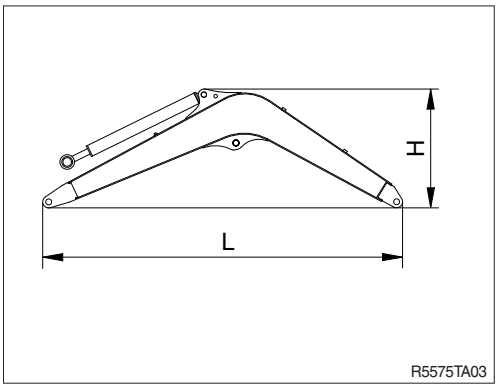
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3685 (12' 1")
H	Height	mm (ft-in)	2865 (9' 5")
Wd	Width	mm (ft-in)	2100 (6' 11")
Wt	Weight	kg (lb)	5615 (12380)

※ With 330 kg (730 lb) counterweight.

2) BOOM ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3126 (10' 3")
H	Height	mm (ft-in)	1138 (3' 9")
Wd	Width	mm (ft-in)	330 (1' 1")
Wt	Weight	kg (lb)	248 (550)

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

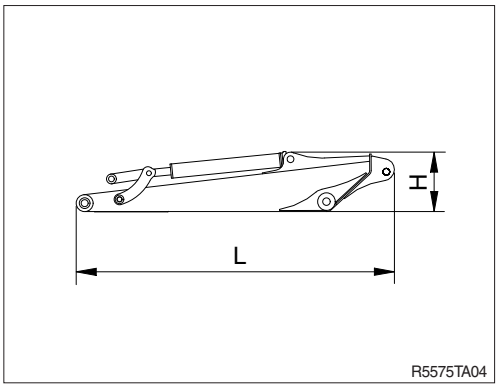


3) ARM ASSEMBLY

(1) 1.60 m (5' 3") arm

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2120 (6' 11")
H	Height	mm (ft-in)	461 (1' 6")
Wd	Width	mm (ft-in)	169 (0' 7")
Wt	Weight	kg (lb)	130 (290)

※ With bucket cylinder (including linkage and pins).



(2) 1.90 m (6' 3") arm

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2146 (7' 0")
H	Height	mm (ft-in)	429 (1' 5")
Wd	Width	mm (ft-in)	169 (0' 7")
Wt	Weight	kg (lb)	135 (300)

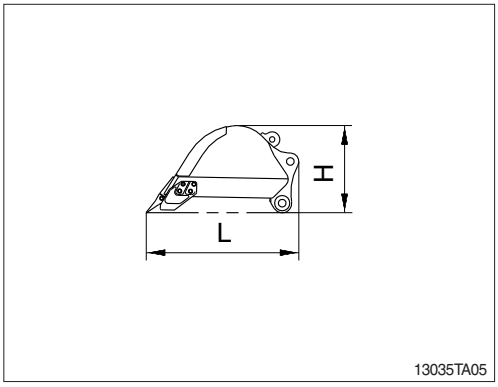
※ With bucket cylinder (including linkage and pins).

4) BUCKET ASSEMBLY

(1) 0.18 m^3 (0.24 yd^3) SAE heaped bucket

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1019 (3' 4")
H	Height	mm (ft-in)	569 (1' 10")
W	Width	mm (ft-in)	730 (2' 5")
Wt	Weight	kg (lb)	163 (360)

※ Including tooth and side cutters



(2) 0.07 m^3 (0.09 yd^3) SAE heaped bucket

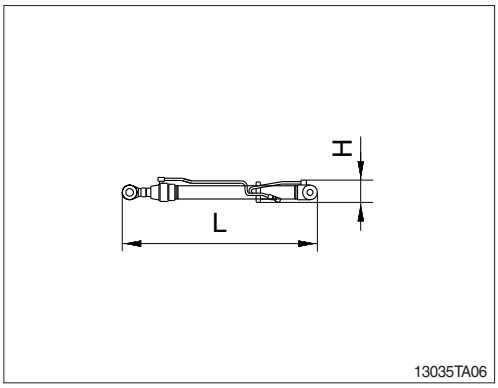
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1019 (3' 4")
H	Height	mm (ft-in)	570 (1' 10")
W	Width	mm (ft-in)	365 (1' 2")
Wt	Weight	kg (lb)	111 (240)

※ Including tooth and side cutters

5) BOOM CYLINDER

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1270 (4' 2")
H	Height	mm (ft-in)	161 (0' 6")
Wd	Width	mm (ft-in)	275 (0' 11")
Wt	Weight	kg (lb)	77 (170)

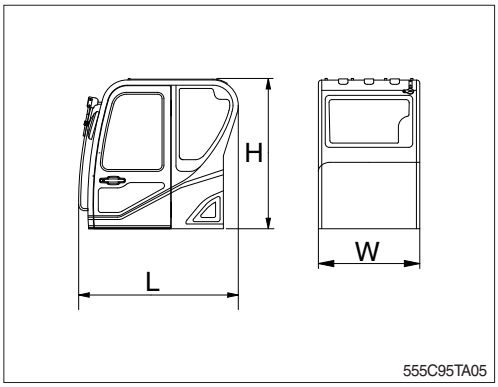
※ Included piping.



6) CAB ASSEMBLY

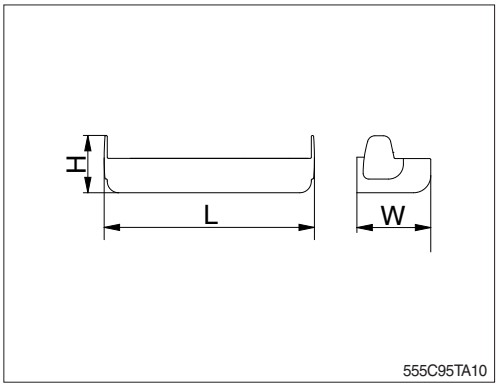
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1665 (5' 6")
H	Height	mm (ft-in)	1640 (5' 5")
Wd	Width	mm (ft-in)	1060 (3' 6")
Wt	Weight	kg (lb)	430 (950)

[ ] : with FOG GUARD



7) COUNTERWEIGHT

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1850 (6' 1")
H	Height	mm (ft-in)	395 (1' 4")
Wd	Width	mm (ft-in)	644 (2' 1")
Wt	Weight	kg (lb)	210 (460)



4. LOADING THE MACHINE

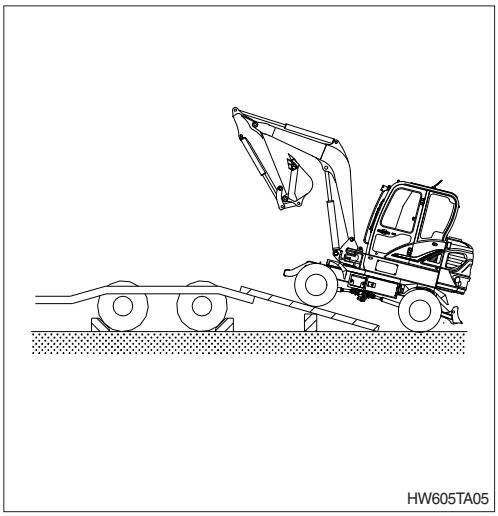
1) Load and unload the machine on a flat ground.

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.

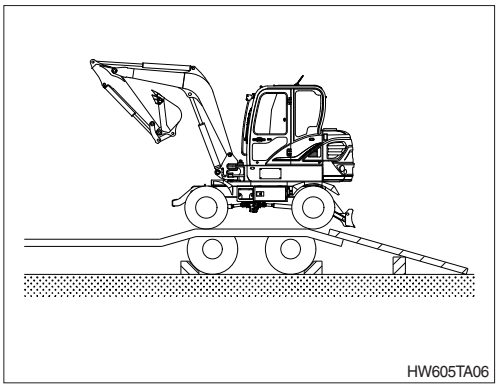
4) Place the swing lock device to the **LOCK** position before fixing the machine at the bed of trailer and confirm if the machine parallels the bed of trailer.

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


HW605TA05

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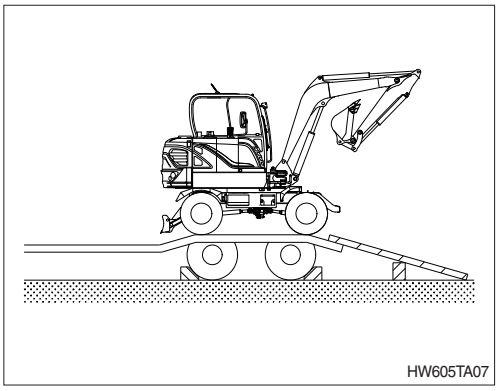
(2) Place the swing lock device to the **LOCK** position after the swing the machine 180 degree.


HW605TA07

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

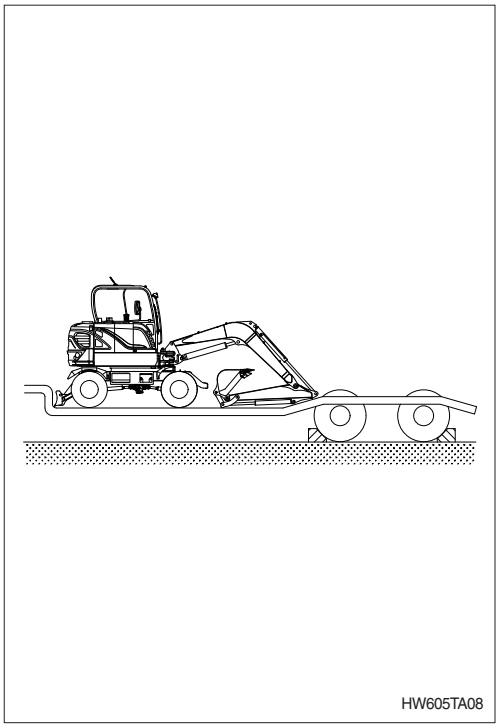
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

⚠ **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.**

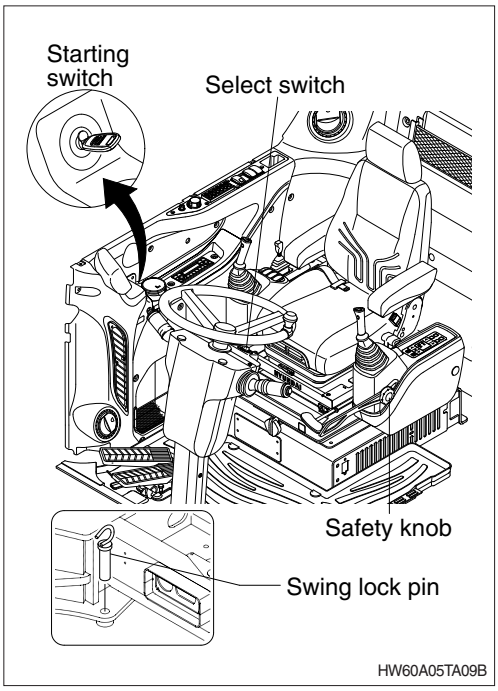
⚠ **Be careful on the boundary place of loading plate or trailer as the balance of machine will abruptly be changed on the point.**



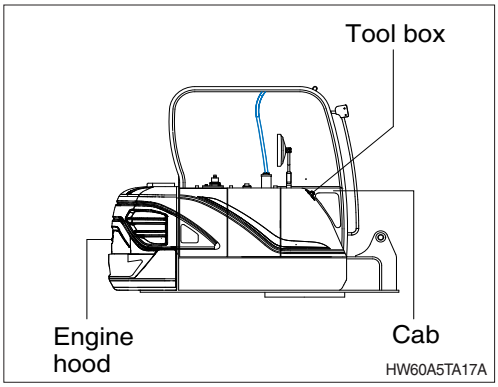
HW605TA08

5. FIXING THE MACHINE

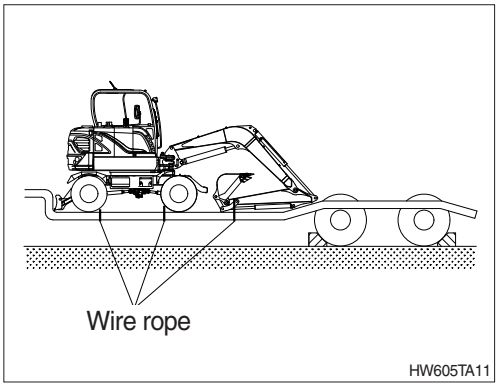
1) Place the swing lock pin on the LOCK position.
2) Place the parking switch to the parking position.
3) Keep the safety knob on the LOCK position.
4) Turn OFF all the switches and remove the key.



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.

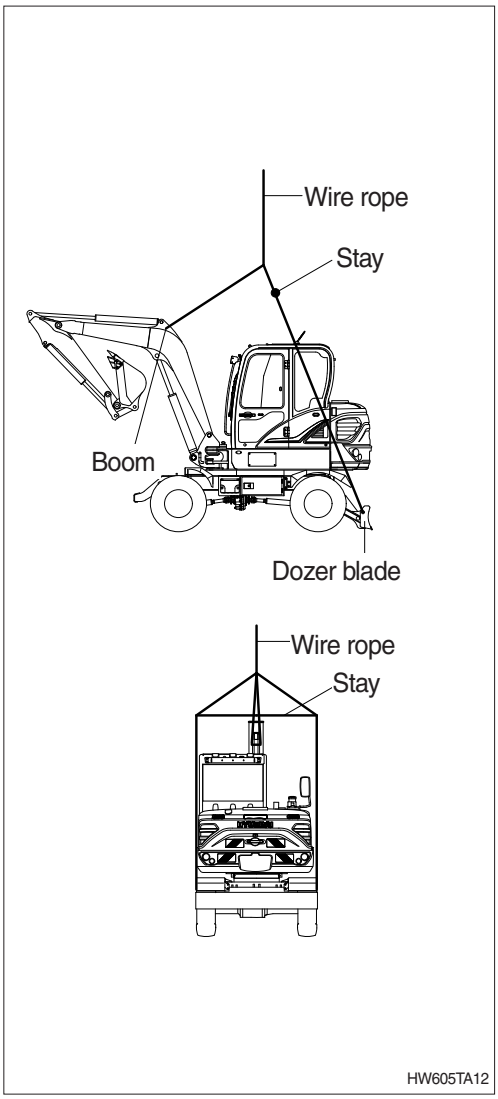
⚠ **Make sure wire rope is proper size.**

⚠ **Place the safety knob 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.**



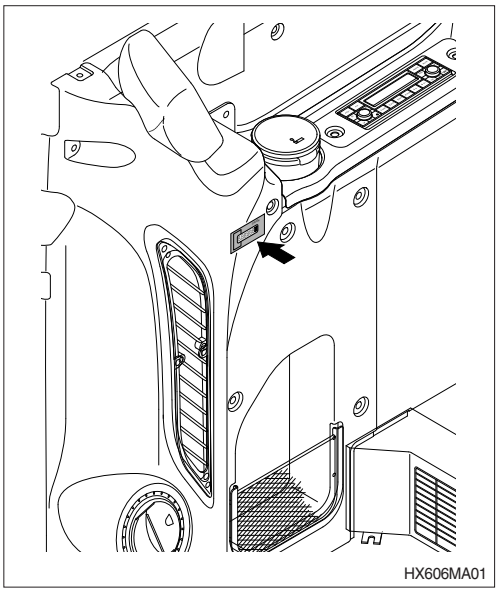
1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

(1) Inspect and service machine as described on page 6-10.

(2) Shorten intervals of inspection and service depending on site conditions. (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 100 hours, carry out all the maintenance「Each 100 hours, each 50 hours and daily service」 at the same time.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2) PRECAUTION

(1) Do not perform maintenance on the machine until you have read the operator's manual and are familiar with the machine.

(2) Daily inspection should be performed according to section, Maintenance check list.

(3) Engine and hydraulic components have been preset from the factory.
Do not allow unauthorized personnel to reset them.

(4) Drain the used oil and coolant (always in separate containers). Handle and dispose of the waste per regulation of each province/country as well as any local laws.

⚠ Hot oil and hot components can cause serious injury or death. Do not allow hot oil or hot components to contact skin. Failure to comply may result in serious injury or death.

△ Accumulated grease and oil on the machine is a fire hazard. Remove any coating/film of fuel, oil or grease by steam cleaning the machine with high pressure water. Preform this at minimum of 1000 hours.

△ Inspect the engine compartment for any trash build up. Remove any trash build up from the engine compartment.

(5) Ask your local dealer or HD Hyundai Construction Equipment for the maintenance advice if unknown.

3) PROPER MAINTENANCE

(1) Replace and repair of parts

It is required to replace the wearable and consumable parts such as bucket tooth, side cut ter, filter and etc., regularly. Replace damaged or worn parts before or at the required time to maintain machine performance.

(2) Always use only HD Hyundai Construction Equipment genuine parts.

(3) Use the recommended oil.

(4) Do not perform repairs while the machine is running. Stop the engine when you fill the oil.

(5) Always wear protective goggles, protective gloves and other personal protective equipment.

(6) Clean around the inlet of oil tank before add ing oil.

(7) Drain oil when the temperature of oil is warm.

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

(9) Confirm if cluster has any warnings present after completion of service.

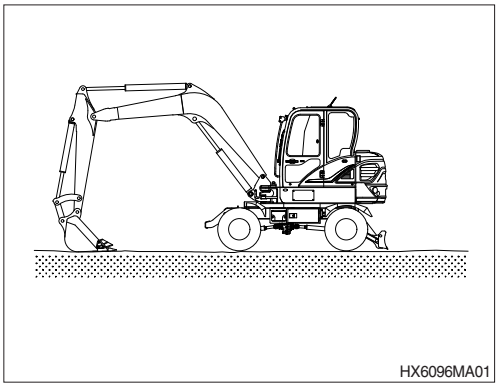
(10) For more detail information of maintenance, please contact your local HD Hyundai Construction Equipment dealer.

※ **Read chapter 1 of this manual for safety instructions prior to performing any maintenance on the machine.**

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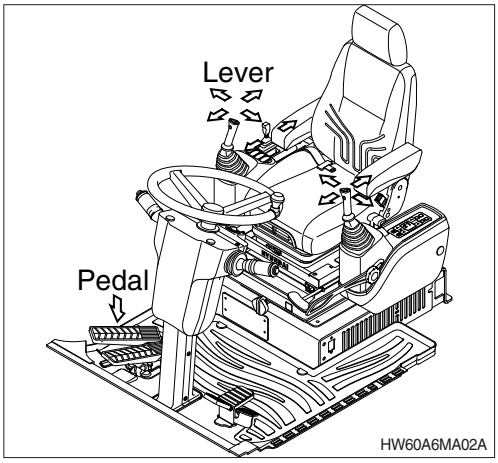
(2) Set the safety knob completely in the UNLOCK position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ 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.



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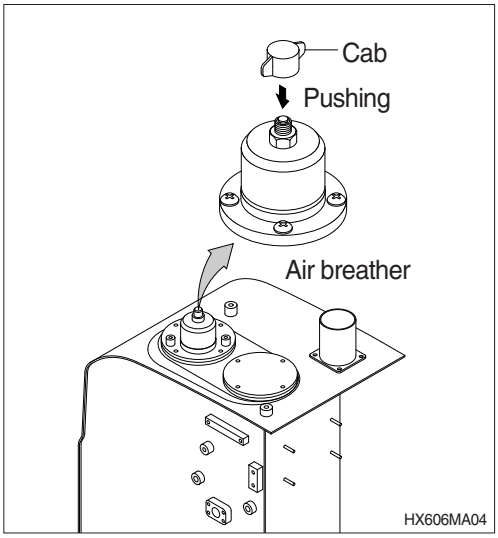
(3) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.



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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.

<table>
<tr><th colspan="3">Periodical replacement of safety parts</th><th>Interval</th></tr>
<tr><td colspan="2" rowspan="2">Engine</td><td>Fuel hose(tank-engine)</td><td rowspan="13">Every 2 years</td></tr>
<tr><td>Heater hose (heater-engine)</td></tr>
<tr><td rowspan="11">Hydraulic system</td><td rowspan="3">Main circuit</td><td>Pump suction hose</td></tr>
<tr><td>Pump delivery hose</td></tr>
<tr><td>Swing hose</td></tr>
<tr><td rowspan="3">Working device</td><td>Boom cylinder line hose</td></tr>
<tr><td>Arm cylinder line hose</td></tr>
<tr><td>Bucket cylinder line hose</td></tr>
<tr><td rowspan="3">Brake line</td><td>Service brake line hose</td></tr>
<tr><td>Parking brake line hose</td></tr>
<tr><td>Steering line hose</td></tr>
</table>

※ **Replace O-ring and gasket at the same time when replacing the hose.**
Replace clamp at the same time if the hose clamp is cracked when checking and replacing the hose.

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8.8T		10.9T		12.9T	
	kgf · m	lbf · ft	kgf · m	lbf · ft	kgf · m	lbf · ft
M 6×1.0	0.8 ~ 1.2	5.8 ~ 8.6	1.2 ~ 1.8	8.7 ~ 13.0	1.5 ~ 2.1	10.9 ~ 15.1
M 8×1.25	2.0 ~ 3.0	14.5 ~ 21.6	2.8 ~ 4.2	20.3 ~ 30.4	3.4 ~ 5.0	24.6 ~ 36.1
M10×1.5	4.0 ~ 6.0	29.0 ~ 43.3	5.6 ~ 8.4	40.5 ~ 60.8	6.8 ~ 10.0	49.2 ~ 72.3
M12×1.75	6.8 ~ 10.2	50.0 ~ 73.7	9.6 ~ 14.4	69.5 ~ 104	12.3 ~ 16.5	89.0 ~ 119
M14×2.0	10.9 ~ 16.3	78.9 ~ 117	16.3 ~ 21.9	118 ~ 158	19.5 ~ 26.3	141 ~ 190
M16×2.0	17.9 ~ 24.1	130 ~ 174	25.1 ~ 33.9	182 ~ 245	30.2 ~ 40.8	141 ~ 295
M18×2.5	24.8 ~ 33.4	180 ~ 241	34.8 ~ 47.0	252 ~ 340	41.8 ~ 56.4	302 ~ 407
M20×2.5	34.9 ~ 47.1	253 ~ 340	49.1 ~ 66.3	355 ~ 479	58.9 ~ 79.5	426 ~ 575
M22×2.5	46.8 ~ 63.2	339 ~ 457	65.8 ~ 88.8	476 ~ 642	78.9 ~ 106	570 ~ 766
M24×3.0	60.2 ~ 81.4	436 ~ 588	84.6 ~ 114	612 ~ 824	102 ~ 137	738 ~ 991
M30×3.5	120 ~161	868 ~ 1164	168 ~ 227	1216 ~ 1641	202 ~ 272	1461 ~ 1967

(2) Fine thread

Bolt size	8.8T		10.9T		12.9T	
	kgf · m	lbf · ft	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8×1.0	2.1 ~ 3.1	15.2 ~ 22.4	3.0 ~ 4.4	21.7 ~ 31.8	3.6 ~ 5.4	26.1 ~ 39.0
M10×1.25	4.2 ~ 6.2	30.4 ~ 44.9	5.9 ~ 8.7	42.7 ~ 62.9	7.0 ~ 10.4	50.1 ~ 75.2
M12×1.25	7.3 ~ 10.9	52.8 ~ 78.8	10.3 ~ 15.3	74.5 ~ 110	13.1 ~ 17.7	94.8 ~ 128
M14×1.5	12.4 ~ 16.6	89.7 ~ 120	17.4 ~ 23.4	126 ~ 169	20.8 ~ 28.0	151 ~ 202
M16×1.5	18.7 ~ 25.3	136 ~ 182	26.3 ~ 35.5	191 ~ 256	31.6 ~ 42.6	229 ~ 308
M18×1.5	27.1 ~ 36.5	196 ~ 264	38.0 ~ 51.4	275 ~ 371	45.7 ~ 61.7	331 ~ 446
M20×1.5	37.7 ~ 50.9	273 ~ 368	53.1 ~ 71.7	384 ~ 518	63.6 ~ 86.0	460 ~ 622
M22×1.5	51.2 ~ 69.2	370 ~ 500	72.0 ~ 97.2	521 ~ 703	86.4 ~ 116	625 ~ 839
M24×2.0	64.1 ~ 86.5	464 ~ 625	90.1 ~ 121	652 ~ 875	108 ~ 146	782 ~ 1056
M30×2.0	129 ~ 174	933 ~ 1258	181 ~ 245	1310 ~ 1772	217 ~ 294	1570 ~ 2126

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

5) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-Bracket)	M10 × 1.5	6.5±0.7	47.0±5.1
2		Engine mounting bolt (bracket-Frame)	M16 × 2.0	29.7±3.0	215±22.0
3		Radiator mounting bolt, nut	M10 × 1.5	6.9±1.4	50±10.0
4		Coupling mounting socket bolt	M14 × 2.0	14±1.0	101±7.2
		Coupling mounting clamp bolt	M16 × 2.0	11±1.0	79±7.2
5	Hydraulic system	Main pump mounting bolt	M12 × 1.75	12.3±3.0	89±22.0
		Main pump housing mounting bolt	M10 × 1.5	6.5±0.7	47±5.1
6		Main control valve mounting bolt	M12 × 1.75	12.8±3.0	92.6±22.0
7		Travel motor mounting bolt	M12 × 1.75	14.7±2.2	106±15.9
8		Fuel tank mounting bolt	M16 × 2.0	29.7±4.5	215±33
9		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7±4.5	215±33
10		Turning joint mounting bolt, nut	M12 × 1.75	14.7±2.2	106±16.0
11	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
12		Swing bearing upper mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
13		Swing bearing lower mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
14		Front axle mounting bolt, nut	M16 × 2.0	29.7±4.5	215±33.0
15		Rear axle mounting bolt, nut	M16 × 2.0	29.7±4.5	215±33.0
16		Gear box mounting bolt	M14 × 2.0	19.6±2.9	142±21.0
17		Oscillating cylinder mounting bolt	M16 × 2.0	29.7±4.5	215±33.0
18		Oscillating cylinder support bolt	M12 × 1.75	12.8±3.0	92.6±22.0
19		Wheel nut	M18 × 1.5	46.0±3.0	333±22.0
20		Front drive shaft mounting bolt, nut	M10 × 1.25	7.4±1.5	53.5±11.0
21		Rear drive shaft mounting bolt, nut	M10 × 1.25	7.4±1.5	53.5±11.0
22	Others	Counterweight mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
23		Cab mounting bolt, nut	M12 × 1.75	12.8±3.0	92±22.0
24		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 (API CK-4)	SAE 10W-30
Hydraulic oil	HD Hyundai Construction Equipment genuine long life (ISO VG 46, VG 68) Conventional (ISO VG15, ★1)
Swing reduction gear oil	SAE 85W-140 (API 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. Mixture of 60% ethylene glycol base antifreeze and 40% water.★1

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

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-24
Hydraulic oil level	Check, Add	6-26
Engine oil level	Check, Add	6-17
Coolant level	Check, Add	6-19
Control panel & pilot lamp	Check, Clean	6-39
Prefilter (water, element)	Check, Drain	6-24
★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	6-24
Drive shaft joint (flange bearing)	Check, Add	6-32
Swing reduction gear oil	Check, Add	6-30
Swing gear & pinion	Check, Add	6-30
Wheel nut	Check, Tight	6-33
Tire air pressure	Check, Inflate	6-33
Bucket linkage & blade pins	Lubricate	6-39
· 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	6-32
· Axle pivot	Lubricate	6-32
· Hub pivot	Lubricate	6-32
· Steering links	Lubricate	6-32
Prefilter (water, element)	Replace	6-24
Transmission case	Lubricate, Add	-
Front axle pivot pin bushing	Lubricate, Add	-
Front axle differential gear case	Check, Add	6-35
Rear axle differential gear case	Check, Add	6-35
Axle planetary gear case	Change	-
Front axle steering case	Change	6-34

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Fan belt tension & damage	Check	-
Bolts & Nuts	Check, Tight	6-8
· Power train mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Hydraulic pump mounting bolts		
Boom swing cylinder (swivel type)	Add, 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
★ Hydraulic oil return filter	Replace	6-28
★ Pilot line filter element	Replace	6-29

★ Replace 2 filters for continuous hydraulic breaker operation only.

5) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-17, 18
Engine oil filter	Replace	6-17, 18
Prefilter	Replace	6-25
Swing reduction gear case	Change	6-30
Swing reduction gear grease	Check, Add	6-30
Transmission case	Check	-
Pilot line filter element	Replace	6-29
Front / Rear axle differential gear case	Change	6-35
Axle planetary gear case	Change	6-35
Fuel filter element	Replace	6-25

※ Service the above items only for the new machine, and thereafter keep the normal service interval.

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Battery (voltage)	Check, Clean	6-40
Aircon & heater circulation filter (outer filter)	Check	6-43
Swing bearing grease	Lubricate	6-30
Air cleaner element (primary)	Check	6-23
Fan belt tension & damage	Check	6-22
Bolts & Nuts	Check, Tight	-
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		
Attachment pin and bushing	Lubricate	6-39
· Boom cylinder tube end		
· Boom swing cylinder tube and rod end		
· Boom foot		
· Boom and arm cylinder rod end		
· Arm and boom cylinder tube end		
· Boom + Arm connecting		
Boom swing cylinder (boom swing type)	Lubricate	6-39
Attachment pins (boom swing type)	Lubricate	6-39

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
★ Engine oil	Change	6-17, 18
Prefilter	Replace	6-24
☆ Air cleaner element (primary)	Inspect, Clean	6-23
Fuel filter element	Replace	6-25
Radiator, cooler fin and charge air cooler	Check, Clean	6-22

★ If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.

★ Change oil every 1000 hours when using API CK-4.

☆ 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
Engine oil filter★4	Replace	6-17, 18
Hydraulic tank air breather element	Change	6-29
Swing reduction gear case	Change	6-30
Swing reduction gear grease	Change	6-30
Front axle differential gear case	Change	6-35
Rear axle differential gear case	Change	6-35
Transmission case	Change, Replace	-
Axle planetary gear case	Change	-
Front axle steering case	Change	6-34
Hydraulic oil return filter	Replace	6-28
Pilot line filter element	Replace	6-29

★4 **Change oil filter every 500 hours when using API CJ-4**

9) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Radiator coolant★1	Change	-
Hydraulic tank suction strainer	Check, Clean	6-28
Hydraulic oil★1	Change	6-28
HBHO★2	Change	6-28
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

★1 Conventional

★2 If do not want to change HBHO (HD Hyundai Construction Equipment Bio Hydraulic Oil, ISO VG 46) every 2000 hours, contact HD Hyundai Construction Equipment dealer and ask about SAMPLING.

※**Change** hydraulic **oil every 600 hours of continuous hydraulic breaker operation.**

10) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil★3	Change	6-27

★3 HD Hyundai Construction Equipment genuine long life

※**Change hydraulic oil every 1000 hours of continuous hydraulic breaker operation.**

11) EVERY 6000 HOURS SERVICE

Check items	Service	Page
Radiator coolant★3	Change	-

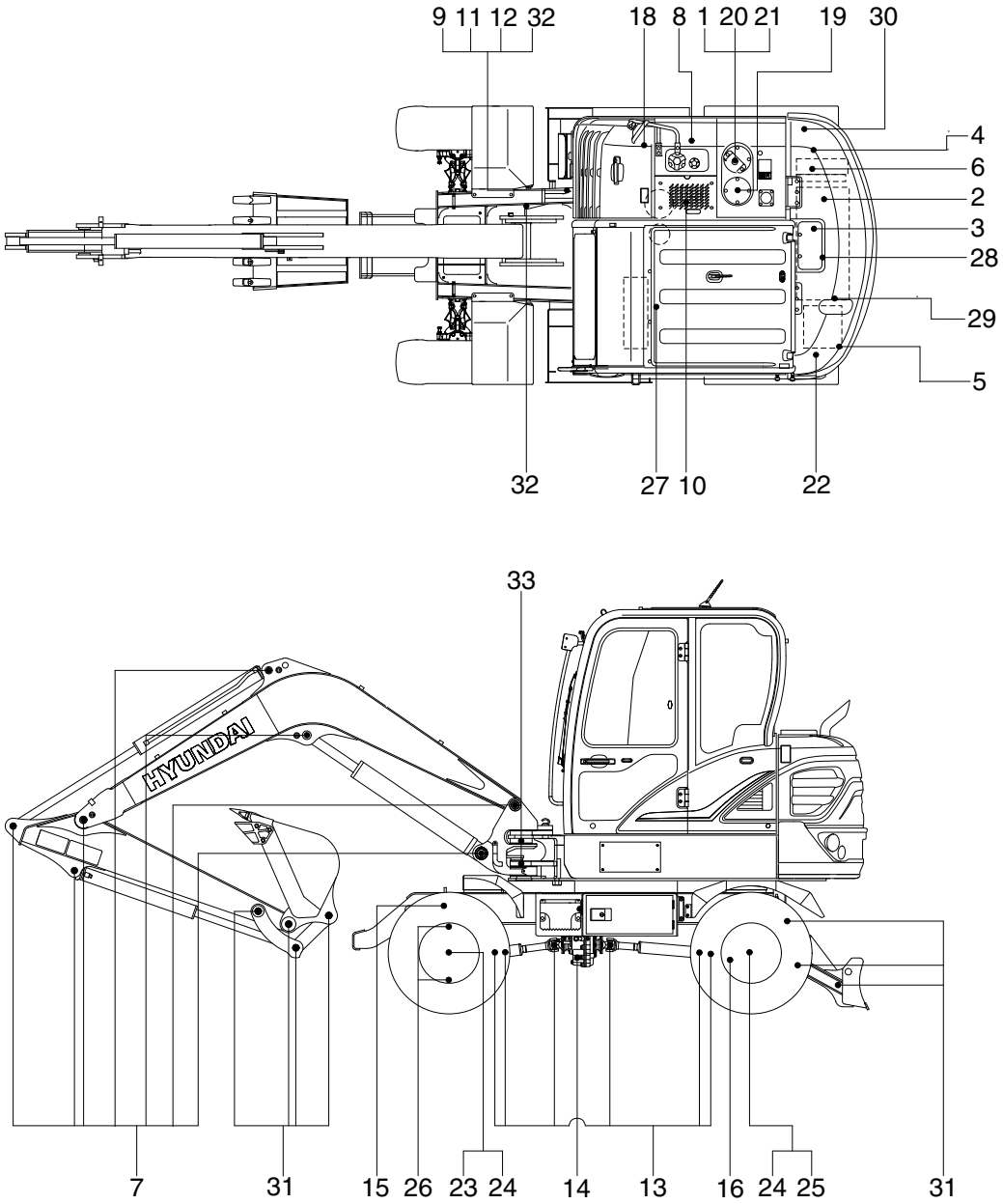
★3 HD Hyundai Construction Equipment genuine long life

12) 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	6-24
· Prefilter	Clean or Replace	6-24
· Fuel filter element	Replace	6-25
Engine lubrication system		
· Engine oil	Change	6-17, 18
· Engine oil filter	Replace	6-17, 18
Engine cooling system		
· Coolant	Add or Change	6-19, 20, 21, 22
· Radiator	Clean or Flush	6-19, 20, 21, 22
· Charge air cooler	Check	6-22
Engine air system		
· Air cleaner element (primary, safety)	Replace	6-23
Hydraulic system		
· Hydraulic oil	Add or Change	6-27
· Hydraulic oil return filter	Replace	6-28
· Pilot line filter element	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



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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	8.6 (2.3)	1
	4	Radiator coolant level	Check, Add	C	11 (2.9)	1
50 hours or weekly	5	Prefilter (water, element)	Check, Clean	-	-	1
	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	1.8 (0.5)	1
	15	Front axle pivot pin bushing	Check, Add	PGL	-	1
	16	Wheel nut	Check, Tighten	-	-	24
	17	Tire air pressure	Check, Add	-	-	8
	23	Front axle differential gear oil	Check, Add	GO	4.5 (1.2)	1
	24	Rear axle differential gear oil	Check, Add	GO	4.5 (1.2)	1
	25	Axle planetary gear oil(Front, rear)	Check, Add	GO	0.4 (0.1)	4
	26	Front axle steering case	Add, Lubricate	PGL	-	4
	31	Bucket linkage & blade pins	Lubricate	PGL	-	8
250 Hours	6	Fan belt tension & damage	Clean	-	-	1
	7	Attachment pins	Lubricate	PGL	-	8
	9	Swing bearing	Lubricate	PGL	-	1
	18	Battery (Voltage)	Check	-	-	1
	27	Air conditioner filter (outer)	Clean	-	-	1
	28	Air conditioner filter (primary)	Check	-	-	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	8.6 (2.3)	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	3	Engine oil filter	Replace	-	-	1
	10	Swing reduction gear oil	Change	GO	1.5 (0.4)	1
	11	Swing reduction gear grease	Change	PGL	0.2 (0.1)	1
	14	Transmission gear oil	Change	GO	1.8 (0.5)	1
	19	Hydraulic oil return filter	Replace	-	-	1
	20	Hydraulic tank air breather element	Replace	-	-	1
	22	Pilot line filter element	Replace	-	-	1
	23	Front axle differential gear oil	Change	GO	4.5 (1.2)	1
	24	Rear axle differential gear oil	Change	GO	4.5 (1.2)	1
	25	Axle planetary gear oil(Front, rear)	Change	GO	0.4 (0.1)	4
	26	Front axle steering case	Change	PGL	-	4
2000 Hours	1	Hydraulic oil★1	Change	HO	70 (18.5)	1
	1	Hydraulic oil (HBHO★2)	Change	HO	70 (18.5)	1
	4	Radiator coolant★1	Change	C	11 (2.9)	1
	21	Hydraulic oil suction strainer	Check, Clean	-	-	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	2
5000 hours	1	Hydraulic oil★3	Change	HO	70 (18.5)	1
6000 hours	4	Radiator coolant★3	Change	C	11 (2.9)	1
	-	DPF (diesel particulate filter)	Clean	-	-	1
As required	27	Air conditioner filters	Check, Replace	-	-	2
	28	Air cleaner element(primary, safety)	Check, Replace	-	-	2

★1 Conventional ★2 HD Hyundai Construction Equipment Bio Hydraulic Oil

★3 HD Hyundai Construction Equipment genuine long life

※ 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.

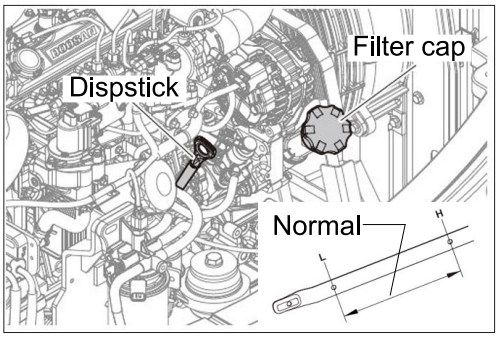
(3) If oil level is LOW, add oil and then check again.

※ **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.**

※ **Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.**



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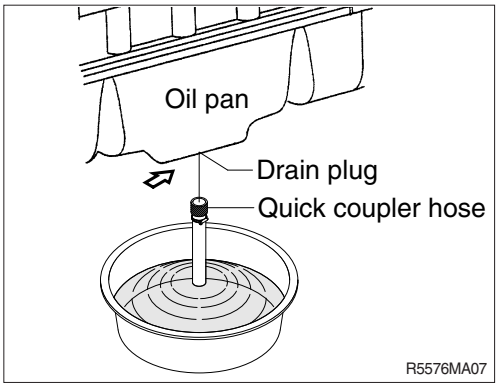
2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(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.**



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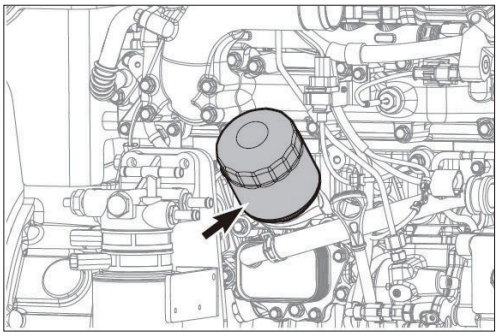
(3) Clean around the filter head, remove the filter with a filter wrench and clean the gasket surface.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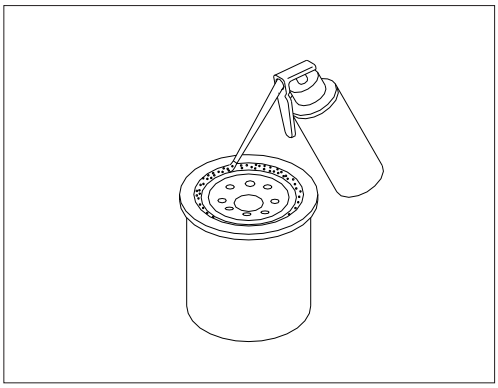
(4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filters.



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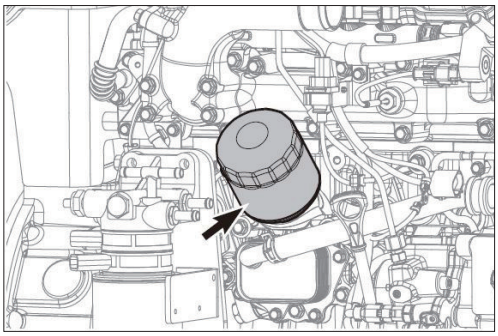
(5) Install the new filter manually by turning it clockwise until if contacts the filter head.
Tighten to 2.0~2.4 kgf·m (14~17 lbf·ft) or one additional turn using the filter wrench.
Remove the quick coupler hose.

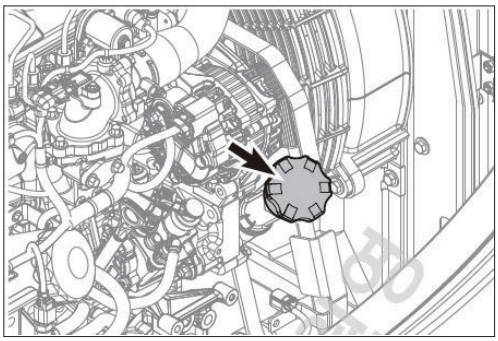
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**



HX656MA06

(6) Fill the engine with clean oil to the proper level.
· Quantity : 8.6 ℓ (2.3 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.



HX656MA07

(8) Reinstall the oil filler cap. If any engine oil is spilled, wipe it away with a clean cloth.

3) CHECK COOLANT

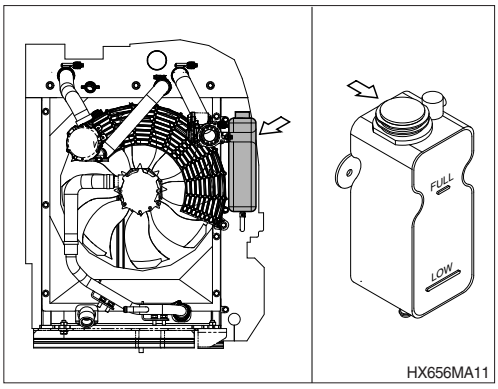
(1) Check if the level of coolant in reservoir tank is between FULL and LOW.

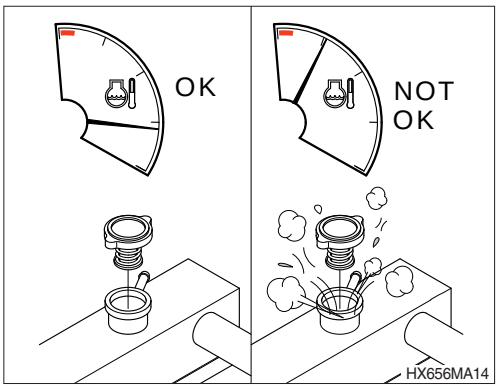
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

(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.**



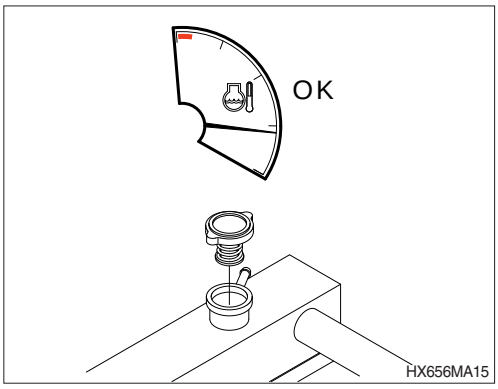


4) FLUSHING AND REFILLING OF RADIATOR

(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.

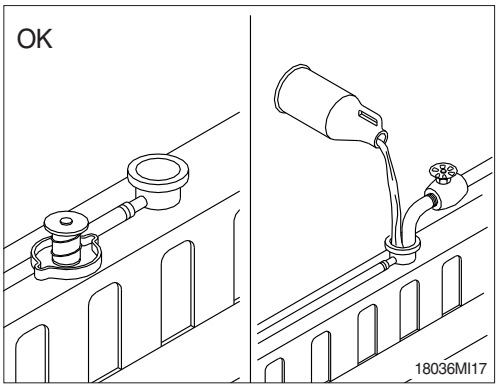


(2) Flushing of cooling system

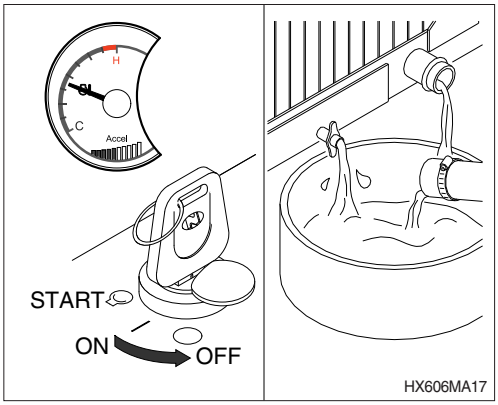
① Fill the system with a mixture of sodium carbonate and water(or a commercially available equivalent).

※ **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.**



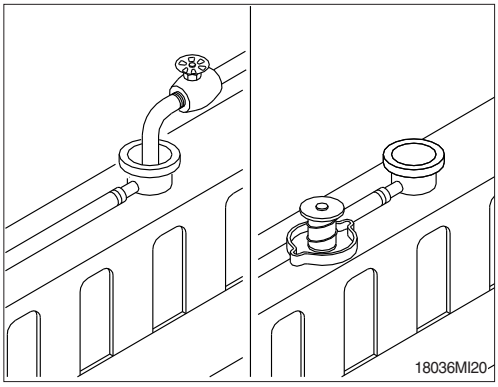
② Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F) .
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

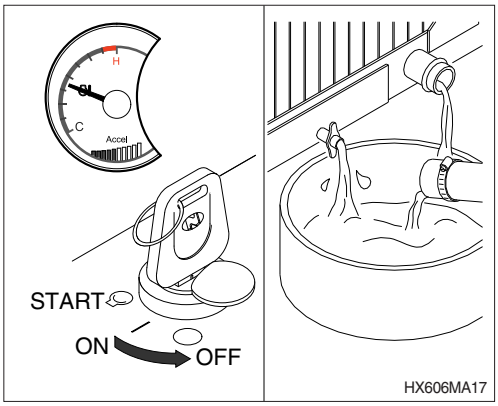
※ **Be sure to vent the engine and aftercooler for complete filling.**

※ **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.

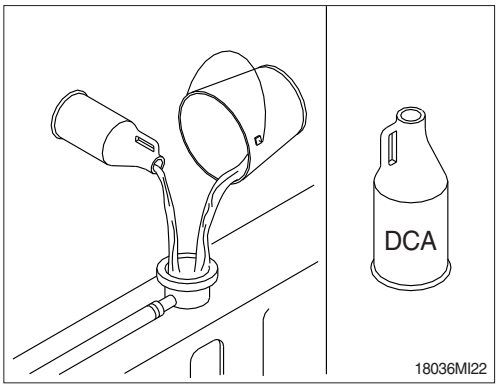
※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**



(3) Cooling system filling

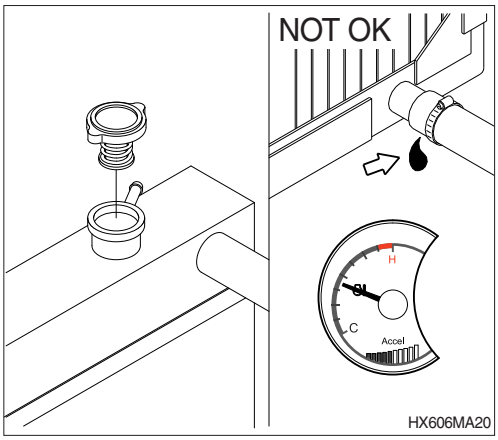
① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-10.

※ **Do not use hard water such as river water or well water.**



※ **The system must be filled slowly to prevent air locks.**
During filling, air must be vented from the engine coolant passage.

② 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.

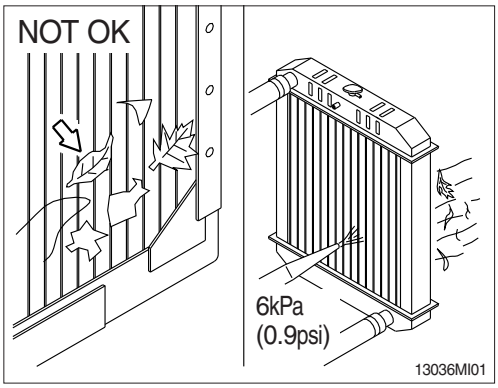


5) CLEAN RADIATOR AND OIL COOLER

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.

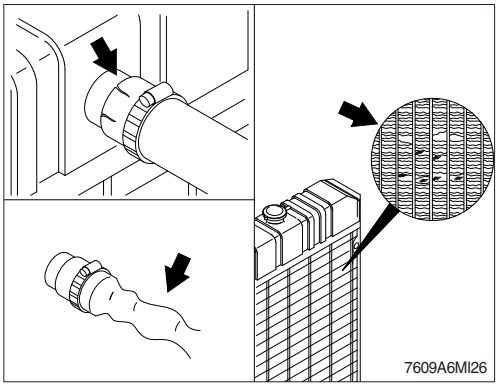
(2) Use 6 kPa (0.9 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



(3) Visually inspect the radiator for bent or broken fins.

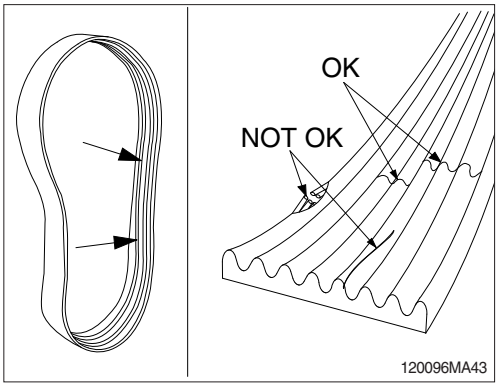
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

(4) Visually inspect the radiator for core and gasket leaks.



6) FAN BELT

(1) Inspect the fan belt for damage.
① Transverse (across the belt) cracks are acceptable.
② Longitudinal (direction of belt ribs) cracks that intersect with transverse cracks are not acceptable.
③ Replace the belt if it is frayed or has pieces of material missing.



(2) Inspect the idle and drive pulleys for wear or cracks.

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.

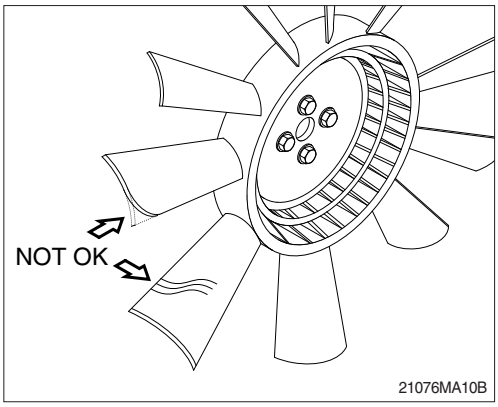
※ Rotate the crankshaft by using the engine barring gear.

※ 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.

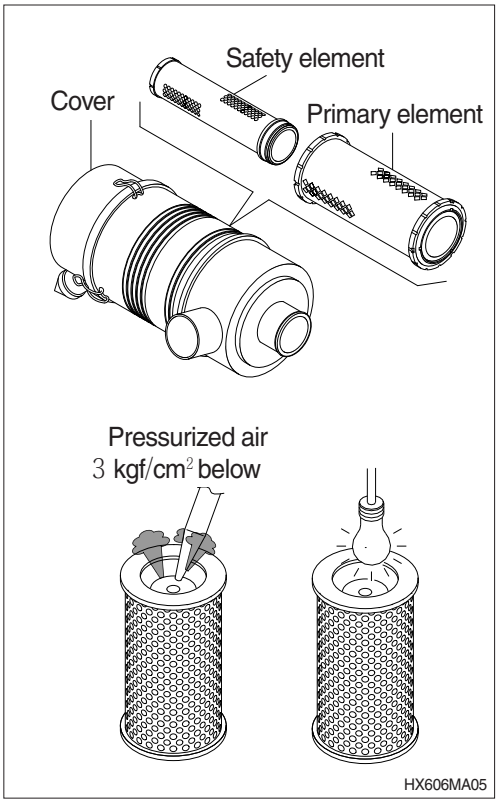
⑤ Insert element and close cover.

※ 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) FUEL TANK

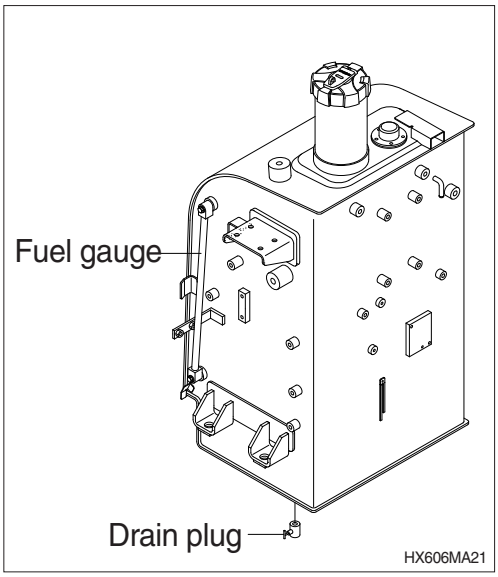
(1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.

(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.



10) WATER SEPARATO (PRE FILTER)

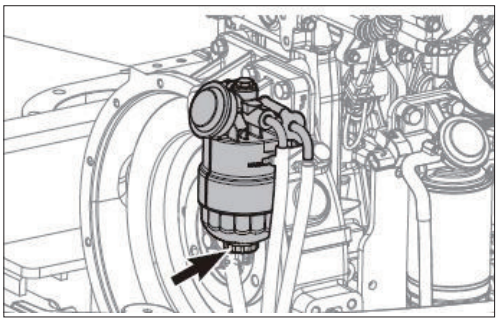
※ **Inspect or drain the collection bowl of water every 50 hours and replace the element every 500 hours.**

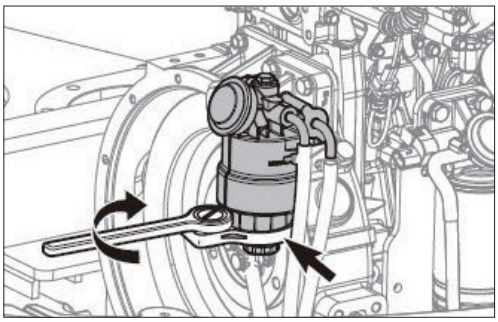
(1) Drain water

① Close the cock valve.

② Loosen the drain valve at the bottom of the water separator. Drain water collected inside.

③ Remove the bowl.





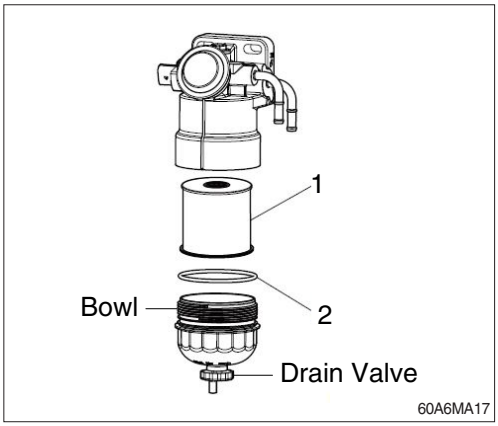
(2) Replace element

① Remove the element (1) from the filter head.

② Pre-fill a new element with fuel and lubricate O-ring (2) on the new element.

③ Install the new element on the filter head and bowl.

④ Open the cock valve.



11) FUEL FILTER

(1) Close the cock valve.

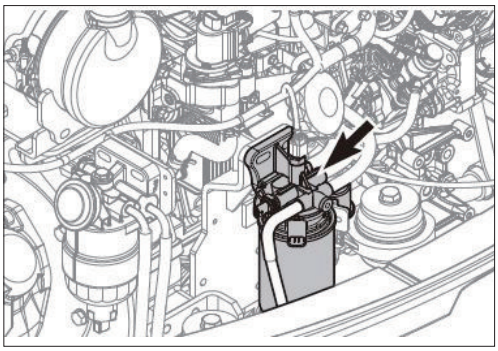
(2) Remove the fuel filter element with a filter wrench, turning it to the left. When removing the fuel filter element, carefully hold it to prevent the fuel from spilling. Wipe up all spilled fuel.

※ **Do not discard drain valve (WIF sensor).**

(3) Clean the filter mounting surface and apply a small amount of diesel fuel to the gasket of the new fuel filter element.

(4) Install the new fuel filter element and WIF sensor.
Turn to the right and hand-taghten if only until it comes in contact with the mounting surface.
Tighten the filter an additional 1/2 of a turn.

(5) Open the coke valve



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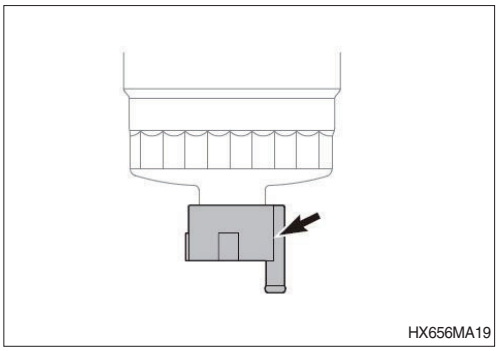

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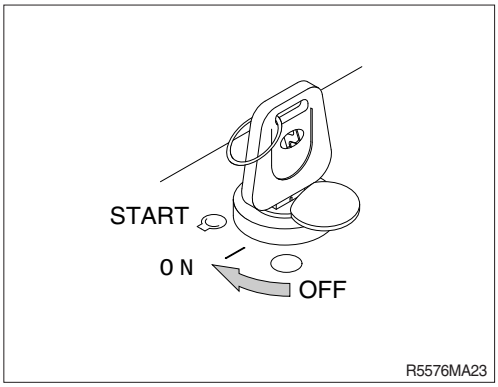
12) PRIMING THE FUEL SYSTEM

(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.**



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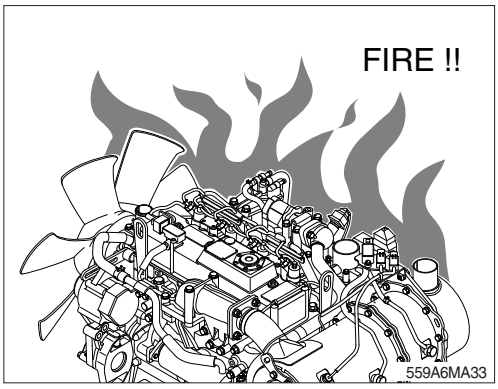
13) LEAKAGE OF FUEL

⚠ **Be careful and clean the fuel hose, injection pump, fuel filter and other connections as the leakage from these part can cause fire.**



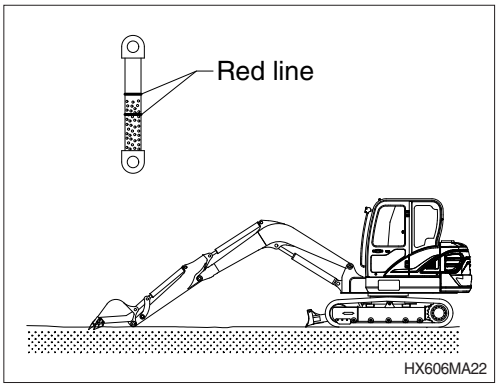
14) HYDRAULIC OIL CHECK

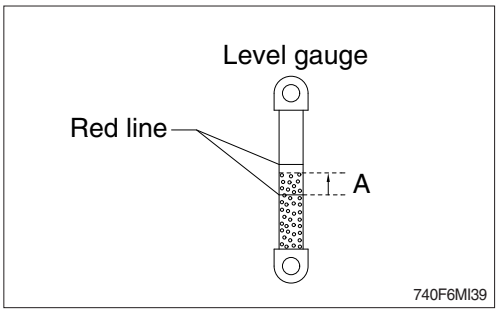
(1) Position the machine as shown in the illustration on the right. Please stop the engine and wait for about 5 minutes.

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

(3) The oil level is normal if the oil is between the red lines. The oil level depends on the temperature of the hydraulic oil. Refer to the height (A) in the below table to check the level gauge.

Temperature		Height A	
℃	°F	mm	inch
0	32	15	0.6
10	50	25	1.0
20	68	30	1.2
30	86	35	1.4
40	104	40	1.6





※ **Refer to page 3-17 for checking the temperature of the hydraulic oil.**

※ **Add the hydraulic oil, if necessary.**

15) FILLING HYDRAULIC OIL

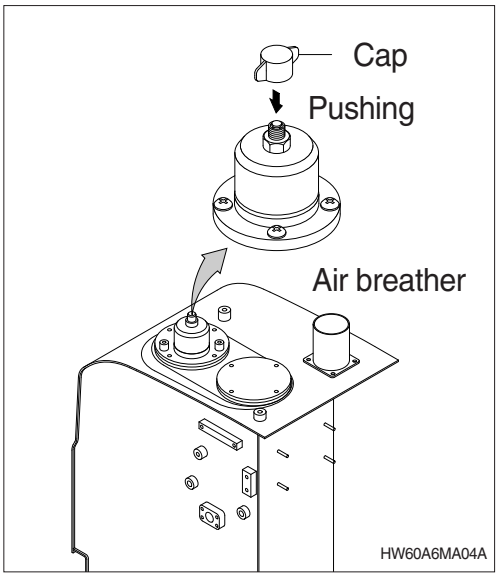
(1) Stop the engine to the position of level check.

(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.



16) 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.

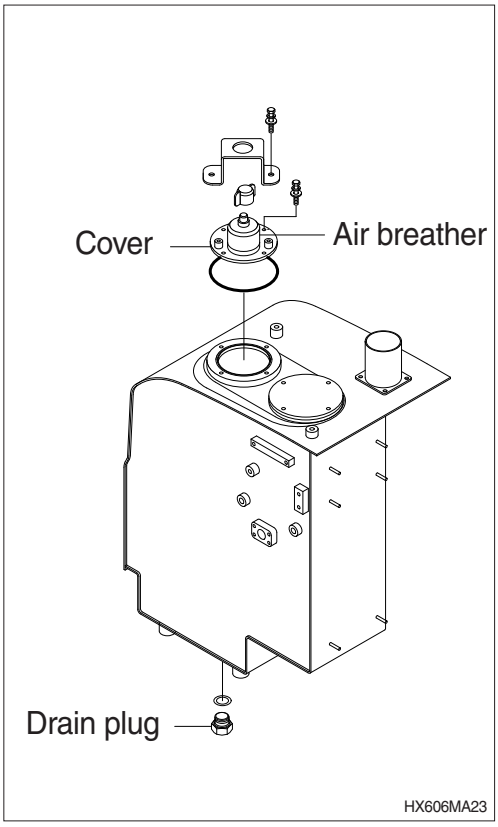
(7) Put the breather in the right position.

(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 (HD Hyundai Construction Equipment 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 HD Hyundai Construction Equipment dealer.



17) 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)

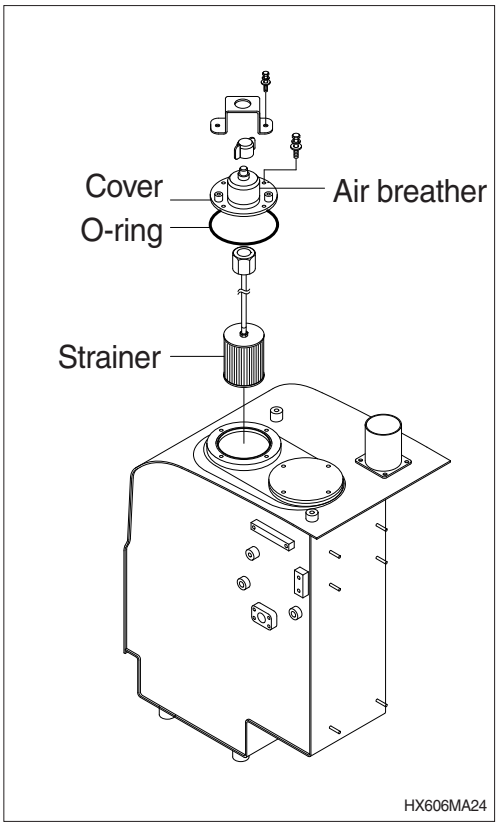
(2) Pull out the strainer in the tank.

(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.



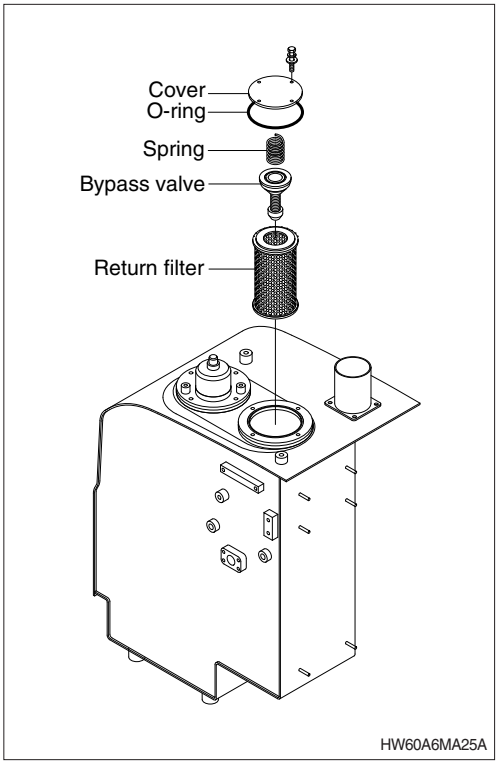
18) REPLACEMENT OF RETURN FILTER

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.



19) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

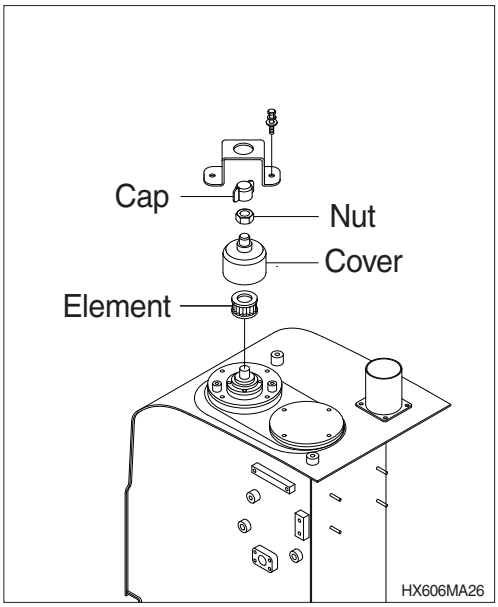
(1) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.

(2) Loosen the lock nut and remove the cover.

(3) Pull out the filter element.

(4) Replace the filter element new one.

(5) Reassemble by reverse order of disassembly.
· Tightening torque : 0.2~0.3 kgf · m
(1.4~2.1 lbf · ft)



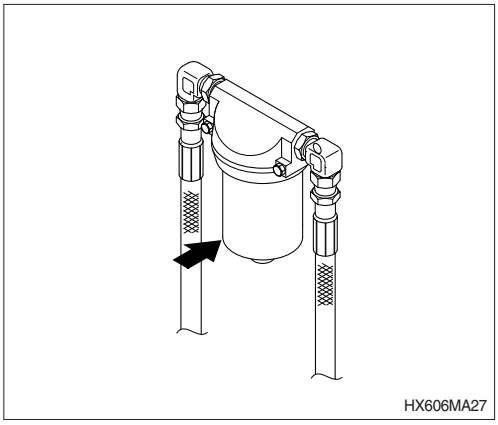
20) REPLACE OF PILOT LINE FILTER

(1) Loosen the nut positioned on the filter body.

(2) Pull out the filter element and clean filter housing.

(3) Install the new element and tighten using specified torque.

※ **Change cartridge after initial 250 hours of operation. Thereafter, change cartridge every 1000 hours.**

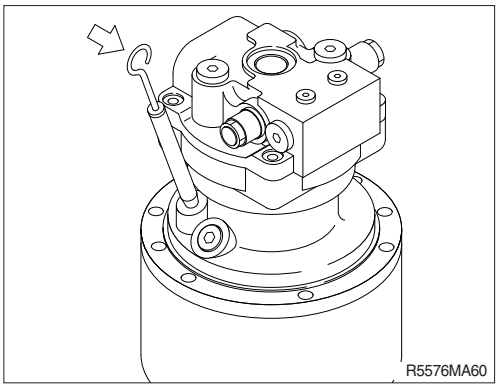


21) CHECK THE SWING REDUCTION GEAR OIL

(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.



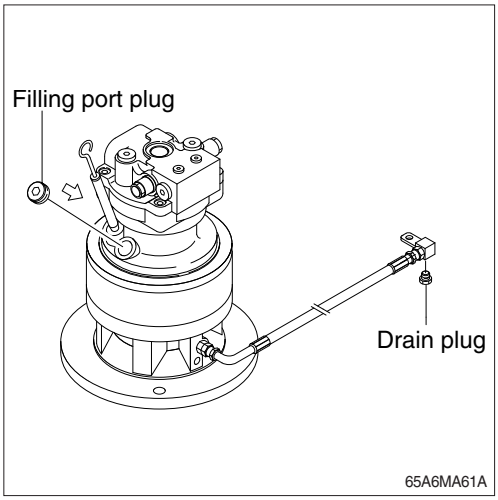
22) CHANGE SWING REDUCTION GEAR OIL

(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.

(3) Drain into a proper container.

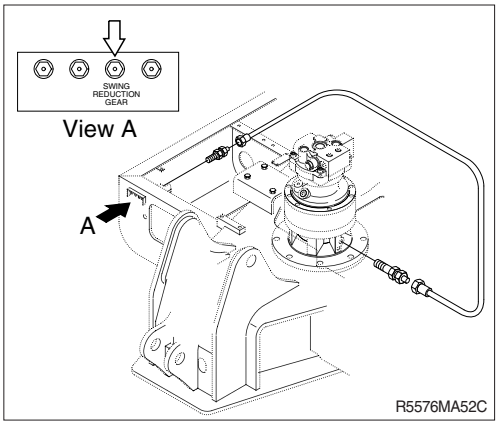
(4) Wash the drain plug and reinstall it with sealing tape.
Fill proper amount of recommended oil.
· Amount of oil : 1.5 ℓ (0.4 U.S.gal)



23) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

(1) Grease at fitting.

※ **Check initial 250 hours and lubricate every 1000 hours.**



24) MANIFOLD

(1) Swing bearing

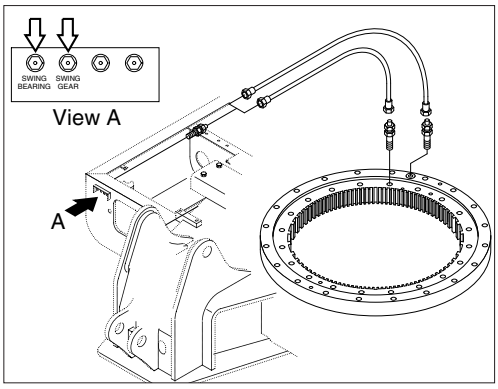
Grease at fitting.

※ **Lubricate every 250 hours.**

(2) Swing gear

Grease at fitting.

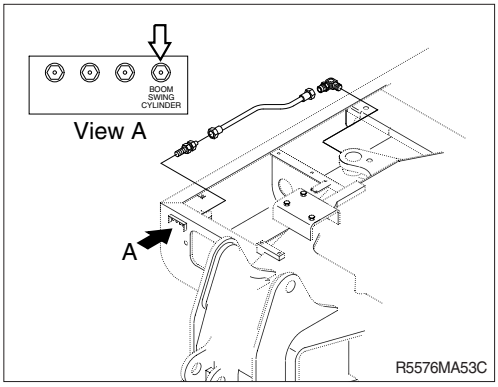
※ **Lubricate every 50 hours.**



(3) Boom swing cylinder

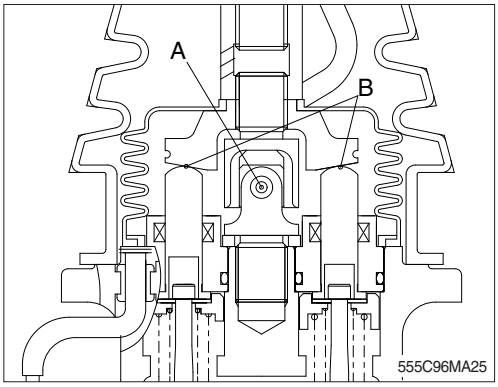
Grease at fitting.

※ **Lubricate initial 50 hours and every 250 hours.**



25) LUBRICATE RCV LEVER

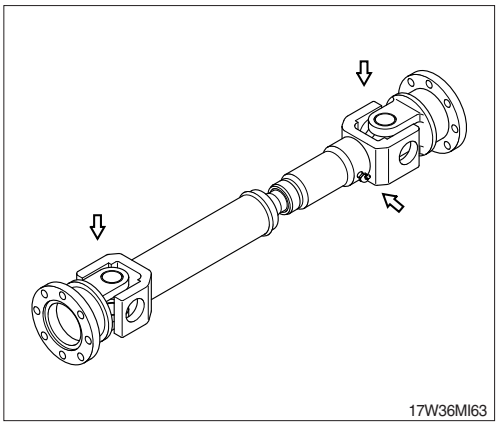
Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



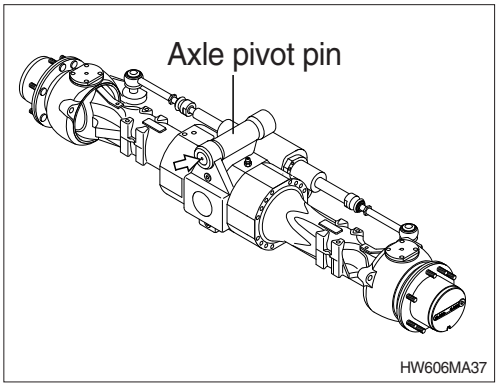
26) LUBRICATE

(1) Drive shaft

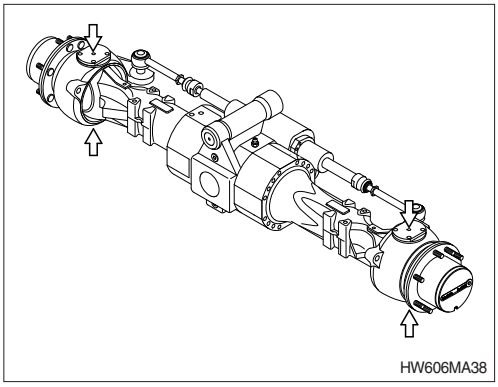
① Front drive shaft : 3 point
② Rear drive shaft : 3 point



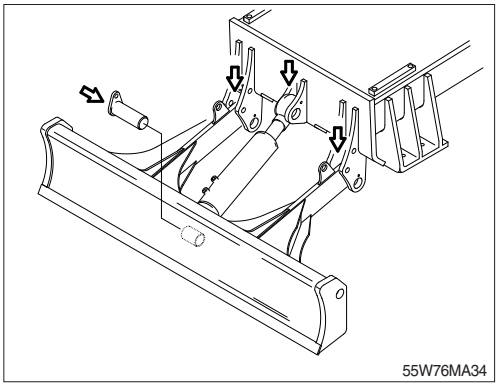
(2) Front axle : 1 point



(3) Steering link : 4 point



(4) Dozer blade : 4 point



27) 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.

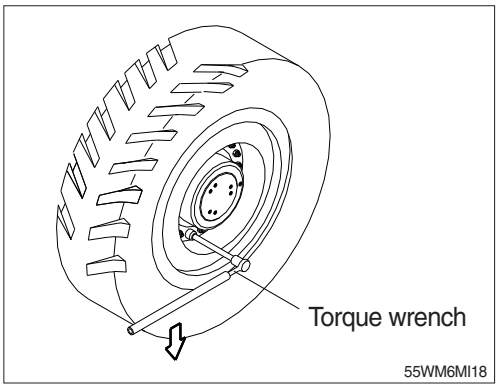
Item	Air pressure
Single	5.6 kgf/cm^2 (80 psi)
Double	10.2 kgf/cm^2 (145 psi)

(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.

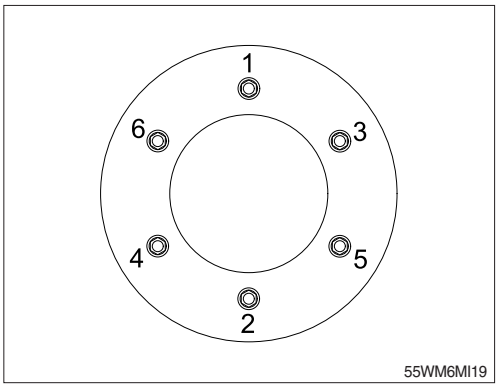


② Installation of tire

· 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)

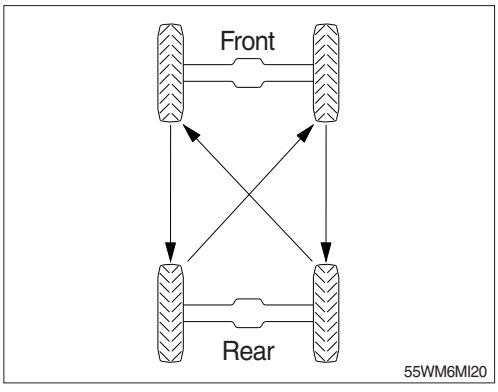


③ Position change of tire

· 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.



28) CHECK PLANETARY GEAR OIL LEVEL

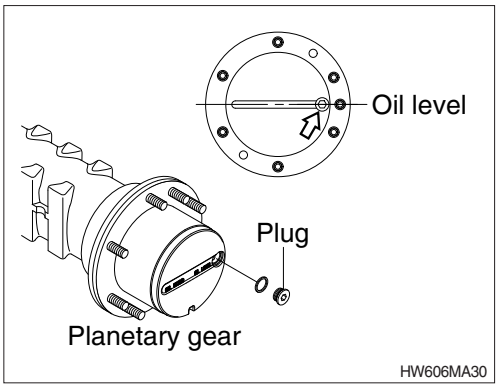
(1) Move the machine to flat ground.

(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.



29) CHECK AND SUPPLYING AXLE OIL

(1) Move the machine to flat ground.

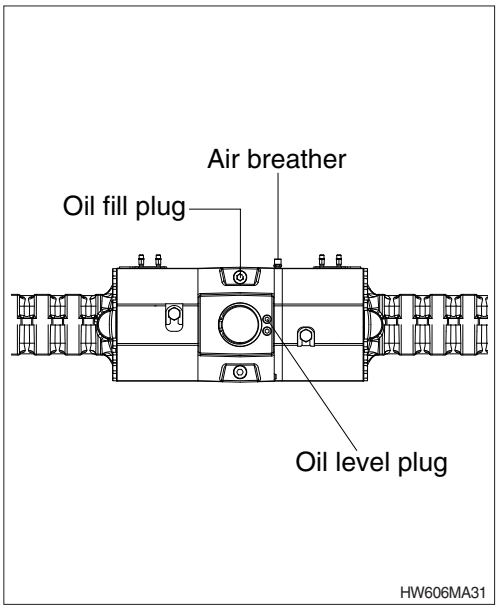
(2) Open the axle air breather to relieve internal air pressure.

(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.**



30) 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

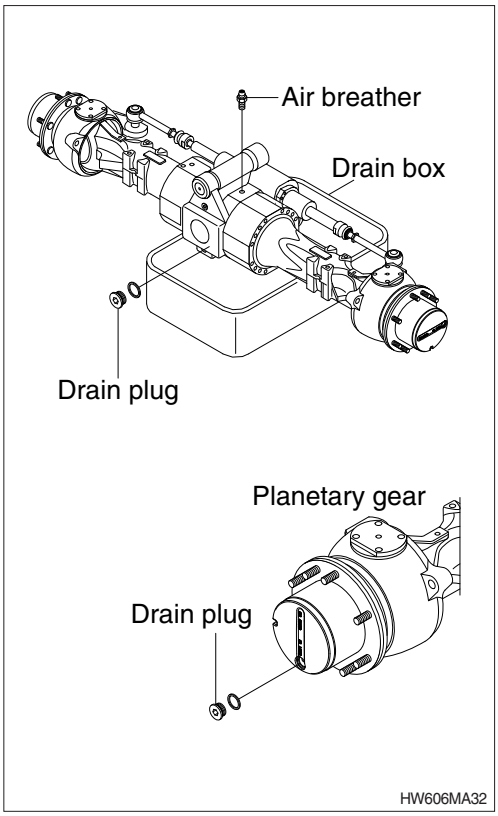
① Remove the drain plug to drain oil off.

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.

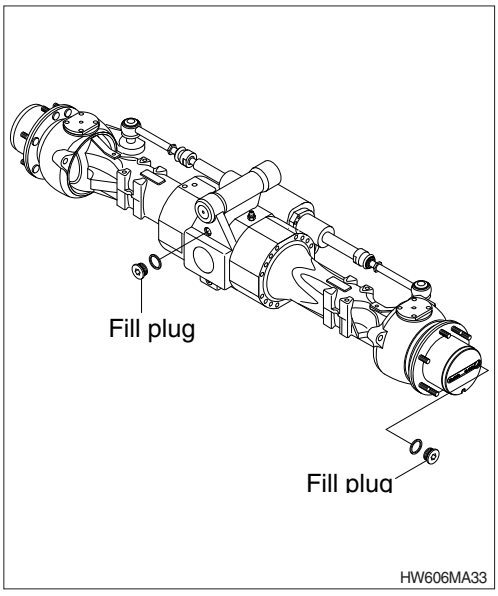
· Oil amount

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.

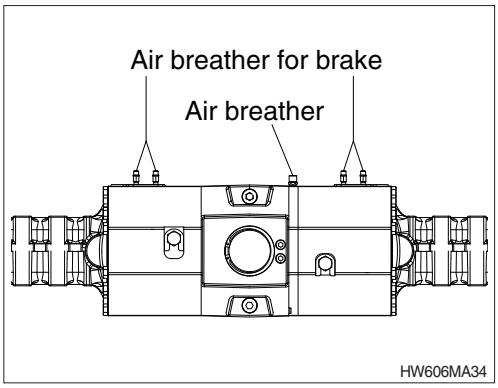
※ If a work requires frequent use of brake, replace it earlier than normal change interval.



31) CLEANING AXLE BREATHER

(1) Remove dust or debris around the breather.

(2) Remove the breather and wash it with cleaning oil.



32) 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.

33) CHANGE THE T/M GEAR OIL

(1) Place a drain transmission under drain plug to catch oil.

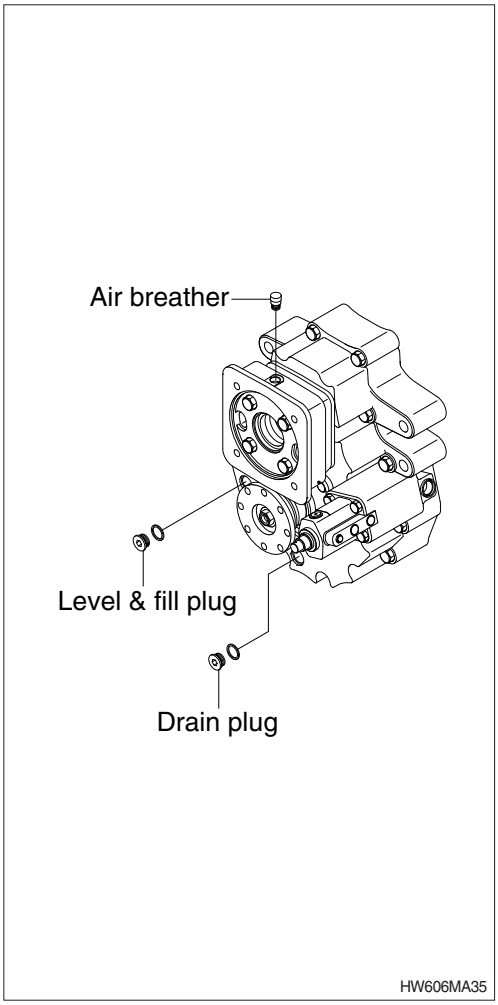
(2) Open transmission air breather to relieve internal air pressure.

(3) Remove the drain plug to drain oil.

(4) Wash drain plug and install it.

(5) Supply oil into the transmission case.

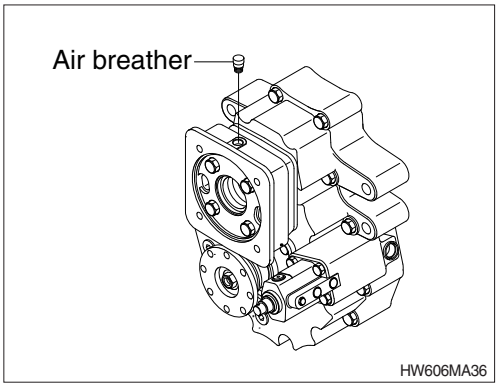
· Oil amount : 1.8 ℓ (0.48 U.S. gal)



34) 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.



35) 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 knob 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.**

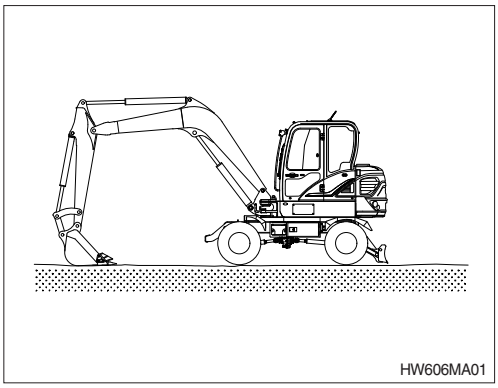
※ **If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.**

※ **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.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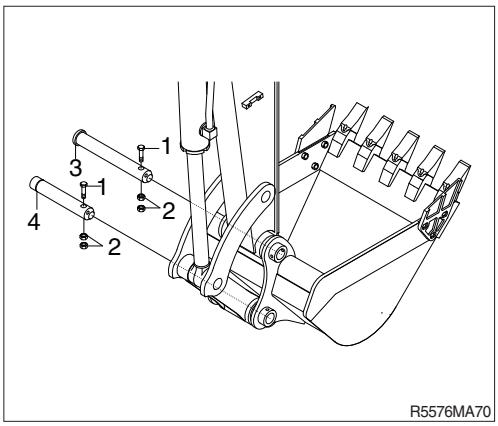

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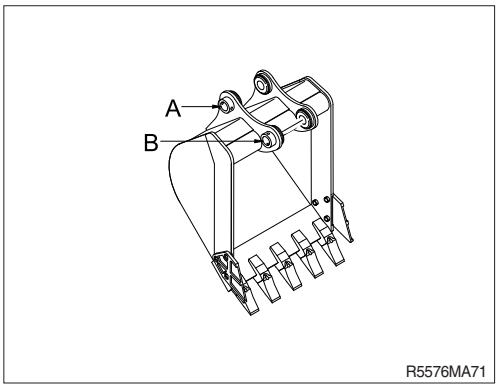
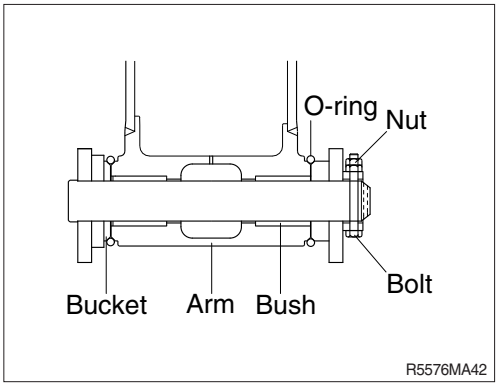


R5576MA71



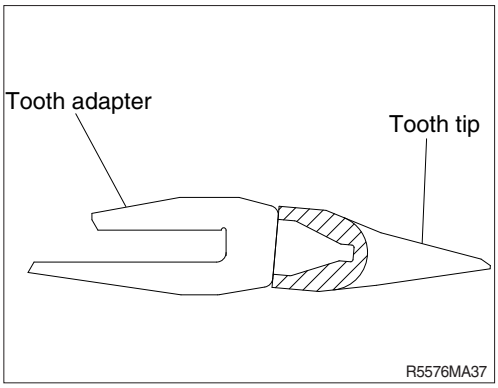
R5576MA42

36) 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.

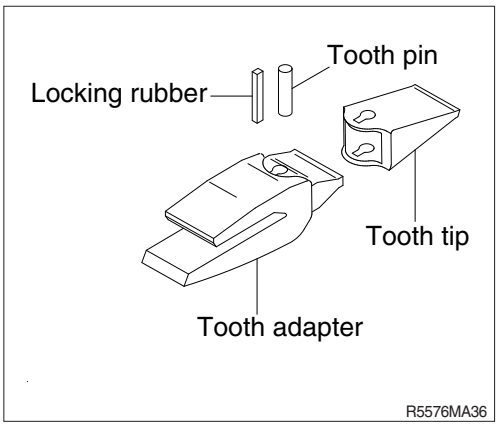
② Remove dust and mud from surface of tooth adapter by using knife.

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.



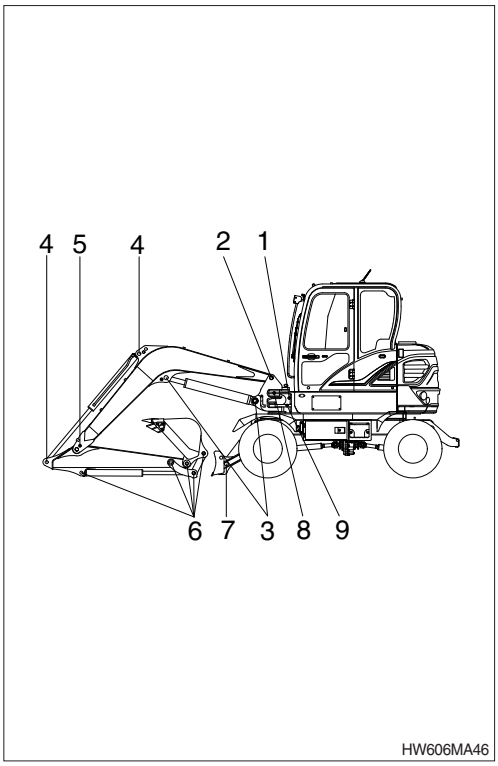
37) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device

Lubricate the grease to the grease nipple according to the lubricating interval.

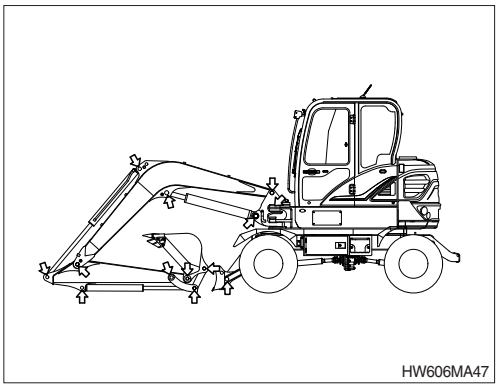
No.	Description	Qty
1	Lubrication manifold at upper frame	4
2	Boom connection pin	2
3	Boom cylinder pin	2
4	Arm cylinder pin	2
5	Boom and arm connection pin	1
6	Bucket cylinder pin(Head and rod)	2
	Bucket link(Control rod)	1
	Arm and bucket connection pin	1
	Arm and control link connection pin	1
7	Dozer 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.



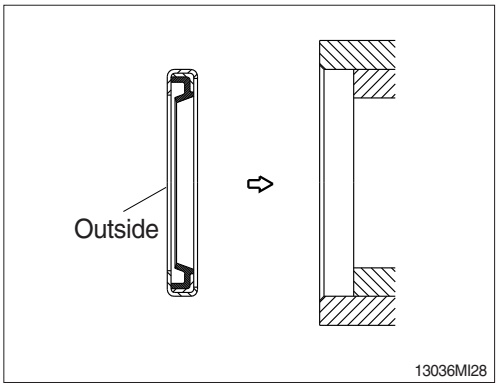
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ 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.

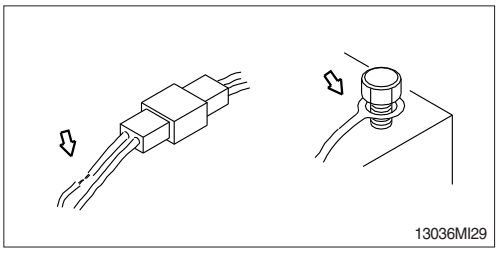
※ Assemble the seal same direction with picture and use with plastic hammer when replace.



7. ELECTRICAL SYSTEM

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

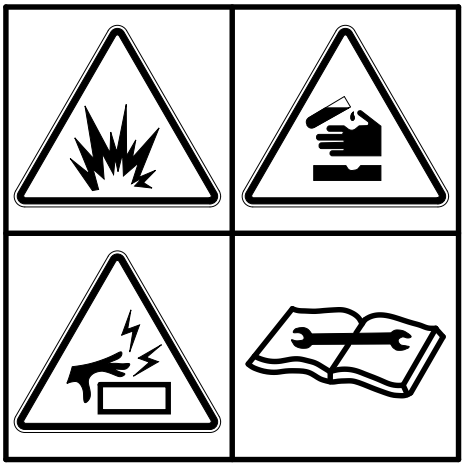
(1) Clean

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.



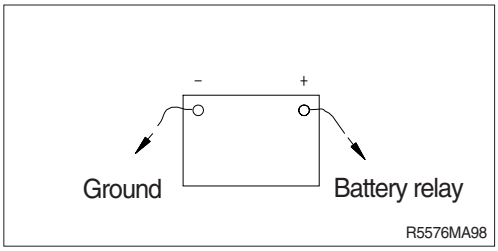
(2) Recycle

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

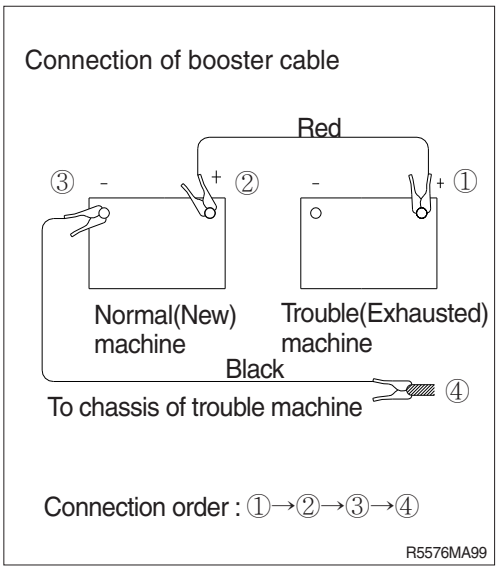
※ **Use the same capacity of battery for starting.**

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.**

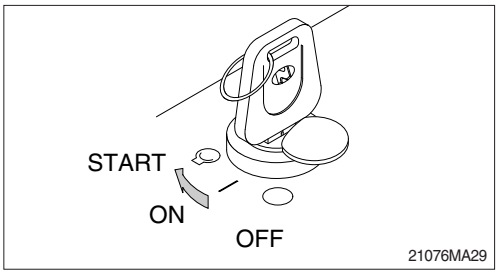


(2) Starting the engine

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.

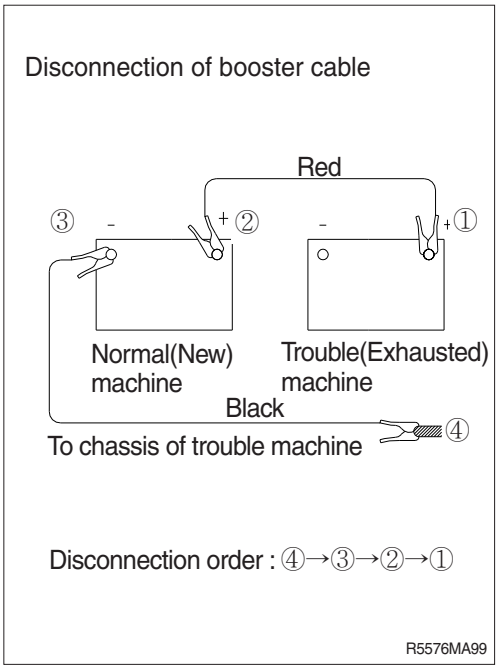
③ Run engine with high idle until charging the exhausted battery by alternator, fully.

⚠ **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.**



(4) Welding repair

Before start to welding, follow the below procedure.

① Shut off the engine and remove the starting switch.

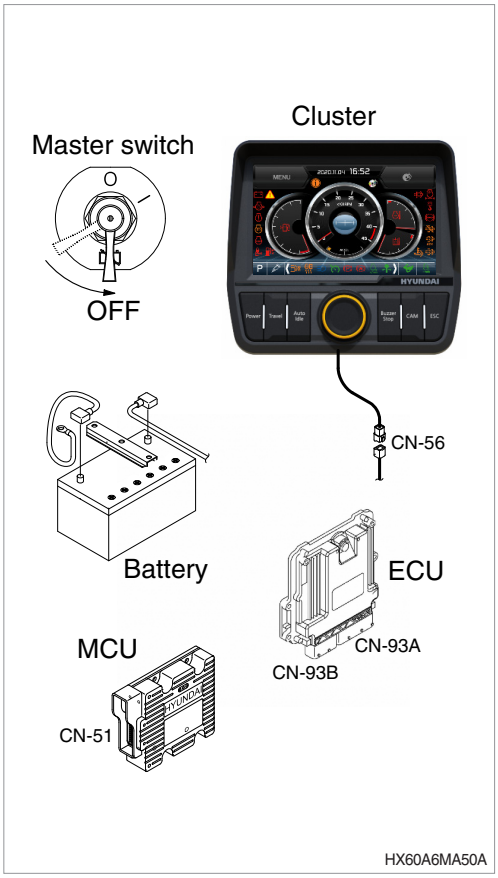
② Disconnect ground cable from battery by master switch.

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.



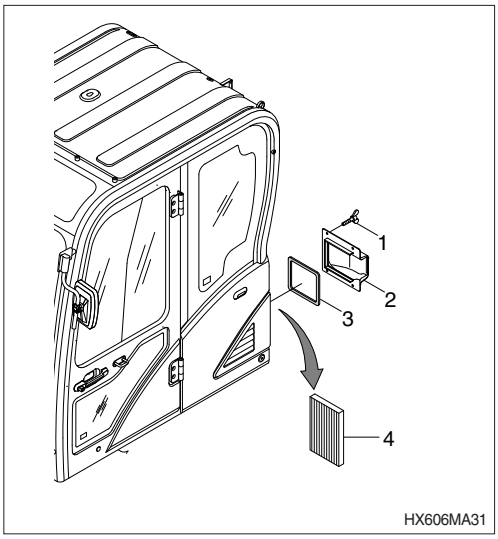
8. AIR CONDITIONER AND HEATER

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.

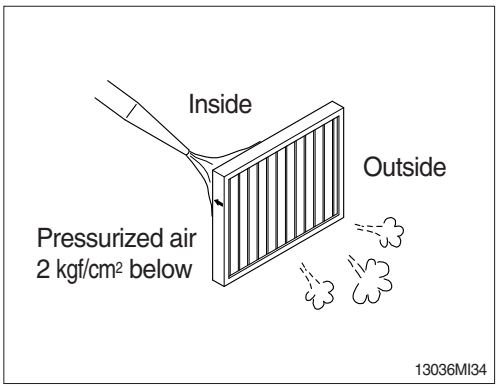
(2) Remove the circulation filter (3).



(3) Clean the filter using a pressurized air (Below 2 kgf/cm^2, 28psi).

△ **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.

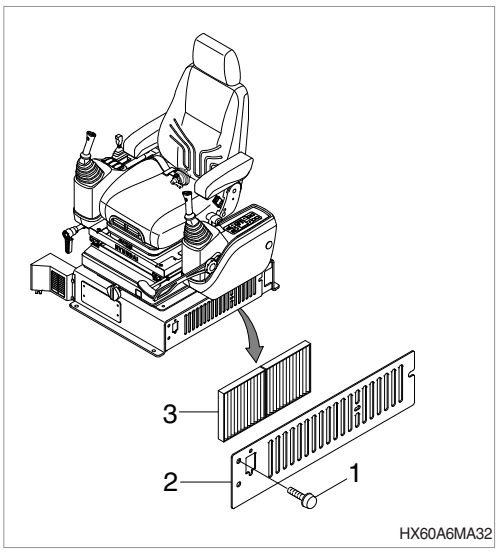


2) CLEAN AND REPLACE OF THE RECIRCULATION FILTER

※ **Always stop the engine before servicing.**

(1) Remove the screw (1), cover (2) and pad (3).

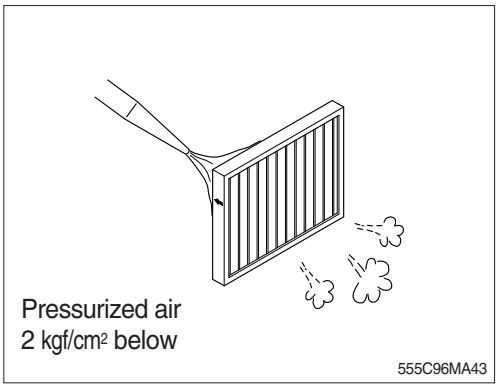
(2) Remove the recirculation filter (4).



(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 : 1430
HW65AH	HFC-134a	0.65 kg (1.43 lb)	CO_2 eq. : 0.9295 t

※ 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.	

HYDRAULIC BREAKER AND QUICK COUPLER

1. SELECTING HYDRAULIC BREAKER

※ **Read safety hints in this manual and breaker & quick coupler manuals in website (Dealer Portal) before using breaker and quick coupler.**

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 HD Hyundai Construction Equipment 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 HW65AH 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 HD Hyundai Construction Equipment 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★1	200
		1000★2	

★1 : Conventional hydraulic oil

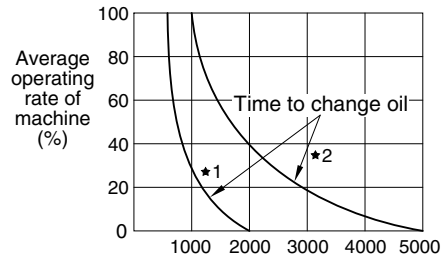
★2 : HD Hyundai Construction Equipment genuine long life hydraulic oil

● **Replace following filter same time**

· Hydraulic oil return filter : 1 EA

· Pilot line filter element : 1 EA

Hyd oil change guide for hydraulic breaker



★1 : Conventional hydraulic oil

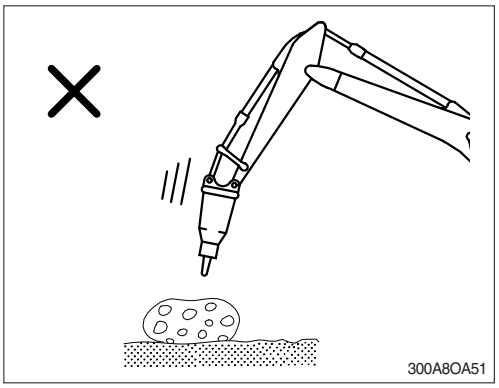
★2 : HD Hyundai Construction Equipment genuine long life hydraulic oil

4. PRECAUTIONS WHILE OPERATING THE BREAKER

DO NOT BREAK ROCK WHILE LOWERING

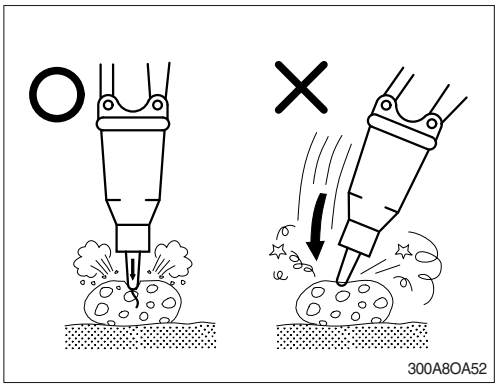
As the breaker is heavy in comparison with bucket, it must be operated slowly.

If breaker is rapidly pushed down, working device may be damaged.



DIRECTION OF THRUST

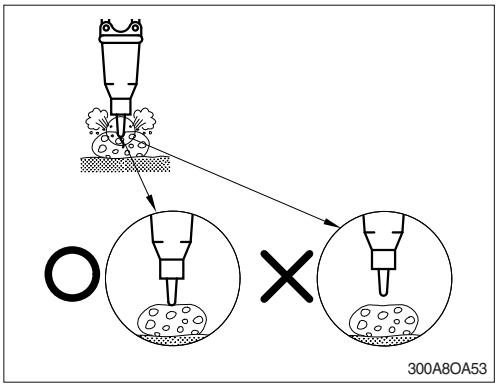
Apply a thrust in a straight line with the tool. Place the tool on a rock with the hammering side as vertically as possible. If the hammering side is oblique, the tool may slip during hammering, causing the chisel and piston to break, or seized. When breaking, select the point of a rock on which hammering can perform stably and fully stabilize the chisel to the hammer.



PROPER THRUST

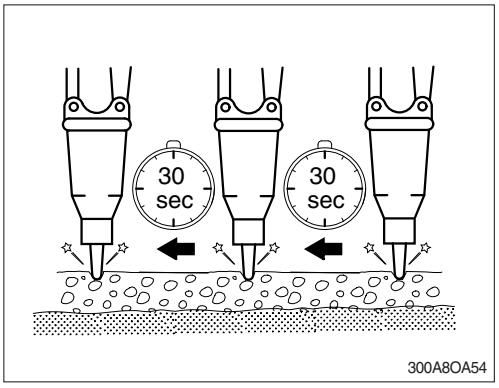
To break effectively, a proper thrust force must be applied to the breaker. If thrust is too low, impact energy of the piston may not be sufficient to break rocks.

Breaking force is transferred to the breaker body, arm and boom resulting in damage of those parts.



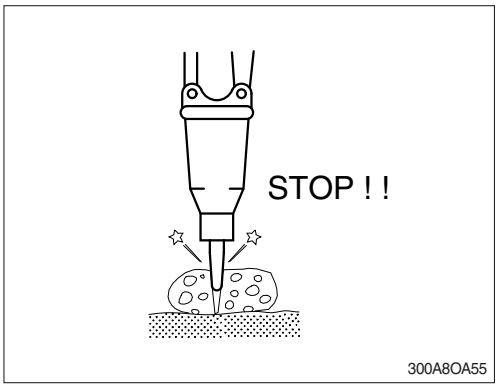
Move the impact point from the edge to the interior. Never try to break off a too large block, if the object has not broken within 30 seconds. The object should be broken up piece by piece in small blocks. Large distance steps will not improve working results.

Operating the breaker longer than 30 seconds may cause damage to the breaker.



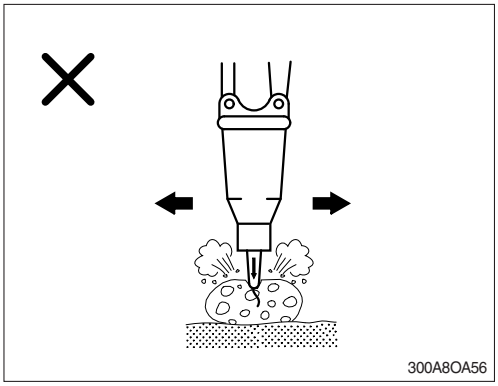
BLANKS THRUST

Blank blows, which are impact on the chisel without contact with the object, are very harmful for the breaker. Always press the chisel down onto the material before starting the breaker. And stop operation immediately as soon as the object has been broken. If operation is continued, blank blows could result in excessive wear to major components.



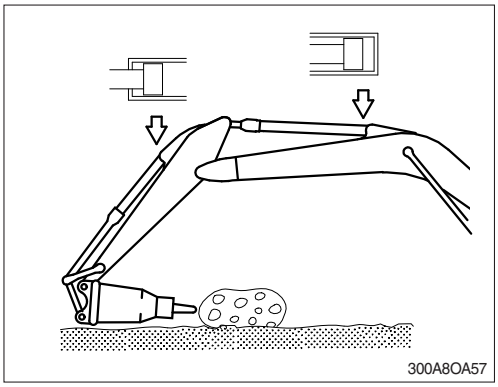
DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING

Do not move hammer while striking.
This will cause damage to the working device and the swing system.



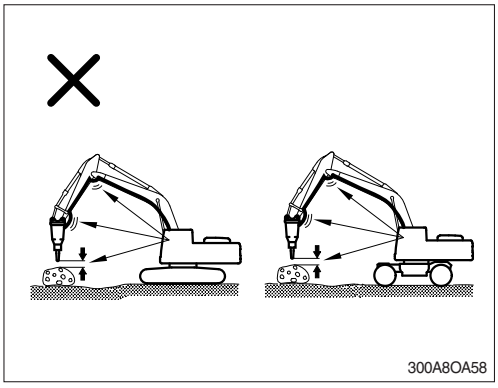
OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

If breaker is operated with the end tip, the cylinder may be damaged.



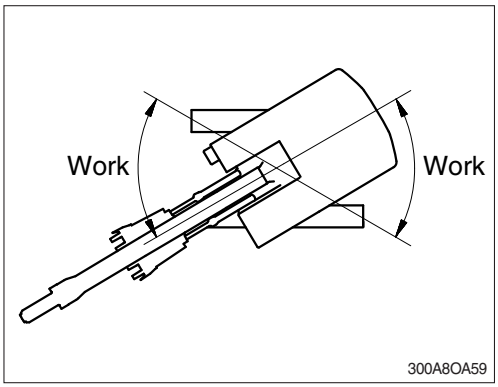
STOP THE OPERATION IMMEDIATELY IF HOSES VIBRATE EXCESSIVELY

Violent pulsations of the high / low pressure breaker hoses could indicate an accumulator fault. Check for oil leaks at the hose fitting points retightening as necessary. Should symptoms persist, contact the service shop appointed by the Hyundal dealer in your territory for repair. An excessive gap between tool and workpiece between strikes may indicate seizure of the tool in the front head. Disassemble the front head, inspect the components and repair or replace defective parts.

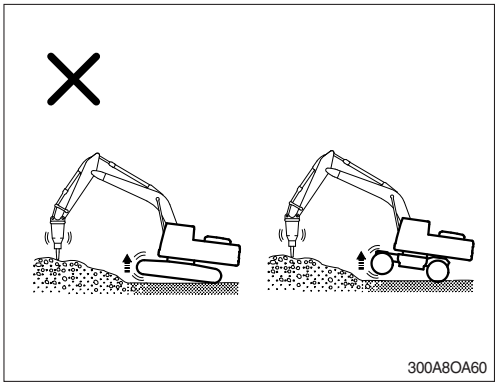


DO NOT WORK WHILE IN A SWING STATE

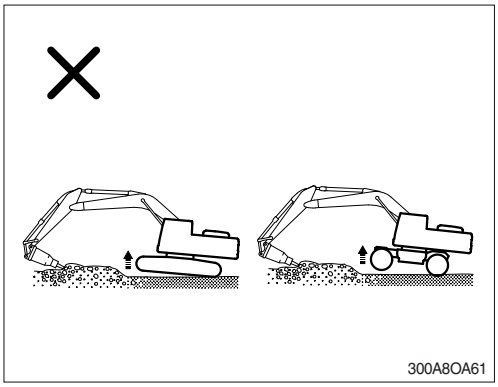
Do not work while swinging the upper structure. It cause oil leakage of the bend in the track shoe and rollers.



Conversely, if thrust is excessive or breaking is performed with boom of the lower chassis raised as shown, the machine may suddenly tip toward the movement. The breaker body may strike the broken rocks violently resulting in damage.

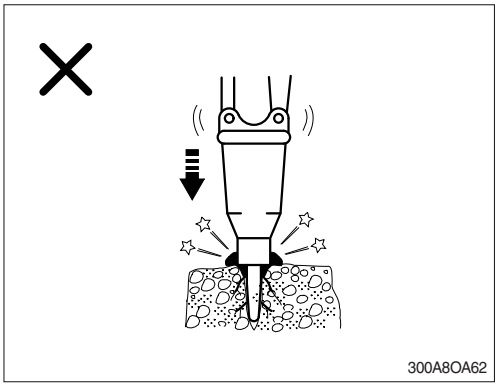


Do not extend the bucket cylinder fully and thrusting to raise the machine off the ground.



Excessive force as above may also result in vibrations being transmitted to the tracks causing damage.

Care is required to ensure adequate but not excessive force is applied to the breaker in operation.



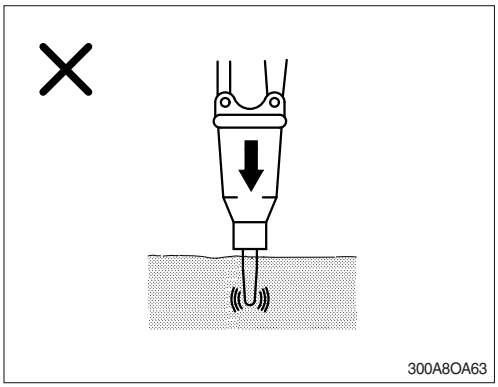
NEVER DRIVE THE CHISEL INTO THE GROUND

If the advance is too large and the chisel is not rocked to release the dust, the chisel will be driven into the material without breaking the material. This causes the chisel tip to glow red-hot and lose its hardness.

As a result, the chisel wears out more quickly. Operating in this way is not permitted.

Dust dampens impact power, when the chisel is inserted into the ground, and reduces the efficiency of the breaker. Tilt the breaker slightly backward and forward, not more than 5°, while operating so that the dust can escape.

Do not rock the breaker at angles greater than 5° or the chisel will be broken.

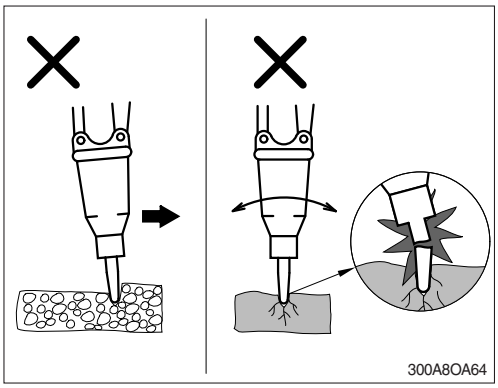


NEVER USE AS A LEVER

Do not use the chisel as a lever; e.g. crowbar, as this will cause the chisel to break.

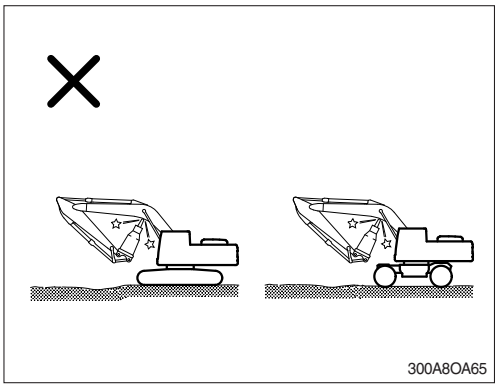
Under any circumstances, operating in this way is not permitted.

Most of bending failure of the chisel may be caused by lever action in stone that is inside hard or frozen ground. Be careful and stop operating if you feel sudden resistance under the chisel.



TAKE CARE OF CHISEL AND BOOM INTERFACE

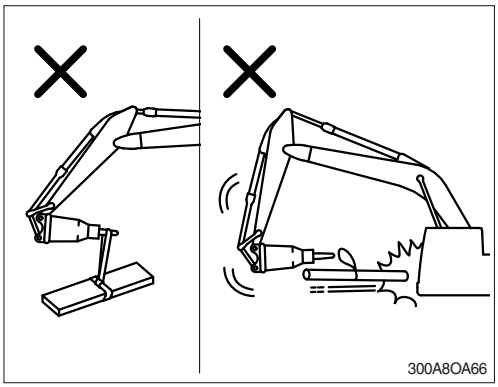
Be aware of clearance between breaker tip and the underside of boom as shown.



NEVER USE FOR LIFT OR TRANSPORT PURPOSES

The hydraulic breaker is not designed to lift or transport loads. Never use the chisel as a lifting point.

This is dangerous and could damage the breaker or the chisel.

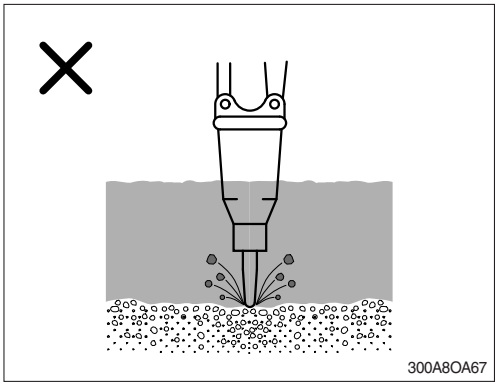


NEVER USE THE HYDRAULIC BREAKER UNDER WATER

The hydraulic breaker, as a standard assembly, never be used in or under water without prior conversion. If you use under water, water fills the impact chamber between the piston and the chisel, a strong hydraulic pressure wave is generated and will damage the seals in the breaker. And, in addition, corrosion, lack of lubrication or penetration of water could result in further damage to components of the breaker and the lower chassis.

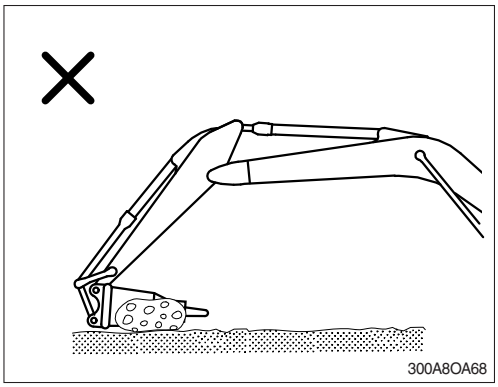
To operate the breaker under water, compressed air must be supplied into the breaker, into the impact chamber of the front-head, prior to use.

Consult your HD Hyundai Construction Equipment dealer for the underwater kit.



DO NOT USE BREAKER TO CARRY BROKEN STONE OR ROCK BY SWING OPERATING

This may damage the operation device and swing system.

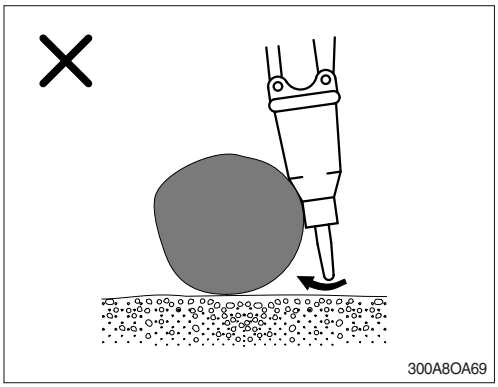


NEVER USE THE CHISEL OR HYDRAULIC BREAKER TO MOVE ROCKS OR OTHER OBJUCTS

The hydraulic breaker is not designed for this usage.

Do not use the breaker or chisel to roll, push the object or reposition the lower chassis.

This may cause damage to the breaker and the lower chassis.



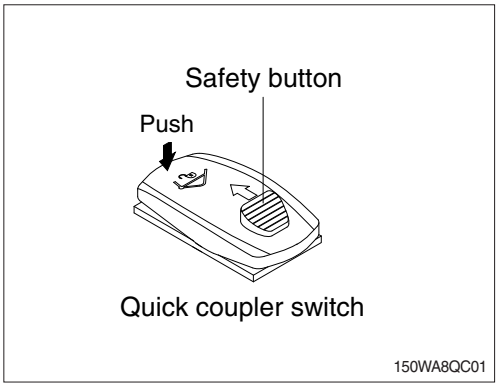
5. QUICK COUPLER

1) FIXING BUCKET WITH QUICK COUPLER

(1) Park the excavator and attachment on firm and level ground.

(2) After checking the safe environment conditions for installing/removing the quick coupler, perform the disengagement process.

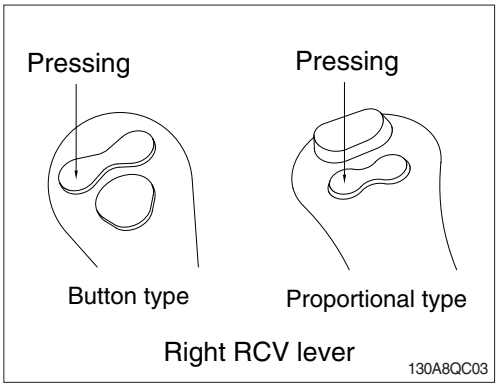
(3) To unlock the quick coupler switch, press the safety button forward and press the switch.



(4) Quick coupler symbols and warning messages appear on the cluster screen, and warning buzzers sound.

※ **The warning buzzer continues to operate up to step (12).**

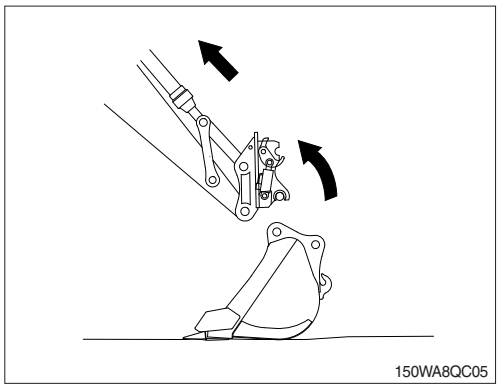
(5) To unlock the quick coupler, press the quick coupler button on the right RCV lever.
To maintain the unlock status of the quick coupler the operator must maintain pressing the coupler button.



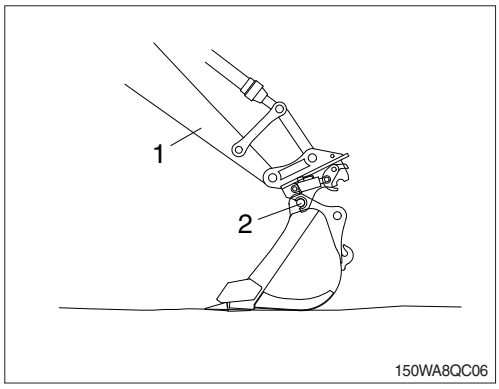
(6) The warning message in the cluster screen is changed, and the quick coupler lock is released.

150WA8QC04

(7) Retract the bucket cylinder. Align the quick coupler with attachment mounting pins or interface.

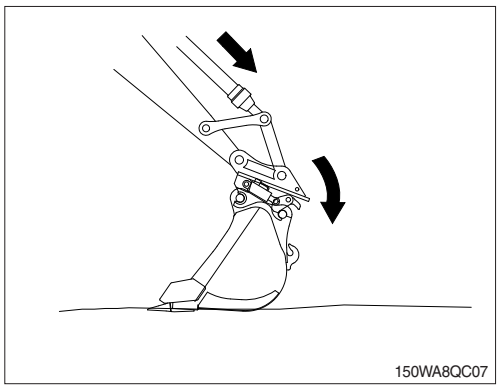

150WA8QC05

(8) Move the arm (1) and raise it until hook engages the upper (2) pin or interface of attachment.

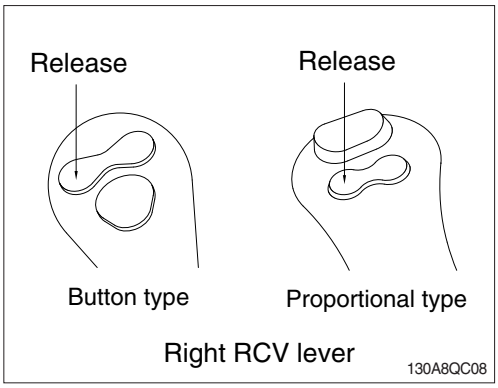


150WA8QC06

(9) With the bucket crowded, engage the quick coupler to the lower attachment pin or interface.


150WA8QC07

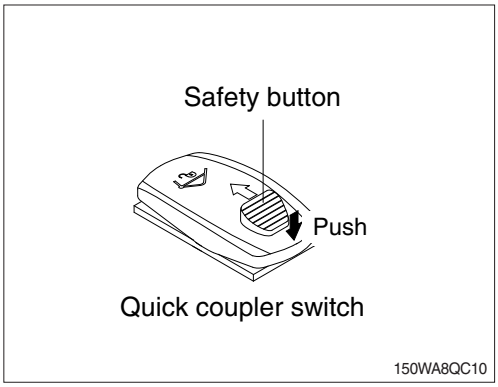
(10) To engage the quick coupler, release the quick coupler button on the right RCV lever.



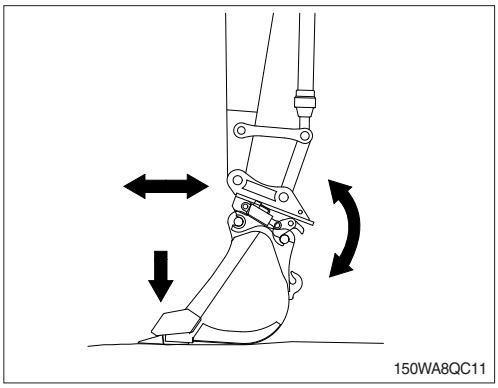
(11) The warning message in the cluster screen is changed, and the quick coupler lock is engaged.

※ **After changing warning message, the quick coupler will be locked even if the operator presses the quick coupler button of the right RCV lever again. To unlock the quick coupler again the operator must repeat from the process (3).**

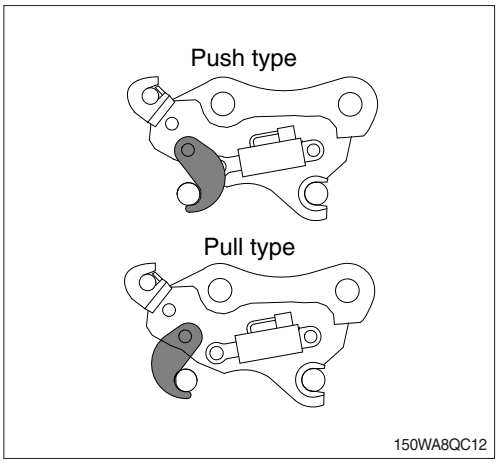
(12) To confirm the engagement of the quick coupler, release the safety button to its original position.
- The buzzer will stop activating.
- The warning message will disappear.



(13) Shake the attachment vigorously and lower the boom to the ground and apply down pressure to the quick coupler and attachment to check that attachment is fully engaged and locked to the quick coupler.

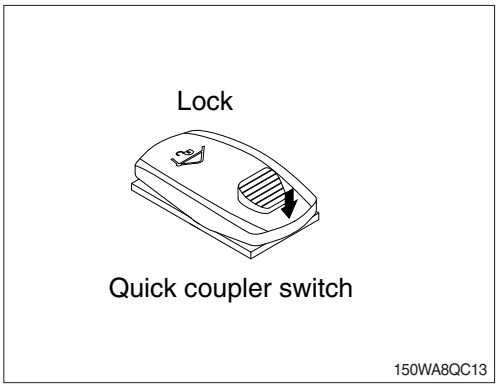


(14) Visually check that quick coupler is fully engaged and locked before operating the machine and attachment.



2) PRECAUTION OF USING QUICK COUPLER

⚠ When operating the machine with quick coupler, confirm that the quick coupler switch is in the LOCK position.
Operating the machine with quick coupler switch unlocked can cause the bucket to drop off and could result in personal injury, death, machine damage or property damage.



⚠ Be careful of the operating the machine which is equipped with quick coupler.
The bucket may hit cab, boom and boom cylinders when it reaches the vicinity of them as shown in the illustration.
HD Hyundai Construction Equipment will not be responsible for any injury, death or damage in the event that the quick coupler and attachment are not install-ed correctly.