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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※ For more informat ion go to www.P65warnings.ca.gov/diesel.

CONTENTS

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, Republic of Korea

HD Hyundai Construction Equipment Europe N.V located at Hyundailaan 4, 3980 Tessenderlo, Belgium, as authorized representative 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

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)

This machine complies with all applicable Environmental Protection Agency (EPA) regulations for warranties for emission-related components. The term of this warranty is 3,000 hours or five years, whichever occurs first.

This warranty does not cover damage arising from accident, misuse or negligence, use of non-HD Hyundai Construction Equipment parts, or 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) : 95 dB

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

CE

TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

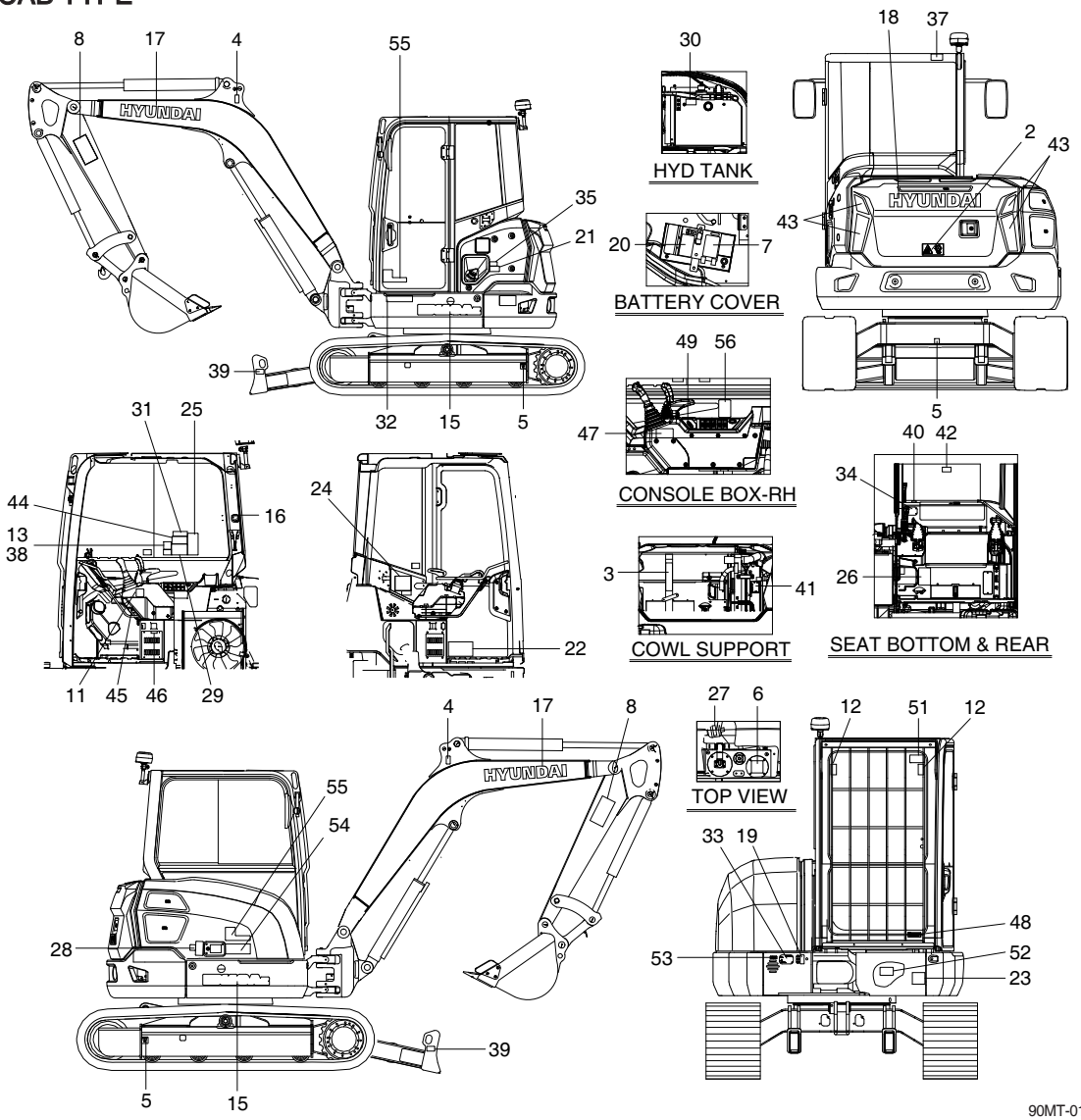
Machine Serial No.	
Engine Serial No.	
Manufacturing year	
Manufacturer Address	HD Hyundai Construction Equipment Co., Ltd. 477, Bundangsuseo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Distributor for U.S.A Address	HD Hyundai Construction Equipment North America, Inc 6100 Atlantic Boulevard 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

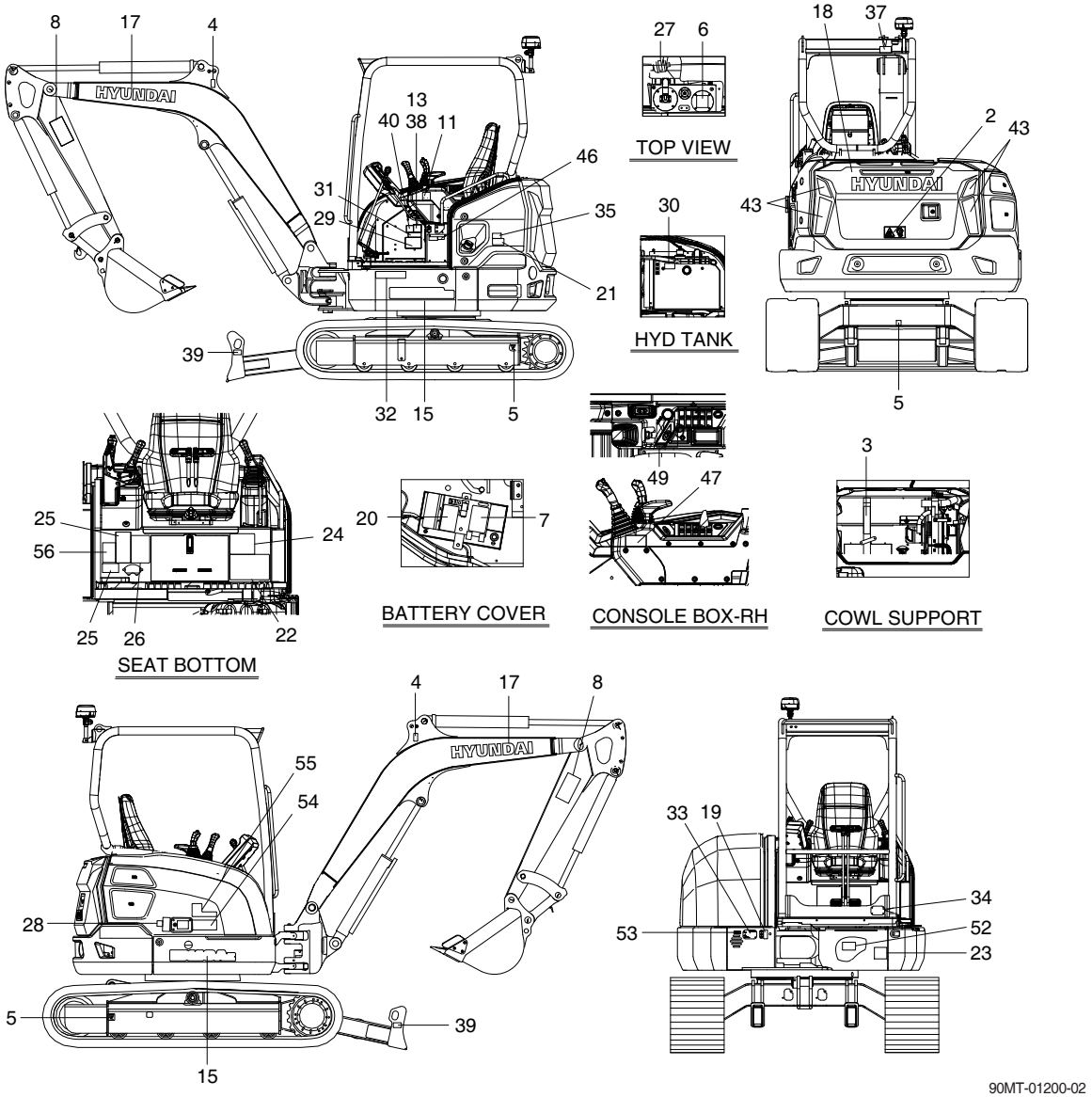
Always keep these labels clean. If they are lost or damage, attach them again or replace them with a new label.

1) CAB TYPE



2	Keep clear (rear)	23	Noise level	41	Refrigerant
3	Engine room caution	24	Lifting chart	42	Emergency exit
4	Lifting point	25	General caution (cab)	43	Reflecting-LH/RH
5	Tie	26	Pattern change	44	Boom caution
6	High pressure	27	Accumulator	46	MCU/ECU connector
7	Battery accident	28	Battery position	47	Caution key
8	Keep clear (attach)	29	Control ideogram	48	FOG plate
11	Console tilting	30	Fuel shut off	49	Key box
12	Front window safety	31	Water separator	51	Front window safety
13	Dozer control ideogram	32	General caution (frame)	52	Leftover fuel
15	Model name	33	Name plate	53	EMC
17	Hyundai logo (boom)	34	ROPS plate	54	Bio oil
18	Hyundai logo (engine hood)	35	Ultra low sulfur diesel	55	Reddot logo
19	Grease	37	Beacon lamp	56	Fuse caution
20	Electric welding	38	Angle dozer control (opt)	57	California65 caution
21	Fueling	39	Lifting point/tie down		
22	Service instruction	40	Fire extinguisher		

2) CANOPY TYPE



2	Keep clear (rear)	22	Service instruction	38	Angle dozer control (opt)
3	Engine room caution	23	Noise level	39	Lifting point/tie down
4	Lifting point	24	Lifting chart	40	Fire extinguisher
5	Tie	25	General caution (cab)	43	Reflecting-LH/RH
6	High pressure	26	Pattern change	46	MCU/ECU connector
7	Battery accident	27	Accumulator	47	Caution key
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19	Grease	34	ROPS plate	57	California65 caution
20	Electric welding	35	Ultra low sulfur diesel		
21	Fueling	37	Beacon lamp		

2. DESCRIPTION

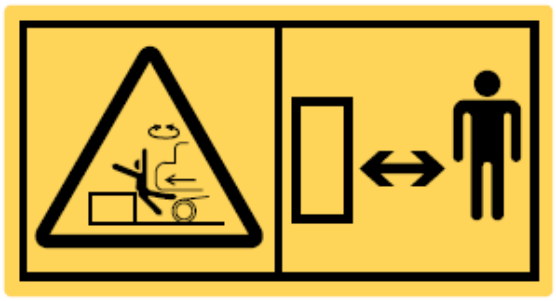
There are labels on this machine please become familiarized with all warning labels and descriptions are based on the cab type.
Replace any safety label that is damaged, or missing.

1) KEEP CLEAR (REAR) (item 2)

This label is positioned on the rear side of the 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.**



94MS-07010

2) ENGINE ROOM CAUTION (item 3)

This label is positioned on the cowl support of the inside engine room.

⚠ **Do not open the engine hood while the engine is 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.**

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

⚠ **Relieve all pressure before disconnecting any hydraulic, coolant or fuel lines etc.**

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

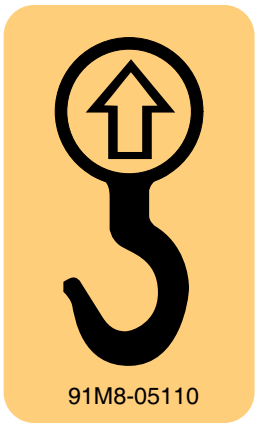
91M8-07111

81M8-07111-00

3) **LIFTING POINT** (item 4)

This label is positioned on the both sides of the boom.

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



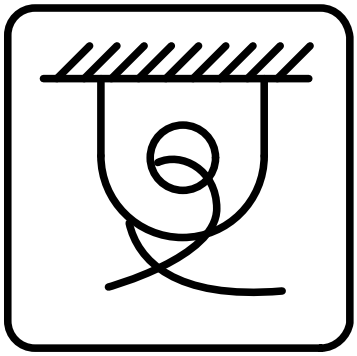
91M8-05110-00

4) **TIE** (item 5)

This label is positioned on the LH, RH and rear sides of the lower frame.

※ **Never tow the machine using tie down eyelet as it may break resulting in personal injury or death.**

※ **See page 4-10 for detail.**



91N6-05120

5) **HIGH PRESSURE** (item 6)

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

※ **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.**

94K8-01110

6) BATTERY ACCIDENT (item 7)

This label is positioned on the inside of the battery cover.

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

Failure to comply may result in serious injury or death.

※ 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 allow any open flames or excessive heat near or when checking the battery.

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

⚠ To prevent electric shock, do not touch battery terminal with wet hands.

94MT-02120

7) KEEP CLEAR (ATTACH) (item 8)

This label is positioned on both sides of the arm.

⚠ Serious injury or death can result from a falling attachment.

⚠ To prevent serious injury or death, do not walk near, under implements or attachments.

This applies when machine is in use, the implements are suspended in air or while the machine is being worked on.

R5570FW31

8) **CONSOLE TILTING** (item 11)

This label is positioned on the left side of the LH console box.

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

91M8-07300-00

9) **FRONT WINDOW SAFETY** (item 12)

This label is positioned on the both sides front window of inside the cab.

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

97MH-07351-00

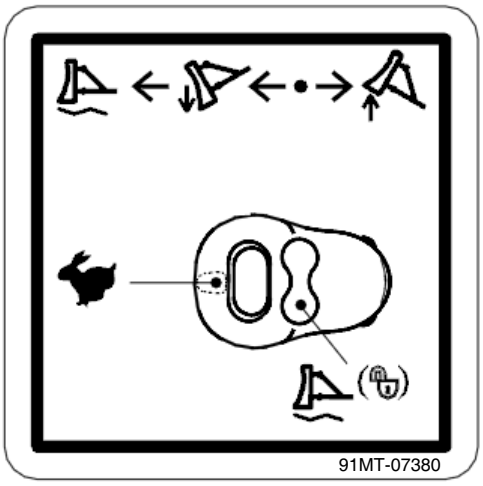
10) **DOZER CONTROL IDEOGRAM** (item 13)

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

※ **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.**



91MT-07380-00

11) **ELECTRIC WELDING** (item 20)

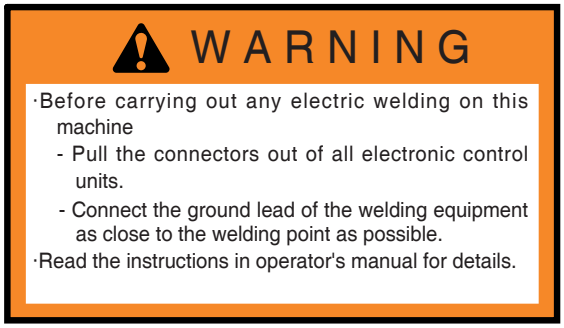
This label is positioned on the inside of the battery cover.

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

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

※ **Be sure to remove paint where ground will be applied to ensure proper grounding of welder. Once welding is complete, clean and repaint area.**

※ **See page 6-38 for detail.**



7807AFW20

12) **FUELING** (item 21)

This label is positioned on the left cover of the cowl.

⚠ **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

13) **GENERAL CAUTION (CAB)** (item 25)

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

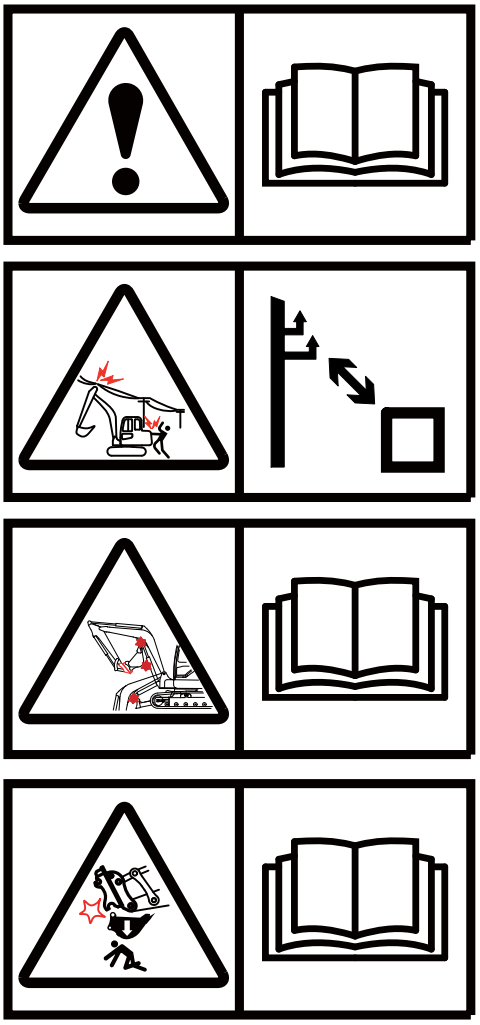
⚠ **Serious injury or death can result from contact with electric lines.**
It is possible to receive shock by merely coming into the vicinity of electric lines, the minimum distance based on supply voltage should never be exceeded.
Refer to page 1-17.

⚠ **Serious injury or death can result from dropping bucket.**

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

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

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



94MS-07240-00

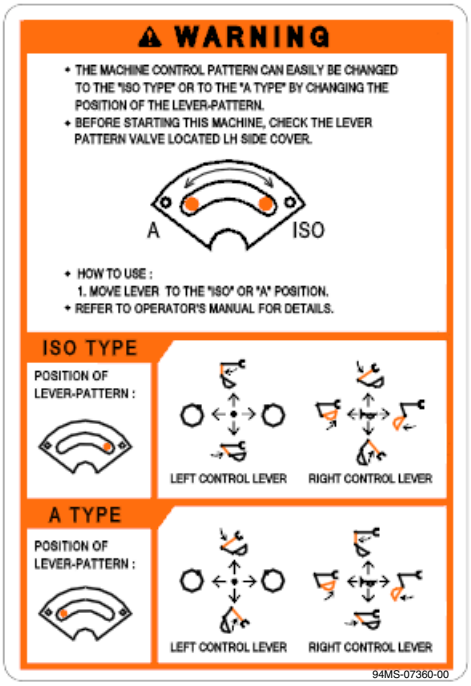
14) PATTERN CHANGE (item 26)

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

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

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

※ See page 4-22 for details.



94MS-07360

15) ACCUMULATOR (item 27)

This label is positioned on the accumulator of the solenoid valve located at the right side of the hydraulic tank..

※ 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 holes in the accumulator or expose it to open flame or fire.

⚠ Do not weld anything to the accumulator.

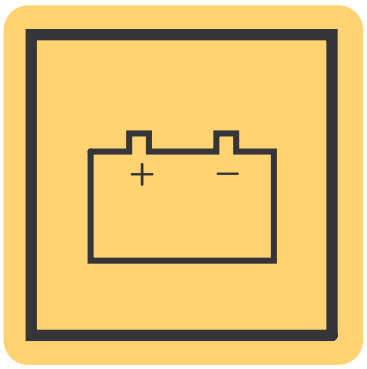
※ When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator. It is necessary to release the gas from the accumulator. A special air bleed valve is necessary for this operation, so please contact your HD Hyundai Construction Equipment distributor.

91N6-03201

16) **BATTERY POSITION** (item 28)

This label is positioned on the right cover of the cowl.

※ **See page 6-36 for the battery handling.**



38090FW03

17) **CONTROL IDEOGRAM** (item 29)

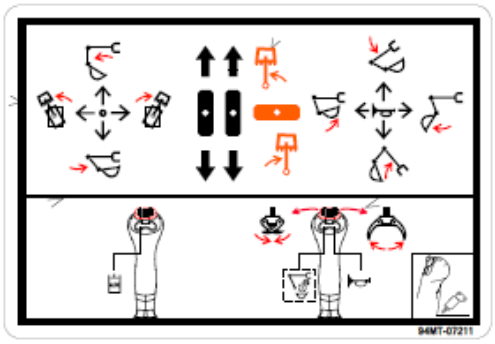
This label is positioned on the right side window of inside the cab.

⚠ **Always ensure the label matches the control pattern. If it does not, replace label with appropriate control pattern label.**

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

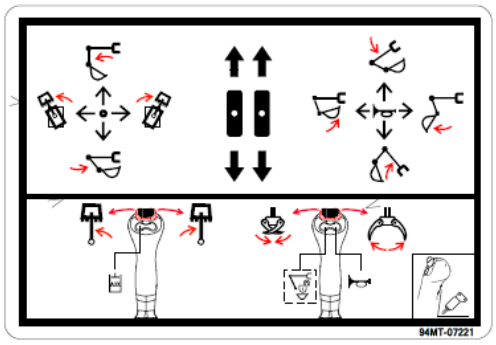
※ **See page 4-7 for details.**

Without proportional+pedal boom swing



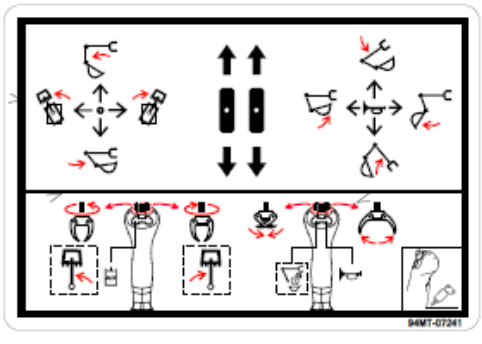
94MT-07211

Without proportional+RCV boom swing



94MT-07221

With proportional + RCV boom swing



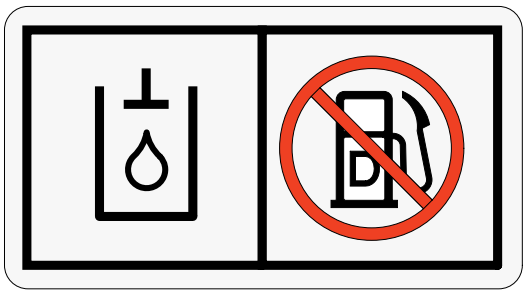
94MT-07241

18) **FUEL SHUT-OFF** (item 30)

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

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

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



140WH90FW51

19) **WATER SEPARATOR** (item 31)

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

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

91Q4-07180

20) **GENERAL CAUTION (FRAME)** (item 32)

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

⚠ **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 5-8 for details.**

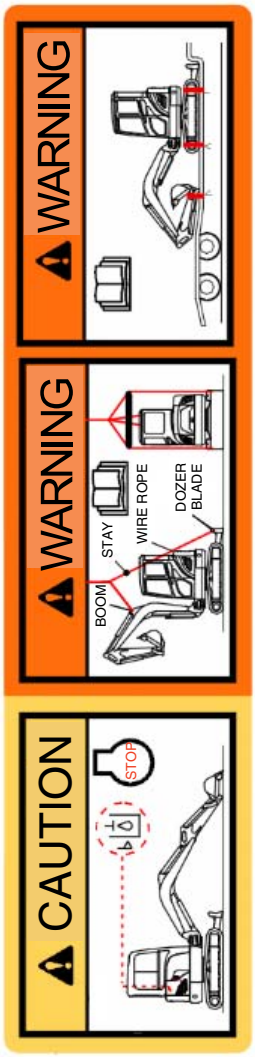
⚠ **Make sure wire rope is proper size and keep correct hoisting method.**

※ **See page 5-9 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.**



97MK-04100

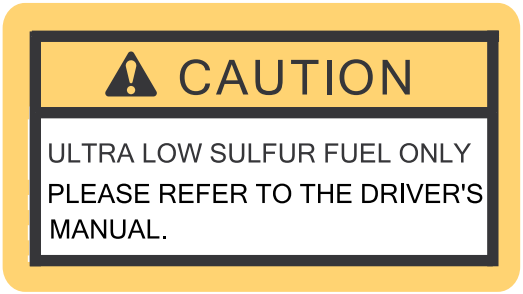
21) **ULTRA LOW SULFUR DIESEL** (item 35)

This label is positioned on the left cover of the cowl.

※ **Use ultra low sulfur fuel only.**

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

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



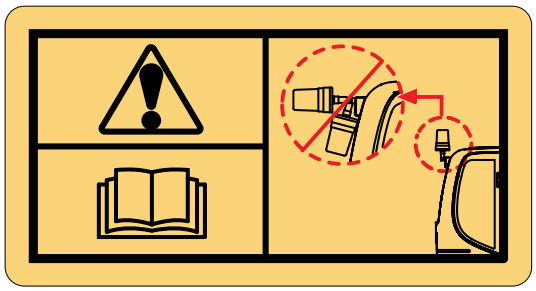
2609A0SL03

22) **BEACON LAMP** (item 37)

This label is positioned on the rear top 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.**



91MK-02221-00

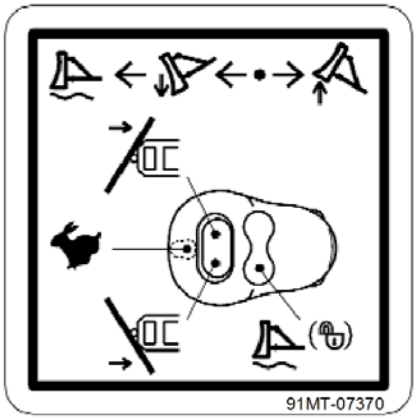
23) **ANGLE BLADE CONTROL** (item 38)

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

⚠ **To avoid personal injury or death,**
- **Never jack up or lift the machine with the angle blade placed at an angle.**
- **Stability of the machine is affected with blade at angle, keep at neutral position.**
- **Before starting the job or when travelling up or down a slope, position and keep the angle blade at neutral.**
- **Do not work under the machine.**

※ **Do not angle blade up with the angle blade placed at an angle.**

※ **Refer to page 0-12 for additional descriptions.**

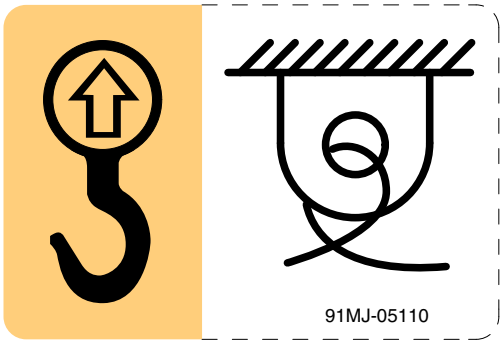


91MT-07370-00

24) **LIFTING POINT/TIE DOWN** (item 39)

This label is positioned on the LH and RH sides of the dozer blade.

- **Lifting point**
  In order to lift the machine, attach the lifting devices to the lifting points.
- **Tie down**
  In order to tie down the machine, attach the tie-downs to the tying points.



91MJ-05110-00

25) **FIRE EXTINGUISHER** (item 40)

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

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

94MS-07290

26) **REFRIGERANT** (item 41)

This label is positioned on the cowl support of the inside of the engine room.

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

※ **Refer to page 6-40.**

91K7-07232

27) **EMERGENCY EXIT** (item 42)

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

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

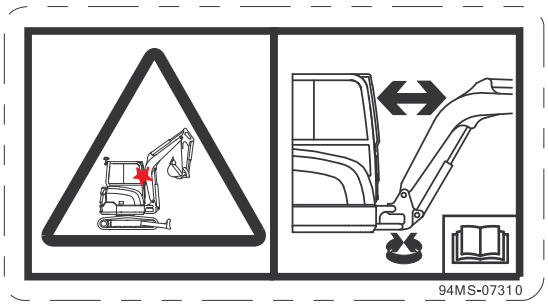
※ **To remove rear window, pull the ring and push out the glass.**

94MT-07280

28) **BOOM CAUTION** (item 44)

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

※ **Be careful to operate the boom. The boom may hit cab when boom reaches vicinity of cab.**



94MS-07310-00

29) **MCU/ECU CONNECTOR** (item 46)

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

※ **MCU communicates the machine data through Laptop computer through RS232 service socket.**

※ **ECU communicates the engine data with cummins INSITE tool adapter through J1939 service socket.**

※ **See page 3-43 for details.**

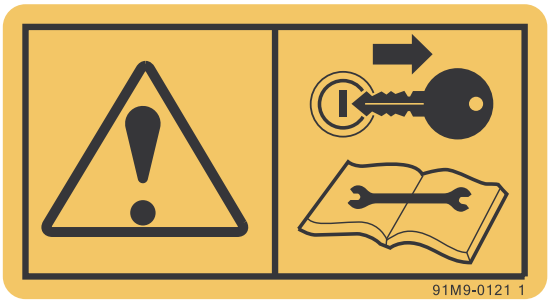
91Q4-15860

30) **CAUTION KEY** (item 47)

This label is positioned on the left side of the RH console box.

⚠ **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.**



91M9-01211-00

31) **FRONT WINDOW SAFETY** (item 51)

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

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

91Q6-07251-00

32) **LEFTOVER FUEL** (item 52)

This label is positioned on the inside the front cover.

⚠ **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.**

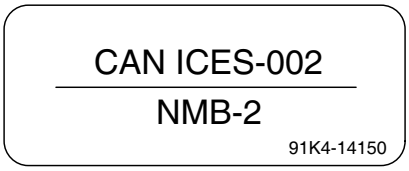
91K4-02700

33) **EMC** (item 53)

This label is positioned on the front side of the upper frame near the PIN plate.

※ **This machine complies with the EMC directive ICES-002.**

※ **EMC : ElectroMagntic Compatibility**



91K4-14150

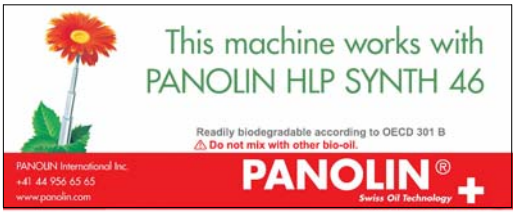
34) **BIO OIL** (item 54)

This label is positioned on the right cover of the cowl.

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

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

⚠ **Do not mix with other bio-oil.**



94MJ-99110

35) **FUSE CAUTION** (item 56)

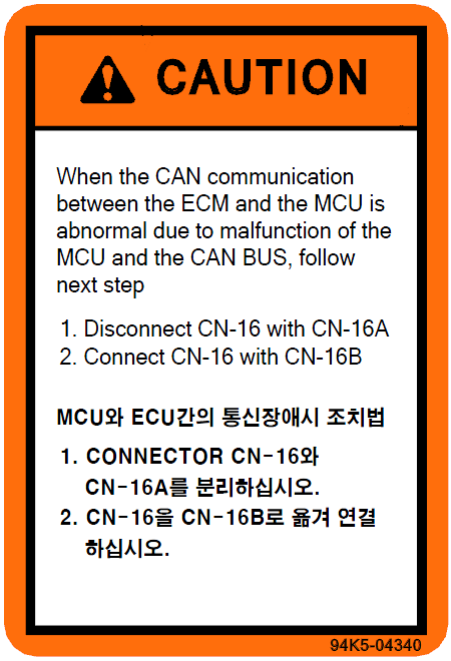
This label is positioned on the right side of the inside the cab.

※ **When the CAN communication between the ECM and the MCU is abnormal due to malfunction of the MCU and the CAN BUS, follow next step.**

(1) Disconnect CN-16 with CN-16A

(2) Connect CN-16 with CN-16B

※ **See page 3-47 for details.**



94K5-04340

36) **PROPOSITION** (item 57)

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

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

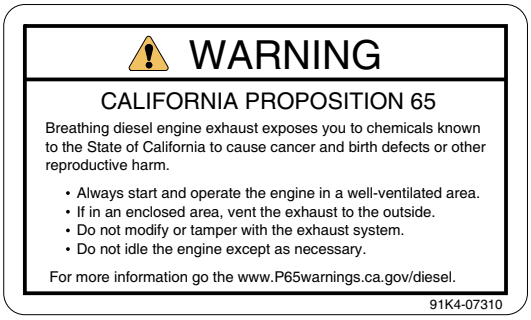
(1) Always start and operate the engine in a well-ventilated area.

(2) If in an enclosed area, vent the exhaust to the outside.

(3) Do not modify or tamper with the exhaust system.

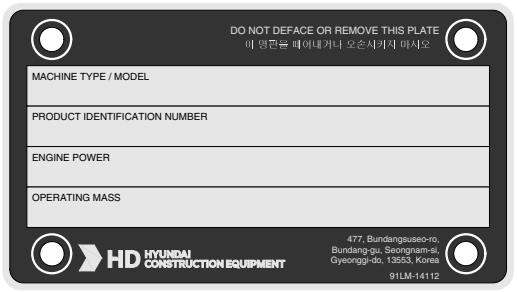
(4) Do not idle the engine except as necessary.

※ **For more informat ion go to www. P65warnings.ca.gov/diesel.**



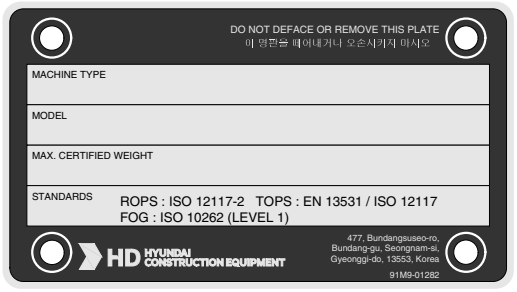
91K4-07310

MACHINE DATA PLATE



For general

For EU only



For ROPS

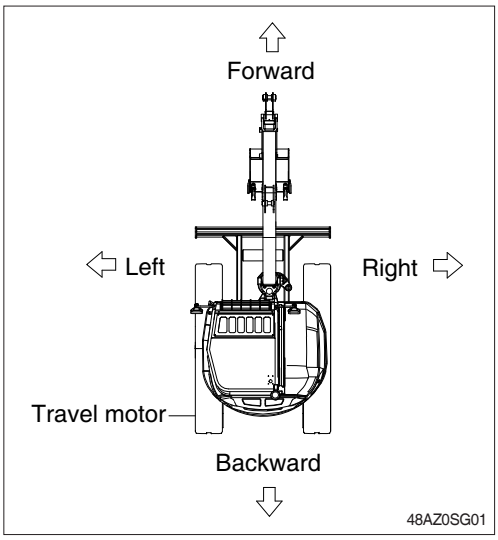
For FOG

MEX0MD01

※ 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.

1. DIRECTION

The direction of the arrows (as they are indicated) are with the travel motors to the rear and the boom facing the opposite direction. Refer to the right illustration.

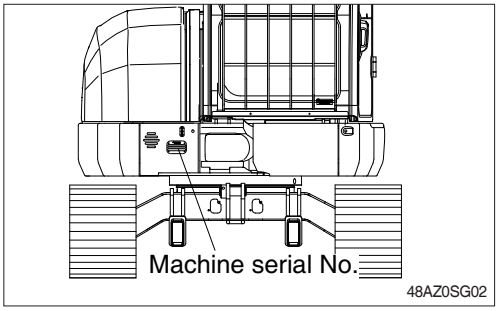


2. SERIAL NUMBER

Provides the serial number when ordering parts or seeking assistance.

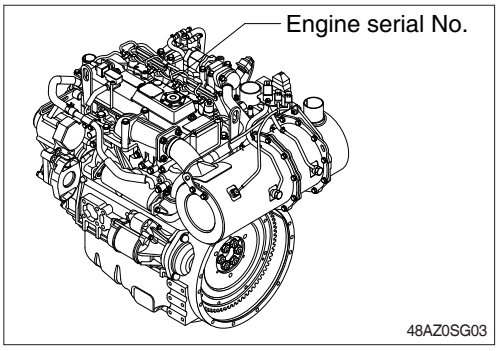
1) MACHINE SERIAL NUMBER

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.

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

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

4. SYMBOLS

⚠ Provides important safety warnings. Failure to follow these warnings could result in serious injury or death.

△ Provides important instructions to prevent damage to the equipment.

※ Provides useful information for the 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.
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.
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:

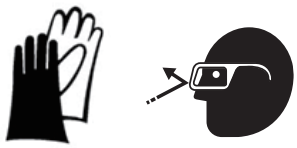
- Move the machine well away from any flammable materials (e.g., fuel, engine oil, clothes, and bits of wood) and adjacent buildings.
- If the engine is running, it may cause a persistent fire. Immediately stop the engine.
- In the event of an electric short, disconnect the batteries to eliminate the 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:

- 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.

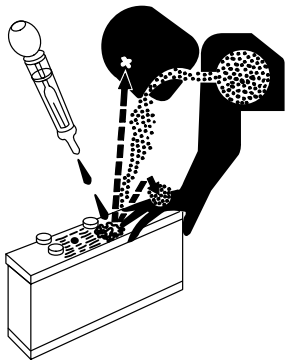
Health and safety instructions in hazardous environments

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.

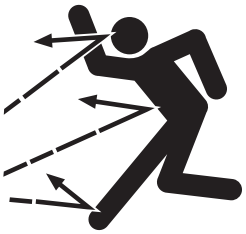
When handling coolants

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,

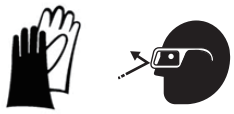
Always wear a safety helmet, protective goggles and safety shoes to prevent injury from airborne particles and thrown or falling objects. Earplugs or earmuffs may be necessary when working in a noisy place.



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.

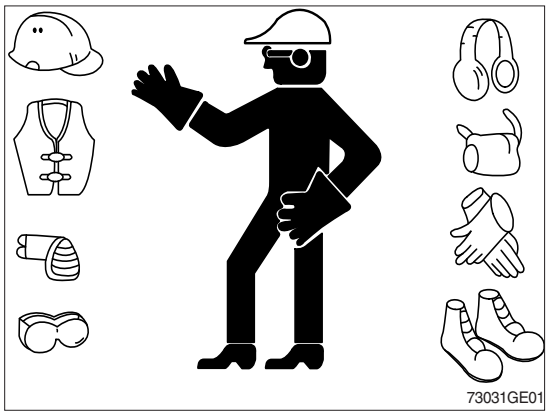
Personal protection gear for various situations

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	

WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

- Do not wear loose clothing and accessories. Secure long hair. These items can snag on controls or on other parts of equipment.
- Do not wear oily clothes. They are highly flammable.
- Wear a hard hat, safety shoes, safety goggles, mask, leather gloves, earplugs and other protective equipment, as required.
- While working on machine, never use inadequate tools. They could break or slip, or they may not adequately perform intended.



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.

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 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.

⑨ 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.

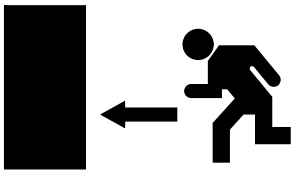
Information on noise

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

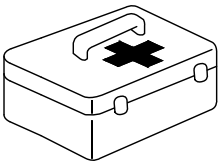
- LwA(Guaranteed) : 95 dB (Uncertainty K 1.0 dB(A))
- LpA(Measured) : 71.4 dB (Uncertainty K 1.0 dB(A))

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.

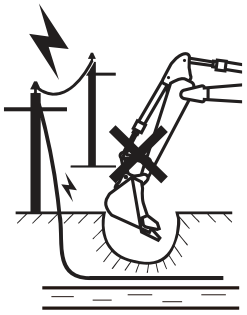
Safety Information on the Machines and Operation

Before Operating the Machine

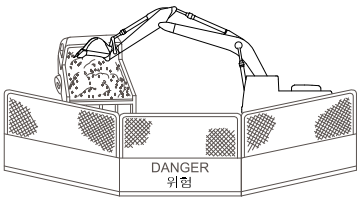
Carefully examine the following conditions and take any necessary actions to prevent risk factors before operating the machine:

Checking the worksite

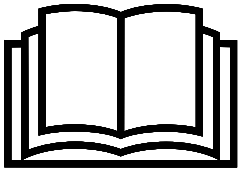
- Always be aware of weather conditions at your worksite. Fog or heavy rain may decrease visibility or render the machine inoperable. In the event of lightning, immediately put the bucket to the ground and evacuate to a safe place.
- Check the worksite for obstacles, and avoid collisions with such obstacles 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. If operation of the machine on such terrain is unavoidable, keep the track perpendicular to the end, place the driving motor at the rear to facilitate escape from the machine in the event of an emergency situation.
- 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.



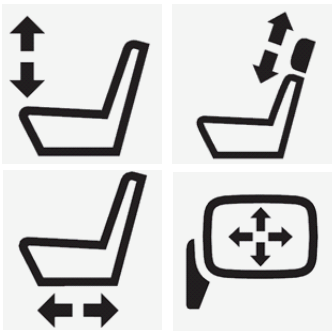
Instructions before operating the machine



- 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

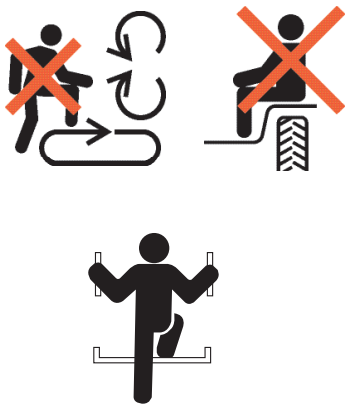
- Check the machine for abnormal noise, vibration or heat, and for the leakage of engine oil, hydraulic oil, fuel or refrigerant.
- Remove any foreign substances from the engine and the battery. The buildup of such substances may cause a fire.
- Do not operate a machine until any necessary repairs are 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

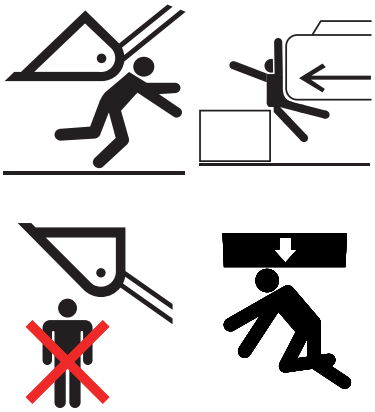


- Do not jump on or off the machine.
- Do not try to get on or off the machine while it is moving.
- Get on or off the machine using the handrail and step (or stepladder, if any). Always keep the handrail and step clean and free from mud or oil.
- Wear anti-slip shoes.
- Comply with the principle of 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.**

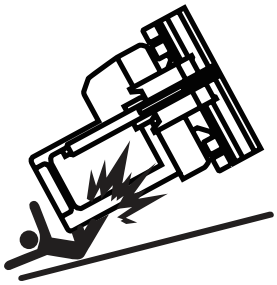
During operation

- 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.

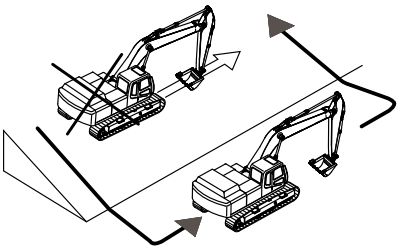


Operation on a slope

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.

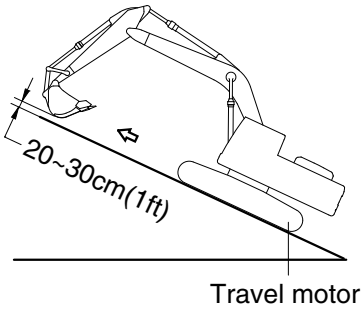


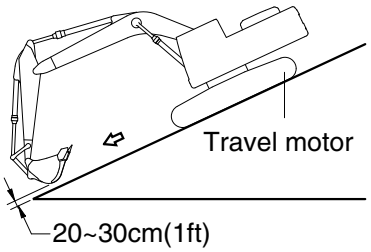
- Do not work on slopes of 10˚ or more.
- Do not exceed the maximum climbing angle of 30˚.
- If operation of the machine on a slope is unavoidable, perform the work after flattening the ground.
- When operating the machine laterally on a slope, there is a high risk of machine overturning or slipping. 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.
- When traveling down a slope, reduce the engine speed with the travel lever kept in the vicinity of the neutral position. 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.)



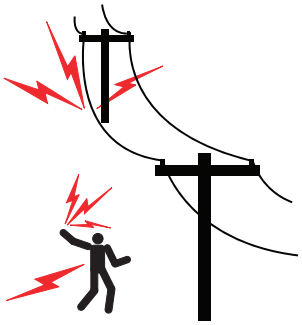


Operations to be avoided or prohibited

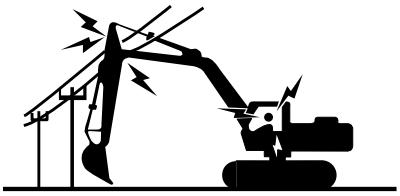
· Pay attention when operating the machine in an enclosed space as this may result in the risk of a buildup of hazardous gases.

· 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.

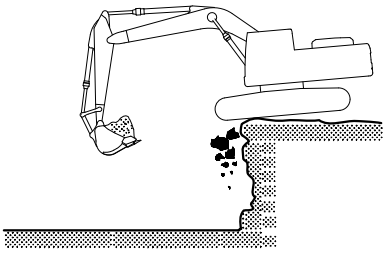
Voltage	Minimum safety distance
6.6 kV	3 m (10 ft)
33.0 kV	4 m (13 ft)
66.0 kV	5 m (16 ft)
154.0 kV	8 m (26 ft)
275.0 kV	10 m (33 ft)



· 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.

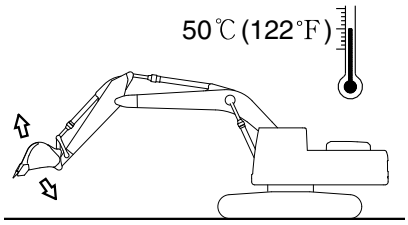


Cautions when operating in specific areas

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

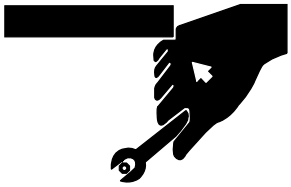
- Do not operate the machine in areas where there is heavy rainfall or thick fog.
- If operating the machine in such areas is unavoidable, perform operation after ensuring sufficient field of vision.
  - Use lighting devices such as the head lamp and working light.
  - Warn any workers within the radius 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

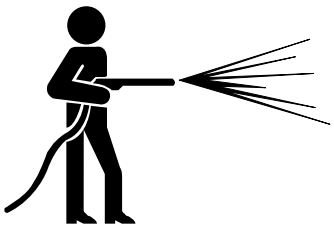
Tools



- 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.



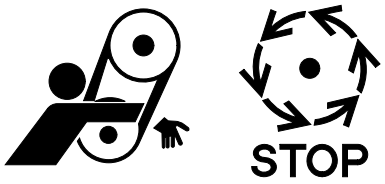
- Use proper lighting devices when operating the machine in a dark area.
- Use lighting devices that are explosion-proof when handling flammable materials such as fuel and hydraulic oil.
- Never attempt to use a direct flame such as a cigarette lighter in lieu of the lighting device.

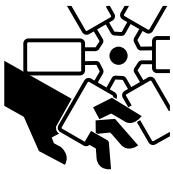
- Check the level of the cooling water after stopping and sufficiently cooling down the engine.
- Sufficiently relieve the inside pressure before opening the cooling water cap.
- The cooling system contains basic components. Use caution to prevent the skin or eyes from coming into contact with the basic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

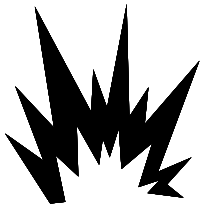
- Never perform a maintenance while the engine is running.
- Never open or remove the engine hood while the machine is in operation.
- If an inspection is required while the engine is running, two or more workers must perform the inspection.
- Keep areas in the vicinity of rotating or moving parts clean.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





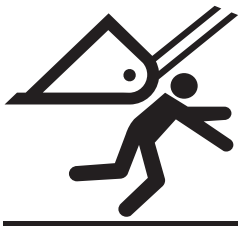
Preventing fire and explosion

- 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.

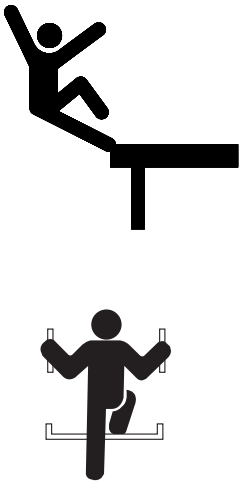


Repair by welding

- 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.

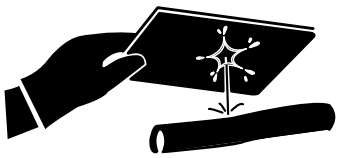
Precautions to take when working on the machine

- 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

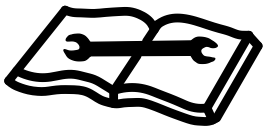
- Make sure that the internal pressure is released before replacing or checking the high-pressure line or hose.
- If the internal pressure is not released, serious injury may result.
- Take the following precautions to avoid serious injury or death:
  - Always check to make sure a working fire extinguisher 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.



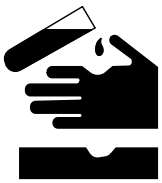
Cautions on inspecting the counterweight

- 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

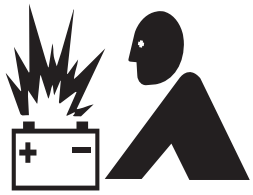


- The battery contains flammable materials.
- Never smoke in the vicinity of the battery.
- The battery electrolyte is strong acid. Pay attention to prevent the skin and eyes from coming into contact with the electrolyte.



- 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.

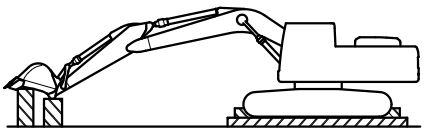
Parking and Storage

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.
- 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

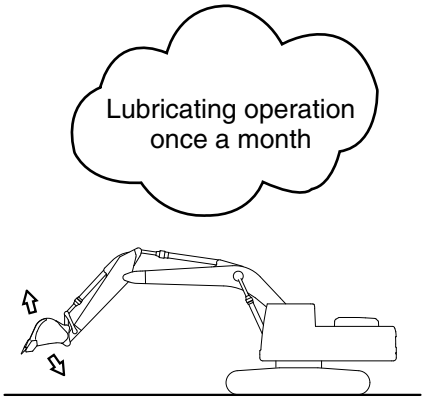
- Park the machine in accordance to any state and local laws.
- When storing the machine for a month or longer, follow these instructions to prevent deterioration of the machine performance :



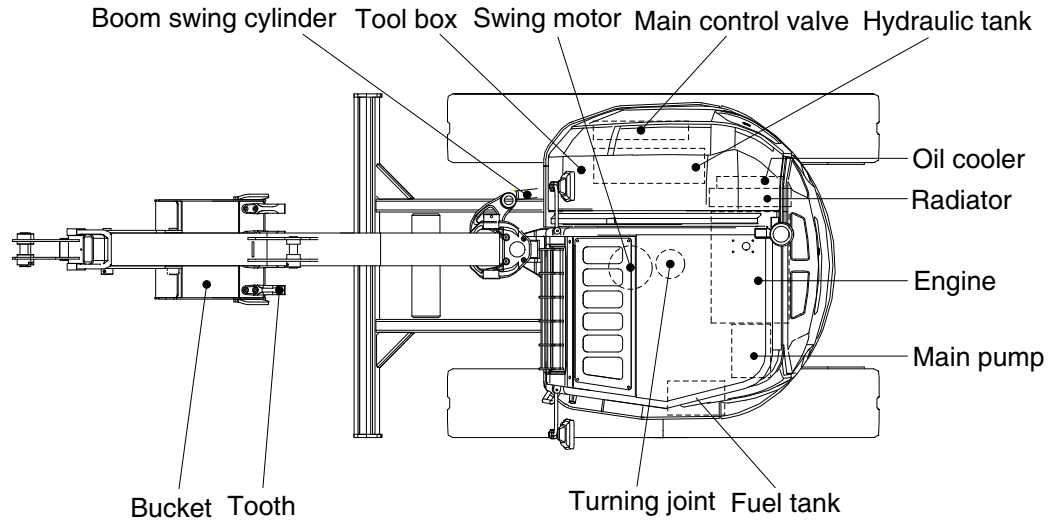
  - Thoroughly clean the machine before storing.
  - Inject sufficient lubrication oil and grease into the injection ports.
  - If any of the machines fluids are low top them off. If any fluids are close to or in need of changing, do so before storing.
  - Oils and coolant may deteriorate during storage 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 tracks immobile by placing wheel chocks.

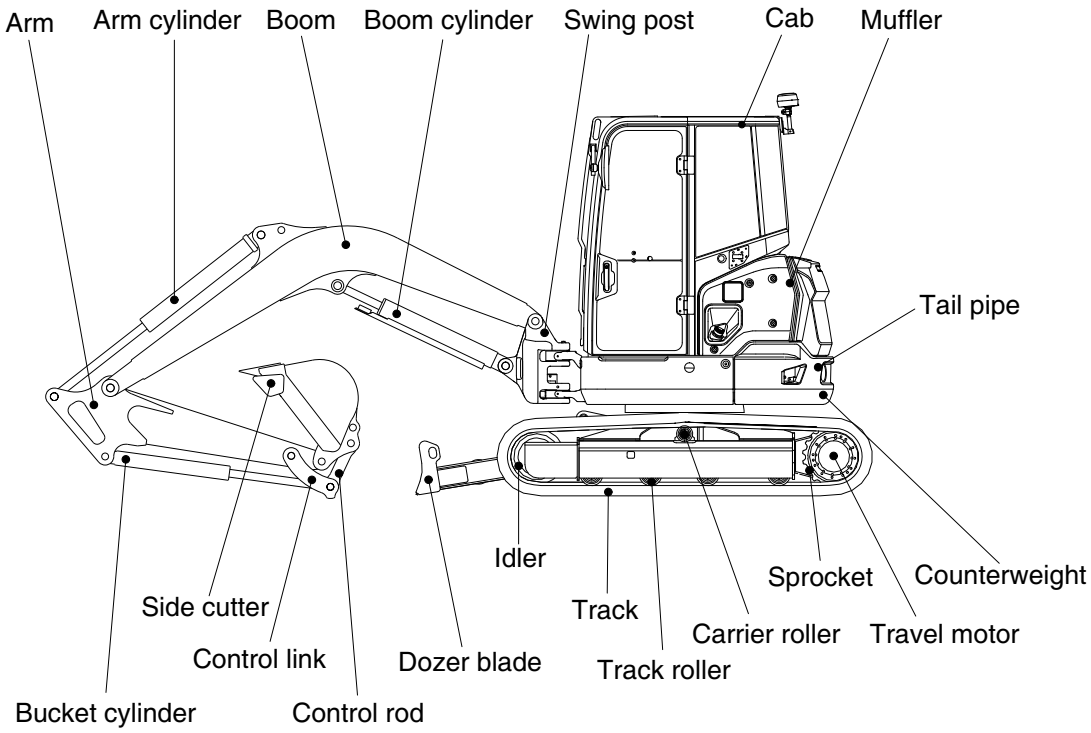
Regular lubrication (during storage)

- 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.



1. MAJOR COMPONENTS



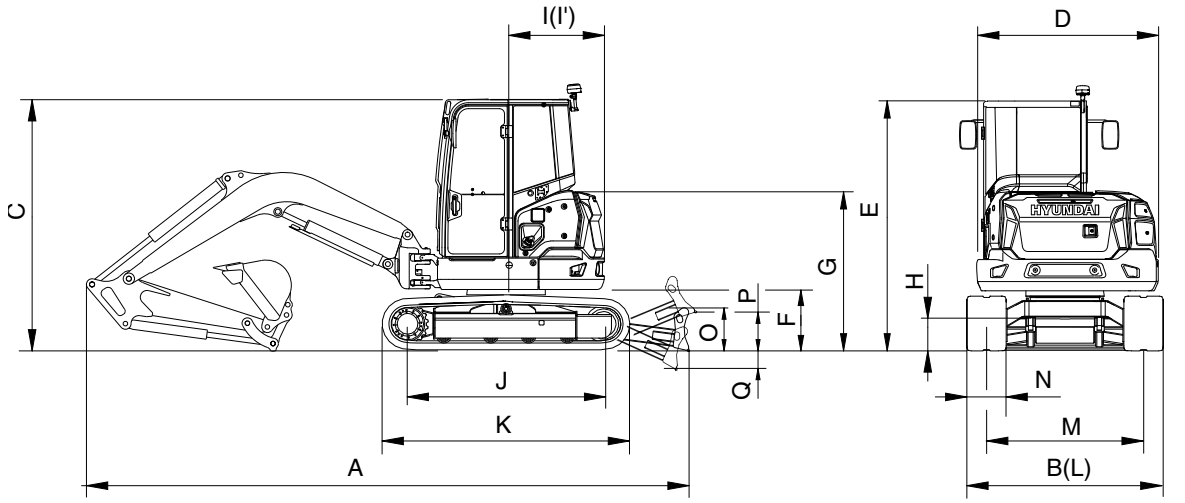


48AZ2SP01

2. SPECIFICATIONS

1) CAB TYPE

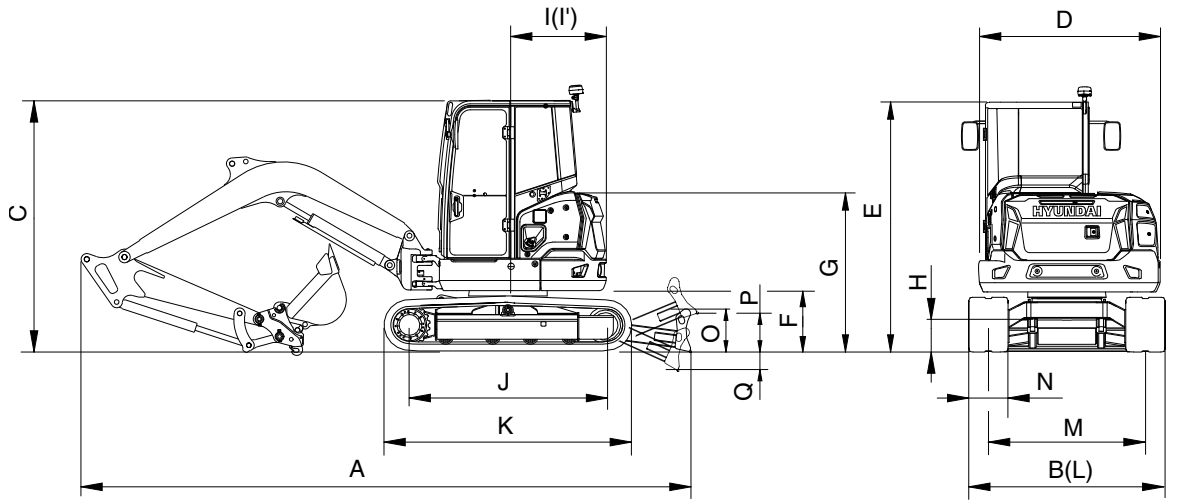
(1) 2.8 m (9' 2") boom, 1.4 m (4' 7") arm, without quick coupler (general standard)



48AZ2SP02

Description		Unit	Specification
Operating weight		kg (lb)	5030 (11090)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.15 (0.18)
Overall length	A	mm (ft-in)	5493 (18' 0")
Overall width, with 300 mm shoe	B		2000 (6' 7")
Overall width, with dozer	-		2000 (6' 7")
Overall height	C		2580 (8' 6")
Overall width of upper structure	D		1850 (6' 1")
Overall height of cab	E		2580 (8' 6")
Ground clearance of counterweight	F		608 (2' 0")
Overall height of engine hood	G		1605 (5' 3")
Minimum ground clearance	H		215 (0' 8")
Rear-end distance	I		1000 (3' 3")
Rear-end swing radius	I'		1000 (3' 3")
Distance between tumblers	J		2000 (6' 7")
Undercarriage length (without grouser)	K		2214 (7' 3")
Undercarriage width	L		2000 (6' 7")
Track gauge	M		1600 (5' 3")
Track shoe width, standard	N		400 (1' 4")
Height of blade	O		350 (1' 2")
Ground clearance of blade up	P		410 (1' 4")
Depth of blade down	Q		580 (1' 11")
Travel speed (low/high)		km/hr (mph)	2.81/4.4
Swing speed		rpm	10.08
Gradeability		Degree (%)	35
Ground pressure		kgf/cm^2 (psi)	0.34 (4.79)
Max traction force		kg (lb)	4650 (10250)

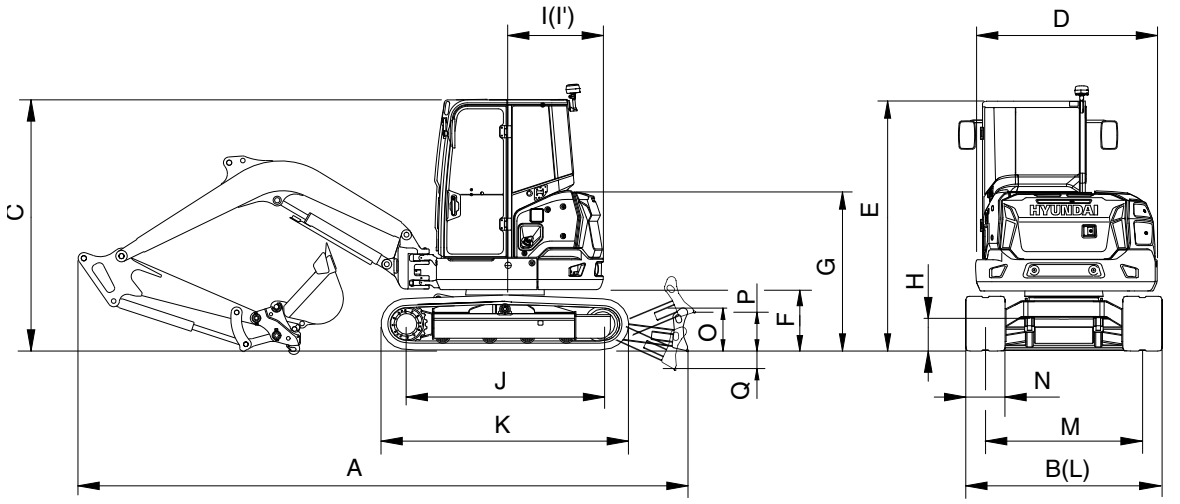
(2) 2.8 m (9' 2") boom, 1.4 m (4' 7") thumb bracket arm, with quick coupler (North america standard)



48AZ2SP03

Description		Unit	Specification
Operating weight		kg (lb)	5080 (11200)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.15 (0.18)
Overall length	A	mm (ft-in)	5493 (18' 0")
Overall width, with 300 mm shoe	B		2000 (6' 7")
Overall width, with dozer	-		2000 (6' 7")
Overall height	C		2580 (8' 6")
Overall width of upper structure	D		1850 (6' 1")
Overall height of cab	E		2580 (8' 6")
Ground clearance of counterweight	F		608 (2' 0")
Overall height of engine hood	G		1605 (5' 3")
Minimum ground clearance	H		215 (0' 8")
Rear-end distance	I		1000 (3' 3")
Rear-end swing radius	I'		1000 (3' 3")
Distance between tumblers	J		2000 (6' 7")
Undercarriage length (without grouser)	K		2214 (7' 3")
Undercarriage width	L		2000 (6' 7")
Track gauge	M		1600 (5' 3")
Track shoe width, standard	N		400 (1' 4")
Height of blade	O		350 (1' 2")
Ground clearance of blade up	P		410 (1' 4")
Depth of blade down	Q		580 (1' 11")
Travel speed (low/high)		km/hr (mph)	2.81/4.4
Swing speed		rpm	10.08
Gradeability		Degree (%)	35
Ground pressure		kgf/cm^2 (psi)	0.34 (4.84)
Max traction force		kg (lb)	4650 (10250)

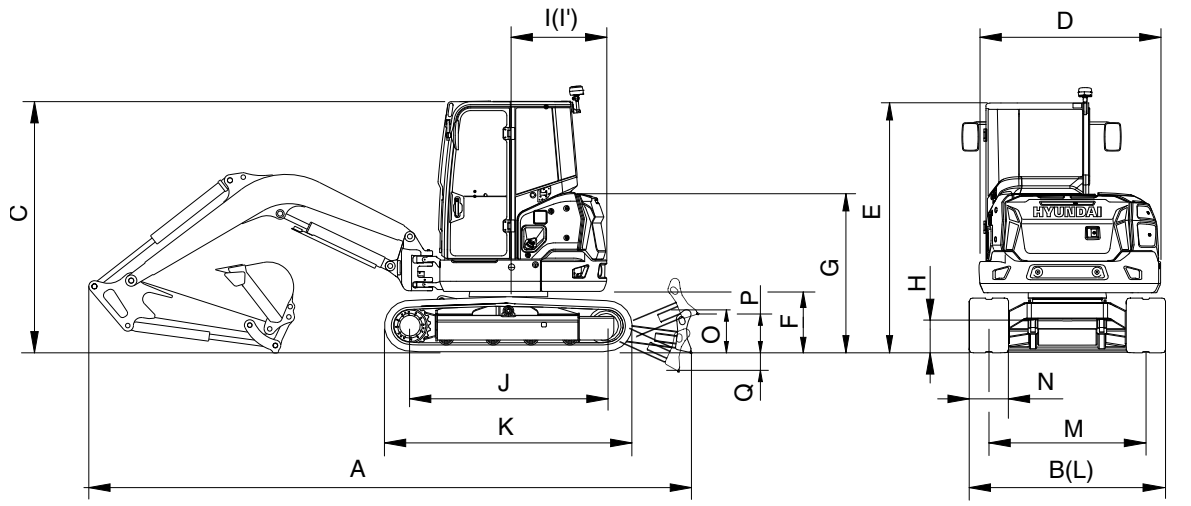
(3) 2.8 m (9' 2") boom, 1.4 m (4' 7") thumb bracket arm, with quick coupler, add counterweight, angle dozer (North america heavy type)



48AZ2SP03

Description		Unit	Specification
Operating weight		kg (lb)	5400 (11900)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.15 (0.18)
Overall length	A	mm (ft-in)	5493 (18' 0")
Overall width, with 300 mm shoe	B		2000 (6' 7")
Overall width, with dozer	-		2000 (6' 7")
Overall height	C		2580 (8' 6")
Overall width of upper structure	D		1850 (6' 1")
Overall height of cab	E		2580 (8' 6")
Ground clearance of counterweight	F		608 (2' 0")
Overall height of engine hood	G		1605 (5' 3")
Minimum ground clearance	H		225 (0' 9")
Rear-end distance	I		1075 (3' 6")
Rear-end swing radius	I'		1075 (3' 6")
Distance between tumblers	J		2000 (6' 7")
Undercarriage length (without grouser)	K		2214 (7' 3")
Undercarriage width	L		2000 (6' 7")
Track gauge	M		1600 (5' 3")
Track shoe width, standard	N		400 (1' 4")
Height of blade	O		400 (1' 4")
Ground clearance of blade up	P		485 (1' 7")
Depth of blade down	Q		670 (2' 2")
Travel speed (low/high)		km/hr (mph)	2.81/4.4
Swing speed		rpm	10.08
Gradeability		Degree (%)	35
Ground pressure		kgf/cm^2 (psi)	0.36 (5.15)
Max traction force		kg (lb)	4650 (10250)

(4) 2.8 m (9' 2") boom, 1.4 m (4' 7") arm, add counterweight, without quick coupler (Europe heavy type)

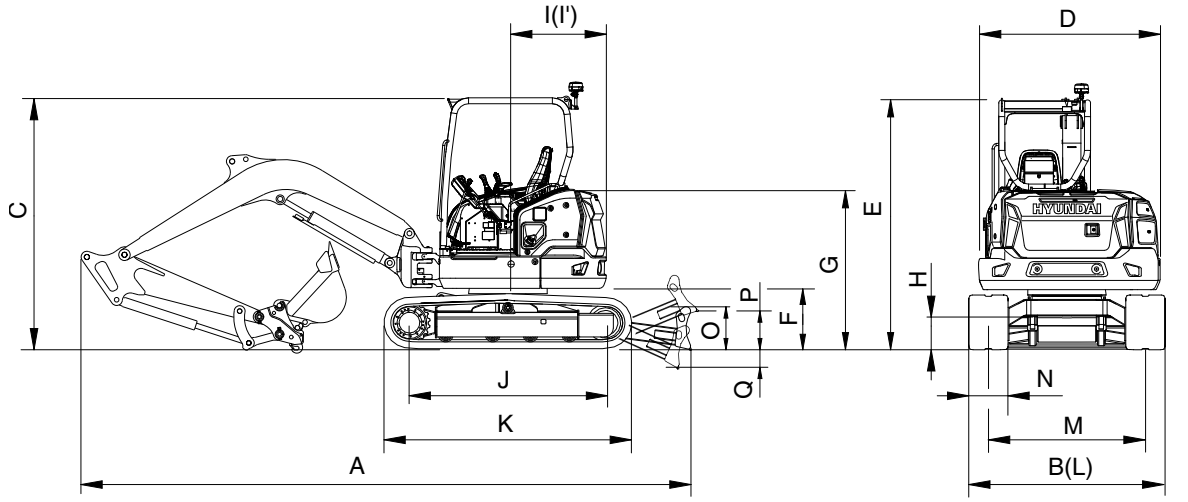


48AZ2SP02

Description		Unit	Specification
Operating weight		kg (lb)	5210 (11490)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.15 (0.18)
Overall length	A	mm (ft-in)	5493 (18' 0")
Overall width, with 300 mm shoe	B		2000 (6' 7")
Overall width, with dozer	-		2000 (6' 7")
Overall height	C		2580 (8' 6")
Overall width of upper structure	D		1850 (6' 1")
Overall height of cab	E		2580 (8' 6")
Ground clearance of counterweight	F		608 (2' 0")
Overall height of engine hood	G		1605 (5' 3")
Minimum ground clearance	H		215 (0' 8")
Rear-end distance	I		1075 (3' 6")
Rear-end swing radius	I'		1075 (3' 6")
Distance between tumblers	J		2000 (6' 7")
Undercarriage length (without grouser)	K		2214 (7' 3")
Undercarriage width	L		2000 (6' 7")
Track gauge	M		1600 (5' 3")
Track shoe width, standard	N		400 (1' 4")
Height of blade	O		350 (1' 2")
Ground clearance of blade up	P		410 (1' 4")
Depth of blade down	Q		580 (1' 11")
Travel speed (low/high)		km/hr (mph)	2.81/4.4
Swing speed		rpm	10.08
Gradeability		Degree (%)	35
Ground pressure		kgf/cm^2 (psi)	0.35 (4.96)
Max traction force		kg (lb)	4650 (10250)

2) CANOPY TYPE

(1) 2.8 m (9' 2") boom, 1.4 m (4' 7") thumb bracket arm, with quick coupler (North america canopy type)

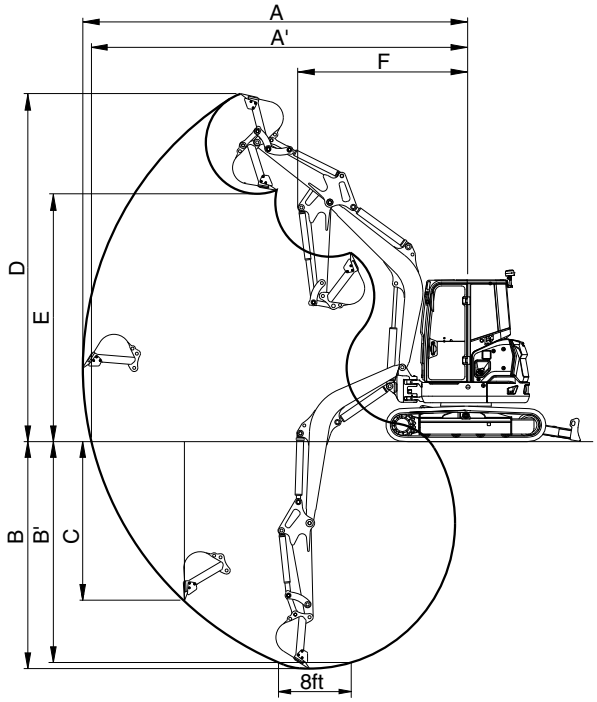


48AZ2SP05

Description		Unit	Specification
Operating weight		kg (lb)	4915 (10840)
Bucket capacity (SAE heaped), standard		m3 (yd3)	0.15 (0.18)
Overall length	A	mm (ft-in)	5493 (18' 0")
Overall width, with 300 mm shoe	B		2000 (6' 7")
Overall width, with dozer	-		2000 (6' 7")
Overall height	C		2565 (8' 5")
Overall width of upper structure	D		1850 (6' 1")
Overall height of cab	E		2565 (8' 5")
Ground clearance of counterweight	F		608 (2' 0")
Overall height of engine hood	G		1605 (5' 3")
Minimum ground clearance	H		215 (0' 8")
Rear-end distance	I		1000 (3' 3")
Rear-end swing radius	I'		1000 (3' 3")
Distance between tumblers	J		2000 (6' 7")
Undercarriage length (without grouser)	K		2214 (7' 3")
Undercarriage width	L		2000 (6' 7")
Track gauge	M		1600 (5' 3")
Track shoe width, standard	N		400 (1' 4")
Height of blade	O		350 (1' 2")
Ground clearance of blade up	P		410 (1' 4")
Depth of blade down	Q		580 (1' 11")
Travel speed (low/high)		km/hr (mph)	2.81/4.4
Swing speed		rpm	10.08
Gradeability		Degree (%)	35
Ground pressure		kgf/cm^2 (psi)	0.33 (4.69)
Max traction force		kg (lb)	4650 (10250)

3. WORKING RANGE

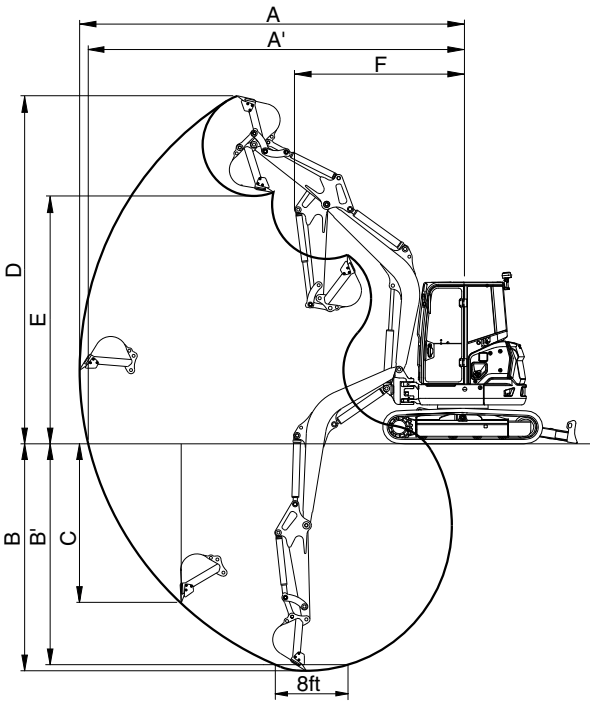
1) 2.8 m (9' 2") BOOM, WITHOUT QUICK COUPLER



48AZ2SP10

Description		Unit	1.4 m (4' 7") Arm
Max digging reach	A	mm (ft-in)	5990 (19' 8")
Max digging reach on ground	A'		5850 (19' 2")
Max digging depth	B		3500 (11' 6")
Max digging depth (8ft level)	B'		3095 (10' 2")
Max vertical wall digging depth	C		2650 (8' 8")
Max digging height	D		5570 (18' 3")
Max dumping height	E		3860 (12' 8")
Min swing radius	F		2540 (8' 4")
Boom swing radius (left/right)		degree	70°/60°
Bucket digging force	SAE	kN	33
		kgf	3370
		lbf	7430
	ISO	kN	37
		kgf	3814
		lbf	8409
Arm crowd force	SAE	kN	23
		kgf	2357
		lbf	5196
	ISO	kN	24
		kgf	2431
		lbf	5359

2) 2.8 m (9' 2") BOOM, WITH QUICK COUPLER



48AZ2SP10

Description		Unit	1.4 m (4' 7") Arm
Max digging reach	A	mm (ft-in)	6110 (20' 1")
Max digging reach on ground	A'		5970 (19' 7")
Max digging depth	B		3620 (11' 11")
Max digging depth (8ft level)	B'		3240 (10' 8")
Max vertical wall digging depth	C		1790 (5' 10")
Max digging height	D		5670 (18' 7")
Max dumping height	E		3740 (12' 3")
Min swing radius	F		2540 (8' 4")
Boom swing radius (left/right)		degree	70°/60°
Bucket digging force	SAE	kN	30
		kgf	3082
		lbf	6794
	ISO	kN	33
		kgf	3330
		lbf	7342
Arm crowd force	SAE	kN	22
		kgf	2225
		lbf	4906
	ISO	kN	22
		kgf	2267
		lbf	4998

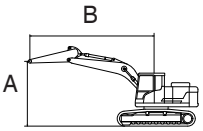
4. WEIGHT

Item	kg	lb
Upperstructure assembly		
· Main frame weld assembly	635	1400
· Engine assembly (including DFP)	209	461
· Main pump assembly	25	54
· Main control valve assembly	55	121
· Swing motor assembly	46	101
· Hydraulic oil tank wa	74	163
· Fuel tank wa	12	26
· Counterweight	300	661
· Counterweight-add	450	992
· Cab assembly	455	1003
Lower chassis assembly		
· Track frame weld assembly	565	1246
· Dozer blade assembly	225	496
· Angle dozer blade assembly	94	207
· Swing bearing	47	104
· Travel motor assembly	160	353
· Turning joint	26	57
· Sprocket	28	61
· Track recoil spring	48	106
· Idler	87	193
· Upper roller	11	24
· Lower roller	99	217
· Track-chain assembly-steel	630	1389
· Track-chain assembly-rubber	456	1005
Front attachment assembly		
· Boom assembly-2.8 m	186	410
· Arm assembly-1.4 m	89	196
· Arm assembly-1.4 m, thumb	92	203
· Bucket assembly	136	299
· Boom cylinder assembly	49	108
· Arm cylinder assembly	43	95
· Bucket cylinder assembly	32	71
· Cylinder assy-dozer	37	81
· Bucket control linkage total	35	76

5. LIFTING CAPACITIES

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	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)
4.0 m (13.1 ft)	kg									*1120	900	3.97
	lb									*2470	1980	(13.0)
3.0 m (9.8 ft)	kg					*1080	890			*1090	690	4.68
	lb					*2380	1960			*2400	1520	(15.4)
2.0 m (6.6 ft)	kg			*1680	1340	*1250	860	*1110	610	*1070	600	5.03
	lb			*3700	2950	*2760	1900	*2450	1340	*2360	1320	(16.5)
1.0 m (3.3 ft)	kg			*2260	1250	*1470	820	*1170	590	*1130	570	5.12
	lb			*4980	2760	*3240	1810	*2580	1300	*2490	1260	(16.8)
0.0 m (0.0 ft)	kg			*2440	1210	*1590	800			*1180	590	4.95
	lb			*5380	2670	*3510	1760			*2600	1300	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1210	*1520	800			*1210	680	4.51
	lb	*5250	*5250	*5000	2670	*3350	1760			*2670	1500	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2480	*1710	1240					*1180	940	3.65
	lb	*6060	5470	*3770	2730					*2600	2070	(12.0)

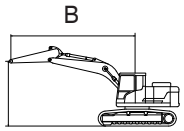
Note 1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the HX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *indicates load limited 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 with your local HD Hyundai Construction Equipment dealer regarding the lifting capacities for specific work tools and attachments.
Please be aware of the local regulations and instructions for lifting operations.

⚠ Failure to comply to the rated load can cause possible serious injury, death, 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	
HX48A Z	Cab	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	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)
4.0 m (13.1 ft)	kg									970	820	3.97
	lb									2140	1810	(13.0)
3.0 m (9.8 ft)	kg					960	820			730	620	4.68
	lb					2120	1810			1610	1370	(15.4)
2.0 m (6.6 ft)	kg			1450	1220	920	780	650	550	640	550	5.03
	lb			3200	2690	2030	1720	1430	1210	1410	1210	(16.5)
1.0 m (3.3 ft)	kg			1360	1120	890	750	640	540	610	520	5.12
	lb			3000	2470	1960	1650	1410	1190	1340	1150	(16.8)
0.0 m (0.0 ft)	kg			1320	1090	860	720			640	540	4.95
	lb			2910	2400	1900	1590			1410	1190	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2140	1320	1090	860	720			730	620	4.51
	lb	*5250	4720	2910	2400	1900	1590			1610	1370	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2190	1350	1120					1010	850	3.65
	lb	*6060	4830	2980	2470					2230	1870	(12.0)

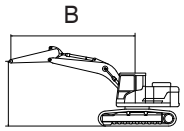
Note 1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the HX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *indicates load limited 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 with your local HD Hyundai Construction Equipment dealer regarding the lifting capacities for specific work tools and attachments.
Please be aware of the local regulations and instructions for lifting operations.

⚠ Failure to comply to the rated load can cause possible serious injury, death, 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	
HX48A Z	Cab	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	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)
4.0 m (13.1 ft)	kg									*1120	970	3.97
	lb									*2470	2140	(13.0)
3.0 m (9.8 ft)	kg					*1080	960			*1090	740	4.68
	lb					*2380	2120			*2400	1630	(15.4)
2.0 m (6.6 ft)	kg			*1680	1440	*1250	930	*1110	660	*1070	650	5.03
	lb			*3700	3170	*2760	2050	*2450	1460	*2360	1430	(16.5)
1.0 m (3.3 ft)	kg			*2260	1350	*1470	890	*1170	650	*1130	620	5.12
	lb			*4980	2980	*3240	1960	*2580	1430	*2490	1370	(16.8)
0.0 m (0.0 ft)	kg			*2440	1310	*1590	870			*1180	650	4.95
	lb			*5380	2890	*3510	1920			*2600	1430	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1310	*1520	870			*1210	740	4.51
	lb	*5250	*5250	*5000	2890	*3350	1920			*2670	1630	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2670	*1710	1340					*1180	1010	3.65
	lb	*6060	5890	*3770	2950					*2600	2230	(12.0)

Note 1. Lifting capacity are based on ISO 10567.
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4. *indicates load limited by hydraulic capacity.

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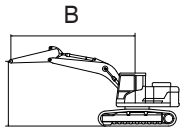
Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Up	-	-

· : 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)
4.0 m (13.1 ft)	kg									1040	890	3.97
	lb									2290	1960	(13.0)
3.0 m (9.8 ft)	kg					1030	880			790	680	4.68
	lb					2270	1940			1740	1500	(15.4)
2.0 m (6.6 ft)	kg			1560	1310	1000	850	700	600	700	590	5.03
	lb			3440	2890	2200	1870	1540	1320	1540	1300	(16.5)
1.0 m (3.3 ft)	kg			1470	1220	960	810	690	590	670	570	5.12
	lb			3240	2690	2120	1790	1520	1300	1480	1260	(16.8)
0.0 m (0.0 ft)	kg			1430	1180	930	790			690	590	4.95
	lb			3150	2600	2050	1740			1520	1300	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2320	1430	1180	930	790			790	670	4.51
	lb	*5250	5110	3150	2600	2050	1740			1740	1480	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2370	1460	1210					1090	920	3.65
	lb	*6060	5220	3220	2670					2400	2030	(12.0)

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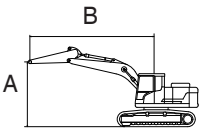
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	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)
4.0 m (13.1 ft)	kg									*1120	930	3.97
	lb									*2470	2050	(13.0)
3.0 m (9.8 ft)	kg					*1080	920			*1090	710	4.68
	lb					*2380	2030			*2400	1570	(15.4)
2.0 m (6.6 ft)	kg			*1680	1380	*1250	890	*1110	630	*1070	620	5.03
	lb			*3700	3040	*2760	1960	*2450	1390	*2360	1370	(16.5)
1.0 m (3.3 ft)	kg			*2260	1290	*1470	850	*1170	620	*1130	600	5.12
	lb			*4980	2840	*3240	1870	*2580	1370	*2490	1320	(16.8)
0.0 m (0.0 ft)	kg			*2440	1250	*1590	830			*1180	620	4.95
	lb			*5380	2760	*3510	1830			*2600	1370	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1250	*1520	830			*1210	700	4.51
	lb	*5250	*5250	*5000	2760	*3350	1830			*2670	1540	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2550	*1710	1280					*1180	970	3.65
	lb	*6060	5620	*3770	2820					*2600	2140	(12.0)

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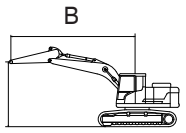
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	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)
4.0 m (13.1 ft)	kg									940	850	3.97
	lb									2070	1870	(13.0)
3.0 m (9.8 ft)	kg					930	850			710	650	4.68
	lb					2050	1870			1570	1430	(15.4)
2.0 m (6.6 ft)	kg			1420	1260	900	820	630	570	620	570	5.03
	lb			3130	2780	1980	1810	1390	1260	1370	1260	(16.5)
1.0 m (3.3 ft)	kg			1320	1170	860	780	620	560	600	540	5.12
	lb			2910	2580	1900	1720	1370	1230	1320	1190	(16.8)
0.0 m (0.0 ft)	kg			1280	1130	830	750			620	560	4.95
	lb			2820	2490	1830	1650			1370	1230	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2230	1280	1130	830	750			710	640	4.51
	lb	*5250	4920	2820	2490	1830	1650			1570	1410	(14.8)
-2.0 m (-6.6 ft)	kg	2730	2280	1310	1160					980	880	3.65
	lb	6020	5030	2890	2560					2160	1940	(12.0)

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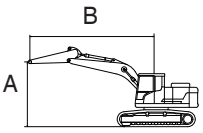
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	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)
4.0 m (13.1 ft)	kg									*1120	1000	3.97
	lb									*2470	2200	(13.0)
3.0 m (9.8 ft)	kg					*1080	990			*1090	760	4.68
	lb					*2380	2180			*2400	1680	(15.4)
2.0 m (6.6 ft)	kg			*1680	1480	*1250	960	*1110	680	*1070	670	5.03
	lb			*3700	3260	*2760	2120	*2450	1500	*2360	1480	(16.5)
1.0 m (3.3 ft)	kg			*2260	1390	*1470	920	*1170	670	*1130	650	5.12
	lb			*4980	3060	*3240	2030	*2580	1480	*2490	1430	(16.8)
0.0 m (0.0 ft)	kg			*2440	1350	*1590	900			*1180	670	4.95
	lb			*5380	2980	*3510	1980			*2600	1480	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1350	*1520	890			*1210	760	4.51
	lb	*5250	*5250	*5000	2980	*3350	1960			*2670	1680	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2740	*1710	1380					*1180	1050	3.65
	lb	*6060	6040	*3770	3040					*2600	2310	(12.0)

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ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Up	-	-

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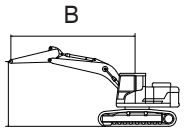

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									1010	920	3.97
	lb									2230	2030	(13.0)
3.0 m (9.8 ft)	kg					1000	910			770	700	4.68
	lb					2200	2010			1700	1540	(15.4)
2.0 m (6.6 ft)	kg			1530	1360	970	880	680	620	680	620	5.03
	lb			3370	3000	2140	1940	1500	1370	1500	1370	(16.5)
1.0 m (3.3 ft)	kg			1430	1270	930	840	670	610	650	590	5.12
	lb			3150	2800	2050	1850	1480	1340	1430	1300	(16.8)
0.0 m (0.0 ft)	kg			1390	1230	910	820			670	610	4.95
	lb			3060	2710	2010	1810			1480	1340	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	1390	1230	910	820			770	700	4.51
	lb	*5250	*5250	3060	2710	2010	1810			1700	1540	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2460	1420	1260					1060	960	3.65
	lb	*6060	5420	3130	2780					2340	2120	(12.0)

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	Down	-	-

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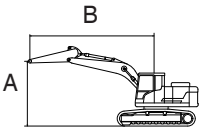

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									*1120	860	3.97
	lb									*2470	1900	(13.0)
3.0 m (9.8 ft)	kg					*1080	850			*1090	650	4.68
	lb					*2380	1870			*2400	1430	(15.4)
2.0 m (6.6 ft)	kg			*1680	1280	*1250	820	*1110	580	*1070	570	5.03
	lb			*3700	2820	*2760	1810	*2450	1280	*2360	1260	(16.5)
1.0 m (3.3 ft)	kg			*2260	1190	*1470	780	*1170	560	*1130	540	5.12
	lb			*4980	2620	*3240	1720	*2580	1230	*2490	1190	(16.8)
0.0 m (0.0 ft)	kg			*2440	1150	*1590	760			*1180	560	4.95
	lb			*5380	2540	*3510	1680			*2600	1230	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2310	*2270	1150	*1520	760			*1210	640	4.51
	lb	*5250	*5090	*5000	2540	*3350	1680			*2670	1410	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2360	*1710	1180					*1180	890	3.65
	lb	*6060	5200	*3770	2600					*2600	1960	(12.0)

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HX48A Z	Cab	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
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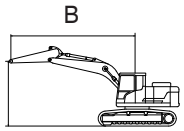

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									940	780	3.97
	lb									2070	1720	(13.0)
3.0 m (9.8 ft)	kg					930	780			710	590	4.68
	lb					2050	1720			1570	1300	(15.4)
2.0 m (6.6 ft)	kg			1410	1160	900	750	630	520	620	520	5.03
	lb			3110	2560	1980	1650	1390	1150	1370	1150	(16.5)
1.0 m (3.3 ft)	kg			1320	1070	860	710	610	510	590	490	5.12
	lb			2910	2360	1900	1570	1340	1120	1300	1080	(16.8)
0.0 m (0.0 ft)	kg			1280	1030	830	690			610	510	4.95
	lb			2820	2270	1830	1520			1340	1120	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2040	1280	1030	830	680			700	580	4.51
	lb	*5250	4500	2820	2270	1830	1500			1540	1280	(14.8)
-2.0 m (-6.6 ft)	kg	2730	2090	1310	1060					980	810	3.65
	lb	6020	4610	2890	2340					2160	1790	(12.0)

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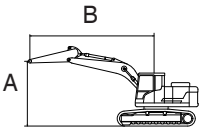
Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Down	-	-

· : 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)
4.0 m (13.1 ft)	kg									*1120	930	3.97
	lb									*2470	2050	(13.0)
3.0 m (9.8 ft)	kg					*1080	920			*1090	710	4.68
	lb					*2380	2030			*2400	1570	(15.4)
2.0 m (6.6 ft)	kg			*1680	1380	*1250	890	*1110	630	*1070	620	5.03
	lb			*3700	3040	*2760	1960	*2450	1390	*2360	1370	(16.5)
1.0 m (3.3 ft)	kg			*2260	1290	*1470	850	*1170	620	*1130	590	5.12
	lb			*4980	2840	*3240	1870	*2580	1370	*2490	1300	(16.8)
0.0 m (0.0 ft)	kg			*2440	1250	*1590	830			*1180	620	4.95
	lb			*5380	2760	*3510	1830			*2600	1370	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1250	*1520	820			*1210	700	4.51
	lb	*5250	5250	*5000	2760	*3350	1810			*2670	1540	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2550	*1710	1280					*1180	970	3.65
	lb	*6060	5620	*3770	2820					*2600	2140	(12.0)

Note 1. Lifting capacity are based on ISO 10567.
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4. *indicates load limited by hydraulic capacity.

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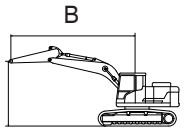
Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Up	-	-

· : 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)
4.0 m (13.1 ft)	kg									1010	850	3.97
	lb									2230	1870	(13.0)
3.0 m (9.8 ft)	kg					1000	840			770	650	4.68
	lb					2200	1850			1700	1430	(15.4)
2.0 m (6.6 ft)	kg			1520	1250	970	810	680	570	670	570	5.03
	lb			3350	2760	2140	1790	1500	1260	1480	1260	(16.5)
1.0 m (3.3 ft)	kg			1430	1160	930	770	670	560	650	540	5.12
	lb			3150	2560	2050	1700	1480	1230	1430	1190	(16.8)
0.0 m (0.0 ft)	kg			1390	1130	900	750			670	560	4.95
	lb			3060	2490	1980	1650			1480	1230	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2210	1390	1130	900	750			770	640	4.51
	lb	*5250	4870	3060	2490	1980	1650			1700	1410	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2260	1420	1160					1060	880	3.65
	lb	*6060	4980	3130	2560					2340	1940	(12.0)

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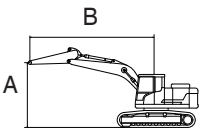
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	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)
4.0 m (13.1 ft)	kg									*1120	890	3.97
	lb									*2470	1960	(13.0)
3.0 m (9.8 ft)	kg					*1080	880			*1090	680	4.68
	lb					*2380	1940			*2400	1500	(15.4)
2.0 m (6.6 ft)	kg			*1680	1320	*1250	850	*1110	600	*1070	590	5.03
	lb			*3700	2910	*2760	1870	*2450	1320	*2360	1300	(16.5)
1.0 m (3.3 ft)	kg			*2260	1230	*1470	810	*1170	590	*1130	570	5.12
	lb			*4980	2710	*3240	1790	*2580	1300	*2490	1260	(16.8)
0.0 m (0.0 ft)	kg			*2440	1190	*1590	790			*1180	590	4.95
	lb			*5380	2620	*3510	1740			*2600	1300	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1190	*1520	780			*1210	670	4.51
	lb	*5250	*5250	*5000	2620	*3350	1720			*2670	1480	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2440	*1710	1220					*1180	920	3.65
	lb	*6060	5380	*3770	2690					*2600	2030	(12.0)

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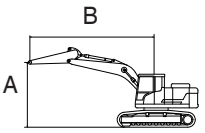
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	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)
4.0 m (13.1 ft)	kg									910	810	3.97
	lb									2010	1790	(13.0)
3.0 m (9.8 ft)	kg					900	810			690	620	4.68
	lb					1980	1790			1520	1370	(15.4)
2.0 m (6.6 ft)	kg			1370	1200	870	780	610	550	600	540	5.03
	lb			3020	2650	1920	1720	1340	1210	1320	1190	(16.5)
1.0 m (3.3 ft)	kg			1280	1110	830	740	590	530	570	520	5.12
	lb			2820	2450	1830	1630	1300	1170	1260	1150	(16.8)
0.0 m (0.0 ft)	kg			1240	1080	810	720			590	530	4.95
	lb			2730	2380	1790	1590			1300	1170	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2120	1240	1080	800	710			680	610	4.51
	lb	*5250	4670	2730	2380	1760	1570			1500	1340	(14.8)
-2.0 m (-6.6 ft)	kg	2660	2170	1270	1110					950	840	3.65
	lb	5860	4780	2800	2450					2090	1850	(12.0)

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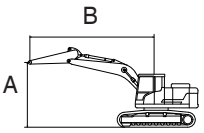
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	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)
4.0 m (13.1 ft)	kg									*1120	960	3.97
	lb									*2470	2120	(13.0)
3.0 m (9.8 ft)	kg					*1080	950			*1090	730	4.68
	lb					*2380	2090			*2400	1610	(15.4)
2.0 m (6.6 ft)	kg			*1680	1420	*1250	920	*1110	650	*1070	640	5.03
	lb			*3700	3130	*2760	2030	*2450	1430	*2360	1410	(16.5)
1.0 m (3.3 ft)	kg			*2260	1330	*1470	880	*1170	640	*1130	620	5.12
	lb			*4980	2930	*3240	1940	*2580	1410	*2490	1370	(16.8)
0.0 m (0.0 ft)	kg			*2440	1290	*1590	860			*1180	640	4.95
	lb			*5380	2840	*3510	1900			*2600	1410	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1290	*1520	850			*1210	730	4.51
	lb	*5250	*5250	*5000	2840	*3350	1870			*2670	1610	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2630	*1710	1320					*1180	1000	3.65
	lb	*6060	5800	*3770	2910					*2600	2200	(12.0)

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ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Cab	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Up	-	-

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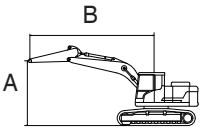

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									980	880	3.97
	lb									2160	1940	(13.0)
3.0 m (9.8 ft)	kg					980	870			750	670	4.68
	lb					2160	1920			1650	1480	(15.4)
2.0 m (6.6 ft)	kg			1490	1300	940	840	660	590	650	590	5.03
	lb			3280	2870	2070	1850	1460	1300	1430	1300	(16.5)
1.0 m (3.3 ft)	kg			1390	1210	900	810	650	580	630	560	5.12
	lb			3060	2670	1980	1790	1430	1280	1390	1230	(16.8)
0.0 m (0.0 ft)	kg			1350	1170	880	780			650	580	4.95
	lb			2980	2580	1940	1720			1430	1280	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2300	1350	1170	880	780			740	660	4.51
	lb	*5250	5070	2980	2580	1940	1720			1630	1460	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2350	1380	1200					1030	910	3.65
	lb	*6060	5180	3040	2650					2270	2010	(12.0)

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	Down	-	-

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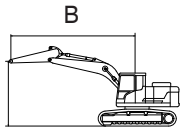

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									*1120	870	3.97
	lb									*2470	1920	(13.0)
3.0 m (9.8 ft)	kg					*1080	860			*1090	660	4.68
	lb					*2380	1900			*2400	1460	(15.4)
2.0 m (6.6 ft)	kg			*1680	1300	*1250	830	*1110	580	*1070	580	5.03
	lb			*3700	2870	*2760	1830	*2450	1280	*2360	1280	(16.5)
1.0 m (3.3 ft)	kg			*2260	1200	*1470	790	*1170	570	*1130	550	5.12
	lb			*4980	2650	*3240	1740	*2580	1260	*2490	1210	(16.8)
0.0 m (0.0 ft)	kg			*2440	1170	*1590	770			*1180	570	4.95
	lb			*5380	2580	*3510	1700			*2600	1260	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2340	*2270	1170	*1520	770			*1210	650	4.51
	lb	*5250	5160	*5000	2580	*3350	1700			*2670	1430	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2390	*1710	1200					*1180	900	3.65
	lb	*6060	5270	*3770	2650					*2600	1980	(12.0)

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
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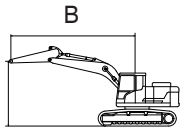

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									930	790	3.97
	lb									2050	1740	(13.0)
3.0 m (9.8 ft)	kg					920	790			700	600	4.68
	lb					2030	1740			1540	1320	(15.4)
2.0 m (6.6 ft)	kg			1400	1180	890	760	620	530	620	520	5.03
	lb			3090	2600	1960	1680	1370	1170	1370	1150	(16.5)
1.0 m (3.3 ft)	kg			1310	1080	850	720	610	520	590	500	5.12
	lb			2890	2380	1870	1590	1340	1150	1300	1100	(16.8)
0.0 m (0.0 ft)	kg			1270	1050	830	700			610	520	4.95
	lb			2800	2310	1830	1540			1340	1150	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2070	1270	1050	820	690			700	590	4.51
	lb	*5250	4560	2800	2310	1810	1520			1540	1300	(14.8)
-2.0 m (-6.6 ft)	kg	2700	2120	1300	1080					970	820	3.65
	lb	5950	4670	2870	2380					2140	1810	(12.0)

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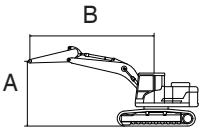
Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Down	-	-

· : 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)
4.0 m (13.1 ft)	kg									*1120	940	3.97
	lb									*2470	2070	(13.0)
3.0 m (9.8 ft)	kg					*1080	930			*1090	720	4.68
	lb					*2380	2050			*2400	1590	(15.4)
2.0 m (6.6 ft)	kg			*1680	1400	*1250	900	*1110	640	*1070	630	5.03
	lb			*3700	3090	*2760	1980	*2450	1410	*2360	1390	(16.5)
1.0 m (3.3 ft)	kg			*2260	1300	*1470	860	*1170	620	*1130	600	5.12
	lb			*4980	2870	*3240	1900	*2580	1370	*2490	1320	(16.8)
0.0 m (0.0 ft)	kg			*2440	1270	*1590	840			*1180	620	4.95
	lb			*5380	2800	*3510	1850			*2600	1370	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1270	*1520	840			*1210	710	4.51
	lb	*5250	*5250	*5000	2800	*3350	1850			*2670	1570	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2590	*1710	1300					*1180	980	3.65
	lb	*6060	5710	*3770	2870					*2600	2160	(12.0)

Note 1. Lifting capacity are based on ISO 10567.
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4. *indicates load limited by hydraulic capacity.

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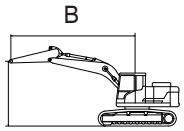
Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Up	-	-

· : 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)
4.0 m (13.1 ft)	kg									1000	860	3.97
	lb									2200	1900	(13.0)
3.0 m (9.8 ft)	kg					1000	850			760	650	4.68
	lb					2200	1870			1680	1430	(15.4)
2.0 m (6.6 ft)	kg			1510	1270	960	820	680	580	670	570	5.03
	lb			3330	2800	2120	1810	1500	1280	1480	1260	(16.5)
1.0 m (3.3 ft)	kg			1420	1180	930	790	670	570	640	550	5.12
	lb			3130	2600	2050	1740	1480	1260	1410	1210	(16.8)
0.0 m (0.0 ft)	kg			1380	1140	900	760			670	570	4.95
	lb			3040	2510	1980	1680			1480	1260	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2250	1380	1140	900	760			760	650	4.51
	lb	*5250	4960	3040	2510	1980	1680			1680	1430	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2300	1410	1170					1050	890	3.65
	lb	*6060	5070	3110	2580					2310	1960	(12.0)

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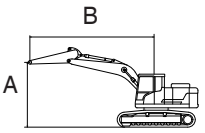
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	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)
4.0 m (13.1 ft)	kg									*1120	900	3.97
	lb									*2470	1980	(13.0)
3.0 m (9.8 ft)	kg					*1080	890			*1090	680	4.68
	lb					*2380	1960			*2400	1500	(15.4)
2.0 m (6.6 ft)	kg			*1680	1340	*1250	860	*1110	610	*1070	600	5.03
	lb			*3700	2950	*2760	1900	*2450	1340	*2360	1320	(16.5)
1.0 m (3.3 ft)	kg			*2260	1240	*1470	820	*1170	590	*1130	570	5.12
	lb			*4980	2730	*3240	1810	*2580	1300	*2490	1260	(16.8)
0.0 m (0.0 ft)	kg			*2440	1210	*1590	800			*1180	590	4.95
	lb			*5380	2670	*3510	1760			*2600	1300	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1210	*1520	800			*1210	680	4.51
	lb	*5250	*5250	*5000	2670	*3350	1760			*2670	1500	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2470	*1710	1240					*1180	940	3.65
	lb	*6060	5450	*3770	2730					*2600	2070	(12.0)

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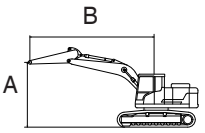
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	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)
4.0 m (13.1 ft)	kg									900	830	3.97
	lb									1980	1830	(13.0)
3.0 m (9.8 ft)	kg					900	820			680	630	4.68
	lb					1980	1810			1500	1390	(15.4)
2.0 m (6.6 ft)	kg			1360	1220	860	790	600	550	600	550	5.03
	lb			3000	2690	1900	1740	1320	1210	1320	1210	(16.5)
1.0 m (3.3 ft)	kg			1270	1130	830	750	590	540	570	520	5.12
	lb			2800	2490	1830	1650	1300	1190	1260	1150	(16.8)
0.0 m (0.0 ft)	kg			1230	1090	800	730			590	540	4.95
	lb			2710	2400	1760	1610			1300	1190	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2150	1230	1090	800	720			680	620	4.51
	lb	*5250	4740	2710	2400	1760	1590			1500	1370	(14.8)
-2.0 m (-6.6 ft)	kg	2630	2200	1260	1120					940	850	3.65
	lb	5800	4850	2780	2470					2070	1870	(12.0)

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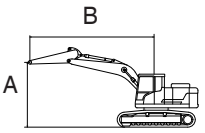
ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	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)
4.0 m (13.1 ft)	kg									*1120	970	3.97
	lb									*2470	2140	(13.0)
3.0 m (9.8 ft)	kg					*1080	960			*1090	740	4.68
	lb					*2380	2120			*2400	1630	(15.4)
2.0 m (6.6 ft)	kg			*1680	1440	*1250	930	*1110	660	*1070	650	5.03
	lb			*3700	3170	*2760	2050	*2450	1460	*2360	1430	(16.5)
1.0 m (3.3 ft)	kg			*2260	1340	*1470	890	*1170	640	*1130	620	5.12
	lb			*4980	2950	*3240	1960	*2580	1410	*2490	1430	(16.8)
0.0 m (0.0 ft)	kg			*2440	1310	*1590	870			*1180	650	4.95
	lb			*5380	2890	*3510	1920			*2600	1430	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1310	*1520	860			*1210	740	4.51
	lb	*5250	*5250	*5000	2890	*3350	1900			*2670	1630	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2660	*1710	1340					*1180	1010	3.65
	lb	*6060	5860	*3770	2950					*2600	2230	(12.0)

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ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Steel Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Up	-	-

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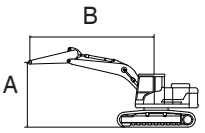

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									980	890	3.97
	lb									2160	1960	(13.0)
3.0 m (9.8 ft)	kg					970	880			740	680	4.68
	lb					2140	1940			1630	1500	(15.4)
2.0 m (6.6 ft)	kg			1470	1320	940	850	660	600	650	600	5.03
	lb			3240	2910	2070	1870	1460	1320	1430	1320	(16.5)
1.0 m (3.3 ft)	kg			1380	1220	900	820	650	590	620	570	5.12
	lb			3040	2690	1980	1810	1430	1300	1370	1260	(16.8)
0.0 m (0.0 ft)	kg			1340	1190	870	790			650	590	4.95
	lb			2950	2620	1920	1740			1430	1300	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2330	1340	1190	870	790			740	670	4.51
	lb	*5250	5140	2950	2620	1920	1740			1630	1480	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2380	1370	1220					1030	930	3.65
	lb	*6060	5250	3020	2690					2270	2050	(12.0)

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	Down	-	-

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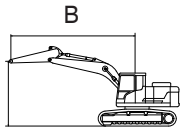

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									*1120	830	3.97
	lb									*2470	1830	(13.0)
3.0 m (9.8 ft)	kg					*1080	820			*1090	630	4.68
	lb					*2380	1810			*2400	1390	(15.4)
2.0 m (6.6 ft)	kg			*1680	1240	*1250	790	*1110	550	*1070	550	5.03
	lb			*3700	2730	*2760	1740	*2450	1210	*2360	1210	(16.5)
1.0 m (3.3 ft)	kg			*2260	1140	*1470	750	*1170	540	*1130	520	5.12
	lb			*4980	2510	*3240	1650	*2580	1190	*2490	1150	(16.8)
0.0 m (0.0 ft)	kg			*2440	1110	*1590	730			*1180	540	4.95
	lb			*5380	2450	*3510	1610			*2600	1190	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2230	*2270	1110	*1520	730			*1210	620	4.51
	lb	*5250	4920	*5000	2450	*3350	1610			*2670	1370	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2280	*1710	1140					*1180	860	3.65
	lb	*6060	5030	*3770	2510					*2600	1900	(12.0)

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Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
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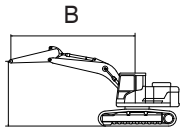

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									900	760	3.97
	lb									1980	1680	(13.0)
3.0 m (9.8 ft)	kg					890	750			680	570	4.68
	lb					1960	1650			1500	1260	(15.4)
2.0 m (6.6 ft)	kg			1360	1120	860	720	600	500	590	500	5.03
	lb			3000	2470	1900	1590	1320	1100	1300	1100	(16.5)
1.0 m (3.3 ft)	kg			1260	1030	820	680	590	490	570	470	5.12
	lb			2780	2270	1810	1500	1300	1080	1260	1040	(16.8)
0.0 m (0.0 ft)	kg			1220	990	800	660			590	490	4.95
	lb			2690	2180	1760	1460			1300	1080	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	1960	1230	990	790	650			670	560	4.51
	lb	*5250	4320	2710	2180	1740	1430			1480	1230	(14.8)
-2.0 m (-6.6 ft)	kg	2630	2010	1260	1020					940	770	3.65
	lb	5800	4430	2780	2250					2070	1700	(12.0)

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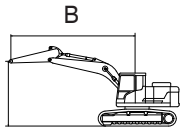
HX48A Z	Canopy	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Down	-	-

· : 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)
4.0 m (13.1 ft)	kg									*1120	900	3.97
	lb									*2470	1980	(13.0)
3.0 m (9.8 ft)	kg					*1080	890			*1090	680	4.68
	lb					*2380	1960			*2400	1500	(15.4)
2.0 m (6.6 ft)	kg			*1680	1340	*1250	860	*1110	600	*1070	600	5.03
	lb			*3700	2950	*2760	1900	*2450	1320	*2360	1320	(16.5)
1.0 m (3.3 ft)	kg			*2260	1240	*1470	820	*1170	590	*1130	570	5.12
	lb			*4980	2730	*3240	1810	*2580	1300	*2490	1260	(16.8)
0.0 m (0.0 ft)	kg			*2440	1210	*1590	800			*1180	590	4.95
	lb			*5380	2670	*3510	1760			*2600	1300	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1210	*1520	790			*1210	680	4.51
	lb	*5250	*5250	*5000	2670	*3350	1740			*2670	1500	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2470	*1710	1240					*1180	930	3.65
	lb	*6060	5450	*3770	2730					*2600	2050	(12.0)

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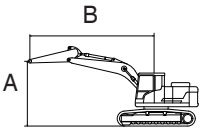
Make adjustments to the rated load as necessary for non-standard configurations.

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	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)
4.0 m (13.1 ft)	kg									980	820	3.97
	lb									2160	1810	(13.0)
3.0 m (9.8 ft)	kg					970	810			740	620	4.68
	lb					2140	1790			1630	1370	(15.4)
2.0 m (6.6 ft)	kg			1470	1210	930	780	650	550	650	540	5.03
	lb			3240	2670	2050	1720	1430	1210	1430	1190	(16.5)
1.0 m (3.3 ft)	kg			1370	1120	900	750	640	540	620	520	5.12
	lb			3020	2470	1980	1650	1410	1190	1370	1150	(16.8)
0.0 m (0.0 ft)	kg			1340	1090	870	720			640	540	4.95
	lb			2950	2400	1920	1590			1410	1190	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2140	1340	1090	870	720			740	610	4.51
	lb	*5250	4720	2950	2400	1920	1590			1630	1340	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2190	1370	1120					1020	850	3.65
	lb	*6060	4830	3020	2470					2250	1870	(12.0)

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ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	Down	-	-

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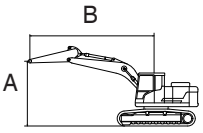

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									*1120	860	3.97
	lb									*2470	1900	(13.0)
3.0 m (9.8 ft)	kg					*1080	850			*1090	650	4.68
	lb					*2380	1870			*2400	1430	(15.4)
2.0 m (6.6 ft)	kg			*1680	1280	*1250	820	*1110	580	*1070	570	5.03
	lb			*3700	2820	*2760	1810	*2450	1280	*2360	1260	(16.5)
1.0 m (3.3 ft)	kg			*2260	1180	*1470	780	*1170	560	*1130	540	5.12
	lb			*4980	2600	*3240	1720	*2580	1230	*2490	1190	(16.8)
0.0 m (0.0 ft)	kg			*2440	1150	*1590	760			*1180	560	4.95
	lb			*5380	2540	*3510	1680			*2600	1230	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2300	*2270	1150	*1520	760			*1210	640	4.51
	lb	*5250	5070	*5000	2540	*3350	1680			*2670	1410	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2350	*1710	1180					*1180	890	3.65
	lb	*6060	5180	*3770	2600					*2600	1960	(12.0)

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ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	300	-	-	Up	-	-

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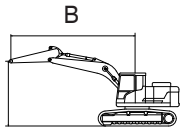

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		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									870	790	3.97
	lb									1920	1740	(13.0)
3.0 m (9.8 ft)	kg					870	780			660	600	4.68
	lb					1920	1720			1460	1320	(15.4)
2.0 m (6.6 ft)	kg			1320	1160	840	750	580	520	570	520	5.03
	lb			2910	2560	1850	1650	1280	1150	1260	1150	(16.5)
1.0 m (3.3 ft)	kg			1220	1070	800	710	570	510	550	490	5.12
	lb			2690	2360	1760	1570	1260	1120	1210	1080	(16.8)
0.0 m (0.0 ft)	kg			1190	1040	770	690			570	510	4.95
	lb			2620	2620	1700	1520			1260	1120	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2050	1190	1040	770	690			650	590	4.51
	lb	*5250	4520	2620	2290	1700	1520			1430	1300	(14.8)
-2.0 m (-6.6 ft)	kg	2550	2100	1220	1220					910	810	3.65
	lb	5620	4630	2690	2690					2010	1790	(12.0)

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ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
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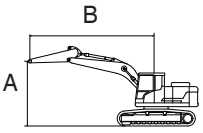

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												m (ft)
4.0 m (13.1 ft)	kg									*1120	930	3.97
	lb									*2470	2050	(13.0)
3.0 m (9.8 ft)	kg					*1080	920			*1090	710	4.68
	lb					*2380	2030			*2400	1570	(15.4)
2.0 m (6.6 ft)	kg			*1680	1380	*1250	890	*1110	630	*1070	620	5.03
	lb			*3700	3040	*2760	1960	*2450	1390	*2360	1370	(16.5)
1.0 m (3.3 ft)	kg			*2260	1280	*1470	850	*1170	610	*1130	590	5.12
	lb			*4980	2820	*3240	1870	*2580	1340	*2490	1300	(16.8)
0.0 m (0.0 ft)	kg			*2440	1250	*1590	830			*1180	610	4.95
	lb			*5380	2760	*3510	1830			*2600	1340	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	*2380	*2270	1250	*1520	820			*1210	700	4.51
	lb	*5250	*5250	*5000	2760	*3350	1810			*2670	1540	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2550	*1710	1280					*1180	970	3.65
	lb	*6060	5620	*3770	2820					*2600	2140	(12.0)

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ANGLE DOZER BLADE

Model	Type		Boom	Arm	Counterweight	Wheel	Dozer		Outrigger	
HX48A Z	Canopy	Rubber Track	Length [mm]	Length [mm]	weight [kg]	width [mm]	Front	Rear	Front	Rear
			2800	1400	450	-	-	Up	-	-

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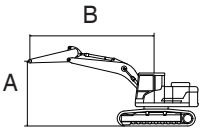

Lift-point height (A)		Lift-point radius (B)								At max. reach		
		2.0 m (6.6 ft)		3.0 m (9.8 ft)		4.0 m (13.1 ft)		5.0 m (16.4 ft)		Capacity		Reach
												m (ft)
4.0 m (13.1 ft)	kg									950	850	3.97
	lb									2090	1870	(13.0)
3.0 m (9.8 ft)	kg					940	850			720	650	4.68
	lb					2070	1870			1590	1430	(15.4)
2.0 m (6.6 ft)	kg			1430	1260	910	820	640	570	630	570	5.03
	lb			3150	2780	2010	1810	1410	1260	1390	1260	(16.5)
1.0 m (3.3 ft)	kg			1340	1170	870	780	620	560	600	540	5.12
	lb			2950	2580	1920	1720	1370	1230	1320	1190	(16.8)
0.0 m (0.0 ft)	kg			1300	1130	840	750			620	560	4.95
	lb			2870	2490	1850	1650			1370	1230	(16.3)
-1.0 m (-3.3 ft)	kg	*2380	2220	1300	1130	840	750			710	640	4.51
	lb	*5250	4890	2870	2490	1850	1650			1570	1410	(14.8)
-2.0 m (-6.6 ft)	kg	*2750	2270	1330	1160					990	880	3.65
	lb	*6060	5000	2930	2560					2180	1940	(12.0)

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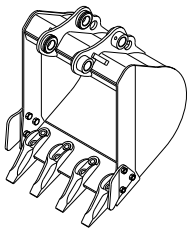
6. BUCKET SELECTION GUIDE



0.15 m³
SAE heaped bucket

Capacity		Width		Weight	Recommendation
					2.8 m (9' 2") boom
SAE heaped	CECE heaped	Without side cutter	With side cutter		1.4 m (4' 7") arm
0.15 m³ (2.10 yd³)	0.13 m³ (0.17 yd³)	490 mm (19.3")	610 mm (24.0")	137 kg (302 lb)	●

● Applicable for materials with density of 2100 kg/m³ (3500 lb/yd³) or less

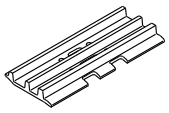
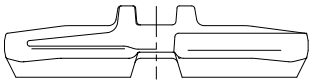
※ These recommendations are for general conditions and average use.
Work tools and ground conditions have effects on machine performance.
Select an optimum combination according to the working conditions and the type of work that is being done.
Consult with your local HD Hyundai Construction Equipment dealer for information on selecting the correct boom-arm-bucket combination.

7. UNDERCARRIAGE

1) TRACKS

X-leg type center frame is integrally welded with reinforced box-section track frames. The design includes dry tracks, lubricated rollers, idlers, sprockets, hydraulic track adjusters with shock absorbing springs and assembled track-type tractor shoes with double grousers.

2) TYPES OF SHOES

Model	Shapes		Steel triple grouser	Rubber track
				
HX48A Z	Shoe width	mm (in)	400 (16")	400 (16")
	Operating weight	kg (lb)	5210 (11490)	5030 (11090)
	Ground pressure	kgf/cm^2 (psi)	0.35 (5.04)	0.34 (4.79)
	Overall width	mm (ft-in)	2000 (6' 7")	2000 (6' 7")

3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

Item	Quantity
Carrier rollers	1EA
Track rollers	4EA
Track shoes (steel grouser)	39EA

4) SELECTION OF TRACK SHOE

Suitable track shoes should be selected according to operating conditions.

Method of selecting shoes

Confirm the category from the list of applications in **table 2**, then use **table 1** to select the shoe. Wide shoes (categories B and C) have limitations on applications. Before using wide shoes, check the precautions, then investigate and study the operating conditions to confirm if these shoes are suitable.

Select the narrowest shoe possible to meet the required flotation and ground pressure. Application of wider shoes than recommendations will cause unexpected problem such as bending of shoes, crack of link, breakage of pin, loosening of shoe bolts and the other various problems.

Table 1

Model	Track shoe	Specification	Category
HX48A Z	T/chain-triple for mini (400 mm)	Option	B
	T/chain-rubber for rail interlocking (400 mm)	Standard	A

Table 2

Category	Applications	Precautions
A	Rocky ground, river beds, normal soil	· Travel at low speed on rough ground with large obstacles such as boulders or fallen trees or a wide range of general civil engineering work
B	Normal soil, soft ground	· These shoes cannot be used on rough ground with large obstacles such as boulders or fallen trees · Travel at high speed only on flat ground · Travel slowly at low speed if it is impossible to avoid going over obstacles
C	Extremely soft ground (swampy ground)	· Use the shoes only in the conditions that the machine sinks and it is impossible to use the shoes of category A or B · These shoes cannot be used on rough ground with large obstacles such as boulders or fallen trees · Travel at high speed only on flat ground · Travel slowly at low speed if it is impossible to avoid going over obstacles

8. SPECIFICATIONS FOR MAJOR COMPONENTS

1) ENGINE

Item	Specification
Model	Yanmar 4TNV88C-PHYB
Type	4 cycle, inline, water-cooled diesel engine
Cooling method	Water cooling
Number of cylinders and arrangement	4 cylinders, in-line
Firing order	1-3-4-2
Combustion chamber type	Direct injection
Cylinder bore × stroke	88 × 90 mm (3.46" × 3.54")
Piston displacement	2190 cc (134 cu in)
Compression ratio	-
Rated gross horse power (SAE J1995)	39.0 hp (29.1 kW)
Rated net horse power (SAE J1995)	37.7 hp (28.1 kW)
Max. power	39.0 hp (29.1 kW)
Maximum torque	14.8 kgf · m (106.9 lbf · ft)
Engine oil quantity	7.4 ℓ (1.95 U.S. gal)
Dry weight	209 kg (461 lb)
Starting motor	12V-2.3 kW
Alternator	12V-55 A

2) MAIN PUMP

Item	Specification
Type	AL A10V O 63LA7DS (Load sensing system)
Capacity	55 cc/rev
Maximum pressure	270 kgf/cm^2 (3850 psi)
Rated oil flow	121 ℓ/min (32.0 U.S. gpm / 26.6 U.K. gpm)
Rated speed	2200 rpm

3) MAIN CONTROL VALVE

Item		Specification
Type		10EL, RS12 (load sensing system)
Operating method		Hydraulic pilot system
Main relief valve pressure		254 kgf/cm^2 (3613 psi)
Overload relief valve pressure	Boom	295 kgf/cm^2 (4196 psi)
	Arm	275 kgf/cm^2 (3912 psi)
	Bucket	275 kgf/cm^2 (3912 psi)

4) SWING MOTOR

Item	Specification
Type	Hydraulic radial motor
Capacity	600 cc
Relief pressure	350 kgf/cm^2 (4980 psi)
Braking system	Automatic, spring applied hydraulic released
Braking torque	1780 kgf · m (12875 lbf · ft)
Brake release pressure	12~30 kgf/cm^2 (171~427 psi)

5) TRAVEL MOTOR

Item	Specification
Type	Two fixed displacement axial piston motor
Capacity	39.2/22.0 cc/rev
Relief pressure	285 kgf/cm^2 (4060 psi)
Reduction gear type	2-stage planetary
Braking system	Automatic, spring applied hydraulic released
Brake release pressure	12 kgf/cm^2 (171 psi)
Braking torque	14.5 kgf · m (105 lbf · ft)

6) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	Ø95× Ø55× 643 mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	Ø80× Ø50× 710 mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	Ø75× Ø45× 590 mm
	Cushion	-
Boom swing cylinder	Bore dia × Rod dia × Stroke	Ø80× Ø50× 525 mm
	Cushion	-
Dozer cylinder	Bore dia × Rod dia × Stroke	Ø115× Ø60× 212 mm
	Cushion	-
Angle dozer cylinder	Bore dia × Rod dia × Stroke	Ø115× Ø60× 212 mm
	Cushion	-
Angle swing cylinder	Bore dia × Rod dia × Stroke	Ø95× Ø45× 335 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.**

7) BUCKET

Item	Capacity		Tooth quantity	Width	
	SAE heaped	CECE heaped		Without side cutter	With side cutter
STD	0.15 m^3 (2.10 yd^3)	0.13 m^3 (0.17 yd^3)	4	490 mm (19.3")	610 mm (24.0")

9. 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) -50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil	7.4 (2.0)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Final drive	Gear oil	1.1×2 (0.29×2)	★SAE 75W-90 SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank: 44 (11.6) System: 63 (16.6)	★ISO VG 15 ISO VG 32 ISO VG 46★3 ISO VG 68
Fuel tank	Diesel fuel★1	66.8 (17.6)	★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 soft water★2	10.2 (2.7)	Ethylene glycol base permanent type (50 : 50) ★Ethylene glycol base permanent type (60 : 40)

※ **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.**

※ **For HD Hyundai Construction Equipment genuine lubricating oils and grease for use in regions with extremely low temperatures, please contact your local HD Hyundai Construction Equipment dealer.**

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

★ : Cold region
Russia, CIS, Mongolia
★1 : Ultra low sulfur diesel
- sulfur content ≤ 10 ppm
★2 : Soft water
City water or distilled water
★3 : HD Hyundai Construction Equipment Bio hydraulic oil

1. CAB DEVICES

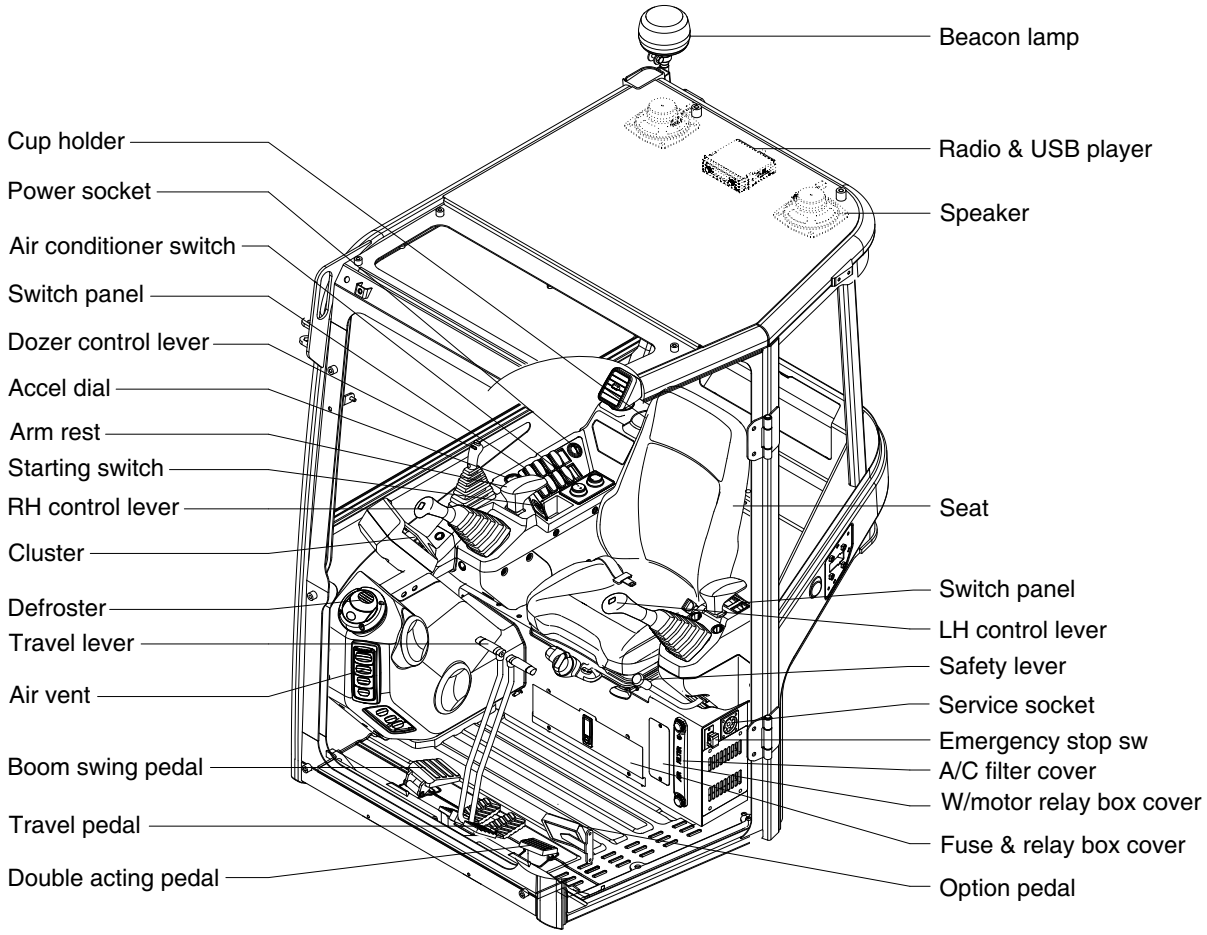
1) The ergonomically designed console box and suspension type seat provide the operator with comfort.

2) ELECTRONIC MONITOR SYSTEM

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

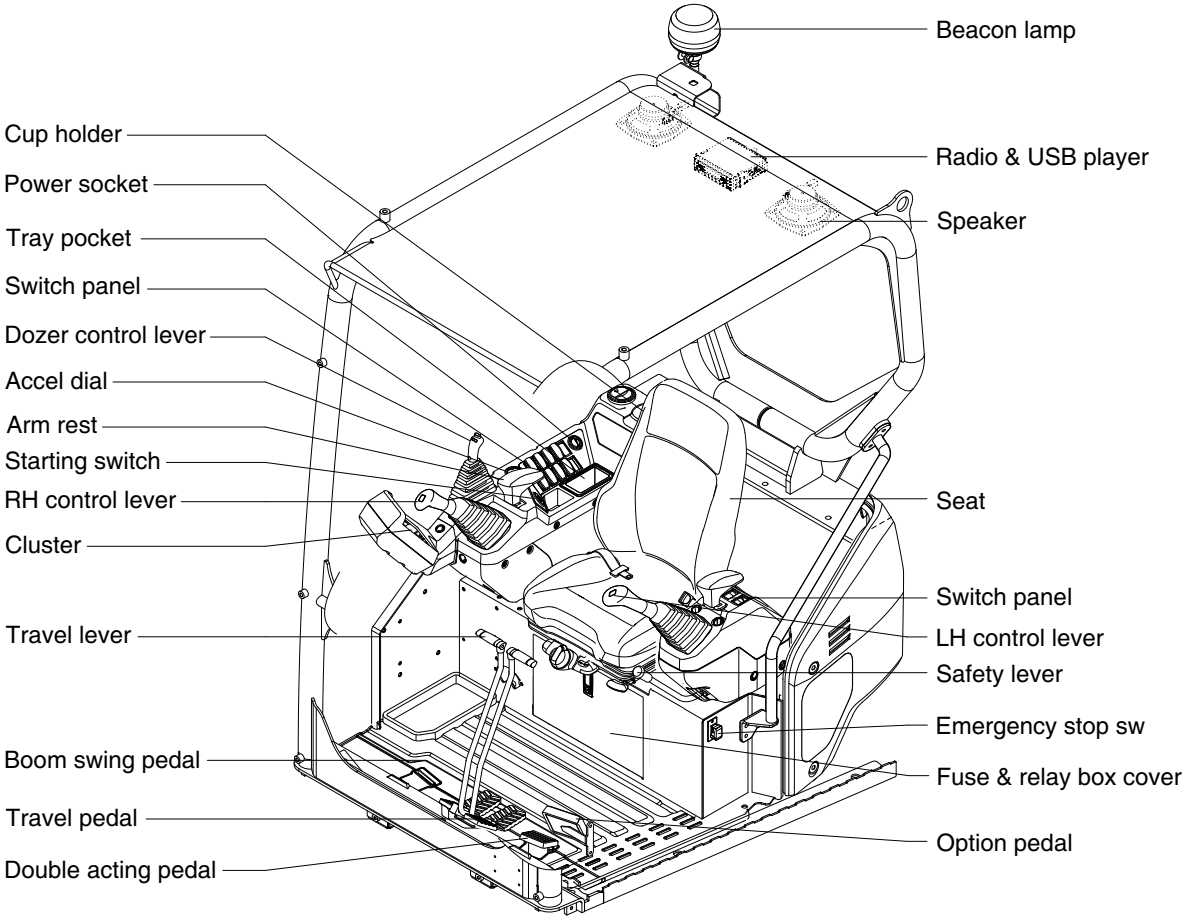
(2) It is equipped with a safety warning system for early detection of machine malfunction.

■ CAB TYPE



35AZ3CD01

■ CANOPY TYPE



35AZ3CD02

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.
The LCD is to display for monitoring, manage and display set with the switches.

※ 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.

Warning lamps (see page 3-6)

Gagues (see page 3-4)

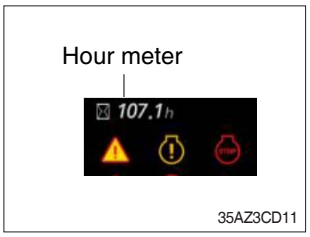
Pilot lamps (see page 3-12)

Switches (see page 3-17)

48AZ3CD10

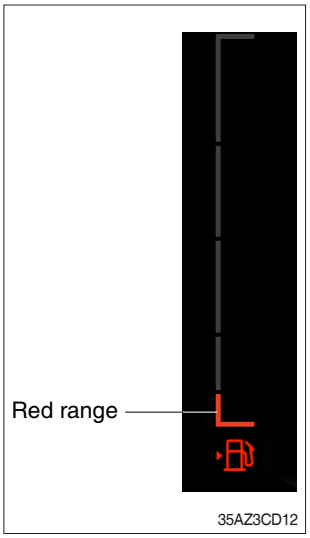
2) GAUGES AND DISPLAYS

(1) Hour meter



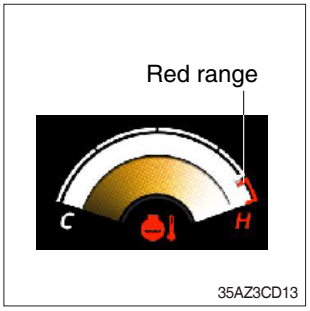
① This meter shows the total operation hours of the machine.
② Always ensure the operating condition of the meter during the machine operation.
Inspect and service the machine based on hours as indicated in chapter 6, maintenance.

(2) Fuel gauge



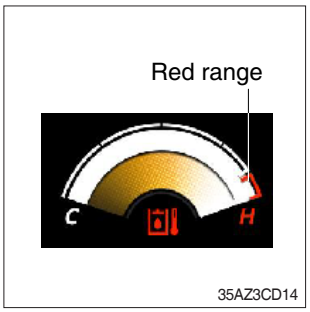
① This gauge indicates the amount of fuel in the fuel tank.
② Fill the fuel when in the red range or warning lamp ON.
※ **If the gauge illuminates the red range or warning lamp ON even though the machine is in the normal condition range, check the electric device as this can be caused by poor connection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

(3) Engine coolant temperature gauge



① This indicates the temperature of coolant.
· Red range : Above 110°C (230°F)
② When the red range pointed or warning lamp ON, engine do not abruptly stop but run it at medium speed to allow it to cool gradually, then stop it.
Check the radiator and engine.
※ **If the engine is stopped without cooled down running, the temperature of engine parts will rise suddenly, this could cause severe engine trouble.**
※ **If the gauge indicates the red range or warning lamp 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) Hydraulic oil temperature gauge



① This gauge indicates the temperature of hydraulic oil.
· Red range : Above 105°C (221°F)

② If the indicator is in the red range or lamp 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.

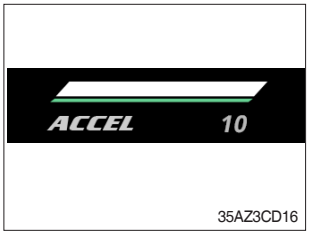
※ If the gauge indicates the red range or warning lamp ON in red even though the machine is in the normal condition range, check the electric device as this can be caused by poor connection of sensor.

(5) Engine rpm gauge and clinometer

① This displays the engine speed.

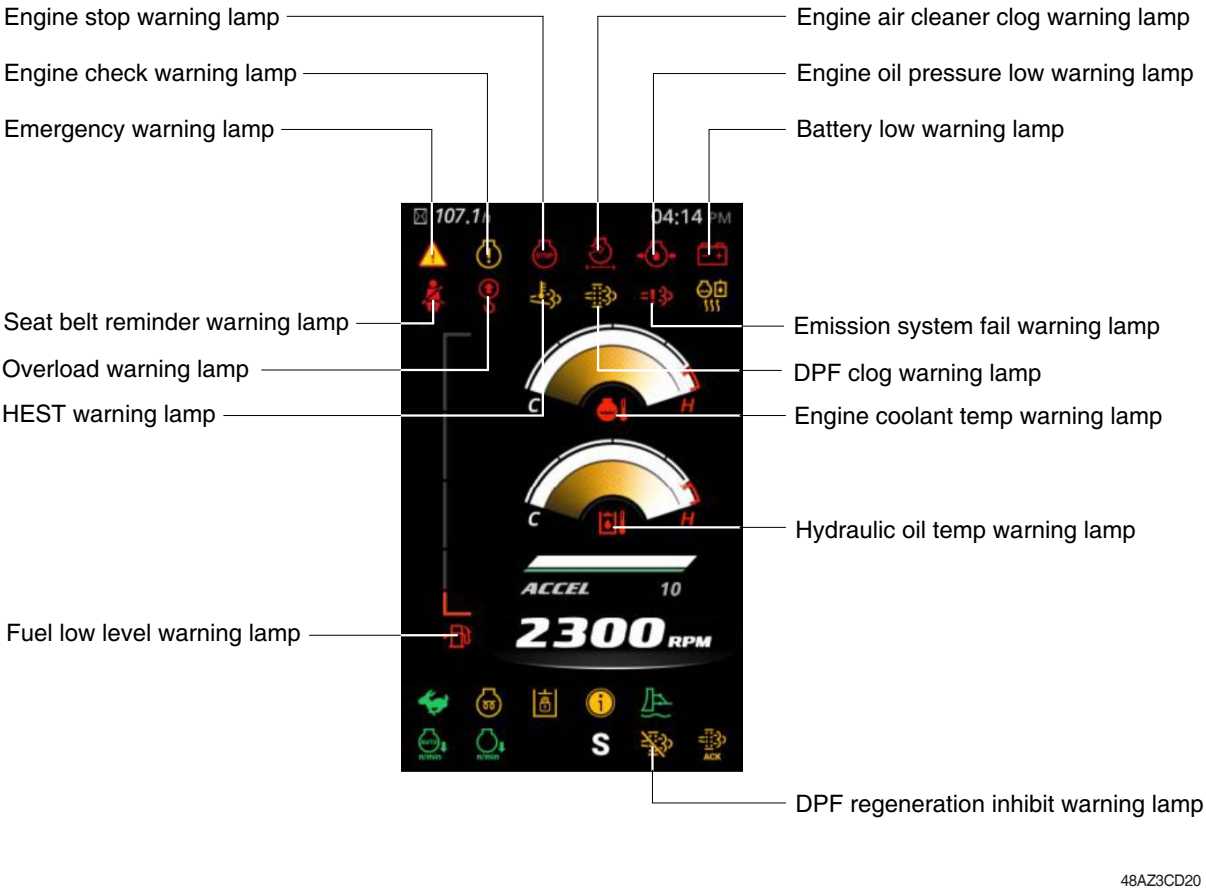
② This displays the tilt of machine.

(6) Accel dial gauge



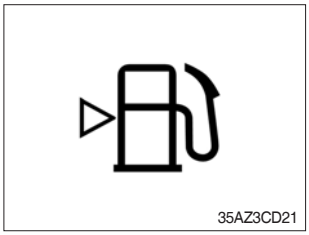
① This gauge indicates the level of accel dial from 0 to 10 step.

3) WARNING LAMPS



48AZ3CD20

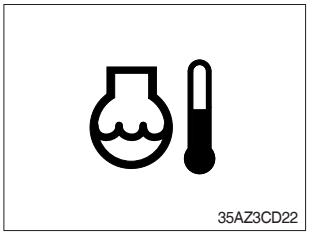
(1) Fuel low level warning lamp



35AZ3CD21

① This lamp lights up and buzzer sounds when the level of fuel is below 12.5 ℓ (3.3 U.S. gal).
② Fill the fuel immediately when the lamp ON.

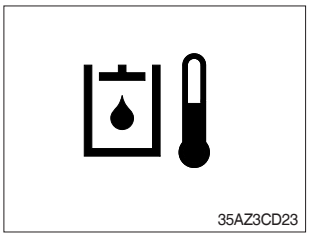
(2) Engine coolant temperature warning lamp



35AZ3CD22

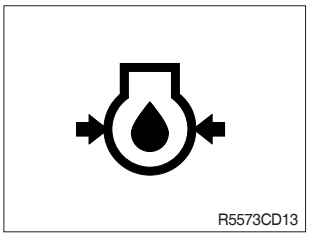
① This lamp lights up and buzzer sounds when the temperature of coolant is over the normal temperature 115°C (239°F).
② Check the cooling system when the lamp ON.

(3) Hydraulic temperature warning lamp



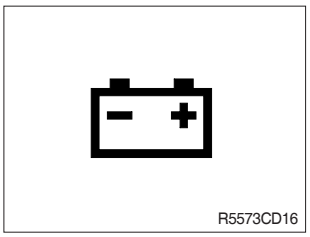
① This lamp lights up and buzzer sounds when the temperature of coolant is over the normal temperature 105°C (221°F).
② Check the cooling system when the lamp ON.

(4) Engine oil pressure low warning lamp



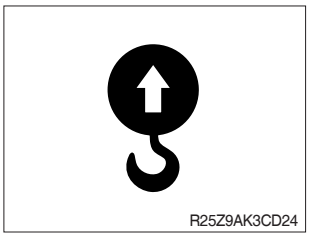
① This lamp lights up and buzzer sounds after starting the engine because of the low oil pressure.
② If the lamp ON during engine operation, shut OFF engine immediately. Check oil level.

(5) Battery low warning lamp



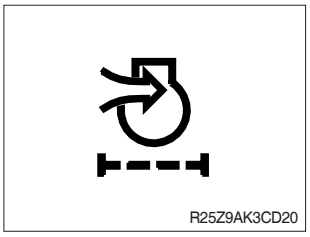
① This lamp lights up and buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
② Check the battery charging circuit when this lamp blinks during engine operation.

(6) Overload warning lamp



① When the machine is overloaded, this lamp blinks and buzzer sounds.
② Reduce the machine load.

(7) Air cleaner clog warning lamp



① This lamp lights up and buzzer sounds when the element of the air cleaner is clogged.
② Check, clean or replace element.

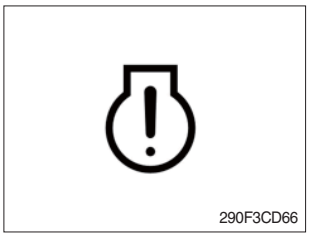
(8) Emergency warning lamp

① This lamp pops up and the buzzer sounds when each of the below warnings occurs.
- Hydraulic oil temperature high warning lamp ON
- Engine coolant temperature high warning lamp ON
- Communication error with ECU

※ **The pop-up warning lamp moves to the original position and lights up when the buzzer stop switch is pushed or pop-up is touched. 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.

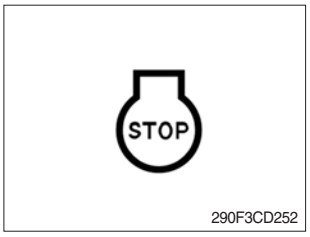
(9) Check engine warning lamp



① This warning lamp lights up and buzzer sounds when the engine must be checked.

※ **When the warning lamp lights up, stop the machine and find the cause for repair.**

(10) Engine stop warning lamp



① If this warning lamp lights up and buzzer sounds, stop the engine immediately and check the engine.

② Check the fault codes on the monitor.

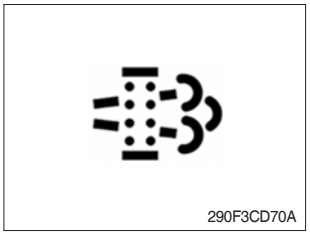
※ **Please contact your HD Hyundai Construction Equipment service center or local dealer.**

(11) Seat belt reminder warning lamp

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

② Fasten the seat belt.

(12) DPF clog warning lamp



① This warning lamp lights up and the buzzer sounds when the regeneration is needed.

② For details, please refer to the after-treatment system below.

※ DPF : Diesel Particulate Filter

※ 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.

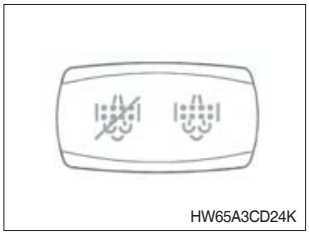
When the regeneration is not performed successfully according to the procedure, warning lamp relevant to the each operating condition is turned ON.

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.

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

※ **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**

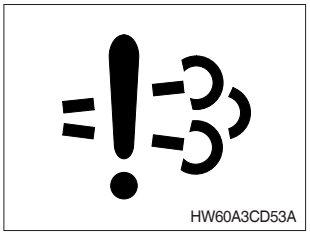
Park the machine on a well-ventilated area, and keep away from inflammable materials to set the machine as shown below.

- 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 lever 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.

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

(13) Exhaust system failure warning lamp



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.

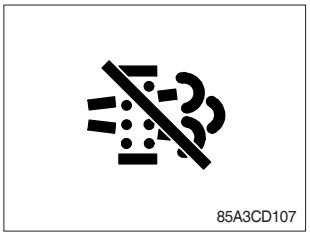
② Please refer to the exhaust gas control system below.

※ 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.

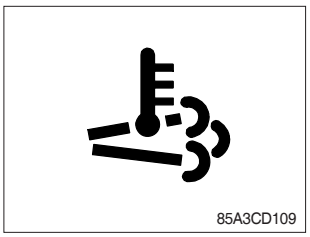
(14) DPF regeneration inhibit warning lamp



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

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

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



① This warning lamp indicates, when illuminated, that exhaust temperatures are high due to regeneration of the DPF.

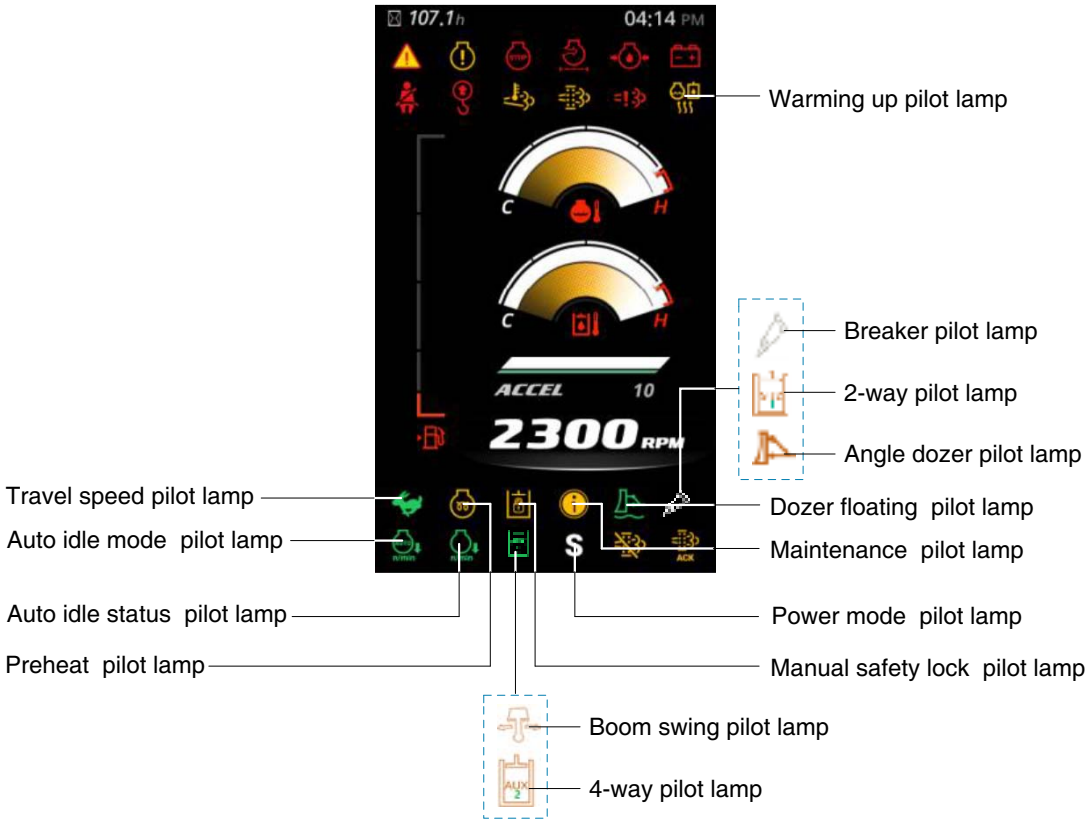
② The lamp will also illuminate during a manual regeneration.

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.

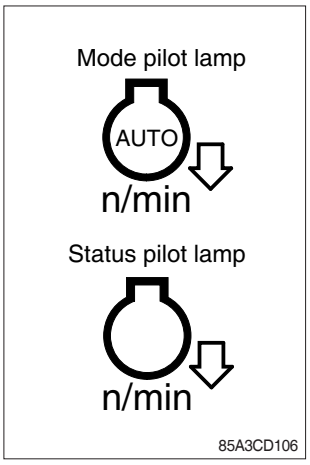
4) PILOT LAMP



(1) Power mode pilot lamp

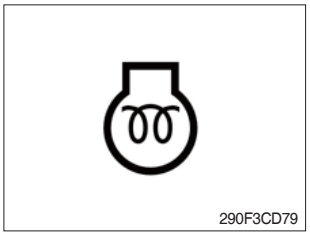
No	Mode	Pilot lamp	Selected mode
1	Power mode	S	Standard power mode
2	Travel mode		Low speed traveling High speed traveling

(2) Auto idle status/ mode pilot lamp



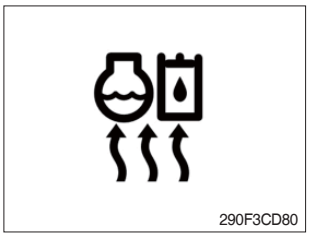
① The auto idle mode pilot lamp will light up when the idle mode is selected.
② The auto idle status pilot lamp will light up when all levers and pedals are at neutral position and the auto idle mode is selected.
③ One of the lever or pedal is operated, the status lamp will go off and the engine speed returns to the previous conditions.

(3) Preheat pilot lamp



① Turning the start key switch to the ON position starts preheating in cold weather.
② Start the engine after this lamp goes OFF.
※ **Refer to page 4-4 for details.**

(4) Warming up pilot lamp



① This lamp 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.

(5) Maintenance pilot lamp

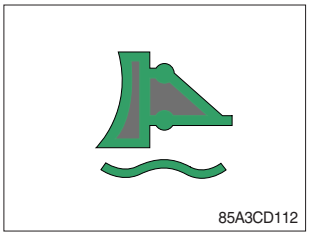
① This lamp lights up when consumable parts are in need of replacement. It means that the change or replacement interval of parts is 30 hours from the required change interval.
② Check the message in maintenance information of main menu.
Also, this lamp lights up for 3 minutes when the start switch is switched to the ON position.

(6) Manual safety lock pilot lamp

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

※ **Refer to page 3-35 for the safety lever.**

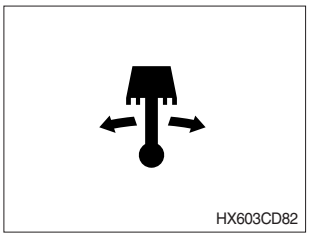
(7) Dozer floating pilot lamp



① This lamp will be light up when the dozer floating lever is pressed.

※ **Refer to page 3-37.**

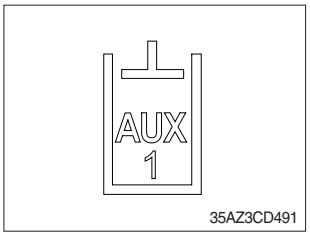
(8) Boom swing pilot lamp



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

※ **Refer to page 3-35.**

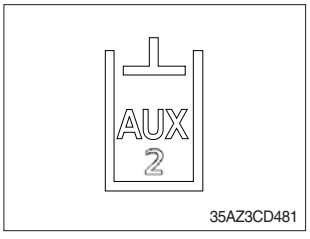
(9) 2-way pilot lamp



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

※ **Refer to page 3-28.**

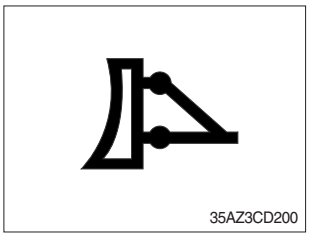
(10) 4-way (rotating) pilot lamp



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 page 3-28.**

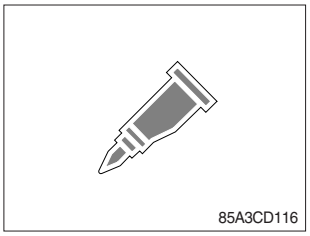
(11) Angle dozer pilot lamp



① This lamp will be light up when the AUX 1 switch is pressed to ANGLE DOZER positions.

※ Refer to page 3-35.

(12) Breaker pilot lamp



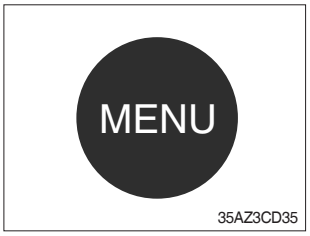
① This lamp will be light up when the breaker select switch is pressed.

※ Refer to page 3-34.

5) SWITCHES

Sound short beep when each button is pressed.

(1) Menu button



① Go into the menu screen.

※ **Please refer to page 3-17.**

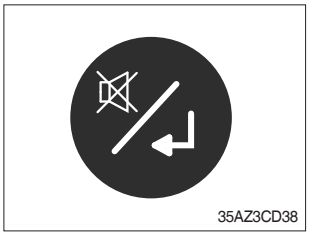
(2) Left/up/(+) and auto idle button

① Move left in sub menu.
② Move up in menu list
③ Increase input value in menu
④ Auto idle ON or OFF in the operation screen

(3) Right/down/(-) button

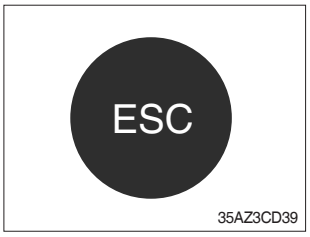
① Move right in sub menu.
② Move down in menu list
③ Decrease input value in menu

(4) Enter and buzzer stop button



① Select menu (enter).
② Stop buzzer sound when press this button more than 1.7 sec.

(5) ESC/ rear camera button



① Escape in the menu.
② Rear camera ON or OFF in the operation screen

6) MAIN MENU

Operation screen

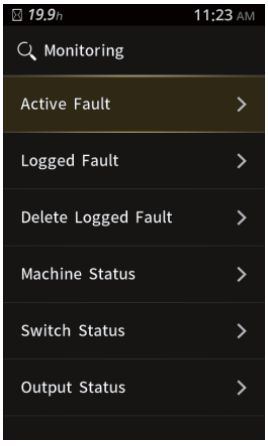
35AZ3CD100

press MENU button

Main menu screen

35AZ3CD106

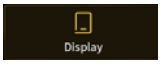
Sub menu screen



35AZ3CD107A

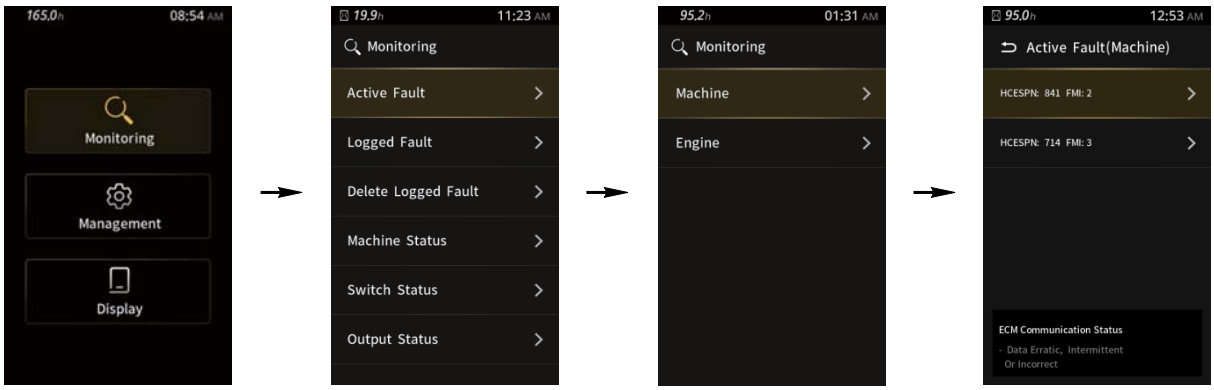
※ Please refer to the switches, page 3-16 for selection and change of menus and input values.
※ In the operation screen, press the menu button to access the sub-menu screen.

(1) Structure

No	Main menu	Sub menu	Description
1	 Monitoring 35AZ3CD103A	Active fault Logged fault Del logged fault Analog Switch Output	Machine, Engine Machine, Engine Machine, Engine Hyd oil temp, Coolant temp, Battery volt Engine speed, Accel dial volt Safety lever, Dozer floating, Seat belt, Travel speed Travel speed sol, Dozer floating sol, Start limit relay, Buzzer
2	 Management 35AZ3CD104A	Operating hours Maintenance Start limit mode Warning setting on/off Change password Machine information A/S phone number Auxilary flow	Operating hours Elapsed time, Change interval, Replacement etc. Disabled, Enable (Always), Enable (Interval) Overload on/off Change password Machine, Engine, CMCU A/S phone number, A/S phone number change Auxilary flow
3	 Display 35AZ3CD105A	Clock Brightness Unit Language	12 Hour, 24 Hour Manual, Auto Temperature, Pressure Korean, English, Turkish

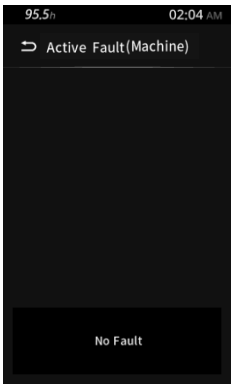
(2) Monitoring

① Active fault



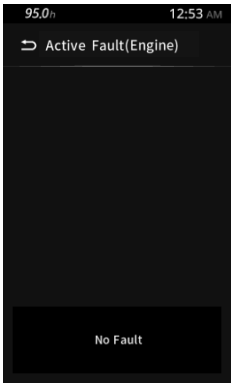
35AZ3CD106 35AZ3CD107A 35AZ3CD108 35AZ3CD110A

- The active fault of the machine and engine can be checked by this menu.



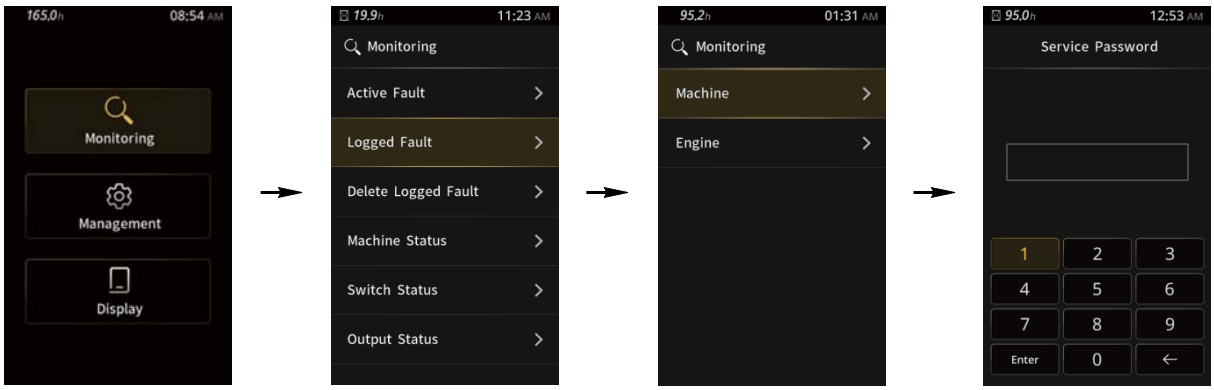
35AZ3CD135A

35AZ3CD109 35AZ3CD111A



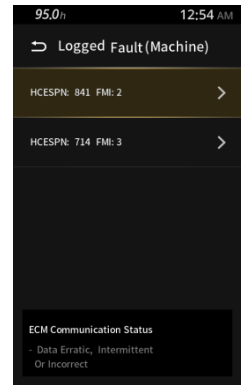
35AZ3CD136A

② Logged fault

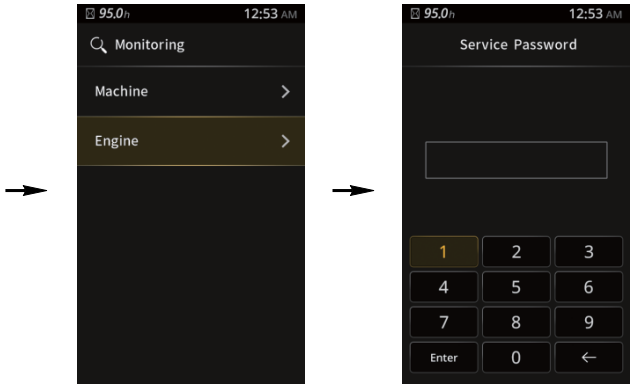


35AZ3CD106 35AZ3CD112A 35AZ3CD108 35AZ3CD113

- The logged fault of the machine and engine can be checked by this menu.
- This menu can be used only HD HCE service man.



35AZ3CD114A

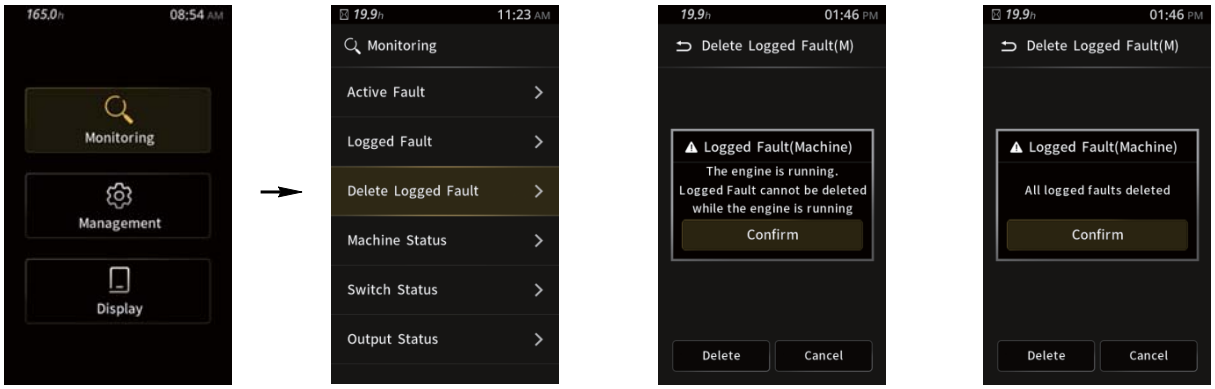


35AZ3CD109 35AZ3CD113

35AZ3CD137A

③ Delete logged fault

"All logged faults deleted" or "Failure"



35AZ3CD106 35AZ3CD116A 35AZ3CD119A 35AZ3CD118A

- The logged fault of the machine and engine can be deleted by this menu.
  (It is possible under the engine stop conditions)

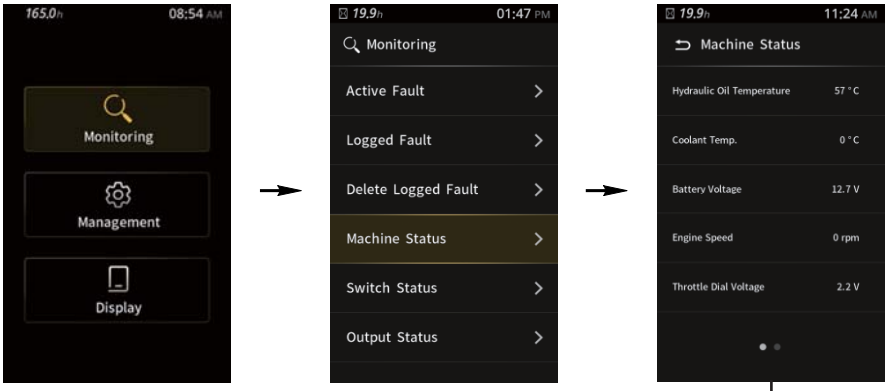
35AZ3CD108 35AZ3CD113 35AZ3CD117A

"All logged faults deleted" or "Failure"

35AZ3CD116A 35AZ3CD122A 35AZ3CD123A

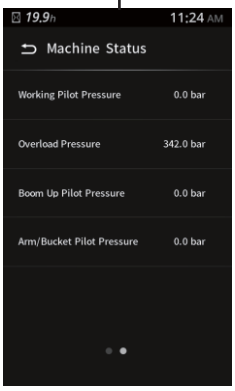
35AZ3CD109 35AZ3CD113 35AZ3CD124A

④ Machine status



35AZ3CD106 35AZ3CD125A 35AZ3CD126A

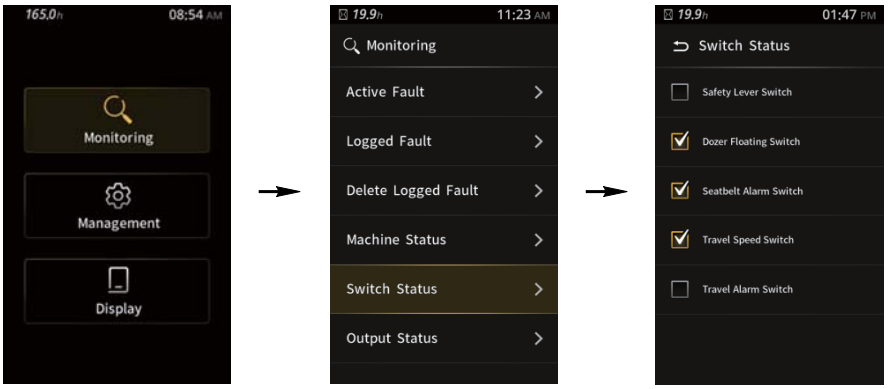
- The machine status such as the engine rpm, oil temperature, voltage and pressure etc. can be checked by this menu.



35AZ3CD127A

⑤ Switch status

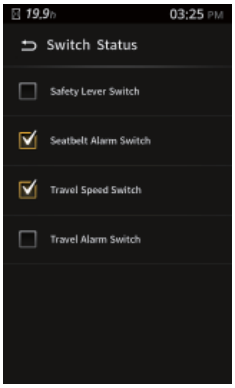
With DPC option



35AZ3CD106 35AZ3CD128A 35AZ3CD129A

Without DPC option

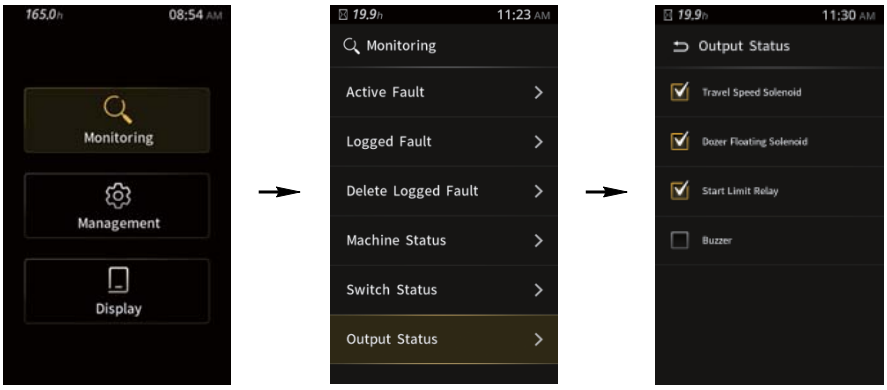
- You can select to display the lamps of the switches on the cluster by this menu.



35AZ3CD229A

⑥ Output statue

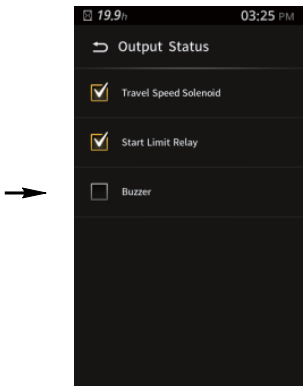
With DPC option



35AZ3CD106 35AZ3CD130A 35AZ3CD131A

- The output status can be confirmed by this menu.

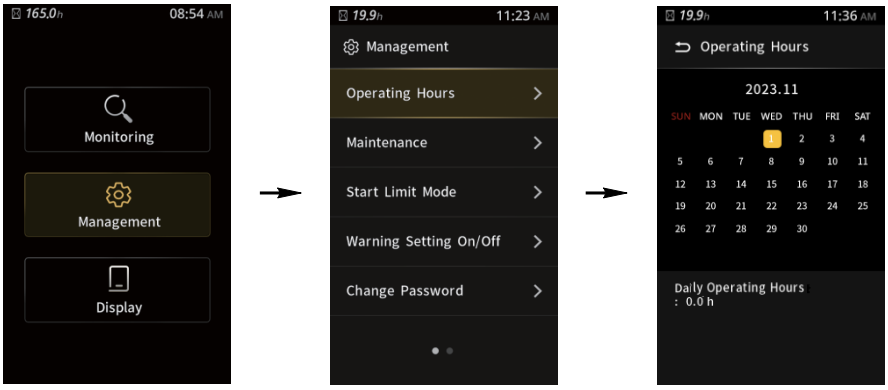
Without DPC option



35AZ3CD231A

(3) Management

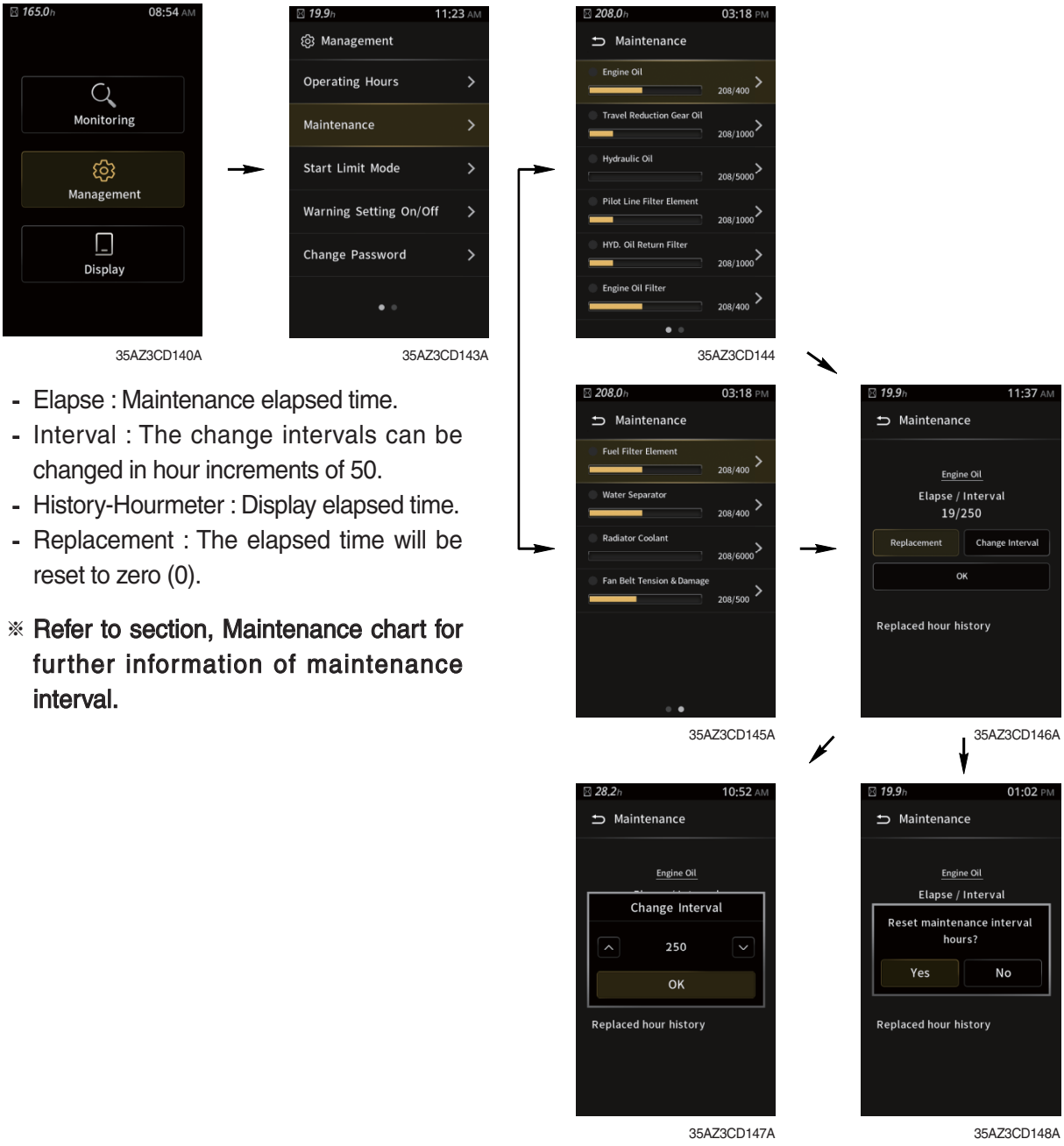
① Operating hours



35AZ3CD140A 35AZ3CD141A 35AZ3CD142A

- You can check the operating hours by this menu.

② Maintenance



35AZ3CD140A 35AZ3CD143A 35AZ3CD144

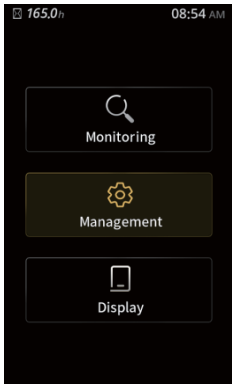
35AZ3CD145A 35AZ3CD146A

35AZ3CD147A 35AZ3CD148A

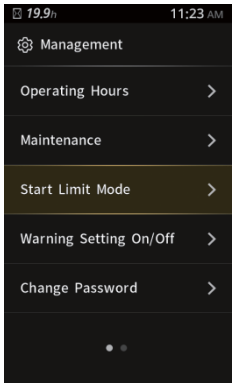
- Elapse : Maintenance elapsed time.
- Interval : The change intervals can be changed in hour increments of 50.
- History-Hourmeter : Display elapsed time.
- Replacement : The elapsed time will be reset to zero (0).

※ **Refer to section, Maintenance chart for further information of maintenance interval.**

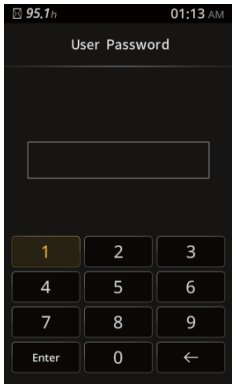
③ Start limit mode



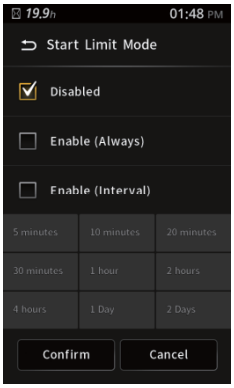
35AZ3CD140A



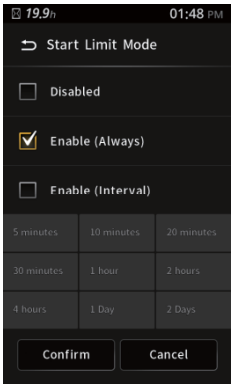
35AZ3CD150A



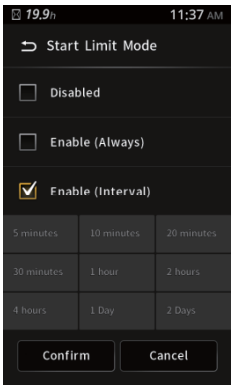
35AZ3CD151



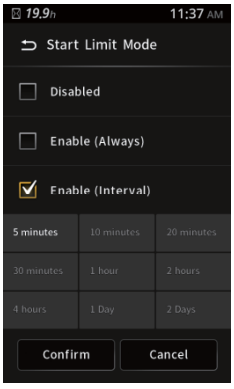
35AZ3CD152A



35AZ3CD153A



35AZ3CD154A

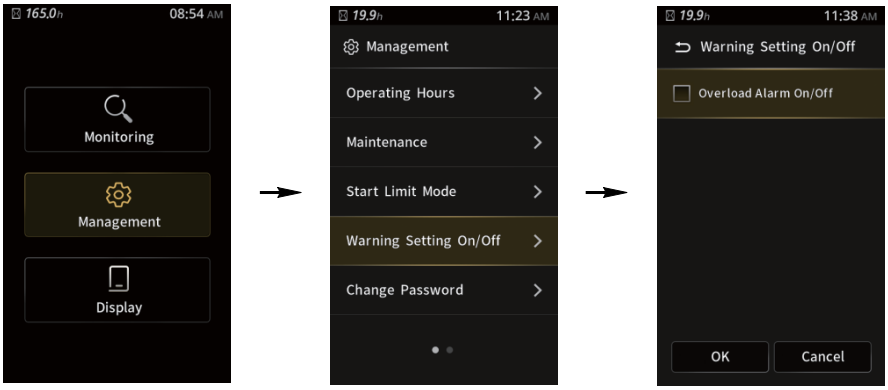


35AZ3CD155A

Start limit mode setting

- Start limit mode is designed to be a theft deterrent or will prevent the unauthorized operation of the machine.
- When you Enable the start limit mode, the password will be required when the starting switch is turned to the on position.
- Machine security
  - Disable : Start limit function is disabled and password is not required to start engine.
  - Enable (Always) : The password is required whenever the operator starts engine.
  - Enable (Interval) : The password is required when the operator starts engine first. But the operator can restart the engine within the interval time without inputting the password. The interval time can be set to a maximum 2 days.

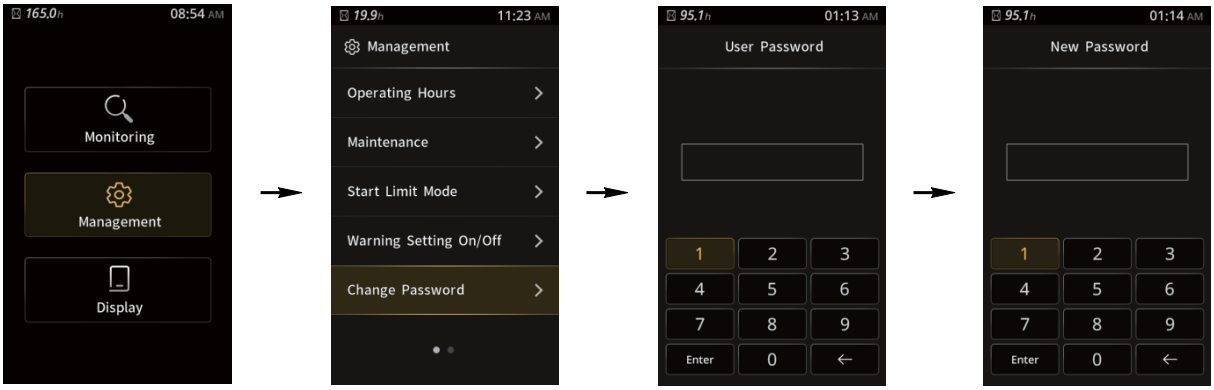
④ Warning setting on/off



35AZ3CD140A 35AZ3CD156A 35AZ3CD157A

- You can set the warning items by this menu.

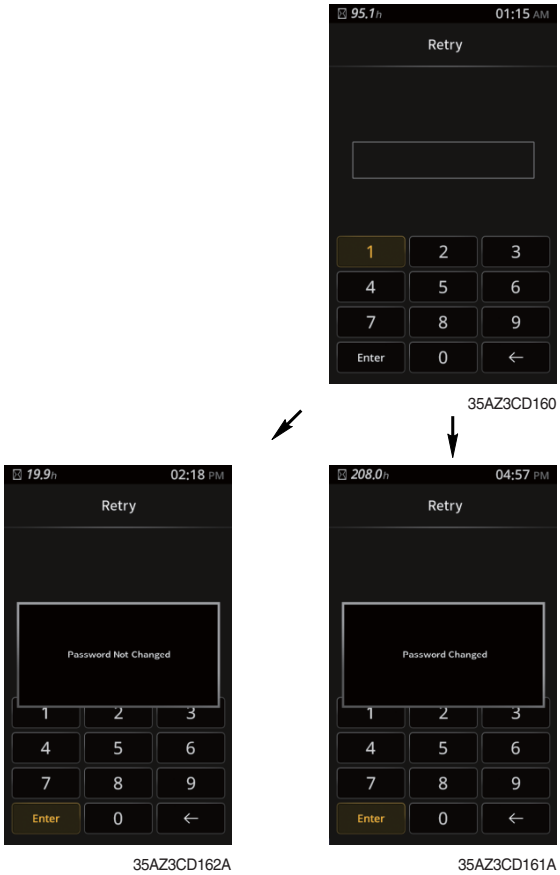
⑤ Change password



35AZ3CD140A 35AZ3CD158A 35AZ3CD151 35AZ3CD159

- The password is 5~10 digits.

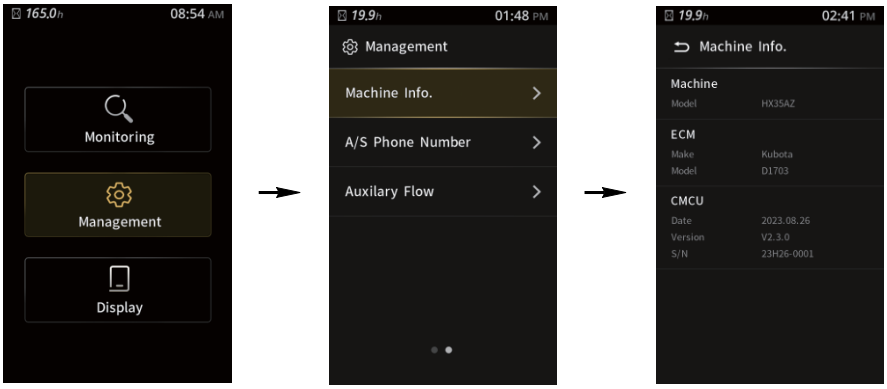
※ **Before first use, please set user password and owner password in advance for machine security.**



35AZ3CD160

35AZ3CD162A 35AZ3CD161A

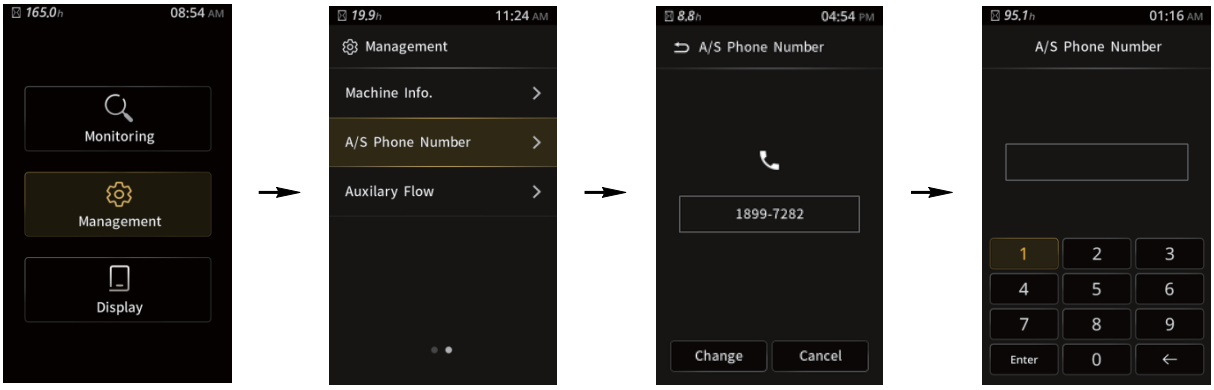
⑥ Machine information



35AZ3CD140A 35AZ3CD163A 35AZ3CD164A

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

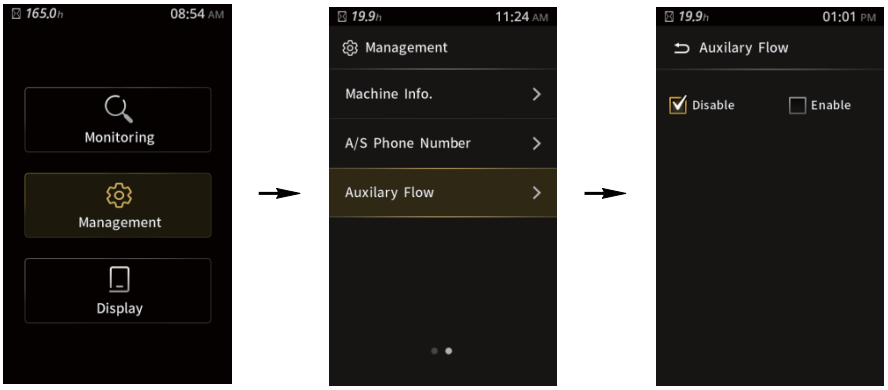
⑦ Contact



35AZ3CD140A 35AZ3CD165A 35AZ3CD166A 35AZ3CD167

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

⑧ Aux. Flow

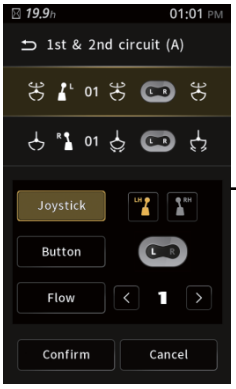


35AZ3CD140A

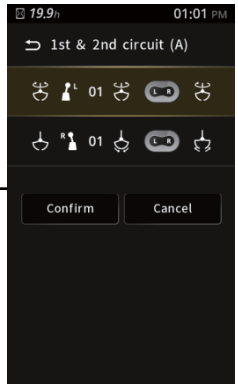
35AZ3CD170A

35AZ3CD171A

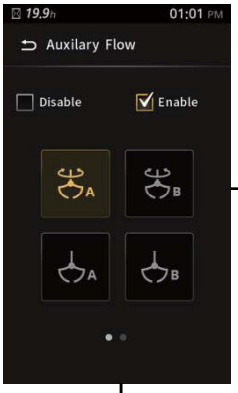
- 3 kinds of option attachment can be selected by this menu.
  a. Rotary grapple (4-way)
  b. Grapple (2-way)
  c. Auger (2-way)
- There are two user modes (type A or B) in each option attachment.



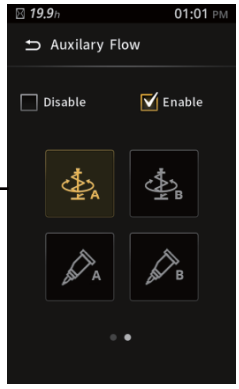
35AZ3CD177A



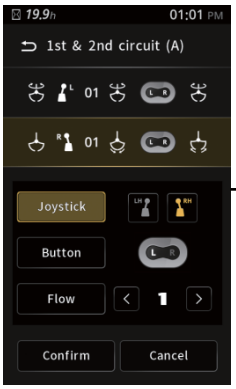
35AZ3CD176A



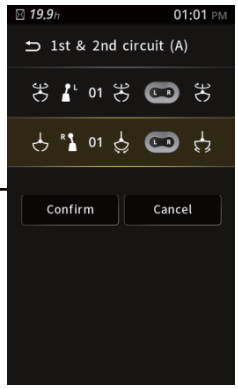
35AZ3CD172A



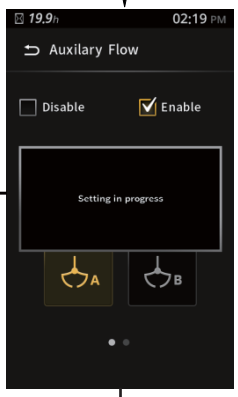
35AZ3CD173A



35AZ3CD179A

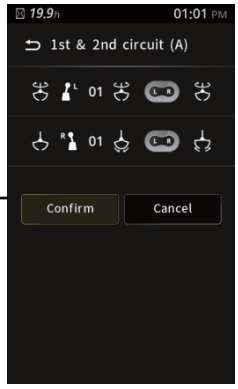


35AZ3CD178A

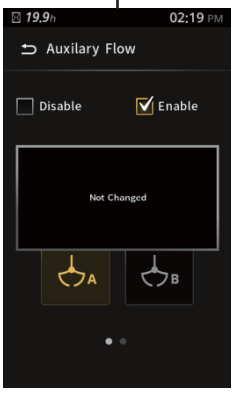


35AZ3CD174A

35AZ3CD181A



35AZ3CD180A



35AZ3CD175A

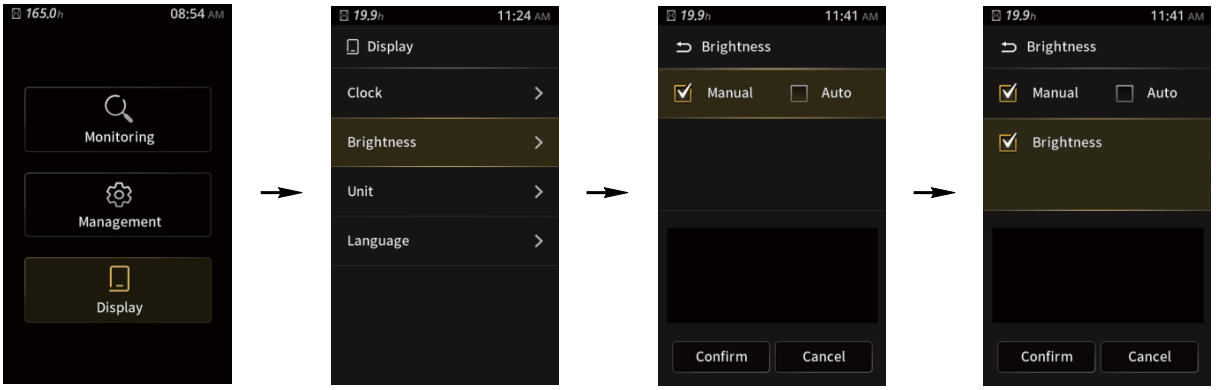
(4) Display set

① Clock

35AZ3CD185A 35AZ3CD186A 35AZ3CD187A

- Set the time (12 hours or 24 hours)

② Brightness

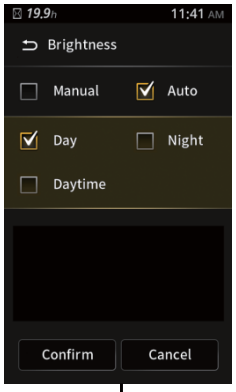


35AZ3CD185A

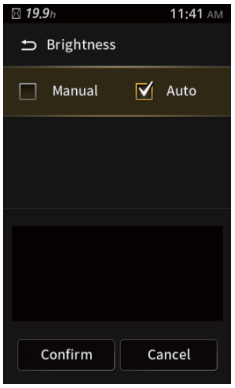
35AZ3CD188A

35AZ3CD189A

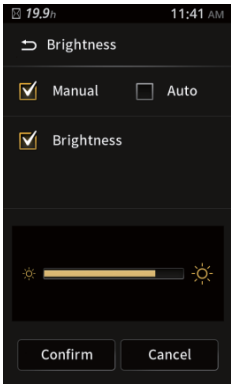
35AZ3CD190A



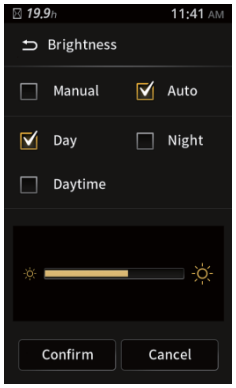
35AZ3CD193A



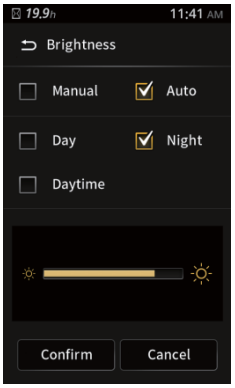
35AZ3CD192A



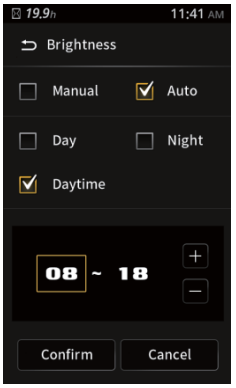
35AZ3CD191A



35AZ3CD194A



35AZ3CD195A



35AZ3CD196A

- Manual : Manual setting for LCD brightness.
- Automatic : Automatic control of LCD brightness as set level of Day/Night.
- Setting day time : Set the time for daylight.
  (in figure, black area represents night time while orange shows day time)

③ Unit

35AZ3CD185A 35AZ3CD197A 35AZ3CD198A

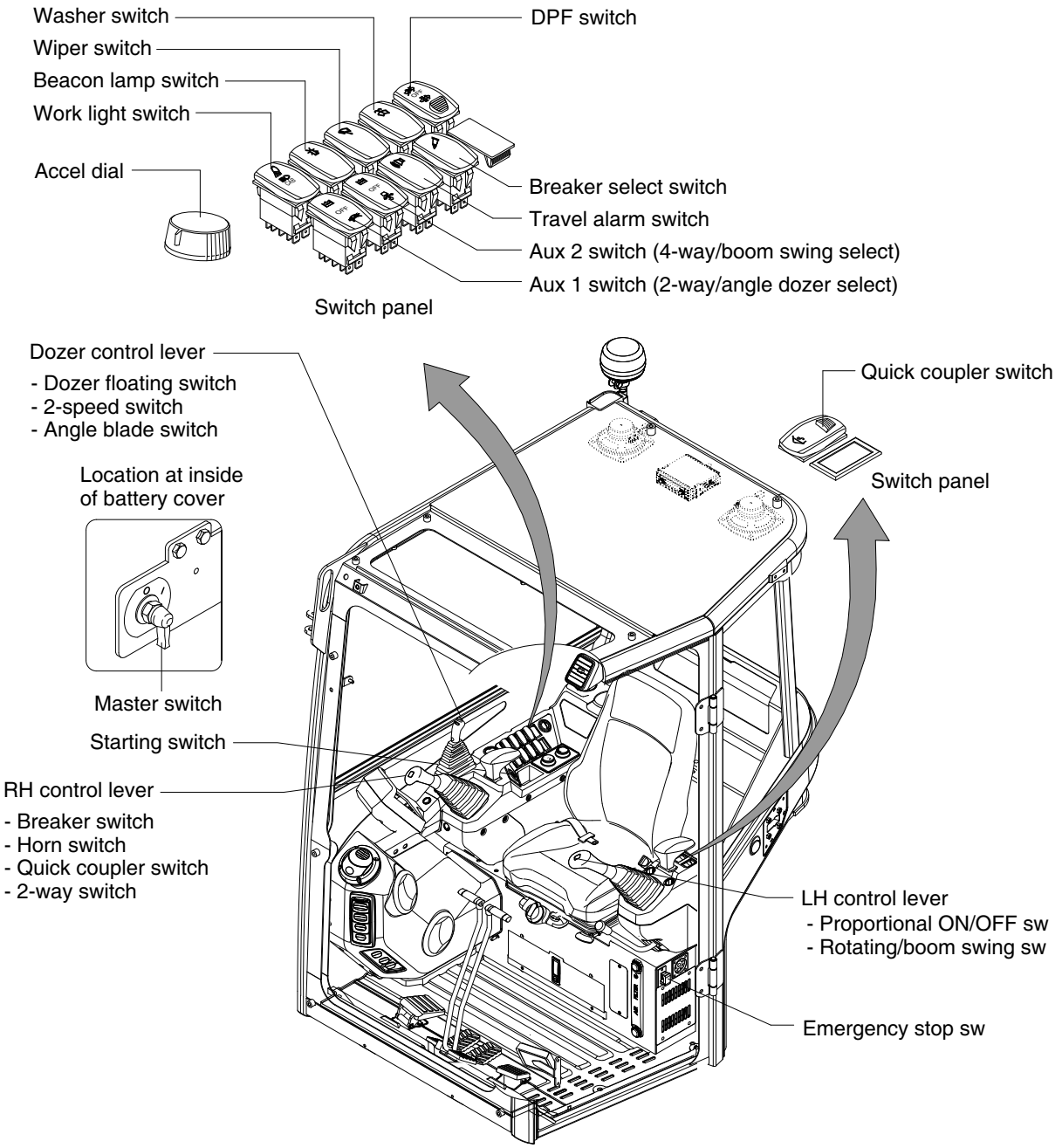
- Temperature : °C ↔ °F
- Pressure : bar ↔ MPa ↔ kgf/cm² ↔ psi

④ Language

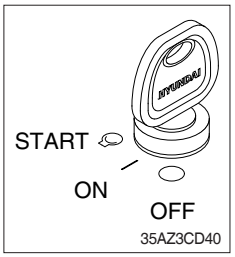
35AZ3CD185A 35AZ3CD199A 35AZ3CD184A

- User can select preferable language and all displays are changed to the selected language (한국어, English or Turkish).

3. SWITCHES



1) STARTING SWITCH



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

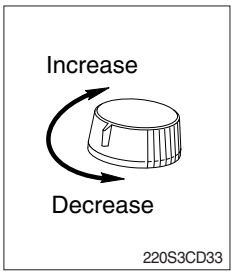
· OFF : None of electrical circuits activate.

· ON : All the systems of machine operate.

· START : Use when starting the engine. Release key immediately after starting.

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

2) ACCEL DIAL SWITCH



(1) There are 10 dial setting.

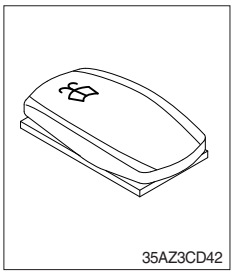
(2) Setting 1 is low idle and setting 10 is high idle.
- By rotating the accel to right : Engine speed increase.
- By rotating the accel to left : Engine speed decrease.

(3) When the dial setting is 1~3, the RCV lever or pedal operation increases the engine rpm to 1380 rpm.

3) WORK LIGHT SWITCH

(1) This switch use to operates the illumination lamp and work light by two step.
- First step : Cabin light, A/C controller and switches illumination lamp comes ON.
- Second step : Work light comes ON.

4) WASHER SWITCH (cab type)



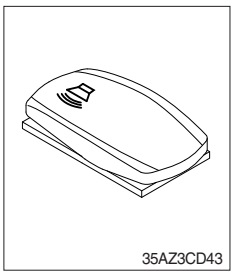
(1) The washer liquid is sprayed and the wiper is operated only while pressing this switch.

5) WIPER SWITCH (cab type)

(1) This switch is used to operate the wiper.
The wiper operates.

△ **If wiper does not operate with the switch in the ON position, turn the switch off immediately. Check the cause. If the switch remains ON, motor failure can result.**

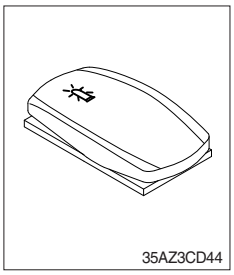
6) TRAVEL ALARM SWITCH (option)



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

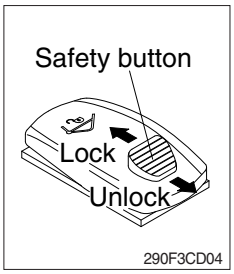
(2) On pressing this switch, the alarm operates only when the machine is traveling.

7) BEACON SWITCH (option)



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

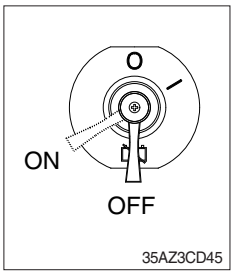
8) QUICK COUPLER SWITCH (option)



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

※ **Refer to page 8-10 for details.**

9) MASTER SWITCH

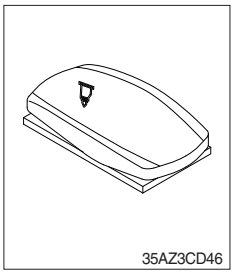


(1) This switch is used to shut off the entire electrical system.

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

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

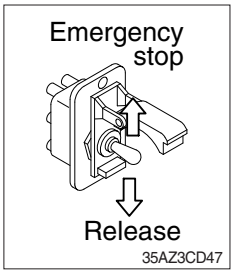
10) BREAKER SELECT SWITCH



(1) This switch is used to select the breaker operation.

※ **Refer to page 8-4.**

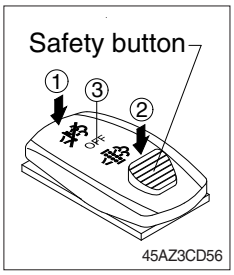
11) EMERGENCY ENGINE STOP SWITCH



(1) This switch is used to emergency stop the engine.

※ **Be sure to keep the emergency switch on the release position when restart the engine.**

12) DPF SWITCH



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

(2) Inhibit position (①)

① The inhibit position disallows any automatic or manual regeneration of the DPF.

② This may be used by operator to prevent regeneration when the machine is operating in a hazardous environment and is concerned about high exhaust temperature.

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

(3) Auto position (③)

This position will initate an automatic regeneration of the DPF.

(4) Manual regeneration position (②)

① This position will only initate a manual regeneration of the DPF when the machine is in non-mission condition, engine must run at low idle speed and DPF soot levels are high enough to allow regeneration.

② HEST lamp will be illuminated during the entire regeneration.

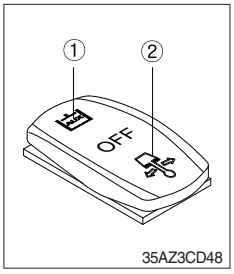
※ **Refer to page 3-11 for details.**

※ **This switch can be moved to the manual regeneration position (②) only when the safety button is pulled backward.**

※ **Also, this switch returns to the OFF position when released from the manual regeneration position (②).**

※ **DPF : Diesel particulate filter**

13) AUX 2 SWITCH (4-way or boom swing select)



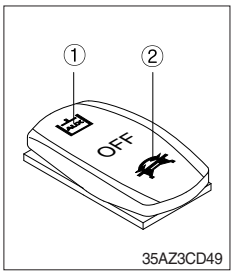
(1) This switch is used to select the 4-way or boom swing operation as below.

① 4-way

② Boom swing

※ **Refer to page 3-36.**

14) AUX 1 SWITCH (2-way or angle dozer select)



(1) This switch is used to select the 2-way or angle dozer operation as below.

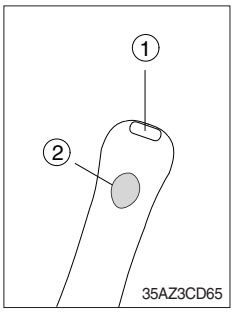
① 2-way

② Angle dozer

※ **Refer to page 3-36.**

15) LH RCV LEVER SWITCH

(1) Without proportional type

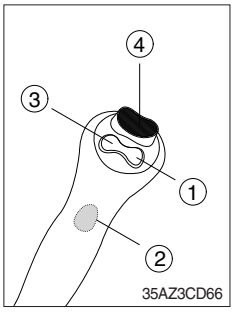


(1) The switches on the LH RCV lever are function as below.

① : None

② : None

(2) With proportional type



(1) The switches on the LH RCV lever are function as below.

① : None

② : None

③ **Proportional ON/OFF switch**

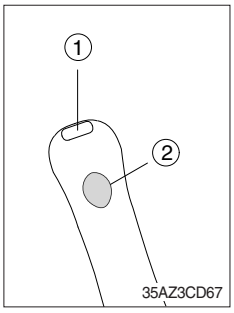
This switch is used to actuate or cancel for the proportional function.

④ **Rotating switch**

This switch is used to rotate the clamshell or boom swing.

16) RH RCV LEVER SWITCH

(1) Without proportional type



(1) The switches on the RH RCV lever are function as below.

① **Horn switch**

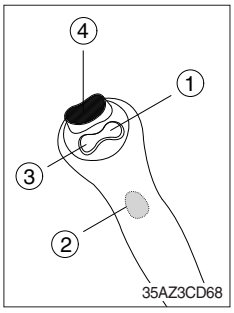
When this switch is pressed, the horn will sound.

② **Quick coupler switch**

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

※ **Refer to page 8-10.**

(2) With proportional type



(1) The switches on the RH RCV lever are function as below.

① **Horn switch**

When this switch is pressed, the horn will sound.

② **Breaker switch**

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

③ **Quick coupler switch**

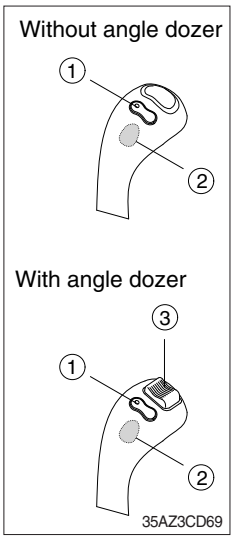
This switch is used to engage or disengage the moving hook on quick coupler.

※ **Refer to page 8-10.**

④ **2-way switch**

This switch is used to clamp or release for the shear.

17) DOZER CONTROL LEVER



① Dozer floating switch
② 2-speed travel switch
③ Angle dozer switch

(1) Dozer floating switch

① The dozer floating feature activates when the dozer floating switch is pressed.
- 1 step : Press the dozer floating switch

※ When the machine is dozer DPC option, start from 1 step.

※ Unless the machine is dozer DPC option, start from 2 step.

- 2 step : Push the dozer lever until the end.
- 3 step : The switch is fixed even if the dozer lever is released.

② Floating release method.
- 1 step : Press the dozer floating switch again.

※ When the machine is dozer DPC option, start from 1 step.

※ Unless the machine is dozer DPC option, start from 2 step.

- 2 step : Pull back the fixed dozer lever.

(2) 2-speed travel switch

① This switch is to control the travel speed which is changed to high speed by pressing the switch and low speed by pressing it again.

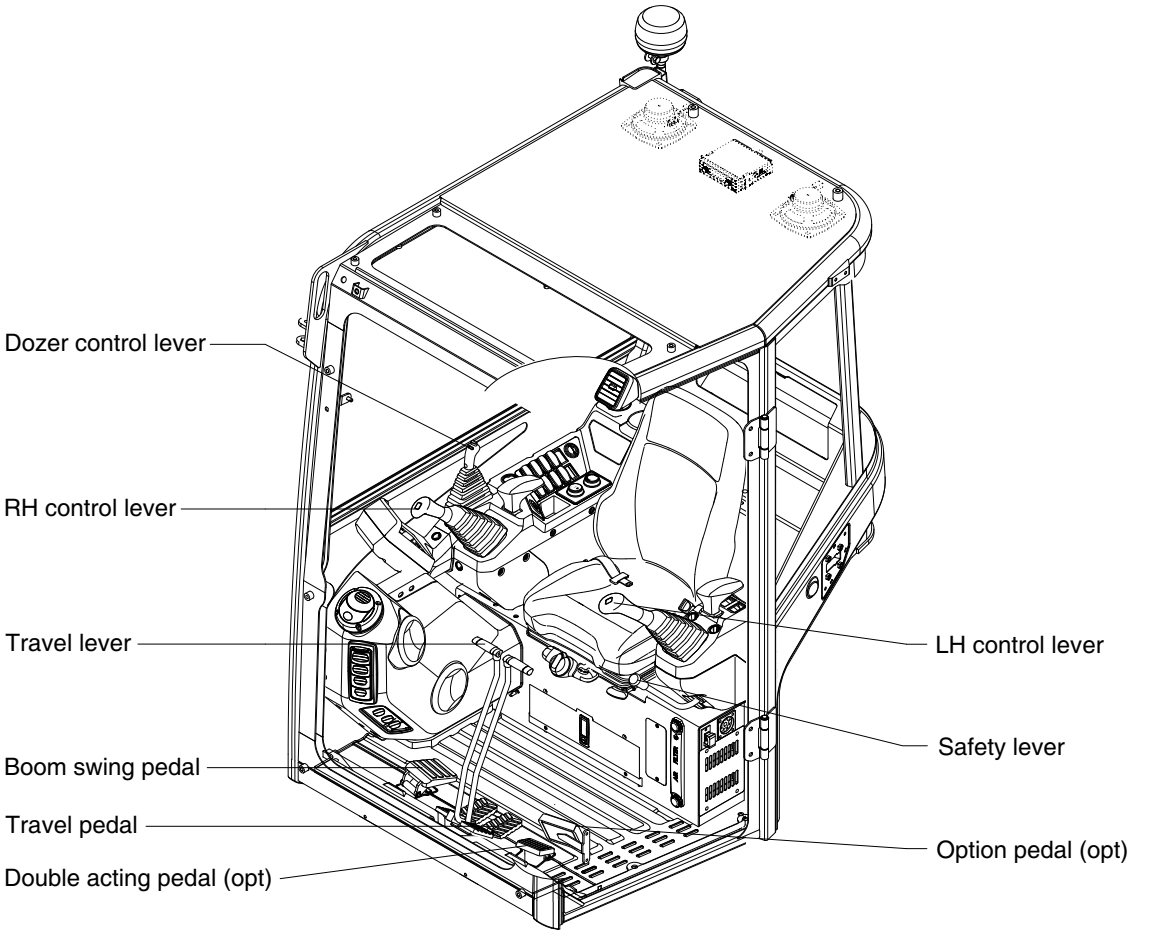
② When the machine travel high speed, the travel speed pilot lamp lights up.

(3) Angle dozer switch

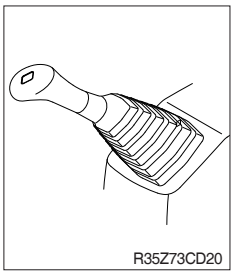
This switch is used to swing the angle dozer to left or right direction.

※ Do not angle blade up with the angle blade placed at an angle.

4. LEVERS AND PEDALS



1) LH CONTROL LEVER



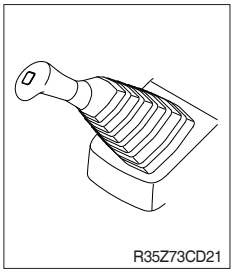
(1) This joystick is used to control the swing and the arm.

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

(3) The proportional on/off switch and rotating/boom swing switch are installed on the control lever.

※ **Refer to page 3-36 for details of the switch function.**

2) RH CONTROL LEVER



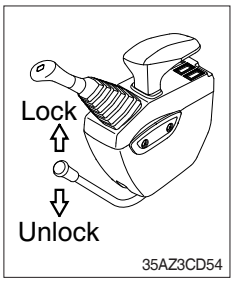
(1) This joystick is used to control the boom and the bucket.

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

(3) The breaker switch, horn switch, quick coupler switch and 2-way switch are installed on the control lever.

※ **Refer to page 3-36 for details of the switch function.**

3) SAFETY LEVER



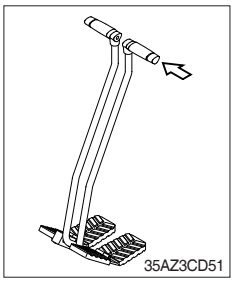
(1) All control levers are disabled from operation by locating the lever to lock position as shown.

※ **Be sure to raise the lever to LOCK position when leaving from operator's seat.**

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

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

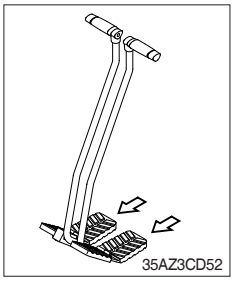
4) TRAVEL LEVER



(1) This lever is mounted on travel pedal and used for traveling by hand. The operation principle is same as the travel pedal.

(2) Refer to traveling of the machine in chapter 4 for details.

5) TRAVEL PEDAL

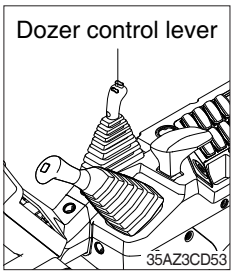


(1) This pedal is used to move the machine forward or backward.

(2) If left side pedal is pressed, left track will move.
If right side pedal is pressed, right track will move.

(3) Refer to traveling of machine in chapter 4 for details.

6) DOZER CONTROL LEVER



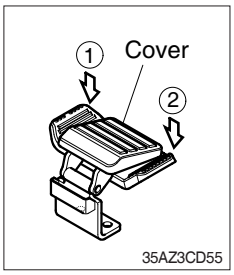
(1) This lever is used to operate the dozer blade.

(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.

(3) The dozer floating switch, 2-speed travel switch and angle dozer switch are installed on the dozer control lever.

※ **Refer to page 3-37 for details of the switch function.**

7) BOOM SWING PEDAL

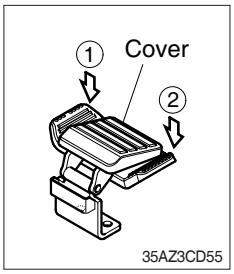


(1) This pedal is used to swing the boom to the right and left direction.

(2) Move the cover to unlock position by foot.

(3) The pedal is pressed to left side (②), boom will swing to the left direction.
The pedal is pressed to right side (①), boom will swing to the right direction.

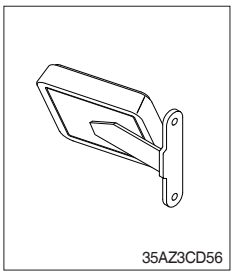
8) DOUBLE ACTING PEDAL (OPT)



(1) This pedal is used to operate the shear.

(2) Move the cover to unlock position by foot.
The pedal is pressed to left side (②), the shear is closed.
The pedal is pressed to right side (①), the shear is opened.

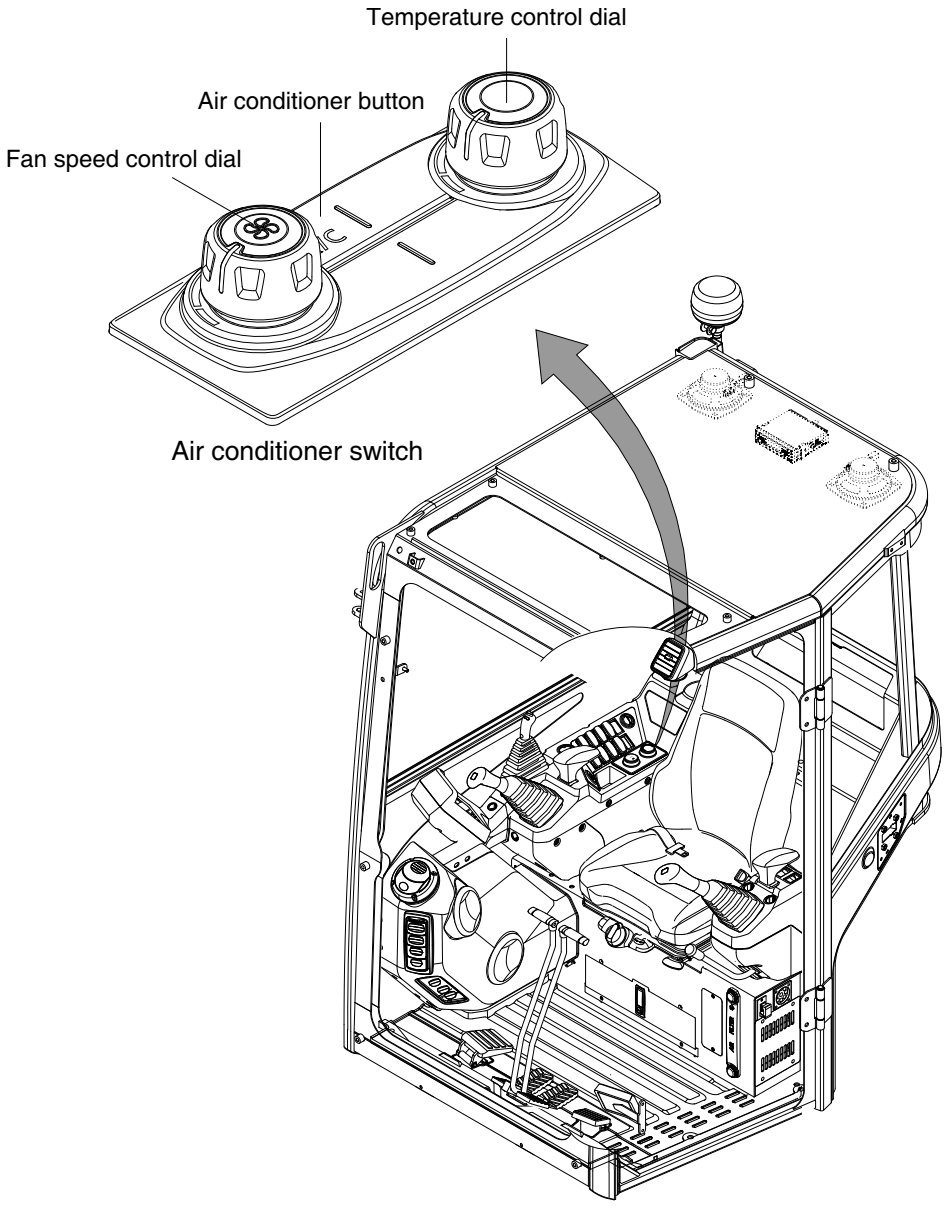
9) OPTION PEDAL (OPT)



(1) This pedal is used to operate the optional attachment.

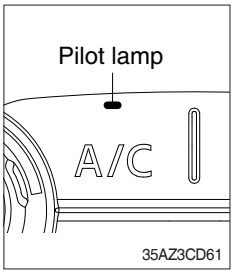
5. AIR CONDITIONER AND HEATER (CAB TYPE)

Air conditioner and heater are equipped for pleasant operation against outside temperature.



35AZ3CD06A

1) AIR CONDITIONER BUTTON

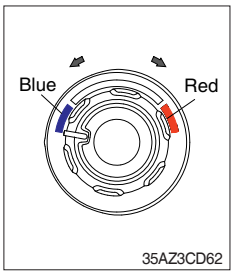


(1) When you push this button, air conditioner system is operated.

(2) Determines whether to perform a cooling function of air conditioner.
① Pilot lamp ON : Air conditioner operation
② Pilot lamp OFF : Fan only

※ The pilot lamp does not light up when the fan speed control dial is 0 step.

2) TEMPERATURE CONTROL DIAL

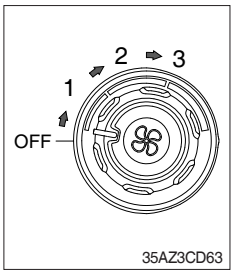


(1) This control dial regulates the temperature of output air.

(2) Anti-clockwise (blue zone) - Cool down air temperature

(3) Clockwise (red zone) - Heat up air temperature

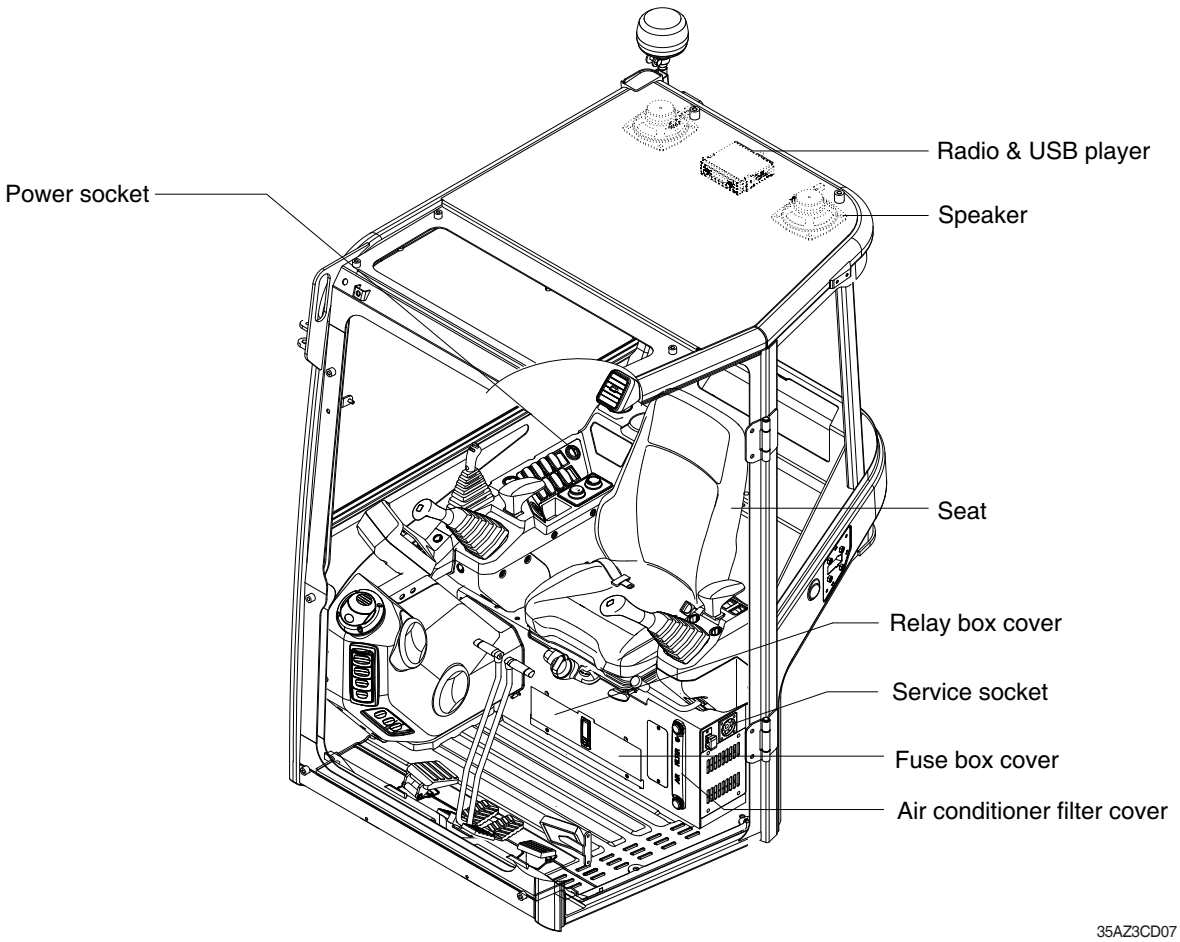
3) FAN SPEED CONTROL DIAL



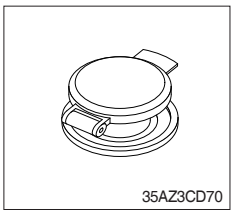
(1) This control dial controls fan speed as below.

- 0 : Off
- 1 : Low
- 2 : Medium
- 3 : High

6. OTHERS

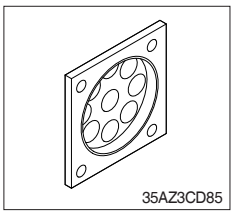


1) POWER SOCKET



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

2) SERVICE SOCKET



(1) Machine control units communicates the machine data with Laptop computer through service socket.

- Cluster program dump
- Machine data monitoring

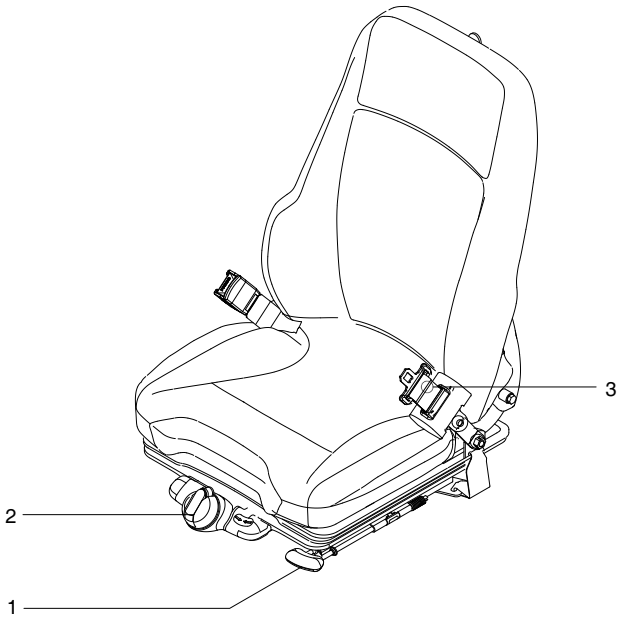
(2) ECU communicates the engine data through service socket.

- ECU fault code check
- Engine data monitoring

3) SEAT

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

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



35AZ3CD71

1 Seat top fore and after positioning adjustment
2 Weight adjustment
3 Back cushion angle adjustment

① Seat top fore and after positioning adjustment

a. Lift handle and move the seat top forward or rearward.
b. Release the handle at one of several positions.

② Weight adjustment

a. Push on button suspension will shifting and can fit for heavier operators.
b. Pull the button will release and fit for lighter operator.

③ Back cushion angle adjustment

a. Lift handle and let back cushion spring forward,or lean backward into the cushion.
b. Release the handle at the desired position.

※ Maintenance

① Lubricate seat slides semi-annually

Adjust seat rearward until it stops,apply a good quality dry lubricant to the upper front of the seat slides. Then move seat forward until it stops,and lubricate the lower rear of the seat slides. Move the seat forward and rearward to the stops several times to the distribute the lubricant,completing the procedure.

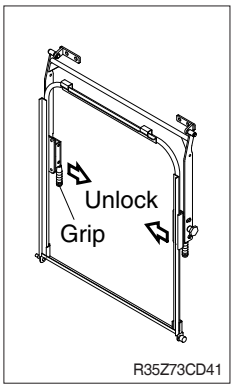
② Seat belts

Inspect seat belts and mounting hardware before use. Replace if worn or damaged;
Replace after three three years of use regardless of appearance.

③ Armrest mechanism

With mechanism in top position and armrest tilted up,spray in between halves of mechanism structure with silicone spray or dry lubricant. This procedure should be done semi-annually.

4) UPPER WINDSHIELD



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

① Hold both grips that are located both side of the windshield frame.

② Move grips to inside in order to release the lock latches.
Hold both grips and push the windshield upward.

③ Hold both grips and back into the storage position.
Release both grips carefully until lock latches are into the locking position.

④ Hold both grips and back into the storage position.

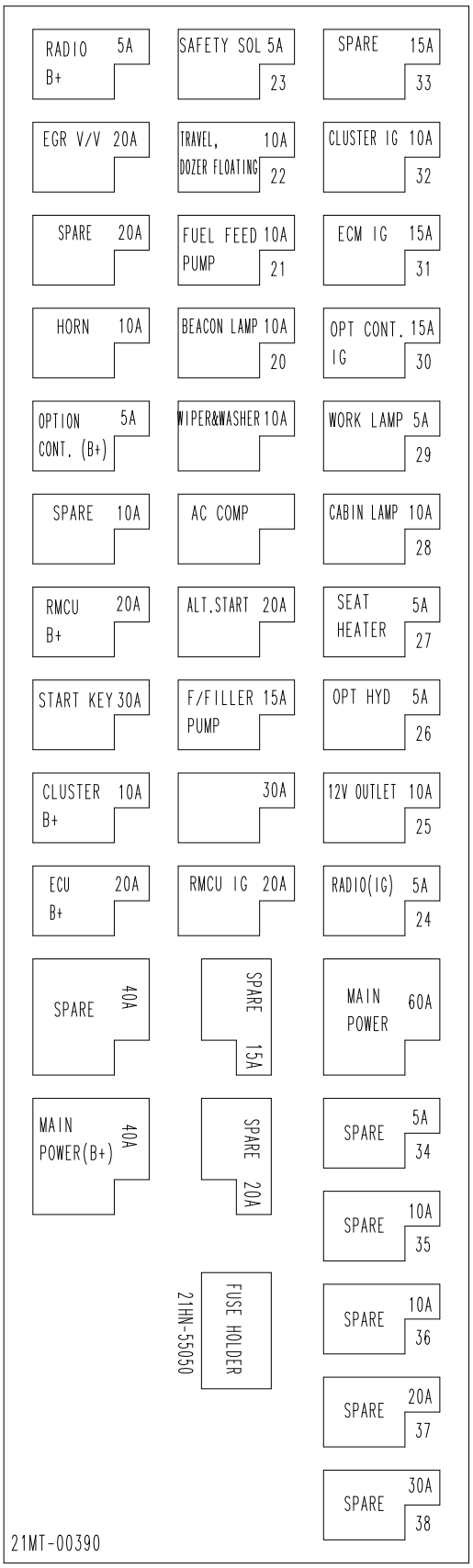
⑤ Release both grips carefully until lock latches are into the locking position.

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

(2) Perform the following procedure in order to close the upper windshield.
Reverse step ① through step ⑤ in order to close the upper windshield.

5) FUSE BOX

Fuse box



21MT-00390

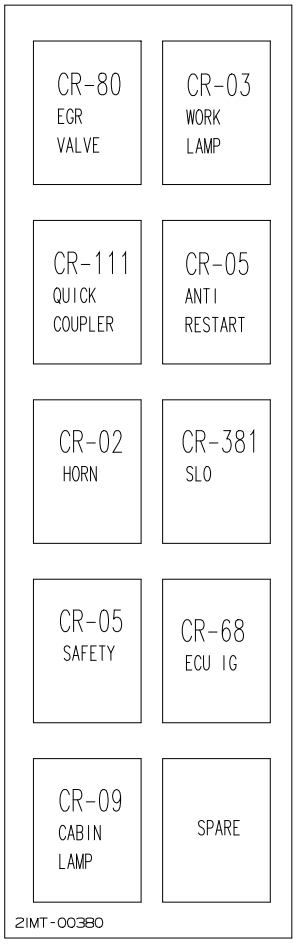
(1) The fuses protect the electrical parts and wiring from burning out.

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

※ When replacing a fuse or relay, always use one of the same capacity.

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

Relay box



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6) RADIO AND USB PLAYER, CAB TYPE

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.

■RESET AND PRECAUTIONS

(1) Reset function

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

① press and hold 

simultaneously for about 5 seconds. (without Bluetooth)

② Take out the fuse for the audio system in the vehicle once and then plug it back in.

※ 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 operating correctly.

(2) Precautions

When the inside of the cab is very cold and the player is used shortly after switching on the heat er, 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

1. INSTRUCTION FOR NEW MACHINE

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

2) Operate according to the 3 steps below 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 performance of machine and shorten the life of the machine.

3) Be careful during the initial 100 hours operation

(1) Check daily for the level and leakage of fluids.

(2) Check greasing points on a regular basis and grease all points as needed. Refer to greasing chart located on the machine.

(3) Check over all hose connections, bolts, nuts and screws, on a daily basis.

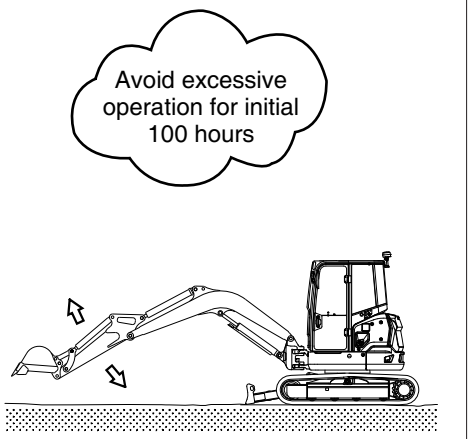
(4) Warm up the machine fully before operating.

(5) Check all gauges occasionally during the operation.

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

4) After the initial 50 or 250 hours of operation replace the following:

Checking items	Hours
Fuel filter element	250
Water separator	
Pilot line filter element	
Hydraulic oil return filter	
Travel reduction gear oil	



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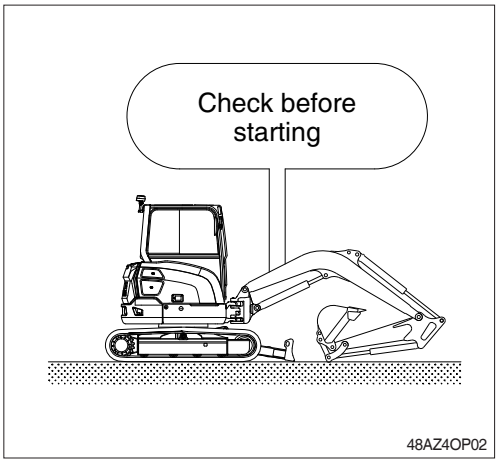
2. CHECK BEFORE STARTING THE ENGINE

1) Look around and under the machine to check:
   - Check for loose nuts, bolts or wiring
   - Collection of dirt
   - Collection of dust at places which reach high temperature
   - Leakage of oil, fuel or coolant
   - Condition of the work equipment and hydraulic system.

※ Refer to section, Maintenance check list in chapter 6.

2) Adjust operator seat to best fit the operator.

3) Adjust all mirrors to best fit the operator.



3. STARTING AND STOPPING THE ENGINE

1) CHECK INDICATOR LIGHTS

(1) Confirm all operating levers are on the neutral position.

(2) Turn the starting switch to the ON position, and check following.

① If all the lamps light ON and buzzer sounding for 6 seconds.

② Only below lamps will light ON and all the other lights will turn OFF after 2 seconds.

· Engine oil pressure warning lamp (1)

· Battery charging warning lamp (2)

※ If the ESL mode is set to the Enable (always) mode, enter the password to start engine.

※ If the incorrect password in entered a total of 5 times, you must wait 30 minutes before trying again.

※ Refer to the page 3-24 for ESL mode setting.

2) STARTING ENGINE IN NORMAL

⚠ Check if any obstacles or people are in the working area. Sound the horn to warn anyone in the vicinity that you are starting the engine.

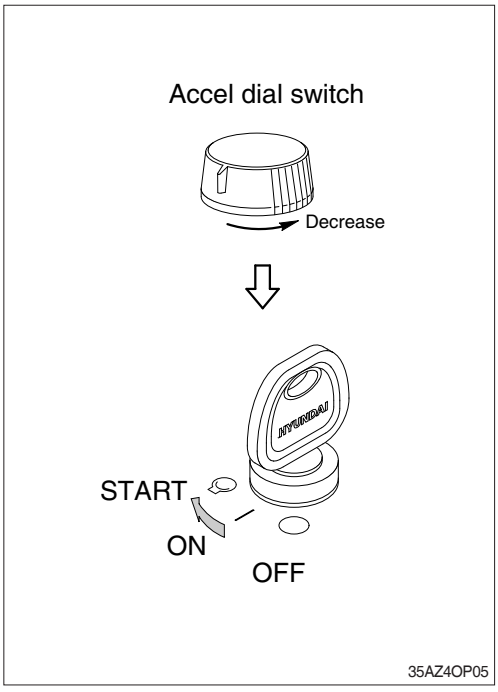
(1) Turn the accel dial to low idle position.

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

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

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

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



3) STARTING ENGINE IN COLD WEATHER

※ **By following below steps, you will be able to improve startability and fuel consumption in cold weather.**

⚠ **Always check for obstacles in the area and sound horn before starting the engine.**

※ **Check engine oil and fuel and replace as necessary. See page 2-48.**

※ **Top off coolant as needed.**

※ **When you turn ON starting switch, the fuel warmer automatically heats the fuel as needed by sensing coolant temperature.**

(1) Confirm all levers are in the neutral position.

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

(3) Turn the starting switch to the ON position, and wait the preheat pilot lamp turns off.

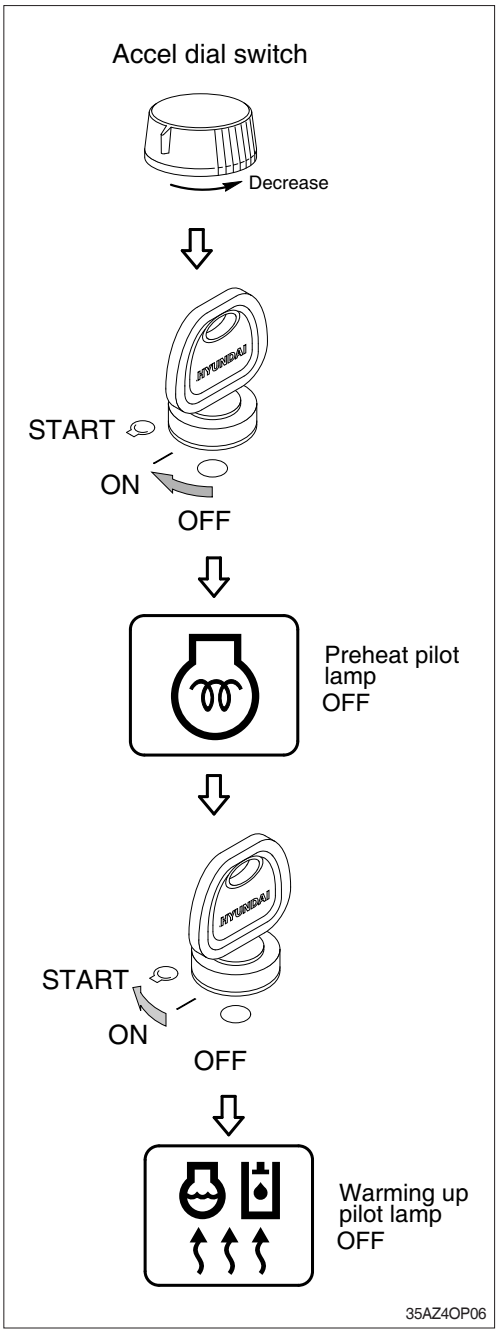
(4) Turn the starting switch to the START position to start the engine.

※ **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 (86˚F) the warming up process automatically starts.

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



4) INSPECTION AFTER ENGINE START

Inspect and confirm the following after engine starts.

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

(2) Is there any leakage of oil or water?

(3) Are any warning lamps (3) ON?
The seat belt reminder warning lamp (4) pops up and the buzzer sounds until seat belt is fastened.

(4) Are indicators for coolant temperature gauge (1) and hydraulic temperature gauge (2) in the normal operating range?

(5) Is 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 control panel, stop the engine immediately and correct problem as required.**

5) WARMING-UP OPERATION

※ **The most suitable temperature for the hydraulic oil is about 50 °C (122 °F).**
If the hydraulic oil temperature drops below 25 °C (77 °F), sudden operation can damage the hydraulic system. So 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.

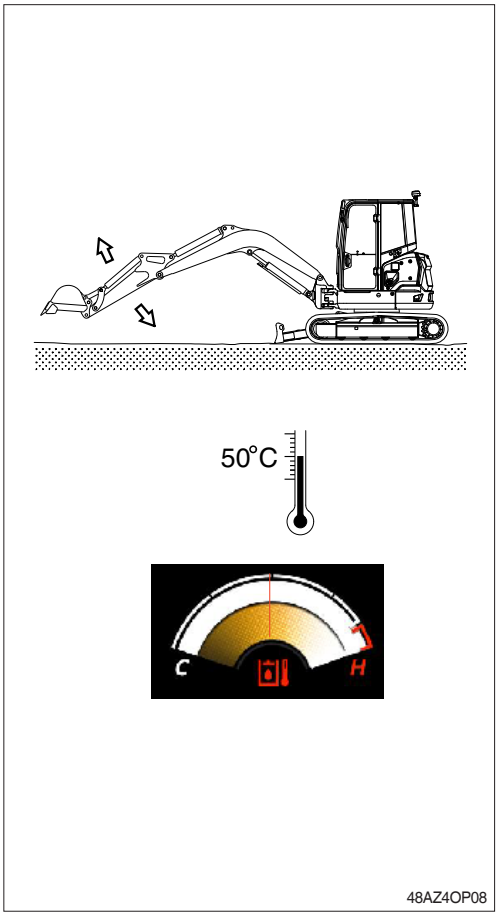
※ **Do not operate anything except bucket lever.**

(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) Finally this warming-up process will be completed by operating all cylinders several times along with the operation of swing and traveling.

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



6) TO STOP THE ENGINE

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

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

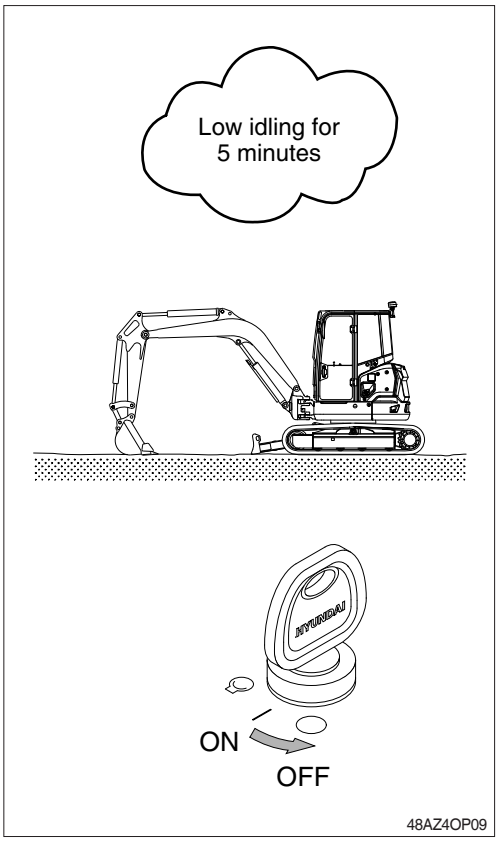
(1) Lower the bucket to the ground then put all the levers in the neutral position.

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

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

(4) Remove the key to prevent other people using the machine and lock the safety lever.

(5) Lock the cab door.



4. OPERATION OF WORKING DEVICE

※ Confirm the operation of control lever and working device.

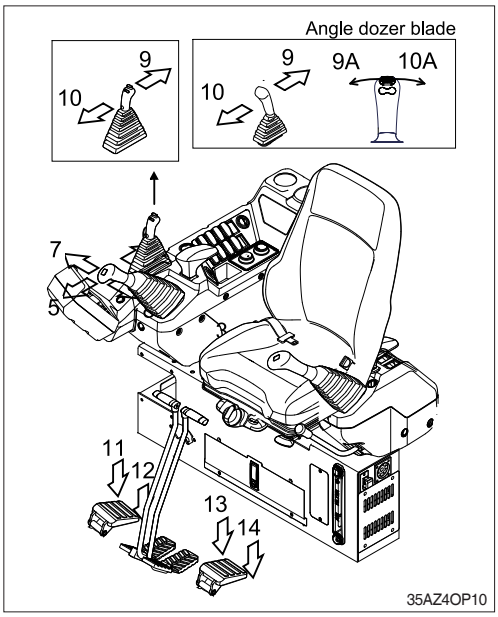
1) Left control lever controls arm and swing.

2) Right control lever controls boom and bucket.

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

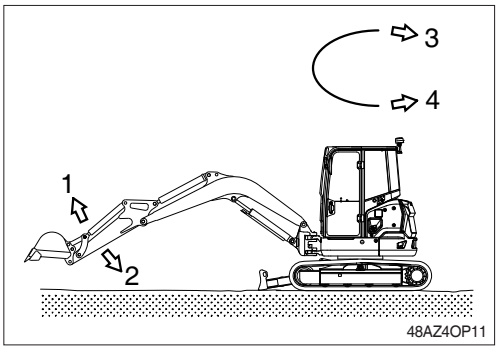
※ When operating swing, consider the swing distance by inertia.

※ Before starting the job or when travelling up or down a slope, position and keep the angle blade at neutral. (if equipped the angle blade)



※ Left control lever

1 Arm roll-out
2 Arm roll-in
3 Swing right
4 Swing left

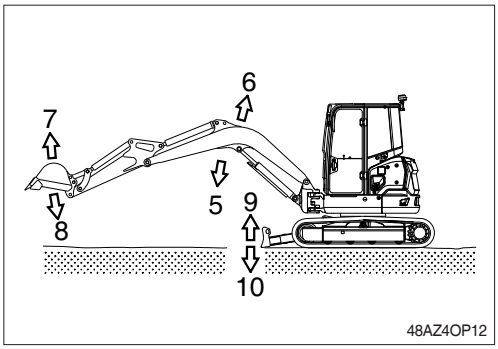


※ Right control lever

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
9A Dozer blade tilting left (opt)
10A Dozer blade tilting right (opt)

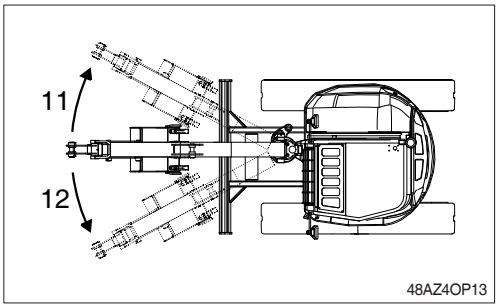


※ Boom swing pedal

11 Boom swing right
12 Boom swing left

※ Option control pedal

13, 14 Refer to optional attachment



5. TRAVELING OF THE MACHINE

1) BASIC OPERATION

(1) Traveling position

The travel motor is in the rear and the working device is forward.

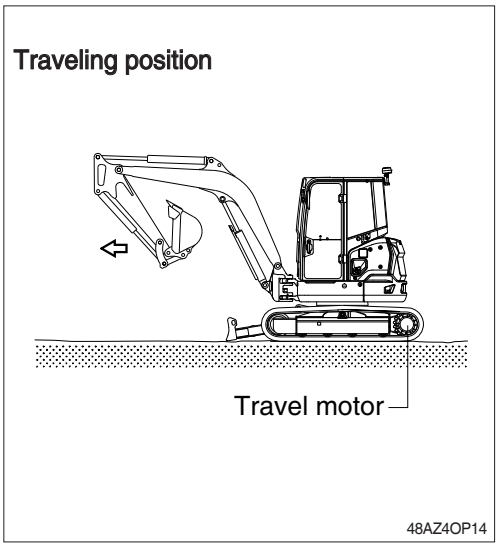
⚠ **Be careful as the traveling direction will be the opposite when the machine is rotated 180°.**

(2) Traveling operation

It is possible to travel by either travel lever or pedal.

※ **Do not travel continuously for a long time.**

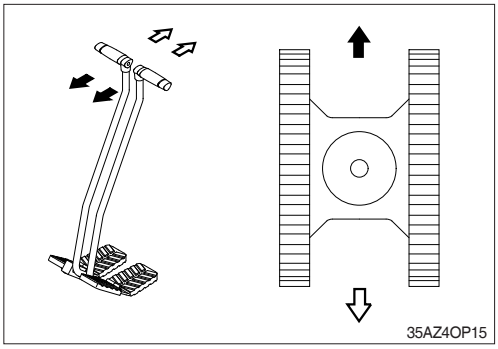
※ **Reduce the engine speed and travel at a low speed when traveling on uneven ground.**



(3) Forward and backward traveling

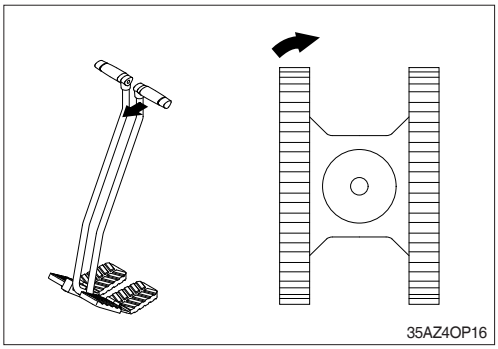
When the left and right travel levers or pedals are pushed at the same time, the machine will travel forward or backward depending on your selection.

※ **The speed can be controlled by the operation stroke of lever or pedal and change of direction will be controlled by difference of the left and right stroke.**



(4) Pivot turning

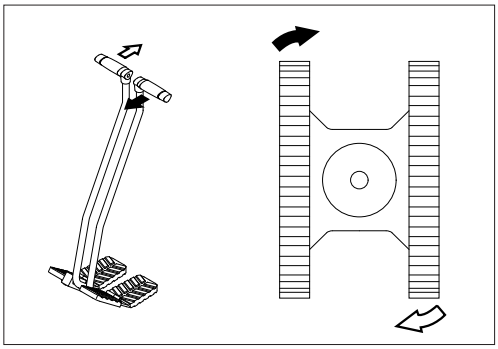
Operating only one side of lever or pedal makes the change of direction possible by moving only one track.



(5) Counter rotation

It is to rotate the undercarriage (only) while not advancing the machine forward or backward.

This is accomplished by moving the travel levers and or pedals in the opposite direction of each other.



2) TRAVELING ON A SLOPE

(1) Make sure that the travel lever is properly maneuvered by confirming the travel motor is in the right location.

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

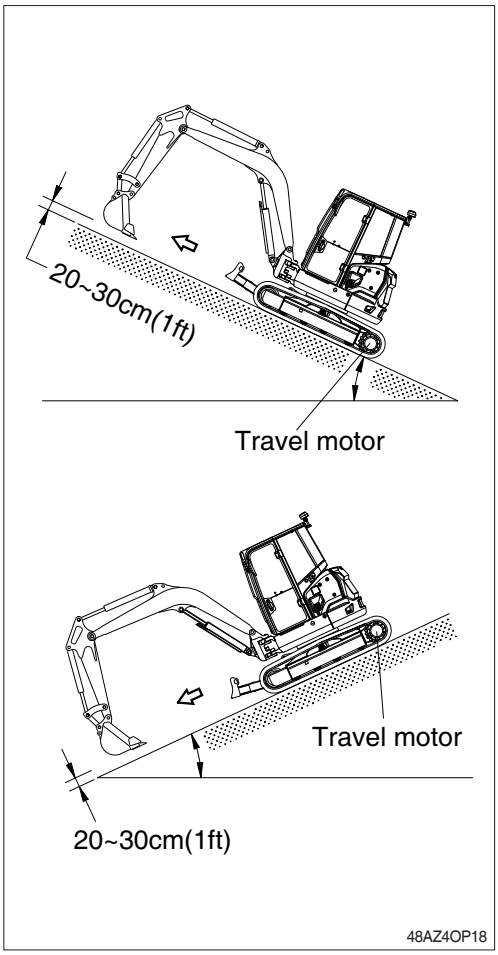
(3) If the machine starts to slide or loses stability, lower the bucket immediately as it will help slow or stop the machine.

(4) When parking on a slope, use the bucket as a brake and place blocks behind the tracks 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. Serious injury or death could occur.

⚠ Be sure to keep the travel speed switch on the LOW while traveling on a slope.



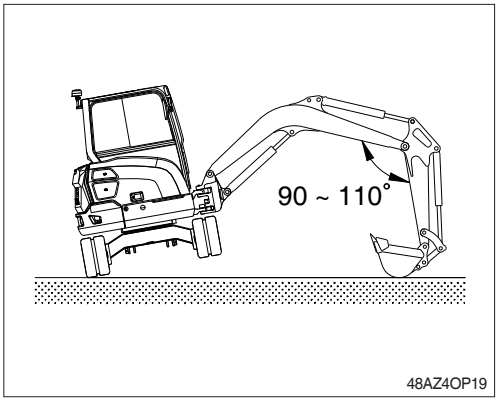
3) TRAVELING ON SOFT GROUND

※ If possible, avoid operating on soft ground.

(1) Move forward as far as machine can move.

(2) Take care not to go beyond the depth where towing is impossible on soft ground.

(3) When driving becomes impossible, lower bucket and use boom and arm to pull the machine.
Operate boom, arm, and travel lever at the same time to avoid the machine sinking.



4) TOWING THE MACHINE

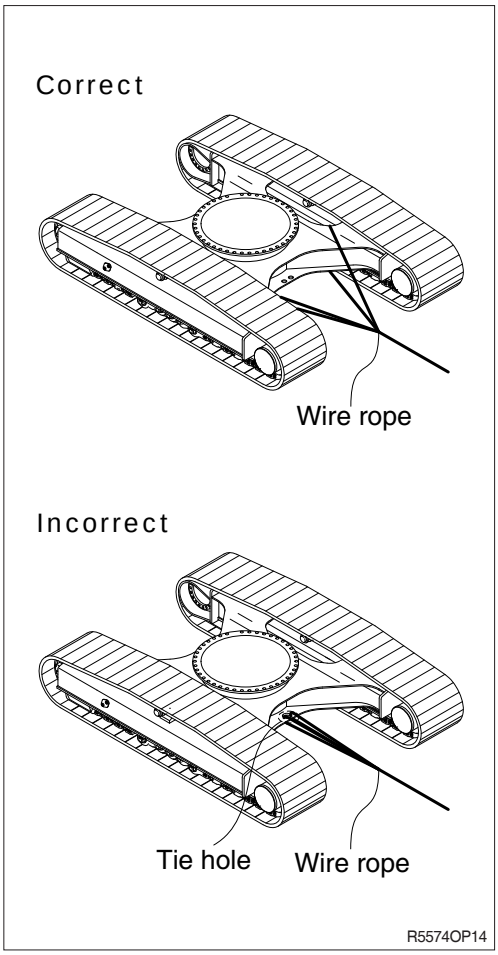
Tow the machine as follows when it can not move on its own.

(1) Tow the machine after hooking the wire rope to the frame as shown in the upper right illustration.

(2) Hook the wire rope to the frame and put a support under each part of wire rope to prevent damage.

※ **Never tow the machine using the tie hole, because this may break.**

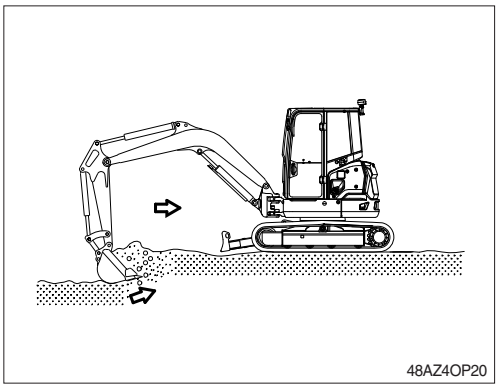
⚠ **Make sure no personnel are standing close to the tow rope as serious injury or death could occur if it breaks.**



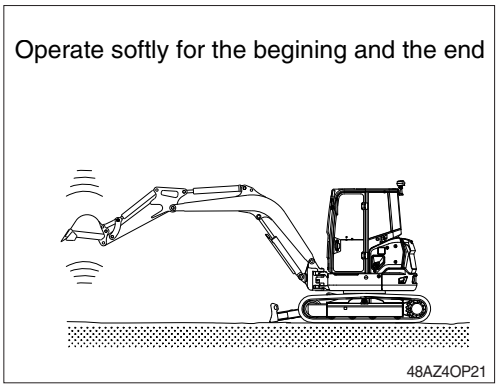
6. EFFICIENT WORKING METHOD

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.

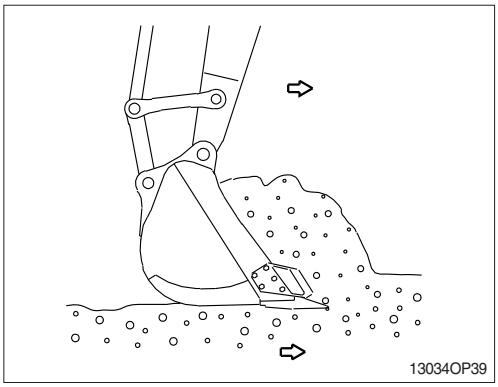
※ **Consult the local regulations and instructions when using the dozer blade for additional machine stability. For the installation of a dozer cylinder safety valve, please contact your HD Hyundai Construction Equipment dealer.**



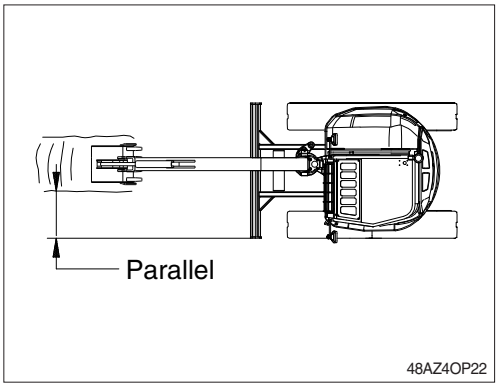
2) When lowering and raising the boom operate softly for the beginning and the end.
   In particularly, sudden stops while lowering the boom may cause damage to the machine.



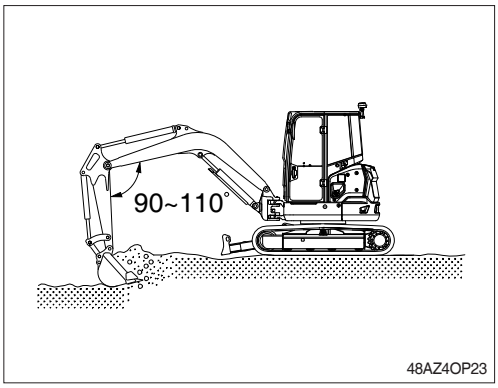
3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



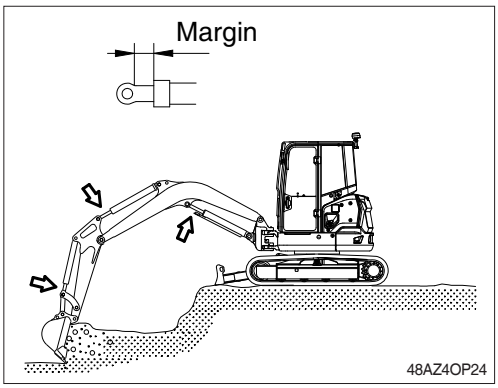
4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



5) Dig slowly while keeping the angle of boom and arm at a 90-110° when maximum digging force is required.

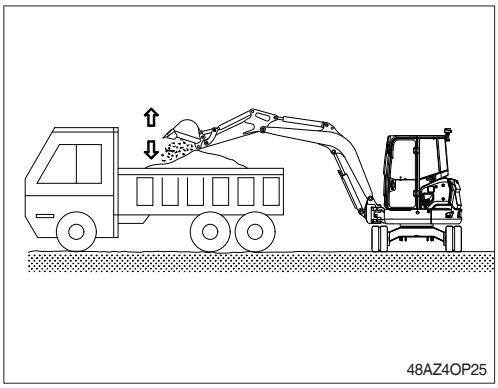


6) Leave a small margin of cylinder stroke to prevent damage of cylinder when working with the machine.

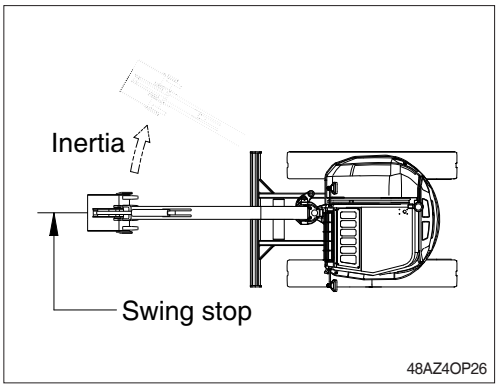


7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

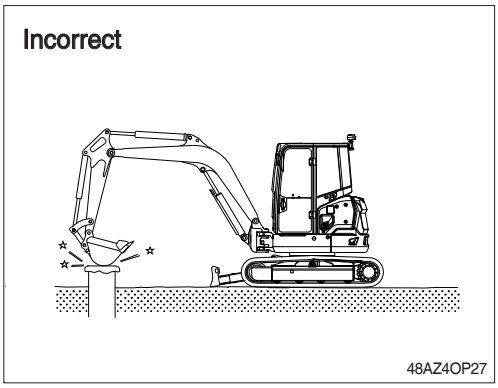
※ **Do not use the impact of bucket tooth when dumping.**



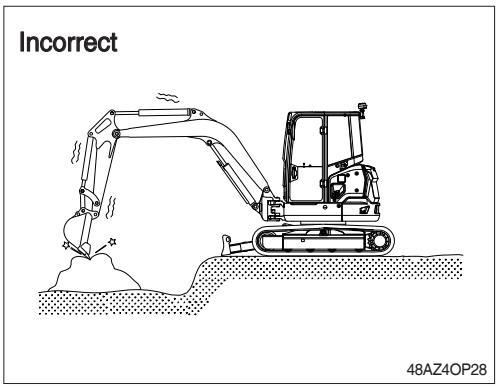
8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



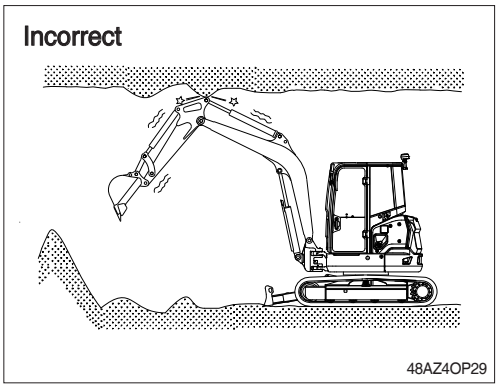
9) Do not use the dropping force of the work equipment for digging.
The machine can be damaged by the impact.



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



11) 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.

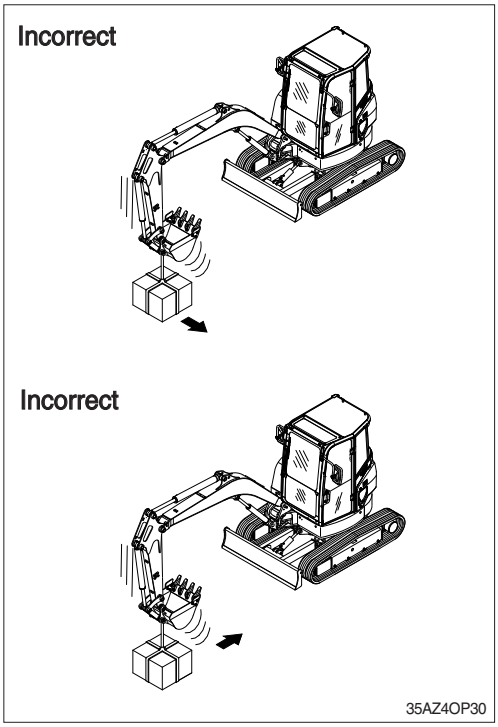


12) NEVER CARRY OUT EXCESSIVE OPERATIONS

Operation exceeding machine performance may result in accident or failure causing serious injury or death.

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

Never travel while carrying a load.



※ **Consult the local regulations and instructions for carrying out lifting operations. In accordance with EN 474-5 the machine must be equipped with following devices.**

- **a lifting device, f.e.lifting hook, lifting eye**
- ***an overload warning device (option)**
- ***safety valves on the arm and the boom cylinder (option)**
- ***a safety valve on the dozer cylinder (option)**

if the dozer blade is used to increase the machine stability.

*** : Please contact your HD Hyundai Construction Equipment dealer for installation.**

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.

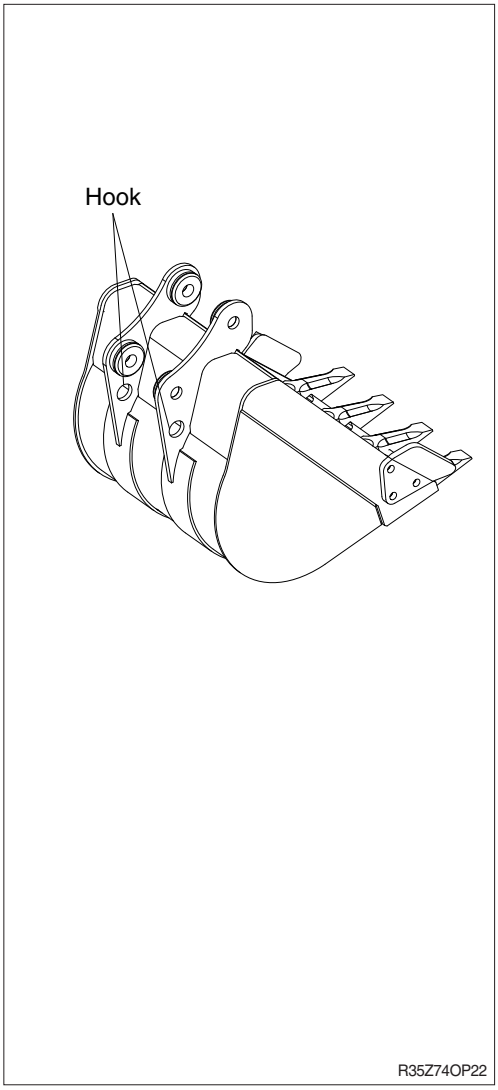
Due to the possible danger of the load falling or of collision with the load, no persons shall be allowed in the working area.

Before performing lifting operation, designate an operation supervisor.

Always execute operation according to their instructions.

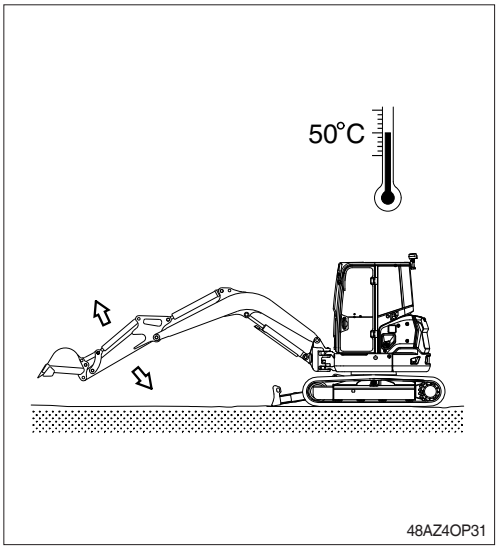
- Execute operating methods and procedures under their direction.
- Select a person responsible for signaling. Operate only on signals given by such person.

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



7. OPERATION IN THE SPECIAL WORK SITES

1) OPERATING 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 lights up 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 parts, such as pins and bushings, clean at all times.

(6) If the air conditioner and heater filters clog, 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, 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 nuts.

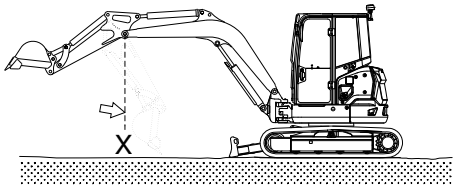
(2) Loosen the track tension slightly when working in such areas.

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

8. NORMAL OPERATION OF EXCAVATOR

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

1) When rolling in the arm, the roll-in movement stops momentary at point **X** in the picture shown, then recovers speed again after passing point **X**. This is because movement by the arm weight is faster than the speed of oil flow into the cylinder.
2) When lowering the boom, you 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 swinging or stopped, a noise near the swing motor may be heard. The noise is generated when the brake valve relieves.



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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**. This happens only when the starting switch is ON and the safety lever is the in the UNLOCK position. After the engine is stopped, set the safety lever to the **LOCK** position.

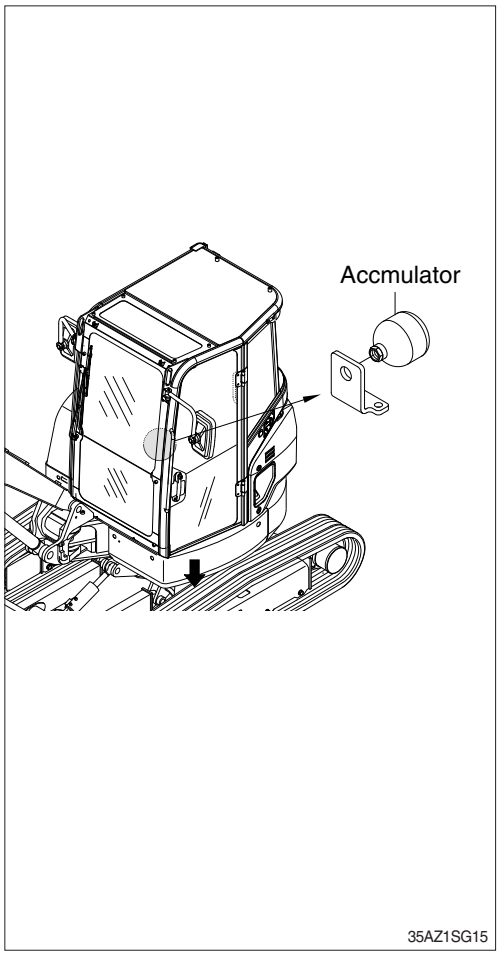
⚠ **Be sure no one is under or near the attachment before lowering the boom. Failure to comply could result in serious injury or death.**

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 flames 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

When storing the machine for longer than 1 month, follow these procedures:

1) BEFORE STORAGE

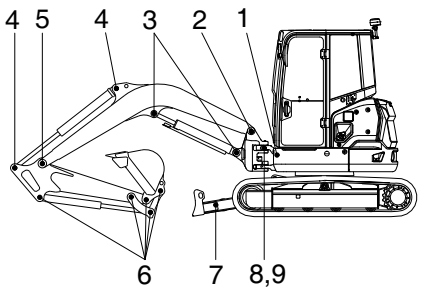
(1) Cleaning the machine

Clean the machine. Check and adjust tracks. 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. As oil can be diluted during storage.**
Apply an anticorrosive lubricant on the exposed part of piston rod of cylinder and in places where the machine rusts easily.



1 Lubricating manifold (3EA)
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 (6EA)
7 Dozer blade and cylinder (4EA)
Angle dozer blade and cylinder (7EA)
8 Boom swing post (2EA)
9 Boom swing cylinder (2EA)

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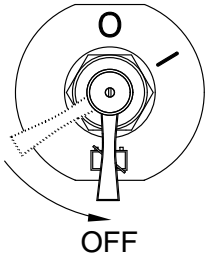
(3) Master switch

Turn OFF the master switch mounted electric box and store the machine.

⚠ **Turn OFF the master switch after the lamp goes OFF.**



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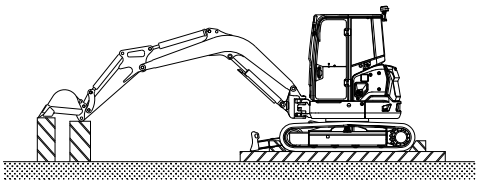
(4) Be sure to mix anticorrosive antifreezing solution in the radiator.

(5) Prevention of dust and moisture

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

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



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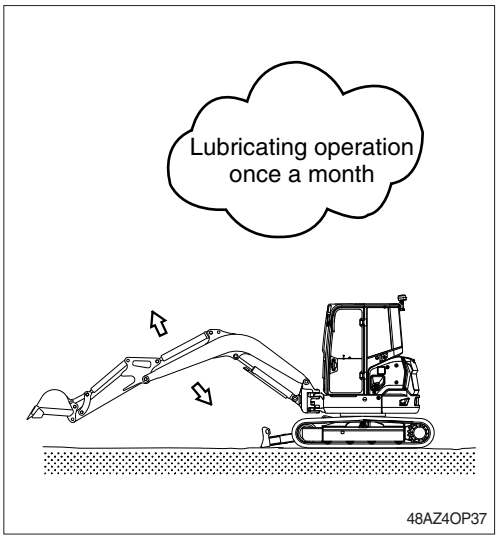
2) DURING STORAGE

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 over 6 months.

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.

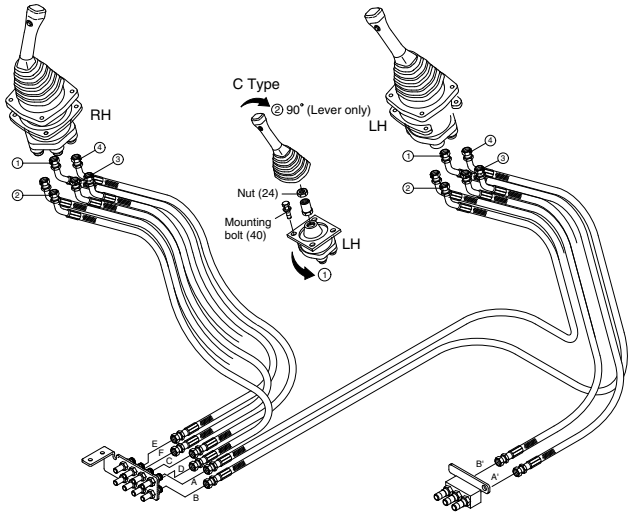
※ Remove the drain port plug and drain the water until the gear oil comes out and then tighten the drain plug.

※ 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.

11. RCV LEVER OPERATING PATTERN

1) PATTERN CHANGE VALVE NOT INSTALLED (standard)



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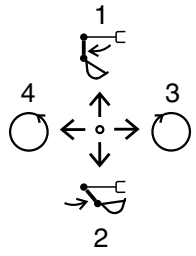
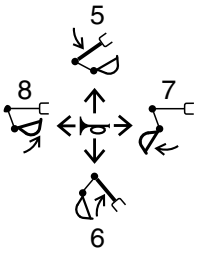
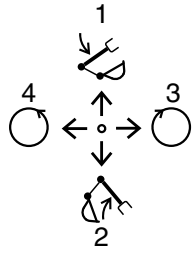
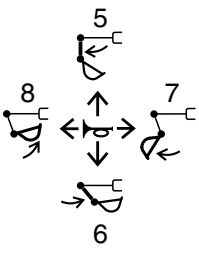
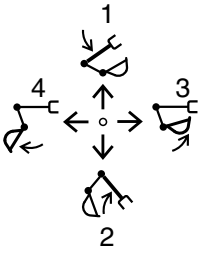
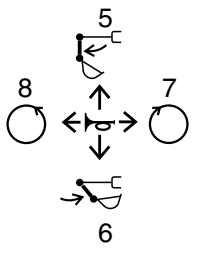
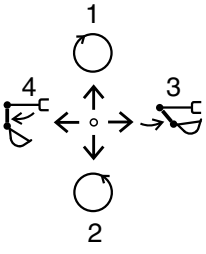
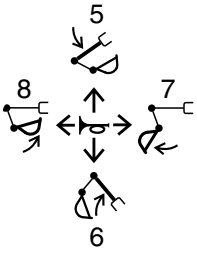
※ **Whenever a change is made to the machine control pattern, also exchange the pattern label in the cab to match the new pattern.**

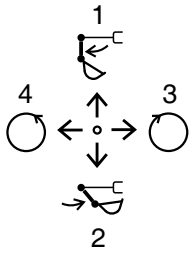
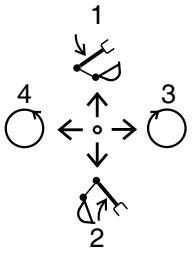
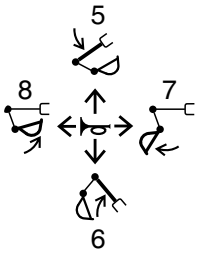
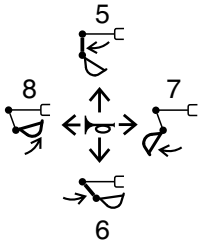
※ **The hose modification works must be carried out between RCV lever and terminal block (Not between terminal block and MCV).**

Pattern	Operation		Control function		Hose connection (port)		
	Left RCV lever	Right RCV lever			RCV lever	Change of Terminal block	
						From	To
ISO Type HD Hyundai Construction Equipment			Left	1 Arm out	②	A	-
				2 Arm in	④	B	-
				3 Swing right	③	B'	-
				4 Swing left	①	A'	-
			Right	5 Boom lower	④	C	-
				6 Boom raise	②	D	-
				7 Bucket out	①	E	-
				8 Bucket in	③	F	-
A Type			Left	1 Boom lower	②	A	C
				2 Boom raise	④	B	D
				3 Swing right	③	B'	-
				4 Swing left	①	A'	-
			Right	5 Arm out	④	C	A
				6 Arm in	②	D	B
				7 Bucket out	①	E	-
				8 Bucket in	③	F	-
B Type			Left	1 Boom lower	②	A	C
				2 Boom raise	④	B	D
				3 Bucket in	③	B'	F
				4 Bucket out	①	A'	E
			Right	5 Arm out	④	C	A
				6 Arm in	②	D	B
				7 Swing right	①	E	B'
				8 Swing left	③	F	A'
C Type			Left	① Loosen the RCV lever mounting bolt (40) and rotate lever assy 90˚ counterclockwise; then install. ② To put lever in correct position, disassemble nut (24) and rotate only lever 90˚ clockwise.			
			Right	Same as ISO type			

2) PATTERN CHANGE VALVE INSTALL (option)

※ If the machine is equipped with the pattern change valve, the machine operation pattern can be easily changed.

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

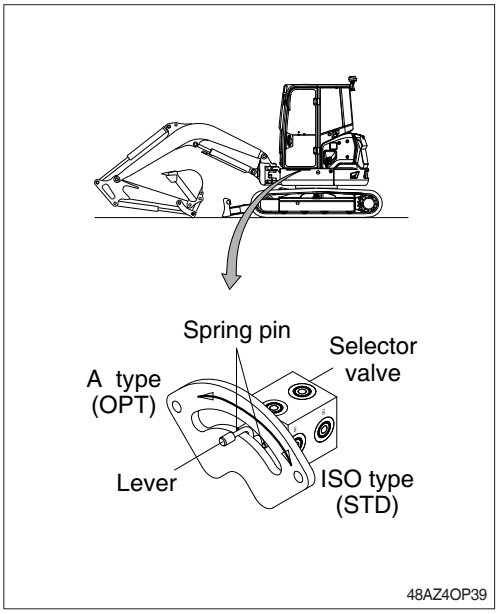
Operation	ISO type	A type
Left RCV lever		
Right RCV lever		

(1) The machine control pattern can be changed from the "ISO type" to "A type" by changing the position of the lever.

⚠ Before starting the machine, check the lever position of pattern change valve and actual operating of attachment.

(2) Change of operating pattern

Move lever from the "ISO type" to "A type" position until touch the spring pin (4).



12. HANDLING THE RUBBER TRACKS

1) USING THE RUBBER TRACKS PROPERLY

Rubber tracks have some advantages over steel tracks.
However, you cannot take full advantage of them if you use them in the same manner as steel ones. Use care in operating with rubber tracks in accord with the conditions of the work site and the type of work.

Comparison table of rubber and steel tracks

	Rubber	Steel
Low vibration	Excellent	Ordinary
Smooth travel	Excellent	Good
Silent travel	Excellent	Ordinary
Less damage to paved roads	Excellent	Ordinary
Simple handling	Excellent	Ordinary
Susceptibility to damage (strength)	Ordinary	Excellent
Drawber full	Excellent	Excellent

Rubber tracks have many advantages inherent in the unique properties of the material. On the other hand, however, they are low in strength. It is essential that you fully understand the properties of rubber tracks, and observe the precautions for operating and handling them to prolong their life and get the most out of them. Be sure to read this section for using the rubber tracks before using them.

2) WARRANTY FOR RUBBER TRACKS

The rubber tracks are not warranted for free repair or replacement if they are damaged because of misuse by the customer, including the failure to comply with the prohibitions and the instructions for safe operation; (for example, the failure to check the tension of the rubber tracks or service the rubber tracks properly, or "using the rubber tracks on surfaces and terrains which could physically damage them".)

3) PROHIBITIONS FOR USING THE RUBBER TRACKS

(1) Do not operate or turn on surfaces of terrains that have sharp stones, a hard, uneven rock base, or that expose the tracks to steel rods, scrap iron, or edges of iron plates. Failure to observe these prohibitions may damage the rubber tracks.

(2) Do not operate the machine on a stony surface like a riverbed. Doing this may damage the rubber tracks by catching gravel in the tracks or may cause the tracks to come off. Forcibly pushing obstacles will also shorten the life of the rubber tracks.

(3) Prevent the rubber tracks from getting exposed to oil, fuel or chemical solvents. If they are exposed, immediately wipe them. Also, do not travel on roads which have oily surfaces.

(4) When storing the rubber tracks for a long time period (more than three months), avoid placing them in a place subject to direct exposure to sunlight or rain.

(5) Do not operate the machine when the tracks will be exposed to heat, (i.e., near an open-air fire, on a steel plate that has been exposed to the blazing sun, or on a hot asphalt road.)

(6) Never run on one rubber track while the other is held above the ground with the implement. Doing this may damage the rubber track or cause it to come off.

4) PRECAUTIONS FOR USING THE RUBBER TRACKS

Observe the following precautions when operating the machine :

(1) Never spin-turn on concrete or asphalt roads.

(2) Do not change course suddenly. Doing this will cause the rubber track to wear early or be damaged.

(3) Do not turn the machine across a large level gap while traveling . Remember that running over a level gap at a right angle will prevent the track from coming off.

(4) Slowly lower the machine after it has been lifted above the ground with the implement.

(5) It is not recommended that the machine be used to handle any materials that become oily after being crushed (e.g., soybeans, corn, rapeseed oil seeds, etc.). After unavoidably using the machine to handle such materials, clean the tracks with water.

(6) It is not recommended that the machine be used to handle materials such as salt, ammonium sulfate, potassium chloride, potassium sulfate, or superbiphosphate of lime. Handling these materials may affect the core metal adversely. After using the machine to handle such materials, clean the tracks with water.

(7) Do not operate the machine at the seashore. Doing this may affect the core metal adversely due to the salt content.

(8) If a rubber track is cracked, it could be easily damaged when exposed to salt, sugar, wheat, or soybeans. Be sure to repair any cracks in the rubber track to prevent rubber chips from getting into the materials being handled.

(9) Do not allow the rubber track to rub aginst a concrete wall.

(10) The rubber tracks are prone to slip on snow or on a frozen road. Be careful of skidding when traveling or operating on a slope in cold weather.

(11) Operating the machine in extremely cold weather will deteriorate the rubber tracks, shortening their life.

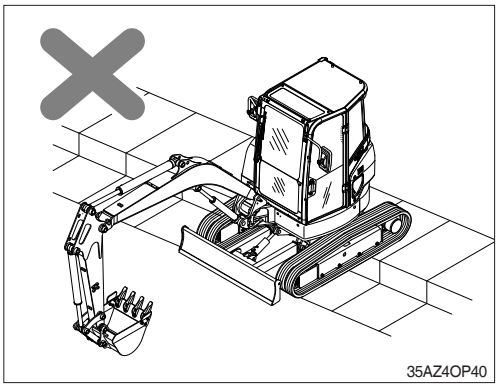
(12) Use the rubber tracks between -25°C to +55°C (-13°F to +131°F) because of the physical characteristics of rubber.

(13) Be careful not to damage the rubber tracks with the bucket while operating the machine.

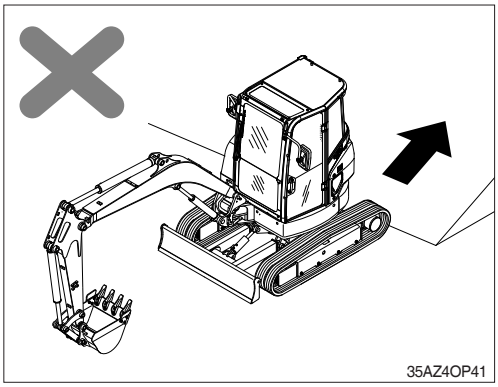
5) BE CAREFUL NOT TO COME OFF THE RUBBER TRACKS

Keep the tracks in appropriate tension to prevent them from coming off.
If the tension is too low, the rubber tracks may come off under the following conditions.
Even if the tension is adequate, take care when operating the tracks under these conditions.
Some illustrations in this section can be different from your machine.

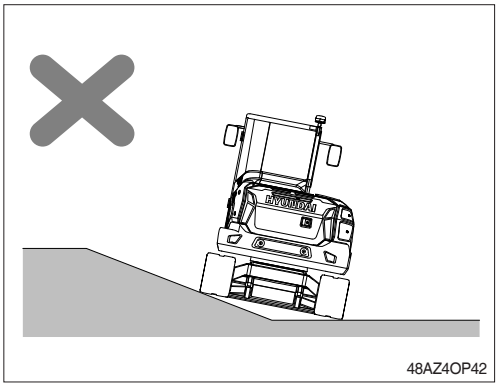
(1) Do not steer the machine at an angle other than 90 degrees across a large level gap created by a curbstone or a rock [approximately more than 20 ㎝ (8")]. Run over a level gap at a right angle only to prevent the tracks from coming off.


35AZ4OP40

(2) Do not steer the machine across a boundary between the flat ground and a slope, while moving backwards. If such travel is not avoidable, slow down the speed.


35AZ4OP41

(3) Do not travel with the track on one side on a slope or on convex ground (causing a machine angle of more than 10 degrees), and with the track on the other side on flat ground, to prevent the rubber track from being damaged. Be sure to travel with the tracks on both sides on the same level surface.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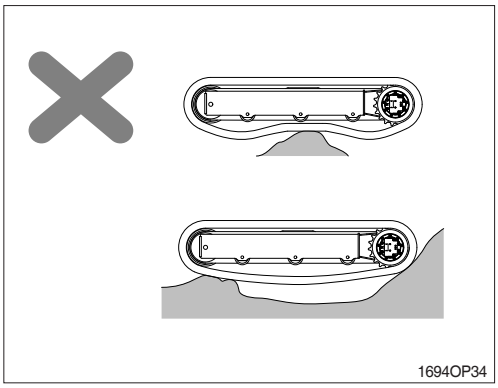
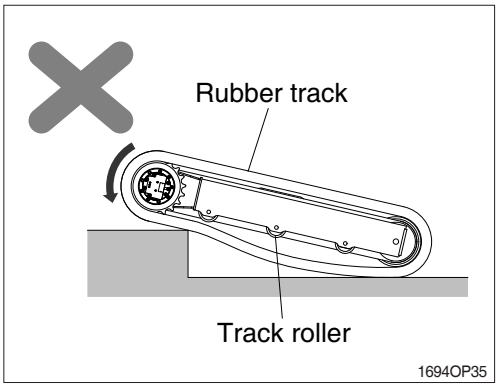
(4) The three cases illustrated above are those which could cause the rubber tracks to loosen. In addition, do not subject machine to such ground conditions as are illustrated in the figure at the right.

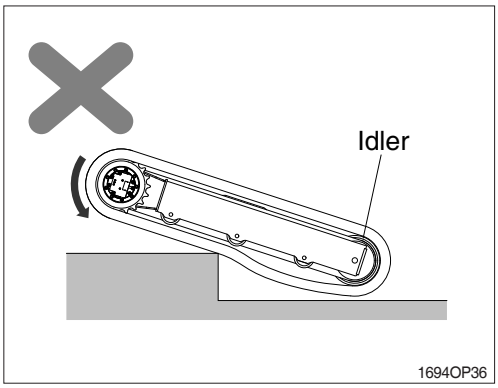


HOW THE RUBBER TRACKS COME OFF

(5) When running over a level gap, a clearance is created between the tracks and the track rollers. At this point, the tracks tend to come off.



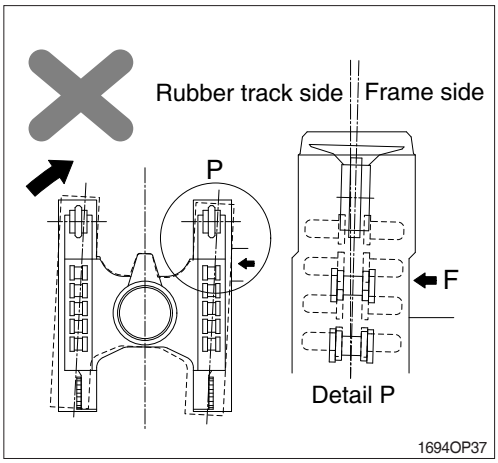
(6) If the machine is traveling in reverse, clearance may also be created between the track rollers and the rubber tracks, and between the idlers and the rubber tracks, causing the rubber tracks to come off.



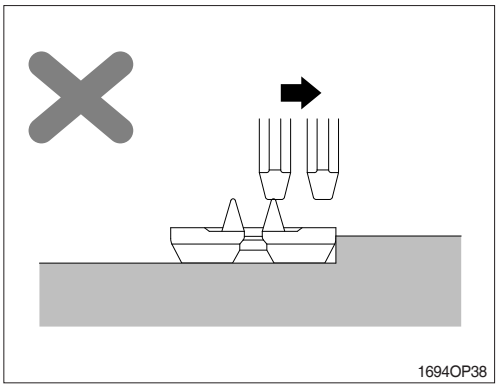
(7) Other situations to be avoided.

① When the machine changes the travel direction while the rubber tracks are blocked sideways by an obstacle or the like.

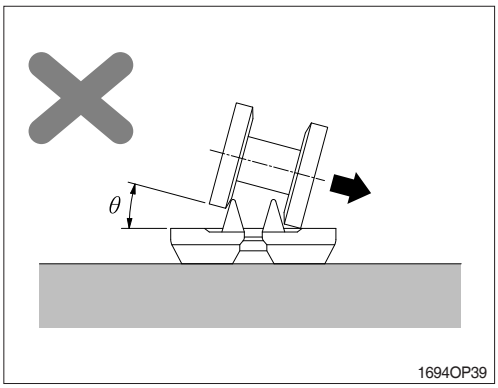
② When the idler and the track rollers are misaligned from the core metal, due to rubber track misalignment.



③ Traveling in reverse under the condition illustrated will cause the rubber tracks to come off.

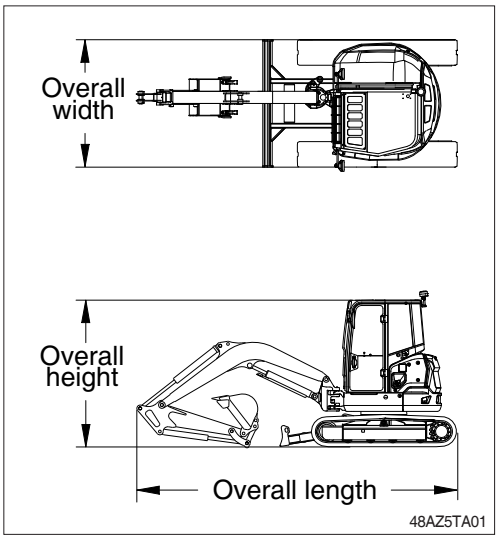


④ Changing the travel direction of the machine under the condition illustrated will cause the rubber tracks to come off.



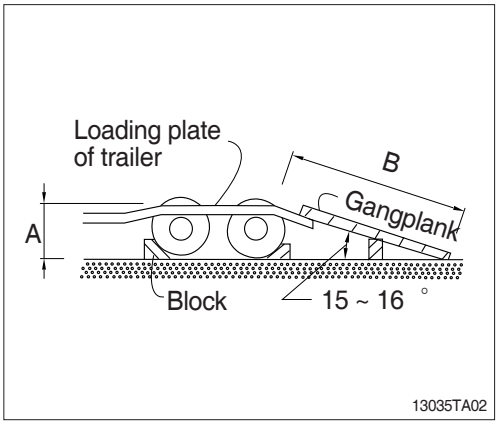
1. PREPARATION FOR TRANSPORTATION

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 chapter 2, specification.
3) Check the whole route such as the road width, the height of bridge and limit of weight etc., which will be passed.
4) Get 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



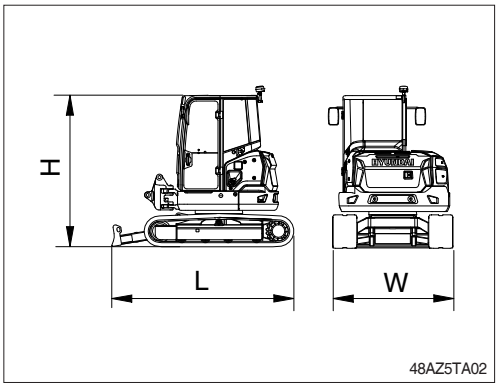
2. DIMENSION AND WEIGHT

1) BASE MACHINE

(1) Rubber track

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3055 (10' 0")
H	Height	mm (ft-in)	2580 (8' 6")
W	Width	mm (ft-in)	2000 (6' 7")
Wt	Weight	kg (lb)	4380 (9660)

※ With 400 mm (16") rubber shoes and 300 kg (660 lb) counterweight.



(2) Rubber track

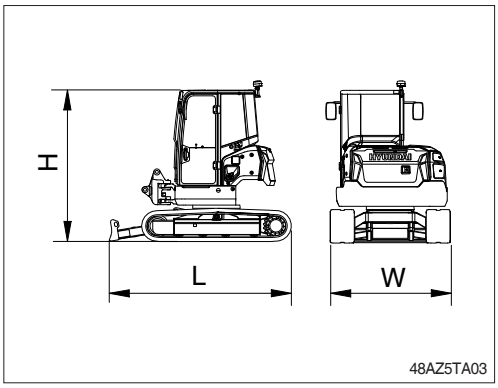
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3055 (10' 0")
H	Height	mm (ft-in)	2580 (8' 6")
W	Width	mm (ft-in)	2000 (6' 7")
Wt	Weight	kg (lb)	4525 (9980)

※ With 400 mm (16") rubber shoes and 450 kg (990 lb) add counterweight.

(3) Rubber track

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3055 (10' 0")
H	Height	mm (ft-in)	2580 (8' 6")
W	Width	mm (ft-in)	2000 (6' 7")
Wt	Weight	kg (lb)	4070 (8970)

※ With 400 mm (16") rubber shoes and without counterweight.



(4) Steel track

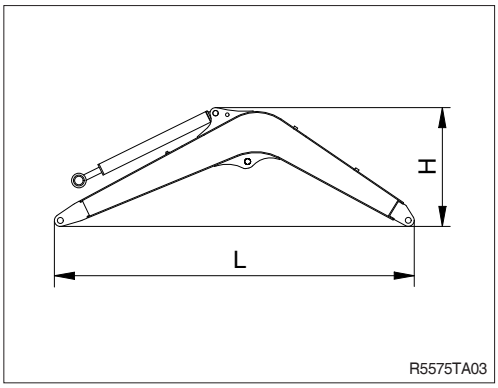
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3055 (10' 0")
H	Height	mm (ft-in)	2580 (8' 6")
W	Width	mm (ft-in)	2000 (6' 7")
Wt	Weight	kg (lb)	4070 (8970)

※ With 400 mm (16") steel shoes and without counterweight.

2) BOOM ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2908 (9' 6")
H	Height	mm (ft-in)	926 (3' 0")
W	Width	mm (ft-in)	266 (0' 10")
Wt	Weight	kg (lb)	269 (590)

※ 2.8 mm (9' 2") boom with arm cylinder (including piping and pins).

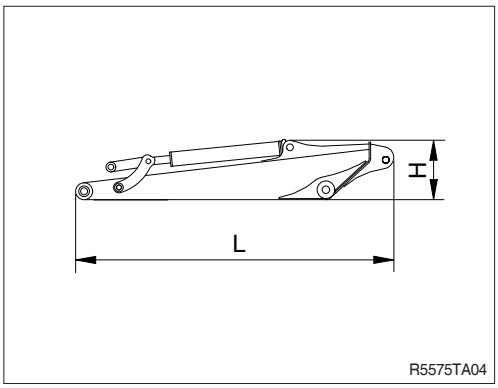


3) ARM ASSEMBLY

(1) Arm assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1836 (6' 0")
H	Height	mm (ft-in)	473 (1' 7")
W	Width	mm (ft-in)	196 (0' 8")
Wt	Weight	kg (lb)	132 (290)

※ 1.4 m (4' 7") arm with bucket cylinder (including linkage and pins).



(2) Arm assembly (with thumb bracket)

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1835 (6' 0")
H	Height	mm (ft-in)	554 (1' 10")
W	Width	mm (ft-in)	196 (0' 8")
Wt	Weight	kg (lb)	135 (300)

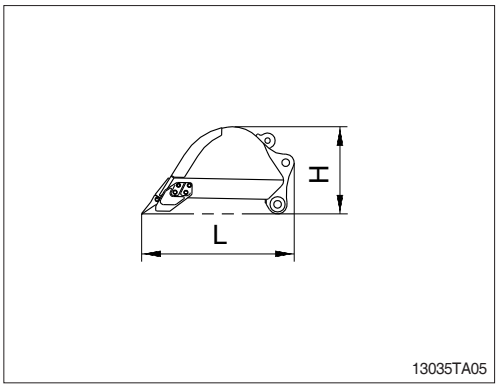
※ 1.4 m (4' 7") long arm with bucket cylinder (including linkage and pins).

4) BUCKET ASSEMBLY

(1) Bucket assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	987 (3' 3")
H	Height	mm (ft-in)	622 (2' 0")
W	Width	mm (ft-in)	606 (2' 0")
Wt	Weight	kg (lb)	134 (290)

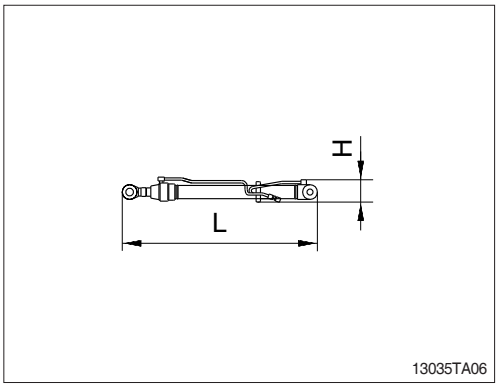
※ 0.15 m^3 (2.10 yd^3) SAE heaped bucket (including tooth and side cutters).



5) BOOM CYLINDER

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1090 (3' 7")
H	Height	mm (ft-in)	191 (0' 8")
W	Width	mm (ft-in)	271 (0' 11")
Wt	Weight	kg (lb)	53 (120)

※ including piping.

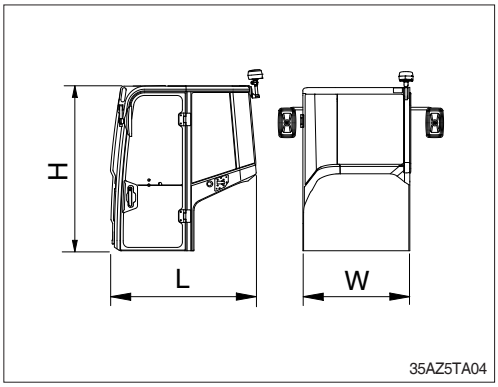


6) CAB ASSEMBLY

(1) Cab assembly

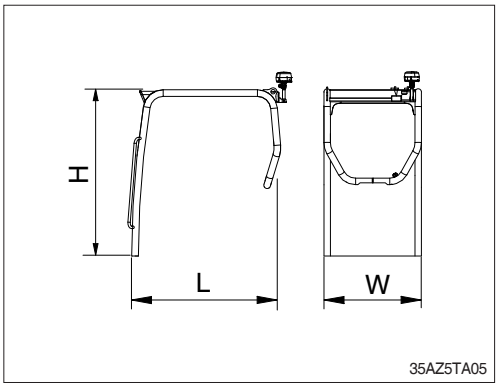
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1400 (4' 7") [1430 (4' 8")]
H	Height	mm (ft-in)	1635 (5' 4") [1635 (5' 4")]
W	Width	mm (ft-in)	1074 (3' 6") [1074 (3' 6")]
Wt	Weight	kg (lb)	455 (1000) [480 (1060)]

[ ] : with FOG GUARD



(2) Canopy assembly

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1340 (4' 5")
H	Height	mm (ft-in)	1620 (5' 4")
W	Width	mm (ft-in)	1030 (3' 5")
Wt	Weight	kg (lb)	320 (710)

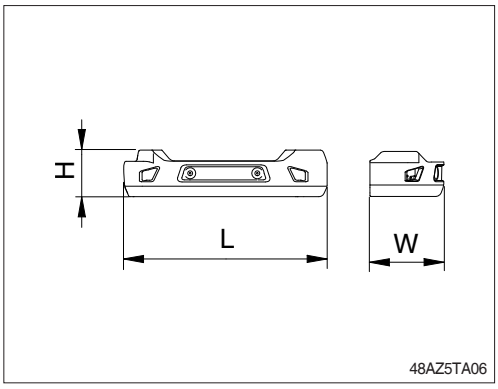


7) COUNTERWEIGHT

(1) Counterweight

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1820 (6' 0")
H	Height	mm (ft-in)	419 (1' 4")
W	Width	mm (ft-in)	685 (2' 3")
Wt	Weight	kg (lb)	300 (660)

※ 300 kg (650 lb) counterweight



(2) Counterweight

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1820 (6' 0")
H	Height	mm (ft-in)	419 (1' 4")
W	Width	mm (ft-in)	685 (2' 3")
Wt	Weight	kg (lb)	300 (660)
		kg (lb)	150 (330)

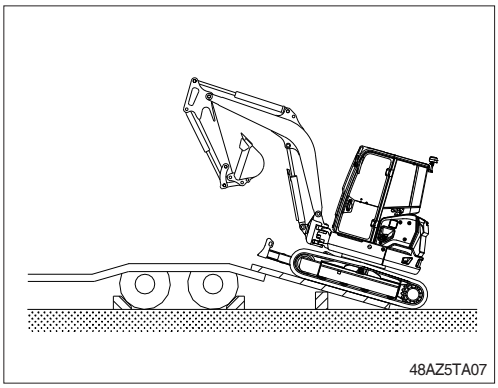
※ 450 kg (990 lb) add counterweight

3. LOADING THE MACHINE

1) Load and unload the machine on flat ground.

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

3) Place the safety lever to the LOCK position (if equipped) before fixing the machine at the bed of trailer and confirm if the machine is parallel to the bed of trailer.
   Keep the travel motor in the rear when loading and in the front when unloading.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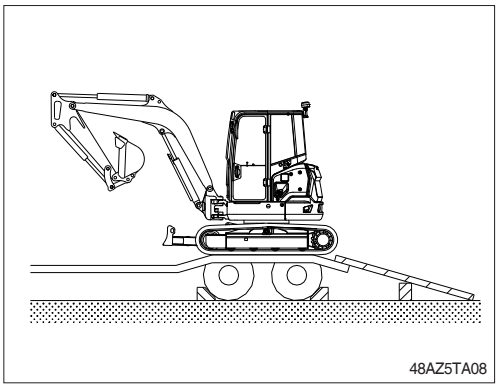
4) Do the following after loading the machine to the trailer.

(1) Stop loading when the machine is located horizontally with the rear wheel of trailer.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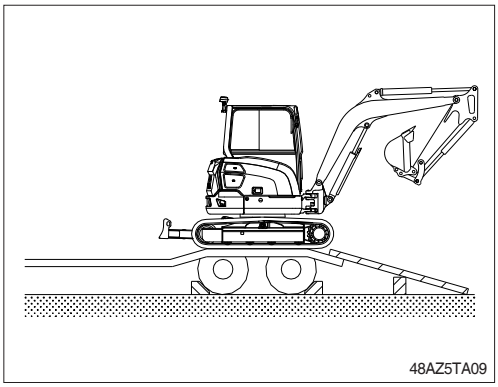
(2) Place the safety lever to the LOCK position (if equipped) after swinging the machine 180°.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(3) Lower the working equipment gently after the location is determined.

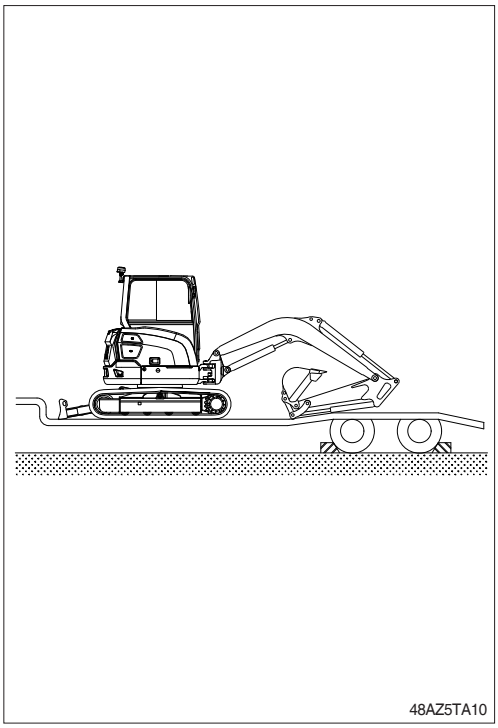
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

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

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

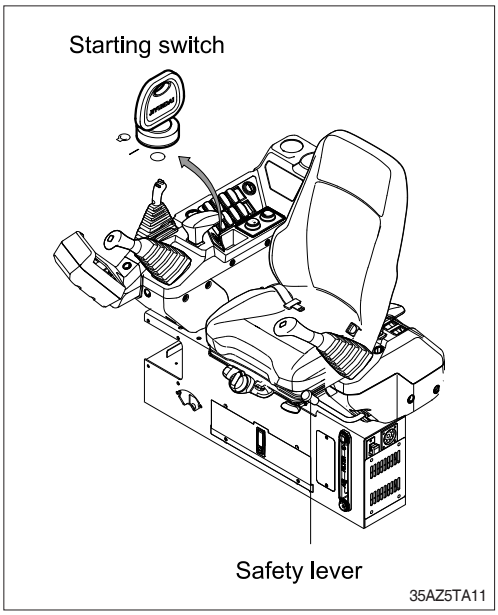
⚠ **Do not operate any other device when loading.**

⚠ **Be careful as to the boundaries of loading plate or trailer as the balance of machine will abruptly change.**

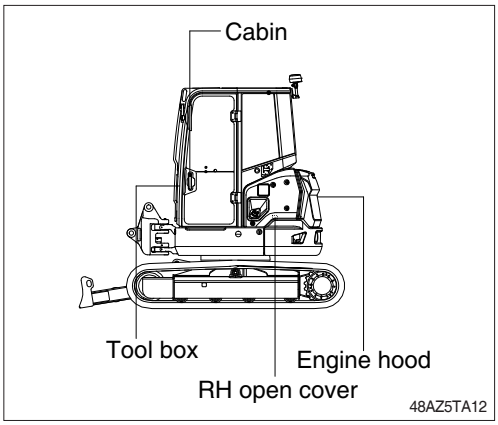


4. FIXING THE MACHINE

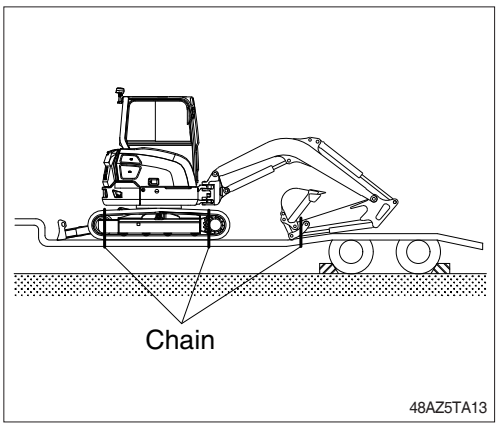
1) Lower down the working device on the loading plate of trailer.
2) Keep the safety lever in the **LOCK** position.
3) Turn **OFF** all the switches and remove the key.



4) Secure all locks.



5) Place timbers behind the tracks, secure the machine to trailer with chains or straps which are in good condition and approved for the weight which they will be securing, to prevent the machine from moving in any direction.



5. LOADING AND UNLOADING BY CRANE

⚠ The wrong hoisting method or installation of lifting device can cause serious injury, death, or damage to the machine.

1) Check the weight, length, width and height of the machine referring to chapter 2, specification when you are going to hoist the machine.
2) Use approved lifting device and ensure distance between lifting device and machine to avoid contact between the two.
3) Place rubber plates at lifting points to avoid any damage to the machine.
4) Place crane in the proper place.
5) Install approved lifting device as shown in the illustration.
6) The maximum angle of the front wire rope must not exceed 60° and the angle of the rear wire rope 45°.

※ If there is no stay, keep the angle of the rear wire rope below 15° to avoid interference with the machine.

⚠ Make sure wire rope is proper size.

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

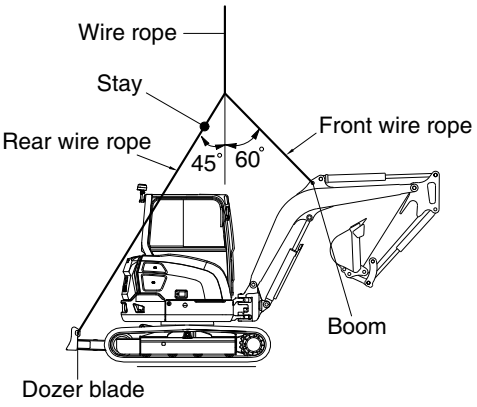
⚠ The wrong hoisting method or installation of wire rope can cause damage to the machine.

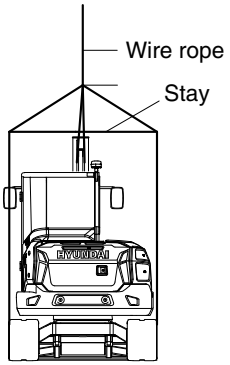
⚠ Do not load abruptly.

⚠ Keep area clear of any and all personnel.

⚠ Maintain center of gravity and balance when lifting.

⚠ Never lift the machine with a person in the cab or on the machine.





Rear view

48AZ5TA14

1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

(1) Inspect and service machine as described on Hour meter.

(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.

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 cutter, 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 adding 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.

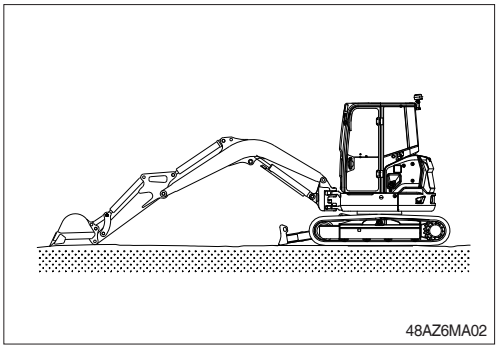
(10) For more detail information of maintenance, please contact your local HD Hyundai Construction Equipment dealer.

※ **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

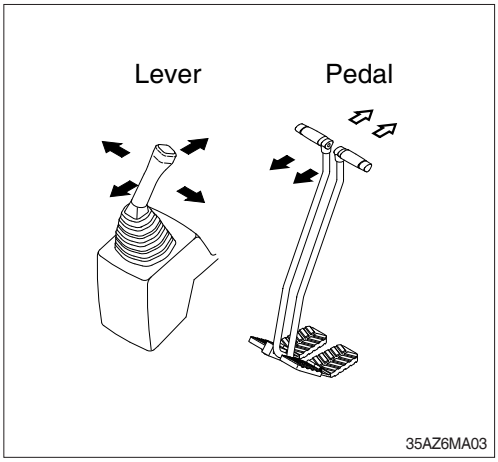
※ **Spewing of oil can cause an severe personal injury. Before you loosen hydraulic cap or any hydraulic line on the machine, always make sure machine of off, cooled down and that pressure is relived of the hydraulic system.**

(1) Repairs or maintenance of the machine shall be performed only after the power is off, and the machine blocked against hazardous motion.
The attachment shall be lowered.



(2) Set the safety lever completely in the UNLOCK position. Refer to section Levers and pedals.
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 servicing hydraulic component, loosen the connections slowly and do not stand in the direction where the oil may shoot out.**



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 install hose in a twisted, bent or crimped way.

(5) Always maintain the specified torque.

6) PERIODICAL REPLACEMENT OF SAFETY PARTS

(1) Perform periodic maintenance of the machine to prolong its useful life. This will assure and allow you to use the machine safely for a long time.
It is recommended to replace any parts related to safety (as needed), not only for safety but in order to maintain performance as well.

(2) These parts can shorten the life of the machine. The life span of such parts cannot be viewed visually and judged by the operator.

(3) Repair or replace if any 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="2">Every
2 years</td></tr>
<tr><td>Heater hose
(heater-engine)</td></tr>
<tr><td rowspan="8">Hydraulic system</td><td rowspan="3">Main circuit</td><td>Pump suction hose</td><td rowspan="3">Every
2 years</td></tr>
<tr><td>Pump delivery hose</td></tr>
<tr><td>Swing hose</td></tr>
<tr><td rowspan="5">Working device</td><td>Boom cylinder line hose</td><td rowspan="5">Every
2 years</td></tr>
<tr><td>Arm cylinder line hose</td></tr>
<tr><td>Bucket cylinder line hose</td></tr>
<tr><td>Dozer cylinder line hose</td></tr>
<tr><td>Boom swing cylinder line hose</td></tr>
</table>

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

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

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	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)-LH	M10 × 1.5	6.63±1.0	48±7.2
2		Engine mounting bolt (Engine-Bracket)-RH	M10 × 1.5	6.63±1.0	48±7.2
3		Engine mounting bolt (Bracket-Frame)	M12 × 1.75	12.8±3.0	93±22.0
4		Engine mounting bolt (Bracket-Pump housing)	M12 × 1.75	12.8±3.0	93±22.0
5		Radiator mounting bolt, nut	M10 × 1.5	6.9±1.4	50±10.0
6		Coupling mounting bolt	M12 × 1.75	10±1.0	72.3±7.2
7		Fuel tank mounting bolt	M10 × 1.5	6.9±1.4	50±10.0
8	Hydraulic system	Main pump mounting bolt	M12 × 1.75	12.8±3.0	93±22.0
9		Main pump housing mounting bolt	M10 × 1.5	6.63±1.0	48±7.2
10		Main control valve mounting bolt	M10 × 1.5	6.9±1.4	50±10.0
11		Hydraulic oil tank mounting bolt	M12 × 1.75	12.3±2.5	89±18.1
12		Turning joint mounting bolt, nut	M10 × 1.5	6.9±1.4	50±10.0
13		Swing motor mounting bolt	M14 × 2.0	19.6±2.9	142±21.0
14	Power train system	Swing bearing upper mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
15		Swing bearing lower mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
16		Travel motor mounting bolt	M12 × 1.75	13.8±1.0	100±7.2
17		Sprocket mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
18	Under carriage	Upper roller mounting bolt, nut	M16 × 2.0	29.7±3.0	215±32.5
19		Lower roller mounting bolt	M16 × 1.5	31.3±3.0	226±21.7
20	Others	Counterweight mounting bolt	M20 × 2.5	57.9±8.7	419±62.9
		Counterweight mounting bolt-add type	M24 × 3.0	100±15	723±108
21		Cab mounting bolt, nut	M 8 × 1.25	2.5±0.5	18.1±3.6
22		Operator's seat mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
23		Under cover mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
24		Swing post pin mounting bolt, nut	M12 × 1.75	12.8±3.0	93±22.0

3. FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil (API CK-4)	SAE 15W-40, SAE 5W-40★
Hydraulic oil	HD Hyundai Construction Equipment genuine long life (ISO VG 46, VG 68) Conventional (ISO VG 15★)
Travel reduction gear	SAE 85W-140 (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2, ★1: Ultra low sulfur diesel
Coolant (DCA4)	ASTM D6210 Mixture of 50% ethylene glycol base antifreeze and 50% water. Mixture of 60% ethylene glycol base antifreeze and 40% water.★

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

★ : Cold region
Russia, CIS, Mongolia

★1 : Ultra low sulfur diesel
- sulfur content ≤ 10 ppm

※ **Refer to the page 2-48 for further information of recommended oils.**

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
· Cooling fan	Check	6-23
· Air intake piping	Check	-
· Air cleaner dust ejection valve	Check	6-23
Fuel tank	Check, Refill	6-24
Hydraulic oil level	Check, Add	6-27
Engine oil level	Check, Add	6-17
Radiator coolant level	Check, Add	6-19
Control panel & pilot lamp	Check, Clean	6-36
Water separator	Check, Drain	6-24
Fan belt tension and damage	Check, Adjust	6-22
★ Attachment pins and bushing	Lubricate	6-35
· Boom cylinder head and rod		
· Boom connecting		
· Arm cylinder head and rod		
· Boom + Arm connecting		
· Bucket cylinder head end		

★ Lubricate every 10 hours or daily for initial 100 hours.

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water, sediment)	Check, Drain, Clean	6-24
Track tension	Check, Adjust	6-32
Swing gear and pinion grease	Lubricate	6-30
Bucket linkage and pin	Lubricate	6-33
· Bucket cylinder rod end		
· Arm + Bucket connecting		
· Arm + Bucket control link		
· Bucket control rod		
· Boom swing post + Upper frame connecting		
· Boom swing cylinder head and rod		
· Dozer blade + Lower frame connecting		
· Dozer blade cylinder head and rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Boom swing cylinder	Lubricate	6-30
Attachment pins and bushing	Lubricate	6-35
· Boom cylinder head and rod		
· Boom connecting		
· Arm cylinder head and rod		
· Boom + Arm connecting		
· Bucket cylinder head end		
Bolts & Nuts	Check, Tight	6-7
· Sprocket mounting bolts		
· Upper roller mounting bolt		
· Lower roller mounting bolt		
· 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		
· Under cover mounting bolts		

※ 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	6-29
★ Pilot line filter element	Replace	6-30

★ Replace 2 filters for continuous hydraulic breaker operation only.

5) EVERY 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-17, 18
Engine oil filter	Replace	6-17, 18
Battery (voltage)	Check, Clean	6-36
Boom swing cylinder	Lubricate	6-30
Swing bearing	Lubricate	6-30
Attachment pins and bushing	Lubricate	6-35
· Boom cylinder head and rod		
· Boom connecting		
· Arm cylinder head and rod		
· Boom + Arm connecting		
· Bucket cylinder head end		
Bolts & nuts	Check, Tight	6-7
· Upper roller mounting bolt		
· Lower roller mounting bolt		
· 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		
· Hydraulic pump mounting bolts		
· Under cover mounting bolts		

6) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Fuel filter element	Replace	6-25
Water separator	Replace	6-24, 25
Pilot line filter element	Replace	6-30
Hydraulic oil return filter	Replace	6-29
Travel reduction gear oil	Change	6-31

※ Service the above items only for the new machine, and thereafter keep the normal service interval.

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
Fuel filter element	Replace	6-25
Water separator	Replace	6-24, 25
Radiator and cooler fin	Check, Clean	6-22
☆Air cleaner element (primary)	Inspect, Clean	6-23
Aircon & heater filter	Clean	6-39

☆ 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
Travel reduction gear oil	Change	6-31
Hydraulic oil return filter	Replace	6-29
Pilot line filter element	Replace	6-30

9) EVERY 1500 HOURS SERVICE

Check items	Service	Page
Aircon & heater filter	Replace	6-39

10) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Radiator coolant ★3	Change	6-19, 20, 21
Hydraulic oil ★1	Change	6-28
Hydraulic oil suction strainer	Check, Clean	6-28
RCV lever	Check, Lubricate	6-31
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

★1 Conventional hydraulic oil ★3 Conventional coolant

※ Change oil every 600 hours of continuous hydraulic breaker operation.

11) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil ★2	Change	6-28

★2 HD Hyundai Construction Equipment genuine long life

※ Change oil every 1000 hours of continuous hydraulic breaker operation.

12) EVERY 6000 HOURS SERVICE

Check items	Service	Page
Radiator coolant *4	Change	6-19, 20, 21

*4 HD Hyundai Construction Equipment genuine long life

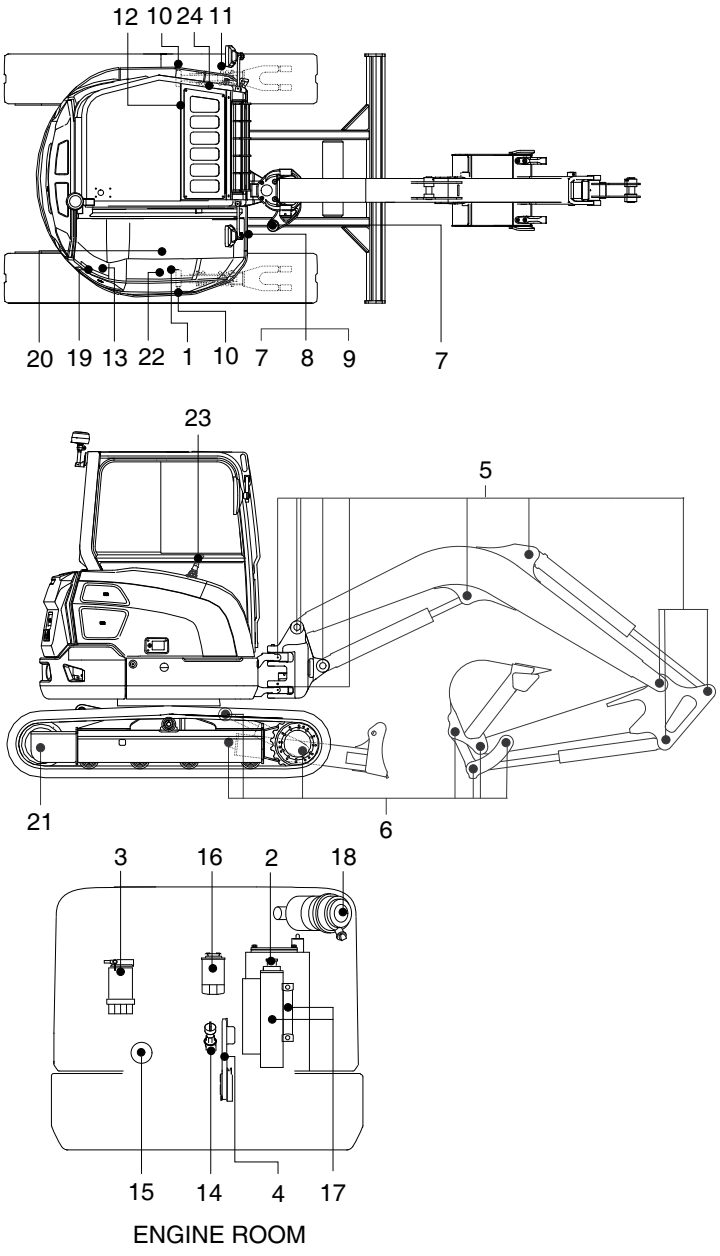
13) WHEN REQUIRED

Whenever you have trouble with 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
· Water separator	Drain or Replace	6-24, 25
· Fuel filter element	Replace	6-25
· Fuel filler pump filter	Clean, Replace	6-26
Engine lubrication system		
· Engine oil	Change	6-17, 18
· Engine oil filter	Replace	6-17, 18
Engine cooling system		
· Radiator coolant	Add or Change	6-19, 20, 21
· Radiator	Clean or Flush	6-19, 20, 21, 22
Engine air and exhaust system		
· Air cleaner element (primary)	Clean, Replace	6-23
· Air cleaner element (safety)	Replace	6-23
· DPF (diesel particulate filter)	Clean	6-26
Hydraulic system		
· Hydraulic oil	Add or Change	6-27, 28
· Hydraulic oil return filter	Replace	6-29
· Pilot line filter element	Replace	6-30
· Hydraulic oil suction strainer	Clean	6-28
· RCV lever	Lubricate	6-31
Under carriage		
· Track tension	Check, Adjust	6-32
Bucket		
· Tooth	Replace	6-34
· Side cutter	Replace	6-33
· Linkage	Adjust	6-33
· Bucket assy	Replace	6-33
Air conditioner and heater		
· Aircon & heater filter	Replace	6-39

5. MAINTENANCE CHART

1) CAB TYPE



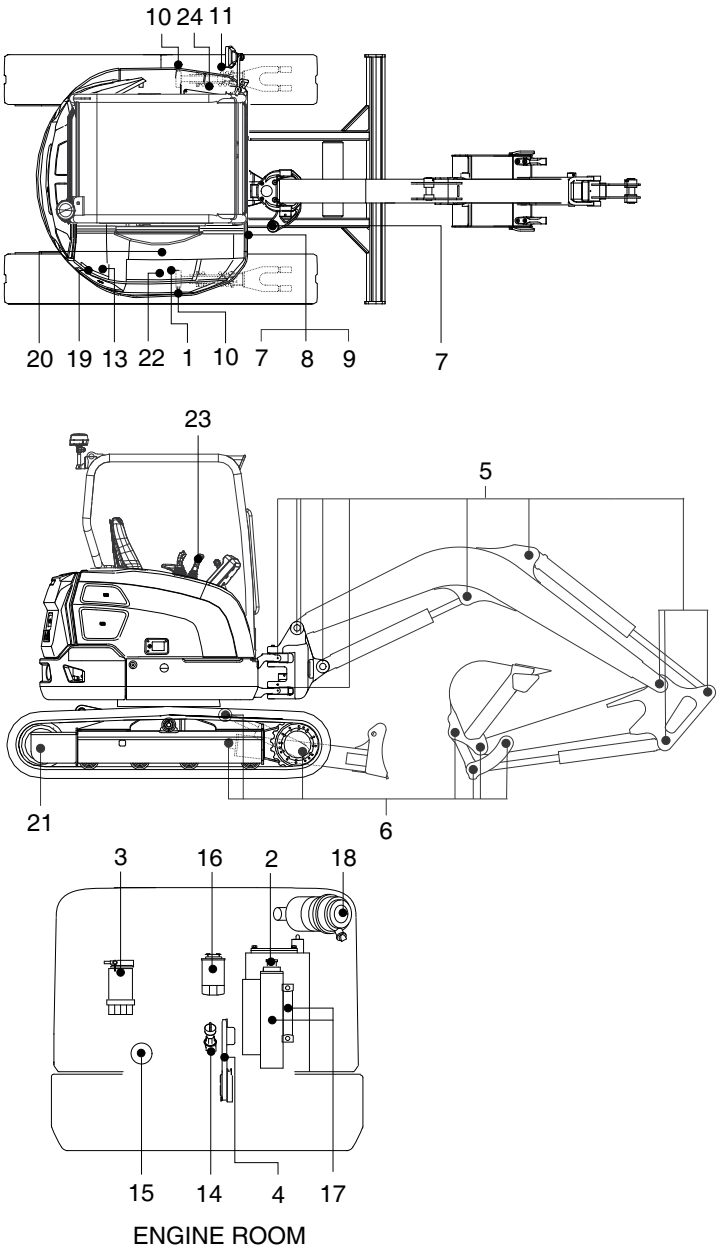
ENGINE ROOM

94MT-10712

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 do not allow any open flames near the machine.

2) CANOPY TYPE



94MT-10721

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 do not allow any open flames near the machine.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
10 Hours or daily	1	Hydraulic oil level	Check, Add	HO	44 (116)	1
	2	Radiator coolant	Check, Add	C	10.2 (2.7)	1
	3	Water separator	Check, Drain	-	-	1
	4	Fan belt tension and damage	Check, Adjust	-	-	1
	14	Engine oil level	Check, Add	EO	7.4 (2.0)	1
Initial 50 Hours	7	Boom swing cylinder	Lubricate	-	-	2
50 Hours or weekly	6	Bucket linkage and blade pins	Lubricate	PGL	-	10
		Bucket linkage and angle blade pins	Lubricate	PGL	-	13
	9	Swing gear and pinion grease	Lubricate	PGL	-	1
	10	Track tension	Check, Adjust	PGL	-	2
	11	Fuel tank (water, sediment)	Check, Clean	-	-	1
Initial 250 Hours	3	Water separator	Replace	-	-	1
	16	Fuel filter element	Replace	-	-	1
	19	Pilot line filter element	Change	-	-	1
	20	Hydraulic oil return filter	Replace	-	-	1
	21	Travel reduction gear oil	Replace	-	1.1 (0.29)	1
250 Hours	5	Attachment pins	Lubricate	PGL	-	10
	7	Boon swing cylinder	Lubricate	PGL	-	2
	8	Swing bearing	Lubricate	PGL	-	1
	13	Battery (voltage)	Check, Clean	-	-	1
	14	Engine oil	Change	EO	7.4 (2.0)	1
	15	Engine oil filter	Replace	-	-	1
500 Hours	12	Aircon & heater filter	Clean	-	-	1
	16	Fuel filter element	Replace	-	-	1
	17	Radiator and cooler fin	Check, Clean	-	-	2
	18	Air cleaner element (primary)	Clean	-	-	1
1000 Hours	19	Pilot line filter element	Replace	-	-	1
	20	Hydraulic oil return filter	Replace	-	-	1
	21	Travel reduction gear oil	Change	GO	1.1 (0.29)	2
1500 Hours	12	Aircon & heater filter	Replace	-	-	1
2000 Hours	1	Hydraulic oil ★1	Change	HO	44 (11.6)	1
	2	Radiator coolant ★1	Change	C	10.2 (2.7)	1
	22	Hydraulic oil suction strainer	Check, Clean	-	-	1
	23	RCV lever	Lubricate	PGL	-	2
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
5000 Hours	1	Hydraulic oil ★2	Change	HO	44 (11.6)	1
6000 Hours	2	Radiator coolant ★2	Change	C	10.2 (2.7)	1
As required	12	Aircon & heater filter	Replace	-	-	1
	14	DPF (diesel particulate filter)	Clean	-	-	1
	18	Air cleaner element (primary/safety)	Clean, Replace	-	-	2
	24	Fuel filler pump filter	Clean, Replace	-	-	1

★1 Conventional ★2 HD Hyundai Construction Equipment genuine long life

※ Oil symbol

Please refer to the recommended lubricants for specification.

DF : Diesel fuel GO : Gear oil HO : Hydraulic oil

C : Coolant PGL : Grease EO : Engine oil

※ Item numbers are based on the cab type.

1) CHECK ENGINE OIL LEVEL

Check the oil level with the machine on 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. Check to see that the oil level lies between the upper line and lower line.

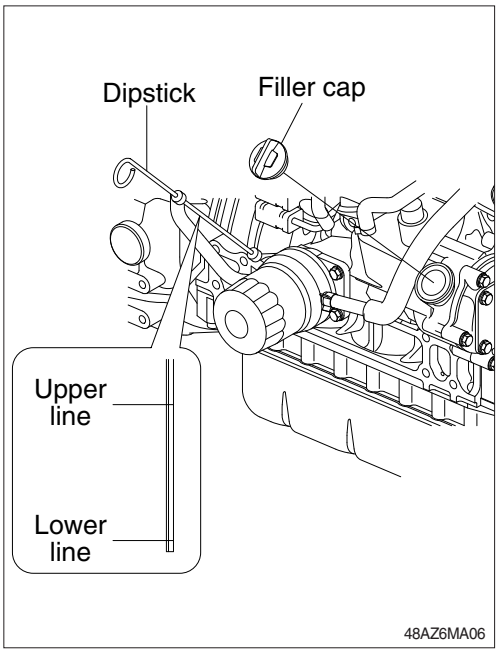
(3) If oil level is LOW, add oil and then check again.

※ **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.**

⚠ **When you use an oil of different brand or viscosity from the previous, drain the remaining oil. Do not mix 2 different types of oil.**



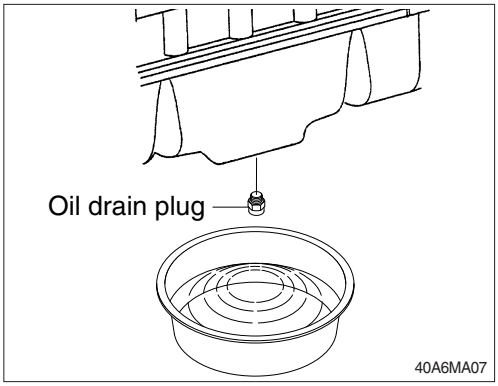
2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(1) Warm up the engine.

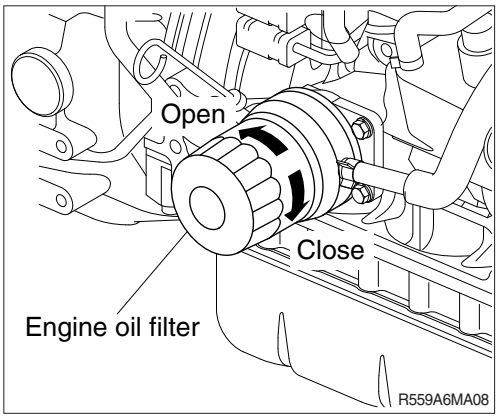
(2) Remove the drain plug.

※ **A drain pan with a capacity of 15 liters (4.0 U.S. gallons) will be adequate.**

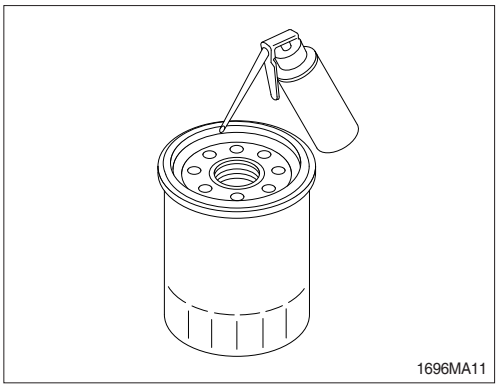
※ **Dispose of the waste oil in accordance with local regulations.**



(3) Clean around the filter head, remove the filter with a filter wrench and clean the mounting surface.

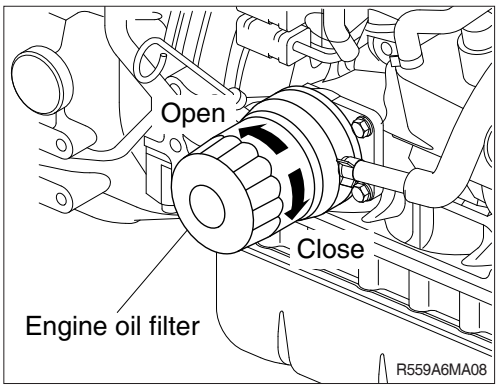


(4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filter.



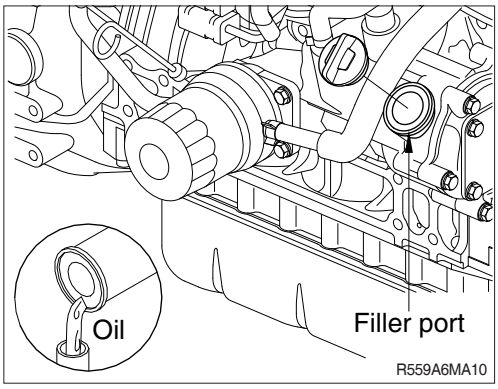
(5) Install the new filter manually by turning it clockwise until if contacts the filter head.
Tighten to 2.0~2.4 kgf · m (14~17 lbf · ft) or one additional turn using the filter wrench.
Remove the quick coupler hose.

※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**



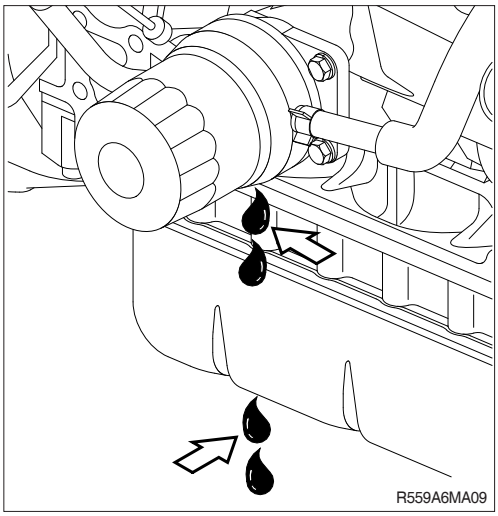
(6) Clean and check the lubricating oil drain plug threads and sealing surface.
Install the lubricating oil pan drain plug.

(7) Fill the engine with clean oil to the proper level.
· Quantity : 7.4 ℓ (2.0 U.S.gallons)



(8) Operate the engine at low idle and inspect for leaks at the filter 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.

(9) 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.

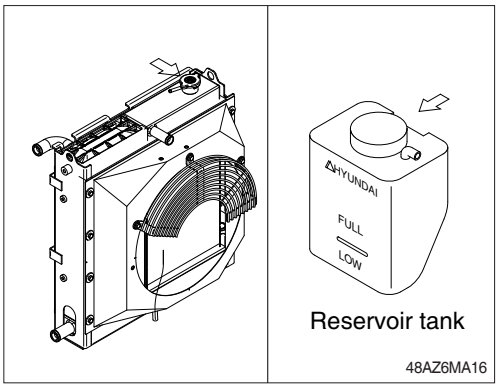
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

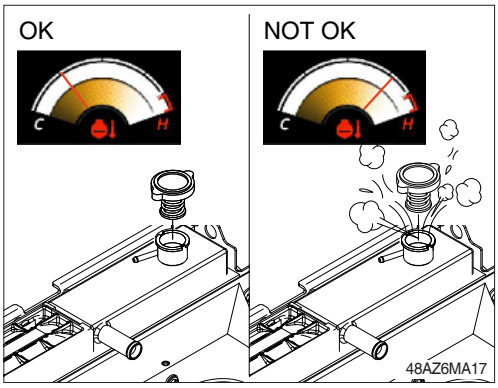
(3) Be sure to add the coolant by opening the cap of radiator when coolant level is below LOW.

(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.**

※ **Do not add cold coolant to a hot engine ; engine castings can be damaged. Allow the engine to cool to below 50 °C (120 °F) before adding coolant.**



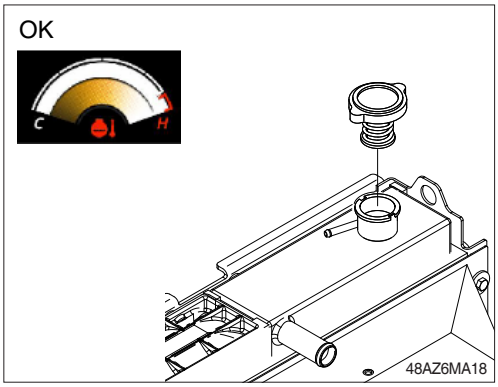


4) FLUSHING AND REFILLING OF RADIATOR

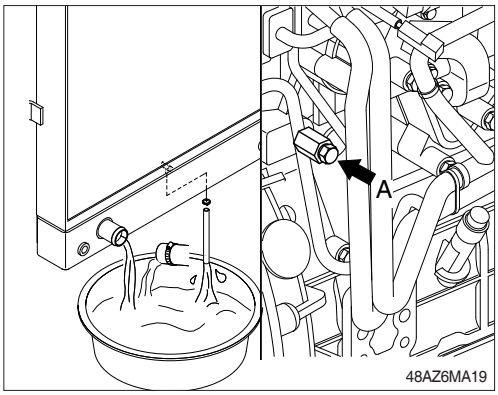
(1) Change coolant

⚠ **Avoid prolonged and repeated skin contact with used antifreeze. Such prolonged and repeated contact can cause skin disorders or other bodily injury.**
Avoid excessive contact-wash thoroughly after contact.
Keep out of reach is made of children.

※ **Protect the environment : Handling and disposal of used antifreeze can be subject to federal, state, and local law regulation.**
Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.
If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.



⚠ **Wait until the temperature is below 50˚C (122˚F) before removing the coolant system pressure cap.**
Failure to do so can cause personal injury from heated coolant spray.
Drain the cooling system by opening the drain valve on the radiator and removing the plug (A) in the bottom of the water inlet. Drain the coolant from engine block. A drain pan with a capacity of 20 liters (5 U.S.gallons) will be adequate in most applications.

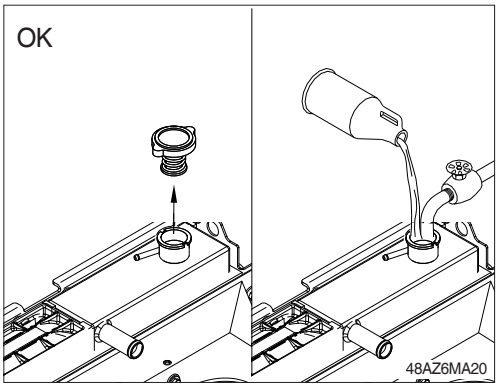


(2) Flushing of cooling system

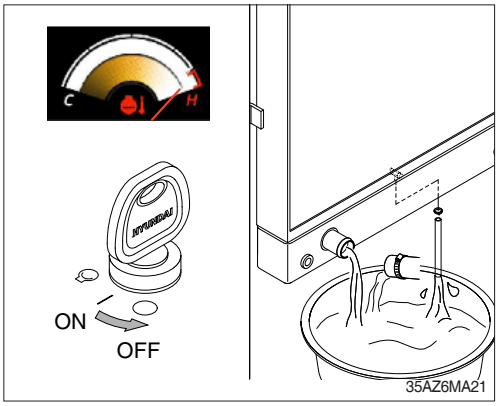
① Fill the system with a mixture of sodium carbonate and water(or a commercially available equivalent).

※ **Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.**

※ **Do not install the radiator cap. The engine is to be operated without the cap for this process.**



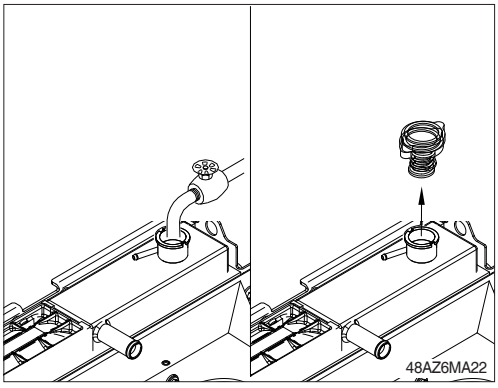
② Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F).
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

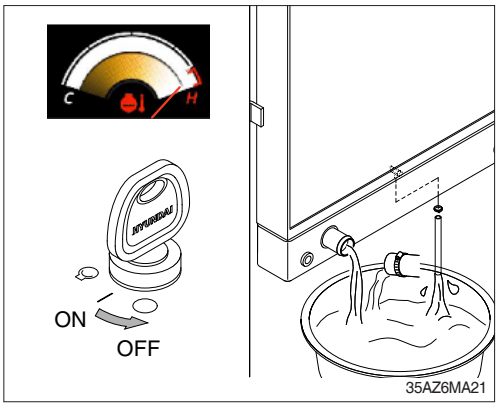
※ **Be sure to vent the engine and aftercooler for complete filling.**

※ **Do not install the radiator cap or the new coolant filter.**



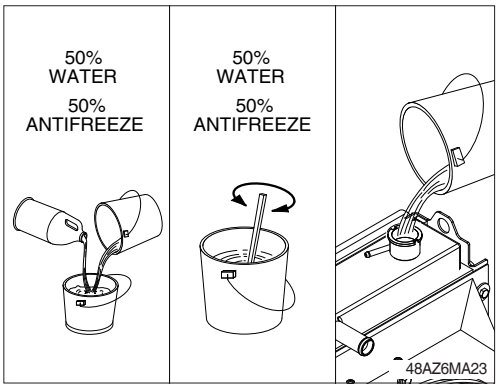
④ Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F) .
Shut the engine off, and drain the cooling system.

※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**



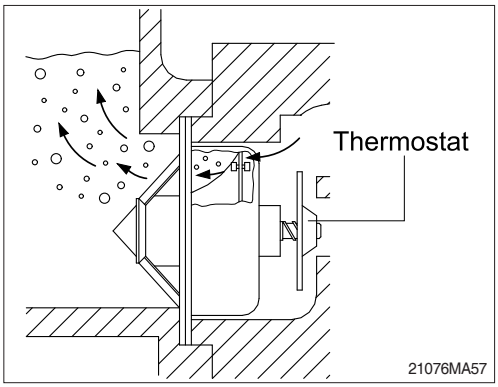
(3) Cooling system filling

① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.
Coolant capacity : 10.2 ℓ (2.7 U.S. gallons)

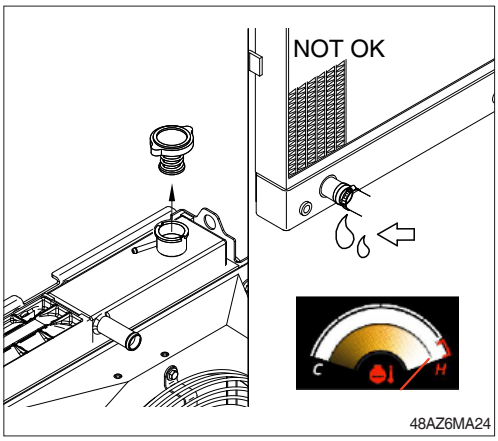


② The system has a maximum fill rate of 14 liters (3.5 U.S. gallons) per minute.
Do not exceed this fill rate.

※ **The system must be filled slowly to prevent air locks.**
During filling, air must be vented from the engine coolant passage.



③ Install the pressure cap. Operate the engine until it reaches a temperature 80˚C (176˚F), and check for coolant leaks.
Check the coolant level again to make sure the system is full of coolant after allow engine to cool.

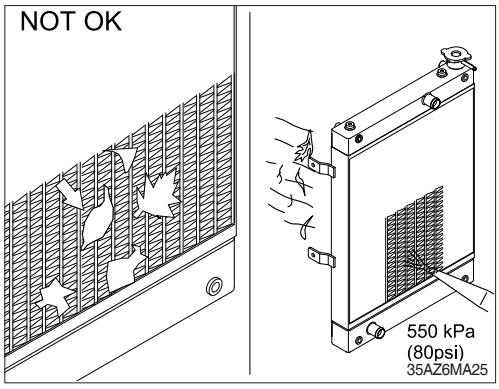


5) CLEAN RADIATOR AND OIL COOLER

Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

(1) Visually inspect the radiator for clogged radiator fins.

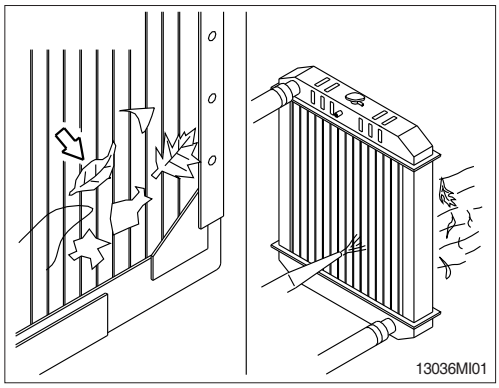
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



(3) Visually inspect the radiator for bent or broken fins.

※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

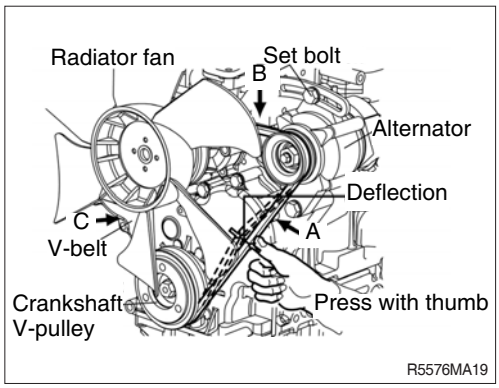
(4) Visually inspect the radiator for core and gasket leaks.



6) FAN BELT TENSION

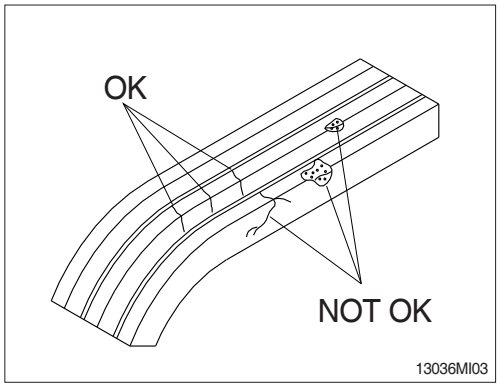
(1) Press the V-belt down with your thumb with a force of approximately 10 kgf to check the deflection.
· Deflection

	A	B	C
Used belt	10~14	7~10	9~13
New belt	8~12	5~8	7~11



※ **A used V-belt refers to a V-belt that has been used on a running engine for five minutes or more.**

(2) Inspect the drive for damage (cracks, oil or wear).
If any of these conditions exist, replace.

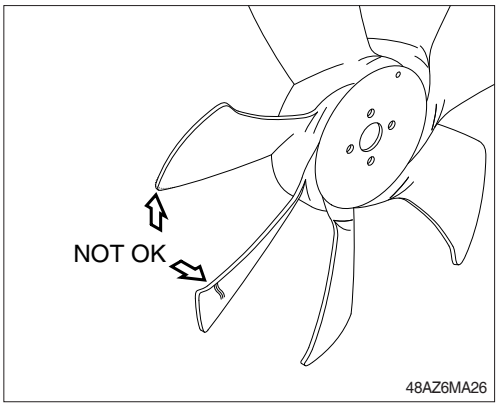


7) INSPECTION OF COOLING FAN

⚠ Serious 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

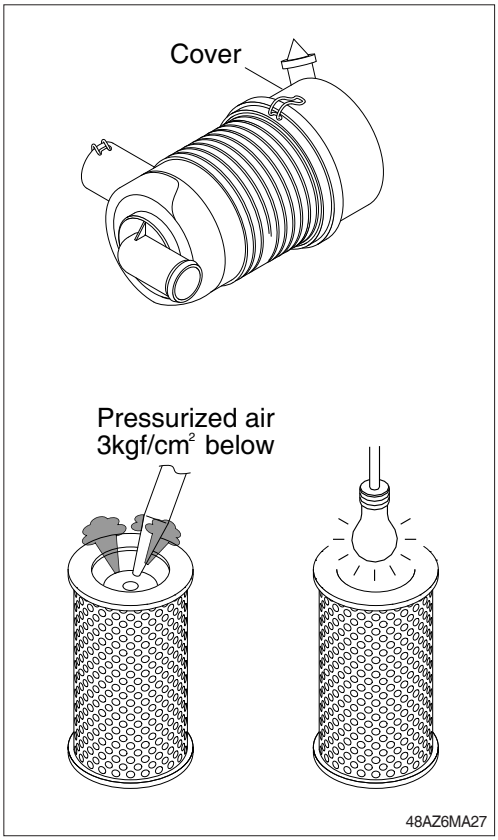
① Open cover and remove the element.
② Clean the inside of the body.
③ Clean the element with pressurized air.
· Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.
④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
⑤ Insert element and close cover.

※ Replace the primary element after 4 cleanings.

(2) Safety element

※ Replace the safety element only when the primary element is cleaned 4 times.

△ Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.



9) CRANKCASE BREATHER

(1) Proper operation of the crankcase breather system is required to maintain the emission requirements of the engine.

※ Please contact your HD Hyundai Construction Equipment service center or local dealer.

10) FUEL TANK

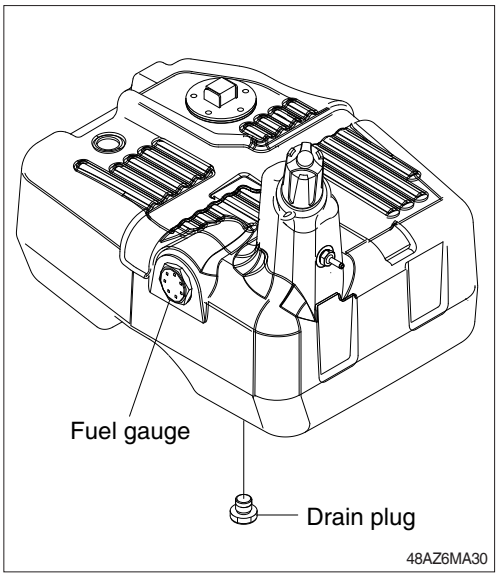
(1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.

(2) Drain the water and sediment in the fuel tank by opening the drain cock.

※ **Be sure to LOCK the cap of fuel tank.**

※ **Remove the strainer of the fuel tank and clean it if contaminated.**

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

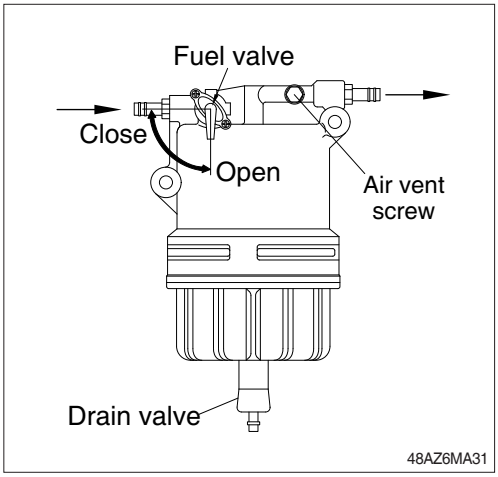


11) WATER SEPARATOR

※ **Inspect or drain the collection bowl of water daily and replace the element after first 250 hours of operation or rebuild, then every 500 hours thereafter.**

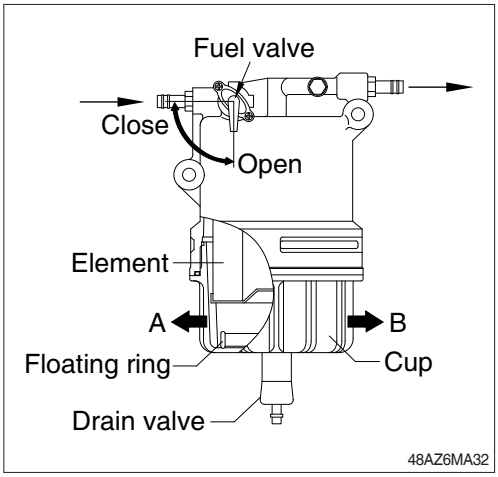
(1) Drain water

① Close the fuel valve.
② Loosen the drain valve at the bottom of the water separator. Drain water collected inside.
③ Hand-tighten the drain valve.
· Tightening torque : 0.15±0.05 kgf · m
(1.1±0.37 lbf · ft)
④ Open the fuel valve.
⑤ Be sure to prime the diesel fuel system when you are finished. See priming the fuel system on page 6-25.
⑥ Check for leaks.

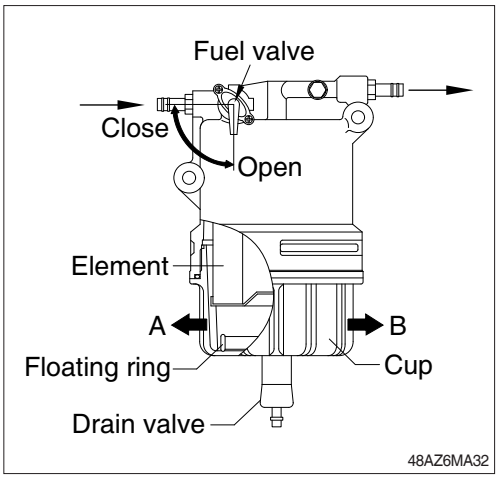


(2) Replace element

① Close the fuel valve.
② Loosen the drain valve and remove the fuel oil and mixed substance.
③ Turn the cup to the left (A) and remove the cup.
④ Carefully hold the cup to prevent fuel from spilling. If you spill any fuel, clean up the spill completely.
⑤ Remove the float ring from the cup. Pour the contaminants into the container and dispose with predetermined method.



⑤ Remove the element from the bracket.
⑥ Clean the inside cup.
⑦ Check the O-ring of the cup and replace if necessary.
⑧ Place a floating ring inside the cup and attach the O-ring and the new element in the cup.
⑨ Install the cup to the bracket by tightening the retaining ring to the right (B) to a torque of 2.8~3.4 kgf · m (20.3~24.6 lbf · ft).
⑩ Close the drain valve.
⑪ Open the fuel valve.
⑫ Prime the fuel system.
⑬ Check for leaks.



12) REPLACEMENT OF FUEL FILTER ELEMENT

(1) Stop the engine and allow it to cool.

(2) Close the fuel valve of the water separator.

(3) 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.

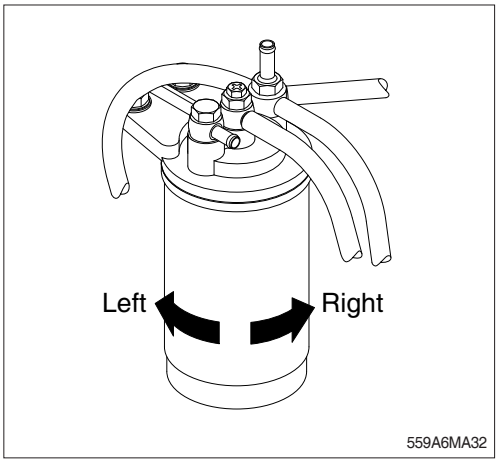
(4) Clean the filter mounting surface and apply a small amount of diesel fuel to the gasket of the new fuel filter element.

(5) Install the new fuel filter element. Turn to the right and hand-taghten if only until it comes in contact with the mounting surface. Tighten to 2.0~2.4 kgf · m (14.5~17.4 lbf · ft) or one additional turn using the filter wrench.

(6) Open the fuel valve of the water separator.

(7) Prime the fuel system.

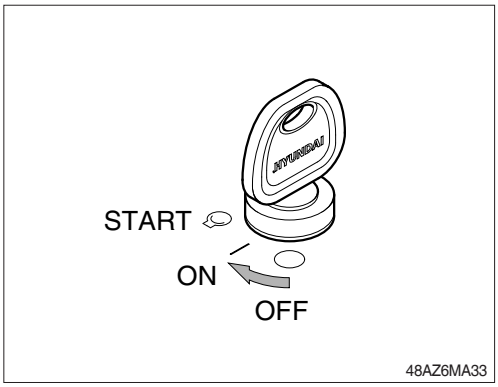
(8) Check for leaks.



13) PRIMING THE FUEL SYSTEM

(1) Turn the starting switch to the ON position for 10~15 seconds. This will allow the electric fuel pump to prime the fuel system.

※ **Never use the starter motor to crank the engine in order to prime the fuel system. This may cause the starter motor to overheat and damage the coils, pinion and/or ring gear.**

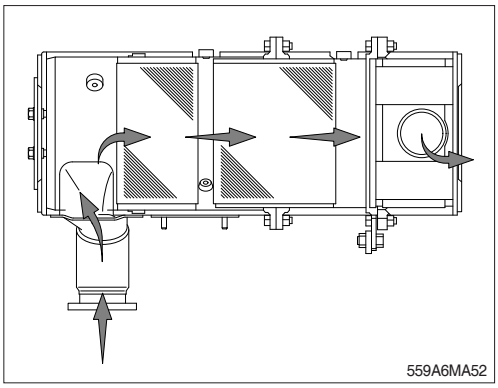


14) DPF (diesel particulate filter) **CLEANING**

The diesel particulate filter can not be cleaned for maintenance purpose using conventional tools. The diesel particulate filter needs to be cleaned and checked using an approved cleaning machine at a authorized service center.

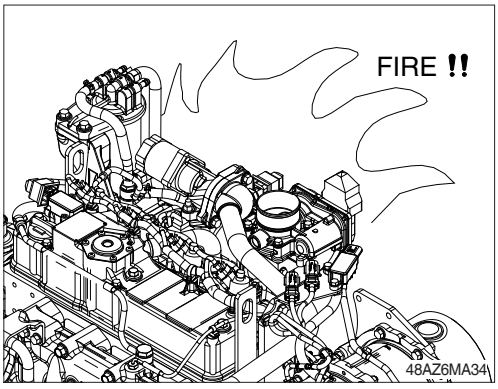
※ The diesel particulate filter shall be cleaned every 6000 hours.

※ Please contact your HD Hyundai Construction Equipment service center or your local dealer.



15) LEAKAGE OF FUEL

⚠ Use care when cleaning the fuel hose, injection pump, fuel filter and other connections as the leakage from these parts can cause fire.



16) FUEL FILLER PUMP FILTER

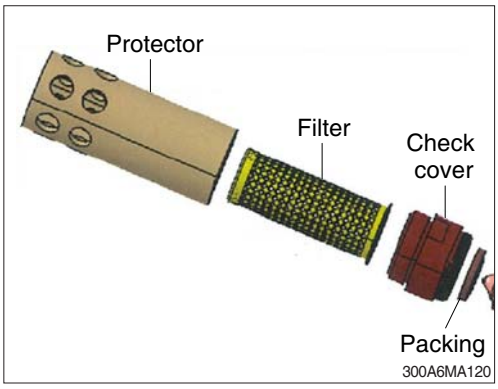
Clean the filter periodically as followings.

(1) Clean the filter when it is required by visual inspection.

(2) Replace the filter when it is permanently damaged.

※ Clean with fuel or compressed, water should not be mixed.

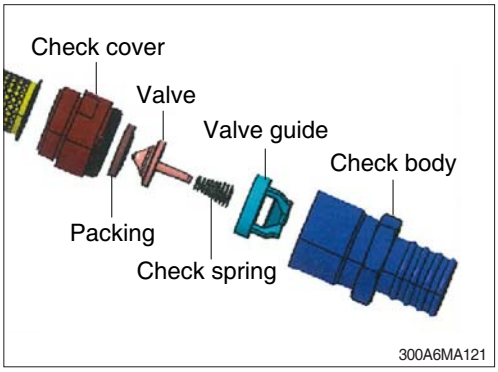
※ The structure can be loosened by hand.



(3) Check valve

① Except for maintenance, the check valve must have been equipped to the hose at all times.

② Clean or replace check valve when foreign material is found in valve.

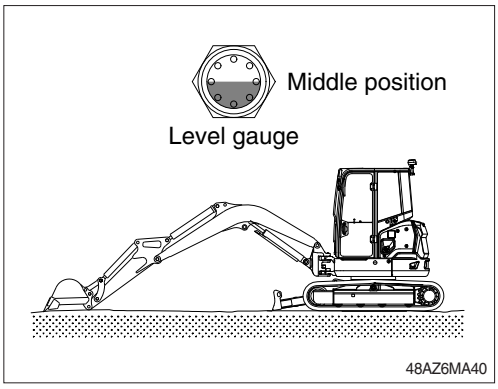


17) HYDRAULIC OIL CHECK

(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 level gauge indicates the middle position.



18) FILLING HYDRAULIC OIL

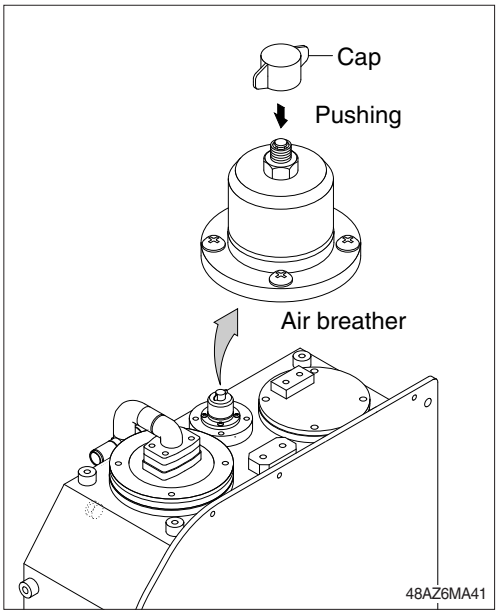
(1) Position the machine like the hydraulic oil check. Then stop engine.

(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.



19) CHANGE HYDRAULIC OIL

(1) Position the machine like the hydraulic oil check. Then stop engine.

(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 drain hose.

(6) Fill proper amount of recommended oil.

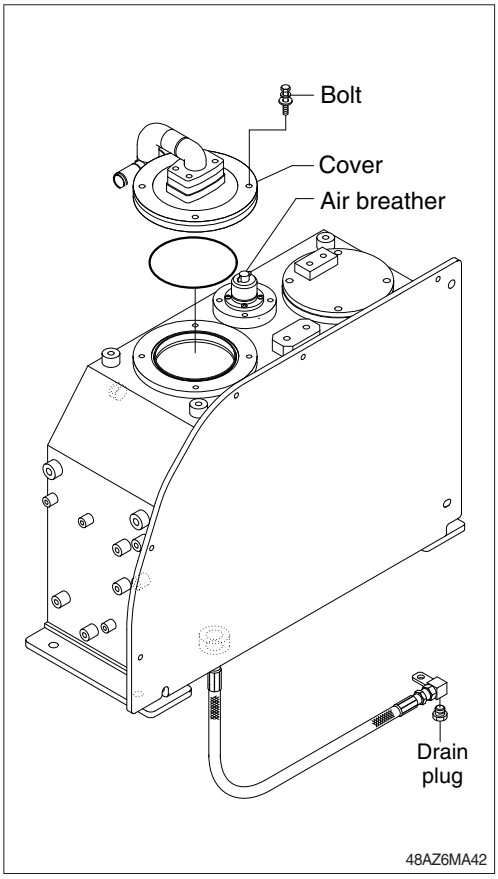
(7) Put the breather in the right position.

(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.



20) 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)

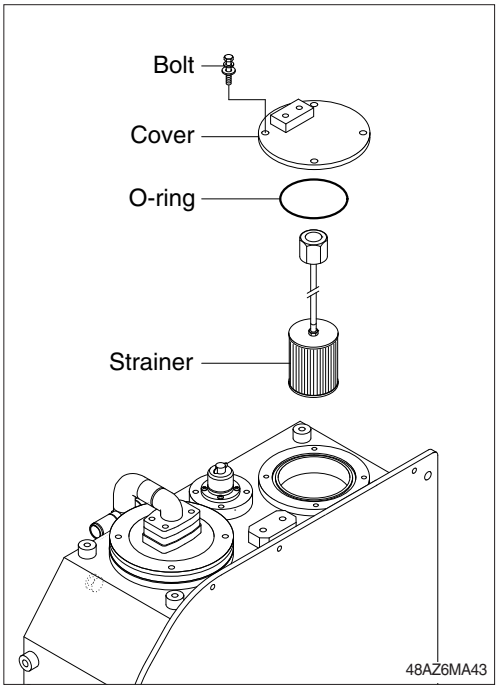
(2) Pull out the strainer in the tank.

(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.**



21) REPLACEMENT OF RETURN FILTER

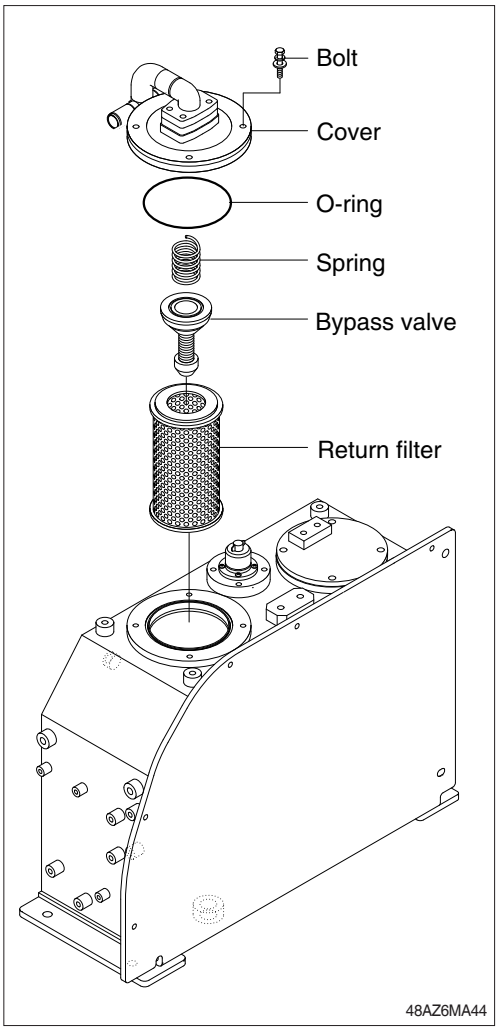
Replace as follows paying attention to the cause to be kept during the replacement.

(1) Remove the cover.

(2) Remove the spring, by-pass valve, and return filter in the tank.

(3) Replace the element with new one.

(4) Reassemble by reverse order of disassembly.
· Tightening torque : 6.9±1.4 kgf·m
(50±10 lbf·ft)



22) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

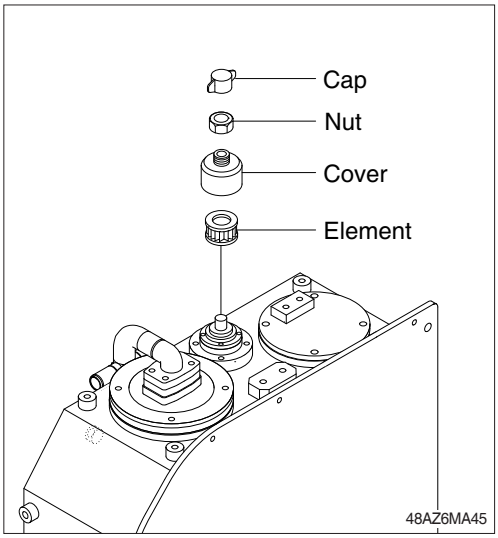
(1) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.

(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)

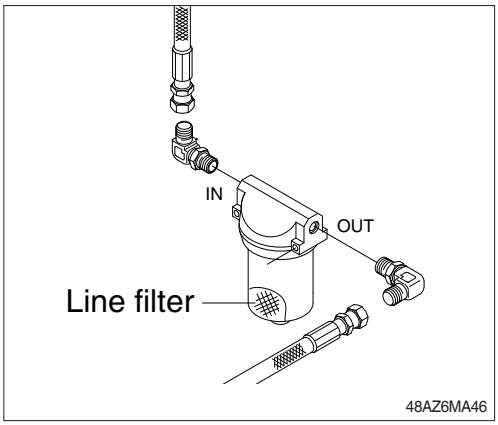


23) REPLACE OF PILOT LINE FILTER

(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.



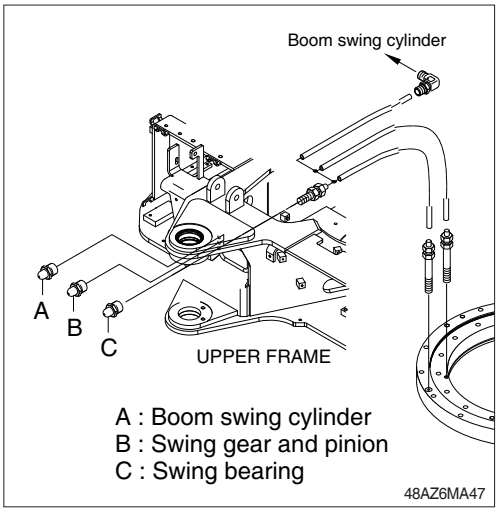
24) LUBRICATE BOOM SWING CYLINDER, SWING BEARING, SWING GEAR & PINION

(1) Grease at 3 fittings.

A : Lubricate every 250 hours.

B : Lubricate every 250 hours.

C : Lubricate every 50 hours.

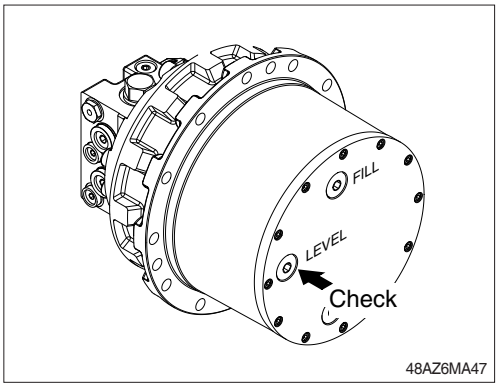


25) CHECK THE TRAVEL REDUCTION GEAR OIL

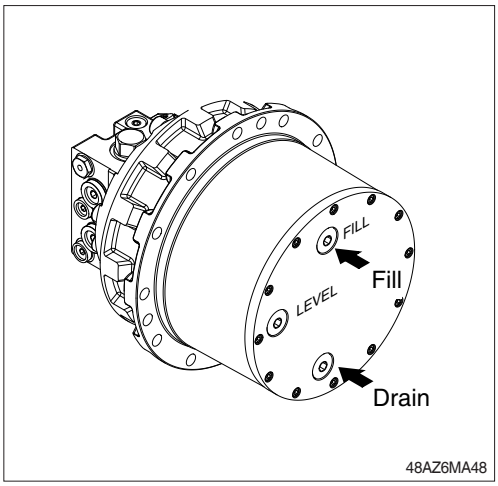
(1) Position the travel motor as shown in the illustration and make sure the machine is on flat ground.

(2) Loosen the level plug and check the oil level.
If the level is at the hole of the plug, it is normal.
Fill the oil if it is not sufficient.

· Tightening torque : 4.0±0.5 kgf·m
(28.9±3.6 lbf·ft)



26) CHANGE OF THE TRAVEL REDUCTION GEAR OIL



(1) Raise the temperature of the oil by operating the machine first.

(2) Position the travel motor as shown in the illustration and make sure the machine is on flat ground.

(3) Loosen the level plug and then the drain plug.

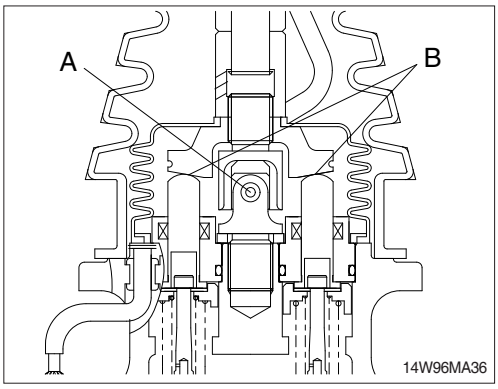
(4) Drain the oil to adequate container with a capacity of 1 ℓ (0.3 U.S. gal).

(5) Tighten the drain plug and fill specified amount of oil at filling port.
- Amount of oil : 0.6 ℓ (0.16 U.S. gal)
- Tightening torque : 4.0±0.5 kgf·m (28.9±3.6 lbf·ft)

(6) Tighten the level plug and travel slowly to check if there is any leakage of oil.
- Tightening torque : 4.0±0.5 kgf·m (28.9±3.6 lbf·ft)

27) LUBRICATE RCV LEVER

Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



28) ADJUSTMENT OF TRACK TENSION

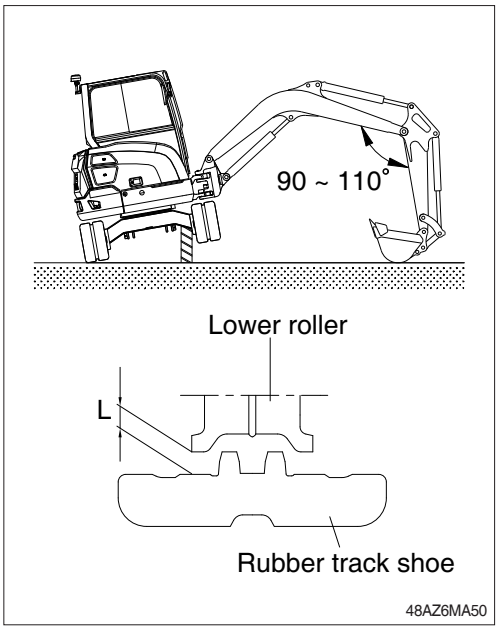
※ **It is important to adjust the tension of track properly to extend the life of track and traveling components.**

※ **The wear of pins and bushings on the undercarriage will vary with the working conditions and soil properties.**
It is thus necessary to continually inspect the track tension so as to maintain the standard tension on it.

(1) Raise the chassis with the boom and arm as shown in the illustration.

※ **Remove mud by rotating the track before measuring.**

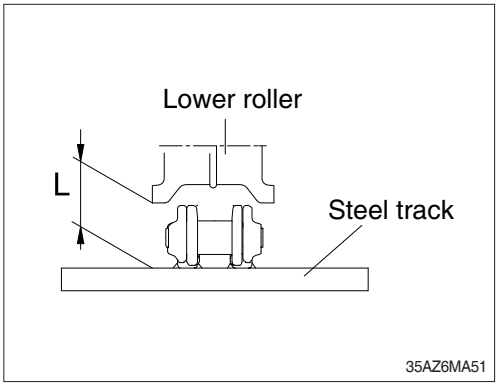
(2) **Rubber track** :
Measure the distance between bottom of lower roller in the center and rubber track.
Put in grease until 5~10mm and check again after lower roller puts spin twice or three times.



Rubber track

Length (L)	
5~10 mm	0.2~0.4"

(3) **Steel track** :
Measure the distance between bottom of lower roller in the center and steel track.
Put in grease until 10~15mm and check again after lower roller puts spin twice or three times.



Steel track

Length (L)	
130~150 mm	5.1~5.9"

(4) If the tension is tight, drain the grease in the grease nipple and if the tension is loose, charge the grease.

⚠ **Personal injury or death can result from grease under pressure.**

⚠ **When loosening the grease nipple, do not loosen more than one turn as there is danger of a spring coming out of the nipple because of the high pressure inside.**

※ **When the grease does not drained smoothly, move the machine to forward and backward a short distance.**
If the track tension is loose even after the grease is charged to the maximum, change the pins and bushings as they are worn excessively.

29) 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 to signal clearly to each other and work carefully to avoid serious injury.**

(1) Lower the bucket on the ground as shown in the illustration on the top right.

(2) Lock the safety lever to the LOCK position and stop the engine.

(3) Remove the stopper bolts (1) and nuts (2), then remove pins (3, 4) and remove the bucket.

※ **When removing the pins, place the bucket so that it is in light contact with the ground.**

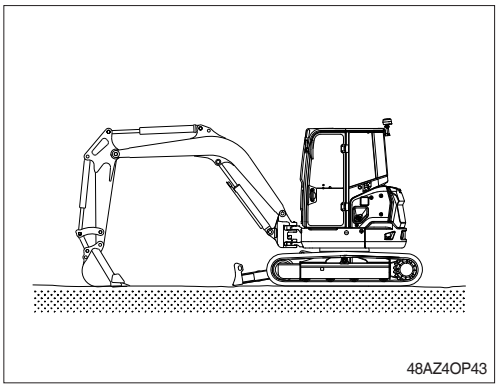
※ **If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.**

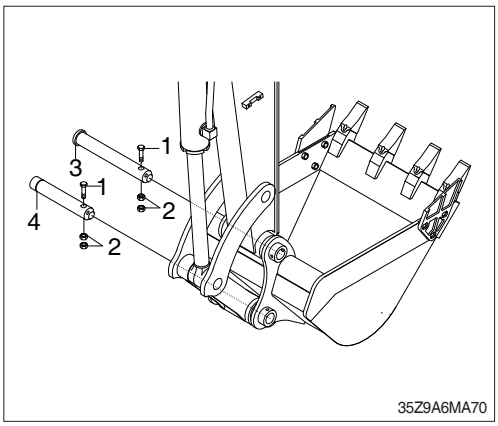
※ **After removing the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushings on both sides do not become damaged.**

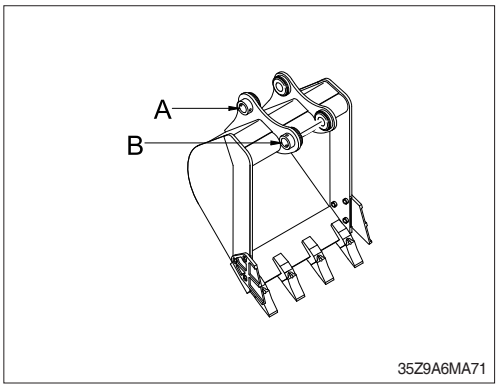
(4) Align the arm with holes (A) and the link with holes (B), then coat with grease and install pins (3, 4)

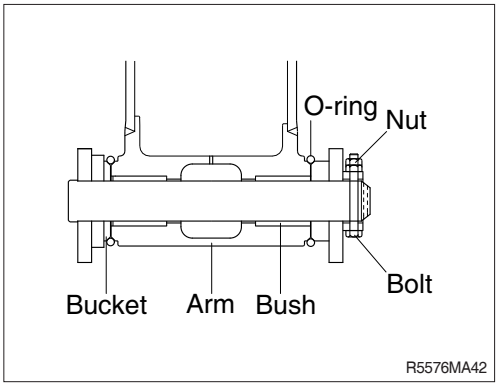
※ **When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the bucket as shown in the picture. After hitting the pin, move the O-ring down to the regular groove.**

(5) Install the stopper bolt (1) and nuts (2) for each pin, then grease the pin.





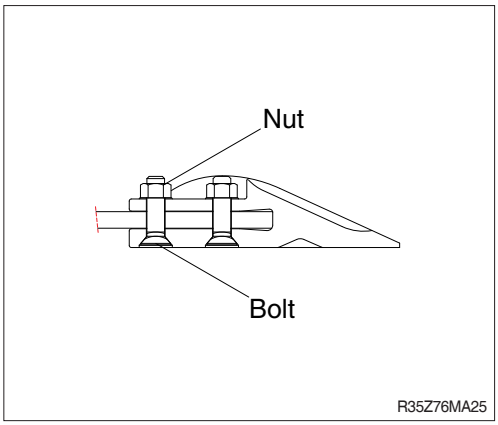




30) REPLACEMENT OF BUCKET TOOTH

(1) Loosen the bolts and nuts.
(2) Remove dust and mud from surface of bucket by using knife.
(3) Fit news tooth to bucket.
(4) Fasten bolts and nuts.

⚠ Personal injury can result from bucket falling.
⚠ Block the bucket before changing tooth tips or side cutters.

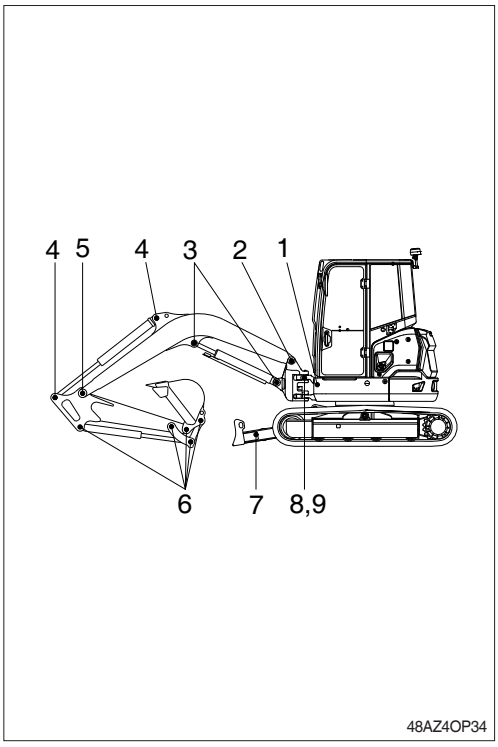


31) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device

Lubricate the grease to the grease nipple according to the lubricating interval.

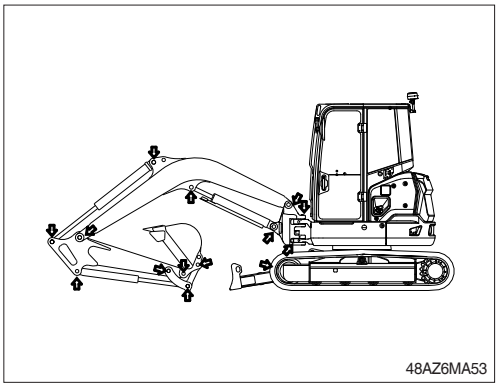
No.	Description	Qty
1	Lubrication manifold at upper frame	3
2	Boom connection pin	2
3	Boom cylinder (head and rod side)	2
4	Arm cylinder pin (head and rod side)	2
5	Boom and arm connection pin	1
6	Bucket cylinder pin (head and rod)	2
	Bucket link (control rod)	1
	Arm and bucket connection pin	1
	Arm and control link connection pin	1
7	Dozer connection pin	2
	Dozer cylinder pin	2
	Angle dozer connection pin (opt)	3
	Angle dozer cylinder pin (opt)	4
8	Boom swing post	2
9	Boom swing cylinder	2



※ **Shorten lubricating interval when working in the water or dusty places.**

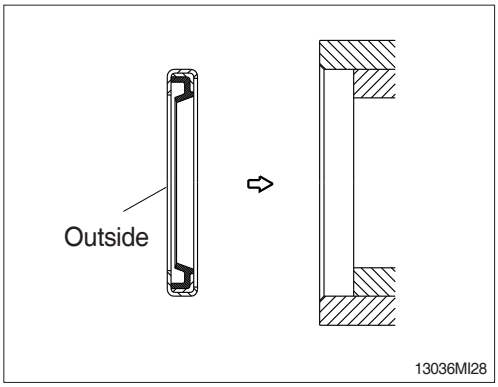
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ **Mount the lip so it is facing outside when replacing dust seals.**



※ **If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.**

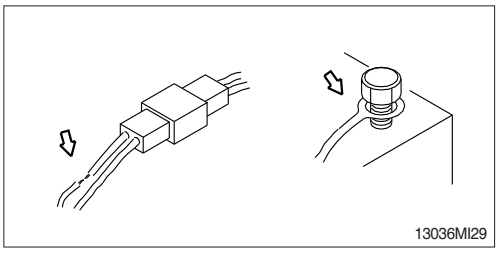
※ **Install seal in the same manner as shown in the illustration. Use a plastic hammer to lightly and evenly tap the seal into place.**



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.

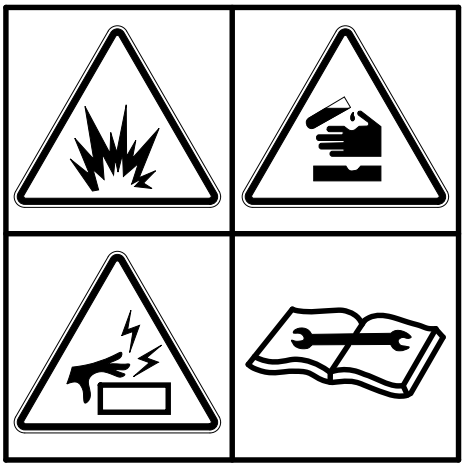
⚠ Battery gas can explode. Keep sparks and flames away from batteries.

⚠ 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.

If eyes are affected, flush with clean water or eye solution and seek immediate medical attention.



(2) Recycle

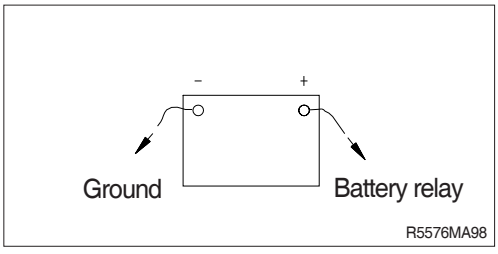
Never discard a battery.

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 (⊖ terminal side) and reconnect it last when reassembling.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

Follow these procedures when starting.

(1) Connection of booster cable

※ Use the same capacity of battery for starting.

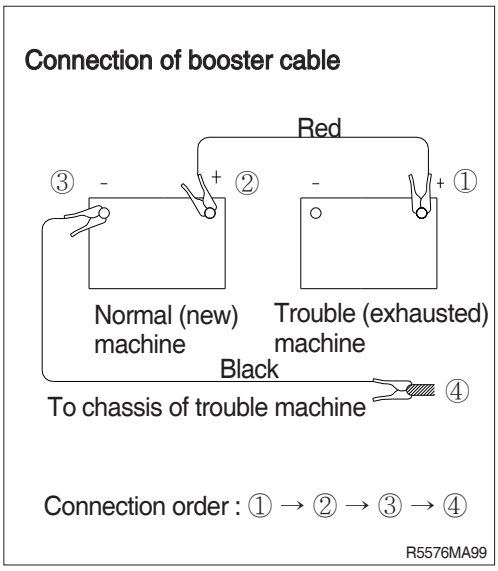
① Make sure that the starting switches of the normal machine and trouble machine are both in the OFF position.

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.

※ Make and maintain a firm connection.

※ Sparks will occur slightly when making the final connection.

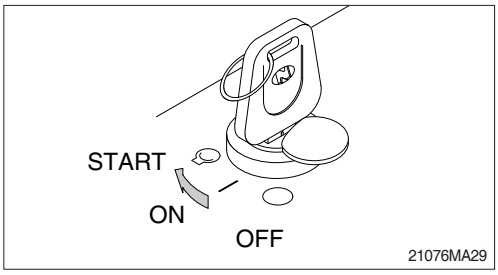


(2) Starting the engine

① Start the engine of the normal machine and keep it running at high idle.

② Start engine of the troubled machine with starting switch.

③ If you can not start it with the first attempt, try again 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.

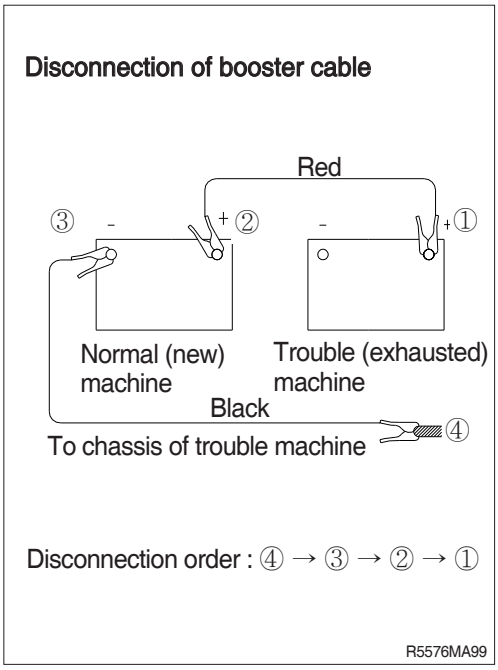
③ Run engine at high idle until charging of the exhausted battery is complete.

⚠ Explosive gas is generated while using the battery or charging it. Keep any flames away and be careful not to cause a spark.

※ Charge the battery in a well ventilated area.

※ Place the machine on the earth or concrete. Avoid charging the machine on any steel or steel plates.

※ Do not connect (+) terminal and (-) terminal when connecting booster cable because it will be shorted.



(4) WELDING REPAIR

Before welding, follow the below procedure.

① Shut off the engine and remove the starting switch.

② Disconnect ground cable from battery by master switch.

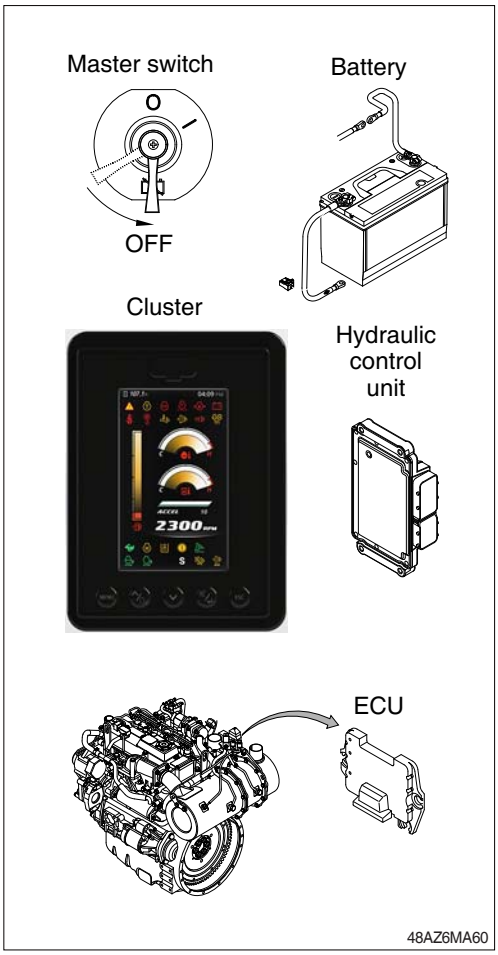
③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (ECU, cluster, hydraulic control unit etc).

④ Connect the earth (ground) lead of the welding equipment as close to the welding point as possible.

※ Remove all paint to ensure a solid ground is achieved.

※ Do not weld or use cutting torch 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 weld before carrying out the above.
If not, it will cause serious damage to electric system.



5) BATTERY CABLE AND CONNECTIONS

⚠ Batteries can emit explosive gases. To reduce the possibility of personal injury, always ventilate the compartment before servicing the batteries.

(1) Remove and inspect the battery cables and connections for cracks or corrosion.

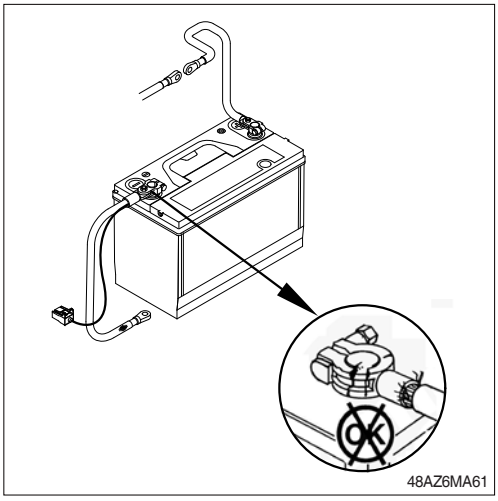
(2) Replace broken terminals, connectors, or cables.

(3) If the connections are corroded, use a battery brush or wire brush to clean the connections.

(4) Make sure all debris are removed from the connecting surfaces.

(5) Install the cables and tighten the battery connections.

(6) Coat the terminals with grease to prevent corrosion.



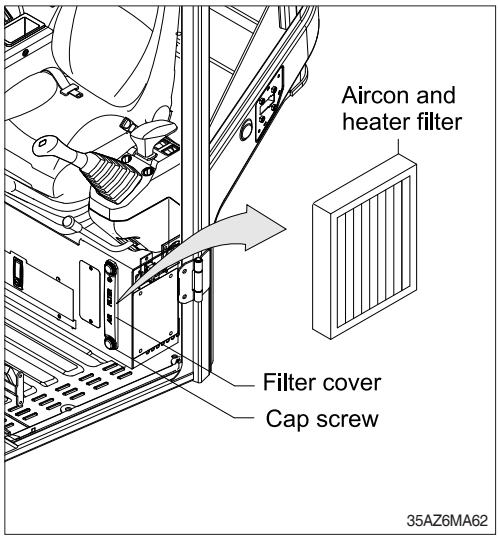
8. AIR CONDITIONER AND HEATER

1) CLEANING AND REPLACEMENT OF FRESH AIR FILTER

※ **Always stop the engine before servicing.**

(1) Remove the cap screw and filter cover on the inside of cabin.

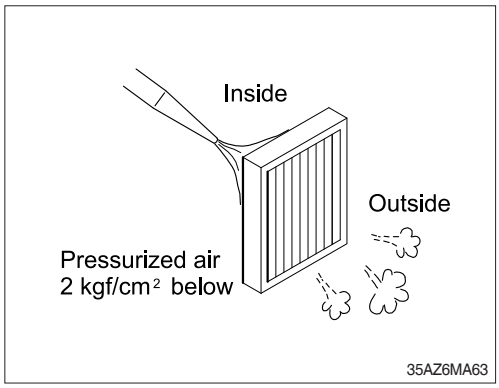
(2) Remove the aircon and heater filter.



(3) Clean the filter using a pressurized air (below 2 kgf/cm², 28 psi).

△ **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) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour or ventilate by using the fresh air function.
(2) Be careful not to overcool the cab.
(3) The cab is properly cooled if the operator feels cool when entering from outside (about 5˚C lower than the outside temperature).
(4) When cooling, change air occasionally.

3) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance does not wear prematurely.

4) CHECK DURING OFF-SEASON

Operate the air conditioner 2 or 3 times a month (each time for a few minutes) to avoid loss of oil film in the compressor.

5) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP : 1430
HX48A Z	HFC-134a	0.70 kg (1.54 lb)	CO_2 eq. : 1.0010 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.

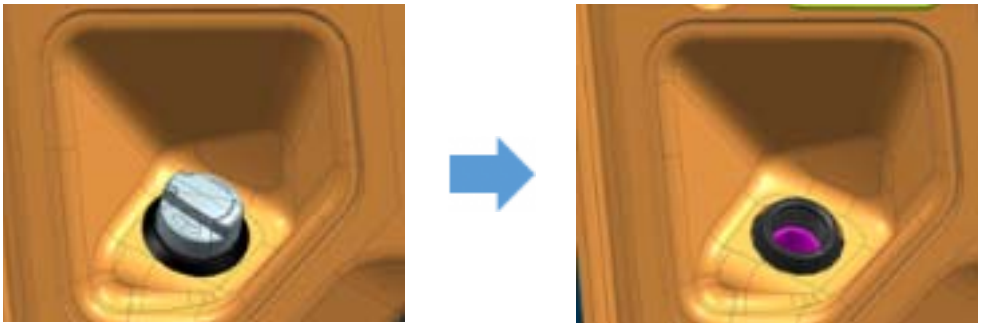
(4) Action in case of exposure

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.

9. TILTING CAB

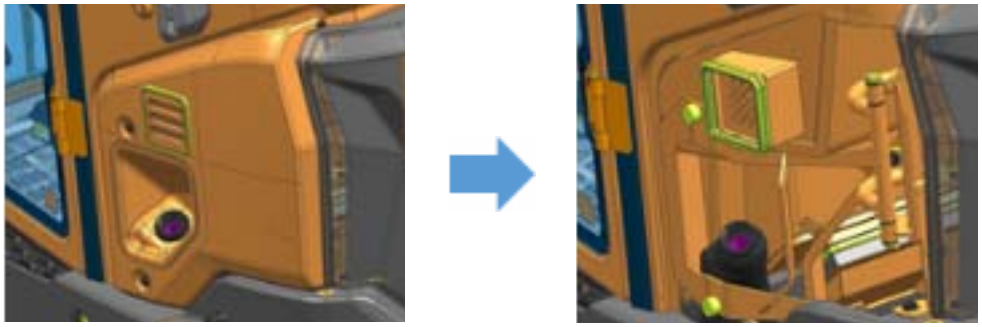
⚠ Keep clearance of people except the operator before tilting the cabin.

1) Locate the machine on flat ground.
2) Remove the fuel tank cap and grommet.



35AZ6MA04

3) Loosen the bolts (4EA, M8) and remove the LH cowl cover.



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※ Install the fuel tank cap to prevent dirt or dust from entering.

4) Remove the rear storage cover and rear mount.

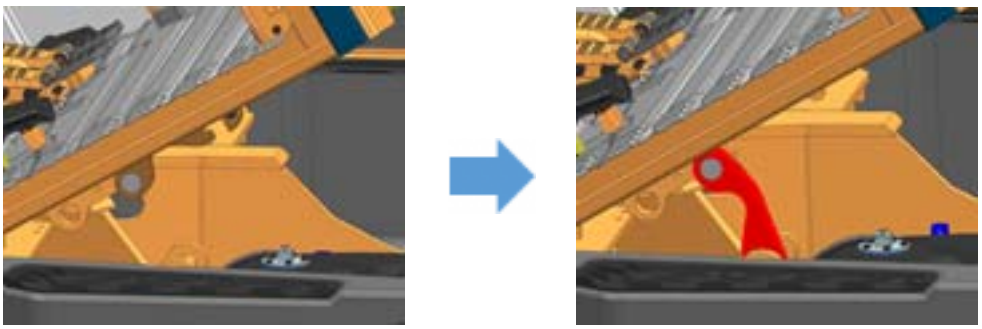
(1) Loosen the screw (8EA, M6) and remove the rear storage cover.
(2) Loosen the bolt and washer (2EA, M12) and remove the rear mount (2EA) and shim (2EA).

35AZ6MA06

5) Tilting the cab assembly (max 30°)

35AZ6MA07

6) Fix the safety plate by using the bolt (1EA, M8).



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※ Return the cab to original position in the reverse order.

1. ENGINE

※ **This guide is not intended to cover every condition, however many of the more common possibilities are listed.**

Trouble	Service	Remark
The engine oil pressure lamp lights up 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 up.	· Supply 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 cap itself. · Replace the monitor.	
The engine does not start when the starting motor is turned over.	· Confirm fuel supply. · Repair where air is leaking into fuel system. · Check the injection pump or the nozzle. · Check the valve clearance. · Check engine compression.	
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. · Clean or replace the turbocharger.	
Combustion noise occasionally changes to breathing sound.	· Check the nozzle.	
Unusual combustion noise or mechanical noise.	· Confirm fuel quality. · Check over-heating · Replace the muffler. · Adjust valve clearance.	

2. ELECTRICAL SYSTEM

Trouble	Service	Remark
Work lamp does not glow brightly or flickers even when engine runs at high idle.	· 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 slips 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 and check 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 HX48A Z system is 254 kgf/cm^2 (3613 psi).
4) The accumulator should be used to the breaker charging and return line.
   If the accumulator is not used, it can cause damage as the input wave is delivered.

※ Keep the pressure pulsation of pump below 60 kgf/cm^2 (850 psi) by installing the accumulator.

5) Do not connect the breaker return line to the main control, but connect to the return line in 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 will be damaged.
7) One spool of the main control valve should be connected to the tank.
8) Select the size of pipe required 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) A machine with hydraulic breaker can cause the hydraulic oil to become severely contaminated.

(2) Therefore machine may go down if not maintained properly.

(3) Inspect and maintain hydraulic oil, return filter, pilot, and drain filter cartridge.

(4) Replace when the breaker work is used for short time according to the standard of right graph.

2) RELEASING 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 you allow pressure to remain on the system, the lifetime of the diaphragm in the accumulator will be shortened.

3) Be careful to prevent contamination by dust, sand etc.

If such pollution becomes mixed into the oil, the pump's moving parts will wear abnormally, shorten lifetime and become damaged. This could also contaminate the entire hydraulic system.

4) When operating breaker, bolts and nuts of main equipment may be loosened by vibration. Therefore, it must be inspected periodically.

Service interval

unit : hours

Attachment	Operating rate	Hydraulic oil	Filter element
Breaker	100 %	600★1	200
		1000★2	

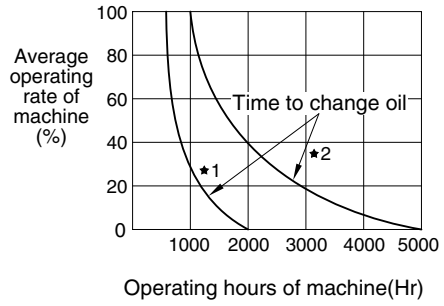
★1 : Conventional hydraulic oil

★2 : HD Hyundai Construction Equipment genuine long life hydraulic oil

Replace following filter same time

- Hydraulic return filter : 1 EA
- Pilot line filter : 1 EA
- Element in hydraulic tank breather : 1EA

Hyd oil change guide for hydraulic breaker



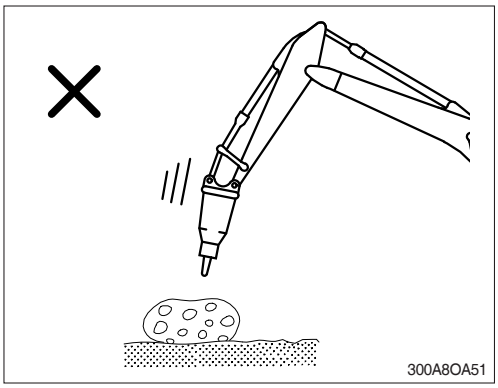
★1 : Conventional hydraulic oil

★2 : HD Hyundai Construction Equipment genuine long life hydraulic oil

4. PRECAUTIONS WHILE OPERATING THE BREAKER

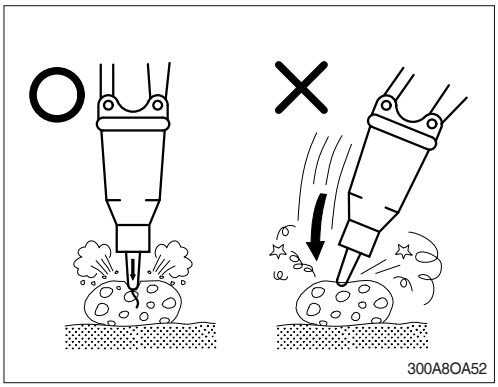
DO NOT BREAK ROCK WHILE LOWERING

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.



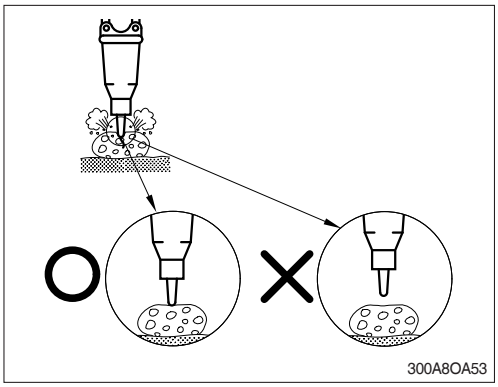
DIRECTION OF THRUST

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.

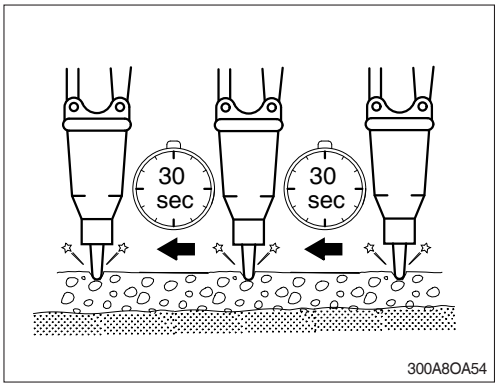


PROPER THRUST

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.

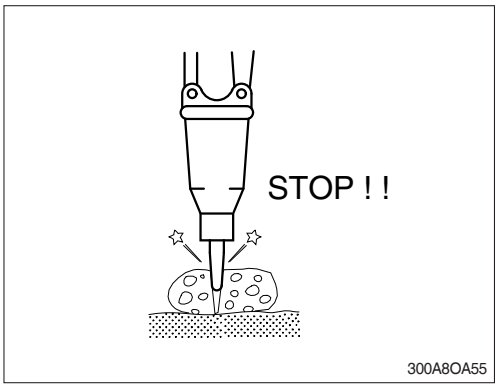


Move the impact point from the edge to the interior. Never try to break off a too large block, if the object has not broken within 30 seconds. The object should be broken up piece by piece in small blocks. Large distance steps will not improve working results.
Operating the breaker longer than 30 seconds may cause damage to the breaker.



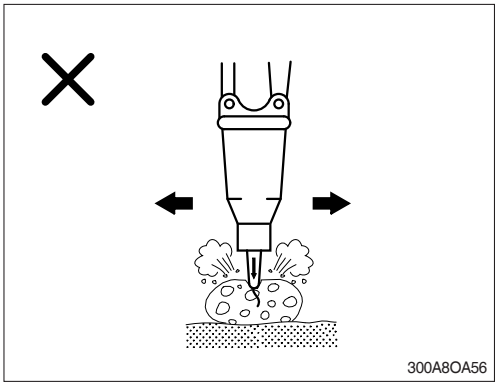
BLANKS THRUST

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.



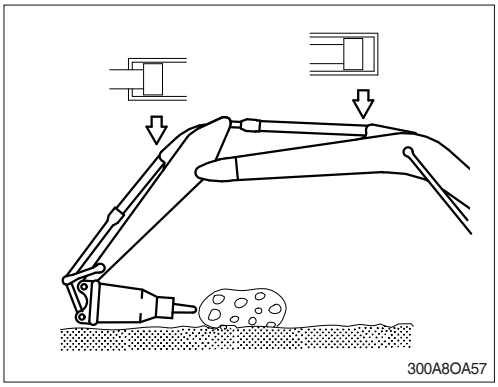
DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING

Do not move hammer while striking.
This will cause damage to the working device and the swing system.



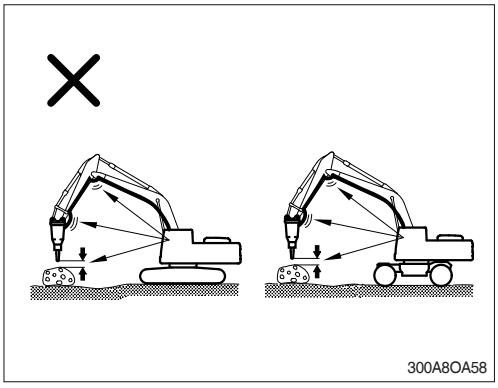
OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

If breaker is operated with the end tip, the cylinder may be damaged.



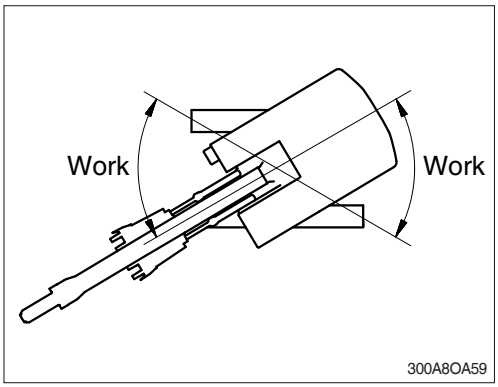
STOP THE OPERATION IMMEDIATELY IF HOS-ES VIBRATE EXCESSIVELY

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.

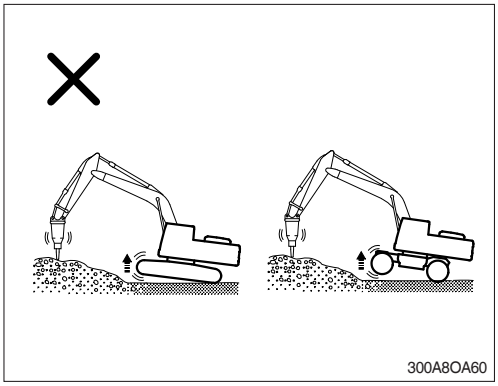


DO NOT WORK WHILE IN A SWING STATE

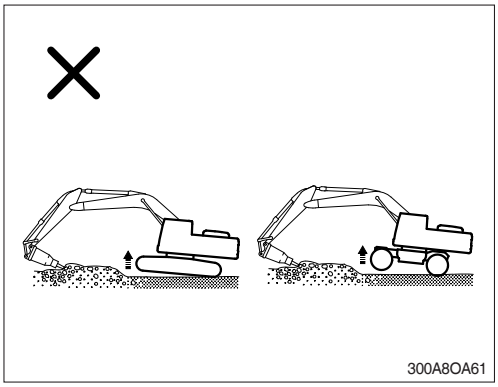
Do not work while swinging the upper structure. It cause oil leakage of the bend in the track shoe and rollers.



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.

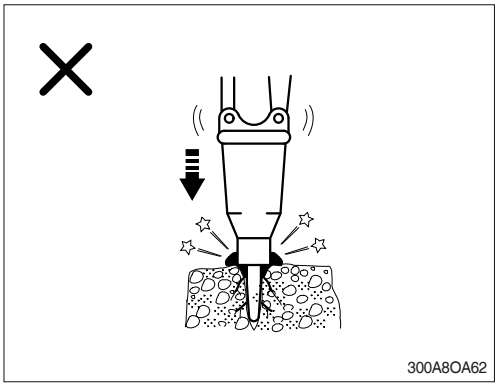


Do not extend the bucket cylinder fully and thrusting to raise the machine off the ground.



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.



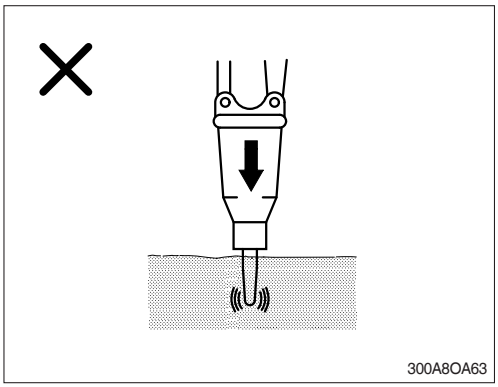
NEVER DRIVE THE CHISEL INTO THE GROUND

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.

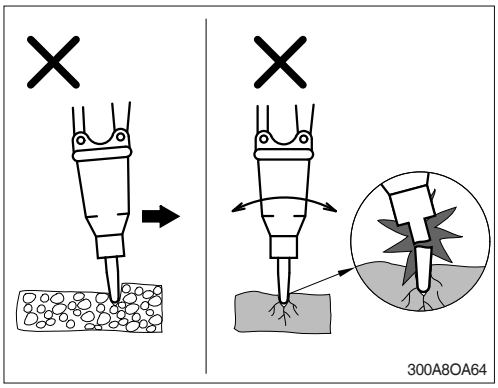


NEVER USE AS A LEVER

Do not use the chisel as a lever; e.g. crowbar, as this will cause the chisel to break.

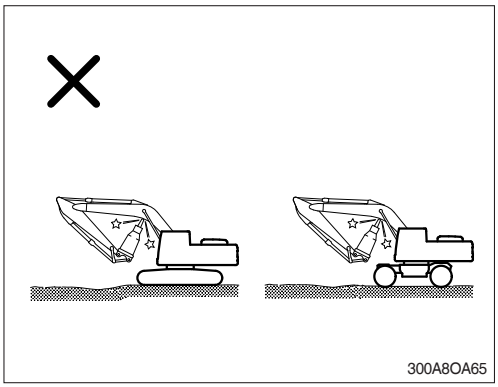
Under any circumstances, operating in this way is not permitted.

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

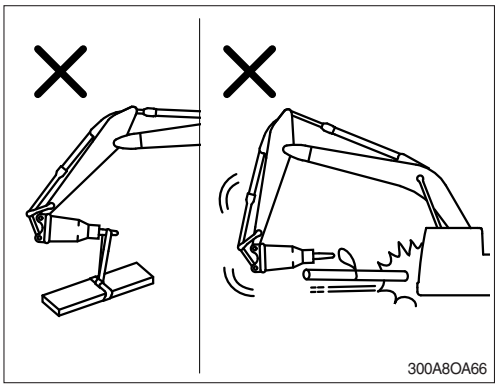
Be aware of clearance between breaker tip and the underside of boom as shown.



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.

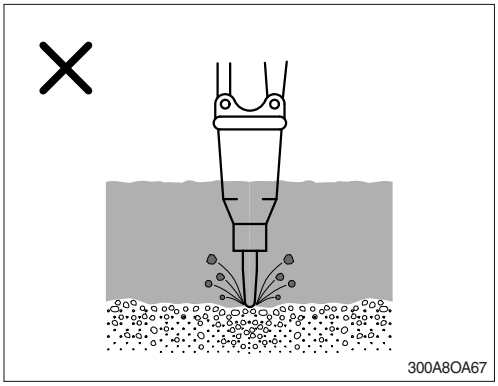


NEVER USE THE HYDRAULIC BREAKER UNDER WATER

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.

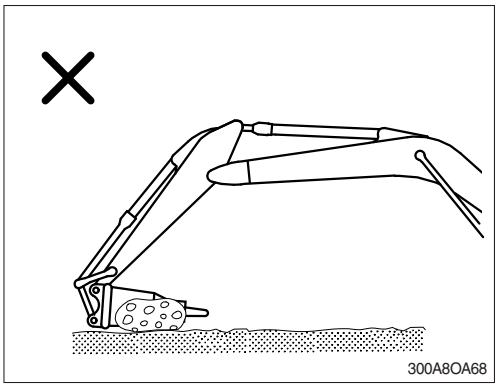
To operate the breaker under water, compressed air must be supplied into the breaker, into the impact chamber of the front-head, prior to use.

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.

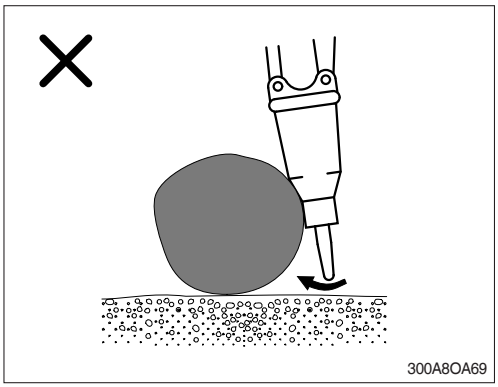


NEVER USE THE CHISEL OR HYDRAULIC BREAKER TO MOVE ROCKS OR OTHER OBJUCTS

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.



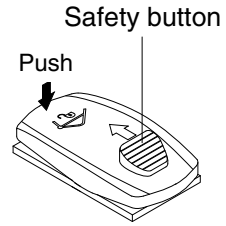
5. QUICK COUPLER

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.

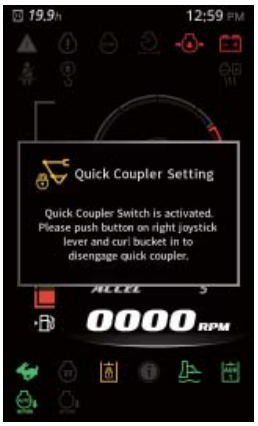


Quick coupler switch

150WA8QC01

(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).**



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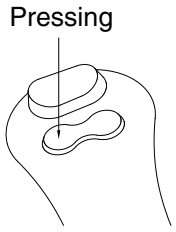
(5) To unlock the quick coupler, press the quick coupler button on the right joystick lever.
To maintain the unlock status of the quick coupler the operator must maintain pressing the coupler button.



Proportional type

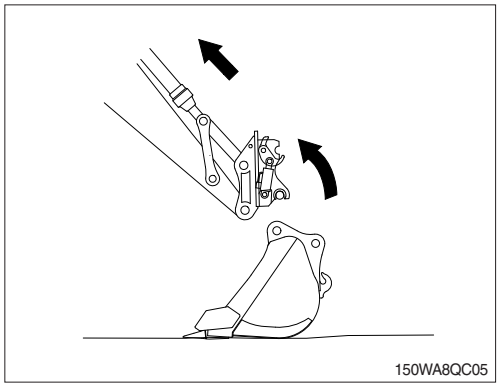
Right joystick lever

85A8QC03A

(6) The warning message in the cluster screen is changed, and the quick coupler lock is released.

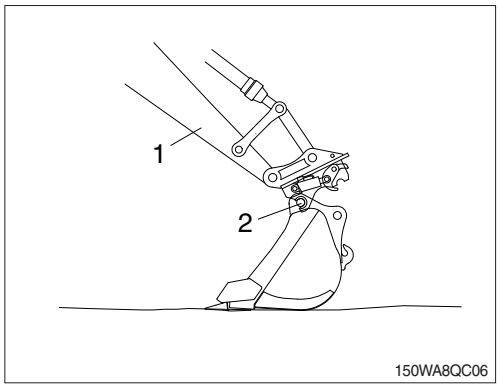
35AZ8QC04A

(7) Retract the bucket cylinder. Align the quick coupler with attachment mounting pins or interface.



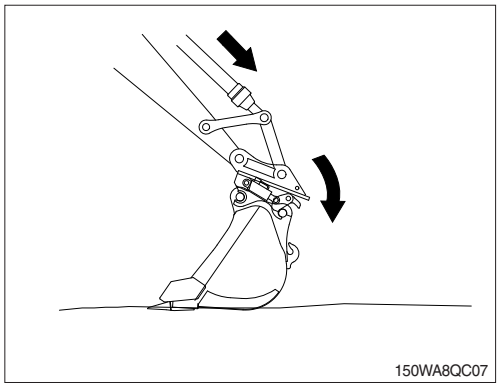
150WA8QC05

(8) Move the arm (1) and raise it until hook engages the upper pin (2) or interface of attachment.



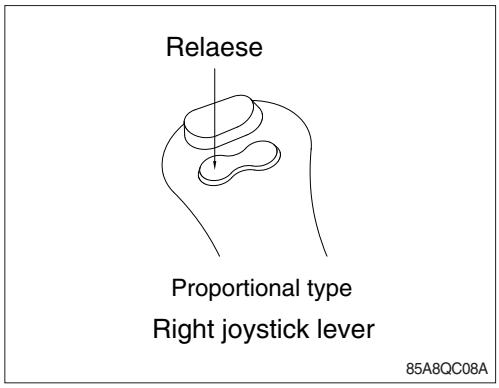
150WA8QC06

(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 joystick lever.

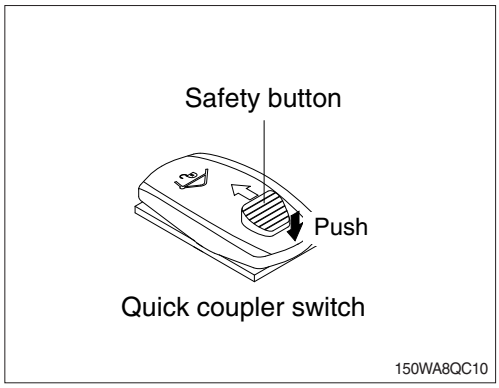


(11) The warning message in the cluster screen is changed, and the quick coupler lock is engaged.

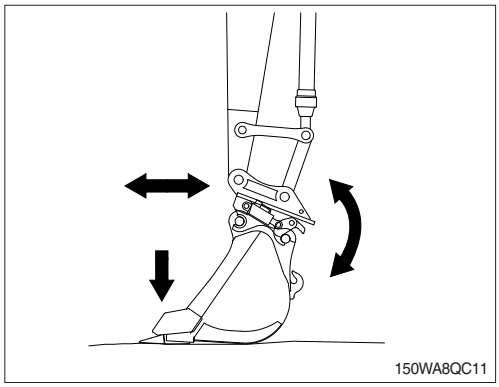
※ **After changing warning message, the quick coupler will be locked even if the operator presses the quick coupler button of the right joystick lever again. To unlock the quick coupler again the operator must repeat from the process (3).**

35AZ8QC09

(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.

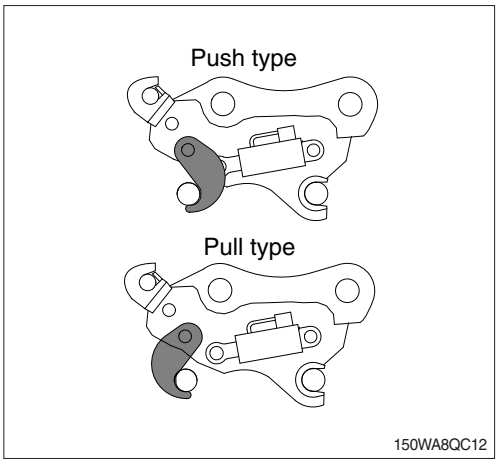


(13) Shake the attachment vigorously and lower the boom to the ground and apply down pressure to the quick coupler and attachment to check that attachment is fully engaged and locked to the quick coupler.



(14) Visually check that quick coupler is fully engaged and locked before operating the machine and attachment.

※ **If the button of the joystick is released during the operation, the operator must repeat again from the process (3) to unlock the quick coupler.**

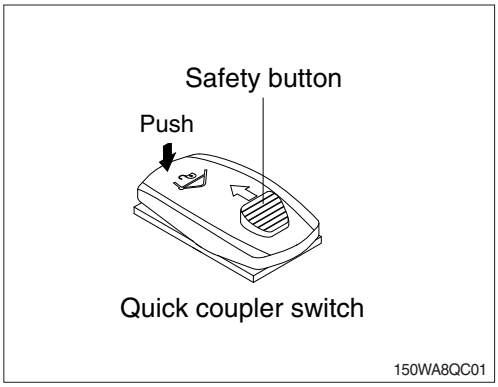


2) REMOVE BUCKET FROM QUICK COUPLER

(1) Park the excavator and attachment on firm and level ground.

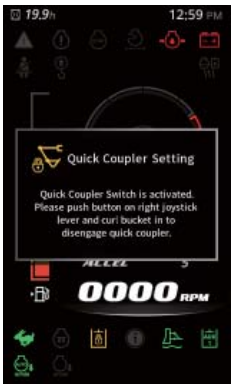
(2) After checking the safe environment conditions for installing/removing the quick coupler, perform the disengagement process.

(3) To unlock the quick coupler switch, press the safety button forward and press the switch.



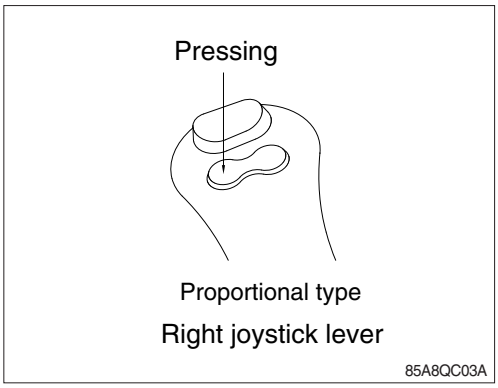
(4) Quick coupler symbols and warning messages appear on the cluster screen, and warning buzzers sound.

※ **The warning buzzer continues to operate up to step (11).**



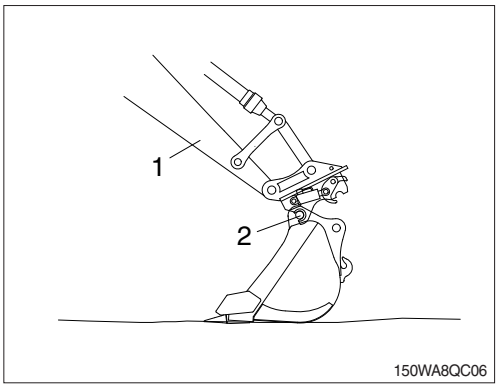
35AZ8QC02A

(5) To unlock the quick coupler, press the quick coupler button on the right joystick lever.
To maintain the unlock status of the quick coupler the operator must maintain pressing the coupler button.

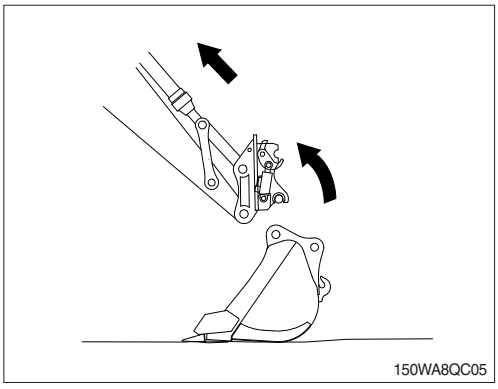


(6) The warning message in the cluster screen is changed, and the quick coupler lock is released.

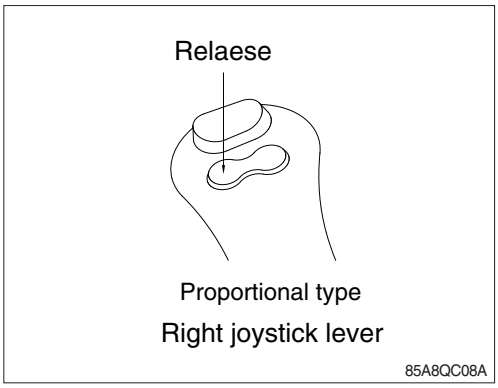
(7) Move the arm (1) and raise it until hook disengages the upper pin (2).



(8) Retract the bucket cylinder.



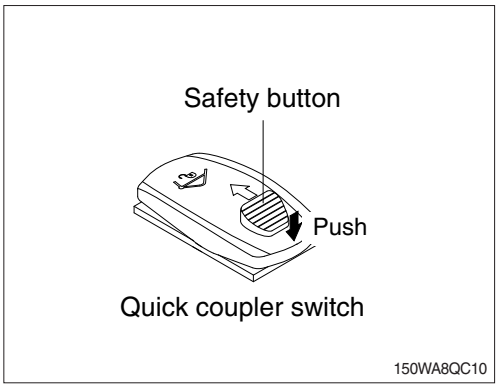
(9) To lock the quick coupler, release the quick coupler button on the right joystick lever.



(10) The warning message in the cluster screen is changed, and the quick coupler lock is engaged.

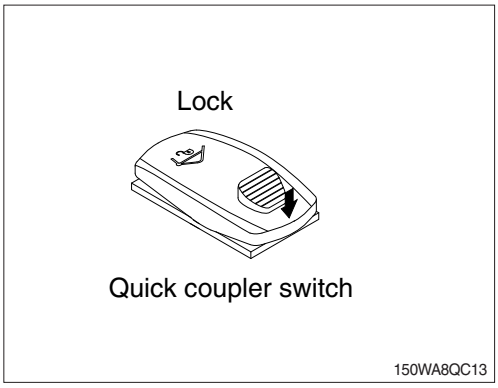
※ **After changing warning message, the quick coupler will be locked even if the operator presses the quick coupler button of the right joystick lever again.**

(11) To confirm the disengagement of the quick coupler, release the safety button to its original position.
- The buzzer will stop activating.
- The warning message will disappear.

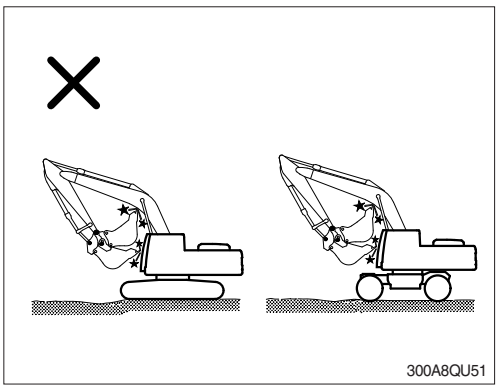


3) PRECAUTION OF USING QUICK COUPLER

⚠ 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.



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