CONTENTS

FOREWORD

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

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

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

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

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

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

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

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

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

   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.

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

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

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

BEFORE SERVICING THIS MACHINE

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

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

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

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

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

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

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

All personnel must remain alert to potential hazards.

Work within your level of training and skill.

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

Use your common sense.

EC REGULATION APPROVED

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

L_{WA} : 102 dB (EU only)

L_{PA} : 72 dB

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

CE

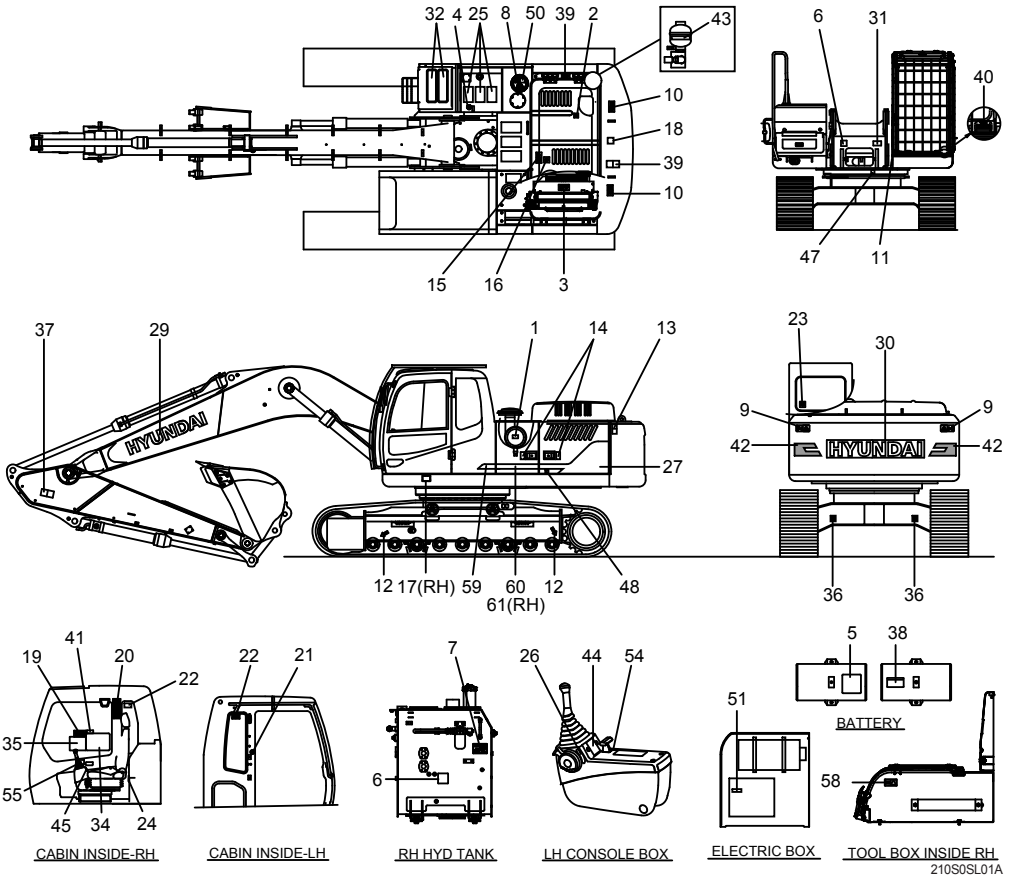
TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine Serial No.	
Engine Serial No.	
Manufacturing year	
Manufacturer Address	Hyundai Construction Equipment co., Ltd. 12th, Fl., Hyundai Bldg. 75, Yulgok-ro, Jongno-Gu, Seoul, 03058, Korea
Distributor for U.S.A Address	Hyundai Construction Equipment U.S.A, Inc 6100 Atlantic Boulevard Norcross GA 30071 U.S.A
Distributor for Europe Address	Hyundai Construction Equipment Europe N. V. Vossendal 11 2240 Geel Belgium
Dealer Address	

SAFETY LABELS

1. LOCATION

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



1	Air cleaner filter	20	Ref operator's manual	40	FOPS FOG plate
2	Turbocharger cover	21	Hammer	41	Caution (water separator, turbocharger)
3	Radiator cap	22	Safety front window	42	Reflecting
4	Fueling	23	Safety rear window	43	Accumulator
5	Battery accident	24	Air conditioner filter	44	Control ideogram (LH)
6	High pressure hose	25	Step tread	45	Control ideogram (RH)
7	Hydraulic oil level	26	Safety knob	47	Swing bearing grease
8	Hydraulic oil lub	27	Model name	48	Battery position
9	Keep clear-rear	29	Trade mark (boom)	50	Fuel shut off
10	Lifting eye	30	Trade mark (CWT)	51	MCU/ECM connector
11	Name plate	31	Reduction gear grease	54	Console box tilting
12	Slinging ideogram	32	Safety work	55	Key off caution
13	Keep clear-side	34	Service instruction	58	Leftover fuel
14	Stay fix	35	Lifting chart	59	Band - cab rear
15	Engine hood shearing	36	Tie	60	Band - LH front
16	No step	37	Keep clear-attach	61	Band - tank
17	Transporting	38	Electric welding		
19	Control ideogram	39	Falling		

2. DESCRIPTION

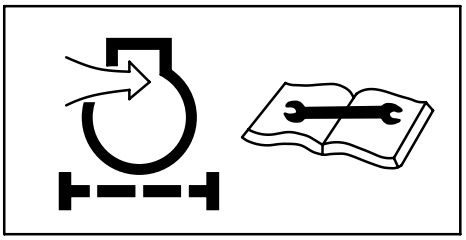
There are several specific warning labels on this machine please become familiarized with all warning labels.

Replace any safety label that is damaged, or missing. If a safety label is attached to a part that is replaced, install a safety label on the replacement part.

1) AIR CLEANER FILTER (item 1)

This warning label is positioned on the air cleaner cover.

※ **Periodic and proper inspection, cleaning and change of elements prolong engine life time and maintain the good performance of engine.**



21070FW01

2) TURBOCHARGER COVER (item 2)

This warning label is positioned on the engine hood.

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

21070FW02

3) RADIATOR CAP (item 3)

This warning label is positioned on the radiator.

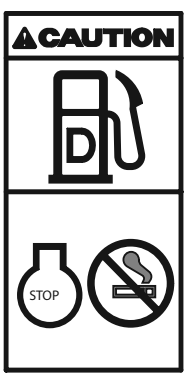
⚠ **Never open the filler cap while engine running or at high coolant temperature. Hot coolant can cause serious burns, injury or death.**

14070FW03

4) FUELING (item 4)

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

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



290F0FW02

5) BATTERY ACCIDENT (item 5)

This warning label is positioned on the battery cover.

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

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

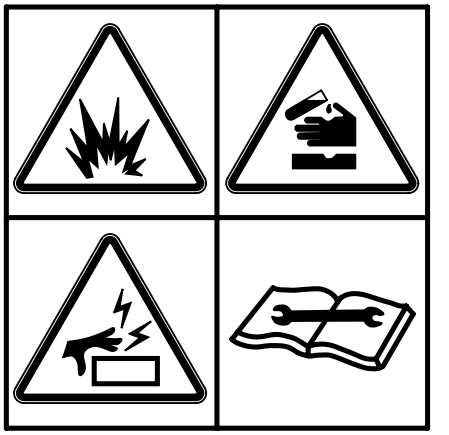
With electrolyte at proper level, less space may cause the gases to be accumulated in the battery.

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

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

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

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



36070FW05

6) HIGH PRESSURE HOSE (item 6)

This warning label is positioned on the front of the upper frame and the rear side of the hydraulic tank.

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

⚠ Avoid the hazard by relieving pressure before disconnecting hydraulic lines or other lines.

※ See the maintenance section for details.

14070FW29

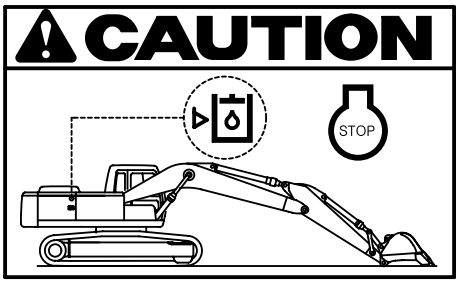
7) HYDRAULIC OIL LEVEL (item 7)

This warning label is positioned on the rear side of the hydraulic tank.

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

※ Check oil level on the level gauge.

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



21070FW07

8) HYDRAULIC OIL LUBRICATION (item 8)

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

※ Do not mix with different brand oils.

⚠ Never open the filler cap while high temperature.

⚠ Loosen the cap slowly and release internal pressure completely.

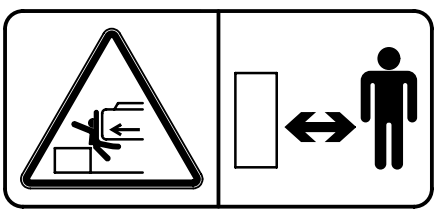
14070FW08

9) KEEP CLEAR-REAR (item 9)

This warning label is positioned on the rear of counterweight.

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

⚠ Do not deface of remove this label from the machine.



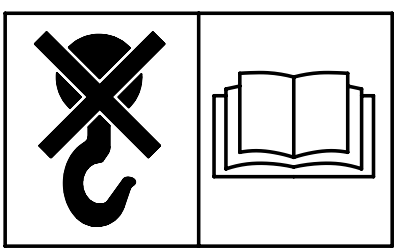
21090FW09

10) LIFTING EYE (item 10)

This warning label is positioned on the counterweight.

⚠ Do not lift the machine by using lifting eyes on the counterweight or the lifting eyes may be subject to overload causing its breaking and possible personal injury.

※ See page 5-7 for proper lifting method of the machine.



21070FW10

11) KEEP CLEAR-SIDE (item 13)

This warning label is positioned on the both side of counterweight.

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

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

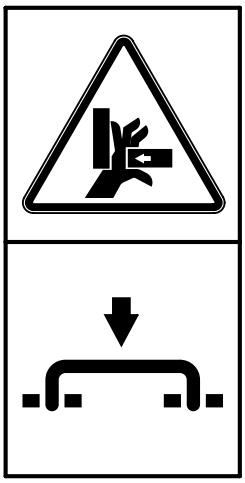
21070FW13

12) STAY FIX (item 14)

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

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

⚠ **Be careful that the opened door may be closed by the external or natural force like strong wind.**



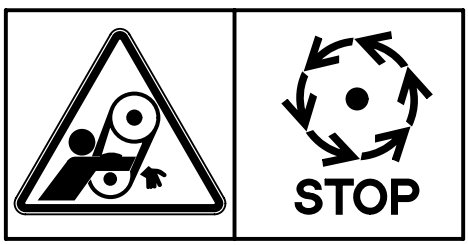
21070FW14

13) ENGINE HOOD SHEARING (item 15)

This warning label is positioned on the engine hood.

⚠ **Don't open the engine hood during the engine's running. Stay clear of rotating parts.**

⚠ **Don't touch exhaust pipe or it may cause severe burn.**



21070FW15

14) NO STEP (item 16)

This warning label is positioned on the engine hood.

△ **Don't step on the engine hood and counterweight.**

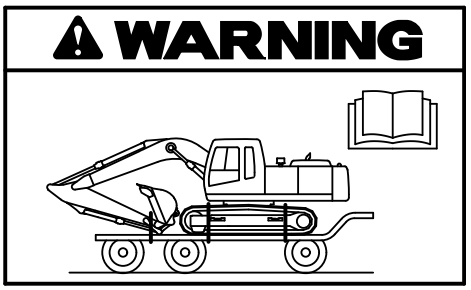
21070FW16

15) TRANSPORTING (item 17)

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

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

See page 5-6 for details.



14070FW17

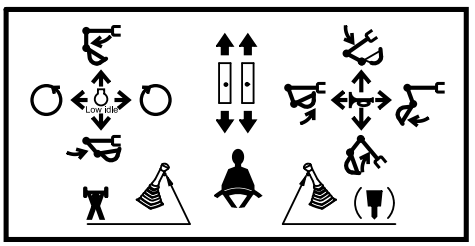
16) CONTROL IDEOGRAM (item 19)

This warning label is positioned in right window of the cab.

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

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

See page 4-13 for details.



36070FW19

17) REF OPERATOR'S MANUAL (item 20)

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

(1) Ref operator manual

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

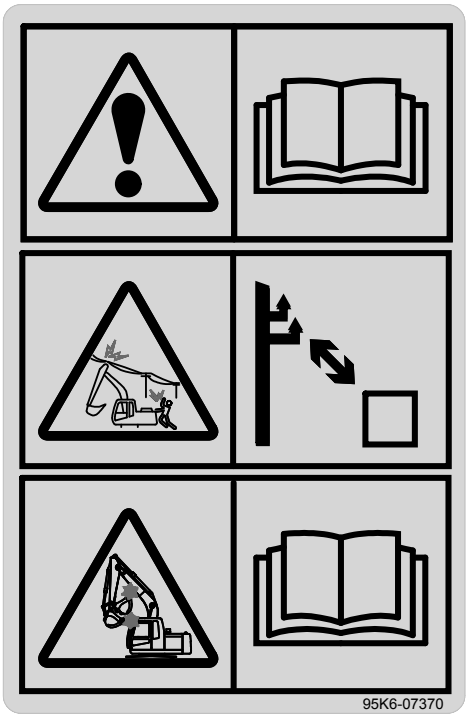
⚠ Do not operate this machine unless you have read and understand the instructions and warnings in this manual. Failure to follow the instructions or warnings could result in injury or death.

(2) Max height

⚠ Serious injury or death can result from contact with electric lines. An electric shock being received by merely coming into the vicinity of an electric lines, the minimum distance should be kept considering the supply voltage as page 1-16.

(3) Interference

⚠ Be careful to operate machine equipped with quick clamp or extensions. Bucket may hit cab or boom, boom cylinders when it reached vicinity of them.



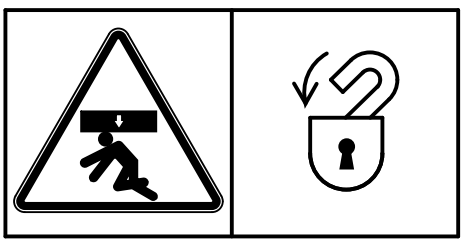
95K6-07370

18) SAFETY FRONT WINDOW (item 22)

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

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

※ See page 3-34 for details.



21070FW24

19) SAFETY REAR WINDOW (item 23)

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

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

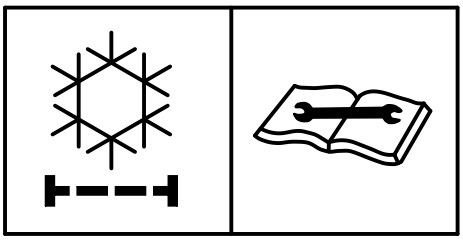
※ **To remove rear window, pull the ring and push out the glass.**

2609A0SL02

20) AIR CONDITIONER FILTER (item 24)

This warning label is positioned on the air conditioner cover.

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

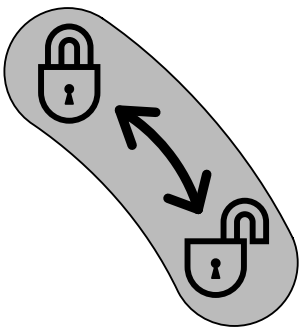


21070FW26

21) SAFETY KNOB (item 26)

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

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

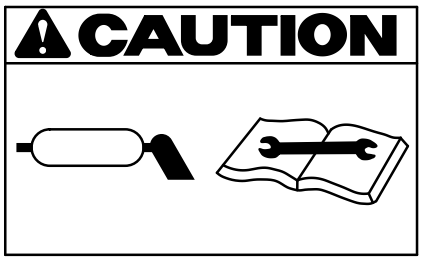


30007A1FW07A

22) REDUCTION GEAR GREASE (item 31)

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

⚠ **Grease is under high pressure.**
Grease coming out of the grease plug under pressure can penetrate the body causing injury or death.



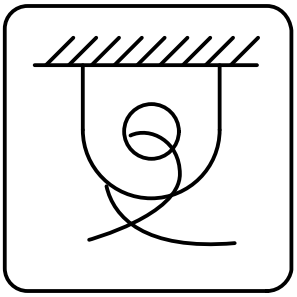
21070FW35

23) TIE (item 36)

This warning label is positioned on the front and rear side of the lower frame.

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

⚠ **See page 4-16 for detail.**



4507A0FW02

24) KEEP CLEAR-ATTACH (item 37)

This warning label is positioned on both side of the arm.

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

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

14070FW31

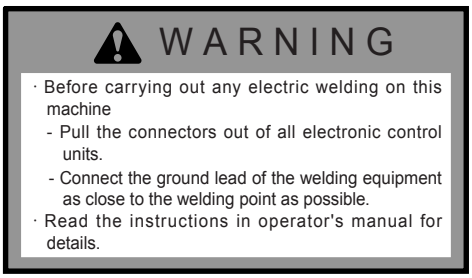
25) ELECTRIC WELDING (item 38)

This warning label is positioned on the battery cover.

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

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

※ **See page 6-43 for detail.**



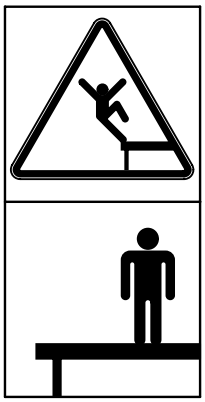
7807AFW20

26) FALLING (item 39)

This warning label is positioned on the top of the pump hood and counterweight.

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

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



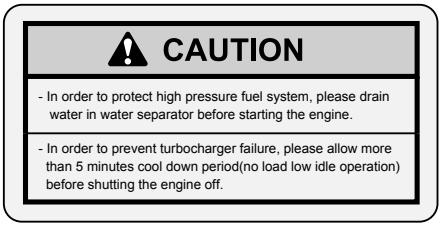
14070FW30

27) CAUTION (W/SEPARATOR, TURBOCHARGER) (item 41)

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

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

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



120090SL02

28) REFLECTING (item 42)

This warning label is positioned on the rear of counterweight.

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

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

290F0FW01

29) ACCUMULATOR (item 43)

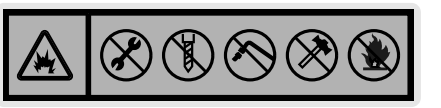
This warning label is positioned on the accumulator of the solenoid valve.

※ **The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.**

⚠ **Never make any hole in the accumulator expose it to flame or fire.**

⚠ **Do not weld anything to the accumulator.**

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



1107A0FW46

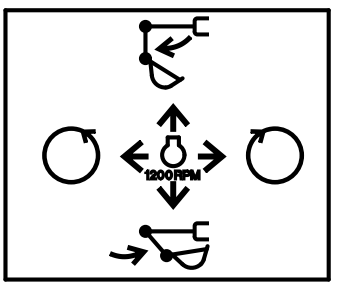
30) CONTROL IDEOGRAM-LH (item 44)

This warning label is positioned on top of LH console box.

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

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

※ **See page 4-27 for detail.**



21070FW20

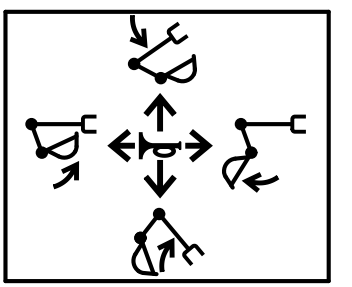
31) CONTROL IDEOGRAM-RH (item 45)

This warning label is positioned on the top of RH console box.

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

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

※ **See page 4-27 for detail.**

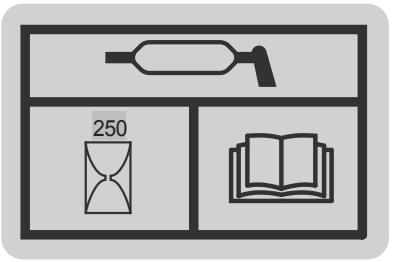


21070FW21

32) SWING BEARING GREASE (item 47)

This warning label is positioned in the front of swing ring gear.

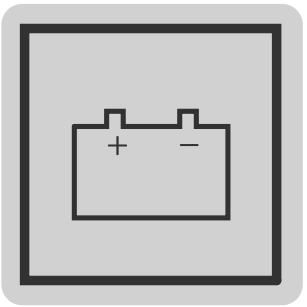
※ **See page 6-34 for details.**



38090FW02

33) BATTERY POSITION (item 48)

This warning label is positioned on the left side cover.



38090FW03

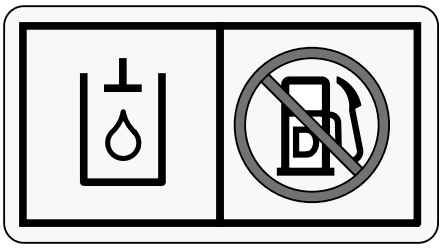
34) FUEL SHUT OFF (item 50)

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

※ **Fill only the hydraulic oil.**

※ **Do not fill the diesel fuel.**

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



140WH90FW51

35) MCU/ECM CONNECTOR (item 51)

This warning label is positioned on the electric box.

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

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

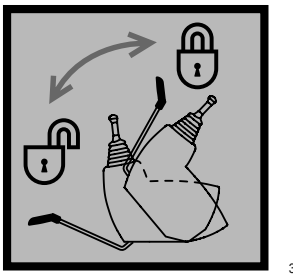
※ **See page 3-34 for details.**

235Z90FW52

36) CONSOLE BOX TILTING (item 54)

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

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



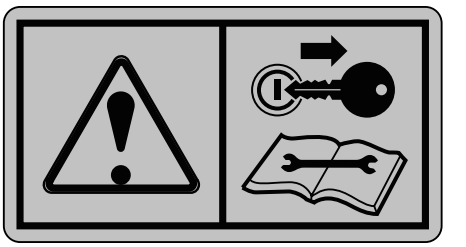
30007A1FW06

37) KEY OFF CAUTION (item 55)

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

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

Extreme care shall be taken during maintenance work.



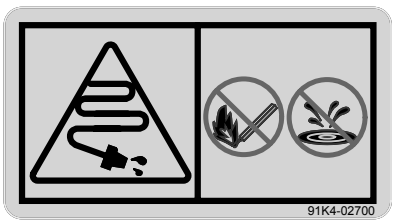
290F0FW05

38) LEFTOVER FUEL (item 58)

This warning label is positioned on the inner right side of tool box.

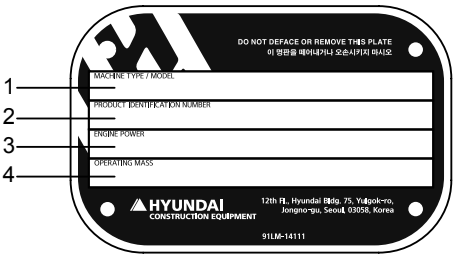
⚠ **Do not fuel a machine near open flames or sparks.**

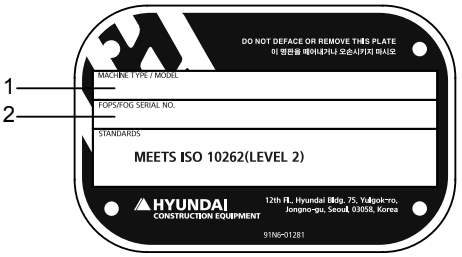
⚠ **Properly clean areas of spillage.**



91K4-02700

MACHINE DATA PLATE





FOR FOPS/FOG

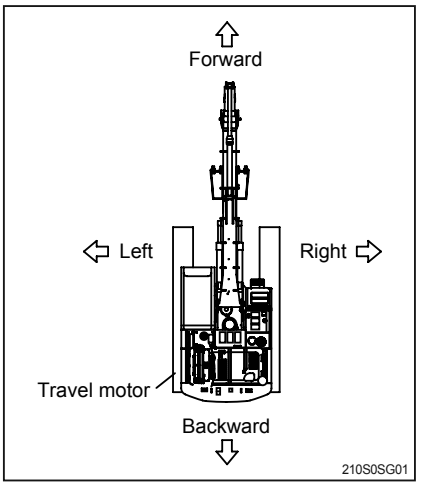
210S0FW06

1 Machine type / model 2 Product identification number 3 Engine power
4 Operating mass

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

1. DIRECTION

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

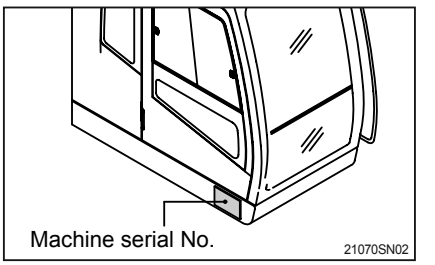


2. SERIAL NUMBER

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

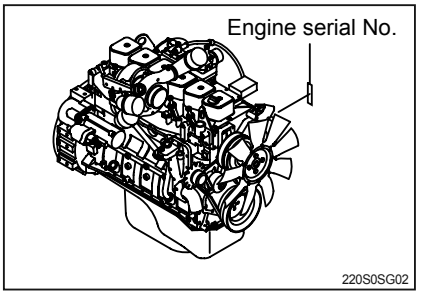
1) MACHINE SERIAL NUMBER

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



2) ENGINE SERIAL NUMBER

The numbers are located on the engine name plate.



3. INTENDED USE

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

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

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

4. SYMBOLS

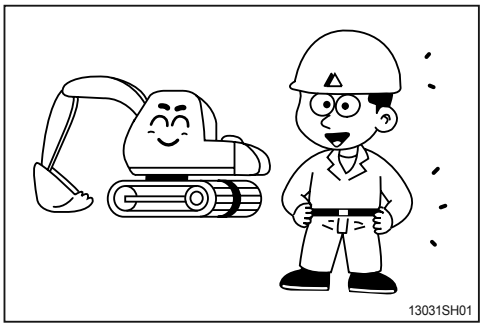
⚠ Important safety hint.

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

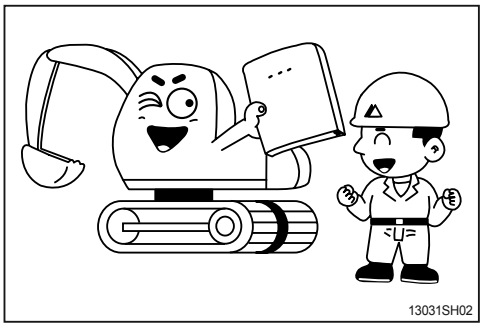
※ It indicates the useful information for operator.

1. BEFORE OPERATING THE MACHINE

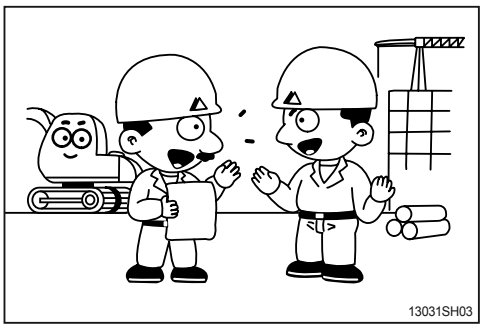
Think-safety first.
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition.
Almost every accident is caused by disregarding the simple and fundamental safety hints.



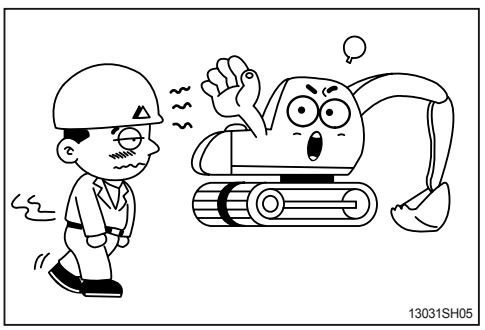
Be sure to understand thoroughly all about the operator's manual before operating the machine.
Proper care is your responsibility.



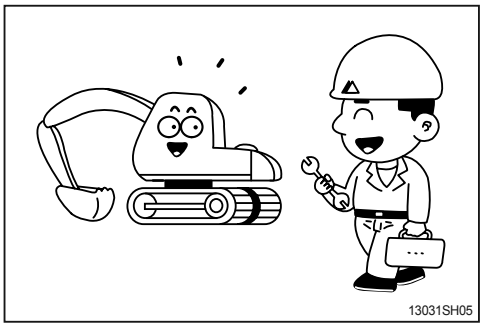
Fully understand the details and process of the construction before starting the work.
If you find anything dangerous on the job, consult with the job supervisor for the preventive measures before operating the machine.



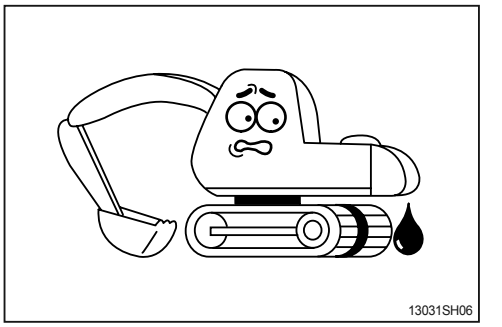
Do not operate when tired, or after drinking alcoholic beverages or any type of drugs.



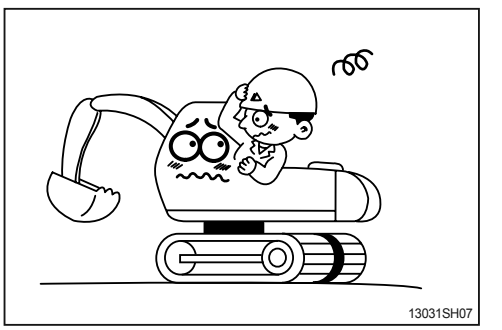
Check daily according to the operation manual.
Repair the damaged parts and tighten the loosened bolts.



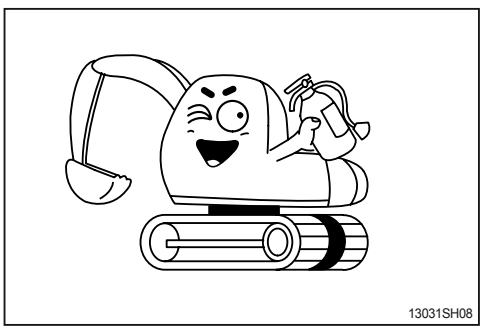
Check for leakage of engine oil, hydraulic oil, fuel and coolant.
Keep machine clean, clean machine regularly.



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



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

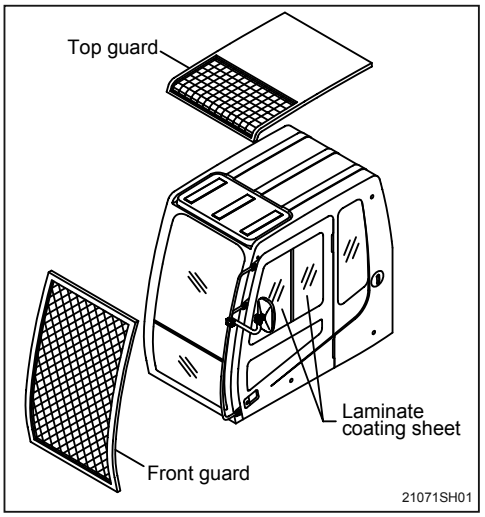


PROTECTION AGAINST FALLING OR FLYING OBJECTS

If there is any danger of falling or flying objects hitting the operator, install protective guards in place to protect the operator as required for each particular situation.

Be sure to close the front window before commencing work.

Make sure to keep all persons other than operator outside the range of falling or flying objects.
In case you need top guard, front guard and FOPS (falling object protective structure), please contact Hyundai distributor.



UNAUTHORIZED MODIFICATION

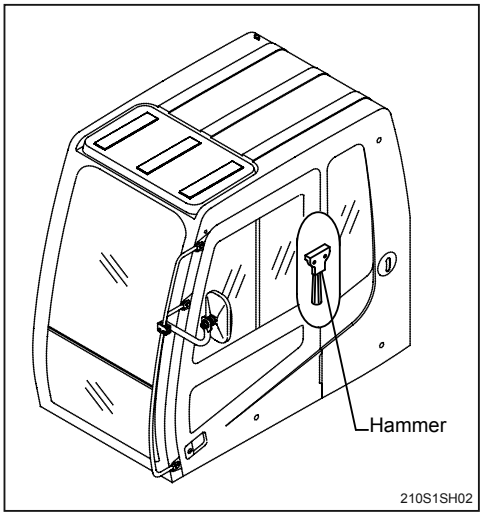
Any modification made without authorization from Hyundai can create hazards.

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

PREPARE FOR EMERGENCY

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

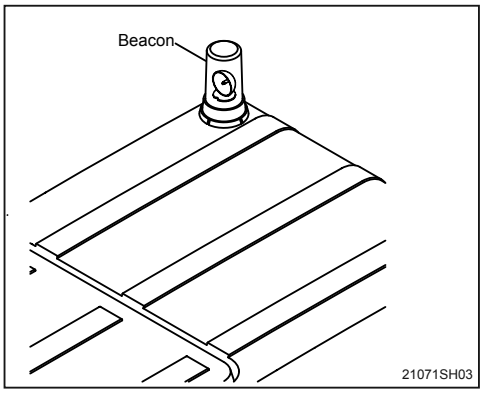
Be sure you know the phone numbers of persons you should contact in case of an emergency.



ROTATING BEACON

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

Please contact your Hyundai distributor to install it.



PRECAUTIONS FOR ATTACHMENTS

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

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

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

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

SAFETY RULES

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

SAFETY FEATURES

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

MACHINE CONTROL PATTERN

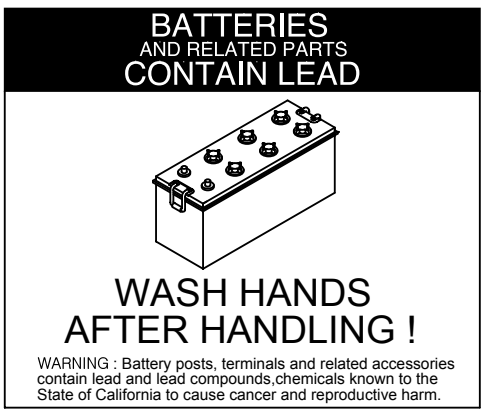
Check machine control pattern for conformance to pattern on label in cab.
If not, change label to match pattern before operating machine.
Failure to do so could result in injury.

CALIFORNIA PROPOSITION 65

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

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

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



13031SH55

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

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

FIRE PREVENTION AND EXPLOSION PREVENTION

Regeneration

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

General

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

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

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

3001SH01

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

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

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

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

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

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

Do not operate the machine near any flame.

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

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

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

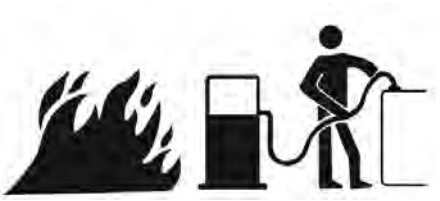
Inspect all lines and hoses for wear or deterioration. Replace damaged lines and hoses. The lines and the hoses should have adequate support and secure clamps. Tighten all connections to the recommended torque. Damage to the protective cover or insulation may provide fuel for fires.

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

3001SH02

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

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



3001SH03

Battery and battery cables

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

3001SH04

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

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

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

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

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

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

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

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

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

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

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

Wiring

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

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

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

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

Consult your Hyundai dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

Lines, Tubes, and Hoses

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

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

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

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

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

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

Ether

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

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

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

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

Fire Extinguisher

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

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

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

Fire Safety

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

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

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

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

Notify emergency personnel of the fire and your location.

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

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

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

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

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

Fire extinguisher Location

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

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

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

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

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

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

Vibration Data for Earth-moving Machines

Information Concerning Hand/Arm Vibration Level

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

Information Concerning Whole Body Vibration Level

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

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

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

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

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

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

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

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

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

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

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

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

Guidelines for Reducing Vibration Levels on Earthmoving Equipment

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

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

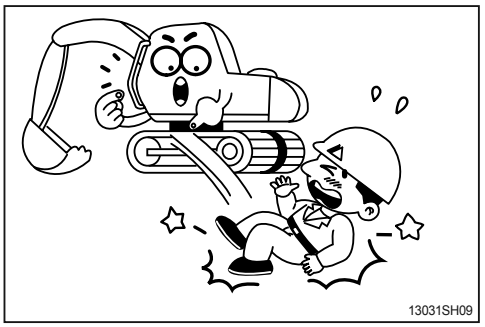
Sources

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

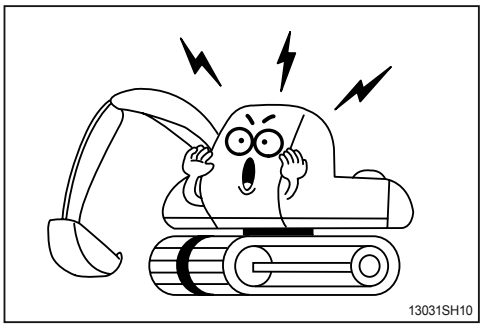
You should check the original directive. This document summarizes part of the content of the applicable law. This document is not meant to substitute the original sources. Other parts of these documents are based on information from the United Kingdom Health and Safety Executive.

2. DURING OPERATING THE MACHINE

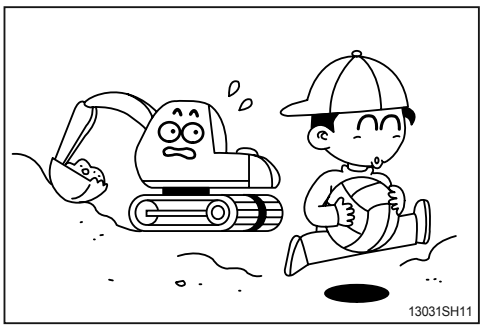
Use the handle and footstep when getting on or off the machine.
Do not jump on or off the machine.



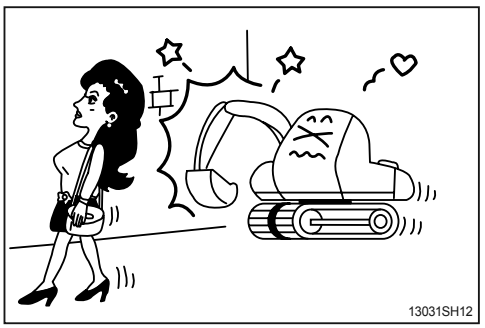
Sound the horn to warn nearby personnel before operating the machine.
Remove all the obstacles like frost on the window before operating the machine for the good visibility.



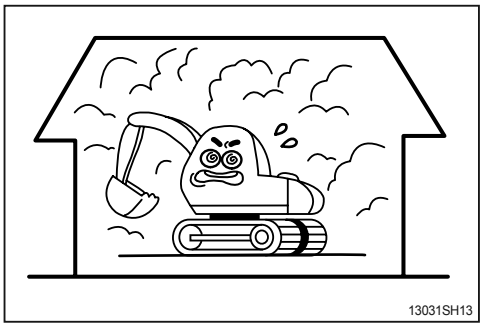
Operate carefully to make sure all personnel or obstacles are clear within the working range of the machine.
Place safety guards if necessary.



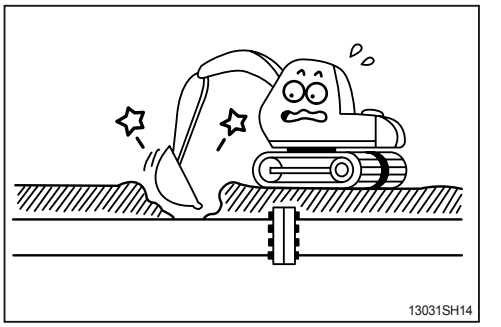
When using the work equipment, pay attention to job site.



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

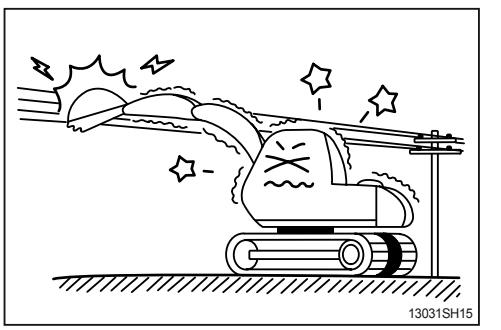


Check the locations of underground gas pipes or water line and secure the safety before operation.

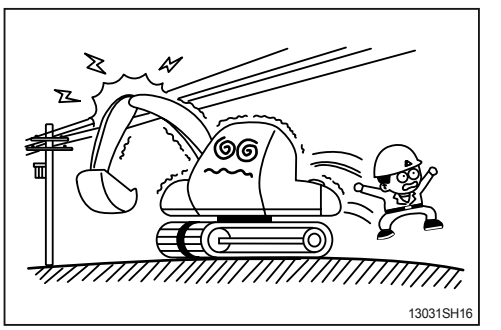


The operating near the electrical lines is very dangerous.
Operate within safe working range permitted as below.

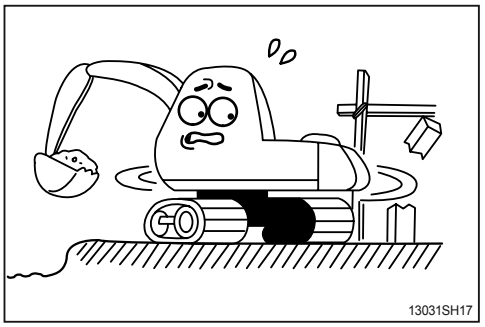
Supply voltage	Min safe separation
6.6 kV	3m (10 ft)
33.0 kV	4m (13 ft)
66.0 kV	5m (16 ft)
154.0 kV	8m (26 ft)
275.0 kV	10m (33 ft)



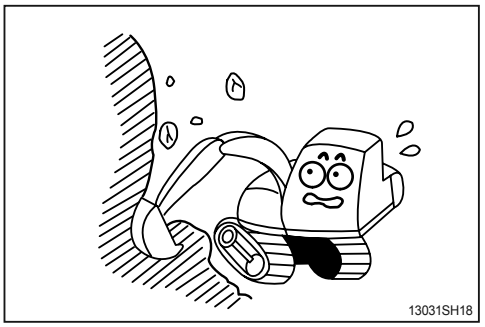
If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current. Jump off the machine without contacting the machine when you need to get off.



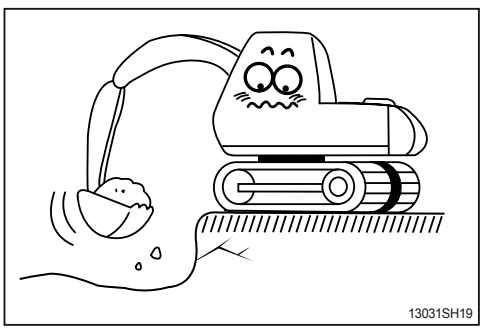
Watch out for obstacles.
Be particularly careful to check the machine clearance during the swing.



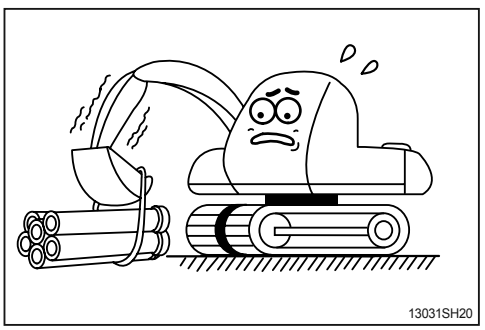
When using the machine as breaker or working in a place where stones may fall down, cab roof guard and head guard should be provided for proper protection.



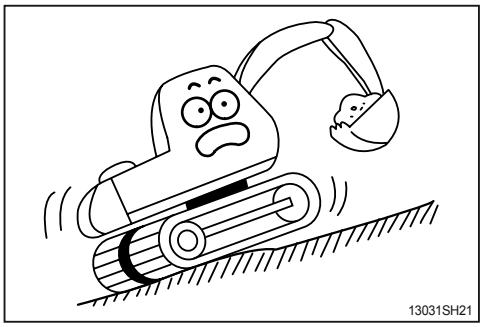
Avoid operating on a cliff or soft ground as there is danger of rolling over.
Make sure to get off easily as keeping the track at a right angle and putting the travel motor into the backward position when working on a cliff or soft ground inevitably.



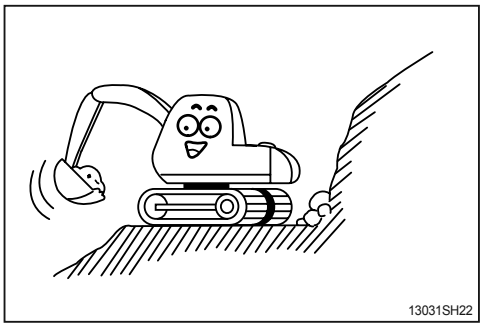
Operate for the lifting work considering the capacity of machine, weight and width of the load.
Be careful not to lift exceeding the machine capacity as it can be the cause of machine damage and safety accident.



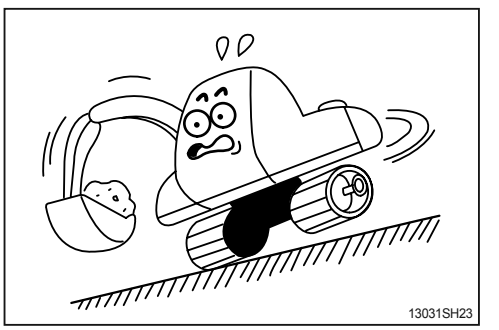
The operation on a slope is dangerous.
Avoid operating the machine on a slope of over 10 degree.



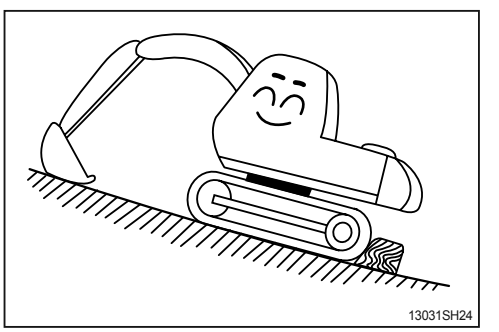
Operate the machine after making ground flat when operation is required on a slope.



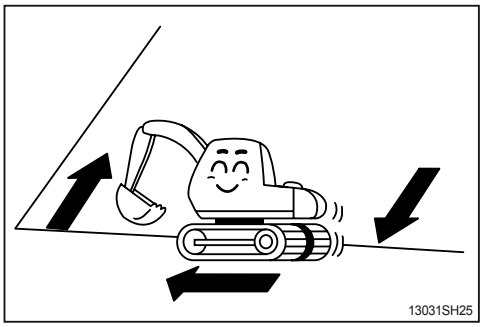
The swing on the slope can be danger of rolling over.
Do not operate to swing the machine with the bucket loaded on a slope since the machine may lose its balance under such an instance.



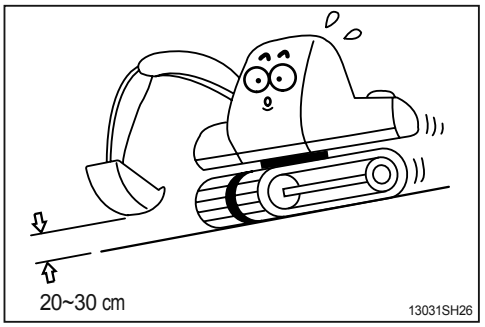
Avoid parking and stopping on a slope.
Lower the bucket to the ground and block the track when parking.



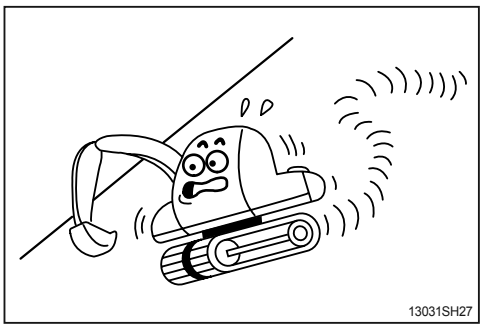
Avoid traveling in a cross direction on a slope as it can cause the danger of rolling over and sliding.



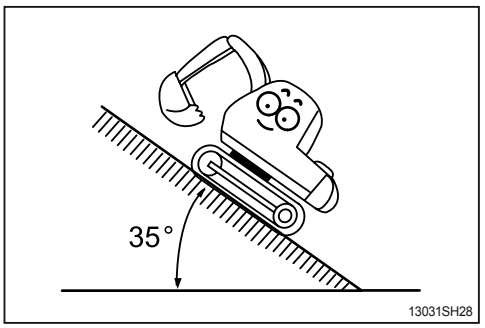
Traveling on a slope is dangerous.
Be sure to operate slowly when traveling down a slope and maintain the bucket at a height of 20~30 ㎝ (1 ft) above the ground so that it can be used as brake in an emergency.



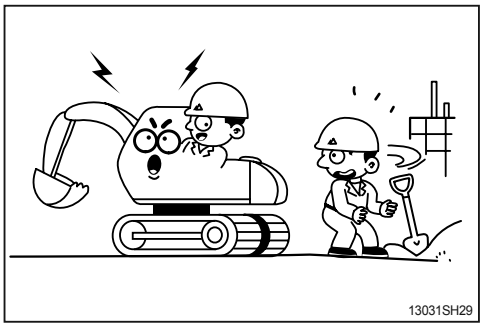
Steering of the machine while traveling on a slope is dangerous.
When an inevitable turning of direction is required, turn on the flat and solid ground.



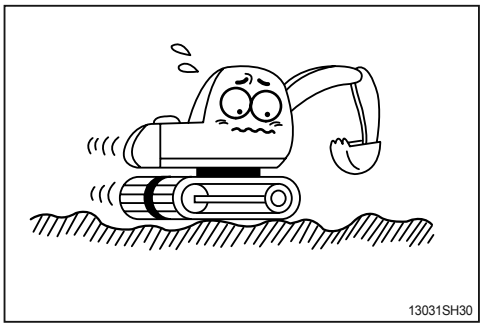
The engine angularity limits are 35 degree.
Do not operate by more than the engine limits in any case.



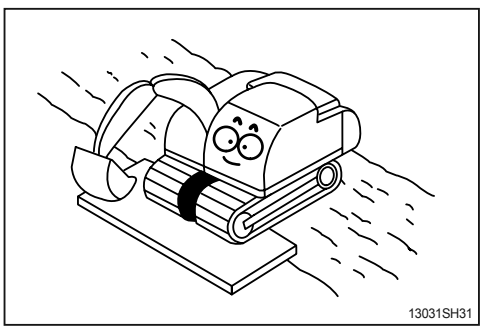
Before traveling the machine, sound the horn to warn nearby personnel.
Operate forward and backward correctly with confirming the location of the travel motor.



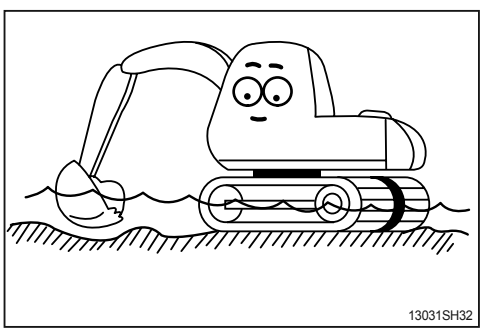
Slow down when traveling through obstacles or uneven ground.



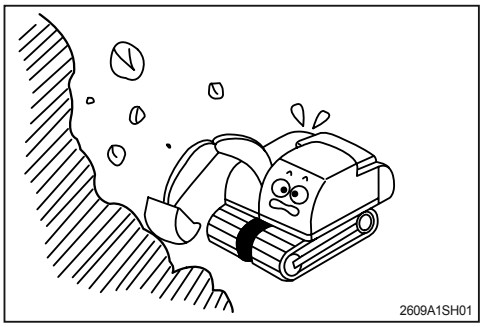
When working on soft ground, place mats or wood boards on the ground to prevent the machine sinking.



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



This machine has ROPS / FOG with option.
Do not attempt to repair a rollover protective structure (ROPS) after an accident.
Repaired structures do not provide the original structure and protection.
Test and approved as a protective CAB according to ROPS and FOG standard.
Meets : ISO 10262 / 3449 / 12117-2
SAE J1356 / JISO 3449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MOUNTING AND DISMOUNTING

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

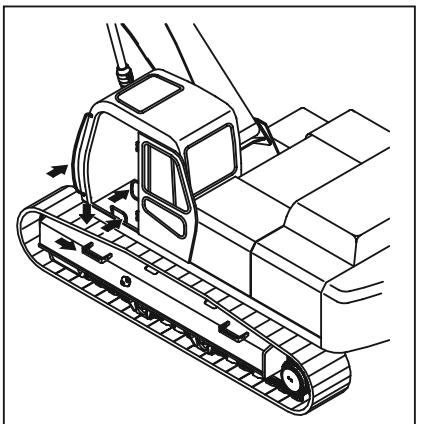
When mounting or dismounting, always face the machine and use the handrails, machine or track frame steps, and track shoes. Additional track frame step can be fitted for wider optional shoe. In this case please contact your Hyundai distributor.

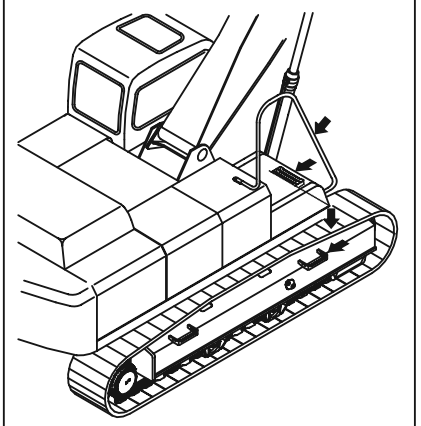
Do not hold any control levers when getting on or off the machine.

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

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

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


29071FW05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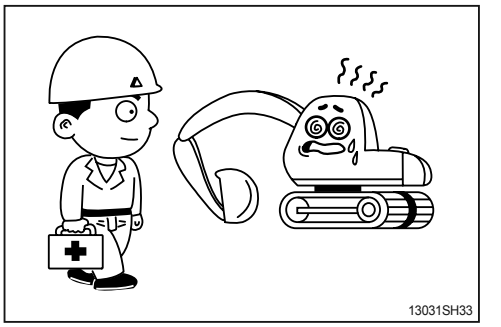
KEEP RIDERS OFF MACHINE

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

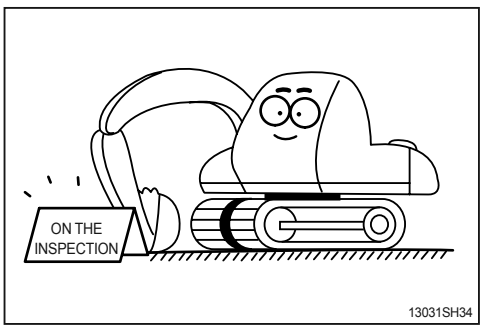
Only allow the operator on the machine. Keep riders off.

3. DURING MAINTENANCE

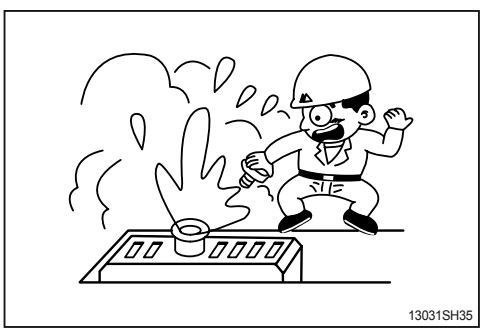
Stop the engine immediately when the trouble of the machine is found.
Inspect immediately the cause of trouble such as vibration, overheating and trouble in the cluster then repair.



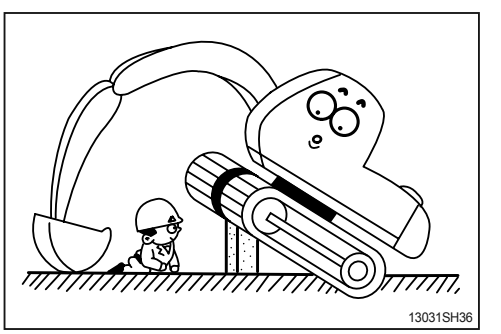
Park on a flat place and stop the engine for inspecting and repairing. Properly TAG machine is not operational. (remove start key)
Extreme care shall be taken during maintenance work. Parts may require additional safe guard.



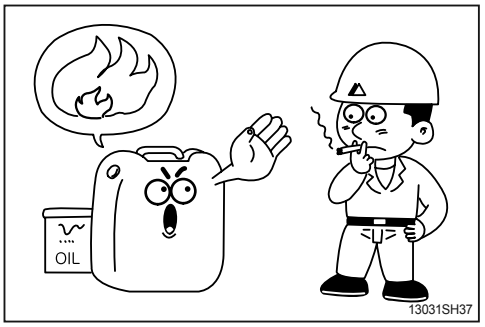
Do not remove the radiator cap from hot engine. Open the cap after the engine cools, below 50 °C (122 °F) to prevent personal injury from heated coolant spray or steam.



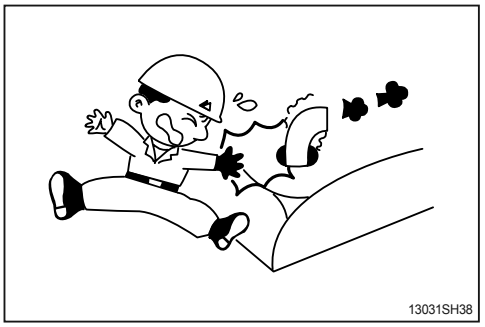
Do not work below the machine.
Be sure to work with proper safety supports.
Do not depend on the hydraulic cylinders to hold up the equipment and attachment.



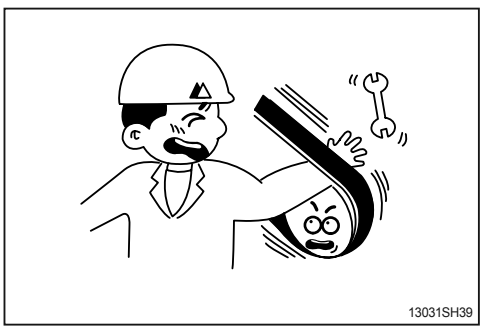
There is the danger of fire in fuel and oil.
Store in cool and dry area, away from any open flames.



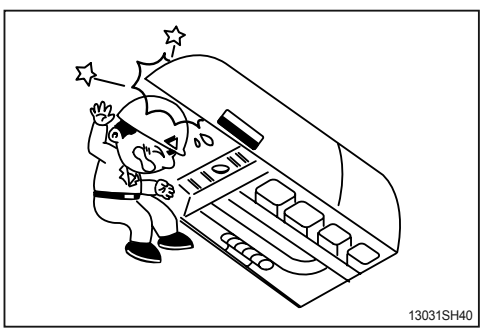
Do not touch exhaust pipe, or may cause severe burn.



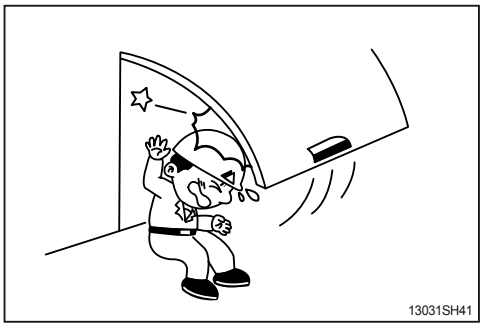
Do not open the engine hood and covers while the engine is running.



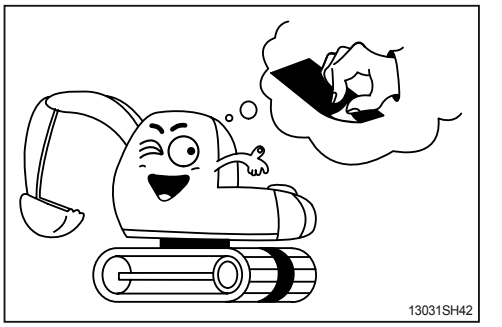
Be careful of not hitting the edges when you service engine.



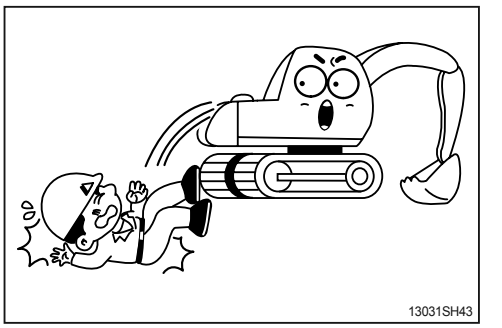
Be careful that the front window may be promptly closed.
Be sure to support stay, when the side door needs to be opened.
Be careful that the open side door may closed by the external or natural force like strong wind.



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

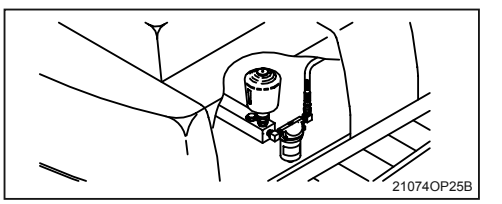


Be careful of not touching slip, fall down etc., when you work at the upper frame to service engine and/or other component.



HIGH PRESSURE GAS

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

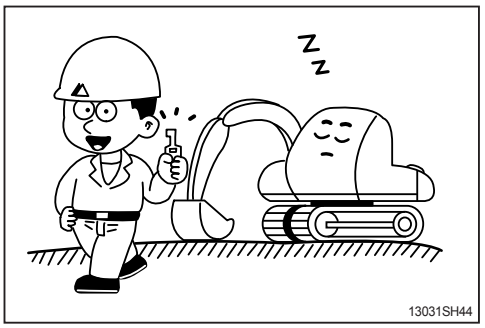


LIFT EYES CAN FAIL

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

4. PARKING

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



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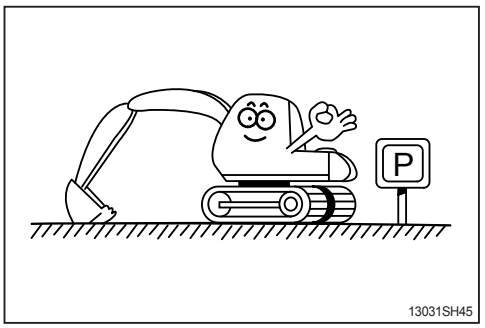
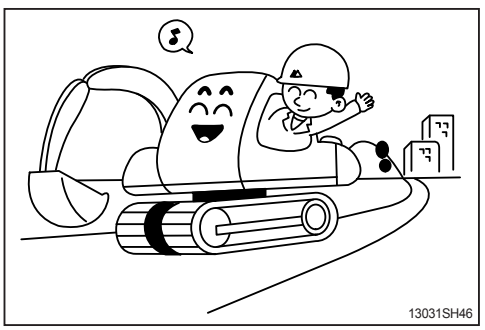
Park the machine in the flat and safe place.

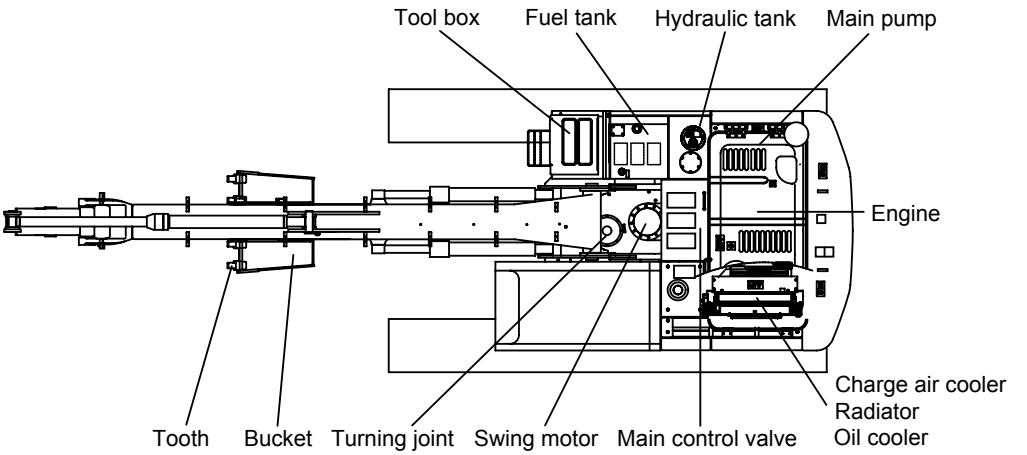


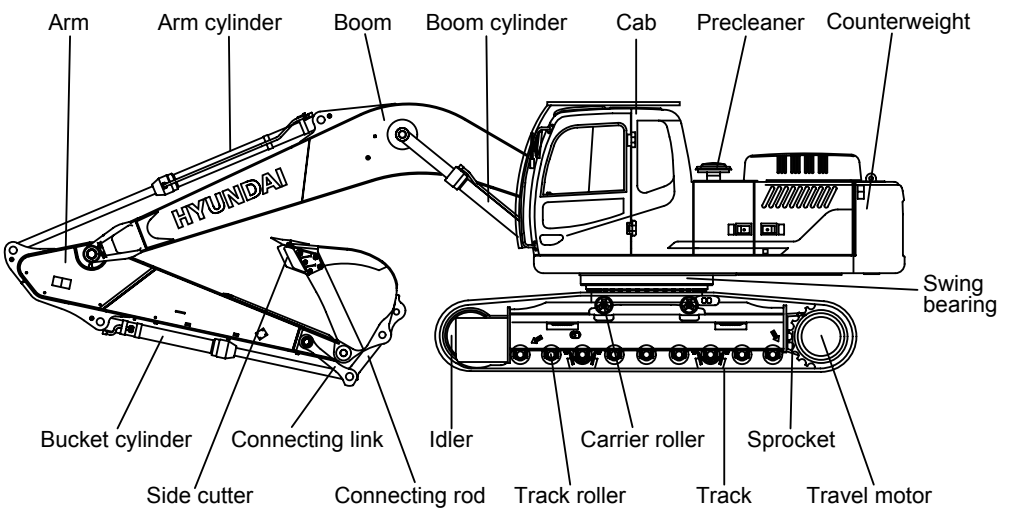
13031SH45

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


13031SH46

1. MAJOR COMPONENT

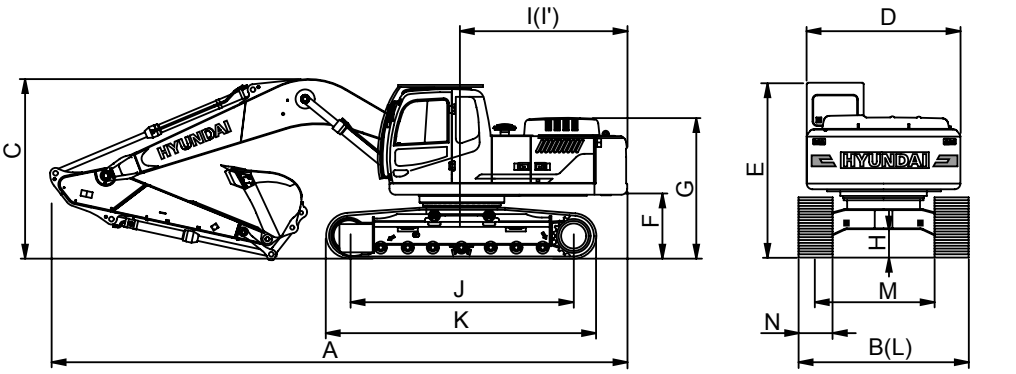




210S2SP01A

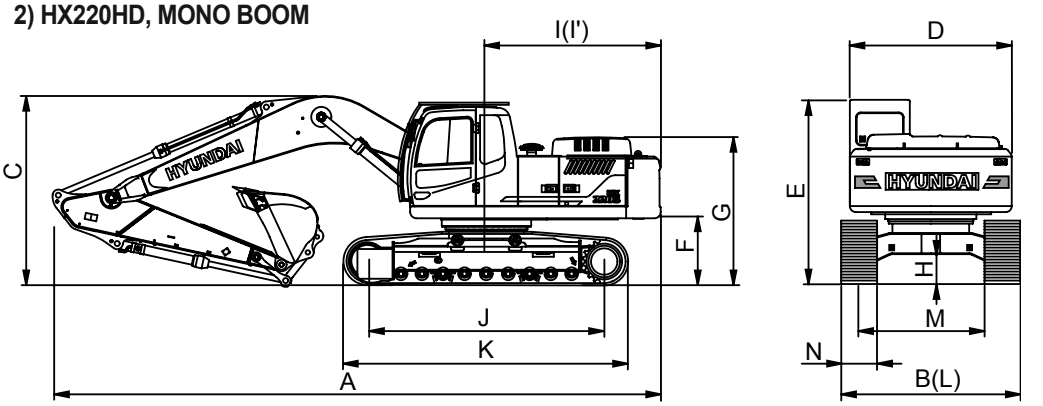
2. SPECIFICATIONS

1) **HX210HD MONO BOOM**



Description		Unit		Specification		
		m (ft-in)	Boom	5.68 (18' 8")		
			Arm	2.92 (9' 7")	2.00 (6' 7")	2.40 (7' 10")
		mm (in)	Shoe	600 (24)		
Operating weight		kg (lb)		20990 (46270)	20790 (45830)	20860 (45990)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)		0.92 (1.20)	0.92 (1.20)	0.92 (1.20)
Overall length	A	mm (ft-in)		9530 (31' 3")	9650 (31' 8")	9570 (31' 5")
Overall width	B			2800 (9' 2")	2800 (9' 2")	2800 (9' 2")
Overall height of boom	C			3030 (9' 11")	3200 (10' 6")	3110 (10' 2")
Superstructure width	D			2700 (8' 10")	2700 (8' 10")	2700 (8' 10")
Overall height of cab	E			3000 (9' 10")	3000 (9' 10")	3000 (9' 10")
Ground clearance of counterweight	F			1060 (3' 6")	1060 (3' 6")	1060 (3' 6")
Overall height of engine hood	G			2380 (7' 10")	2380 (7' 10")	2380 (7' 10")
Overall height of handrail	G'			2970 (9' 9")	2970 (9' 9")	2970 (9' 9")
Minimum ground clearance	H			470 (1' 7")	470 (1' 7")	470 (1' 7")
Rear-end distance	I			2770 (9' 1")	2770 (9' 1")	2770 (9' 1")
Rear-end swing radius	I'			2845 (9' 4")	2845 (9' 4")	2845 (9' 4")
Distance between tumblers	J			3360 (11' 0")	3360 (11' 0")	3360 (11' 0")
Undercarriage length	K			4170 (13' 8")	4170 (13' 8")	4170 (13' 8")
Undercarriage width	L			2800 (9' 2")	2800 (9' 2")	2800 (9' 2")
Track gauge	M			2200 (7' 3")	2200 (7' 3")	2200 (7' 3")
Track shoe width, standard	N			600 (2' 0")	600 (2' 0")	600 (2' 0")
Travel speed (low/high)		km/hr (mph)		3.5/5.7	3.5/5.7	3.5/5.7
Swing speed		rpm		12.2	12.2	12.2
Gradeability		Degree (%)		35 (70)	35 (70)	35 (70)
Ground pressure		kgf/cm^2 (psi)		0.48 (6.86)	0.48 (6.80)	0.48 (6.82)
Max traction force		kg (lb)		21100 (46517)	21100 (46517)	21100 (46517)

2) HX220HD, MONO BOOM



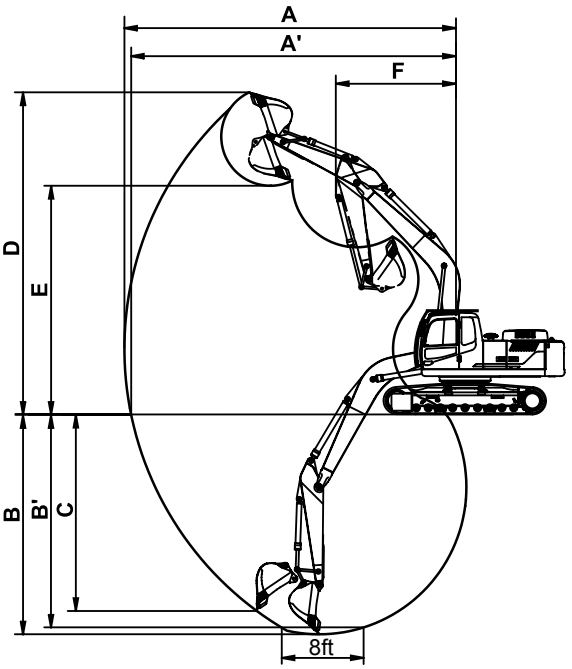
210S2SP03

Description		Unit		Specification		
		m (ft-in)	Boom	5.68 (20' 6")		
			Arm	2.92 (9' 7")	2.00 (6' 7")	2.40 (7' 10")
		mm (in)	Shoe	600 (24)		
Operating weight		kg (lb)		21420(47220)	21220 (46780)	21280 (46910)
Bucket capacity (SAE heaped), standard		m^3 (yd^3)		0.92 (1.20)	0.92 (1.20)	0.92 (1.20)
Overall length	A	mm (ft-in)		9530 (31' 3")	9650 (31' 8")	9570 (31' 5")
Overall width	B			2990 (9' 10")	2990 (9' 10")	2990 (9' 10")
Overall height of boom	C			3030 (9' 11")	3200 (10' 6")	3110 (10' 2")
Superstructure width	D			2700 (8' 10")	2700 (8' 10")	2700 (8' 10")
Overall height of cab	E			3000 (9' 10")	3000 (9' 10")	3000 (9' 10")
Ground clearance of counterweight	F			1060 (3' 6")	1060 (3' 6")	1060 (3' 6")
Overall height of engine hood	G			2380 (7' 10")	2380 (7' 10")	2380 (7' 10")
Overall height of handrail	G'			2970 (9' 9")	2970 (9' 9")	2970 (9' 9")
Minimum ground clearance	H			470 (1' 7")	470 (1' 7")	470 (1' 7")
Rear-end distance	I			2770 (9' 1")	2770 (9' 1")	2770 (9' 1")
Rear-end swing radius	I'			2845 (9' 4")	2845 (9' 4")	2845 (9' 4")
Distance between tumblers	J			3650 (12' 0")	3650 (12' 0")	3650 (12' 0")
Undercarriage length	K			4440 (14' 7")	4440 (14' 7")	4440 (14' 7")
Undercarriage width	L			2990 (9' 10")	2990 (9' 10")	2990 (9' 10")
Track gauge	M			2390 (7' 10")	2390 (7' 10")	2390 (7' 10")
Track shoe width, standard	N			600 (2' 0")	600 (2' 0")	600 (2' 0")
Travel speed (low/high)		km/hr (mph)		3.5/5.7	3.5/5.7	3.5/5.7
Swing speed		rpm		12.2	12.2	12.2
Gradeability		Degree (%)		35 (70)	35 (70)	35 (70)
Ground pressure		kgf/cm^2 (psi)		0.45 (6.50)	0.45 (6.45)	0.45 (6.46)
Max traction force		kg (lb)		21100 (46517)	21100 (46517)	21100 (46517)

3. WORKING RANGE AND DIGGING FORCE

1) HX210HD, MONO BOOM

HX220HD,MONO BOOM



210S2SP04A

Description	m (ft-in)	Boom	5.68 (18' 8")		
		Arm	2.92 (9' 7")	2.00 (6' 7")	2.40 (7' 10")
Max digging reach	mm (ft-in)	A	9,980 (32' 9")	9,140 (30' 0")	9,500 (31' 2")
Max digging reach on ground		A'	9,820 (32' 3")	8,960 (29' 5")	9,330 (30' 7")
Max digging depth		B	6,730 (22' 1")	5,820 (19' 1")	6,220 (20' 5")
Max digging depth (8 ft level)		B'	6,560 (21' 6")	5,580 (18' 4")	6,010 (19' 9")
Max vertical wall digging depth		C	6,280 (20' 7")	5,280 (17' 4")	5,720 (18' 9")
Max digging height		D	9,600 (31' 6")	9,140 (30' 0")	9,340 (30' 8")
Max dumping height		E	6,780 (22' 3")	6,330 (20' 9")	6,520 (21' 5")
Min swing radius		F	3,670 (12' 0")	3,750 (12' 4")	3,740 (12' 3")
Bucket digging force	kN	SAE	133.4	133.4	133.4
	kgf		13600	13600	13600
	lbf		29980	29980	29980
	kN	ISO	152.0	152.0	152.0
	kgf		15500	15500	15500
	lbf		34170	34170	34170
Arm digging force	kN	SAE	102.0	144.2	119.6
	kgf		10400	14700	12200
	lbf		22930	32410	26900
	kN	ISO	106.9	151.0	125.5
	kgf		10900	15400	12800
	lbf		24030	33950	28220

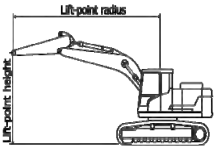
4. WEIGHT

Item	HX210HD		HX220HD	
	kg	lb	kg	lb
Upperstructure assembly	8950	19730	←	
Main frame weld assembly	2600	5730	←	
Engine assembly	437	963	←	
Main pump assembly	120	265	←	
Main control valve assembly	200	440	←	
Swing motor assembly	190	420	←	
Hydraulic oil tank assembly	240	530	←	
Fuel tank assembly	195	430	←	
Counterweight	3600	7940	←	
Cab assembly	310	680	←	
Lower chassis assembly	8060	17770	8700	19180
Track frame weld assembly	2545	5611	2720	6000
Swing bearing	290	639	←	
Travel motor assembly	305	670	←	
Turning joint	55	120	←	
Track recoil spring	140	309	←	
Idler	151	333	←	
Carrier roller	21	46	←	
Track roller	48	106	←	
Track-chain assembly (600 mm standard triple grouser shoe)	1353	2983	1356	2989
Front attachment assembly (5.68 m boom, 2.92 m arm, 0.87 m^3 SAE heaped bucket)	4030	8880	←	
5.68 m boom assembly	1640	3620	←	
2.92 m arm assembly	750	1650	←	
0.92 m^3 SAE heaped bucket	765	1690	←	
Boom cylinder assembly	180	400	←	
Arm cylinder assembly	290	640	←	
Bucket cylinder assembly	175	390	←	
Bucket control link assembly	170	370	←	

5. LIFTING CAPACITIES

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa. [㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger [F]	Outtriger [R]	Cabin type
HX210HD	OPT	MONO	GP	5680	GP	2000	GP	0.92	NO	NO	3600	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius								At max. reach		
		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
												m(ft)
7.5m	kg									*5700	*5700	5.00
24.6ft	lb									*12570	*12570	(16.4)
6.0m	kg					*5440	4320			*5500	3910	6.35
19.7ft	lb					*11990	9520			*12130	8620	(20.8)
4.5m	kg			*6870	6500	*5780	4190			4890	3160	7.14
14.8ft	lb			*15150	14330	*12740	9240			10780	6970	(23.4)
3.0m	kg			*8650	5950	6250	3970	4430	2840	4390	2810	7.55
9.8ft	lb			*19070	13120	13780	8750	9770	6260	9680	6190	(24.8)
1.5m	kg					6020	3770	4350	2760	4230	2690	7.64
4.9ft	lb					13270	8310	9590	6080	9330	5930	(25.1)
0.0m	kg			9160	5420	5890	3650			4360	2760	7.43
0.0ft	lb			20190	11950	12990	8050			9610	6080	(24.4)
-1.5m	kg			9180	5430	5880	3640			4870	3060	6.88
-4.9ft	lb			20240	11970	12960	8020			10740	6750	(22.6)
-3.0m	kg	*12330	10710	*9100	5570					6170	3860	5.90
-9.8ft	lb	*27180	23610	*20060	12280					13600	8510	(19.4)
-4.5m	kg											
-14.8ft	lb											

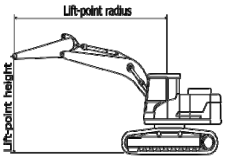
Note 1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the HX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The Lift-point is bucket pivot mounting pin on the arm (without bucket mass).
4. *Indicates load limited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

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

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa. [㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger [F]	Outtriger [R]	Cabin type
HX220HD	OPT	MONO	GP	5680	GP	2000	GP	0.92	NO	NO	3600	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius								At max. reach		
		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
												m(ft)
7.5m	kg									*5700	*5700	5.00
24.6ft	lb									*12570	*12570	(16.4)
6.0m	kg					*5440	4810			*5500	4360	6.35
19.7ft	lb					*11990	10600			*12130	9610	(20.8)
4.5m	kg			*6870	*6870	*5780	4680			5510	3540	7.14
14.8ft	lb			*15150	*15150	*12740	10320			12150	7800	(23.4)
3.0m	kg			*8650	6710	*6510	4450	5000	3190	4950	3160	7.55
9.8ft	lb			*19070	14790	*14350	9810	11020	7030	10910	6970	(24.8)
1.5m	kg					6850	4250	4920	3110	4780	3030	7.64
4.9ft	lb					15100	9370	10850	6860	10540	6680	(25.1)
0.0m	kg			*10480	6160	6710	4130			4940	3110	7.43
0.0ft	lb			*23100	13580	14790	9110			10890	6860	(24.4)
-1.5m	kg			*10180	6180	6700	4120			5520	3450	6.88
-4.9ft	lb			*22440	13620	14770	9080			12170	7610	(22.6)
-3.0m	kg	*12330	*12330	*9100	6320					*6650	4340	5.91
-9.8ft	lb	*27180	*27180	*20060	13930					*14660	9570	(19.4)
-4.5m	kg											
-14.8ft	lb											

Note 1. Lifting capacity are based on ISO 10567.
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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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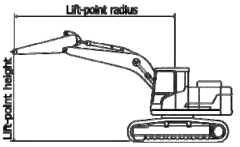
Consult your Hyundai dealer regarding the lifting capacities for specific work tools and attachments.

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

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa.[㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger [F]	Outtriger [R]	Cabin type
HX210HD	OPT	MONO	GP	5680	GP	2000	GP	0.92	NO	NO	4200	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius								At max. reach		
		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
												m(ft)
7.5m	kg									*5700	*5700	5.00
24.6ft	lb									*12570	*12570	(16.4)
6.0m	kg					*5440	4660			*5500	4220	6.35
19.7ft	lb					*11990	10270			*12130	9300	(20.8)
4.5m	kg			*6870	*6870	*5780	4530			5220	3430	7.14
14.8ft	lb			*15150	*15150	*12740	9990			11510	7560	(23.4)
3.0m	kg			*8650	6430	*6510	4310	4750	3100	4700	3060	7.55
9.8ft	lb			*19070	14180	*14350	9500	10470	6830	10360	6750	(24.8)
1.5m	kg					6450	4100	4660	3020	4540	2940	7.64
4.9ft	lb					14220	9040	10270	6660	10010	6480	(25.1)
0.0m	kg			9810	5900	6320	3990			4680	3010	7.43
0.0ft	lb			21630	13010	13930	8800			10320	6640	(24.4)
-1.5m	kg			9830	5920	6300	3970			5220	3340	6.88
-4.9ft	lb			21670	13050	13890	8750			11510	7360	(22.6)
-3.0m	kg	*12330	11600	*9100	6060					6600	4200	5.90
-9.8ft	lb	*27180	25570	*20060	13360					14550	9260	(19.4)
-4.5m	kg											
-14.8ft	lb											

Note 1. Lifting capacity are based on ISO 10567.
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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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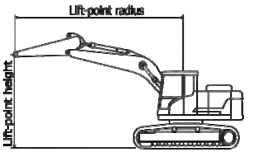
Consult your Hyundai dealer regarding the lifting capacities for specific work tools and attachments.

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

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa. [㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger [F]	Outtriger [R]	Cabin type
HX220HD	OPT	MONO	GP	5680	GP	2000	GP	0.92	NO	NO	4200	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius								At max. reach		
		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
												m(ft)
7.5m	kg									*5700	*5700	5.00
24.6ft	lb									*12570	*12570	(16.4)
6.0m	kg					*5440	5160			*5500	4680	6.35
19.7ft	lb					*11990	11380			*12130	10320	(20.8)
4.5m	kg			*6870	*6870	*5780	5030			*5540	3820	7.14
14.8ft	lb			*15150	*15150	*12740	11090			*12210	8420	(23.4)
3.0m	kg			*8650	7220	*6510	4800	5340	3450	5280	3420	7.55
9.8ft	lb			*19070	15920	*14350	10580	11770	7610	11640	7540	(24.8)
1.5m	kg					*7230	4600	5250	3370	5110	3290	7.64
4.9ft	lb					*15940	10140	11570	7430	11270	7250	(25.1)
0.0m	kg			*10480	6680	7170	4480			5270	3370	7.43
0.0ft	lb			*23100	14730	15810	9880			11620	7430	(24.4)
-1.5m	kg			*10180	6690	7150	4460			5890	3750	6.88
-4.9ft	lb			*22440	14750	15760	9830			12990	8270	(22.6)
-3.0m	kg	*12330	*12330	*9100	6840					*6650	4700	5.91
-9.8ft	lb	*27180	*27180	*20060	15080					*14660	10360	(19.4)
-4.5m	kg											
-14.8ft	lb											

Note 1. Lifting capacity are based on ISO 10567.
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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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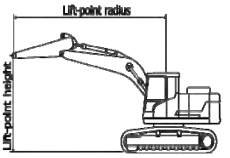
⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessory for non-standard configurations.

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa.[㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger[F]	Outtriger[R]	Cabin type
HX210HD	OPT	MONO	GP	5680	GP	2400	GP	0.92	NO	NO	3600	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius								At max. reach		
		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
												m(ft)
7.5m	kg									*5080	4910	5.58
24.6ft	lb									*11200	10820	(18.3)
6.0m	kg					*4980	4380			*4620	3490	6.82
19.7ft	lb					*10980	9660			*10190	7690	(22.4)
4.5m	kg			*6320	*6320	*5430	4230	4520	2920	4470	2880	7.55
14.8ft	lb			*13930	*13930	*11970	9330	9960	6440	9850	6350	(24.8)
3.0m	kg			*8110	6050	*6200	3990	4440	2840	4050	2590	7.94
9.8ft	lb			*17880	13340	*13670	8800	9790	6260	8930	5710	(26.1)
1.5m	kg			9370	5590	6030	3770	4330	2740	3910	2480	8.03
4.9ft	lb			20660	12320	13290	8310	9550	6040	8620	5470	(26.3)
0.0m	kg			9130	5390	5870	3630	4260	2680	4010	2530	7.83
0.0ft	lb			20130	11880	12940	8000	9390	5910	8840	5580	(25.7)
-1.5m	kg	*10830	10320	9110	5370	5820	3590			4420	2770	7.31
-4.9ft	lb	*23880	22750	20080	11840	12830	7910			9740	6110	(24.0)
-3.0m	kg	*13210	10520	9230	5470	5910	3670			5410	3390	6.40
-9.8ft	lb	*29120	23190	20350	12060	13030	8090			11930	7470	(21.0)
-4.5m	kg			*7130	5770					*6300	5160	4.89
-14.8ft	lb			*15720	12720					*13890	11380	(16.0)

Note 1. Lifting capacity are based on ISO 10567.
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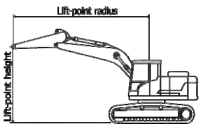
Lifting capacities will vary with different work tools, ground conditions and attachments.
The difference between the weight of a work tool attachment must be subtracted.
Consult your Hyundai dealer regarding the lifting capacities for specific work tools and attachments.

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

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa. [㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger[F]	Outtriger[R]	Cabin type
HX220HD	OPT	MONO	GP	5680	GP	2400	GP	0.92	NO	NO	3600	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius								At max. reach		
		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
												m(ft)
7.5m	kg									*5080	*5080	5.58
24.6ft	lb									*11200	*11200	(18.3)
6.0m	kg					*4980	4870			*4620	3900	6.81
19.7ft	lb					*10980	10740			*10190	8600	(22.4)
4.5m	kg			*6320	*6320	*5430	4710	*4990	3270	*4490	3230	7.55
14.8ft	lb			*13930	*13930	*11970	10380	*11000	7210	*9900	7120	(24.8)
3.0m	kg			*8110	6810	*6200	4480	5010	3190	4570	2910	7.94
9.8ft	lb			*17880	15010	*13670	9880	11050	7030	10080	6420	(26.1)
1.5m	kg			*9660	6340	6860	4250	4900	3090	4420	2790	8.03
4.9ft	lb			*21300	13980	15120	9370	10800	6810	9740	6150	(26.3)
0.0m	kg			*10360	6140	6690	4100	4820	3020	4540	2850	7.83
0.0ft	lb			*22840	13540	14750	9040	10630	6660	10010	6280	(25.7)
-1.5m	kg	*10820	*10820	*10290	6110	6640	4060			5010	3130	7.31
-4.9ft	lb	*23850	*23850	*22690	13470	14640	8950			11050	6900	(24.0)
-3.0m	kg	*13210	12210	*9460	6220	6740	4140			6140	3820	6.41
-9.8ft	lb	*29120	26920	*20860	13710	14860	9130			13540	8420	(21.0)
-4.5m	kg			*7130	6530					*6300	5820	4.89
-14.8ft	lb			*15720	14400					*13890	12830	(16.0)

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

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Lifting capacities will vary with different work tools, ground conditions and attachments.
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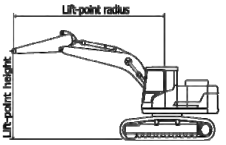
⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessory for non-standard configurations.

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa.[㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger[F]	Outtriger[R]	Cabin type
HX210HD	OPT	MONO	GP	5680	GP	2400	GP	0.92	NO	NO	4200	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius								At max. reach		
		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
												m(ft)
7.5m	kg									*5080	*5080	5.58
24.6ft	lb									*11200	*11200	(18.3)
6.0m	kg					*4980	4710			*4620	3780	6.82
19.7ft	lb					*10980	10380			*10190	8330	(22.4)
4.5m	kg			*6320	*6320	*5430	4560	4840	3180	*4490	3130	7.55
14.8ft	lb			*13930	*13930	*11970	10050	10670	7010	*9900	6900	(24.8)
3.0m	kg			*8110	6530	*6200	4330	4750	3100	4340	2820	7.94
9.8ft	lb			*17880	14400	*13670	9550	10470	6830	9570	6220	(26.1)
1.5m	kg			*9670	6070	6450	4100	4640	3000	4200	2710	8.03
4.9ft	lb			*21320	13380	14220	9040	10230	6610	9260	5970	(26.3)
0.0m	kg			9780	5870	6290	3960	4570	2930	4310	2770	7.83
0.0ft	lb			21560	12940	13870	8730	10080	6460	9500	6110	(25.7)
-1.5m	kg	*10830	*10830	9760	5850	6240	3920			4740	3030	7.31
-4.9ft	lb	*23880	*23880	21520	12900	13760	8640			10450	6680	(24.0)
-3.0m	kg	*13210	11400	*9460	5950	6330	4000			5800	3690	6.40
-9.8ft	lb	*29120	25130	*20860	13120	13960	8820			12790	8140	(21.0)
-4.5m	kg			*7130	6250					*6300	5590	4.89
-14.8ft	lb			*15720	13780					*13890	12320	(16.0)

Note 1. Lifting capacity are based on ISO 10567.
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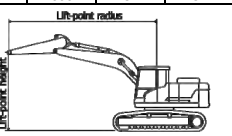
⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessory for non-standard configurations.

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa. [㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger [F]	Outtriger [R]	Cabin type
HX220HD	OPT	MONO	GP	5680	GP	2400	GP	0.92	NO	NO	4200	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius								At max. reach		
		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
												m(ft)
7.5m	kg									*5080	*5080	5.58
24.6ft	lb									*11200	*11200	(18.3)
6.0m	kg					*4980	*4980			*4620	4190	6.81
19.7ft	lb					*10980	*10980			*10190	9240	(22.4)
4.5m	kg			*6320	*6320	*5430	5060	*4990	3540	*4490	3490	7.55
14.8ft	lb			*13930	*13930	*11970	11160	*11000	7800	*9900	7690	(24.8)
3.0m	kg			*8110	7330	*6200	4820	5340	3460	*4580	3150	7.94
9.8ft	lb			*17880	16160	*13670	10630	11770	7630	*10100	6940	(26.1)
1.5m	kg			*9660	6860	*7000	4600	5230	3350	4730	3040	8.03
4.9ft	lb			*21300	15120	*15430	10140	11530	7390	10430	6700	(26.3)
0.0m	kg			*10360	6650	7140	4450	5160	3290	4860	3100	7.83
0.0ft	lb			*22840	14660	15740	9810	11380	7250	10710	6830	(25.7)
-1.5m	kg	*10820	*10820	*10290	6620	7090	4410			5350	3400	7.31
-4.9ft	lb	*23850	*23850	*22690	14590	15630	9720			11790	7500	(24.0)
-3.0m	kg	*13210	13160	*9460	6730	*6940	4490			*6280	4140	6.41
-9.8ft	lb	*29120	29010	*20860	14840	*15300	9900			*13850	9130	(21.0)
-4.5m	kg			*7130	7040					*6300	6270	4.89
-14.8ft	lb			*15720	15520					*13890	13820	(16.0)

Note 1. Lifting capacity are based on ISO 10567.
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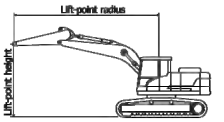
Model	Type	Boom	Boom type	Length[mm]	Arm type	Length [mm]	BK type	Capa.[㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger [F]	Outtriger[R]	Cabin type
HX210HD	OPT	MONO	GP	5680	GP	2920	GP	0.92	NO	NO	3600	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius										At max. reach		
		1.5m (4.9ft)		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
														m(ft)
7.5m	kg							*4440	4430			*3360	*3360	6.26
24.6ft	lb							*9790	9770			*7410	*7410	(20.5)
6.0m	kg							*4410	*4410			*3090	3050	7.38
19.7ft	lb							*9720	*9720			*6810	6720	(24.2)
4.5m	kg							*4920	4260	4540	2930	*3010	2560	8.07
14.8ft	lb							*10850	9390	10010	6460	*6640	5640	(26.5)
3.0m	kg					*7340	6150	*5740	4000	4420	2820	*3060	2310	8.43
9.8ft	lb					*16180	13560	*12650	8820	9740	6220	*6750	5090	(27.7)
1.5m	kg					*9060	5610	6010	3740	4290	2700	*3240	2210	8.51
4.9ft	lb					*19970	12370	13250	8250	9460	5950	*7140	4870	(27.9)
0.0m	kg			*5920	*5920	9070	5320	5810	3560	4180	2600	*3580	2240	8.32
0.0ft	lb			*13050	*13050	20000	11730	12810	7850	9220	5730	*7890	4940	(27.3)
-1.5m	kg	*6490	*6490	*10390	10020	8970	5240	5720	3480	4150	2570	3910	2430	7.84
-4.9ft	lb	*14310	*14310	*22910	22090	19780	11550	12610	7670	9150	5670	8620	5360	(25.7)
-3.0m	kg	*11110	*11110	*14070	10210	9050	5300	5760	3520			4640	2880	7.00
-9.8ft	lb	*24490	*24490	*31020	22510	19950	11680	12700	7760			10230	6350	(23.0)
-4.5m	kg			*11520	10600	*8120	5520					*6030	4030	5.65
-14.8ft	lb			*25400	23370	*17900	12170					*13290	8880	(18.5)

Note 1. Lifting capacity are based on ISO 10567.
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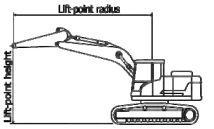
⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessory for non-standard configurations.

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa.[㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger [F]	Outtriger[R]	Cabin type
HX220HD	OPT	MONO	GP	5680	GP	2920	GP	0.92	NO	NO	3600	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius										At max. reach		
		1.5m (4.9ft)		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
														m(ft)
7.5m	kg							*4440	*4440			*3360	*3360	6.26
24.6ft	lb							*9790	*9790			*7410	*7410	(20.5)
6.0m	kg							*4410	*4410			*3090	*3090	7.38
19.7ft	lb							*9720	*9720			*6810	*6810	(24.2)
4.5m	kg							*4920	4750	*4660	3280	*3010	2870	8.07
14.8ft	lb							*10850	10470	*10270	7230	*6640	6330	(26.5)
3.0m	kg					*7340	6920	*5740	4480	5000	3170	*3060	2600	8.43
9.8ft	lb					*16180	15260	*12650	9880	11020	6990	*6750	5730	(27.7)
1.5m	kg					*9060	6370	*6610	4220	4860	3040	*3240	2500	8.51
4.9ft	lb					*19970	14040	*14570	9300	10710	6700	*7140	5510	(27.9)
0.0m	kg			*5910	*5910	*10050	6070	6630	4040	4750	2950	*3580	2540	8.32
0.0ft	lb			*13030	*13030	*22160	13380	14620	8910	10470	6500	*7890	5600	(27.3)
-1.5m	kg	*6490	*6490	*10380	*10380	*10260	5980	6540	3960	4720	2920	*4190	2750	7.84
-4.9ft	lb	*14310	*14310	*22880	*22880	*22620	13180	14420	8730	10410	6440	*9240	6060	(25.7)
-3.0m	kg	*11110	*11110	*14070	11880	*9740	6050	6580	3990			5270	3260	7.00
-9.8ft	lb	*24490	*24490	*31020	26190	*21470	13340	14510	8800			11620	7190	(23.0)
-4.5m	kg			*11530	*11530	*8130	6270					*6030	4560	5.66
-14.8ft	lb			*25420	*25420	*17920	13820					*13290	10050	(18.6)

Note 1. Lifting capacity are based on ISO 10567.
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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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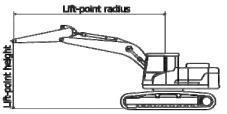
⚠ Failure to comply to the rated load can cause possible personal injury or property damage.
Make adjustments to the rated load as necessory for non-standard configurations.

Model	Type	Boom	Boom type	Length[mm]	Arm type	Length [mm]	BK type	Capa.[㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger[F]	Outtriger[R]	Cabin type
HX210HD	OPT	MONO	GP	5680	GP	2920	GP	0.92	NO	NO	4200	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius										At max. reach		
		1.5m (4.9ft)		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
														m(ft)
7.5m	kg							*4440	*4440			*3360	*3360	6.26
24.6ft	lb							*9790	*9790			*7410	*7410	(20.5)
6.0m	kg							*4410	*4410			*3090	*3090	7.38
19.7ft	lb							*9720	*9720			*6810	*6810	(24.2)
4.5m	kg							*4920	4590	*4660	3180	*3010	2790	8.07
14.8ft	lb							*10850	10120	*10270	7010	*6640	6150	(26.5)
3.0m	kg					*7340	6630	*5740	4330	4740	3070	*3060	2530	8.43
9.8ft	lb					*16180	14620	*12650	9550	10450	6770	*6750	5580	(27.7)
1.5m	kg					*9060	6090	6430	4080	4600	2950	*3240	2430	8.51
4.9ft	lb					*19970	13430	14180	8990	10140	6500	*7140	5360	(27.9)
0.0m	kg			*5920	*5920	9720	5800	6230	3890	4500	2850	*3580	2460	8.32
0.0ft	lb			*13050	*13050	21430	12790	13730	8580	9920	6280	*7890	5420	(27.3)
-1.5m	kg	*6490	*6490	*10390	*10390	9620	5720	6140	3820	4460	2820	*4190	2670	7.84
-4.9ft	lb	*14310	*14310	*22910	*22910	21210	12610	13540	8420	9830	6220	*9240	5890	(25.7)
-3.0m	kg	*11110	*11110	*14070	11090	9690	5780	6180	3850			4980	3160	7.00
-9.8ft	lb	*24490	*24490	*31020	24450	21360	12740	13620	8490			10980	6970	(23.0)
-4.5m	kg			*11520	11480	*8120	6000					*6030	4390	5.65
-14.8ft	lb			*25400	25310	*17900	13230					*13290	9680	(18.5)

Note 1. Lifting capacity are based on ISO 10567.
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3. The Lift-point is bucket pivot mounting pin on the arm (without bucket mass).
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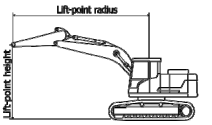
Make adjustments to the rated load as necessory for non-standard configurations.

Model	Type	Boom	Boom type	Length [mm]	Arm type	Length [mm]	BK type	Capa.[㎥]	QC	Swing Post	CWT[kg]	Shoe (wheel) [mm]	Outtriger[F]	Outtriger [R]	Cabin type
HX220HD	OPT	MONO	GP	5680	GP	2920	GP	0.92	NO	NO	4200	600	NONE	NONE	CABIN

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



Lift-point height (m/ft)		Lift-point radius										At max. reach		
		1.5m (4.9ft)		3.0m (9.8ft)		4.5m (14.8ft)		6.0m (19.7ft)		7.5m (24.6ft)		Capacity		Reach
														m(ft)
7.5m	kg							*4440	*4440			*3360	*3360	6.26
24.6ft	lb							*9790	*9790			*7410	*7410	(20.5)
6.0m	kg							*4410	*4410			*3090	*3090	7.38
19.7ft	lb							*9720	*9720			*6810	*6810	(24.2)
4.5m	kg							*4920	*4920	*4660	3550	*3010	*3010	8.07
14.8ft	lb							*10850	*10850	*10270	7830	*6640	*6640	(26.5)
3.0m	kg					*7340	*7340	*5740	4830	*5020	3430	*3060	2830	8.43
9.8ft	lb					*16180	*16180	*12650	10650	*11070	7560	*6750	6240	(27.7)
1.5m	kg					*9060	6880	*6610	4570	5190	3310	*3240	2730	8.51
4.9ft	lb					*19970	15170	*14570	10080	11440	7300	*7140	6020	(27.9)
0.0m	kg			*5910	*5910	*10050	6580	7080	4390	5080	3210	*3580	2770	8.32
0.0ft	lb			*13030	*13030	*22160	14510	15610	9680	11200	7080	*7890	6110	(27.3)
-1.5m	kg	*6490	*6490	*10380	*10380	*10260	6490	6990	4310	5050	3180	*4190	3000	7.84
-4.9ft	lb	*14310	*14310	*22880	*22880	*22620	14310	15410	9500	11130	7010	*9240	6610	(25.7)
-3.0m	kg	*11110	*11110	*14070	12840	*9740	6560	7030	4340			*5400	3550	7.00
-9.8ft	lb	*24490	*24490	*31020	28310	*21470	14460	15500	9570			*11900	7830	(23.0)
-4.5m	kg			*11530	*11530	*8130	6780					*6030	4930	5.66
-14.8ft	lb			*25420	*25420	*17920	14950					*13290	10870	(18.6)

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 your Hyundai dealer regarding the lifting capacities for specific work tools and attachments.

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

6. BUCKET SELECTION GUIDE

1)HX210HD/ HX220HD COUNTERWEIGHT:

All Buckets are welded with high-strength steel.

0.92 (1.20)

1.20 (1.57)

◉ 0.87 (1.14)
◉ 1.20 (1.57)

SAE Heaped m3 (yd3)

Capacity m3(yd2)			Width mm(in)	Weight Kg (lb)	Tooth EA	Recommendation mm (ft-in)					
						5.680					
						3.6 ton CWT			4.2 ton CWT		
Type	SAE Heaped	CECE Heaped				2000 (6'7") Arm	2400 (7'10") Arm	2920 (9'7") Arm	2000 (6'7") Arm	2400 (7'10") Arm	2920 (9'7") Arm
HX210HD	0.92 (1.20)	0.80 (1.05)	1,080 (42.5")	765 (1,690)	5	●	◐	·	●	●	◐
	1.20 (1.57)	1.00(1.31)	1,330 (52.4")	810 (1,790)	5	■	▲	▲	◐	■	▲
	◉ 0.87 (1.14)	0.75 (0.98)	1,140 (44.9")	900 (1,980)	5	●	◐	■	●	●	◐
	◉ 1.20 (1.57)	1.00 (1.31)	1,410 (55.5")	1,030 (2,270)	5	■	▲	X	■	■	▲
HX220HD	0.92 (1.20)	0.80 (1.05)	1,080 (42.5")	765 (1,690)	5	●	●	◐	●	●	●
	1.20 (1.57)	1.00 (1.31)	1,330 (52.4")	810 (1,790)	5	◐	■	▲	◐	◐	■
	◉ 0.87 (1.14)	0.75 (0.98)	1,140 (44.9")	900 (1,980)	5	●	●	◐	●	●	●
	◉ 1.20 (1.57)	1.00 (1.31)	1,410 (55.5")	1,030 (2,270)	5	■	■	▲	◐	■	■

◉ Rock- Heavy duty bucket

●	Applicable for materials with density of 2100 kg/m^3 (3500 lb/yd^3) or less
◐	Applicable for materials with density of 1800 kg/m^3 (3000 lb/yd^3) or less
■	Applicable for materials with density of 1500 kg/m^3 (2500 lb/yd^3) or less
▲	Applicable for materials with density of 1200 kg/m^3 (2000 lb/yd^3) or less
X	Not recommended

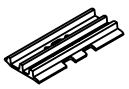
※ These recommendations are for general conditions and average use.
Work tools and ground conditions have effects on machine performance.
Select an optimum combination according to the working conditions and the type of work that is being done.
Consult your Hyundai dealer for information on selecting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

7. UNDERCARRIAGE

1) TRACKS

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

2) TYPES OF SHOES

Model	Shapes		Triple grouser			
						
HX210HD	Shoe width	mm (in)	600 (24)	-	-	800 (32)
	Operating weight	kg (lb)	20990 (46270)	-	-	21540 (47490)
	Ground pressure	kgf/cm^2 (psi)	0.48 (6.86)	-	-	0.42 (6.03)
	Overall width	mm (ft-in)	2800 (9' 2")	-	-	3000 (9' 10")
HX220HD	Shoe width	mm (in)	600 (24)	-	-	800 (32)
	Operating weight	kg (lb)	21420 (47220)	-	-	22200 (48940)
	Ground pressure	kgf/cm^2 (psi)	0.45 (6.50)	-	-	0.35 (5.06)
	Overall width	mm (ft-in)	2990 (9' 10")	-	-	3190 (10' 6")

3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

Item		Quantity
Carrier rollers		2 EA
Track rollers	HX210HD	7 EA
	HX220HD	9 EA
Track shoes	HX210HD	46 EA
	HX220HD	49 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

Track shoe	Specification	Category
600 mm triple grouser	Standard	A
800 mm triple grouser	Option	C

※ 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	HYUNDAI 6BTAA-5.9 (HM5.9)
Type	4-cycle, turbocharged, charge air cooled, mechanical controlled diesel engine
Cooling method	Water cooled
Number of cylinders and arrangement	6 cylinders, in-line
Firing order	1-5-3-6-2-4
Combustion chamber type	Direct injection type
Cylinder bore×stroke	102×120 mm (4.02 "×4.72 ")
Piston displacement	5900 cc (360 cu in)
Compression ratio	17.3 : 1
Rated gross horse power (SAE J1995)	148 Hp at 2000rpm (110 kW at 2000 rpm)
Rated net horse power (SAE J1349)	145 Hp at 2000 rpm (108 kW at 2000 rpm)
Maximum torque at 1300 rpm	64 kgf · m (463 lbf · ft)
Engine oil quantity	14 ℓ (3.8 U.S. gal) : -#1161 20 ℓ (5.3 U.S. gal) : #1162-
Dry weight	437 kg (963 lb)
High idling speed	2250 + 50 rpm
Low idling speed	800 ± 100 rpm
Rated fuel consumption	95 g/Hp · hr at 1200 rpm
Starting motor	Lucas 24V
Alternator	Lucas 24V-75A
Battery	2×12V×100Ah

2) MAIN PUMP

Item	Specification
Type	Variable displacement tandem axis piston pumps
Capacity	2×117 cc/rev
Maximum pressure	350 kgf/cm^2 (4978 psi)
Rated oil flow	2×234 ℓ /min (61.8 U.S. gpm/ 51.4 U.K. gpm)
Rated speed	2000 rpm

3) GEAR PUMP

Item	Specification
Type	Fixed displacement gear pump single stage
Capacity	15 cc/rev
Maximum pressure	40 kgf/cm^2 (568 psi)
Rated oil flow	30.0 ℓ/min (7.9 U.S. gpm/6.7 U.K. gpm)

4) MAIN CONTROL VALVE

Item	Specification
Type	9 spools mono-block
Operating method	Hydraulic pilot system
Main relief valve pressure	350 kgf/cm^2 (4978 psi)
Overload relief valve pressure	400 kgf/cm^2 (5689 psi)

5) SWING MOTOR

Item	Specification
Type	Two fixed displacement axial piston motor
Capacity	142.8 cc/rev
Relief pressure	265 kgf/cm^2 (3894 psi)
Braking system	Automatic, spring applied hydraulic released
Braking torque	63.3 kgf/cm^2 (470.8 lbf · ft)
Brake release pressure	20.9~35.5 kgf/cm^2 (297~505 psi)
Reduction gear type	2 - stage planetary
Swing speed	12.2rpm

6) TRAVEL MOTOR

Item	Specification
Type	Variable displacement axial piston motor
Relief pressure	350 kgf/cm^2 (4978 psi)
Reduction gear type	2-stage planetary
Braking system	Automatic, spring applied hydraulic released
Brake release pressure	13 kgf/cm^2 (182 psi)
Braking torque	65.1 kgf · m (470 lbf · ft)

7) REMOTE CONTROL VALVE

Item		Specification
Type		Pressure reducing type
Operating pressure	Minimum	6.5 kgf/cm^2 (92 psi)
	Maximum	26 kgf/cm^2 (370 psi)
Single operation stroke	Lever	61 mm (2.4 in)
	Pedal	123 mm (4.84 in)

8) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	Ø120 × Ø85 × 1290 mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	Ø140 × Ø100 × 1510 mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	Ø120 × Ø85 × 1055 mm
	Cushion	Extend only

※ 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) SHOE

Item		Width	Ground pressure	Link quantity	Overall width
HX210HD	Standard	600 mm (24")	0.48 kgf/cm^2 (6.86 psi)	46	2800 mm (9' 2")
	Option	800 mm (32")	0.42 kgf/cm^2 (6.03 psi)	46	3000 mm (9' 10")
HX220HD	Standard	600 mm (24")	0.45 kgf/cm^2 (6.50 psi)	49	2990 mm (9' 10")
	Option	800 mm (32")	0.35 kgf/cm^2 (5.06 psi)	49	3190 mm (10' 6")

10) BUCKET

Item		Capacity		Tooth quantity	Width	
		SAE heaped	CECE heaped		Without side cutter	With side cutter
HX210HD HX220HD	STD	0.92 m^3 (1.20 yd^3)	0.80 m^3 (1.05 yd^3)	5	1080 mm (42.5")	1250 mm (49.2")
	OPT	1.20 m^3 (1.57 yd^3)	1.00 m^3 (1.31 yd^3)	5	1330 mm (52.4")	1500 mm (59.1")
		◈0.87 m^3 (1.14 yd^3)	0.75 m^3 (0.98 yd^3)	5	1140 mm (44.9")	–
		◈1.20 m^3 (1.14 yd^3)	1.00 m^3 (1.31 yd^3)	5	1410 mm (55.5")	–

◈ : Heavy duty bucket

9. RECOMMENDED OILS

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

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

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature ˚C(˚F)
			-50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil ★2		★SAE 0W-40 ★SAE 0W-30 SAE 5W-30 SAE 10W-30 SAE 15W-40
Swing drive	Gear oil	6.2 (1.6)	★SAE 75W-90
Final drive		4.5×2 (1.2×2)	SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank : 160 (42.3) System : 275 (72.6)	★ISO VG 15 ISO VG 32 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel	340 (89.8)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and soft water★1	31 (8.2)	Ethylene glycol base permanent type (50 : 50) ★Ethylene glycol base permanent type (60 : 40)

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

★ : Cold region
Russia, CIS, Mongolia
★1 : Soft water
City water or distilled water
★2 : Meets or exceeds
API CI-4 grade

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

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

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

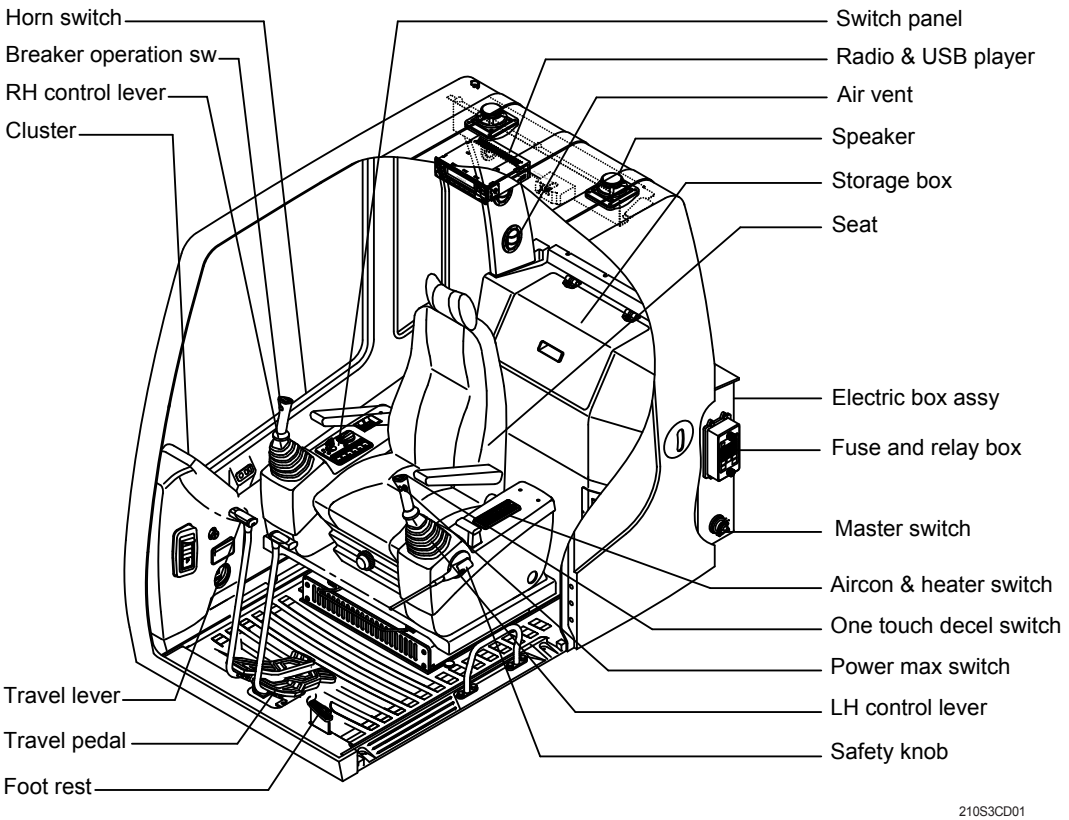
1. CAB DEVICES

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

2) ELECTRONIC MONITOR SYSTEM

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

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



2. CLUSTER

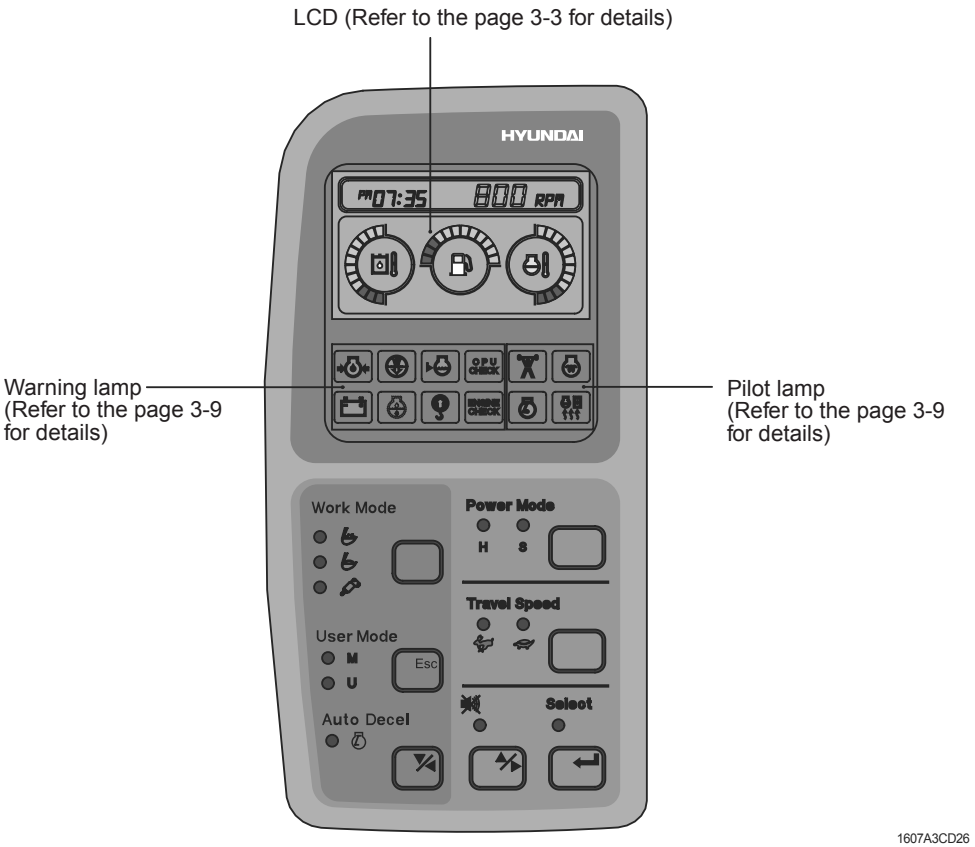
1) MONITOR PANEL

The monitor panel consists of LCD and lamps as shown below, to warn the operator in case of abnormal machine operation or conditions for the appropriate operation and inspection.

- LCD : Indicate operating status of the machine.
- Warning lamp : Indicate abnormality of the machine(Red).
- Pilot lamp : Indicate operating status of the machine(Amber).

※ The monitor 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 monitor provides a warning immediately check the problem, and perform the required action.



※ The warming lamp lights ON and the buzzer sounds when the machine has a problem.
In this case, press the buzzer stop switch and buzzer stop, but the warming lamp lights until the problem is cleared.

2) LCD main operation display

Default screen

1607A3CD02A

Option screen

1607A3CD02B

1 Time display
2 RPM display
3 Hydraulic oil temperature gauge
4 Fuel level gauge
5 Engine coolant temperature gauge

(1) Time display


1607A3CD02C

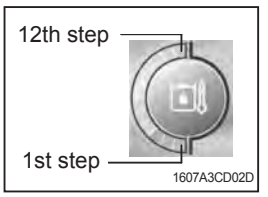
① This displays the current time.
※ **Refer to the page 3-7 to set time for details.**

(2) RPM display


1607A3CD02C

① This displays the engine rpm.

(3) Hydraulic oil temperature gauge

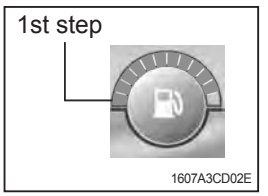


1607A3CD02D

① This gauge indicates the temperature of hydraulic oil in 12 step gauge.
- 1st step : Below 30°C (86°F)
- 2nd–10th step : 30–105°C (86–221°F)
- 11th–12th step : Above 105°C (221°F)

② The gauge between 2nd and 10th steps illuminates when operating.
③ Keep idling engine at low speed until the gauge between 2nd and 10th steps illuminates, before operation of machine.
④ When the gauge of 11th and 12th steps illuminates, reduce the load on the system. If the gauge stays in the 11th–12th steps, stop the machine and check the cause of the problem.

(4) Fuel level gauge



1607A3CD02E

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

(5) Engine coolant temperature gauge

1607A3CD02F

① This gauge indicates the temperature of coolant in 12 step gauge.
- 1st step : Below 30°C (86°F)
- 2nd–10th step : 30–105°C (86–221°F)
- 11th–12th step : Above 105°C (221°F)

② The gauge between 2nd and 10th steps illuminates when operating.
③ Keep idling engine at low speed until the gauge between 2nd and 10th steps illuminates, before operation of machine.
④ When the gauge of 11th and 12th steps illuminates, turn OFF the engine, check the radiator and engine.

3) Warning of main operation screen

(1) Warning display

① Engine coolant temperature


- This lamp blinks and the buzzer sounds when the temperature of coolant is over the normal temperature 105°C (221°F).
- Check the cooling system when the lamp blinks.

② Fuel level


- This lamp blinks and the buzzer sounds when the level of fuel is below 31 ℓ (8.2 U.S. gal).
- Fill the fuel immediately when the lamp blinks.

③ Hydraulic oil temperature


- This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105°C (221°F).
- Check the hydraulic oil level when the lamp blinks.
- Check for debris between oil cooler and radiator.

④ All gauge


- This lamp blinks and the buzzer sounds when the all gauge is abnormal.
- Check the each system when the lamp blinks.

⑤ Communication error

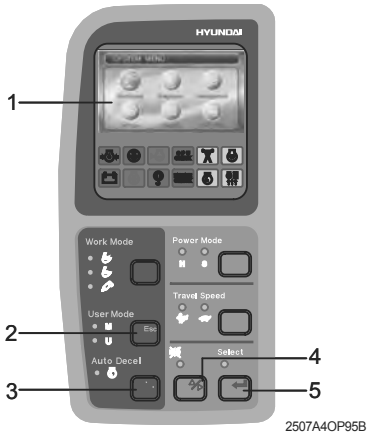
- Communication problem between CPU controller and cluster makes the lamp blinks and the buzzer sounds.
- Check if any fuse for CPU burnt off. If not check the communication line between them.

(2) Pop-up icon display

No	Switch	Selected mode	Display
1	Work mode switch	General work mode	
		Heavy duty work mode	
		Breaker operation mode	
2	Power mode switch	High power work mode	
		Standard power work mode	

No	Switch	Selected mode	Display
3	Auto deceleration switch	Light ON	
		Light OFF	
4	Travel speed control switch	Low speed	
		High speed	

4) LCD



2507A4OP95B

1 : LCD

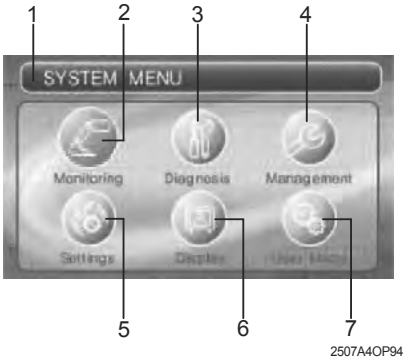
2 : Escape,
Return to the previous menu

3 : Down/Left Direction

4 : Up/Right Direction

5 : Select (Enter)
Activate the currently chosen item

(1) Main menu



2507A4OP94

1 : Menu information

2 : Monitoring
- Equipment, Switch, Output

3 : Diagnosis
- Current error, Recorded error

4 : Maintenance

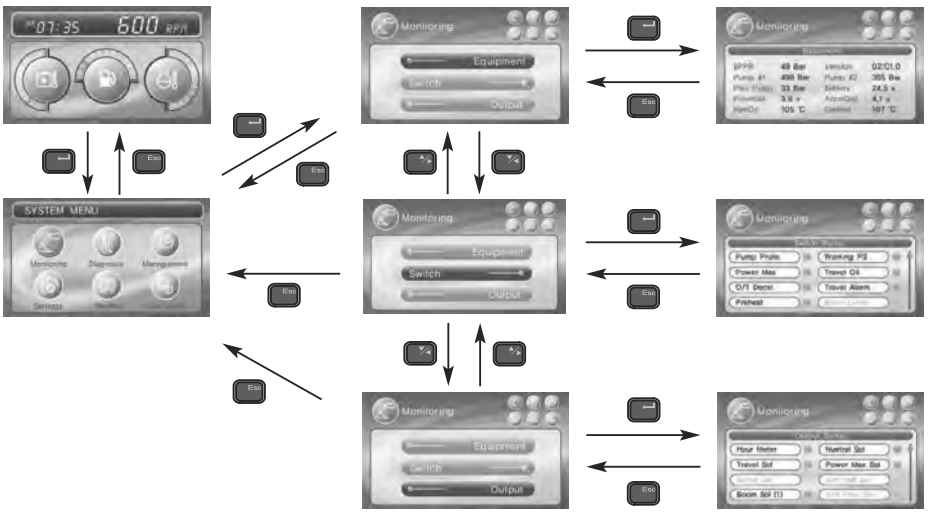
5 : Settings
- Time set, Dual mode
- System lock (Reserved)

6 : Display
- Operation skin, Brightness, Language

7 : User mode

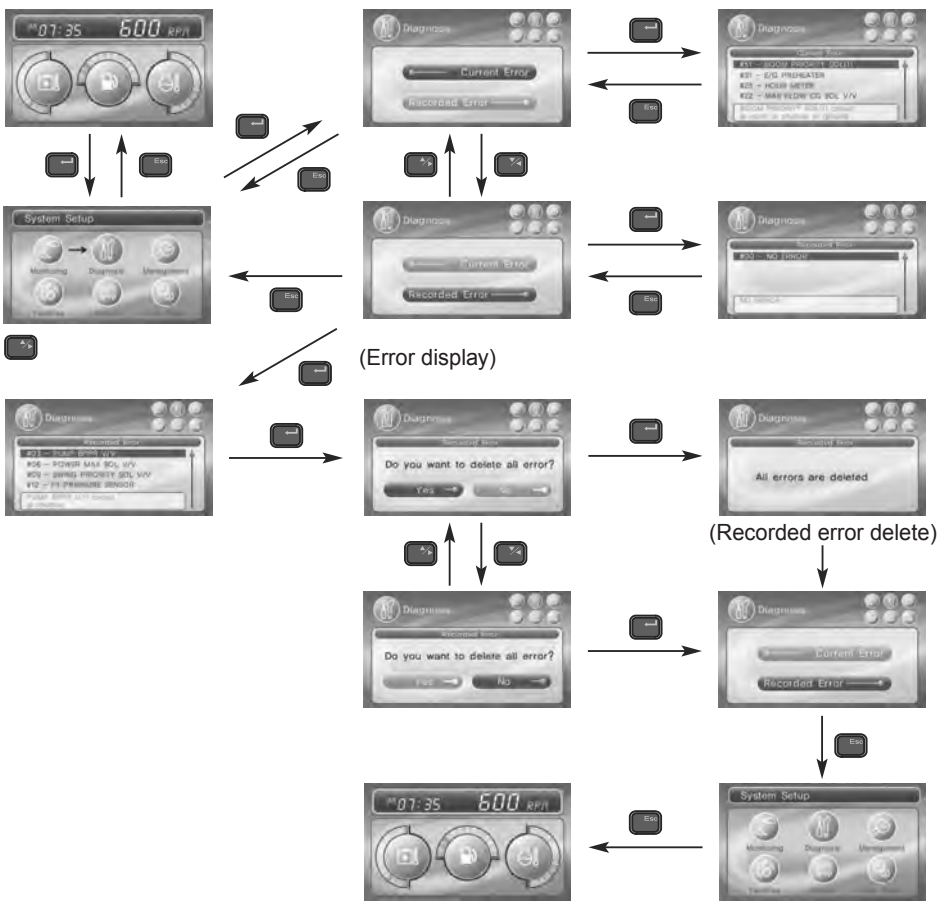
(2) Display map

① Monitoring



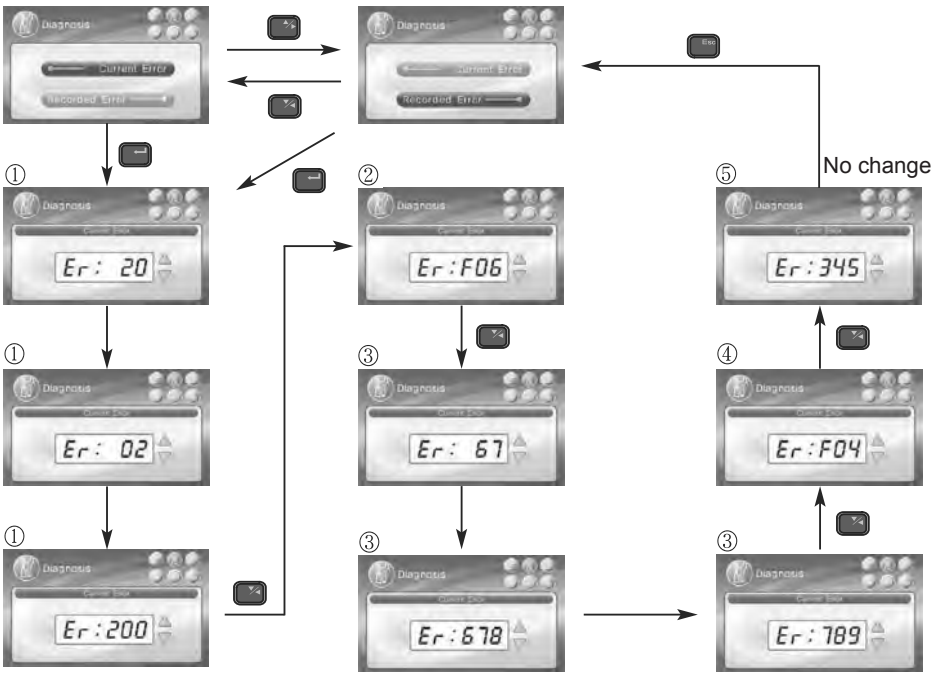
② Diagnosis

a. Protocol type 1

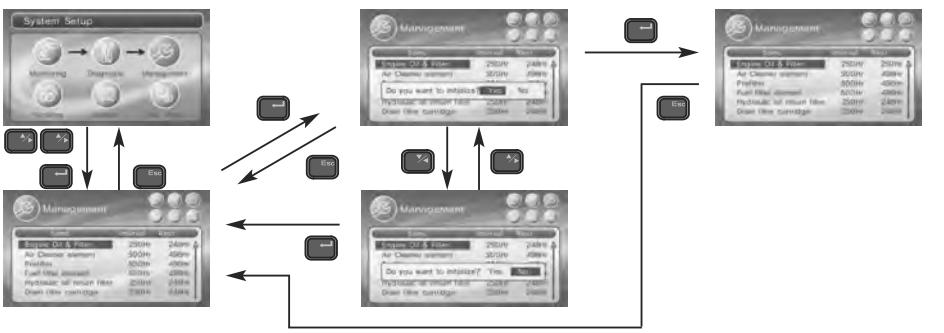


b. Protocol type 2

- If there are more than 2 error codes, each one can be displayed by pressing or switch respectively.
- 3 error codes (① SPN200200, ② FMI06, ③ SPN6789, ④ FMI04, ⑤ 345) display.



③ Maintenance



④ Setting

a. Time set

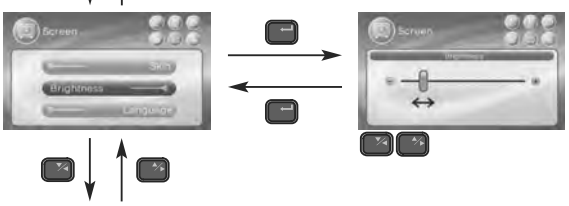
b. System lock - Reserved

c. Dual mode
- Changing the MCU mode

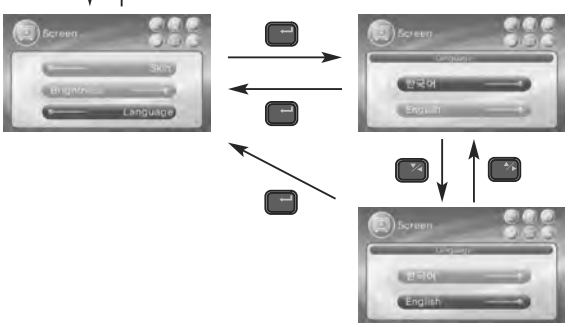
⑤ Display

a. Operation skin

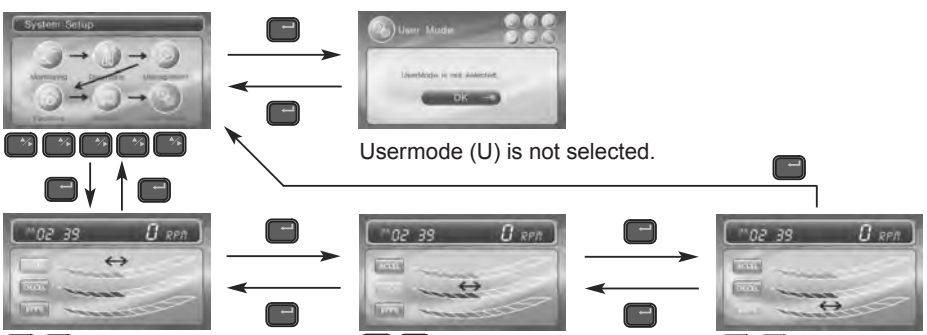
b. Brightness



c. Language



⑥ User mode



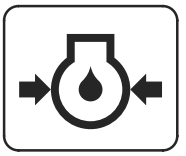
: Adjusting
: Setting

: Adjusting
: Setting

: Adjusting
: Setting

5) Warning and pilot lamp

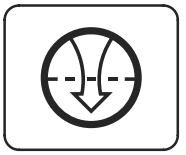
(1) Engine oil pressure warning lamp



21073CD07

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

(2) Air cleaner warning lamp



21073CD08

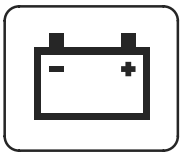
① This lamp blinks and the buzzer sounds when the filter of air cleaner is clogged.
② Check the filter and clean or replace it.

(3) CPU controller check warning lamp

21073CD10

① If any fault code is received from CPU controller, this lamp blinks and the buzzer sounds.
② Check the communication line between CPU controller and cluster.

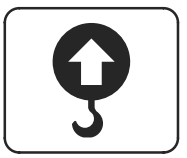
(4) Battery charging warning lamp



21073CD13

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

(5) Overload warning lamp



21073CD15

① When the machine is overload, the overload warning lamp blinks during the overload switch is ON.

(6) Engine check warning lamp

29073CD10

① This lamp blinks and the buzzer sounds when the communication between CPU controller and ECU on the engine is abnormal, or if any fault code received from ECU.
② Check the communication line between them.
If the communication line is OK, then check the fault code on the cluster.

(7) Power max pilot lamp (null)

21073CD11

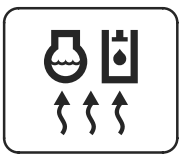
① The lamp will be ON when pushing power max switch on the LH RCV lever.

(8) Decel pilot lamp

21073CD17

① Operating auto decel or one touch decel makes the lamp ON.
② The lamp will be ON when pushing one touch decel switch on the LH RCV lever.

(9) Warming up pilot lamp



21073CD18

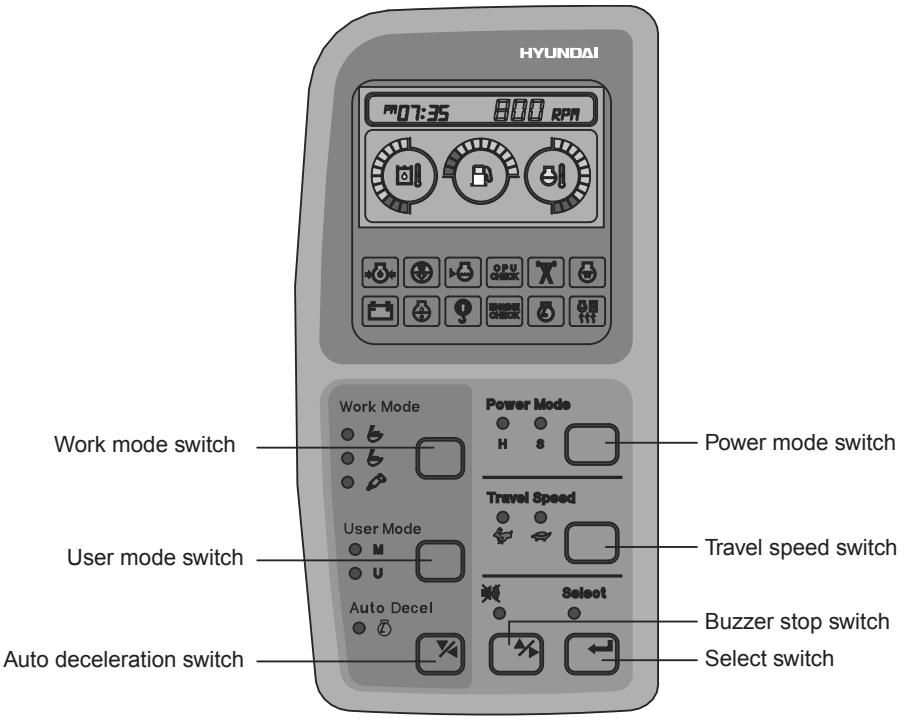
① This lamp is turned ON when the coolant temperature is below 30°C (86°F).
② The automatic warming up is cancelled when the engine coolant temperature is above 30°C, or when 10 minutes have passed since starting.

(10) Preheat pilot lamp

21073CD12

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

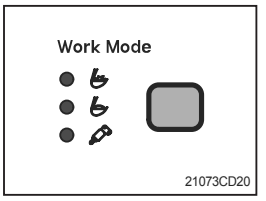
6) SWITCH PANEL



1607A3CD19

※ **When the switches (Work mode, Power mode, Auto decel, Travel speed control) are selected, the pop-up icon is displayed on the LCD.**
Refer to the page 3-4 for details.

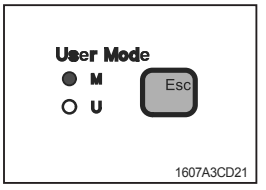
(1) Work mode switch



① This switch is to select the machine operation mode, which shifts from general operation mode to heavy operation mode and breaker mode in a raw by pressing the switch.
- : Heavy duty work mode
- : General work mode
- : Breaker operation mode

※ **Refer to the page 4-8 for details.**

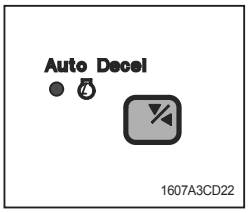
(2) User modet switch



① This switch is to select the maximum power or user mode.
- M : Maximum power.
- U : Memorizing operators preferable power setting.

※ **Refer to the page 4-8 for details.**

(3) Auto deceleration switch

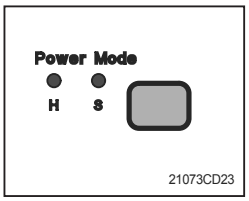


① This switch is used to actuate or cancel the auto deceleration function.

② When the switch actuated and all control levers and pedals are at neutral position, engine speed will be lowered automatically to save fuel consumption.

- Light ON : Auto deceleration function is selected.
- Light OFF : a. Auto deceleration function is cancelled so that the engine speed increased to previous setting value.
  b. One touch decel function is available.

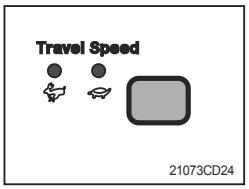
(4) Power mode switch



① The lamp of selected mode is turned ON by pressing the switch( ).

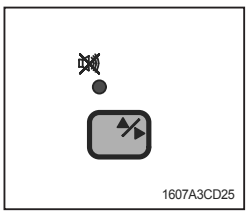
- H : High power work.
- S : Standard power work.

(5) Travel speed control switch



① This switch is to control the travel speed which is changed to high speed(Rabbit mark) by pressing the switch and low speed(Turtle mark) by pressing again.

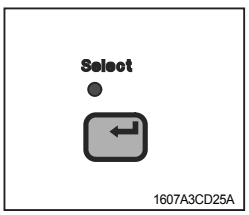
(6) Buzzer stop switch



① When the starting switch is turned ON first, normally the alarm buzzer sounds for 2 seconds during lamp check operation.

② The red lamp lights ON and the buzzer sounds when the machine has a problem.
In this case, press this switch and buzzer stops, but the red lamp lights until the problem is cleared.

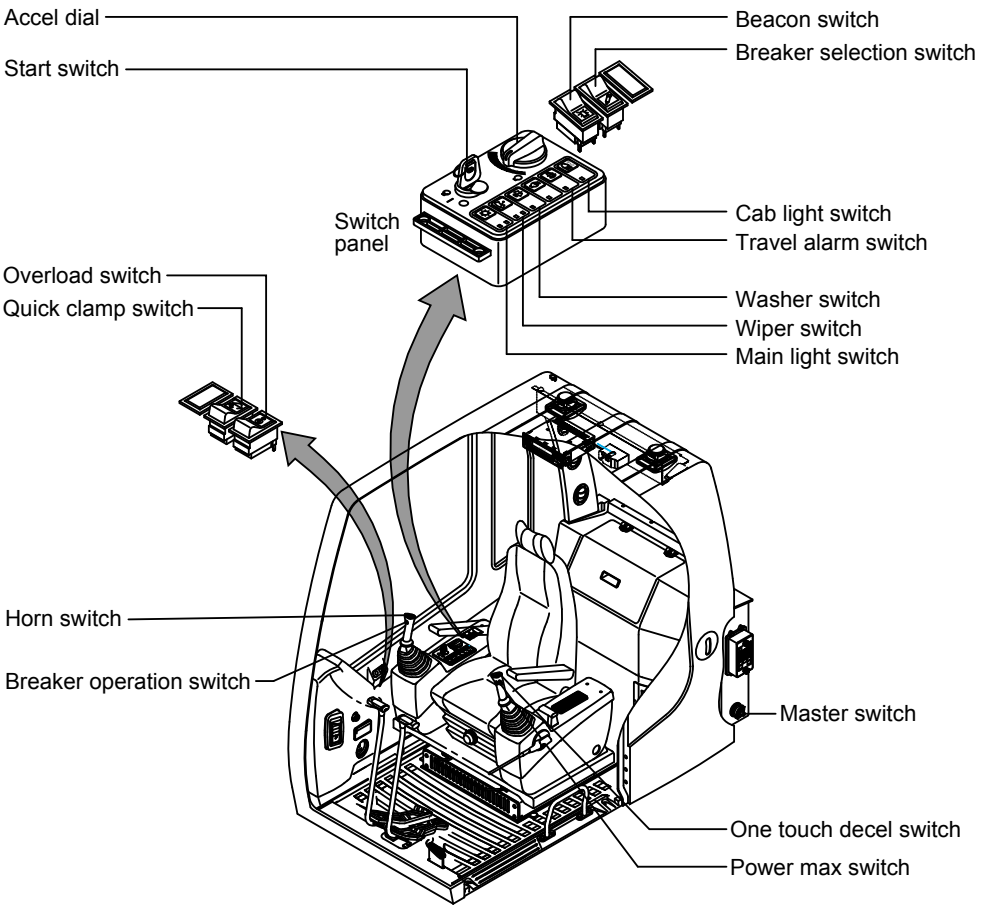
(7) Select switch



① This switch is used to enter main menu and sub menu of LCD.

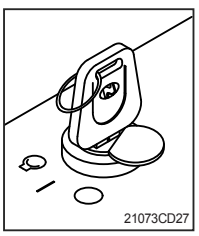
※ **Refer to the page 3-5 for details.**

3. SWITCHES



210S3CD26

1) STARTING SWITCH

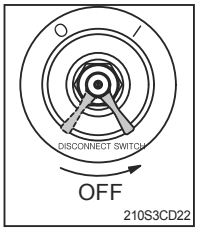


(1) There are three positions, OFF, ON and START.
- ○ (OFF) : None of electrical circuits activate.
- | (ON) : All the systems of machine operate.
- ⏻ (START) : Use when starting the engine. Release key immediately after starting.

※ 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 take according to ambient temperature (opt).

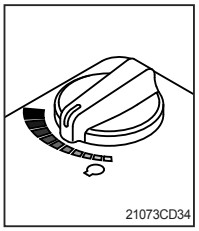
※ Key must be in the ON position with engine running maintain electrical and hydraulic function and prevent serious machine damage.

2) MASTER SWITCH



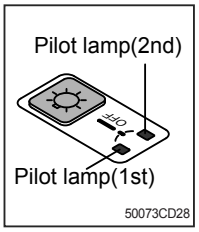
(1) This switch is used to shut off the entire electrical system.
(2) I : The battery remains connected to the electrical system.
O : The battery is disconnected to the electrical system.
※ **Never turn the master switch to O (OFF) with the engine running. Engine and electrical system damage could result.**

(3) ACCEL DIAL SWITCH



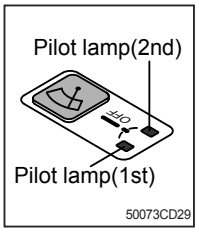
(1) There are 10 dial setting.
Setting 1 is low idle (Turtle) and setting 10 is high idle (Rabbit).
· By rotating the accel dial to right : Engine speed increases
· By rotating the accel dial to left : Engine speed decreases

(4) MAIN LIGHT SWITCH



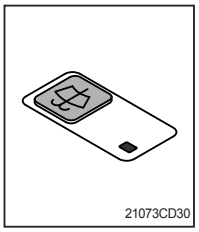
(1) This switch used to operate the head light and work light.
· Press the switch once to head light comes ON.
· Press the switch once more to work light comes ON.
· Press the switch again, return to a first step position.
· Press the switch more than one second to turn off lights.

(5) WIPER SWITCH



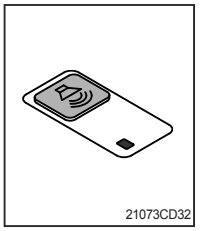
(1) This switch used to operate wiper.
· Press the switch once to intermittently operate wiper.
· Press the switch once more to operate wiper low speed.
· Press the switch again return to a first step position.
· Press the switch more than one second to turn off wiper.

(6) WASHER SWITCH



(1) The washer liquid is sprayed and the wiper is operated only while pressing this switch.
(2) The indicator lamp is turned ON when operating this switch.

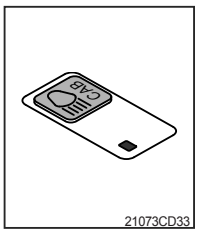
7) TRAVEL ALARM SWITCH



(1) This switch is to activate travel alarm function surrounding when the machine travels to forward and backward.

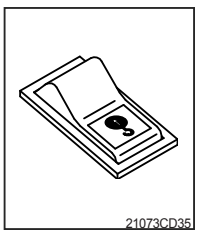
(2) On pressing this switch, the alarm operates only when the machine is traveling.

8) CAB LIGHT SWITCH (OPTION)



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

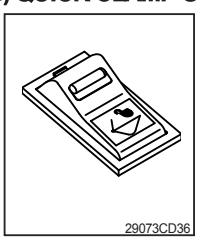
9) OVERLOAD SWITCH



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

(2) When turn OFF buzzer stops and warning lamp goes out.

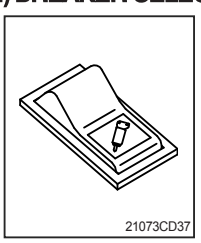
10) QUICK CLAMP SWITCH (OPTION)



(1) This switch is used for engaging or disengaging the moving hook on quick clamp.

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

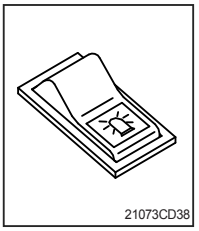
11) BREAKER SELECTION SWITCH (OPTION)



(1) This switch is used to select breaker.

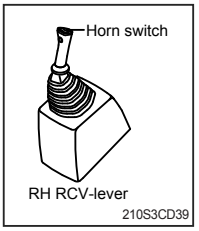
※ **The breaker operates only when this switch is selected.**

12) BEACON SWITCH (OPTION)



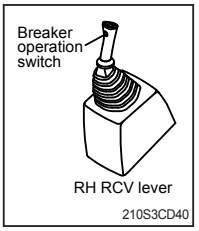
(1) This switch turns ON the rotary light on the cab.
(2) The below indicator lamp is turned ON when operating this switch.

13) HORN SWITCH



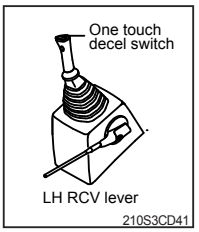
(1) This switch is at the top of right side control lever. On pressing, the horn sounds.

14) BREAKER OPERATION SWITCH



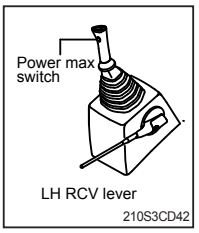
(1) On pressing this switch, the breaker operates only when the breaker selection switch on the switch panel is selected.

15) ONE TOUCH DECEL SWITCH



(1) This switch is used to actuate the deceleration function quickly.
(2) The engine speed is increased to previous setting value by pressing the switch again.

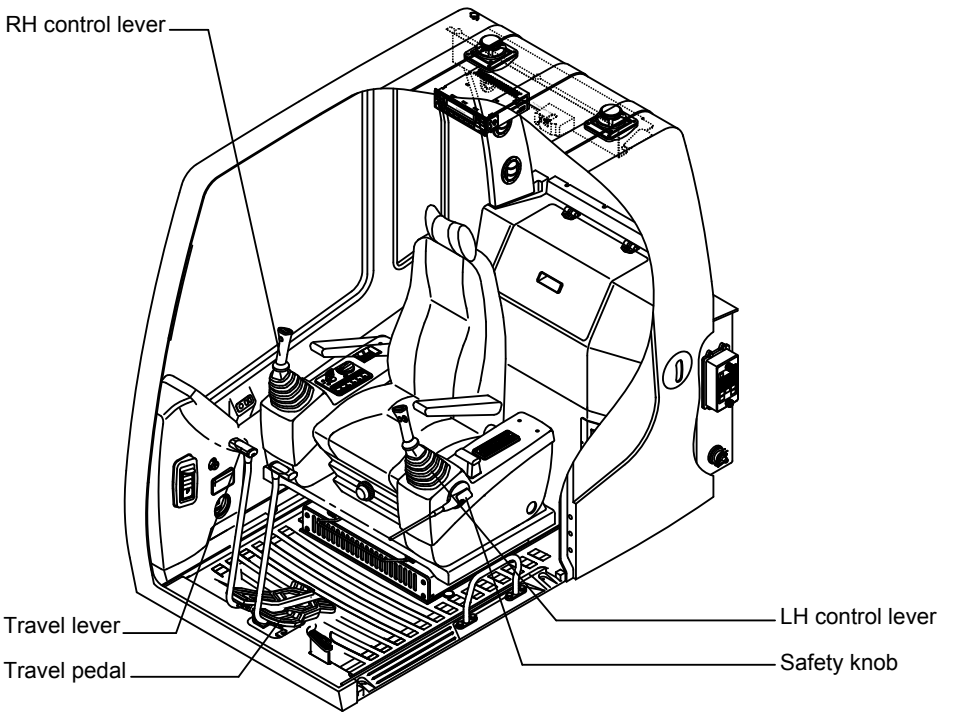
16) POWER MAX SWITCH (NULL)



(1) This switch activate power max function.
When this switch is kept pressed, hydraulic power of work equipment will increased approx 110 percent during 8 seconds.
(2) After 8 seconds, function is cancelled automatically even switch is keep pressed.

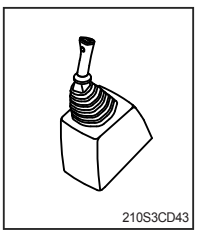
※ **Don not use for craning purposes.**

4. LEVERS AND PEDALS



210S3CD38

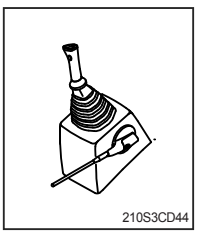
1) LH CONTROL LEVER



210S3CD43

(1) This joystick is used to control the swing and the arm.
(2) Refer to **operation of working device** in chapter 4 for details.

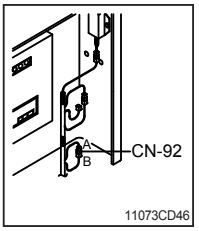
2) RH CONTROL LEVER



210S3CD44

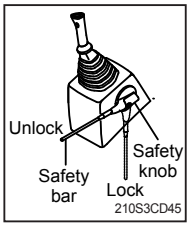
(1) This joystick is used to control the boom and the bucket.
(2) Refer to **operation of working device** in chapter 4 for details.

4) EMERGENCY ENGINE STARTING CONNECTOR



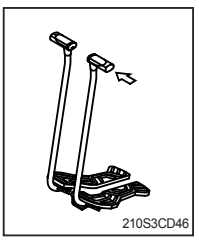
(1) If the MCU is removed, the engine does not start.
(2) Before starting the engine, connect the connector CN-92 A with B.
※ **Do not connect these connectors when the MCU is not removed.**

5) SAFETY KNOB



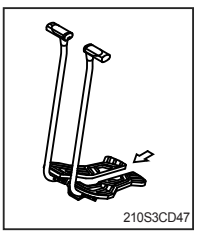
(1) All control levers and pedals are disabled from operation by locating the safety knob to the LOCK position as shown.
※ **Be sure to turn the safety knob to the LOCK position when entering or leaving the operators seat/cabin.**
(2) The machine is operational by turning the safety knob to the UNLOCK position.
※ **Do not use the safety bar for handle when getting on or off the machine.**

6) TRAVEL LEVER



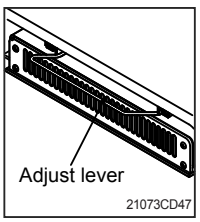
(1) This lever is mounted on travel pedal and used for traveling by hand. The operation principle is same as the travel pedal.
(2) Refer to **traveling of machine** in chapter 4 for details.

7) 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.

8) SEAT AND CONSOLE BOX ADJUST LEVER

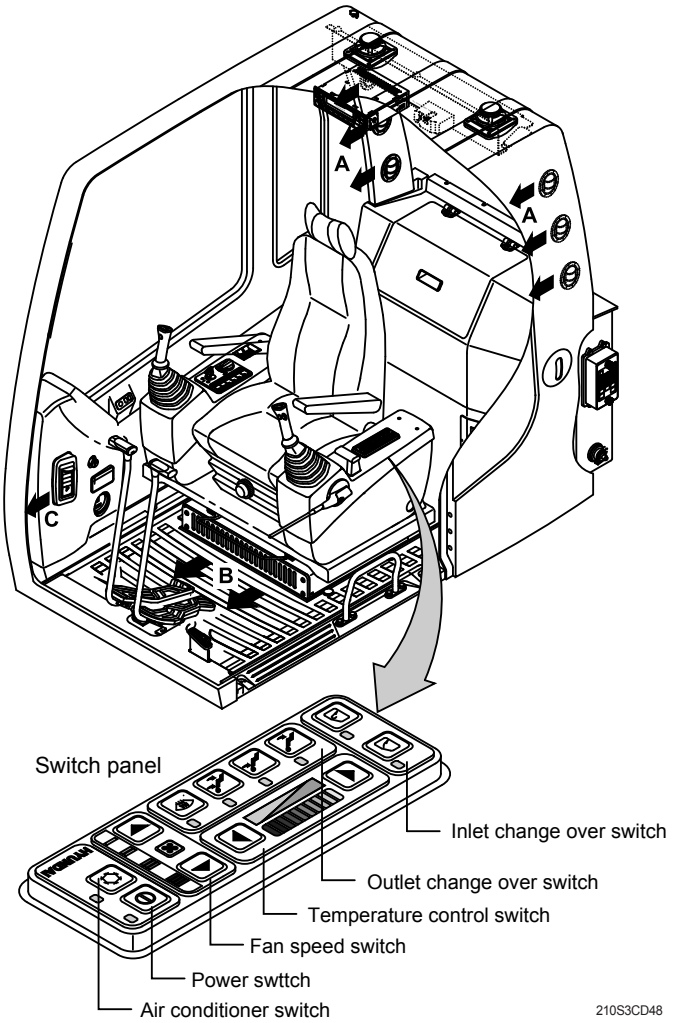


(1) This lever is used to move the seat and console box to fit the contours of the operator's body.
(2) Pull the lever to adjust forward or backward over 170 mm (6.7").

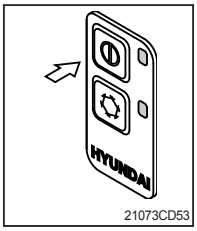
5. AIR CONDITIONER AND HEATER

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

· **Location of air flow ducts**



1) POWER SWITCH

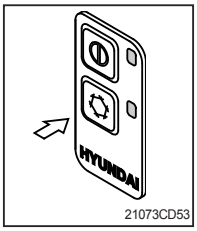


(1) This switch makes the system and the LED simultaneously ON or OFF.

※ **Default setting values**

Function	Air conditioner	Fan speed	Temperature	Outlet	Inlet
Max warm	OFF	1	Max cool	Face	Recirculation

2) AIR CONDITIONER SWITCH(Compressor switch)

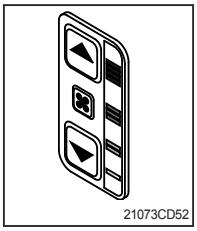


(1) Operating this switch turns the compressor and the LED simultaneously on or off.

(2) In accordance with the evaporator temperature, compressor turns on or off automatically without changing LED stare.

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

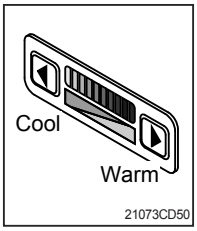
3) FAN SPEED SWITCH



(1) It is possible to control the fan to four steps.

(2) The first step or the fourth step gives 5 times beeps.

4) TEMPERATURE CONTROL SWITCH



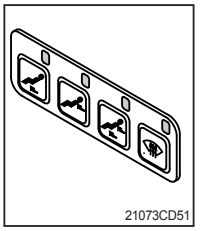
(1) There are 9 steps to control temperature from max cool to max warm controlled up and down by 1 step.

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

(3) For the max warm or the max cool it's better to be configured as following table.

Temperature	Air conditioner	Fan speed	Outlet	Inlet
Max cool	ON	4	Face	Recirculation
Max warm	OFF	3	Foot	Fresh

5) OUTLET CHANGE OVER SWITCH



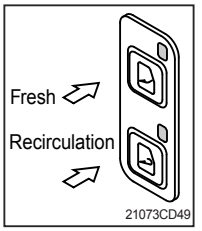
(1) There are four steps of air flow.

Switch position		Mode			
Outlet	A		O	O	
	B	O		O	O
	C				O

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

(3) In case of heating range (5~Max warm), air conditioner won't turns ON.

6) INLET CHANGE OVER SWITCH



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

① Fresh

Inhaling air from the outside to pressurize cab inside.

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

② Recirculation

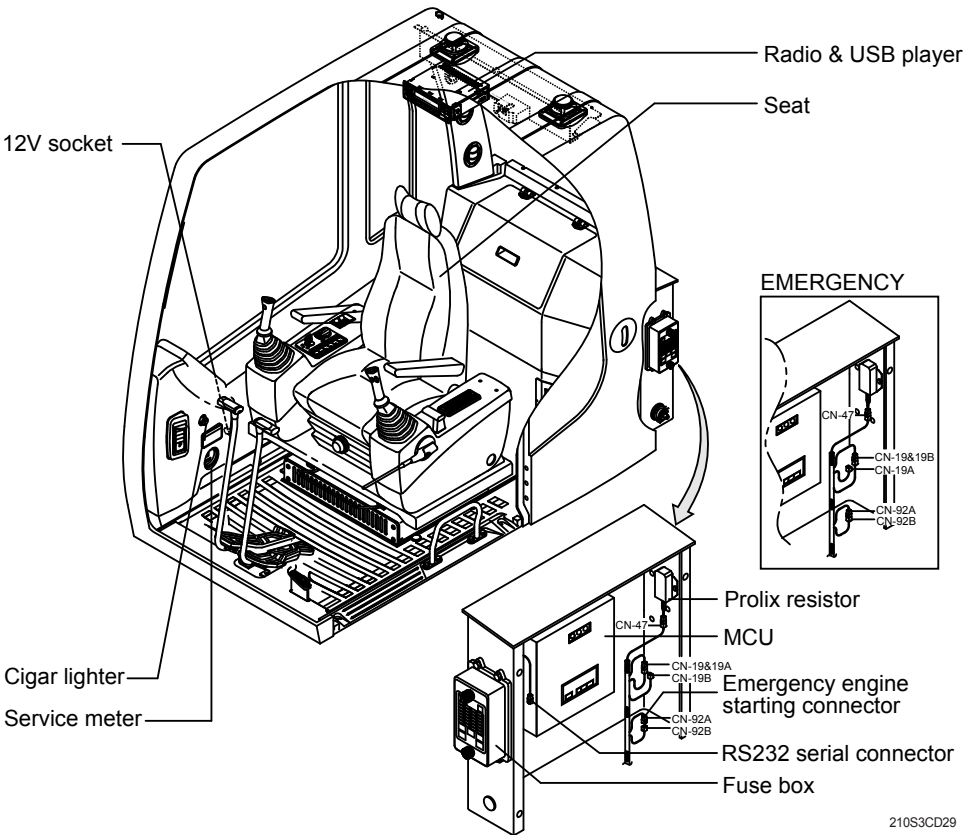
It recycles the heated or cooled air to increase the energy efficiency.

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

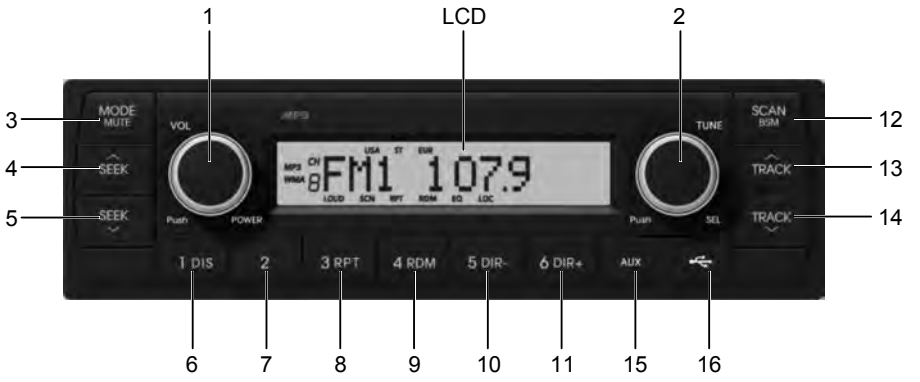
※ Check out the recirculation filter periodically to keep a good efficiency.

(2) Recirculation function operates when the system is OFF but it can be changed whenever needed.

6. OTHERS


Radio & USB player
Seat
12V socket
EMERGENCY
CN-47
CN-19&19B
CN-19A
CN-92A
CN-92B
Prolix resistor
MCU
Emergency engine starting connector
RS232 serial connector
Fuse box
Cigar lighter
Service meter
210S3CD29

1) RADIO AND USB PLAYER (Machine serial No. : -#0700)



9403CD101

■FRONT PANEL PRESENTATION

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

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

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

4 ····· Radio seek up button

5 ····· Radio seek down button

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

7 ····· Station preset 2

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

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

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

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

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

13 ····· Track up button

14 ····· Track down button

15 ····· USB connector

16 ····· AUX IN Jack

■GENERAL

(1) Power and volume button

① Power ON / OFF button

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

② Volume UP/DOWN control knob

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

③ Initial volume level set up

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

④ Clock ON/OFF control

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

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

⑤ Clock adjustment

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

(2) Menu Selection

9403CD103

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

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

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

② Bass control

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

③ Treble control

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

④ Balance control

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

⑤ Fader control

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

⑥ EQ control

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

EQ OFF → CLASSIC → POP → ROCK → JAZZ

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

⑦ Loud control

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

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

⑧ Beep control

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

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

(3) Mute control

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

(4) Mode selection

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

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

■RADIO

(1) Mode button

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

(2) Manual tuning button

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

(3) Auto tuning button

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

(4) Station preset button

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

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

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

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

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

■USB PLAYER

(1) USB playback

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

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

(2) Track Up / Down button

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

(3) MP3 directory / File searching

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

(4) Directory Up / Down button

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

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

(5) Track Scan Play (SCAN) button

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

(6) Track Repeat Play (RPT) button

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

(7) Track Random Play (RDM) button

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

(8) ID3 v2 (DISP)

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

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

* USB Information and Notice
  a. Playback FILE SYSTEM and condition allowance.
     - FAT, FAT12, FAT16 and FAT32 in the file system.
     - V1.1, V2.2 and V2.3 in the TAG (ID3) version.
  b. Display up to 32 characters in the LCD display.
  c. No support any of MULTI-CAED Reader.
  d. No high speed playback but only playing with normal full speed.

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

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

■AUX OPERATION

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

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

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

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

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

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

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

RADIO AND USB PLAYER (Machine serial No. : #0701-)

■PRECAUTIONS

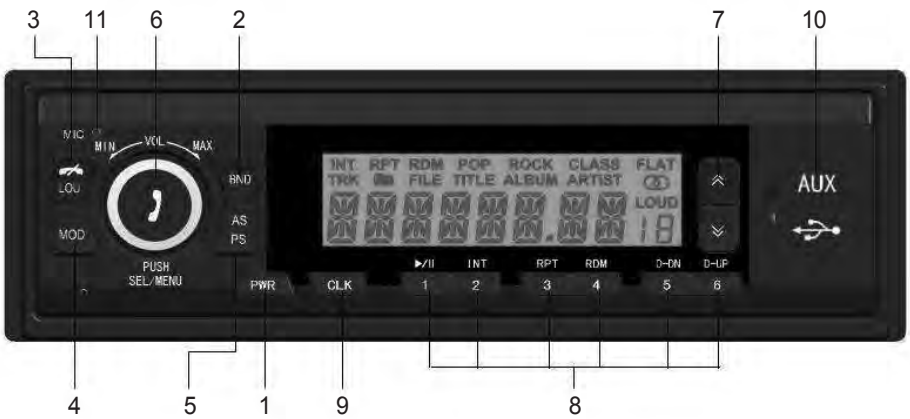
- Please adjust the volume to a reasonable level to protect your hearing.
- Please prevent water spraying onto the device.
- It is a normal phenomenon that the temperature of the chassis of the device rises after prolonged usage under high volume.
- Please avoid touching it when overheat.
- Please do not disassemble the device or else warranty is void.
- Please contact the HYUNDAI dealer if you find any difficulties in using the device.

■FEATURE

Including FM/AM tuner, MP3 player, AUX IN, Bluetooth functions, Clock setting & Equalizer setting.

① Main feature	: Digital FM/AM Radio Tuner, USB-MP3 Player, Clock display, AUX IN, Bluetooth function
② Tuner	: Support FM tuning , AM tuning
③ MP3 player	: Support MP3 format in USB drives
④ AUX IN	: Support sound source from external devices through AUX cable
⑤ Bluetooth	: A2DP, AVRCP, HFP
⑥ Clock display	: Support 24-hour format and clock memory (when only ACC supply is disconnected)

■PANEL



300S3CD50

■FRONT PANEL PRESENTATION

1 POWER
2 BAND SELECTION
3 LOUDNESS / HANG UP
4 MODE
5 AS / PS (Auto Preset Store)
6 ANSWER CALLS / VOLUME / SEL
7 SEEK / MUSIC TRACK
8 PRESET FUNCTION KEYS
9 CLOCK
10 AUX / USB PORT
11 MIC

■OPERATIONS

(1) PWR : Press < PWR > to switch on and off.

(2) BND : Selecting waveband FM1/ FM2/FM3/AM1/ AM2.

(3) LOUDNESS / HANG UP

① LOUDNESS

Press < LOU >. Then "LOUD" will be shown on the LCD screen. Only activated under AM/FM mode.

② HANG UP

Hang up the phone.

(4) MOD : Press to switch between modes : RADIO ↔ AUX IN ↔ BT PLAY ↔ MP3(USB).

(5) AS / PS : Hold for more than 2 seconds to auto scan and prestore stations.

(6) VOLUME / ANSWER CALLS

① ADJUST VOLUME

Rotate < SEL/MENU > to adjust volume.

② ANSWER CALLS

Press < SEL/MENU > to answer calls.

(7) SEEK / MUSIC TRACK : Switch UP / DOWN to seek radio frequencies, MP3 track or BT PLAY track.

(8) MP3 SETTINGS

① MP3 MODE

Press < MOD > to exchange between radio, AUX IN, BT PLAY and MP3.

② USB PLAYER

Without USB device LCD DISPLAY will not show "MP3".
With a USB device but no MP3 format inside the LCD DISPLAY shows "NO FILE".
After loading, LCD DISPLAY shows the total amount of songs and starts playing.

③ SCAN AND QUICK SCAN

Press < ∧ ∨ > to select the previous / next song. Press and hold < ∧ ∨ > for more than 2 seconds for a quick scan, the final scanned song will be played after 2 seconds without any operations.

④ MP3 PLAYER

····· Pause / Player

····· Scan / Player

····· Repeat / Player

····· Random / Player

····· Skip -10

····· Skip +10

(9) CLOCK SETTINGS

① CLOCK DISPLAY

Press < CLK > to enter to clock mode.

② ADJUST CLOCK

Press < CLK > for more than 2 seconds to enter clock mode. Press and hold < CLK > until the display is flashing. Then rotate < SEL/MENU > to adjust hours up/down. After that press < CLK > change to minutes mode. Then rotate < SEL/MENU > to adjust minutes up/down. Finally press < SEL/MENU > again to complete the setting.

(10) SOUND EFFECTS

Press < SEL/MENU > to change VOL → BAS → TRE → BAL.

① Volume : When LCD shows "MAIN V" then rotate < SEL/MENU > to adjust.
② Bass : When LCD shows "BASS" then rotate < SEL/MENU > to adjust.
③ Treble : When LCD shows "TRE B" then rotate < SEL/MENU > to adjust.
④ Balance : When LCD shows "BAL" then rotate < SEL/MENU > to adjust.

(11) BLUETOOTH PLAYER MODE

① Connet TD-650 with your phone device through bluetooh and if the connection is succeeded, " ■ " will be shown on the LCD screen.
② Press < MOD > button and switch to "BT play mode" so that you can play music from your phone device.

※ Bluetooth functions may vary due to different phones. It is recommended to contact manufacturer AS department if you find any difficulties.

(12) MIC PORT : This port connect radio with your phone device through bluetooth to call.

(13) AREA SELECTION FUNCTION

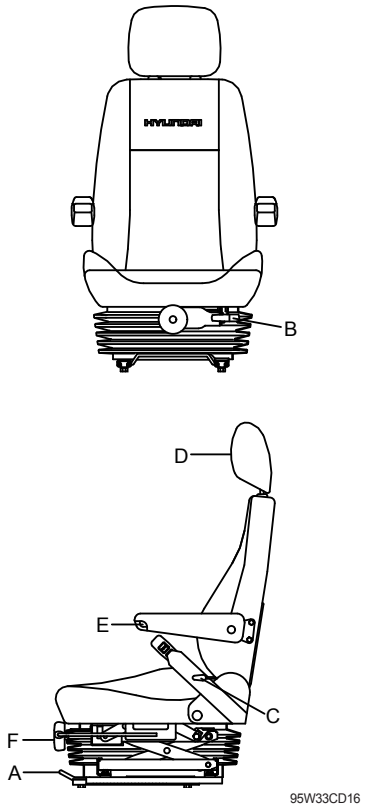
※ Setting conditions : only under standby mode.
※ Complete area selecting 「LOU ~ ① 」 within 5 seonds.

■ TROUBLESHOOTING

Problem	Cause / Remedy
Soundless	1. Check connection. 2. Delete mute function. 3. Turn volume up. 4. Restart.
No Display	1. Wrong installation
MP3 without playing	1. USB incorrect insertion 2. USB without MP3 format
Bluetooth disconnection	1. Restart Redio. 2. Restart Bluetooth of your phone.

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.



(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 170 mm (6.7") in 13 steps.

(2) Upward/Downward adjustment (B)

① Pull lever B to adjust seat upward or downward.

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) Arm rest adjustment (E)

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

(5) Head rest adjustment (D)

This is adjustable vertically to fit operator's requirements.

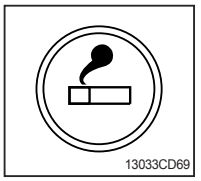
(6) Cushion adjustment (F)

Adjust the handle to the operator's weight.

⚠ 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) CIGAR LIGHTER



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

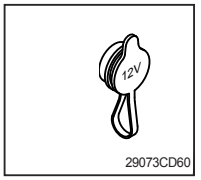
(2) The lighter can be used when it springs out in a short while after being pressed down.

※ Service socket

Use cigar lighter socket when you need emergency power.

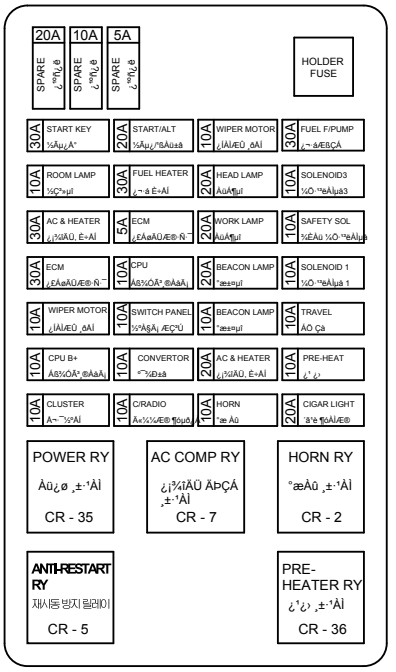
Do not use the lighter exceeding 24V, 100W.

4) 12V SOCKET(Option)



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

5) FUSE BOX



21N5-30141

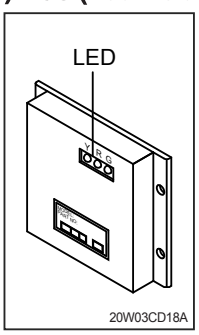
(1) The fuses protect the electrical parts and wiring from burning out.

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

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

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

6) MCU (machine control unit)



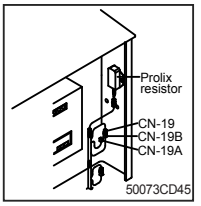
(1) To match the engine torque with the pump absorption torque, MCU controller varies EPPR valve output pressure, which control pump discharge amount whenever feedbacked engine speed drops under the reference rpm of each mode set.

(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 or ROM	• Change the controller
G and Y are turned ON	Trouble on serial communication line	• Check if serial communication lines between MCU and cluster are connected
Three LED are turned OFF	Trouble on MCU power	• Check if the input power wire (24V, GND) of MCU is disconnected • Check the fuse

G : green, R : red, Y : yellow

7) PROLIX RESISTOR (Option)



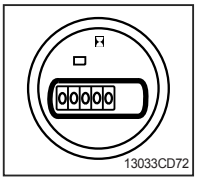
(1) This resistor is used to continuous working in case of malfunction of the MCU.

※ Never connect connector CN-19 with connector CN-19B when MCU is in normal operation.

· Normal : CN-19 connect with connector CN-19A

· Emergency : CN-19 connect with connector CN-19B

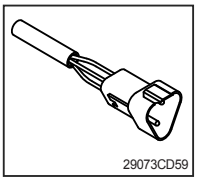
8) SERVICE METER



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

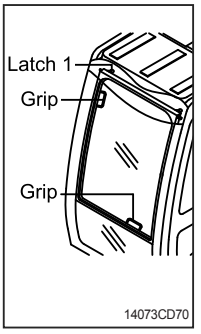
(2) Always ensure the operating condition of the meter during the machine operation. Inspect and service the machine based on hours as indicated in chapter 6, maintenance.

9) RS232 SERIAL CONNECTOR



(1) MCU communicates the machine data with Lap top computer through RS232 connector.

10) UPPER WINDSHIELD



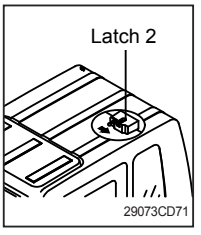
(1) Perform the following procedure in order to open the upper windshield.

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

② Hold both grips that are located at the bottom of the windshield frame and at the top of the windshield frame push the windshield upward.

③ Hold both grips that are provided on the windshield frame and back into the storage position until auto lock latch(2) is engaged, move the levers of both latches(1) into the locked position. Push the levers toward the rear of the cab in order to hold the windshield in storage position.

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



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

① Move the lever of the auto lock latch(2) in the direction of the arrow in order to release the auto lock latch.

② Reverse step ① through step ③ in order to close the upper windshield.

1. SUGGESTION FOR NEW MACHINE

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

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

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

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

3) Be careful during the initial 100 hours operation

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

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

(3) Tighten bolts.

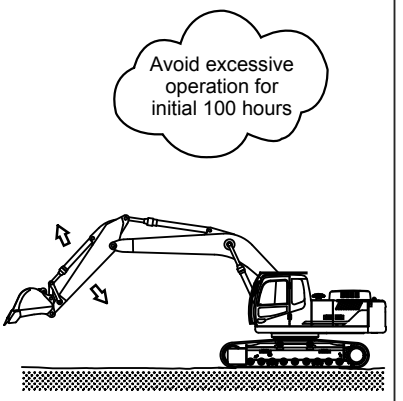
(4) Warm up the machine fully before operation.

(5) Check the gauges occasionally during the operation.

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

4) Replace followings after initial 250 hours of operation

Checking items	Hours
Engine oil	250
Engine oil filter element	
Fuel filter	
Prefilter	
Hydraulic oil return filter element	
Hydraulic oil tank drain filter cartridge	
Line filter element	
Swing reduction gear oil	
Travel reduction gear oil	



21S4OP01A

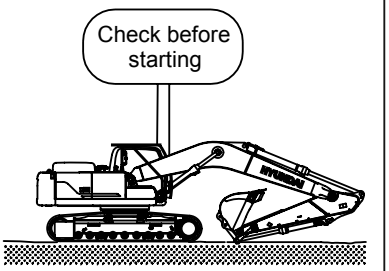
2. CHECK BEFORE STARTING THE ENGINE

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

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

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

3) Adjust the rear view mirror.



210S4OP02

3. STARTING AND STOP THE ENGINE

1) CHECK INDICATOR LIGHTS

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

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

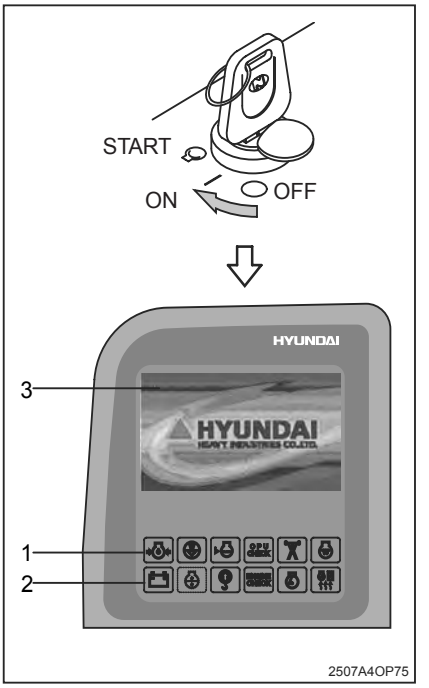
① If all the lamps light ON and buzzer sounding for 2 seconds.

② After lamp check「1.00」, the version of cluster program, is displayed on 「LCD(3)」 for 5 seconds and the cluster returns to default.

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

· Engine oil pressure warning lamp (1)

· Battery charging warning lamp (2)



2) STARTING ENGINE IN NORMAL TEMPERATURE

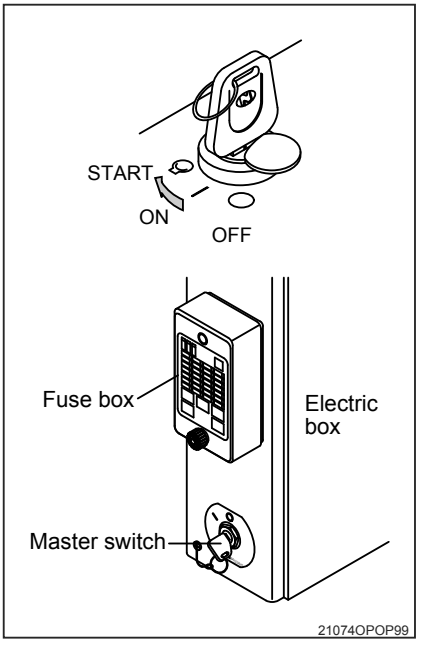
※ **Sound the horn to warn the surroundings after checking if personnel or obstacles are in the area.**

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

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

※ **Do not hold the starting switch in the START position for longer than 20 seconds**

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



3) STARTING ENGINE IN COLD WEATHER

- ※ **Sound horn to warn surroundings after checking if there are obstacles in the area.**
- ※ **Replace the engine oil and fuel referring to recommended oils at page 2-16.**
- ※ **Fill the anti-freeze solution to the coolant as required.**
- ※ **If you turn ON the starting switch, the fuel warmer is automatically operated to heat the fuel by sensing the coolant temperature.**

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

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

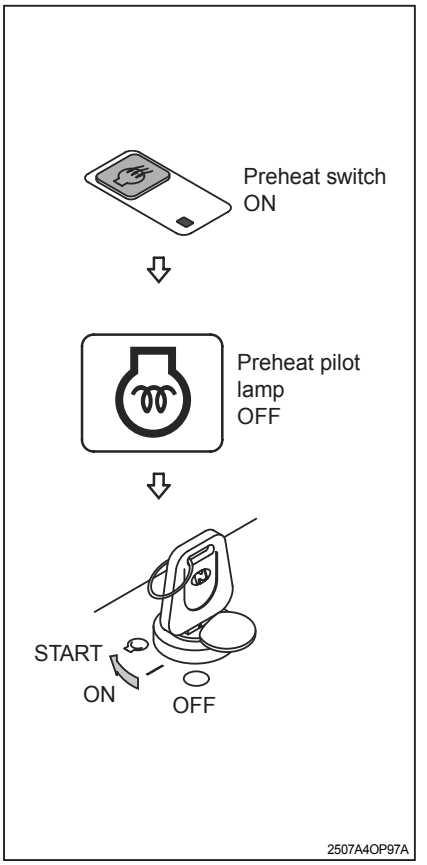
(3) Press the preheat switch ON.

(4) Start the engine by turning the starting switch to the START position after the preheat pilot lamp OFF.

- ※ **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) The operation for the warming up machine is automatic.



4) INSPECTION AFTER ENGINE START

Inspect and confirm the following after engine starts.

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

(2) Are there leakages of oil or water?

(3) Are all the warning lamps turned OFF (1-8)?

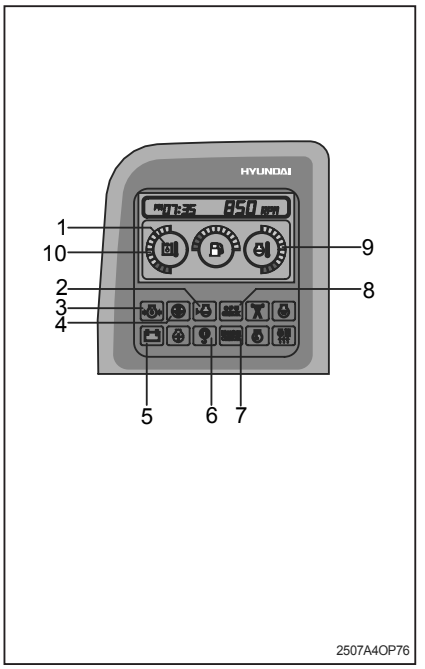
(4) Are the indicator of water temperature gauge (9) and hydraulic temperature gauge (10) in the green zone?

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

(6) Are the sound and vibration normal?

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

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



5) WARMING-UP OPERATION

※ **The most suitable temperature for the hydraulic oil is about 50℃ (122℉).**
It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25℃ (77℉).
Then temperature must be raised to at least 25℃ (77℉) before starting work.

(1) Run the engine at low idle speed for 5 minutes.

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

(3) Operate bucket lever for 5 minutes.

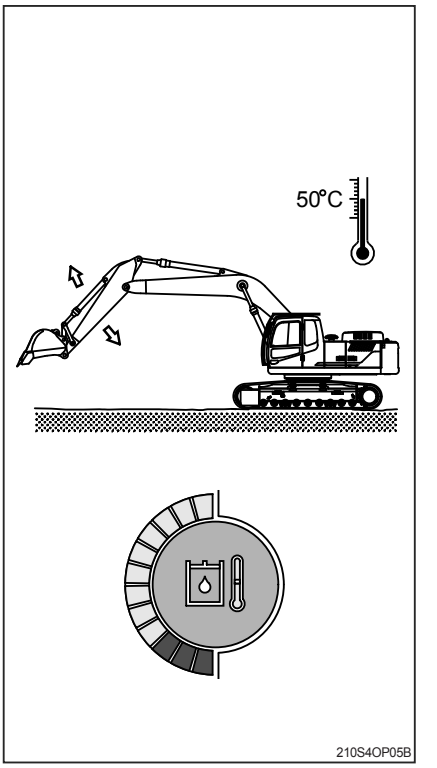
※ **Do not operate anything except bucket lever.**

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

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

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

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



6) TO STOP THE ENGINE

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

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

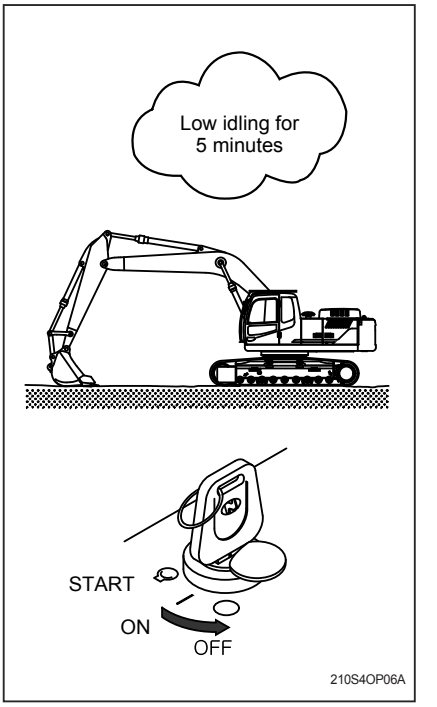
(1) Down the bucket on the ground then put all the levers in the neutral position.

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

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

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

(5) Lock the cab door.



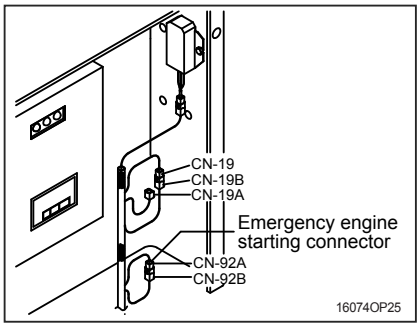
7) OPERATION IN CASE OF MALFUNCTION OF THE MCU

※ **The following explains the way to start and to work the machine continuously in case of malfunction of the MCU.**

(1) Emergency starting engine

① If the MCU is removed, the engine does not start.

② Before starting the engine, connect the connector CN-92A with CN-92B.



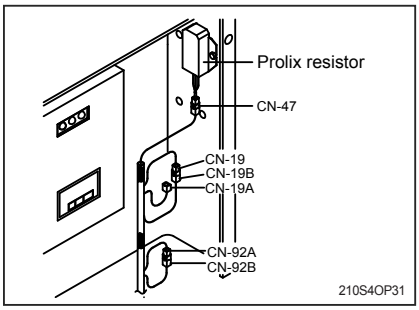
2) Engine speed control

Engine speed can be controlled as following.

① Disconnect the CN-19A from CN-19 connector.

② Connect the CN-19 connector to CN-19B.

③ Engine speed controlled by the accel dial.



4. MODE SELECTION SYSTEM

1) STRUCTURE OF CAPO SYSTEM

CAPO, Computer Aided Power Optimization system, is the name of mode selection system developed by Hyundai.

(1) Work mode

3 work modes can be selected for the optimal work speed of the machine operation.

① Heavy duty work mode

The boom priority solenoid is activated to make the boom operation speed faster.

② General work mode

When key switch is turned ON, this mode is selected automatically and swing operation speed is faster than heavy duty work mode.

③ Breaker operation mode

It sets the pump flow to the optimal operation of breaker by activating the max flow cut-off solenoid.

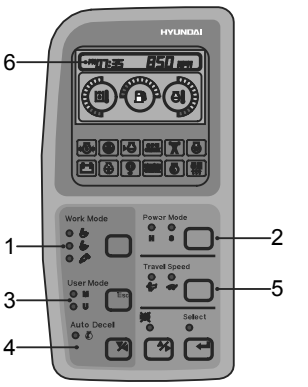
(2) Power mode

Power mode designed for various work loads maintains high performance and reduces fuel consumption.

- H mode : High power
- S mode : Standard power

(3) User mode

- M : Maximum power
- U : You can change the engine and pump power and memorize it for your preference.

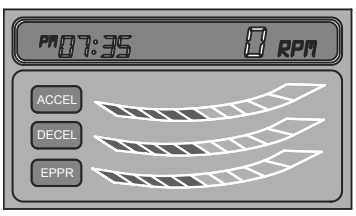


2507A4OP04

1 Work mode
2 Power mode
3 User mode
4 Auto decel mode
5 Travel mode
6 LCD

How to modulate the memory set

① Each memory mode has a initial set which are mid-range of max engine speed, auto decel rpm, and EPPR valve input current.



2507A4OP08

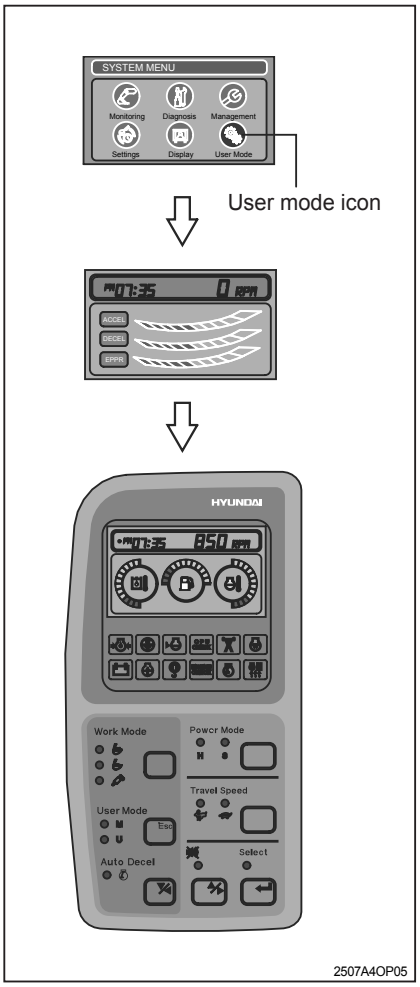
② High idle rpm, auto decel rpm, EPPR pressure can be modulated and memorized separately in the U-mode.

※ **Refer to the page 3-8 for set of user mode.**

· LCD segment vs parameter setting

Segment (▮)	ACCEL (rpm)	DECEL (rpm)	EPPR (bar)
1	1300	1000 (low idle)	0
2	1400	1050	3
3	1500	1080	6
4	1600	1100	9
5	1650	1150	12
6	1700	1200	16
7	1750	1250 (auto decel)	20
8	1800	1300	26
9	1850	1350	32
10	1900	1400	38

※One touch decel : 1050 rpm



(4) Auto decel mode

Engine quick deceleration.

(5) Travel mode

: Low speed traveling.

: High speed traveling.

(6) Monitoring system

Information of machine performance as monitored by the CPU controller can be displayed on the LCD. Refer to the page 3–5.

(7) Self diagnostic system

① **CPU controller**

The CPU controller diagnoses problems in the CAPO system caused by electric parts' malfunction and by open or short circuit, which are displayed on the LCD as error codes (2 digit).

② **Engine controller (ECU)**

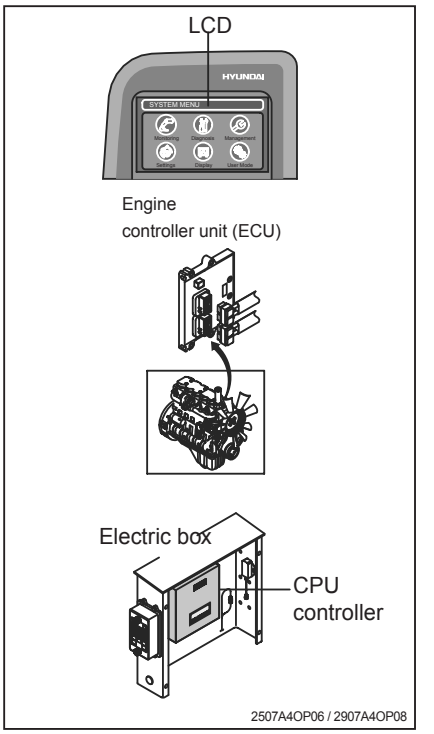
If the engine or relevant system has problem ECU diagnoses and displays on the LCD as fault codes (3 digit or more).

※ **Consult Hyundai or Huyndai dealer for details.**

※ **Refer to the page 3-5 for LCD display.**

(8) Anti-restart system

The system protects the starter from inadvertent restarting after the engine is already operational.



2507A4OP06 / 2907A4OP08

2) HOW TO OPERATE MODE SELECTION SYSTEM

(1) When start key is turned ON

① When start key is turned ON, all illumination lamps are ON and all lamps are OFF automatically after 5 seconds. But a battery charging warning lamp and an engine oil pressure warning lamp keep turned ON until engine starting.

② After lamp check「1.00」, the version of cluster program, is displayed on LCD for 2 seconds.

③ After the version of program is displayed, the cluster returns to default. Exactly engine rpm, battery charging warning lamp and engine oil pressure warning lamp are turned ON and S mode, auto decel, low travel speed (Turtle mark) are displayed.

④ In default condition self-diagnostic function including trouble detecting of electric system can be carried out.

2507A4OP77

(2) After engine start

① When the engine is started, three lamps are ON as below.

Mode		Status
Work mode		ON
Power mode	S	ON
Travel mode	Low ( )	ON
Auto decel mode		ON

- In this condition, tachometer indicates low idle, 1000±100 rpm.
- If coolant temperature is below 30℃, after 10 seconds the engine speed increases to 1250± 100 rpm automatically to warm up the machine.
- After 2-3 minutes, you can select any mode depending on job requirement.

② Self-diagnostic function can be carried out the same as start key is ON.

※ **Refer to 4-12 page for details.**

2507A4OP07

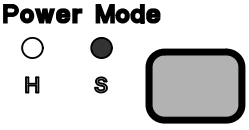
3) SELECTION OF POWER MODE

(1) S mode

When the accel dial is at setting 10 and auto decel mode is cancelled and S mode is selected.

Engine rpm	Effect
1900 ± 50	Same power as non mode type machine.

※ **When the accel dial is located below 9 the engine speed decreases about 50~100 rpm per dial set.**



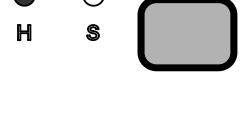
21073CD23A

(2) H mode

When the accel dial is at setting 10 and auto decel mode is cancelled and H mode is selected.

Engine rpm	Effect
2000 ± 50	Approximately 110% of power and speed available than non mode type machine or S mode.

※ **When the multimodal dial is located below 9 the engine speed decreases about 50~100 rpm per dial set.**



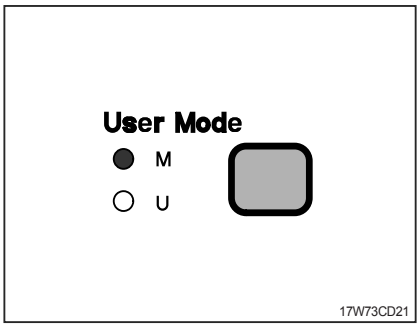
21073CD23B

(3) M mode

When the accel dial is at setting 10 and auto decel mode is cancelled and H mode is selected.

Engine rpm	Effect
2100 ± 50	Approximately 130 % of power and speed available than **non** mode type machine or **S** mode.

※ **When the multimodal dial is located below 9 the engine speed decreases about 50~100 rpm per dial set.**



5. OPERATION OF THE WORKING DEVICE

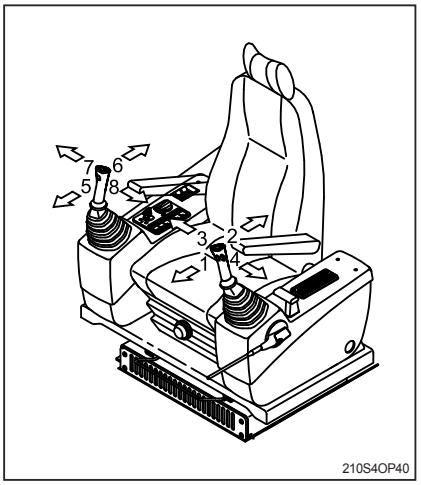
※ **Confirm the operation of control lever and working device.**

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.

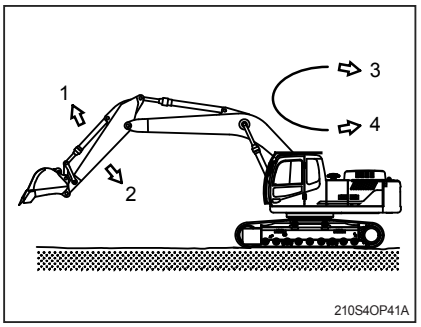
※ **When operating swing, consider the swing distance by inertia.**



210S4OP40

※ **Left control lever**

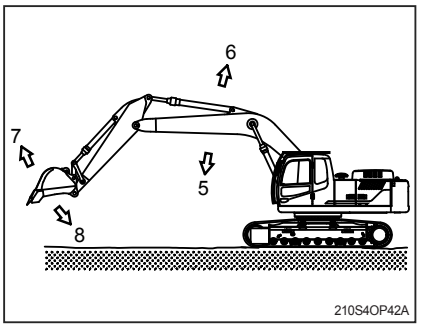
1 Arm roll-out
2 Arm roll-in
3 Swing right
4 Swing left



210S4OP41A

※ **Right control lever**

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



210S4OP42A

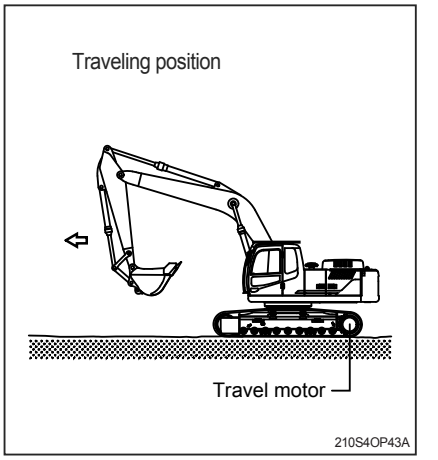
6. TRAVELING OF THE MACHINE

1) BASIC OPERATION

(1) Traveling position

It is the position which the traveling motor is in the rear and the working device is forward.

⚠ Be careful as the traveling direction will be reversed when the whole machine is swinged 180 degree.



(2) Traveling operation

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

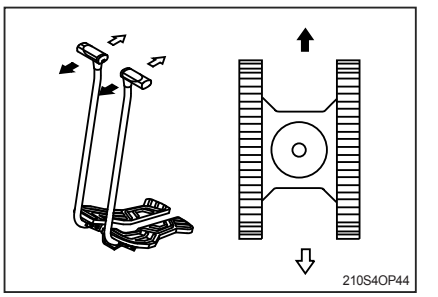
※ **Do not travel continuously for a long time.**

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

(3) Forward and backward traveling

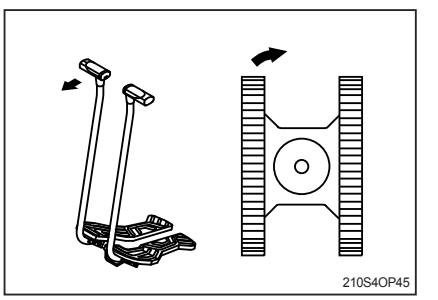
When the left and right travel lever or pedal are pushed at the same time, the machine will travel forward or backward.

※ **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.**



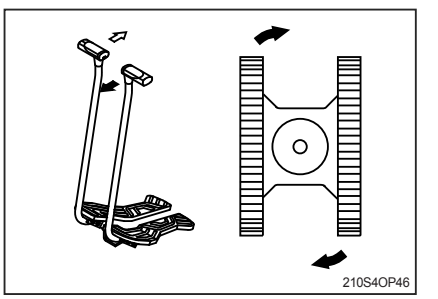
(4) Pivot turning

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



(5) Counter rotation

It is to change the direction at the original place by moving the right and left track. Both side of lever or pedal are operated to the other way at the same time.



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

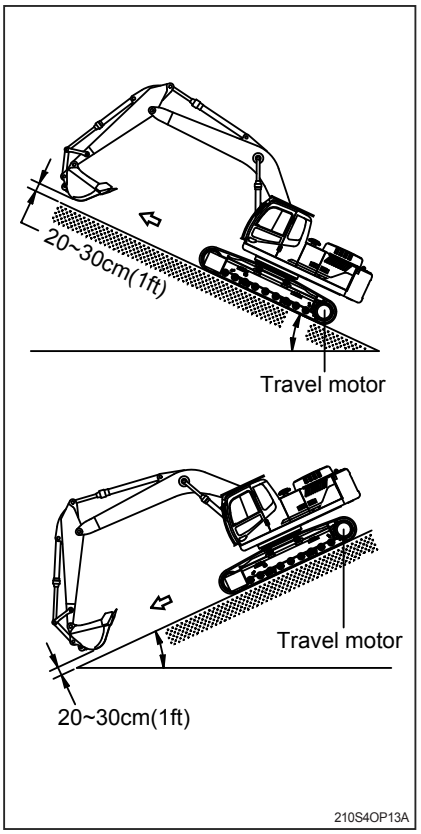
(3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.

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

※ **Machine cannot travel effectively on a slope when the oil temperature is low. Do the warming-up operation when it is going to travel on a slope.**

⚠ **Be careful when working on slopes. It may cause the machine to lose its balance and turn over.**

⚠ **Be sure to keep the travel speed switch on the LOW (Turtle mark) while traveling on a slope.**



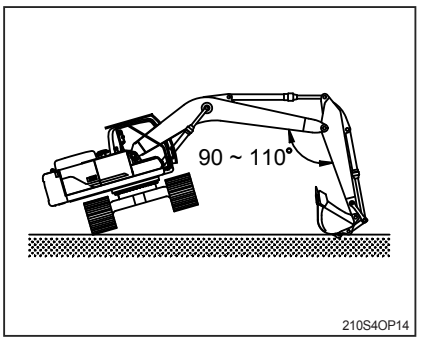
3) TRAVELING ON SOFT GROUND

※ **If possible, avoid to operate 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

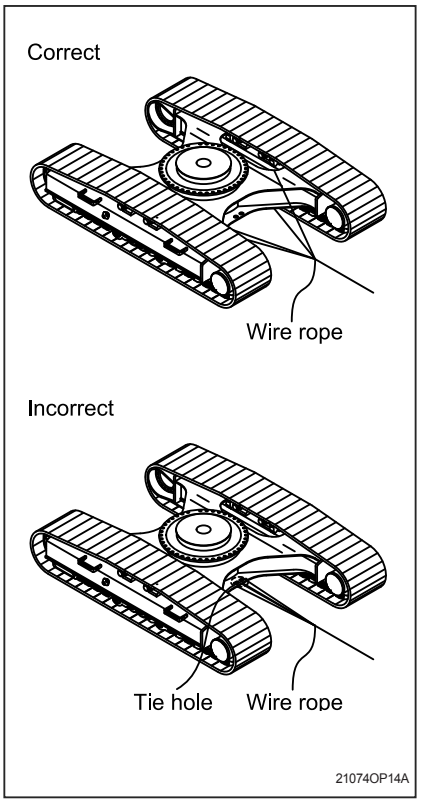
Tow the machine as follows when it can not move on it's own.

(1) Tow the machine by other machine after hook the wire rope to the frame as shown in picture at right.

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

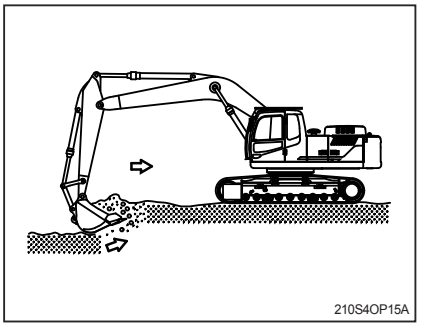
※ **Never tow the machine using only the tie hole, because this may break.**

⚠ **Make sure no personnel are standing close to the tow rope.**

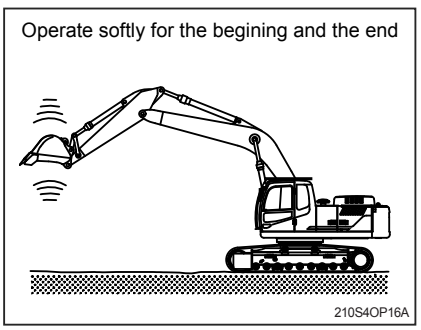


7. EFFICIENT WORKING METHOD

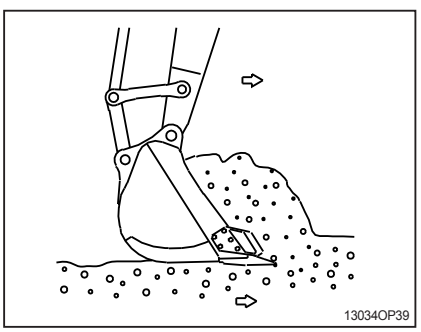
1) Do the digging work by arm.
   Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.



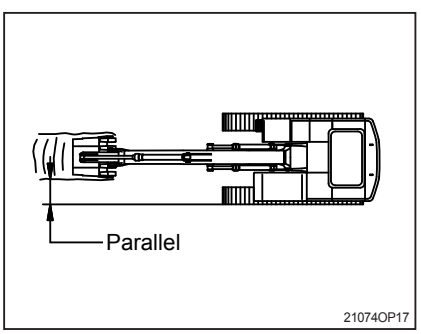
2) When lowering and raising the boom operate softly for the beginning and the end.
   In particularly, sudden stops while lowering the boom may cause damage to the machine.



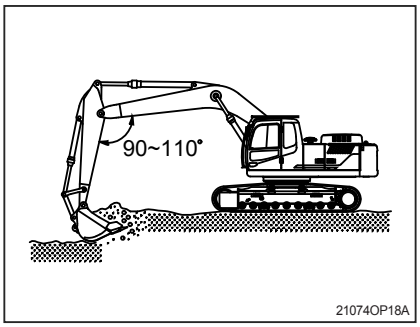
3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



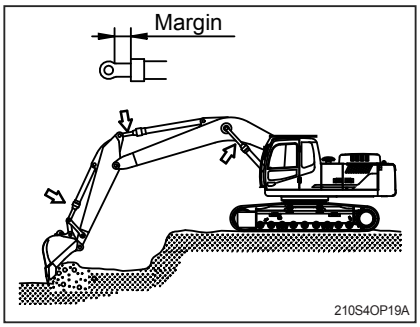
4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



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

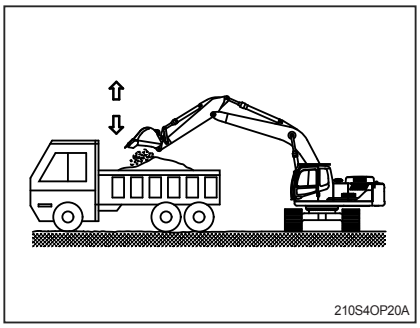


6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

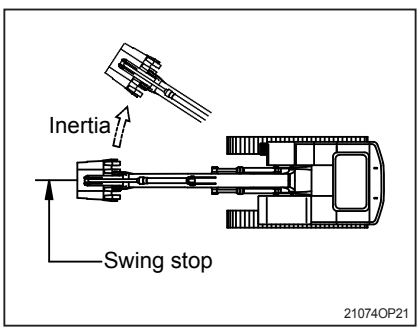


7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

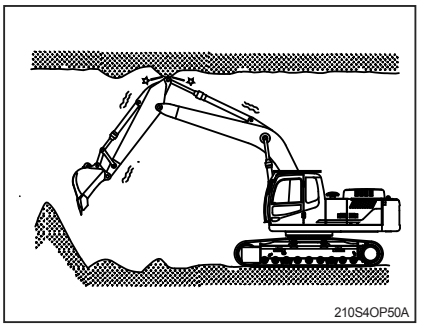
※ **Do not use the impact of bucket tooth when dumping.**



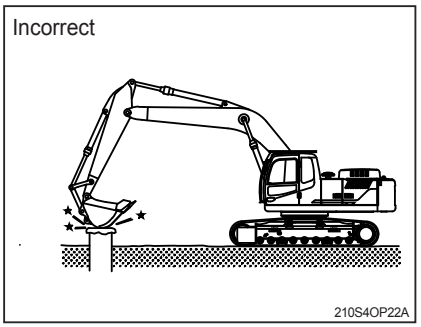
8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



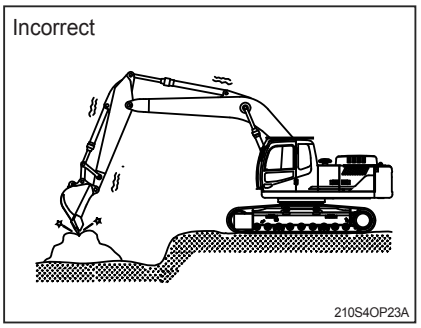
9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



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



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



12) NEVER CARRY OUT EXCESSIVE OPERATIONS

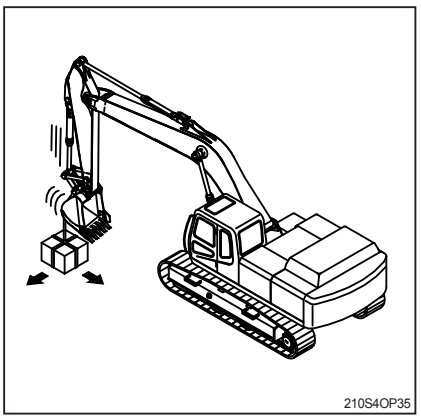
Operation exceeding machine performance may result in accident or failure.

Carry out lifting operation within specified load limit.

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

Never travel while carrying a load.

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



13) BUCKET WITH HOOK

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

The following operations are prohibited.

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

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

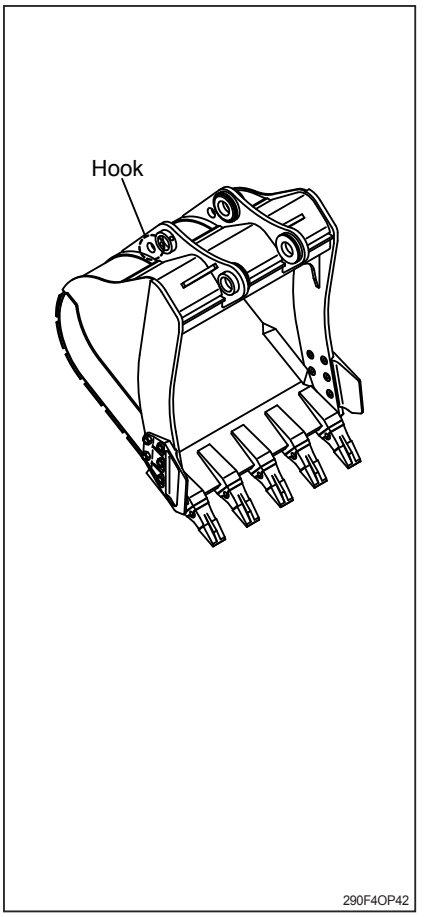
When performing lifting operation, never raise or lower a person.

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

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

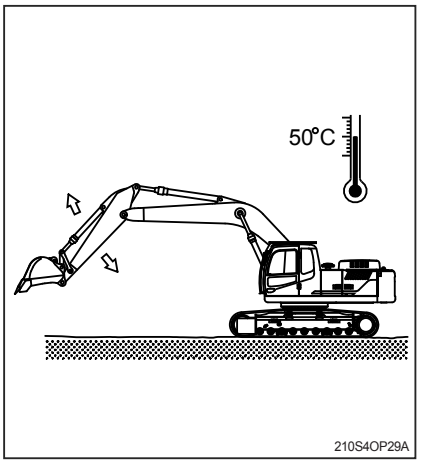
- Execute operating methods and procedures under his direction.
- Select a person responsible for signaling. Operate only on signals given by such person.

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



8. OPERATION IN THE SPECIAL WORK SITES

1) OPERATION THE MACHINE IN A COLD WEATHER



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

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

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

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

(5) Always keep the battery completely charged.

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

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

2) OPERATION IN SANDY OR DUSTY WORK SITES

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

※ **Replace the inner and outer element after 6 times of cleaning.**

(2) Inspect radiator 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 frequently.

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

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

※ **Clean electrical components, especially the starting motor and alternator to avoid accumulation of dust.**

3) SEA SHORE OPERATION

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

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

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

4) OPERATION IN MUD, WATER OR RAIN WORK SITES

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

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

(3) Perform all daily lubrication and service.

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

5) OPERATION IN ROCKY WORK SITES

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

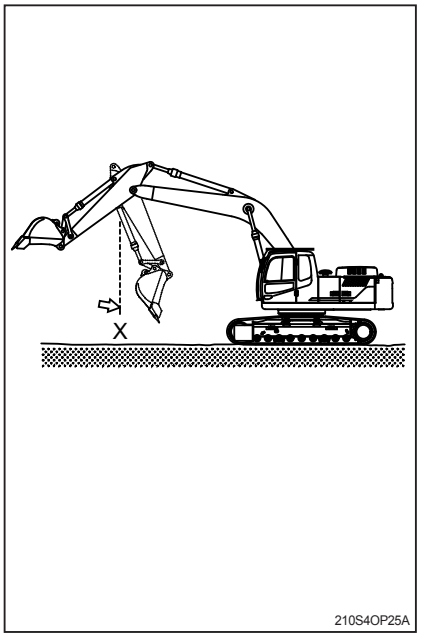
(2) Loosen the track tension a little when working in such areas.

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

9. NORMAL OPERATION OF EXCAVATOR

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

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



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10. ATTACHMENT LOWERING (when engine is stopped)

1) On machines equipped with an accumulator, for a short time (within 2 minute) 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.

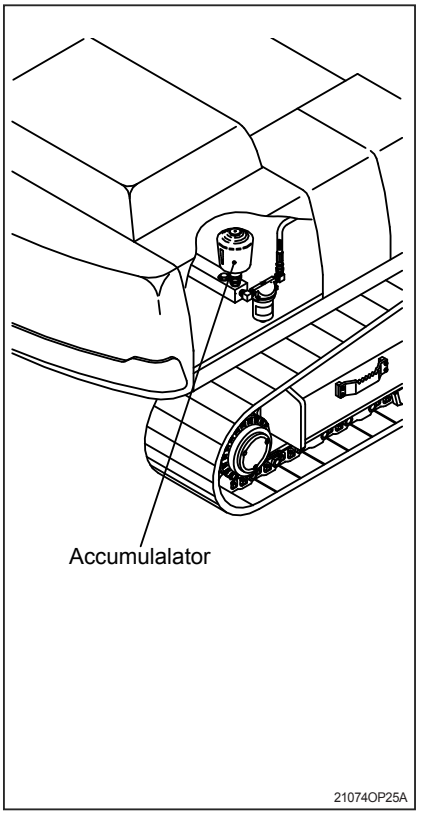
⚠ **Be sure no one is under or near the attachment before lowering the boom.**

2) The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.

⚠ **Never make any hole in the accumulator expose it to flame or fire.**

⚠ **Do not weld anything to the accumulator.**

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



11. STORAGE

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

1) BEFORE STORAGE

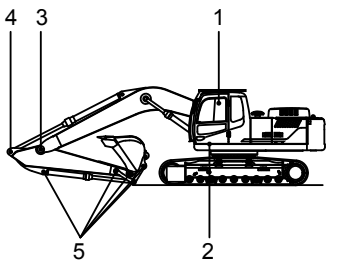
(1) Cleaning the machine

Clean the machine. 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 (5EA)
2 Boom cylinder pin (2EA)
3 Boom and arm connection pin (1EA)
4 Arm cylinder pin (1EA)
5 Arm and bucket (6EA)

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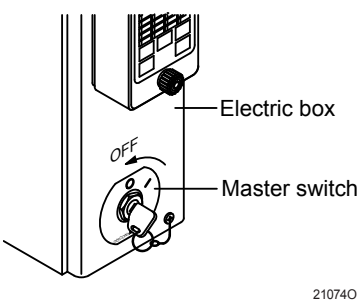
(3) Master switch

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

⚠ **Off the master switch after lamp off.**

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



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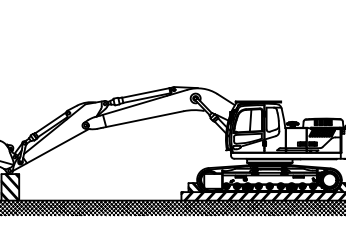
(5) Prevention of dust and moisture

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

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



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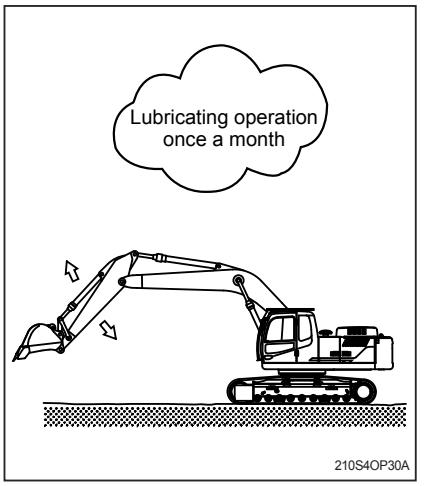
2) DURING STORAGE

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

- **Check the level of engine oil and coolant and fill if required when starting engine.**
- **Clean the anticorrosive on the piston rod of cylinder.**
- **Operate the machine such as traveling, swing and work equipment operation to make sure enough lubrication of all functional components.**



BATTERY

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

② Every 2 months, check the battery voltage and keep battery voltage over 25.08V.

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

3) AFTER STORAGE

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

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

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

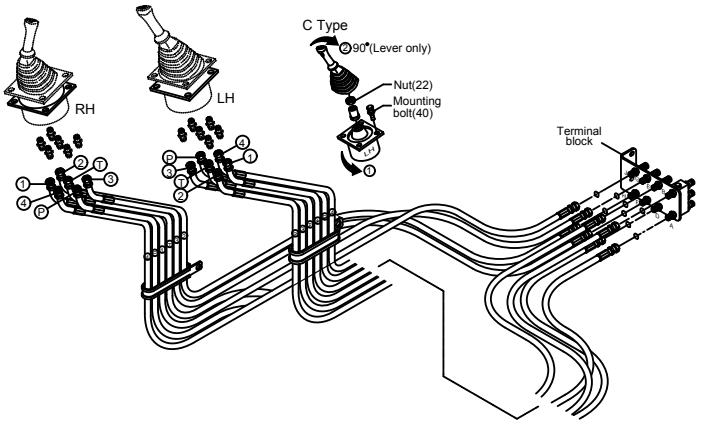
(3) When storage period is 6 months over

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

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

- **Remove the drain port plug and drain the water until the gear oil comes out and then tighten the drain plug.**
- **Refer to the service instruction, section 6 for the drain plug location.**
- **If the machine is stored without carrying out the monthly lubricating operation, consult your Hyundai dealer for service.**

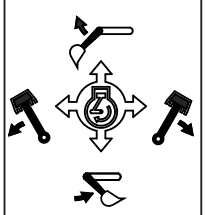
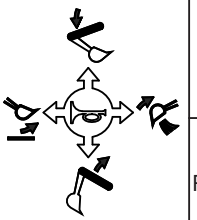
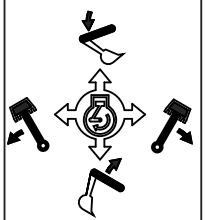
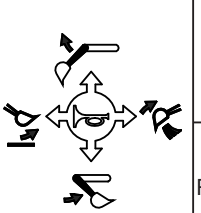
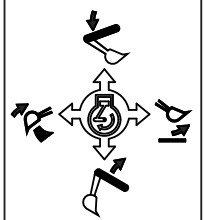
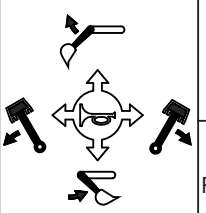
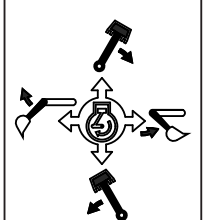
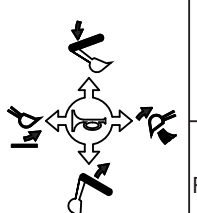
12. RCV LEVER OPERATING PATTERN



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

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

210S4OP47

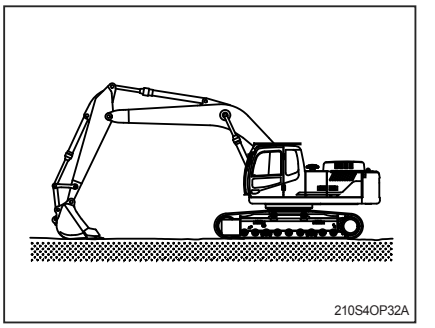
Pattern	Operation		Control function		Hose connection (port)		
	Left RCV lever	Right RCV lever			RCV lever	Change of Terminal block	
						From	To
ISO Type Hyundai			Left	Arm out	②	D	-
				Arm in	④	E	-
				Swing right	③	B	-
				Swing left	①	A	-
			Right	Boom lower	④	J	-
				Boom raise	②	H	-
				Bucket out	①	G	-
				Bucket in	③	F	-
A Type			Left	Boom lower	②	D	J
				Boom raise	④	E	H
				Swing right	③	B	-
				Swing left	①	A	-
			Right	Arm out	④	J	D
				Arm in	②	H	E
				Bucket out	①	G	-
				Bucket in	③	F	-
B Type			Left	Boom lower	②	D	J
				Boom raise	④	E	H
				Bucket in	③	B	F
				Bucket out	①	A	G
			Right	Arm out	④	J	D
				Arm in	②	H	E
				Swing right	①	G	B
				Swing left	③	F	A
C Type			Left	① Loosen the RCV lever mounting bolt (40) and rotates lever assy 90° counterclockwise; then install. ② To put lever in correct position, disassemble nut (22) and rotates only lever 90° clockwise.			
			Right	Same as ISO type			

13. SWITCHING HYDRAULIC ATTACHMENT CIRCUIT

The combined hydraulic attachment circuit is capable of providing single action or double action.

The position of 3 way valve selects the single action hydraulic attachment circuit or the double action hydraulic attachment circuit.

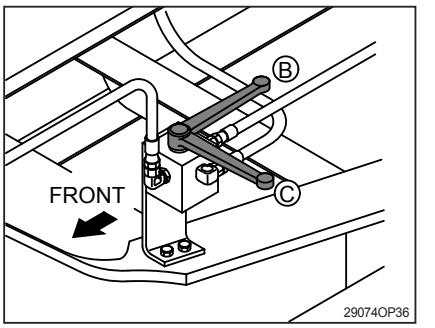
Before you change the flow mode of hydraulic attachment circuit, place the machine in the servicing position as shown. Stop the engine.



4) Use the manual lever to turn the 3 way valve.
Make sure that you fully turn the valve until the valve stops.

(1) One way flow (Hydraulic breaker)
Position the manual lever parallel to the piping (ⓑ).

(2) Two way flow (Clamshell or shear)
Position the manual lever perpendicular to the piping (ⓒ).



1. PREPARATION FOR TRANSPORTATION

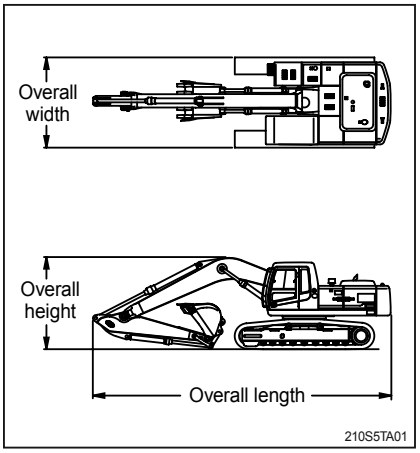
1) When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc.

2) Select proper trailer after confirming the weight and dimension from the chapter 2, specification.

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

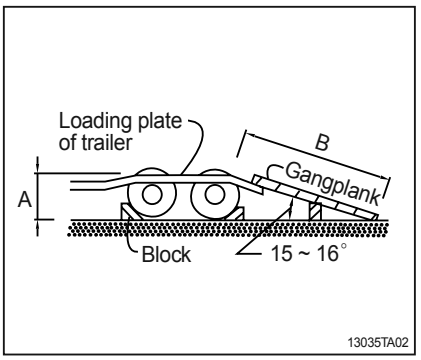
4) Get the permission from the related authority if necessary.

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



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

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

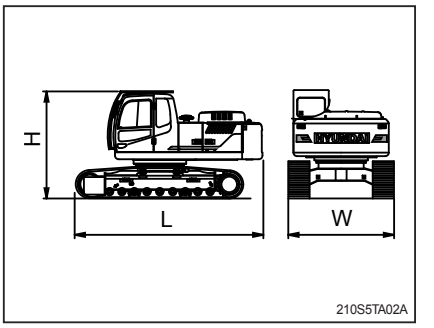


2. DIMENSION AND WEIGHT

1) BASE MACHINE

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	4990 (16' 4")
H	Height	mm (ft-in)	2920 (9' 7")
W	Width	mm (ft-in)	2990 (9' 10")
Wt	Weight	kg (lb)	17410 (38380)

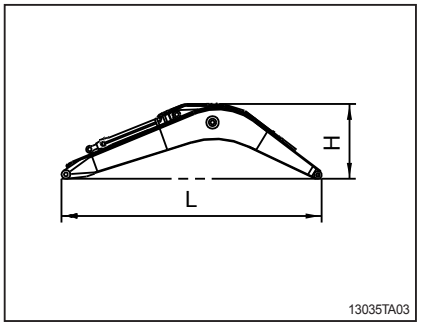
※ **With 600 mm (24") triple grouser shoes and 3600 kg (7940 lb) counterweight.**



2) BOOM ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	5900 (19' 4")
H	Height	mm (ft-in)	1550 (5' 1")
W	Width	mm (ft-in)	700 (2' 4")
Wt	Weight	kg (lb)	2070 (4560)

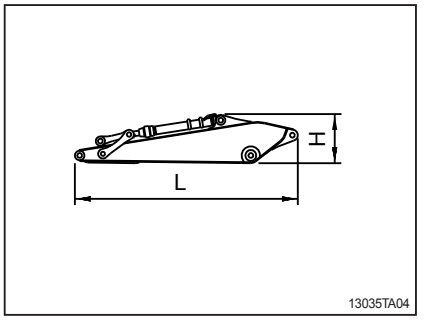
※ **5.68 m (18' 8") boom with arm cylinder (included piping and pins).**



3) ARM ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3910 (12'10")
H	Height	mm (ft-in)	870 (2' 10")
W	Width	mm (ft-in)	350 (1' 2")
Wt	Weight	kg (lb)	1095 (2410)

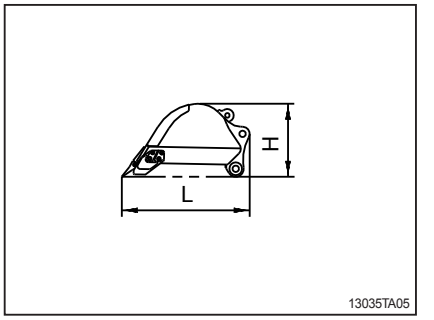
※ **2.92 m (9' 7") arm with bucket cylinder (included linkage and pins).**



4) BUCKET ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1600 (5' 3")
H	Height	mm (ft-in)	980 (3' 3")
W	Width	mm (ft-in)	1250 (4' 1")
Wt	Weight	kg (lb)	765 (1690)

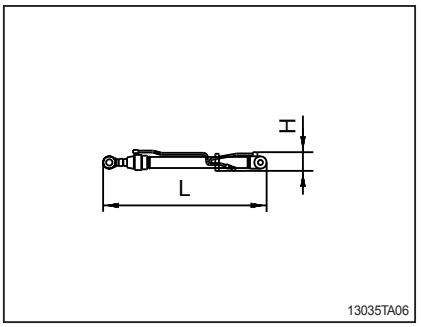
※ **0.92 m³ (1.20 yd³) SAE heaped bucket (included tooth and side cutters).**



5) BOOM CYLINDER

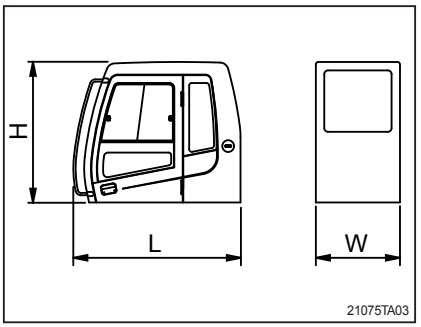
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1960 (6' 5")
H	Height	mm (ft-in)	230 (0' 9")
W	Width	mm (ft-in)	330 (1' 1")
Wt	Weight	kg (lb)	380 (840)

※ **Included piping.**



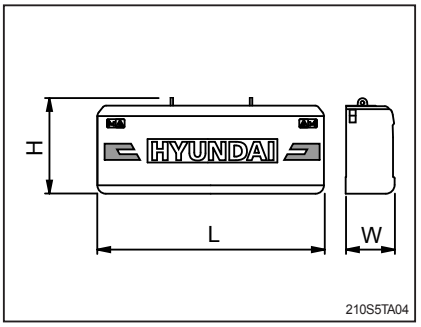
6) CAB ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1962 (6' 4")
H	Height	mm (ft-in)	1676 (5' 5")
W	Width	mm (ft-in)	1288 (4' 2")
Wt	Weight	kg (lb)	310 (680)



7) COUNTERWEIGHT

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2700 (8' 10")
H	Height	mm (ft-in)	1050 (3' 5")
W	Width	mm (ft-in)	560 (1' 10")
Wt	Weight	kg (lb)	3600 (7940)

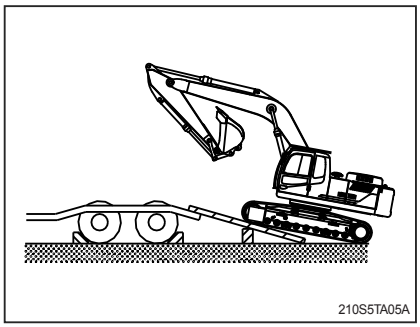


3. LOADING THE MACHINE

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

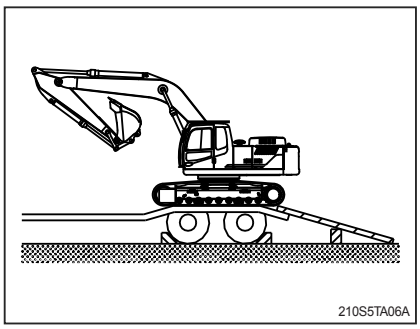
2) Use the gangplank with sufficient length, width, thickness and gradient.

3) Place the swing lock switch to the LOCK position (if equipped) before fixing the machine at the bed of trailer and confirm if the machine parallels the bed of trailer.
   Keep the travel motor in the rear when loading and in the front when unloading.

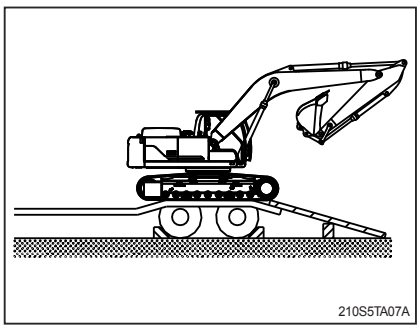

210S5TA05A

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.


210S5TA06A

(2) Place the swing lock switch to the LOCK position (if equipped) after the swing the machine 180 degree.


210S5TA07A

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

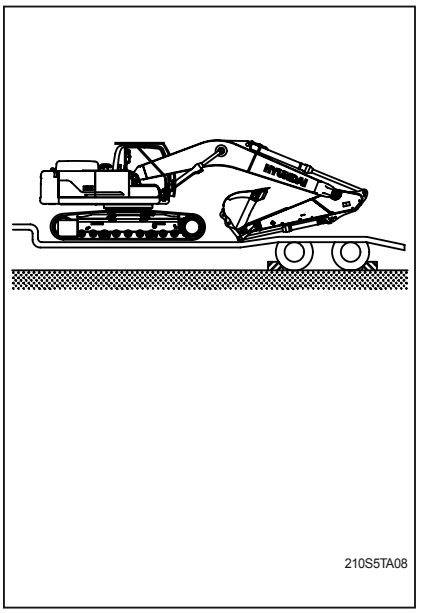
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

⚠ **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 since it will be very dangerous.**

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

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

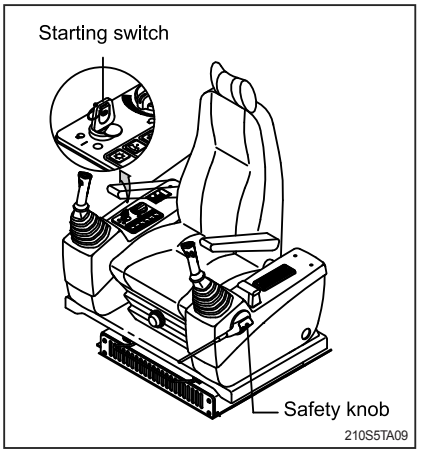


4. FIXING THE MACHINE

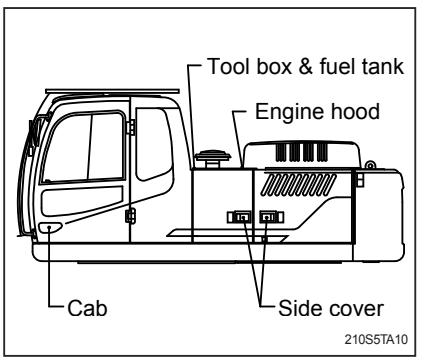
1) Lower down the working device on the loading plate of trailer.

2) Keep the safety knob on the LOCK position.

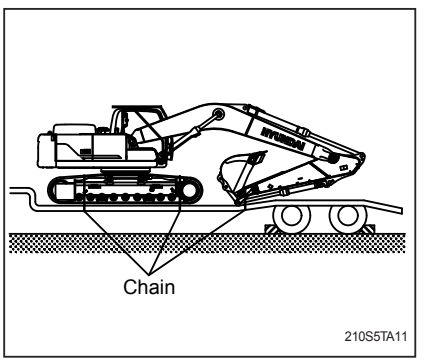
3) Turn OFF all the switches and remove the key.



4) Secure all locks.



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



5. LOADING AND UNLOADING BY CRANE

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

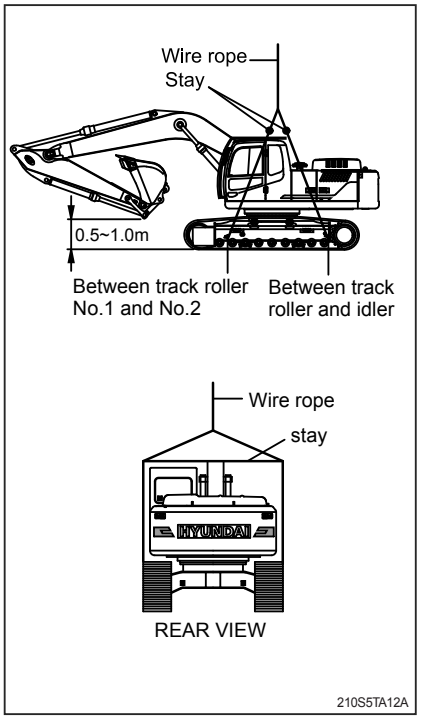
⚠ Make sure wire rope is proper size.

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

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

⚠ Do not load abruptly.

⚠ Keep area clear of personnel.



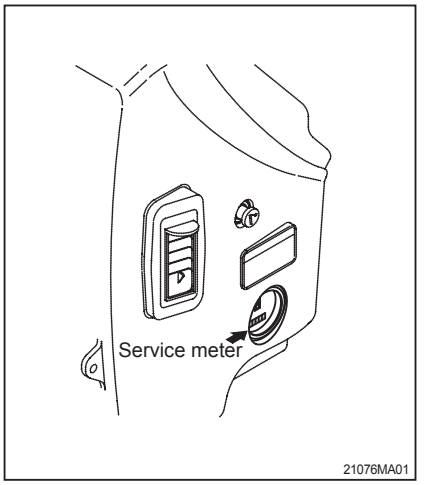
1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

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

(2) Shorten the interval of inspect and service depending on site condition. (such as dusty area, quarry, sea shore and etc.)

(3) Practice the entire related details at the same time when the service interval is doubled.
For example, in case of 100 hours, carry out all the maintenance「Each 100 hours, each 50 hours and daily service」at the same time.



2) PRECAUTION

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

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

(3) Engine and hydraulic components have been preset in the factory.
Do not allow unauthorized personnel to reset them.

(4) Drain the used oil and coolant in a container and handle according to the method of handling for industrial waste to meet with regulations of each province or country.

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

△ Accumulated grease and oil on the machine is a fire hazard. Remove this debris with steam cleaning or high pressure water, at least every 1000 hours.

△ Inspect the engine compartment for any trash build up. Remove any trash build up from the engine compartment.

(5) Ask to your local dealer or Hyundai 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 at proper time to keep the performance of machine.

(2) Use genuine parts.

(3) Use the recommended oil.

(4) Remove the dust or water around the inlet of oil tank before supplying oil.

(5) Drain oil when the temperature of oil is warm.

(6) Do not repair anything while operating the engine.

Stop the engine when you fill the oil.

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

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

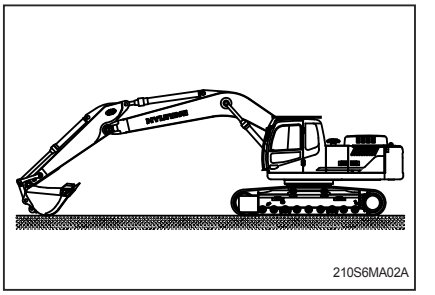
(9) For more detail information of maintenance, please contact local Hyundai dealer.

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

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

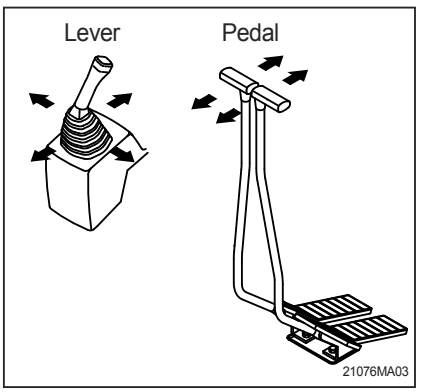
※ **Spouting of oil can cause the accident when loosening the cap or hose right after the operating of machine as the machine or oil is on the high pressure on the condition.**
Be sure to relieve the pressure in the system before repairing hydraulic system.

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

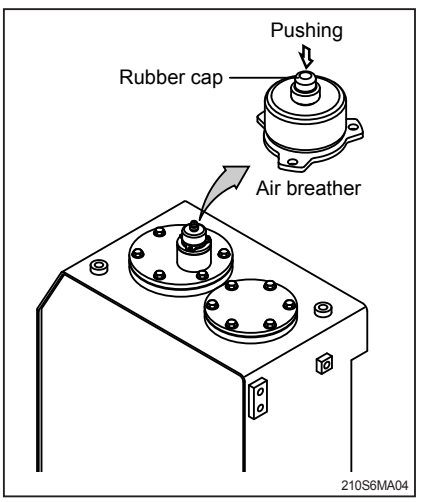


(2) Set the safety knob completely in the UNLOCK position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

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



(3) Relieve the pressure in the tank by pushing the rubber cap of the air breather.



5) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPES

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

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

(3) Use genuine parts.

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

(5) Keep the specified tighten torque.

6) PERIODICAL REPLACEMENT OF SAFETY PARTS

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

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

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

<table>
<tr><th colspan="3">Periodical replacement of safety parts</th><th>Interval</th></tr>
<tr><td colspan="2" rowspan="2">Engine</td><td>Fuel hose (tank-engine)</td><td rowspan="2">Every
2 years</td></tr>
<tr><td>Heater hose
(heater-engine)</td></tr>
<tr><td rowspan="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>

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

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

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8.8T		10.9T		12.9T	
	kgf·m	lbf·ft	kgf·m	lbf·ft	kgf·m	lbf·ft
M 6 × 1.0	0.8 ~ 1.2	5.8 ~ 8.6	1.2 ~ 1.8	8.7 ~ 13.0	1.5 ~ 2.1	10.9 ~ 15.1
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.6	2.8 ~ 4.2	20.3 ~ 30.4	3.4 ~ 5.0	24.6 ~ 36.1
M10 × 1.5	4.0 ~ 6.0	29.0 ~ 43.3	5.6 ~ 8.4	40.5 ~ 60.8	6.8 ~ 10.0	49.2 ~ 72.3
M12 × 1.75	6.8 ~ 10.2	50.0 ~ 73.7	9.6 ~ 14.4	69.5 ~ 104	12.3 ~ 16.5	89.0 ~ 119
M14 × 2.0	10.9 ~ 16.3	78.9 ~ 117	16.3 ~ 21.9	118 ~ 158	19.5 ~ 26.3	141 ~ 190
M16 × 2.0	17.9 ~ 24.1	130 ~ 174	25.1 ~ 33.9	182 ~ 245	30.2 ~ 40.8	141 ~ 295
M18 × 2.5	24.8 ~ 33.4	180 ~ 241	34.8 ~ 47.0	252 ~ 340	41.8 ~ 56.4	302 ~ 407
M20 × 2.5	34.9 ~ 47.1	253 ~ 340	49.1 ~ 66.3	355 ~ 479	58.9 ~ 79.5	426 ~ 575
M22 × 2.5	46.8 ~ 63.2	339 ~ 457	65.8 ~ 88.8	476 ~ 642	78.9 ~ 106	570 ~ 766
M24 × 3.0	60.2 ~ 81.4	436 ~ 588	84.6 ~ 114	612 ~ 824	102 ~ 137	738 ~ 991
M30 × 3.5	120 ~ 161	868 ~ 1164	168 ~ 227	1216 ~ 1641	202 ~ 272	1461 ~ 1967

(2) Fine thread

Bolt size	8.8T		10.9T		12.9T	
	kgf · m	lbf · ft	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8 × 1.0	2.1 ~ 3.1	15.2 ~ 22.4	3.0 ~ 4.4	21.7 ~ 31.8	3.6 ~ 5.4	26.1 ~ 39.0
M10 × 1.25	4.2 ~ 6.2	30.4 ~ 44.9	5.9 ~ 8.7	42.7 ~ 62.9	7.0 ~ 10.4	50.1 ~ 75.2
M12 × 1.25	7.3 ~ 10.9	52.8 ~ 78.8	10.3 ~ 15.3	74.5 ~ 110	13.1 ~ 17.7	94.8 ~ 128
M14 × 1.5	12.4 ~ 16.6	89.7 ~ 120	17.4 ~ 23.4	126 ~ 169	20.8 ~ 28.0	151 ~ 202
M16 × 1.5	18.7 ~ 25.3	136 ~ 182	26.3 ~ 35.5	191 ~ 256	31.6 ~ 42.6	229 ~ 308
M18 × 1.5	27.1 ~ 36.5	196 ~ 264	38.0 ~ 51.4	275 ~ 371	45.7 ~ 61.7	331 ~ 446
M20 × 1.5	37.7 ~ 50.9	273 ~ 368	53.1 ~ 71.7	384 ~ 518	63.6 ~ 86.0	460 ~ 622
M22 × 1.5	51.2 ~ 69.2	370 ~ 500	72.0 ~ 97.2	521 ~ 703	86.4 ~ 116	625 ~ 839
M24 × 2.0	64.1 ~ 86.5	464 ~ 625	90.1 ~ 121	652 ~ 875	108 ~ 146	782 ~ 1056
M30 × 2.0	129 ~ 174	933 ~ 1258	181 ~ 245	1310 ~ 1772	217 ~ 294	1570 ~ 2126

2) PIPE AND HOSE (FLARE TYPE)

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

3) PIPE AND HOSE (ORFS TYPE)

Thread size (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
1-7/16-12	41	21	152
1-11/16-12	50	35	253

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
1"	41	21	152
1-1/4"	50	35	253

4) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-bracket)	M12 × 1.75	11.45 ± 1.0	82.8 ± 7.2
2		Engine mounting bolt (bracket-frame, FR)	M20 × 2.5	52.1 ± 5.0	377 ± 36.2
3		Engine mounting bolt (bracket-frame, RR)	M24 × 3.0	90.0 ± 9.0	651 ± 65.1
4		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
5		Coupling mounting socket bolt	M20 × 2.5	59.7 ± 8.7	419 ± 62.9
6		Main pump housing mounting bolt	M10 × 1.5	4.8 ± 0.3	34.7 ± 2.2
7	Hydraulic system	Main pump mounting socket bolt	M20 × 2.5	42 ± 4.5	304 ± 32.5
8		Main control valve mounting nut	M12 × 1.75	12.2 ± 1.3	88.2 ± 9.4
9		Fuel tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.9
10		Hydraulic oil tank mounting bolt	M20 × 2.5	45 ± 5.1	325 ± 36.9
11		Turning joint mounting bolt, nut	M12 × 1.75	12 ± 1.3	86.8 ± 9.4
12	Power train system	Swing motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
		Swing bearing upper part mounting bolt	M20 × 2.5	57.8 ± 6.4	418 ± 46.3
13		Swing bearing lower part mounting bolt	M20 × 2.5	57.8 ± 6.4	418 ± 46.3
14		Travel motor mounting bolt	M16 × 2.0	23 ± 2.5	166 ± 18.1
15		Sprocket mounting bolt	M16 × 2.0	26 ± 4.0	188 ± 28.9
16	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7 ± 4.4	215 ± 31.8
17		Track roller mounting bolt	M20 × 2.5	54.7 ± 5.0	396 ± 36.2
18		Track tension cylinder mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
19		Track shoe mounting bolt, nut	M20 × 1.5	78 ± 8.0	564 ± 57.9
20		Track guard mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
21	Others	Counter weight mounting bolt	M36 × 3.0	308 ± 46	2228 ± 333
22		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
23		Operator's seat mounting bolt	M8 × 1.25	4.05 ± 0.8	29.3 ± 5.8

※ **For tightening torque of engine and hydraulic components, see engine maintenance guide and service manual.**

3. FUEL, COOLANT AND LUBRICANTS

1) NEW MACHINE

New machine used and filled with following lubricants.

Description	Specification
Engine oil (API CI-4)	SAE 15W-40, ★SAE 5W-40
Hydraulic oil	Hyundai genuine long life hydraulic oil (ISO VG32, VG 46, VG 68) Conventional hydraulic oil (ISO VG 15★)
Swing and travel reduction gear	SAE 85W-140 (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2
Coolant	Mixture of 50% ethylene glycol base antifreeze and 50% water. Mixture of 60% ethylene glycol base antifreeze and 40% water.★

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

★ Cold region
Russia, CIS, Mongolia

2) RECOMMENDED OILS

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

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

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature ˚C(˚F)
			-50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil ★2	14 (3.8) : -#1161 20 (5.3) : #1162-	★SAE 0W-40 ★SAE 0W-30 SAE 5W-30 SAE 10W-30 SAE 15W-40
Swing drive	Gear oil	6.2 (1.6)	★SAE 75W-90
Final drive		4.5×2 (1.2×2)	SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank : 165 (43.6) System : 275 (72.6)	★ISO VG 15 ISO VG 32 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel	400 (106)	★ASTM D975 NO.1 ASTM D975 NO.2
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and soft water★1	31 (8.2)	Ethylene glycol base permanent type (50 : 50) ★Ethylene glycol base permanent type (60 : 40)

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

★ : Cold region
Russia, CIS, Mongolia
★1 : Soft water
City water or distilled water
★2 : Meets or exceeds
API CI-4 grade

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

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

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

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-26
Hydraulic oil level	Check, Add	6-31
Engine oil level	Check, Add	6-18
Coolant level	Check, Add	6-20
Control panel & pilot lamp	Check, Clean	6-41
Prefilter (water)	Check, Drain	6-27
Fan belt tension and damage	Check	6-24, 25
Attachment pin and bushing ★	Lubricate	6-40
· Boom cylinder tube end		
· Boom foot		
· Boom cylinder rod end		
· Arm cylinder tube end		
· Arm cylinder rod end		
· Boom + Arm connecting		
· Bucket cylinder tube end		

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

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water, sediment)	Drain	6-26
Track tension	Check, Adjust	6-36
Swing reduction gear oil	Check, Add	6-34
Attachment pin and bushing	Lubricate	6-40
· Bucket cylinder rod end		
· Bucket + Arm connecting		
· Bucket control link + Arm		
· Bucket control rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Bolts & Nuts · 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 · Carrier roller mounting bolts · Track roller mounting bolts · Hydraulic pump mounting bolts	Check, Tight	6-8

4) EVERY 200 HOURS SERVICE

Check items	Service	Page
Return filter ★	Replace	6-32
Pilot line filter ★	Replace	6-33
Drain filter cartridge ★	Replace	6-33

★ Replace 3 filters for continuous hydraulic breaker operation only.

5) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-18, 19
Engine oil filter	Replace	6-18, 19
Prefilter (element)	Replace	6-27
Fuel filter element	Replace	6-28
Pilot line filter element	Replace	6-33
Hydraulic oil return filter	Replace	6-32
Drain filter cartridge	Replace	6-33
Swing reduction gear oil	Change	6-34
Travel reduction gear case	Change	6-35

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Engine oil * (-#1161)	Change	6-18, 19
Engine oil filter * (-#1161)	Replace	6-18, 19
Battery (voltage)	Check, Clean	6-41
Swing bearing grease	Check, Add	6-34
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		
· Carrier roller mounting bolts		
· Track roller mounting bolts		
· Hydraulic pump mounting bolts		
Attachment pin and bushing	Lubricate	6-40
· 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		
Aircon & heater filter (fresh air)	Clean	6-44

*** If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.**

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
Engine oil *(#1162-)	Change	6-18, 19
Engine oil filter *(#1162-)	Replace	6-18, 19
Radiator, cooler fin and charge air cooler	Check, Clean	6-23
Fuel filter element	Replace	6-28
Prefilter	Replace	6-27
Aircon & heater filter (fresh air)	Clean	6-44
Air cleaner element (primary) *1	Check, clean	6-26

*** API CI-4 (Change oil and filter every 250 hours when using API CH-4)**

***1 When working in dusty environments, more frequent cleaning is highly recommended.**

8) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Hydraulic tank air breather element	Replace	6-33
Travel motor reduction gear oil	Change	6-35
Swing reduction gear oil	Change	6-34
Grease in swing gear and pinion	Change	6-35
Hydraulic oil return filter	Replace	6-32
Drain filter cartridge	Replace	6-33
Pilot line filter	Replace	6-33

9) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Coolant	Change	6-20, 21, 22, 23
Air cleaner element (primary, safety) *1	Replace	6-26
Hydraulic oil *2	Change	6-31
Hydraulic tank suction strainer	Check, Clean	6-32
RCV lever	Check, Lubricate	6-36
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

*1 When working in dusty environments, more frequent replacing is highly recommended.

*2 Conventional hydraulic oil

*2 **Change oil every 600 hours of continuous hydraulic breaker operation.**

10) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil *3	Change	6-31

*3 Hyundai genuine long life hydraulic oil

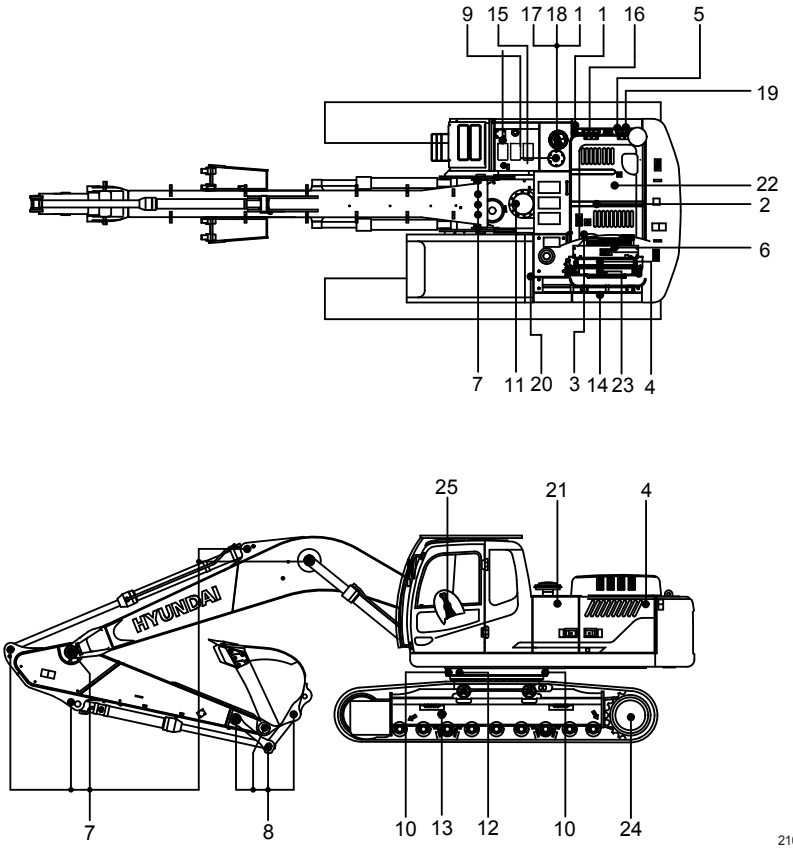
*3 **Change oil every 1000 hours of continuous hydraulic breaker operation.**

11) WHEN REQUIRED

Whenever you have trouble in the machine, you must perform the service of related items, system by system.

Check items	Service	Page
Fuel system		
· Fuel tank	Drain or Clean	6-26
· Prefilter (water, element)	Drain or Replace	6-27
· Fuel filter element	Replace	6-28
Engine lubrication system		
· Engine oil	Change	6-18, 19
· Engine oil filter	Replace	6-18, 19
Engine cooling system		
· Coolant	Add or Change	6-20, 21, 22, 23
· Radiator	Clean or Flush	6-20, 21, 22, 23
· Charge air cooler	Check, Clean	6-23
Engine air system		
· Air cleaner element (primary)	Clean or Replace	6-26
· Air cleaner element (safety)	Replace	6-26
Hydraulic system		
· Hydraulic oil	Add or Change	6-31
· Return filter	Replace	6-32
· Drain line filter	Replace	6-33
· Pilot line filter	Replace	6-33
· Element of breather	Replace	6-33
· Suction strainer	Clean	6-32
· RCV lever	Lubricate	6-36
Undercarriage		
· Track tension	Check, Adjust	6-36
Bucket		
· Tooth	Replace	6-38
· Side cutter	Replace	6-38
· Linkage	Adjust	6-37
· Bucket assy	Replace	6-37
Air conditioner and heater		
· Fresh air filter	Replace	6-44
· Recirculation filter	Clean, Replace	6-44, 45

5. MAINTENANCE CHART



Caution

1. Service intervals are based on the hour meter reading.
2. The number of each item shows the lubrication point on the machine.
3. Stop engine while filling oil, and use no open flames.

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	165 (43.6)	1
	2	Engine oil level	Check, Add	EO	14 (3.8)	1
	4	Radiator coolant	Check, Add	C	31 (8.2)	1
	5	Prefilter (water)	Check, Drain	-	-	1
	6	Fan belt tension and damage	Check	-	-	1
	7	*Attachment pin & bushing	Check, Lubricate	PGL		11
	9	Fuel tank	Check, Refill	DF	400 (106)	1
50 Hours or weekly	8	Bucket linkage pins	Check, Lubricate	PGL	-	6
	9	Fuel tank (water, sediment)	Check, Drain	-	-	1
	11	Swing reduction gear oil	Check, Add	GO	6.2 (1.6)	1
	13	Track tension	Check, Adjust	PGL	-	2

* For initial 100 hours.

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
250 Hours	2	Engine oil (-#1161)	Change	EO	14 (3.8)	1
	3	Engine oil filter (-#1161)	Replace	-	-	1
	7	Attachment pins & bushings	Check, Lubricate	PGL	-	11
	10	Swing bearing grease	Check, Add	PGL	-	2
	14	Battery (voltage)	Check, Clean	-	-	1
	20	Aircon & heater filt er (fresh air)	Clean	-	-	1
Initial 250 Hours	2	Engine oil	Change	EO	20 (5.3)	1
	3	Engine oil filter	Replace	-	-	1
	5	Prefilter (element)	Replace	-	-	1
	11	Swing reduction gear oil	Change	GO	6.2 (1.6)	1
	15	Hydraulic oil return filter	Replace	-	-	1
	16	Drain filter cartridge	Replace	-	-	1
	19	Pilot line filter element	Replace	-	-	1
	22	Fuel filter element	Replace	-	-	2
	24	Travel reduction gear case	Change	GO	4.5 (1.2)	2
500 Hours	2	Engine oil (#1162-)	Change	EO	20 (5.3)	1
	3	Engine oil filter (#1162-)	Replace	-	-	1
	5	Prefilter (element)	Replace	-	-	1
	21	Air cleaner element (primary)	Check, Clean	-	-	1
	22	Fuel filter element	Replace	-	-	2
	23	Radiator, oil cooler, charge air cooler	Check, Clean	-	-	3
1000 Hours	11	Swing reduction gear oil	Change	GO	6.2 (1.6)	1
	12	Swing gear and pinion grease	Change	PGL	7.9 kg (17.5 lb)	1
	15	Hydraulic oil return filter	Replace	-	-	1
	16	Drain filter cartridge	Replace	-	-	1
	17	Air breather element	Replace	-	-	1
	19	Pilot line filter	Replace	-	-	1
	24	Travel reduction gear case	Change	GO	4.5 (1.2)	2
2000 Hours	1	Hydraulic oil *1	Change	HO	165 (43.6)	1
	4	Radiator coolant	Change	C	31 (8.2)	1
	18	Hydraulic oil suction strainer	Check, Clean	-	-	1
	21	Air cleaner element (primary, safety)	Replace	-	-	2
	25	RCV lever	Check, Lubricate	PGL	-	2
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
5000 Hours	1	Hydraulic oil *2	Change	HO	165 (43.6)	1
As required	20	Aircon & heater fresh filter	Replace	-	-	1
	20	Aircon & heater recirculation filter	Clean, Replace	-	-	1
	21	Air cleaner element (primary)	Replace	-	-	1
	21	Air cleaner element (safety)	Replace	-	-	1

*1 Conventional hydraulic oil *2 Hyundai genuine long life hydraulic oil

※ **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 a flat ground before starting engine.

(1) Pull out the dipstick and wipe with a clean cloth.

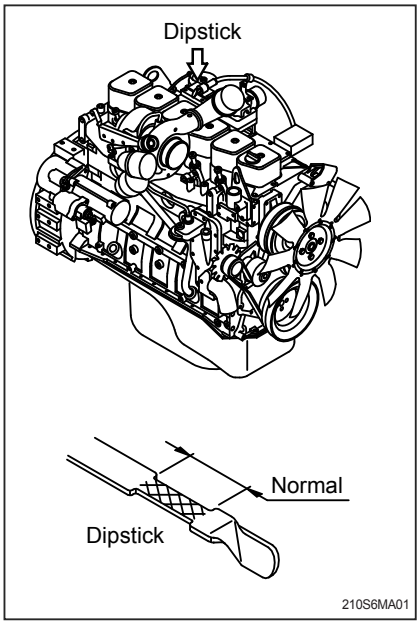
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

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

※ **If the oil is contaminated or diluted, change the oil regardless of the regular change interval.**

※ **Check oil level after engine has been stopped for 15 minutes.**

⚠ **Do not operate unless the oil level is in the normal range.**



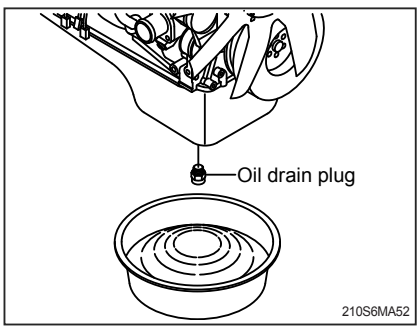
2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(1) Warm up the engine until the water temperature reaches 60°C (140°F).

(2) Shut off the engine.

(3) Remove the oil drain plug.

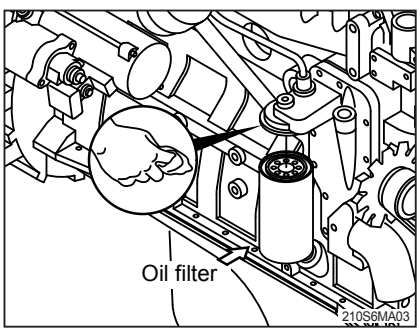
※ **A drain pan with a capacity of 24 liters (6.3 U.S. gallons) will be adequate.**



(4) Clean around the filter head, remove the filter and clean the gasket surface.

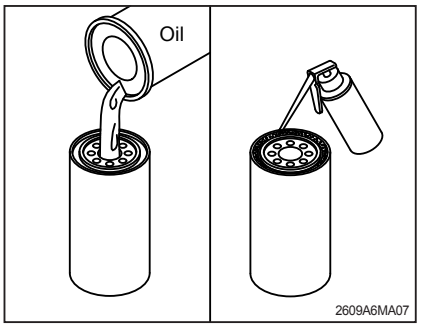
· Wrench size : 90 ~ 95 ㎜ (3.5~3.8 in)

※ **The O-ring can stick on the filter head. Make sure it is removed before installing the new filter.**



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

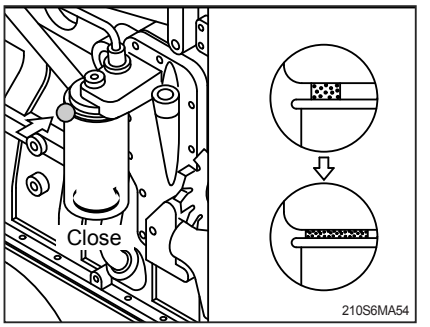
※ **Fill the filters with clean lubricating oil before installation.**



(5) Install the filter to the filter head.

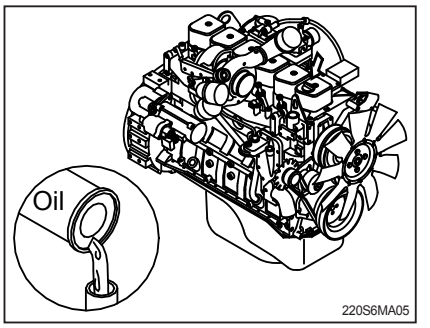
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**

· Install the filter as specified by the filter manufacturer.

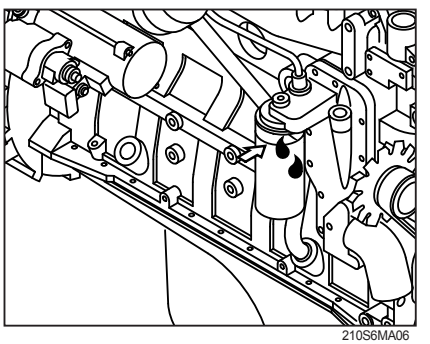


(6) Fill the engine with clean oil to the proper level.

· Quantity : 14 ℓ (3.8 U.S. gallons) (-#1161)
20 ℓ (5.3 U.S. gallons) (#1162-)



(7) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.
Shut the engine off and check the oil level with the dipstick. Allow 15 minutes for oil to drain down before checking.



3) CHECK COOLANT

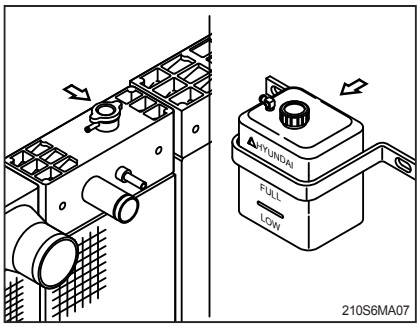
(1) Check if the level of coolant in reservoir tank is between FULL and LOW.

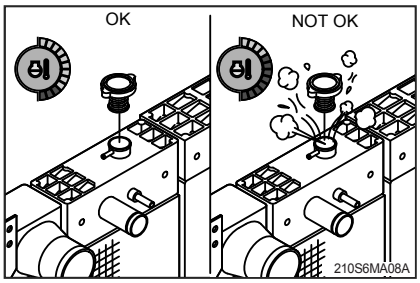
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

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

(4) Replace gasket of radiator cap when it is damaged.

⚠ **Hot coolant can spray out if radiator cap is removed while engine is hot. Remove the cap after the engine has cooled down.**



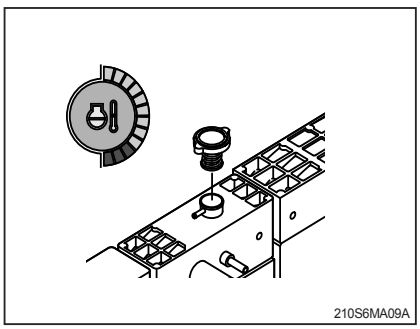


4) FLUSHING AND REFILLING OF RADIATOR

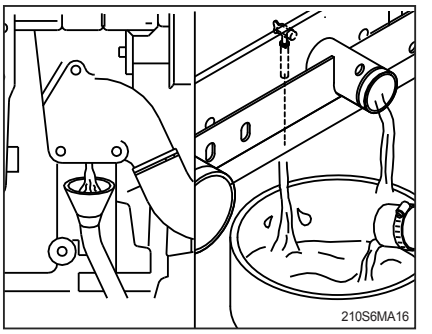
(1) Change coolant

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

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



⚠ Wait until the temperature is below 50 ˚C (120 ˚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. A drain pan with a capacity of 40 liters (10 U.S. gallons) will be adequate in most applications.

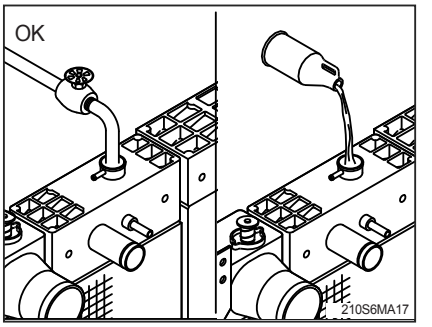


(2) Flushing of cooling system

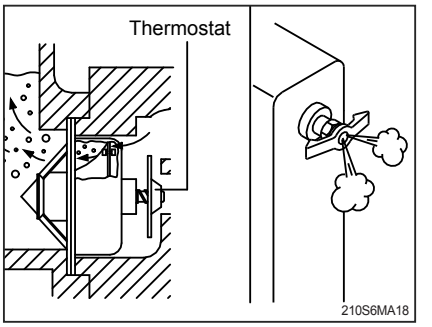
① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).

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

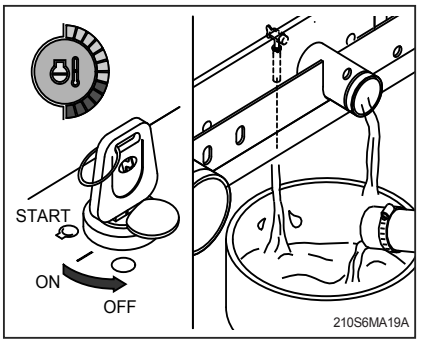
※ Do not install the radiator cap. The engine is to be operated without the cap for this process.



※ During filling, air must be vented from the engine coolant passages. Open the engine venting petcock.
The system must be filled slowly to prevent air locks. Wait 2 to 3 minutes to allow air to be vented, then add mixture to bring the level to the top.



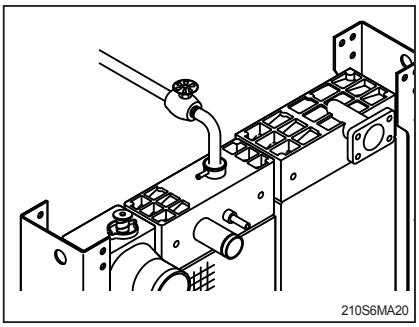
② Operate the engine for 5 minutes with the coolant temperature above 80 ˚C (176 ˚F).
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

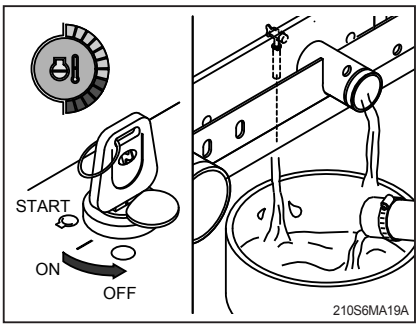
※ **Be sure to vent the engine and aftercooler for complete filling.**

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



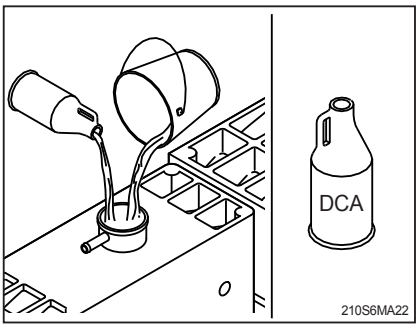
④ Operate the engine for 5 minutes with the coolant temperature above 80 ˚C (176 ˚F). Shut the engine off, and drain the cooling system.

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



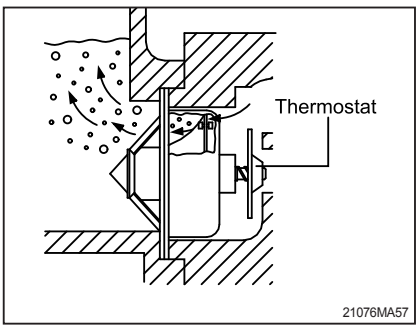
(3) Cooling system filling

① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.
Coolant capacity (engine only) : 9.5ℓ (2.5 U.S. gallons)

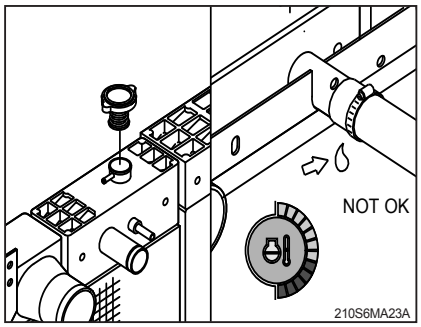


② The system has a maximum fill rate of 14 liters (3.5 U.S. gallons) per minute.
Do not exceed this fill rate.

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



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

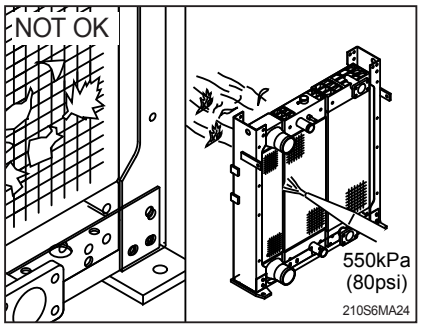


5) CLEAN RADIATOR AND OIL COOLER

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

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

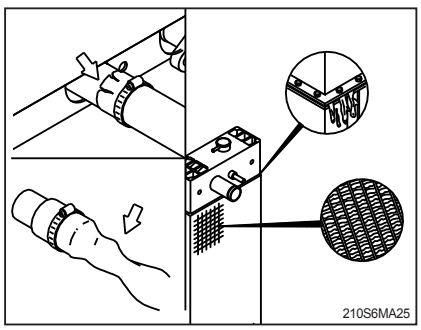
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



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

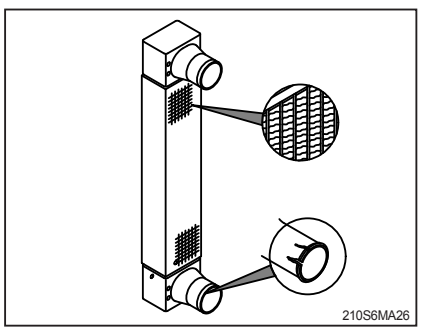
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

(4) Visually inspect the radiator for core leaks.



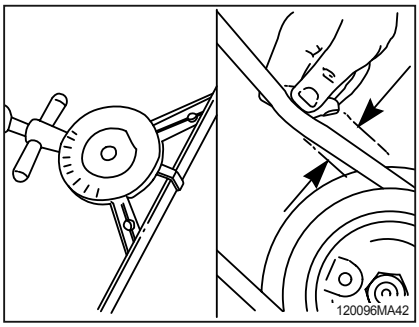
6) CHECK CHARGE AIR COOLER

Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact Hyundai distributor.



7) FAN BELT

(1) An deflection method can be used to check belt tension by applying 11.3 kgf (25 lbf) force between the pulleys on V-belts. If the deflection is more than one belt thickness per foot of pulley center distance, the belt tension must be adjusted.

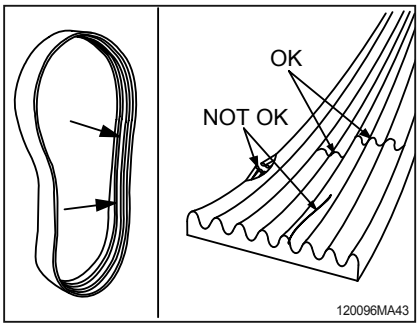


(2) Inspect the fan belt for damage.

① Transverse (across the belt) cracks are acceptable.

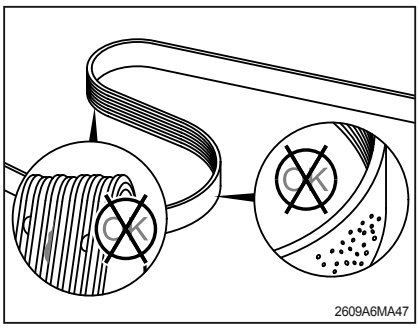
② Longitudinal (direction of belt ribs) cracks that intersect with transverse cracks are not accept able.

Replace the belt if it is frayed or has pieces of material missing.



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

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



8) INSPECTION OF COOLING FAN

⚠ Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade and cause fan failure.

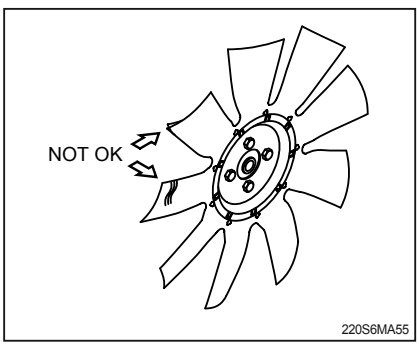
※ Rotate the crankshaft by using the engine bearing gear.

※ A visual inspection of the cooling fan is required daily.

Check for cracks, loose rivets, and bent or loose blades.

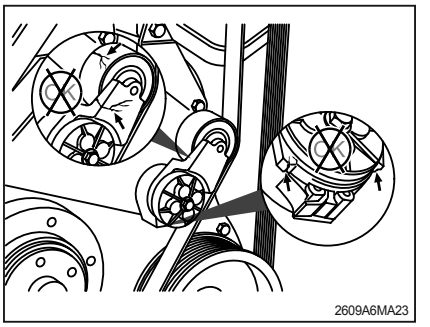
Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.

Replace any fan that is damaged.

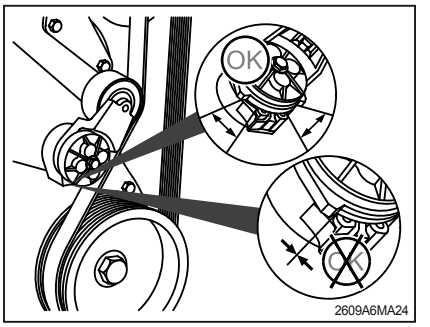


9) FAN BELT TENSIONER

(1) With the engine stopped, check the tensioner arm, pulley, and stops for cracks. If any cracks are found, the tensioner must be replaced.

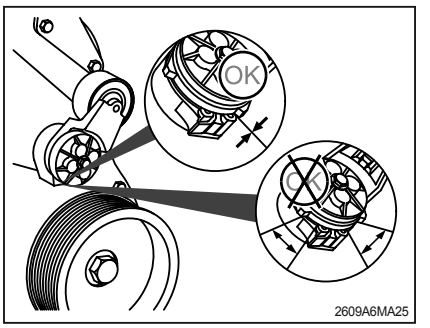


(2) With the belt installed, verify that neither tensioner arm stop is in contact with the spring case stop.
After replacing the belt, if the tensioner arm stops are still in contact with the spring case stop, replace the tensioner.

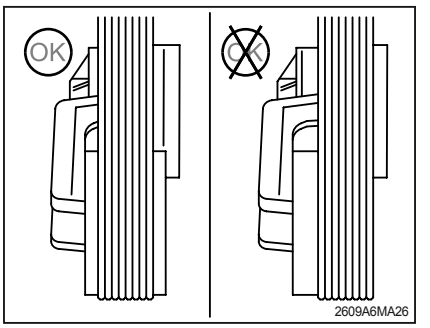


(3) With the belt removed, verify that the tensioner arm stop is in contact with the spring case stop.
If these two are not touching, the tensioner must be replaced.

※ **After replacing the belt, if the tensioner arm stop is still in contact with the spring case stop, the tensioner must be replace.**



(4) Check the location of the drive belt on the belt tensioner pulley. The belt should be centered on, or close to the middle of, the pulley. Misaligned belts, either too far forward or backward, can cause belt wear, belt roll-offs, or increase uneven tensioner bushing wear.



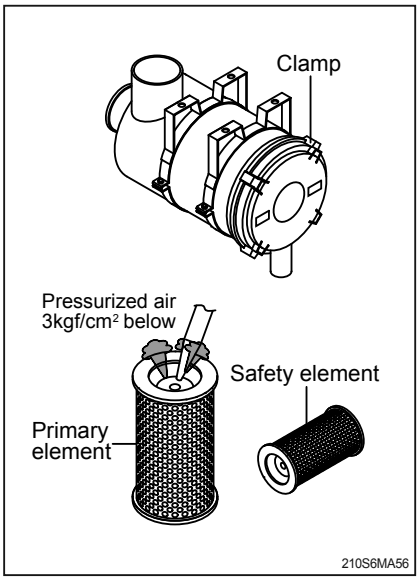
10) CLEANING OF AIR CLEANER

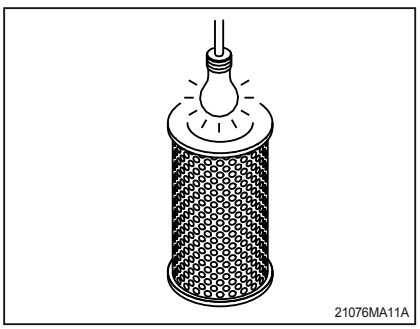
(1) Primary element

① Loosen the clamps 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 tighten wing nut.
※ **Replace the primary element after 4 times cleanings.**

(2) Safety element

※ **Replace the safety element only when the primary element is cleaned for the 4 times.**
※ **Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.**



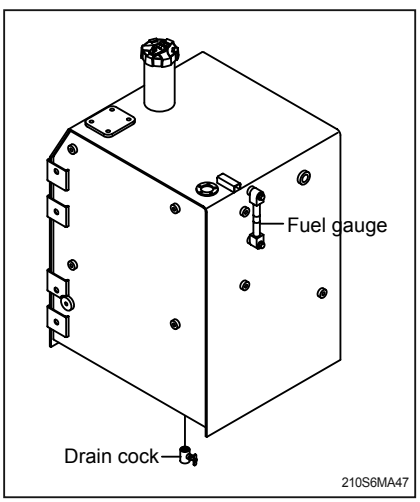


11) FUEL TANK

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

(2) Drain the water and sediment in the fuel tank by opening the drain cock.
※ Be sure to LOCK the cap of fuel tank.
※ Remove the strainer of the fuel tank and clean it if contaminated.

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



12) PREFILTER

※ Inspect or drain the collection bowl of water daily and replace the element every 500 hours.

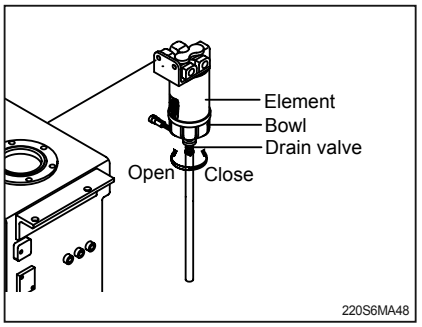
(1) Drain water

① Open bowl drain valve to evacuate water.

② Close drain valve.

※ Don't tighten up a drain valve so strong.

※ Please inspect and drain water frequently for remain water volume to be less than 1/3 volume of a collection bowl.



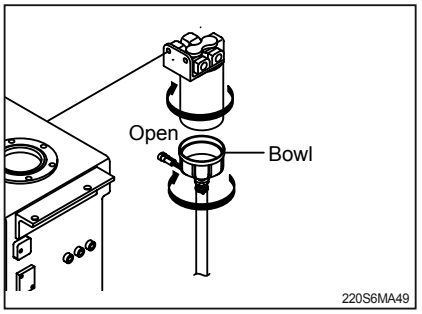
(2) Replace element

① Drain the unit of fuel. Follow "Drain water" instructions above.

② Remove element and bowl from filter head.

※ The bowl is reusable, do not damage or discard.

③ Separate element from bowl. Clean bowl and seal gland.

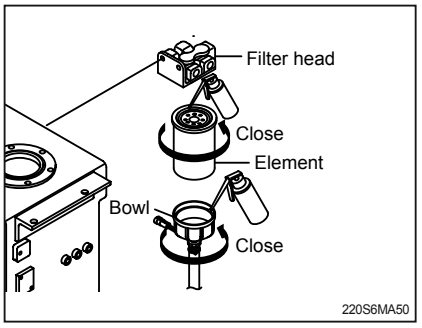


④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.

⑤ Attach bowl to new element firmly by hand.

⑥ Lubricate new element seal and place in element top gland.

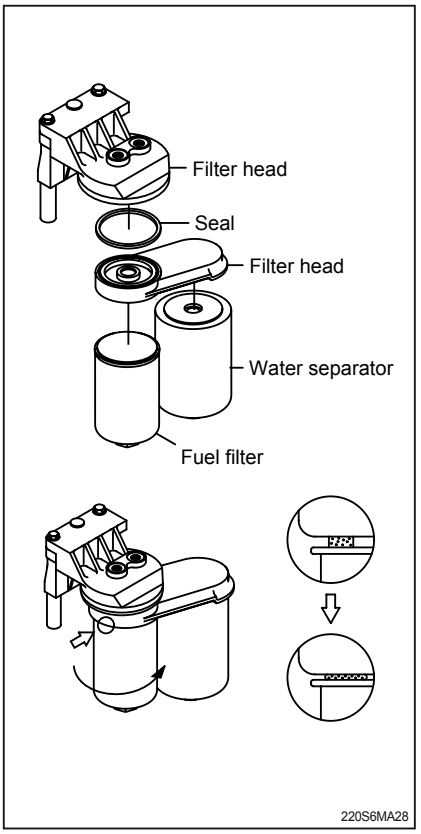
⑦ Attach the element and bowl to the head.



13) REPLACEMENT OF FUEL FILTER

(1) Clean the area around the filter head, remove the filter and clean the gasket surface.
Wrench size : 90~95 mm (3.5~3.8 in)
(2) Replace the seal.
(3) Fully fill clean diesel fuel in the new filter.
(4) Apply engine oil on the gasket of filter when mounting, and tighten 1/2 to 3/4 turn more after the gasket touches the filter head.
(5) Relieve the air after mounting.

※ **Check for fuel leakage after the engine starts. If air is in the fuel system, the engine will not start. Start engine after bleeding the air according to the method of bleeding air.**

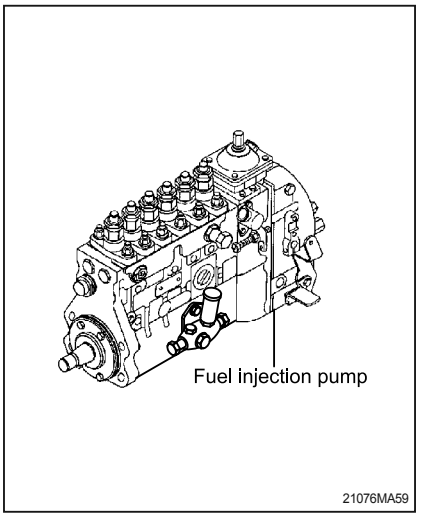


14) BLEEDING THE FUEL SYSTEM

(1) Controlled venting is provided at the injection pump through the fuel drain manifold. Small amounts of air introduced by changing the fuel filters or fuel injection pump supply line will be vented automatically, if the fuel filter is changed in accordance with the instructions.

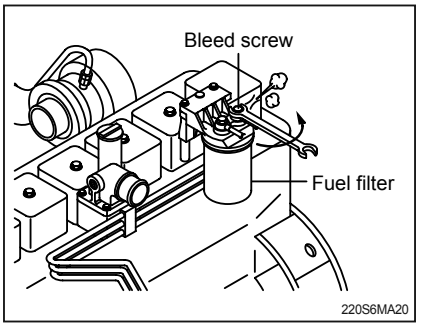
※ **Manual bleeding is required if :**

- **The fuel filter is not filled prior to installation.**
- **Fuel injection pump is replaced.**
- **High pressure fuel line connections are loosened or fuel lines replaced.**
- **Initial engine start up or start up after an extended period of no engine operation.**
- **Machine fuel tank has been run until empty.**



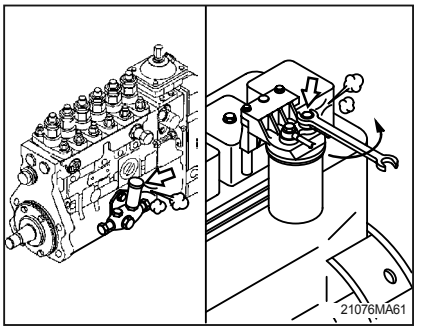
(2) Venting the low pressure lines and fuel filter

① Open the bleed screw.
· Wrench size : 17 mm



② Operate the hand lever until the fuel flowing from the fitting is free of air.
Tighten the bleed screw.
· Torque : 0.9 kgf · m (6.6 lbf · ft)

③ Operate the engine and check for leaks.



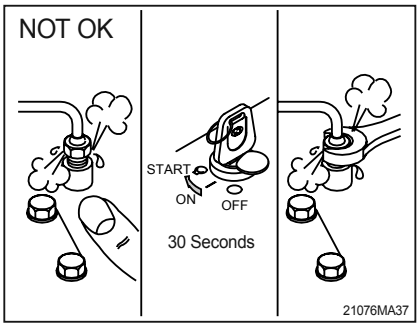
(3) Venting the high pressure lines

⚠ The pressure of the fuel in the line is sufficient to penetrate the skin and cause serious bodily harm.

① Loosen the fittings at the injectors, and crank the engine to allow entrapped air to bleed from the lines. Tighten the fittings.

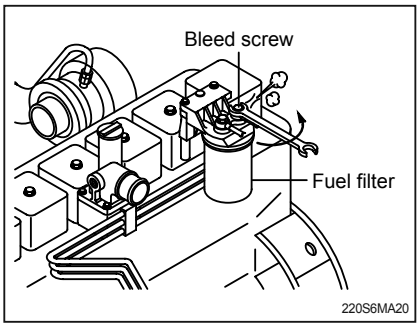
· Wrench size :19 ㎜

② Start the engine and vent one line at a time until the engine runs smoothly.



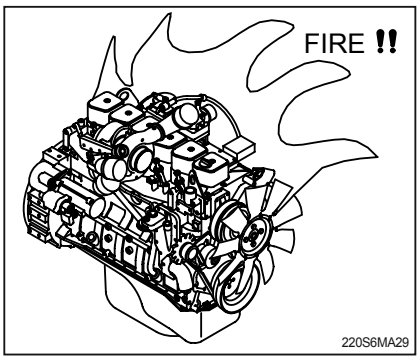
※ Do not engage the starter for more than 30 seconds each time when it is used to vent the system : wait 2 minutes between engagements.

⚠ Do not bleed a hot engine as this could cause fuel to spill onto a hot exhaust manifold creating a danger of fire.



15) LEAKAGE OF FUEL

⚠ Be careful and clean the fuel hose, injection pump, fuel filter and other connections as the leakage from these part can cause fire.

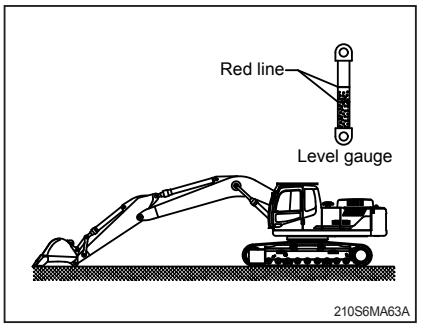


14) HYDRAULIC OIL CHECK

(1) Stop the engine after retract the arm and bucket cylinders, then lower the boom and set the bucket on the ground at a flat location as in the illustration.

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

(3) The oil level is normal if between the red lines.



15) FILLING HYDRAULIC OIL

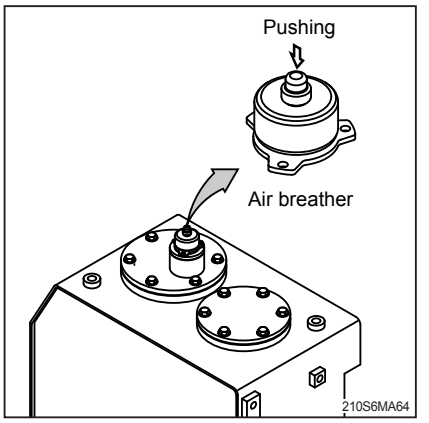
(1) Stop the engine to the position of level check.

(2) Relieve the pressure in the tank by pushing the top of the air breather.

(3) Remove the breather on the top of oil tank and fill the oil to the specified level.
· Tightening torque : 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.



16) CHANGE HYDRAULIC OIL

(1) Lower the bucket on the ground pulling the arm and bucket cylinder to the maximum.

(2) Relieve the pressure in the tank by pushing the top of the air breather.

(3) Remove the cover.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

(4) Prepare a suitable container.

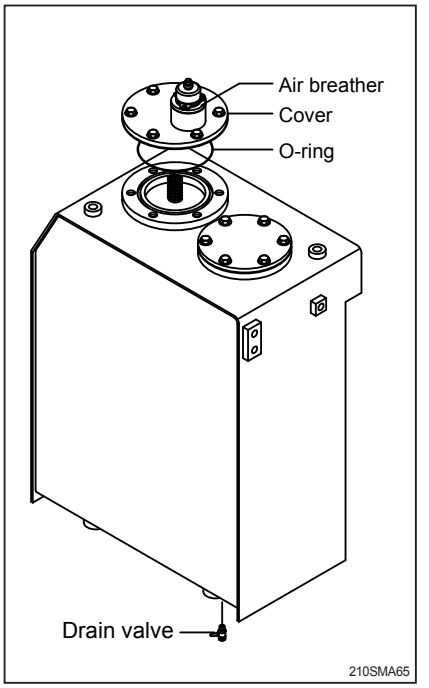
(5) To drain the oil open the drain valve at the bottom of the oil tank.

(6) Fill proper amount of recommended oil.

(7) Put the breather in the right position.

(8) Bleed air hydraulic pump loosen the air breather at top of hydraulic pump assembly.

(9) Start engine and run continually. Release the air by full stroke of each control lever.



17) CLEAN SUCTION STRAINER

Clean suction strainer as follows paying attention to the cause to be kept during oil filling.

(1) Remove the cover on the top of the oil tank.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

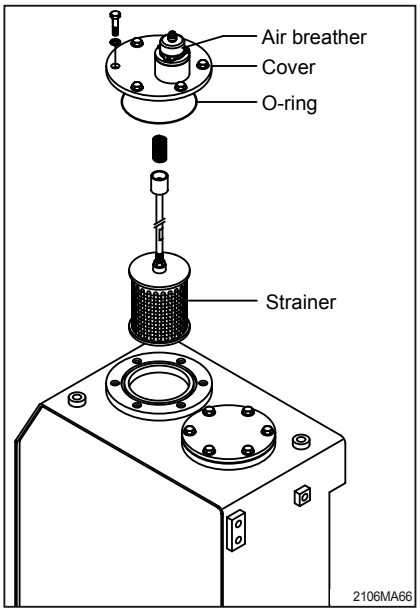
(2) Pull out the strainer in the tank.

(3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.

(4) Replace the suction strainer if it is damaged.

(5) Assemble with reverse order of disassembly. Be sure to install a new O-ring and reinsert in the oil tank.

※ **Loosen the bolt slowly at the cover can be spring out by the spring when removing it.**



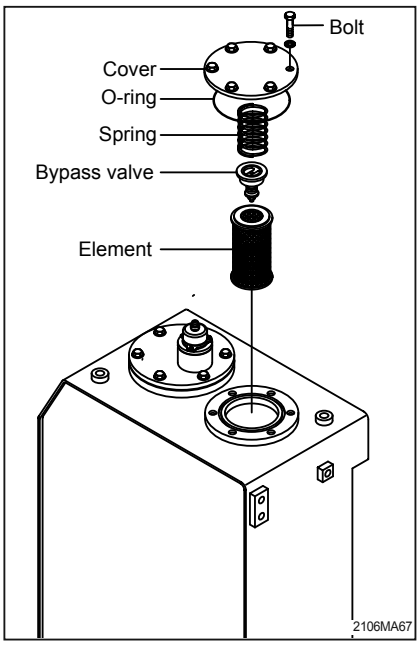
18) REPLACEMENT OF RETURN FILTER

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

(1) Remove the cover.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

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

(3) Replace the element with a new one.



19) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

(1) Relieve the pressure in the tank by pushing the rubber cap of the air breather.

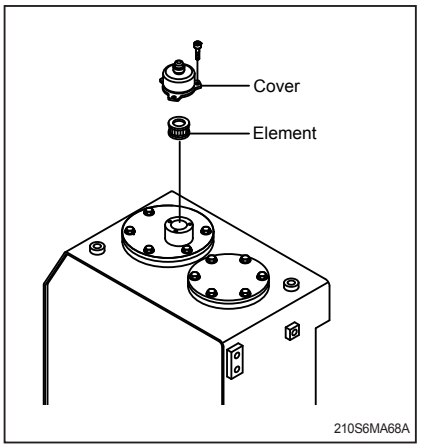
(2) Loosen the bolt and remove the cover.

(3) Pull out the filter element.

(4) Replace the filter element new one.

(5) Apply oil on the O-ring and reassemble by reverse order of disassembly.

· Tightening torque : 0.8~1.0 kgf · m
(5.9~7.4 lbf · ft)

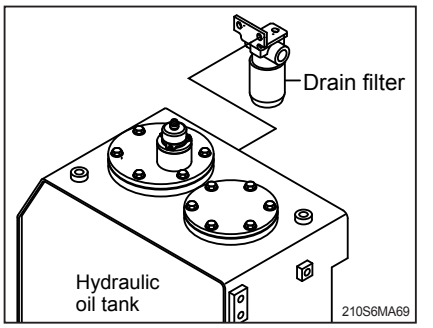


20) REPLACE OF DRAIN FILTER CARTRIDGE

Clean the dust around filter and replace with new one after removing the cartridge.

※ **Tighten about 2/3 turn more after the gasket of cartridge contacts seal side of filter body for mounting.**

※ **Change cartridge after initial 50 hours of operation. Thereafter, change cartridge every 250 hours.**



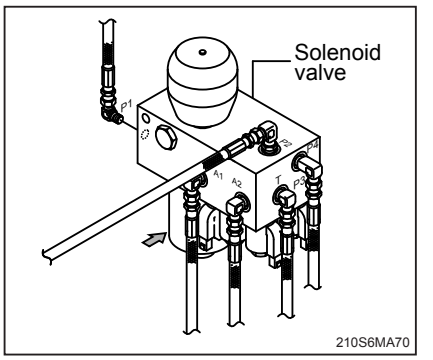
21) REPLACE OF PILOT LINE FILTER

(1) Loosen the nut positioned on the filter body.

(2) Pull out the filter element and clean filter housing.

(3) Install the new element and tighten using specified torque.

※ **Change cartridge after initial 250 hours of operation. Thereafter, change cartridge every 1000 hours.**

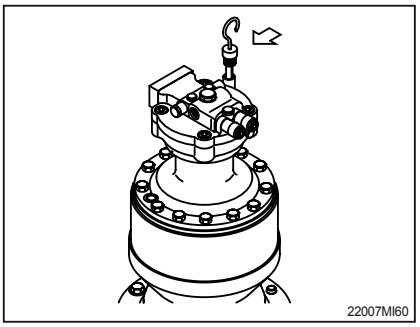


22) CHECK THE SWING REDUCTION GEAR OIL

(1) Pull out the dipstick and clean it.

(2) Insert it again.

(3) Pull out one more time to check the oil level and fill the oil if the level is not sufficient.



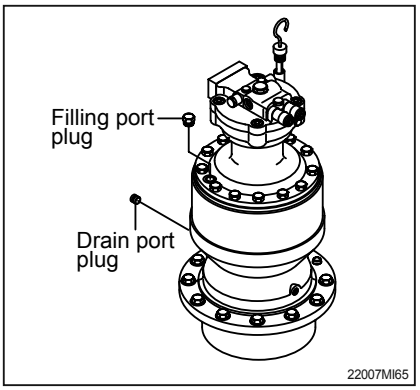
23) CHANGE SWING REDUCTION GEAR OIL

(1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.

(2) Loosen the plug of the drain port.

(3) Drain into a proper container.

(4) Wash the drain plug and reinstall it with sealing tape.
Fill proper amount of recommended oil.
· Amount of oil : 6.2 ℓ (1.6 U.S.gal)

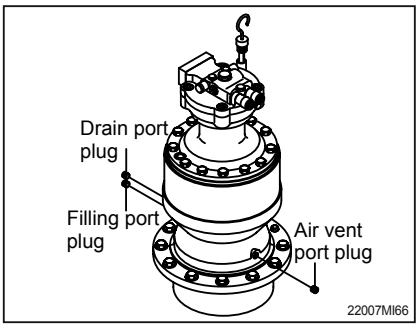


24) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

(1) Remove air vent plug.

(2) Remove grease fill plug and install grease fitting at that place.

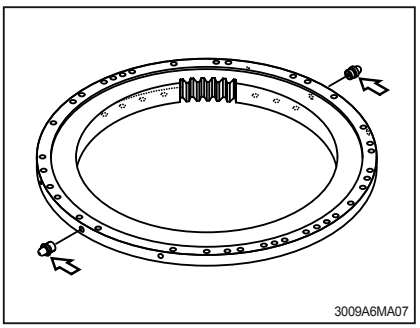
(3) Lubricate NLGI No.2 with grease gun until comes out new grease from air vent port.
· Amount of oil : 1.1 kg (2.4 lb)



25) LUBRICATE SWING BEARING

(1) Grease at 2 fitting.

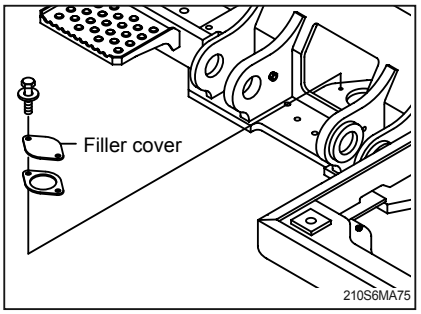
※ **Lubricate every 250 hours.**



26) SWING GEAR AND PINION

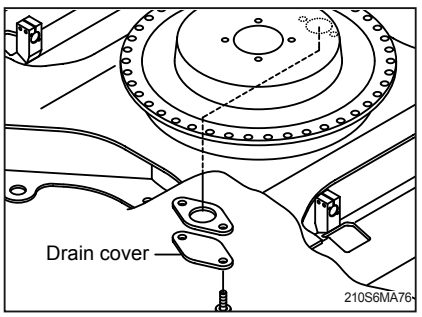
(1) Drain old grease

① Remove under cover of lower frame.
② Remove drain cover of lower frame.
③ Remove filler cover of upper frame.
④ Operate full turn (360˚) of swing several times.



(2) Refill new grease

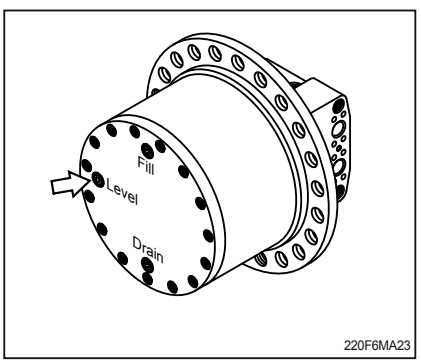
① Install drain cover.
② Fill with new grease.
③ Install filler cover.
· Capacity : 7.9 kg (17.5 lb)



27) CHECK THE TRAVEL REDUCTION GEAR OIL

(1) Operate the machine to the position of drain plug down to the 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.



28) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

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

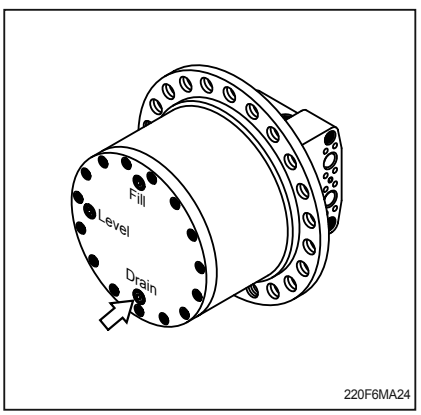
(2) Stop when the position of the drain plug is down.

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

(4) Drain the oil to adequate container.

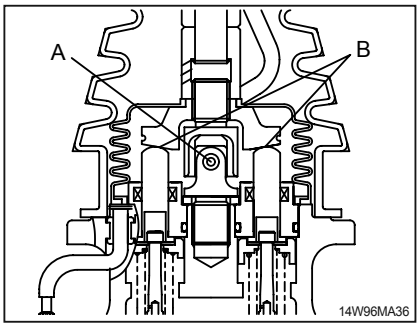
(5) Tighten the drain plug and fill specified amount of oil at filling port.

(6) Tighten the level plug and travel slowly to check if there is any leakage of oil.



29) LUBRICATE RCV LEVER

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



30) ADJUSTMENT OF TRACK TENSION

※ It is important to adjust the tension of track properly to extend the lifetime of track and traveling device.

※ The wear of pins and bushings on the under-carriage 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.

(2) Measure the distance between bottom of track frame on track center and back of shoe.

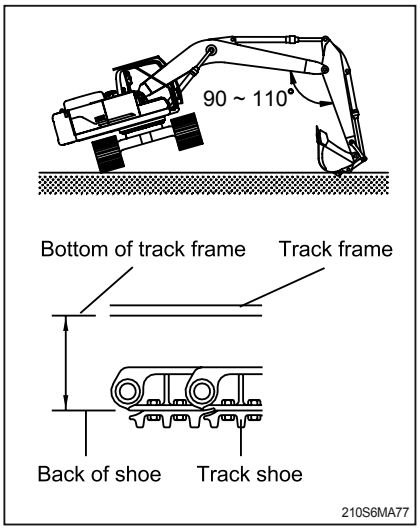
※ **Remove mud with rotating the track before measuring.**

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

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

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

※ **When the grease is drained, move the track to the forward and backward slightly.**
If the track tension is loose even after the grease is charged to the maximum, change the pins and bushings as there are worn seriously.



Length (L)	
300~330 mm	11.8~13"

31) REPLACEMENT OF BUCKET

⚠ When knocking the pin in with a hammer, metal particles may fly and cause serious injury, particularly if they get into your eyes. When carrying out this operation, always wear goggles, helmet, gloves, and other protective equipment.

※ When the bucket is removed, place it in a stable condition.

※ When performing joint work, make sure signals to each other and work carefully for safety's sake.

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

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

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

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

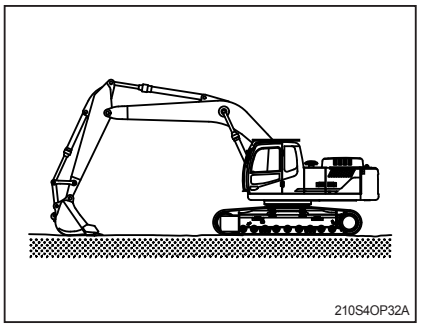
※ If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

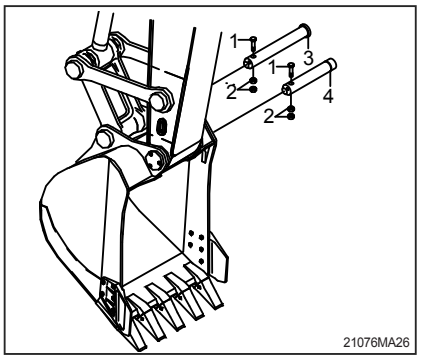
※ After remove the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.

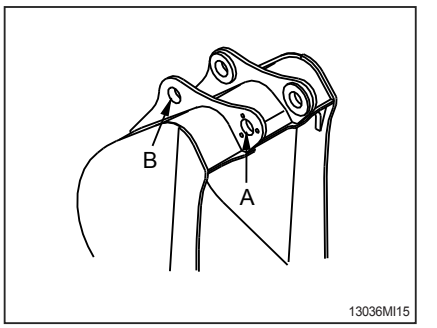
(4) Align the arm with holes (A) and the link with holes (B), then coat with grease and install pins (3, 4)

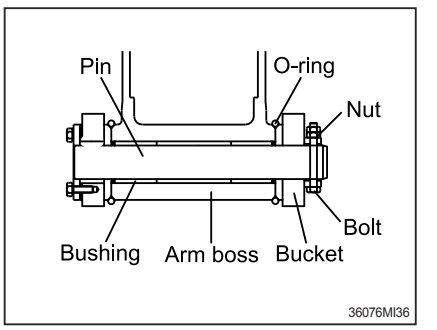
※ When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the bucket as shown in the picture.
After knocking the pin, move the O-ring down to the regular groove.

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







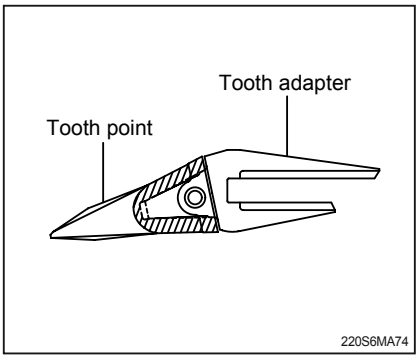


32) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth point before adapter starts to wear.

② If excessive use, tooth adapter has worn out, replacement may become impossible.



(2) Instructions for replacement

① Pull out pin by striking pin with punch or hammer, avoiding damage to lock washer.

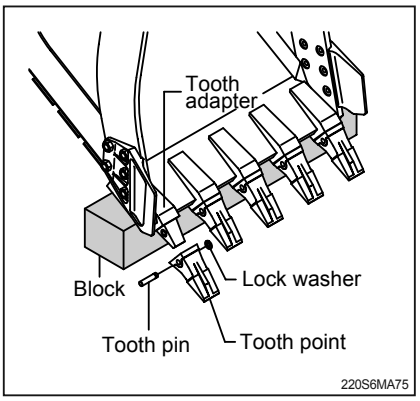
② Remove dust and mud from surface of tooth adapter by using knife.

③ Place lock washer in its proper place, and fit tooth point to adapter.

④ Insert pin until lock washer is positioned at tooth pin groove.

⚠ Personal injury can result from bucket falling.

⚠ Block the bucket before changing tooth points or side cutters.



33) ADJUSTMENT OF BUCKET CLEARANCE

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

(2) Swing to the right and keep the arm boss to be contact to the bucket left.

(3) Lock the safety knob to the LOCK position and stop the engine.

(4) Measure the clearance (A) between bucket and arm boss. This is the total clearance.

(5) Adjusting

① Loosen bolt (2), and remove washer (3), plate (1) and shim (4).

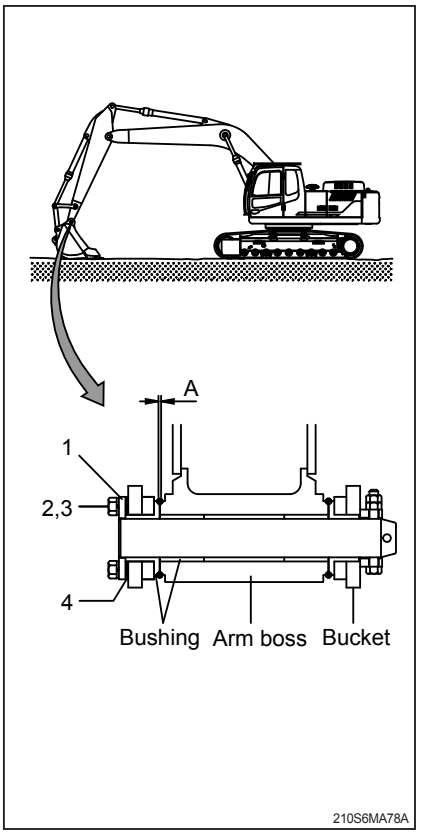
② Remove the shim equivalent value with measuring value.

③ Assemble the parts in the reverse order of removal.

· Tightening torque : 29.6±3.2 kgf · m
(214.0±23.1 lbf · ft)

· Normal clearance : 0.5~1.0 mm
(0.02~0.04 in)

※ **If the bucket is not adjusted correctly, noise and vibration created during operation, and damaged O-ring, pin and bushing quickly.**



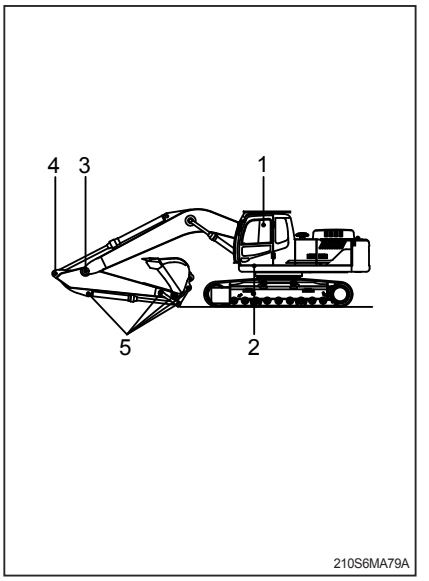
35) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device

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

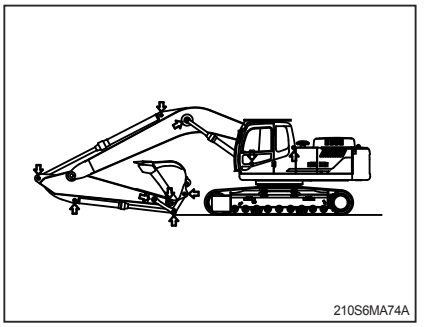
No.	Description	Qty
1	Lubrication manifold at boom	5
2	Boom cylinder pin (Head side)	2
3	Boom and arm connection pin	1
4	Arm cylinder pin (Rod side)	1
5	Bucket cylinder pin (Head, rod)	2
	Bucket link (Control rod)	3
	Arm and bucket connection pin	1
	Arm and control link connection pin	1

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



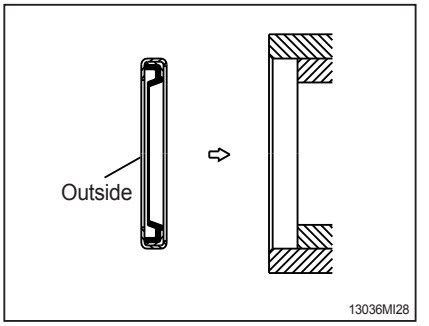
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ Mount the lip to be faced outside when replace the dust seal.



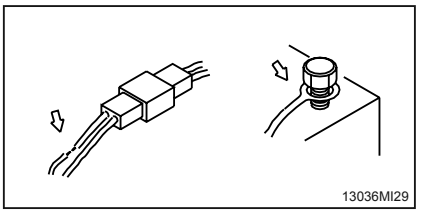
※ If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.

※ Assemble the seal same direction with picture and use with plastic hammer when replace.



1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

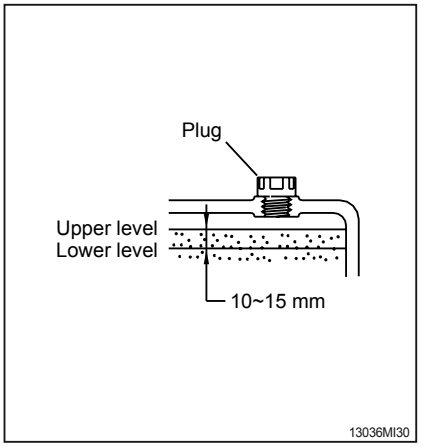
(1) Check and repair

① Check the electrolyte level and fill with distilled water to the prescribed level as necessary.

② Wash the terminal with hot water if it is contaminated, and apply Vaseline/Petroleum Jelly to the terminals after washing.

⚠ Do not stain clothes or skin with electrolyte as it is acid.
Be careful not to get the electrolyte in eyes. Wash with clean water and go to the doctor if it enters the eyes.

※ Remove the fire and spark around battery.

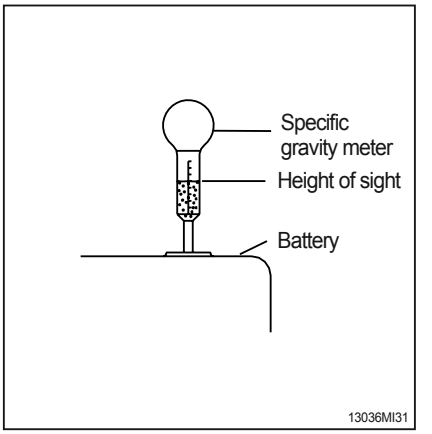


(2) Specific gravity of battery

Judge the charging rate of battery by the specific gravity. The specific gravity changes by the ambient temperature.

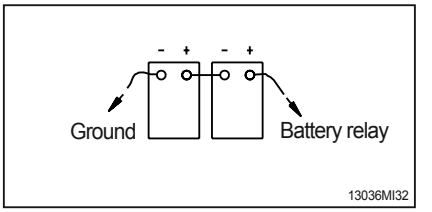
Check the charging rate by referring to the chart below.

Temperature / Charging rate	20˚C (68˚F)	10˚C (50˚F)	-10˚C (14˚F)
100%	1.26	1.27	1.28
90%	1.24	1.25	1.26
80%	1.22	1.23	1.24
75%	1.21	1.22	1.23



(3) Method of removing the battery cable

Remove the cable from the ground connection first (⊖ terminal side) and reconnect it last when reassembling.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

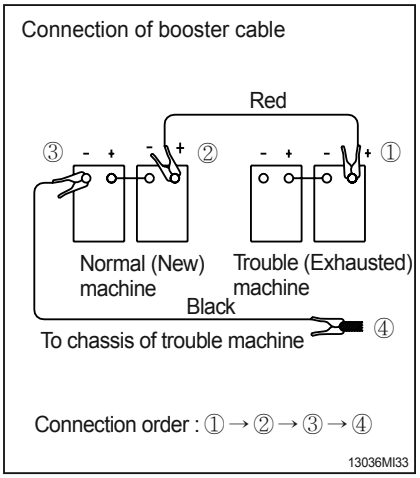
※ Use the same capacity of battery for starting.

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

② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.

③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.

※ Keep firmly all connection, the spark will be caused when connecting finally.

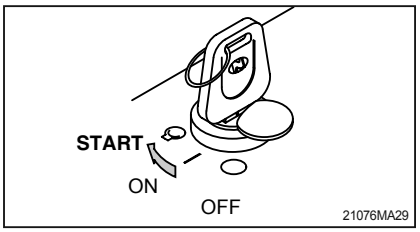


(2) Starting the engine

① Starting the engine of the normal machine and keep it to run at high idle.

② Start engine of the trouble machine with starting switch.

③ If you can not start it by one time, restart the engine after 2 minutes.



(3) Taking off the booster cable

① Take off the booster cable (black).

② Take off the booster cable (red) connected to the (+) terminal.

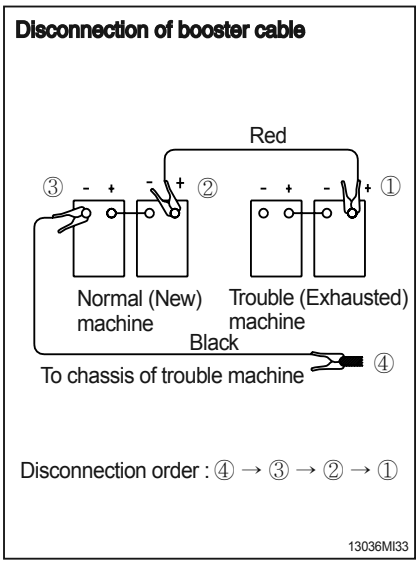
③ Run engine with high idle until charging the exhausted battery by alternator, fully.

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

※ Charge the battery in the well ventilated place.

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

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



(4) Welding repair

Before start to welding, follow the below procedure.

① Shut off the engine and remove the starting switch.

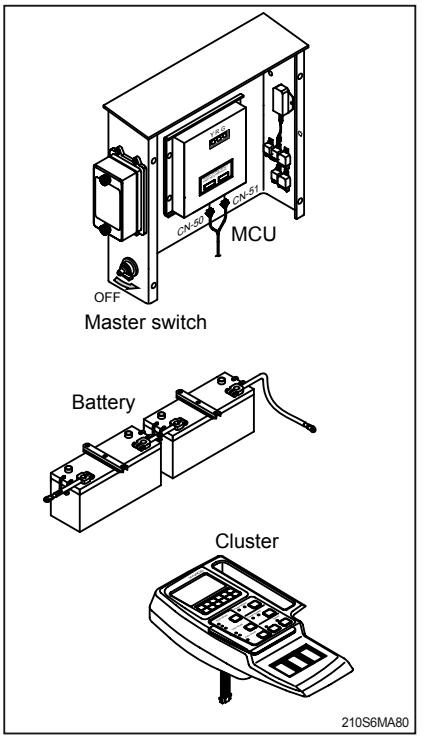
② Disconnect ground cable from battery by master switch.

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

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

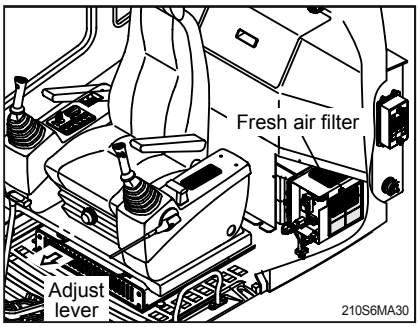
※ Do not weld or flame cut on pipes or tubes that contain flammable fluids. Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.

⚠ Do not attempt to welding work before carry out the above.
If not, it will caused serious damage at electric system.



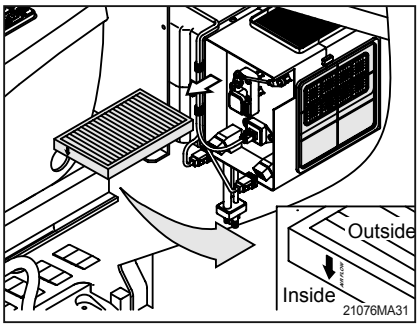
8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF FRESH AIR FILTER



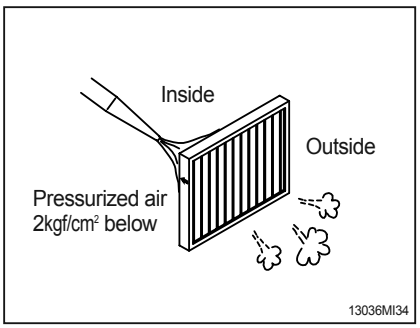
※ **Always stop the engine before servicing.**

(1) Move seat and console box to arrow direction using the adjust lever.



(2) Remove the fresh air filter.

※ **When installing a filter, be careful not to change the filter direction.**

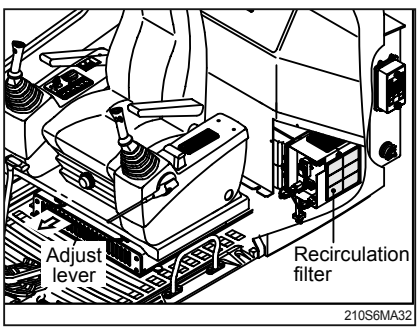


(3) Clean the filter using a pressurized air (Below 2 kgf/cm², 28 psi).

△ **When using pressurized air, be sure to wear safety glasses.**

(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.

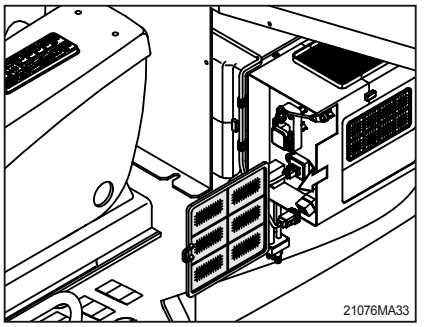
2) CLEAN AND REPLACE OF RECIRCULATION FILTER



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

(1) Move seat and console box to arrow direction using the adjust lever.

(2) Remove recirculation filter

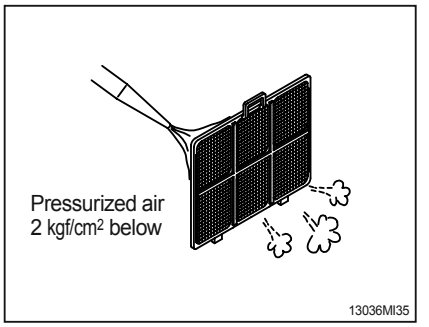


(3) Clean the recirculation filter using a pressurized air (below 2 kgf/cm², 28 psi) or washing with water.

△ **When using pressurized air, be sure to wear safety glasses.**

※ **Dry off after washing with water.**

(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



3) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour.

(2) Be careful not to overcool the cab.

(3) The cab is properly cooled if the operator feels cool when entering there from outside (about 5°C lower than the outside temperature).

(4) When cooling, change air occasionally.

4) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

5) CHECK DURING OFF-SEASON

Operate the air conditioner 2 or 3 times a month (each for a few minutes) to avoid loss of oil film in the compressor.

1. ENGINE

This guide is not intended to cover every conditions, however many of the more common possibilities are listed.

Trouble	Service	Remark
The engine oil pressure lamp lights ON when engine speed is raised after completion of warm up.	· Add the oil to the specified level. · Replace the oil filter cartridge. · Check oil leakage from the pipe or the joint. · Replace the monitor.	
Steam is emitted from the top part of the radiator (the pressure valve). Coolant level warning lamp lights ON.	· Supply the coolant and check leakage. · Adjust fan belt tension. · Wash out inside of cooling system. · Clean or repair the radiator fin. · Check the thermostat. · Tighten the radiator cap firmly or replace the packing of it. · Replace the monitor.	
The engine does not start when the starting motor is turned over.	· Add fuel. · Repair where air is leaking into fuel system. · Check the injection pump or the nozzle. · Check the valve clearance. · Check engine compression pressure. · In cold weather, check if fuel warmer system is working normal (opt).	Refer to the pages 3-13 and 4-4.
Exhaust gas is white or blue.	· Adjust to specified oil quantity. · Replace with specified fuel.	
Exhaust gas occasionally turns black.	· Clean or replace the air cleaner element. · Check the nozzle. · Check engine compression pressure. · Clean or replace the turbocharger.	
Combustion noise occasionally changes to breathing sound.	· Check the nozzle.	
Unusual combustion noise or mechanical noise.	· Check with specified fuel. · Check over-heating · Replace the muffler. · Adjust valve clearance.	

2. ELECTRICAL SYSTEM

Trouble	Service	Remark
Lamp does not glow brightly even when engine runs at high speed. Lamp flickers while engine runs.	· Check for loose terminals and open-circuit wiring. · Adjust belt tension.	
Battery charging lamp does not go out even when engine runs at high speed.	· Check the alternator. · Check and repair wiring.	
Unusual noise is emitted from the alternator.	· Check the alternator.	
Starting motor does not turn when starting switch is turned ON.	· Check and repair the wiring. · Charge the battery. · Check the starting motor. · Check the safety relay.	
The pinion of the starting motor keeps going in and out.	· Charge the battery. · Check the safety relay.	
Starting motor turns the engine sluggishly.	· Charge the battery. · Check the starting motor.	
The starting motor disengages before the engine starts up.	· Check and repair the wiring. · Charge the battery.	
The engine warming up lamp does not go ON.	· Check and repair wiring. · Check the monitor.	
The engine oil pressure lamp does not light up when engine is stationary (When the starting switch is in ON position.)	· Check the monitor. · Check the caution lamp switch.	
Battery charging lamp does not light up when the engine is stationary. (when the starting switch is in ON position.)	· Check the monitor. · Check and repair the wiring.	

3. OTHERS

Trouble	Service	Remark
Track slip out of place. Excessive wear of the sprocket.	· Adjust tension of track.	
Bucket either rises slowly or not at all.	· Add oil to specified level.	
Slow speed of travel, swing, boom, arm and bucket.	· Add oil to specified level.	
Unusual noise emitted from pump.	· Clean the hydraulic tank strainer.	
Excessive oil temperature rise of hydraulic oil.	· Clean the oil cooler. · Adjust fan belt tension. · Add oil to specified level.	

HYDRAULIC BREAKER AND QUICK CLAMP

1. SELECTING HYDRAULIC BREAKER

1) Become familiar with the manual and select breakers suitable to machine specifications.
2) Make careful selection in consideration of oil quantity, pressure and striking force, to enable satisfied performance.
3) When apply a breaker to the machine, consult your local dealer of Hyundai for further explanation.

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 HX210S, HX220S system is 330 kgf/cm^2 (4700 psi).

4) Adjusting oil quantity

(1) Use the breaker mode from work mode. Default oil flow quantity is 185 lpm at 2100 rpm. Use accel dial switch to control the oil flow quantity.

(2) If the quantity of hydraulic oil is not controlled properly, it causes short lifecycle of the breaker and the machine by increased breaking force and count.

Oil quantity according to engine rpm

Engine rpm	Oil flow ℓ /min	Oil flow U.S.gpm
2000	176	46.5
1900	168	44.4
1800	159	42.0
1700	150	39.6

※ Relief pressure : 200 kgf/cm^2

5) The accumulator should be used to the breaker charging and return line.
If the accumulator is not used, it will be damage as the input wave is delivered.

※ **Keep the pressure pulsation of pump below 60 kgf/cm^2 (853 psi) by installing the accumulator.**

6) Do not connect the breaker return line to the main control, but connect to the return line front of the cooler.

7) Do not connect the breaker return line to drain lines, such as of swing motor, travel motor or pump, otherwise they should be damaged.

8) One of spool of the main control valve should be connected to the tank.

9) Select the size of pipe laying considering the back pressure.

10) Shimless tube should be used for the piping. The hose and seal should be used Hyundai genuine parts.

11) Weld the bracket for pipe clamp to prevent damage caused by vibration.

1) MAINTENANCE OF HYDRAULIC OIL AND FILTER

(1) As machine with an hydraulic breaker provides the hydraulic oil becomes severely contaminated.

(2) So, unless frequently maintained, the machine may easily go out of order.

(3) Inspect and maintain hydraulic oil and 3 kinds of filter elements in particular, in order to prolong machine life.

2) RELEASE THE PRESSURE IN BREAKER CIRCUIT

When breaker operating is finished, stop engine and push pedal or switch for breaker to release pressure in breaker circuit.

If pressure still remains, the lifetime of the diaphragm in the accumulator will be shortened.

3) Be careful to prevent contamination by dust, sand and etc.

If such pollution become mixed into the oil, the pump moving parts will wear abnormally, shorten lifetime and become damaged.

4) When operating breaker, bolts and nuts of main equipment may be loosened by vibration. So, it must be inspected periodically.

Service interval unit : hours

Attachment	Operating rate	Hydraulic oil	Filter element
Breaker	100 %	600★1	200
		1000★2	

★1 : Conventional hydraulic oil

★2 : Hyundai genuine long life hydraulic oil

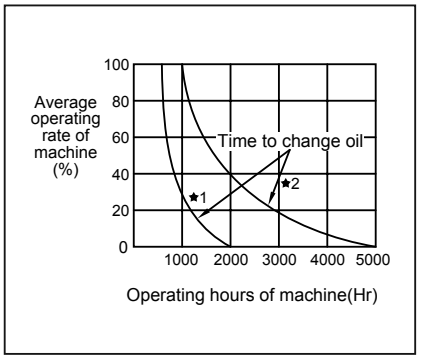
● **Replace following filter same time**

· Hydraulic return filter : 1 EA

· Pilot line filter : 1 EA

· Drain filter cartridge : 1 EA

Filter replace guide for hydraulic breaker



★1 : Conventional hydraulic oil

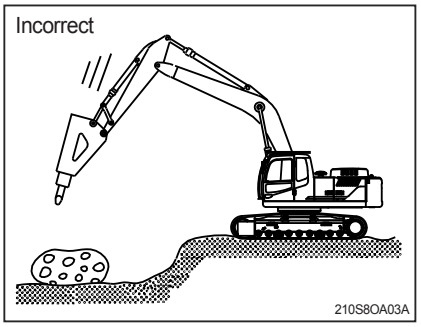
★2 : Hyundai genuine long life hydraulic oil

4. PRECAUTIONS WHILE OPERATING THE BREAKER

1) DO NOT BREAK ROCK WHILE LOWERING

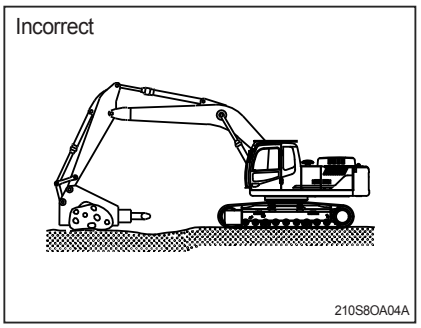
As the breaker is heavy in comparison with bucket, it must be operated slowly.

If breaker is rapidly pushed down, working device may be damaged.



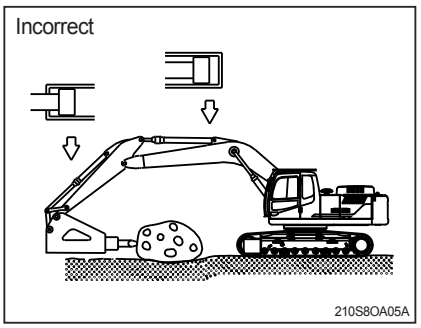
2) DO NOT USE BREAKER TO CARRY BROKEN STONE OR ROCK BY SWING OPERATING

This may damage the operation device and swing system.



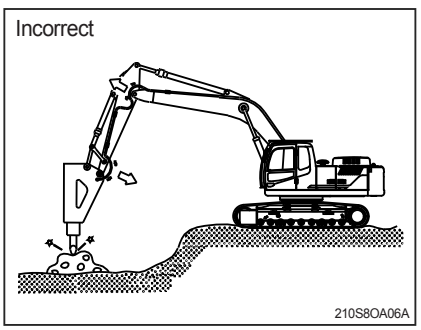
3) OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

If breaker is operated with the end tip, the cylinder may be damaged.



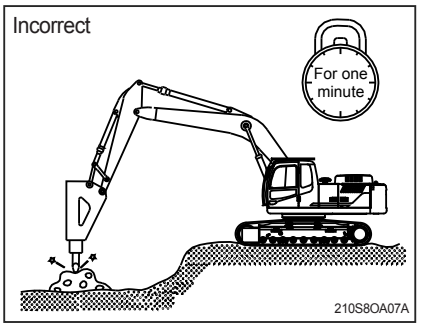
4) IF THE HYDRAULIC HOSES VIBRATE EXCESSIVELY

If the machine used in this condition continuously this will effect badly on the machine such as loosening bolt, oil leakage, damage of pump pipe and etc.



5) DO NOT CONTINUE TO WORKING OVER ONE MINUTE AT SAME POSITION OF BOOM AND ARM

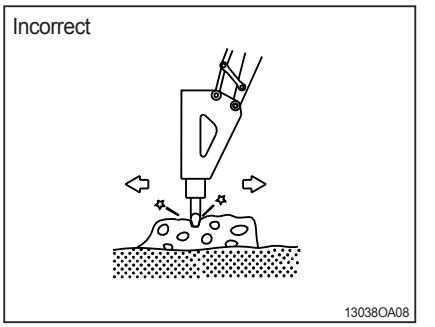
This will increase the temperature of the oil, and cause problem in the accumulator and seals.



6) DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING

Do not move hammer while striking.

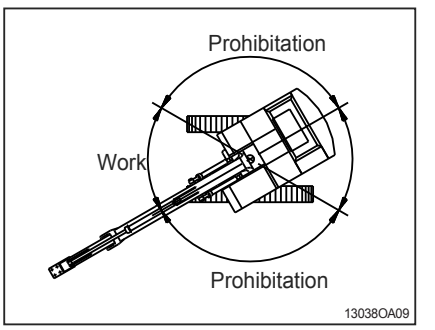
This will cause damage to the working device and the swing system.



7) DO NOT WORK WHILE SWING STATE

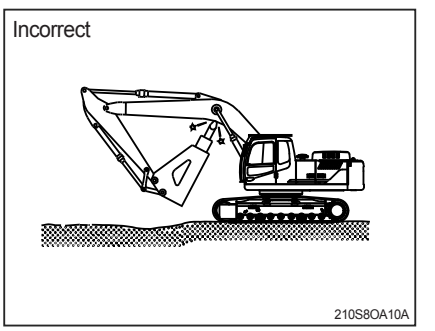
Do not work while swing position of superstructure.

It cause the band of track shoe, oil leakage of roller.



8) TAKE CARE OF CHISEL AND BOOM INTERFACE

Make sure of the arm and bucket control lever operation.

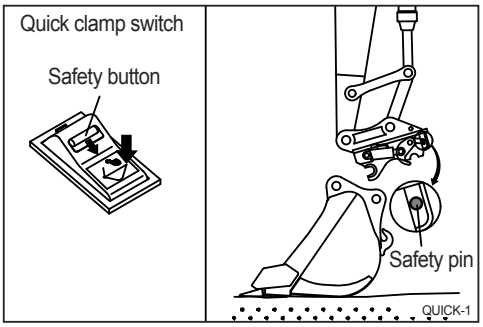


5. QUICK CLAMP

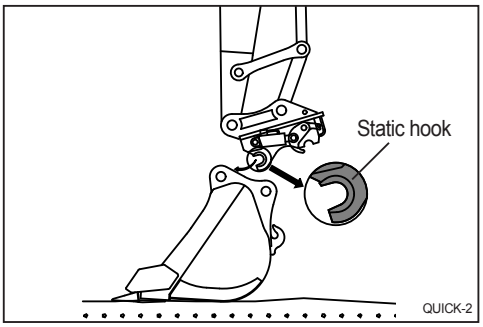
1) FIXING BUCKET WITH QUICK CLAMP

(1) Before fixing bucket, remove safety pin of the moving hook.

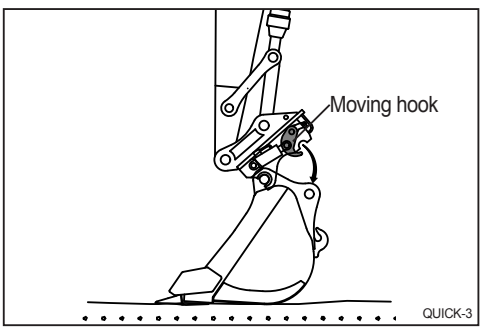
(2) Pulling safety button, press the quick clamp switch to unlock position. Then, the moving hook is placed on release position.



(3) Aligning the arm and bucket, insert static hook of quick clamp to the bucket pin.

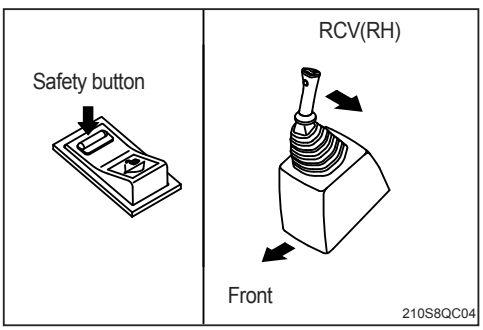


(4) Operate RCV lever to bucket-in position. Then, the moving hook is coupled with the bucket link pin.
Make sure that the moving hook is completely contacted with bucket link pin.

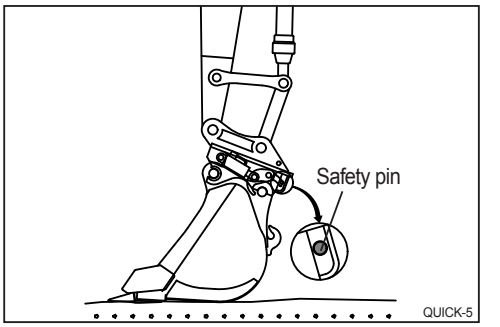


(5) Push safety button to lock position.
Operate RCV lever to bucket-in position.

※ **Be sure to check connection status between bucket pins and hooks of quick clamp.**



(6) After checking the connection status between bucket pins and hooks of quick clamp, **insert safety pin of moving hook to lock position.**

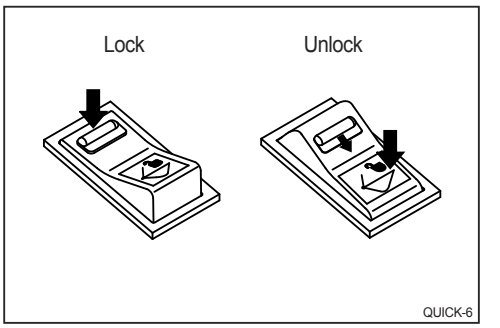


2) REMOVE BUCKET FROM QUICK CLAMP

Removing procedure is reverse of fixing.

3) PRECAUTION OF USING QUICK CLAMP

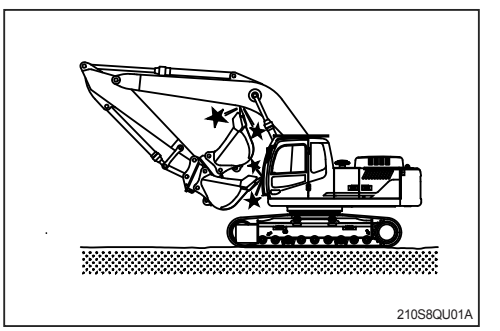
⚠ **When operating the machine with quick clamp, confirm that the quick clamp switch is lock position and safety pin of moving hook is inserted.**
Operating the machine with quick clamp switch unlocked and without safety pin of moving hook can cause the bucket to drop off and bring about the accident.



⚠ **Serious injury or death can result from this accident.**

⚠ **Be careful to operate the machine equipped with quick clamp. The bucket may hit cab, boom and boom cylinders when it reaches vicinity of them.**

✱ **HYUNDAI will not be responsible for any injury or damage in case that safety pin is not installed properly.**



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