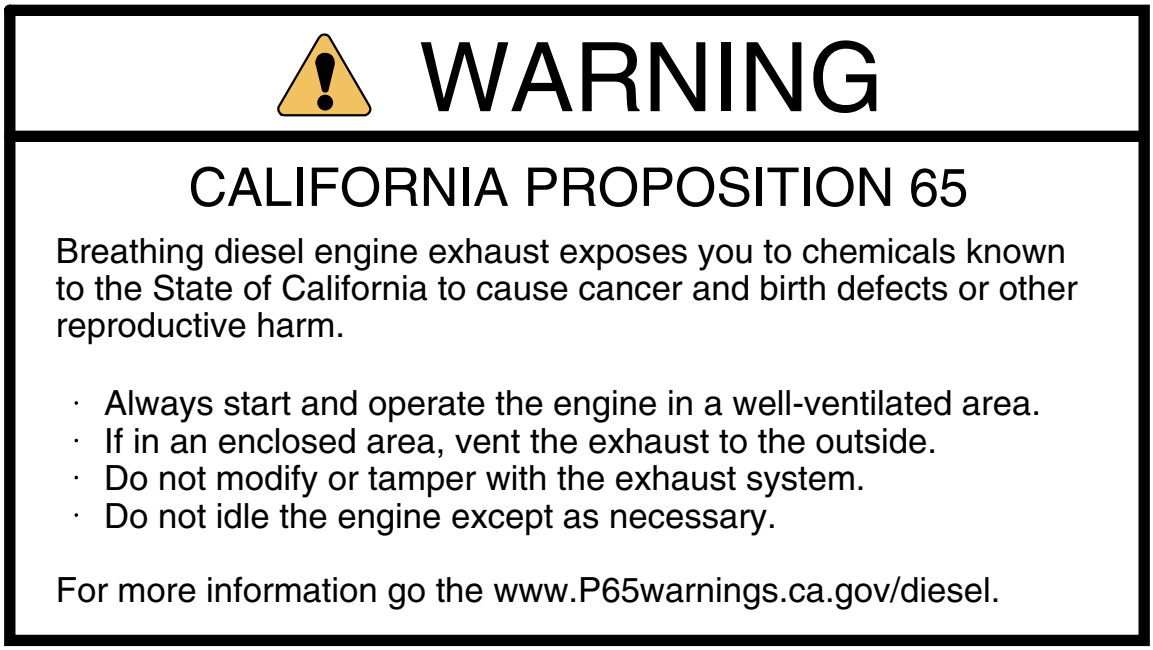


91K4-07310-EN

⚠ 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 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 13553, 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) : 98 dB

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

CE

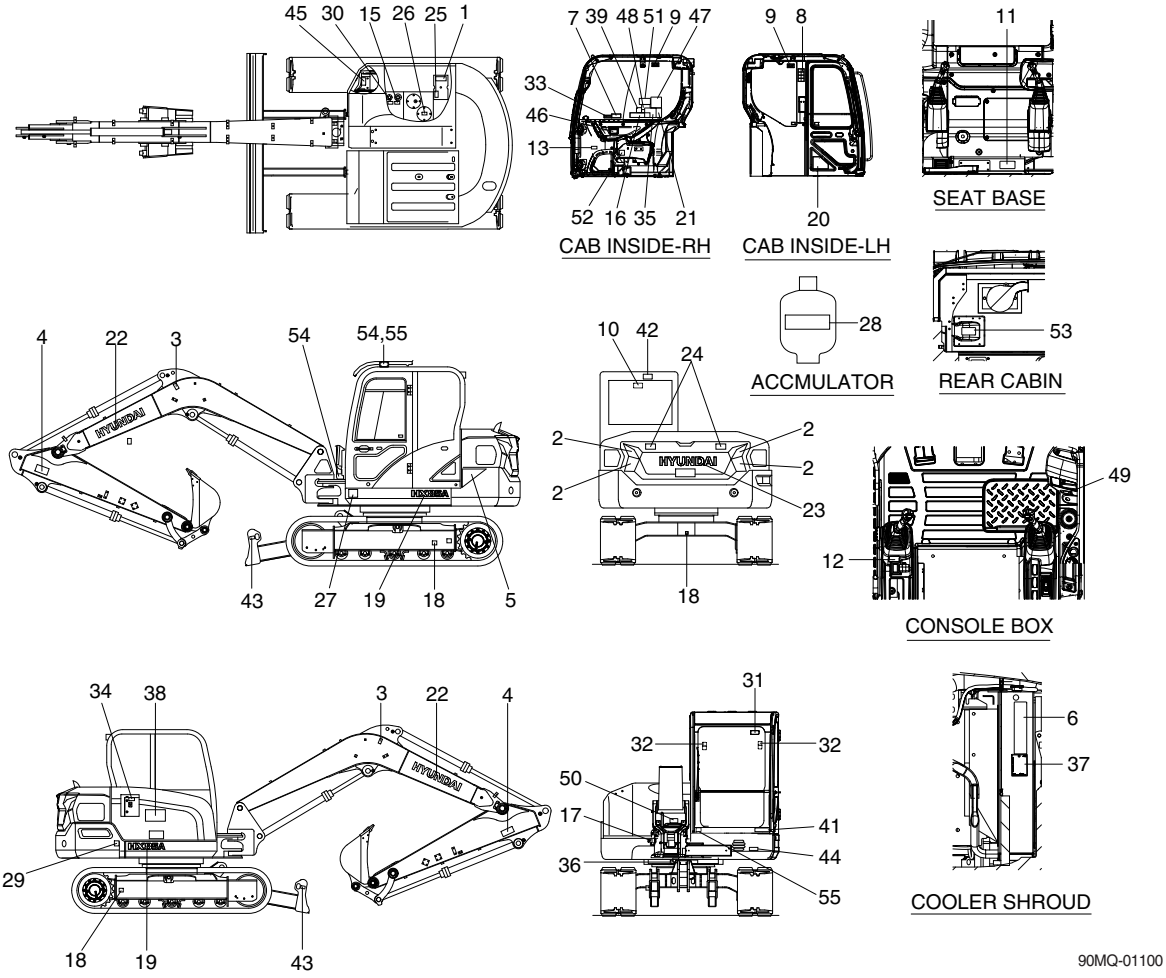
TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

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 13553, Korea
Distributor for U.S.A Address	HD Hyundai Construction Equipment Americas, 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, replace them with a new label.



1	Battery accident	20	Service instruction	39	Dozer control ideogram
2	Reflecting	21	Lifting chart	40	Angle dozer control ideogram
3	Lifting point	22	Hyundai logo - boom	41	Pin plate
4	Keep clear - boom/arm	23	Hyundai logo - CWT	42	Beacon lamp
5	Left side	24	Keep clear - rear	43	Lifting point/tie down
6	Caution - engine room	25	ECU connector	44	EMC
7	Control ideogram	26	High pressure	45	Leftover fuel
8	General cautions - cab	27	Noise level	46	Caution key
9	Safety - front window	28	Accumulater	47	Pattern change
10	Emergency exit	29	Battery position	48	California 65 caution
11	Aircon filter	30	Ultra low sulfur fuel	49	Start key
12	Console box tilting	31	Warning window	50	Air compressor
13	Safety knob	32	Stay fix - cab	51	Air compressor-cab
14	ROPS plate	33	Lubrication oil	52	Fire extinguisher
15	Fueling	34	Fuel shut off	53	Turbo cover
16	General warning - frame	35	Water separator	54	FOG plate
17	Indicate - grease	36	Swing bearing	55	ROPS plate
18	Tie	37	Refrigerant		
19	Model name	38	Bio oil		

2. DESCRIPTION

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

Replace any safety label that is damaged, or missing.

1) BATTERY ACCIDENT (item 1)

This label is positioned on the battery cover.

⚠ Follow all warnings. Failure to comply may result in serious injury or death.

⚠ 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.

※ 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.

⚠ 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.

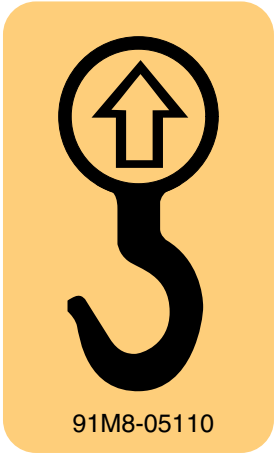
⚠ To prevent electric shock, do not touch battery terminal with wet hands.

91N6-02122

2) LIFTING POINT (item 3)

This label is positioned near the fastening holes on the both sides of the boom.

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



91M8-05110

3) KEEP CLEAR-BOOM/ARM (item 4)

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.

91M8-06111

4) CAUTION-ENGINE ROOM (item 6)

This label is positioned on the top side of the cooler shroud.

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

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

※ See the maintenance section for details.

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

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

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

91M8-07111

5) **CONTROL IDEOGRAM** (item 7)

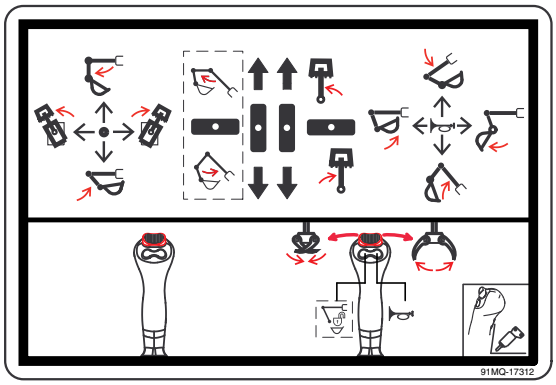
This label is positioned on the right window of inside the cab.

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

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

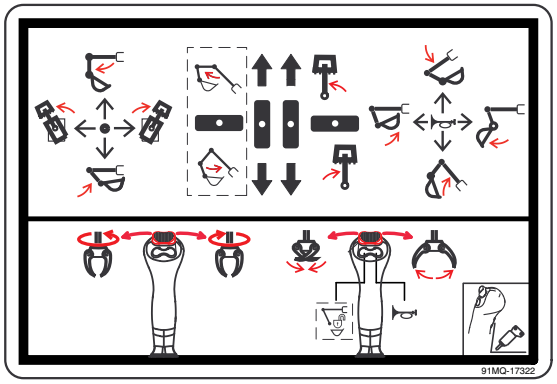
※ See page 4-7 for details.

Without rotating



91MQ-17312

With rotating



91MQ-17322

6) GENERAL CAUTIONS-CAB (item 8)

This label is positioned on the right 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 1-21.

⚠ Serious injury or death can result from falling bucket.

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

⚠ When operating machine equipped with quick coupler or extensions, the bucket may come into contact with the boom, boom cylinders or cab, during the bucket or arm retraction operation.

91M9-07243

7) SAFETY FRONT WINDOW (item 9)

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

⚠ Make sure that front window is fully latched and locked into place before operating the machine.

91M8-07251

8) EMERGENCY EXIT (item 10)

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

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

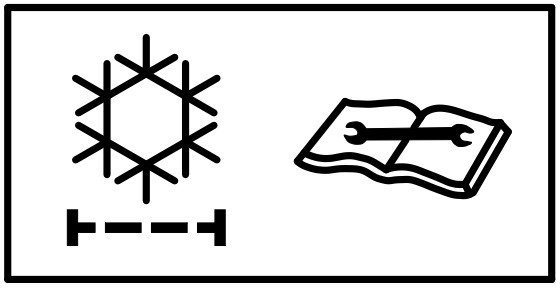
※ **In emergency, break out the window using the hammer and escape from the cabin.**

94MT-07280

9) AIR CONDITIONER FILTER (item 11)

This label is positioned on the front of seat base.

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

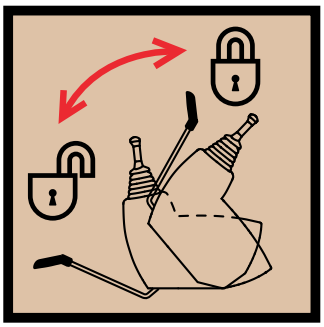


91M8-07270

10) CONSOLE BOX TILTING (item 12)

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

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



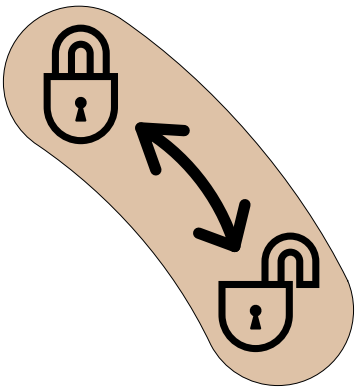
92N6-07510

11) SAFETY KNOB (item 13)

This label is positioned on the cover of the safety knob.

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

※ **See page 3-48 for details.**



92N6-07310

12) **FUELING** (item 15)

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

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

91MT-01130

13) **GENERAL WARNING-FRAME (item 16)**

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

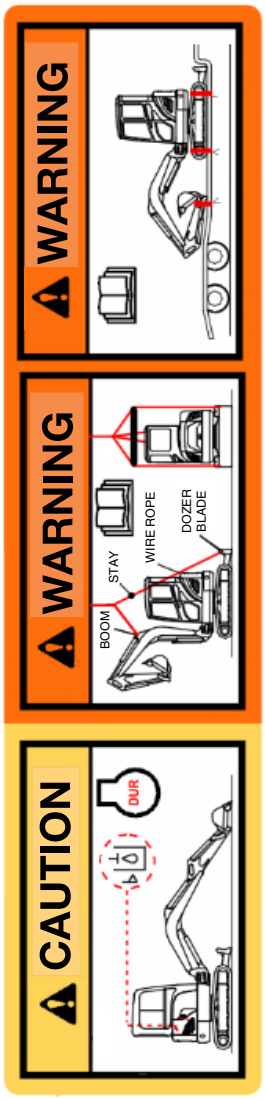
⚠ **Review the operator's manual before transporting the machine. Tie down arm and track to the carrier with appropriate rated straps or chains.**

※ **See page 5-10 for details.**

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

※ **Check oil level on the level gauge as shown in the upper right hand illustration.**

※ **Using the recommend hydraulic oil, fill to the specified level if necessary. Please refer to section, Maintenance.**

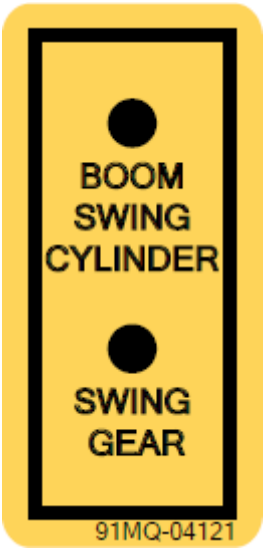


91MQ-04100

14) **GREASE INDICATE** (item 17)

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

※ **See page 6-31for details.**



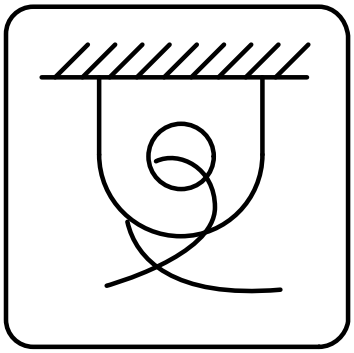
91MQ-04121

15) **TIE** (item 18)

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 details.**



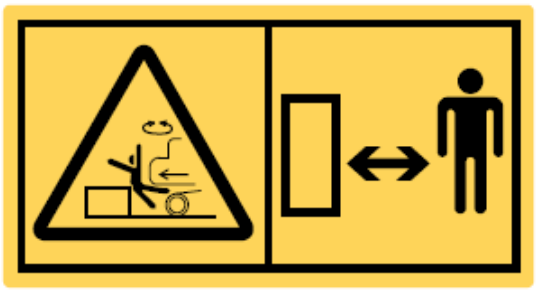
91N6-05120

16) **KEEP CLEAR-REAR** (item 24)

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

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

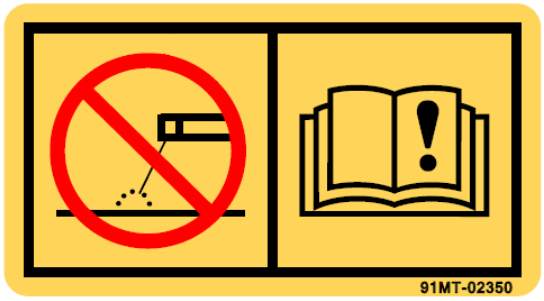
⚠ **Do not deface or remove this label from the machine.**



94MS-07010

17) ECU CONNECTOR (item 25)

This label is positioned on the top side of the battery cover.



91MT-02350

⚠ 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.

18) HIGH PRESSURE (item 26)

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

94K8-01110

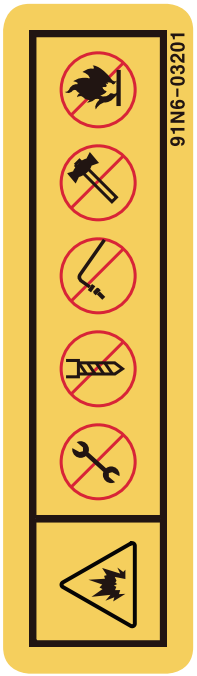
⚠ Escaping fluid under pressure can penetrate the skin causing serious injury or death.

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

※ See the maintenance section for details.

19) ACCUMULATOR (item 28)

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



91N6-03201

※ 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.

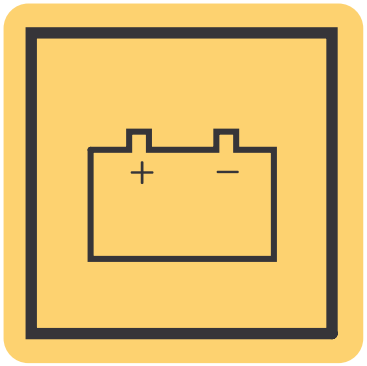
⚠ Do not weld anything to the accumulator.

※ 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.

20) **BATTERY POSITION** (item 29)

This label is positioned on the right side of engine hood.

※ **See page 6-37 for the battery handling.**

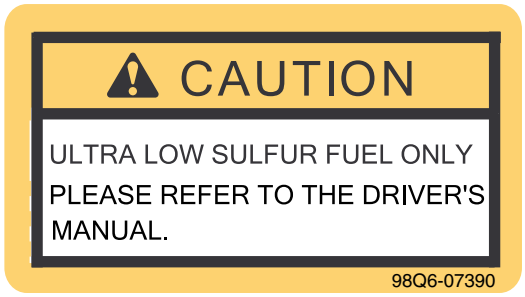


91MJ-02110

21) **ULTRA LOW SULFUR FUEL** (item 30)

This label is positioned on the top side of the fuel cover.

⚠ **EPA Regulation use low sulfur fuel or ultra low sulfur fuel only.**



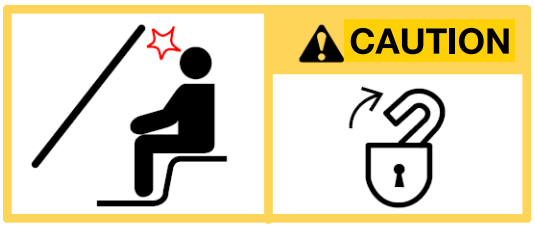
98Q6-07390

22) **WARNING FRONT WINDOW** (item 31)

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

⚠ **Make sure that front window is fully latched and locked into place before operating the machine. Failure to comply may result in serious injury or death.**

※ **See page 3-57 for details.**



91M9-07150

23) **STAY FIX-CABIN** (item 32)

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

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

⚠ **A door which is not fixed in the fully closed or open position (via stay) can suddenly move causing severe personal injury or death.**

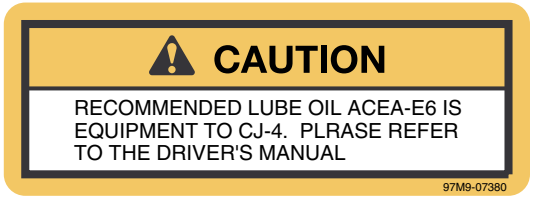
91M9-07112

24) **LUBRICATION OIL** (item 33)

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

※ **Recommended lube oil ACEA-E6 is equipment to CJ-4.**

※ **See page 2-61 for details.**



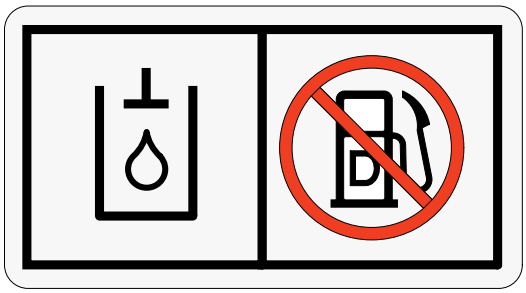
97M9-07380

25) **FUEL SHUT OFF** (item 34)

This label is positioned on the hydraulic oil tank.

※ **Fill only with hydraulic oil.**

※ **Do not fill with diesel fuel.**



91Q6-03230

26) **WATER SEPARATOR** (item 35)

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

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

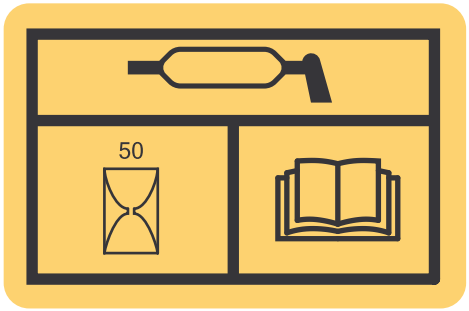
91Q4-07180

27) **SWING BEARING** (item 36)

This label is positioned on the front side of the swing bearing.

※ **Lubricate every 50 hours.**

※ **See page 6-31 for details.**



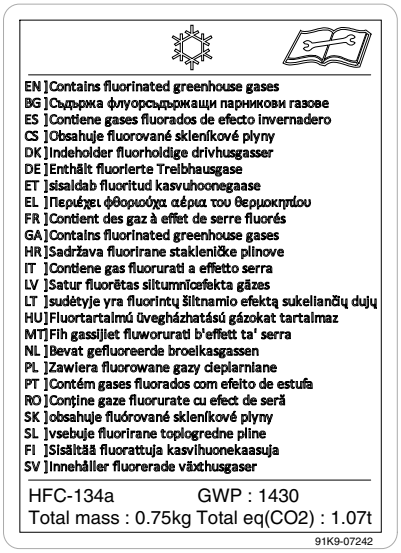
91Q6-03240

28) **REFRIGERANT** (item 37)

This label is positioned on the top side of the cooler shroud.

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

※ **Refer to page 6-42.**



91K9-07242

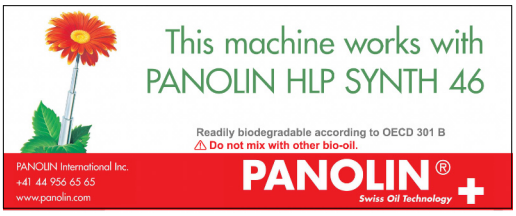
29) **BIO OIL** (item 38)

This label is positioned on the right side hood.

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

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

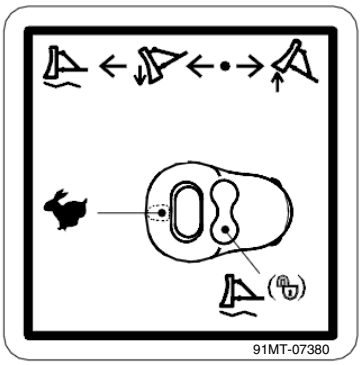
△ **Do not mix with other bio-oil.**



91WD-99110

30) **DOZER CONTROL IDEOGRAM** (item 39)

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



91MT-07380

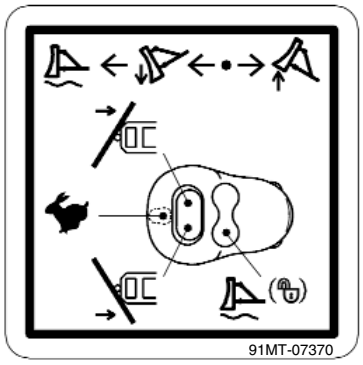
※ **See page 4-7 for details.**

※ **Guidelines 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.

31) **ANGLE DOZER CONTROL IDEOGRAM** (item 40)

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



91MT-07370

⚠ **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.**

※ **See above additional descriptions.**

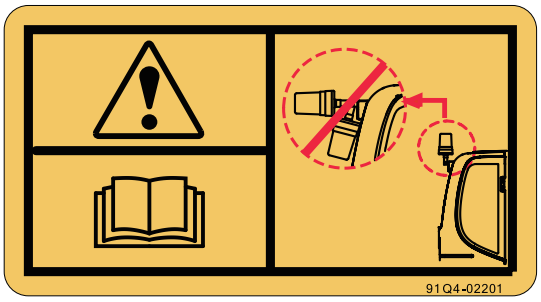
32) **BEACON LAMP** (item 42)

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

※ **Make sure the beacon lamp maintains a vertical position.**

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

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



91Q4-02201

33) **LIFTING POINT/TIE DOWN** (item 43)

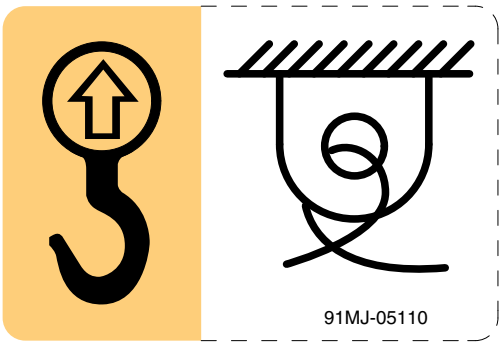
This label is positioned on the LH and RH sides of the dozer blade.

※ **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.



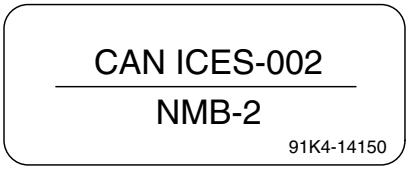
91MJ-05110

34) **EMC** (item 44)

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

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

※ **EMC : ElectroMagntic Compatibility**



91K4-14150

35) **LEFTOVER FUEL** (item 45)

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.**

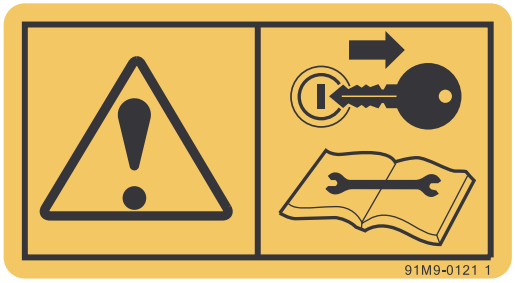
91K4-02700

36) **CAUTION KEY** (item 46)

This label is positioned on the RH side near the start switch of inside the cab.

⚠ **Park on a flat place and stop the engine for inspecting and repairing. Properly TAG machine is not operational. (remove start key)**

※ **Extreme care shall be taken during maintenance work.**



91M9-01211

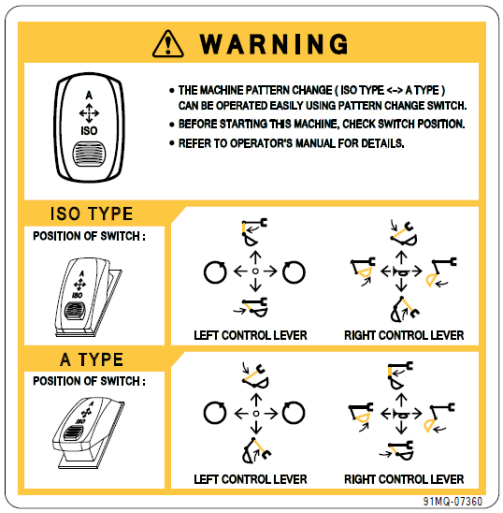
37) **PATTERN CHANGE** (item 47)

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

⚠ **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.**



91MQ-07360

38) **CALIFORNIA PROPOSITION 65** (item 48)

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.**

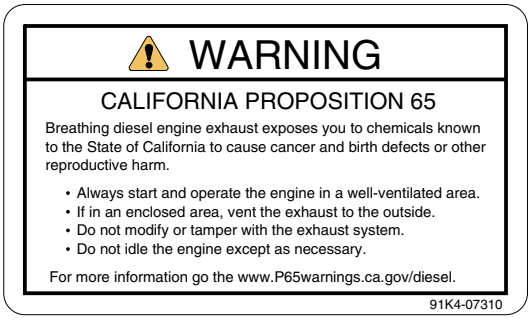
(1) Always start and operate the engine in a well-ventilated area.

(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

39) **AIR COMPRESSOR** (item 50)

This warning label is positioned on the front cover.

⚠ **Do not touch air compressor or it may cause server burn.**

91Q4-13301

40) **AIR COMPRESSSOR -CAB** (item 51)

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

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

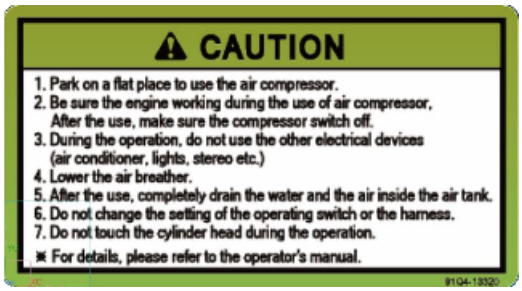
(2) Be sure the engine working during the use of air compressor. After the use, make sure the compressor switch off.

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

(4) Lower the air breather.
After the use, completely drain the water and the air inside the air tank.

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

⚠ **Do not touch the cylinder head during the operation.**



91Q4-13320

41) **FIRE EXTINGUISHER** (item 52)

This label is located on the left side of the RH console.

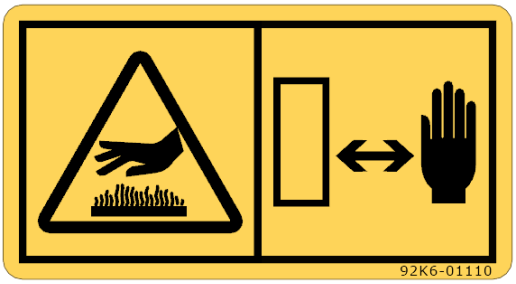
※ **Read and understand the instructions adhered decal on the fire extinguisher.**

91Q6-07290

42) **TURBO COVER** (item 53)

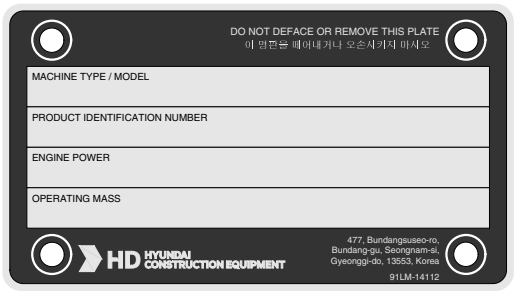
This label is positioned on the rear side of the cab.

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

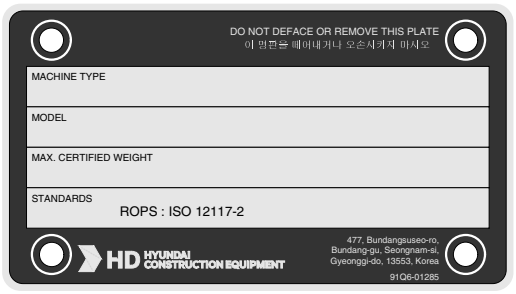


92K6-01110

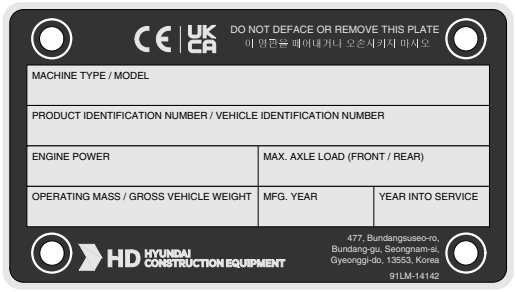
MACHINE DATA PLATE



For general

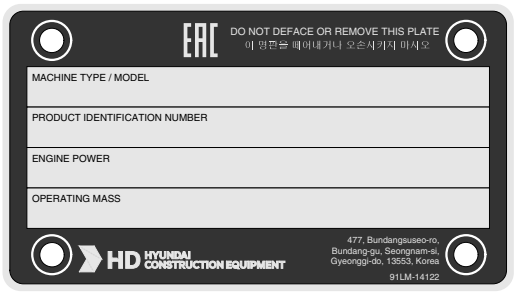


For ROPS



For EU only

For FOPS/FOG



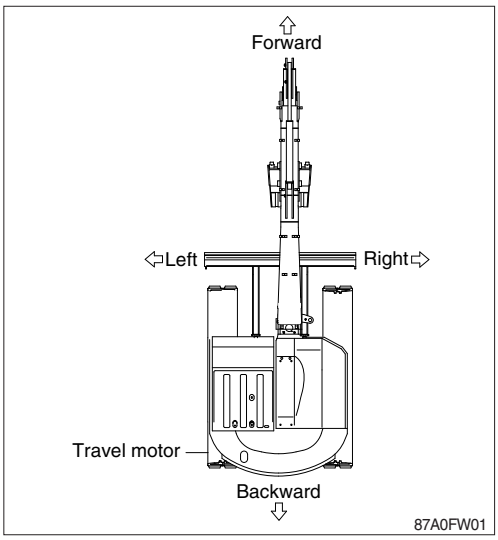
For EAC only

EX0MD01

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

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.

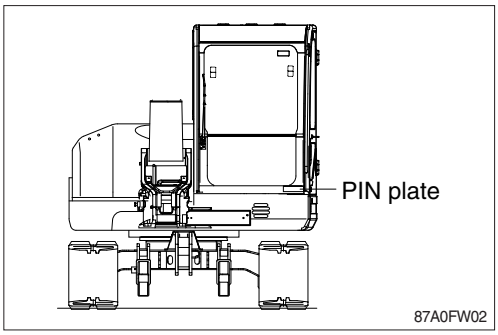


2. SERIAL NUMBER

Provides the serial number when ordering parts or seeking assistance.

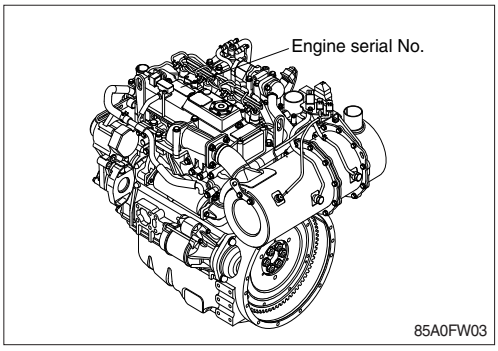
1) MACHINE SERIAL NUMBER

The numbers are located on the PIN plate.



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 section, 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.

- Aways 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:

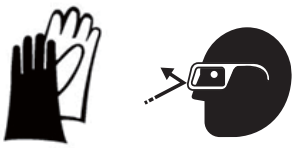
- Move the machine well away from any flammable materials (e.g., fuel, engine oil, clothes, and bits of wood) and adjacent buildings.
- If the engine is running, it may cause a persistent fire. Immediately stop the engine.
- In the event of an electric short, disconnect the batteries to eliminate the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

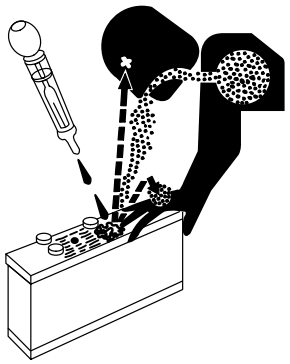
Health and safety instructions in hazardous environments

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.

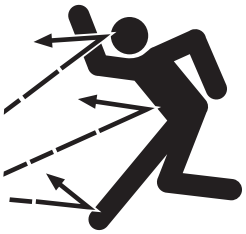
When handling coolants

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,

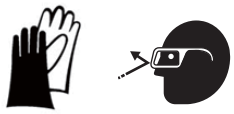
Always wear a safety helmet, protective goggles and safety shoes to prevent injury from airborne particles and thrown or falling objects. Earplugs or earmuffs may be necessary when working in a noisy place.



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.

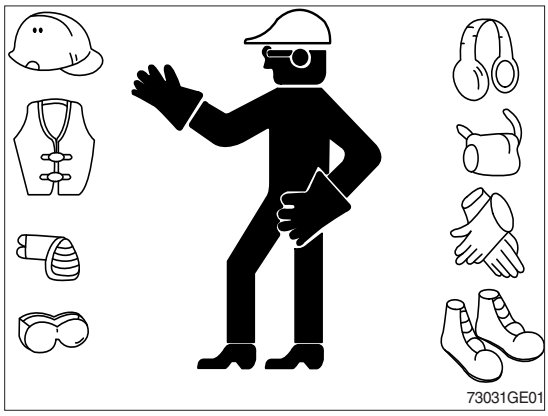
Personal protection gear for various situations

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.

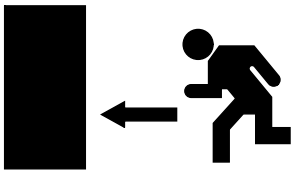
Information on noise

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

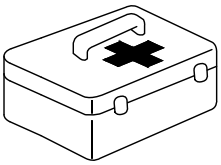
- LwA(Guaranteed) : 98 dB (Uncertainty K 1.0 dB(A))
- LpA(Measured) : 78 dB (Uncertainty K 1.0 dB(A))

Emergency situations

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



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



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

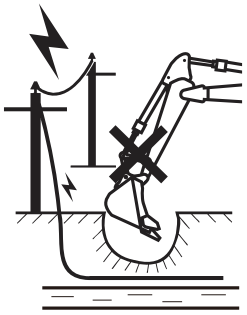
Safety Information on the Machines and Operation

Before Operating the Machine

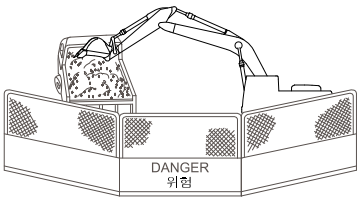
Carefully examine the following conditions and take any necessary actions to prevent risk factors before operating the machine:

Checking the worksite

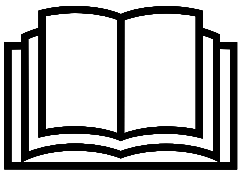
- Always be aware of weather conditions at your worksite. Fog or heavy rain may decrease visibility or render the machine inoperable. In the event of lightning, immediately put the bucket to the ground and evacuate to a safe place.
- Check the worksite for obstacles, and avoid collisions with such obstacles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



- If the worksite is a marshy place (e.g., shallow river, large or small lake, swamp, etc), check the conditions and the depth of marshy areas and the flow rate before driving or operating the machine. Do not operate the machine underwater.
- When operating the machine in water or when crossing shallow, check the bed soil condition and depth and flow speed of water, then proceed taking care that water is not above upper rollers.
- Do not operate the machine on cliffs or at the end of a road on soft ground as the machine may overturn. 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.



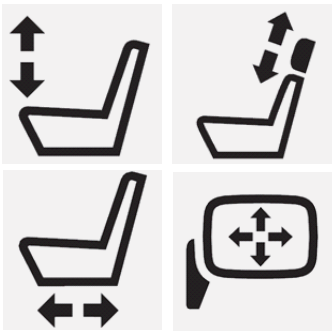
Instructions before operating the machine



- 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.

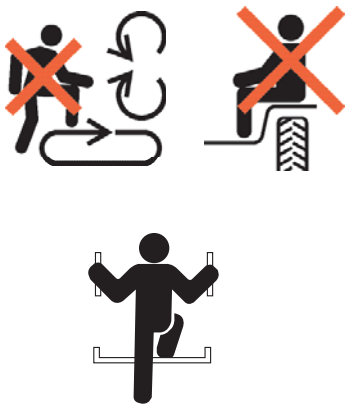


- Adjust the operator’s seat to suit the physical condition of the operator. Check the seatbelt for damage, and replace it if damaged. Do not store unnecessary objects or tools in the cabin.
- Keep clean all parts related to visibility, such as the windshield and rearview mirror. Adjust the rearview 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

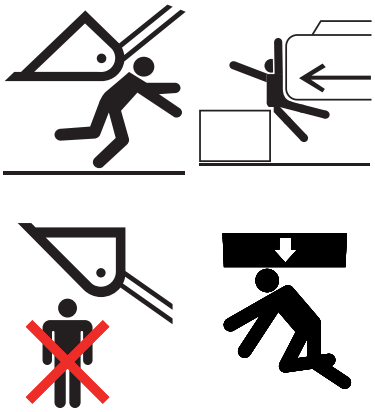
- Do not jump on or off the machine.
- Do not try to get on or off the machine while it is moving.
- Get on or off the machine using the handrail and step (or stepladder, if any). Always keep the handrail and step clean and free from mud or oil.
- Wear anti-slip shoes.
- Comply with the principle of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

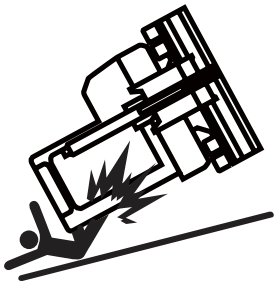
During operation

- 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.

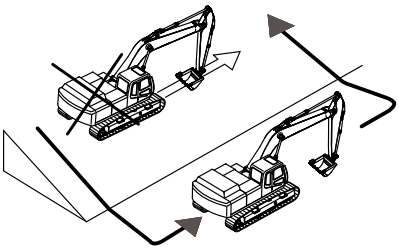


Operation on a slope

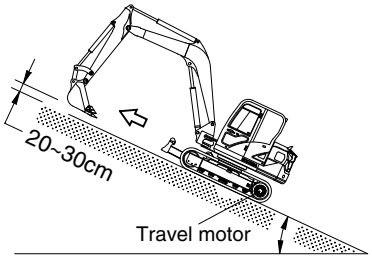
When operating the machine on a slope, failure to comply with these instructions could result in the machine tipping over, which may lead to serious injury or death.



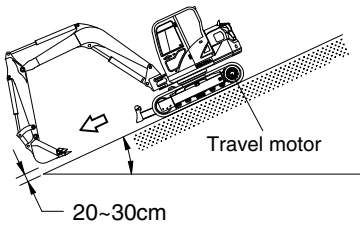
- Do not work on slopes of 10˚ or more.
- Do not exceed the maximum climbing angle of 30˚.
- If operation of the machine on a slope is unavoidable, perform the work after flattening the ground.
- When operating the machine laterally on a slope, there is a high risk of machine overturning or slipping.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

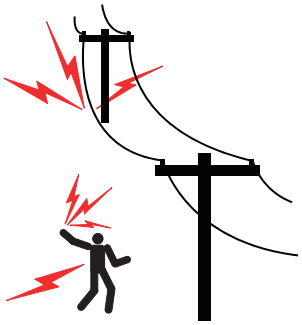


Operations to be avoided or prohibited

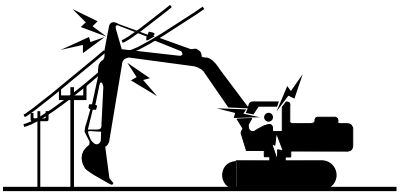
· Pay attention when operating the machine in an enclosed space as this may result in the risk of a buildup of hazardous gases.

· 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.

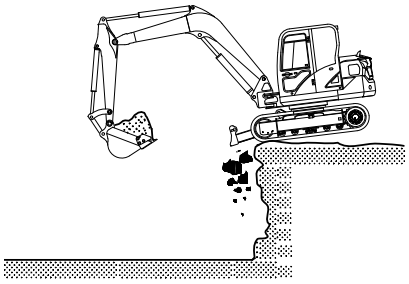
Voltage	Minimum safety distance
6.6 kV	3 m (10 ft)
33.0 kV	4 m (13 ft)
66.0 kV	5 m (16 ft)
154.0 kV	8 m (26 ft)
275.0 kV	10 m (33 ft)



· 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.



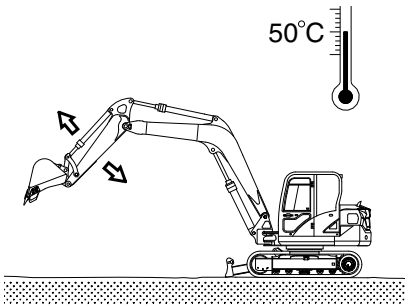
· Avoid operating the machine on soft ground, a slope or cliff as there is a risk that it may overturn. Pay special attention when it is raining as the rainfall may soften the ground.
· When operating or driving the machine in water, check the floor conditions, depth of water and flow rate, and make 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

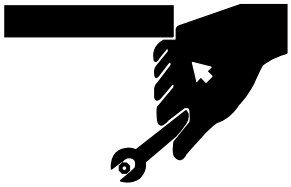
- Do not operate the machine in areas where there is heavy rainfall or thick fog.
- If operating the machine in such areas is unavoidable, perform operation after ensuring sufficient field of vision.
  - Use lighting devices such as the head lamp and working light.
  - Warn any workers within the radius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

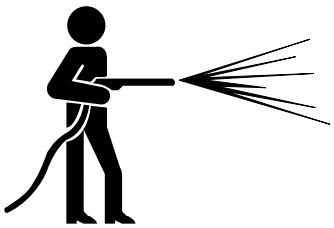
Tools



- 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.



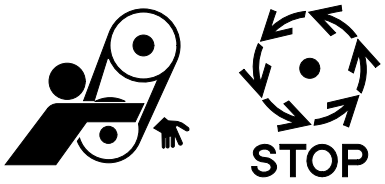
- Use proper lighting devices when operating the machine in a dark area.
- Use lighting devices that are explosion-proof when handling flammable materials such as fuel and hydraulic oil.
- Never attempt to use a direct flame such as a cigarette lighter in lieu of the lighting device.

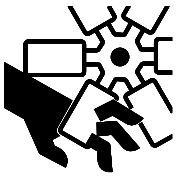
- Check the level of the cooling water after stopping and sufficiently cooling down the engine.
- Sufficiently relieve the inside pressure before opening the cooling water cap.
- The cooling system contains basic components. Use caution to prevent the skin or eyes from coming into contact with the basic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

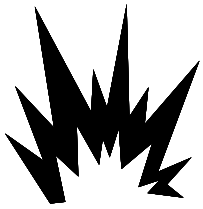
- Never perform a maintenance while the engine is running.
- Never open or remove the engine hood while the machine is in operation.
- If an inspection is required while the engine is running, two or more workers must perform the inspection.
- Keep areas in the vicinity of rotating or moving parts clean.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





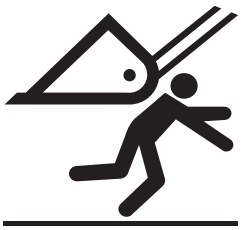
Preventing fire and explosion

- 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

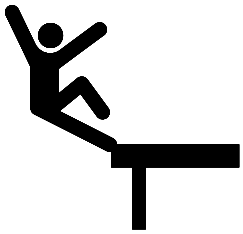
- Do not allow unauthorized workers to access the machine.
- Place the machine in a safe position.
- Install safety fences around the machine.



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.

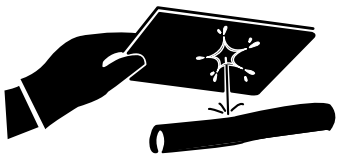
Precautions to take when working on the machine



- 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

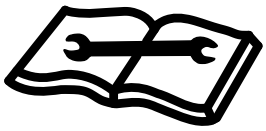
- Make sure that the internal pressure is released before replacing or checking the high-pressure line or hose.
- If the internal pressure is not released, serious injury may result.
- Take the following precautions to avoid serious injury or death:
  - Always check to make sure a working fire extinguisher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



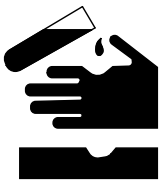
Cautions on inspecting the counterweight

- 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

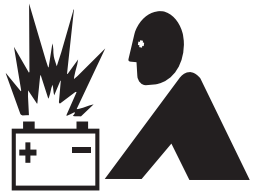


- The battery contains flammable materials.
- Never smoke in the vicinity of the battery.
- The battery electrolyte is strong acid. Pay attention to prevent the skin and eyes from coming into contact with the electrolyte.



- 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.

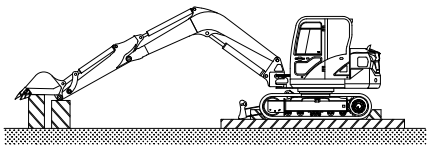
Parking and Storage

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

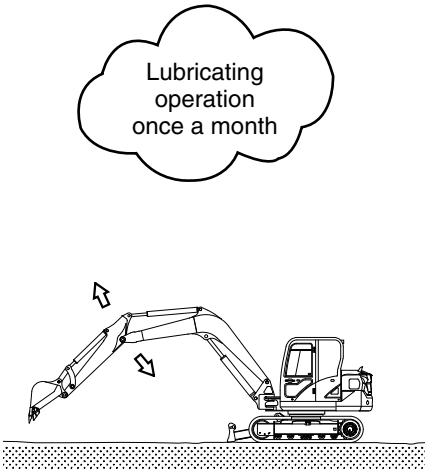
- Park the machine in accordance to any state and local laws.
- When storing the machine for a month or longer, follow these instructions to prevent deterioration of the machine performance :



  - 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.



Visibility

Before you start the machine, perform a walk-around inspection in order to ensure that there are no hazards around the machine.

While the machine is in operation, constantly survey the area around the machine in order to identify potential hazards as hazards become visible around the machine.

Your machine may be equipped with visual aids. Some examples of visual aids are Closed Circuit Television(CCTV), AAVM(Advanced Around View Monitoring) and mirrors. Before operating the machine, ensure that the visual aids are in proper working condition and that the visual aids are clean.

If may not be possible to provide direct visibility on large machines to all areas around the machine, appropriate job site organization is required in order to minimize hazards that are caused by restricted visibility. Job site organization is a collection of policies and procedures that coordinates machines and people that work together in the same area.

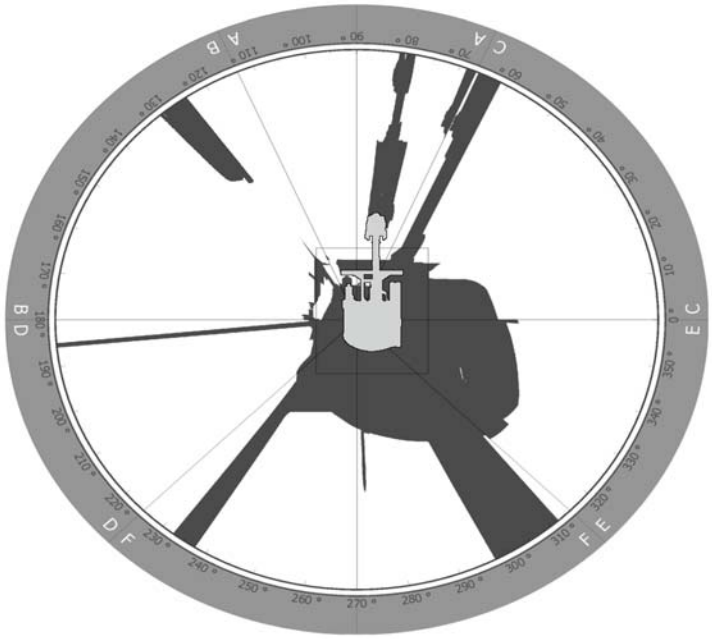
Examples of job site organization include the following:

- Safety instructions
- Controlled patterns of machine movement and vehicle movement
- Workers that direct traffic to move when it is safe
- Restricted areas
- Operator training
- Warning symbols or warning signs on machines or on vehicles
- A system of communication
- Communication between workers and operators prior to approaching the machine

Modifications of the machine configuration by the user could result in a restriction of the machine visibility. In this case, a new risk assessment must be performed according to ISO 5006:2017.

Restricted Visibility

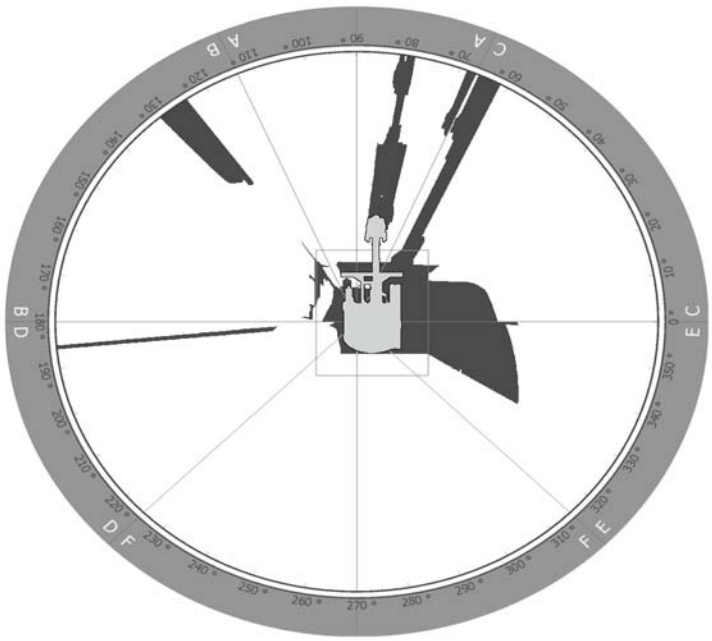
The size and the configuration of this machine may result in areas that cannot be seen when the operator is seated. The following illustration of visual map provides an approximate visual indication of areas of significant restricted visibility. This illustration indicates restricted visibility areas at ground level inside a radius of 12.00m (40 ft) from the operator on a machine only with the use of right side mirror and left side mirror installed. (without the use of optional visual aids.) This illustration provide areas of restricted visibility for distances outside a radius of 12.00m (40 ft).
This machine may be equipped with optional visual aids (CCTV or AAVM) that may provide visibility to some of the restricted visibility areas. For areas that are not covered by the optional visual aids, the job site organization must be utilized to minimize hazards associated with this restricted visibility.



< Top view of the machine at ground level visibility without use of optional visual aids >

※ The shaded areas indicate the approximate location of areas with significant restricted visibility. (Radius = 12 m / 34 ft)

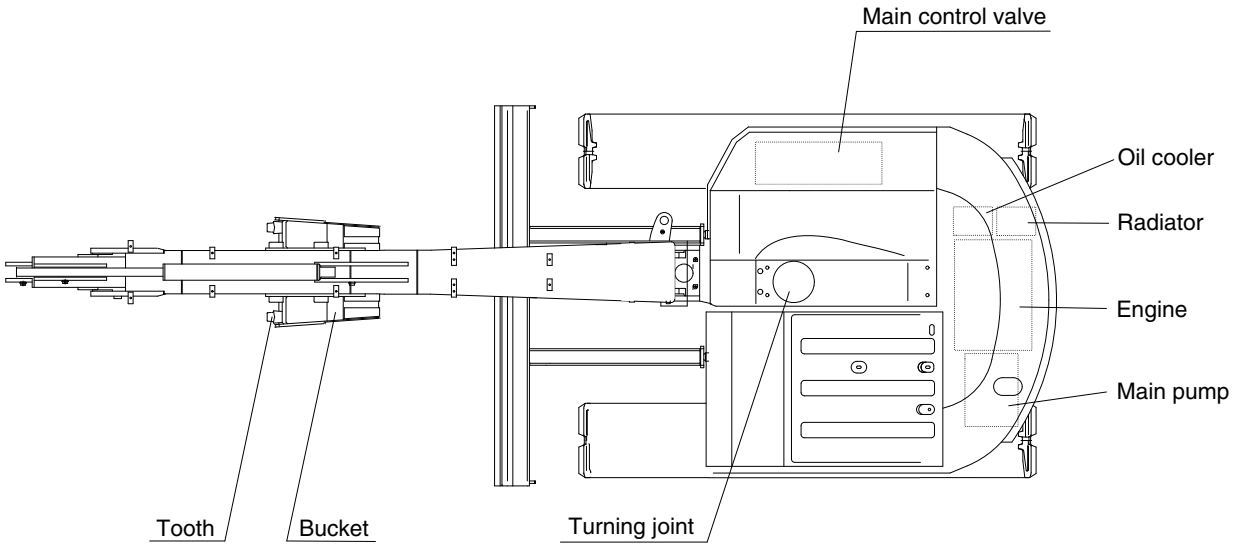
There is restricted visibility to the area directly behind the machine with no optional visual aids. Failure to make sure the area is clear could result in serious injury or death. Make sure that the area is clear before you start the reverse movement.

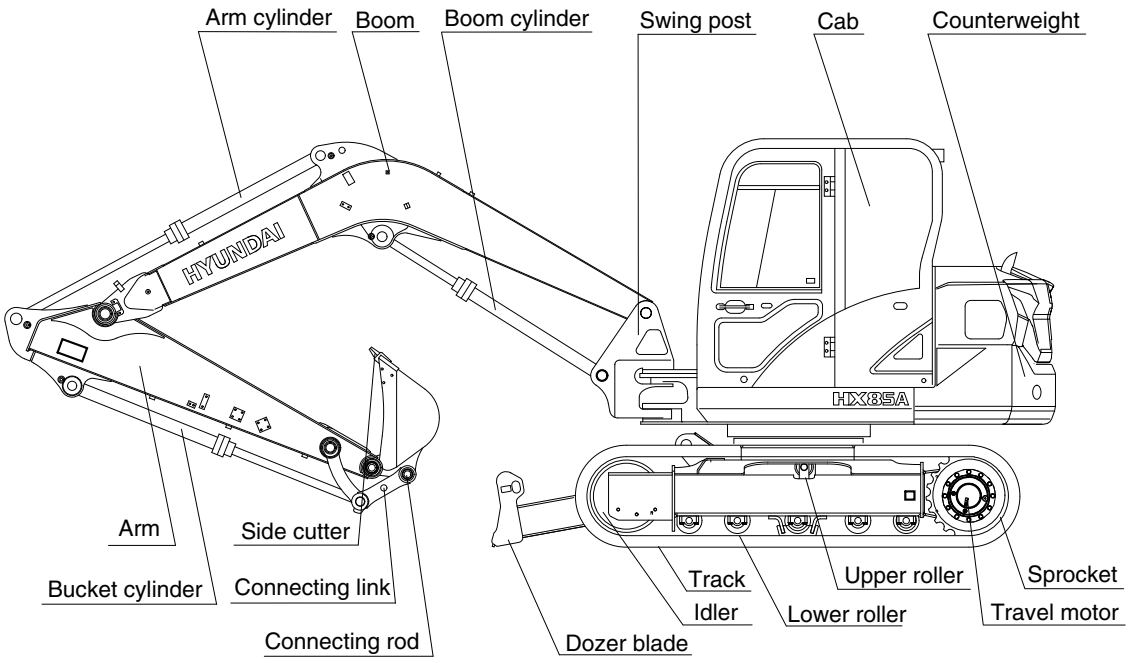


< Top view of the machine at ground level visibility with use of optional visual aids >

※ The shaded areas indicate the approximate location of areas with significant restricted visibility. (Radius = 12 m / 34 ft)

1. MAJOR COMPONENT



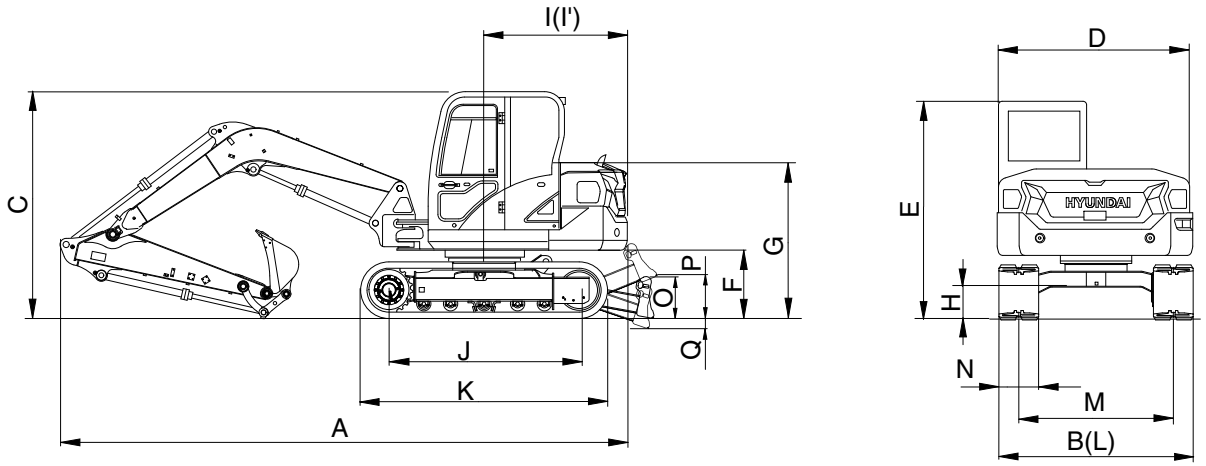


87A2SP01

2. SPECIFICATIONS

1) NORTH AMERICA

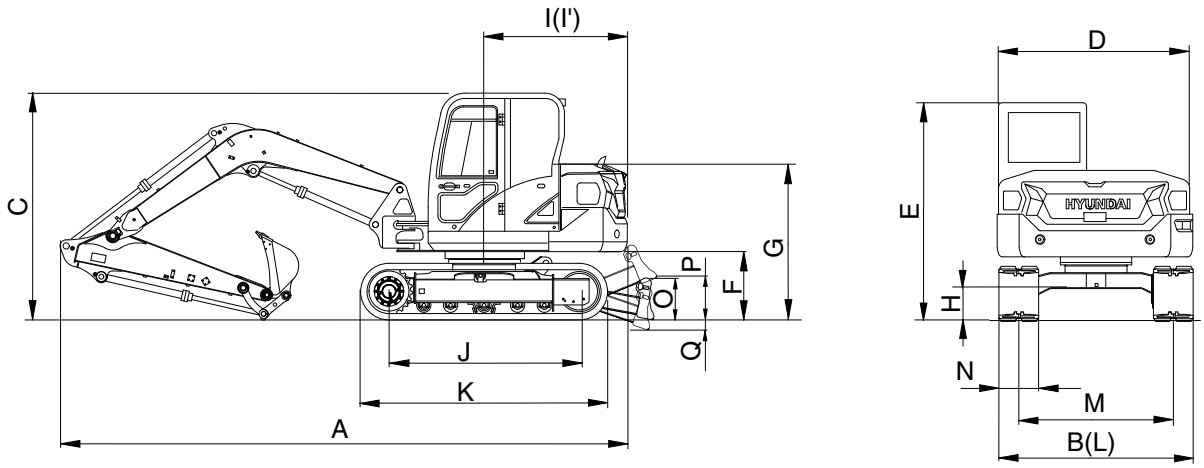
(1) 3.55 m (11' 8") mono boom, 2.10 m (6' 11") thumb bracket long arm and 1250 kg counterweight with crawler dozer



87A2SP02

Description		Unit	Specification
Operating weight		kg (lb)	9090 (20040)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.25 (0.33)
Overall length	A	mm (ft-in)	6730 (22' 1")
Overall width, with 450 mm shoe	B		2300 (7' 7")
Overall width with dozer	-		2300 (7' 7")
Overall height	C		2585 (8' 6")
Superstructure width	D		2270 (7' 5")
Overall height of cab	E		2585 (8' 6")
Ground clearance of counterweight	F		747 (2' 5")
Engine cover height	G		1765 (5' 9")
Minimum ground clearance	H		262 (0' 10")
Rear-end distance	I		1675 (5' 6")
Rear-end swing radius	I'		1675 (5' 6")
Distance between tumblers	J		2270 (7' 5")
Undercarriage length (without grouser)	K		2859 (9' 5")
Undercarriage width	L		2300 (7' 7")
Track gauge	M		1850 (6' 1")
Track shoe width, standard	N		450 (1' 6")
Height of blade	O		437 (1' 5")
Ground clearance of blade up	P		428 (1' 5")
Depth of blade down	Q		417 (1' 4")
Travel speed (Low/high)		km/hr (mph)	2.7/5.2 (1.7/3.2)
Swing speed		rpm	9.5
Gradeability		Degree (%)	30 (58)
Ground pressure (450 mm shoe)		kgf/cm^2 (psi)	0.41 (5.8)
Max traction force		kg (lb)	7580 (16710)

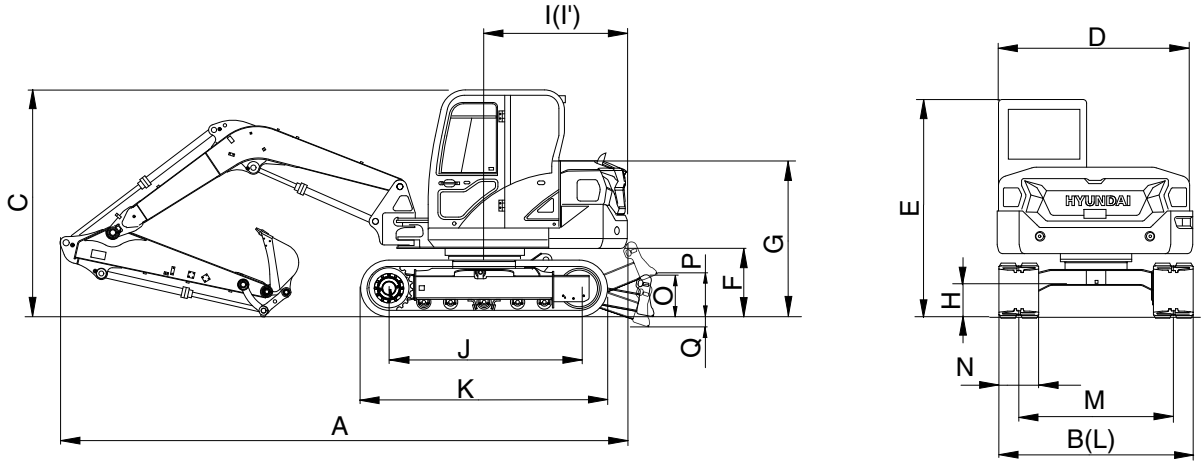
(2) 3.55 m (11' 8") mono boom, 1.75 m (5' 9") thumb bracket arm and 1000 kg counterweight with crawler dozer



87A2SP02

Description		Unit	Specification
Operating weight		kg (lb)	8815 (19430)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.25 (0.33)
Overall length	A	mm (ft-in)	6620 (21' 9")
Overall width, with 450 mm shoe	B		2300 (7' 7")
Overall width with dozer	-		2300 (7' 7")
Overall height	C		2585 (8' 6")
Superstructure width	D		2270 (7' 5")
Overall height of cab	E		2585 (8' 6")
Ground clearance of counterweight	F		747 (2' 5")
Engine cover height	G		1765 (5' 9")
Minimum ground clearance	H		262 (0' 10")
Rear-end distance	I		1600 (5' 3")
Rear-end swing radius	I'		1600 (5' 3")
Distance between tumblers	J		2270 (7' 5")
Undercarriage length (without grouser)	K		2859 (9' 5")
Undercarriage width	L		2300 (7' 7")
Track gauge	M		1850 (6' 1")
Track shoe width, standard	N		450 (1' 6")
Height of blade	O		437 (1' 5")
Ground clearance of blade up	P		428 (1' 5")
Depth of blade down	Q		417 (1' 4")
Travel speed (Low/high)		km/hr (mph)	2.7/5.2 (1.7/3.2)
Swing speed		rpm	9.5
Gradeability		Degree (%)	30 (58)
Ground pressure (450 mm shoe)		kgf/cm^2 (psi)	0.40 (5.63)
Max traction force		kg (lb)	7580 (16710)

(3) 3.55 m (11' 8") mono boom, 2.10 m (6' 11") thumb bracket long arm and 1250 kg counterweight with angle dozer

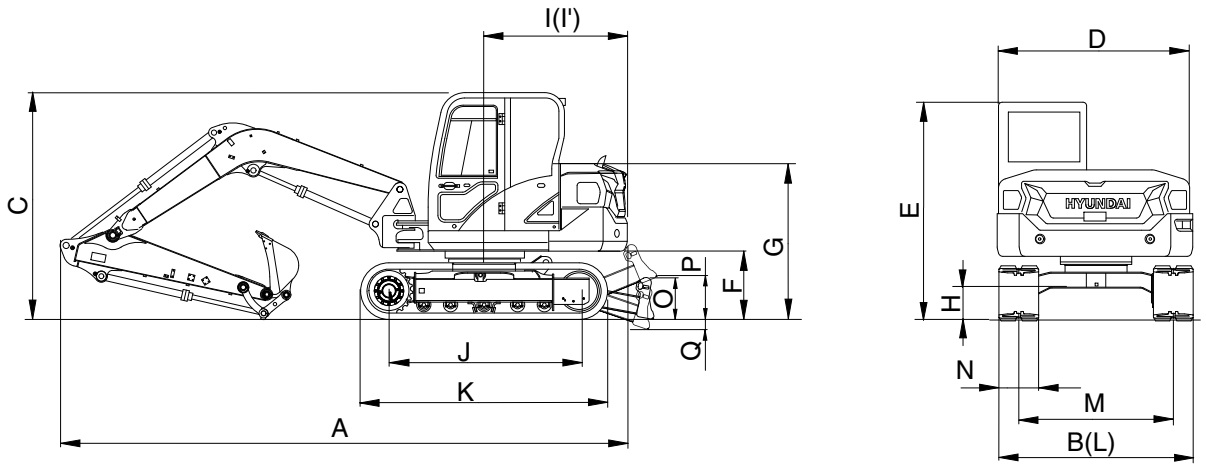


87A2SP02

Description		Unit	Specification
Operating weight		kg (lb)	9355 (20620)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.25 (0.33)
Overall length	A	mm (ft-in)	6730 (22' 1")
Overall width, with 450 mm shoe	B		2300 (7' 7")
Overall width with dozer	-		2300 (7' 7")
Overall height	C		2585 (8' 6")
Superstructure width	D		2270 (7' 5")
Overall height of cab	E		2585 (8' 6")
Ground clearance of counterweight	F		747 (2' 5")
Engine cover height	G		1765 (5' 9")
Minimum ground clearance	H		263 (0' 10")
Rear-end distance	I		1675 (5' 6")
Rear-end swing radius	I'		1675 (5' 6")
Distance between tumblers	J		2270 (7' 5")
Undercarriage length (without grouser)	K		2859 (9' 5")
Undercarriage width	L		2300 (7' 7")
Track gauge	M		1850 (6' 1")
Track shoe width, standard	N		450 (1' 6")
Height of blade	O		454 (1' 6")
Ground clearance of blade up	P		489 (1' 7")
Depth of blade down	Q		506 (1' 8")
Travel speed (Low/high)		km/hr (mph)	2.7/5.2 (1.7/3.2)
Swing speed		rpm	9.5
Gradeability		Degree (%)	30 (58)
Ground pressure (450 mm shoe)		kgf/cm^2 (psi)	0.42 (5.97)
Max traction force		kg (lb)	7580 (16710)

2) EUROPE

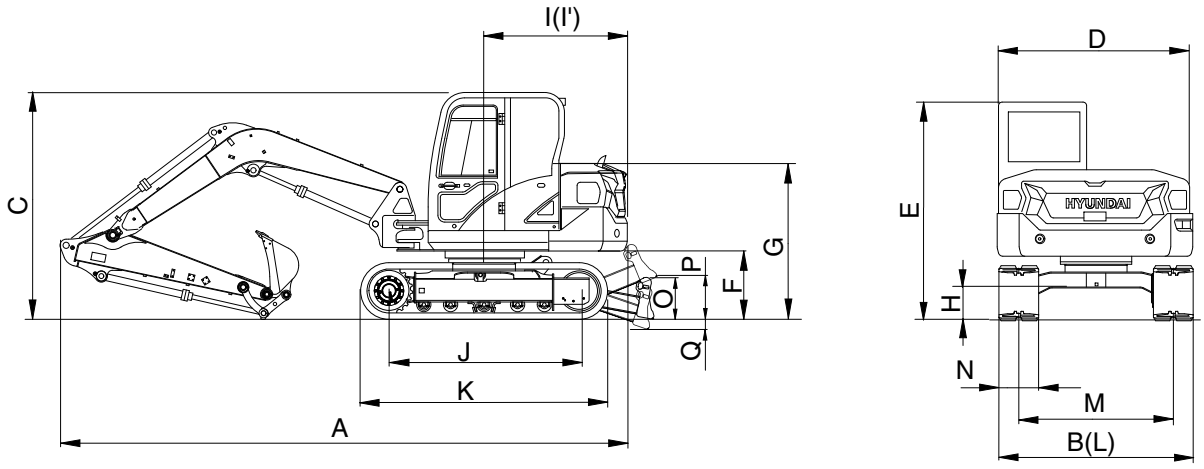
(1) 3.55 m (11' 8") mono boom, 1.75 m (5' 9") arm and 1000 kg counterweight with crawler dozer



87A2SP02

Description		Unit	Specification
Operating weight		kg (lb)	8865 (19540)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.25 (0.33)
Overall length	A	mm (ft-in)	6620 (21' 9")
Overall width, with 450 mm shoe	B		2300 (7' 7")
Overall width with dozer	-		2300 (7' 7")
Overall height	C		2585 (8' 6")
Superstructure width	D		2270 (7' 5")
Overall height of cab	E		2585 (8' 6")
Ground clearance of counterweight	F		747 (2' 5")
Engine cover height	G		1765 (5' 9")
Minimum ground clearance	H		262 (0' 10")
Rear-end distance	I		1600 (5' 3")
Rear-end swing radius	I'		1600 (5' 3")
Distance between tumblers	J		2270 (7' 5")
Undercarriage length (without grouser)	K		2859 (9' 5")
Undercarriage width	L		2300 (7' 7")
Track gauge	M		1850 (6' 1")
Track shoe width, standard	N		450 (1' 6")
Height of blade	O		437 (1' 5")
Ground clearance of blade up	P		428 (1' 5")
Depth of blade down	Q		417 (1' 4")
Travel speed (Low/high)		km/hr (mph)	2.7/5.2 (1.7/3.2)
Swing speed		rpm	9.5
Gradeability		Degree (%)	30 (58)
Ground pressure (450 mm shoe)		kgf/cm^2 (psi)	0.40 (5.66)
Max traction force		kg (lb)	7580 (16710)

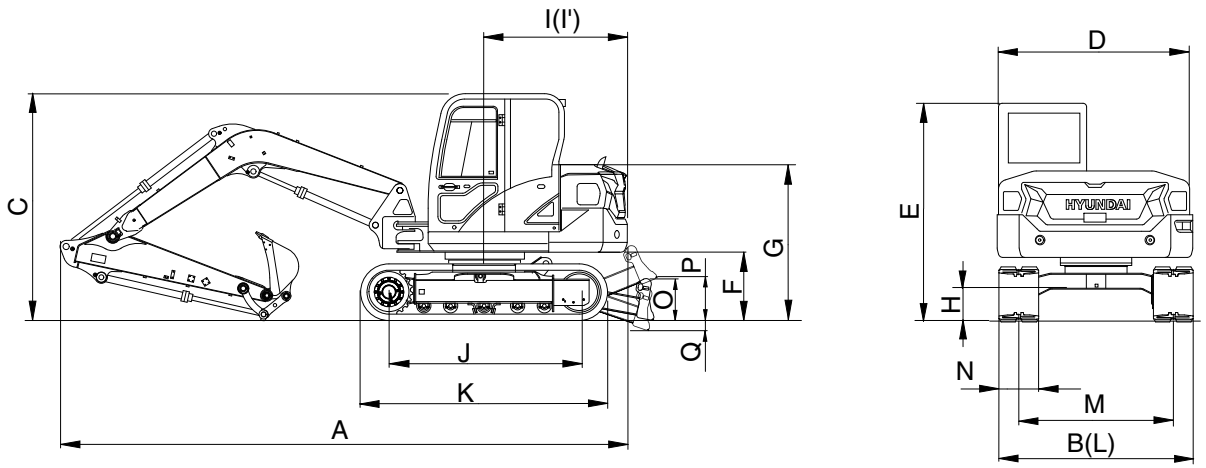
(2) 3.55 m (11' 8") mono boom, 2.10 m (6' 11") long arm and 1150 kg counterweight with crawler dozer



87A2SP02

Description		Unit	Specification
Operating weight		kg (lb)	8845 (19500)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.25 (0.33)
Overall length	A	mm (ft-in)	6700 (22' 0")
Overall width, with 450 mm shoe	B		2300 (7' 7")
Overall width with dozer	-		2300 (7' 7")
Overall height	C		2585 (8' 6")
Superstructure width	D		2270 (7' 5")
Overall height of cab	E		2585 (8' 6")
Ground clearance of counterweight	F		747 (2' 5")
Engine cover height	G		1765 (5' 9")
Minimum ground clearance	H		262 (0' 10")
Rear-end distance	I		1650 (5' 5")
Rear-end swing radius	I'		1650 (5' 5")
Distance between tumblers	J		2270 (7' 5")
Undercarriage length (without grouser)	K		2859 (9' 5")
Undercarriage width	L		2300 (7' 7")
Track gauge	M		1850 (6' 1")
Track shoe width, standard	N		450 (1' 6")
Height of blade	O		437 (1' 5")
Ground clearance of blade up	P		428 (1' 5")
Depth of blade down	Q		417 (1' 4")
Travel speed (Low/high)		km/hr (mph)	2.7/5.2 (1.7/3.2)
Swing speed		rpm	9.5
Gradeability		Degree (%)	30 (58)
Ground pressure (450 mm shoe)		kgf/cm^2 (psi)	0.40 (5.64)
Max traction force		kg (lb)	7580 (16710)

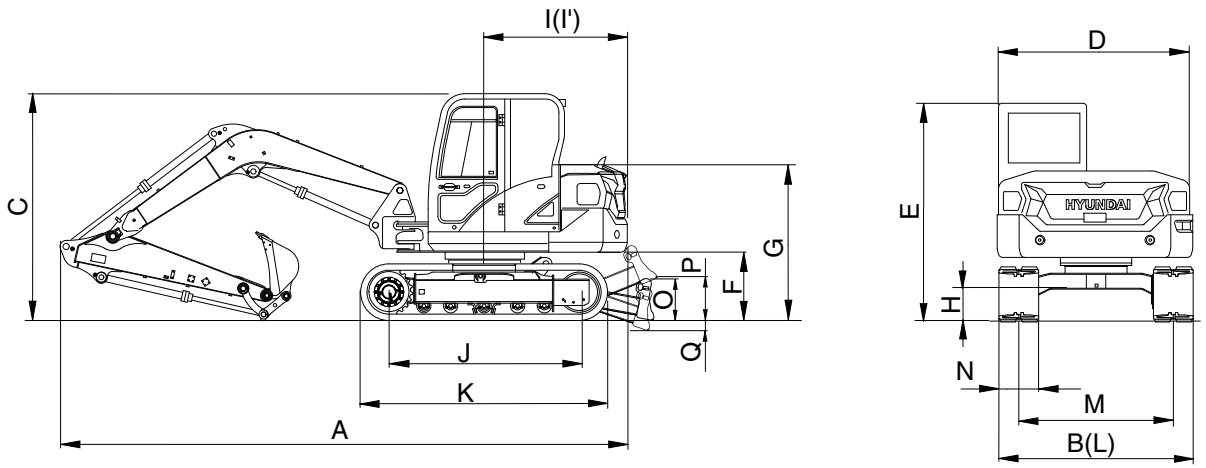
(3) 3.92 m (12' 10") 2-piece boom, 1.75 m (5' 9") arm and 1150 kg counterweight with crawler dozer



87A2SP02

Description		Unit	Specification
Operating weight		kg (lb)	9075 (20010)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.25 (0.33)
Overall length	A	mm (ft-in)	7055 (23' 2")
Overall width, with 450 mm shoe	B		2300 (7' 7")
Overall width with dozer	-		2300 (7' 7")
Overall height	C		2585 (8' 6")
Superstructure width	D		2270 (7' 5")
Overall height of cab	E		2585 (8' 6")
Ground clearance of counterweight	F		747 (2' 5")
Engine cover height	G		1765 (5' 9")
Minimum ground clearance	H		262 (0' 10")
Rear-end distance	I		1650 (5' 5")
Rear-end swing radius	I'		1650 (5' 5")
Distance between tumblers	J		2270 (7' 5")
Undercarriage length (without grouser)	K		2859 (9' 5")
Undercarriage width	L		2300 (7' 7")
Track gauge	M		1850 (6' 1")
Track shoe width, standard	N		450 (1' 6")
Height of blade	O		437 (1' 5")
Ground clearance of blade up	P		428 (1' 5")
Depth of blade down	Q		417 (1' 4")
Travel speed (Low/high)		km/hr (mph)	2.7/5.2 (1.7/3.2)
Swing speed		rpm	9.5
Gradeability		Degree (%)	30 (58)
Ground pressure (450 mm shoe)		kgf/cm^2 (psi)	0.41 (5.79)
Max traction force		kg (lb)	7580 (16710)

(4) 3.92 m (12' 10") 2-piece boom, 2.10 m (6' 11") arm and 1250 kg counterweight with crawler dozer

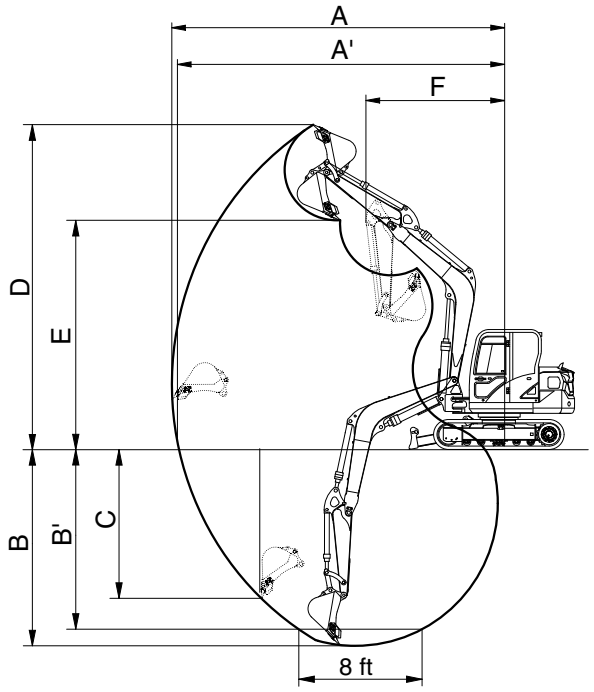


87A2SP02

Description		Unit	Specification
Operating weight		kg (lb)	9210 (20300)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	0.25 (0.33)
Overall length	A	mm (ft-in)	7050 (23' 2")
Overall width, with 450 mm shoe	B		2300 (7' 7")
Overall width with dozer	-		2300 (7' 7")
Overall height	C		2585 (8' 6")
Superstructure width	D		2270 (7' 5")
Overall height of cab	E		2585 (8' 6")
Ground clearance of counterweight	F		747 (2' 5")
Engine cover height	G		1765 (5' 9")
Minimum ground clearance	H		262 (0' 10")
Rear-end distance	I		1675 (5' 6")
Rear-end swing radius	I'		1675 (5' 6")
Distance between tumblers	J		2270 (7' 5")
Undercarriage length (without grouser)	K		2859 (9' 5")
Undercarriage width	L		2300 (7' 7")
Track gauge	M		1850 (6' 1")
Track shoe width, standard	N		450 (1' 6")
Height of blade	O		437 (1' 5")
Ground clearance of blade up	P		428 (1' 5")
Depth of blade down	Q		417 (1' 4")
Travel speed (Low/high)		km/hr (mph)	2.7/5.2 (1.7/3.2)
Swing speed		rpm	9.5
Gradeability		Degree (%)	30 (58)
Ground pressure (450 mm shoe)		kgf/cm^2 (psi)	0.41 (5.87)
Max traction force		kg (lb)	7580 (16710)

3. WORKING RANGE

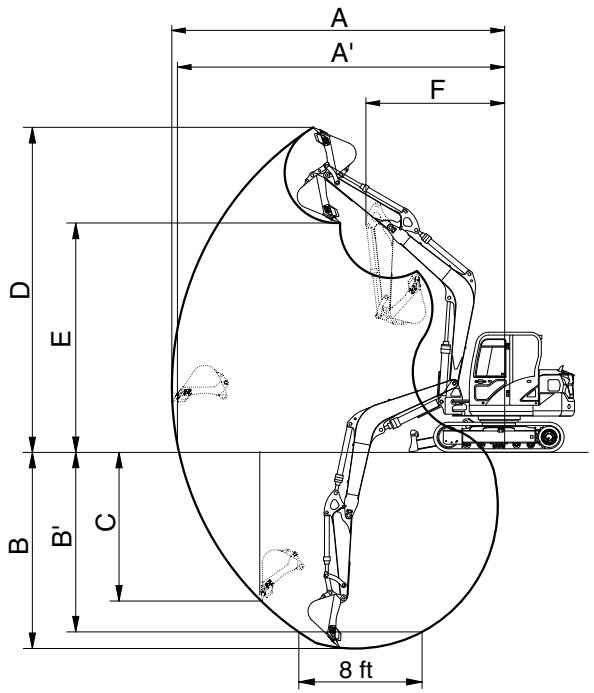
1) MONO BOOM



87A2SP03

Description	m (ft-in)	Boom	3.55 (11' 8")	
		Arm	1.75 (5' 9")	2.10 (6' 11")
Max digging reach	mm (ft-in)	A	7090 (23' 3")	7420 (24' 4")
Max digging reach on ground		A'	6940 (22' 9")	7280 (23' 11")
Max digging depth		B	4240 (13' 11")	4590 (15' 1")
Max digging depth (8 ft level)		B'	3880 (12' 9")	4270 (14' 0")
Max vertical wall digging depth		C	3660 (12' 0")	4010 (13' 2")
Max digging height		D	7035 (23' 1")	7290 (23' 11")
Max dumping height		E	5000 (16' 5")	5250 (17' 3")
Min swing radius		F	2560 (8' 5")	2770 (9' 1")
Boom swing radius (left/right)			70˚/60˚	
Bucket digging force	kN	SAE	53	53
	kgf		5388	5402
	lbf		11879	11910
	kN	ISO	62	62
	kgf		6267	6283
	lbf		13815	13852
Arm digging force	kN	SAE	40	36
	kgf		4042	3639
	lbf		8911	8022
	kN	ISO	41	37
	kgf		4222	3782
	lbf		9307	8338

2) 2 PCS BOOM



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Description	m (ft-in)	Boom	3.92 (12' 10")	
		Arm	1.75 (5' 9")	2.10 (6' 11")
Max digging reach	mm (ft-in)	A	7550 (24' 9")	7890 (25' 11")
Max digging reach on ground		A'	7400 (24' 3")	7750 (25' 5")
Max digging depth		B	4260 (14' 0")	4610 (15' 1")
Max digging depth (8 ft level)		B'	4100 (13' 5")	4460 (14' 8")
Max vertical wall digging depth		C	3840 (12' 7")	4185 (13' 9")
Max digging height		D	7910 (25' 11")	8230 (27' 0")
Max dumping height		E	5870 (19' 3")	6195 (20' 4")
Min swing radius		F	2470 (8' 1")	2780 (9' 1")
Boom swing radius (left/right)			70˚/60˚	
Bucket digging force	kN	SAE	53	53
	kgf		5388	5402
	lbf		11879	11910
	kN	ISO	62	62
	kgf		6267	6283
	lbf		13815	13852
Arm digging force	kN	SAE	40	36
	kgf		4042	3639
	lbf		8911	8022
	kN	ISO	41	37
	kgf		4222	3782
	lbf		9307	8338

4. WEIGHT

Item	Qty (EA)	kg	lb
Upperstructure assembly			
· Main frame weld assembly	1	1135	2502
· Engine assembly (including DFP)	1	278	613
· Main pump assembly	1	32	71
· Main control valve assembly	1	90	198
· Swing motor assembly	1	80	176
· Hydraulic oil tank WA	1	67	148
· Fuel tank WA	1	60	132
· Counterweight-casting type	1	1000	2205
· Counterweight-add	1	1150	2535
· Counterweight-cast add increased	1	1250	2756
· Cab assembly	1	455	1003
Lower chassis assembly			
· Track frame weld assembly	1	1004	2213
· Dozer blade assembly	1	337	743
· Swing bearing	1	155	342
· Travel motor assembly	2	170	375
· Turning joint	1	26	57
· Sprocket	2	49	108
· Track recoil spring	2	123	270
· Idler	2	132	291
· Upper roller	2	14	30
· Lower roller	10	155	342
· Track-chain assembly-triple for mini	2	858	1892
· Track-chain assembly-600 mm triple LC	2	1014	2235
· Track-chain assembly-450 mm LC bolt-on type	2	858	1892
· Track-chain assembly-450 mm LC rubber pad	2	908	2002
· Track-chain assembly-rail interlocking	2	800	1764

※ This information is different with operating and transportation weight because it is not including harness, pipe, oil, fuel so on.

※ Refer to transportation for actual weight information and specifications for operating weight.

Item	Qty (EA)	kg	lb
Front attachment assembly			
· Boom assembly-3.55 m mono boom	1	410	904
· Boom assembly-3.92 m 2-piece boom	1	494	1089
· Arm assembly-1.75 m	1	172	379
· Arm assembly- 2.10 m long	1	197	434
· Arm assembly-1.75 m thumb bracket	1	178	392
· Arm assembly-2.10 m thumb bracket	1	202	445
· Bucket assembly-general	1	185	408
· Bucket assembly-heavy duty	1	248	547
· Boom cylinder assembly	1	115	254
· Arm cylinder assembly	1	67	148
· Bucket cylinder assembly	1	59	130
· Dozer cylinder assembly	1	80	176
· Bucket control linkage total	1	70	154

※ This information is different with operating and transportation weight because it is not including harness, pipe, oil, fuel so on.

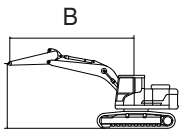
※ Refer to transportation for actual weight information and specifications for operating weight.

5. LIFTING CAPACITIES

1) COUNTERWEIGHT 1000 KG

Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1000	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	1890			*2130	1580	5.02
(14.8 ft)	lb					*4590	4170			*4700	3480	(16.5)
3.0 m	kg			*3260	*3260	*2360	1840			*2030	1230	5.81
(9.8 ft)	lb			*7190	*7190	*5200	4060			*4480	2710	(19.1)
1.5 m	kg					*2900	1740	*2180	1150	*2150	1130	6.06
(4.9 ft)	lb					*6390	3840	*4810	2540	*4740	2490	(19.9)
Ground	kg			*3610	3030	*3180	1670			*2220	1160	5.87
Line	lb			*7960	6680	*7010	3680			*4890	2560	(19.2)
-1.5 m	kg	*3910	*3910	*4660	3050	*2860	1670			*2260	1390	5.16
(-4.9 ft)	lb	*8620	*8620	*10270	6720	*6310	3680			*4980	3060	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

※ 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.
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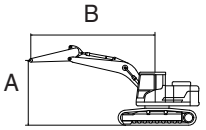
※ Please be aware of the local regulations and instructions for lifting operations.

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

Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1000	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m (19.7 ft)	kg									*2500	*2500	3.21
	lb									*5510	*5510	(10.5)
4.5 m (14.8 ft)	kg					2030	1750			1680	1460	5.02
	lb					4480	3860			3700	3220	(16.5)
3.0 m (9.8 ft)	kg			*3260	3180	1970	1700			1310	1140	5.81
	lb			*7190	7010	4340	3750			2890	2510	(19.1)
1.5 m (4.9 ft)	kg					1870	1600	1220	1060	1200	1040	6.06
	lb					4120	3530	2690	2340	2650	2290	(19.9)
Ground Line	kg			3350	2750	1800	1530			1240	1070	5.87
	lb			7390	6060	3970	3370			2730	2360	(19.2)
-1.5 m (-4.9 ft)	kg	*3910	*3910	3380	2770	1790	1530			1480	1280	5.16
	lb	*8620	*8620	7450	6110	3950	3370			3260	2820	(16.9)
-3.0 m (-9.8 ft)	kg			*2550	*2550					*1960	*1960	3.57
	lb			*5620	*5620					*4320	*4320	(11.7)

※ Note

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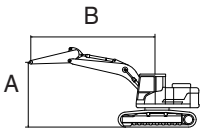
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1000	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			*1830	1400	5.43
(14.8 ft)	lb					*4060	*4060			*4030	3090	(17.8)
3.0 m	kg			*2720	*2720	*2150	1850	*1950	1170	*1750	1120	6.15
(9.8 ft)	lb			*6000	*6000	*4740	4080	*4300	2580	*3860	2470	(20.2)
1.5 m	kg					*2740	1740	*2100	1140	*1840	1040	6.39
(4.9 ft)	lb					*6040	3840	*4630	2510	*4060	2290	(21.0)
Ground	kg			*3720	3010	*3130	1660	*2170	1110	*2060	1060	6.21
Line	lb			*8200	6640	*6900	3660	*4780	2450	*4540	2340	(20.4)
-1.5 m	kg	*3290	*3290	*4970	3010	*2990	1640			*2120	1230	5.56
(-4.9 ft)	lb	*7250	*7250	*10960	6640	*6590	3620			*4670	2710	(18.2)
-3.0 m	kg			*3280	3100					*2020	1900	4.16
(-9.8 ft)	lb			*7230	6830					*4450	4190	(13.7)

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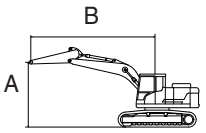
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1000	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	1770			1480	1290	5.43
(14.8 ft)	lb					*4060	3900			3260	2840	(17.8)
3.0 m	kg			*2720	*2720	1980	1710	1250	1080	1190	1040	6.15
(9.8 ft)	lb			*6000	*6000	4370	3770	2760	2380	2620	2290	(20.2)
1.5 m	kg					1870	1600	1210	1050	1100	950	6.39
(4.9 ft)	lb					4120	3530	2670	2310	2430	2090	(21.0)
Ground	kg			3340	2730	1790	1520	1180	1020	1130	970	6.21
Line	lb			7360	6020	3950	3350	2600	2250	2490	2140	(20.4)
-1.5 m	kg	*3290	*3290	3340	2730	1770	1500			1320	1130	5.56
(-4.9 ft)	lb	*7250	*7250	7360	6020	3900	3310			2910	2490	(18.2)
-3.0 m	kg			*3280	2820					*2020	1740	4.16
(-9.8 ft)	lb			*7230	6220					*4450	3840	(13.7)

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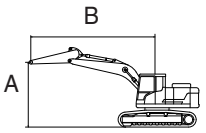
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1000	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	1940			*2130	1610	5.02
(14.8 ft)	lb					*4590	4280			*4700	3550	(16.5)
3.0 m	kg			*3260	*3260	*2360	1880			*2030	1260	5.81
(9.8 ft)	lb			*7190	*7190	*5200	4140			*4480	2780	(19.1)
1.5 m	kg					*2900	1780	*2180	1180	*2150	1160	6.06
(4.9 ft)	lb					*6390	3920	*4810	2600	*4740	2560	(19.9)
Ground	kg			*3610	3100	*3180	1710			*2220	1190	5.87
Line	lb			*7960	6830	*7010	3770			*4890	2620	(19.2)
-1.5 m	kg	*3910	*3910	*4660	3120	*2860	1710			*2260	1420	5.16
(-4.9 ft)	lb	*8620	*8620	*10270	6880	*6310	3770			*4980	3130	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

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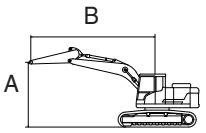
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1000	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					2000	1800			1650	1500	5.02
(14.8 ft)	lb					4410	3970			3640	3310	(16.5)
3.0 m	kg			*3260	*3260	1940	1750			1290	1180	5.81
(9.8 ft)	lb			*7190	*7190	4280	3860			2840	2600	(19.1)
1.5 m	kg					1840	1650	1200	1090	1180	1080	6.06
(4.9 ft)	lb					4060	3640	2650	2400	2600	2380	(19.9)
Ground	kg			3300	2840	1770	1590			1210	1110	5.87
Line	lb			7280	6260	3900	3510			2670	2450	(19.2)
-1.5 m	kg	*3910	*3910	3320	2860	1760	1580			1460	1320	5.16
(-4.9 ft)	lb	*8620	*8620	7320	6310	3880	3480			3220	2910	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

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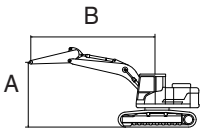
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1000	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			*1830	1430	5.43
(14.8 ft)	lb					*4060	*4060			*4030	3150	(17.8)
3.0 m	kg			*2720	*2720	*2150	1890	*1950	1200	*1750	1150	6.15
(9.8 ft)	lb			*6000	*6000	*4740	4170	*4300	2650	*3860	2540	(20.2)
1.5 m	kg					*2740	1790	*2100	1170	*1840	1060	6.39
(4.9 ft)	lb					*6040	3950	*4630	2580	*4060	2340	(21.0)
Ground	kg			*3720	3080	*3130	1700	*2170	1140	*2060	1090	6.21
Line	lb			*8200	6790	*6900	3750	*4780	2510	*4540	2400	(20.4)
-1.5 m	kg	*3290	*3290	*4970	3080	*2990	1680			*2120	1270	5.56
(-4.9 ft)	lb	*7250	*7250	*10960	6790	*6590	3700			*4670	2800	(18.2)
-3.0 m	kg			*3280	3170					*2020	1950	4.16
(-9.8 ft)	lb			*7230	6990					*4450	4300	(13.7)

※ 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.

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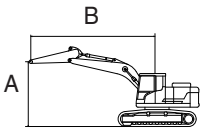
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1000	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	1820			1460	1330	5.43
(14.8 ft)	lb					*4060	4010			3220	2930	(17.8)
3.0 m	kg			*2720	*2720	1950	1760	1230	1120	1170	1070	6.15
(9.8 ft)	lb			*6000	*6000	4300	3880	2710	2470	2580	2360	(20.2)
1.5 m	kg					1840	1660	1190	1090	1080	990	6.39
(4.9 ft)	lb					4060	3660	2620	2400	2380	2180	(21.0)
Ground	kg			3280	2820	1760	1580	1160	1060	1110	1010	6.21
Line	lb			7230	6220	3880	3480	2560	2340	2450	2230	(20.4)
-1.5 m	kg	*3290	*3290	3280	2820	1740	1560			1290	1170	5.56
(-4.9 ft)	lb	*7250	*7250	7230	6220	3840	3440			2840	2580	(18.2)
-3.0 m	kg			*3280	2910					2010	1800	4.16
(-9.8 ft)	lb			*7230	6420					4430	3970	(13.7)

※ Note

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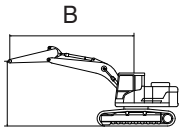
2) COUNTERWEIGHT 1150 KG

Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1150	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	1980			*2130	1650	5.02
(14.8 ft)	lb					*4590	4370			*4700	3640	(16.5)
3.0 m	kg			*3260	*3260	*2360	1920			*2030	1290	5.81
(9.8 ft)	lb			*7190	*7190	*5200	4230			*4480	2840	(19.1)
1.5 m	kg					*2900	1820	*2180	1200	*2150	1190	6.06
(4.9 ft)	lb					*6390	4010	*4810	2650	*4740	2620	(19.9)
Ground	kg			*3610	3180	*3180	1760			*2220	1220	5.87
Line	lb			*7960	7010	*7010	3880			*4890	2690	(19.2)
-1.5 m	kg	*3910	*3910	*4660	3200	*2860	1750			*2260	1460	5.16
(-4.9 ft)	lb	*8620	*8620	*10270	7050	*6310	3860			*4980	3220	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

※ Note

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4. *indicates load limited by hydraulic capacity.

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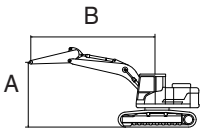
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1150	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	1830			1760	1530	5.02
(14.8 ft)	lb					*4590	4030			3880	3370	(16.5)
3.0 m	kg			*3260	*3260	2060	1780			1380	1200	5.81
(9.8 ft)	lb			*7190	*7190	4540	3920			3040	2650	(19.1)
1.5 m	kg					1960	1680	1280	1110	1260	1090	6.06
(4.9 ft)	lb					4320	3700	2820	2450	2780	2400	(19.9)
Ground	kg			3520	2890	1890	1610			1300	1130	5.87
Line	lb			7760	6370	4170	3550			2870	2490	(19.2)
-1.5 m	kg	*3910	*3910	3550	2910	1880	1610			1560	1340	5.16
(-4.9 ft)	lb	*8620	*8620	7830	6420	4140	3550			3440	2950	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

※ Note

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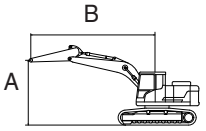
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1150	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			*1830	1460	5.43
(14.8 ft)	lb					*4060	*4060			*4030	3220	(17.8)
3.0 m	kg			*2720	*2720	*2150	1940	*1950	1230	*1750	1180	6.15
(9.8 ft)	lb			*6000	*6000	*4740	4280	*4300	2710	*3860	2600	(20.2)
1.5 m	kg					*2740	1830	*2100	1200	*1840	1090	6.39
(4.9 ft)	lb					*6040	4030	*4630	2650	*4060	2400	(21.0)
Ground	kg			*3720	3160	*3130	1750	*2170	1170	*2060	1120	6.21
Line	lb			*8200	6970	*6900	3860	*4780	2580	*4540	2470	(20.4)
-1.5 m	kg	*3290	*3290	*4970	3160	*2990	1730			*2120	1300	5.56
(-4.9 ft)	lb	*7250	*7250	*10960	6970	*6590	3810			*4670	2870	(18.2)
-3.0 m	kg			*3280	3250					*2020	1990	4.16
(-9.8 ft)	lb			*7230	7170					*4450	4390	(13.7)

※ Note

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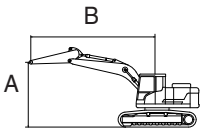
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1150	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			1560	1350	5.43
(14.8 ft)	lb					*4060	*4060			3440	2980	(17.8)
3.0 m	kg			*2720	*2720	2080	1790	1310	1140	1250	1090	6.15
(9.8 ft)	lb			*6000	*6000	4590	3950	2890	2510	2760	2400	(20.2)
1.5 m	kg					1960	1690	1280	1110	1160	1000	6.39
(4.9 ft)	lb					4320	3730	2820	2450	2560	2200	(21.0)
Ground	kg			3500	2870	1880	1600	1250	1080	1190	1030	6.21
Line	lb			7720	6330	4140	3530	2760	2380	2620	2270	(20.4)
-1.5 m	kg	*3290	*3290	3500	2870	1860	1580			1390	1200	5.56
(-4.9 ft)	lb	*7250	*7250	7720	6330	4100	3480			3060	2650	(18.2)
-3.0 m	kg			*3280	2960					*2020	1830	4.16
(-9.8 ft)	lb			*7230	6530					*4450	4030	(13.7)

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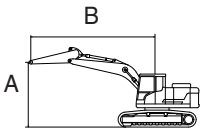
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	1750	1150	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg	*3010	*3010					*2700	2200	4.11
(19.7 ft)	lb	*6640	*6640					*5950	4850	(13.5)
4.5 m	kg	*2870	*2870	*2370	1930			*2180	1330	5.58
(14.8 ft)	lb	*6330	*6330	*5220	4250			*4810	2930	(18.3)
3.0 m	kg			*2670	1830	*2070	1160	*1990	1070	6.29
(9.8 ft)	lb			*5890	4030	*4560	2560	*4390	2360	(20.6)
1.5 m	kg			*3010	1700	*2110	1120	*1870	990	6.52
(4.9 ft)	lb			*6640	3750	*4650	2470	*4120	2180	(21.4)
Ground	kg			*2960	1620	*1970	1090	*1730	1020	6.34
Line	lb			*6530	3570	*4340	2400	*3810	2250	(20.8)
-1.5 m	kg	*3260	3010	*2360	1620			*1460	1190	5.71
(-4.9 ft)	lb	*7190	6640	*5200	3570			*3220	2620	(18.7)

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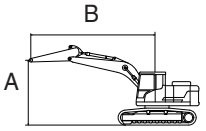
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	1750	1150	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg	*3010	*3010					2380	2030	4.11
(19.7 ft)	lb	*6640	*6640					5250	4480	(13.5)
4.5 m	kg	*2870	*2870	2070	1780			1420	1220	5.58
(14.8 ft)	lb	*6330	*6330	4560	3920			3130	2690	(18.3)
3.0 m	kg			1970	1680	1240	1070	1150	980	6.29
(9.8 ft)	lb			4340	3700	2730	2360	2540	2160	(20.6)
1.5 m	kg			1830	1550	1200	1030	1060	910	6.52
(4.9 ft)	lb			4030	3420	2650	2270	2340	2010	(21.4)
Ground	kg			1760	1480	1170	1000	1090	930	6.34
Line	lb			3880	3260	2580	2200	2400	2050	(20.8)
-1.5 m	kg	*3260	2720	1760	1480			1280	1090	5.71
(-4.9 ft)	lb	*7190	6000	3880	3260			2820	2400	(18.7)

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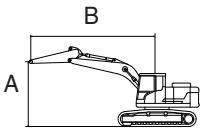
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	2100	1150	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg			*2330	1930			*2300	1790	4.68
(19.7 ft)	lb			*5140	4250			*5070	3950	(15.3)
4.5 m	kg			*2200	1950			*1890	1180	5.99
(14.8 ft)	lb			*4850	4300			*4170	2600	(19.6)
3.0 m	kg			*2520	1850	*1990	1170	*1790	980	6.64
(9.8 ft)	lb			*5560	4080	*4390	2580	*3950	2160	(21.8)
1.5 m	kg			*2930	1710	*2080	1120	*1740	910	6.86
(4.9 ft)	lb			*6460	3770	*4590	2470	*3840	2010	(22.5)
Ground	kg			*3000	1610	*2030	1080	*1620	930	6.69
Line	lb			*6610	3550	*4480	2380	*3570	2050	(22.0)
-1.5 m	kg	*3750	2950	*2530	1600	*1530	1080	*1410	1060	6.10
(-4.9 ft)	lb	*8270	6500	*5580	3530	*3370	2380	*3110	2340	(20.0)
-3.0 m	kg	*1900	*1900	*1260	*1260			*870	*870	4.90
(-9.8 ft)	lb	*4190	*4190	*2780	*2780			*1920	*1920	(16.1)

※ Note

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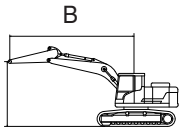
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	2100	1150	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg			2070	1780			1930	1650	4.68
(19.7 ft)	lb			4560	3920			4250	3640	(15.3)
4.5 m	kg			2100	1800			1270	1090	5.99
(14.8 ft)	lb			4630	3970			2800	2400	(19.6)
3.0 m	kg			2000	1700	1250	1070	1050	900	6.64
(9.8 ft)	lb			4410	3750	2760	2360	2310	1980	(21.8)
1.5 m	kg			1840	1560	1200	1020	970	830	6.86
(4.9 ft)	lb			4060	3440	2650	2250	2140	1830	(22.5)
Ground	kg			1750	1470	1160	980	990	850	6.69
Line	lb			3860	3240	2560	2160	2180	1870	(22.0)
-1.5 m	kg	3300	2660	1730	1450	1160	990	1140	970	6.10
(-4.9 ft)	lb	7280	5860	3810	3200	2560	2180	2510	2140	(20.0)
-3.0 m	kg	*1900	*1900	*1260	*1260			*870	*870	4.90
(-9.8 ft)	lb	*4190	*4190	*2780	*2780			*1920	*1920	(16.1)

※ Note

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE BLADE	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1150	450	-	Down	-	-	-

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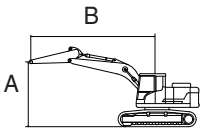

Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	2020			*2130	1690	5.02
(14.8 ft)	lb					*4590	4450			*4700	3730	(16.5)
3.0 m	kg			*3260	*3260	*2360	1960			*2030	1320	5.81
(9.8 ft)	lb			*7190	*7190	*5200	4320			*4480	2910	(19.1)
1.5 m	kg					*2900	1860	*2180	1230	*2150	1220	6.06
(4.9 ft)	lb					*6390	4100	*4810	2710	*4740	2690	(19.9)
Ground	kg			*3610	3250	*3180	1800			*2220	1250	5.87
Line	lb			*7960	7170	*7010	3970			*4890	2760	(19.2)
-1.5 m	kg	*3910	*3910	*4660	3270	*2860	1790			*2260	1490	5.16
(-4.9 ft)	lb	*8620	*8620	*10270	7210	*6310	3950			*4980	3280	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE BLADE	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1150	450	-	Up	-	-	-

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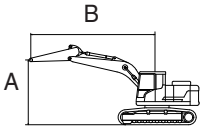

Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	1880			1730	1570	5.02
(14.8 ft)	lb					*4590	4140			3810	3460	(16.5)
3.0 m	kg			*3260	*3260	2030	1830			1350	1230	5.81
(9.8 ft)	lb			*7190	*7190	4480	4030			2980	2710	(19.1)
1.5 m	kg					1930	1730	1260	1150	1240	1130	6.06
(4.9 ft)	lb					4250	3810	2780	2540	2730	2490	(19.9)
Ground	kg			3470	2980	1860	1670			1280	1160	5.87
Line	lb			7650	6570	4100	3680			2820	2560	(19.2)
-1.5 m	kg	*3910	*3910	3490	3000	1850	1660			1530	1390	5.16
(-4.9 ft)	lb	*8620	*8620	7690	6610	4080	3660			3370	3060	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE BLADE	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1150	450	-	Down	-	-	-

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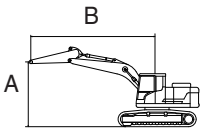

Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			*1830	1490	5.43
(14.8 ft)	lb					*4060	*4060			*4030	3280	(17.8)
3.0 m	kg			*2720	*2720	*2150	1980	*1950	1260	*1750	1210	6.15
(9.8 ft)	lb			*6000	*6000	*4740	4370	*4300	2780	*3860	2670	(20.2)
1.5 m	kg					*2740	1870	*2100	1230	*1840	1120	6.39
(4.9 ft)	lb					*6040	4120	*4630	2710	*4060	2470	(21.0)
Ground	kg			*3720	3230	*3130	1790	*2170	1200	*2060	1140	6.21
Line	lb			*8200	7120	*6900	3950	*4780	2650	*4540	2510	(20.4)
-1.5 m	kg	*3290	*3290	*4970	3230	*2990	1770			*2120	1330	5.56
(-4.9 ft)	lb	*7250	*7250	*10960	7120	*6590	3900			*4670	2930	(18.2)
-3.0 m	kg			*3280	*3280					*2020	*2020	4.16
(-9.8 ft)	lb			*7230	*7230					*4450	*4450	(13.7)

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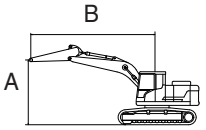
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE BLADE	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1150	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			1530	1390	5.43
(14.8 ft)	lb					*4060	*4060			3370	3060	(17.8)
3.0 m	kg			*2720	*2720	2050	1840	1290	1180	1230	1130	6.15
(9.8 ft)	lb			*6000	*6000	4520	4060	2840	2600	2710	2490	(20.2)
1.5 m	kg					1930	1740	1260	1140	1140	1040	6.39
(4.9 ft)	lb					4250	3840	2780	2510	2510	2290	(21.0)
Ground	kg			3450	2960	1850	1660	1220	1110	1170	1060	6.21
Line	lb			7610	6530	4080	3660	2690	2450	2580	2340	(20.4)
-1.5 m	kg	*3290	*3290	3450	2960	1830	1640			1360	1240	5.56
(-4.9 ft)	lb	*7250	*7250	7610	6530	4030	3620			3000	2730	(18.2)
-3.0 m	kg			*3280	3050					*2020	1890	4.16
(-9.8 ft)	lb			*7230	6720					*4450	4170	(13.7)

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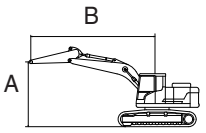
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	ANGLE BLADE	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	1750	1150	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg	*3010	*3010					*2700	2240	4.11
(19.7 ft)	lb	*6640	*6640					*5950	4940	(13.5)
4.5 m	kg	*2870	*2870	*2370	1970			*2180	1360	5.58
(14.8 ft)	lb	*6330	*6330	*5220	4340			*4810	3000	(18.3)
3.0 m	kg			*2670	1870	*2070	1190	*1990	1100	6.29
(9.8 ft)	lb			*5890	4120	*4560	2620	*4390	2430	(20.6)
1.5 m	kg			*3010	1740	*2110	1150	*1870	1020	6.52
(4.9 ft)	lb			*6640	3840	*4650	2540	*4120	2250	(21.4)
Ground	kg			*2960	1660	*1970	1120	*1730	1040	6.34
Line	lb			*6530	3660	*4340	2470	*3810	2290	(20.8)
-1.5 m	kg	*3260	3080	*2360	1660			*1460	1220	5.71
(-4.9 ft)	lb	*7190	6790	*5200	3660			*3220	2690	(18.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	ANGLE BLADE	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	1750	1150	450	-	Up	-	-	-

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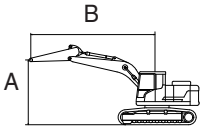

Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg	*3010	*3010					2340	2080	4.11
(19.7 ft)	lb	*6640	*6640					5160	4590	(13.5)
4.5 m	kg	*2870	*2870	2040	1830			1400	1260	5.58
(14.8 ft)	lb	*6330	*6330	4500	4030			3090	2780	(18.3)
3.0 m	kg			1940	1740	1220	1110	1130	1020	6.29
(9.8 ft)	lb			4280	3840	2690	2450	2490	2250	(20.6)
1.5 m	kg			1800	1600	1180	1060	1040	940	6.52
(4.9 ft)	lb			3970	3530	2600	2340	2290	2070	(21.4)
Ground	kg			1730	1530	1150	1040	1070	960	6.34
Line	lb			3810	3370	2540	2290	2360	2120	(20.8)
-1.5 m	kg	*3260	2810	1730	1530			1250	1130	5.71
(-4.9 ft)	lb	*7190	6190	3810	3370			2760	2490	(18.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	ANGLE BLADE	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	2100	1150	450	-	Down	-	-	-

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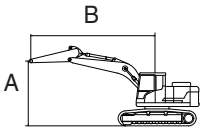

Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg			*2330	1970			*2300	1830	4.68
(19.7 ft)	lb			*5140	4340			*5070	4030	(15.3)
4.5 m	kg			*2200	1990			*1890	1210	5.99
(14.8 ft)	lb			*4850	4390			*4170	2670	(19.6)
3.0 m	kg			*2520	1890	*1990	1200	*1790	1000	6.64
(9.8 ft)	lb			*5560	4170	*4390	2650	*3950	2200	(21.8)
1.5 m	kg			*2930	1750	*2080	1150	*1740	930	6.86
(4.9 ft)	lb			*6460	3860	*4590	2540	*3840	2050	(22.5)
Ground	kg			*3000	1650	*2030	1110	*1620	950	6.69
Line	lb			*6610	3640	*4480	2450	*3570	2090	(22.0)
-1.5 m	kg	*3750	3020	*2530	1640	*1530	1110	*1410	1090	6.10
(-4.9 ft)	lb	*8270	6660	*5580	3620	*3370	2450	*3110	2400	(20.0)
-3.0 m	kg	*1900	*1900	*1260	*1260			*870	*870	4.90
(-9.8 ft)	lb	*4190	*4190	*2780	*2780			*1920	*1920	(16.1)

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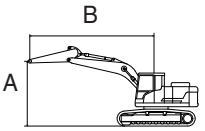
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	ANGLE BLADE	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	2100	1150	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg			2040	1830			1900	1700	4.68
(19.7 ft)	lb			4500	4030			4190	3750	(15.3)
4.5 m	kg			2070	1850			1240	1130	5.99
(14.8 ft)	lb			4560	4080			2730	2490	(19.6)
3.0 m	kg			1970	1760	1230	1110	1030	930	6.64
(9.8 ft)	lb			4340	3880	2710	2450	2270	2050	(21.8)
1.5 m	kg			1810	1610	1180	1060	950	860	6.86
(4.9 ft)	lb			3990	3550	2600	2340	2090	1900	(22.5)
Ground	kg			1720	1520	1140	1020	970	880	6.69
Line	lb			3790	3350	2510	2250	2140	1940	(22.0)
-1.5 m	kg	3240	2750	1700	1500	1140	1030	1120	1010	6.10
(-4.9 ft)	lb	7140	6060	3750	3310	2510	2270	2470	2230	(20.0)
-3.0 m	kg	*1900	*1900	*1260	*1260			*870	*870	4.90
(-9.8 ft)	lb	*4190	*4190	*2780	*2780			*1920	*1920	(16.1)

※ Note

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3. The lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *indicates load limited by hydraulic capacity.

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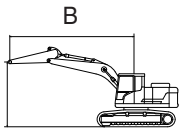
3) COUNTERWEIGHT 1250 KG

Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1250	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	2030			*2130	1700	5.02
(14.8 ft)	lb					*4590	4480			*4700	3750	(16.5)
3.0 m	kg			*3260	*3260	*2360	1980			*2030	1340	5.81
(9.8 ft)	lb			*7190	*7190	*5200	4370			*4480	2950	(19.1)
1.5 m	kg					*2900	1880	*2180	1240	*2150	1230	6.06
(4.9 ft)	lb					*6390	4140	*4810	2730	*4740	2710	(19.9)
Ground	kg			*3610	3280	*3180	1810			*2220	1260	5.87
Line	lb			*7960	7230	*7010	3990			*4890	2780	(19.2)
-1.5 m	kg	*3910	*3910	*4660	3300	*2860	1810			*2260	1510	5.16
(-4.9 ft)	lb	*8620	*8620	*10270	7280	*6310	3990			*4980	3330	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

※ Note

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1250	450	-	Up	-	-	-

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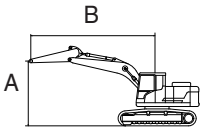

Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	1890			1810	1570	5.02
(14.8 ft)	lb					*4590	4170			3990	3460	(16.5)
3.0 m	kg			*3260	*3260	2120	1830			1420	1240	5.81
(9.8 ft)	lb			*7190	*7190	4670	4030			3130	2730	(19.1)
1.5 m	kg					2020	1740	1320	1150	1300	1130	6.06
(4.9 ft)	lb					4450	3840	2910	2540	2870	2490	(19.9)
Ground	kg			*3610	2980	1950	1670			1340	1170	5.87
Line	lb			*7960	6570	4300	3680			2950	2580	(19.2)
-1.5 m	kg	*3910	*3910	3660	3010	1950	1660			1610	1390	5.16
(-4.9 ft)	lb	*8620	*8620	8070	6640	4300	3660			3550	3060	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1250	450	-	Down	-	-	-

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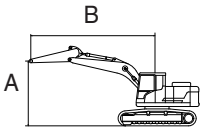

Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			*1830	1510	5.43
(14.8 ft)	lb					*4060	*4060			*4030	3330	(17.8)
3.0 m	kg			*2720	*2720	*2150	1990	*1950	1270	*1750	1220	6.15
(9.8 ft)	lb			*6000	*6000	*4740	4390	*4300	2800	*3860	2690	(20.2)
1.5 m	kg					*2740	1890	*2100	1240	*1840	1130	6.39
(4.9 ft)	lb					*6040	4170	*4630	2730	*4060	2490	(21.0)
Ground	kg			*3720	3260	*3130	1800	*2170	1210	*2060	1150	6.21
Line	lb			*8200	7190	*6900	3970	*4780	2670	*4540	2540	(20.4)
-1.5 m	kg	*3290	*3290	*4970	3260	*2990	1780			*2120	1340	5.56
(-4.9 ft)	lb	*7250	*7250	*10960	7190	*6590	3920			*4670	2950	(18.2)
-3.0 m	kg			*3280	*3280					*2020	*2020	4.16
(-9.8 ft)	lb			*7230	*7230					*4450	*4450	(13.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1250	450	-	Up	-	-	-

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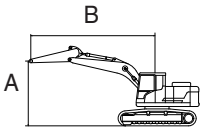

Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			1600	1400	5.43
(14.8 ft)	lb					*4060	*4060			3530	3090	(17.8)
3.0 m	kg			*2720	*2720	2140	1850	1350	1180	1300	1130	6.15
(9.8 ft)	lb			*6000	*6000	4720	4080	2980	2600	2870	2490	(20.2)
1.5 m	kg					2030	1740	1320	1150	1200	1040	6.39
(4.9 ft)	lb					4480	3840	2910	2540	2650	2290	(21.0)
Ground	kg			3620	2960	1940	1660	1290	1120	1230	1060	6.21
Line	lb			7980	6530	4280	3660	2840	2470	2710	2340	(20.4)
-1.5 m	kg	*3290	*3290	3620	2970	1920	1640			1430	1240	5.56
(-4.9 ft)	lb	*7250	*7250	7980	6550	4230	3620			3150	2730	(18.2)
-3.0 m	kg			*3280	3050					*2020	1890	4.16
(-9.8 ft)	lb			*7230	6720					*4450	4170	(13.7)

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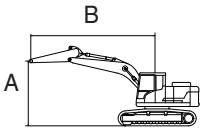
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	1750	1250	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg	*3010	*3010					*2700	2260	4.11
(19.7 ft)	lb	*6640	*6640					*5950	4980	(13.5)
4.5 m	kg	*2870	*2870	*2370	1980			*2180	1370	5.58
(14.8 ft)	lb	*6330	*6330	*5220	4370			*4810	3020	(18.3)
3.0 m	kg			*2670	1890	*2070	1200	*1990	1110	6.29
(9.8 ft)	lb			*5890	4170	*4560	2650	*4390	2450	(20.6)
1.5 m	kg			*3010	1750	*2110	1160	*1870	1030	6.52
(4.9 ft)	lb			*6640	3860	*4650	2560	*4120	2270	(21.4)
Ground	kg			*2960	1680	*1970	1130	*1730	1050	6.34
Line	lb			*6530	3700	*4340	2490	*3810	2310	(20.8)
-1.5 m	kg	*3260	3110	*2360	1680			*1460	1230	5.71
(-4.9 ft)	lb	*7190	6860	*5200	3700			*3220	2710	(18.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	1750	1250	450	-	Up	-	-	-

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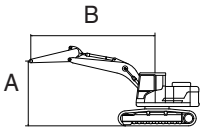

Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg	*3010	*3010					2450	2090	4.11
(19.7 ft)	lb	*6640	*6640					5400	4610	(13.5)
4.5 m	kg	*2870	*2870	2130	1830			1470	1260	5.58
(14.8 ft)	lb	*6330	*6330	4700	4030			3240	2780	(18.3)
3.0 m	kg			2040	1740	1290	1110	1190	1020	6.29
(9.8 ft)	lb			4500	3840	2840	2450	2620	2250	(20.6)
1.5 m	kg			1900	1610	1240	1070	1100	940	6.52
(4.9 ft)	lb			4190	3550	2730	2360	2430	2070	(21.4)
Ground	kg			1820	1530	1210	1040	1130	970	6.34
Line	lb			4010	3370	2670	2290	2490	2140	(20.8)
-1.5 m	kg	*3260	2810	1820	1530			1320	1130	5.71
(-4.9 ft)	lb	*7190	6190	4010	3370			2910	2490	(18.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	2100	1250	450	-	Down	-	-	-

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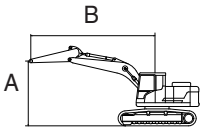

Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg			*2330	1980			*2300	1840	4.68
(19.7 ft)	lb			*5140	4370			*5070	4060	(15.3)
4.5 m	kg			*2200	2010			*1890	1220	5.99
(14.8 ft)	lb			*4850	4430			*4170	2690	(19.6)
3.0 m	kg			*2520	1910	*1990	1210	*1790	1010	6.64
(9.8 ft)	lb			*5560	4210	*4390	2670	*3950	2230	(21.8)
1.5 m	kg			*2930	1760	*2080	1160	*1740	940	6.86
(4.9 ft)	lb			*6460	3880	*4590	2560	*3840	2070	(22.5)
Ground	kg			*3000	1670	*2030	1120	*1620	960	6.69
Line	lb			*6610	3680	*4480	2470	*3570	2120	(22.0)
-1.5 m	kg	*3750	3050	*2530	1650	*1530	1120	*1410	1100	6.10
(-4.9 ft)	lb	*8270	6720	*5580	3640	*3370	2470	*3110	2430	(20.0)
-3.0 m	kg	*1900	*1900	*1260	*1260			*870	*870	4.90
(-9.8 ft)	lb	*4190	*4190	*2780	*2780			*1920	*1920	(16.1)

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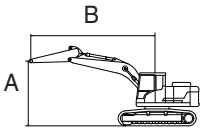
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	CRAWLER DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	2100	1250	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg			2140	1830			1980	1700	4.68
(19.7 ft)	lb			4720	4030			4370	3750	(15.3)
4.5 m	kg			2160	1860			1310	1130	5.99
(14.8 ft)	lb			4760	4100			2890	2490	(19.6)
3.0 m	kg			2060	1760	1290	1110	1080	930	6.64
(9.8 ft)	lb			4540	3880	2840	2450	2380	2050	(21.8)
1.5 m	kg			1910	1620	1240	1060	1010	860	6.86
(4.9 ft)	lb			4210	3570	2730	2340	2230	1900	(22.5)
Ground	kg			1810	1520	1200	1020	1030	880	6.69
Line	lb			3990	3350	2650	2250	2270	1940	(22.0)
-1.5 m	kg	3410	2760	1790	1510	1210	1030	1180	1010	6.10
(-4.9 ft)	lb	7520	6080	3950	3330	2670	2270	2600	2230	(20.0)
-3.0 m	kg	*1900	*1900	*1260	*1260			*870	*870	4.90
(-9.8 ft)	lb	*4190	*4190	*2780	*2780			*1920	*1920	(16.1)

※ Note

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4. *indicates load limited by hydraulic capacity.

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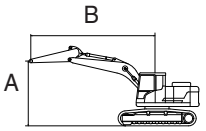
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1250	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	2070			*2130	1730	5.02
(14.8 ft)	lb					*4590	4560			*4700	3810	(16.5)
3.0 m	kg			*3260	*3260	*2360	2020			*2030	1370	5.81
(9.8 ft)	lb			*7190	*7190	*5200	4450			*4480	3020	(19.1)
1.5 m	kg					*2900	1920	*2180	1270	*2150	1250	6.06
(4.9 ft)	lb					*6390	4230	*4810	2800	*4740	2760	(19.9)
Ground	kg			*3610	3350	*3180	1850			*2220	1290	5.87
Line	lb			*7960	7390	*7010	4080			*4890	2840	(19.2)
-1.5 m	kg	*3910	*3910	*4660	3370	*2860	1850			*2260	1540	5.16
(-4.9 ft)	lb	*8620	*8620	*10270	7430	*6310	4080			*4980	3400	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	1750	1250	450	-	Up	-	-	-

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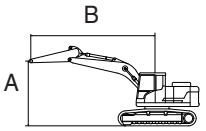

Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2500	*2500	3.21
(19.7 ft)	lb									*5510	*5510	(10.5)
4.5 m	kg					*2080	1940			1790	1620	5.02
(14.8 ft)	lb					*4590	4280			3950	3570	(16.5)
3.0 m	kg			*3260	*3260	2090	1880			1400	1270	5.81
(9.8 ft)	lb			*7190	*7190	4610	4140			3090	2800	(19.1)
1.5 m	kg					1990	1790	1300	1190	1280	1170	6.06
(4.9 ft)	lb					4390	3950	2870	2620	2820	2580	(19.9)
Ground	kg			3580	3070	1920	1720			1320	1200	5.87
Line	lb			7890	6770	4230	3790			2910	2650	(19.2)
-1.5 m	kg	*3910	*3910	3600	3100	1910	1720			1590	1430	5.16
(-4.9 ft)	lb	*8620	*8620	7940	6830	4210	3790			3510	3150	(16.9)
-3.0 m	kg			*2550	*2550					*1960	*1960	3.57
(-9.8 ft)	lb			*5620	*5620					*4320	*4320	(11.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1250	450	-	Down	-	-	-

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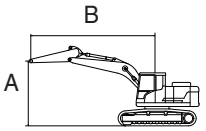

Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			*1830	1540	5.43
(14.8 ft)	lb					*4060	*4060			*4030	3400	(17.8)
3.0 m	kg			*2720	*2720	*2150	2030	*1950	1300	*1750	1250	6.15
(9.8 ft)	lb			*6000	*6000	*4740	4480	*4300	2870	*3860	2760	(20.2)
1.5 m	kg					*2740	1930	*2100	1270	*1840	1150	6.39
(4.9 ft)	lb					*6040	4250	*4630	2800	*4060	2540	(21.0)
Ground	kg			*3720	3330	*3130	1840	*2170	1240	*2060	1180	6.21
Line	lb			*8200	7340	*6900	4060	*4780	2730	*4540	2600	(20.4)
-1.5 m	kg	*3290	*3290	*4970	3330	*2990	1820			*2120	1370	5.56
(-4.9 ft)	lb	*7250	*7250	*10960	7340	*6590	4010			*4670	3020	(18.2)
-3.0 m	kg			*3280	*3280					*2020	*2020	4.16
(-9.8 ft)	lb			*7230	*7230					*4450	*4450	(13.7)

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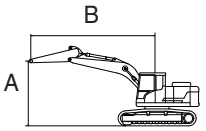
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
MONO BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3550	2100	1250	450	-	Up	-	-	-

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



Load point height (A)		Load radius (B)								At max. reach		
		1.5 m (4.9 ft)		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
												m (ft)
6.0 m	kg									*2120	*2120	3.88
(19.7 ft)	lb									*4670	*4670	(12.7)
4.5 m	kg					*1840	*1840			1580	1440	5.43
(14.8 ft)	lb					*4060	*4060			3480	3170	(17.8)
3.0 m	kg			*2720	*2720	2110	1900	1330	1210	1280	1160	6.15
(9.8 ft)	lb			*6000	*6000	4650	4190	2930	2670	2820	2560	(20.2)
1.5 m	kg					2000	1790	1300	1180	1180	1070	6.39
(4.9 ft)	lb					4410	3950	2870	2600	2600	2360	(21.0)
Ground	kg			3560	3060	1910	1710	1270	1150	1210	1100	6.21
Line	lb			7850	6750	4210	3770	2800	2540	2670	2430	(20.4)
-1.5 m	kg	*3290	*3290	3560	3060	1890	1690			1410	1280	5.56
(-4.9 ft)	lb	*7250	*7250	7850	6750	4170	3730			3110	2820	(18.2)
-3.0 m	kg			*3280	3140					*2020	1950	4.16
(-9.8 ft)	lb			*7230	6920					*4450	4300	(13.7)

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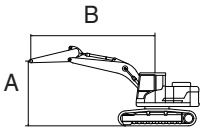
Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	1750	1250	450	-	Down	-	-	-

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



Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg	*3010	*3010					*2700	2310	4.11
(19.7 ft)	lb	*6640	*6640					*5950	5090	(13.5)
4.5 m	kg	*2870	*2870	*2370	2020			*2180	1400	5.58
(14.8 ft)	lb	*6330	*6330	*5220	4450			*4810	3090	(18.3)
3.0 m	kg			*2670	1930	*2070	1230	*1990	1140	6.29
(9.8 ft)	lb			*5890	4250	*4560	2710	*4390	2510	(20.6)
1.5 m	kg			*3010	1790	*2110	1190	*1870	1050	6.52
(4.9 ft)	lb			*6640	3950	*4650	2620	*4120	2310	(21.4)
Ground	kg			*2960	1720	*1970	1160	*1730	1080	6.34
Line	lb			*6530	3790	*4340	2560	*3810	2380	(20.8)
-1.5 m	kg	*3260	3180	*2360	1720			*1460	1260	5.71
(-4.9 ft)	lb	*7190	7010	*5200	3790			*3220	2780	(18.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	1750	1250	450	-	Up	-	-	-

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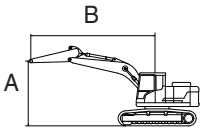

Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg	*3010	*3010					2410	2150	4.11
(19.7 ft)	lb	*6640	*6640					5310	4740	(13.5)
4.5 m	kg	*2870	*2870	2100	1880			1440	1300	5.58
(14.8 ft)	lb	*6330	*6330	4630	4140			3170	2870	(18.3)
3.0 m	kg			2000	1790	1270	1140	1170	1050	6.29
(9.8 ft)	lb			4410	3950	2800	2510	2580	2310	(20.6)
1.5 m	kg			1870	1660	1220	1100	1080	970	6.52
(4.9 ft)	lb			4120	3660	2690	2430	2380	2140	(21.4)
Ground	kg			1790	1590	1190	1070	1110	1000	6.34
Line	lb			3950	3510	2620	2360	2450	2200	(20.8)
-1.5 m	kg	*3260	2900	1790	1590			1300	1170	5.71
(-4.9 ft)	lb	*7190	6390	3950	3510			2870	2580	(18.7)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
2 PCS BOOM	ANGLE DOZER	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		3917	2100	1250	450	-	Down	-	-	-

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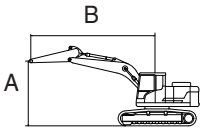

Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg			*2330	2020			*2300	1880	4.68
(19.7 ft)	lb			*5140	4450			*5070	4140	(15.3)
4.5 m	kg			*2200	2050			*1890	1250	5.99
(14.8 ft)	lb			*4850	4520			*4170	2760	(19.6)
3.0 m	kg			*2520	1950	*1990	1240	*1790	1040	6.64
(9.8 ft)	lb			*5560	4300	*4390	2730	*3950	2290	(21.8)
1.5 m	kg			*2930	1800	*2080	1190	*1740	970	6.86
(4.9 ft)	lb			*6460	3970	*4590	2620	*3840	2140	(22.5)
Ground	kg			*3000	1710	*2030	1150	*1620	990	6.69
Line	lb			*6610	3770	*4480	2540	*3570	2180	(22.0)
-1.5 m	kg	*3750	3120	*2530	1690	*1530	1150	*1410	1130	6.10
(-4.9 ft)	lb	*8270	6880	*5580	3730	*3370	2540	*3110	2490	(20.0)
-3.0 m	kg	*1900	*1900	*1260	*1260			*870	*870	4.90
(-9.8 ft)	lb	*4190	*4190	*2780	*2780			*1920	*1920	(16.1)

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Type		Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
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		3917	2100	1250	450	-	Up	-	-	-

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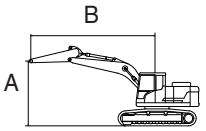


Load point height (A)		Load radius (B)						At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		Capacity		Reach
										m (ft)
6.0 m	kg			2110	1880			1960	1750	4.68
(19.7 ft)	lb			4650	4140			4320	3860	(15.3)
4.5 m	kg			2130	1910			1290	1160	5.99
(14.8 ft)	lb			4700	4210			2840	2560	(19.6)
3.0 m	kg			2030	1810	1270	1150	1060	960	6.64
(9.8 ft)	lb			4480	3990	2800	2540	2340	2120	(21.8)
1.5 m	kg			1880	1670	1220	1100	990	890	6.86
(4.9 ft)	lb			4140	3680	2690	2430	2180	1960	(22.5)
Ground	kg			1780	1570	1180	1060	1010	910	6.69
Line	lb			3920	3460	2600	2340	2230	2010	(22.0)
-1.5 m	kg	3350	2850	1760	1560	1180	1060	1160	1050	6.10
(-4.9 ft)	lb	7390	6280	3880	3440	2600	2340	2560	2310	(20.0)
-3.0 m	kg	*1900	*1900	*1260	*1260			*870	*870	4.90
(-9.8 ft)	lb	*4190	*4190	*2780	*2780			*1920	*1920	(16.1)

※ 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.

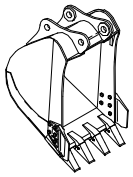
※ Lifting capacities are based upon a standard machine conditions.
Lifting capacities will vary with different work tools, ground conditions and attachments.
The difference between the weight of a work tool attachment must be subtracted.
Consult with your local HD Hyundai Construction Equipment dealer 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 serious injury, death, or property damage. Make adjustments to the rated load as necessary for non-standard configurations.

6. BUCKET SELECTION GUIDE

1) 1000 kg COUNTERWEIGHT



0.25, 0.28 m³ SAE heaped bucket

Capacity		Width		Weight	Tooth	Recommendation	
						3.55 m (11' 8") Mono boom	
SAE heaped	CECE heaped	Without side cutter	With side cutter			1.75 m arm (5' 9")	2.10 m arm (6' 11")
0.25 m³ (0.33 yd³)	0.21 m³ (0.27 yd³)	672 mm (26.5")	795 mm (31.3")	185 kg (410 lb)	4 EA	●	●
0.28 m³ (0.37 yd³)	0.25 m³ (0.33 yd³)	672 mm (26.5")	830 mm (32.7")	248 kg (550 lb)	4 EA	●	●

● Applicable for materials with density of 2100 kg/m³ (3540 lb/yd³) or less

◐ Applicable for materials with density of 1800 kg/m³ (3030 lb/yd3) or less

■ Applicable for materials with density of 1500 kg/m³ (2530 lb/yd³) or less

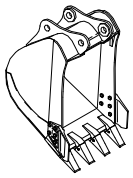
▲ Applicable for materials with density of 1200 kg/m³ (2020 lb/yd³) or less

× Not recommended

※ Maximum density (kg/m³)

Capacity		Width		Weight	Tooth	Recommendation	
						3.55 m (11' 8") Mono boom	
SAE heaped	CECE heaped	Without side cutter	With side cutter			1.75 m arm (5' 9")	2.10 m arm (6' 11")
0.25 m³ (0.33 yd³)	0.21 m³ (0.27 yd³)	672 mm (26.5")	795 mm (31.3")	185 kg (410 lb)	4 EA	3270	2937
0.28 m³ (0.37 yd³)	0.25 m³ (0.33 yd³)	672 mm (26.5")	830 mm (32.7")	248 kg (550 lb)	4 EA	2779	2482

2) 1150 kg COUNTERWEIGHT



0.25, 0.28 m³ SAE heaped bucket

Capacity		Width		Weight	Tooth	Recommendation			
						3.55 m (11' 8") Mono boom		3917 m (12' 10") 2-piece boom	
SAE heaped	CECE heaped	Without side cutter	With side cutter			1.75 m arm (5' 9")	2.10 m arm (6' 11")	1.75 m arm (5' 9")	2.10 m arm (6' 11")
0.25 m³ (0.33 yd³)	0.21 m³ (0.27 yd³)	672 mm (26.5")	795 mm (31.3")	185 kg (410 lb)	4 EA	●	●	●	●
0.28 m³ (0.37 yd³)	0.25 m³ (0.33 yd³)	672 mm (26.5")	830 mm (32.7")	248 kg (550 lb)	4 EA	●	●	●	◐

● Applicable for materials with density of 2100 kg/m³ (3540 lb/yd³) or less

◐ Applicable for materials with density of 1800 kg/m³ (3030 lb/yd3) or less

■ Applicable for materials with density of 1500 kg/m³ (2530 lb/yd³) or less

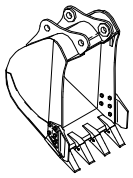
▲ Applicable for materials with density of 1200 kg/m³ (2020 lb/yd³) or less

× Not recommended

※ Maximum density (kg/m³)

Capacity		Width		Weight	Tooth	Recommendation			
						3.55 m (11' 8") Mono boom		3917 m (12' 10") 2-piece boom	
SAE heaped	CECE heaped	Without side cutter	With side cutter			1.75 m arm (5' 9")	2.10 m arm (6' 11")	1.75 m arm (5' 9")	2.10 m arm (6' 11")
0.25 m³ (0.33 yd³)	0.21 m³ (0.27 yd³)	672 mm (26.5")	795 mm (31.3")	185 kg (410 lb)	4 EA	3470	3124	2745	2462
0.28 m³ (0.37 yd³)	0.25 m³ (0.33 yd³)	672 mm (26.5")	830 mm (32.7")	248 kg (550 lb)	4 EA	2967	2649	2311	2057

3) 1250 kg COUNTERWEIGHT



0.25, 0.28 m³ SAE heaped bucket

Capacity		Width		Weight	Tooth	Recommendation			
						3.55 m (11' 8") Mono boom		3917 m (12' 10") 2-piece boom	
SAE heaped	CECE heaped	Without side cutter	With side cutter			1.75 m arm (5' 9")	2.10 m arm (6' 11")	1.75 m arm (5' 9")	2.10 m arm (6' 11")
0.25 m³ (0.33 yd³)	0.21 m³ (0.27 yd³)	672 mm (26.5")	795 mm (31.3")	185 kg (410 lb)	4 EA	●	●	●	●
0.28 m³ (0.37 yd³)	0.25 m³ (0.33 yd³)	672 mm (26.5")	830 mm (32.7")	248 kg (550 lb)	4 EA	●	●	●	●

● Applicable for materials with density of 2100 kg/m³ (3540 lb/yd³) or less

◐ Applicable for materials with density of 1800 kg/m³ (3030 lb/yd3) or less

■ Applicable for materials with density of 1500 kg/m³ (2530 lb/yd³) or less

▲ Applicable for materials with density of 1200 kg/m³ (2020 lb/yd³) or less

× Not recommended

※ Maximum density (kg/m³)

Capacity		Width		Weight	Tooth	Recommendation			
						3.55 m (11' 8") Mono boom		3917 m (12' 10") 2-piece boom	
SAE heaped	CECE heaped	Without side cutter	With side cutter			1.75 m arm (5' 9")	2.10 m arm (6' 11")	1.75 m arm (5' 9")	2.10 m arm (6' 11")
0.25 m³ (0.33 yd³)	0.21 m³ (0.27 yd³)	672 mm (26.5")	795 mm (31.3")	185 kg (410 lb)	4 EA	3605	3251	2868	2577
0.28 m³ (0.37 yd³)	0.25 m³ (0.33 yd³)	672 mm (26.5")	830 mm (32.7")	248 kg (550 lb)	4 EA	3078	2762	2420	2160

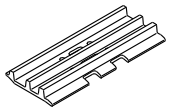
7. UNDERCARRIAGE

1) TRACKS

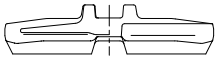
X-leg type center frame is integrally welded with reinforced box-section track frames. The design includes dry tracks, lubricated rollers, idlers, sprockets, hydraulic track adjusters with shock absorbing springs and assembled track-type tractor shoes with triple grousers.

2) TYPES OF SHOES

(1) Steel track

Shapes		Triple grouser		
				
Shoe width	mm (in)	450 (18)	600 (24)	450 (18)
Operating weight	kg (lb)	8670 (19110)	8850 (19510)	8670 (19110)
Ground pressure	kgf/cm^2 (psi)	0.39 (5.52)	0.30 (4.21)	0.39 (5.52)
Overall width	mm (ft-in)	2300 (7' 7")	2450 (8' 0")	2300 (7' 7")

(2) Rubber track

Shapes		Rubber track	
			
Shoe width	mm (in)	450 (18) (LC rubber pad)	450 (18) (rail interlocking)
Operating weight	kg (lb)	8720 (19220)	8635 (19040)
Ground pressure	kgf/cm^2 (psi)	0.38 (5.46)	0.39 (5.50)
Overall width	mm (ft-in)	2300 (7' 7')	2300 (7' 7')

3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

Item	Quantity
Upper rollers	1 EA
Lower rollers	5 EA
Track shoes	40 EA

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
HX85A HX90A	T/chain-triple for mini (450 mm)	Standard	A
	T/chain-triple LC (600 mm)	Option	A
	T/chain-bolt-on type (450 mm)	Option	A
	T/chain-LC rubber pad (450 mm)	Option	B
	T/chain-rail interlocking (450 mm)	Option	B

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 4TNV98C
Type	4-cycle, inline, water-cooled diesel
Cooling method	Water-cooled
Number of cylinders and arrangement	4 cylinders, in-line
Firing order	1-3-4-2
Combustion chamber type	Direct injection type
Cylinder bore × stroke	98 × 110 mm (3.86" × 4.33")
Piston displacement	3319 cc (203 cu in)
Compression ratio	-
Rated gross horse power	66.9 hp (49.9 kW)
Rated net horse power	65.0 hp (48.5 kW)
Maximum horse power	66.9 hp (49.9 kW)
Maximum torque	24.6 kgf · m (177.2 lbf · ft)
Engine oil quantity	10.5 ℓ (2.77 U.S. gal)
Dry weight	278 kg (613 lb)
Starting motor	12 V-3 kW
Alternator	12 V-100 A

2) MAIN PUMP

Item	Specification
Type	Variable displacement piston pumps
Capacity	72 cc/rev
Maximum pressure	280 kgf/cm^2 (3980 psi)
Maximum oil flow	144 ℓ /min (38 U.S.gpm)
Rated speed	2000 rpm

3) GEAR PUMP (P4)

Item	Specification
Type	Fixed displacement gear pump single stage
Capacity	8 cc/rev
Maximum pressure	34 kgf/cm^2 (484 psi)
Rated oil flow	16 ℓ /min (4.2 U.S.gpm/3.5 U.K.gpm)

4) MAIN CONTROL VALVE

Item	Specification
Type	9 spools sectional inline
Operating method	Hydraulic pilot system
Main relief valve pressure	280 kgf/cm^2 (3983 psi)
Overload relief valve pressure	310 kgf/cm^2 (4410 psi)
2-way (breaker piping) flow rate	120 l/min (31.7 US gpm)
4-way (rotating piping) flow rate	100 l/min (26.4 US gpm)

5) SWING MOTOR

Item	Specification
Type	Axial piston motor
Capacity	43.4 cc/rev
Relief pressure	245 kgf/cm^2 (3490 psi)
Braking system	Automatic, spring applied hydraulic released
Braking torque	17 kgf · m (123 lbf · ft)
Brake release pressure	25~50 kgf/cm^2 (356~711 psi)
Swing bearing lubrication	Grease
Reduction gear type	2 - stage planetary

6) TRAVEL MOTOR

Item	Specification
Type	Two fixed displacement axial piston motor
Capacity	54.3/27.5 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)

7) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	Ø120 × Ø70 × 865 mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	Ø100 × Ø60 × 860 mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	Ø90 × Ø55 × 685 mm
	Cushion	Extend only
Adjust cylinder (2-pcs boom only)	Bore dia × Rod dia × Stroke	Ø95 × Ø55 × 550 mm
	Cushion	-
Boom swing cylinder	Bore dia × Rod dia × Stroke	Ø110 × Ø60 × 707 mm
	Cushion	-
Dozer cylinder	Bore dia × Rod dia × Stroke	Ø130 × Ø70 × 190 mm
	Cushion	-
Dozer cylinder (DPC)	Bore dia × Rod dia × Stroke	Ø140 × Ø70 × 180 mm
	Cushion	-
Angle swing cylinder	Bore dia × Rod dia × Stroke	Ø100 × Ø60 × 461 mm
	Cushion	-

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

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

9. 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	10.5 (2.8)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Final drive	Gear oil	1.1×2 (0.3×2)	★SAE 75W-90 SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank; 56 (14.8) System; 109 (28.8)	★ISO VG 15 ISO VG 32 ISO VG 46, HBHO VG 46★3 ISO VG 68
Fuel tank	Diesel fuel★1	115 (30.4)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and water 50 : 50★2	13 (3.4)	Ethylene glycol base permanent type ★Ethylene glycol base permanent type (60 : 40)

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

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

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

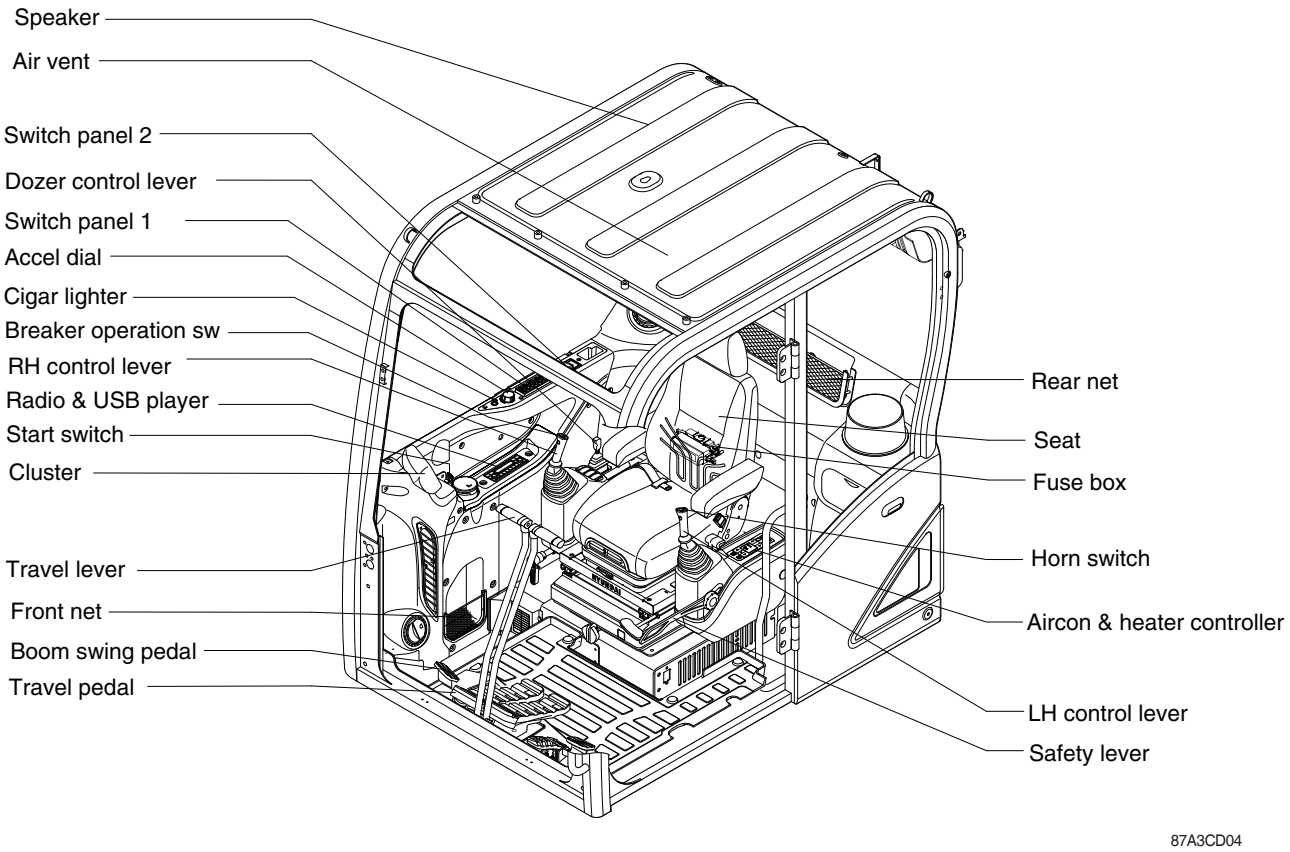
1. CAB DEVICES

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 warning system for early detection of machine malfunction.



2. CLUSTER

1) STRUCTURE (TYPE A)

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

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

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

87A3CD50

※ **The warning lamp pops up, lights ON (on the left-top side) and the buzzer sounds when the machine has a problem.**
The warning lamp lights ON until the problem is cleared. Refer to page 3-8 for details.

STRUCTURE (TYPE B)

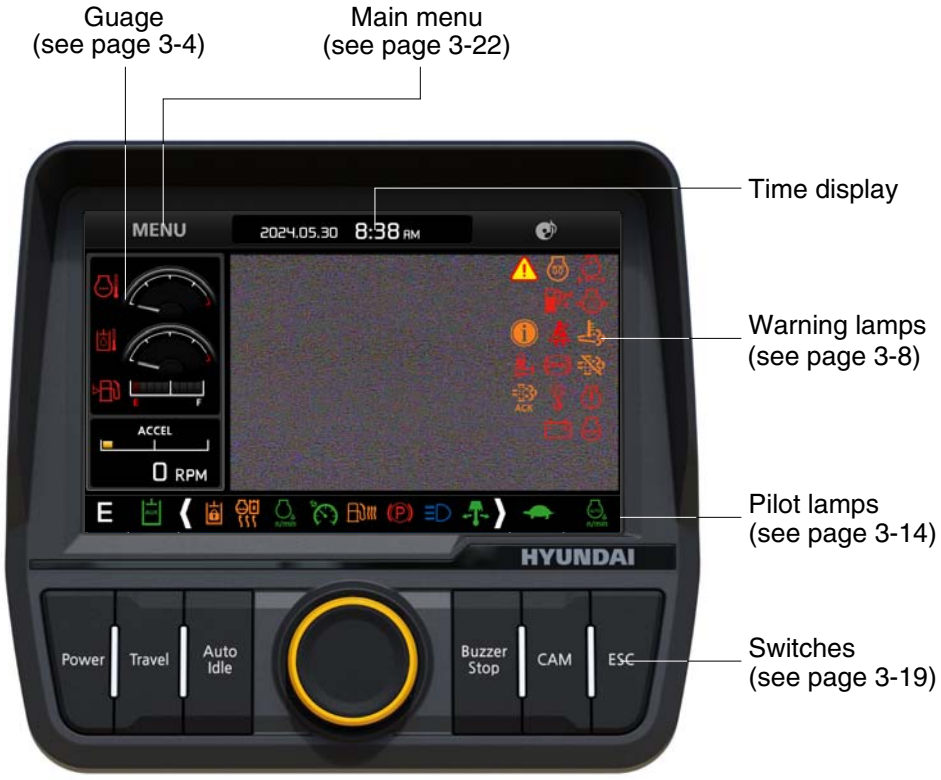
The cluster consists of LCD and switches as shown below. The LCD is to warn the operator in case of abnormal machine operation or conditions for the appropriate operation and inspection.

Also, The LCD is to set and display for modes, monitoring and utilities with the switches.

The switches or touch screen are to set the machine operation modes.

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

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



87A3CD10

※ **The warning lamp pops up, lights ON (on the left-top side) and the buzzer sounds when the machine has a problem.**

The warning lamp lights ON until the problem is cleared. Refer to page 3-8 for details.

※ **If the camera screen is canceled according to the driver's intention, there is a risk of an accident due to limited visibility. Therefore, any travel or operation of the equipment is strictly prohibited when the driver's visibility is limited, and we are not responsible for any accidents resulting from this.**

2) GAUGE (TYPE A)

(1) Operation screen

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

87A3CD51

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

(2) Engine coolant temperature gauge

87A3CD52

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

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

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

(3) Hydraulic oil temperature gauge

87A3CD53

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

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

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

(4) Fuel level gauge

87A3CD54

① This gauge indicates the amount of fuel in the fuel tank.
- Black range : 23 ℓ (6.1 U.S. gal) or more
- Red range : below 23 ℓ (6.1 U.S. gal)

② Fill the fuel when in the red range, or lamp lights ON in red.

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

(5) Engine rpm gauge and clinometer

87A3CD55

① This displays the engine speed.

② This displays the tilt of machine.

(6) Accel dial gauge

87A3CD56

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

3) COMMUNICATION ERROR AND LOW VOLTAGE WARNING POP-UP

(1) Communication error pop-up

87A3CD57

① Cluster displays this communication error pop-up when it has communication error with MCU.

② Communication error pop-up displays at operation screen only. Just buzzer alarm at the other screen.

③ If communication with MCU become normal state, it will disappear automatically.

(2) Low voltage warning pop-up

HX60A3CD108

① Cluster displays this low voltage warning pop-up when the battery voltage is low.

② Low voltage warning pop-up displays at operation screen only. Just buzzer alarm at the other screen.

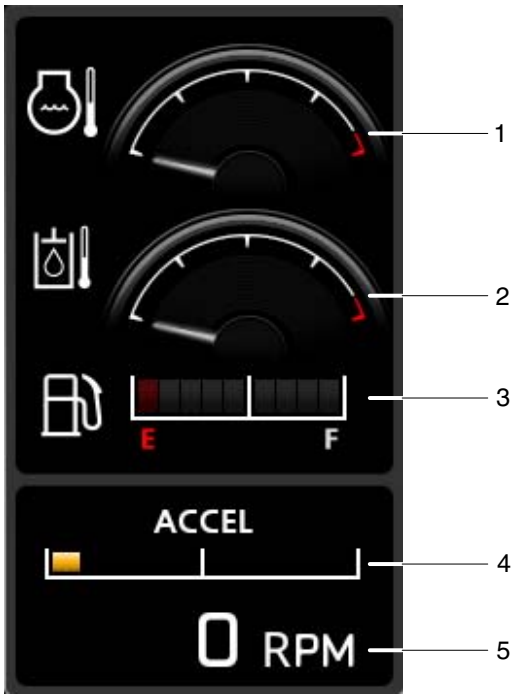
③ This pop-up will disappear with using touch screen or buzzer stop switch. While the battery voltage is low, buzzer sounds every minute.

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

GAUGE (TYPE B)

(1) Operation screen

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



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

87A3CD11

(2) Engine coolant temperature gauge

87A3CD12

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

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

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

(3) Hydraulic oil temperature gauge

87A3CD13

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

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

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

(4) Fuel level gauge

87A3CD14

① This gauge indicates the amount of fuel in the fuel tank.
- Black range : 23 ℓ (6.1 U.S. gal) or more
- Red range : below 23 ℓ (6.1 U.S. gal)

② Fill the fuel when in the red range, or lamp lights ON in red.

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

(5) Engine rpm

87A3CD16

① This displays the engine speed.

(6) Accel dial gauge

87A3CD15

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

3) COMMUNICATION ERROR AND LOW VOLTAGE WARNING POP-UP

(1) Communication error pop-up

87A3CD17

① Cluster displays this communication error pop-up when it has communication error with MCU.

② Communication error pop-up displays at operation screen only. Just buzzer alarm at the other screen.

③ If communication with MCU become normal state, it will disappear automatically.

(2) Low voltage warning pop-up

87A3CD18

① Cluster displays this low voltage warning pop-up when the battery voltage is low.

② Low voltage warning pop-up displays at operation screen only. Just buzzer alarm at the other screen.

③ This pop-up will disappear with using touch screen or buzzer stop switch. While the battery voltage is low, buzzer sounds every minute.

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

4) WARNING LAMPS

- TYPE A

87A3CD60

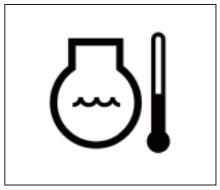
※ Each warning lamp on the left-top of the LCD pops up on the center of LCD and the buzzer sounds when the each warning is happened. The pop-up warning lamp moves to the original position and lights up when the buzzer stop switch is pushed or the pop-up is touched. And the buzzer stops.
※ Refer to page 3-20 for the switch.

- TYPE B

87A3CD20

※ Each warning lamp on the right-top of the camera screen pops up on the center of LCD and the buzzer sounds when the each warning is happened. The pop-up warning lamp moves to the original position and lights up when the buzzer stop switch is pushed or the pop-up is touched. And the buzzer stops.
※ Warning lights turn on in order from the upper right corner according to the order in which they occur.
※ Refer to page 3-20 for the switch.

(1) Engine coolant temperature warning lamp



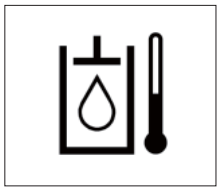
290F3CD61

① The lamp pops up on the center of LCD and the buzzer sounds when the engine coolant temperature is over 110˚C or more.

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

③ Check the cooling system when the lamp keeps ON.

(2) Hydraulic oil temperature warning lamp



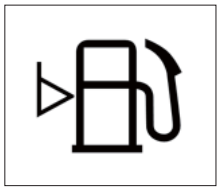
290F3CD62

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

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

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

(3) Fuel level warning lamp



290F3CD63

① This warning lamp lights up and the buzzer sounds when the level of fuel is below 23 ℓ (6.1 U.S. gal).

② Fill the fuel immediately when the lamp is ON.

(4) Emergency warning lamp

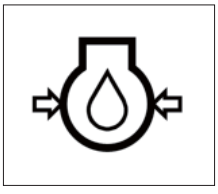
290F3CD64

① This warning lamp pops up and the buzzer sounds when each of the below warnings occurs.
- MCU input voltage abnormal
- Accel dial circuit abnormal or open

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

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

(5) Engine oil pressure warning lamp



290F3CD65

① This lamp lights up when the engine oil pressure is low.

② If the lamp lights up, shut OFF the engine immediately. Check oil level.

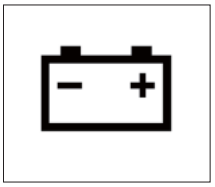
(6) Check engine warning lamp

290F3CD66

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

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

(7) Battery charging warning lamp

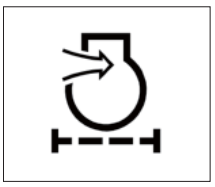


290F3CD67

① This warning lamp lights up when the battery charging voltage is low.

② Check the battery charging circuit when this lamp lights up.

(8) Air cleaner warning lamp

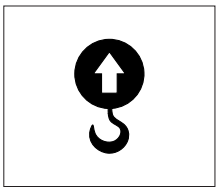


290F3CD68

① This warning lamp lights up when the air cleaner is clogged.

② Check, clean or replace the filter.

(9) Overload warning lamp (option)

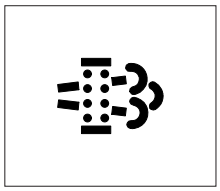


HX603CD80

① When the machine is overloaded, the overload warning lamp lights up when the overload switch is ON. (if equipped)

② Reduce the machine load.

(10) DPF (diesel particulate filter) warning lamp



87A3CD28

① This warning lamp lights up or go off when the regeneration is needed.

② This warning lamp lights up while DPF regeneration inhibit switch is in "Regeneration ingibited" state, when stationary regeneration is permitted.

③ This warning lamp lights up during reset regeneration standby or in back up mode.

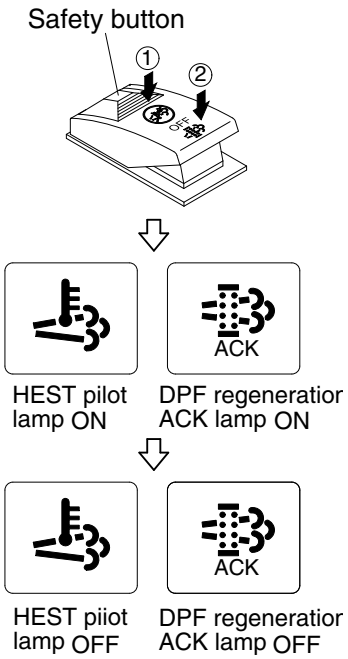
④ This warning lamp blinks during reset regeneration standby DPF regeneration inhibit switch is in "Regeneration inhibited" state.

※ Consequences of delaying regeneration

- Poor performance caused by increasing exhaust gas pressure.
- Higher fuel consumption
- Shorter filter lifetime

Condition	Warning lamp			Remedy
	DPF	Check engine (pop up)	Stop engine (pop up)	
Normal	Off	Off	Off	· Automatic regeneration
Soot low	On	Off	Off	· Push DPF switch to OFF position if DPF switch is in inhibit position. (see 3-44 page) · Engine power may be reduced automatically (soot medium)
Soot midium	Blink	Off	Off	
Soot high	On	On	Off	· Engine power and speed will be reduced automatically · Initiate a manual regeneration
Stop	On	Off	On	· Stop the engine immediatary. · Please contact your HD Hyundai Construction Equipment service center or local dealer.

※ Manual regeneration method of DPF



85A3CD213

※ Manual regeneration must be operated in a fireproof area.

① Stop and park the machine.

② The accel dial to the lowerest position and operate the engine in idling.

③ Pull the safety button and push the switch to position ② to initiate the manual regeneration of DPF.

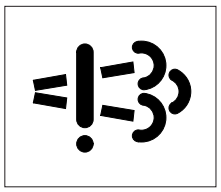
※ Refer to page 3-44 for the switch operation.

※ The engine speed may increase gradually to high idle rpm and DPF regeneration begins and it will take approximately 25~30 minutes.

④ When the manual regeneration starts, the DPF warning lamp light go off and the regeneration acknowledge lamp and HEST warning lamp will light up while the regeneration function is operating.

⑤ The regeneration acknowledge lamp and HEST warning lamp will light OFF when the regeneration function is completed.

(11) Emission system fail warning lamp



300A3CD15

① This warning lamp indicates there are faults related to the emission system.

② The lamp lights up when each of the below warnings is happened.

a. The EGR valve malfunctions.

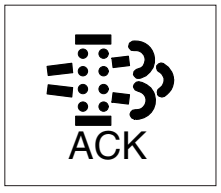
b. Electrical malfunction of the EGR control sensors. (disconnection, short)

c. Tampering with the EGR control sensors.

③ This warning lamp can be shown together with DPF warning lamp or engine fail lamp or engine stop warning lamp when DPF system is diagnosed.

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

(12) DPF regeneration acknowledge warning lamp



87A3CD29

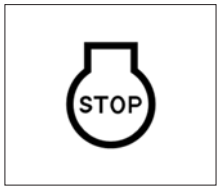
① This warning lamp lights up stationary regeneration is in process.

② This warning lamp lights up, when stationary regeneration is in process after DPF regeneration request switch is pressed and hold for more than 3 seconds.

③ This warning lamp blinks when stationary regeneration standby or regeneration interlock switch is in "regeneration permitted (interlock enabled) status.

④ This warning lamp blinks while stationary regeneration standby or back mode, when DPF regeneration inhibit switch in "Regeneration permitted" status and regeneration interlock switch is in regeneration permitted status.

(13) Stop engine warning lamp



290F3CD252

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

(14) Water in fuel warning lamp

HX60A3CD110

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

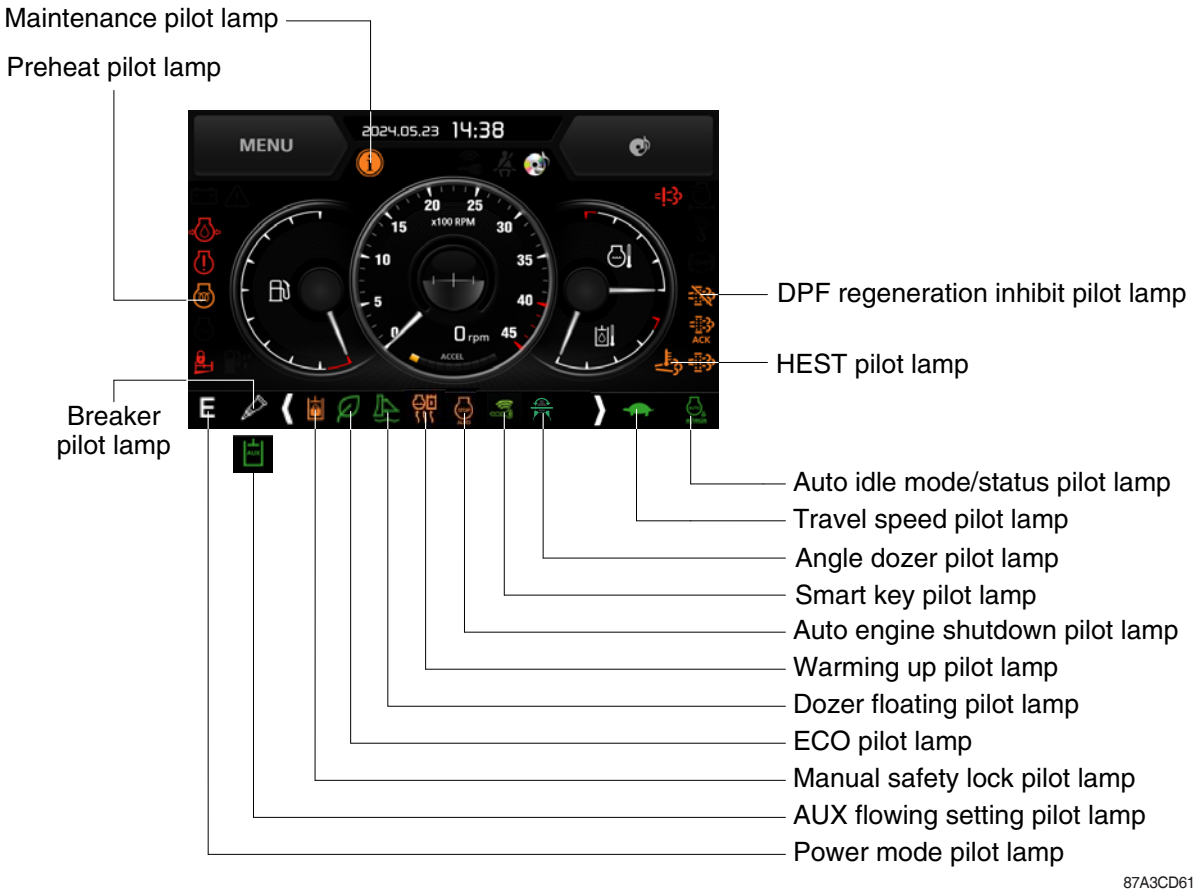
(15) Seat belt reminder warning lamp

300A3CD25

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

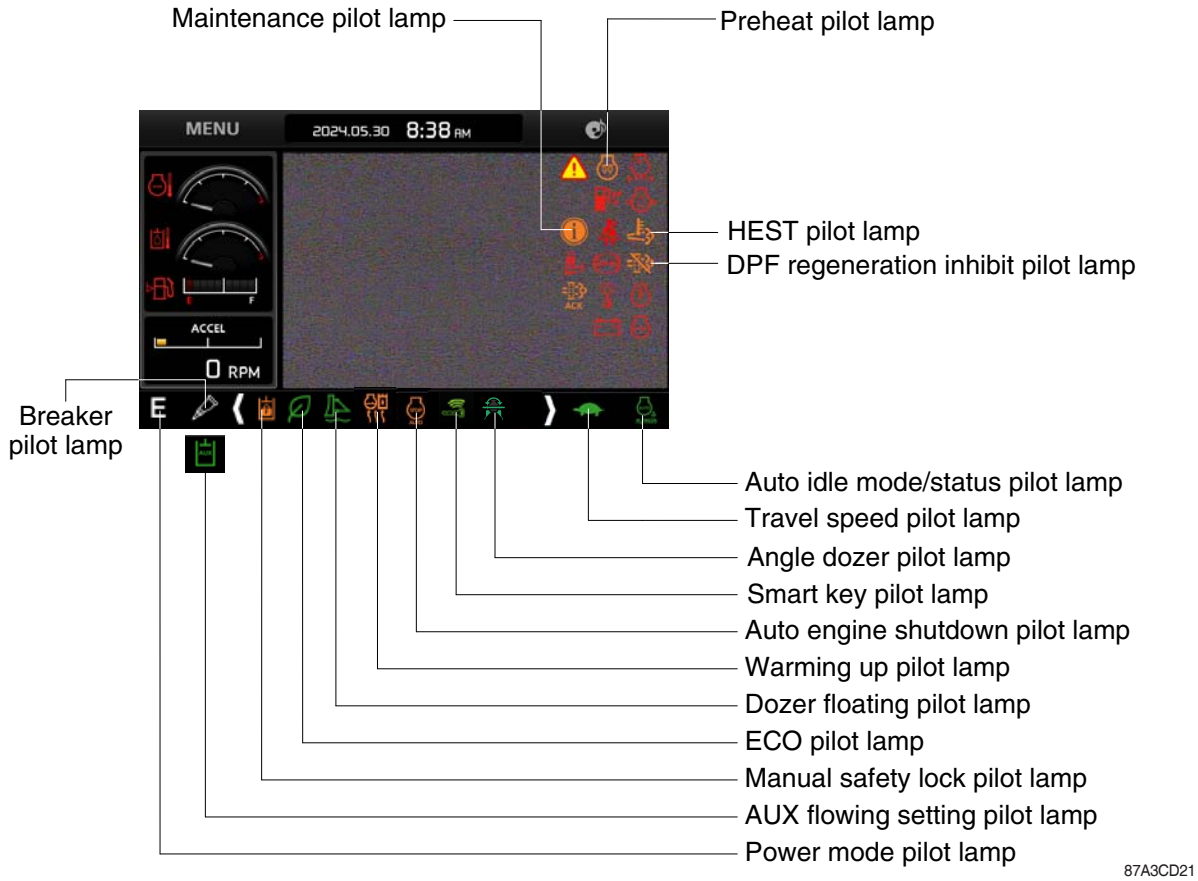
5) PILOT LAMPS

- TYPE A



87A3CD61

- TYPE B

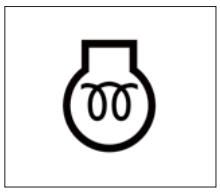


87A3CD21

(1) Mode pilot lamps

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

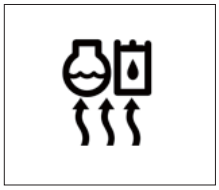
(2) Preheat pilot lamp



290F3CD79

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

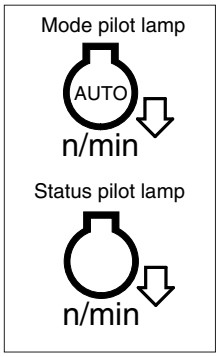
(3) Warming up pilot lamp



290F3CD80

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

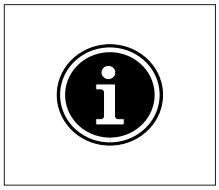
(4) Auto idle mode/status pilot lamp



85A3CD106

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

(5) Maintenance pilot lamp



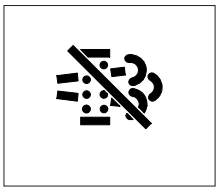
HX60A3CD116

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

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

※ **Refer to page 3-27.**

(6) DPF regeneration inhibit pilot lamp

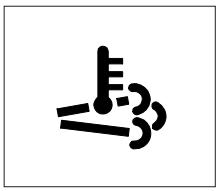


85A3CD107

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

※ **Refer to page 3-44 for the DPF switch.**

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



85A3CD109

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

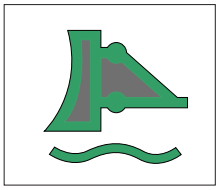
② The lamp will also illuminate during a manual regeneration.

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.**

(8) Dozer floating pilot lamp

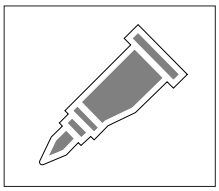


85A3CD112

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

※ **Refer to page 3-49.**

(9) Breaker pilot lamp

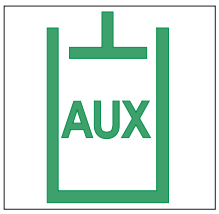


85A3CD116

① This lamp will be light up as conditions below.
- The breaker selection switch is pressed on the membrane switch.
- The AUX switch is pressed to OFF positions.

※ Refer to page 3-43 and 3-46.

(10) AUX flowing setting pilot lamp



85A3CD114

① This lamp will be light up as conditions below.
- The AUX flow setting is selected Enables in the cluster.
- The AUX switch is pressed to AUX positions.

※ Refer to page 3-27 and 3-44.

(11) ECO mode pilot lamp

85A3CD111A

① This lamp will light up when the ECO mode switch is pressed.
② The machine will be operated in economy conditions.

(12) Manual safety lock pilot lamp

140WA3CD37

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

※ Refer to page 3-48 for the safety knob.

(13) Auto engine shutdown pilot lamp

220A3CD202A

① This lamp lights up when the auto engine shutdown is activated.

※ Refer to page 3-32.

(14) Smart key pilot lamp (option)

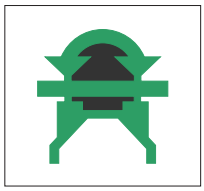
300A3CD36A

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

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

※ Refer to page 3-31.

(15) Angle dozer pilot lamp (option)



85A3CD113

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

※ Refer to page 3-44.

6) SWITCHES

- TYPE A

87A3CD62

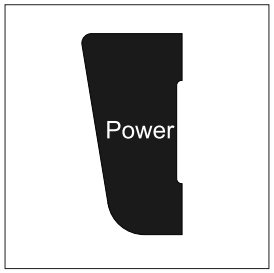
※ When the switches are selected, the pilot lamps are displayed on the LCD. Refer to page 3-14 for details.

- TYPE B

87A3CD27

※ When the switches are selected, the pilot lamps are displayed on the LCD. Refer to page 3-14 for details.

(1) Power mode switch

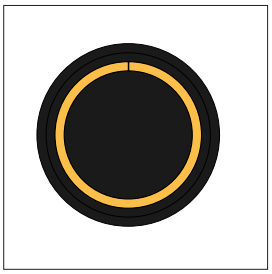


HX60A3CD118

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

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

(2) Select switch



HX60A3CD119

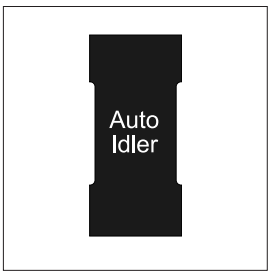
① This switch is used to select or change the menu or input value.

② Knob push
- Short (below 0.5 sec) : Select menu

③ Knob rotation

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

(3) Auto idle switch

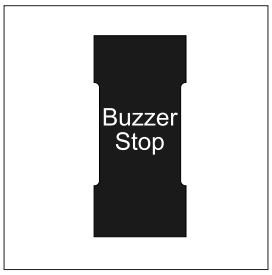


HX60A3CD120

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

※ **Refer to page 3-15 for details.**

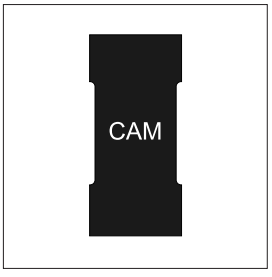
(4) Buzzer stop switch



HX60A3CD121

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

(5) Camera switch

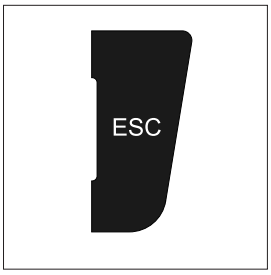


HX60A3CD122

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

※ **Please refer to page 3-38 for the camera.**

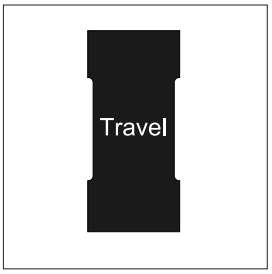
(6) Escape switch



HX60A3CD123

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

(7) Travel speed control switch



HX60A3CD104

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

- : Low speed
- : High speed

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

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

7) MAIN MENU

- TYPE A

Main menu screen

Tap MENU or Press

Press

Sub menu screen

87A3CD63 HW60AH3CD125A

※ Please refer to the select switch, page 3-20 for selection and change of menus and input values.
※ In the operation screen, tap MENU or press the select switch to access the sub-menu screen.

- TYPE B

Main menu screen

Tap MENU or Press

Press

Sub menu screen

87A3CD30 HW60AH3CD125A

※ Please refer to the select switch, page 3-20 for selection and change of menus and input values.
※ In the operation screen, tap MENU or press the select switch to access the sub-menu screen.

(1) Structure

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

(2) Monitoring

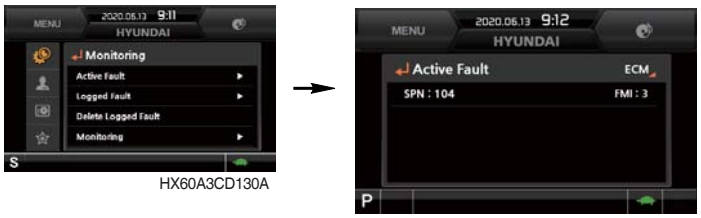
① Active fault - Machine

HX60A3CD130A

HX60A3CD131A

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

② Active fault - Engine



HX60A3CD130A

HX60A3CD133A

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

③ Logged fault - Machine/ Engine

HX60A3CD134A

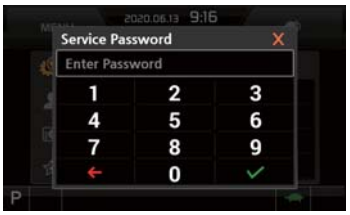
HX60A3CD135A

HX60A3CD136A

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

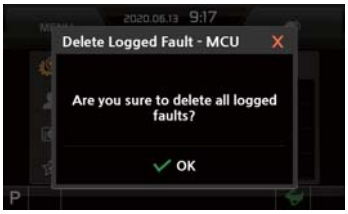
④ Delete logged fault

HX60A3CD143A

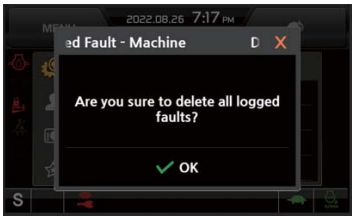


HX60A3CD144A

HW60AH3CD145A



HX60A3CD146A



HW60AH3CD147A

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

⑤ Monitoring (machine status)

HX60A3CD137A

HX60A3CD138A

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

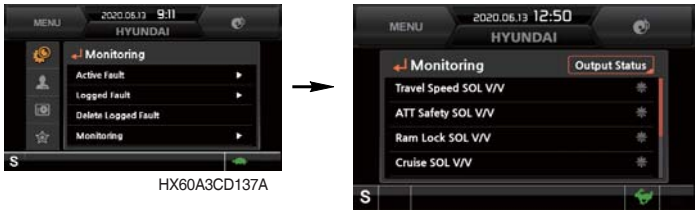
⑥ Monitoring (switch status)

HX60A3CD137A

HX60A3CD140A

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

⑦ **Monitoring** (output status)



HX60A3CD137A

HX60A3CD142A

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

(3) Management

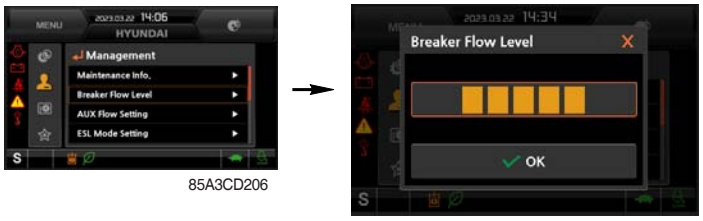
① Maintenance information

HX60A3CD157A HX60A3CD199K HX60A3CD159A

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

※ **Change or replace interval**
Refer to the page 6-15.

② Breaker flow level



85A3CD206 85A3CD207

- The breaker flow level can be modulated in 1~5 steps.

③ AUX flow setting

a. Option attach selection

85A3CD214 HW60A3CD42O

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

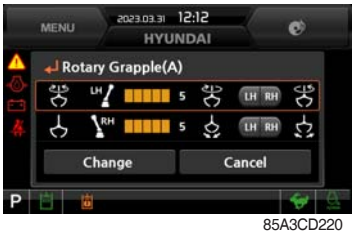
※ **There are two user modes (type A or B) in each option attachment.**

b. Proportional flow control setting

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

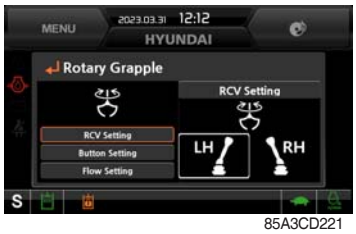
a) Rotary setting

HW60A3CD42O



85A3CD220

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

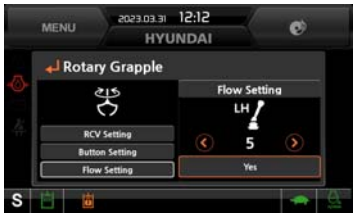


85A3CD221

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

85A3CD222

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

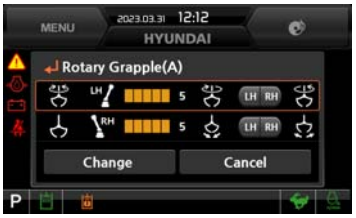


85A3CD223

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

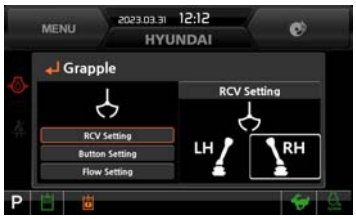
b) Grapple setting

HW60A3CD42O



85A3CD220

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



85A3CD224

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

85A3CD225

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

85A3CD226

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

85A3CD227

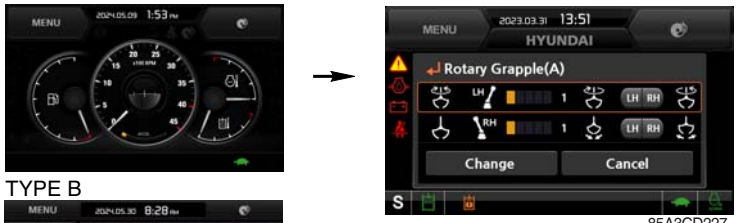
· Flow setting value can be saved by pressing change button.

85A3CD228

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

c) Confirmation

TYPE A



85A3CD227

TYPE B

87A3CD30

· AUX flowing setting pilot lamp ( ) is activated on the lower side of the main screen as below conditions.

※ The AUX switch is pressed to the AUX position and the AUX flow setting is selected Enabled.

a) Rotary setting
- Rotary RCV : LH
- Rotary flow level : 3
- CW rotation : LH
- CCW rotation : RH

b) Grapple setting
- Grapple RCV : RH
- Grapple flow level : 3
- Open : LH
- Close : RH

④ ESL mode setting

85A3CD215

HX60A3CD149A

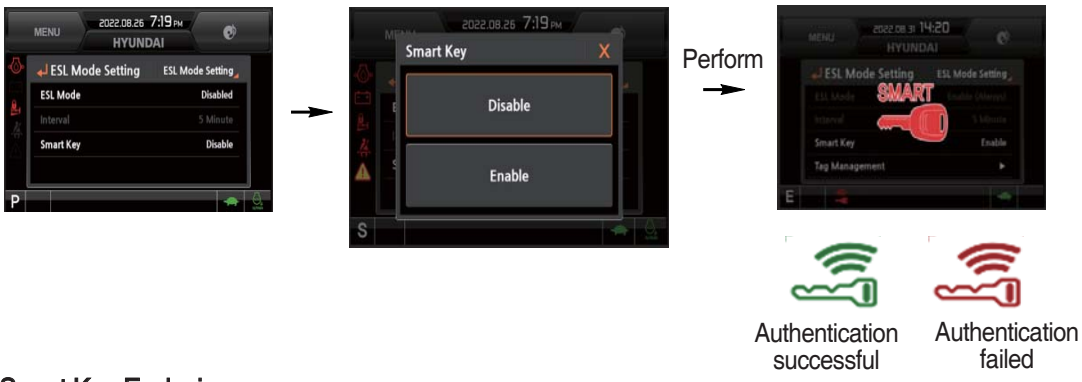
HW60AH3CD150A

- ESL : Engine Starting Limit
- ESL mode is designed to be a theft deterrent or will prevent the unauthorized operation of the machine.
- When you Enable the ESL mode, the password will be required when the starting switch is turned to the on position.
- Disable : ESL function is disabled and password is not required to start engine.
  Enable (always) : The password is required whenever the operator starts engine.
  Interval : The password is required when the operator starts engine first. But the operator can restart the engine within the interval time without inputting the password.

※ The interval time can be set to a maximum 4 hours.

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

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



- **Smart Key Exclusive**

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

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

Start Limit - Tag Management

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

※ Engine Starting Condition

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

⑤ Automatic engine shutdown

85A3CD208 85A3CD209 85A3CD210

- TYPE A

85A3CD211

- TYPE B

87A3CD31

The automatic engine shutdown function can be set by this menu.

a. Once (one time)

· Automatic shutdown function set Once when key-on or engine operation condition.
  - Key-off when the shutdown button clicks after pop-up the automatic stop icon.
  - Shift automatic shutdown function to Disable when the cancel button clicks after pop-up the automatic stop icon.

· Keep Disable for the automatic shutdown function when key-off after key-on again or start engine.

b. Always (continuous use)

· Automatic shutdown function set Always when key-on or engine operation condition.
  - Key-off when the shutdown button clicks after pop-up the automatic stop icon.
  - Shift automatic shutdown function to Disable when when the cancel button clicks after pop-up the automatic stop icon.

· Keep Always for the automatic shutdown function when key-off after key-on again or start engine.

c. Disable

· Disable the engine automatic shutdown function.

⑥ Password change

– The password is 5~10 digits.

85A3CD215

HX60A3CD149A

HX60A3CD153A

Enter the current password

Select the password change

HX60A3CD156A

HX60A3CD155A

HX60A3CD149A

Saved the new password in the MCU

Enter the new password again

Enter the new password

⑦ Machine information

HX60A3CD160A

HX60A3CD161A

HX60A3CD162A

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

⑧ A/S phone number

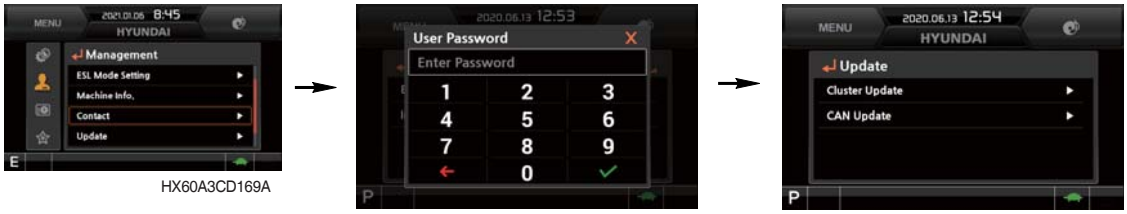
HX60A3CD163A

HX60A3CD164A

HX60A3CD165A

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

⑨ Cluster update



HX60A3CD169A

HX60A3CD149A

HX60A3CD170A

Enter the user password

Select the cluster update

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

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

a. Application update

HX60A3CD172A

HX60A3CD173A

HX60A3CD174A

Select application item

Select file to update

Select OK

HX60A3CD176

HX60A3CD175A

Completed

In process

b. System update

HX60A3CD177A

HX60A3CD173A

HX60A3CD174A

Select system item

Select file to update

Select OK

HX60A3CD176

HX60A3CD175A

Completed

In process

⑩ Service menu

HX60A3CD165A HX60A3CD144A HX60A3CD168A

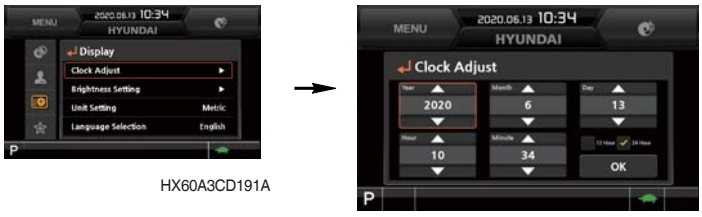
Enter the manager password

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

※ This menu can be used only HD Hyundai Construction Equipment service man. Do not attempt unauthorized adjustment.

(4) Display

① Clock adjust



HX60A3CD191A

HX60A3CD192A

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

② Brightness

HX60A3CD193A

HX60A3CD194A

HX60A3CD195A

Manual (1st~10th step)

HX60A3CD197A

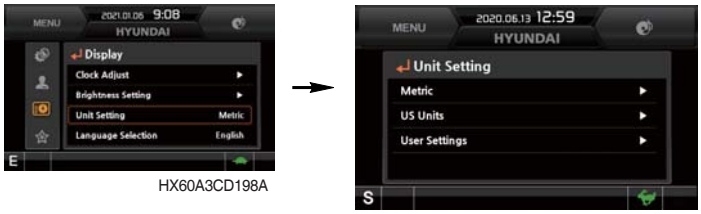
Auto (day/night)

HX60A3CD196A

Auto (day time)

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

③ Unit set



HX60A3CD198A

HX60A3CD199A

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

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

④ Language selection

HX60A3CD200A

HX60A3CD201A

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

(5) Utilities

① Entertainment

HX60A3CD70A HX60A3CD208A HX60A3CD209A

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

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

② Camera setting

HX60A3CD202A HX60A3CD203A

- Three cameras can be installed on the machine and display order can be set by this menu.

※ If the camera is not equipped, this menu is not useful.

- Turning the select switch in clockwise direction, the next ordered will be shown and in counter-clockwise direction, the previously ordered will be shown. Also, the camera channel can be changed by touching the screen.
- Display change to reduction size or display is not visible by pushing the select switch or touch the screen.
  (display reduction size → hiding → display)

HX60A3CD204

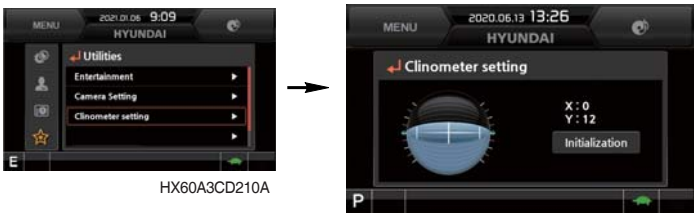
- The camera display is terminated by pressing the ESC switch or touch the X icon on the screen.

· **Camera control switch**

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

87A3CD32

③ Clinometer setting



HX60A3CD210A

HX60A3CD211A

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

④ Manual

HX60A3CD212A

85A3CD229

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

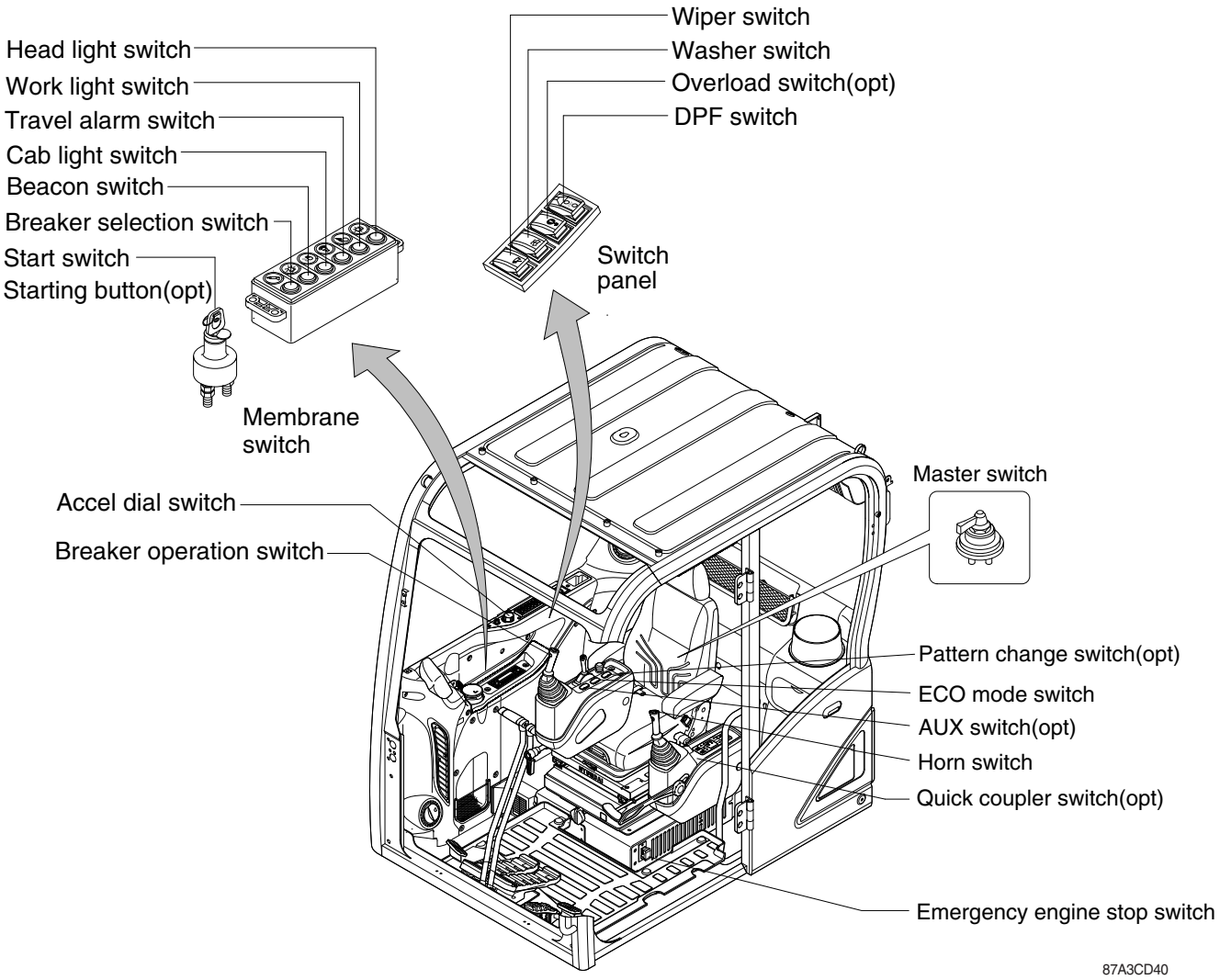
⑤ Emergency mode

HX60A3CD205A

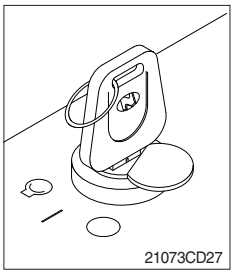
HX60A3CD206A

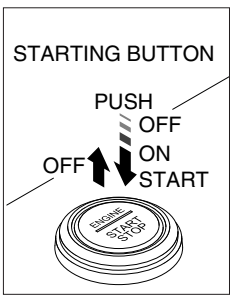
· When switches of the monitor and the accel dial fails, switches are displayed on LCD, and you are allowed to perform operation by touching the screen.
· Such operation is allowed only on this mode screen.

3. SWITCHES



1) STARTING SWITCH





Starting button with smart key tag (opt)

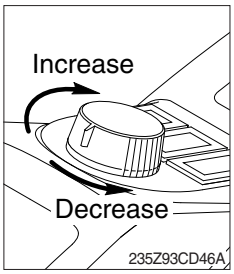
(1) There are three positions, OFF, ON and START.
- ○ (OFF) : No of electrical circuits activate.
- | (ON) : All the systems of machine operate.
- (START) : Use when starting the engine.
  Release key immediately after starting.

※ **If you turn ON the starting switch in cold weather, the fuel warmer is automatically operated to heat the fuel by sensing the coolant temperature. Start the engine in 1~2 minutes after turning ON the starting switch. More time may be required according to ambient temperature.**

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

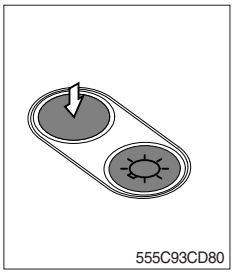
※ **Key must be in the ON position with engine running maintain electrical and hydraulic function and prevent serious machine damage.**

2) ACCEL DIAL



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

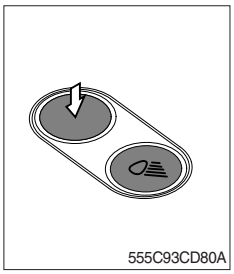
3) HEAD LIGHT SWITCH



(1) This switch is used to operate the head light and illumination lamps.
(2) Press the switch once, the head light and the below illumination lamps light up.
- Air conditioner and heater controller
- Radio and USB player
- USB socket, DPF switch, accel dial and cigar lighter

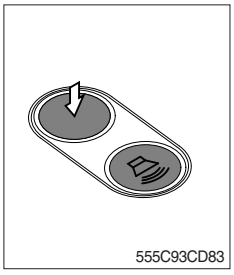
(3) Press the switch once more, the head light and illumination lamps turn off.

4) WORK LIGHT SWITCH



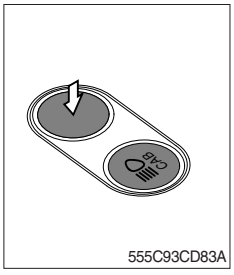
(1) This switch is used to operate the work light.
- Press the switch once, the work light and the pilot lamp light up.
- Press the switch once more, the work light and pilot lamp turn off.

5) TRAVEL ALARM SWITCH



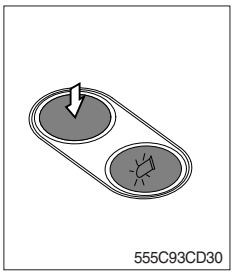
(1) This switch is to activate travel alarm function surrounding when the machine travels.
- ON : The travel alarm function is activated.
- OFF : The travel alarm function is not activated.

6) CAB LIGHT SWITCH



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

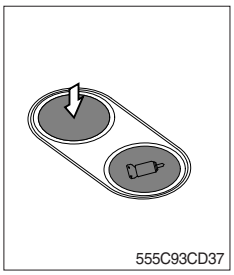
7) BEACON SWITCH (option)



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

(2) The indicator lamp lights up when operating this switch.

8) BREAKER SELECTION SWITCH (option)



(1) When this switch is pressed, the breaker will be ready to operation.

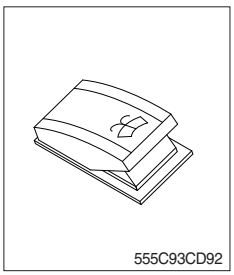
※ **Refer to page 3-46 for details.**

9) WIPER SWITCH

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

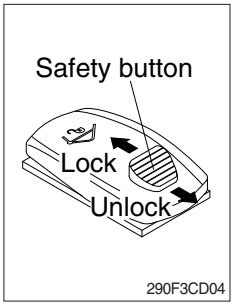
△ **If wiper does not operate with the switch in the ON position, turn the switch off immediately. Check the cause. If the switch remains ON, motor failure can result.**

10) WASHER SWITCH



(1) This switch is used to operate the washer.
Washer fluid is sprayed and the wiper is operated only when this switch is pressed. If you release the switch, return to the first position.

11) QUICK COUPLER SWITCH (option)



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

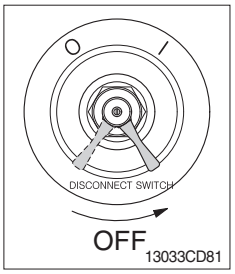
※ **Refer to page 8-10 for details.**

12) OVERLOAD SWITCH (option)

(1) When this switch is activated, buzzer makes sound and overload warning lamp lights up in the event that the machine is or becomes in an overloaded situation.

(2) When the switch is inactivated, buzzer stops and warning lamp goes off.

13) MASTER SWITCH

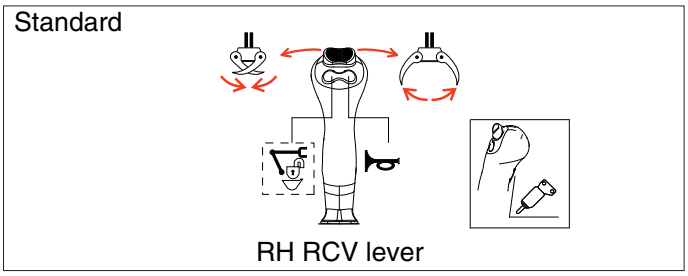


(1) This switch is used to shut off the entire electrical system.

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

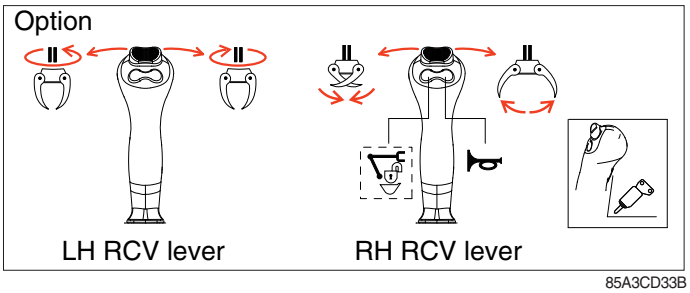
※ **Never turn the master switch to O (OFF) with the engine running. It could result in engine and electrical system damage.**

14) CONTROL LEVER SWITCH (LH, RH)



(1) The breaker operates in three steps below.

- **First step : Select breaker selection switch on the membrane switch.**
- **Second step : Select Aux switch to position 3.**
- **Third step : Press breaker operation switch.**



(2) This switch operates the clamshell or shear.

※ **This switch applies to double action hydraulic attachment circuit.**

15) DPF (diesel particulate filter) 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) OFF 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.

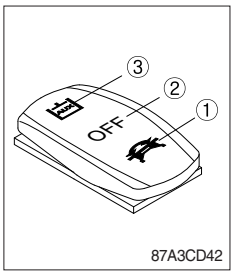
② HEST lamp will be illuminated during the entire regeneration.

※ **Refer to the page 3-16 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).**

16) AUX SWITCH (option)



(1) This switch is used to select the auxiliary optional functions.

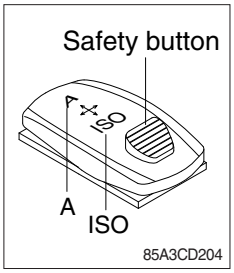
① : Angle dozer

② : Off

③ : Breaker operating or 2way or 4way

※ **Refer to page 3-27 and section, Levers and pedals for details.**

17) PATTERN CHANGE SWITCH (option)



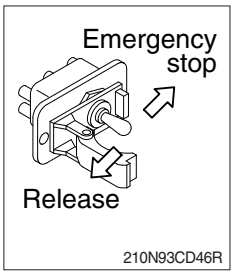
(1) The pattern change can be operated easily using this switch.

- Position ISO : ISO type pattern
- Position A : A type pattern

⚠ **Before starting the machine, check switch position.**

※ **Refer to page 4-22 for the details.**

18) EMERGENCY ENGINE STOP SWITCH



(1) This switch is used to stop the engine in the event of an emergency.

(2) The engine system reboot is required through master switch ON / OFF operation for restarting after the emergency stop switch operation.

※ Be sure to return the emergency switch to the release position before trying to restart the engine.

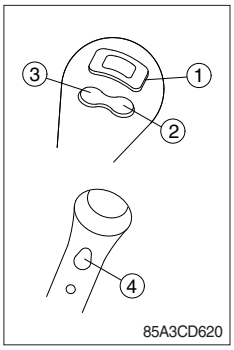
19) ECO MODE SWITCH

(1) This switch is used to improve the fuel economy of the equipment.

(2) The pump horsepower is reduced, when you press this switch.

20) LH RCV LEVER SWITCH

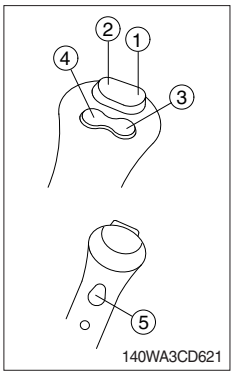
(1) Button type



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

① None
② None
③ None
④ None

(2) Proportional type (option)



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

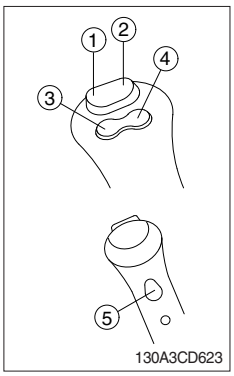
① CW rotating switch
When this switch is pressed, the clockwise rotating will operate.

② CCW rotating switch
When this switch is pressed, the counterclockwise rotating will operate.

③ None.
④ None.
⑤ None.

21) RH RCV LEVER SWITCH

(1) Proportional type



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

① **2-way clamp switch**

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

② **2-way release switch**

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

③ **Quick coupler switch**

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

※ **Refer to page 8-10.**

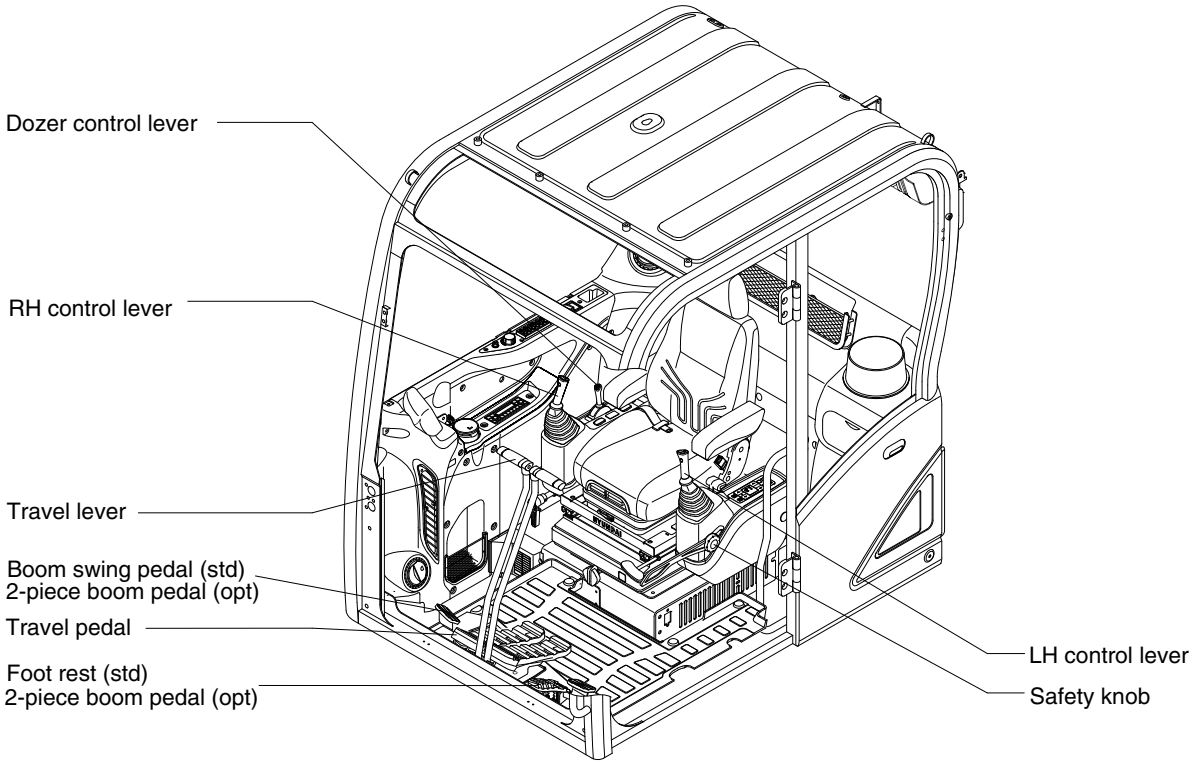
④ **Horn switch**

When this switch is pressed, the horn will sound.

⑤ **Breaker switch**

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

4. LEVERS AND PEDALS



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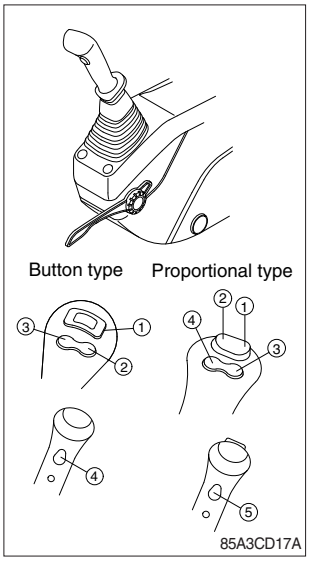
1) LH CONTROL LEVER



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

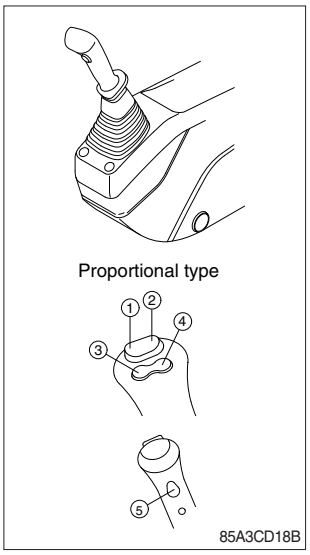
※ Refer to operation of working device in chapter 2 for details.

(2) The switch functions are as below.

No.	Button type	Proportional type (opt)
①	N.A	Rotating-CW
②	N.A	Rotating-CCW
③	N.A	N.A
④	N.A	N.A
⑤	-	N.A

※ Refer to page 3-45 for the details of the switch function.

2) RH CONTROL LEVER



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

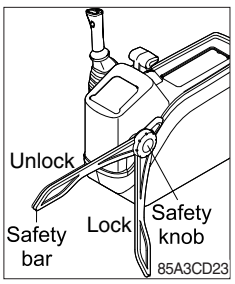
※ Refer to operation of working device in chapter 2 for details.

(2) The switch functions are as below.

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

※ Refer to page 3-46 for the details of the switch function.

3) SAFETY KNOB



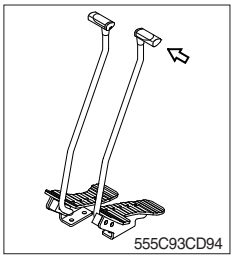
(1) All control levers and pedals are disabled from operation by locating the safety knob to the LOCK position as shown.

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

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

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

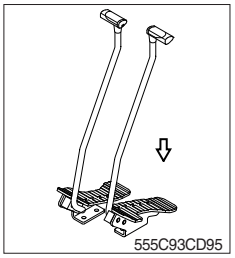
4) TRAVEL LEVER



(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

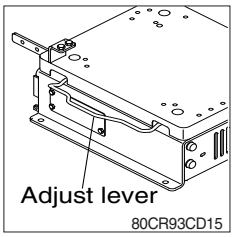


(1) This pedal is used to move the machine forward or backward.

(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.

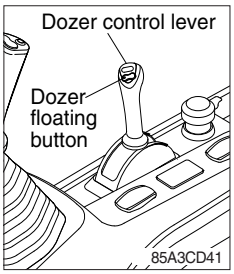
6) SEAT AND CONSOLE BOX ADJUST LEVER



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

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

7) DOZER CONTROL LEVER



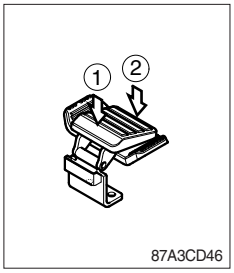
(1) This lever is used to operate the dozer blade.

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

(3) The dozer floating feature activates when the dozer floating button is pressed.
- First step : Press the dozer floating button.
- Second step : Push the dozer lever until the end.
- Third step : The lever is fixed even if the dozer lever is released. (detent function)

(4) Floting release method.
- First step : Press the dozer floating button again.
- Second step : Pull back the fixed dozer lever.

8) BOOM SWING PEDAL



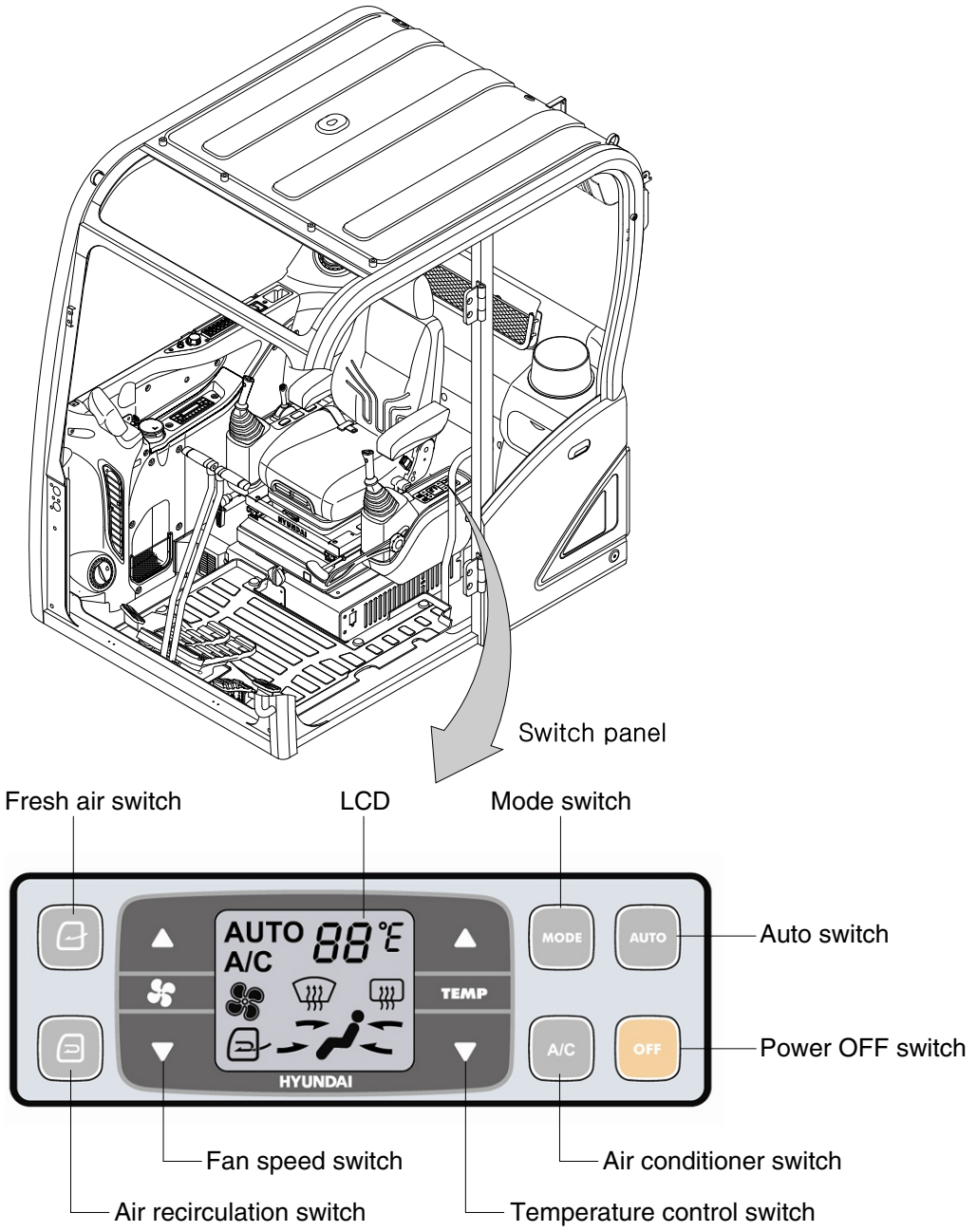
(1) This pedal is used to swing the boom to the right and left direction.

(2) If the front (①) of the pedal is pressed, boom will swing to the left direction.
If the rear (②) of the pedal is pressed, boom will swing to the right direction.

5. FULL AUTO AIR CONDITIONER AND HEATER

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

· **Location of air flow ducts**



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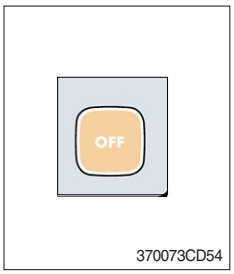
1) POWER OFF SWITCH

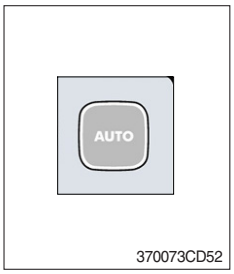


(1) This switch turns the system and the LED OFF.
Just before the power OFF, set values are stored.

(2) Default setting values

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

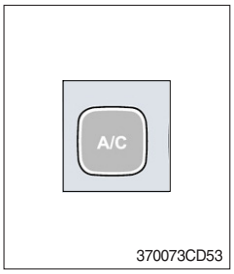
2) AUTO SWITCH



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

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

3) AIR CONDITIONER SWITCH (compressor switch)

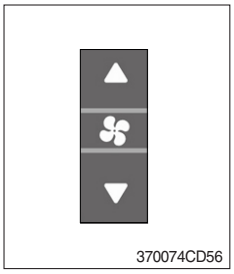


(1) This switch turns the compressor and the LCD ON.

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

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

4) FAN SPEED SWITCH

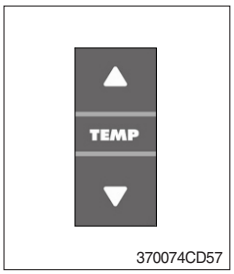


(1) Fan speed is controlled automatically by sett temperature.

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

(3) This switch turns the system ON.

5) TEMPERATURE CONTROL SWITCH



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

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

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

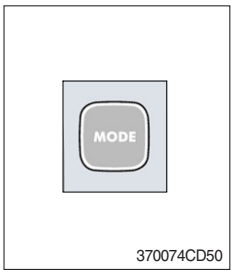
Temperature	Compressor	Fan speed	In/Outlet	Mode
Max cool	ON	Max (Hi)	Recirculation	Vent
Max warm	OFF	Max (Hi)	Fresh	Foot

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

① Default status (℃)

② The temperature unit can be changed (℃ ↔ ˚F) by pressing temperature switchs (Up/Down) simultaneously for more than 5 seconds.

6) MODE SWITCH



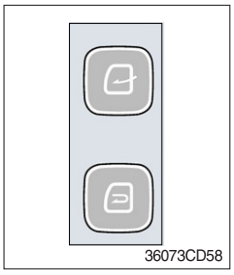
(1) Operating this switch, it beeps and displays symbol of each mode in the following order. (Vent → Vent/Foot → Foot → Foot/Def → Vent)

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

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

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

7) FRESH AIR/AIR RECIRCULATION SWITCH



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

① **Fresh air ( )**

Inhaling air from the outside.

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

② **Air recirculation ( )**

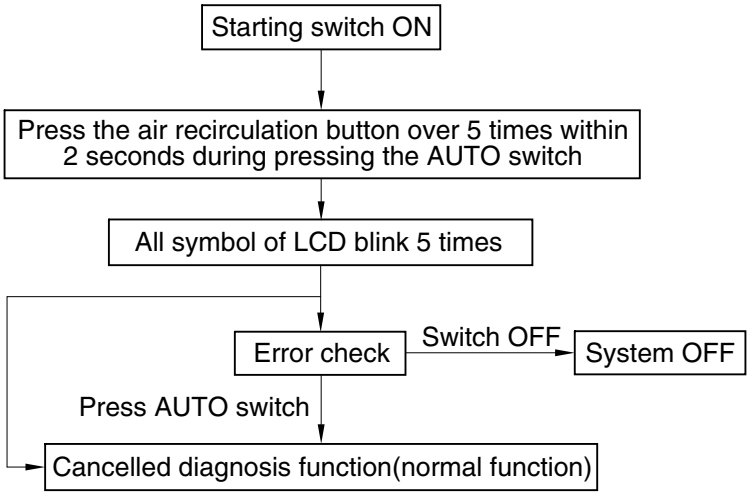
It recycles the heated or cooled air to increase the energy efficiency.

※ **Change air occasionally when using recirculation for a long periods of time**

※ **Check condition of an outer filter and an inner filter periodically to maintain good efficiency of the system.**

8) SELF DIAGNOSIS FUNCTION

(1) Procedure



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(2) Error check

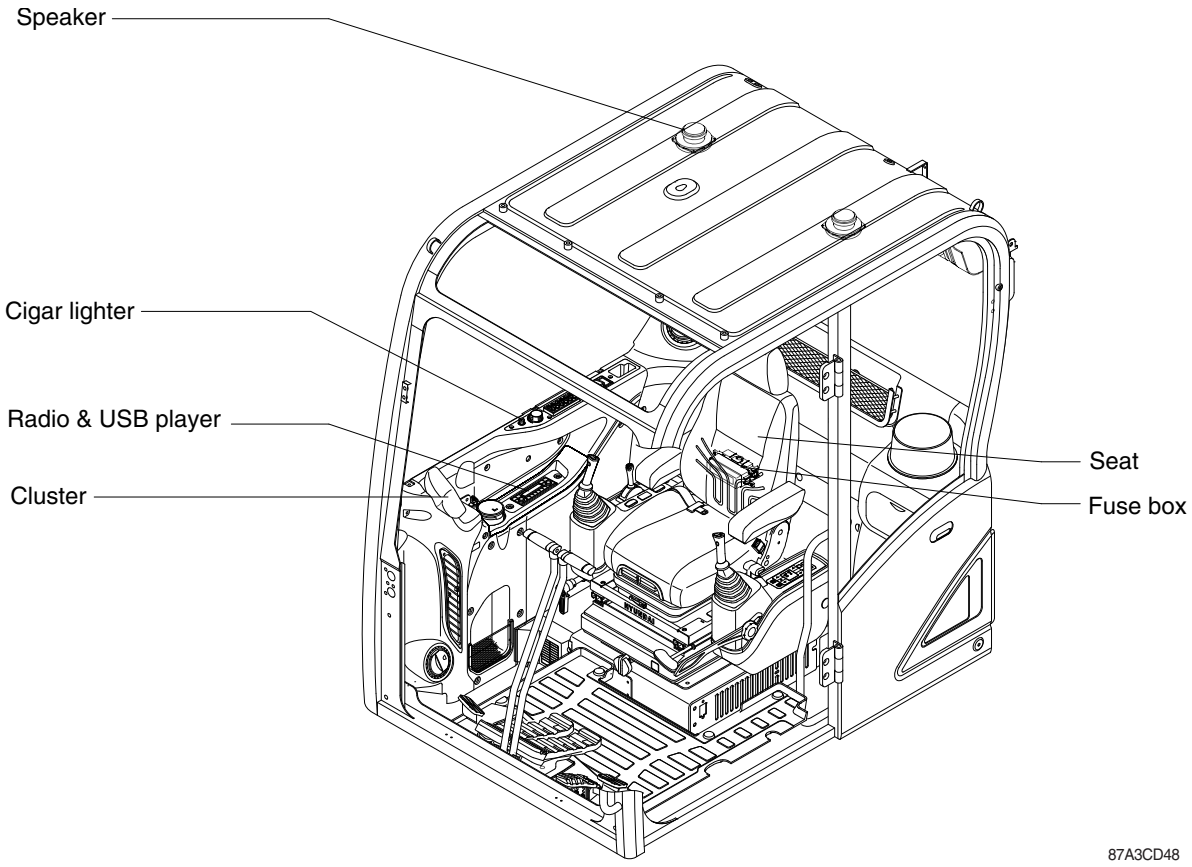
- The corresponding error code flickers on the setup temperature display panel, the other symbol will turn OFF.
- Error code flickers every 0.5 second.
- If error code is more than two, each code flickers 2 times in sequence.
- Error code

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

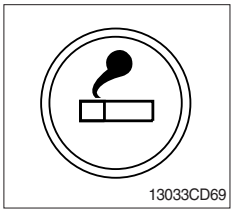
(3) Fail safe function

Error description	Fail safe function
Cabin inside sensor (11)	25˚C alternate value control
Ambient sensor (12)	20˚C alternate value control
Duct (evaporator) sensor (14)	1˚C alternate value control
Temp actuator (15)	If opening amount is 0 %, the alternate value is 0 %
	If not, the alternate value is 100 %
Mode actuator 1, 2 (16, 17)	The alternate value is Vent

6. OTHERS



1) CIGAR LIGHTER



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

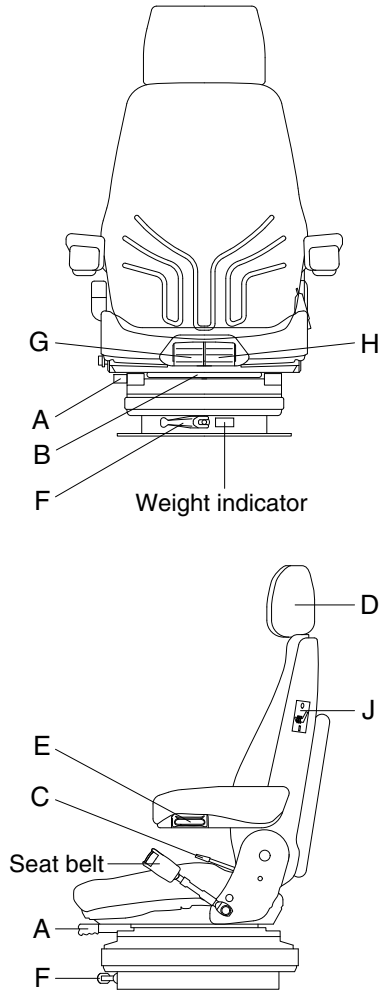
(2) The lighter can be used when it springs out in a short while after being pressed down.

※ **Service socket**

Use cigar lighter socket when you need emergency power.
Do not use the lighter exceeding 12 V, 120 W.

2) 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.



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(1) Forward/Backward adjustment (A)

① Pull lever A to adjust seat forward or backward.

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

⚠ Do not lift the locking lever with you leg.

(2) Upward/Downward adjustment (B)

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

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

(3) Reclining adjustment (C)

Pull lever C to adjust seat back rest.

(4) Armrest adjustment (E)

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

(5) Headrest adjustment (D)

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

(6) Weight adjustment (F)

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

(7) Seat depth adjustment (G)

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

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

(8) Seat pan angle adjustment (H)

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

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

(9) Seat heater (J)

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

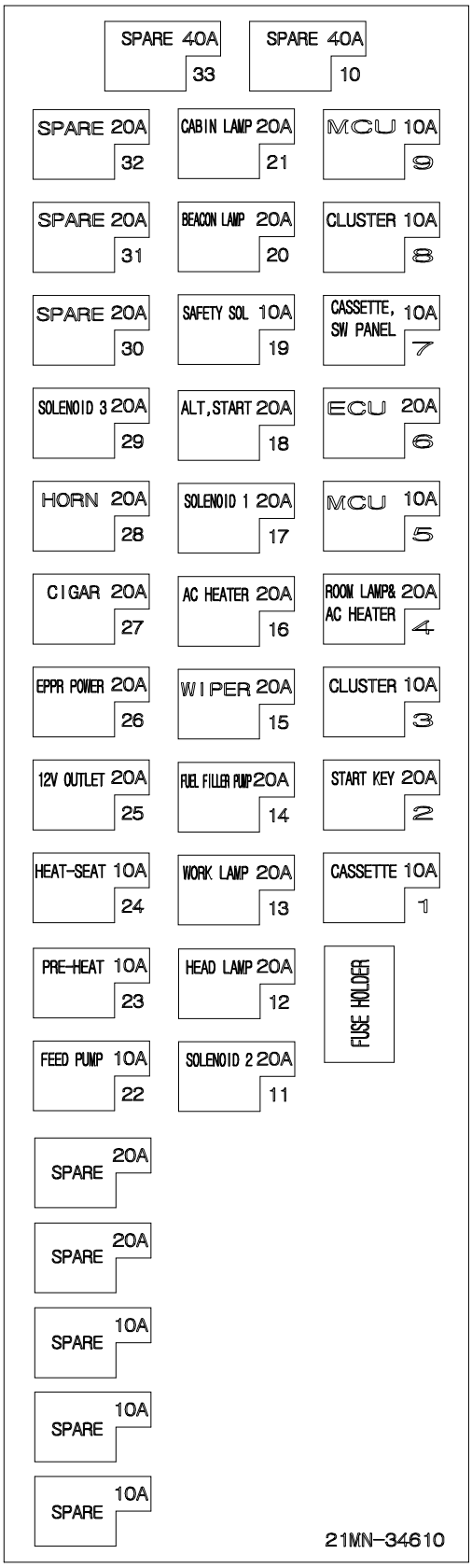
0 = Seat heater OFF

I = Seat heater ON

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

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

3) FUSE BOX



21MN-34610

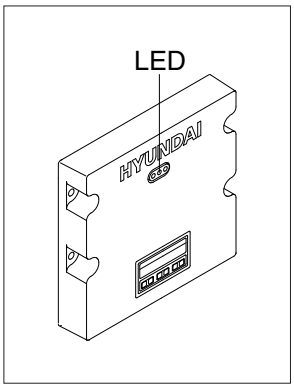
(1) The fuses protect the electrical parts and wiring from burning out.

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

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

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

4) MCU



85A3CD57

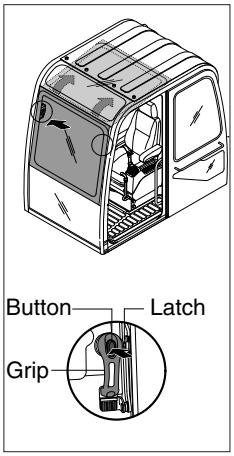
(1) To match the pump absorption torque with the engine torque, MCU varies EPPR valve output pressure, which controls pump discharge volume whenever engine speed drops and provides feedback, under the reference rpm of each mode set.

(2) Three LED lamps on the MCU display as below.

LED lamp	Trouble	Service
G is turned ON	Normal	-
G and R are turned ON	Trouble on MCU	· Change the MCU
G and Y are turned ON	Trouble on serial communication line	· Check if serial communication lines between controller and cluster are disconnected
Three LED's are turned OFF	Trouble on MCU power	· Check if the input power wire (24 V, GND) of controller is disconnected · Check the fuse

G : green, R : red, Y : yellow

5) UPPER WINDSHIELD



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

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

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

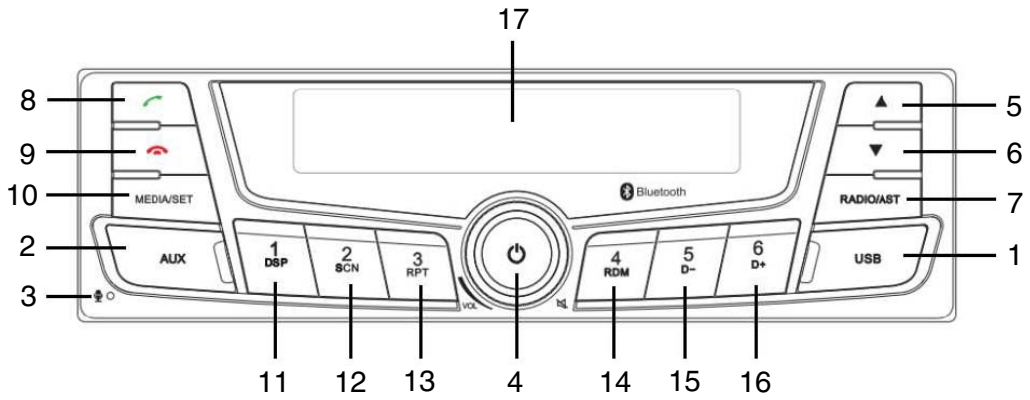
③ Hold both grips that are provided on the windshield frame and pull back into the storage position until auto lock latch is engaged.

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

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

6) RADIO, USB PLAYER, BLUETOOTH AUDIO

■ FRONT VIEW



19A3RD05

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

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

3 Internal Microphone

4 Power ON/OFF, Mute and Pause knob.

5 Searching for next station, manual step up and next track.
*. Short Press :
Radio mode) Search for the next station automatically USB/BT Audio) Next Track
*. Long Press :
Radio mode) Step up manually USB/BT Audio) Fast Forward

6 Searching for previous station, manual step down and previous song.
• Short Press :
Radio mode) Search for the previous station automatically USB/BT Audio) Previous song
• Long Press :
Radio mode) Step down manually USB/BT Audio) Fast rewind

7 Radio Button: enters Radio mode, changes the radio band ,and activates Automatic station storage
• Short Press : Select the Radio band
• Long Press : AST mode

8 Call button :
• When a call comes in : accepts a call(press) ; switches a call mode (Talking / Private mode)

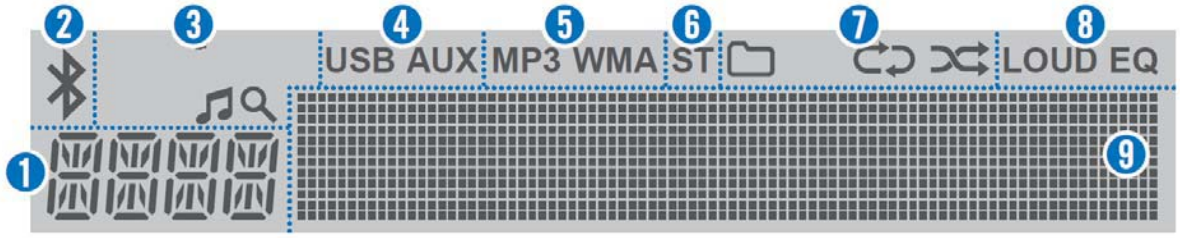
9 Call end button :
• During a call connection : ends a call (press);

10 Media selection or Setup button
• Short Press : Move back to previous media
• Long Press : Move to the setting mode

11~16 Preset buttons :
- Radio : Recall each stored station(press); store each station (press and hold).
- USB/BT AUDIO :
Preset1 : Display folder name / ID3 Information
Preset2 : Scan each track for 10 seconds
Preset3 : Repeat the file and folder
Preset4 : Play folders at random or play all
Preset5 :
• Short Press: Move to previous folder
• Long Press : Play first 10 tracks of current folder
Preset6 :
• Short Press : Move to next folder
• Long Press : Play first 10 tracks of current folder

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

■ DISPLAY WINDOW (LCD)



19A3RD03

1 Function display area for showing the function mode.

2 Bluetooth indicator for the Bluetooth connection.

3 Search indicator for USB play list.

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

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

6 ST (Stereo) indicators for FM stereo reception.

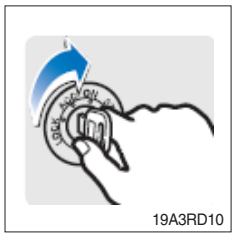
7 Playback mode indicators for USB playback mode.
: Folder mode.
: Repeat playback.
: Random playback.

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

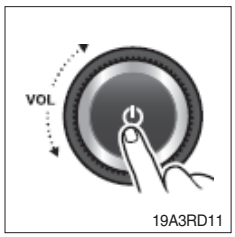
9 Multi-function display area for showing the play, reception or menu information.

■ GENERAL

(1) Turning the unit on/off



① Turn the starting switch to ON position.



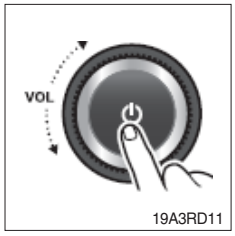
② Press the POWER button to turn the power on.
- If the source is ready, playback also starts.
- To turn on the power directly.

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

(2) Adjusting volume directly

① Turn the VOLUME dial to control volume.
- Available volume range: 00 (mute) ~ 30.

(3) Muting the sound quickly



① Press the MUTE button to turn mute on.
- "Mute" will be displayed on the LCD and mute the sound.
- Press the MUTE button again or turn VOLUME dial to restore sound.

(4) Setting the sound

① Press and hold MEDIA/SET button for 2 seconds, then rotate the volume to access the [AUDIO SET] menu

Press the volume knob to access the Audio Settings menu.

Then press the volume knob and the Audio Settings option appears as below.

- BASS : sets the bass sound level (-7 ~ +7).
- TREBLE : sets the treble sound level (-7 ~ +7).
- BALANCE : sets the sound balance between the right and left speakers (LEFT 7 ~ RIGHT 7).
- EQUALIZER : selects the one of the 5 EQ styles (EQ OFF, CLASSIC, POP, ROCK, JAZZ).
- LOUD : Selects the one of the 2 options (ON, OFF)

※ If there is no operation after 5 seconds, automatically exit the [Audio Settings] menu.

※ The BASS and TREBLE can be adjusted only if the EQ OFF is selected in the sub-menu.

※ Press and hold [MEDIA/SET] to enter the settings, and press [VOL] again to return to the Previous Settings item when you press [VOL] to enter the previous one.

(5) Setting the system functions

① Press and hold [MEDIA/SET] for 2 seconds, then rotate the volume knob to access the [SYSTEM SET] menu.

Press the volume knob to access the system settings menu. Then press the volume knob and the system settings option appears.

Each item can be adjusted by rotating the volume knob.

② S-VOL Settings.

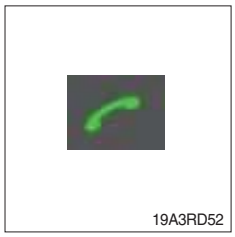
- The S-VOL value ranges from 5 to 25. You can set the default volume here.
- When the player is turned on, if the volume of the last shutdown is greater than the default volume, it will be restored to the default volume after being turned on.
- If the volume before power off is between VOL5 and the default volume, turn it on and return to the volume before power off.
- If the volume is less than VOL5 before power off, power on will return to VOL5.

(6) Setting the regions

- ASIA / MIDDLE EAST
  FM : 87.5 ~ 108.0 MHz (100 kHz step)
  AM : 531 ~ 1,602 kHz (9 kHz step)
- AMERICA
  FM : 87.5 ~ 107.9 MHz (200 kHz step)
  AM : 530 ~ 1,710 kHz (10 kHz step)
- LATIN
  FM : 87.5 ~ 108.0 MHz (100 kHz step)
  AM : 530 ~ 1,710 kHz (10 kHz step)
- EUROPE
  FM : 87.5 ~ 108.0 MHz (50 kHz step)
  AM : 522 ~ 1,620 kHz (9 kHz step)
- JAPAN
  FM : 76 ~ 90 MHz (100 kHz step)
  AM : 522 ~ 1,629 kHz (9 kHz step)
- Russia (OIRT)
  FM : 65.0 ~ 74.0 MHz (30 kHz step)
  AM : 522 ~ 1,602 kHz (9 kHz step)

■ BLUETOOTH

(1) Pairing/Connecting your device

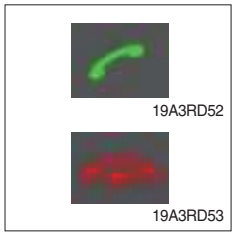


① Press button for 2 seconds. The Bluetooth icon on the screen starts blinking for 120 seconds .
[The Bluetooth device is visible at this point]
② Turn on your phone's Bluetooth
③ Go to your phone's Bluetooth Settings page
④ Look for a new Bluetooth device
⑤ Select [HYUNDAI] from the list of Bluetooth names.
⑥ When pairing is completed, the fixed Bluetooth icon will be displayed on the screen.

(2) Answering a call

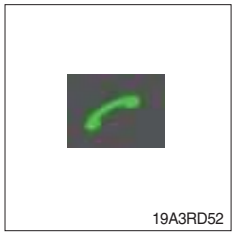
※ When a call comes in, the audio source is muted, and display the call information with ring tone.

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



① To answer a call, press the button or to reject a call press and hold the button.
- When a call comes in, the audio source is muted.
- When a call is ended, this unit returns to the previous state media playback.

(3) Private calls



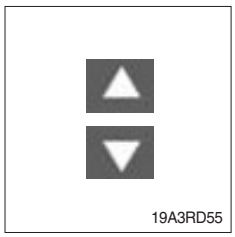
During the call, you can do this by pressing button to switch the sound output between the phone and the car speakers.

■ RADIO

(1) Tuning in a radio station

① Press the RADIO/AST button repeatedly to enter the radio band in order of FM1, FM2, FMA, AM1, AMA.

You can select the FM1, FM2, FMA or AM1, AMA radio band. While the Auto Store stations (AST) are stored, you can select the AMA or FMA band by additional. The previously chosen broadcasting station will be received.



② Press the TUNE/TRACK UP & DOWN button to select the station. During the FM reception, the Stereo [ST] indicator is on.

(2) Saving radio stations manually (Long Press : More than 2 seconds)

※ You can save up to 6 preset channels each for FM1, FM2, AM1 band. If change the stations while driving, use preset button to prevent accidents.

① Press RADIO/AST button repeatedly to select the band.
② After selecting the frequency, press and hold the PRESET [1 DSP] ~ [6 D+] button.
③ The frequency is saved to the selected preset button.
· A total of 18 frequencies with 6 preset frequencies each for FM1/ FM2/AM1 modes can be saved.

(3) Saving radio stations automatically (Short Press)

※ You can save up to 6 preset channels automatically each for FMA and AMA band.

① Press the RADIO/AST button repeatedly to enter the radio band.
· The previously chosen broadcasting station will be received.

② Press and hold the RADIO/AST button to automatically save receivable frequencies to preset button.
· Up to 6 stations can be stored in each of the FMA and AMA band.

(4) Listening to a preset station

① Press the RADIO/AST button repeatedly to enter the radio band.
- You can select the FM1, FM2, FMA or AM1, AMA radio band. While the Auto Store stations (AST) are stored, you can select the AMA or FMA band by additional.
- The previously chosen broadcasting station will be received.

② Press the PRESET [1 DSP] ~ [6 D+] button.
- From the 6 presets, select the frequency you want to listen to.

■ USB PLAYER

(1) Playing an USB device

① Open the cover, plug the USB device (included MP3/WMA media file) to the USB port.

Once a USB is connected, USB will automatically start playing from the first file within the USB.

If a previously played USB is reconnected, then the file after the most recently played file is played.

If a different USB is connected or the file information within the USB was changed, then the USB will start playing from the first song within the USB.

② When an USB device to be played is already connected, press the MEDIA/SET button to play USB device.

The previously selected file is played.

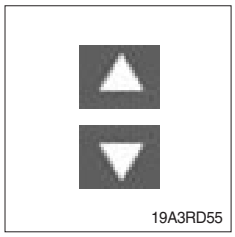
③ While playing, press the Volume Knob to pause the file.

(2) Changing the song information

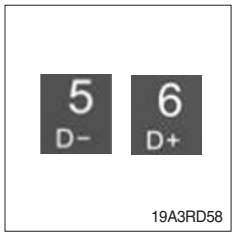
① Press the [1 DSP] button repeatedly to display information about the file being played.

② The information displayed includes the file name, playing time, ID3 Tag or folder name information saved with the song.

(3) Controlling the playback



① While playing, Press the Track up and Track down button to move to the previous or next track.



② Press the [5 D-] or [6 D+] button to moves to the previous or next folder.
[5 D-] press : move to previous folder.
[6 D+] press : move to next folder.

③ While playing, press the [1 DSP] button to pause the track.
Press the button again to play the current track.

(4) Change the playback mode

① Press the [3 RPT] button to select the Repeat playback mode.
② On : The current file plays repeatedly.
③ On : The current folder plays repeatedly.
④ Off : Cancels repeat playback.

① Press the [4 RDM] button to select the Random playback mode.
② On : All files of current folder play in random order.
③ On : All files of USB device play in random order.
④ Off : Cancels random playback.

(5) Handling precautions for USB device

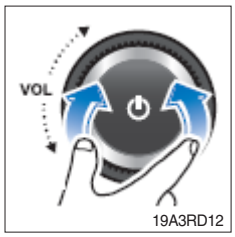
① The amount of time required to recognize the external USB device may differ depending on the type, size, or file formats stored on the USB. Such differences in the required time are not indications of malfunction. Please wait the period of time required to recognize the device.

② The device may not recognize the USB device if separately purchased USB hubs and extension cables are being used.

③ The device may not support normal operation when using formats such as HDD Type, CF, or SD Memory.

■ AUX PLAYER

※ By connecting an optional portable audio device to the AUX input jack (stereo 3.5 mm) on the unit and then simply selecting the source, you can listen on your car speakers.



① Turn the VOLUME dial left to decrease the volume level.
- The AUX volume can also be controlled separately through the connected device.

② Turn the external audio equipment off. Open the cover, connect the audio output of the external audio equipment to AUX input terminal on the unit.

③ Turn the external audio equipment on. Start playback of the external audio equipment at a moderate volume.

④ Press the MEDIA/SET button repeatedly to select the AUX function.

⑤ Set your usual listening volume by turn the VOLUME dial left/right on the unit.
- Once the connector is disconnected, the previous mode will be restored.
- AUX mode can be used only when an external audio player has been connected.

1. INSTRUCTION FOR NEW MACHINE

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

2) Operate according to the 3 steps and avoid excessive operation for the initial 100 hours.

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

※ **Excessive operation may deteriorate the performance of the 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.

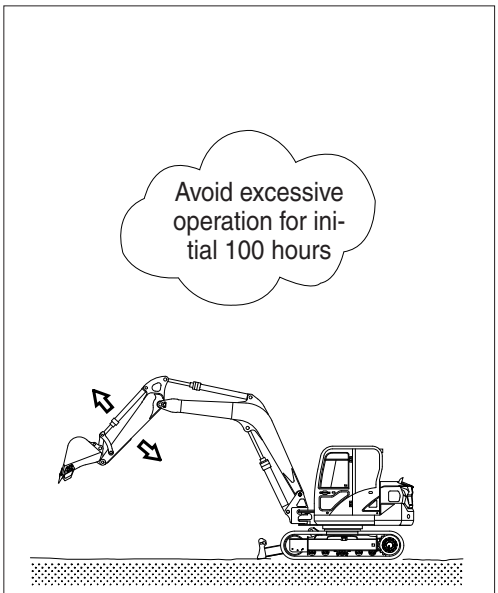
(4) Warm up the machine fully before operating.

(5) Check all gauges occasionally during the operation.

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

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

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



87A4OP01

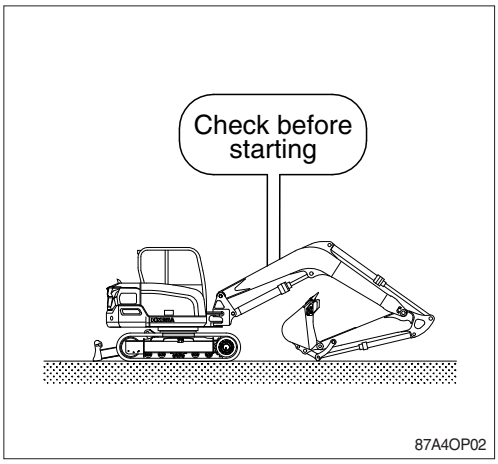
2. CHECK BEFORE STARTING THE ENGINE

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.



87A4OP02

3. STARTING AND STOPPING THE ENGINE

1) CHECK INDICATOR LIGHTS

(1) Confirm all operating lever is on the neutral position.

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

① If all the lamps light up, buzzer will sound for 6 seconds.

② Only below lamps will light up and all the other lights will go OFF after 2 seconds.

· Battery charging warning lamp

· Engine oil pressure warning lamp

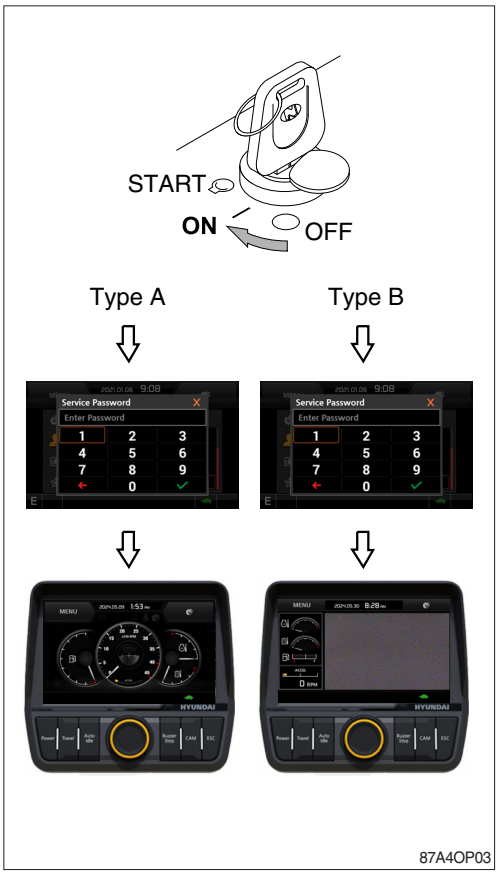
③ The preheat pilot lamp will light up when the coolant temperature is below 10 ℃ (50 °F).

④ The warming up pilot lamp will light up when the coolant temperature is below 30 ℃ (86 °F).

※ If the ESL function is set to the Enable, 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 page 3-30 for the ESL function.



87A4OP03

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.

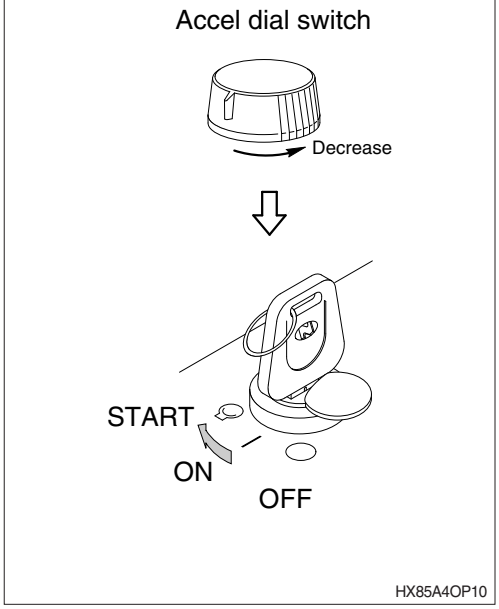
(1) Turn the multimodal dial to low idle position.

(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.



HX85A4OP10

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 2-61.**

※ **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 multimodal dial to low idle position.

(3) Turn the starting switch to the ON position, and wait 1~2 minutes. More time might be required, it depends on the ambient temperature.

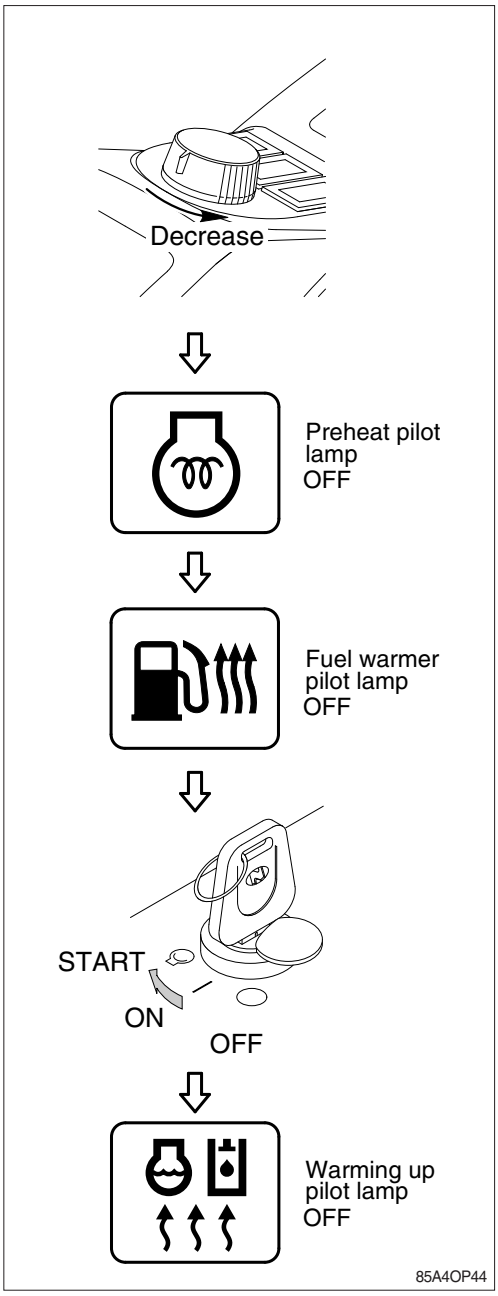
(4) Wait for five minutes to warm up the engine after the preheating pilot lamp truns off, and then turn the starting switch to the START position to start the engine.

※ **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 ℃ (86 ℉) 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 all the warning lamps turned OFF (1)?

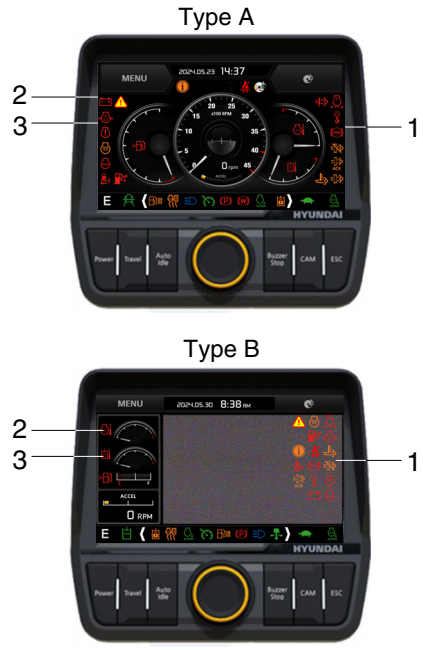
(4) Are the indicator of water temperature gauge (2) and hydraulic temperature gauge (3) in the operating range?

(5) 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.**



87A4OP05

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.

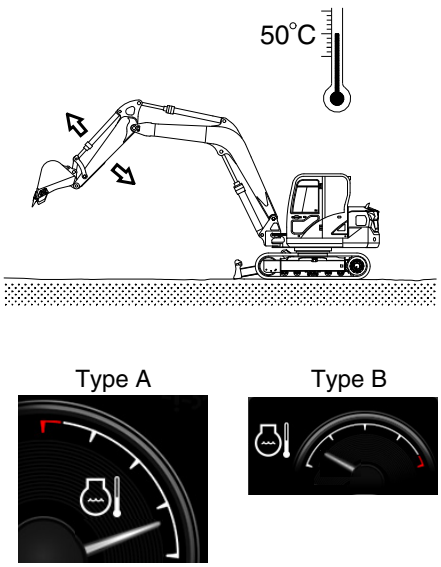
※ **Do not operate anything except bucket lever.**

(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.**



87A4OP06

6) TO STOP THE ENGINE

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

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

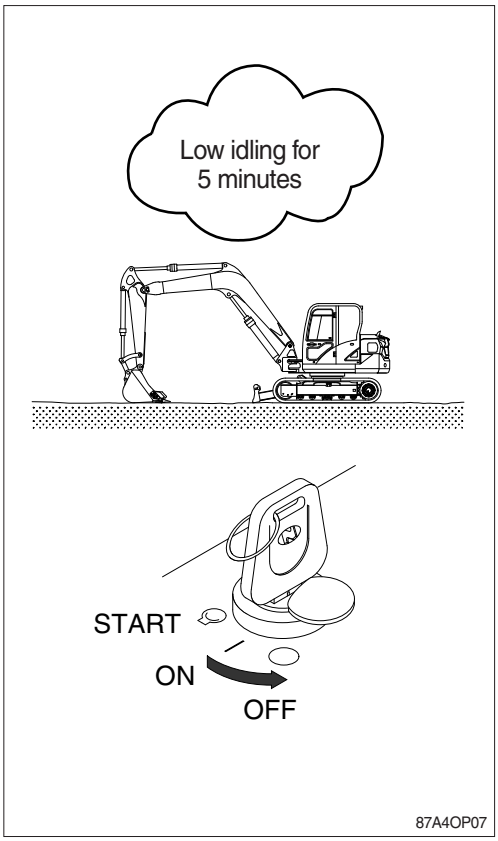
(1) Lower the bucket to the ground then put all the levers in the neutral position.

(2) Run the engine at low idle 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 the safety knob.

(5) Lock the cab door.



4. OPERATION OF WORKING DEVICE

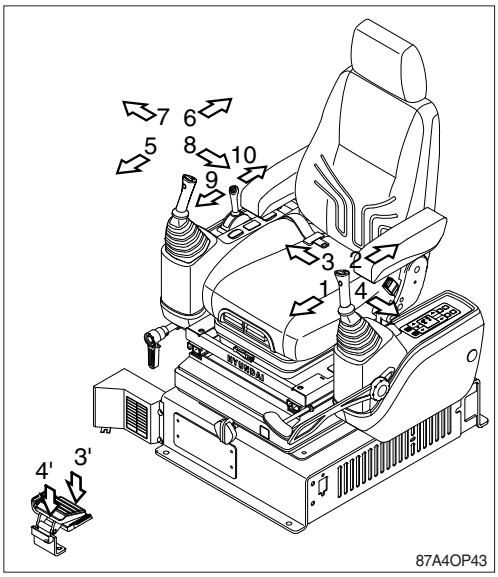
※ Confirm the operation of control lever and working device.

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.



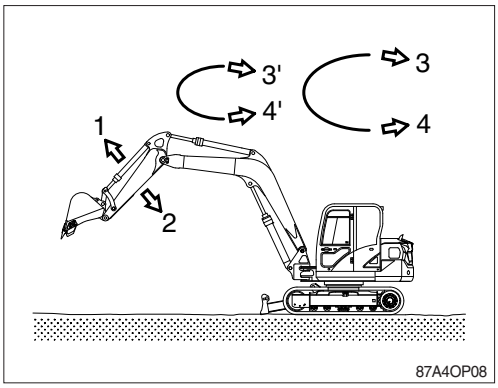
87A4OP43

※ Left control lever

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

※ Boom swing

3' Boom swing right
4' Boom swing left



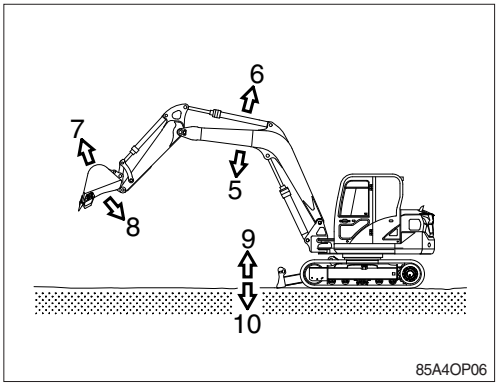
87A4OP08

※ 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



85A4OP06

5. TRAVELING OF THE MACHINE

1) BASIC OPERATION

(1) Traveling position

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

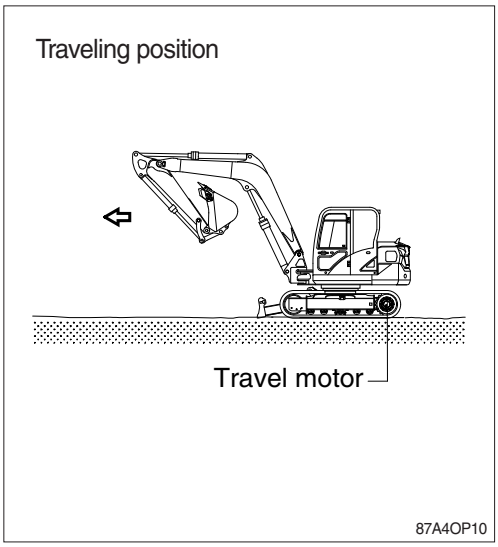
⚠ Be careful as the traveling direction will be the opposite when the machine is rotated 180˚.

(2) Traveling operation

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

※ Do not travel continuously for a long time.

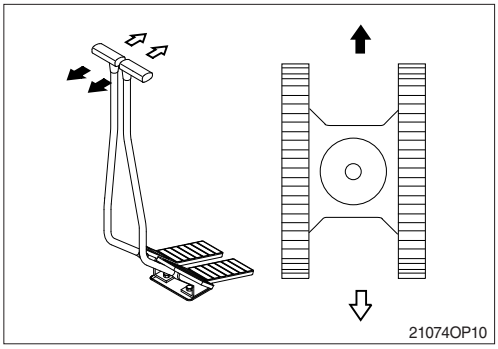
※ Reduce the engine speed and travel at a low speed when traveling on uneven ground.



(3) Forward and backward traveling

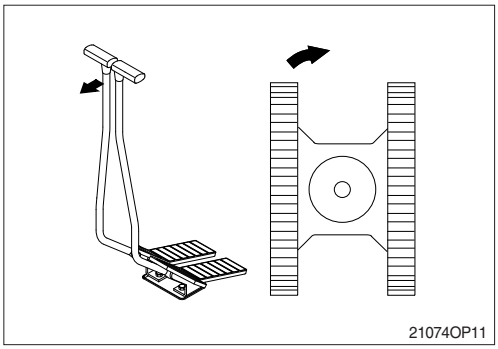
When the left and right travel levers or pedals are pushed at the same time, the machine will travel forward or backward depending on your selection.

※ 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.



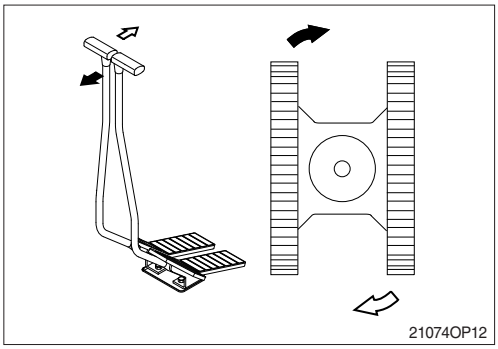
(4) Pivot turning

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.

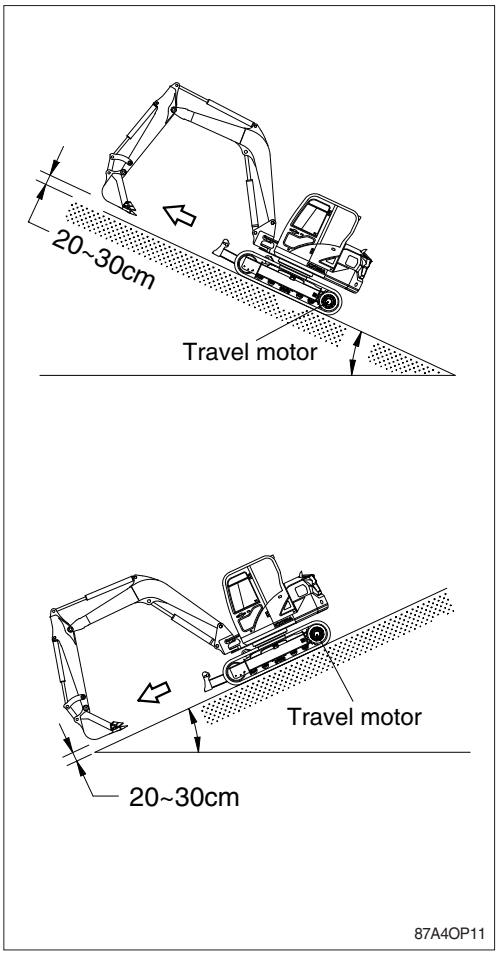
(3) If the machine starts to slide or loses stability, lower the bucket immediately as it will help slow or stop the machine.

(4) When parking on a slope, use the bucket as a brake.

※ 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 (turtle mark) while traveling on a slope.



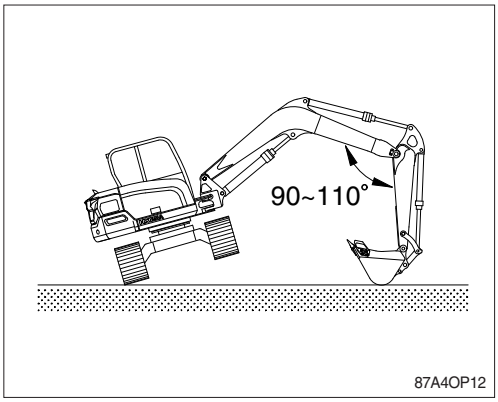
3) TRAVELING ON SOFT GROUND

※ 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

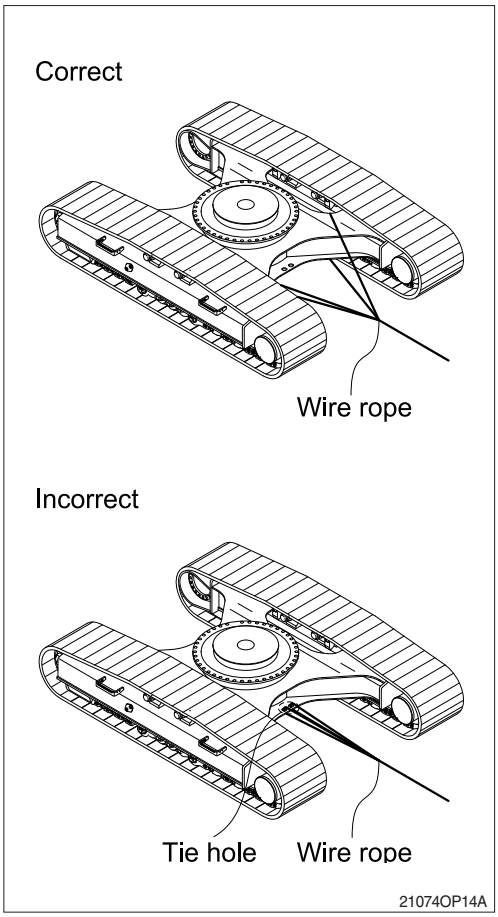
Tow the machine as follows when it can not move on its own.

(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.

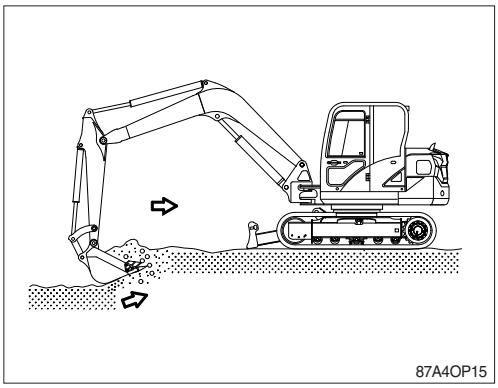
※ **Never tow the machine using only the tie hole, because this may break.**

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

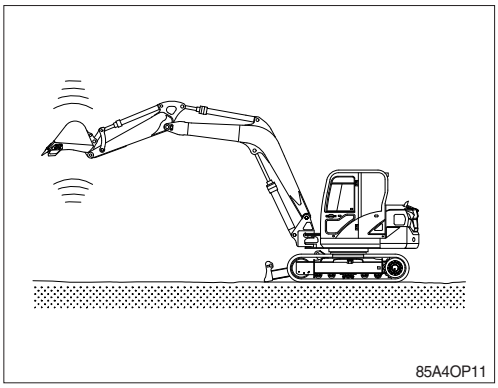


6. EFFICIENT WORKING METHOD

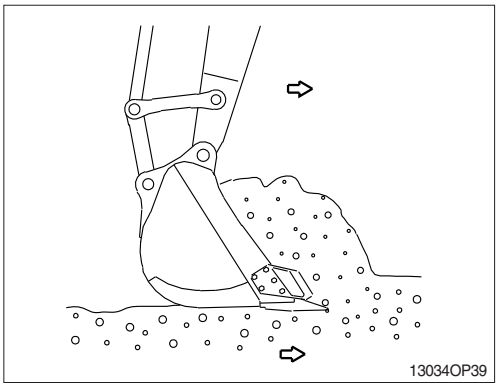
1) Do the digging work by arm.
   Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.



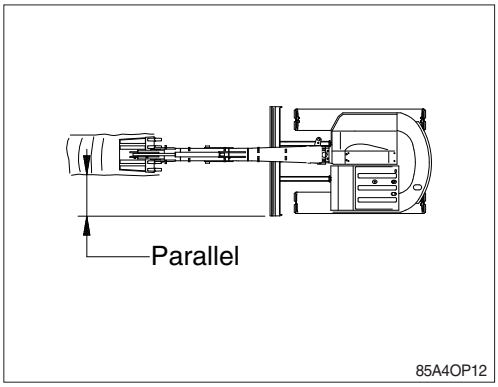
2) When lowering and raising the boom operate softly for the beginning and the end.
   In particularly, sudden stops while lowering the boom may cause damage to the machine.



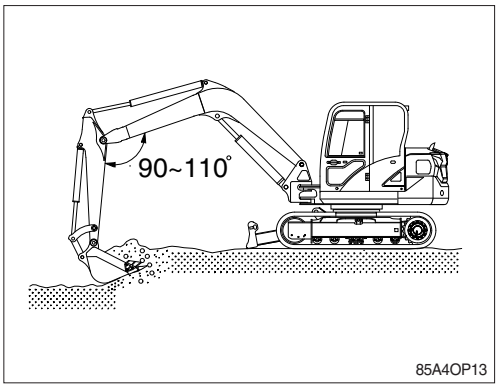
3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



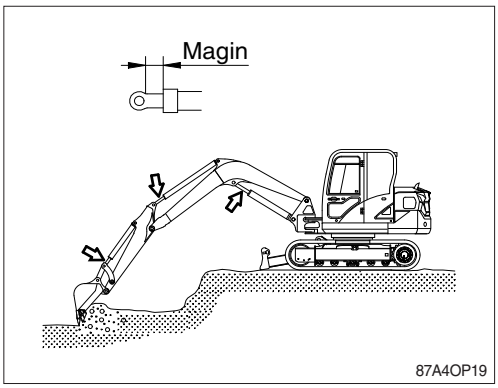
4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



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

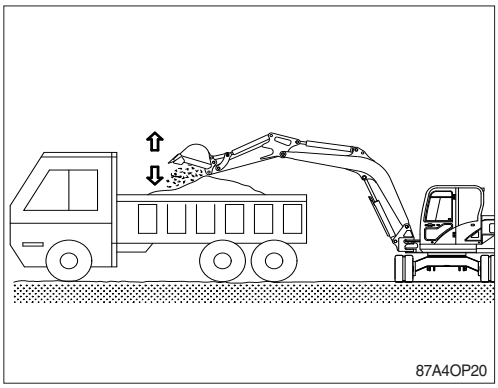


6) Leave a small margin of cylinder stroke to prevent damage of cylinder when working with the machine.

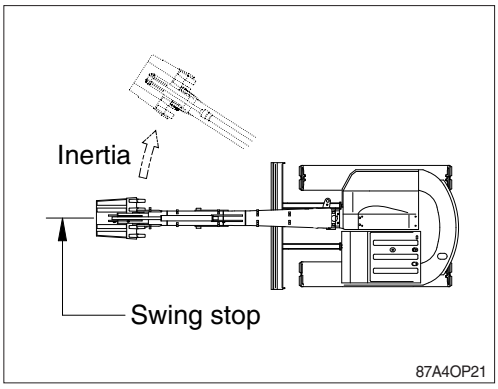


7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

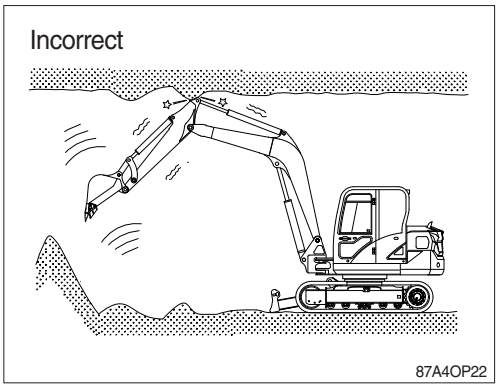
※ **Do not use the impact of bucket tooth when dumping.**



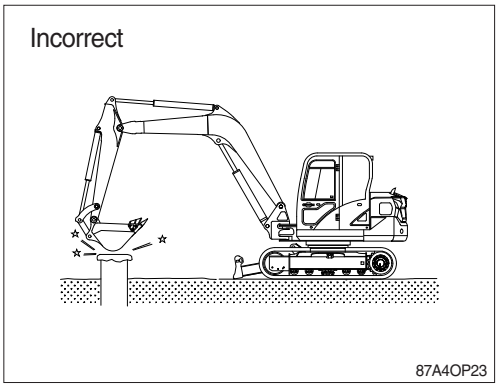
8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



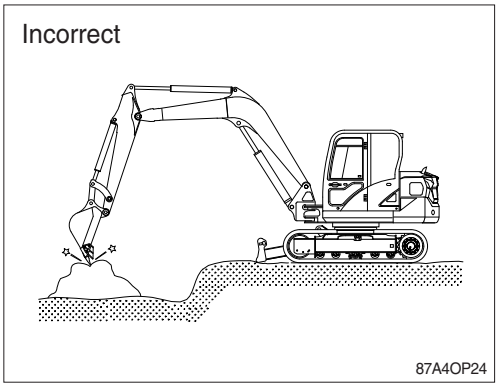
9) Do not use the dropping force of the work equipment for digging.
The machine can be damaged by the impact.



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



12) NEVER CARRY OUT EXCESSIVE OPERATIONS

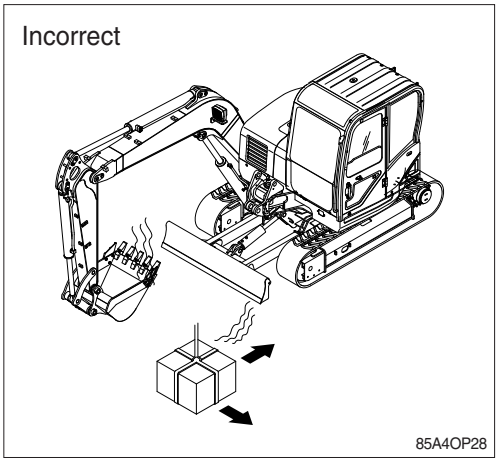
Operation exceeding machine performance may result in accident or failure, causing serious injury or death.

Carry out lifting operation within specified load limit.

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

Never travel while carrying a load.

If you need an overload warning device installed for object handling procedure, please contact your local HD Hyundai Construction Equipment distributor.



13) BUCKET WITH HOOK

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

The following operations are prohibited.

- Lifting loads with a wire rope fitted around the bucket teeth.
- Lifting loads with the wire rope wrapped directly around the boom or arm.

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

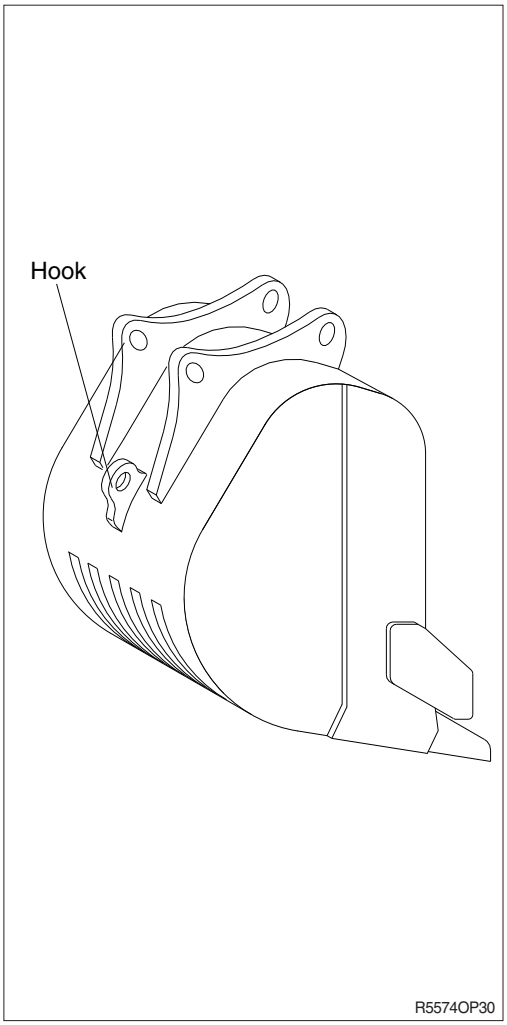
When performing lifting operation, never raise or lower a person.

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

Before performing lifting operation, designate an operation supervisor.
Always execute operation according to their instructions.

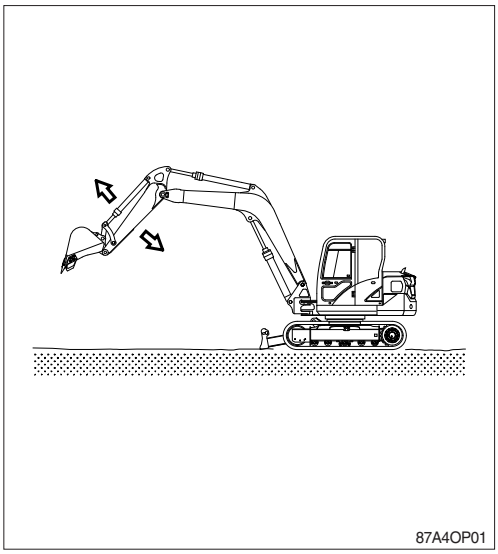
- Execute operating methods and procedures under their direction.
- Select a person responsible for signaling. Operate only on signals given by such person.

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 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.

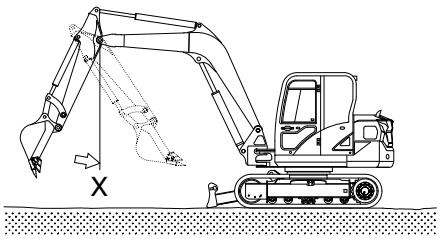
(2) Loosen the track tension slightly when working in such areas.

(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 started swinging or stopped, a noise near the swing motor may be heard. The noise is generated when the brake valve relieves.



87A4OP25

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 knob is the in the UNLOCK position. After the engine is stopped, set the safety knob to the LOCK position.

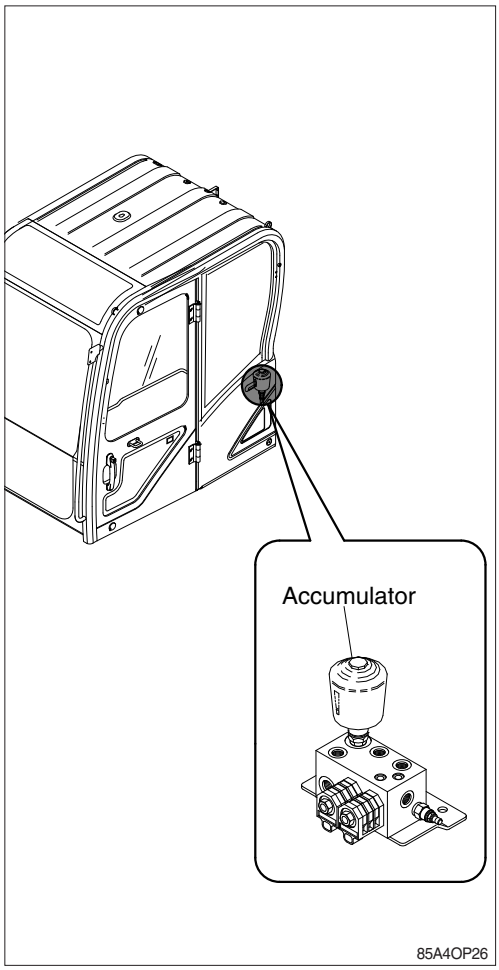
⚠ **Be sure no one is under or near the attachment before lowering the boom. Failure to comply could result in serious injury or death.**

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

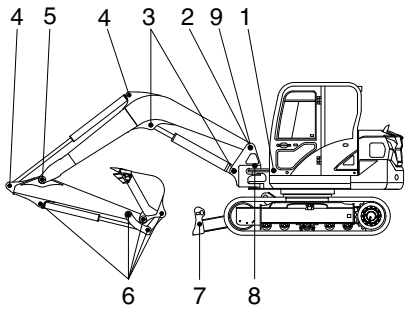
(1) Cleaning the machine

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. Apply an anticorrosive lubricant on the exposed part of piston rod of cylinder and in places where the machine rusts easily.**



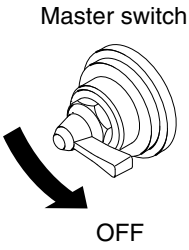
1 Lubricating manifold (2EA)
2 Boom connection pin (2EA)
3 Boom cylinder pin (2EA)
4 Arm cylinder pin (2EA)
5 Boom and arm connection pin (1EA)
6 Arm and bucket (7EA)
7 Dozer blade connection pin (4EA)
7 Angle dozer blade connection pin (7EA)
8 Boom swing post (3EA)
9 Boom rear bearing center (1EA)

87A4OP28

(3) Master switch

Turn OFF the master switch mounted on the right side of the engine room.

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

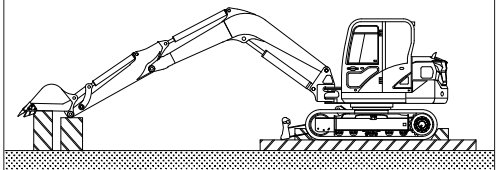


80CR94OP27

(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.**



87A4OP35

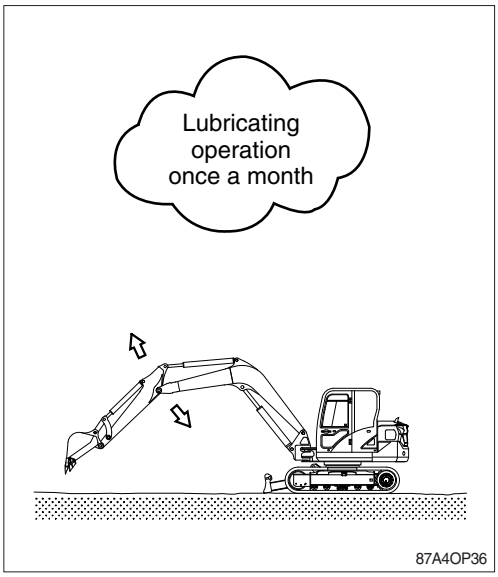
2) DURING STORAGE

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.

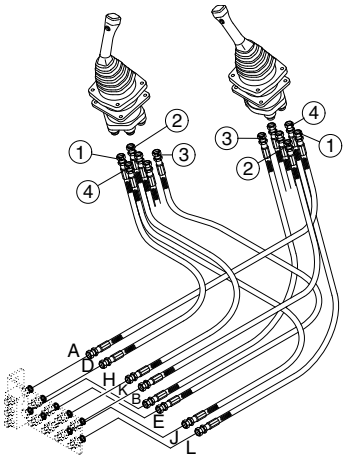
※ Remove the drain port plug and drain the water until the gear oil comes out and then tighten the drain plug.

※ Refer to chapter 6, Maintenance 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

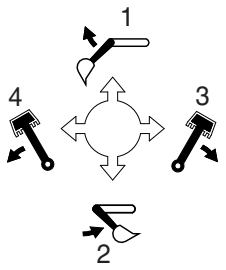
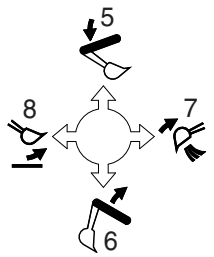
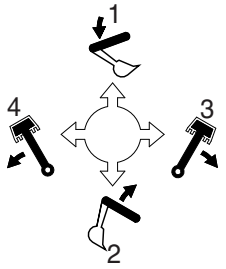
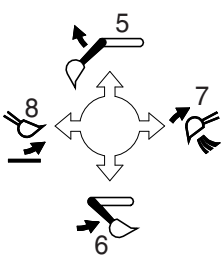
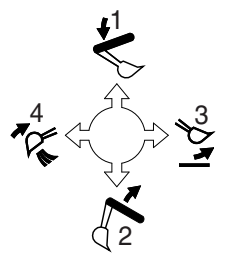
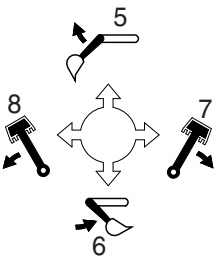
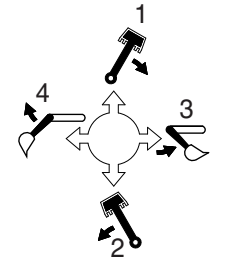
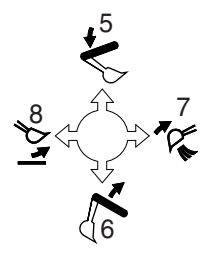
1) PATTERN CHANGE VALVE NOT INSTALLED (standard)



87A4OP37

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

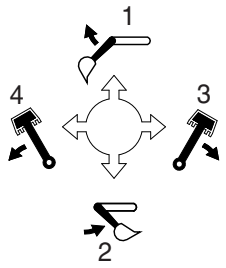
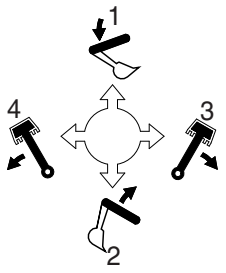
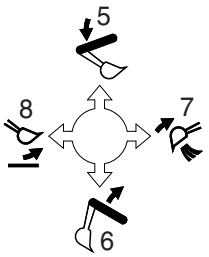
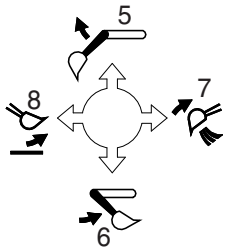
※ The hose modification works must be carried out between RCV lever and terminal block (Not between terminal block and MCV).

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

2) PATTERN CHANGE SOLENOID VALVE INSTALL (option)

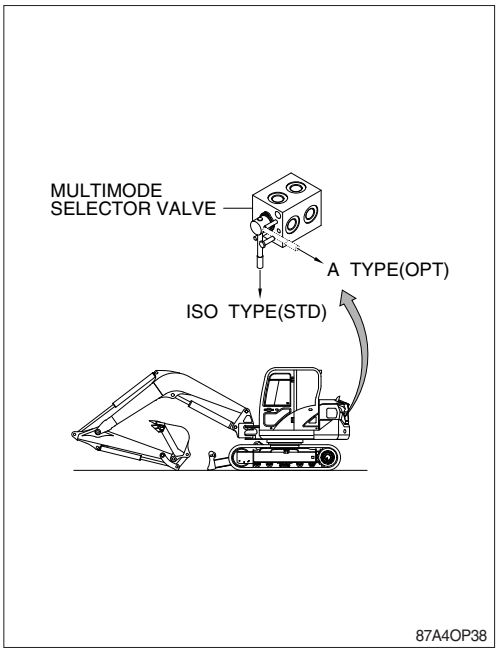
※ If the machine is equipped with the pattern change solenoid valve, the machine operation pattern can be easily changed.

※ 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 pattern change switch.

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



(2) Change of operating pattern

The machine control pattern is changed as below.

- Position ① : ISO type
- Position ② : A type

※ Refer to the page 3-44 for the switch.

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.

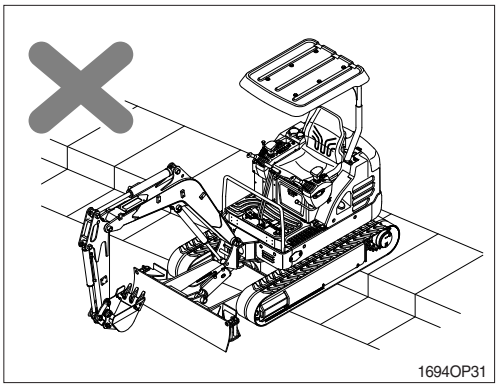
(12) Use the rubber tracks between -25°C to +55°C (-13°F to +131°F) because of the physical characteristics of rubber.

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

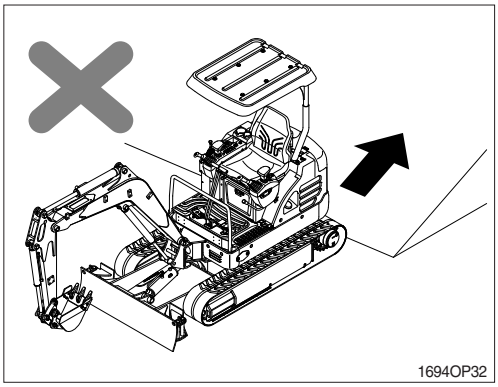
5) BE CAREFUL NOT TO COME OFF THE RUBBER TRACKS

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.

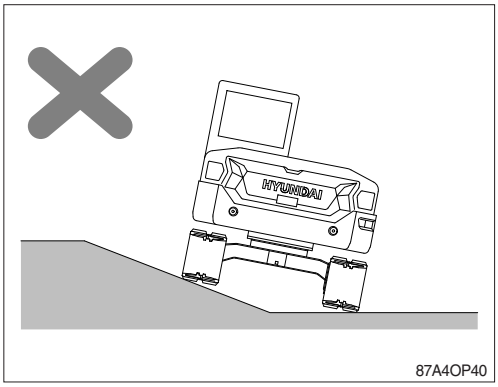
(1) Do not steer the machine at an angle other than 90 degrees across a large level gap created by a curbstone or a rock [approximately more than 20 cm (8")]. Run over a level gap at a right angle only to prevent the tracks from coming off.


1694OP31

(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.

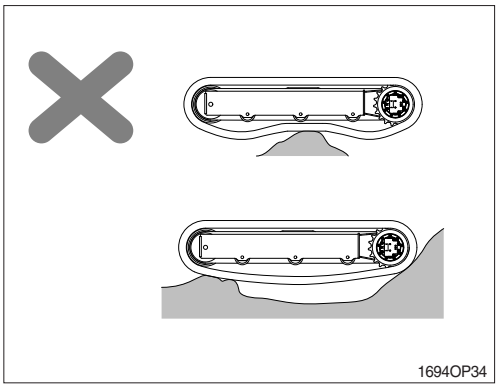

1694OP32

(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.

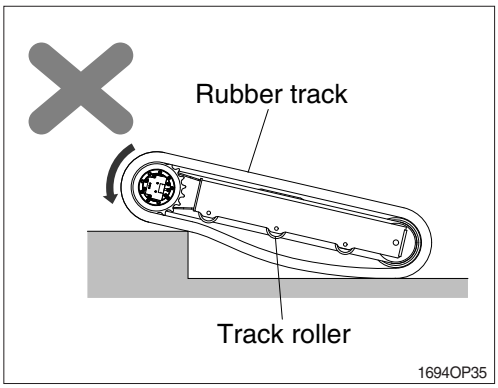


87A4OP40

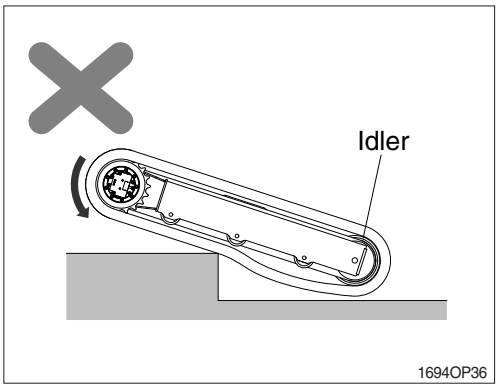
(4) The three cases illustrated above are those which could cause the rubber tracks to loosen. In addition, do not subject machine to such ground conditions as are illustrated in the figure at the right.



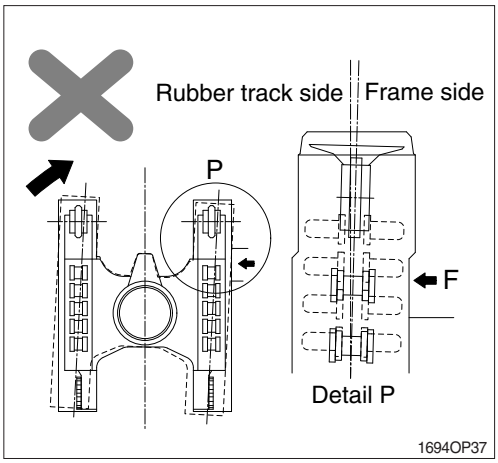
(5) **HOW THE RUBBER TRACKS COME OFF**
When running over a level gap, a clearance is created between the tracks and the track rollers. At this point, the tracks tend to come off.



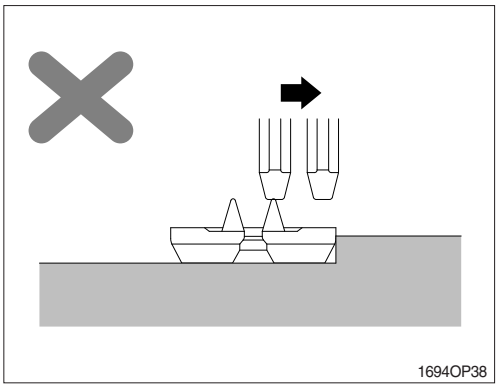
(6) If the machine is traveling in reverse, clearance may also be created between the track rollers and the rubber tracks, and between the idlers and the rubber tracks, causing the rubber tracks to come off.



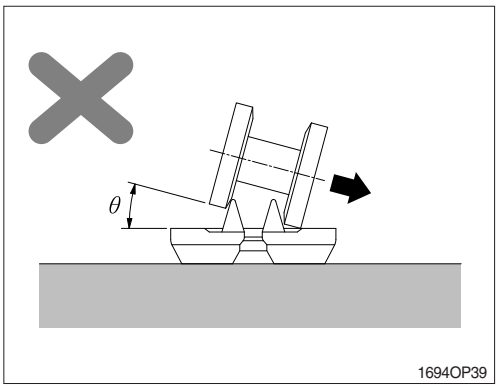
(7) Other situations to be avoided.
① When the machine changes the travel direction while the rubber tracks are blocked sideways by an obstacle or the like.
② When the idler and the track rollers are misaligned from the core metal, due to rubber track misalignment.



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

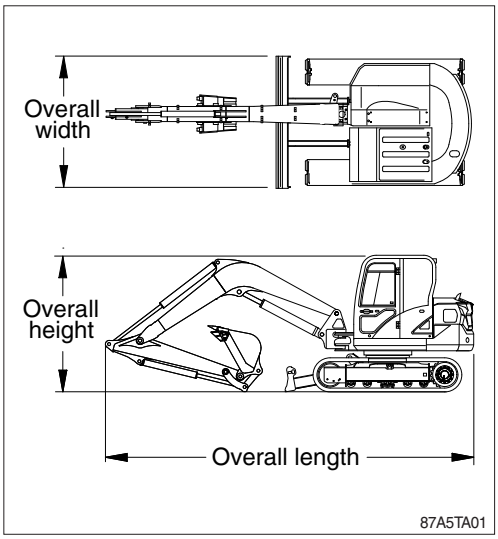
1) When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc.

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.

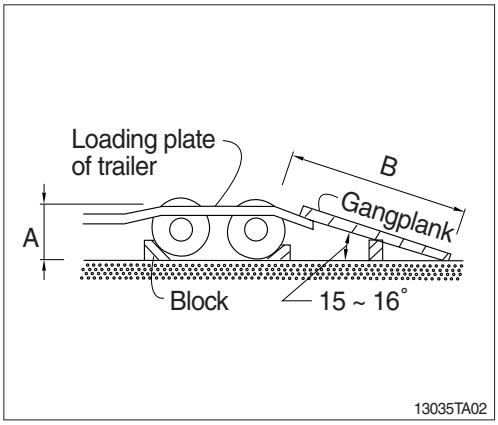
4) Get permission from the related authority if necessary.

5) Prepare suitable capacity of trailer to support the machine.



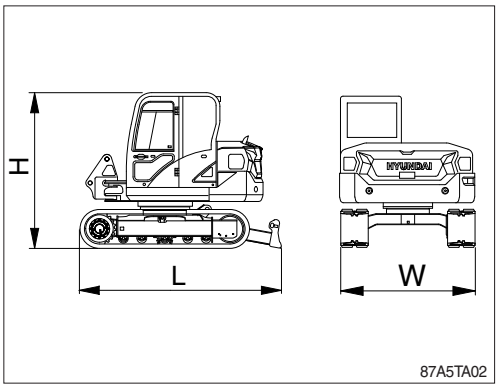
6) Prepare gangplank for safe loading referring to the below table and illustration.

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)	3605 (11' 10")
H	Height	mm (ft-in)	2585 (8' 6")
W	Width	mm (ft-in)	2300 (7' 7")
Wt	Weight	kg (lb)	7410 (16340)

※ With rubber for rail interlocking and 1000 kg (2205 lb) cast type counterweight

(2) Rubber track

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3650 (12' 0")
H	Height	mm (ft-in)	2585 (8' 6")
W	Width	mm (ft-in)	2300 (7' 7")
Wt	Weight	kg (lb)	7555 (16660)

※ With rubber for rail interlocking and 1150 kg (2535 lb) add counterweight

(3) Rubber track

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3680 (12' 1")
H	Height	mm (ft-in)	2585 (8' 6")
W	Width	mm (ft-in)	2300 (7' 7")
Wt	Weight	kg (lb)	7655 (16880)

※ With rubber for rail interlocking and 1250 kg (2756 lb) cast add increased counterweight

(4) Steel track

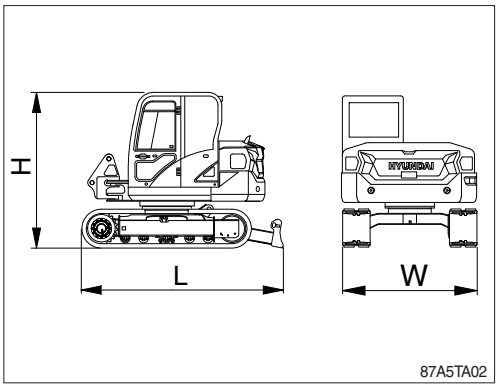
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3605 (11' 10")
H	Height	mm (ft-in)	2580 (8' 6")
W	Width	mm (ft-in)	2300 (7' 7")
Wt	Weight	kg (lb)	7445 (16410)

※ With triple for mini and 1000 kg (2205 lb) cast type counterweight

(5) Steel track

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3650 (12' 0")
H	Height	mm (ft-in)	2580 (8' 6")
W	Width	mm (ft-in)	2300 (7' 7")
Wt	Weight	kg (lb)	7590 (16730)

※ With triple for mini and 1150 kg (2535 lb) add counterweight



(6) Steel track

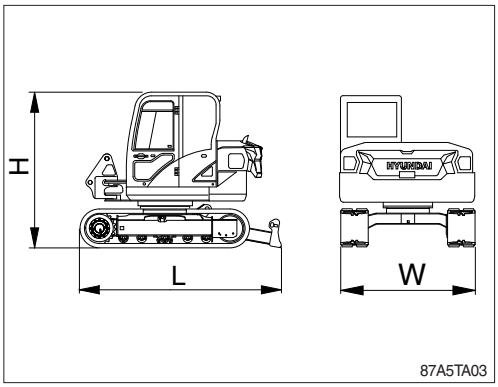
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3680 (12' 1")
H	Height	mm (ft-in)	2580 (8' 6")
W	Width	mm (ft-in)	2300 (7' 7")
Wt	Weight	kg (lb)	7690 (16950)

※ With triple for mini and and 1250 kg (2756 lb) cast add increased counterweight

(7) Rubber track

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3595 (11' 10")
H	Height	mm (ft-in)	2585 (8' 6")
W	Width	mm (ft-in)	2300 (7' 7")
Wt	Weight	kg (lb)	6400 (14110)

※ With rubber for rail interlocking and without counterweight

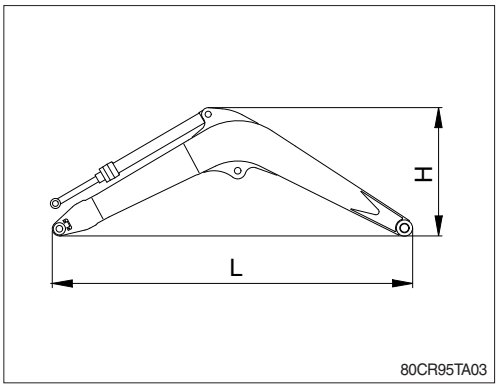


(8) Steel track

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3595 (11' 10")
H	Height	mm (ft-in)	2580 (8' 6")
W	Width	mm (ft-in)	2300 (7' 7")
Wt	Weight	kg (lb)	6435 (14190)

※ With triplr for mini and without counterweight

2) BOOM ASSEMBLY



(1) 3.55 m mono boom

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3703 (12' 2")
H	Height	mm (ft-in)	1200 (3' 11")
W	Width	mm (ft-in)	382 (1' 3")
Wt	Weight	kg (lb)	552 (1220)

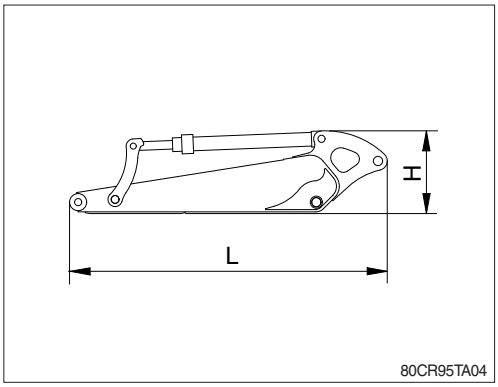
※ With arm cylinder (Including piping and pins).

(2) 3.92 m 2-piece boom

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	4067 (13' 4")
H	Height	mm (ft-in)	906 (3' 0")
W	Width	mm (ft-in)	575 (1' 11")
Wt	Weight	kg (lb)	704 (1550)

※ With arm cylinder (Including piping and pins).

3) ARM ASSEMBLY



(1) 1.75 m arm

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2295 (7' 6")
H	Height	mm (ft-in)	587 (1' 11")
W	Width	mm (ft-in)	349 (1' 2")
Wt	Weight	kg (lb)	322 (710)

※ With bucket cylinder (included linkage and pins)

(2) 2.10 m long arm

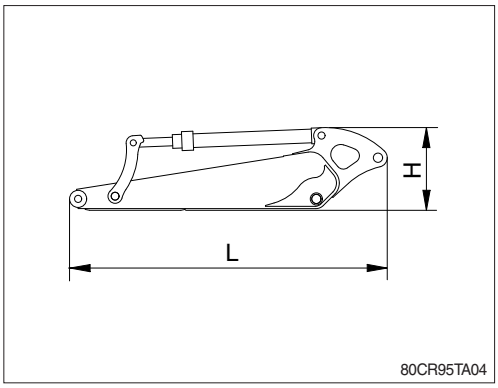
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2645 (8' 8")
H	Height	mm (ft-in)	552 (1' 10")
W	Width	mm (ft-in)	349 (1' 2")
Wt	Weight	kg (lb)	354 (780)

※ With bucket cylinder (included linkage and pins)

(3) 1.75 m thumb bracket arm

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2295 (7' 6")
H	Height	mm (ft-in)	685 (2' 3")
W	Width	mm (ft-in)	349 (1' 2")
Wt	Weight	kg (lb)	328 (720)

※ With bucket cylinder (included linkage and pins)



(4) 2.1 m thumb bracket long arm

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2645 (8' 8")
H	Height	mm (ft-in)	650 (2' 2")
W	Width	mm (ft-in)	349 (1' 2")
Wt	Weight	kg (lb)	359 (790)

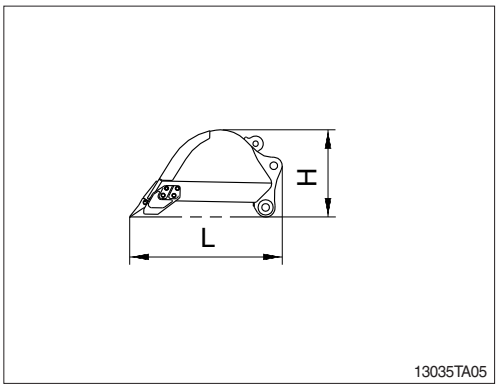
※ With bucket cylinder (included linkage and pins)

4) BUCKET ASSEMBLY

(1) 0.25 m³ general bucket

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1141 (3' 9")
H	Height	mm (ft-in)	616 (2' 0")
W	Width	mm (ft-in)	796 (2' 7")
Wt	Weight	kg (lb)	185 (410)

※ Including tooth and side cutters



(2) 0.28 m³ heavy duty bucket

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1115 (3' 8")
H	Height	mm (ft-in)	750 (2' 6")
W	Width	mm (ft-in)	830 (2' 9")
Wt	Weight	kg (lb)	248 (550)

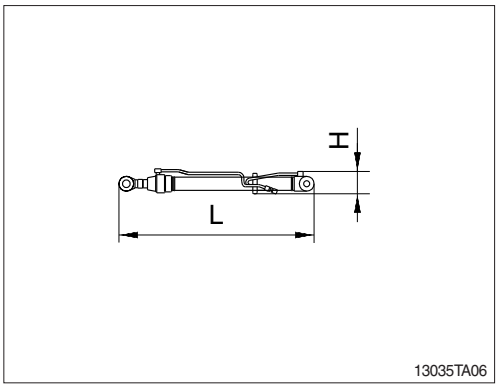
※ Including tooth and side cutters

5) BOOM CYLINDER

(1) Mono boom cylinder

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1498 (4' 11")
H	Height	mm (ft-in)	271 (0' 11")
W	Width	mm (ft-in)	234 (0' 9")
Wt	Weight	kg (lb)	115 (250)

※ Including piping.



(2) 2-piece boom cylinder

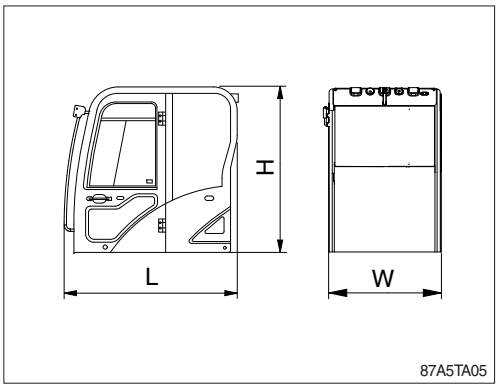
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1498 (4' 11")
H	Height	mm (ft-in)	271 (0' 11")
W	Width	mm (ft-in)	234 (0' 9")
Wt	Weight	kg (lb)	115 (250)

※ Including piping.

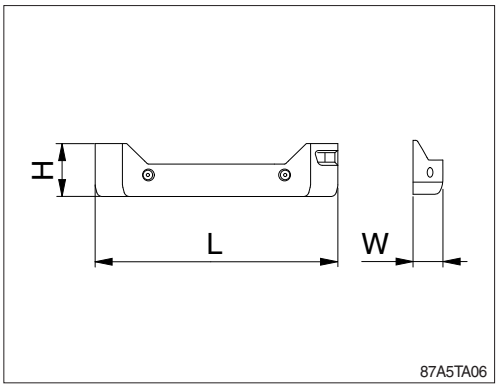
6) CAB ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1657 (5' 5") [1665 (5' 6")]
H	Height	mm (ft-in)	1576 (5' 2") [1640 (5' 5")]
W	Width	mm (ft-in)	1060 (3' 6") [1060 (3' 6")]
Wt	Weight	kg (lb)	360 (790) [450 (990)]

[ ] : with FOG GUARD



7) COUNTERWEIGHT



(1) 1000 kg (2205 lb) cast type counterweight

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2270 (7' 5")
H	Height	mm (ft-in)	496 (1' 8")
W	Width	mm (ft-in)	932 (3' 1")
Wt	Weight	kg (lb)	1000 (2200)

(2) 1150 kg (2535 lb) add counterweight

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2270 (7' 5")
H	Height	mm (ft-in)	496 (1' 8")
W	Width	mm (ft-in)	982 (3' 3")
Wt	Weight	kg (lb)	1150 (2540)

(3) 1250 kg (2756 lb) cast add increased counter-weight

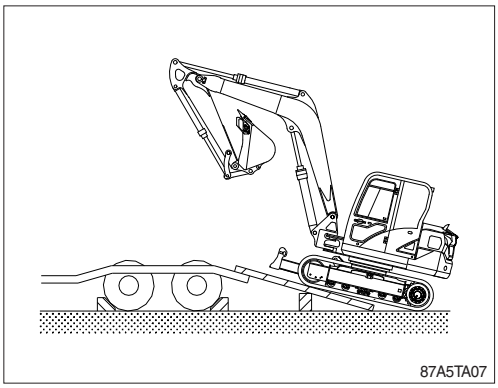
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2270 (7' 5")
H	Height	mm (ft-in)	496 (1' 8")
W	Width	mm (ft-in)	1007 (3' 4")
Wt	Weight	kg (lb)	1250 (2760)

3. LOADING THE MACHINE

1) Load and unload the machine on flat ground.

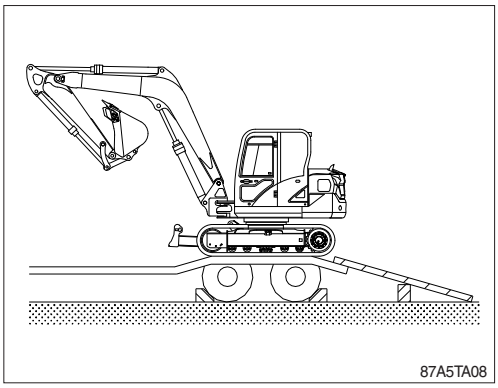
2) Use the gangplank with sufficient length, width, thickness and gradient.

3) Place the safety knob 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.


87A5TA07

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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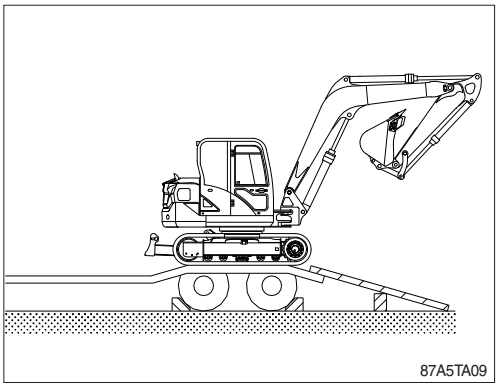
(2) Place the safety knob to the LOCK position (if equipped) after swinging the machine 180°.


87A5TA09

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

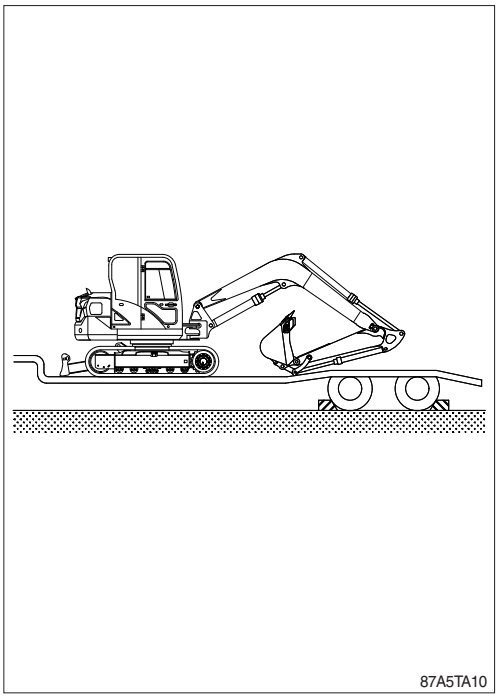
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

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

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

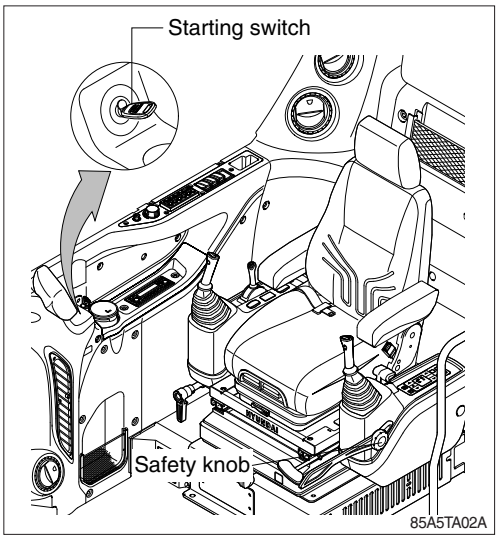
⚠ **Do not operate any other device when loading.**

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

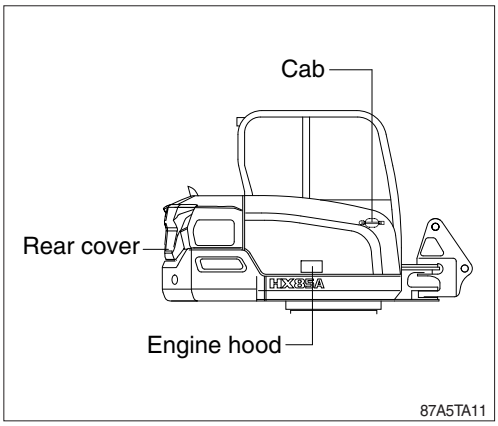

87A5TA10

4. FIXING THE MACHINE

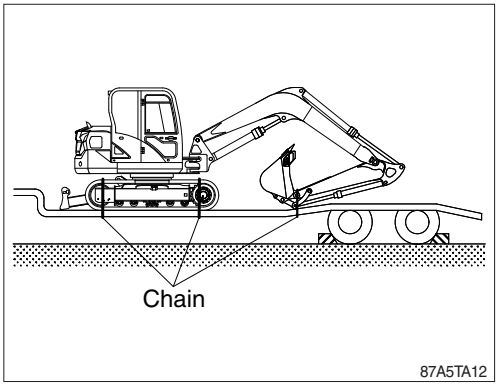
1) Place the swing lock lever on the LOCK position.
2) Lower down the working device on the loading plate of trailer.
3) Keep the safety knob in the LOCK position.
4) Turn OFF all the switches and remove the key.



5) Secure all locks.



6) 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.

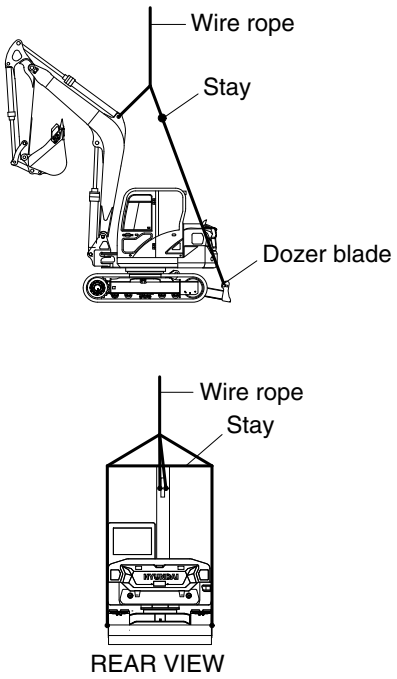
⚠ Make sure wire rope is proper size.

⚠ Ensure that lifting device is free form any damage and is approved for the weight being lifted and supported.

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

⚠ Do not load abruptly.

⚠ Keep area clear of any and all personnel.



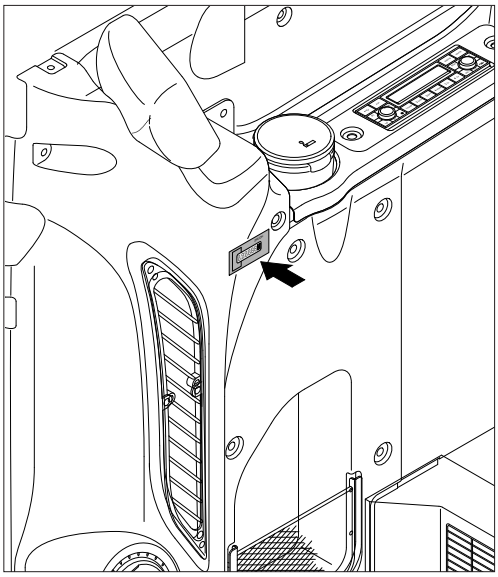
1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

(1) Inspect and service machine as described on page 6-10.

(2) Shorten intervals of inspection and service depending on site conditions. (such as dusty area, quarry, sea shore and etc.)

(3) Practice the entire related details at the same time when the service interval is doubled.
For example, in case of 100 hours, carry out all the maintenance「Each 100hours, each 50 hours and daily service」at the same time.



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2) PRECAUTION

(1) Do not perform maintenance on the machine until you have read the operator's manual and are familiar with the machine.

(2) Daily inspection should be performed according to section, Maintenance check list.

(3) Engine and hydraulic components have been preset from the factory.
Do not allow unauthorized personnel to reset them.

(4) Drain the used oil and coolant (always in separate containers). Handle and dispose of the waste per regulation of each province/country as well as any local laws.

⚠ Hot oil and hot components can cause serious injury or death. Do not allow hot oil or hot components to contact skin. Failure to comply may result in serious injury or death.

△ 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.

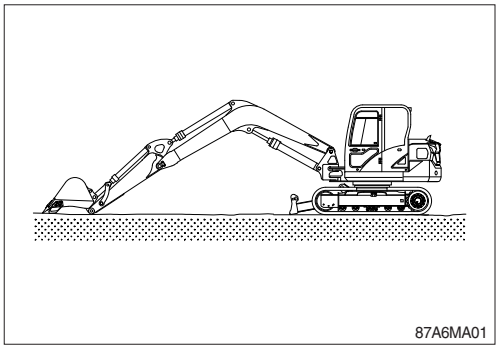
(10) For more detail information of maintenance, please contact your local HD Hyundai Construction Equipment dealer.

※ **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

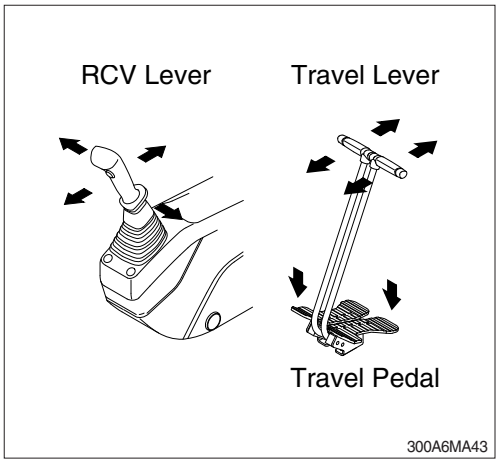
※ **Spewing of oil can cause an severe personal injury. Before you loosen hydraulic cap or any hydraulic line on the machine, always make sure machine of off, cooled down and that pressure is relived of the hydraulic system.**

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

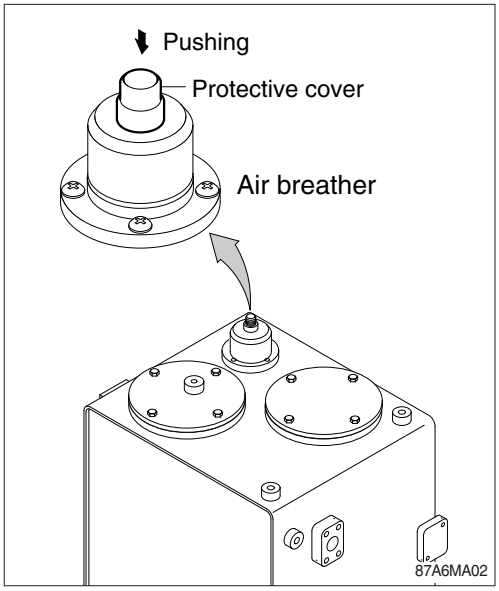


(2) Set the safety knob completely in the UNLOCK position. Refer to section Levers and pedals. Operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ **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.**



(3) Relieve the pressure in the tank by pushing the protective cover of the air breather.



5) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPES

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

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

(3) Use genuine parts.

(4) Do not install hose in a twisted, bent or crimped way.

(5) Always maintain the specified torque.

6) PERIODIC REPLACEMENT OF 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">Periodic replacement of 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="6">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="3">Working device</td><td>Boom cylinder line hose</td><td rowspan="3">Every
2 years</td></tr>
<tr><td>Arm cylinder line hose</td></tr>
<tr><td>Bucket cylinder line hose</td></tr>
</table>

※ Replace O-ring and gasket at the same time when replacing the hose.
Replace clamp at the same time if the hose clamp is cracked when checking and replacing the hose.

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 6 × 1.0	0.9 ~ 1.3	6.5 ~ 9.4	1.1 ~ 1.7	8.0 ~ 12.3
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.7 ~ 4.1	19.5 ~ 29.7
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60.0
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.0	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

(2) Fine thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8 × 1.0	2.2 ~ 3.4	15.9 ~ 24.6	3.0 ~ 4.4	21.7 ~ 31.8
M10 × 1.2	4.5 ~ 6.7	32.5 ~ 48.5	5.9 ~ 8.9	42.7 ~ 64.4
M12 × 1.25	7.8 ~ 11.6	56.4 ~ 83.9	10.6 ~ 16.0	76.7 ~ 116
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 131	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 195	26.6 ~ 36.0	192 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 391	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 516	70.7 ~ 95.7	511 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 665	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1339	182 ~ 248	1314 ~ 1796
M36 × 3.0	192 ~ 260	1390 ~ 1880	262 ~ 354	1894 ~ 2562
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

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	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

3) PIPE AND HOSE (ORFS TYPE)

Thread size (PF)	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	130.2
1-7/16-12	41	21	151.9
1-11/16-12	50	35	253.2

4) FITTING

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	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

5) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-bracket)	M10 × 1.5	6.5±0.7	47.0±5.1
2		Engine mounting bolt (bracket-frame)	M16 × 2.0	26.7±3.0	193±21.7
3		Radiator mounting bolt, nut	M16 × 2.0	29.7±4.5	215±32.5
4		Coupling mounting socket bolt	M14 × 2.0	14±1.0	101±7.2
5		Fuel tank mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
6	Hydraulic system	Main pump mounting bolt	M14 × 2.0	23.5±2.5	170±18.1
7		Main pump housing mounting bolt	M10 × 1.5	6.0±1.5	43.4±10.9
8		Main control valve mounting bolt	M10 × 1.5	6.9±1.5	49.9±10.9
9		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
10		Turning joint mounting bolt, nut	M12 × 1.75	12.8±3.0	92.6±21.7
11	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
12		Swing bearing upper mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
13		Swing bearing lower mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
14		Travel motor mounting bolt	M16 × 2.0	23±2.5	166±18.1
15	Under carriage	Sprocket mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
16		Upper roller mounting bolt, nut	M16 × 2.0	29.7±3.0	215±21.7
17		Lower roller mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
18		Track tension cylinder mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
19		Track shoe mounting bolt, nut	M14 × 1.5	25.5±2.5	184±18.1
20	Others	Counterweight mounting bolt	M27 × 3.0	135±15	976±108
21		Counterweight mounting bolt-add	M24 × 3.0	100±15	723±108
22		Cab mounting bolt, nut	M12 × 1.75	12.2±1.3	88.2±9.4
23		Operator's seat mounting bolt	M 8 × 1.25	1.17±0.5	8.5±3.6
24		Under cover mounting bolt	M10 × 1.5	6.9±1.5	49.9±10.9
25		Travel motor cover mounting bolt	M12 × 1.75	12.8±3.0	92.6±21.7

3. FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil	SAE 10W-30 (API CK-4)
Hydraulic oil	HD Hyundai Construction Equipment genuine long life (ISO VG46, VG68) Conventional (ISO VG15) HD Hyundai Construction Equipment Bio Hydraulic Oil (HBHO, ISO VG 46)
Swing and travel reduction gear	SAE 80W-90 (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2 (low sulfur fuel or ultra low sulfur fuel)
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50 % water.

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

- Low sulfur fuel : sulfur content $\leq$500 ppm
- Ultra low sulfur fuel : sulfur content $\leq$10 ppm

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-24
Hydraulic oil level	Check, Add	6-27
Engine oil level	Check, Add	6-17
Radiator coolant level	Check, Add	6-19
Control panel & pilot lamp	Check, Clean	-
★ Attachment pins	Lubricate	6-36
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		

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

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Water separator	Check, Drain	6-24
Fuel tank (water, sediment)	Drain	6-24
Swing gear & pinion	Lubricate	6-31
Track tension	Check, Adjust	6-33
Bucket linkage & blade pins	Lubricate	6-34
· Bucket cylinder rod end		
· Bucket + Arm connecting		
· Bucket control link + Arm		
· 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		
· Angle dozer cylinder head and rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Fan belt tension & damage	Check, Adjust	-
Boom swing cylinder	Check, Lubricate	6-31
Bolts & nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		

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) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-17, 18
Engine oil filter	Replace	6-17, 18
Fuel filter element	Replace	6-25
Hydraulic oil return filter	Replace	6-29
Pilot line filter element	Replace	6-30
Travel reduction gear oil	Change	6-32

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Fan belt tension & damage	Check, Adjust	-
Battery (voltage)	Check, Clean	6-37
Boom swing cylinder	Check, Lubricate	6-31
Aircon and heater outer filter	Check, Clean	6-40
Swing bearing grease	Lubricate	6-31
Attachment pin and bushing	Lubricate	6-36
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		
Bolts & nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
★Engine oil	Change	6-17, 18
★Engine oil filter	Replace	6-17, 18
Radiator and oil cooler fin	Check, clean	6-22
☆Air cleaner element (primary)	Check, clean	6-23
Fuel filter element	Replace	6-25
Water separator	Replace	6-24
Air compressor air filter	Check, Clean	-

★ If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.

☆ Clean the primary element only after 500 hours operation or when the air cleaner warning lamp blinks.
Replace primary element and safety element after 4 times cleanings of primary element.

8) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Hydraulic tank air breather element	Replace	6-30
Travel reduction gear oil	Change	6-32
Hydraulic oil return filter	Replace	6-29
Pilot line filter element	Replace	6-30

9) EVERY 1500 HOURS SERVICE

Check items	Service	Page
Crankcase breather system	Check, Replace	6-24

10) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Radiator coolant★1	Change	6-19, 20, 21
Hydraulic oil suction strainer	Check, Clean	6-29
Hydraulic oil★1	Change	6-28
HBHO★2	Change	6-28
Air compressor air filter	Replace	-
RCV lever	Lubricate	6-31
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

★1 Conventional

★2 If do not want to change HBHO (HD Hyundai Construction Equipment Bio Hydraulic Oil, ISO VG 46) every 2000 hours, contact HD Hyundai Construction Equipment dealer and ask about SAMPLING.

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

11) EVERY 3000 HOURS SERVICE

Check items	Service	Page
DPF (diesel particulate filter)	Clean	6-26

12) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil★3	Change	6-28

★3 HD Hyundai Construction Equipment genuine long life

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

13) EVERY 6000 HOURS SERVICE

Check items	Service	Page
Radiator coolant★3	Change	6-19, 20, 21

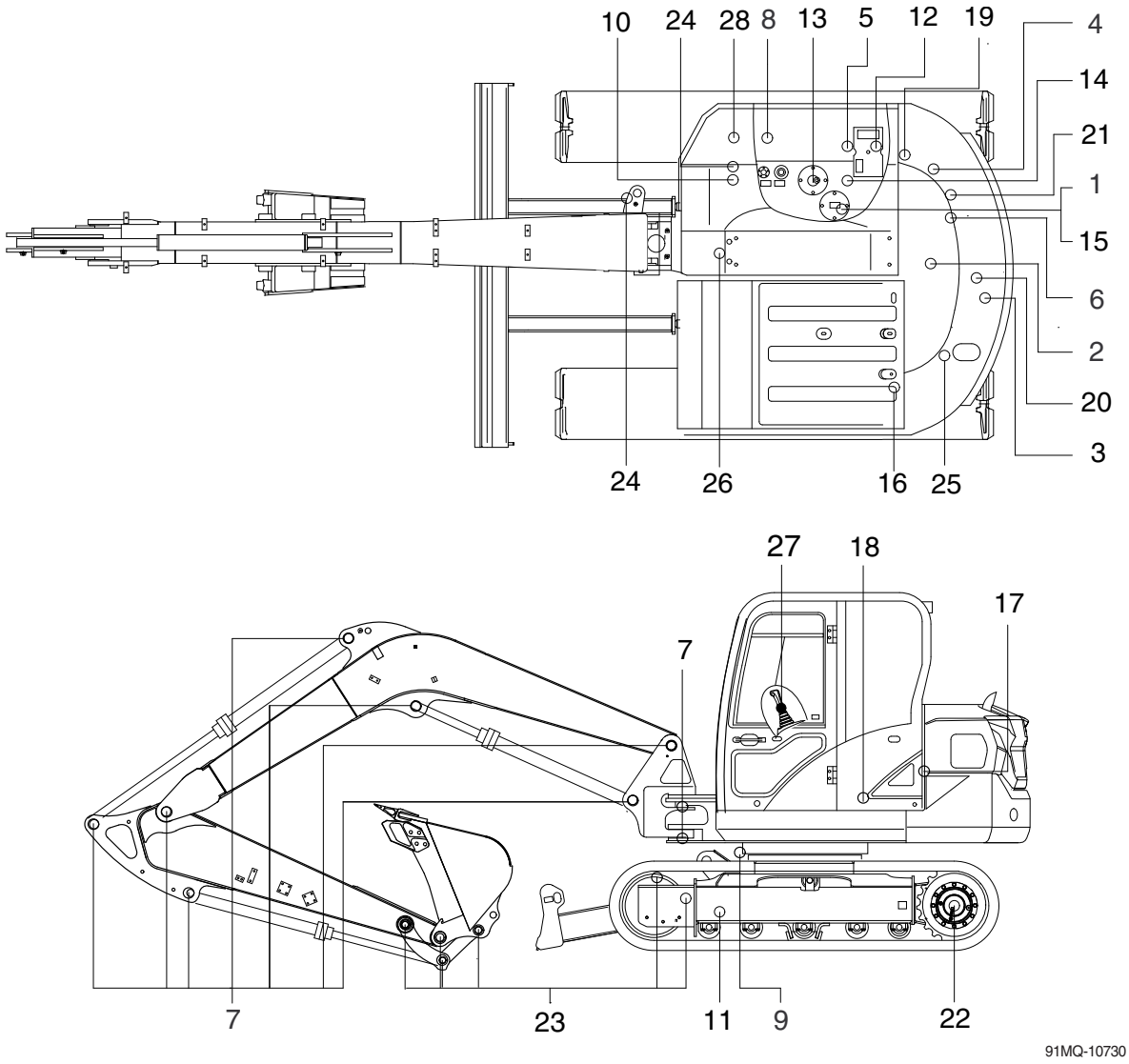
★3 HD Hyundai Construction Equipment genuine long life

14) 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
· Fuel filter element	Replace	6-25
Engine lubrication system		
· Engine oil	Change	6-17, 18
· Engine oil filter	Replace	6-17, 18
Engine cooling system		
· Radiator coolant	Add or Change	6-19, 20, 21
· Radiator	Clean or Flush	6-22
Engine air system		
· Air cleaner element (primary, safety)	Replace	6-23
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 tank air breather element	Replace	6-30
· Hydraulic oil suction strainer	Clean	6-29
Under carriage		
· Track tension	Check, Adjust	6-33
Bucket		
· Tooth	Replace	6-35
· Side cutter	Replace	6-34
· Linkage	Adjust	6-34
· Bucket assy	Replace	6-35
Aircon and heater		
· Outer filter	Clean, Replace	6-40
· Inner filter	Replace	6-40, 41
Others		
· DPF (diesel particulate filter)	Clean	6-26
· Air compressor air filter	Replace	-
· Fuel filler pump filter	Clean, Replace	6-26

5. MAINTENANCE CHART



Caution

1. Service intervals are based on the hour meter reading.
2. The number of each item shows the lubrication point on the machine.
3. Stop engine while filling oil and do not allow any open flames near the machine.
4. The service intervals in this sign cannot be fit for rough work condition.
5. Do not open the cap or drain plug while hot temperature of fluid to prevent unexpected spouting.

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	56 (14.8)	1
	2	Engine oil level	Check, Add	EO	10.5 (2.8)	1
	4	Radiator coolant	Check, Add	C	13 (3.4)	1

※ 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

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
Initial 50 Hours	6	Fan belt tension and damage	Check, Adjust	-	-	1
	24	Boom swing cylinder	Lubricate	PGL	-	2
50 Hours or weekly	5	Water separator	Check, Drain	-	-	1
	8	Fuel tank (water, sediment)	Check, Clean	-	-	1
	10	Swing gear & pinion	Check, Lubricate	PGL	-	1
	11	Track tension	Check, Adjust	PGL	-	2
	23	Bucket linkage & blade pins	Lubricate	PGL	-	9
		Bucket linkage & angle dozer pins	Lubricate	PGL	-	12
Initial 250 Hours	2	Engine oil	Change	EO	10.5 (2.8)	1
	3	Engine oil filter	Replace	-	-	1
	13	Hydraulic oil return filter	Replace	-	-	1
	16	Pilot line filter element	Replace	-	-	1
	20	Fuel filter element	Replace	-	-	1
	22	Travel reduction gear oil	Change	GO	1.1 (0.3)	2
250 Hours	6	Fan belt tension and damage	Check, Adjust	-	-	1
	7	Attachment pins	Lubricate	PGL	-	11
	9	Swing bearing	Lubricate	PGL	-	3
	12	Battery (voltage)	Check, Clean	-	-	1
	17	Aircon and heater outer filter	Clean	-	-	1
	24	Boom swing cylinder	Lubricate	PGL	-	2
500 Hours	2	Engine oil	Change	EO	10.5 (2.8)	1
	3	Engine oil filter	Replace	-	-	1
	5	Water separator	Replace	-	-	1
	19	Air cleaner element (primary)	Clean	-	-	1
	20	Fuel filter element	Replace	-	-	1
	21	Radiator and oil cooler	Check, Clean	-	-	3
	26	Air compressor air filter	Check, Clean	-	-	1
1000 Hours	13	Hydraulic oil return filter	Replace	-	-	1
	14	Hydraulic tank air breather element	Replace	-	-	1
	16	Pilot line filter element	Replace	-	-	1
	22	Travel reduction gear oil	Change	GO	1.1 (0.3)	2
1500 Hours	-	Crankcase breather system	Check, Replace	-	-	1
2000 Hours	1	Hydraulic oil★1	Change	HO	56 (14.8)	1
	1	Hydraulic oil (HBHO★2)	Change	-	56 (14.8)	1
	4	Radiator coolant★1	Change	C	13 (3.4)	1
	15	Hydraulic oil suction strainer	Check, Clean	-	-	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
	26	Air compressor air filter	Replace	-	-	1
	27	RCV lever	Lubricate	PGL	-	2
3000 Hours	25	DPF (diesel particulate filter)	Clean	-	-	1
5000 Hours	1	Hydraulic oil★3	Change	HO	56 (14.8)	1
6000 Hours	4	Radiator coolant★3	Change	C	13 (3.4)	1
As required	17	Aircon and heater outer filter	Replace	-	-	1
	18	Aircon and heater inner filter	Clean, Replace	-	-	1
	19	Air cleaner element (primary)	Replace	-	-	1
		Air cleaner element (safety)	Replace	-	-	1
	26	Air compressor air filter	Replace	-	-	1
	28	Fuel filler pump filter	Clean, Replace	-	-	1

★1 Conventional ★2 HD Hyundai Construction Equipment Bio Hydraulic Oil

★3 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

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.

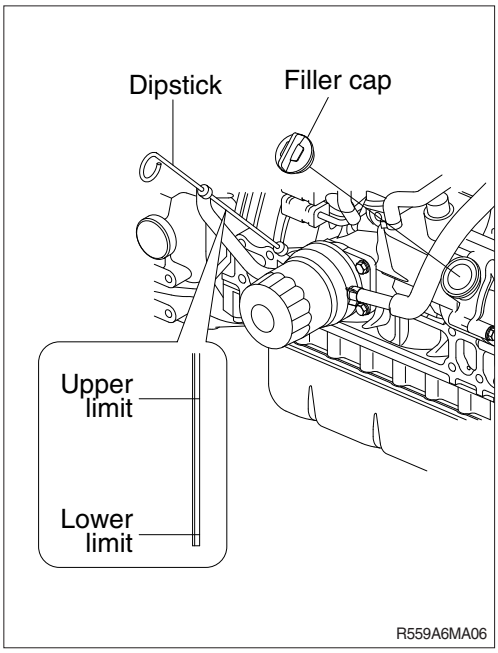
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

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

※ **If the oil is contaminated or diluted, change the oil regardless of the regular change interval.**

※ **Check oil level after engine has been stopped for 15 minutes.**

⚠ **Do not operate unless the oil level is in the normal range.**



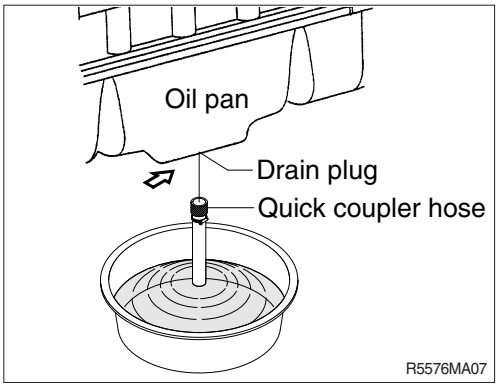
2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(1) Warm up the engine.

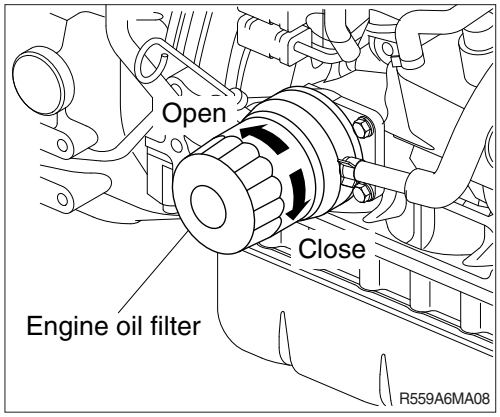
(2) Remove the cover of drain plug and connect the quick coupler hose.

※ **A drain pan with a capacity of 20 liters (5 U.S. gallons) will be adequate.**

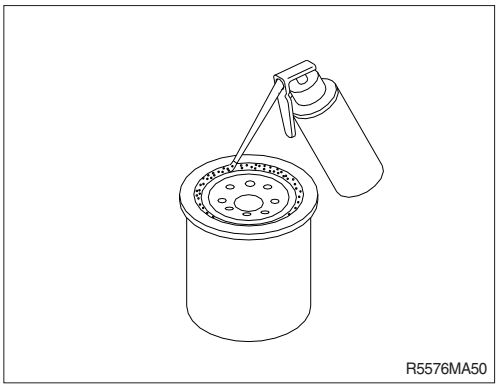
※ **Dispose of the waste oil in accordance with local regulations.**



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

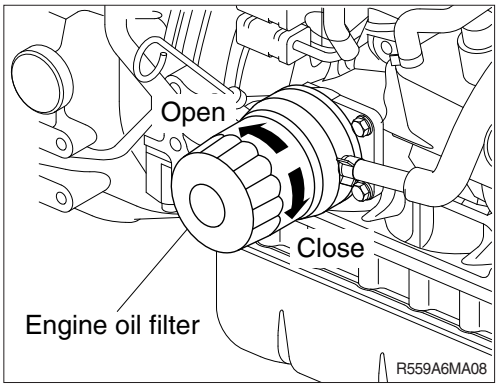


(4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filter.

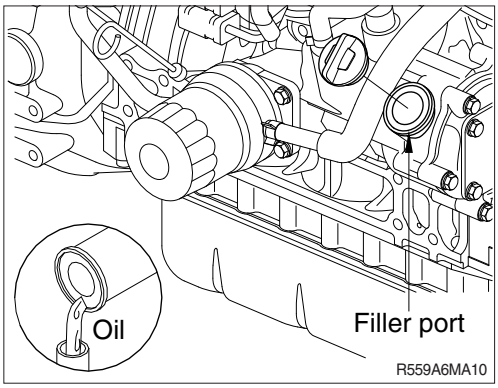


(5) Install the new filter manually by turning it clockwise until if contacts the filter head.
Tighten to 2.0~2.4 kgf · m (14~17 lbf · ft) or one additional turn using the filter wrench.
Remove the quick coupler hose.

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

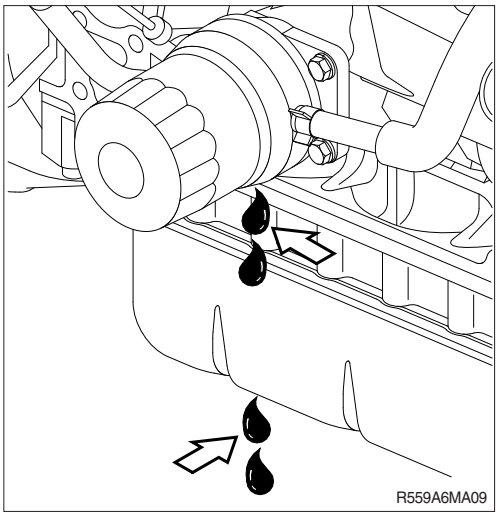


(6) Fill the engine with clean oil to the proper level.
· Quantity : 10.5 ℓ (2.8 U.S.gallons)



(7) 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.

(8) Reinstall the oil filler cap. If any engine oil is spilled, wipe it away with a clean cloth.



3) CHECK RADIATOR COOLANT

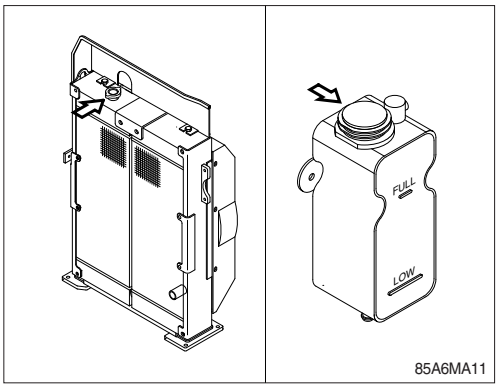
(1) Check if the level of coolant in reservoir tank is between FULL and LOW.

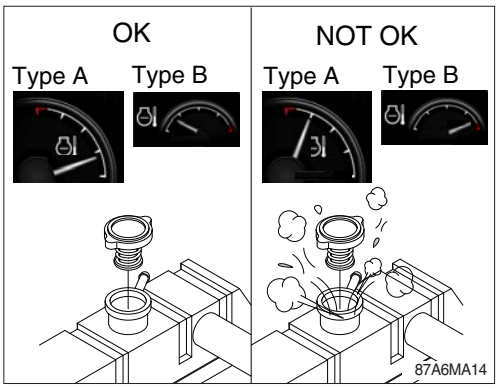
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

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

(4) Replace gasket of radiator cap when it is damaged.

⚠ **Hot coolant can spray out if radiator cap is removed while engine is hot. Remove the cap after the engine has cooled down.**



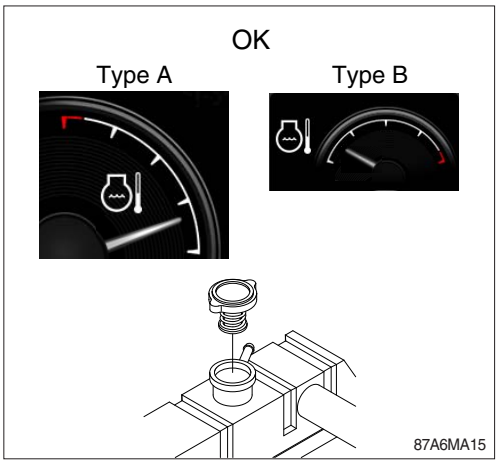


4) FLUSHING AND REFILLING OF RADIATOR

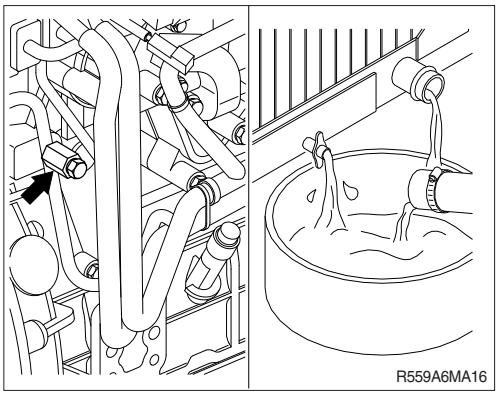
(1) Change radiator coolant

⚠ **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 is made.
Keep out of reach of children.

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



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

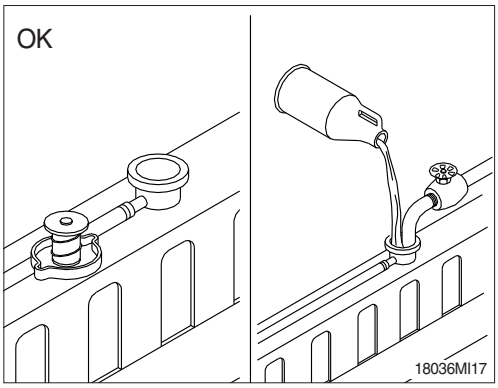


(2) Flushing of cooling system

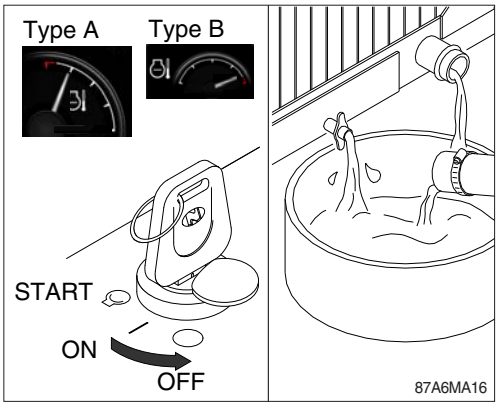
① Fill the system with a mixture of sodium carbonate and water(or a commercially available equivalent).

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

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



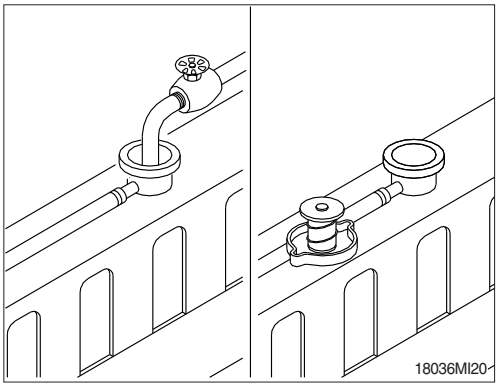
② Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F).
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

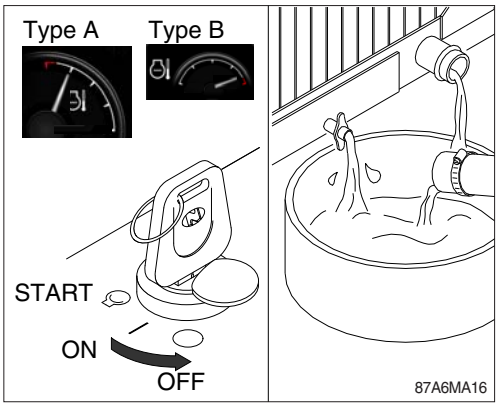
※ **Be sure to vent the engine and aftercooler for complete filling.**

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



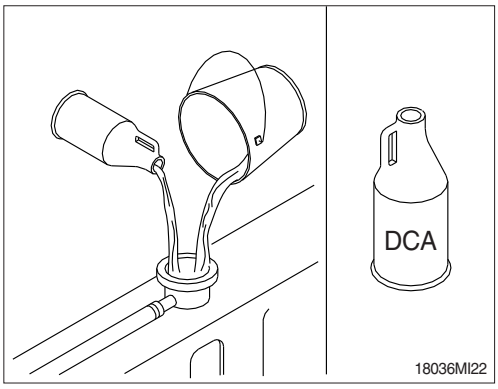
④ Operate the engine for 5 minutes with the coolant temperature above 80˚C(176˚F).
Shut the engine off, and drain the cooling system.

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



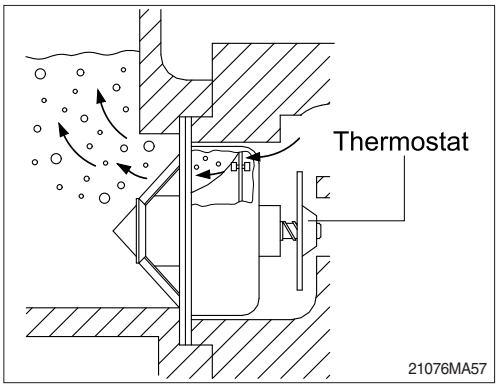
(3) Cooling system filling

① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.
Coolant capacity (engine only) : 4.2ℓ(1.1 U.S. gallons)



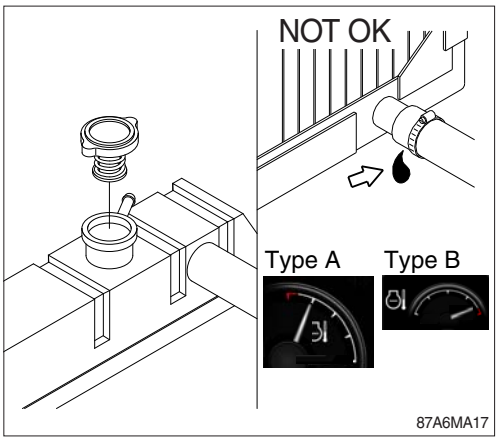
② The system has a maximum fill rate of 14 liters (3.5 U.S. gallons) per minute.
Do not exceed this fill rate.

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



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

※ **If the gasket of the surge tank cap is damaged, discard the old filler cap and install a new cap.**

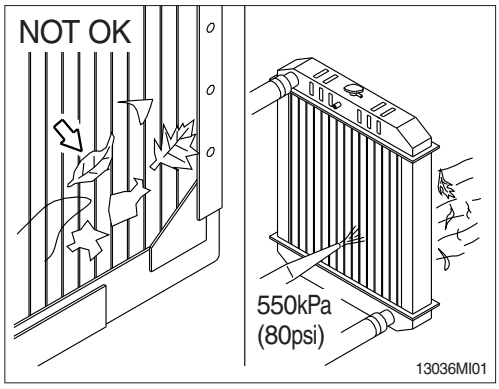


5) CLEAN RADIATOR AND OIL COOLER

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

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

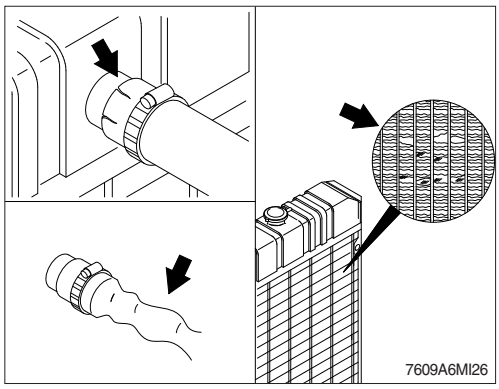
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



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

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

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

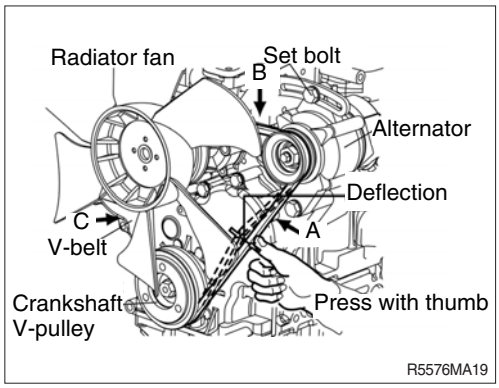


6) FAN BELT TENSION

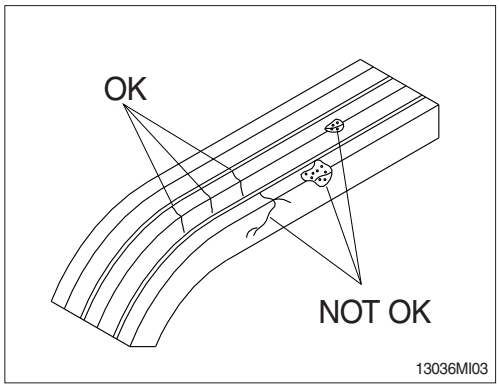
(1) Measure the belt deflection at the longest span of the belt.

· Deflection

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



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

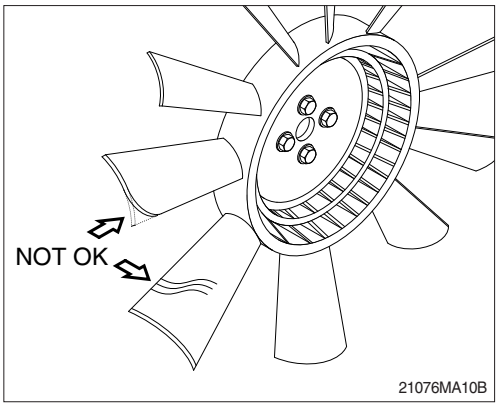


7) INSPECTION OF COOLING FAN

⚠ 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

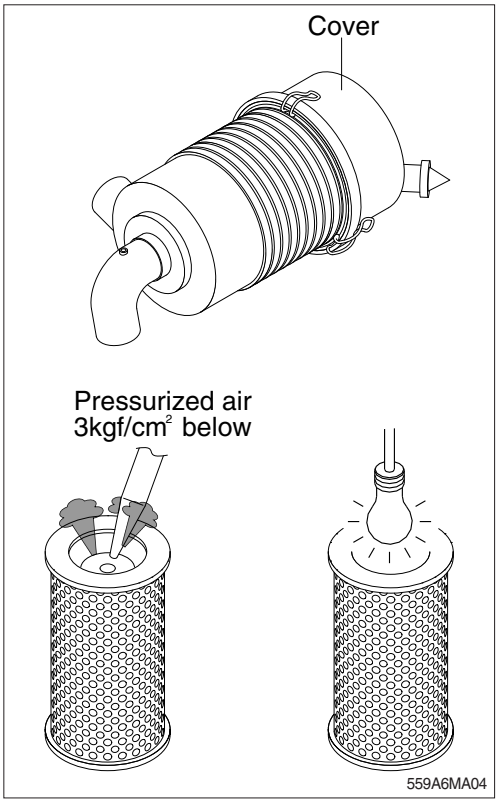
① Open cover and remove the element.
② Clean the inside of the body.
③ Clean the element with pressurized air.
· Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.
④ Inspect for cracks or damage of element by putting a light bulb inside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

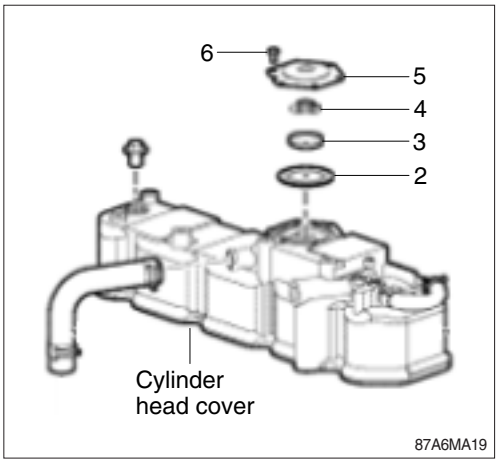
△ Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.



9) CRANKCASE BREATHER SYSTEM

(1) Remove the bolts (6) retaining the diaphragm cover.
(2) Remove the diaphragm cover (5), spring (4), diaphragm plate (3) and diaphragm (2).
(3) Inspect the diaphragm for tears. Inspect the spring for distortion. Replace components if necessary.
(4) Reinstall the diaphragm, diaphragm plate, spring and diaphragm cover. Tighten the bolts.

※ Check every 1500 hours.



10) FUEL TANK

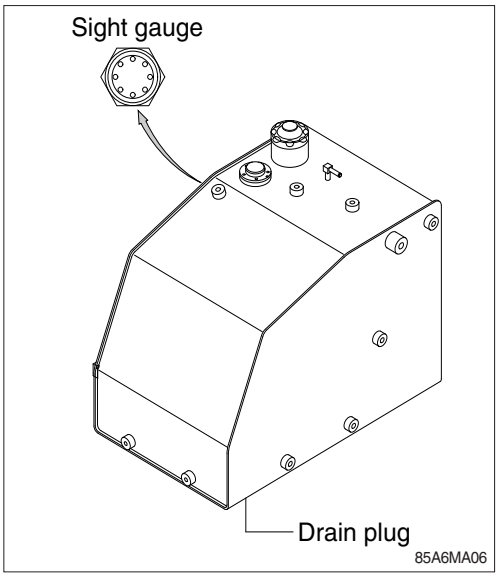
※ **Remove the strainer of the fuel tank and clean it if contaminated.**

(1) Fill fuel tank fully to minimize water condensation and check the fuel gauge level 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.**

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

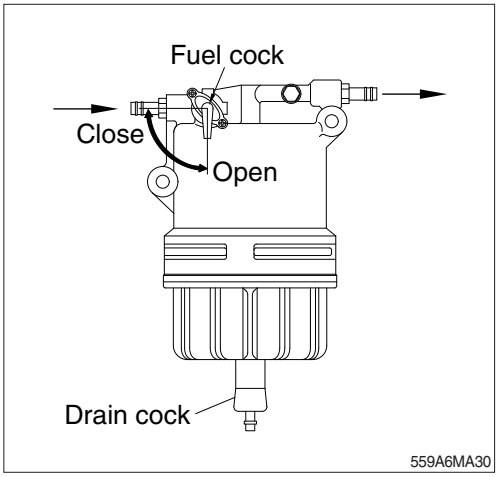


11) WATER SEPARATOR

※ **Inspect or drain the collection bowl of water every 50 hours and replace the element every 500 hours.**

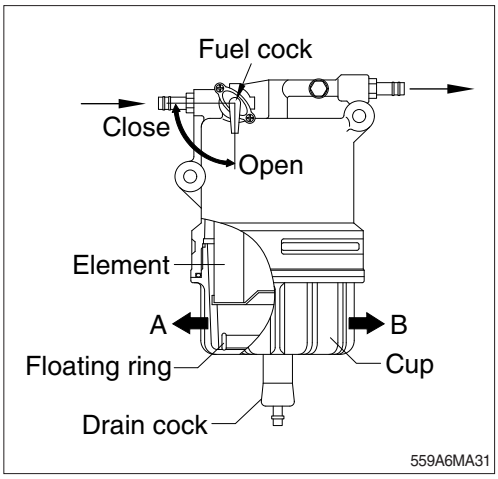
(1) Drain water

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

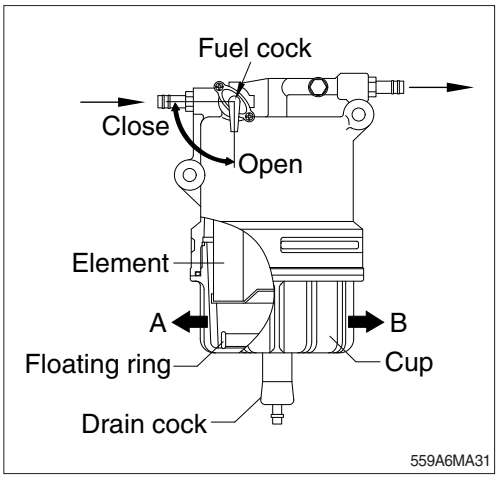


(2) Replace element

① Close the fuel cock.
② Turn the retaining ring to the left (A) and remove the cup.
③ Carefully hold the cup to prevent fuel from spilling. If you spill any fuel, clean up the spill completely.
④ Remove the float ring from the cup. Pour the contaminants into the container and dispose of it properly.



⑤ Replace the new element into the top of the water separator.
⑥ Install the new O-ring in the cup.
⑦ Position the floating ring in the cup.
⑧ Check the condition of the cup. Replace if necessary.
⑨ Install the cup to the bracket by tightening the retaining ring to the right (B) to a torque of 2.8~3.4 kgf · m (20.3~24.6 lbf · ft).
⑩ Close the drain cock.
⑪ Open the fuel cock.
⑫ Prime the fuel system.
⑬ Check for leaks.



12) REPLACEMENT OF FUEL FILTER ELEMENT

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

(2) Close the fuel cock 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.

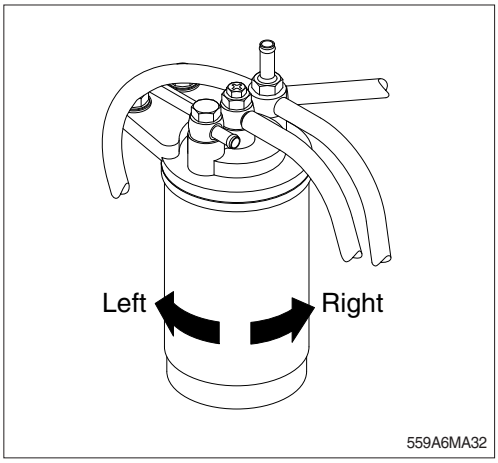
(4) Clean the filter mounting surface and apply a small amount of diesel fuel to the gasket of the new fuel filter element.

(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 cock of the water separator.

(7) Prime the fuel system.

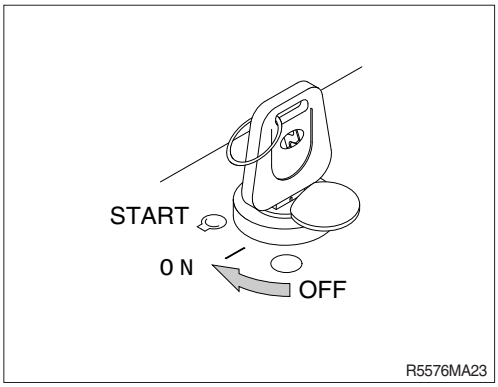
(8) Check for leaks.



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.**

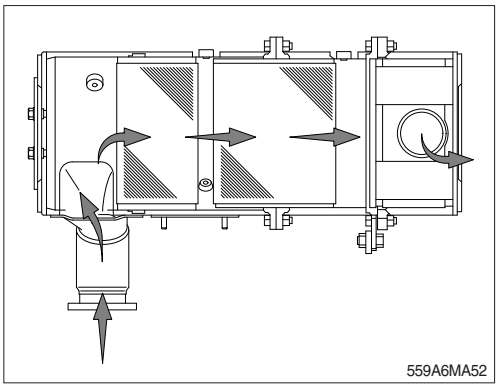


14) DPF (diesel particulate filter) **CLEANING**

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.

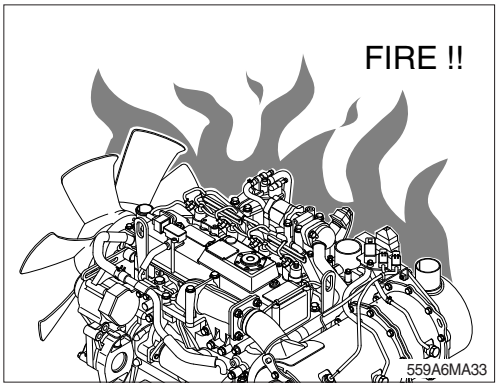
※ The diesel particulate filter shall be cleaned every 6000 hours.

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

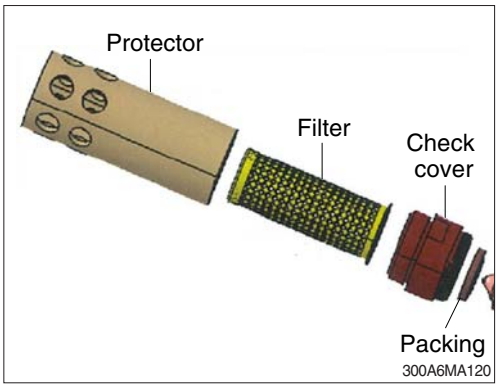
Clean the filter periodically as followings.

(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.

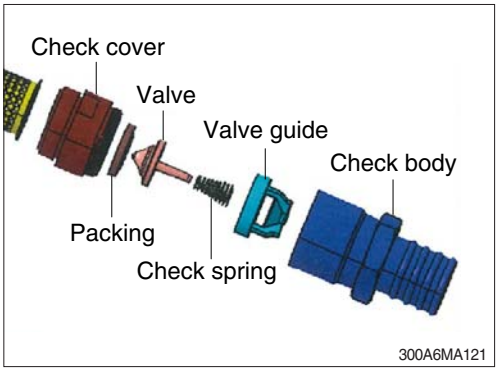
※ The structure can be loosened by hand.



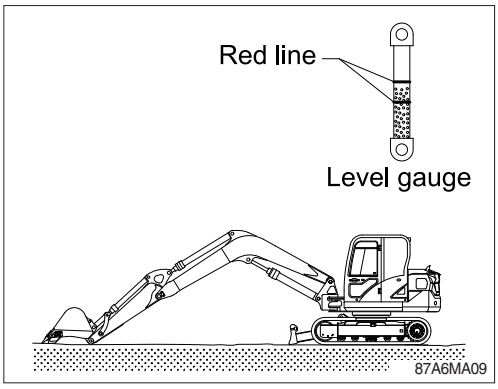
(3) Check valve

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

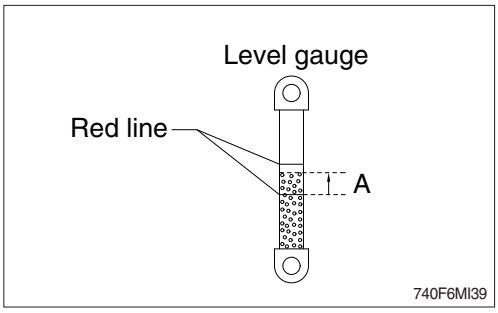


(1) Position the machine as shown in the illustration on the right. Please stop the engine and wait for about 5 minutes.

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

(3) The oil level is normal if the oil is between the red lines. The oil level depends on the temperature of the hydraulic oil. Refer to the height (A) in the below table to check the level gauge.

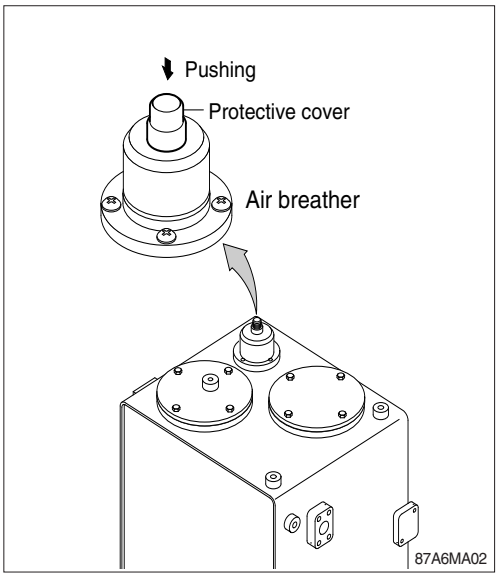
Temperature		Height A	
℃	°F	mm	inch
0	32	15	0.6
10	50	25	1.0
20	68	30	1.2
30	86	35	1.4
40	104	40	1.6



※ Refer to page 3-25 for checking the temperature of the hydraulic oil.

※ Add the hydraulic oil, if necessary.

18) FILLING HYDRAULIC OIL



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

(2) Relieve the pressure in the tank by pushing the protective cover of the air breather.

(3) Remove the breather on the top of oil tank and fill the oil to the specified level.

· Tightening torque : 4.05±0.8 kgf · m
(29.3±5.8 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) Relieve the pressure in the tank by pushing the protective cover of the air breather.

(3) Remove the support.
- Tightening torque : 6.9±1.4 kgf · m (50±10 lbf · ft)

(4) Prepare a suitable container with a capacity of 109 ℓ (28.8 U.S. gal)

(5) To drain the oil loosen the drain plug at the bottom of the oil tank.

(6) Close the drain vavle and fill proper amount of recommended oil.

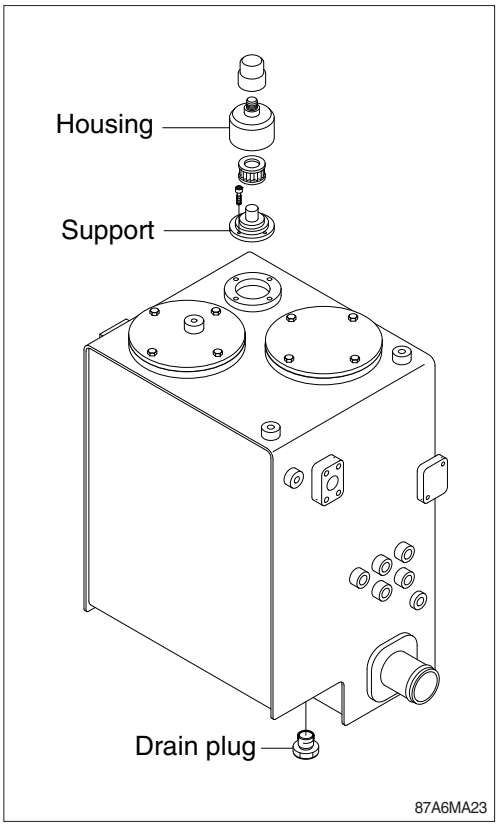
(7) Put the breather in the right position.

(8) To 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.

※ In case 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 your local HD Hyundai Construction Equipment dealer.



20) CLEAN SUCTION STRAINER

Clean suction stainer as follows.

(1) Remove the cover on the top of the oil tank.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

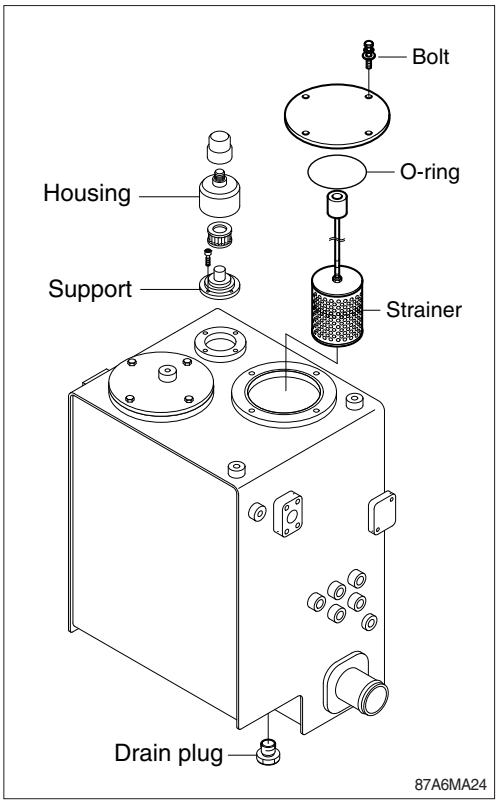
(2) Pull out the strainer in the tank.

(3) Wash the suction strainer with gasoline or cleaning oil (mineral spirits).

(4) Replace the suction strainer if it is damaged.

(5) Assemble with reverse order of disassembly.
Be sure to install a new O-ring.

※ Loosen bolts on the cover slowly as the cover has spring force applied. This will prevent cover from popping off without notice.



21) REPLACEMENT OF RETURN FILTER

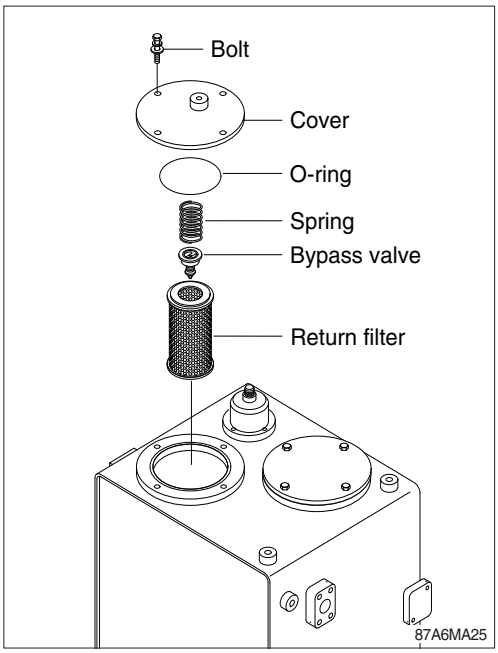
Replace return filter as follow.

(1) Loosen the bolt and remove the cover.

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

(3) Replace the return filter with a 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 AIR BREATHER

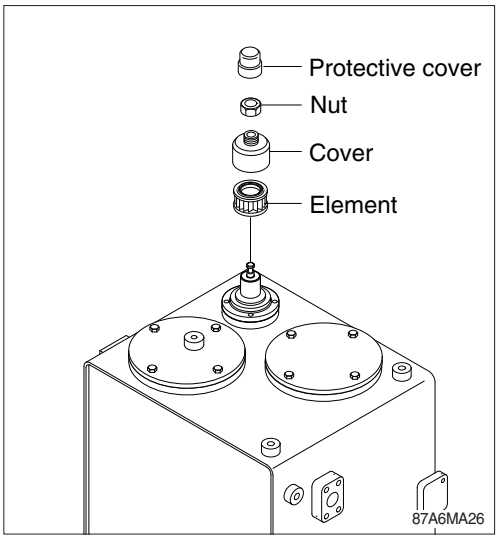
(1) Relieve the pressure in the tank by pushing the protective cover of the air breather.

(2) Loosen the lock nut and remove the cover.

(3) Pull out the ari breather element.

(4) Replace the air breather element with a new one.

(5) Reassemble by reverse order of disassembly.
· Tightening torque : 4.05±0.8 kgf · m
(29.3±5.8 lbf · ft)



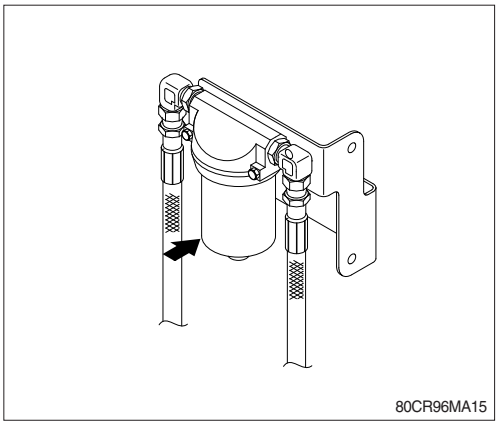
23) REPLACEMENT OF PILOT LINE FILTER ELEMENT

(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.
· Tightening torque : 3.0±0.5 kgf · m
(21.7±3.6 lbf · ft)

※ **Change the element after initial 250 hours of operation. Thereafter, change the element every 1000 hours.**



24) LUBRICATE SWING BEARING AND RING GEAR

(1) Swing bearing

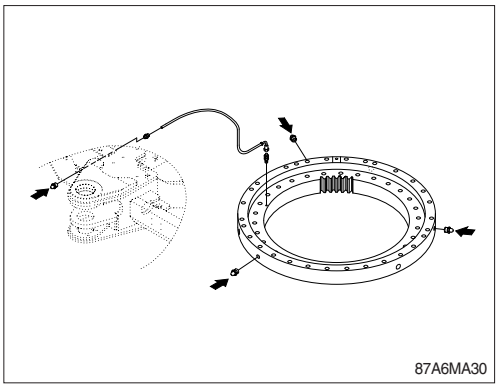
Grease at 3 fittings shown in the illustration.

※ **Lubricate every 250 hours.**

(2) Swing ring gear (manifold)

Grease at 1 fitting shown in the illustration.

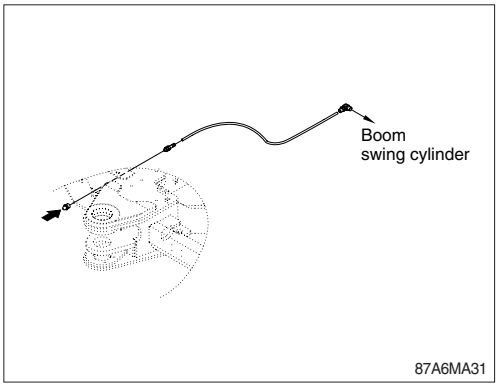
※ **Lubricate every 50 hours.**



(3) Boom swing cylinder

Grease at fitting shown in the illustration.

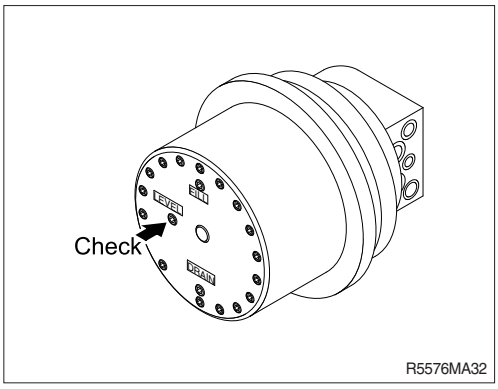
※ **Lubricate every 250 hours.**



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 : 6.0±1.0 kgf · m
(43.4±7.2 lbf · ft)



26) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

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

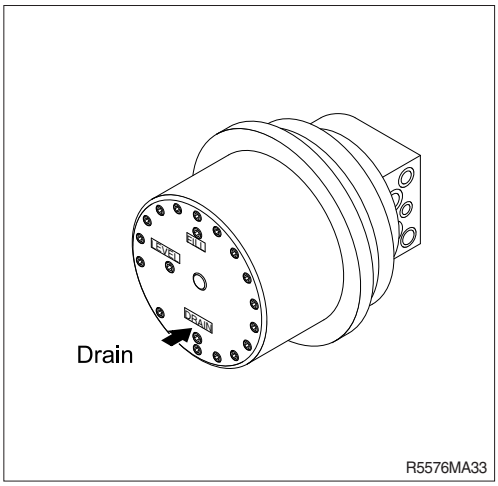
(2) Position the travel motor as shown in the illustration and make sure the machine is on flat ground.

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

(4) Drain the oil to adequate container with a capacity of 5 ℓ (1.3 U.S. gal).

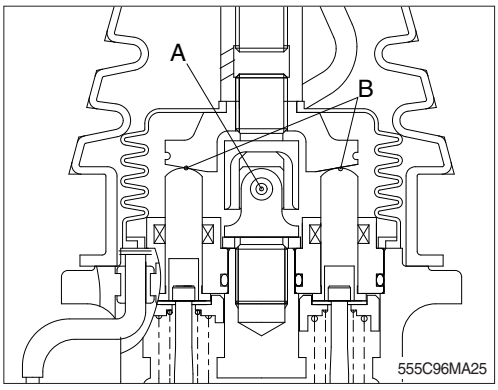
(5) Tighten the drain plug and fill specified amount of oil at filling port.
- Amount of oil : 1.1 ℓ (0.3 U.S. gal)
- Tightening torque : 6.0±1.0 kgf · m
(43.4±7.2 lbf · ft)

(6) Tighten the level plug and travel slowly to check if there is any leakage of oil.



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

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

※ **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.

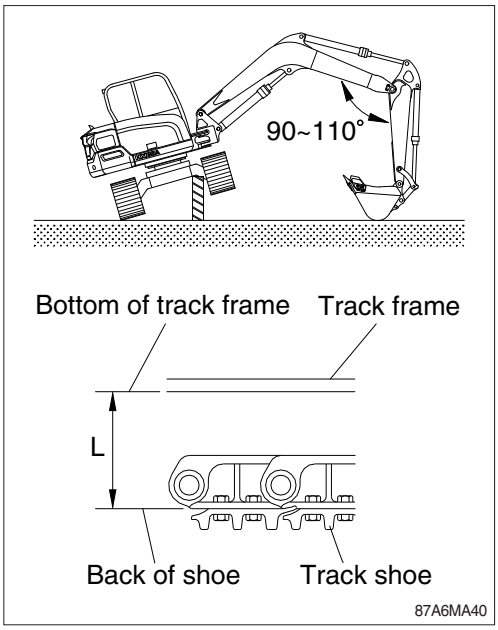
(2) Measure the distance between bottom of track frame on track center and back of shoe.

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

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

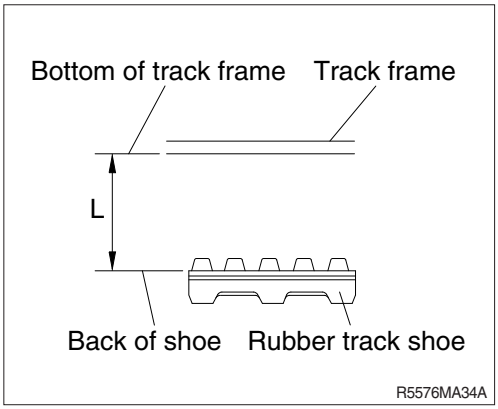
⚠ **Unscrew the grease nipple after release the tension by pushing the poppet only when necessarily required.**
Grease leaking hole is not existing. So, while unscrew the grease nipple, grease is not leaking until the grease nipple is completely coming out. If the tension is not released in advance, the grease nipple can be suddenly popped out by pressurized grease.

※ **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.



Steel track

Length (L)	
210~240 mm	8.3"~9.4"



Rubber track

Length (L)	
100~110 mm	3.9~4.3"

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 knob to the LOCK position and stop the engine.

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

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

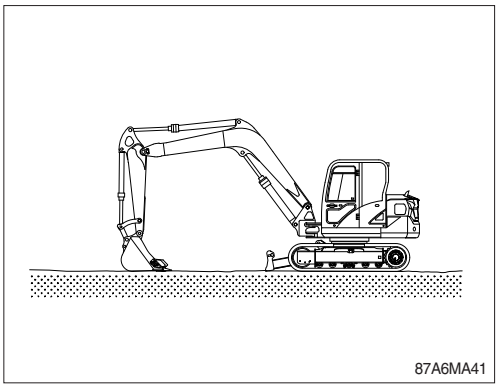
※ **If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.**

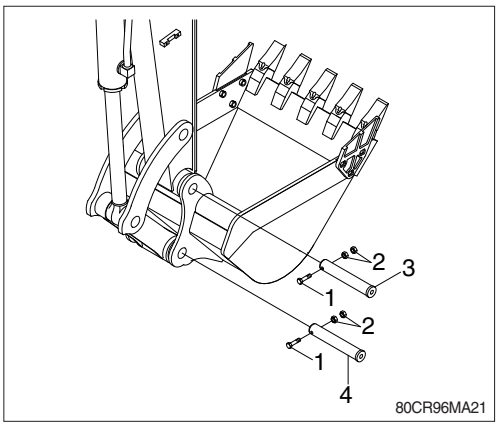
※ **After removing the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushings on both sides do not become damaged.**

(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.
· Tightening torque : 14.7±2.2 kgf·m
(106±15.9 lbf·ft)


87A6MA41



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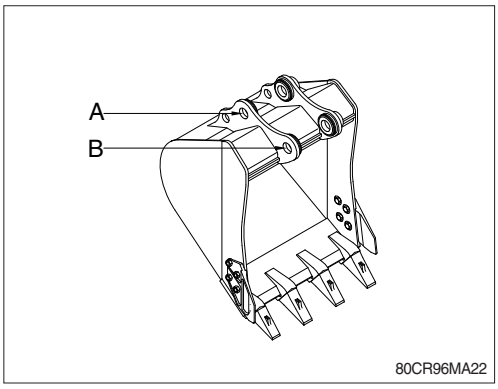
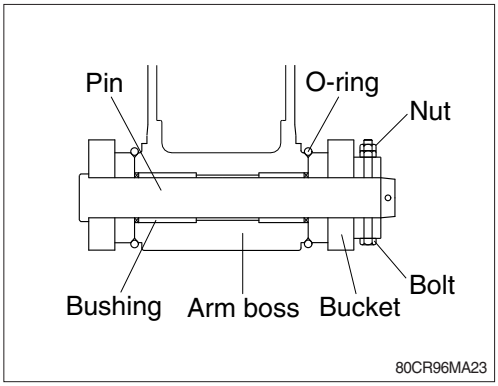


80CR96MA22



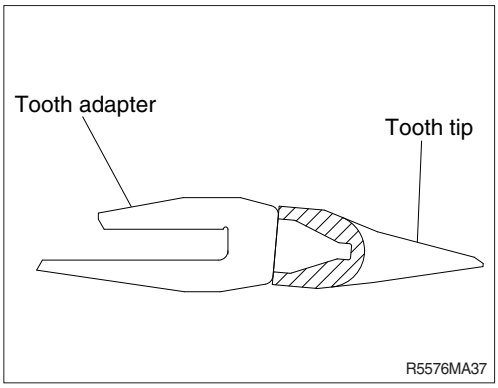
80CR96MA23

30) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth tip before adapter starts to wear.

② In case of excessive use and tooth adapter has worn excessively, replacement may become impossible.



(2) Instructions for replacement

① Pull out pin by striking pin with punch or hammer, avoiding damage to rubber pin lock.

② Remove dust and mud from surface of tooth adapter by using knife.

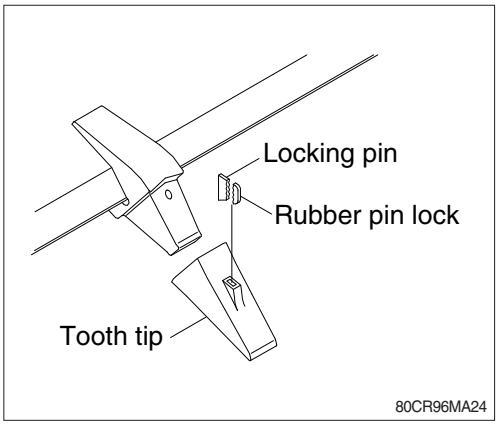
③ Place rubber pin lock in its proper place, and fit tooth tip to adapter.

④ Insert pin until rubber pin lock is positioned at locking pin groove.

⚠ Serious injury or death can result from bucket falling.

⚠ Block the bucket before changing tooth tips or side cutters.

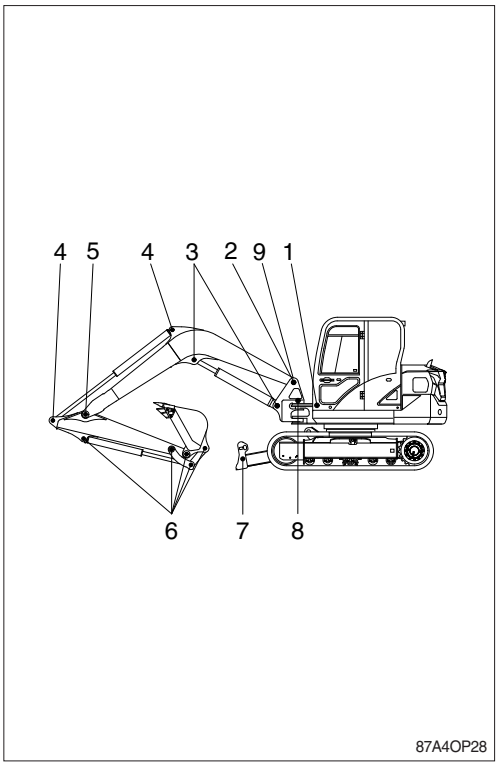
⚠ The operator should wear clothes and personal protection gear that are appropriate for the work environment. Protects the eyes from dust, particles and airborne materials with a protection gear like goggle.



31) LUBRICATE PINS

(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	2
2	Boom connection pin	2
3	Boom cylinder pin (head and rod)	2
4	Arm cylinder pin (head and rod)	2
5	Boom and arm connection pin	1
6	Bucket cylinder pin (head and rod)	2
	Bucket link (control rod)	2
	Arm and bucket connection pin	1
	Bucket and control rod connection pin	1
	Arm and control link connection pin	1
7	Dozer blade connection pin	4
	Angle dozer blade connection pin	7
8	Boom swing post	3
9	Boom rear bearing center ★	1

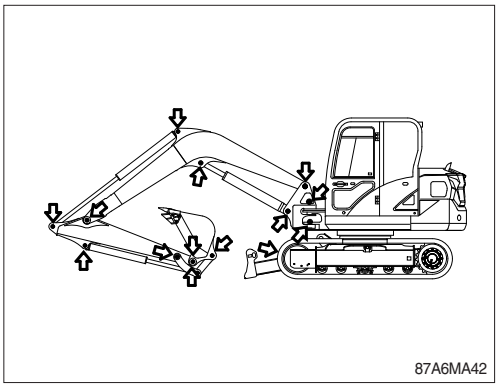


※ **Shorten lubricating interval when working in water or dusty places.**

★ **Not required : If necessary, lubricate the grease.**

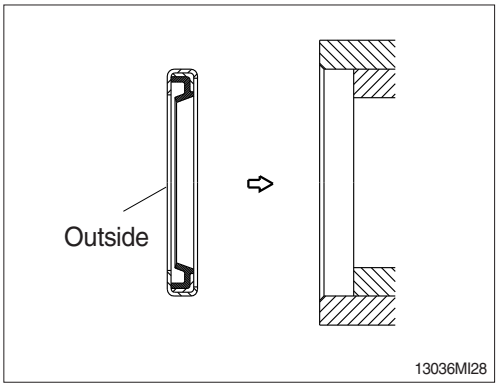
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ **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.**

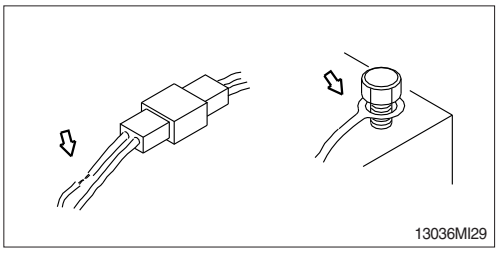
※ **Install seal in the same manner as shown in the illustration. Use a plastic hammer to lightly and evenly tap the seal into place.**



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.

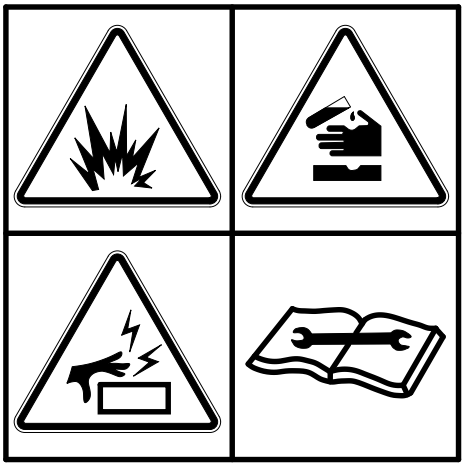
⚠ Battery gas can explode. Keep sparks and flames away from batteries.

⚠ 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

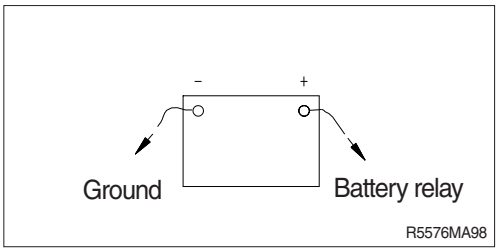
Never discard a battery.

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 first (⊖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.

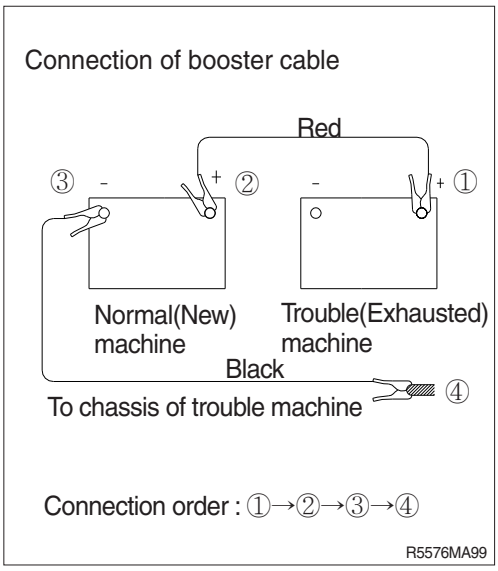
① Make sure that the starting switches of the normal machine and trouble machine are both in the OFF position.

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.

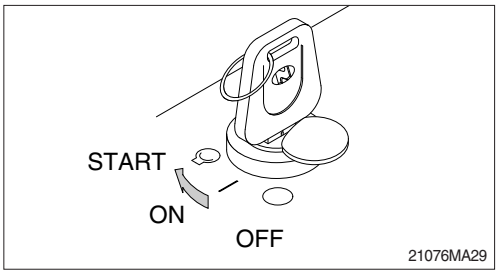


(2) Starting the engine

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.

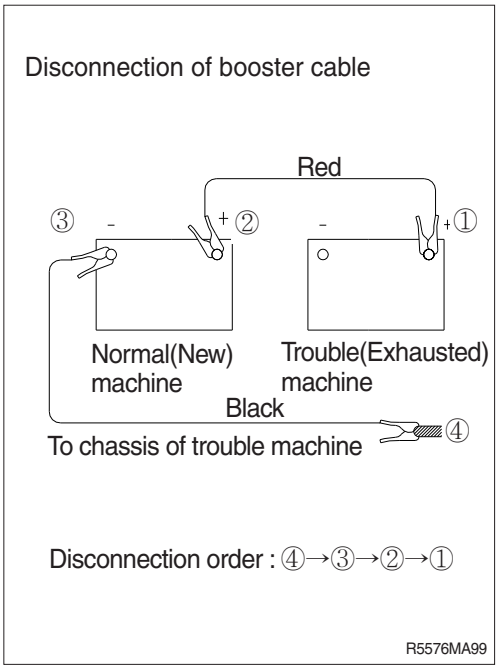
③ Run engine at high idle until charging of the exhausted battery is complete.

⚠ 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 key.

(2) Disconnect ground cable from battery by master switch.

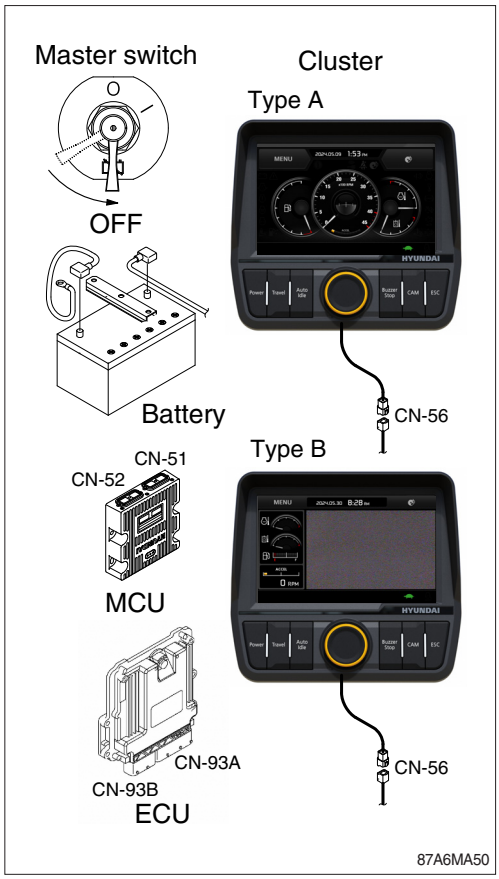
(3) Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (cluster etc).

(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 flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.**

⚠ **Do not attempt to weld before carrying out the above.**
If not, it will cause serious damage to electric system.



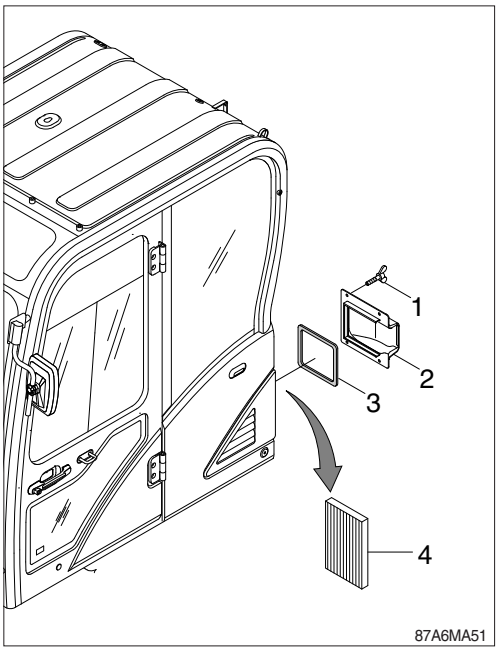
8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF THE OUTER FILTER

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

(1) Remove the screw (1), cover (2) and pad (3).

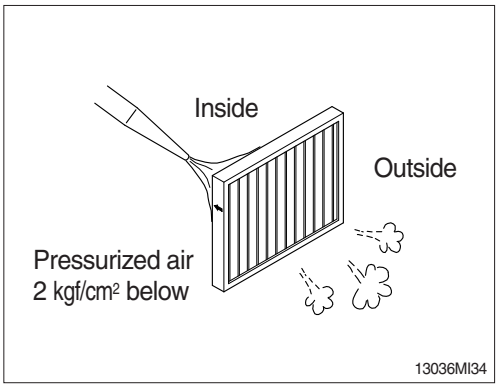
(2) Remove the outer filter (4).



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

⚠ **When using pressurized air, be sure to wear safety glasses.**

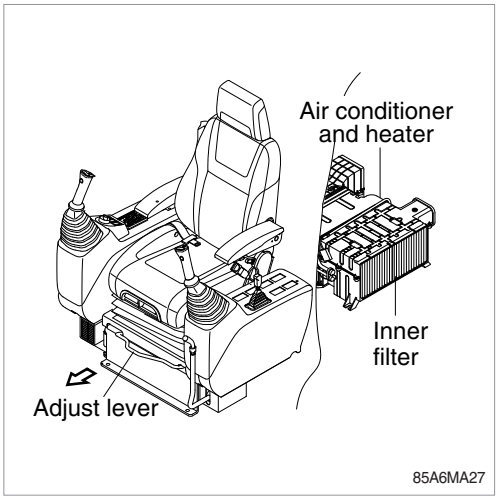
(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



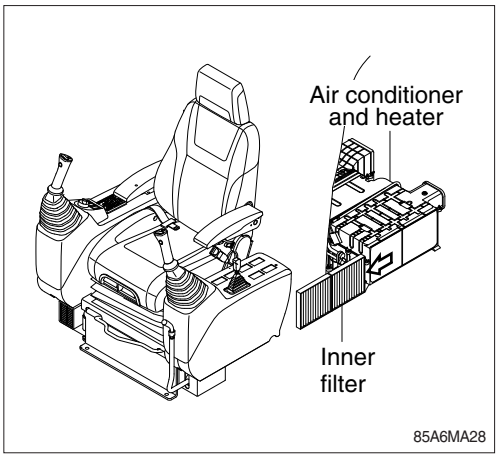
2) CLEAN AND REPLACE OF THE INNER FILTER

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

(1) Move seat and console box to arrow diction using the adjust lever.



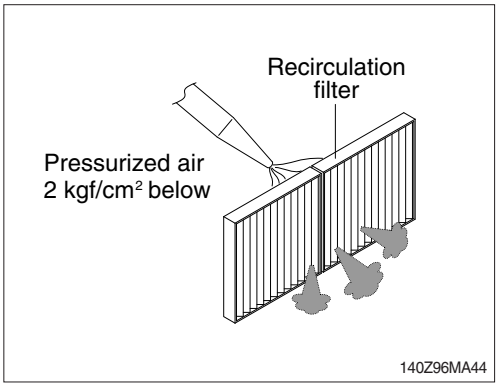
(2) Remove the inner filter.



(3) Clean the inner filter using pressurized air (below 2 kgf/cm², 28 psi) or washing with water.

⚠ When using pressurized air, be sure to wear safety glasses.

(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



3) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour 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) CHECK DURING SEASON

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

5) 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.

6) REFRIGERANT

(1) Equipment contains fluorinated greenhouse gas.

Model	Type	Quantity	GWP : 1430
HX85A, HX90A	HFC-134a	0.75 kg (1.65 lb)	CO_2 eq. : 1.07 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 (CO_2). GWP is calculated in terms of the 100-year warming potential of 1 kg of a greenhouse gas relative to 1 kg of CO_2.

(2) Environmental precautions

The air conditioning system of the machine is filled with HFC-134a refrigerant at the factory.
HFC-134a refrigerant is a flourinated greenhouse gas and contributes to global warming.
Do not release refrigerant into the environment.

(3) Safety precautions

Work on the air conditioning system must only be performed by a qualified service technician.
Do not attempt to preform work on the air conditioning system.
Wear safety goggles, chemical resistant gloves and appropriate personal protective equipment to protect bare skin when there is a risk of contact with refrigerant.

(4) Action in case of exposure

① Eye contact / Limited skin contact
Rinse with warm water and apply a light bandage. Seek medical attention immediately.

② Extensive skin contact
Rinse with warm water and carefully heat the area with warm water or warm clothing.
Seek medical attention immediately.

③ Inhalation
Leave the area and find fresh air. Seek medical attention immediately.

1. ENGINE

※ **This guide is not intended to cover every 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 the 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 HX85A, HX90A system is 280 kgf/cm^2 (3980 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 oil 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 HD Hyundai Construction Equipment genuine parts.
10) Weld the bracket for pipe clamp to prevent damage caused by vibration.

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, hydraulic oil return filter, pilot line filter element and drain filter.

(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. So, it must be inspected periodically.

Service interval unit : hours

Attachment	Operating rate	Hydraulic oil	Filter element
Breaker	100 %	600★1	200
		1000★2	

★1 : Conventional hydraulic oil

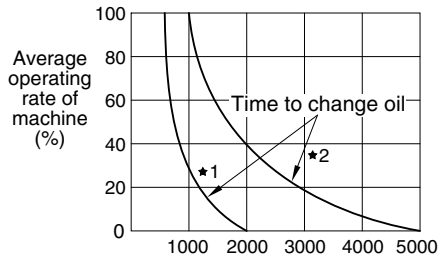
★2 : HD Hyundai Construction Equipment genuine long life hydraulic oil

● **Replace following filter at same time**

· Hydraulic oil return filter : 1 EA

· Pilot line filter element : 1 EA

Hyd oil change guide for hydraulic breaker



★1 : Conventional hydraulic oil

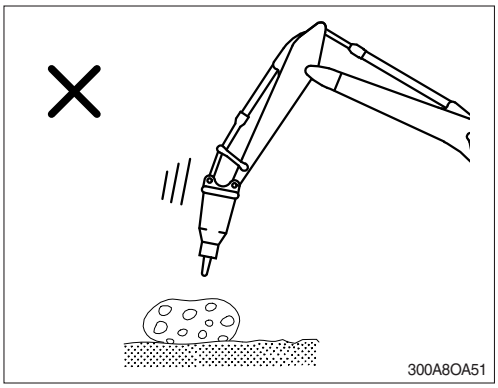
★2 : HD Hyundai Construction Equipment genuine long life hydraulic oil

4. PRECAUTIONS WHILE OPERATING THE BREAKER

DO NOT BREAK ROCK WHILE LOWERING

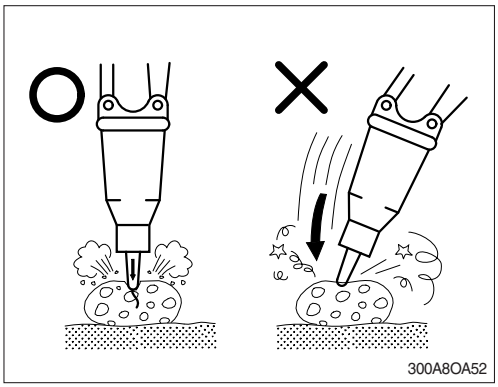
As the breaker is heavy in comparison with bucket, it must be operated slowly.

If breaker is rapidly pushed down, working device may be damaged.



DIRECTION OF THRUST

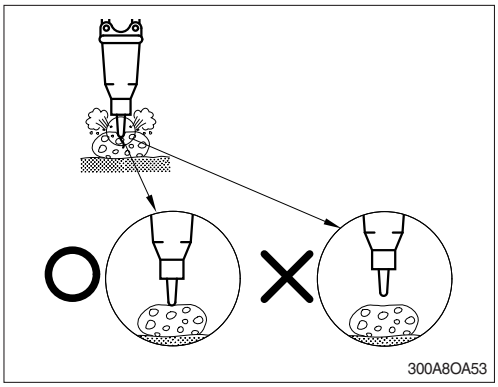
Apply a thrust in a straight line with the tool. Place the tool on a rock with the hammering side as vertically as possible. If the hammering side is oblique, the tool may slip during hammering, causing the chisel and piston to break, or seized. When breaking, select the point of a rock on which hammering can perform stably and fully stabilize the chisel to the hammer.



PROPER THRUST

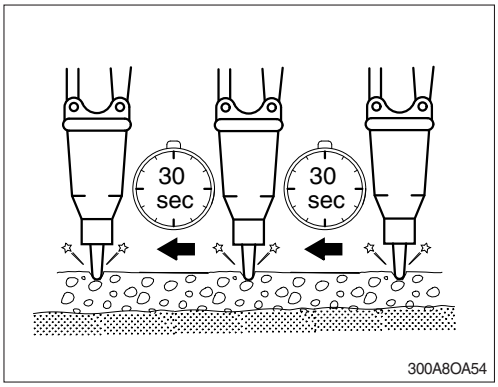
To break effectively, a proper thrust force must be applied to the breaker. If thrust is too low, impact energy of the piston may not be sufficient to break rocks.

Breaking force is transferred to the breaker body, arm and boom resulting in damage of those parts.



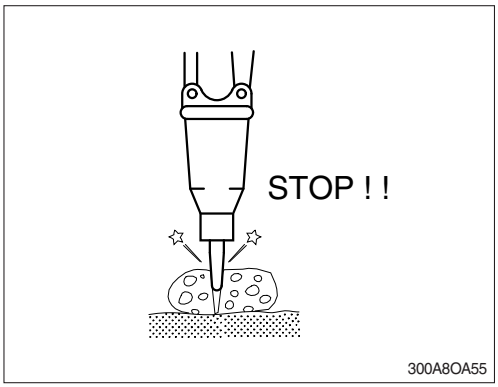
Move the impact point from the edge to the interior. Never try to break off a too large block, if the object has not broken within 30 seconds. The object should be broken up piece by piece in small blocks. Large distance steps will not improve working results.

Operating the breaker longer than 30 seconds may cause damage to the breaker.



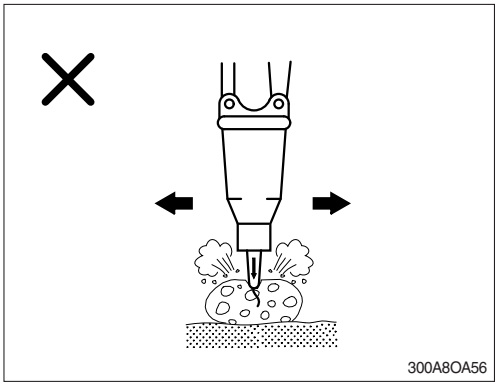
BLANKS THRUST

Blank blows, which are impact on the chisel without contact with the object, are very harmful for the breaker. Always press the chisel down onto the material before starting the breaker. And stop operation immediately as soon as the object has been broken. If operation is continued, blank blows could result in excessive wear to major components.



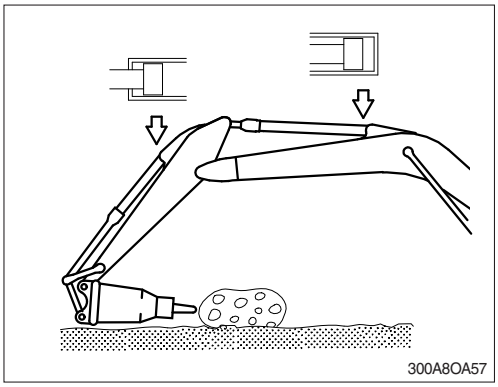
DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING

Do not move hammer while striking.
This will cause damage to the working device and the swing system.



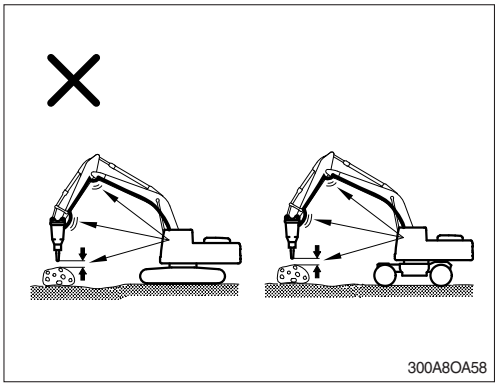
OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

If breaker is operated with the end tip, the cylinder may be damaged.



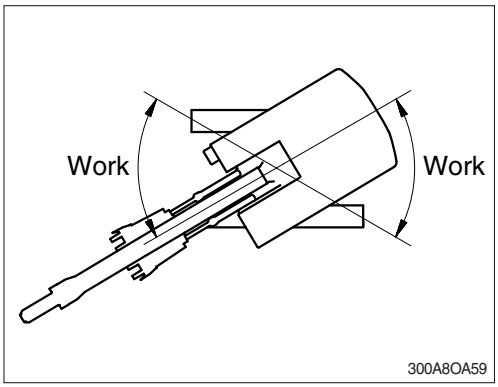
STOP THE OPERATION IMMEDIATELY IF HOSES VIBRATE EXCESSIVELY

Violent pulsations of the high / low pressure breaker hoses could indicate an accumulator fault. Check for oil leaks at the hose fitting points retightening as necessary. Should symptoms persist, contact the service shop appointed by the Hyundal dealer in your territory for repair. An excessive gap between tool and workpiece between strikes may indicate seizure of the tool in the front head. Disassemble the front head, inspect the components and repair or replace defective parts.

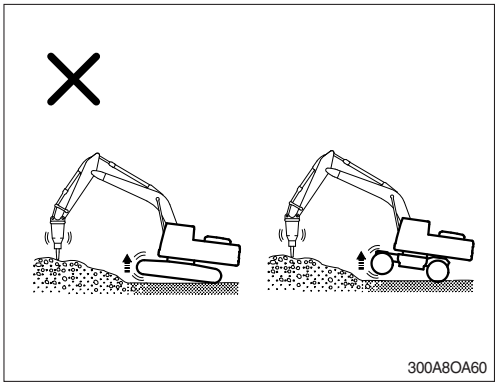


DO NOT WORK WHILE IN A SWING STATE

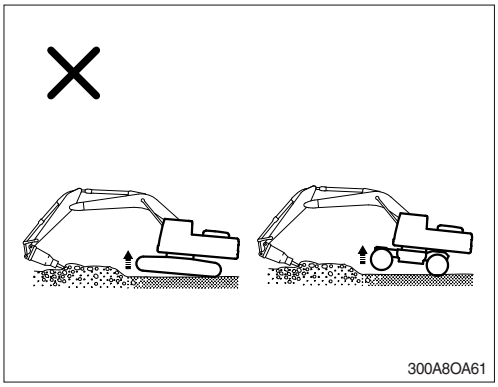
Do not work while swinging the upper structure. It cause oil leakage of the bend in the track shoe and rollers.



Conversely, if thrust is excessive or breaking is performed with boom of the lower chassis raised as shown, the machine may suddenly tip toward the movement. The breaker body may strike the broken rocks violently resulting in damage.

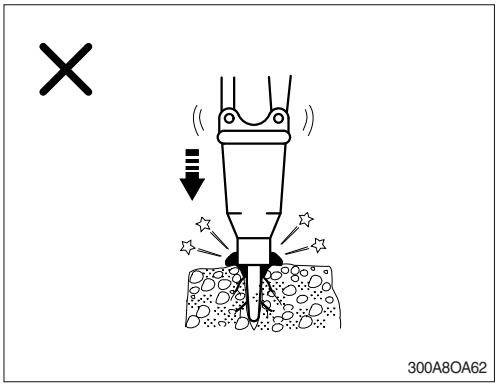


Do not extend the bucket cylinder fully and thrusting to raise the machine off the ground.



Excessive force as above may also result in vibrations being transmitted to the tracks causing damage.

Care is required to ensure adequate but not excessive force is applied to the breaker in operation.



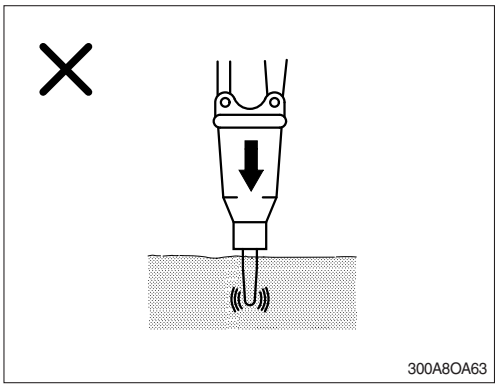
NEVER DRIVE THE CHISEL INTO THE GROUND

If the advance is too large and the chisel is not rocked to release the dust, the chisel will be driven into the material without breaking the material. This causes the chisel tip to glow red-hot and lose its hardness.

As a result, the chisel wears out more quickly. Operating in this way is not permitted.

Dust dampens impact power, when the chisel is inserted into the ground, and reduces the efficiency of the breaker. Tilt the breaker slightly backward and forward, not more than 5°, while operating so that the dust can escape.

Do not rock the breaker at angles greater than 5° or the chisel will be broken.

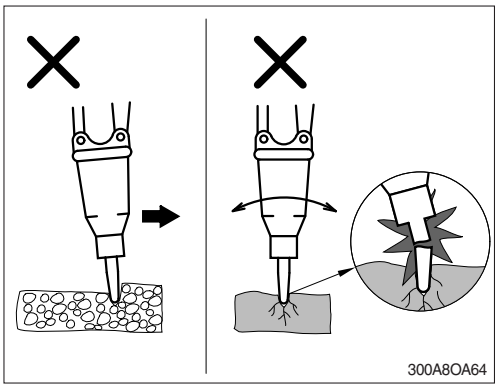


NEVER USE AS A LEVER

Do not use the chisel as a lever; e.g. crowbar, as this will cause the chisel to break.

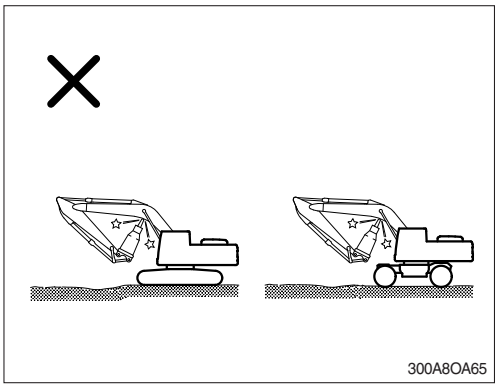
Under any circumstances, operating in this way is not permitted.

Most of bending failure of the chisel may be caused by lever action in stone that is inside hard or frozen ground. Be careful and stop operating if you feel sudden resistance under the chisel.



TAKE CARE OF CHISEL AND BOOM INTERFACE

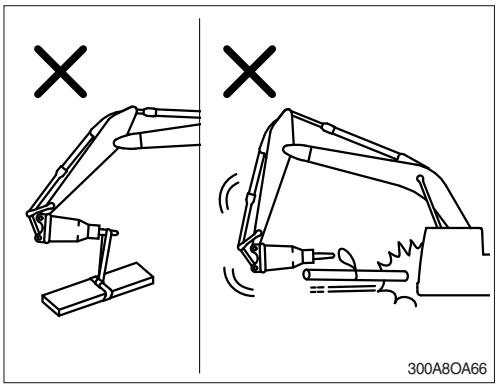
Be aware of clearance between breaker tip and the underside of boom as shown.



NEVER USE FOR LIFT OR TRANSPORT PURPOSES

The hydraulic breaker is not designed to lift or transport loads. Never use the chisel as a lifting point.

This is dangerous and could damage the breaker or the chisel.

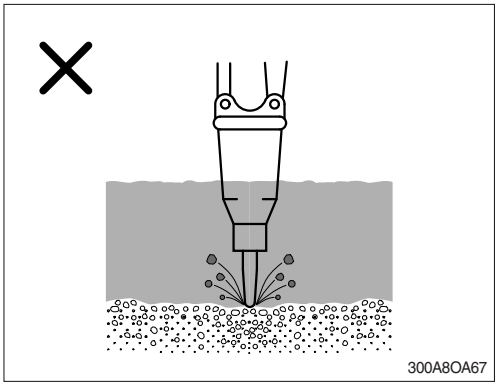


NEVER USE THE HYDRAULIC BREAKER UNDER WATER

The hydraulic breaker, as a standard assembly, never be used in or under water without prior conversion. If you use under water, water fills the impact chamber between the piston and the chisel, a strong hydraulic pressure wave is generated and will damage the seals in the breaker. And, in addition, corrosion, lack of lubrication or penetration of water could result in further damage to components of the breaker and the lower chassis.

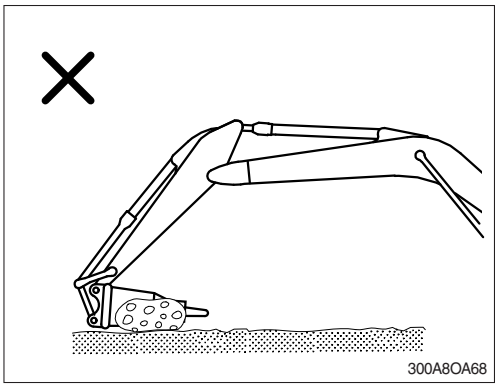
To operate the breaker under water, compressed air must be supplied into the breaker, into the impact chamber of the front-head, prior to use.

Consult your HD Hyundai Construction Equipment dealer for the underwater kit.



DO NOT USE BREAKER TO CARRY BROKEN STONE OR ROCK BY SWING OPERATING

This may damage the operation device and swing system.

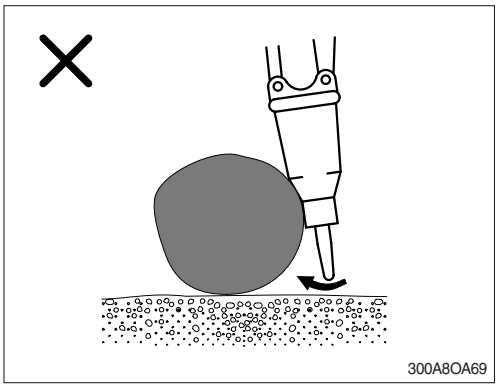


NEVER USE THE CHISEL OR HYDRAULIC BREAKER TO MOVE ROCKS OR OTHER OBJUCTS

The hydraulic breaker is not designed for this usage.

Do not use the breaker or chisel to roll, push the object or reposition the lower chassis.

This may cause damage to the breaker and the lower chassis.



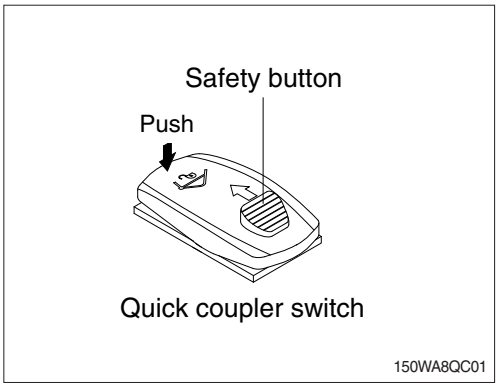
5. QUICK COUPLER

1) FIXING BUCKET WITH QUICK COUPLER

(1) Park the excavator and attachment on firm and level ground.

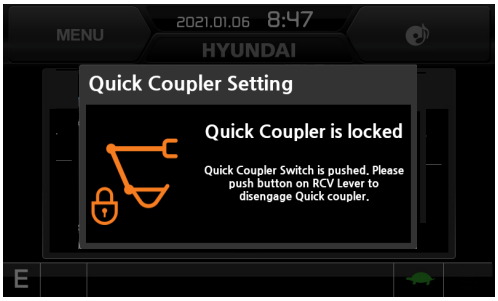
(2) After checking the safe environment conditions for installing/removing the quick coupler, perform the disengagement process.

(3) To unlock the quick coupler switch, press the safety button forward and press the switch.

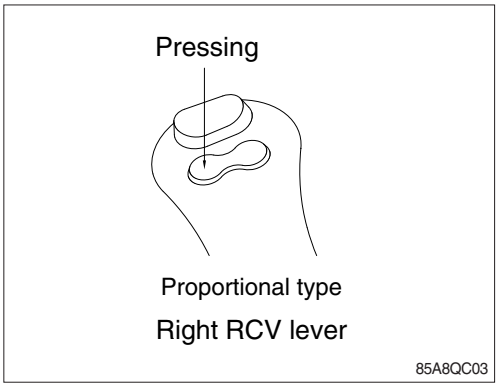


(4) Quick coupler symbols and warning messages appear on the cluster screen, and warning buzzers sound.

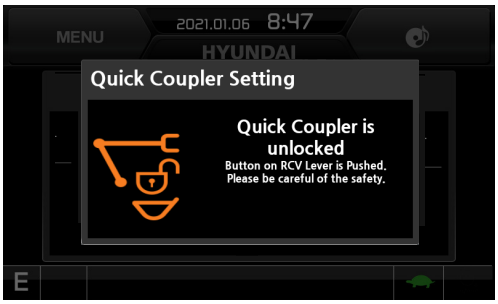
※ **The warning buzzer continues to operate up to step (12).**



(5) To unlock the quick coupler, press the quick coupler button on the right RCV lever.
To maintain the unlock status of the quick coupler the operator must maintain pressing the coupler button.

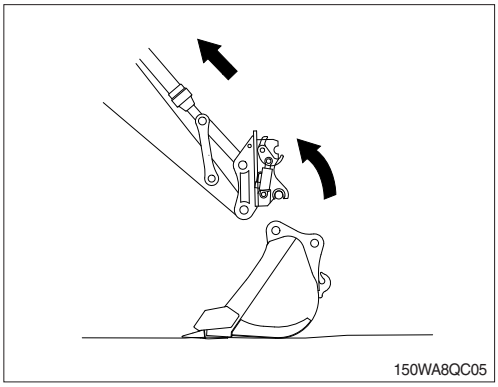


(6) The warning message in the cluster screen is changed, and the quick coupler lock is released.



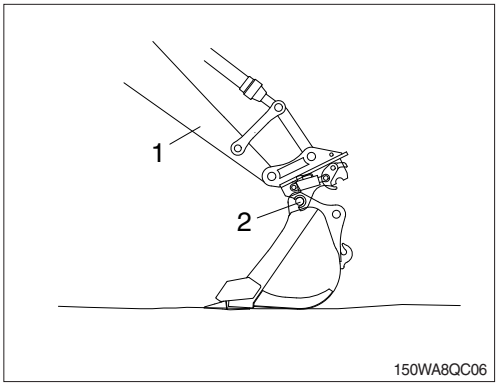
87A8QC05

(7) Retract the bucket cylinder. Align the quick coupler with attachment mounting pins or interface.



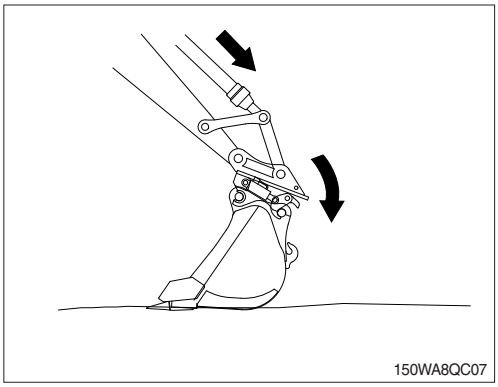
150WA8QC05

(8) Move the arm (1) and raise it until hook engages the upper (2) pin or interface of attachment.



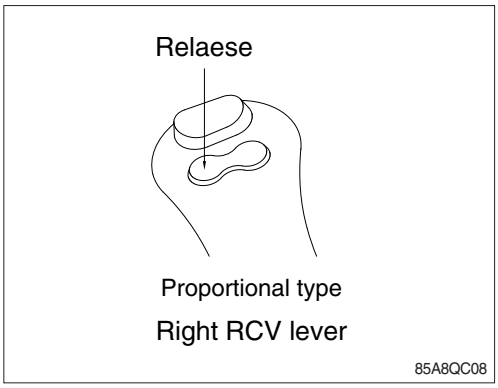
150WA8QC06

(9) With the bucket crowded, engage the quick coupler to the lower attachment pin or interface.



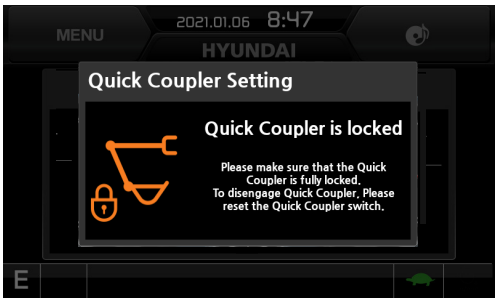
150WA8QC07

(10) To engage the quick coupler, release the quick coupler button on the right RCV lever.

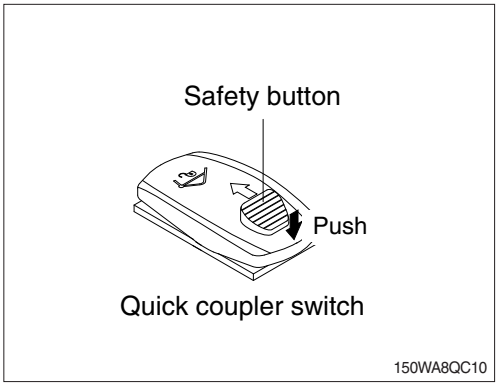


(11) The warning message in the cluster screen is changed, and the quick coupler lock is engaged.

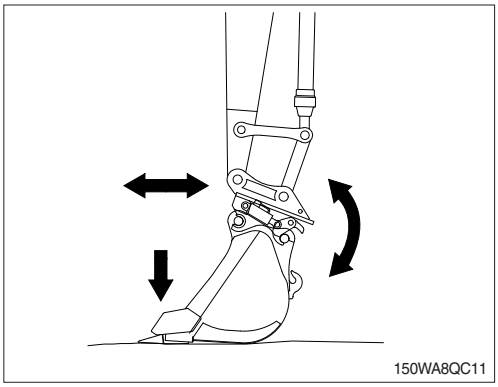
※ **After changing warning message, the quick coupler will be locked even if the operator presses the quick coupler button of the right RCV lever again. To unlock the quick coupler again the operator must repeat from the process (3).**



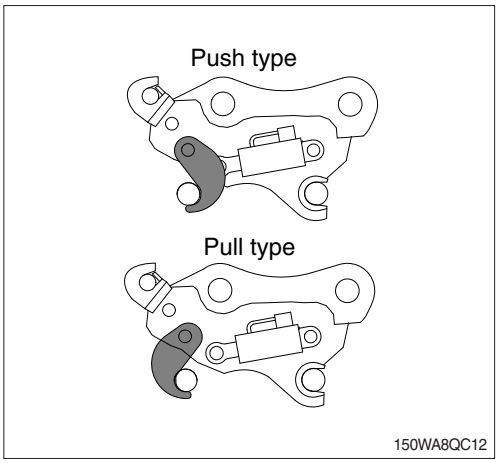
(12) To confirm the engagement of the quick coupler, release the safety button to its original position.
- The buzzer will stop activating.
- The warning message will disappear.



(13) Shake the attachment vigorously and lower the boom to the ground and apply down pressure to the quick coupler and attachment to check that attachment is fully engaged and locked to the quick coupler.

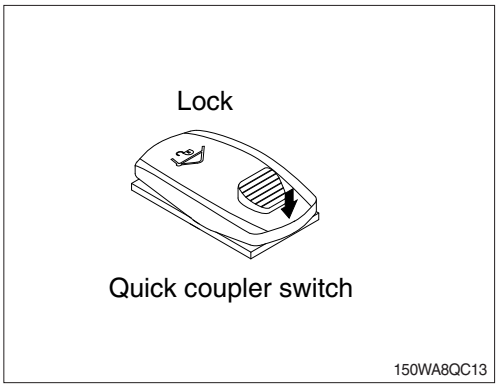


(14) Visually check that quick coupler is fully engaged and locked before operating the machine and attachment.

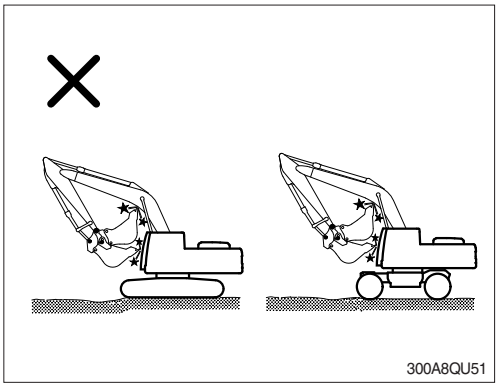


2) PRECAUTION OF USING QUICK COUPLER

⚠ When operating the machine with quick coupler, confirm that the quick coupler switch is in the LOCK position.
Operating the machine with quick coupler switch unlocked can cause the bucket to drop off and could result in personal injury, death, machine damage or property damage.



⚠ Be careful of the operating the machine which is equipped with quick coupler.
The bucket may hit cab, boom and boom cylinders when it reaches the vicinity of them as shown in the illustration.
HD Hyundai Construction Equipment will not be responsible for any injury, death or damage in the event that the quick coupler and attachment are not install-ed correctly.



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