CONTENTS

FOREWORD

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

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

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

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

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

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

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

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

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

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

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

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

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.

※ How to adjust the language of cluster

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

※ Please refer to the page 3-20 for the cluster.

EC REGULATION APPROVED

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

LWA : 115 dB (EU only)

LPA : 75 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

EC Declaration of Conformity

1. HYUNDAI CONSTRUCTION EQUIPMENT EUROPE N.V VOSSENDAAL 11, 2440 GEEL (Belgium), as authorized representative in the European Community of HYUNDAI CONSTRUCTION EQUIPMENT Co. Ltd.(Korea)
   certifies that the construction equipment machinery.

   Machine Type : *******

   Brand : HYUNDAI

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

2. Manufacturer — Hyundai Construction Equipment Co. Ltd.
   12th, Fl., Hyundai Bldg. 75, Yulgok-ro, Jongno-Gu, Seoul, Republic of Korea

   Authorized representative : Owner of the technical file for machine production — HYUNDAI CONSTRUCTION EQUIPMENT EUROPE N.V.
   VOSSENDAAL 11, 2440 GEEL
   BELGIUM

3. Harmonized European directives : 2006/42/EC (Machinery), 97/68/EC (Exhaust Gas Emission), 2004/108/EC (Electromagnetic Compatibility), 200/14/EC (Noise Emission)

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

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

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

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

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

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

7. Remarks

   J. C. JUNG
   MANAGING DIRECTOR
   Place and date of issue :

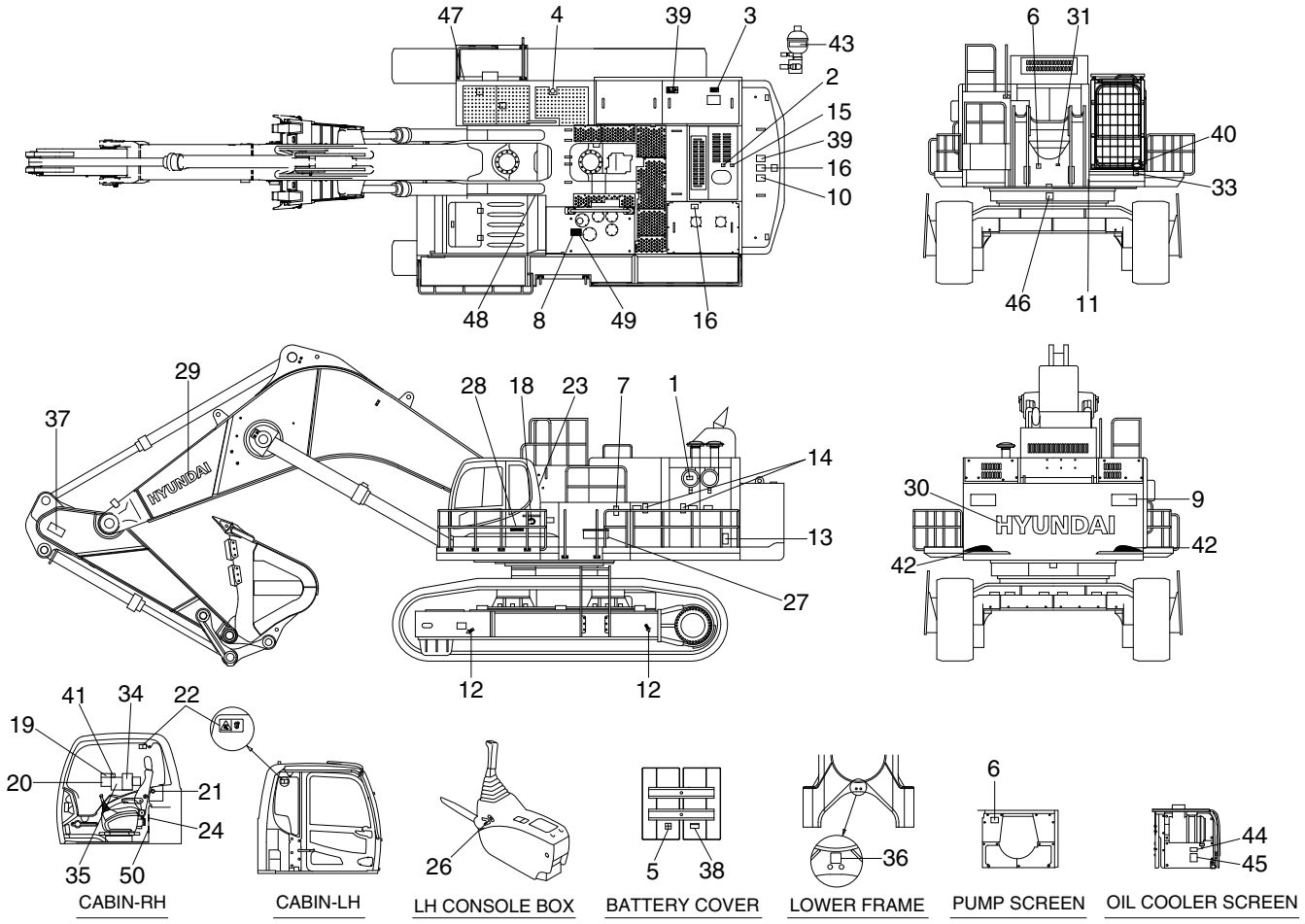
TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

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



120090SL01A

1	Air cleaner filter	19	Control ideogram	38	Connector
2	Turbocharger cover	20	Ref operator manual-Cab RH pillar	39	Falling
3	Radiator cap	21	Hammer	40	FOPS FOG plate
4	Fueling	22	Safety front window	41	Caution (water separator, turbocharger)
5	Battery accident	23	Alternate exit		
6	High pressure hose	24	Air conditioner filter		
7	Hydraulic oil level	26	Safety knob	42	Reflecting
8	Hydraulic oil lub	27	Model name	43	Accumulator
9	Keep clear-rear	28	Logo (ROBEX)	44	RCV lever pattern
10	Lifting eye	29	Trade mark (boom)	45	Machine control pattern
11	Name plate	30	Trade mark (CWT)	46	Swing grease
12	Slinging ideogram	31	Reduction gear grease	47	Battery position
13	Keep clear-side	33	Noise level LWA	48	Beacon lamp
14	Stay fix	34	Service instruction	49	Fuel shut off
15	Shearing-muffler hood	35	Lifting chart	50	MCU/ECM connector
16	No step	36	Tie		
18	Low emission engine	37	Keep clear-Boom/arm		

2. DESCRIPTION

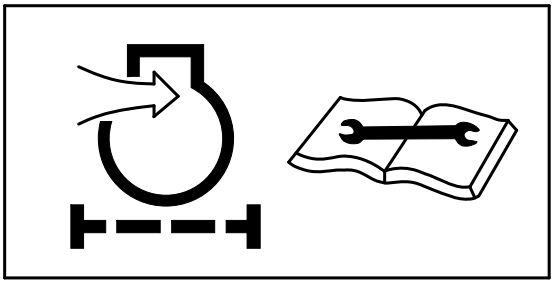
There are several specific warning labels on this machine please become familiarized with all warning labels.

Replace any safety label that is damaged, or missing.

1) **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.**

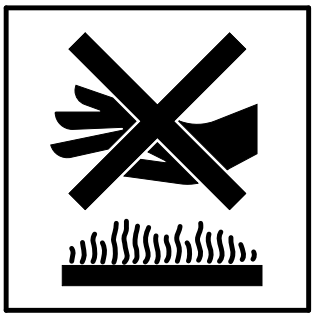


21070FW01

2) **TURBOCHARGER COVER** (item 2)

This warning label is positioned on the turbocharger cover.

⚠ **Do not touch turbocharger or it may cause severe burn.**



21070FW02

3) **RADIATOR CAP** (item 3)

This warning label is positioned on the radiator.

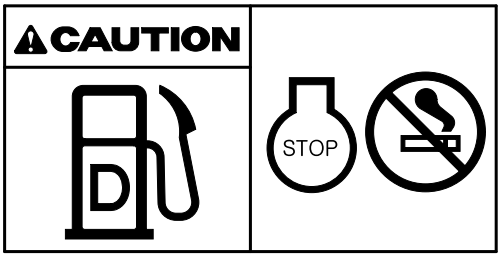
⚠ **Never open the filler cap while engine running or at high coolant temperature.**

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.**



21070FW04

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.

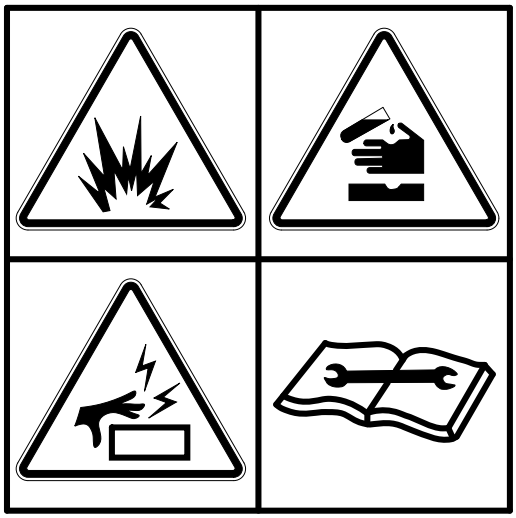
※ Maintain the electrolyte at the recommended level. Add distilled water to the battery only when starting up, never when shutting down. With electrolyte at proper level, less space may cause the gases to be accumulated in the battery.

⚠ 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 screen plate.

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

※ Study the service manual before service job.

14070FW29

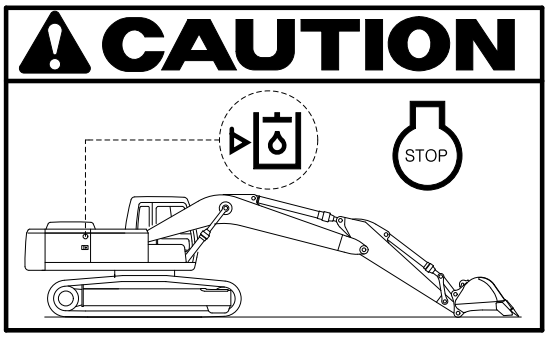
7) HYDRAULIC OIL LEVEL (item 7)

This warning label is positioned on the screen plate.

⚠ 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.

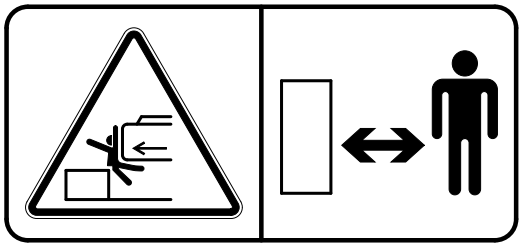
14070FW08

9) KEEP CLEAR (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.



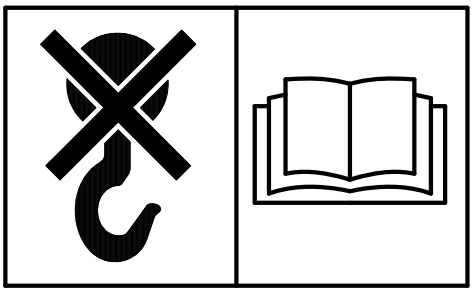
21090FW09

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 5-9 for proper lifting method of the machine.



21070FW10

11) **SIDE KEEP CLEAR** (item 13)

This warning label is positioned on the side of LH rear side cover.

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

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

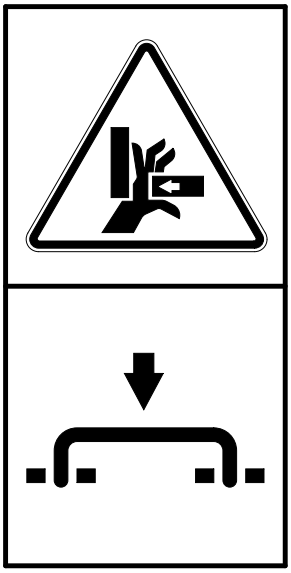
21070FW13

12) **STAY FIX** (item 14)

This warning label is positioned on the 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.**



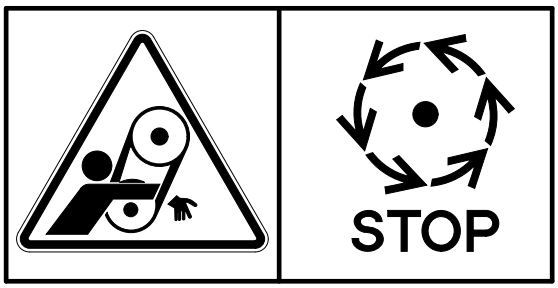
21070FW14

13) **SHEARING-MUFFLER HOOD** (item 15)

This warning label is positioned on the engine hood.

⚠ **Don't open the engine hood during the engine's running.**

⚠ **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 and counterweight.

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

21070FW16

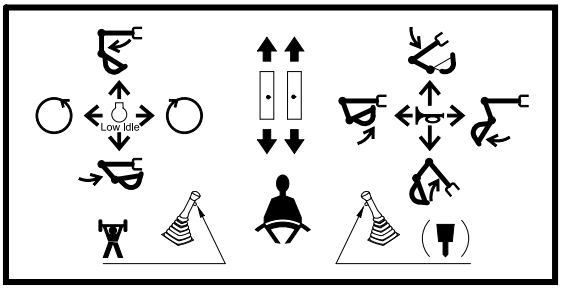
15) **CONTROL IDEOGRAM** (item 19)

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 4-12 for details.

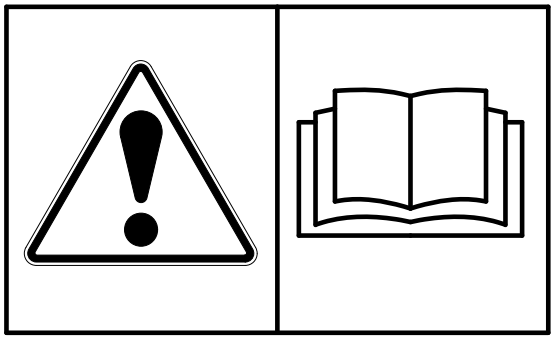


36070FW19

16) **REF OPERATOR MANUAL** (item 20)

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

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



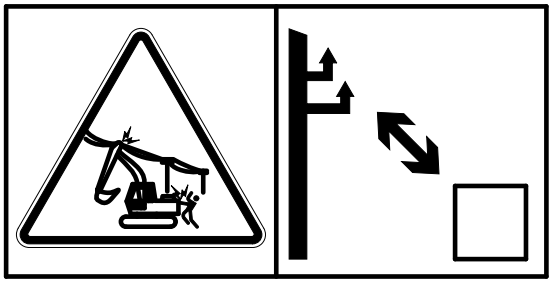
21070FW22

17) **MAX HEIGHT** (item 20)

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

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

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



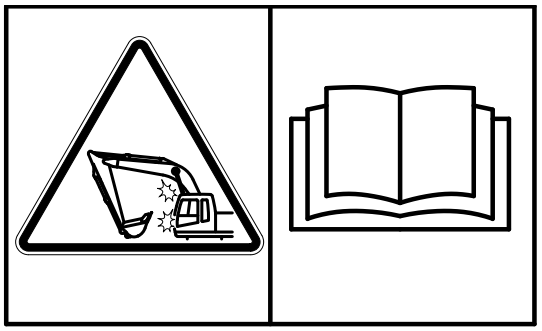
21070FW23

18) **INTERFERENCE** (item 20)

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

⚠ **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.**

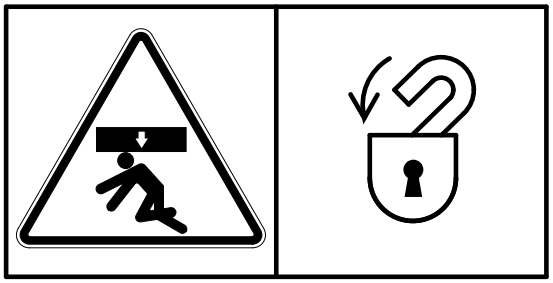


29090FW01

19) **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.**



21070FW24

20) **EMERGENCY EXIT** (item 23)

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

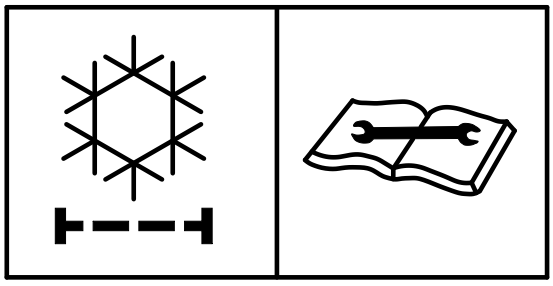
※ **The rear window serves us an alternate exit.**

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

21) **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.**

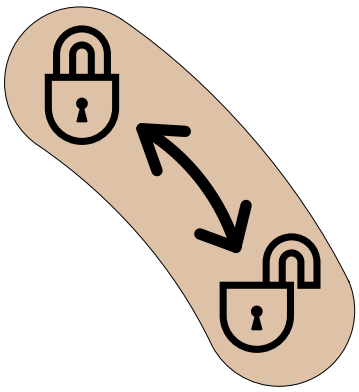


21070FW26

22) **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.**

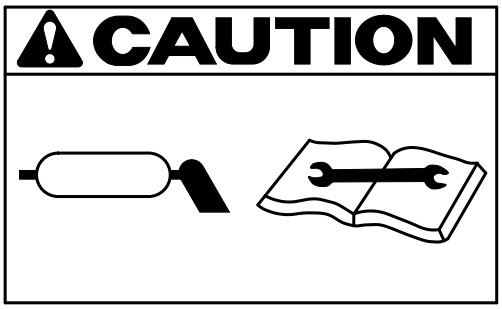


30007A1FW07A

23) **REDUCTION GEAR GREASE** (item 31)

This warning label is positioned in 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.



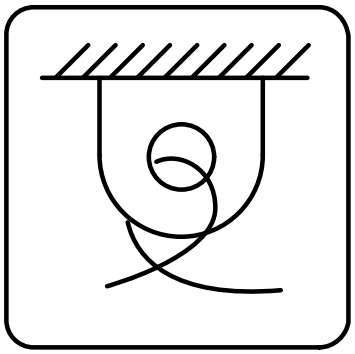
21070FW35

24) **TIE** (item 36)

This warning label is positioned on the lower frame.

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

⚠ **See page 4-15 for detail.**



4507A0FW02

25) **KEEP CLEAR-BOOM/ARM** (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

26) **CONNECTOR** (item 38)

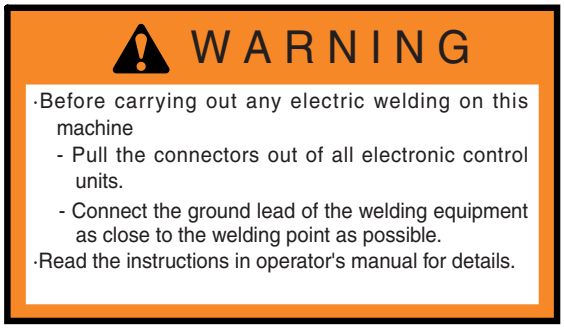
This warning label is positioned on the battery cover.

⚠ **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 6-45 for detail.**



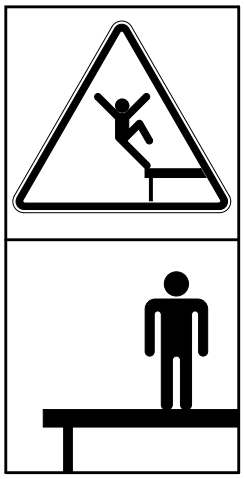
7807AFW20

27) **FALLING** (item 39)

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

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

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



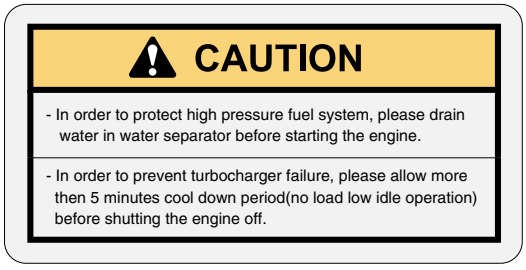
14070FW30

28) **CAUTION (WATER 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.**



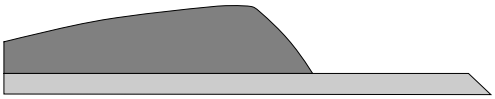
120090SL02

29) **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.**



21090FW70

30) **ACCUMULATOR** (item 43)

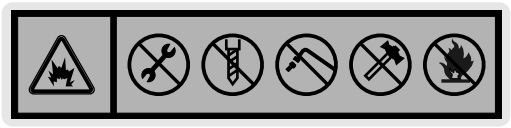
This warning label is positioned on the accumulator of the solenoid valve.

※ **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

31) **RCV LEVER PATTERN** (item 44)

This warning label is positioned on the oil-cooler screen.

※ **See page 4-26 for detail.**

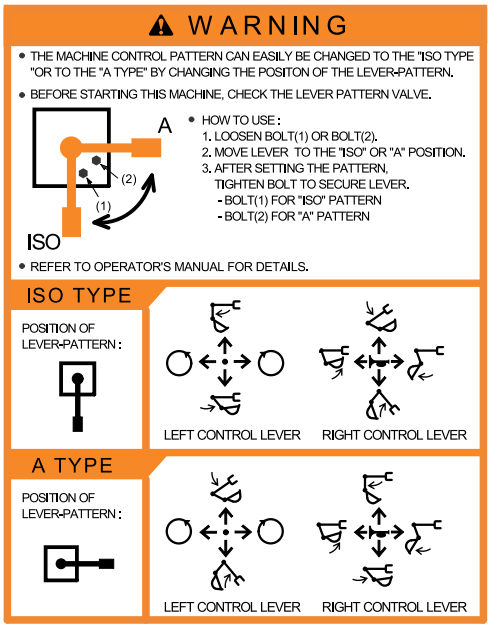
14W90FW47

32) **MACHINE CONTROL PATTERN** (item 45)

This warning label is positioned on the LH support of cowl.

⚠ **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.**

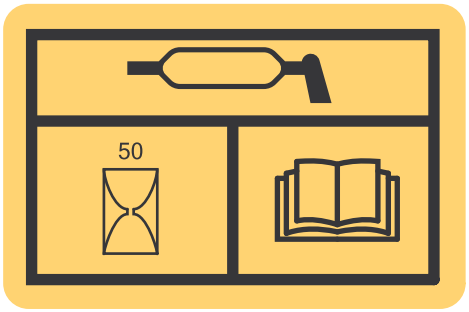


38090FW01A

33) **SWING GREASE** (item 46)

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

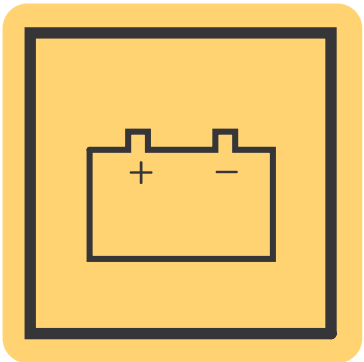
※ **See page 6-35 for details.**



38090FW02

34) **BATTERY POSITION** (item 47)

This warning label is positioned right side of tool box.



38090FW03

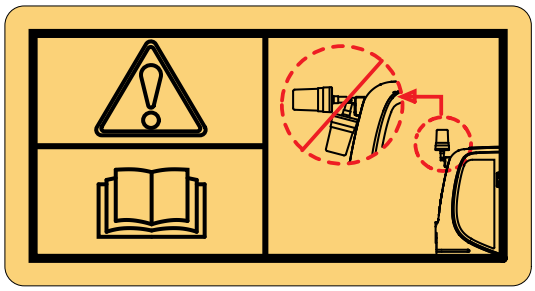
35) **BEACON LAMP** (item 48)

This warning label is positioned on the center outside of the cabin.

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

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

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



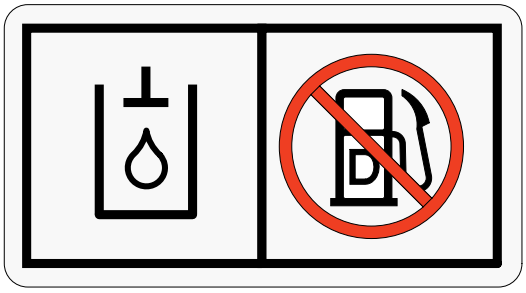
140Z90FW49

36) **FUEL SHUT OFF** (item 49)

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

※ **Fill only the hydraulic oil.**

※ **Do not fill the diesel fuel.**



140WH90FW51

37) **MCU/ECM CONNECTOR** (item 50)

This warning label is positioned on the low cover of the air conditioner in the cab.

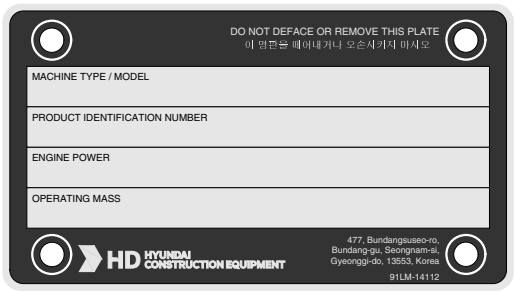
※ **MCU communicates the machine data with Laptop computer through RS232 service socket.**

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

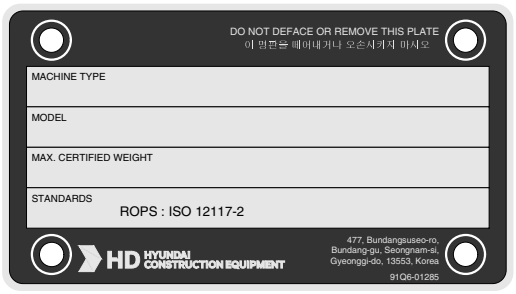
※ **See page 3-54 for details.**

235Z90FW52

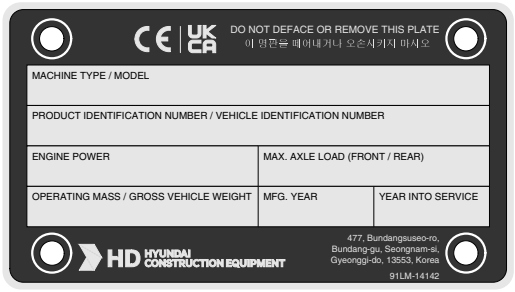
MACHINE DATA PLATE



For general

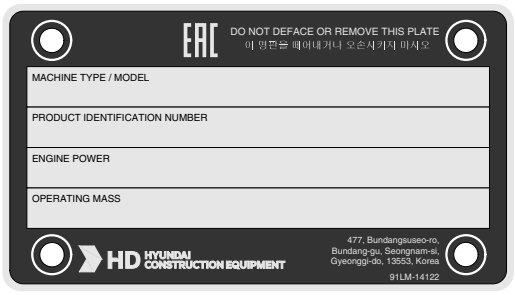


For ROPS



For EU only

For FOPS/FOG



For EAC only

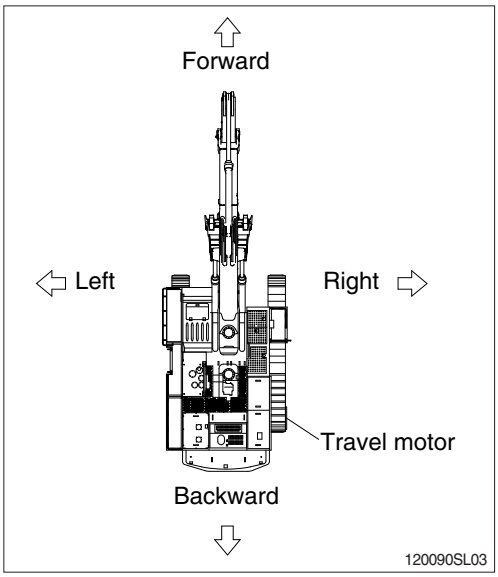
EX0MD01

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

GUIDE

1. DIRECTION

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

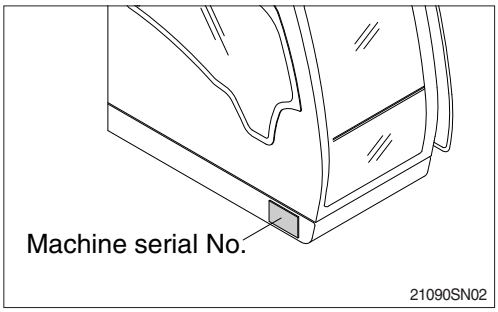


2. SERIAL NUMBER

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

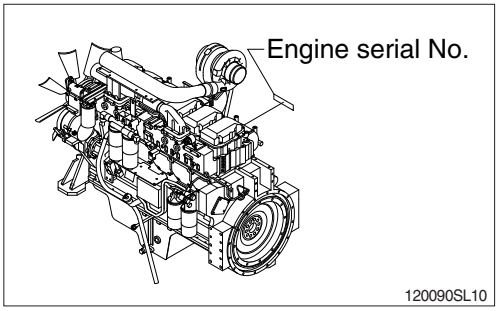
1) MACHINE SERIAL NUMBER

The numbers are located below the 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

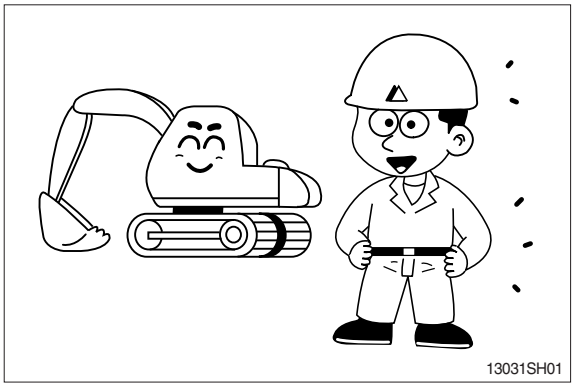
⚠ Important safety hint.

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

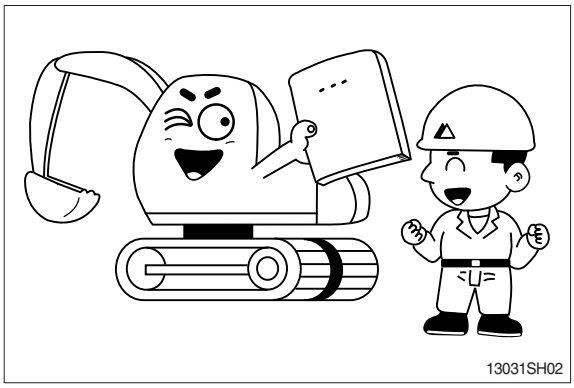
※ It indicates the useful information for operator.

1. BEFORE OPERATING THE MACHINE

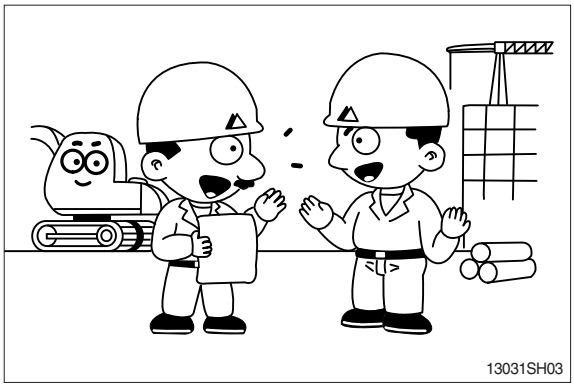
Think-safety first.
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition.
Almost every accident is caused by disregarding the simple and fundamental safety hints.


13031SH01

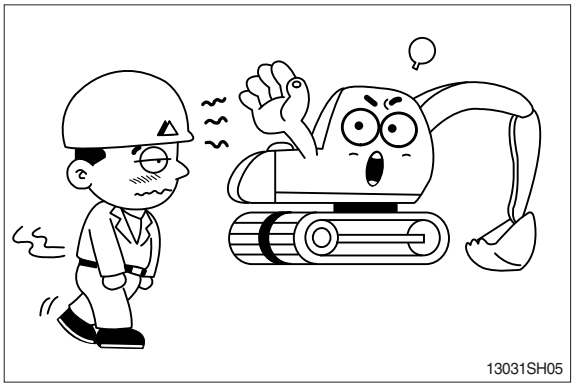
Be sure to understand thoroughly all about the operator's manual before operating the machine.
Proper care is your responsibility.


13031SH02

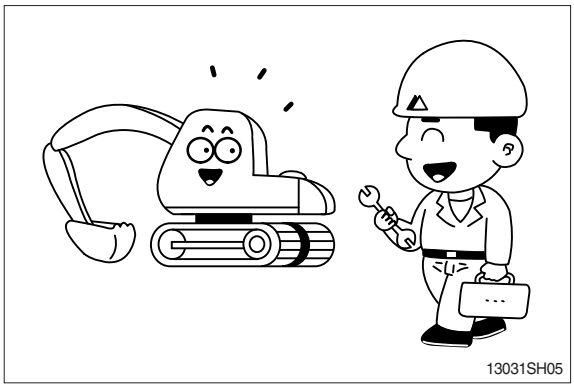
Fully understand the details and process of the construction before starting the work.
If you find anything dangerous on the job, consult with the job supervisor for the preventive measures before operating the machine.


13031SH03

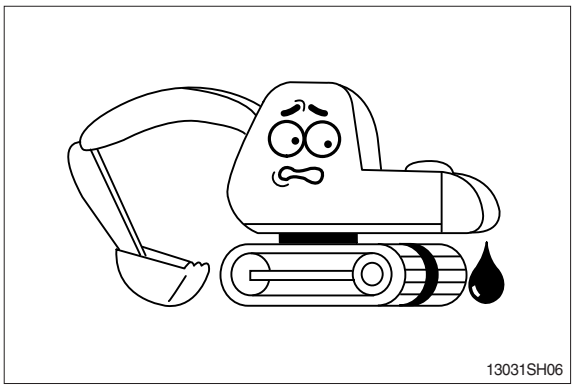
Do not operate when tired, orafter drinking alcoholic beverages or any type of drugs.


13031SH05

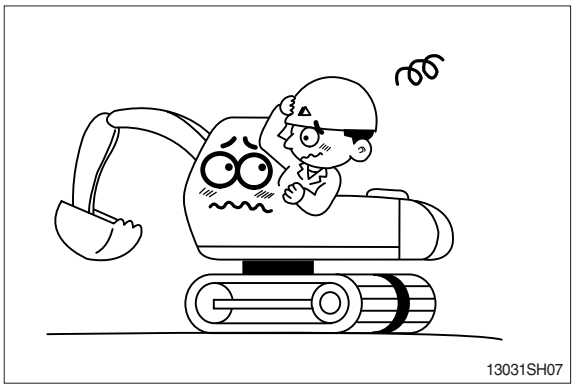
Check daily according to the operation manual.
Repair the damaged parts and tighten the loosened bolts.



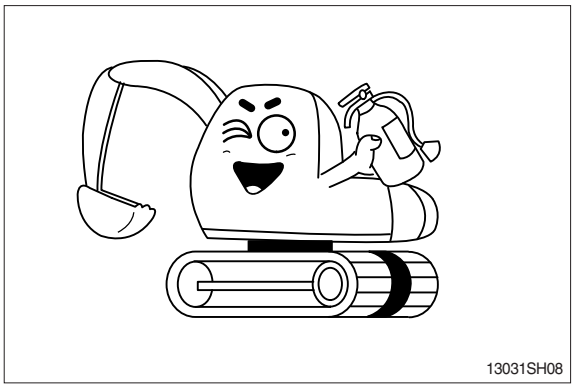
Check for leakage of engine oil, hydraulic oil, fuel and coolant.
Keep machine clean, clean machine regularly.



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.

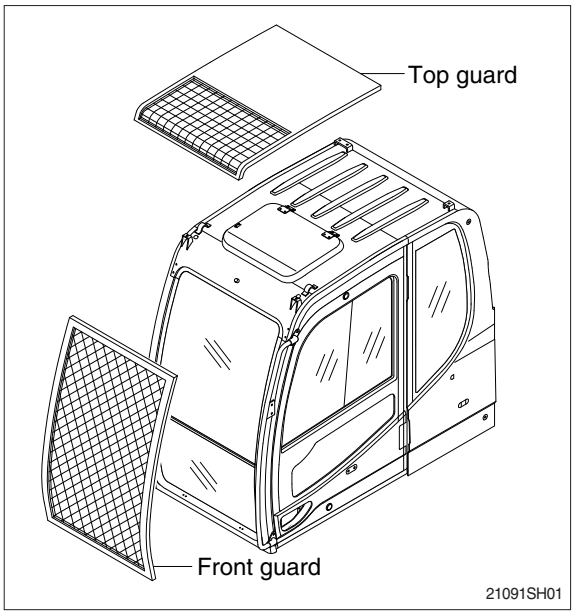


PROTECTION AGAINST FALLING OR FLYING OBJECTS

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 in Europe.



UNAUTHORIZED MODIFICATION

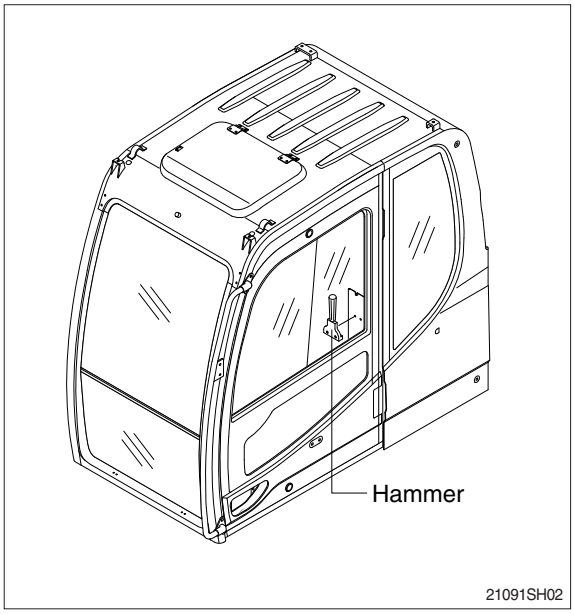
Any modification made without authorization from Hyundai can create hazards.

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.

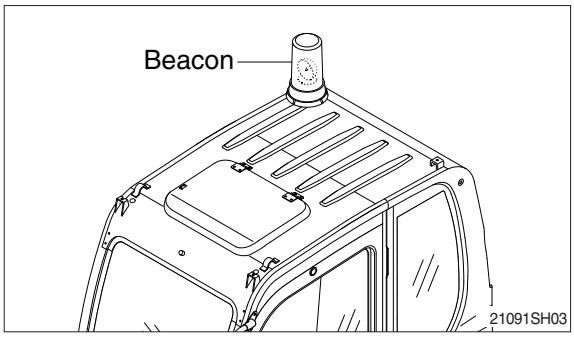
Be sure you know the phone numbers of persons you should contact in case of an emergency.



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

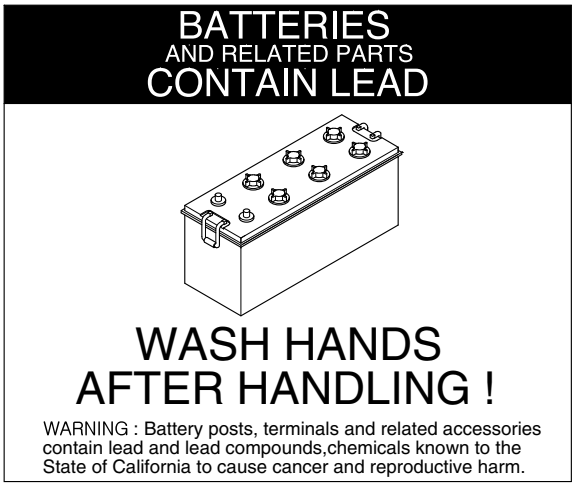
Check machine control pattern for conformance to pattern on label in cab.
If not, change label to match pattern before operating machine.
Failure to do so could result in injury.

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.

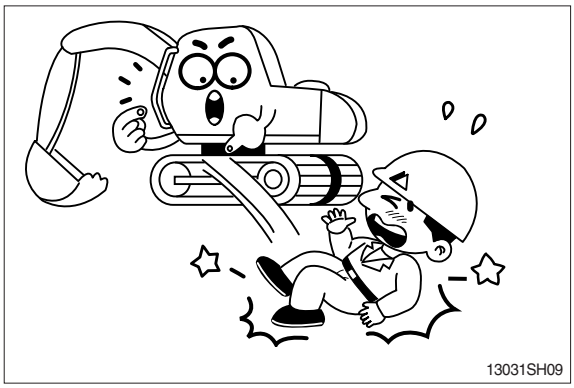
Sources

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.

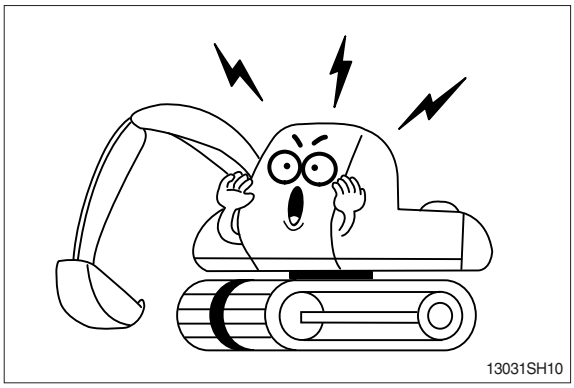
You should check the original directive. This document summarizes part of the content of the applicable law. This document is not meant to substitute the original sources. Other parts of these documents are based on information from the United Kingdom Health and Safety Executive.

2. DURING OPERATING THE MACHINE

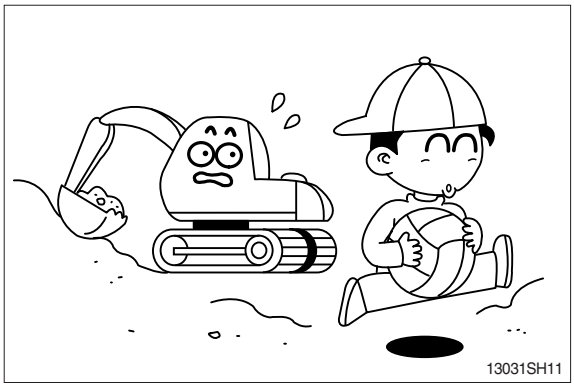
Use the handle and footstep when getting on or off the machine.
Do not jump on or off the machine.



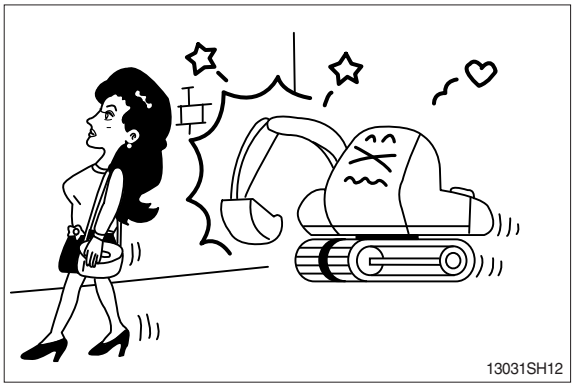
Sound the horn to warn nearby personnel before operating the machine.
Remove all the obstacles like frost on the window before operating the machine for the good visibility.



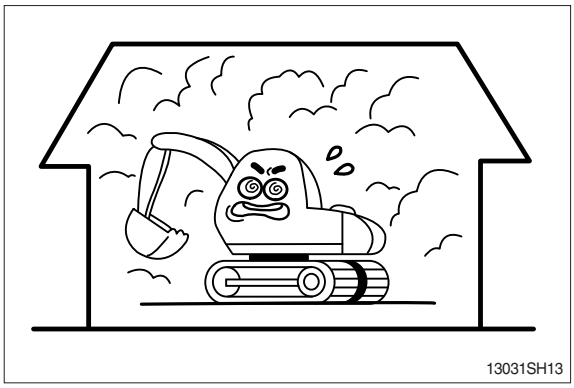
Operate carefully to make sure all personnel or obstacles are clear within the working range of the machine.
Place safety guards if necessary.



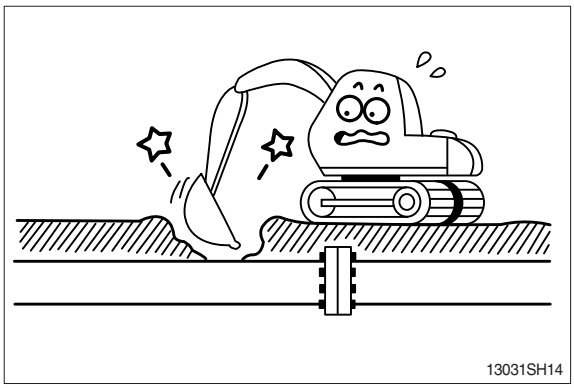
When using the work equipment, pay attention to job site.



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

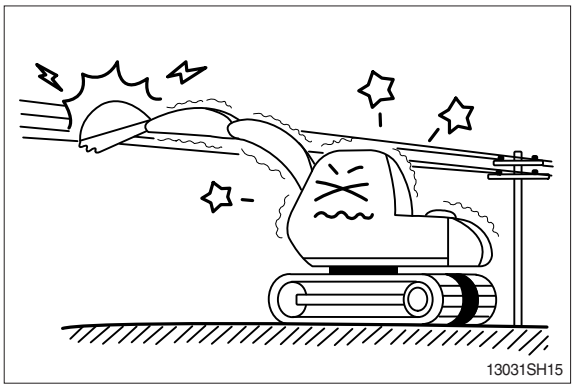


Check the locations of underground gas pipes or water line and secure the safety before operation.

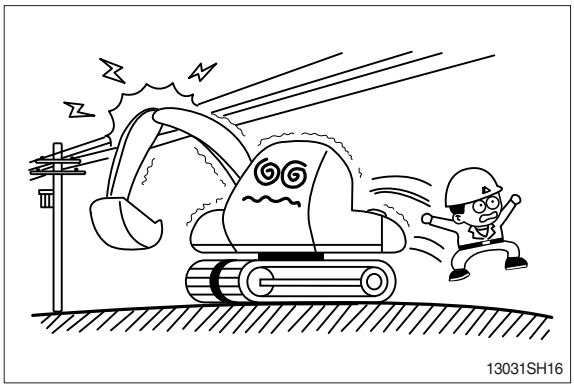


The operating near the electrical lines is very dangerous.
Operate within safe working range permitted as below.

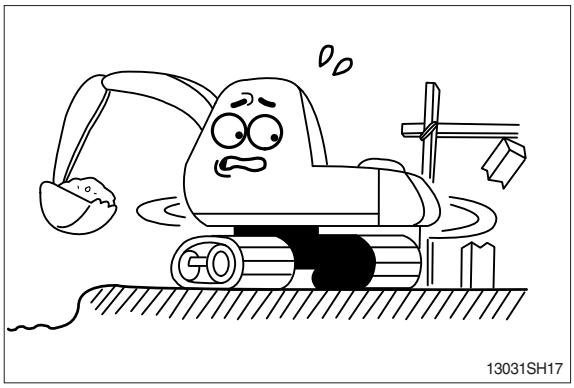
Supply voltage	Min safe separation
6.6 kV	3m (10 ft)
33.0 kV	4m (13 ft)
66.0 kV	5m (16 ft)
154.0 kV	8m (26 ft)
275.0 kV	10m (33 ft)



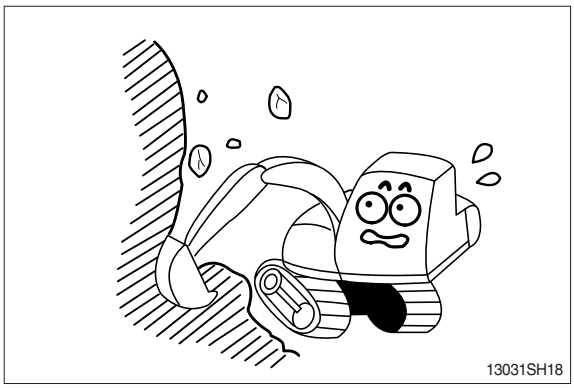
If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current. Jump off the machine without contacting the machine when you need to get off.



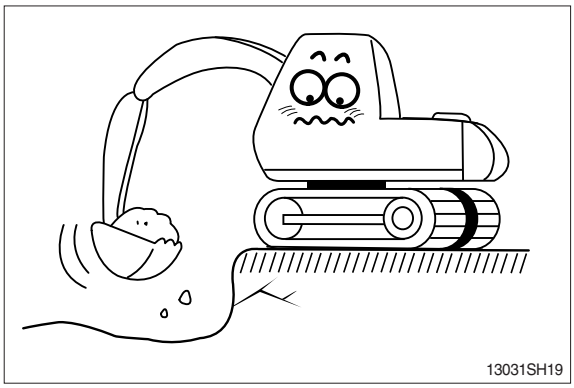
Watch out for obstacles.
Be particularly careful to check the machine clearance during the swing.



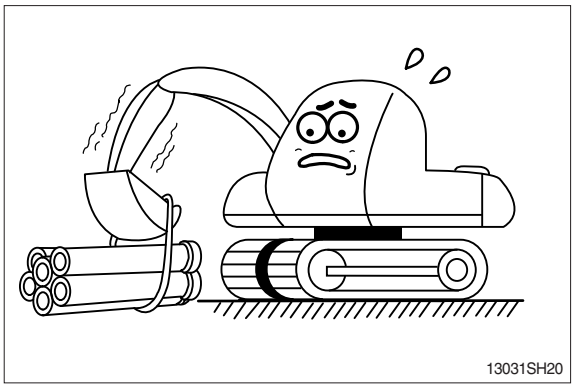
When using the machine as breaker or working in a place where stones may fall down, cab roof guard and head guard should be provided for proper protection.



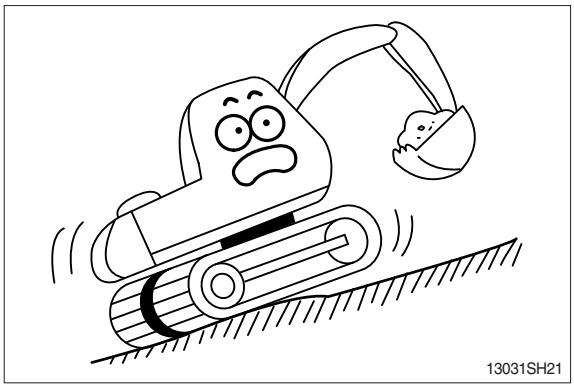
Avoid operating on a cliff or soft ground as there is danger of rolling over.
Make sure to get off easily as keeping the track at a right angle and putting the travel motor into the backward position when working on a cliff or soft ground inevitably.



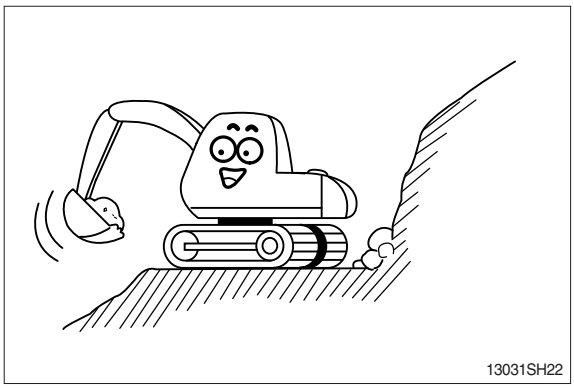
Operate for the lifting work considering the cacapacity of machine, weight and width of the load.
Be careful not to lift exceeding the machine capacity as it can be the cause of machine damage and safety accident.



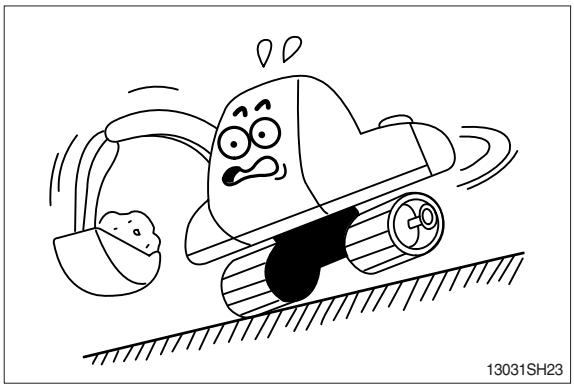
The operation on a slope is dangerous.
Avoid operating the machine on a slope of over 10 degree.



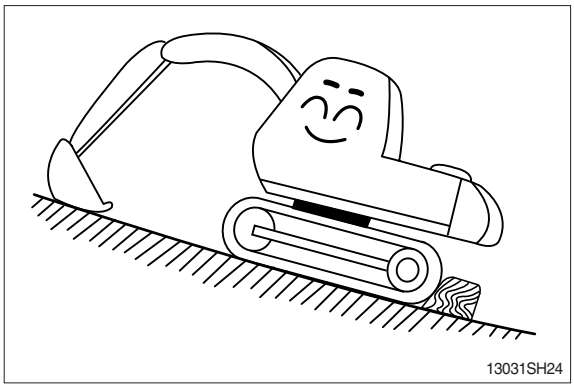
Operate the machine after making ground flat when operation is required on a slope.



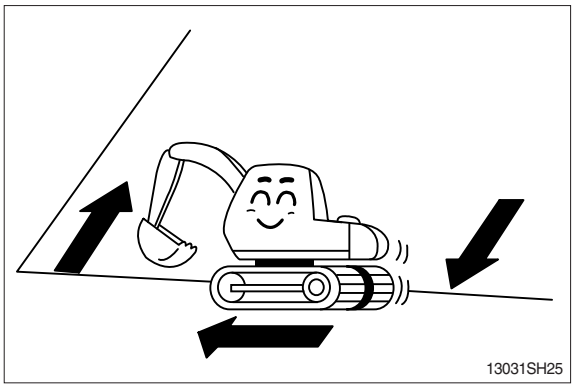
The swing on the slope can be danger of rolling over.
Do not operate to swing the machine with the bucket loaded on a slope since the machine may lose its balance under such an instance.



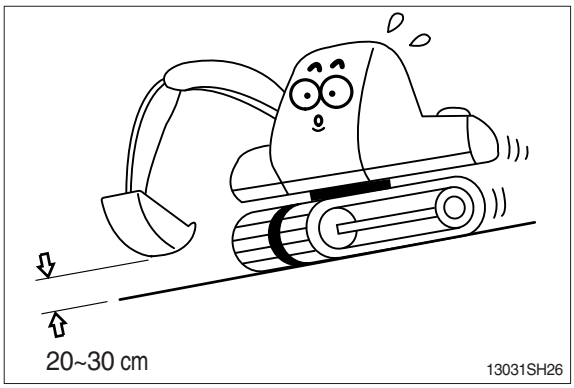
Avoid parking and stopping on a slope.
Lower the bucket to the ground and block the track when parking.



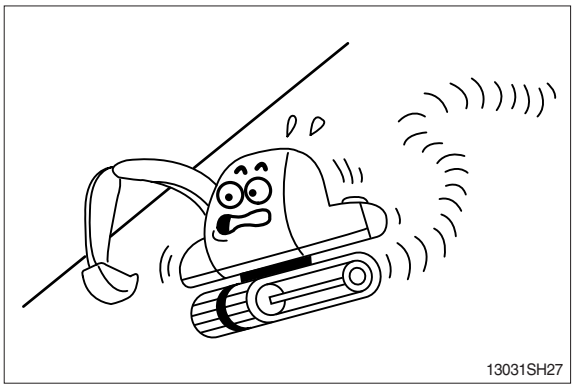
Avoid traveling in a cross direction on a slope as it can cause the danger of rolling over and sliding.



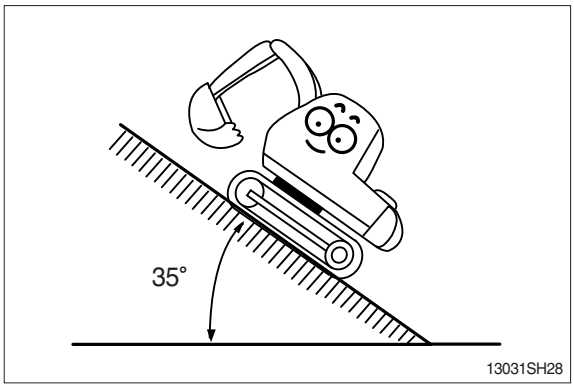
Traveling on a slope is dangerous.
Be sure to operate slowly when traveling down a slope and maintain the bucket at a height of 20~30 ㎝ (1 ft) above the ground so that it can be used as brake in an emergency.



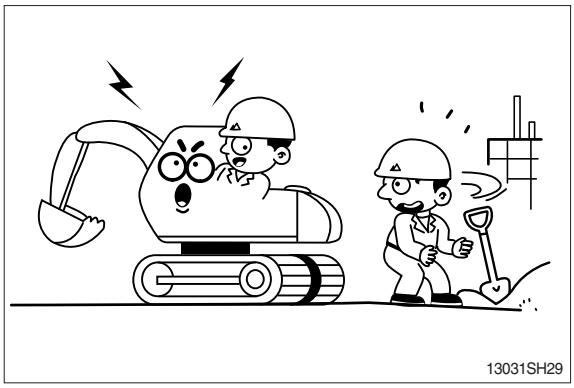
Steering of the machine while traveling on a slope is dangerous.
When an inevitable turning of direction is required, turn on the flat and solid ground.



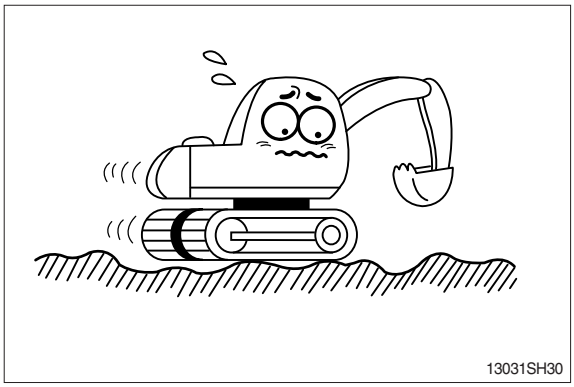
The engine angularity limits are 35 degree.
Do not operate by more than the engine limits in any case.



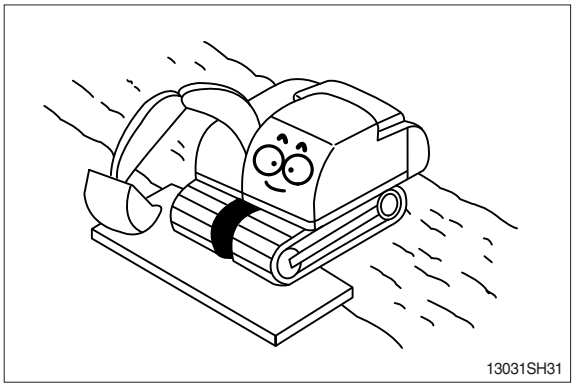
Before traveling the machine, sound the horn to warn nearby personnel.
Operate forward and backward correctly with confirming the location of the travel motor.



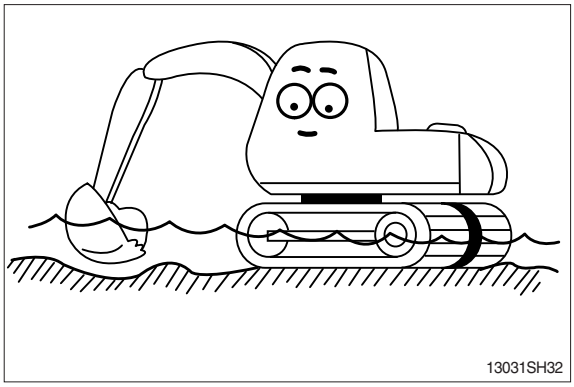
Slow down when traveling through obstacles or uneven ground.



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.



MOUNTING AND DISMOUNTING

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

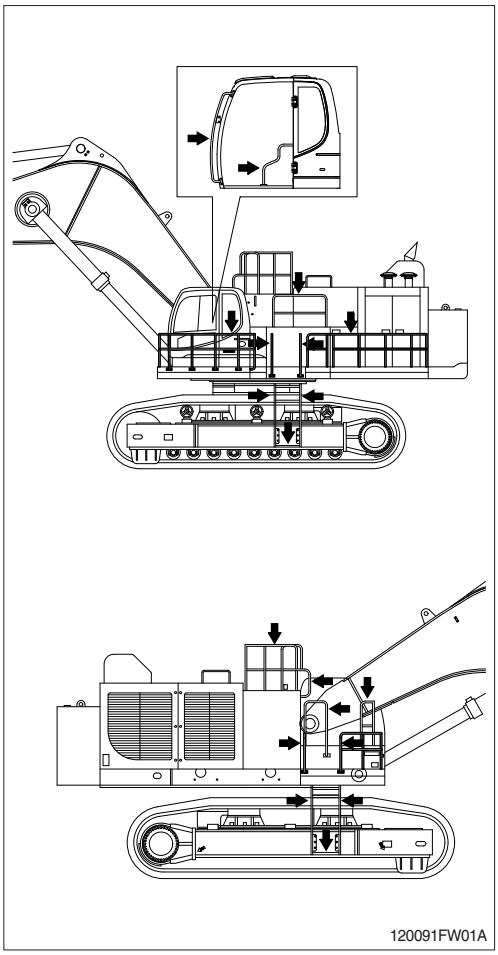
When mounting or dismounting, always face the machine and use the handrails, ladder or foot board.

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, ladder or foot board.

Always remove any oil or mud from the handrails, ladder or foot board. 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.



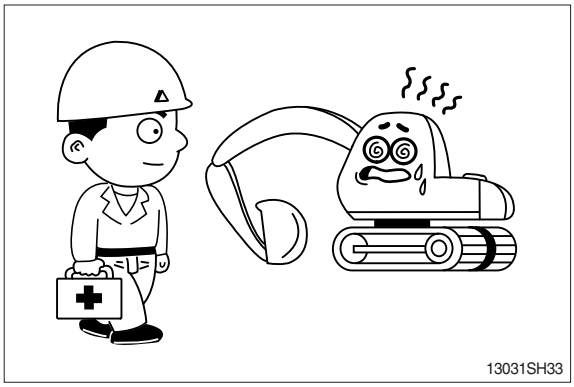
KEEP RIDERS OFF MACHINE

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

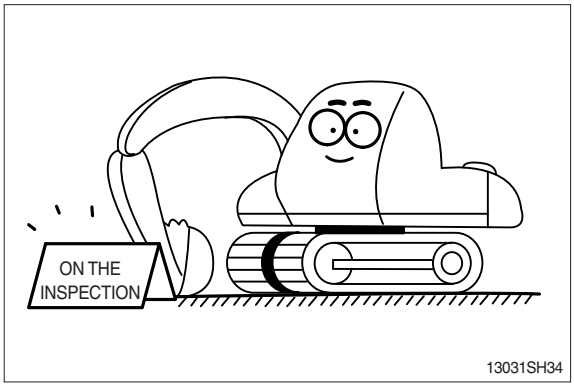
Only allow the operator on the machine. Keep riders off.

3. DURING MAINTENANCE

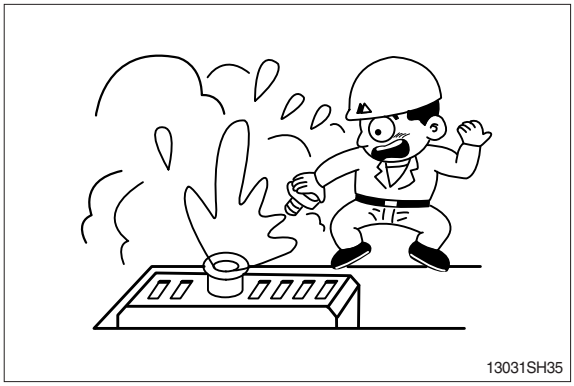
Stop the engine immediately when the trouble of the machine is found.
Inspect immediately the cause of trouble such as vibration, overheating and trouble in the cluster then repair.



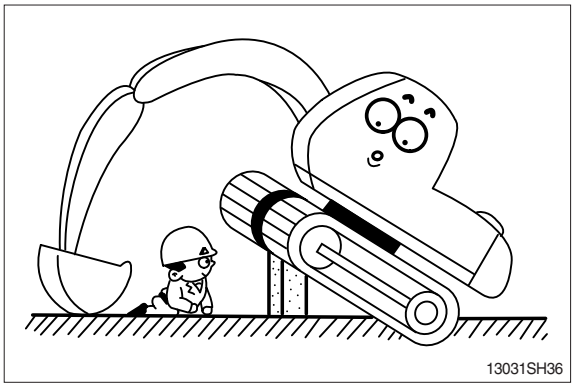
Park on a flat place and stop the engine for inspecting and repairing. Properly TAG machine is not operational. (remove start key)
Extreme care shall be taken during maintenance work. Parts may require additional safe guard.



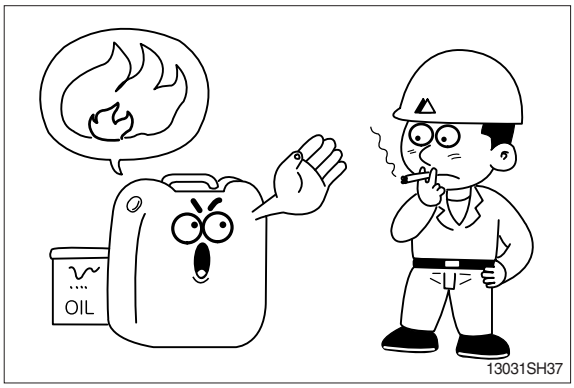
Do not remove the radiator cap from hot engine.
Open the cap after the engine cools, below 50 ℃(122°F) to prevent personal injury from heated coolant spray or steam.



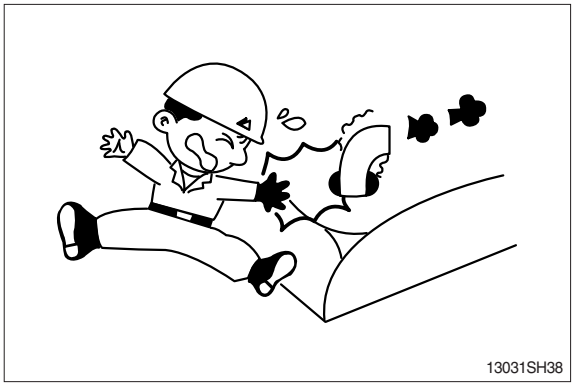
Do not work below the machine.
Be sure to work with proper safety supports.
Do not depend on the hydraulic cylinders to hold up the equipment and attachment.



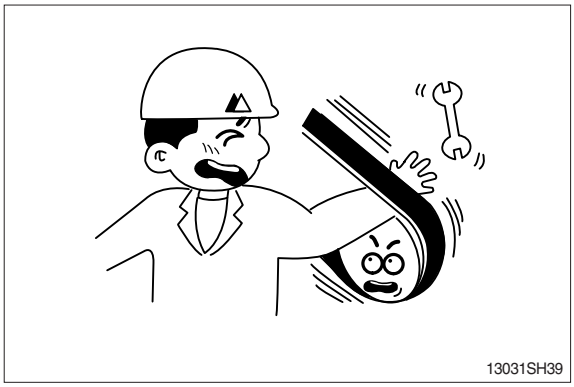
There is the danger of fire in fuel and oil.
Store in cool and dry area, away from any open flames.



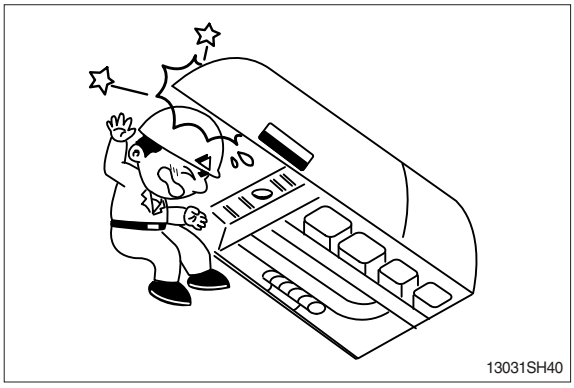
Do not touch exhaust pipe, or may cause severe burn.



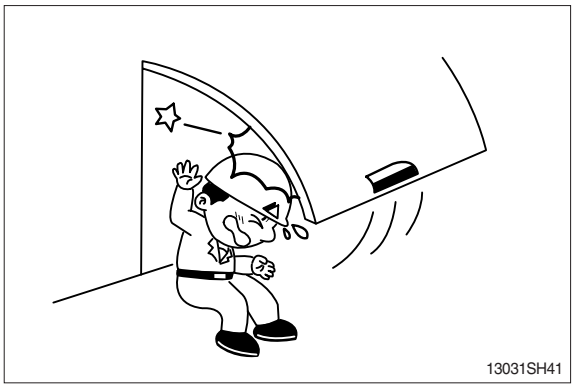
Do not open the engine hood and covers while the engine is running.



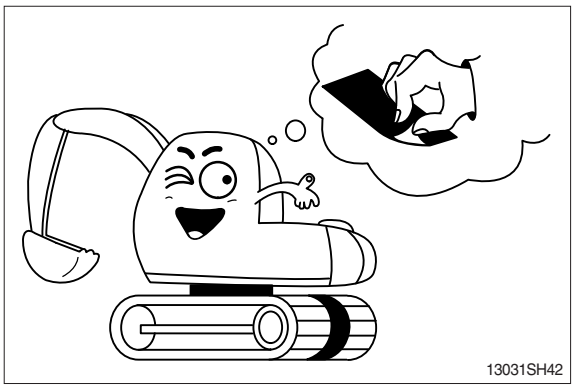
Be careful of not hitting the edges when you service engine.



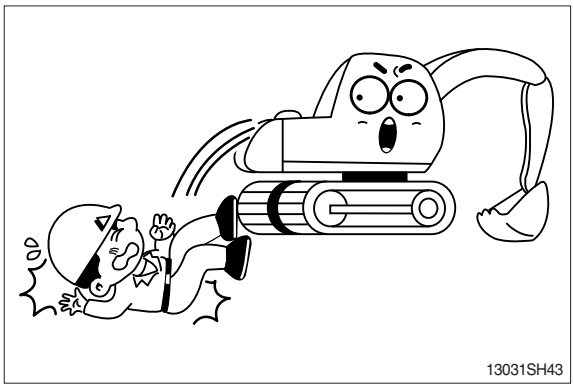
Be careful that the front window may be promptly closed.
Be sure to support stay, when the side door needs to be opened.
Be careful that the open side door may closed by the external or natural force like strong wind.


13031SH41

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.

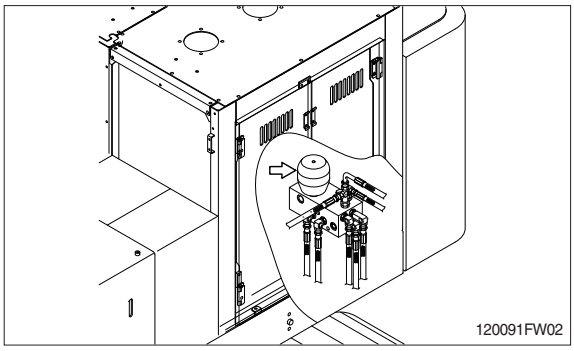

13031SH42

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


13031SH43

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.

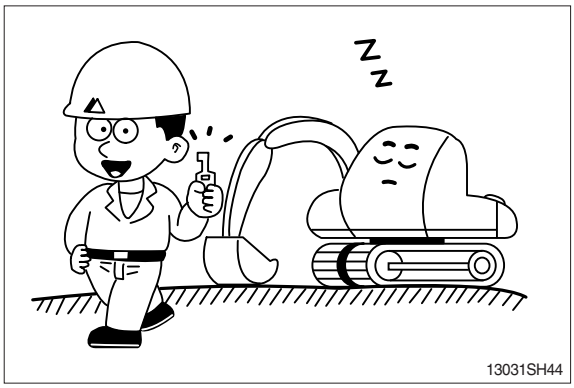

120091FW02

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.

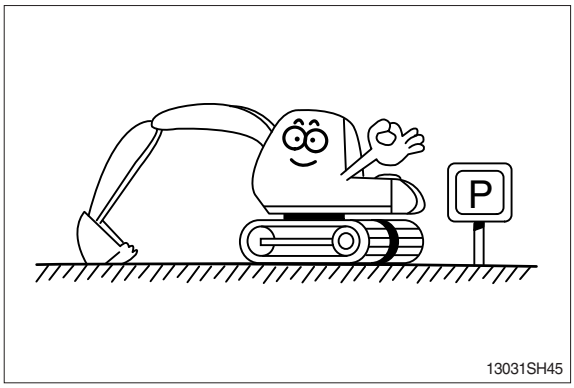
4. PARKING

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.



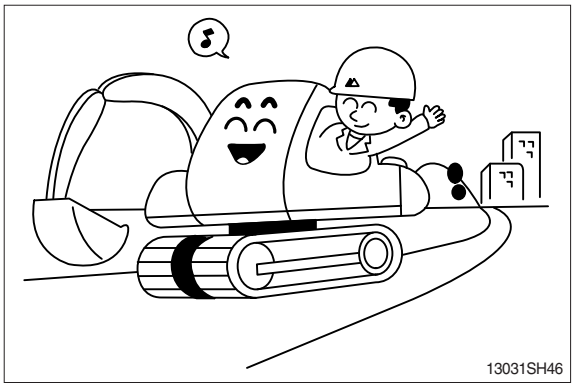
13031SH44

Park the machine in the flat and safe place.

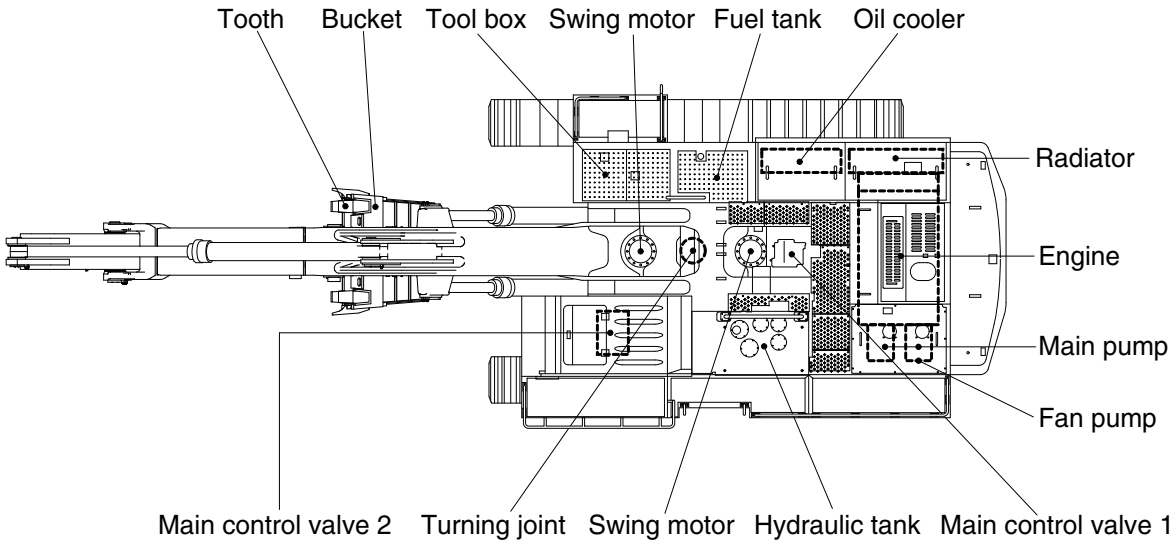


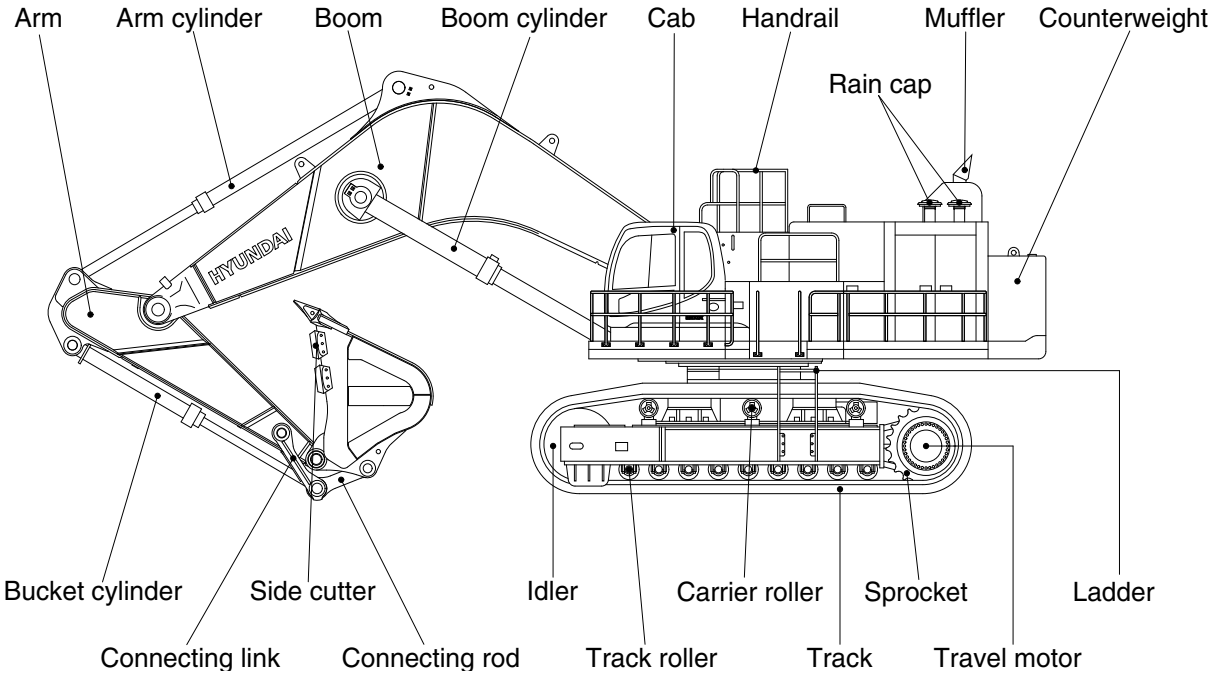
13031SH45

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


13031SH46

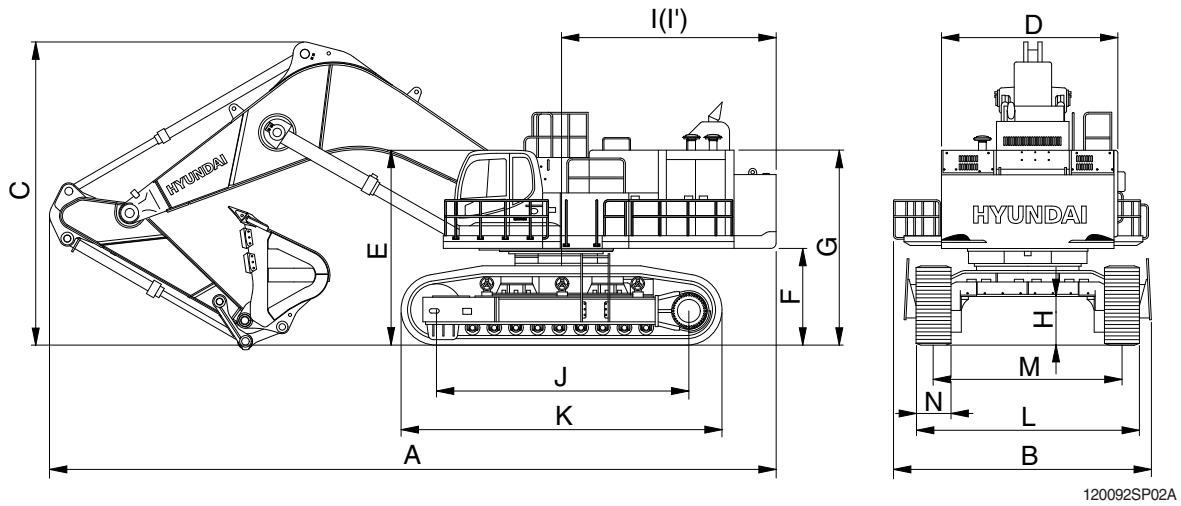
1. MAJOR COMPONENT





120092SP01A

2. SPECIFICATIONS



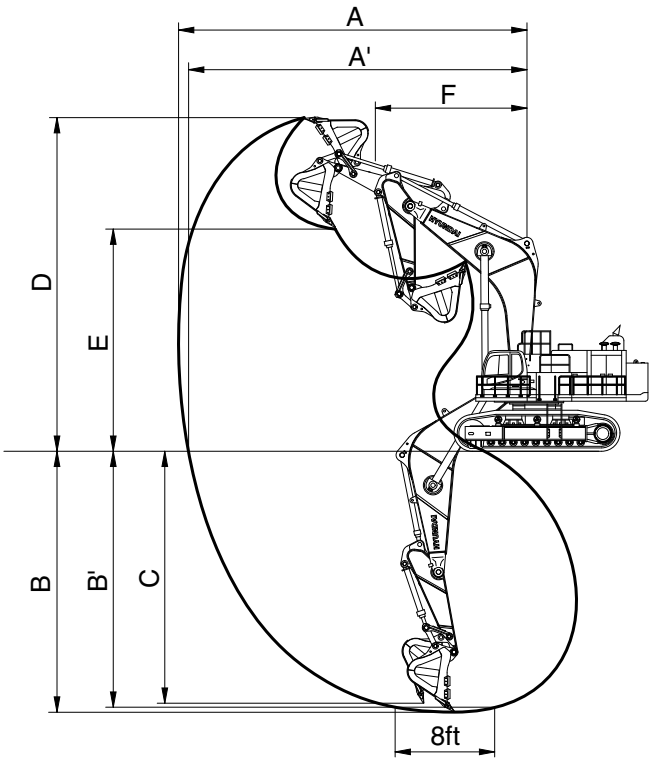
120092SP02A

Description		Unit	Specification
Operating weight		kg (lb)	118000 (260140) <118860 (262036)>
Bucket capacity (SAE heaped), standard		m^3 (yd^3)	6.70 (8.76)
Overall length	A	mm (ft-in)	14580 (47' 10")
Overall width, with 700 mm shoe	B		5560 (18' 3")
Overall height	C		6210 (20' 4")
Superstructure width	D		3520 (11' 7")
Overall height of cab	E		4250 (13' 11") <5450 (17' 11")>
Ground clearance of counterweight	F		1825 (6' 0")
Body height	G		4460 (14' 8")
Minimum ground clearance	H		990 (3' 3")
Rear-end distance	I		4805 (15' 9")
Rear-end swing radius	I'		4870 (16' 0")
Distance between tumblers	J		5010 (16' 5")
Undercarriage length	K		6400 (21' 0")
Undercarriage width	L		4600 (15' 1")
Track gauge	M		3900 (12' 10")
Track shoe width, standard	N		700 (28")
Travel speed (low/high)		km/hr (mph)	2.3/3.2 (1.4/2.0)
Swing speed		rpm	5.6
Gradeability		Degree (%)	35 (70)
Ground pressure (700 mm shoe)		kgf/cm^2(psi)	1.51 (21.47)
Max traction force		kg (lb)	70200 (154760)

< > : Cabin riser

3. WORKING RANGE

· 7.55 m (24' 9") BOOM



120092SP03A

Description		3.40 m (11' 2") Arm
Max digging reach	A	13760 mm (45' 2")
Max digging reach on ground	A'	13380 mm (43'11")
Max digging depth	B	8010 mm (26' 3")
Max digging depth (8ft level)	B'	7840 mm (25' 9")
Max vertical wall digging depth	C	5230 mm (17' 2")
Max digging height	D	12420 mm (40' 9")
Max dumping height	E	7840 mm (25' 9")
Min swing radius	F	6550 mm (21' 6")
Bucket digging force	SAE	511.9[558.5] kN
		52200[56950] kgf
		115080[125550] lbf
	ISO	581.5[636.0] kN
		59300[64690] kgf
		130730[142610] lbf
Arm crowd force	SAE	423.7[462.2] kN
		43200[47130] kgf
		95240[103900] lbf
	ISO	429.5[468.6] kN
		43800[47780] kgf
		96560[105340] lbf

[ ] : Power boost

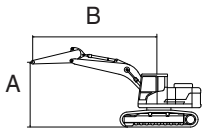
4. WEIGHT

Item	R1250-9	
	kg	lb
Upperstructure assembly	43700	96340
Main frame weld assembly	11960	26370
Engine assembly	2720	6000
Main pump assembly	160	350
Fan pump	55	120
Gear box	580	1280
Main control valve assembly 1	450	990
Main control valve assembly 2	160	350
Swing motor assembly	440	970
Hydraulic oil tank assembly	1770	3900
Fuel tank assembly	1940	4280
Counterweight	20400	44970
Cab assembly	435	960
Cab riser assy	860	1896
Lower chassis assembly	45940	101280
Lower track center frame	17700	39020
Swing bearing	2170	4780
Travel motor assembly	970	2140
Turning joint	75	165
Track recoil spring and tension body	1030	2270
Idler	850	1870
Sprocket	315	700
Carrier roller	70	150
Track roller	210	460
Track-chain assembly (700 ㎜ double grouser shoe)	5070	11180
Front attachment assembly (7.55 m boom, 3.40m arm, 6.70 m^3 SAE heaped bucket)	28360	62520
7.55 m boom assembly	10310	22730
3.40 m arm assembly	4010	8840
6.70 m^3 SAE heaped bucket	5860	12920
Boom cylinder assembly	1190	2620
Arm cylinder assembly	1510	3330
Bucket cylinder assembly	1050	2310
Bucket control rod assembly	1450	3200

5. LIFTING CAPACITIES

Model	Type	Boom	Arm	Counterweight	Shoe	Wheel	Dozer		Outtriger	
R1250-9	MONO BOOM	Length [mm]	Length [mm]	weight [kg]	width [mm]	width [mm]	Front	Rear	Front	Rear
		7550	3400	20400	700	-	-	-	-	-

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



Lift-point height (A)		Lift-point radius (B)												At max. reach		
		3.0 m (9.8 ft)		4.5 m (14.8 ft)		6.0 m (19.7 ft)		7.5 m (24.6 ft)		9.0 m (29.5 ft)		10.5 m (34.4 ft)		Capacity		Reach
9.0 m (29.5 ft)	kg									*19580	*19580			*14850	*14850	9.27
	lb									*43170	*43170			*32740	*32740	(30.4)
7.5 m (24.6 ft)	kg									*25900	*25900			*14460	*14460	10.10
	lb									*57100	*57100			*31880	*31880	(33.1)
6.0 m (19.7 ft)	kg							*31100	*31100	*26900	*26900	*17990	*17990	*14490	*14490	10.64
	lb							*68560	*68560	*59300	*59300	*39660	*39660	*31940	*31940	(34.9)
4.5 m (14.8 ft)	kg					*42940	*42940	*33570	*33570	*28140	27500	*24560	21560	*14900	*14900	10.95
	lb					*94670	*94670	*74010	*74010	*62040	60630	*54150	47530	*32850	*32850	(35.9)
3.0 m (9.8 ft)	kg							*35510	34730	*29150	26530	*24820	21030	*15720	*15720	11.03
	lb							*78290	76570	*64260	58490	*54720	46360	*34660	*34660	(36.2)
1.5 m (4.9 ft)	kg					*46700	*46700	*36270	33510	*29500	25740	*24570	20580	*17040	*17040	10.90
	lb					*102960	*102960	*79960	73880	*65040	56750	*54170	45370	*37570	*37570	(35.8)
0.0 m (0.0 ft)	kg					*44880	*44880	*35540	32800	*28800	25240	*21090	20350	*19150	*19150	10.55
	lb					*98940	*98940	*78350	72310	*63490	55640	*46500	44860	*42220	*42220	(34.6)
-1.5 m (-4.9 ft)	kg			*50120	*50120	*41080	*41080	*33070	32570	*26540	25090			*22370	21940	9.94
	lb			*110500	*110500	*90570	*90570	*72910	71800	*58510	55310			*49320	48370	(32.6)
-3.0 m (-9.8 ft)	kg	*45200	*45200	*41780	*41780	*35030	*35030	*28320	*28320	*21290	*21290			*21030	*21030	9.04
	lb	*99650	*99650	*92110	*92110	*77230	*77230	*62430	*62430	*46940	*46940			*46360	*46360	(29.7)
-4.5 m (-14.8 ft)	kg			*29670	*29670	*25510	*25510	*19220	*19220					*17860	*17860	7.73
	lb			*65410	*65410	*56240	*56240	*42370	*42370					*39370	*39370	(25.4)

Note 1. Lifting capacity are based on ISO 10567.

2. Lifting capacity of the ROBEX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.

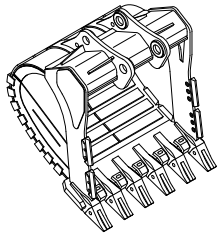
3. The Lift-point is bucket pivot mounting pin on the arm (without bucket mass).

4. *Indicates load limited by hydraulic capacity.

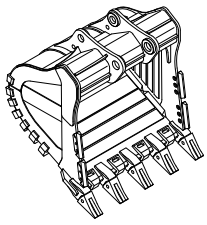
※ Lifting capacities are based upon a standard machine conditions.
Lifting capacities will vary with different work tools, ground conditions and attachments.
The difference between the weight of a work tool attachment must be subtracted.
Consult with your local HD Hyundai Construction Equipment dealer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

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

6. BUCKET SELECTION GUIDE



Heavy duty



Rock heavy duty

Type	Capacity		Width	Weight	Tooth	MONO
						Recommendation
	SAE Heaped	CECE heaped	Without side cutter			7.55 m (24' 9") Boom
	m^3 (yd^3)	m^3 (yd^3)	mm (in)	kg (lb)	EA	3.40 m (11' 2') Arm
Heavy duty	6.70 (8.76)	5.90 (7.72)	2535 (99.8")	7385 (16280)	6	◐
	7.00 (9.16)	6.15 (8.04)	2535 (99.8")	7565 (16680)	6	◐
	8.57 (11.21)	7.68 (10.05)	2535 (99.8")	7295 (16080)	6	■
Rock heavy duty	6.00 (7.85)	5.30 (6.93)	2420 (95.3")	6605 (14560)	5	●

●	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
-	Not available

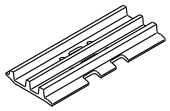
※ These recommendations are for general conditions and average use.
Work tools and ground conditions have effects on machine performance.
Select an optimum combination according to the working conditions and the type of work that is being done.
Consult with your local HD Hyundai Construction Equipment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

7. UNDERCARRIAGE

1) TRACKS

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

2) TYPES OF SHOES

Model	Shapes		Double grouser		
					
R1250-9	Shoe width	mm (in)	700 (28)	800 (32)	900 (36)
	Operating weight	kg (lb)	118000 (260140)	118670 (261620)	119470 (263380)
	Ground pressure	kgf/cm^2 (psi)	1.51 (21.47)	1.34 (19.05)	1.20 (17.06)
	Under carriage width	mm (ft-in)	4600 (15' 1")	4700 (15' 5")	4800 (15' 9")

3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

Item	Quantity
Carrier rollers	3 EA
Track rollers	8 EA
Track shoes	52 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
700 mm double grouser	Standard	A
800 mm double grouser	Option	B
900 mm double grouser	Option	C

※ Table 2

Category	Applications	Applications
A	Rocky ground, river beds, normal soil	· Travel at low speed on rough ground with large obstacles such as boulders or fallen trees
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 gound (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	Cummins QSK 23
Type	4-cycle turbocharged charge air cooled diesel engine
Cooling method	Water cooling
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	170 × 170 mm (6.7" × 6.7")
Piston displacement	23000 cc (1404 cu in)
Compression ratio	16 : 1
Rated gross horse power(SAE J1995)	760 hp at 1800 rpm (567 kW at 1800 rpm)
Maximum torque	354 kgf · m (2560 lbf · ft) at 1350 rpm
Engine oil quantity	70 ℓ (18.5 U.S. gal)
Dry weight	2070 kg (6000 lb)
High idling speed	1800 ± 50 rpm
Low idling speed	900 ± 50 rpm
Rated fuel consumption	153.6 g/Hp · hr at 1800 rpm
Starting motor	Nikko (24 V-7.5 kW × 2EA)
Alternator	Sawafuji 24 V-75 A
Battery	4 × 12 V × 160 Ah

2) GEAR BOX

Item	Specification
Model	Stiebel 4325
Ratio	1.05452 (speed increae)

3) MAIN PUMP

Item	Specification
Type	Variable displacement axis piston pumps
Capacity	3 × 280 cc/rev
Maximum pressure	320 kgf/cm^2 (4550 psi) [350 kgf/cm^2 (4980 psi)]
Rated oil flow	3 × 490 ℓ /min (129.4 U.S. gpm / 107.8 U.K. gpm)
Rated speed	1800 rpm

[ ] : Power boost

4) FAN PUMP

Item	Specification
Type	Variable displacement axis piston pumps
Capacity	65 cc/rev
Maximum pressure	270 kgf/cm^2 (3840 psi)
Rated speed	1800 rpm

5) GEAR PUMP

Item	Specification
Type	Fixed displacement gear pump single stage
Capacity	30 cc/rev
Maximum pressure	40 kgf/cm^2 (570 psi)
Rated oil flow	54 ℓ /min (14.3 U.S. gpm/11.9 U.K. gpm)

6) MAIN CONTROL VALVE

Item	Specification
Type	13 spools
Operating method	Hydraulic pilot system
Main relief valve pressure	320 kgf/cm^2 (4550 psi) [350 kgf/cm^2 (4980 psi)]
Overload relief valve pressure	360 kgf/cm^2 (5120 psi)

[ ]: Power boost

7) SWING MOTOR

Item	Specification
Type	Fixed displacement axial piston motor
Capacity	250 cc/rev
Relief pressure	300 kgf/cm^2 (4270 psi)
Braking system	Automatic, spring applied hydraulic released
Braking torque	107 kgf · m (774 lbf · ft)
Brake release pressure	30~50 kgf/cm^2 (427~711 psi)
Reduction gear type	2 - stage planetary

8) REMOTE CONTROL VALVE

Item		Specification
Type		Pressure reducing type
Operating pressure	Minimum	6.5 kgf/cm^2 (92 psi)
	Maximum	25 kgf/cm^2 (360 psi)
Single operation stroke	Lever	61 mm (2.4 in)
	Pedal	123 mm (4.84 in)

9) TRAVEL MOTOR

Item	Specification
Type	Variable displacement axial piston motor
Relief pressure	350 kgf/cm^2 (4980 psi)
Capacity (max / min)	337.2/228.6 cc/rev
Reduction gear type	3-stage planetary
Braking system	Automatic, spring applied hydraulic released
Brake release pressure	18 kgf/cm^2 (256 psi)
Braking torque	114 kgf · m (825 lbf · ft)

10) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	ø 230 × ø 160 × 2165 mm
	Cushion	Extend only
Arm cylinder	Bore dia × Rod dia × Stroke	ø 260 × ø 180 × 2180 mm
	Cushion	Extend and retract
Bucket cylinder	Bore dia × Rod dia × Stroke	ø 240 × ø 170 × 1792 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.

11) SHOE

Item		Width	Ground pressure	Link quantity	Overall width
R1250-9	Standard	※ 700 mm (28")	1.51 kgf/cm^2 (21.47 psi)	52	4600 mm (15' 1")
	Option	※ 800 mm (32")	1.34 kgf/cm^2 (19.05 psi)	52	4700 mm (15' 5")
		※ 900 mm (36")	1.20 kgf/cm^2 (17.06 psi)	52	4800 mm (15' 9")

※ Double grouser

12) BUCKET

Item		Capacity		Tooth quantity	Width	
		SAE heaped	CECE heaped		Without side cutter	With side cutter
R1250-9	Standard	6.70 m^2 (8.76 yd^3)	5.88 m^2 (7.69 yd^3)	5	2390 mm (94.1")	-

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	70 (18.5)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Gear box	Heavy duty gear oil	6.0 (1.6)	★SAE 75W-90 ISO VG 100~220
Swing drive	Gear oil	8.0×2 (2.1×2)	★SAE 75W-90
Final drive		20×2 (5.3×2)	SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank : 670 (177) System: 1160 (306)	★ISO VG 15 ISO VG 32 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel	1475 (390)	★ASTM D975 NO.1 ASTM D975 NO.2
Lower roller	Gear oil	1.08 (0.3)	★SAE 75W-90
Upper roller		0.68 (0.18)	
Idler		0.83 (0.22)	SAE 85W-140
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and soft water★1	100 (26.4)	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

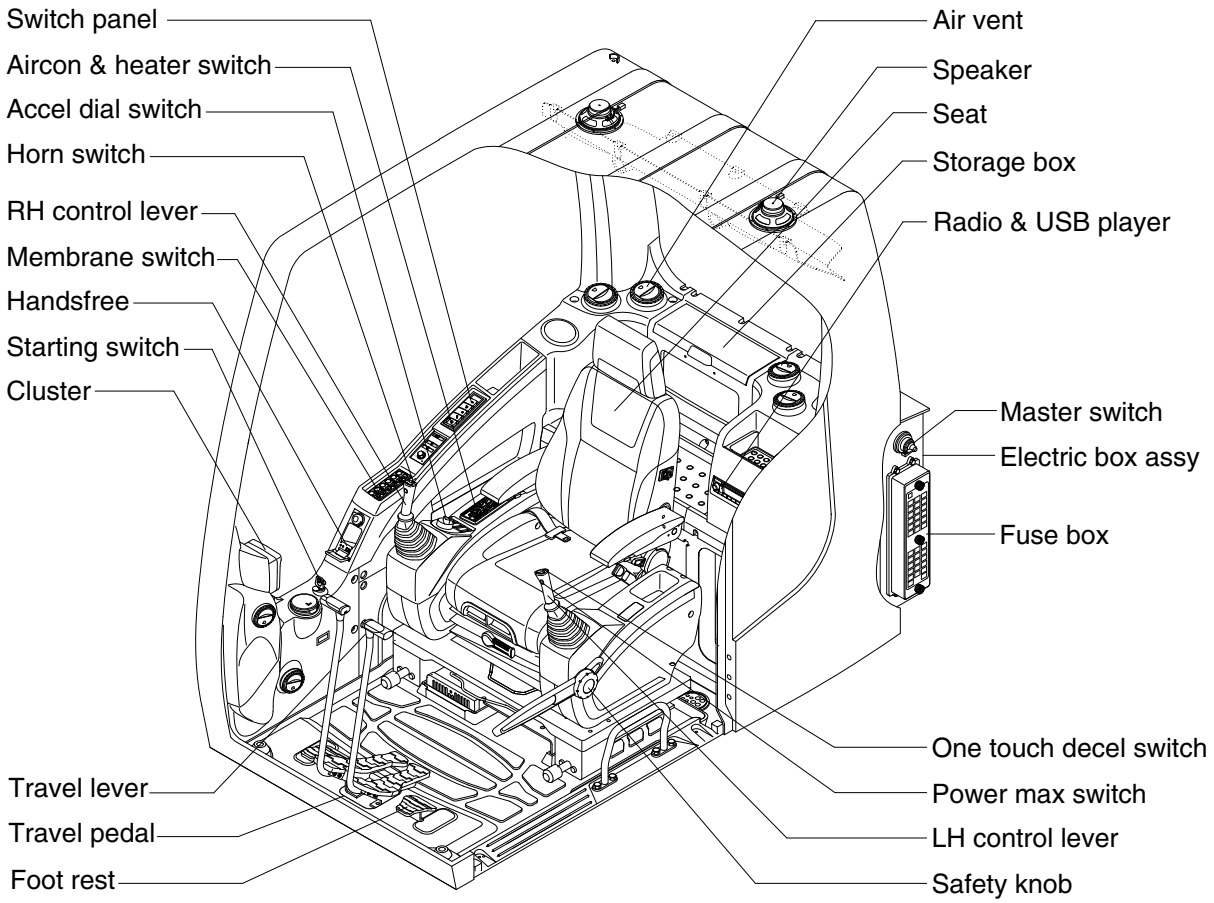
1. CAB DEVICES

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.



120093CD02

2. CLUSTER

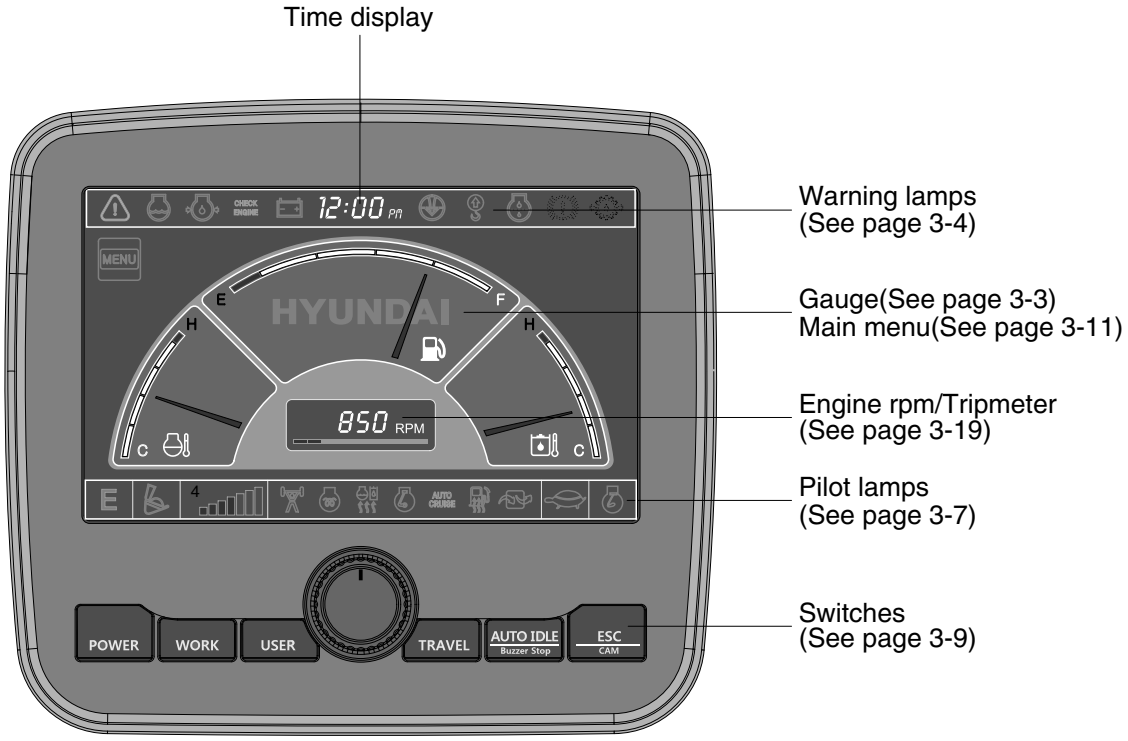
1) STRUCTURE

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

The switches are to set the machine operation modes.

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

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

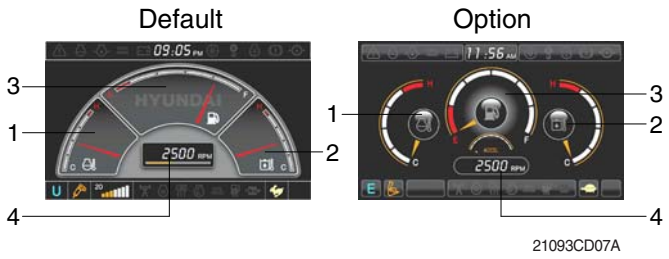


21093CD07

※ The warning lamp pops up and/or blinks and the buzzer sounds when the machine has a problem. The warning lamp blinks until the problem is cleared. Refer to page 3-4 for details.

2) GAUGE

(1) Operation screen

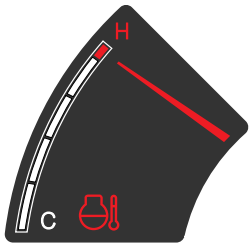


21093CD07A

1 Engine coolant temperature gauge
2 Hydraulic oil temperature gauge
3 Fuel level gauge
4 RPM / Tripmeter display

※ **Operation screen type can be set by the screen type menu of the display. Refer to page 3-21 for details.**

(2) Engine coolant temperature gauge



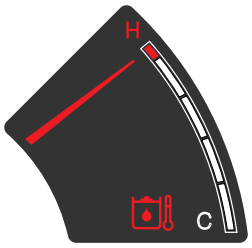
21093CD07G

① This gauge indicates the temperature of coolant.
- White range : 40-107˚C (104-225˚F)
- Red range : Above 107˚C (225˚F)

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

※ **If the gauge indicates the red range or lamp 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.**

(3) Hydraulic oil temperature gauge



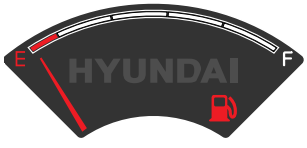
21093CD07E

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

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

※ **If the gauge indicates the red range or lamp 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.**

(4) Fuel level gauge



21093CD07F

① This gauge indicates the amount of fuel in the fuel tank.

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

※ **If the gauge indicates the red range or lamp 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.**

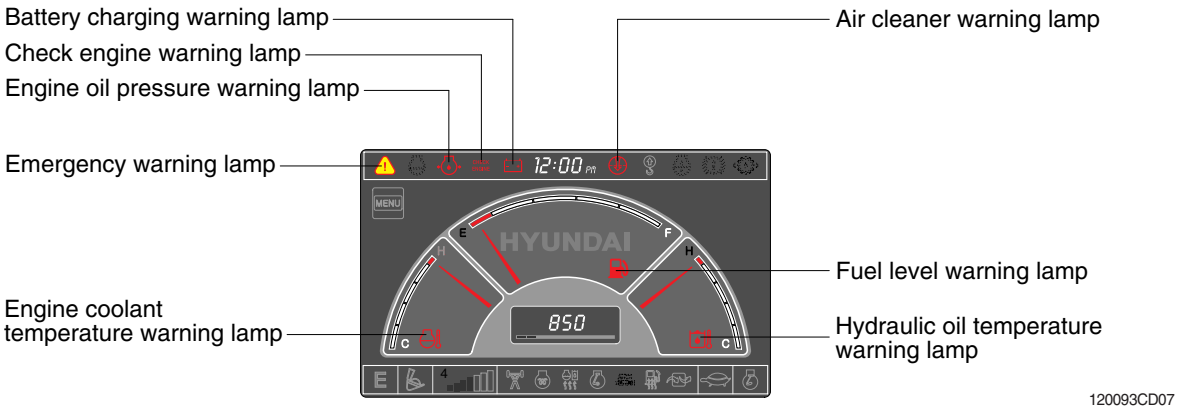
(5) RPM / Tripmeter display

21093CD02D

① This displays the engine rpm or the tripmeter.

※ **Refer to page 3-19 for details.**

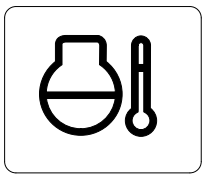
3) WARNING LAMPS



120093CD07

※ **Each warning lamp on the top of the LCD pops up on the center of LCD and the buzzer sounds when the each warning is happened. The pop-up warning lamp moves to the original position and blinks when the select switch is pushed. And the buzzer stops.**
Refer to page 3-10 for the select switch.

(1) Engine coolant temperature



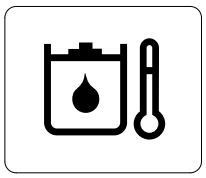
21093CD08A

① Engine coolant temperature warning is indicated two steps.
- 103˚C over : The lamp blinks.
- 107˚C over : The lamp pops up on the center of LCD and the buzzer sounds.

② The pop-up lamp moves to the original position and blinks when the select switch is pushed. Also, the buzzer stops and lamp keeps blink.

③ Check the cooling system when the lamp keeps ON.

(2) Hydraulic oil temperature



21093CD08C

① Hydraulic oil temperature warning is indicated two steps.
- 100˚C over : The lamp blinks and the buzzer sounds.
- 105˚C over : The lamp pops up on the center of LCD and the buzzer sounds.

② The pop-up lamp moves to the original position and blinks when the select switch is pushed. Also, the buzzer stops and lamp keeps blink.

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

(3) Fuel level

21093CD08B

① This warning lamp blinks and the buzzer sounds when the level of fuel is below 131 ℓ (34.6 U.S. gal).

② Fill the fuel immediately when the lamp blinks.

(4) Emergency warning lamp

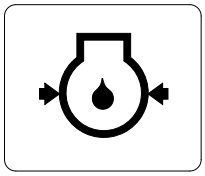
21093CD30

① This lamp pops up and the buzzer sounds when each of the below warnings is happened.
- Engine coolant overheating (over 107˚C)
- Hydraulic oil overheating (over 105˚C)
- Pump EPPR circuit abnormal or open
- Attachment flow EPPR circuit abnormal or open
- MCU input voltage abnormal
- Accel dial circuit abnormal or open
- Cluster communication data error
- Engine ECM communication data error

※ The pop-up warning lamp moves to the original position and blinks when the select switch is pushed. Also the buzzer stops. This is same as following warning lamps.

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

(5) Engine oil pressure warning lamp

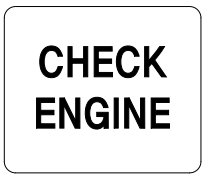


21093CD32

① This lamp blinks when the engine oil pressure is low.

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

(6) Check engine warning lamp



21093CD33

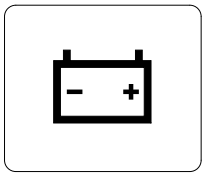
① This lamp blinks when the communication between MCU and engine ECM on the engine is abnormal, or if the cluster received any fault code from engine ECM.

② Check the communication line between them.
If the communication line is OK, then check the fault codes on the cluster.

29093CD03

③ This lamp blinks when "Engine check water in fuel" is displayed in the message box then check water separator.

(7) Battery charging warning lamp

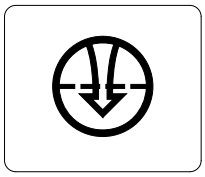


21093CD34

① This lamp blinks when the battery charging voltage is low.

② Check the battery charging circuit when this lamp blinks.

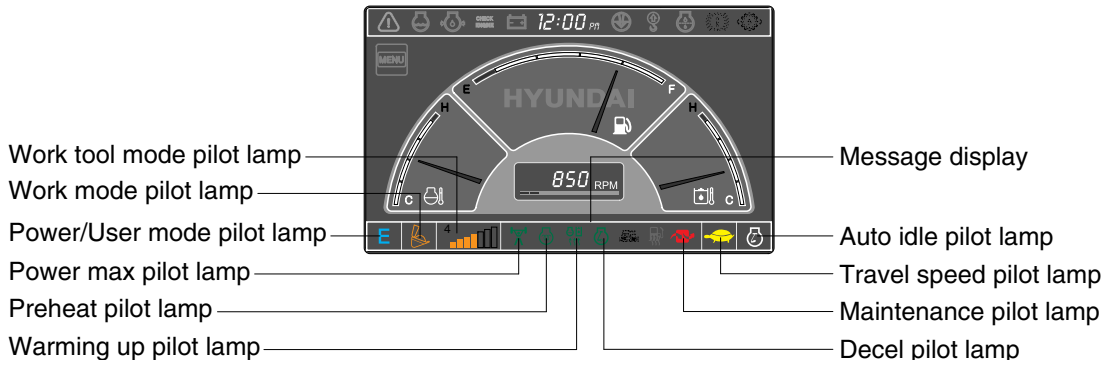
(8) Air cleaner warning lamp



21093CD35

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

4) PILOT LAMPS

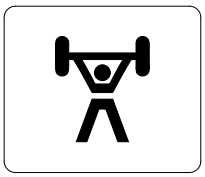


120093CD05

(1) Mode pilot lamps

No	Mode	Pilot lamp	Selected mode
1	Power mode	P	Heavy duty power work mode
		S	Standard power mode
		E	Economy power mode
2	User mode	U	User preferable power mode
3	Work mode		General operation mode
			Breaker operation mode
			Crusher operation mode
4	Travel mode		Low speed traveling
			High speed traveling
5	Auto idle mode		Auto idle
6	Work tool mode	4	Oil flow level of breaker or crusher mode
7	Message display	M	"Setting is completed" display after selection

(2) Power max pilot lamp



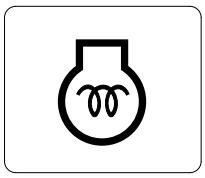
21093CD38

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

② The power max function is operated maximum 8 seconds.

※ **Refer to the page 3-26 for power max function.**

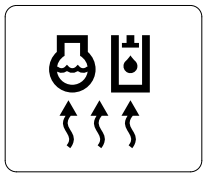
(3) Preheat pilot lamp



21093CD39

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

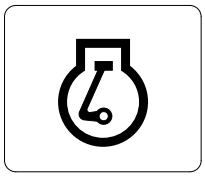
(4) Warming up pilot lamp



21093CD40

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

(5) Decel pilot lamp



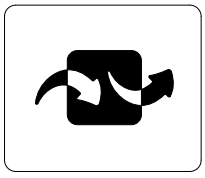
21093CD41

① Operating one touch decel switch on the RCV lever makes the lamp ON.
② Also, the lamp will be ON and engine speed will be lowered automatically to save fuel consumption when all levers and pedals are at neutral position, and the auto idle function is selected.

※ One touch decel is not available when the auto idle pilot lamp is turned ON.

※ Refer to the page 3-26.

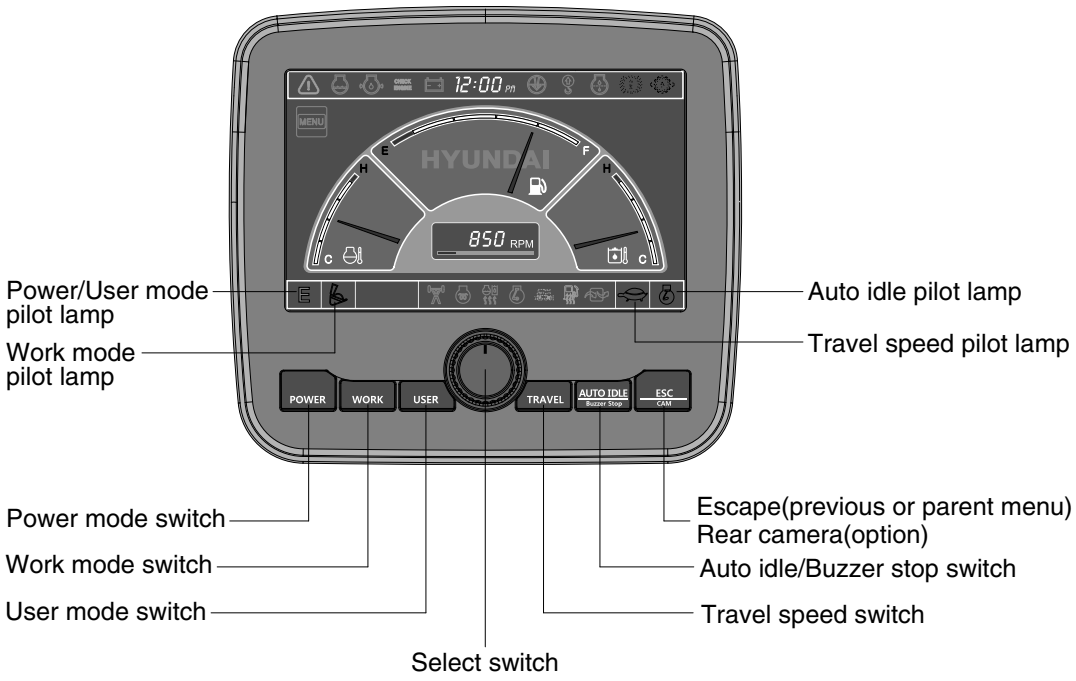
(6) Maintenance pilot lamp



21093CD44

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

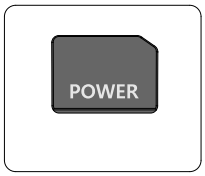
5) SWITCHES



21093CD45

※ **When the switches are selected, the pilot lamps are displayed on the LCD. Refer to the page 3-7 for details.**

(1) Power mode switch

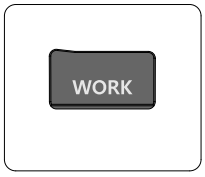


21093CD45A

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

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

(2) Work mode switch

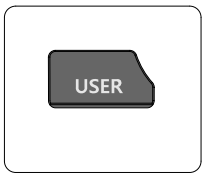


21093CD45C

① This switch is to select the machine work mode, which shifts from general operation mode to optional attachment operation mode.
- : General operation mode
- : Breaker operation mode (if equipped)
- : Crusher operation mode (if equipped)
- Not installed : Breaker or crusher is not installed.

※ **Refer to the page 4-6 for details.**

(3) User mode switch

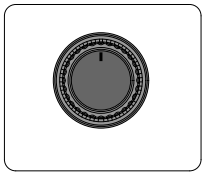


21093CD45D

① This switch is used to memorize the current machine operating status in the MCU and activate the memorized user mode.
- Memory : Push more than 2 seconds.
- Action : Push within 2 seconds.
- Cancel : Push this switch once more within 2 seconds.

② Refer to the page 3-12 for another set of user mode.

(4) Select switch



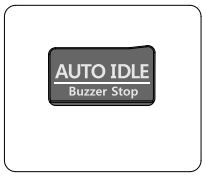
21093CD45E

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

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

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

(5) Auto idle/ buzzer stop switch

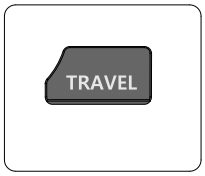


21093CD45F

① This switch is used to activate or cancel the auto idle function.
- Pilot lamp ON : Auto idle function is activated.
- Pilot lamp OFF : Auto idle function is cancelled.

② The buzzer sounds when the machine has a problem.
In this case, push this switch and buzzer stops, but the warning lamp blinks until the problem is cleared.

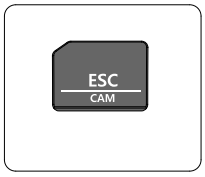
(6) Travel speed control switch



21093CD45G

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

(7) Escape/Camera switch



21093CD45H

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

② In the operation screen, pushing this switch will display the view of the camera on the machine (if equipped).
Please refer to page 3-22 for the camera.

③ If the camera is not installed, this switch is used only ESC function.

6) MAIN MENU

21093CD64

21093CD64A

Press

21093CD64B

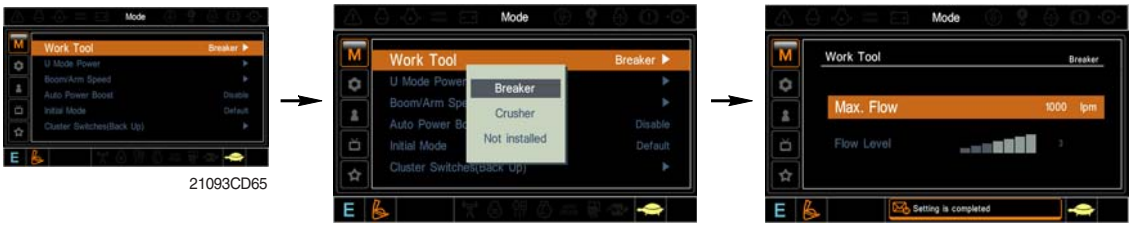
※ Please refer to select switch, page 3-10 for selection and change of menu and input value.

(1) Structure

No	Main menu	Sub menu	Description
1	M Mode 21093CD64D	Work tool U mode power Boom/Arm speed Auto power boost Initial mode Cluster switch (back up)	Breaker, Crusher, Not installed User mode only Boom speed, Arm speed Enable, Disable Default, U mode Switch function
2	Monitoring 21093CD64E	Active fault Logged fault Delete logged fault Monitoring (analog) Monitoring (digital) Operating hours	MCU, Engine ECM MCU, Engine ECM All logged fault delete, Initialization canceled Machine information Switch status, Output status Operating hours for each mode
3	Management 21093CD64F	Maintenance information Machine security Machine Information A/S phone number Service menu	Replacement, Change interval oils and filters ESL mode setting, Password change Cluster, MCU, Engine, Machine A/S phone number, A/S phone number change Power shift, Hourmeter start, Replacement history, Update
4	Display 21093CD64G	Display item Clock Brightness Unit Language Screen type	Engine speed, Tripmeter A, Tripmeter B, Tripmeter C Clock Manual, Auto Temperature, Pressure, Flow, Date format Korean, English, Chinese A type, B type
5	Utilities 21093CD64H	Tripmeter DMB Entertainment Camera setting Message box	3 kinds (A, B, C) DMB select, DAB select, Channel scan, Exit Play MP4, codec. Basic direction, Display switching, Full screen Record for fault, attachment etc.

(2) Mode setup

① Work tool



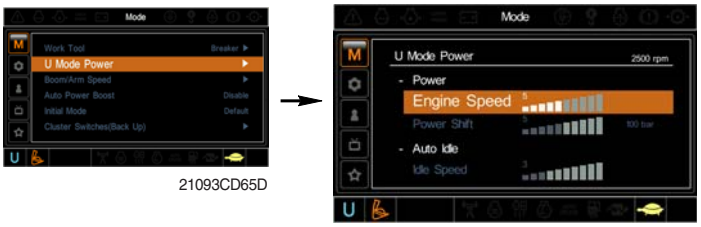
21093CD65 21093CD65A 21093CD65B

A B

- A : Select one installed optional attachment.
- B : Max flow - Set the maximum flow for the attachment.
  Flow level - Reduce the operating flow from maximum flow.
  Breaker - Max 7 steps, Reduced 10 lpm each step.
  Crusher - Max 4 steps, Reduced 20 lpm each step.

※ **The flow level is displayed with the work mode pilot lamp.**

② U mode power

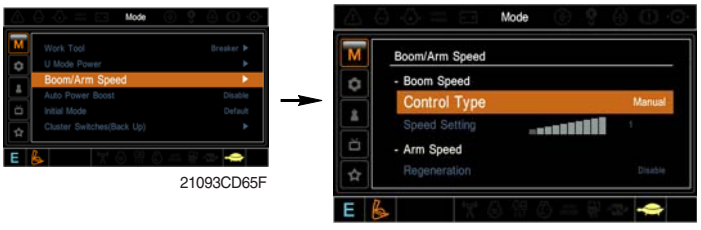


21093CD65D 21093CD65E

- Engine high idle rpm, auto idle rpm and pump torque (power shift) can be modulated and memorized separately in U-mode.
- U-mode can be activated by user mode switch.

Step (▮)	Engine speed (rpm)	Idle speed (rpm)	Power shift (bar)
1	1300	800	0
2	1400	850	3
3	1500	One touch decel low idle (900)	6
4	1550	950	9
5	1600	1000	12
6	1650	1050	16
7	1700	Auto decel rpm (1100)	20
8	1750	1150	26
9	1800	1200	32
10	1850	1250	38

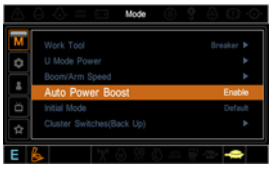
③ Boom/Arm speed



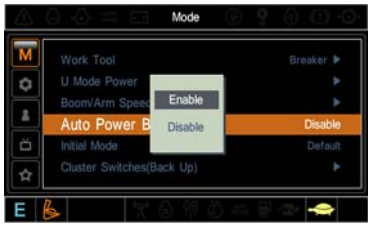
21093CD65F 21093CD65G

- **Boom speed**
  - Control type
    Manual - Boom up speed is fixed as set steps.
    Auto - Boom up speed is automatically adjusted as working conditions by the MCU.
  - Speed setting - Boom up speed is increased as much as activated steps.
- **Arm speed**
  - Regeneration - Arm regeneration function can be activated or cancelled.
    Enable - Arm in speed is up.
    Disable - Fine operation.

④ Auto power boost



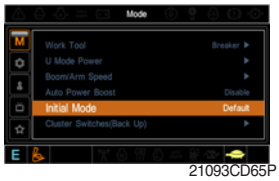
21093CD65L



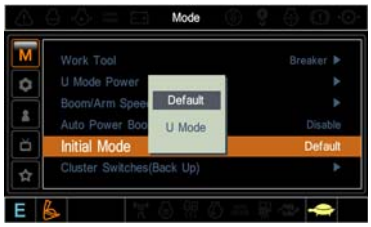
21093CD65M

· The power boost function can be activated or cancelled.
· Enable - The digging power is automatically increased as working conditions by the MCU.
It is operated max 8 seconds.
· Disable - Not operated.

⑤ Initial mode



21093CD65P



21093CD65Q

· Default - The initial power mode is set E mode when the engine is started.
· U mode - The initial power mode is set U mode when the engine is started.

⑥ Cluster switch (back up)

21093CD65S

21093CD65T

- The cluster switch can be selected and changed by this menu when the switches are abnormal on the cluster.
- In order to exit "Cluster switch" mode, please put the cursor on the ESC/CAM switch by turning the select switch and push the select switch.
- In "Cluster switch", other switches except "Select switch" do not work.

(3) Monitoring

① Active fault

21093CD66 21093CD66A 21093CD66B

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

② Logged fault

21093CD66C 21093CD66D 21093CD66E

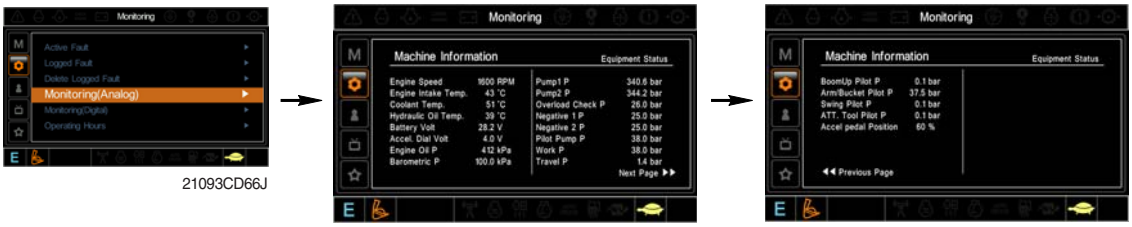
· The logged faults of the MCU or engine ECM can be checked by this menu.

③ Delete logged fault

21093CD66F 21093CD66G 21093CD66H

· The logged faults of the MCU or engine ECM can be deleted by this menu.

④ Monitoring(Analog)

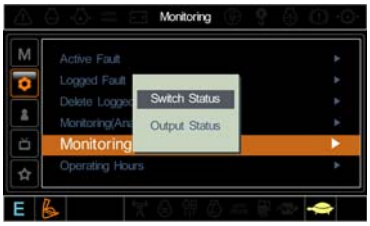


21093CD66J 21093CD66K 21093CD66L

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

⑤ **Monitoring** (digital)

21093CD66M



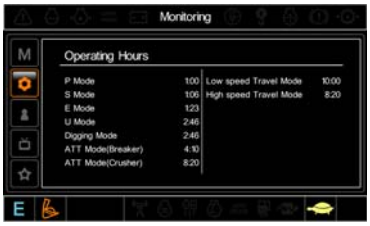
21093CD66N

21093CD66P

· The switch status or output status can be confirmed by this menu.
· The activated switch or output pilot lamps ☼ are light ON.

⑥ **Operating hours**

21093CD66Q



21093CD66R

· The operating hour of each mode can be confirmed by this menu.

(4) Management

① Maintenance information

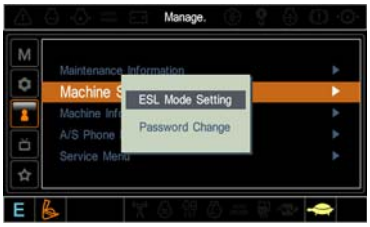
21093CD67 21093CD67A 21093CD67Q 21093CD67R 21093CD67S 21093CD67T

- Alarm(☼ ✹ ✹) : Gray ☼ Normal
  Yellow ✹ - First warning
  Red ✹ - Second warning
- Replacement : The elapsed time will be reset to zero (0).
- Change interval : The change or replace interval can be changed in the unit of 50 hours.
- OK : Return to the item list screen.
- **Change or relpace interval**

No	Item	Interval
1	Engine oil	500
2	Final gear oil	1000
3	Swing gear oil	1000
4	Hydraulic oil	5000
5	Pilot line filter	1000
6	Drain filter	1000
7	Hydraulic oil return filter	1000
8	Engine oil filter	500
9	Fuel filter	500
10	Hydraulic tank breather	250
11	Air cleaner (inner)	500
12	Radiator coolant	2000
13	Swing gear pinion grease	1000

② Machine security

21093CD67C



21093CD67D

21093CD67E

· **ESL mode**

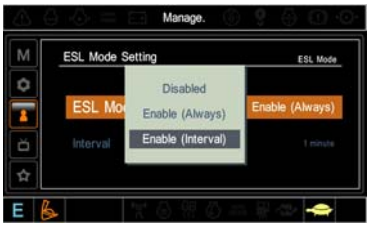
- ESL : Engine Starting Limit
- ESL mode is desingned to be a theft deterrent or will prevent the unauthorized operation of the machine.
- If the ESL mode was selected Enable, the password will be required when the start switch is turned ON.
- Disable : Not used ESL function

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

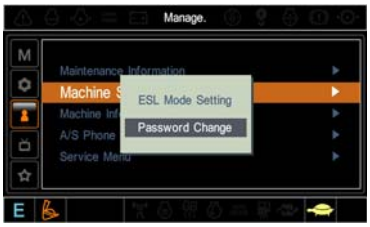
  Enable (interval) : The password is required when the operator start engine first. But the operator restarts the engine within the interval time, the password is not required.

  The interval time can be set maximum 4 hours.

21093CD67EE



21093CD67H



21093CD67U

Enter the current password 21093CD67V

· **Password change**

- The password is 5~10 digits.

Enter the new password 21093CD67VV

21093CD67X

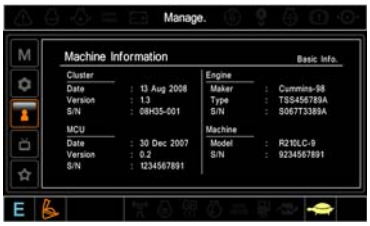
The new password is stored in the MCU.

21093CD67XX

Enter the new password again

③ Machine Information

21093CD67F



21093CD67G

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

④ A/S phone number

21093CD67J

21093CD67K

21093CD67L

21093CD67Y

21093CD67Z

⑤ Service menu

21093CD67M

Enter the password

21093CD67N

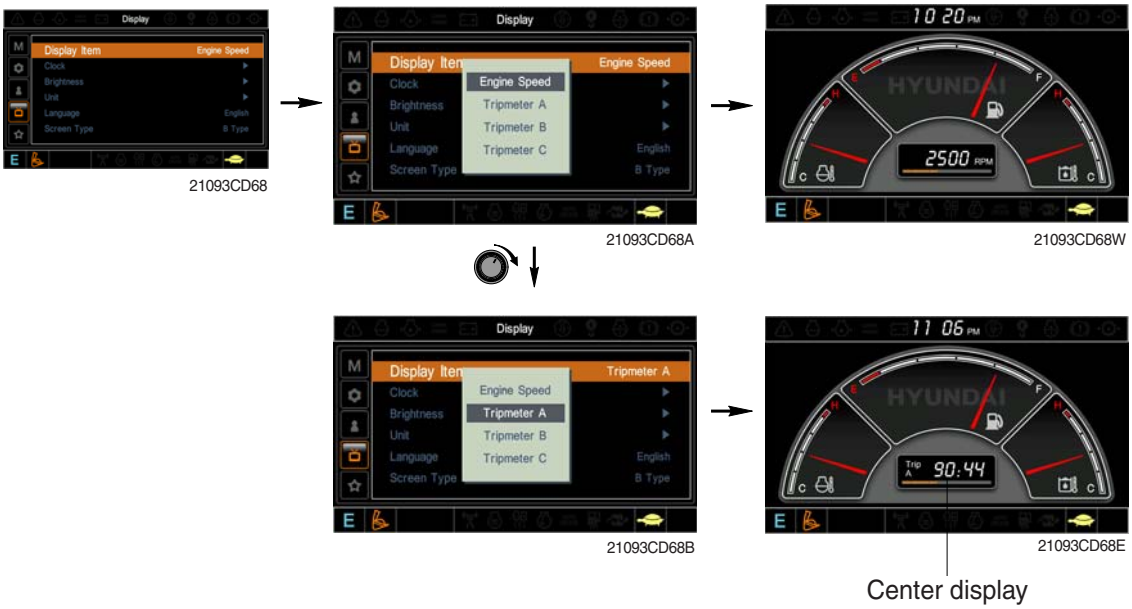
21093CD67P

21093CD67ZZ

· Power shift (standard/option) : Power shift pressure can be set by option menu.
· Hourmeter start : Operating hours since the machine line out can be checked by this menu.
· Replacement history : Replacement history of the MCU and cluster can be checked by this menu.
· Update : Firm ware can be upgraded by this menu. (the USB port is located under the cluster)

(5) Display

① Display item

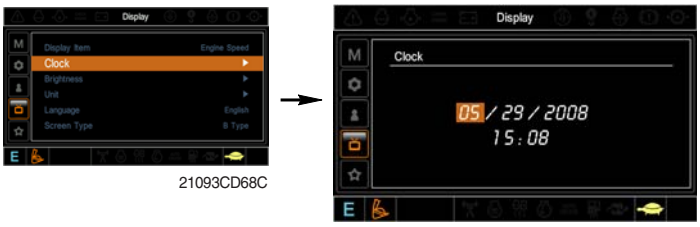


21093CD68 21093CD68A 21093CD68W

21093CD68B 21093CD68E

- The center display type of the LCD can be selected by this menu.
- The engine speed or each of the tripmeter (A,B,C) is displayed on the center display.

② Clock



21093CD68C 21093CD68D

- The first line's three spots "**/**/****" represent Month/Day/Year each.
- The second line shows the current time. (0:00~23:59)

③ Brightness

21093CD68F

Manual (1st~10th step) 21093CD68G

21093CD68H

21093CD68J

Auto (day/night)

21093CD68K

※ If "Auto" is chosen, brightness for day and night can be differently set up. Also by using the bar in lower side, users can define which time interval belongs to day and night.
(in bar figure, gray area represents night time while white shows day time)

④ Unit

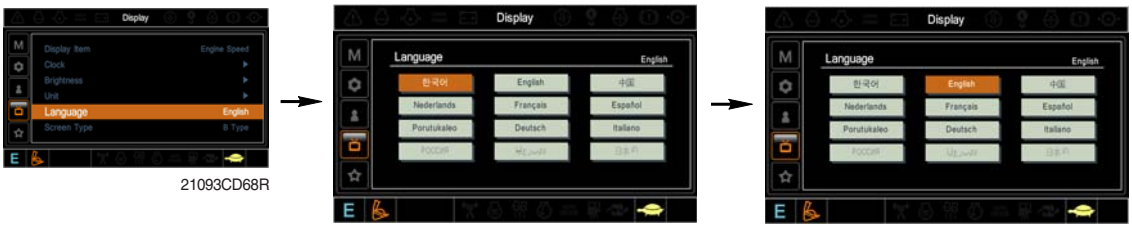
21093CD68L

21093CD68M

21093CD68N

- Temperature : ˚C ↔ ˚F
- Pressure : bar ↔ MPa ↔ kgf/cm²
- Flow : lpm ↔ gpm
- Date format : yy/mm/dd ↔ mm/dd/yy ↔ dd-Mar-yy

⑤ Language



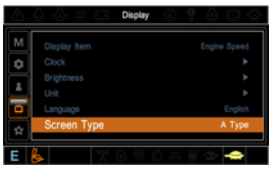
21093CD68R

21093CD68S

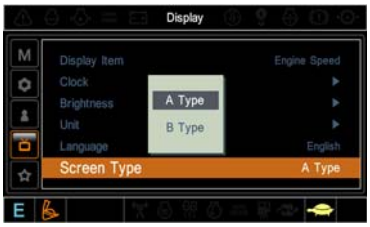
21093CD68T

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

⑥ Screen type

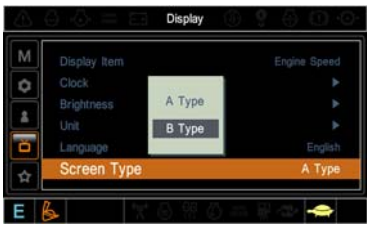


21093CD68U



A Type 21093CD68V

Standard 21093CD68W



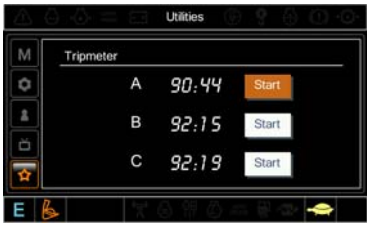
B Type 21093CD68X

Option 21093CD68Y

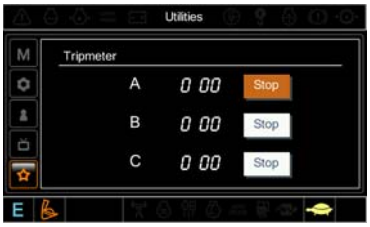
(6) Utilities

① Tripmeter

21093CD69



21093CD69A

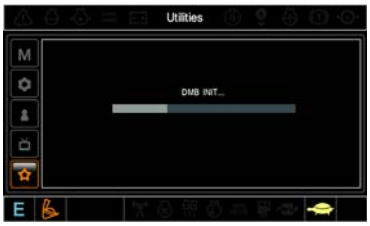


21093CD69B

- Maximum 3 kinds of tripmeters can be used at the same time.
- Each tripmeter can be turned on by choosing "Start" while it also can be turned off by choosing "Stop".
- If the tripmeter icon is activated in the operation screen, it can be controlled directly there.

② DMB

21093CD69C



21093CD69D

21093CD69E

- DMB select : TV channel can be selected by this menu.
- DAB select : Audio channel can be selected by this menu.
- Channel scan : This menu can be used other region for TV/Audio.
- Exit : Exit DMB menu

③ Entertainment

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

21093CD69F 21093CD69G

④ Camera setting

21093CD69J 21093CD69K 21093CD69L

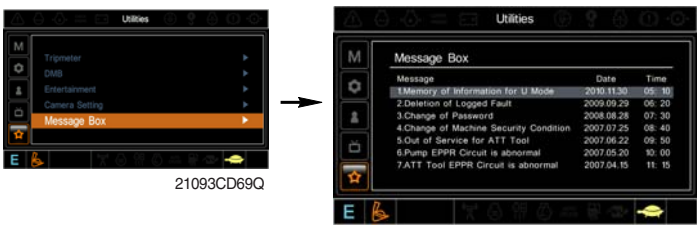
- Three cameras can be installed on the machine.
- The display order can be set by this menu.

21093CD69M 21093CD69N

- If the camera was not equipped, this menu is not useful.
- In the operation screen, if the ESC/CAM switch is pushed, the first ordered display camera will be viewed.
- Turnning the select switch in clockwise direction, the next ordered will be shown and in counter-clockwise direction, the previously ordered will be shown.
- Push the select switch, the displayed screen will be enlargement.

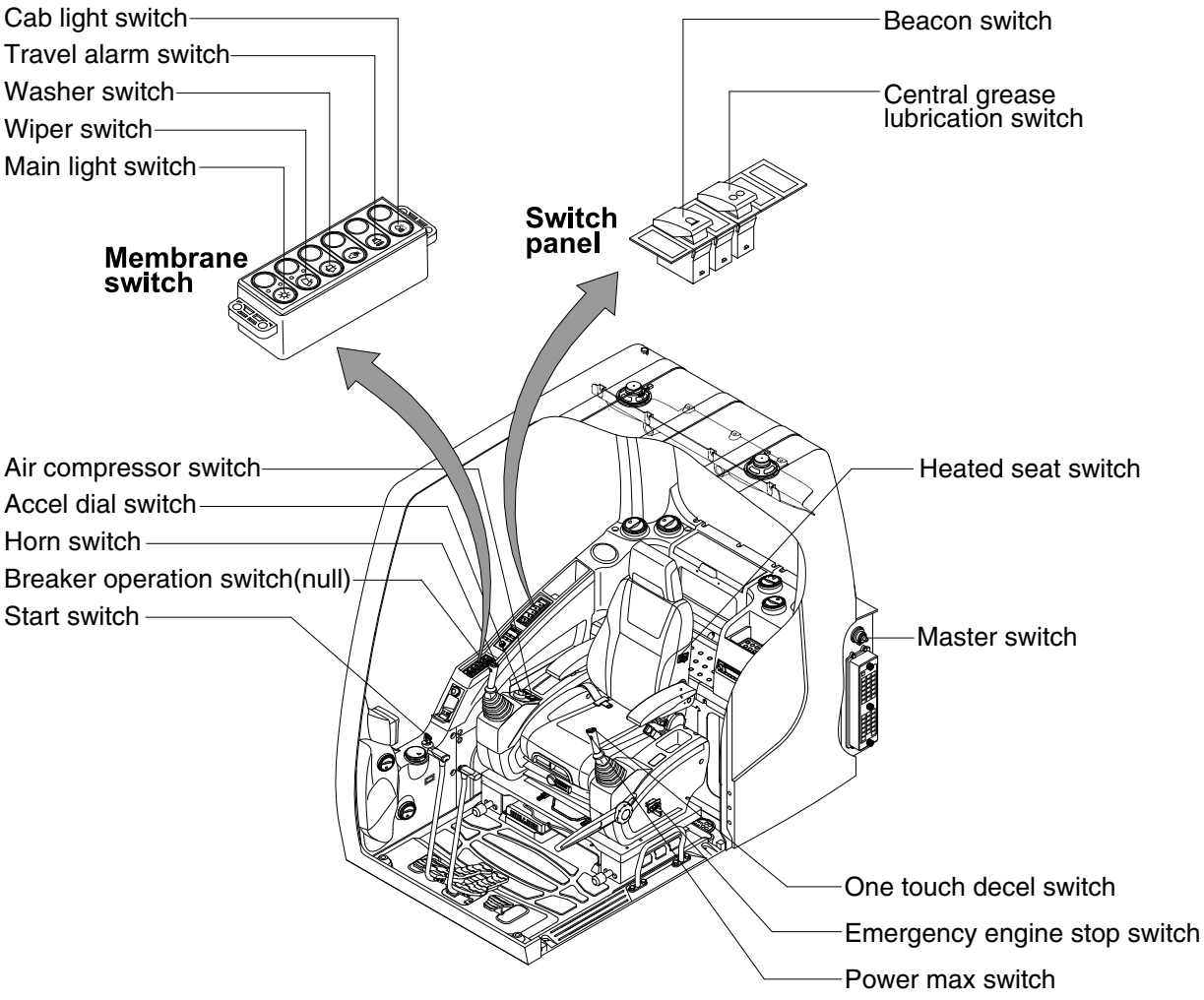
⑤ Message box

- **The history of the machine operating status can be checked by this menu.**



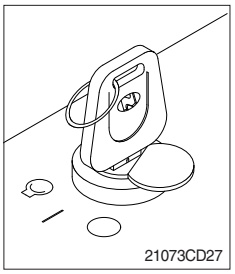
21093CD69Q 21093CD69R

3. SWITCHES



120093CD03A

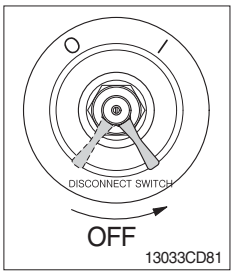
1) STARTING SWITCH



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

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

2) MASTER SWITCH

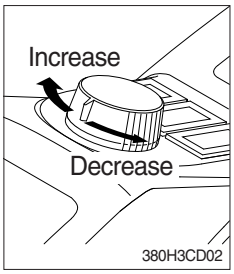


(1) This switch is used to shut off the entire electrical system.

(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.

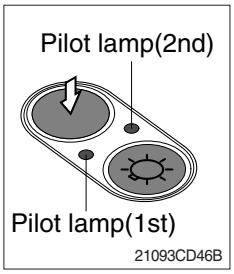
3) ACCEL DIAL SWITCH



(1) There are 10 dial setting.

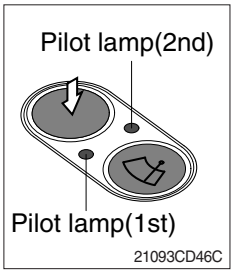
(2) Setting 1 is low idle and setting 10 is high idle.
- By rotating the accel dial to right : Engine speed increases
- By rotating the accel dial to left : Engine speed decreases

4) MAIN LIGHT SWITCH



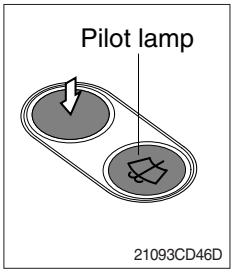
(1) This switch used to operate the head light and work light.
- Press the switch once, the head light comes ON and the 1st pilot lamp ON.
- Press the switch once more, the work light comes ON and the 2nd pilot lamp ON.
- Press the switch again, return to a first step position.
- Press the switch more than one second to turn off lights.

5) WIPER SWITCH



(1) This switch used to operate wiper.
- Press the switch once the wiper operates intermittently and the 1st pilot lamp comes ON.
- Press the switch once more, the wiper operates low speed and the 2nd pilot lamp comes ON.
- Press the switch again return to a first step position.
- Press the switch more than one second to turn off wiper.

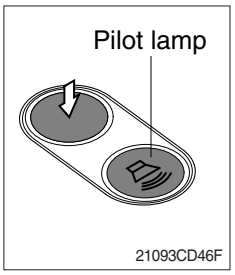
6) WASHER SWITCH



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

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

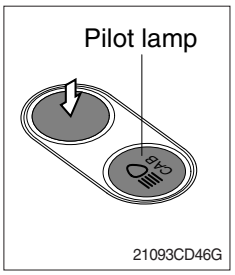
7) TRAVEL ALARM SWITCH



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

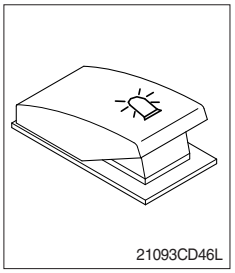
(2) On pressing this switch, the alarm operates only when the machine is traveling.

8) CAB LIGHT SWITCH (option)



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

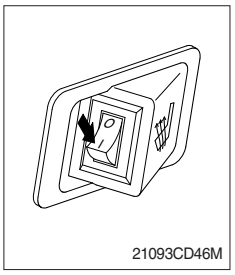
9) BEACON SWITCH (option)



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

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

10) HEATED SEAT SWITCH (option)

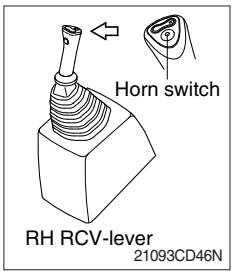


(1) This switch is used to heat the seat.

- Heater ON : 10±3.5˚C
- Heater OFF : 20±3˚C

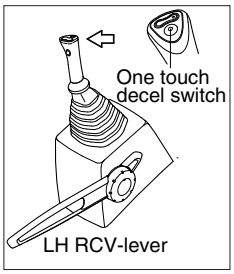
(2) On pressing the switch, the indicator lamp is turned ON.

11) HORN SWITCH



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

12) ONE TOUCH DECEL SWITCH

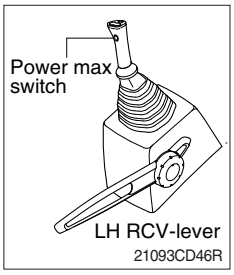


(1) This switch is used to actuate the deceleration function quickly.

(2) The engine speed is increased to previous setting value by pressing the switch again.

(3) One touch decel function is available only when the auto idle pilot lamp is turned OFF.

13) POWER MAX SWITCH

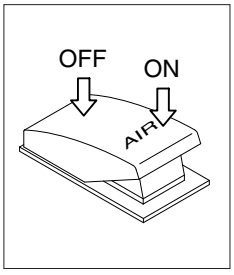


(1) This switch activate power max function.
When this switch is kept pressed, hydraulic power of work equipment will be increased to approx 110 percent during 8 seconds.

(2) After 8 seconds, function is cancelled automatically even the switch keeps pressed.

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

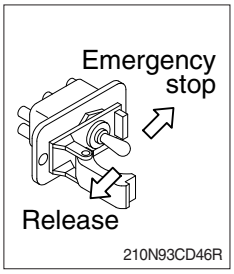
14) AIR COMPRESSOR SWITCH (option)



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

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

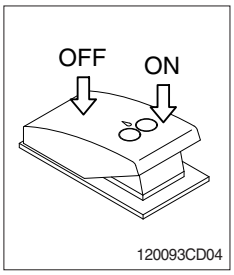
15) EMERGENCY ENGINE STOP SWITCH



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

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

16) CENTRAL GREASE LUBRICATION SWITCH

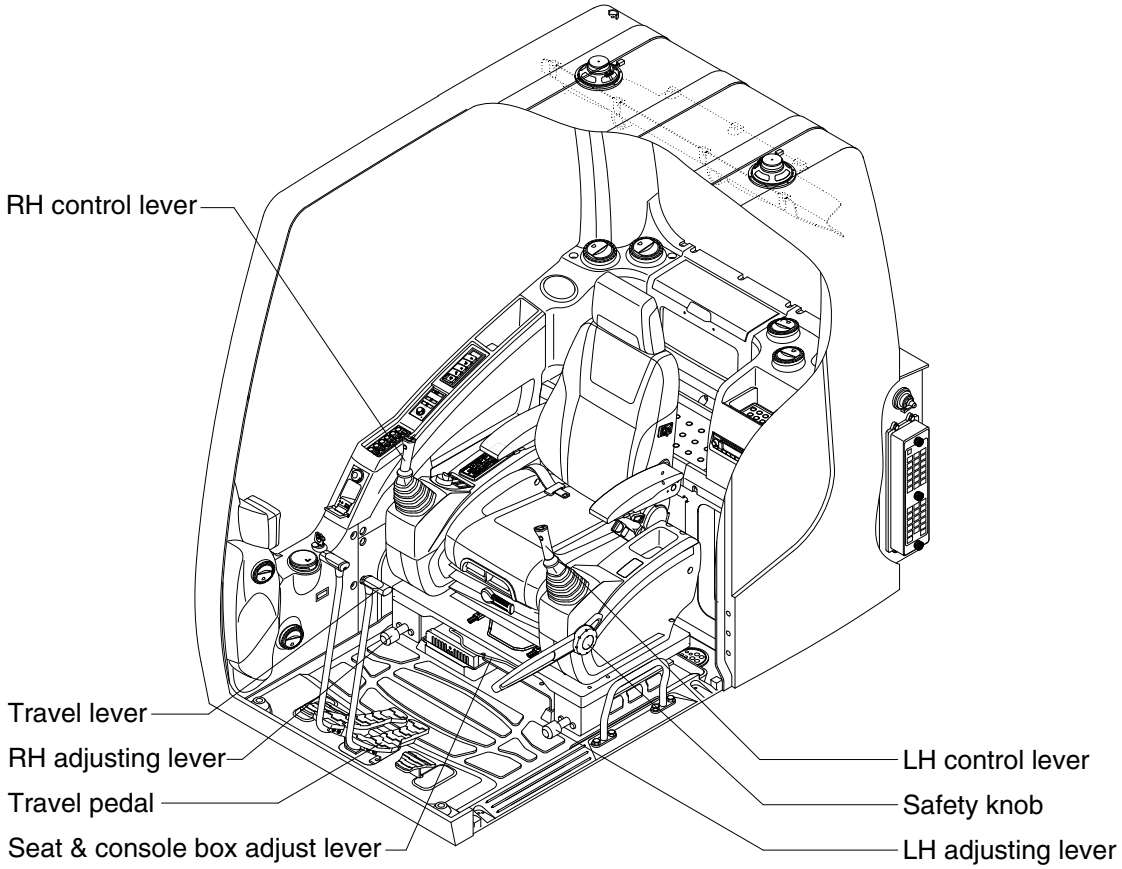


(1) This switch is used to operate the central grease lubrication system.

(2) When this switch turned ON, the central grease lubrication system is operated for 16 minutes only once.

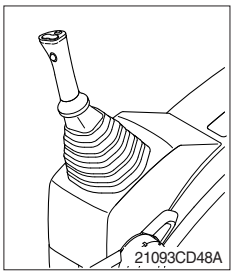
※ Refer to the page 8-1 for details.

4. LEVERS AND PEDALS



120093CD16

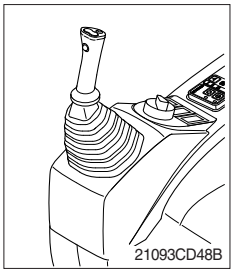
1) LH CONTROL LEVER



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

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

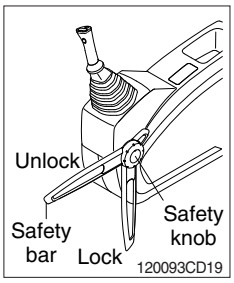
2) RH CONTROL LEVER



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

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

3) SAFETY KNOB



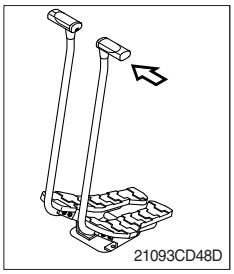
(1) All control levers and pedals are disabled from operation by locating the safety knob to the LOCK position as shown.

※ **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.**

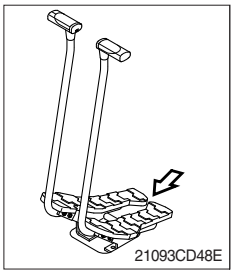
4) TRAVEL LEVER



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

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

5) TRAVEL PEDAL

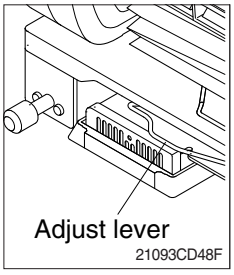


(1) This pedal is used to move the machine forward or backward.

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

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

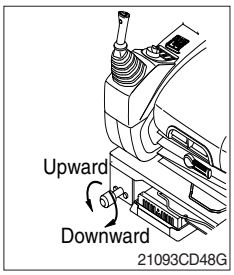
6) SEAT AND CONSOLE BOX ADJUST LEVER



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

(2) Pull the lever to adjust forward or backward over 170 mm (6.7").

7) ADJUSTING LEVER



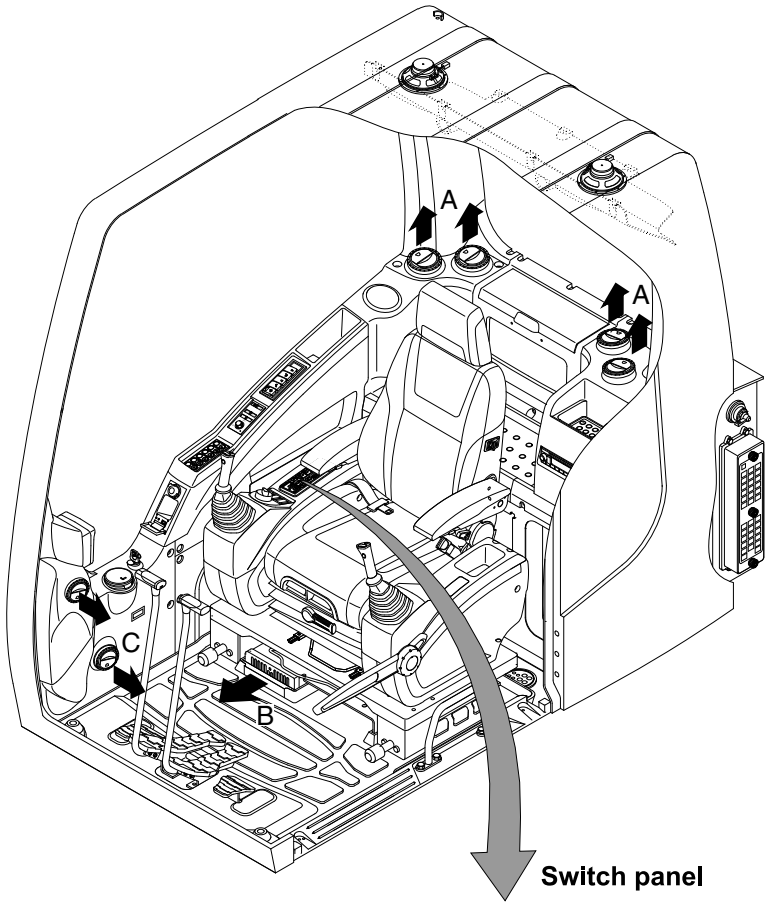
(1) This lever is used to move the LH and RH control lever to fit the contours of the operator's body.

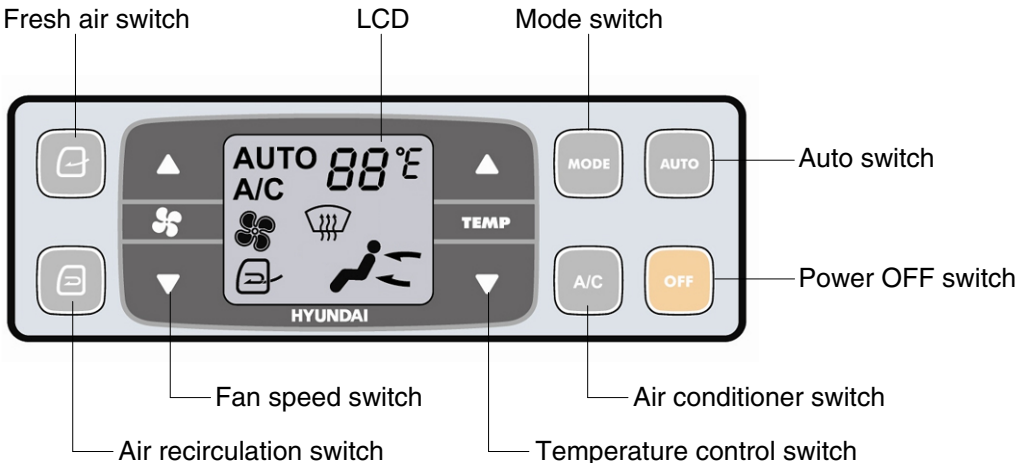
(2) The control lever can be moved upward and downward over 30 mm (1.2").

5. AIR CONDITIONER AND HEATER (FULL AUTO)

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

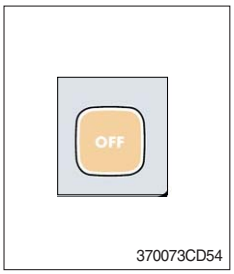
· **Location of air flow ducts**





21093CD49

1) POWER OFF SWITCH



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

(2) Default setting values

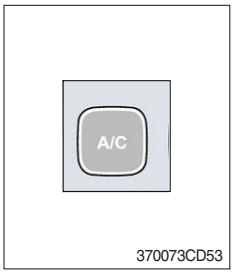
Function	Air conditioner	In/outlet	LCD	Temperature	Mode
Value	OFF	Inlet	OFF	Previous sw OFF	Previous sw OFF

2) AUTO SWITCH

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

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

3) AIR CONDITIONER SWITCH (compressor switch)

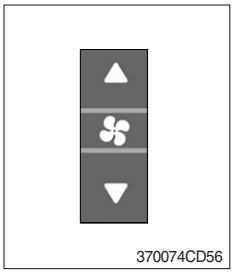


(1) This switch turns the compressor and the LCD ON.

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

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

4) FAN SPEED SWITCH

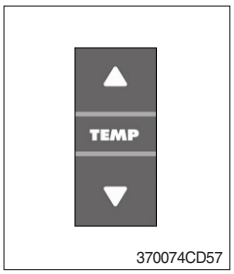


(1) Fan speed is controlled automatically by setted temperature.

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

(3) This switch makes the system ON.

5) TEMPERATURE CONTROL SWITCH



(1) Setting temperature indication
① Type A : 17~32˚C, scale : 1˚C
② Type B : Lo, 18~31˚C, Hi, scale : 1˚C

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

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

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

(4) Temperature unit can be changed between celsius (˚C) and fahrenheit (˚F)
① Default status (˚C)
② Push Up/Down temperature control switch simultaneously more than 5 second displayed temperature unit change (˚C → ˚F)

6) MODE SWITCH

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

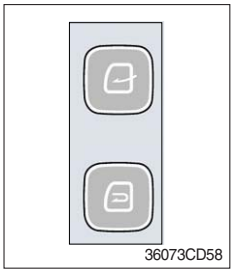
Mode switch		Vent	Vent/Foot	Foot	Foot/Def
Outlet	A	●	●		
	B		●	●	●
	C				●

· B type : Vent → Vent/Foot → Def/Foot → Def/Vent → Def/Vent/Foot

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

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

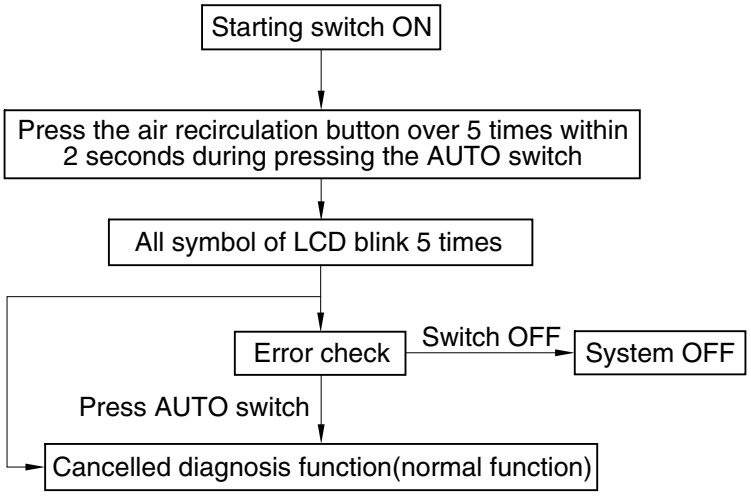
7) FRESH AIR/AIR RECIRCULATION SWITCH



(1) It is possible to change the air-inlet method.
① Fresh air ( )
Inhaling air from the outside.
※ Check out the fresh air filter periodically to keep a good efficiency.
② Air recirculation ( )
It recycles the heated or cooled air to increase the energy efficiency.
※ Change air occasionally when using recirculation for a long time.
※ Check out the recirculation filter periodically to keep a good efficiency.

8) SELF DIAGNOSIS FUNCTION

(1) Procedure



3607A3CD69

(2) Error check

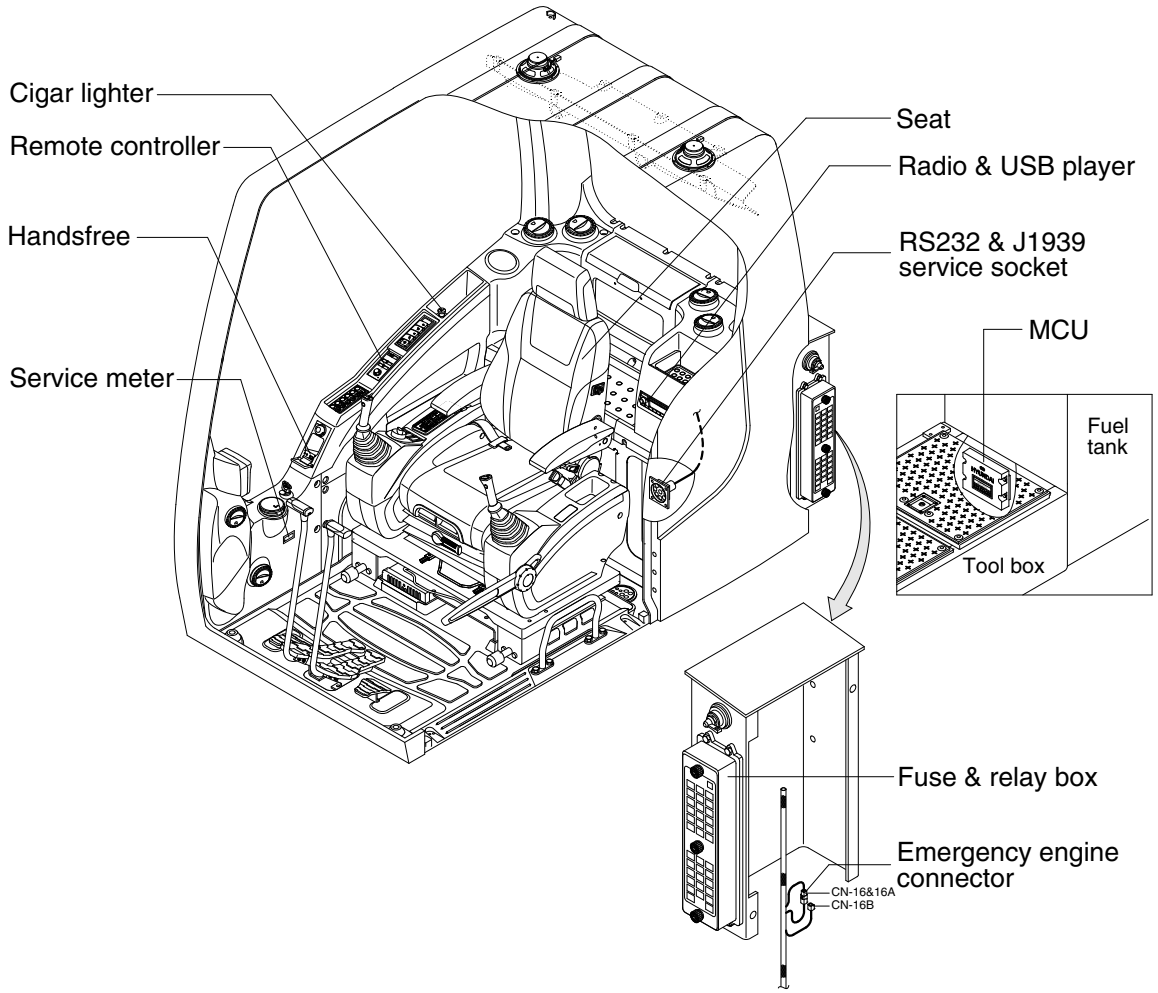
- The corresponding error code flickers on the setup temperature display panel, the other symbol will turn OFF.
- Error code flickers every 0.5 second.
- If error code is more than two, each code flickers 2 times in sequence.
- Error code

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

(3) Fail safe function

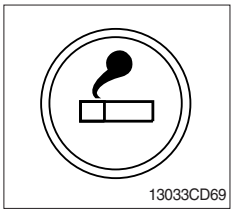
Error description	Fail safe function
Cabin inside sensor (11)	25˚C alternate value control
Ambient sensor (12)	20˚C alternate value control
Duct (evaporator) sensor (14)	1˚C alternate value control
Temp actuator (15)	If opening amount is 0 %, the alternate value is 0 %
	If not, the alternate value is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

6. OTHERS



120093CD01

1) CIGAR LIGHTER



13033CD69

(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.

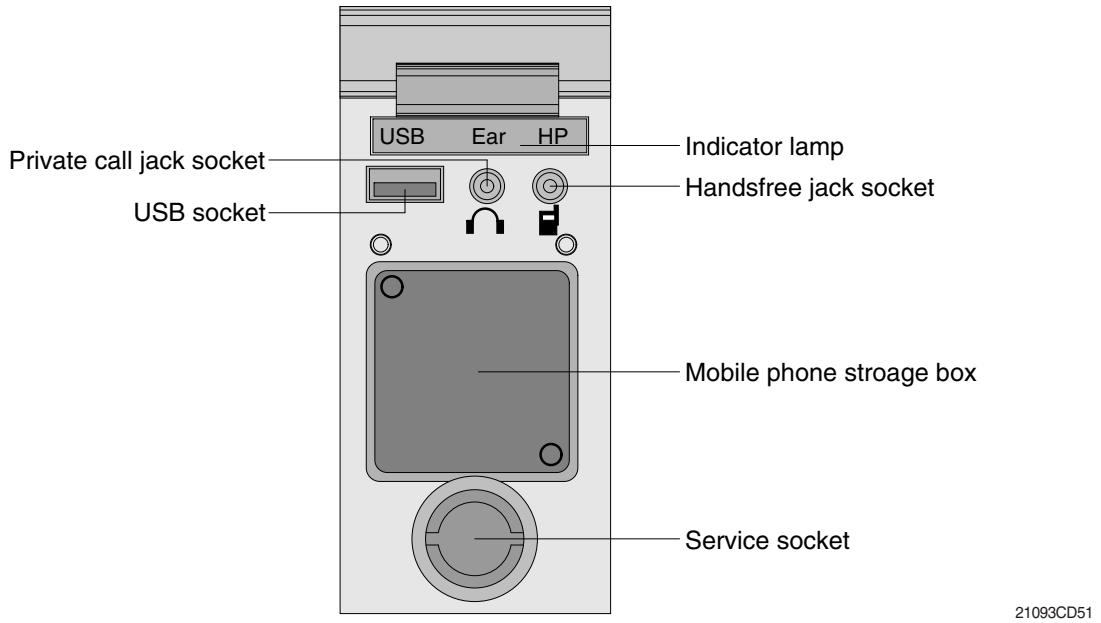
※ **Service socket**

Use cigar lighter socket when you need emergency power.

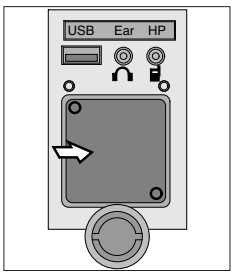
Do not use the lighter exceeding 24V, 100W.

2) HANDSFREE

Allow you to dial a call or to have a conversation without holding your handset. Use the remote controller when making and answering a calls or ring off.

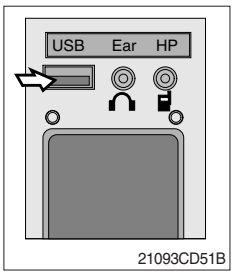


(1) Mobile phone storage box



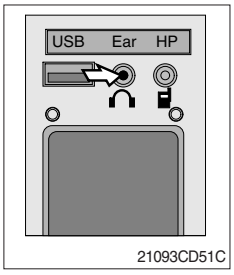
① Mobile phone can be stored when call by handsfree.

(2) USB socket



① This socket is used to charging the mobile phone.

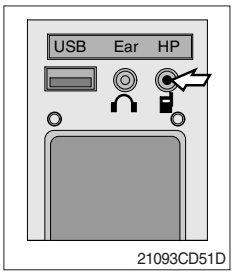
(3) Private call jack socket



① This can be used protect you privacy calling by using ear phone.

② The mobile phone must be connected handsfree jack socket.

(4) Handsfree jack socket

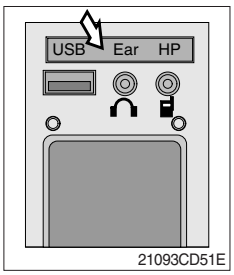


① Connect the jack cable when call by handsfree.

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

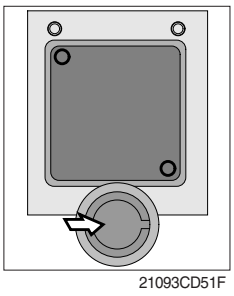
③ Check the jack type of mobile phone before use.

(5) Indicator lamp



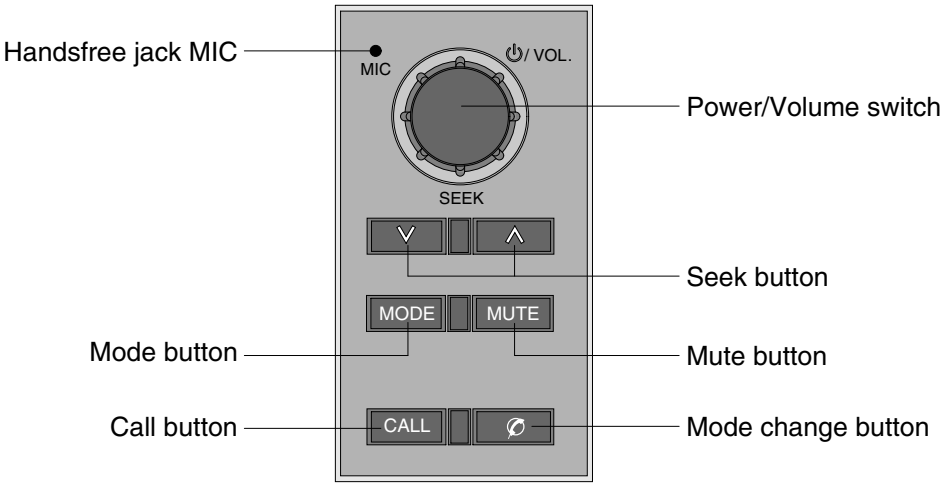
① This lamp is turned ON when the handsfree mode selected.

(6) Service socket



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

3) REMOTE CONTROLLER



21093CD52

(1) Power and volume switch

21093CD52A

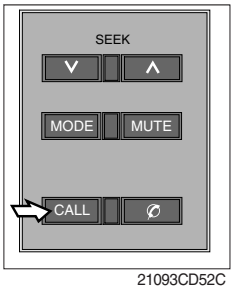
① This switch is used to turn the audio or handsfree ON or OFF.
② This switch is turned to right, the handsfree volume is increased over 7 steps.
③ If it is turned to left, volume will be decreased.
※ This switch adjust the audio volume when selected audio mode.

(2) Mode change button

21093CD52B

① This button is to select the handsfree mode or audio mode.
- Lamp ON : Handsfree mode ("TEL MUTE" displayed ON audio LCD)
- Lamp OFF : Audio mode

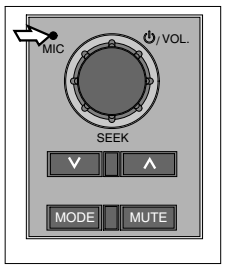
(3) Call button



21093CD52C

① This button is used answer a call, last number redial, ring off.
② For calling, press the button over 0.5sec within 3 seconds until the beep sounds.
※ This can be used when the starting switch is ON.

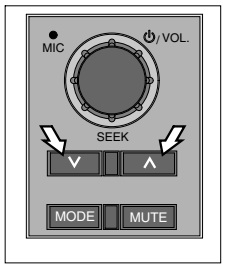
(4) Handsfree MIC



21093CD52D

① This MIC transfers user voice to receiver of the call when making a call by handsfree.

(5) Seek button

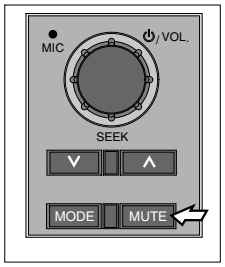


21093CD52E

① If this button pressed, the radio automatically stops at the next frequency of broadcasting for your listening.

② Press ^ to turn a station of a higher frequency or v to a lower frequency.

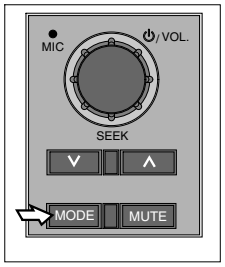
(6) Mute button



21093CD52G

① Short press this button to mute or cancel the mute (silence) while broadcasting.

(7) Mode button



21093CD52F

① Press the mode button to select the desired mode.

② FM1 → FM2 → AM → CD → MP3 → FM1

※ The LCD displayed each mode.

4) RADIO AND USB PLAYER (WITH BLUETOOTH)

9403CD100

■ FRONT PANEL PRESENTATION

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

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

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

4 ····· Call & Pair button

5 ····· Call end button

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

7 ····· Station preset 2

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

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

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

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

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

13 ····· Auto tune up, Seek up button

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

15 ····· USB connector

16 ····· AUX IN Jack

17 ····· MIC hole

RADIO AND USB PLAYER (WITHOUT BLUETOOTH)

9403CD101

■ FRONT PANEL PRESENTATION

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

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

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

4 ····· Radio seek up button

5 ····· Radio seek down button

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

7 ····· Station preset 2

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

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

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

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

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

13 ····· Track up button

14 ····· Track down button

15 ····· USB connector

16 ····· AUX IN Jack

■ GENERAL

(1) Power and volume button

① Power ON / OFF button

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

② Volume UP/DOWN control knob

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

③ Initial volume level set up

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

④ Clock ON/OFF control

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

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

⑤ Clock adjustment

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

(2) Menu Selection

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

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

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

② Bass control

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

③ Treble control

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

④ Balance control

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

⑤ Fader control

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

⑥ EQ control

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

EQ OFF → CLASSIC → POP → ROCK → JAZZ

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

⑦ Loud control

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


9403CD110

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

9403CD106

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.

9403CD107

(3) MP3 directory / File searching

9403CD111

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 diplayed, 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

9403CD112

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 seonds 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 seonds to random play the tracks in current foler.
- RANDOM off : Simply press it again to cancel RANDOM feature.

(8) ID3 v2 (DISP)

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

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

∗ USB Information and Notice

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

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

c. No support any of MULTI-CAED Reader.

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

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

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

■ AUX OPERATION

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

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

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

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

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

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

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

■ **BLUETOOTH** (if equipped)

1) Using a bluetooth wireless connection

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

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

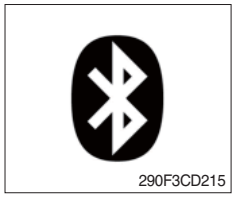
※ Since this audio unit is on standby to connect with your cellular phone via bluetooth wireless technology, using this audio unit without running the engine can result battery drainage.

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

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

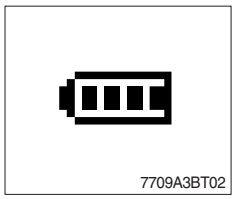
※ Digital Noise & Echo suppression system provides the best sound clarity with little or no distortion (Echo & side tone will happen depending on cellular phone or service network).

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



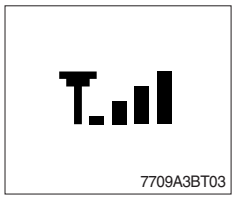
① Bluetooth icon

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



② Battery icon

It indicates the battery status of the connected bluetooth device.



③ Single strength icon

It indicates the signal strength of the connected bluetooth device.

2) Pairing in hands free modes

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

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

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

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

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

3) Cellular phone pairing mode

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

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

(3) HYUNDAI should appear on your cellular phone screen.

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

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

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

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

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

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

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

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

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

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

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

4) Bluetooth connection and disconnection

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

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


9403CD118


9403CD117

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

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

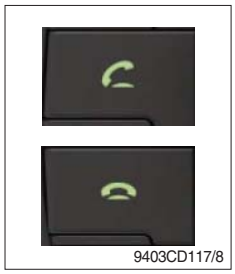
※ In case of failure of bluetooth pairing :
- Delete item in paired list on your phone.
- Reset both phone by power off/on and the audio unit by ACC off/on.

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

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

5) Using the audio unit as a handsfree device

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


9403CD117/8

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

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

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

6) Audio transfer between the audio unit and phone

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

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

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

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

7) Last call number dialing

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

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

8) To make a call by cellular phone

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

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

9) Using the audio unit as bluetooth music

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

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

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

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

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

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

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

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

■ RESET AND PRECAUTIONS

1) Reset function

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

(1) press and hold 

simultaneously for about 5 seconds. (without Bluetooth)

Press and hold 

simultaneously for about 5 seconds. (with Bluetooth)

(2) Take out the fuse for the audio system in the vehicle once and then plug again.

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

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

2) Precautions

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

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

(1) Operation voltage : 9~32 volts DC, negative

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

(3) Tuning range

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

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

(4) USB version : USB 1.1

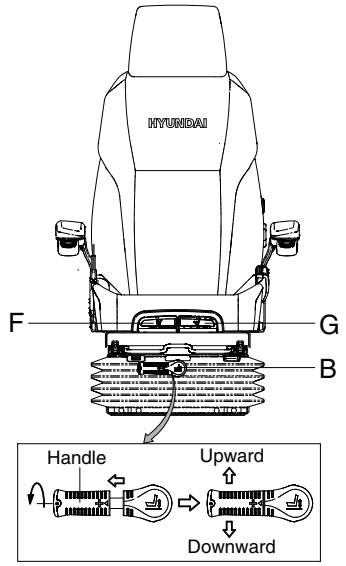
(5) Bluetooth version : V2.1

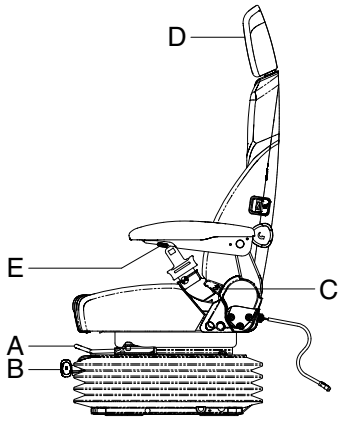
(6) Bluetooth supported profile :

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

5) 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.





21093CD55

(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 140 mm (5.5") in 13 steps.

(2) Height/weight adjustment (B)

① Turn the handle to adjust seat upward or downward

· Turn to clockwise, the seat is moved to upward and the weight is increased.
If it is turned to counterclockwise, the seat is moved to downward and the weight is decreased.

② **Method of changing direction** (up/down)

· First, pull the handle to outside.

· Second, rotate 180˚ and release the handle.

(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 over 60 mm (2.4").

(6) Seat cushion tilt adjustment (F)

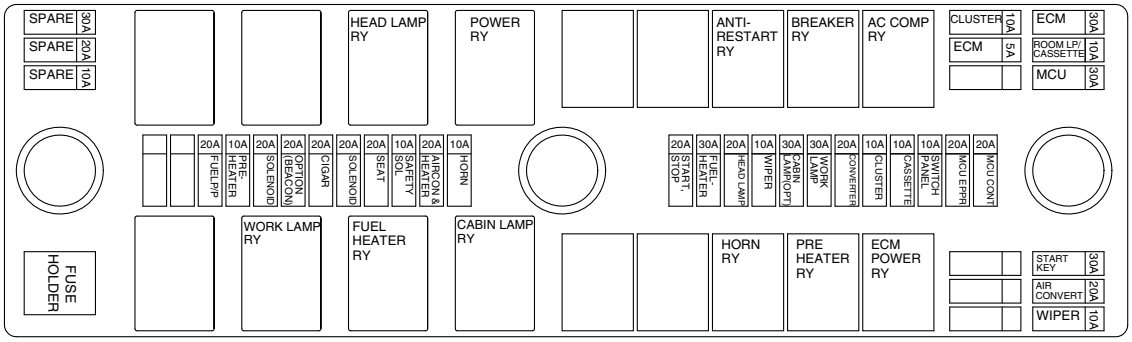
Pull lever F to adjust seat cushion tilting angle.

(7) Seat cushion length adjustment (G)

⚠ Pull lever G to adjust seat cushion forward or backward.

⚠ 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.

6) FUSE & RELAY BOX



21093CD56

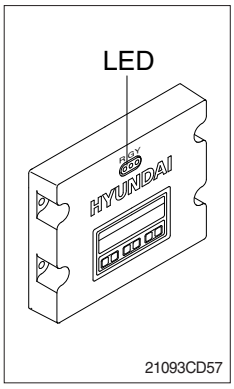
(1) The fuses protect the electrical parts and wiring from burning out.

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

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

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

7) MCU



21093CD57

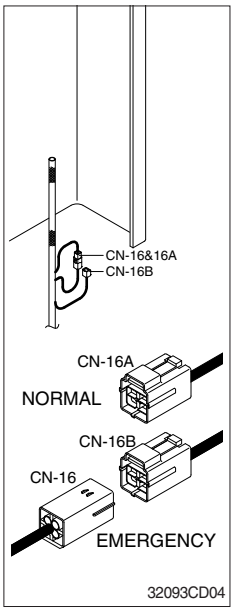
(1) To match the pump absorption torque with the engine torque, MCU varies EPPR valve output pressure, which control pump discharge amount whenever feedbacked engine speed drops under the reference rpm of each mode set.

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

G : green, R : red, Y : yellow

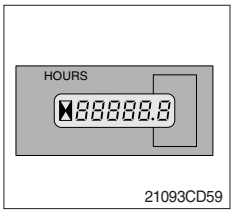
8) EMERGENCY ENGINE SPEED CONTROL CONNECTOR



(1) When the CAN communication between the ECM and the MCU is abnormal due to malfunction of the MCU, change CN-16 connection from CN-16A to CN-16B and then control the engine speed by rotating accel dial switch.

※ Never connect connector CN-16 with CN-16B when MCU is in normal operation.

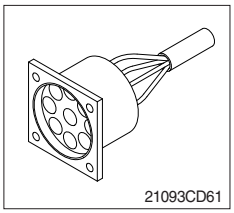
9) SERVICE METER



(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.

10) RS232 & J1939 SERVICE SOCKET



(1) MCU communicates the machine data with Laptop computer through RS232 service socket.

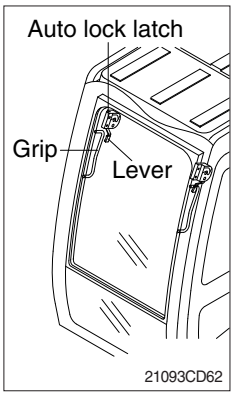
(2) ECM communicates the engine data with cummins INSITE adapter through J1939 service socket.

① ECM fault code check

② ECM program change

③ Engine data monitoring & test

11) UPPER WINDSHIELD

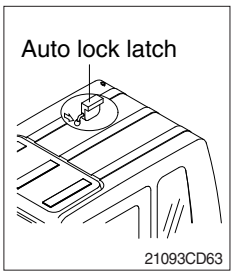


(1) Perform the following procedure in order to open the upper windshield.

① Pull both levers with hold both grips that are located at the top of the windshield frame and push the windshield upward.

② Hold both grips and back into the lock position until auto lock latch is engaged, then release the lever locked 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 Pull the lever of the auto lock latch in order to release the auto lock latch.

② Reverse above step ① and ② 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 50 or 250 hours of operation

Checking items	Hours
Engine oil	250
Engine oil filter element	
Fuel filter element	
Hydraulic oil return filter element	
Hydraulic oil tank drain filter cartridge	
Line filter element	
Gear box	
Swing reduction gear case	

120094OP02A

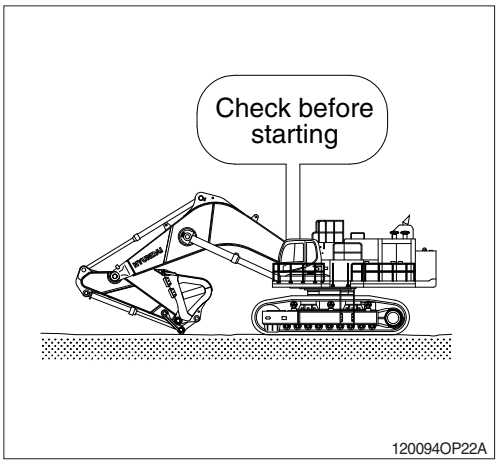
2. CHECK BEFORE STARTING THE ENGINE

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.



120094OP22A

3. STARTING AND STOP THE ENGINE

1) CHECK INDICATOR LIGHTS

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

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

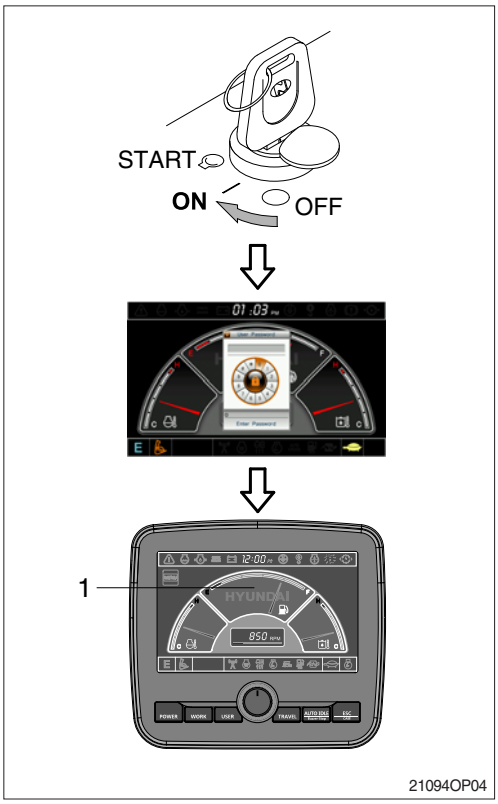
※ **If the ESL mode is set to the enable, enter the password to start engine.**

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

※ **Refer to page 3-17 for ESL mode.**

After initialization of cluster, the operating screen is displayed on LCD (1).

(3) Also, self-diagnostic function is carried out.



21094OP04

2) STARTING ENGINE IN NORMAL TEMPERATURE

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

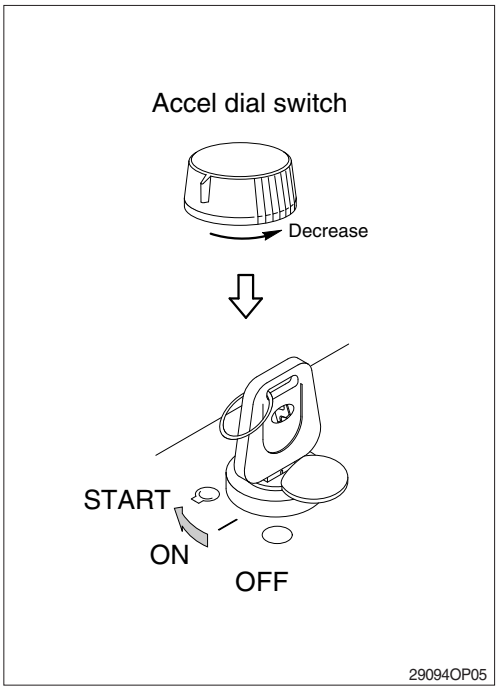
(1) Turn the accel dial switch to low idle position.

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

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

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

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



29094OP05

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 2-12.

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

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

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

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

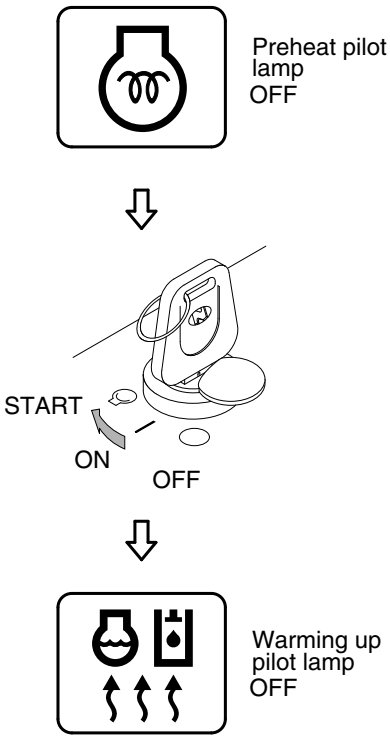
(4) Wait for five minutes to warm up the engine after the preheating pilot lamp off, and than turn the starting switch to the START position to start the engine.

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

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

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

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



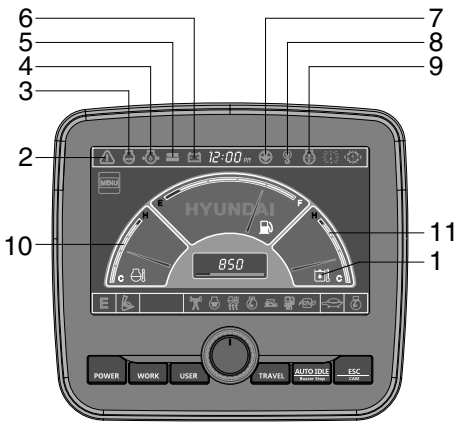
120094OP33

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 (1-9)?
(4) Are the indicator of water temperature gauge (10) and hydraulic temperature gauge (11) in the operating range?
(5) Are the engine sound and the color of exhaust gas normal?
(6) Are the sound and vibration normal?

※ **Do not increase engine speed quickly after starting, it can damage engine or turbocharger.**
※ **If there are problems in the cluster, stop the engine immediately and correct problems as required.**



21094OP06

5) WARMING-UP OPERATION

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

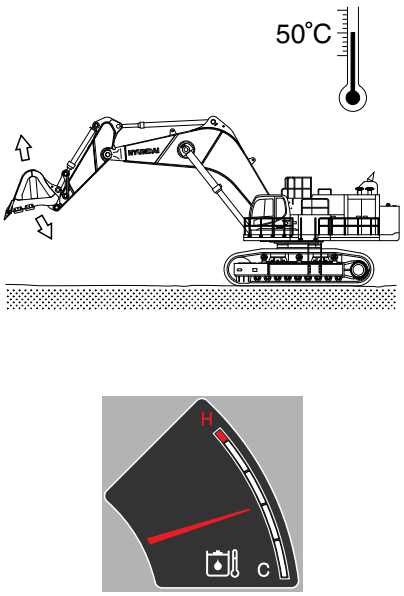
(1) Run the engine at low idle speed for 5 minutes.

(2) Speed up the engine by accel dial 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.



120094OP03A

6) TO STOP THE ENGINE

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

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

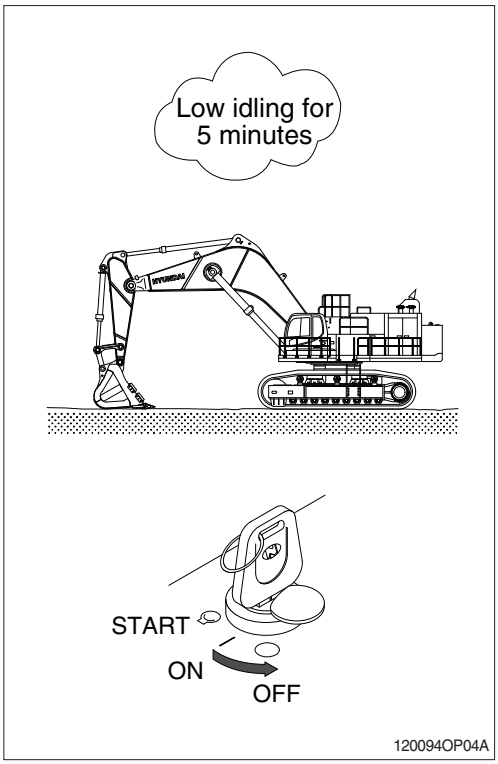
(1) Down the bucket on the ground then put all the levers in the neutral position.

(2) Run the engine at low idle 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.



4. MODE SELECTION SYSTEM

1) STRUCTURE OF MECHATRONICS SYSTEM

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

※ **Please refer to chapter 3, cluster for below modes setting.**

(1) Power mode

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

- P mode : Heavy duty power
- S mode : Standard power
- E mode : Economy power

(2) Work mode

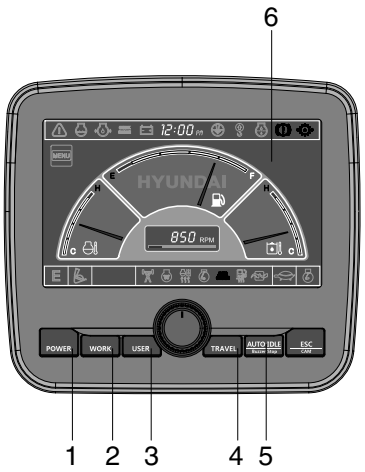
One of the two work modes can be selected for the optimal work condition of the machine operation.

① **General work mode (bucket)**

When key switch is turned ON, this mode is selected automatically.

② **Work tool mode (breaker, crusher)**

It controls the pump flow and system pressure for the optimal operation of breaker or crusher.



21094OP10

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

(3) User mode

① User mode is useful for setting the user preperable power quickly.
(engine speed, power shift and idle speed)

② There are two methods for use of user mode.

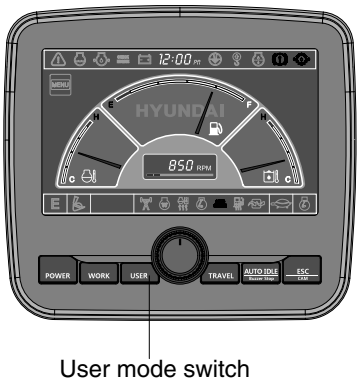
a. **In operation screen**

User mode switch is used to memorize the current machine operating status and activate the memorized user mode.
Refer to page 3-10.

b. **In menu**

Engine high idle rpm, auto idle rpm and pump torque (power shift) can be modulated and memorized separately in menu status.

- Each memory mode has a initial set which are mid-range of max engine speed, power shift and auto idle speed.



21094OP11

- High idle rpm, auto idle rpm and EPPR pressure can be adjusted and memorized in the U-mode.

※ **Refer to the page 3-12 for setting the user mode (available on U mode only).**

· LCD segment vs parameter setting

Step (▮)	Engine speed (rpm)	Idle speed (rpm)	Power shift (bar)
1	1300	800	0
2	1400	850	3
3	1500	One touch decel low idle (900)	6
4	1550	950	9
5	1600	1000	12
6	1650	1050	16
7	1700	Auto decel rpm (1100)	20
8	1750	1150	26
9	1800	1200	32
10	1850	1250	38

21094OP12

(4) Travel mode

: Low speed traveling.

: High speed traveling.

(5) Auto idle mode

Pilot lamp ON : Auto idle function is activated.

Pilot lamp OFF : Auto idle function is canceled.

(6) Monitoring system

Information of machine performance as monitored by the MCU can be displayed on the LCD. Refer to the page 3-11.

(7) Self diagnostic system

① **MCU (Machine Control Unit)**

The MCU diagnoses machine status and problems and displays fault code in the cluster (fault code detected by MCU is composed of HCE-SPN and FMI).

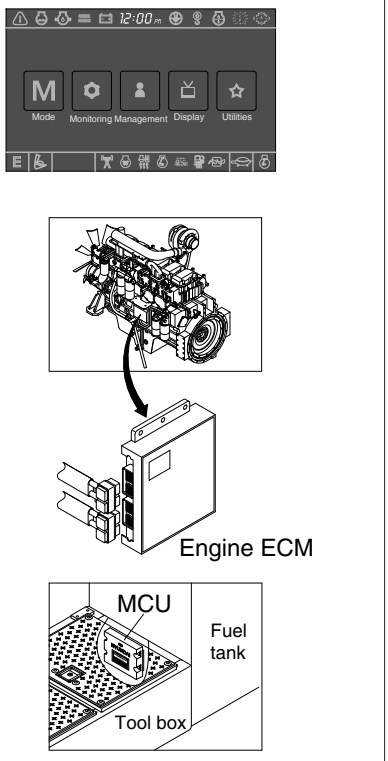
② **Engine ECM (Electronic Control Module)**

If the engine or relevant system has problem, engine ECM detects and displays on the LCD as fault codes (this code is composed of SPN and FMI).

※ **Refer to the page 3-11 for LCD display.**

(8) Anti-restart system

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



120094OP01

2) HOW TO OPERATE MODE SELECTION SYSTEM

(1) When start key switch is turned ON

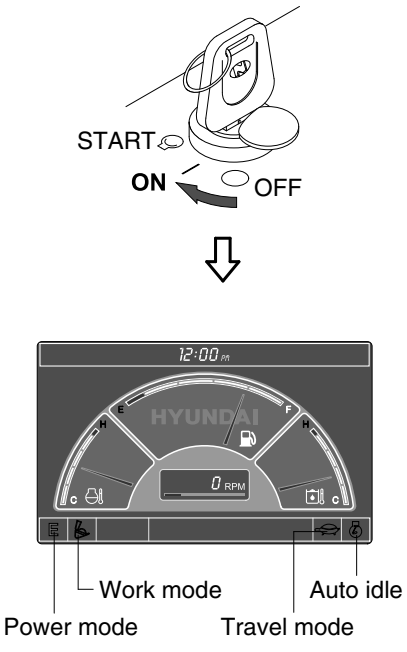
① When start key switch is turned on, the cluster turns on and buzzer sounds for 4 seconds. And then main information as gauges and engine speed are displayed on LCD.

② Initial default mode settings are dispalyed in the cluster.

Mode		Status
Power mode	E	ON
Work mode		ON
Travel mode	Low ( )	ON
Auto idle		ON

※ **These setting can be changed at U mode.**

③ Self-diagnostic function can be carried out from this point.



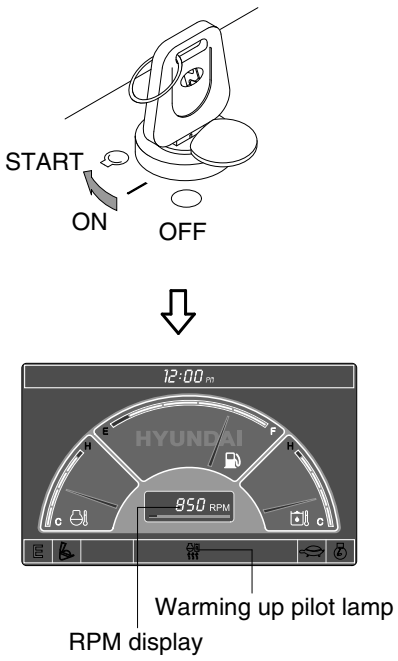
21094OP14

(2) After engine start

① When the engine is started, rpm display indicates low idle, 900±100 rpm.

② If coolant temperature is below 30˚C, the warming up pilot lamp lights ON and after 4 seconds the engine speed increases to 1100±100 rpm automatically to warm up the machine.

· After 2-3 minutes, you can select any mode depending on job requirement.



21094OP15

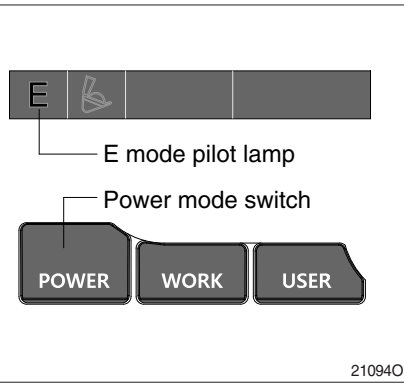
3) SELECTION OF POWER MODE

(1) E mode

The accel dial is set 10 and the auto idle mode is canceled.

Engine rpm	Effect
1600 ± 50	Variable power control in proportion to lever stroke (improvement in fuel efficiency) ※ Same power as S mode in full lever operation.

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



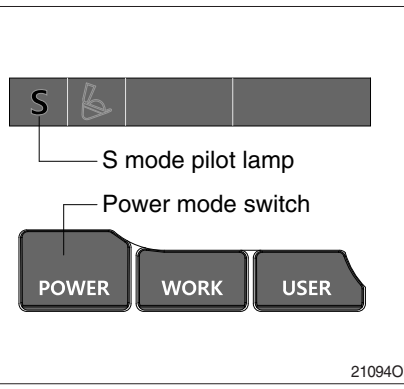
21094OP16

(2) S mode

The accel dial is set 10 and the auto idle mode is canceled.

Engine rpm	Effect
1700 ± 50	Standard power

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



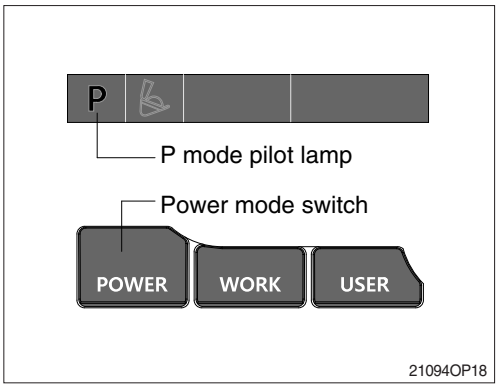
21094OP17

(3) P mode

The accel dial is set 10 and the auto idle mode is canceled.

Engine rpm	Effect
1800 ± 50	Approximately 120 % of power and speed available than S mode.

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



5. OPERATION OF THE WORKING DEVICE

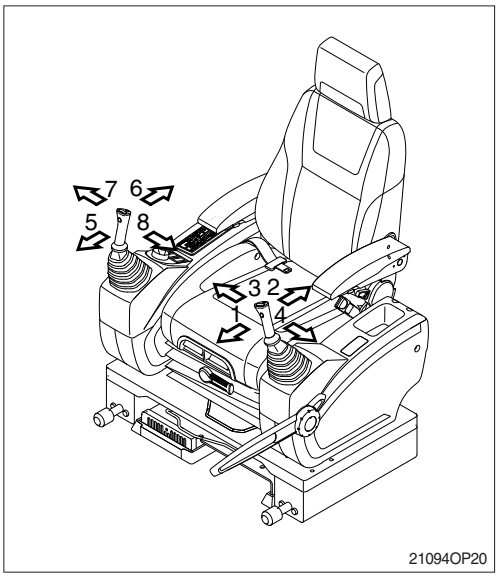
※ Confirm the operation of control lever and working device.

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.

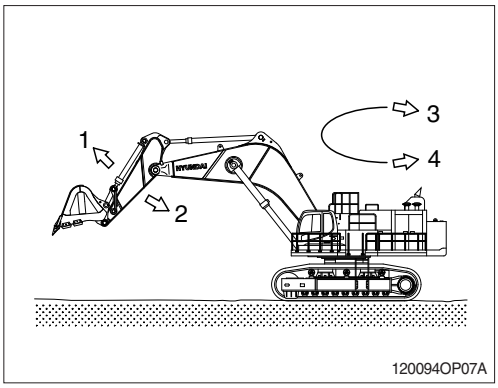
※ When operating swing, consider the swing distance by inertia.



21094OP20

※ Left control lever

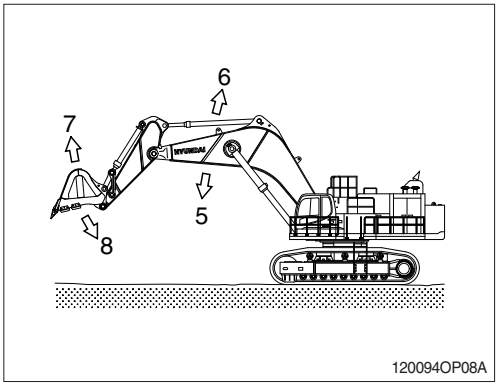
1 Arm roll-out
2 Arm roll-in
3 Swing right
4 Swing left



120094OP07A

※ Right control lever

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



120094OP08A

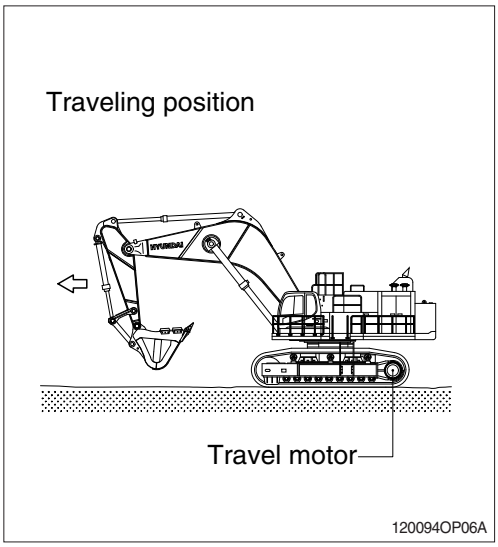
6. TRAVELING OF THE MACHINE

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.

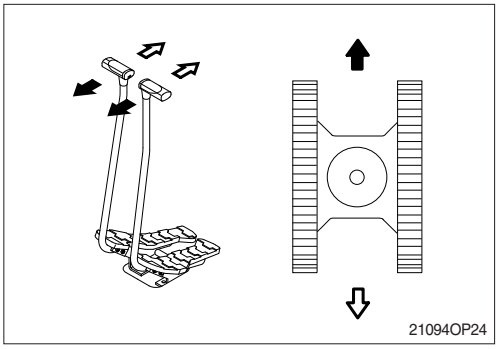
※ **Do not travel continuously for a long time.**

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

(3) Forward and backward traveling

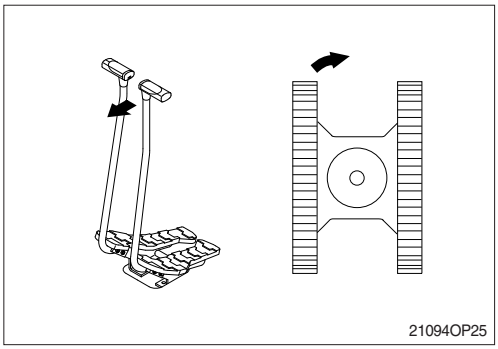
When the left and right travel lever or pedal are pushed at the same time, the machine will travel forward or backward.

※ **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.**



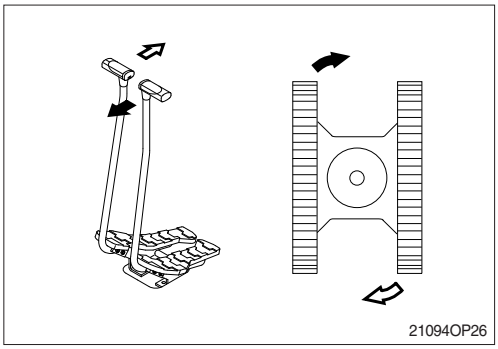
(4) Pivot turning

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

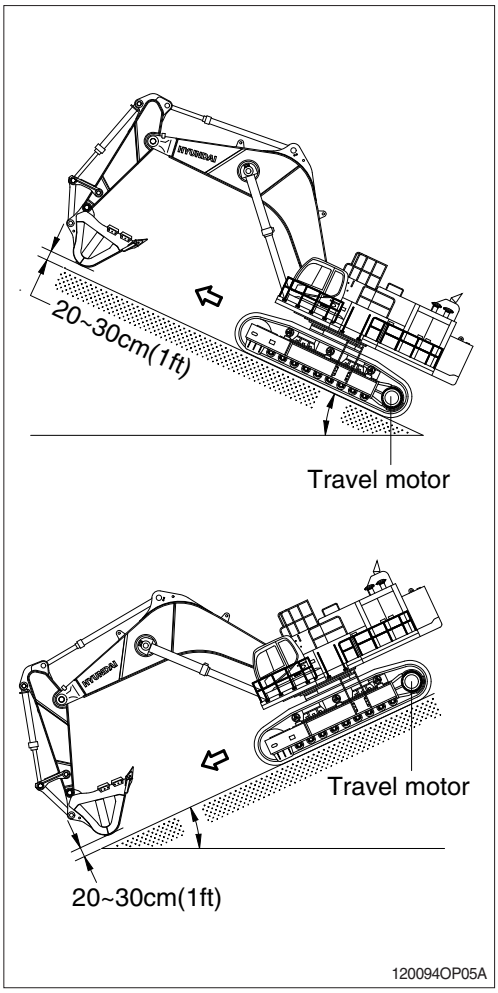
(3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.

(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.



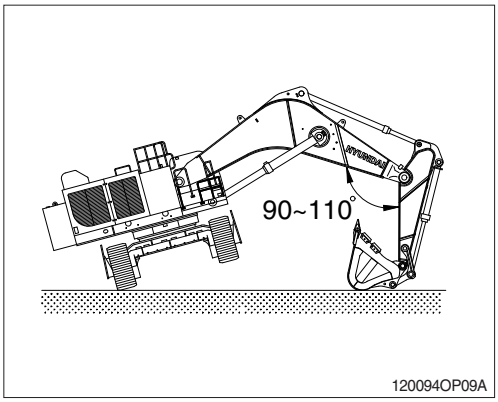
3) TRAVELING ON SOFT GROUND

※ 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

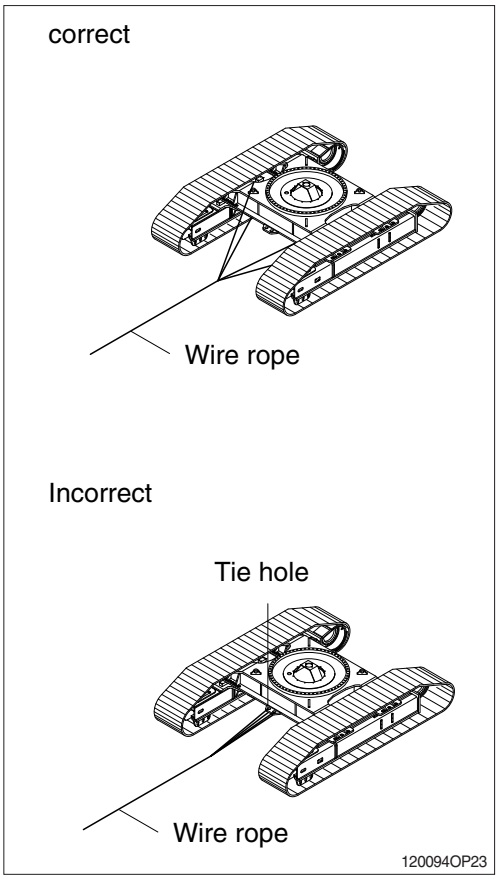
Tow the machine as follows when it can not move on it's own.

(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.

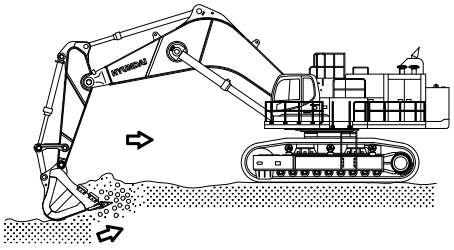
※ Never tow the machine using only the tie hole, because this may break.

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



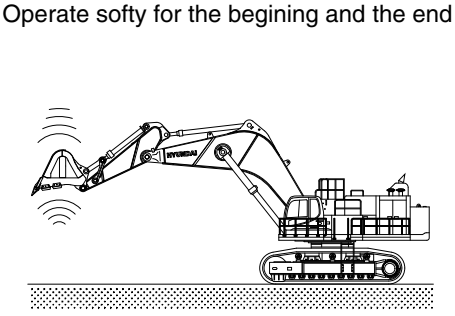
7. EFFICIENT WORKING METHOD

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.



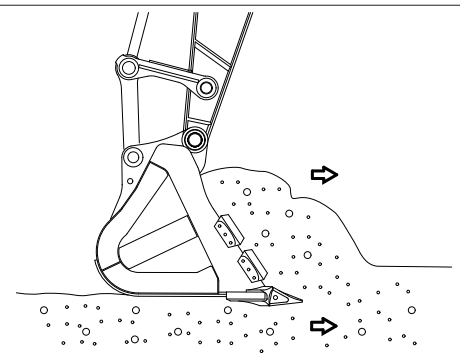
120094OP10A

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.



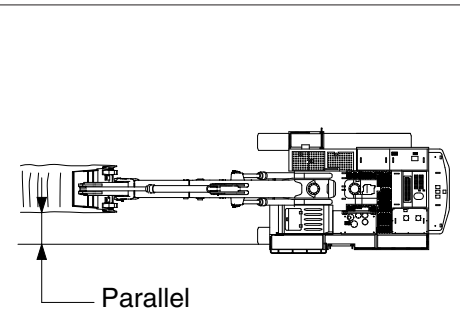
120094OP11A

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



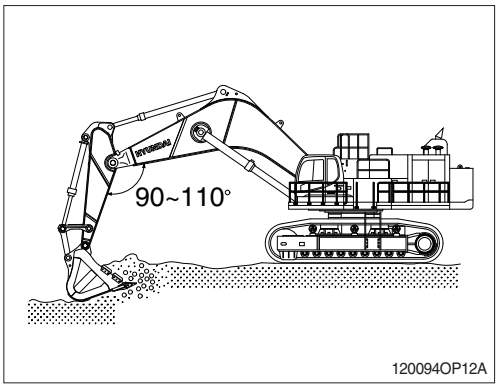
120094OP27

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

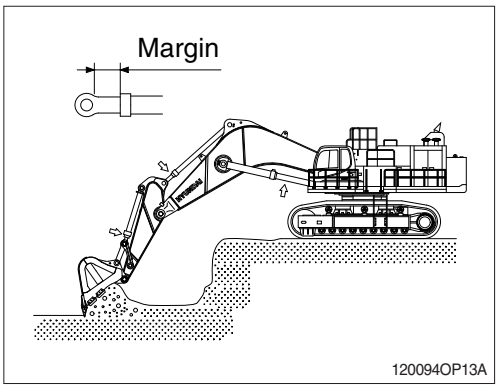


120094OP17

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

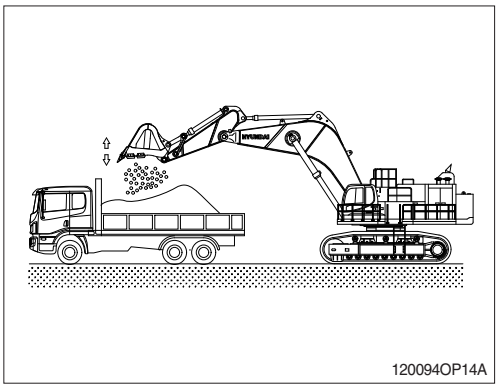


6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

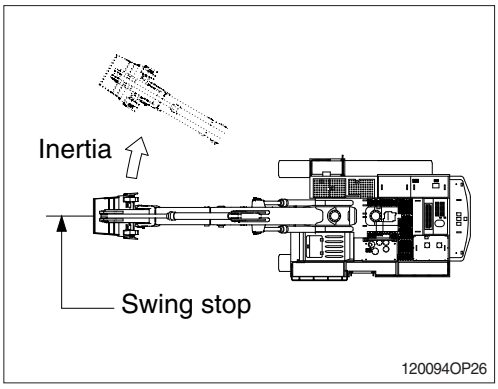


7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
   Operate bucket lever 2 or 3 times when hard to dump.

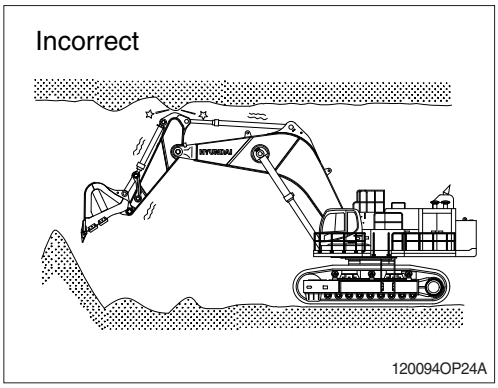
※ **Do not use the impact of bucket tooth when dumping.**



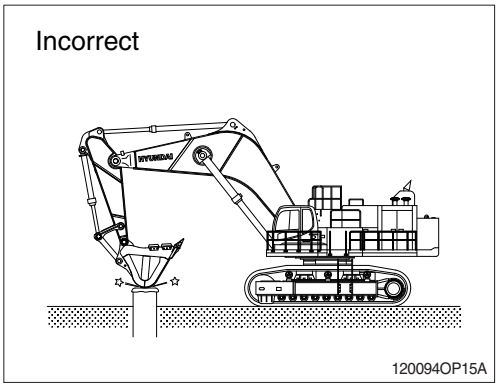
8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



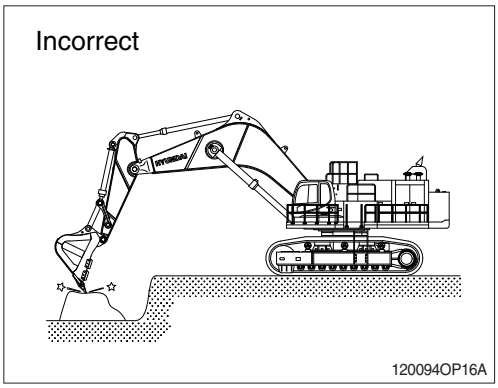
9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



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

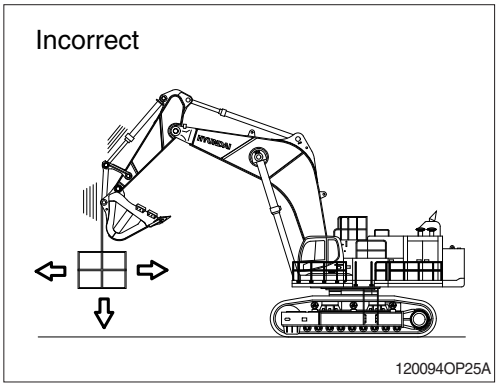
Operation exceeding machine performance may result in accident or failure.

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.

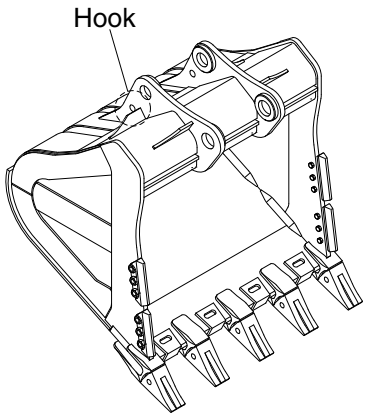
When performing lifting operation, never raise or lower a person.

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.

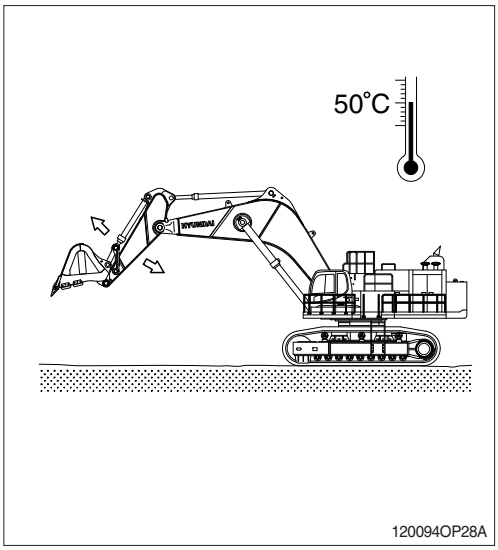
Never leave the operator's seat while lifting a load.



120094OP29

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 simultane-ously, regardless of inspection period.

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

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

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

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

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

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

(7) Clean electrical components, especially the starting motor and alternator to avoid accumu-lation 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.

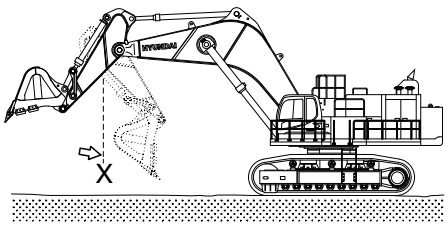
(2) Loosen the track tension a little when working in such areas.

(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.



120094OP18A

10. ATTACHMENT LOWERING (when engine is stopped)

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

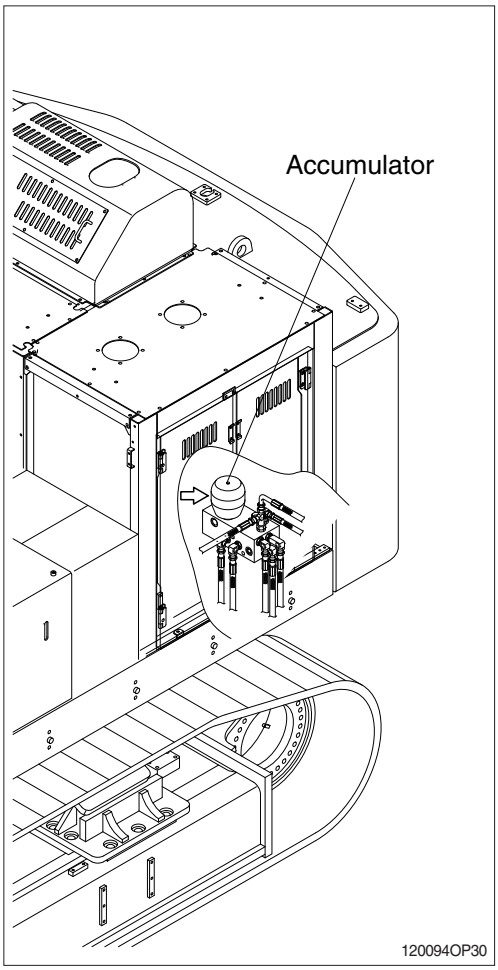
⚠ **Be sure no one is under or near the attachment before lowering the boom.**

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

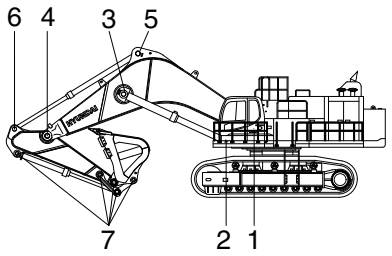
(1) Cleaning the machine

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.



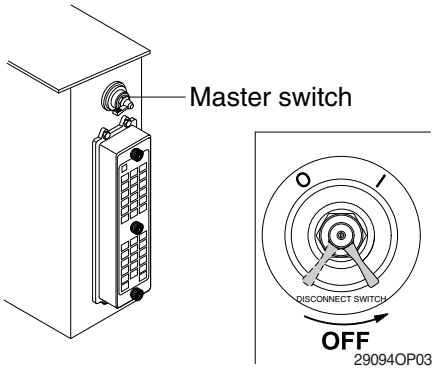
1 Boom and upper frame connection pin (2EA)
2 Boom cylinder head pin (2EA)
3 Boom cylinder rod pin (2EA)
4 Boom and arm connection pin (2EA)
5 Arm cylinder head pin (1EA)
6 Arm cylinder rod pin (1EA)
7 Arm and bucket (7EA)

120094OP19A

(3) Master switch

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

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

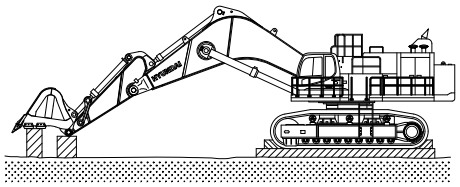


29094OP03

(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.



120094OP20A

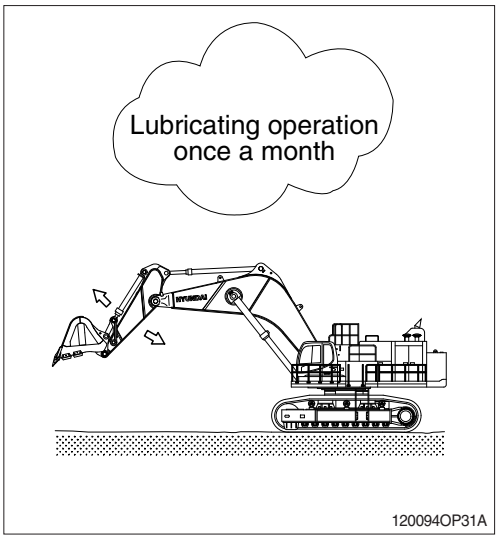
2) DURING STORAGE

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.

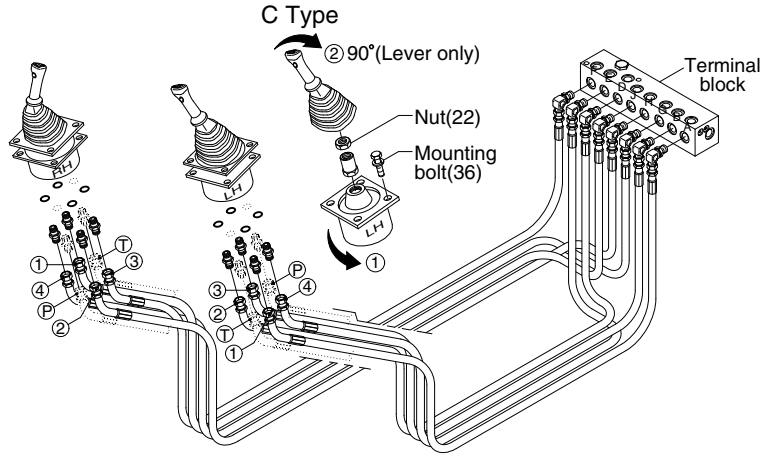
※ Remove the drain port plug and drain the water until the gear oil comes out and then tighten the drain plug.

※ 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

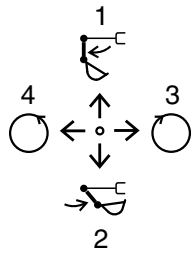
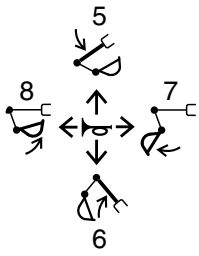
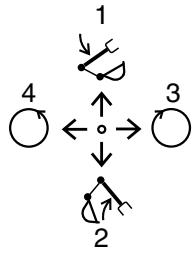
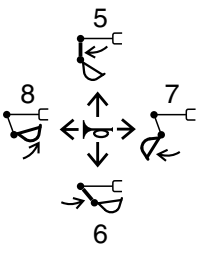
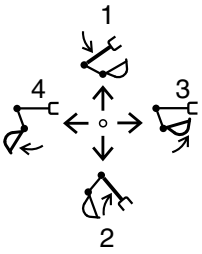
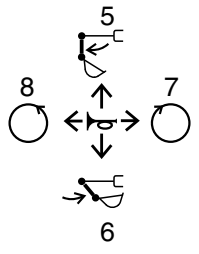
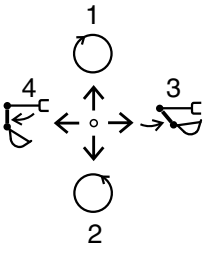
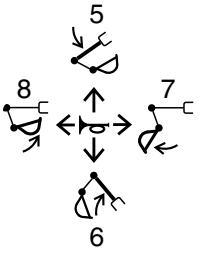
1) PATTERN CHANGE VALVE NOT INSTALL (standard)



※ **Whenever a change is made to the machine control patern 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).**

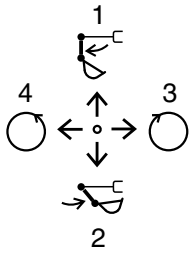
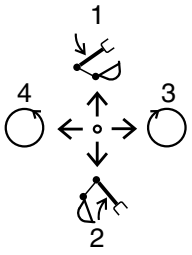
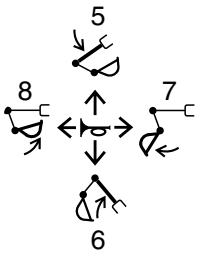
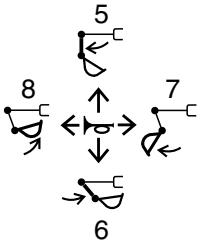
120094OP34

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	1 Arm out	②	D	-
				2 Arm in	④	E	-
				3 Swing right	③	B	-
				4 Swing left	①	A	-
			Right	5 Boom lower	④	J	-
				6 Boom raise	②	H	-
				7 Bucket out	①	G	-
				8 Bucket in	③	F	-
A Type			Left	1 Boom lower	②	D	J
				2 Boom raise	④	E	H
				3 Swing right	③	B	-
				4 Swing left	①	A	-
			Right	5 Arm out	④	J	D
				6 Arm in	②	H	E
				7 Bucket out	①	G	-
				8 Bucket in	③	F	-
B Type			Left	1 Boom lower	②	D	J
				2 Boom raise	④	E	H
				3 Bucket in	③	B	F
				4 Bucket out	①	A	G
			Right	5 Arm out	④	J	D
				6 Arm in	②	H	E
				7 Swing right	①	G	B
				8 Swing left	③	F	A
C Type			Left	① Loosen the RCV lever mounting bolt (36) 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			

2) PATTERN CHANGE VALVE INSTALL (option)

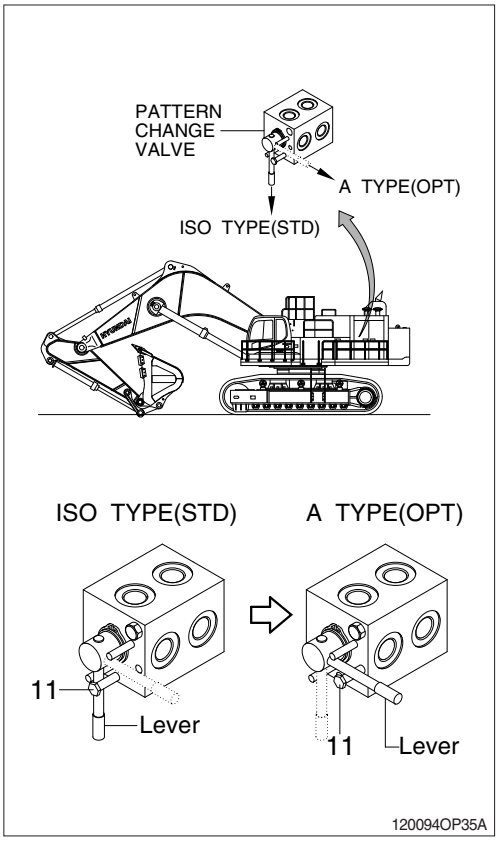
※ If the machine is equipped with the pattern change valve, the machine operation pattern can be easily changed.

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

Operation	ISO type	A type
Left RCV lever		
Right RCV lever		

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

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



(2) Change of operating pattern

① Loosen the bolt (11).

② Move lever from the "ISO type" to "A type" position.

③ After the lever is set, tighten the bolt in order to secure the lever.

1. PREPARATION FOR TRANSPORTATION

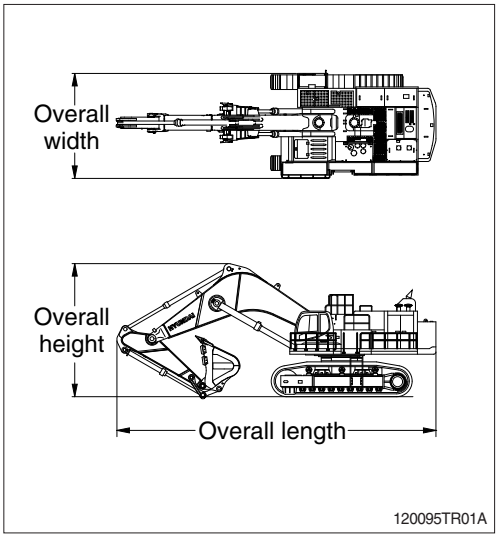
1) When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc.

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.

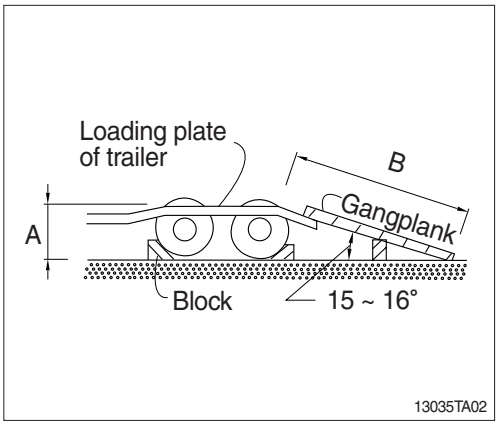
4) Get the permission from the related authority if necessary.

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

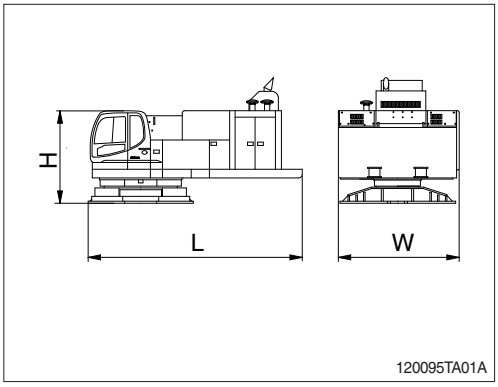


2. DIMENSION AND WEIGHT

1) BASE MACHINE

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	6885 (22' 7")
H	Height	mm (ft-in)	3410 (11' 2")
W	Width	mm (ft-in)	3580 (11' 9")
Wt	Weight	kg (lb)	41000 (90390)

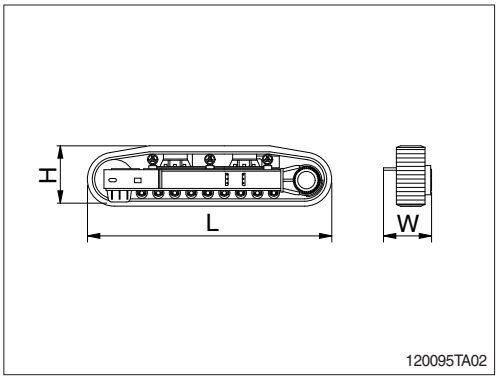
※ Remove catwalk and handrail for transport.



2) TRACK FRAME

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	6425 (21' 1")
H	Height	mm (ft-in)	1585 (5' 2")
W	Width	mm (ft-in)	1060 (3' 6")
Wt	Weight	kg (lb)	14120 (31130)

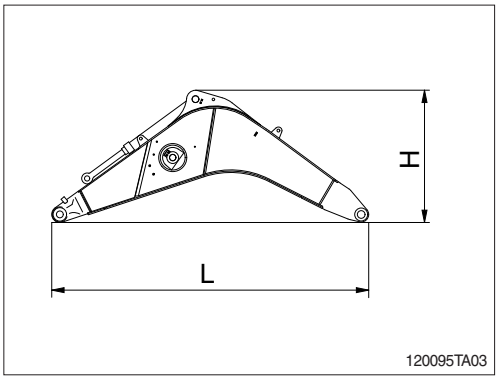
※ Shoe (700 mm)



3) BOOM ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	7930 (26' 0")
H	Height	mm (ft-in)	3430 (24' 8")
W	Width	mm (ft-in)	1500 (4' 11")
Wt	Weight	kg (lb)	12300 (27120)

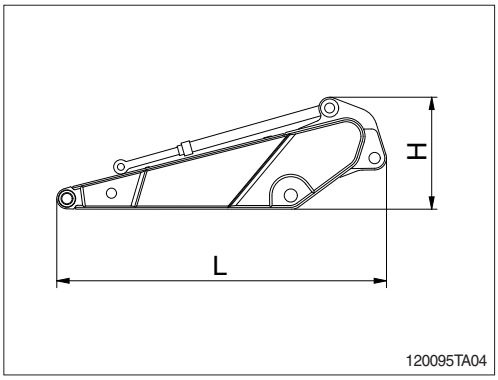
※ 7.55 m (24' 9") boom with arm cylinder (Included piping and pins).



4) ARM ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	5030 (16' 6")
H	Height	mm (ft-in)	930 (3' 1")
W	Width	mm (ft-in)	1720 (5' 8")
Wt	Weight	kg (lb)	6500 (14330)

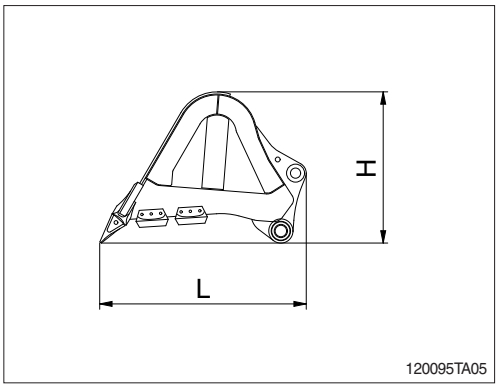
※ 3.40 m (11' 2") arm with bucket cylinder (Included linkage and pins).



5) BUCKET ASSEMBLY

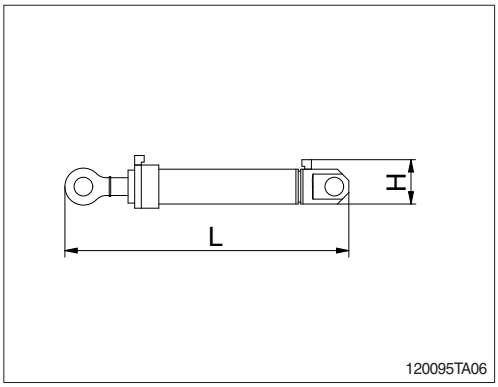
Mark	Description	Unit	Specification
L	Length	mm (ft-in)	2780 (9' 1")
H	Height	mm (ft-in)	2255 (7' 5")
W	Width	mm (ft-in)	2390 (94.1")
Wt	Weight	kg (lb)	5860 (12920)

※ 6.70 m (8.76 yd³) SAE heaped bucket (Included tooth).



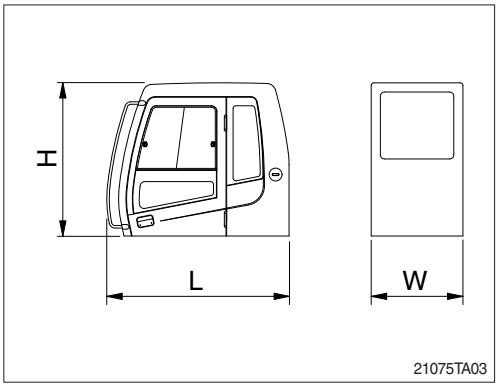
6) BOOM CYLINDER

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3615 (11' 10")
H	Height	mm (ft-in)	432 (1' 5")
W	Width	mm (ft-in)	340 (1' 1")
Wt	Weight	kg (lb)	2380 (5250)



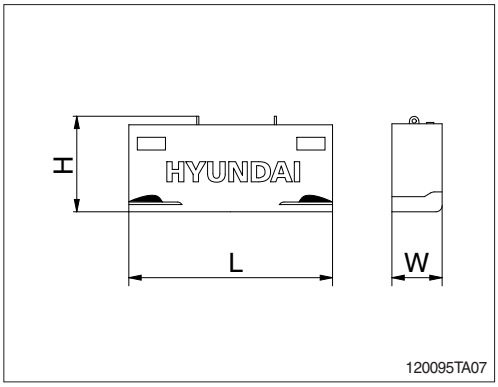
7) CAB ASSEMBLY

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	1962 (6' 5")
H	Height	mm (ft-in)	1676 (5' 6")
W	Width	mm (ft-in)	1288 (4' 3")
Wt	Weight	kg (lb)	310 (680)



8) COUNTERWEIGHT

Mark	Description	Unit	Specification
L	Length	mm (ft-in)	3520 (11' 7")
H	Height	mm (ft-in)	1840 (6' 0")
W	Width	mm (ft-in)	980 (3' 3")
Wt	Weight	kg (lb)	20400 (44980)



3. DISASSEMBLING FOR TRANSPORTATION

1) DISCONNECTING HYDRAULIC HOSES AND LINES

※ Consult with your local dealer or Hyundai for the disassembly or assembly of this machine.

(1) Position the machine on flat, firm and level ground.

(2) Retract the bucket cylinder and arm cylinder completely.

(3) Lower the boom to the ground as shown.

(4) Stop the engine.

(5) Turn the safety knob to the LOCK position to lock the system securely.

※ Refer to the page 3-29 for details.

(6) Turn the engine start switch to ON position.
Do not start the engine.

(7) Turn the safety knob to the UNLOCK position, Move the left and right operating levers, respectively to the full exten-sion in all directions to remove internal pressure from the hydraulic circuits. And then turn the safety knob to the LOCK position.

(8) Turn the star switch to OFF position.

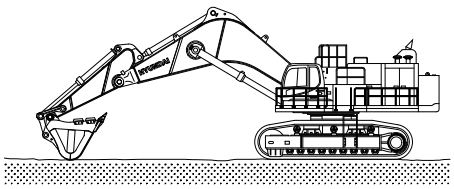
(9) Release internal pressure in the hydraulic tank through the air breather of the hydraulic tank.

(10) Disconnect hoses and lines.

※ Treat oil in an environmentally safe way.

⚠ Immediately after operating the machine, the hot hydraulic oil can cause severe burns to unprotected skin.

⚠ These may be residual hydraulic pressure can remain in the hydraulic system.
Serious injury may result if this residual pressure is not released before any service is done on the hydraulic system.



120094OP21A

2) ATTACHMENT REMOVAL AND INSTALLATION

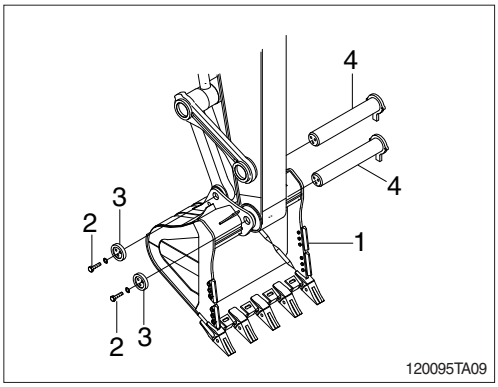
※ Follow the disconnecting hydraulic hoses and lines procedure before disassemble the components.

(1) Bucket assembly removal

※ Set the back face of the bucket facing down, lower the work equipment completely to the ground.

① Remove 3 pin lock bolts (2) of bucket (1) than remove stoppers (3).

② Remove pins (4).

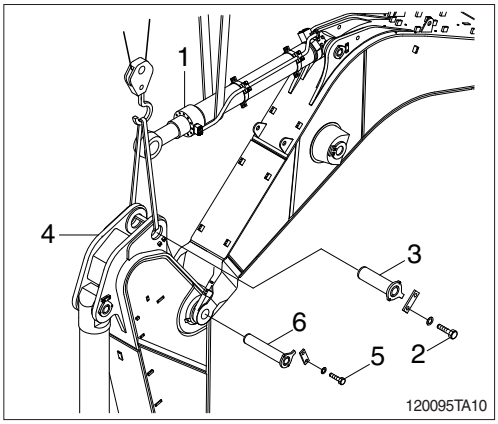


(2) Arm assembly removal

① Sling arm cylinder assembly (1) and remove bolts (2) and pull out pin (3).

② Sling arm assembly (4) and remove bolts (5) and pull out pin (6).

③ Lift off arm assembly (4).

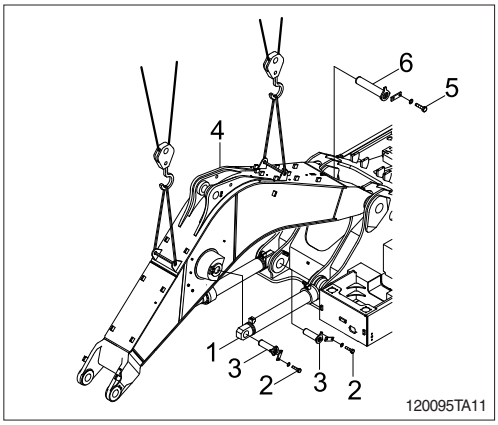


(3) Boom assembly removal

① Sling boom cylinder (1) and remove bolts (2) and pull out pin (3).

② Sling boom assembly (4) and remove bolts (5) and pull out foot pins (6).

③ Lift off boom assembly (4) slowly.



(4) Attachment installation

① Carry out installation in the reverse order to removal.

⚠ Personal injury or death can occur from a attachment falling during installation. Do not allow personnel under or around the attachment during installation.

⚠ Use certified cables and shackles of adequate load rating. Improper lifting can allow the load to shift and cause injury or death.

3) COUNTERWEIGHT REMOVAL AND INSTALLATION

(1) Counterweight removal

① As shown in the illustration, connect the lifting cables or slings with sufficient strength for the counterweight at the lifting eye correctly.

② Disassemble four bolts.

③ Lift the counterweight enough.

④ Place the counterweight onto suitable support.

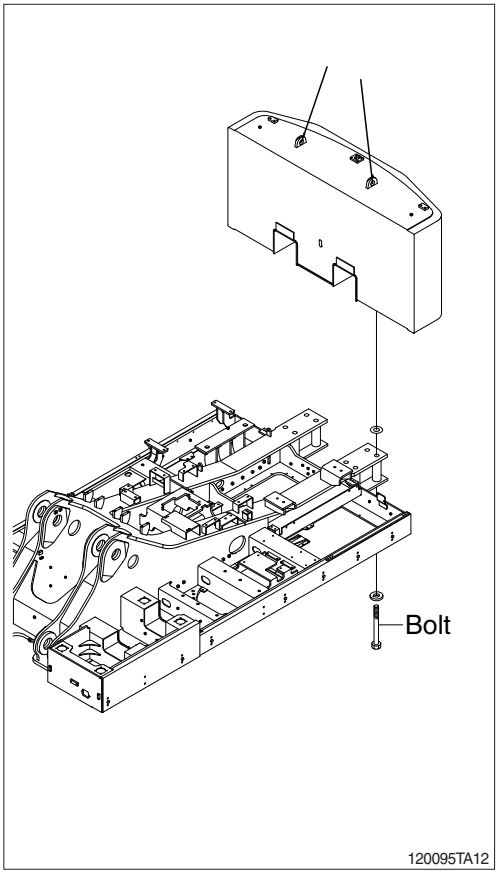
(2) Counterweight installation

① Carry out installation in the reverse order to removal.

· Tightening torque : 390 ± 40 kgf · m
(2820 ± 290 lbf · ft)

⚠ Personal injury or death can occur from a counterweight falling during installation.
Do not allow personnel under or around the counterweight during installation.

⚠ Use certified cables and shackles of adequate load rating. Improper lifting can allow the load to shift and cause injury or death.



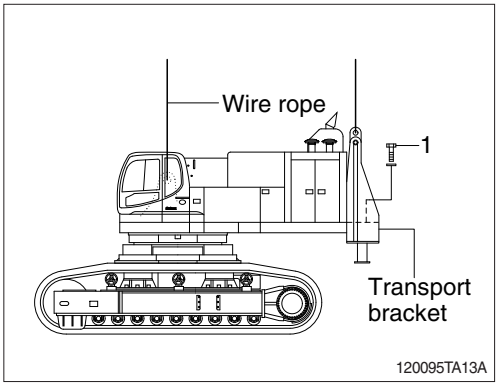
4) UPPER STRUCTURE REMOVAL AND INSTALLATION

(1) Upper structure removal

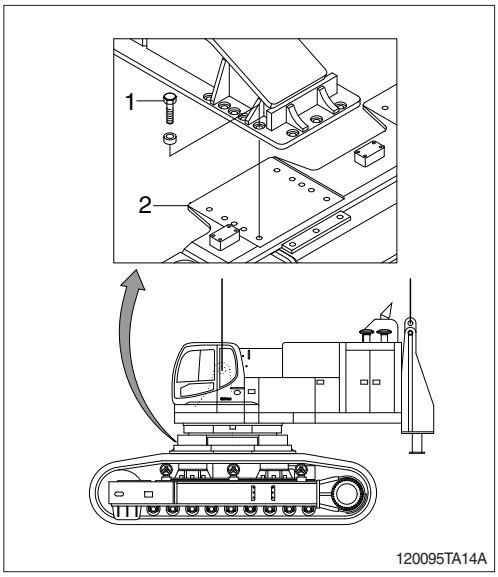
① Remove work equipment assembly.
※ Refor to the page 5-5 for details.

② Remove counterweight assembly.
※ Refor to the page 5-6 for details.

③ Assemble transport bracket by bolt (1).
④ Install wire rope for upper frame assembly.

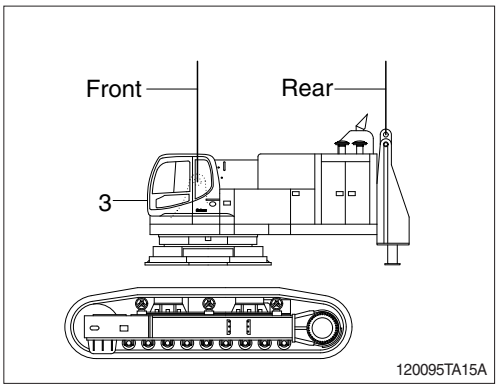


⑤ Remove 13 mounting bolts (1) and spacers from lower track (2).



⑥ Lift off revolving upper structure assembly (3).

· Front litfing load : 2840 kg (6260 lb)
· Rear litfing load : 1260 kg (2780 lb)



(2) Upper structure installation

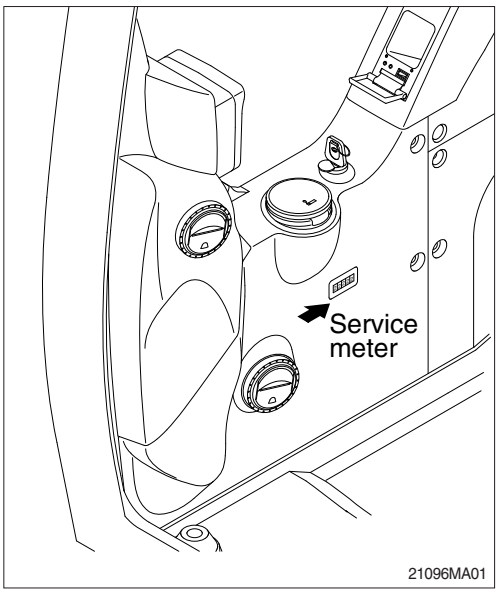
① Carry out installation in the reverse order to removal.
· Tightening torque : 483±48 kgf · m (3490±347 lbf · ft)

⚠ Personal injury or death can occur from a upper structure falling during installation. Do not allow personnel under or around the counterweight during installation.

⚠ Use certified cables and shackles of adequate load rating. Improper lifting can allow the load to shift and cause injury or death.

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

2) PRECAUTION

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

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

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

(4) Ask to your local dealer or Hyundai for the maintenance advice if unknown.

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

3) PROPER MAINTENANCE

(1) Replace and repair of parts

It is required to replace the wearable and consumable parts such as bucket tooth, side cutter, filter and etc., regularly.

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

(2) Use genuine parts.

(3) Use the recommended oil.

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

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

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

Stop the engine when you fill the oil.

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

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

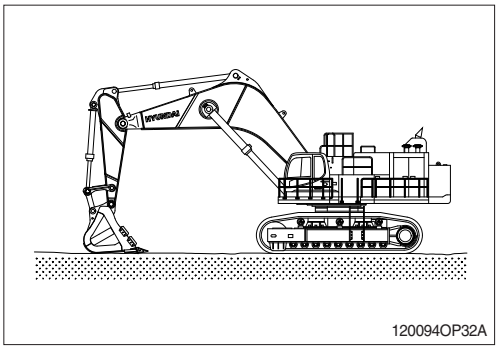
(9) For more detail information of maintenance, please contact local Hyundai dealer.

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

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

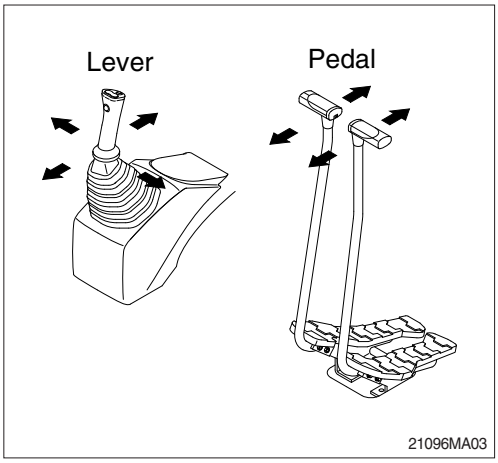
※ Spouting of oil can cause the accident when loo-sening the cap or hose right after the opera-ting of machine as the machine or oil is on the high pressure on the condition.
Be sure to relieve the pressure in the system before repairing hydraulic system.

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

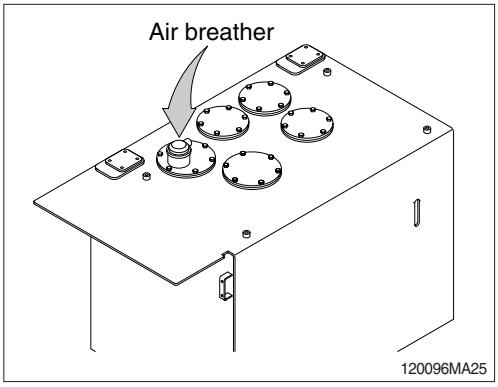


(2) Set the safety knob completely in the UNLOCK position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

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



5) PRECAUTION WHEN INSTALLING HYDRAULIC HOSES OR PIPES

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

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

(3) Use genuine parts.

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

(5) Keep the specified tighten torque.

6) PERIODICAL REPLACEMENT OF SAFETY PARTS

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

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

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

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

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

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

2. TIGHTENING TORQUE

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

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

(2) Fine thread

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

2) PIPE AND HOSE (FLARE type)

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

3) PIPE AND HOSE (ORFS type)

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

4) FITTING

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

4) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut (FR)	M22 × 2.5	70 ± 7.0	506 ± 50.6
2		Engine mounting bolt, nut (RR, bracket)	M18 × 2.5	39 ± 4.0	282 ± 28.9
3		Engine mounting bolt, nut (RR, frame)	M24 × 3.0	90 ± 9.0	650 ± 65
4		Gear box mounting bolt	M12 × 1.75	12.3 ± 1.0	89 ± 7.2
5		Radiator mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 63
6		Oil cooler mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 63
7		Coupling mounting socket bolt	M10 × 1.5	27.0 ± 3.0	195 ± 21.7
8		Fan pump mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
9	Hydraulic system	Main pump mounting socket bolt	M20 × 2.5	57.9 ± 8.7	419 ± 63
10		Main control valve 1 mounting bolt	M20 × 2.5	42.6 ± 4.2	308 ± 30.3
11		Main control valve 2 mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
12		Fuel tank mounting bolt	M20 × 2.5	58 ± 6.0	420 ± 43.4
13		Hydraulic oil tank mounting bolt	M20 × 2.5	58 ± 6.0	420 ± 43.4
14		Turning joint mounting bolt, nut	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
15	Power train system	Swing motor mounting bolt	M24 × 3.0	100 ± 15	723 ± 108
16		Swing bearing upper part mounting bolt	M30 × 3.5	199 ± 10	1439 ± 72.3
17		Swing bearing lower part mounting bolt	M30 × 3.5	199 ± 10	1439 ± 72.3
18		Travel motor mounting bolt	M30 × 3.5	150 ± 10	1085 ± 72.3
19		Sprocket mounting bolt	M30 × 3.5	199 ± 10	1439 ± 72.3
20	Under carriage	Carrier roller mounting bolt, nut	M20 × 2.5	57.9 ± 8.7	419 ± 63
21		Track roller mounting bolt	M27 × 3.0	140 ± 7.0	1013 ± 50.6
22		Track tension cylinder mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
23		Track shoe mounting bolt, nut	M24 × 1.5	240 ± 2.0	1736 ± 145
24		Track guard mounting bolt	M27 × 3.0	140 ± 7.0	1013 ± 50.6
25	Others	Counterweight mounting bolt	M42 × 3.0	390 ± 40	2821 ± 289
26		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
27		Operator's seat mounting bolt	M 8 × 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	SAE 10W-30 (API CH-4), ★SAE 5W-40 (API CH-4)
Hydraulic oil	Hyundai genuine long life hydraulic oil (ISO VG 32, VG 46, VG 68) Conventional hydraulic oil (ISO VG 15★)
Swing and travel reduction gear	SAE 80W-90 (API GL-5)
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2
Coolant (DCA4)	ASTM D6210 Mixture of 50% ethylene glycol base antifreeze and 50% water. Mixture of 60% ethylene glycol base antifreeze and 40% water.★

SAE : Society of Automotive Engineers
API : American Petroleum Institute
ISO : International Organization for Standardization
NLGI : National Lubricating Grease Institute
ASTM : American Society of Testing and Material
DCA4 : Brand name of Chemical Additive manufactured by the Cummins Fleetguard Co

Ultra low sulfur diesel
- sulfur content ≤ 15 ppm

★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	70 (18.5)	★SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Gear box	Heavy duty gear oil	6.0 (1.6)	★SAE 75W-90 ISO VG 100~220
Swing drive	Gear oil	8.0×2 (2.1×2)	★SAE 75W-90
Final drive		20×2 (5.3×2)	SAE 80W-90
Hydraulic tank	Hydraulic oil	Tank : 670 (177) System: 1160 (306)	★ISO VG 15 ISO VG 32 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel	1475 (390)	★ASTM D975 NO.1 ASTM D975 NO.2
Lower roller	Gear oil	1.08 (0.3)	★SAE 75W-90
Upper roller		0.68 (0.18)	
Idler		0.83 (0.22)	SAE 85W-140
Fitting (grease nipple)	Grease	As required	★NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and soft water★1	100 (26.4)	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

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

Check items	Service	Page
Visual check		
Fuel tank	Check, Refill	6-29
Hydraulic oil level	Check, Add	6-32
Engine oil level	Check, Add	6-18
Coolant level	Check, Add	6-21
Control panel & pilot lamp	Check, Clean	6-43
Fan belt tension	Check, Adjust	6-25
Fuel filter	Check, drain	6-30

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Fuel tank (water, sediment)	Drain	6-29
Track tension	Check, Adjust	6-38
Swing reduction gear oil	Check, Add	6-35
Attachment pin and bushing	Lubricate	6-42
· 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		
· Bucket cylinder rod end		
· Bucket + Arm connecting		
· Bucket control link + Arm		
· Bucket control rod		

3) INITIAL 50 HOURS SERVICE

Check items	Service	Page
Fan system grease	Check, Add	6-37
Bolts & Nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		

4) EVERY 200 HOURS SERVICE

Check items	Service	Page
★ Return filter	Replace	6-33
★ Pilot line filter	Replace	6-34
★ Drain filter cartridge	Replace	6-34

★ **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
Fuel filter element	Replace	6-30-1
Pilot line filter	Replace	6-34
Hydraulic return filter	Replace	6-33
Drain filter cartridge	Replace	6-34
Swing reduction gear oil	Change	6-35
Swing reduction gear grease	Check, Add	6-35
Gear box oil	Change	6-28
Travel reduction gear oil	Change	6-37

6) EVERY 250 HOURS SERVICE

Check items	Service	Page
Battery (voltage)	Check, Clean	6-43
Aircon & heater fresh air filter	Check	6-46
Swing bearing grease	Lubricate	6-35
Central grease pump	Check, Add	8-1
Bolts & Nuts	Check, Tight	6-8
· Sprocket mounting bolts		
· Travel motor mounting bolts		
· Swing motor mounting bolts		
· Swing bearing mounting bolts		
· Engine mounting bolts		
· Counterweight mounting bolts		
· Turning joint locating bolts		
· Track shoe mounting bolts and nuts		
· Hydraulic pump mounting bolts		
Attachment pin and bushing	Lubricate	6-42
· 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		

7) EVERY 500 HOURS SERVICE

Check items	Service	Page
★Engine oil	Change	6-18, 19
★Engine oil filter	Replace	6-18, 19
Water filter (corrosion resistor)	Replace	6-20
Coolant test (DCA4 concentration)	Test, Add	6-21-1, 2
Oil cooler	Check, Clean	6-24
Radiator, cooler fin and charge air cooler	Check, Clean	6-25
☆Air cleaner element (primary)	Check, Clean	6-29
Fuel filter element	Replace	6-30-1

★ If you use high sulfur containing fuel above than 0.5% or use low grade of engine oil reduce change interval.

☆ Clean the primary element only after 500 hours operation or when the air cleaner warning lamp blinks. Replace primary element and safety element after 4 times cleanings of primary element.

8) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Travel motor reduction gear oil	Change	6-37
Swing reduction gear oil	Change	6-35
Swing reduction gear grease	Change	6-35
Grease in swing gear and pinion	Change	6-36
Hydraulic oil return filter	Replace	6-33
Drain filter cartridge	Replace	6-34
Pilot line filter	Replace	6-34
lAir breather element	Replace	6-34

9) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Coolant	Change	6-21, 22, 23, 24
Hydraulic tank suction strainer	Check, Clean	6-33
Gear box oil	Change	6-28
Hydraulic oil ★1	Change	6-32
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-
Air cleaner element (primary, safety)	Replace	6-29

★1 Conventional hydraulic oil

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

10) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil ★2	Change	6-32

★2 Hyundai genuine long life hydraulic oil

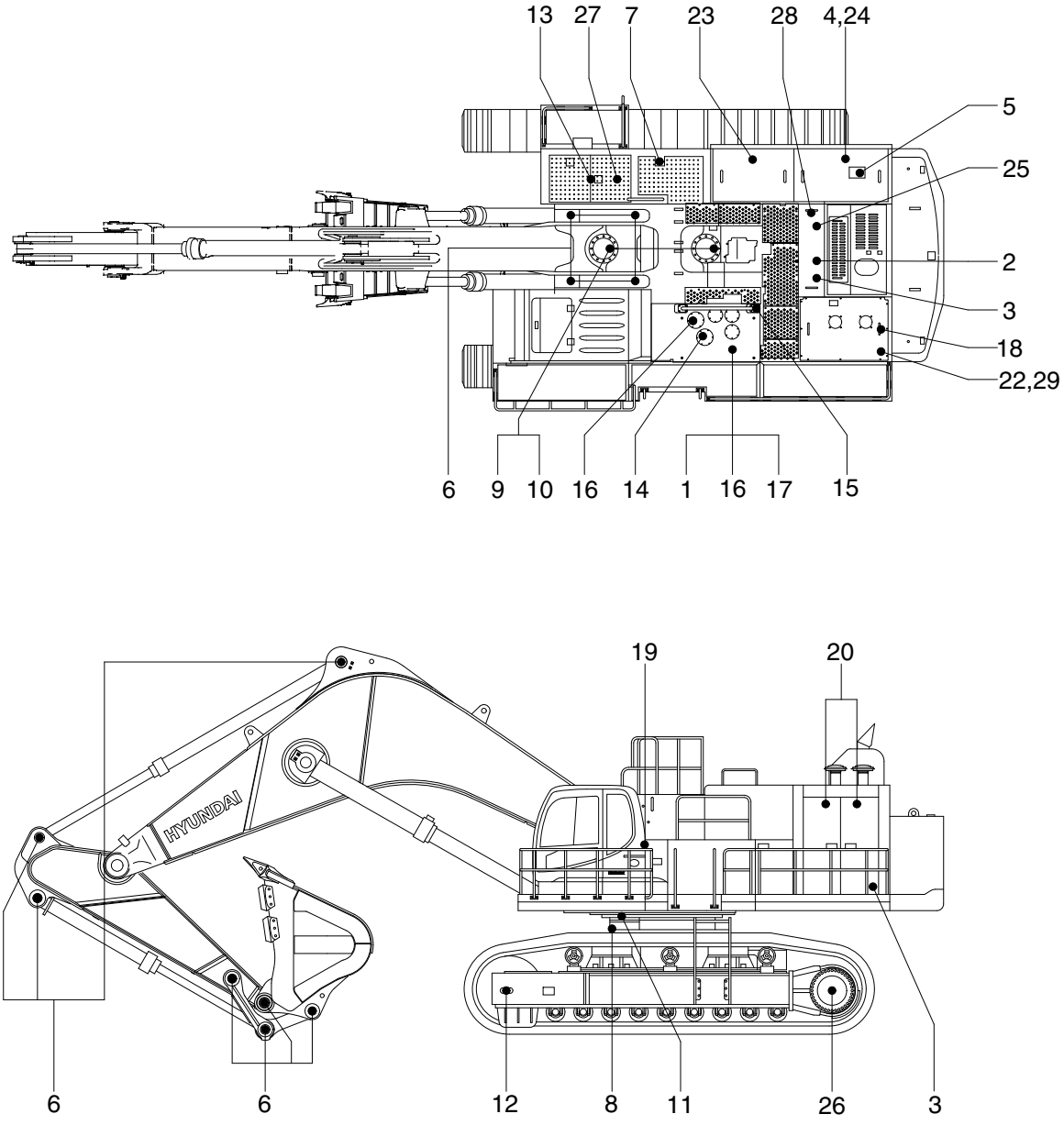
★ Change oil every 1000 hours of continuous hydraulic breaker operation.

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	6-29
· Fuel filter	Drain, Replace	6-30, 30-1
Engine lubrication system		
· Engine oil	Change	6-18, 19
· Engine oil filter	Replace	6-18, 19
· Gear box oil	Change	6-28
· Fan system grease	Check, Add	6-37
Engine cooling system		
· Coolant	Add or Change	6-21, 22, 23, 24
· Radiator	Clean or Flush	6-21, 22, 23, 24
· Charge air cooler	Check	6-25
· Water filter (corrosion resistor)	Replace	6-20
Engine air system		
· Air cleaner element	Replace	6-29
Hydraulic system		
· Hydraulic oil	Add or Change	6-32
· Return filter	Replace	6-33
· Drain line filter	Replace	6-34
· Pilot line filter	Replace	6-34
· Element of breather	Replace	6-34
· Suction strainer	Clean	6-33
Under carriage		
· Track tension	Check, Adjust	6-38
Bucket		
· Tooth	Replace	6-40
· Linkage	Adjust	6-41
· Bucket assy	Replace	6-39
Air conditioner and heater		
· Fresh air filter	Clean, Replace	6-46
· Recirculation filter	Clean	6-47
Attachment lubrication system		
· Central grease pump	Check, Add	8-1

5. MAINTENANCE CHART



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Caution

1. Service intervals are based on the hour meter reading.
2. The number of each item shows the lubrication point on the machine.
3. Stop engine while filling oil, and use no open flames.

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	670 (177)	1
	2	Engine oil level	Check, Add	EO	70 (18.5)	1
	4	Radiator coolant	Check, Add	C	100 (26.4)	1
	5	Fan belt tension and damage	Check, Adjust	-	-	1
	7	Fuel tank	Check, Refill	DF	1475 (390)	1
	22	Fuel filter	Check, drain	-	-	1
50 Hours or weekly	6	Attachment pin	Check, Add	PGL	-	16
	7	Fuel tank (water, sediment)	Check, Clean	-	1475 (390)	1
	9	Swing reduction gear case	Check, Add	GO	8.0 (2.1)	2
	12	Track tension	Check, Adjust	PGL	-	2
250 Hours	8	Swing bearing grease	Check, Add	PGL	-	4
	13	Battery (voltage)	Check, Clean	-	-	1
	19	Aircon and heater fresh air filter	Check, Clean	-	-	1
	27	Central grease pump	Check, Add	PGL	8 kg(18.6 lb)	1
500 Hours	2	Engine oil	Change	EO	70 (18.5)	1
	3	Engine oil filter	Replace	-	-	2
	20	Air cleaner element (primary)	Check, Clean	-	-	1
	22	Fuel filter element	Replace	-	-	1
	23	Oil cooler	Check, Clean	-	-	1
	24	Radiator, charge air cooler	Check, Clean	-	-	1
	25	Water filter (corrosion resistor)	Replace	-	-	1
	25	Coolant test (DCA4 concentration)	Test, Add	DCA4	-	1
1000 Hours	9	Swing reduction gear case	Change	GO	8.0 (2.1)	2
	10	Swing reduction gear grease	Check, Add	PGL	1.6 (0.4)	2
	11	Swing gear and pinion grease	Change	PGL	50 kg (110 lb)	1
	14	Hydraulic oil return filter	Replace	-	-	3
	15	Drain filter cartridge	Replace	-	-	2
	16	Air breather element	Replace	-	-	1
	18	Pilot line filter element	Replace	-	-	1
	26	Travel reduction gear case	Change	GO	20 (5)	2
2000 Hours	1	Hydraulic oil ★1	Change	HO	670 (177)	1
	4	Radiator coolant	Change	C	100 (26.4)	1
	17	Hydraulic oil suction strainer	Check, Clean	-	-	2
	20	Air cleaner element (primary, safety)	Replace	-	-	2
	29	Gear box	Change	GO3	6 (1.6)	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
5000 Hours	1	Hydraulic oil ★2	Change	HO	670 (177)	1
As required	19	Aircon & heater fresh filter	Replace	-	-	1
	19	Aircon & heater recirculation filter	Clean, Replace	-	-	1
	20	Air cleaner element (primary, safety)	Replace	-	-	2
	27	Center grease pump	Check, Add	PGL	8 kg (18.6 lb)	1
	28	Fan system grease	Check, Add	PGL	0.2 (0.05)	2

★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 GO3 : Heavy duty gear oil
C : Coolant PGL : Grease EO : Engine oil (ISO VG 100~220)

1) CHECK ENGINE OIL LEVEL

Check the oil level with the machine on a flat ground before starting engine.

(1) Pull out the dipstick and wipe with a clean cloth.

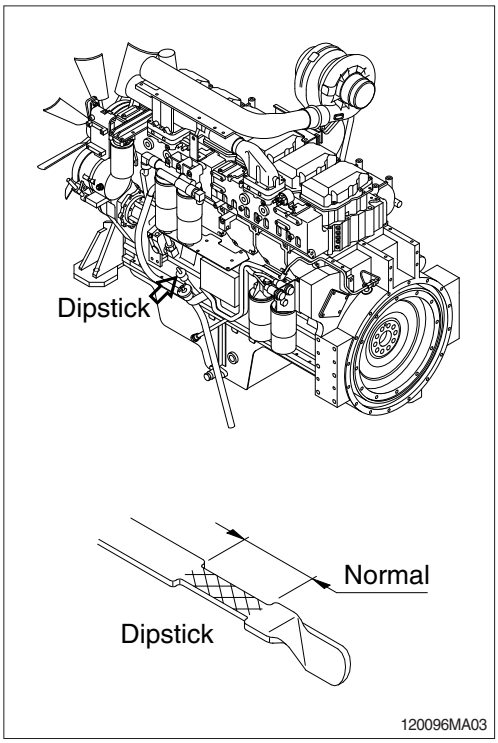
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

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

※ **If the oil is contaminated or diluted, change the oil regardless of the regular change interval.**

※ **Check oil level after engine has been stopped for 15 minutes.**

⚠ **Do not operate unless the oil level is in the normal range.**



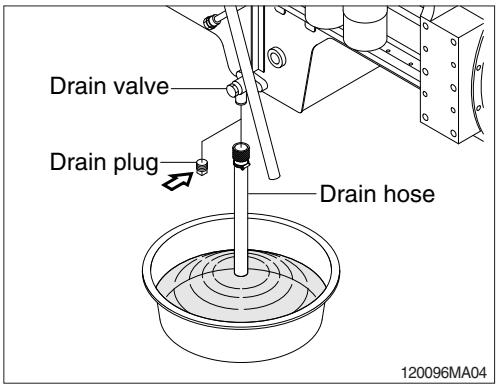
2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(1) Warm up the engine.

(2) Remove the oil drain plug and fit the drain hose.

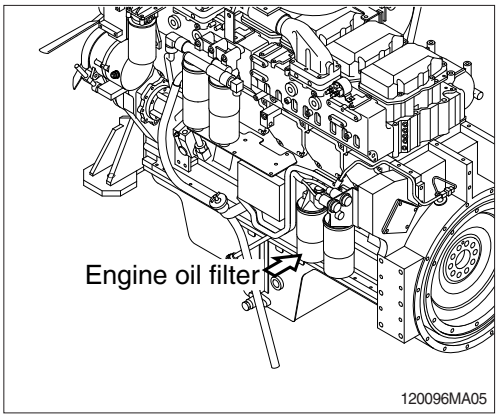
(3) Open the drain valve and drain oil.

※ **A drain pan with a capacity of 80 liters (21.1 U.S. gallons) will be adequate.**



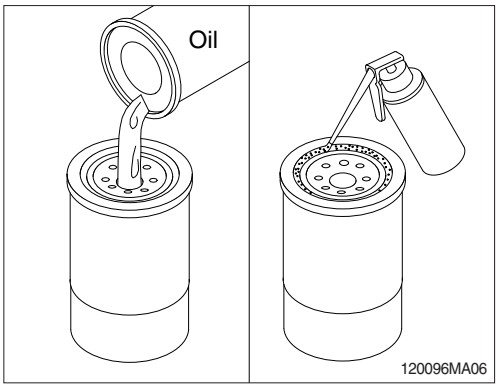
(4) Clean around the filter head, remove the filter by oil filter wrench and clean the gasket surface.

※ **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.

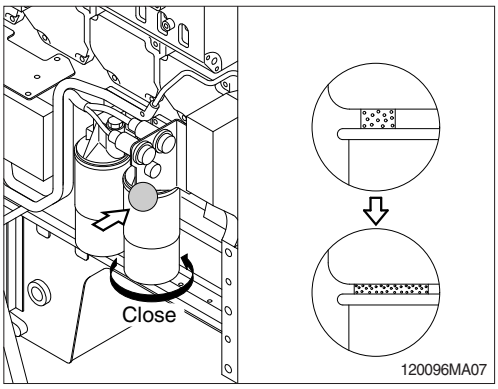
※ **Fill the filters with clean lubricating oil.**



(5) Install the filter to the filter head.

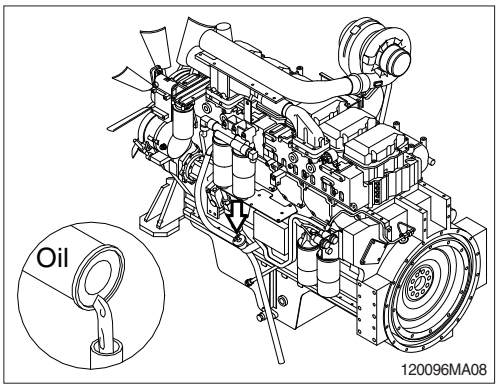
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**

- Install the filter as specified by the filter manufacturer.

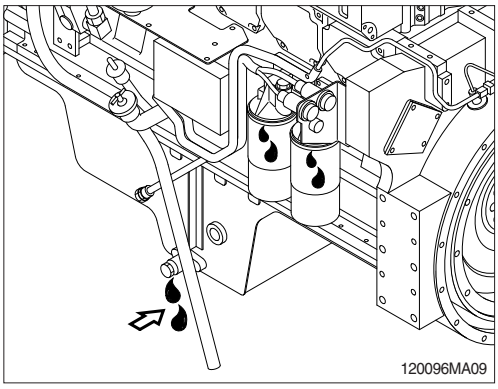


(6) Fill the engine with clean oil to the proper level.

- Quantity : 70 ℓ (18.5 U.S. gallons)



(7) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.
Shut the engine off and check the oil level with the dipstick. Allow 15minutes for oil to drain down before checking.

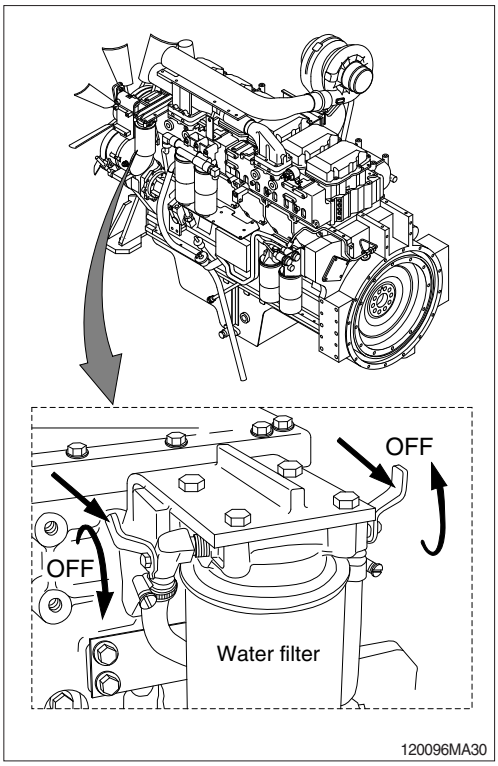


3) REPLACEMENT OF WATER FILTER (CORROSION RESISTOR)

(1) Turn the valve on the filter head to the OFF position.

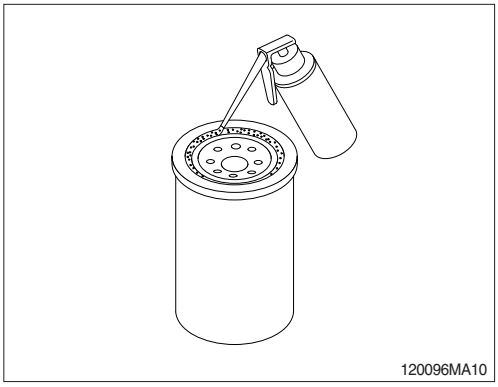
⚠ **Wait until the temperature is below 50˚C (122˚F) before removing the radiator cap.**
Remove the coolant system radiator cap and close the shutoff valve before removing the water filter. Failure to do so can result in personal injury from heated coolant spray.

(2) Remove and discard the water filter.
Clean the gasket surface.



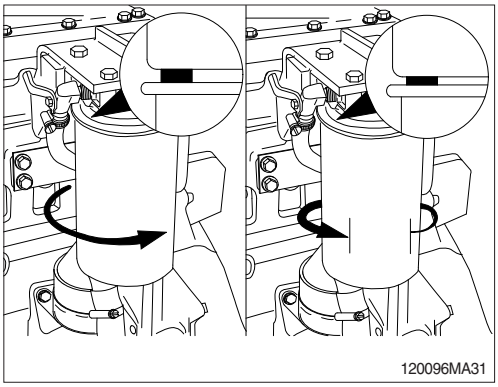
(3) Apply a thin film of lubricating oil to the gasket sealing surface before installing the new water filter.

⚠ **Do not allow oil to get into the filter.**
It will break down the supplement coolant addl-tive.

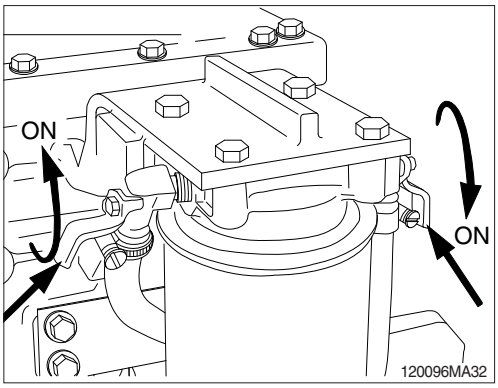


(4) Install the water filter on the filter head. Tighten the filter until the gasket contacts the filter head surface.
Tighten the water filter an additional 1/2 to 3/4 of a turn or as specified by the filter manufacturer.

⚠ **Mechanical overtightening can distort the threads or damage the filter head.**



(5) Trun the valve to the ON position.



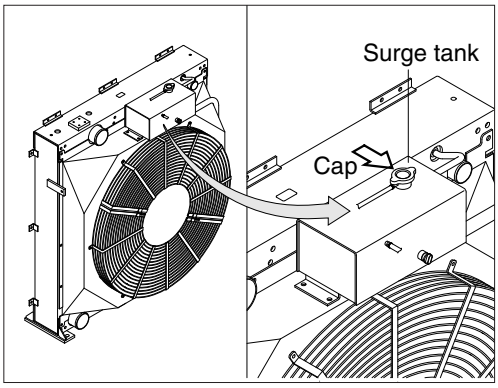
4) CHECK COOLANT

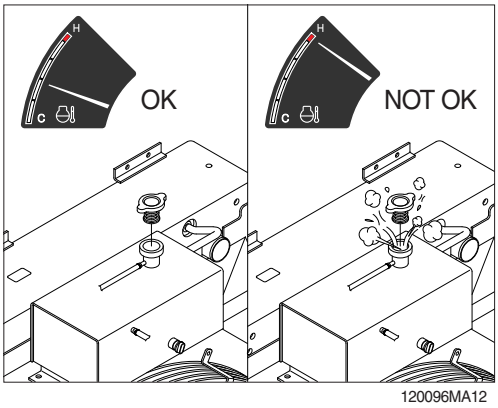
(1) Add the mixture of antifreeze and water after removing the cap of the surge tank if coolant is not sufficient.

(2) Be sure to use the surge tank empty, add the coolant by opening the cap of surge tank.

(3) Replace gasket of surge tank cap when it is damaged.

⚠ Hot coolant can spray out if surge tank cap is removed while engine is hot. Remove the cap after the engine has cooled down.





4-1) COOLANT TEST STRIPS INSTRUCTIONS

(1) Pre-test instruction

Recommended testing frequency - at every coolant filter change interval.

① Collect coolant sample from the radiator drain valve.
- Do not collect from the coolant recovery or overflow system
- Coolant must be between 10~54℃ when tested
- Room temperature is best.

② For accurate results, test must be completed within 75 seconds.
- Follow recommended test times. Use a stopwatch.

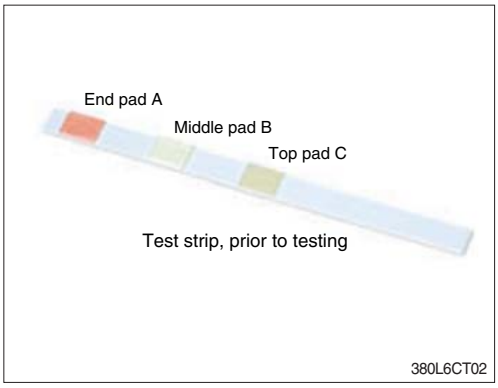
③ Record and track results.

380L6CT01

(2) Test instruction

① Remove one strip from bottle and replace cap immediately.
Do not touch the pads on the end of the strip. Discard kit if nitrite test pads of unused strips have turned brown.

② Dip strip for 1 second in coolant sample, remove, and shake strip briskly to remove excess liquid.



380L6CT02

③ 45 seconds after dipping strip, compare results to color chart and record in the following order:

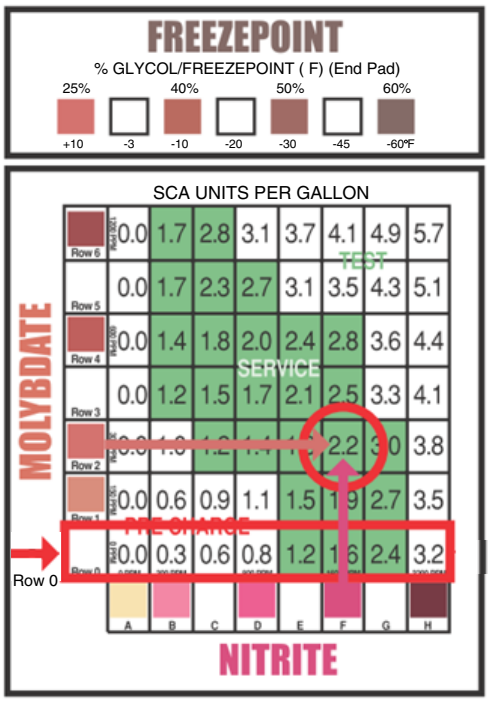
for DCA4:

a FREEZEPOINT
b MOLYBDATE
c NITRITE

④ All three readings must be completed no later than 75 seconds after dipping strip.

⑤ If uncertain about the color match, pick the low numbered block.
ex.) If nitrite color is not F, use column E.

⑥ Determine where the molybdate level intersect the nitrite level on the chart. The amount of SCA units per gallon in the cooling system is given where the molybdate row intersect the nitrite column.



380L6CT03

(3) Maintenance actions based on results

① Above normal

ABOVE NORMAL - Do not replace the coolant filter or add DCA4 liquid until additive concentration falls below 3 units per gallon.

- Test at every subsequent coolant filter change interval.

② Normal

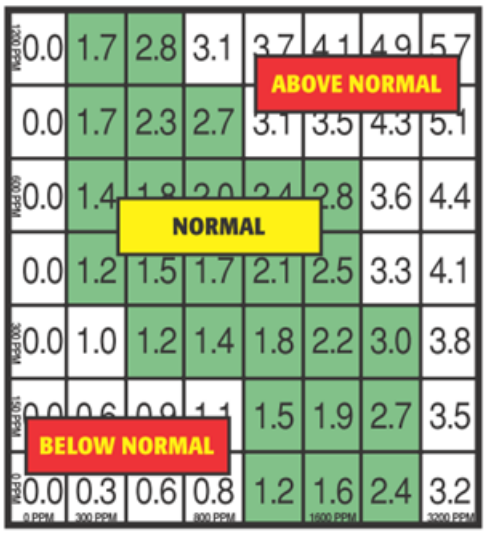
NORMAL - Continue to replace the coolant filter at your normal interval.

③ Below normal

BELOW NORMAL - Replace the coolant filter and add 1 pint of additive per each 4 gallons of coolant.

- Replace the coolant filter and add 40 cc of additive per each 1 liter of coolant.

※ If you need part number of Test kit or DCA4, please see Parts Manual.



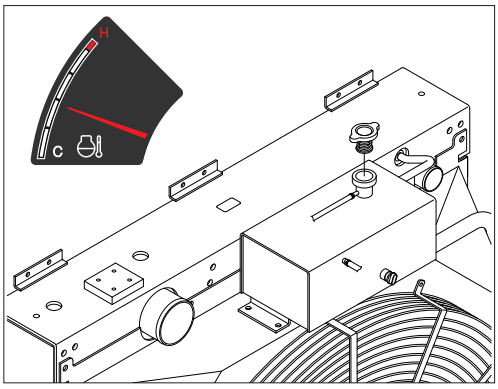
380L6CT04

5) FLUSHING AND REFILLING OF RADIATOR

(1) Change coolant

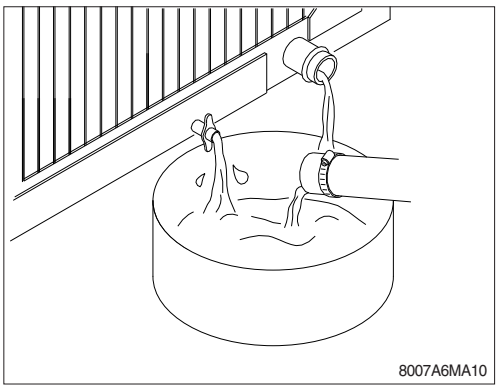
⚠ Avoid prolonged and repeated skin contact with used antifreeze. Such prolonged repeated contact can cause skin disorders or other bodily injury.
Avoid excessive contact-wash thoroughly after contact.
Keep out of reach of children.

※ 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.



120096MA13

⚠ 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 100 liters (26.4 U.S.gallons) will be adequate in most applications.

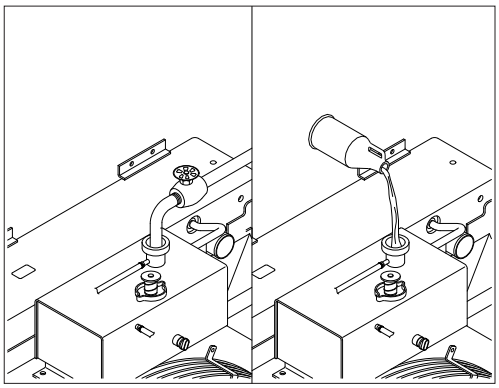

8007A6MA10

(2) Flushing of cooling system

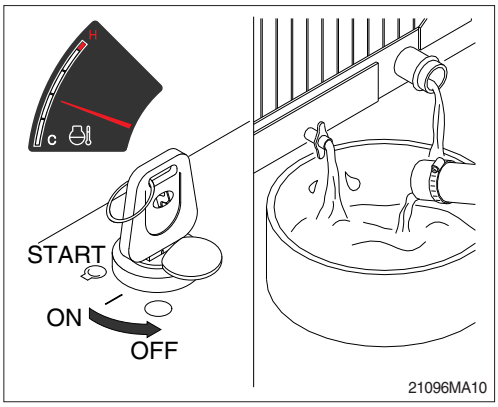
① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).

※ 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 surge tank cap. The engine is to be operated without the cap for this process.


120096MA14

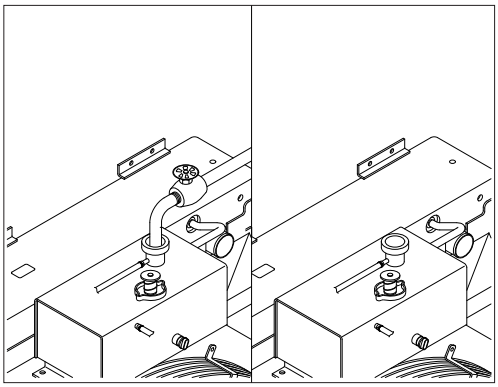
② Operate the engine for 5 minutes with the coolant temperature above 85˚C (185˚F).
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

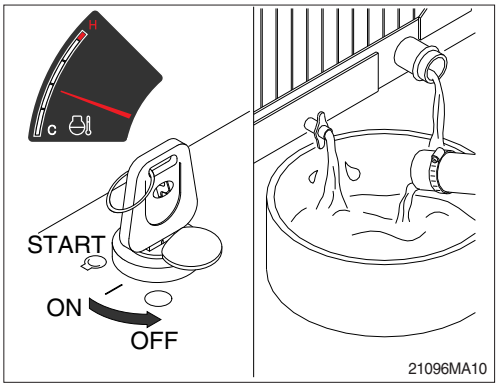
※ **Be sure to vent the engine and aftercooler for complete filling.**

※ **Do not install the surge tank cap and the new coolant filter.**



④ Operate the engine for 5 minutes with the coolant temperature above 85˚C (185˚F).
Shut the engine off, and drain the cooling system.

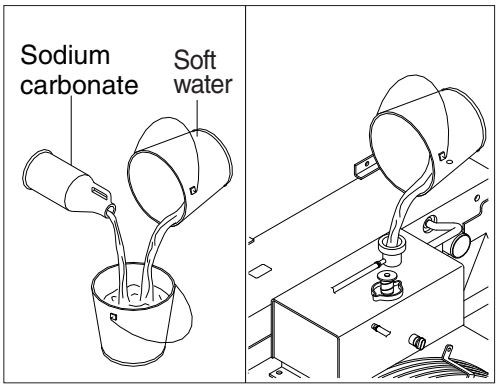
※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**



(3) Cooling system filling

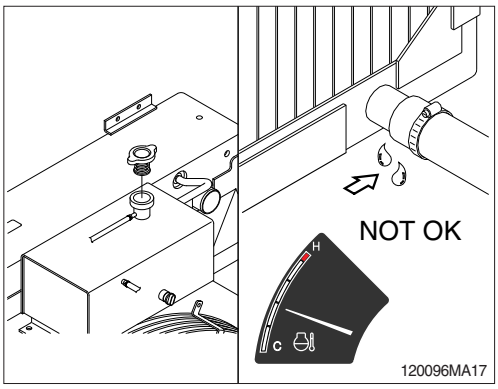
① Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-10.
Coolant capacity (engine only) : 46 ℓ (12 U.S. gallons)

※ **Do not use hard water such as river water or well water.**



120096MA16

② Install the pressure cap. Operate the engine until it reaches a temperature 70˚C (160˚F), and check for coolant leaks.
Check the coolant level again to make sure the system is full of coolant.



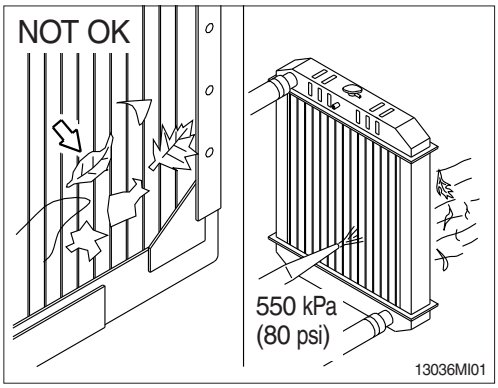
120096MA17

6) 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.

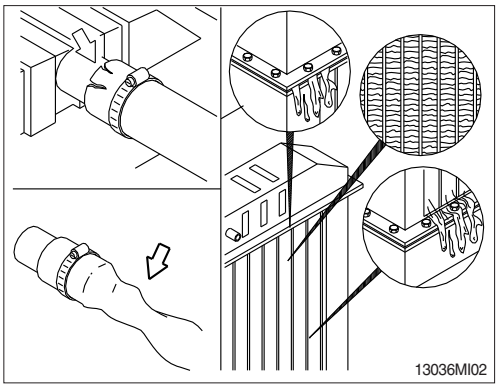


13036MI01

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

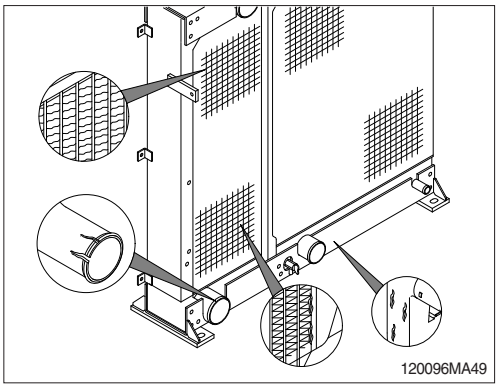
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

(4) Visually inspect the radiator for core leaks.


13036MI02

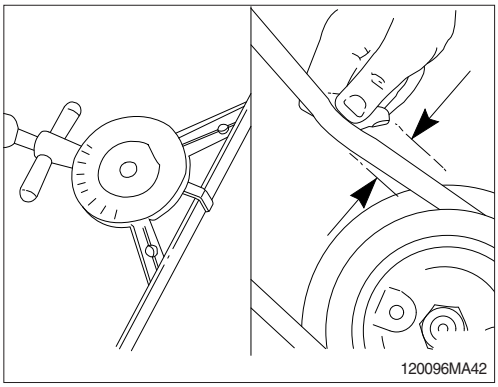
7) CHECK CHARGE AIR COOLER

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.

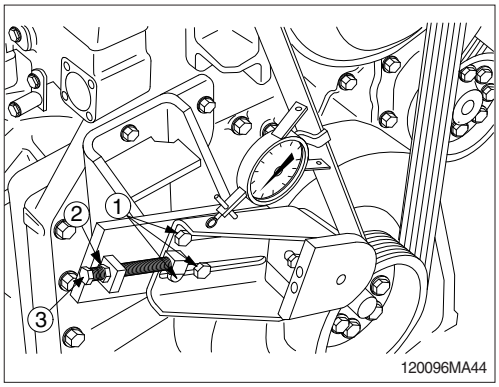


8) FAN BELT TENSION

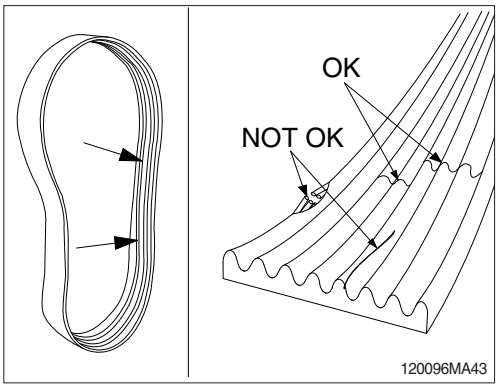
(1) Use the belt tension gage to measure the belt tension.
- Fan belt tension : 11.3 kg (25 lb)



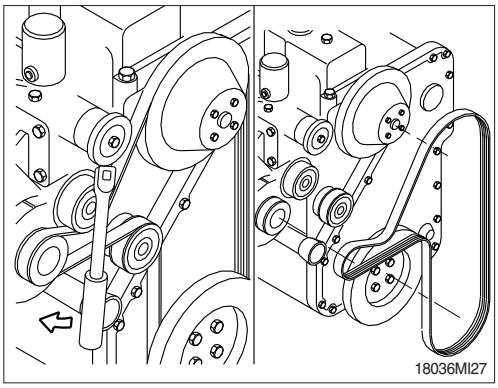
(2) Loosen the tensioner clamping bolts (1).
Loosen the adjusting screw locknut (2).
Turn the adjusting screw (3) clockwise to increase belt tension and counterclockwise to decrease belt tension.



(3) Inspect the drive for damage.



(4) Inspect the drive belt and fan hub.



9) INSPECTION OF COOLING FAN

⚠ Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade and cause fan failure.

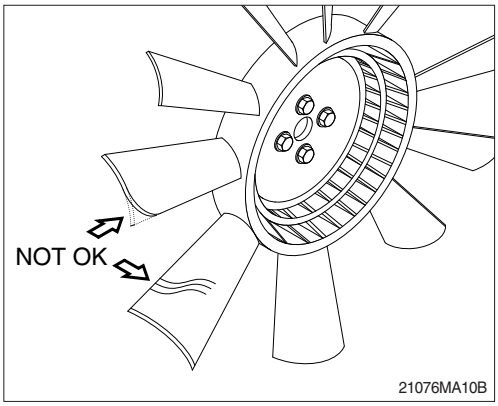
※ Rotate the crankshaft by using the engine barring gear.

※ A visual inspection of the cooling fan is required daily.

Check for cracks, loose rivets, and bent or loose blades.

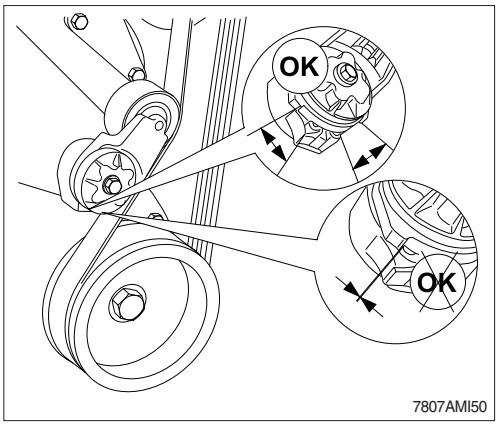
Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.

Replace any fan that is damaged.

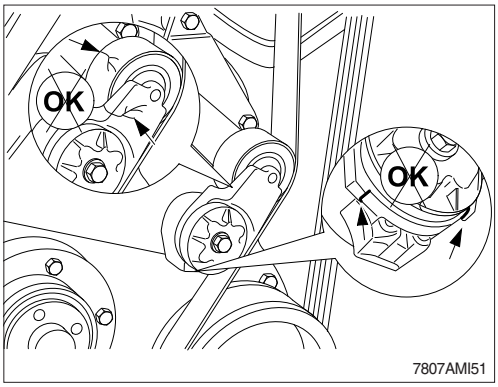


10) BELT TENSIONER, AUTOMATIC ADJUSTMENT

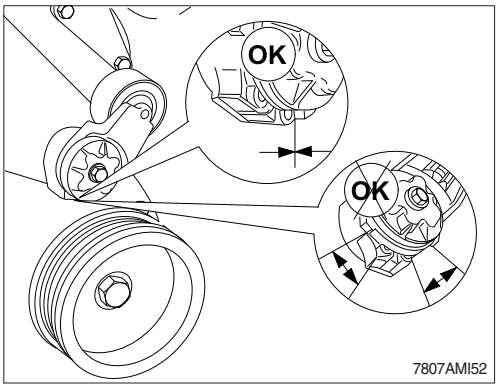
(1) Every 1000hours, or 1 year, whichever occurs first, inspect the automatic belt tensioner.
With the engine turned off, check that neither the top nor bottom tensioner arm stop is touching the cast boss on the tensioner body. If either of the stops is touching a boss, the alternator belt must be replaced. Check to make sure the correct belt part number is being used it either condition exists.



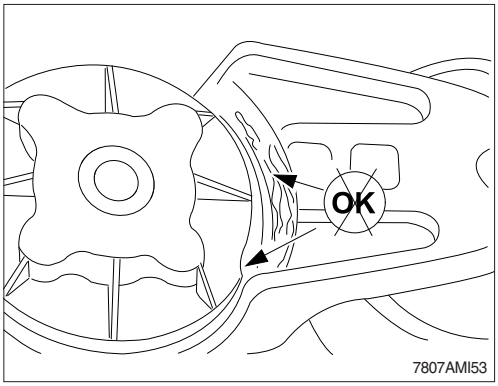
(2) Check the tensioner pulley and body for cracks. If any cracks are noticed, the tensioner must be replaced. Refer to a Cummins Authorized Repair facility. Check the tensioner for dirt buildup. If this condition exists, the tensioner must be removed and steam-cleaned.



(3) Check that the bottom tensioner arm stop is in contact with the bottom tensioner arm stop boss on the tensioner body. If these two are not touching, the tensioner must be replaced.



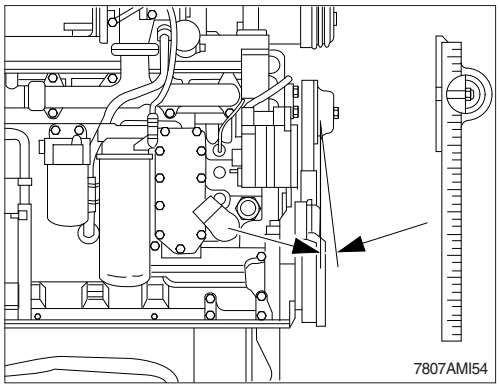
(4) Inspect the tensioner for evidence of the pivoting tensioner arm contacting the stationary circular base. If there is evidence of thess two areas touching, the pivot tube bushing has failed and the tensioner must be replaced.



(5) A worn tensioner that has play in it or a belt that "walks" off its pulley possibly indicates pulley misalignment.

※ **Maximum pulley mislignment is three degrees. This measurement can be taken with a straight-edge and an inclinometer.**

(6) Install the belt.



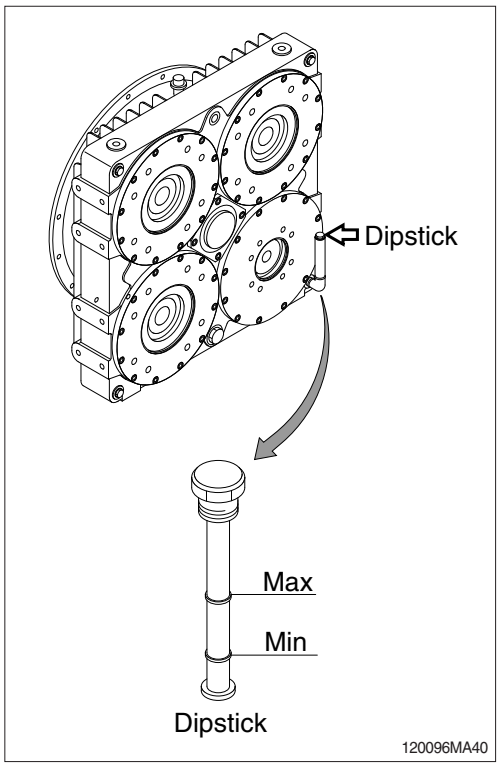
11) CHECK GEAR BOX OIL LEVEL

Check the oil level with the machine on a flat ground.

(1) Pull out the dipstick and wipe with a clean.

(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 than check again.



12) CHANGE GEAR BOX OIL

(1) Warm up the gear box.

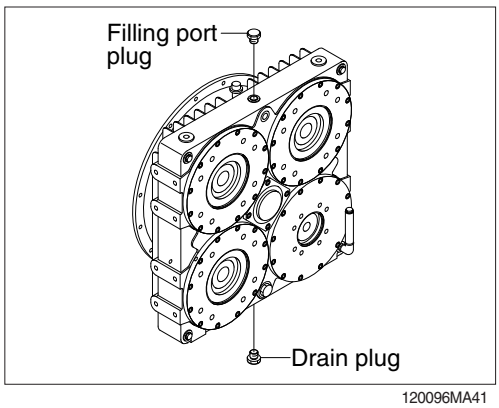
(2) Prepare a proper container.

(3) Loosen the drain plug.

(4) Clean around the drain plug and tighten the drain plug.

Fill proper amount of recommeded oil.

· Amount of oil : 6.0 ℓ (1.6 U.S. gallons)



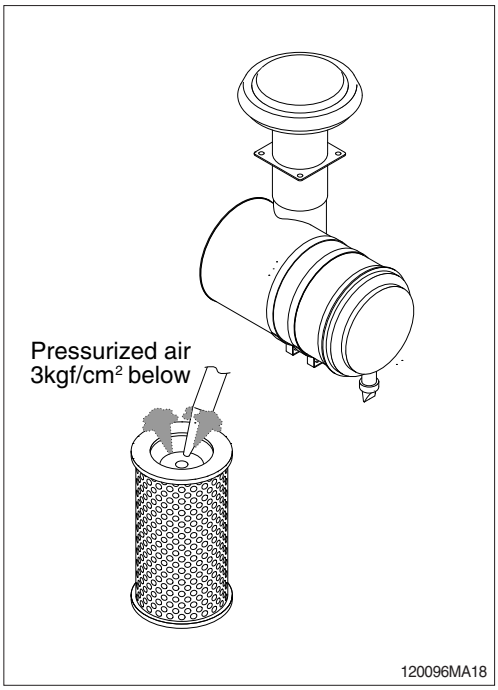
13) CLEANING OF AIR CLEANER

(1) Primary element

① Open the cover and remove the element.
② Clean the inside of the body.
③ Clean the element with pressurized air.
- Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.

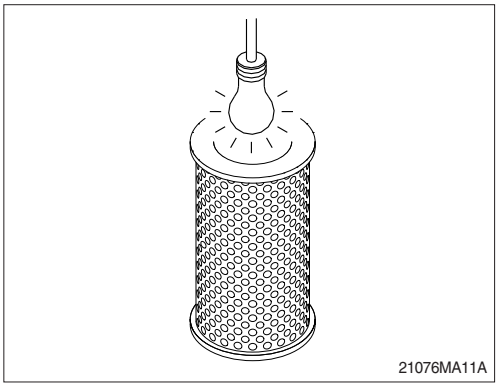
④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
⑤ Insert element and tighten wing nut.

※ **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.

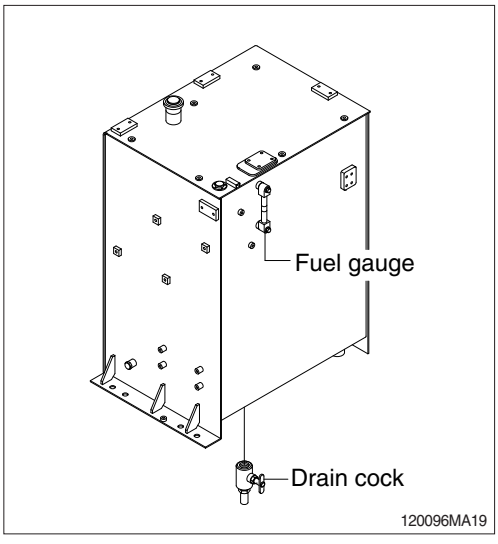


14) FUEL TANK

(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.



15) FUEL FILTER

※ Check all electrical connections for corrosion and all fuel fittings for leaks every 12 months.

※ Extreme winter or salt corrosion environments may require lubrication of the top collar threads with anti-seize lubricant every 180 days.

⚠ When diesel fuel is circulated through an operating engine, it can become very hot. To prevent personal injury.

⚠ Scalding hazard! Do not allow heated liquid fuel to come in contact with eyes or unprotected skin. Always allow the engine and fuel to cool to ambient temperature before replacing the fuel filter or performing service operations which could result in the spillage of fuel from the fuel system. If this is not possible, protective clothing (face shield, insulated hat, gloves, apron) must be worn.

⚠ Heated diesel fuel can form combustible vapor mixtures in the area around the fuel source. To eliminate the potential for fire, keep open flames, sparks or other potential ignition sources away from the work area, and do not smoke during filter replacement or service operations which could result in the escape of diesel fuel or fuel vapors.

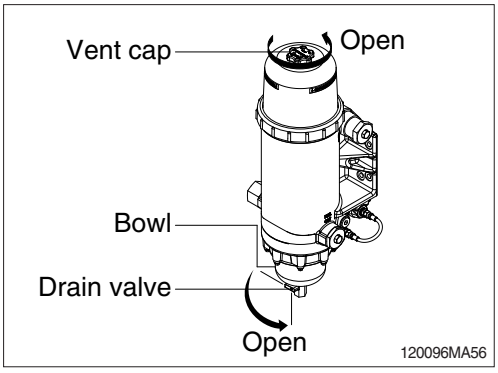
⚠ Always perform engine or vessel fuel system maintenance in a well ventilated area that is kept free of bystanders.

⚠ To ensure priming pump hoses are not kinked by mishandling, do not lift or handle the fuel processor by the hoses. Do not allow the weight of the processor to rest on the hoses.
To avoid fuel line water traps that can freeze in cold conditions and restrict, or block, the flow of fuel to the engine, be certain that there are no low spots in the hoses when routing them in the engine compartment.

※ To avoid damaging the aluminum fuel housing, do not overtighten fuel lines or line fittings. Do not exceed 9.0 kgf·m (65 lbf·ft).

(1) Drain water

① Turn off the engine and open the vent cap.
② Place a suitable container under the drain valve at the base of the fuel filter and open the drain valve.
③ Water and contaminants will flow into the container. When fuel begins to flow out of the drain, close the drain valve.
④ Tighten the vent cap by hand until it “clicks.”
⑤ Start the engine. Raise the RPM for one minute to purge the air from the system.



(2) Replace element

① Turn off the engine. Remove the vent cap and dispose of the O-ring. Clean the threads of the vent cap and on the top of the cover. Set the vent cap aside.

② Open the drain valve and drain the fuel completely from the unit, then close the drain valve.

※ **The unit must be completely drained to prevent contamination of the clean side of the filtration system.**

③ Using the collar wrench loosen the collar. Remove the clear cover and collar from the fuel filter. Discard the cover O-ring and install a new O-ring (supplied with the filter) on the cover. Clean the threads on the collar and body of the fuel filter.

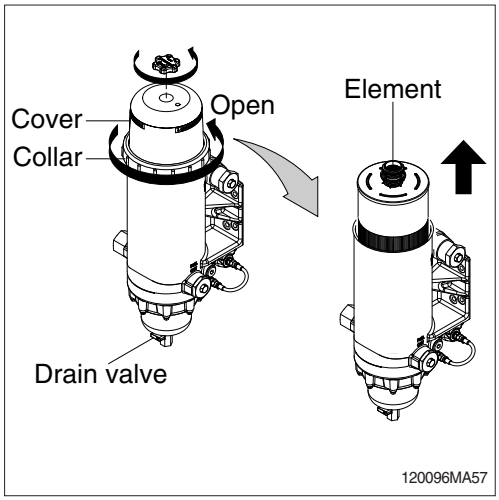
④ Install the new O-ring on the vent cap (supplied with the filter).

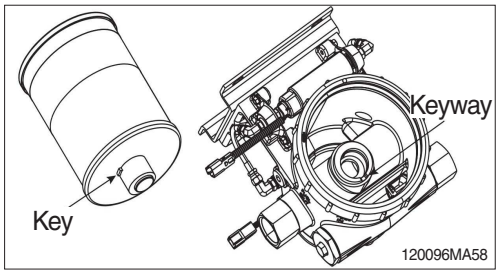
⑤ Remove the filter element from the fuel filter by pulling upward.

⑥ Install the new filter element. The right figure shows a key of the filter which fits into a keyway on the center boss. Position the filter element so the filter element key is lined up with the keyway on the center boss of the housing and press the filter element into the housing. Ensure the filter element is fully seated by firmly pushing on the end plate.

⑦ After checking to make sure the new O-ring seal is seated correctly on the base of the cover, install the cover and collar.
Simultaneously apply modest pressure to the top of the cover and turn the collar until it no longer spins freely. Using the collar wrench, tighten the collar the distance of two additional ribs.

⑧ Prime the fuel system according to the steps in the "Priming the fuel system" instructions below. (The vent cap will be returned to the fuel filter during the priming process).





(3) Priming the fuel system

① Check to make sure the drain valve at the base of the fuel filter is closed. Close the fuel shutoff valve (if equipped).

② Remove the vent cap from the top of the clear cover. Fill the fuel filter full of clean fuel. Tighten the vent cap (tighten by hand only) until it "clicks."

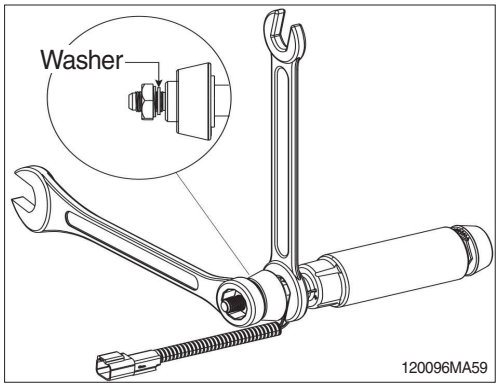
③ Open the fuel shutoff valve (if equipped). Start the engine. When the lubrication system reaches its normal operating pressure, increase engine speed to high idle for one to two minutes. Loosen the vent cap until the fuel level drops to just above the collar. Tighten the vent cap (tighten by hand only) until it "clicks."

※ **The clear filter cover will not fill completely during engine operation. It will gradually fill over time and the fuel level will rise as the filter becomes clogged.**

(4) Servicing the primer pump

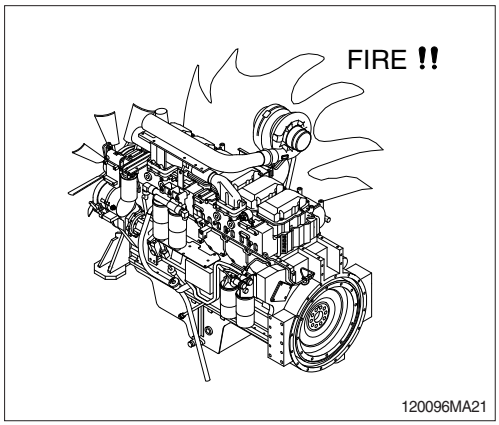
① Remove the fitting on the end of the pump using two wrenches to hold the end stationary as the fitting is loosened.

② The washer on the fittings must be in place when reassembled.



16) 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.**

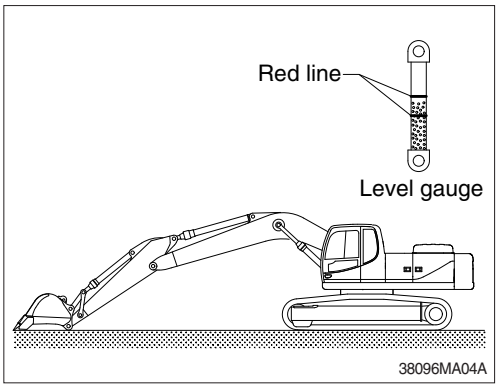


18) HYDRAULIC OIL CHECK

(1) Position the machine as shown in the illustration on the right. Please stop the engine and wait for about 5 minutes.

(2) Check the oil level at the level gauge of hydraulic oil tank.

(3) The oil level is normal if between the red lines.



19) FILLING HYDRAULIC OIL

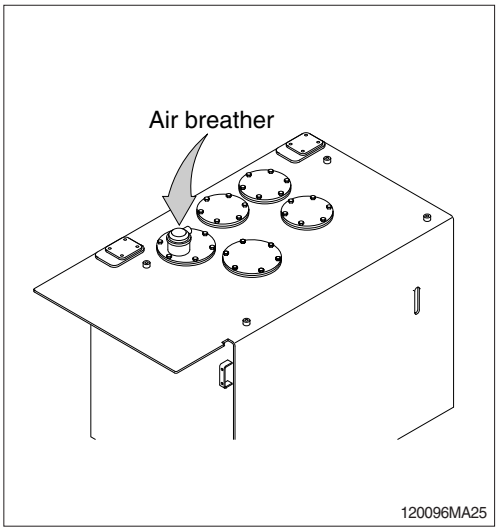
(1) Stop the engine to the position of level check.

(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 : 1.44±0.3 kgf · m
(10.4±2.1 lbf · ft)

(4) Start engine after filling and operate the work equipment several times.

(5) Check the oil level at the level check position after engine stops.



20) 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.

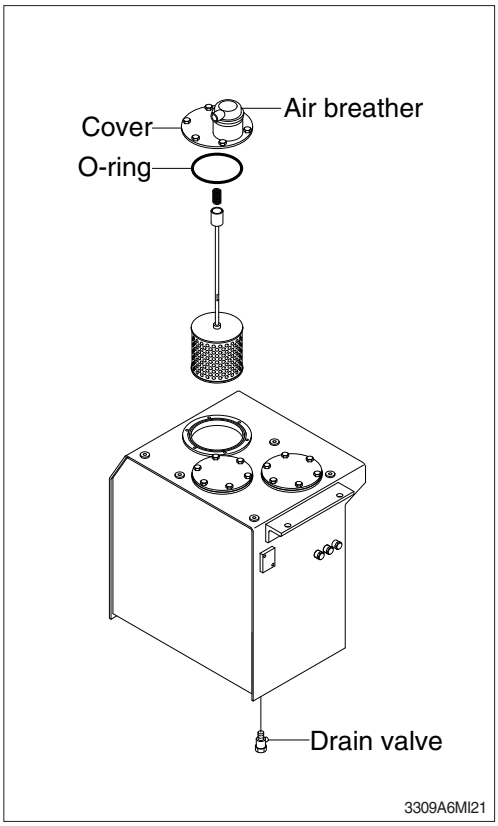
(5) To drain the oil loosen the drain plug at the bottom of the oil tank.

(6) Fill proper amount of recommended oil.

(7) Put the breather in the right position.

(8) Bleed air hydraulic pump loosen the air breather at top of hydraulic pump assembly.

(9) Start engine and run continually. Release the air by full stroke of each control lever.



21) 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)

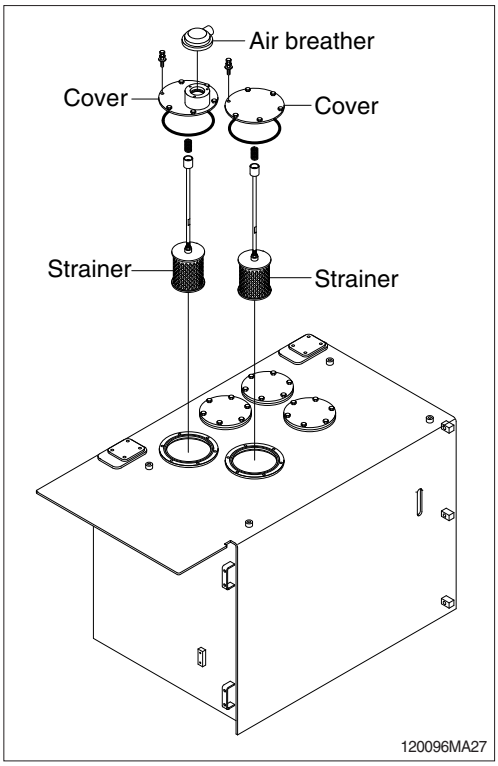
(2) Pull out the strainer in the tank.

(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.**



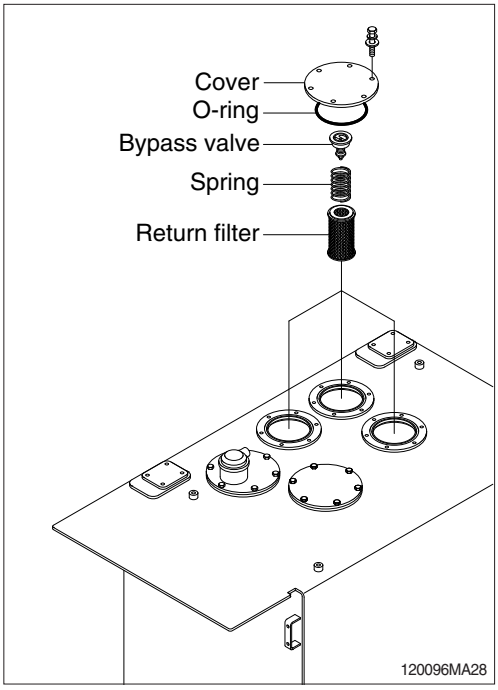
22) REPLACEMENT OF RETURN FILTER

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

(1) Remove the cover.
· Tightening torque : 6.9±1.4 kgf · m
(50±10 lbf · ft)

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

(3) Replace the element with new one.



23) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

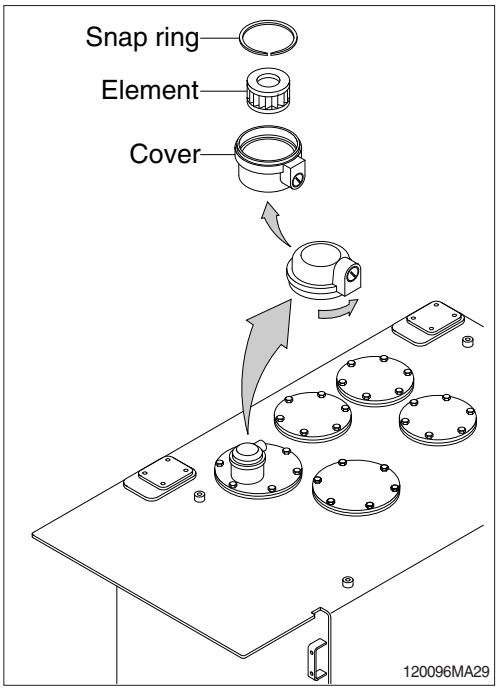
(1) Relieve the pressure in the tank by pushing the top of the air breather.

(2) Remove the cover.

(3) Remove the snap ring and pull out the filter element.

(4) Replace the filter element new one.

(5) Reassemble by reverse order of disassembly.
- Tightening torque : 0.2~0.3 kgf · m
  (1.4~2.1 lbf · ft)

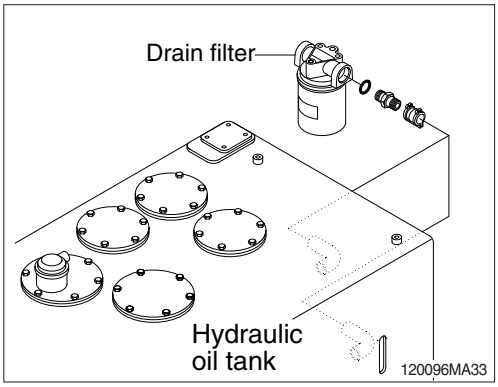


24) REPLACE OF DRAIN FILTER CARTRIDGE

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 250 hours of operation. Thereafter, change cartridge every 1000 hours.**



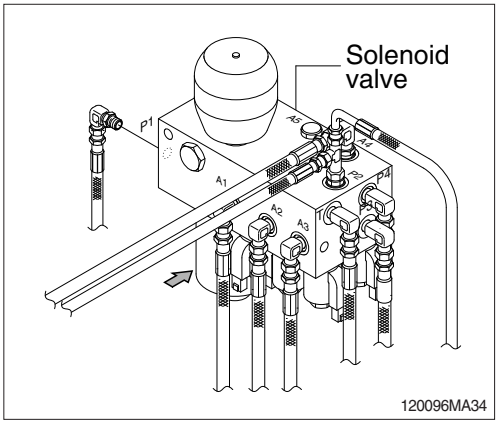
25) REPLACE OF PILOT LINE FILTER

(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.**

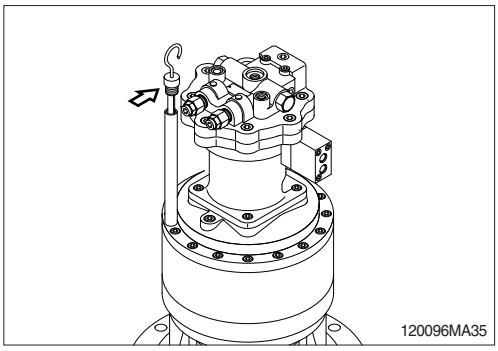


26) CHECK THE SWING REDUCTION GEAR OIL

(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.



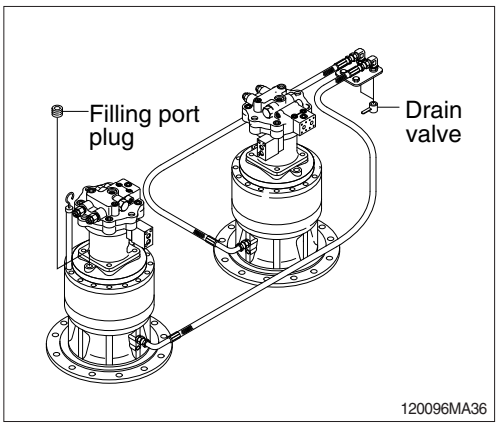
27) CHANGE SWING REDUCTION GEAR OIL

(1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.

(2) Prepare a proper container.

(3) Loosen the drain valve.

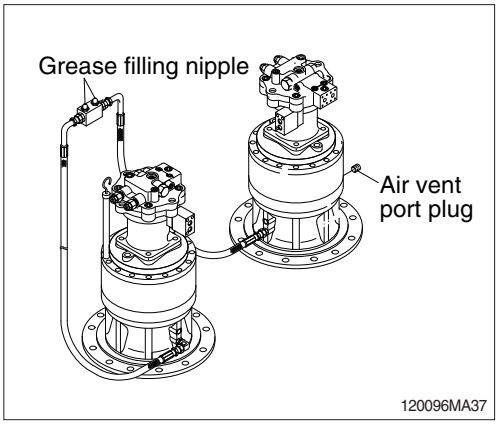
(4) Clean around the valve and close the drain valve.
Fill proper amount of recommended oil.
· Amount of oil (each) : 8.0 ℓ (2.1 U.S.gal)



28) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

(1) Remove air vent plug.

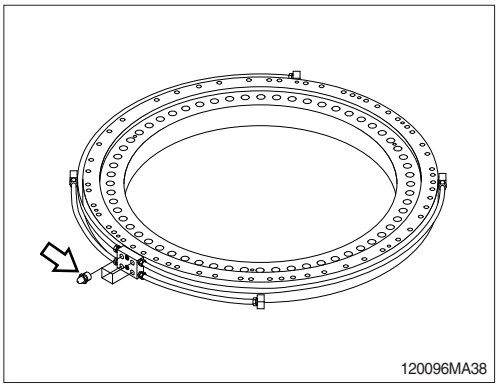
(2) Lubricate NLGI No.2 with grease gun until comes out new grease from air vent port.
· Amount of oil : 1.6 kg (0.42 lb)



29) LUBRICATE SWING BEARING

(1) Grease at 4 fitting.

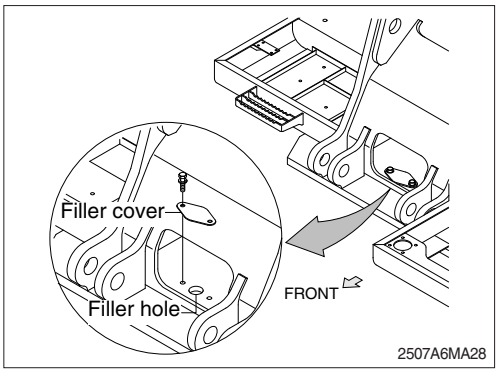
※ **Lubricate every 50 hours.**



30) SWING GEAR AND PINION

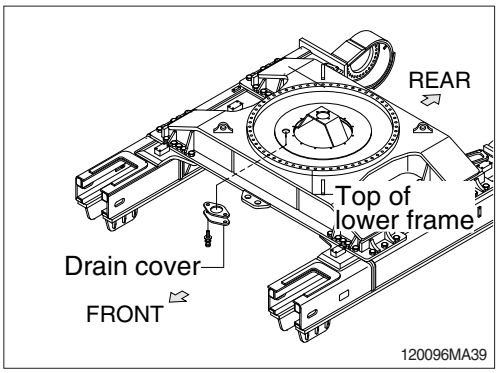
(1) Drain old grease

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 : 50 kg (110 lb)

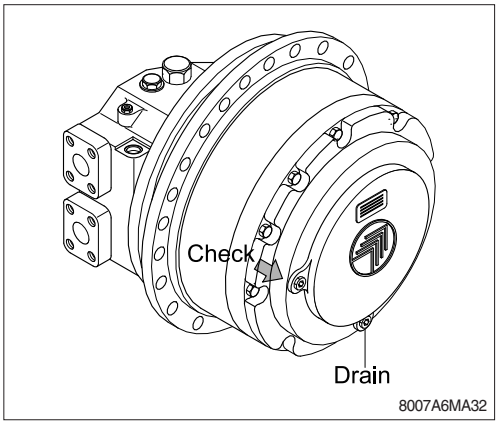


31) CHECK THE TRAVEL REDUCTION GEAR OIL

(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.

· Amount of oil : 20 ℓ (5.3 U.S.gal)



32) 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.

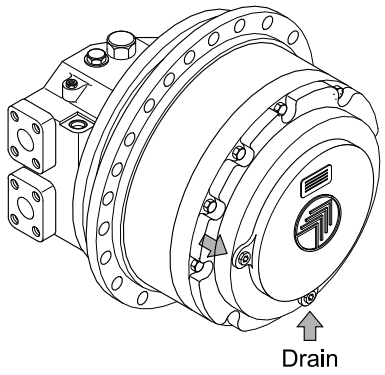
(3) Loosen the level plug and then the drain plug.

(4) Drain the oil to adequate container.

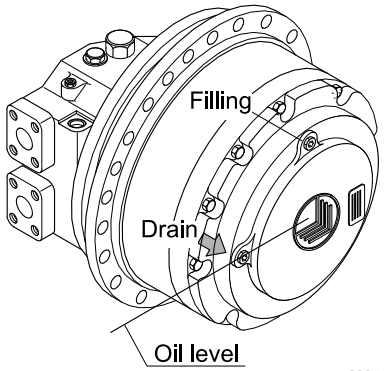
(5) Tighten the drain plug and fill specified amount of oil at filling port.

(6) Tighten the level plug and travel slowly to check if there is any leakage of oil.

· Draining position



· Filling position



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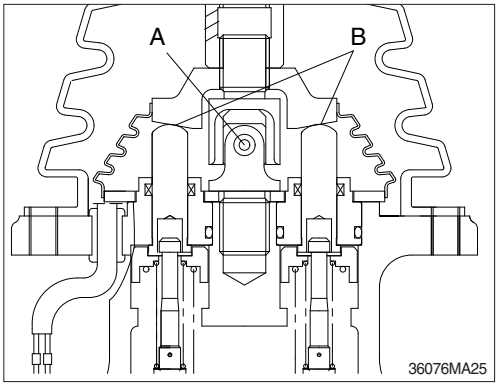
33) LUBRICATE RCV LEVER

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



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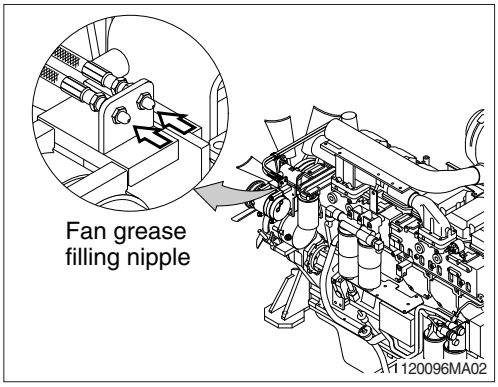
34) LUBRICATE ENGINE FAN SYSTEM

(1) Grease at 2 fitting.

· Capacity : 0.2 ℓ (0.05 U.S.gal)



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35) ADJUSTMENT OF TRACK TENSION

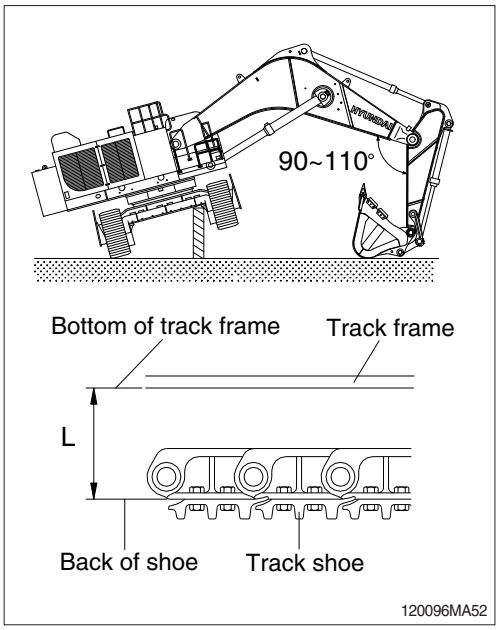
※ It is important to adjust the tension of track properly to extend the lifetime of track and traveling device.

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

(1) Raise the chassis with the boom and arm.

(2) Measure the distance between bottom of track frame on track center and track of shoe.

※ Remove mud with rotating the track before measur-ing.



(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.

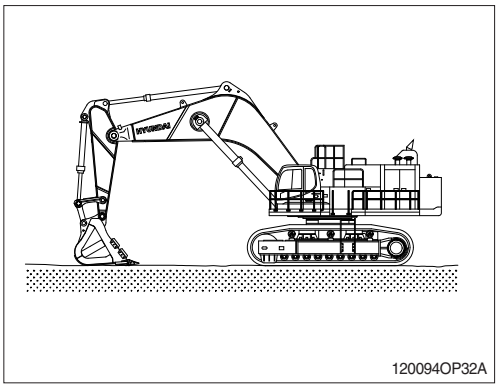
Working condition	Length (L)	
General	470~510 mm	18.5~20.0"

36) 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.**



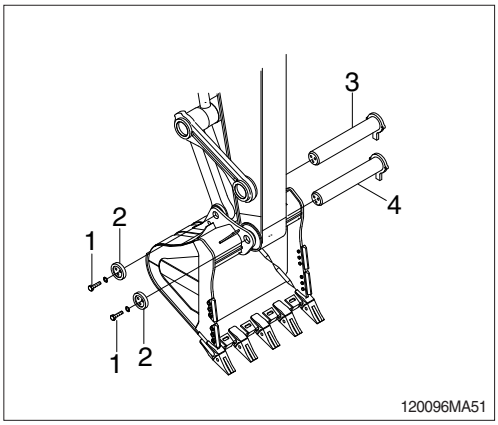
(1) Lower the bucket on the ground as the picture shown in the right.

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

(3) Remove the stopper bolts (1) and stopper (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.**

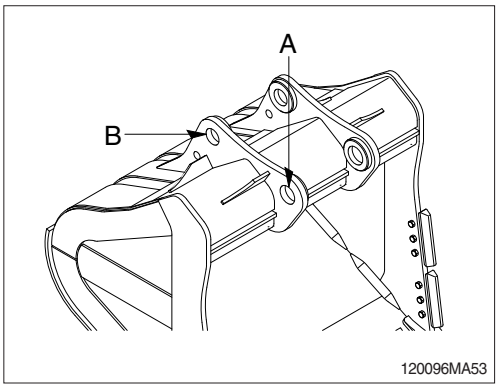
※ **If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.**



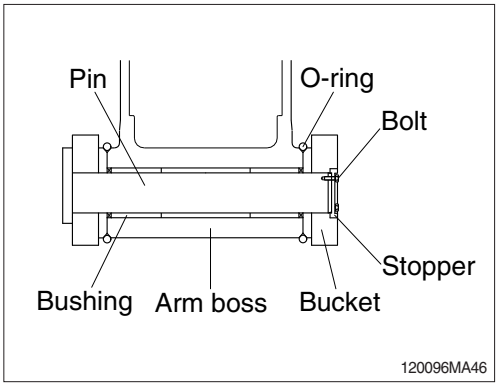
※ **After remove the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.**

(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.

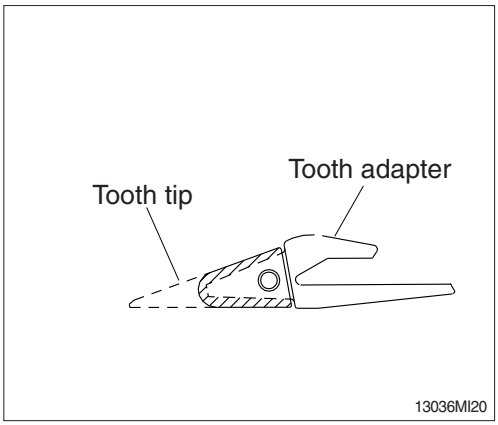


37) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth tip before adapter starts to wear.

② If excessive use, tooth adapter has worn out, replacement may become impossible.



(2) Instructions for replacement

① Pull out pin by striking pin with punch or hammer, avoiding damage to locking washer.

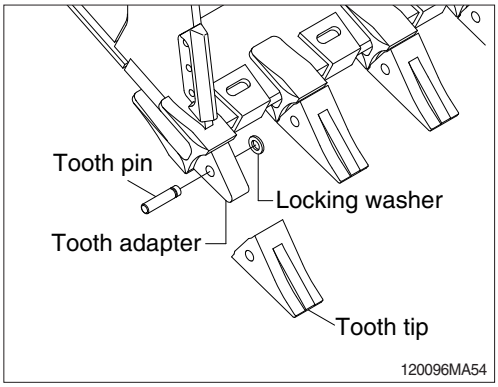
② Remove dust and mud from surface of tooth adapter by using knife.

③ Place locking washer in its proper place, and fit tooth tip to adapter.

④ Insert pin until locking washer is positioned at tooth pin groove.

⚠ Personal injury can result from bucket falling.

⚠ Block the bucket before changing tooth tips or side cutters.



38) ADJUSTMENT OF BUCKET CLEARANCE

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

(2) Swing to the left 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 (1), and remove stopper (2), and shim (3).

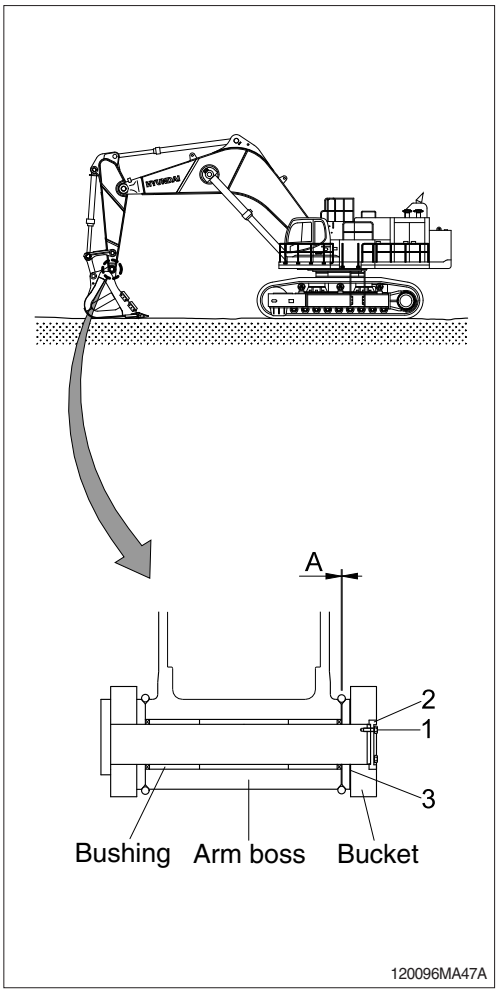
② Remove the shim equivalent value with measuring value.

③ Assemble the parts in the reverse order of removal.

· Tightening torque : 100±15 kgf · m
(723±108 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.

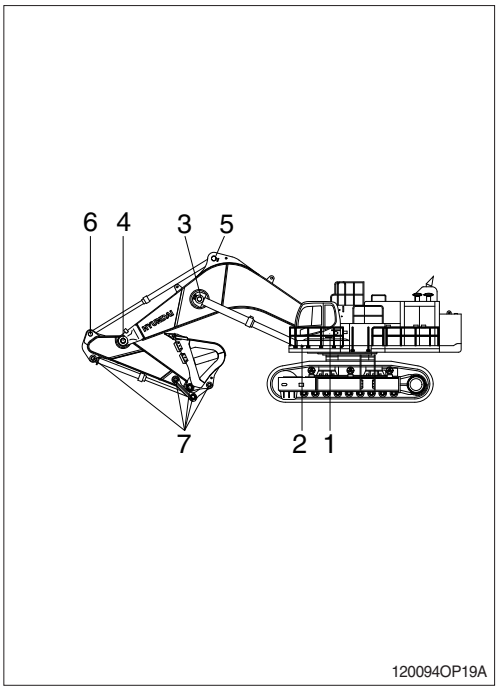


39) LUBRICATE PIN AND BUSHING

(1) Lubricating point

No.	Description	Qty
1	Boom and upper frame connection pin	2
2	Boom cylinder head pin	2
3	Boom cylinder rod pin	2
4	Boom and arm connection pin	2
5	Arm cylinder head pin	1
6	Arm cylinder rod pin	1
7	Bucket cylinder pin(head, rod)	2
	Bucket link(control rod)	3
	Arm and bucket connection pin	1
	Arm and control link connection pin	1

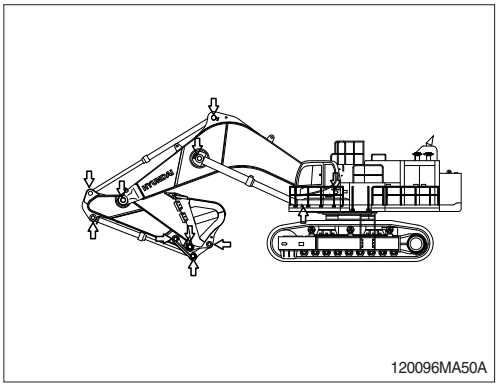
※ **Refer to the page 8-1 for central grease lubrication system.**



120094OP19A

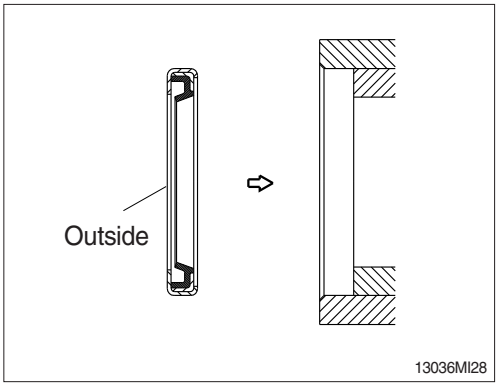
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ **Mount the lip to be faced outside when replace the dust seal.**


120096MA50A

※ **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.**



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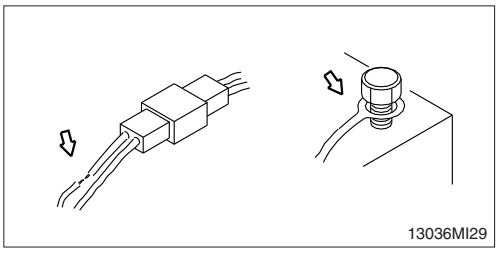
7. ELECTRICAL SYSTEM

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

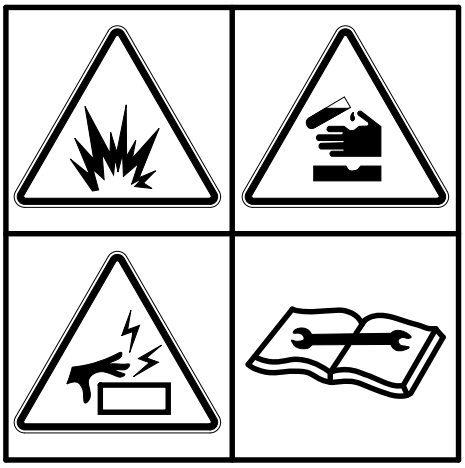
(1) Clean

① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.

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

⚠ Always wear protective glasses when working with batteries.

⚠ Do not stain clothes or skin with electrolyte as it is acid.
Be careful not to get the electrolyte in eyes.
Wash with clean water and go to the doctor if it enters the eyes.



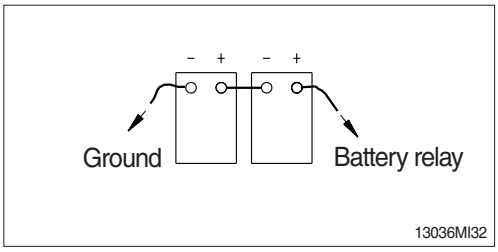
(2) Recycle

Never discard a battery.
Always return used batteries to one of the following locations.

- A battery supplier
- An authorized battery collection facility
- Recycling facility

(3) Method of removing the battery cable

Remove the cable from the ground connection first (⊖ terminal side) and reconnect it last when reassembling.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

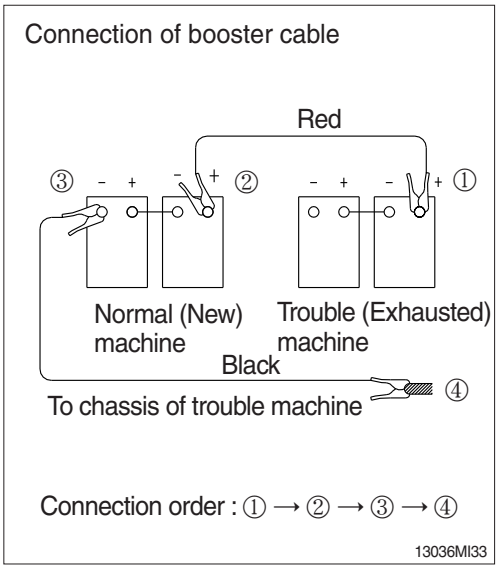
※ Use the same capacity of battery for starting.

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

② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.

③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.

※ Keep firmly all connection, the spark will be caused when connecting finally.

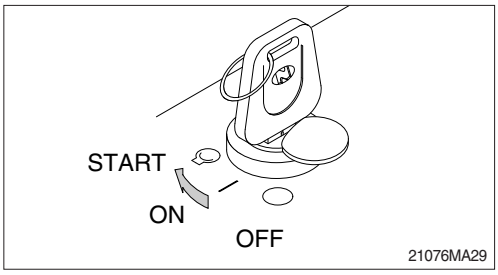


(2) Starting the engine

① Starting the engine of the normal machine and keep it to run at high idle.

② Start engine of the trouble machine with starting switch.

③ If you can not start it by one time, restart the engine after 2 minutes.



(3) Taking off the booster cable

① Take off the booster cable (black).

② Take off the booster cable (red) connected to the (+) terminal.

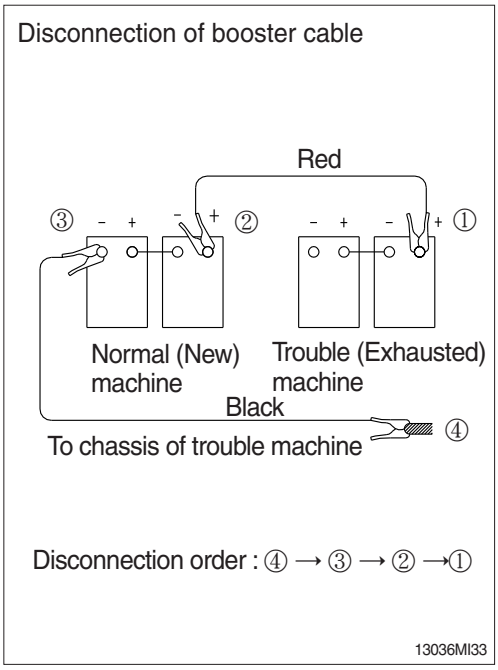
③ Run engine with high idle until charging the exhausted battery by alternator, fully.

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

※ Charge the battery in the well ventilated place.

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

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



(4) Welding repair

Before start to welding, follow the below procedure.

① Shut off the engine and remove the starting switch.

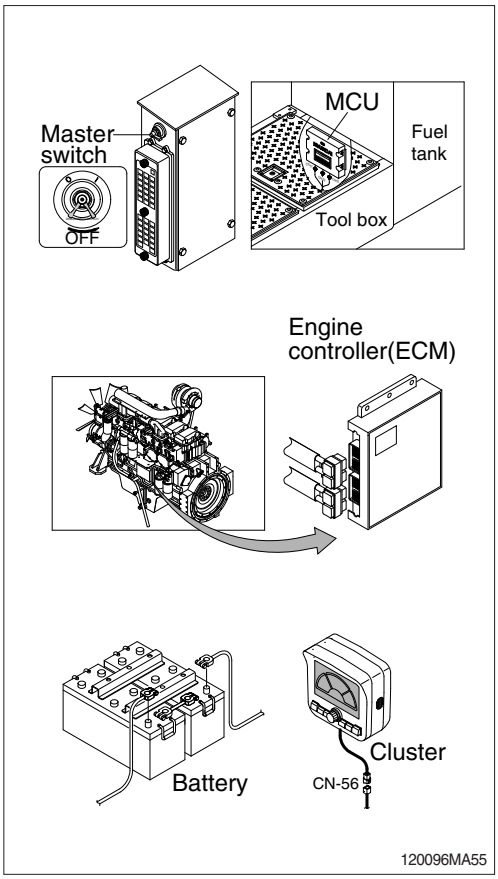
② Disconnect ground cable from battery by master switch.

③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units(MCU, ECM, 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.

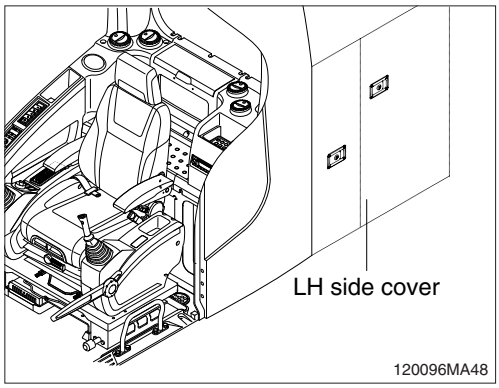


8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF FRESH AIR FILTER

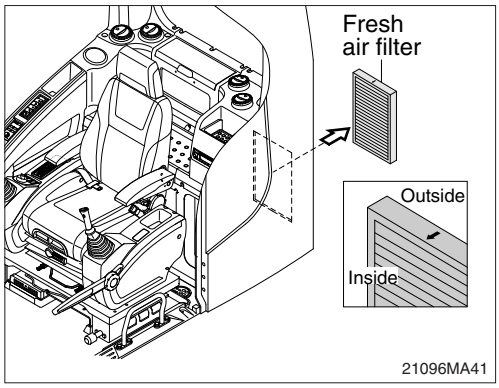
※ **Always stop the engine before servicing.**

(1) Open the LH side cover.



(2) Remove the fresh air filter.

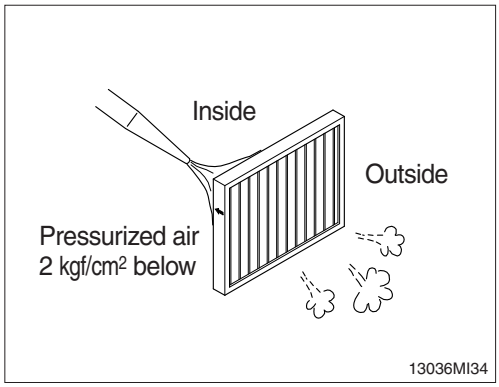
※ **When installing a filter, be careful not to change the filter direction.**



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

△ **When using pressurized air, be sure to wear safety glasses.**

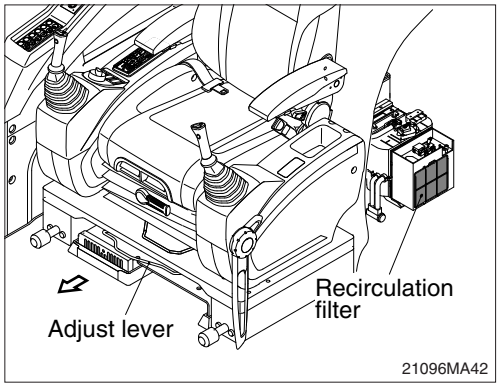
(4) **Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.**



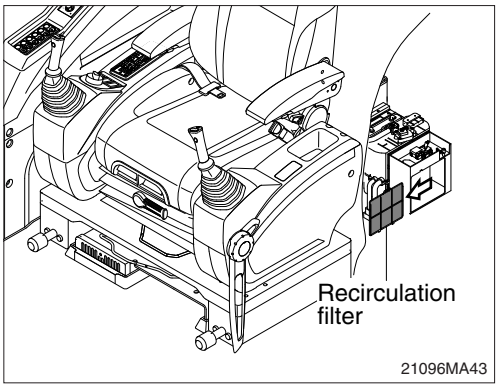
2) CLEAN AND REPLACE OF RECIRCULATION FILTER

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

(1) Move seat and console box to arrow direction using the adjust lever.



(2) Remove recirculation filter.

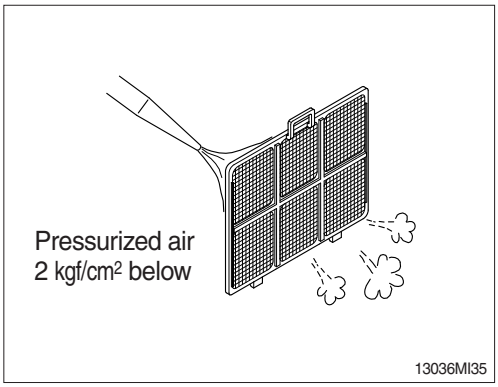


(3) Clean the recirculation filter using a pressurized air (below 2 kgf/cm², 28 psi) or washing with water.

△ **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.

6) Refrigerant (R134-a) amount : 1000 ± 50 g

7) COMPRESSOR LUBRICANT OIL (SYNTHETIC OIL) : 265mL

1. ENGINE

※ This guide is not intended to cover every conditions, however many of the more common possibilities are listed.

Trouble	Service	Remark
The engine oil pressure lamp lights ON when engine speed is raised after completion of warm up.	· Add the oil to the specified level. · Replace the oil filter cartridge. · Check oil leakage from the pipe or the joint. · Replace the monitor.	
Steam is emitted from the top part of the radiator (the pressure valve). Coolant level warning lamp lights ON.	· Supply the coolant and check leakage. · Adjust fan belt tension. · Wash out inside of cooling system. · Clean or repair the radiator fin. · Check the thermostat. · Tighten the radiator cap firmly or replace the packing of it. · Replace the monitor.	
The engine does not start when the starting motor is turned over.	· Add fuel. · Repair where air is leaking into fuel system. · Check the injection pump or the nozzle. · Check the valve clearance. · Check engine compression pressure.	
Exhaust gas is white or blue.	· Adjust to specified oil quantity. · Replace with specified fuel.	
Exhaust gas occasionally turns black.	· Clean or replace the air cleaner element. · Check the nozzle. · Check engine compression pressure. · Clean or replace the turbocharger.	
Combustion noise occasionally changes to breathing sound.	· Check the nozzle.	
Unusual combustion noise or mechanical noise.	· Check with specified fuel. · Check over-heating. · Replace the muffler. · Adjust valve clearance.	

2. ELECTRICAL SYSTEM

Trouble	Service	Remark
Lamp does not glow brightly even when engine runs at high speed. Lamp flickers while engine runs.	· Check for loose terminals and open-circuit wiring. · Adjust belt tension.	
Battery charging lamp does not go out even when engine runs at high speed.	· Check the alternator. · Check and repair wiring.	
Unusual noise is emitted from the alternator.	· Check the alternator.	
Starting motor does not turn when starting switch is turned ON.	· Check and repair the wiring. · Charge the battery. · Check the starting motor. · Check the safety relay.	
The pinion of the starting motor keeps going in and out.	· Charge the battery. · Check the safety relay.	
Starting motor turns the engine sluggishly.	· Charge the battery. · Check the starting motor.	
The starting motor disengages before the engine starts up.	· Check and repair the wiring. · Charge the battery.	
The engine warming up lamp does not go ON.	· Check and repair wiring. · Check the monitor.	
The engine oil pressure lamp does not light up when engine is stationary (when the starting switch is in ON position.)	· Check the monitor. · Check the caution lamp switch.	
Battery charging lamp does not light up when the engine is stationary. (when the starting switch is in ON position.)	· Check the monitor. · Check and repair the wiring.	

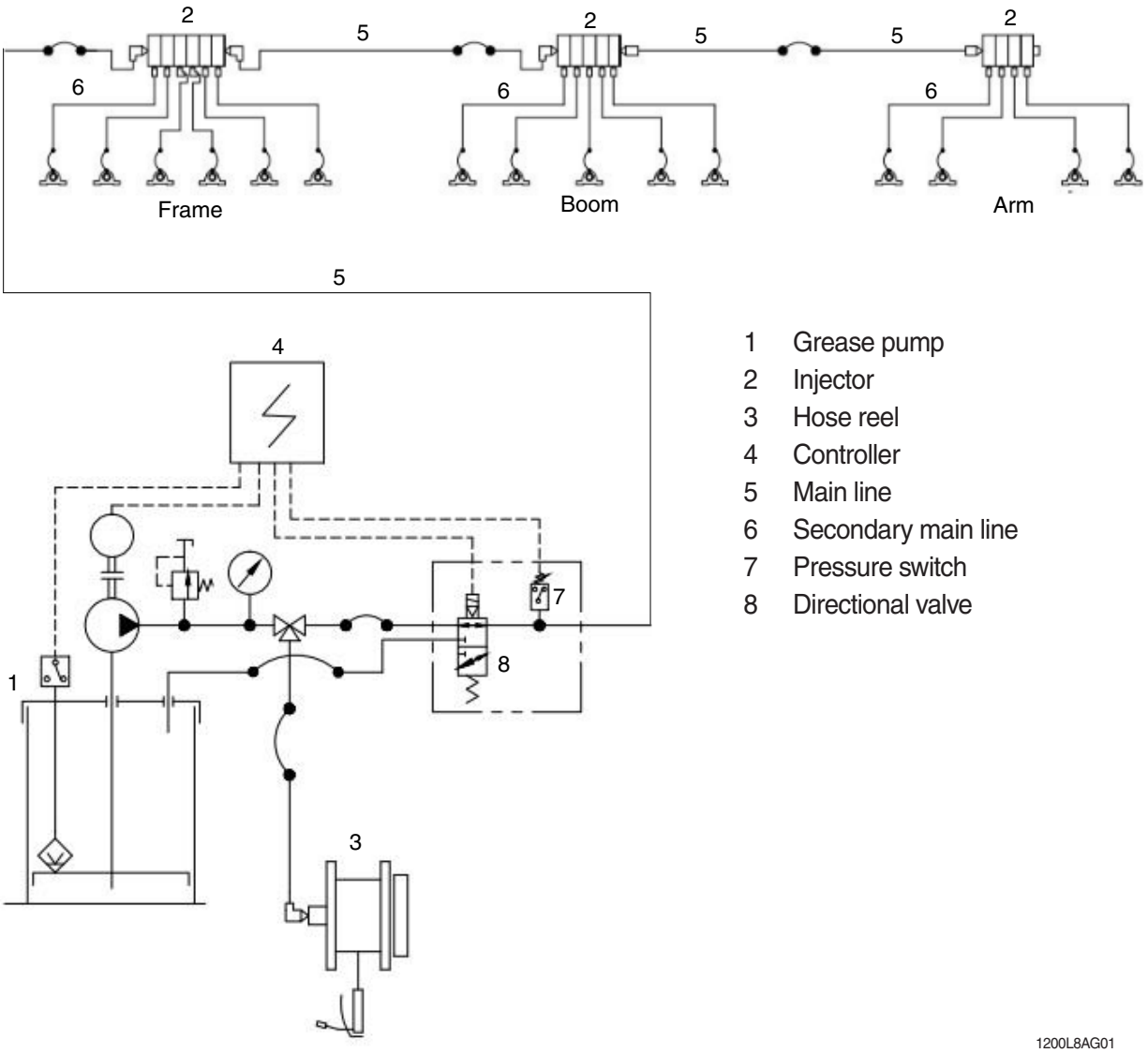
3. OTHERS

Trouble	Service	Remark
Track slip out of place. Excessive wear of the sprocket.	· Adjust tension of track.	
Bucket either rises slowly or not at all.	· Add oil to specified level.	
Slow speed of travel, swing, boom, arm and bucket.	· Add oil to specified level.	
Unusual noise emitted from pump.	· Clean the hydraulic tank strainer.	
Excessive oil temperature rise of hydraulic oil.	· Clean the oil cooler. · Adjust fan belt tension. · Add oil to specified level.	

1. CENTRAL GREASE LUBRICATION SYSTEM

1) OUTLINE

(1) System diagram



1 Grease pump
2 Injector
3 Hose reel
4 Controller
5 Main line
6 Secondary main line
7 Pressure switch
8 Directional valve

1200L8AG01

(2) Major device

① **Grease pump**
A device for generating a high pressure of pressure to discharge lubricant.

② **Injector**
A device for supplying the transferred lubricant to each lubrication point.

③ **Hose reel**
The lubricant transferred from the pump is used for manual lubrication at the lubrication point using a hose reel grease gun.

④ **Controller**
Adjusts the operation time and the rest time of the fueling pump, and controls the system.

⑤ **Main line**

The grease fed from the pump is transferred to the injector.

⑥ **Secondary main line**

It transfers grease from the injector to lubrication point.

⑦ **Pressure switch**

The pressure switch is activated when the pump operates and the pressure in the main line for grease discharge is generated and reaches the set pressure.

⑧ **Directional valve**

It is a valve that acts to bypass the grease pressure of the main line to the pump.

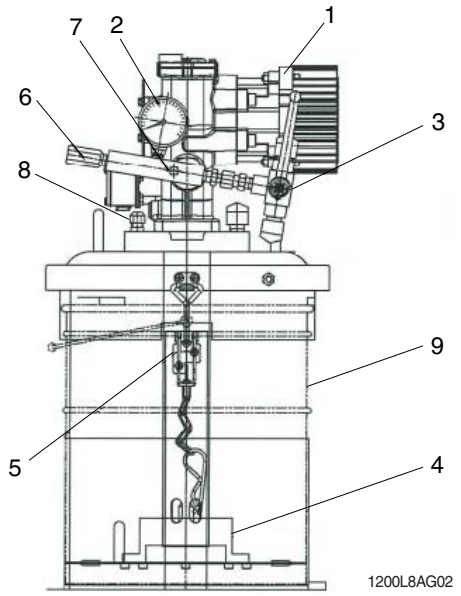
(3) Safety management guidelines

① Before using grease pump, please read this manual carefully.
② In order to use this product stably, please observe safety management guidelines.
③ While driving the pump, make sure that the direction of the grease gun and the discharge port are not facing the person.
④ Be sure to turn off the power when repairing or servicing the pump.
⑤ If the pump is used for purposes other than greasing, it may cause physical injury due to damage or malfunction of the pump.
⑥ For the purpose of maintenance, do not spray water directly to the products which constitute the auto grease system. (pumps, controllers, injectors, valves)
⑦ When performing maintenance, inspection, or replacement of grease containers, do not allow foreign objects to enter the pump or piping or fittings.

2) MAJOR COMPONENT

(1) Grease pump

① Structure



1 Grease pump assy
2 Pressure gauge
3 3-way ball valve
4 Follow plate
5 Fastener
6 Safety valve
7 Air vent
8 Low level
9 Grease can

② Specifications

Item		Specification
Pump	Model	85748
	Max operating pressure	344 bar
	Outlet volume	57 cc/min (50 r/min)
	Operating temperature	-30 ~65 ˚C
	Suitable lubricants	NLGI EP00~EP1
	Pump outlet	NPTF 1/4"
	Output/pump cycle	1.15 CC
Motor	Voltage	DC 24V
	Power	0.25 kW
	Gear ratio	34 : 1
	Speed	3~50 r/min

③ Function

a. Pressure gauge

Confirms the operating pressure of the fueling pump during pump operation.

b. Air vent

When the pump is in operation, if the grease can not be pumped due to the mixing of air in the grease. the function is to open the air vent to discharge the air penetrated into the grease.

c. Safety valve

It is a valve to protect the pump when the abnormal pressure rises due to

d. Low level switch

It is a low-level signal function that tells you when to replace the grease.

e. Three-way valve

It is used by operating Auto mode and Manual mode according to pump operation condition.

f. Follower plate

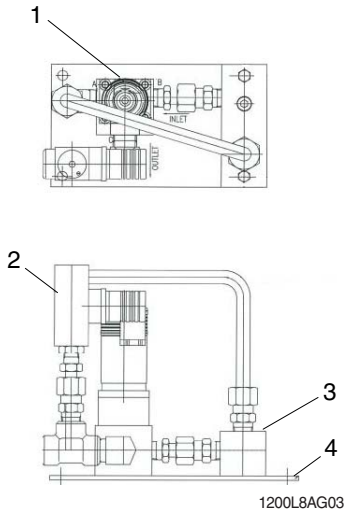
It is located inside the grease container to help pumping the pump smoothly and to clean the grease on the inner wall of the container.

g. Fastener

It is a device for dismantling or fixing a lock (clamp) using a Fastener of a pump before and after a grease container change.

※ If you did not change the grease "consistency" according to the atmospheric temperature condition, it will cause poor pump performance and malfunction. Therefore, change the grease (consistency) to match the temperature condition.

(2) Directional valve



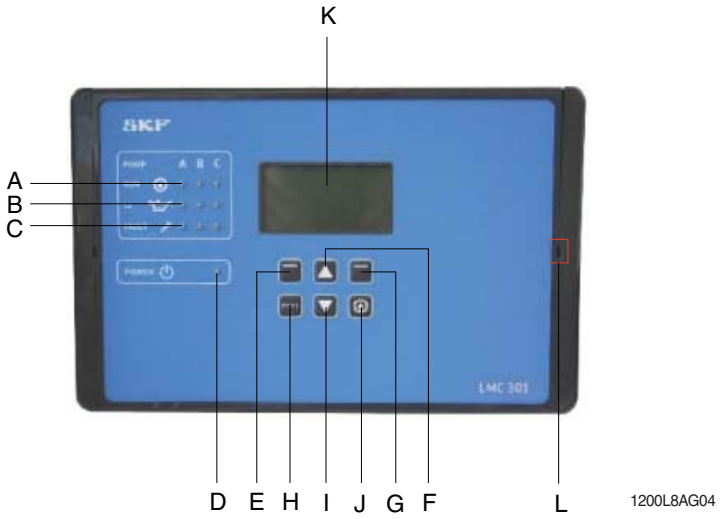
1 3/2-way solenoid valve
2 Pressure switch
3 Block
4 Base

Specifications

Item	Specification
Type	3/2-way solenoid valve
Model	VP1Z-1/2-G24
Max operating pressure	400 bar
Flow rate Qmax	15 lpm
Line connection (A, B, C)	PF 1/2"
Solenoid voltage	24V DC

(3) Controller

① Configuration



Point	Name	Function
A	Pump run LED	Light up during pump running.
B	Low level LED	Light up during low level alarm.
C	Fault LED	Light up during other alarm except low level.
D	Power LED	Light up during energized.
E	Left selection button	Push to select bottom left square menu in the LCD screen.
F	Up selection button	Push to select upper menu or increase input value in the LCD screen.
G	Right selection button	Push to select bottom right square menu in the LCD screen.
H	Reset button	Push to eliminate alarm or stop the lubrication cycle during pump running.
I	Down selection button	Push to select downer menu or reduce input value in the LCD screen.
J	Manual lubrication button	Hold 3 seconds to manual lubricate for 1 cycle.
K	LCD screen	LCD screen.
I	Controller opening tip	Use a (-) driver to open the controller.

② Specifications

Item	Specification
Cabinet size	10.6299 (L) x 6.6929 (W) x 3.5433 (H) (inch)
Working voltage	DC 24V +/- 10%
Power consumption	3A internal fuse (only for controller)
Motor driver current	MAX. 15A (DC)
Working temperature	- 30 ~ 70 (˚C)
Output CH	4CH 8 count, contact 8A of 2 to max. 15A
Intput CH	4CH 10 count, short-circuit-proof, 2 are analog capable
Ingress protection	IP 65

③ Error and display icons

1200L8AG05

a. LL indicate

Low level alarm is ringing. Check the grease bucket and change the grease bucket if it is empty.

1200L8AG06

b. Fault indicate

The pump is not filling the grease line or malfunction happened in the pressure switch. Check the whole system including the injector movement.

1200L8AG07

c. Power light is not working

Energizing to the auto lubrication system has a problem. Check the cable or the fuse.

④ LCD display

Symbol	Status	Function
	Stopped/OFF	The system was stopped by pressing the reset key and can be restarted by briefly pressing the running key.
	Pause	The respective lubrication area is currently in the interval time.
T	Wait Temperature	Temperature waiting time.
	Wait	Lubrication zone waiting because another zone currently being lubricated.
	Lubricate	The system lubricates.
	Hold	Holding time.
	Pressure relief	System relieved.
	Runtime	Pump runs.
	Secured/Access denied	No access as local admin or supervisor.
	Access	Access as local admin or supervisor.
	Fault	There is a fault.
	Digital inputs/outputs on	Digital output switched on.
	Digital inputs/outputs off	Digital output switched off.

⑤ Cable connection

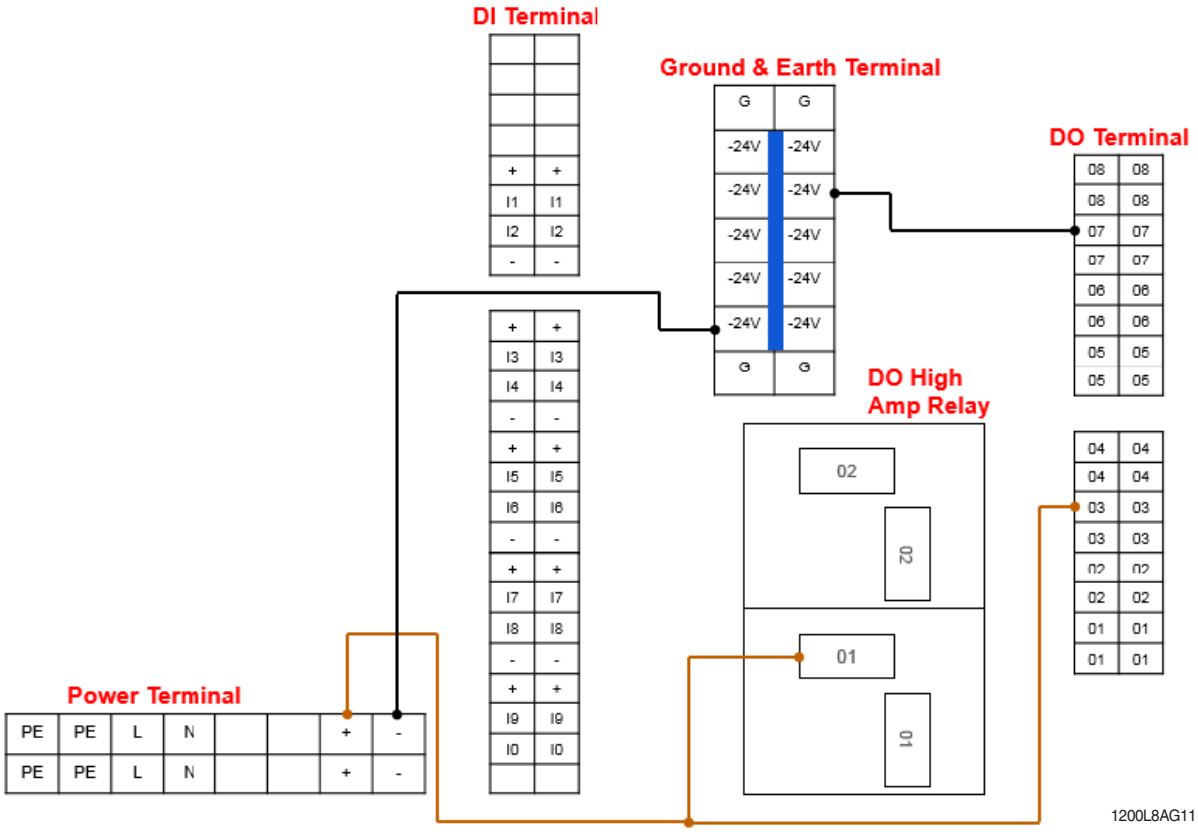
a. Main cable display

1200L8AG09

X1	4P cable from main excavator
X2	2P pressure switch
	2P low level switch
	2P relief valve
X3	2P pump power

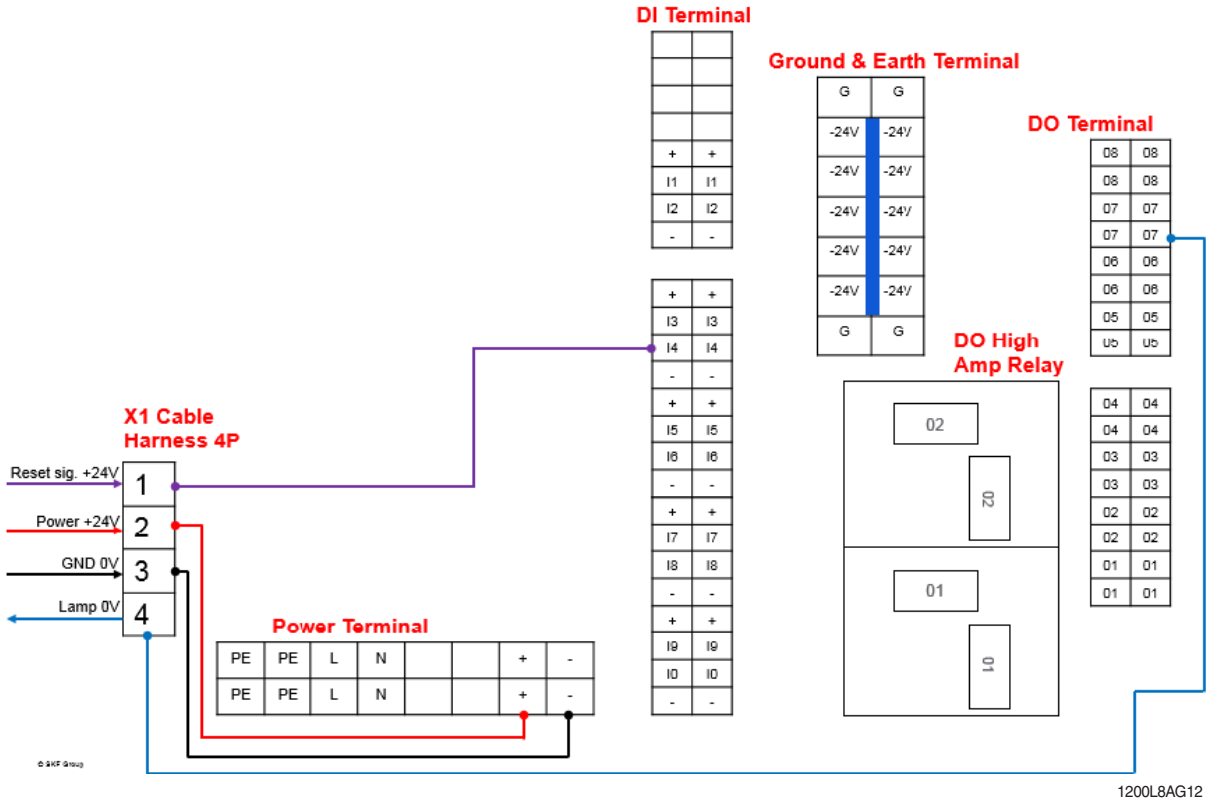
b. Inner circuit connection diagram

1200L8AG10

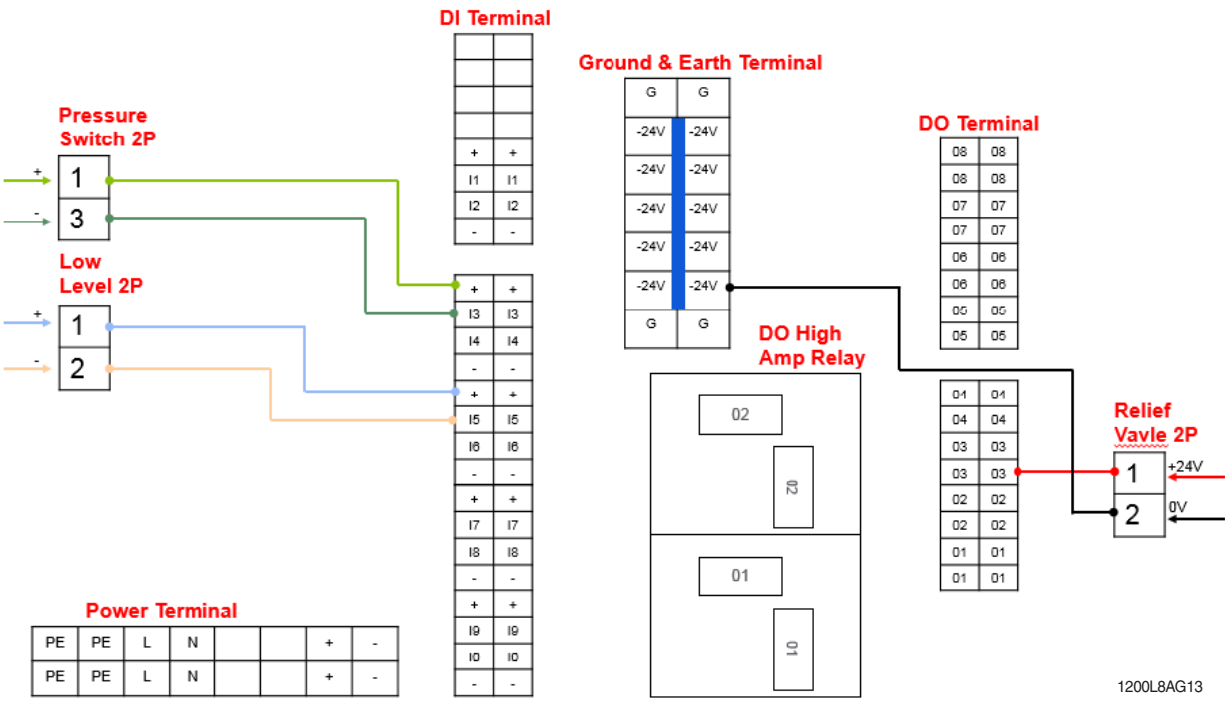


1200L8AG11

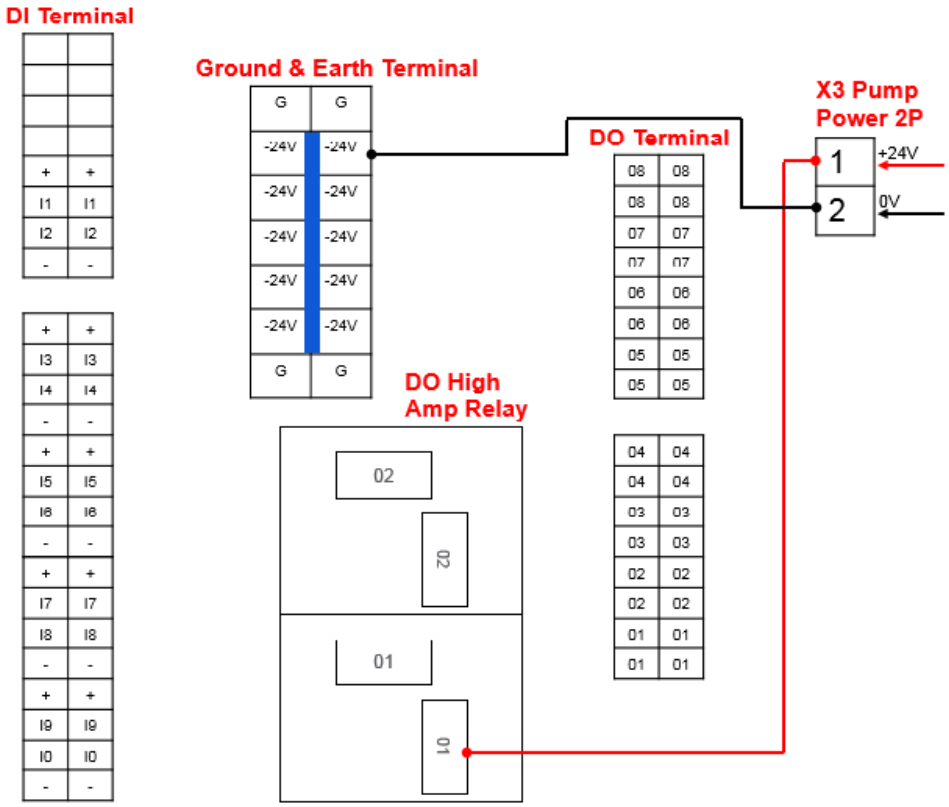
c. X1 cable connection diagram



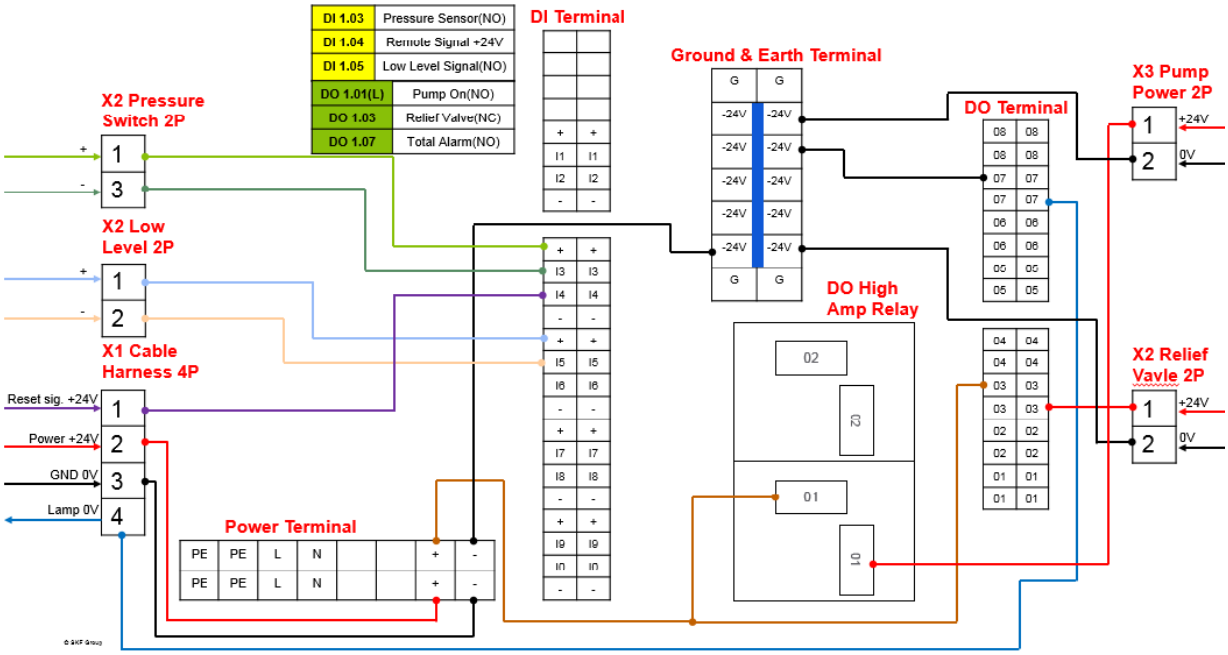
d. X2 cable connection diagram



e. X3 cable connection diagram



f. Full connection diagram



(4) Injector

1200L8AG16

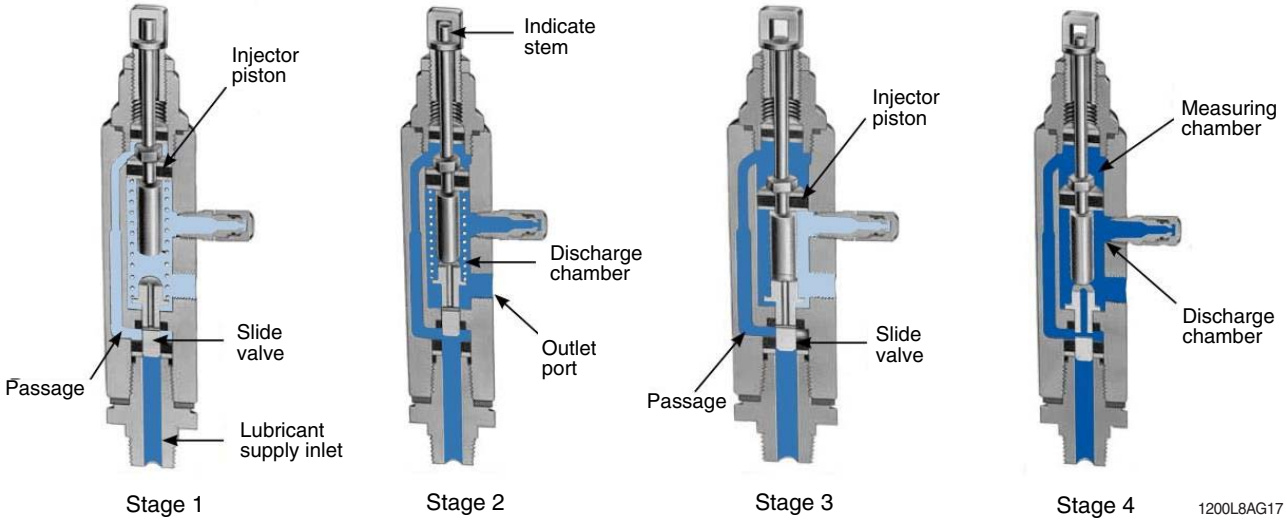
① Description

a. Visible monitoring through indicator pins
b. Individual injector exchangeable
c. Discharge amount, stroke (each) : 0.131 ~ 1.31 cc

② Adjustment of discharge amount

a. Loosen the locknut counterclockwise and turn it one more turn to the loose position.
b. While holding the locknut, tighten the adjusting screw clockwise (with your fingers) until it stops. At this point, the discharge volume is 0.147 cc.
c. Adjust the adjusting screw by turning it counterclockwise as much as necessary discharge amount. Each output becomes (0.147 cc), and when it is adjusted about 8 times, the maximum discharge amount (1.31 cc) becomes.
d. The lock nuts are tightened with a torque of 1.0~1.2 kgf · m (7.4~8.9 lbf · ft).

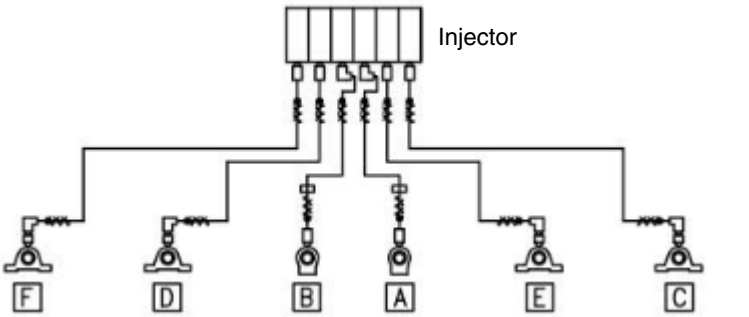
③ Operation



1200L8AG17

④ Operation

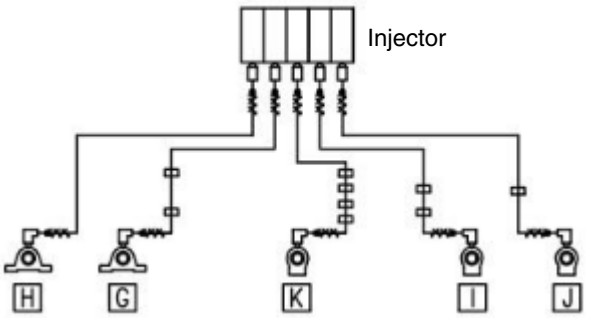
a. Frame



1200L8AG18

A Boom cylinder B/RH
B Boom cylinder B/LH
C Swing R/LH
D Swing F/LH
E Swing F/RH
F Swing R/RH

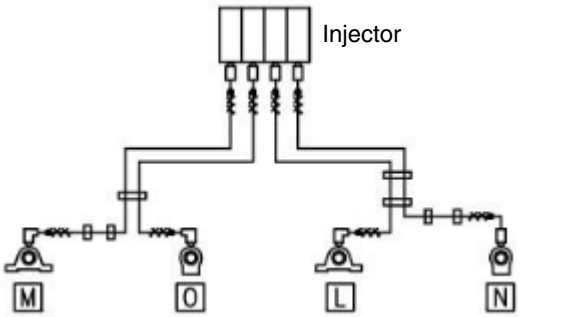
b. Boom



1200L8AG19

G Boom B/LH
H Boom B/RH
I Arm cylinder L/C
J Boom cylinder T/LH
K Boom cylinder T/RH

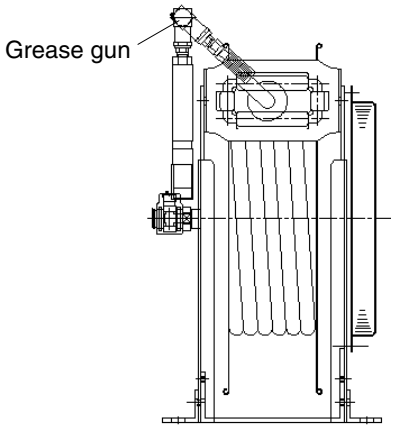
c. Arm



1200L8AG20

L Boom T/LH
M Boom T/RH
N Arm cylinder S/C
O Bucket cylinder L/C

⑤ Hose reel



1200L8AG56

Item	Specification
Model	RHA-925
Max operating pressure	280 bar
Hose size	3/8" x 2W
Winding length	15 m
Painting color	Yellow

3) OPERATION

(1) Operation Mode

① Automatic operation : Automatic grease injection
② Manual Operation : Manual grease injection using grease gun

(2) Automatic Operation

Usage for frame / boom / arm lubrication.

1200L8AG21

① Pump operation should performed when operation stops. (wait for a while during pump operation)
② Check the pump run lamp and power lamp of the controller. (At this time, the lamp lights up)
③ Use the knob on the valve (3-way) to change direction to auto position.

1200L8AG22

※ At this time, the residual pressure in the piping of the grease hose must be relieved by using the manual gun. (when the high pressure inside the hose is left, it can cause malfunction in the pump operation. Also, it can protect the hose by removing the high pressure in the pipe)

1200L8AG23

④ The internal pressure of the manual hose reel, must be pressure removed by means of a grease gun before performing the following operations.

1200L8AG24

⑤ When you press holding on the manual lube button in the controller, the pump starts operating. (auto mode is set at the factory.)

⑥ The pump starts to operate, and grease is supplied to the injector through the piping to supply lubricant.

⑦ When the pump reaches the set pressure, the pump stops operating. (factory setting pressure is 200 bar)

⑧ The grease in the main line is goes back to the pump through the relief valve (bypass) and will be ready for the next operation.

※ Refer to page 8-37 for controller.

※ How to change the manual mode
Usage for frame / boom / arm lubrication.
The operating sequence must be observed.

1200L8AG21

① Turn valve to up (check) position.

1200L8AG22

② Key on the engine.
Green light will appear and start automatically.

1200L8AG23

③ Eliminate pressure in hose reel by squeezing the gun handle.

1200L8AG24

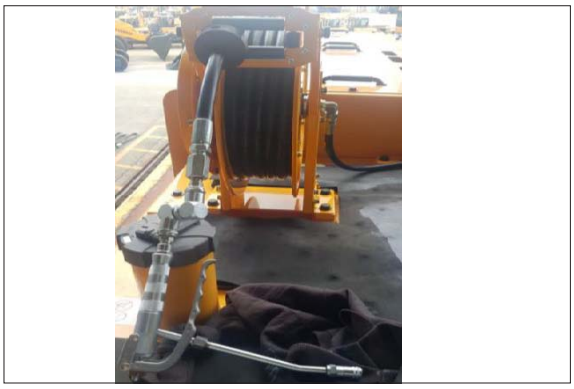
④ Hold on  for 3 seconds for additional lubrication.

(3) Manual operation

Usage for bucket lubrication only.

1200L8AG25

① Pump operation should performed when operation stops. (wait for a while during pump operation)
② Use the knob on the valve (3-way) to change direction to manual.
③ When you hold on the controllers manual lube button for 3 seconds, the pump starts manual operating.
④ When the pump reaches the set pressure, the pump stops operating.
(factory setting pressure is 240 bar))



1200L8AG25-1

⑤ You can lubricate the grease with a grease gun at the feeding position using the hose reel

1200L8AG25-2

⑥ During lubrication, the pump is operated.

1200L8AG25-3

⑦ When the lubrication is stopped, the pump will stop operating.
⑧ When lubrication is finished, put the hose and place it in the original position.

※ How to change the automatic mode
Usage for frame / boom / arm lubrication.
The operating sequence must be observed.

1200L8AG25

① Turn valve to right position.

1200L8AG23

② Get grease gun from reel.

1200L8AG24

③ Hold on for 3 seconds to start the pump.
The pump will stop soon unless the grease gun is not used.

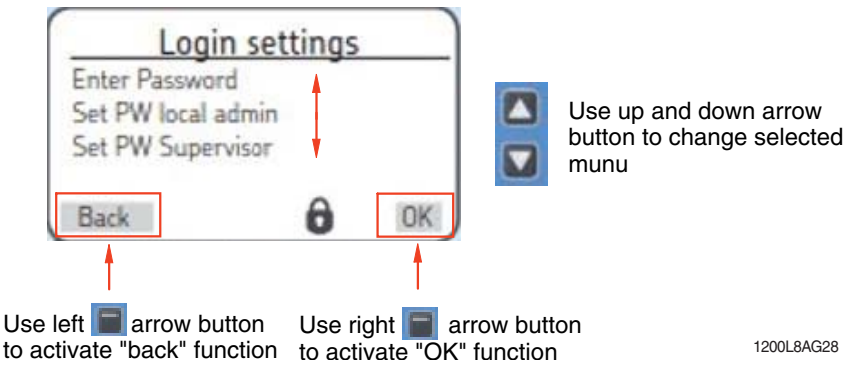
1200L8AG26

④ Connect the outlet to bucket point and squeeze the handle.
Pump will start running when pressure falls.

5) SYSTEM SETTING

(1) Usage of select button

※ Refer to page 8-5 for details.



(2) Operation default value and changing value

① I/O address

DI 1.03	Pressure sensor (NO)
DI 1.04	Remote signal +24V
DI 1.05	Low level signal (NO)

DO 1.01 (Large relay)	Pump on (NO)
DO 1.03	Relief valve (NC)
DO 1.07	Tatal alarm (NO)

② Factory set value

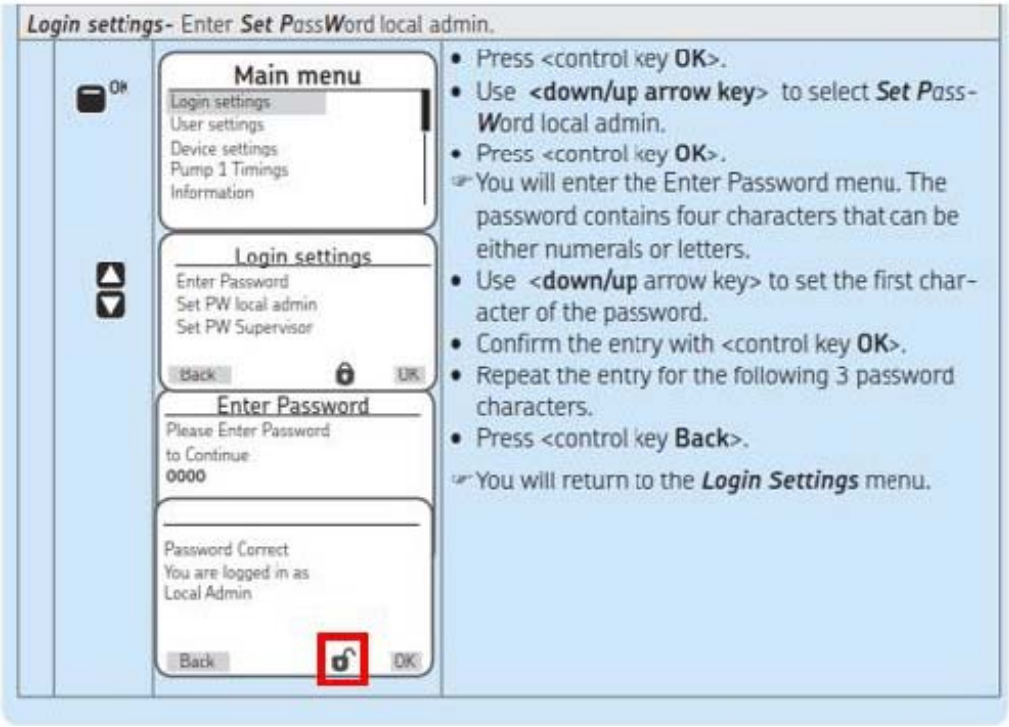
Item	Set value
Control type	Pressure control.
Low level active condition	10 seconds steady signal received.
Normal lube cycle time	10 minutes repeating cycle. Set in as normal.(factory default)
Heavy lube cycle time	20 minutes repeating cycle. Configuration change needed. Change the lube cycle to heavy mode to reduce grease amount. Unless, use normal mode as default set.
Monitoring time	25 minutes. Pressure switch signal needs to be received under 25 minutes. After finishing using the manual mode, switch the 2 way valve to the auto mode direction. It will send an alarm when using manual mode too long.
Pump control	Max 3 pumps are controllable. Only one pump is controllable in this system.(default)
Zone control	Max 3 zones are controllable. Only one zone is controllable in this system.(default)

※ Do not reprogram the controller without any permission.
Changing function values might lead to a malfunction of the whole auto lubrication system.

③ Login setting

Need to access as Supervisor to change setting. Unless, value changeable menus will no appear.

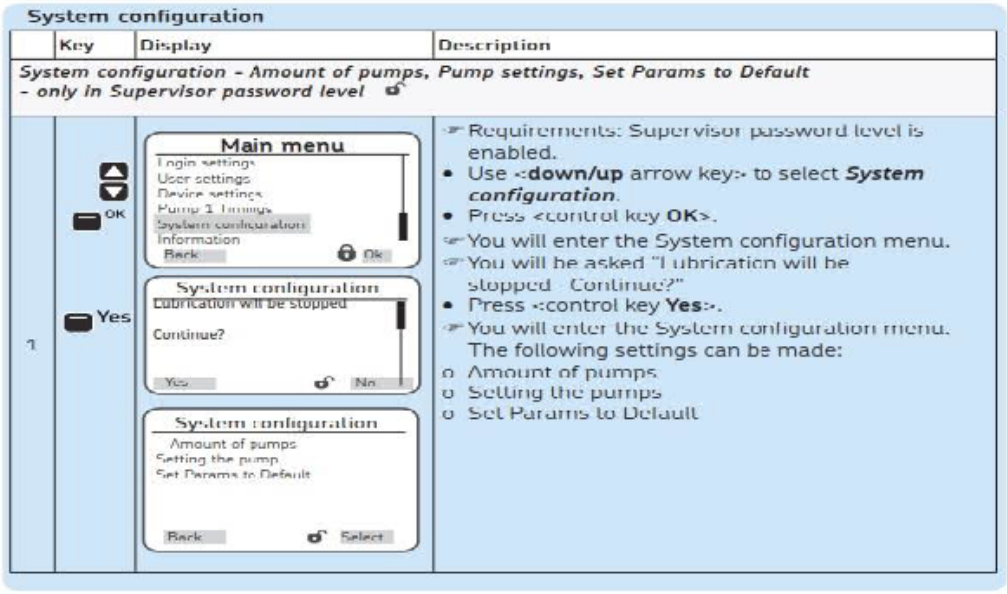
User type	Password
Operator	without password access
Local administrator	1000
Supervisor	2020



1200L8AG29

· **Changing configuration**

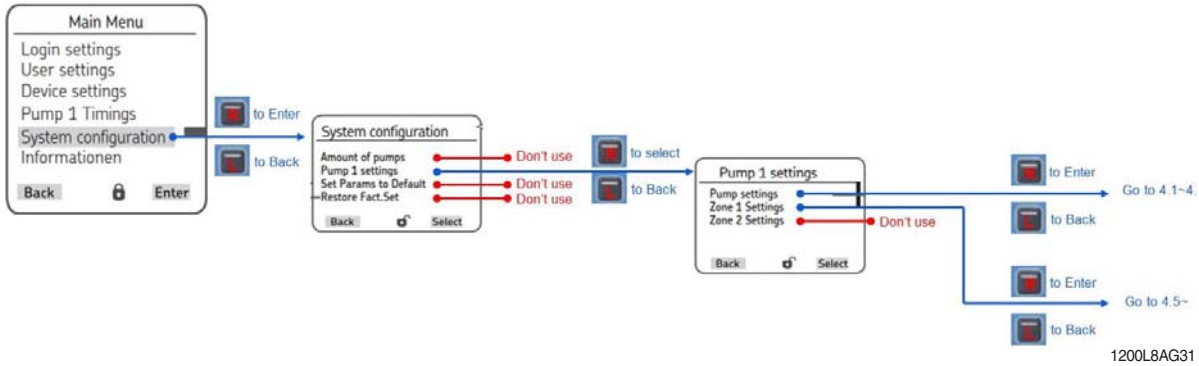
"System configuration" menu will appear after logged on as supervisor. Bottom icon will change as unlocked.



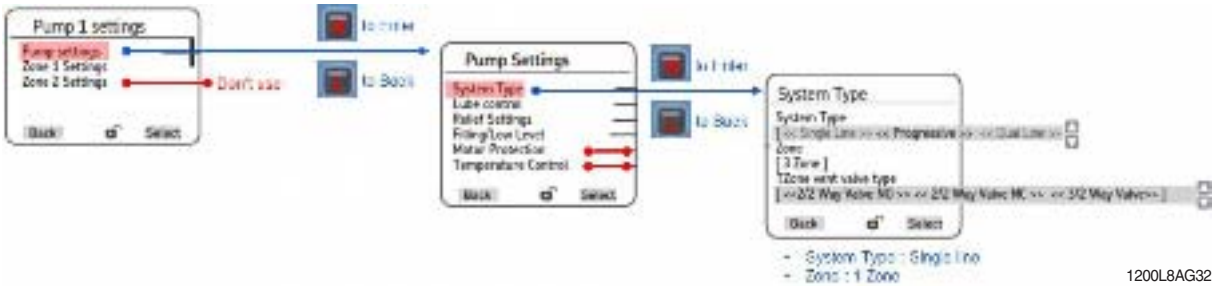
1200L8AG30

④ Setting system

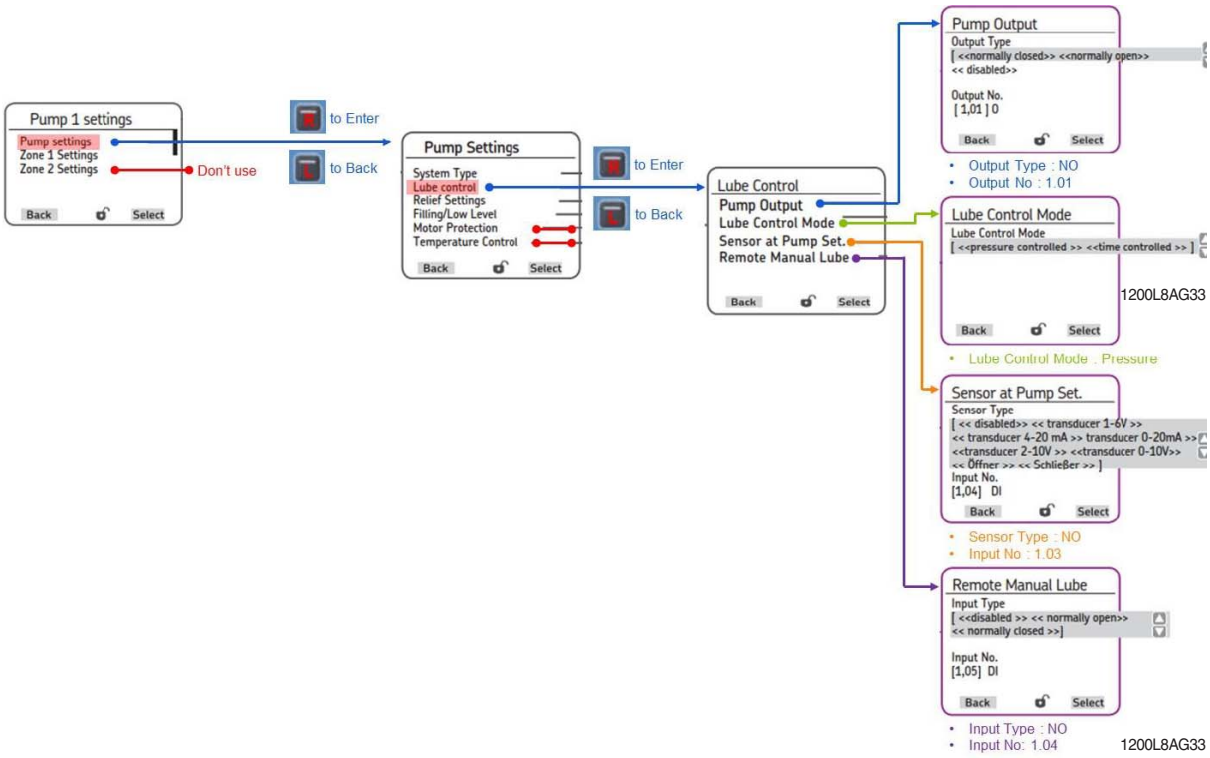
a. Configuration



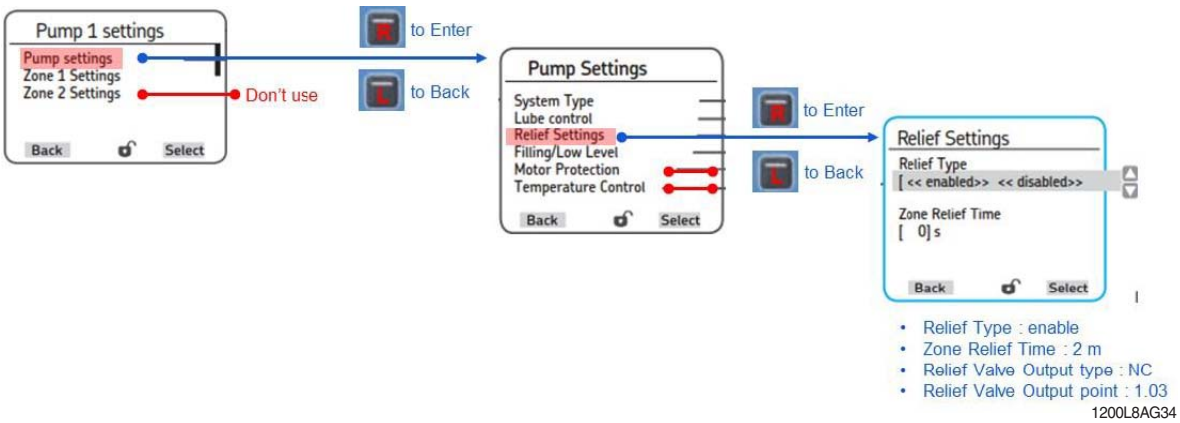
b. System type setting (pump setting)



c. Lube control setting (pump setting)



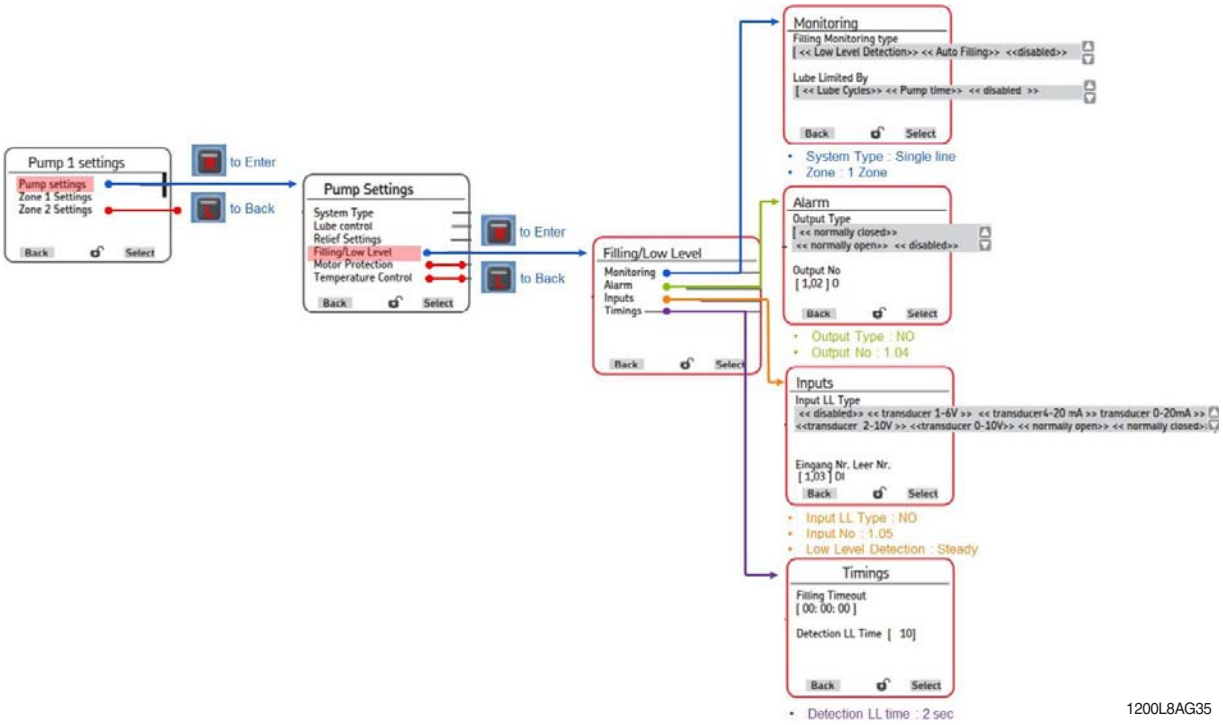
d. Relief setting (pump setting)



- Relief Type : enable
- Zone Relief Time : 2 m
- Relief Valve Output type : NC
- Relief Valve Output point : 1.03

1200L8AG34

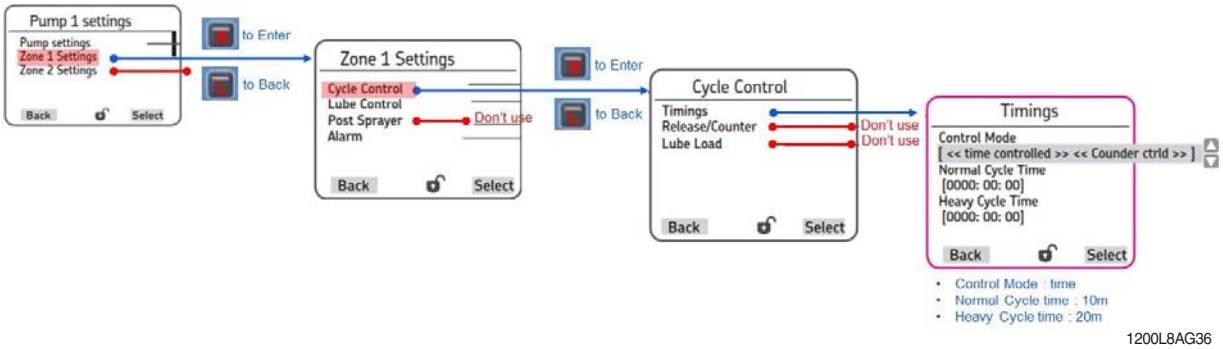
e. Relief setting (pump setting)



- System Type : Single line
- Zone : 1 Zone
- Output Type : NO
- Output No : 1.04
- Input LL Type : NO
- Input No : 1.05
- Low Level Detection : Steady
- Detection LL time : 2 sec

1200L8AG35

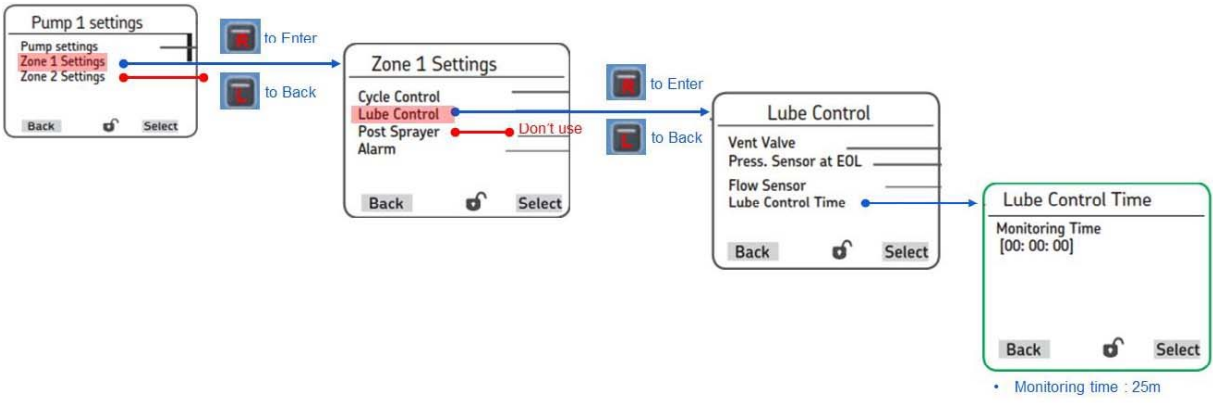
f. Cycle control setting (zone 1 settings)



- Control Mode : time
- Normal Cycle time : 10m
- Heavy Cycle time : 20m

1200L8AG36

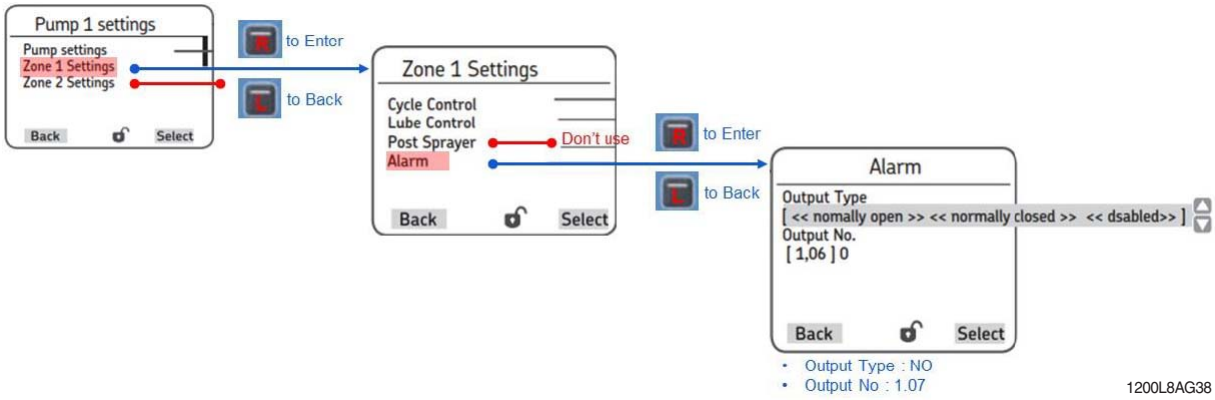
g. Cycle control setting (zone 1 settings)



- Monitoring time : 25m

1200L8AG37

h. Cycle control setting (zone 1 settings)



- Output Type : NO
- Output No : 1.07

1200L8AG38

6) MAINTENACE

(1) Regulator inspection of pump

Cycle	Check	Measure
Daily	Pump operating status	Check pump motor drive
	Controller status	Power lamp (standby) lights visual confirmation.
	Grease balance	Check the grease level gauge
	Pump leakage	Check pump connection
	Pump braced tight	Check pump fixing clamp (2 places)
	Injector operating status	Check ijector pin is operating correctly {* Normal discharge of lubrication point grease}
Weekly	Grease balance	Check grease level in grease cans (pail)
	Hose reel braced tight	Check clamping clamp (4 places)
	Hose reel leakage	Confirmation of connection piping
	Controller operating status	(1-Cycle) operating switch
	Controller braced tight	Confirmation of fixed clamp (2 places)
	Controller connector pinned	Cable connector (2 places) check the fixing part
	Injector locked state	Check injector (sl-4,5,6) fixing part
	Feeding point leakage	Confirmation of grease onlet (15 places)
Yearly	Pump component fastend correctly	Check tightening bolt's tightness
	Soling valve unit fastened correctly	Check tightening bolt's tightness
	Injector component mounted correctly	Check tightening bolt's tightness
	Feeding point status	Check tightening bolt's tightness

※ When replacing the grease container, always clean the grease on the follower-plate and pump suction pipe before proceeding to replace the container. There is no filter inside or outside of the pump. Users should be careful about the prevention of foreign matter mixing to ensure pump performance.

(2) Replacing grease can

※ It is necessary to carry out the container replacement with two people together to prevent the contamination of foreign matter as much as possible.

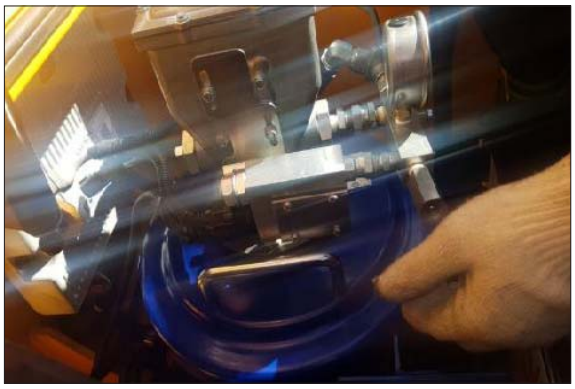
▲ Turn OFF the controller power before the grease can replacement.

1200L8AG39

① Remove the two connecting pins located at the front and rear of the pump, then open the fixed ring.

1200L8AG40

② Remove two motor connecting cable connectors and one low-level cable connector.



1200L8AG41

③ Use the upper handle of the pump to lift the pump.

▲ Becareful when lifting up the pump. It is heavy.

※ The piping hoses and cables are connected to the pump so extra caution is reqired when lifting the pump.

※ Be careful not to expose the lifted pump to surrounding objects.

※ Contamination of foreign materials can cause pump failure.

1200L8AG43

④ Lift up the grease can.

⑤ Use the follwer-plate handle to remove a can from the exterior can.

※ Grease on the top of the plate has to be cleanly wiped at every replacement. Keep it clean.

※ Pump suction pipe and grease can need to be cleaned at every replacement to keep it clean.

1200L8AG43

⑥ After preparing the new grease, open the lid and place a clean follower plate on the top of grease can with a little pressure.

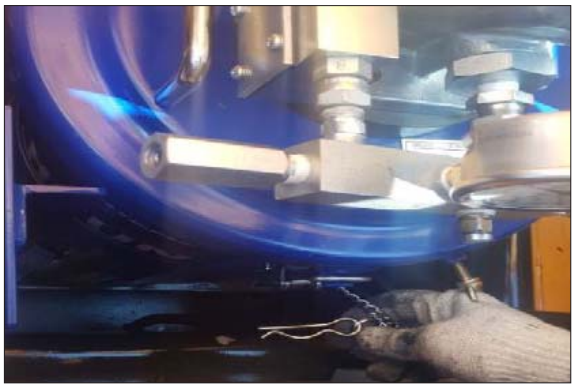
1200L8AG44

⑦ Hold the pump slightly tilted and carefully push it into the center circle of the follower plate.

※ To prevent foreign matter from penetrating Be extremely careful.

1200L8AG45

⑧ Connect the separated motor cable connector and low-level connector as shown in the picture.



1200L8AG46

⑨ Place the pump correctly.

⑩ Fasten 2 cicada rings on pump top plate. Next, secure the two safety pins.

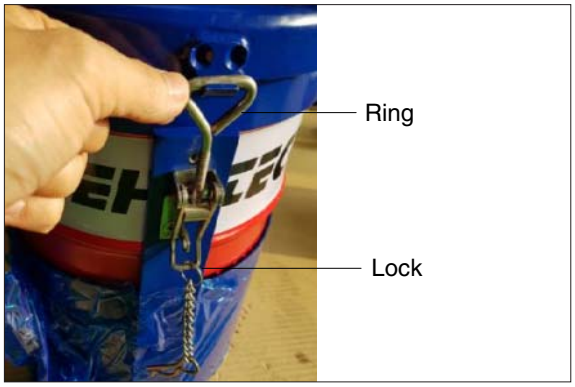
※ You must insert the safety pin to prevent the detachment of the hook.

1200L8AG47

⑪ When the vessel change is complete, the pump is ready for operation.

⑫ Turn the controller power ON. Be sure to check the pump-operation-selection switch and direction valve.
Press the start button to start the operation.

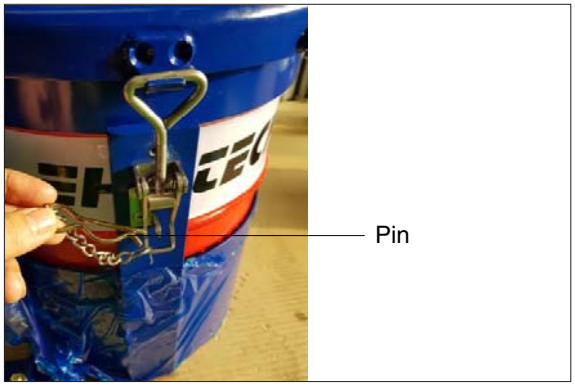
(3) Locking the can



1200L8AG48

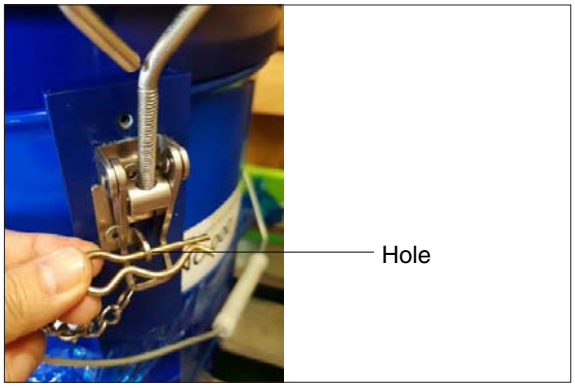
① First place the hook as shown in figure and press the lock device down gently to hold.

※ **There are two fixing hooks on front and rear.**



1200L8AG49

② Use a secure pin and push it into the hole at the center of the hook.



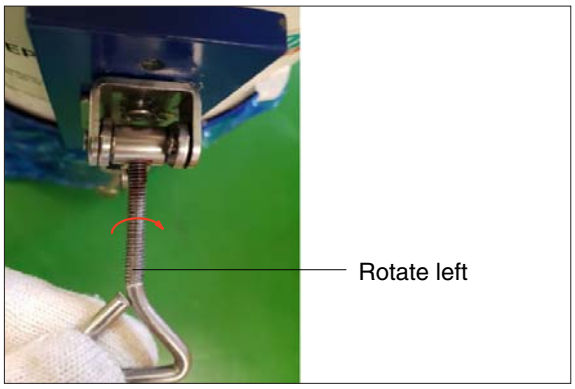
1200L8AG50

③ Be sure to insert it correctly to prevent a misplacement of the cicadas ring or the pump.

④ To open the secure ring, follow this description in reverse order.

(4) Can height adjustment

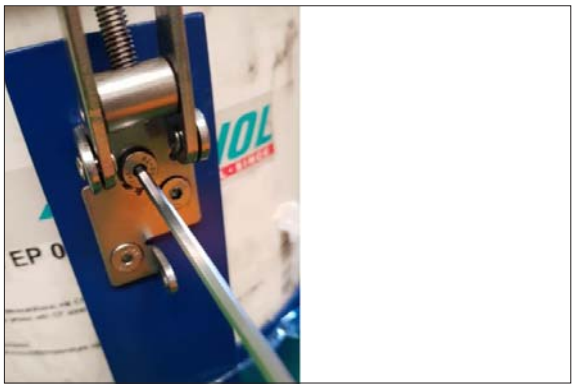
※ When shipped from the factory, it is designed as a grease can height (370 ~ 380 mm).



1200L8AG51

① If it is not fastened to the connecting ring, or if it is loose, rotate the ring to the proper position. Set it to be fixed.

※ **Excessive tightening of the ring and rock may cause breakage or bending of the linkage, so be careful.**



1200L8AG52

② If it is impossible to lock the can to the holder, use a L wrench to change the position.

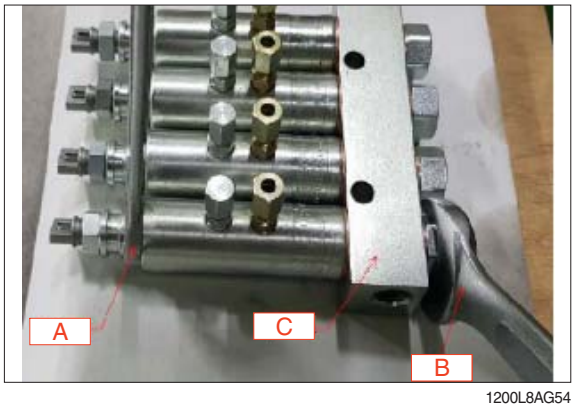
③ Remove the screws and replace the locking fittings up or down to change the position. Find the right position using different heights of grease can.

※ **When working with L-wrench, be sure to work in a tight position. Using worn tools (wrenches) may cause a difficult to loosen the bolt due to wear and detachment of bolt loosening parts.**

1200L8AG53

※ **Two holes to change the locking height.**

Replacing injector



1200L8AG54

① Hold “A” with a tool and turn “B” to the counter clockwise. Then the injector disconnects from the manifold.

② After finalizing the replacement work.
You can proceed in reverse order to put items back together.

※ **Make sure the injector outlet direction is same with the other injecting points.**

7) CHECK AND REPAIR

Item		Cause		Measure
If pump does not work		Power connection status		Check main power/connector
		Motor cable connector connection		Check
		Controller connector connection status		Check
When grease can not be discharged		Grease exhaustion		Grease can replacement
		Air intrusion in grease		Air extract operation
		Selects grease to match ambient		Change the grease consistency★1
Description of each function	Controller ★2	Power switch disabled		Check main power / connector
		Operation switch disabled		Replace controller
	Low-level error	Grease shortage		Replace controller
	Over time	No grease discharge		Change the grease consistency
		Air mixture ★3		Air extract operation
		Hose fastening pipe leak check		Pipe connection
		Hose leak check		Hose fastening and replacement
Injector discharge disable		Check injector pin operation	Pin function	Normal
			Pin malfunction	Change
Check hose reel		Hose leakage		Change
		Grease gun leakage		Change

★1 If you did not change the grease "consistency" according to the atmospheric temperature condition, it will cause poor pump performance and malfunction. Therefore, change the grease (consistency) to match the temperature condition.

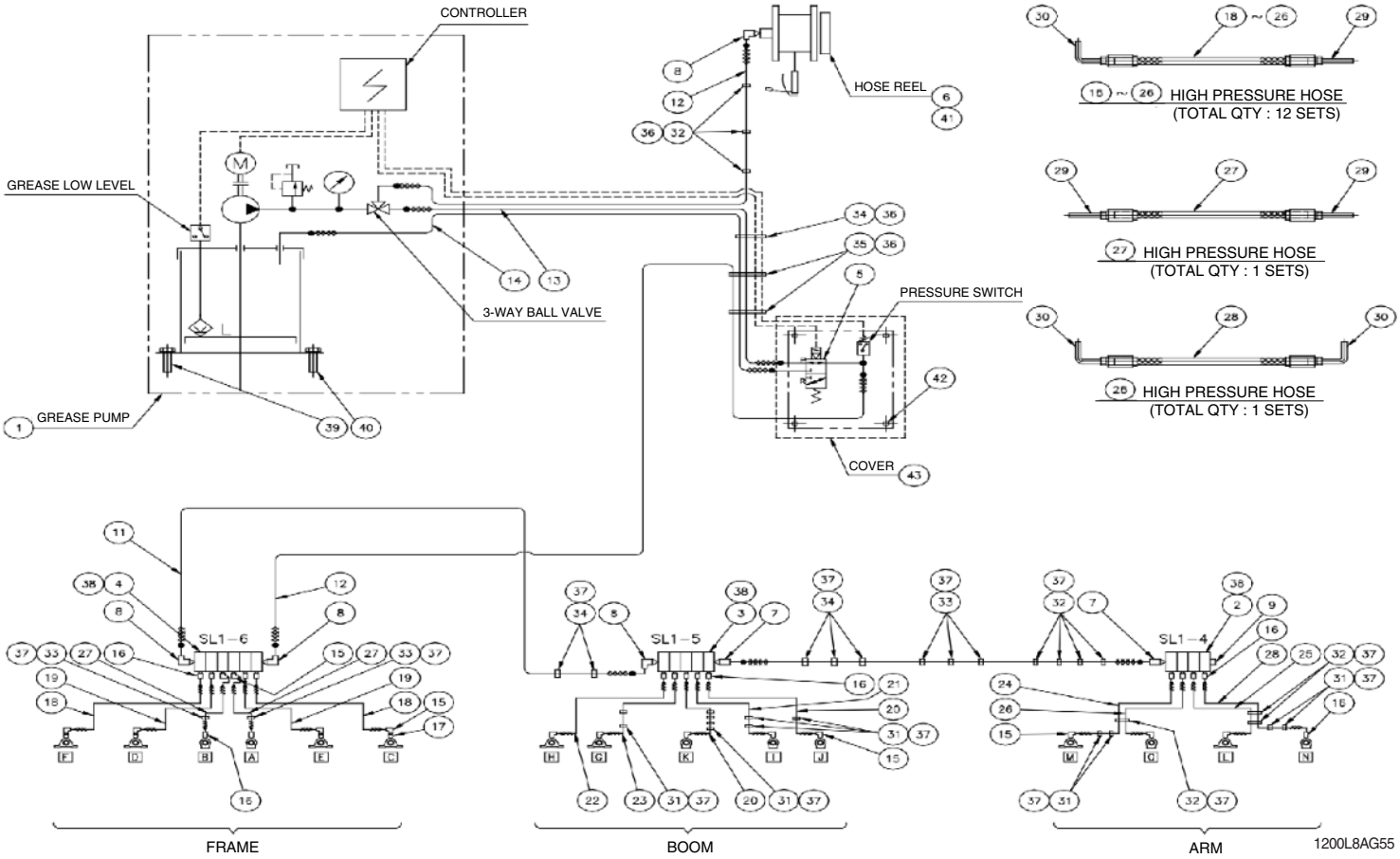
★2 The controller should not be sprayed with water or directly hit from it.
Water penetration is a direct cause of malfunction of the product.

★3 When air is taken into the air vents due to air entrainment, sometimes grease color becomes white under high pressure, the grease does not come out continuously with the air vents. And there are tough sounds ("poock, poock") continue air ejection until it is continuously discharged continuously.

8) TROUBLESHOOTING

Effect	Condition	Check	Cause or remedy
If pump does not work	Check controller power lamp (if power lamp off)	Power fuse check (fuse box)	Fuse replace
		Check cable connection (controller)	Cable or connector damaged
	Check controller power lamp (if power lamp on)	Check cable connection (pump motor)	Cable or connector damaged
		Push start button and check pump working	Controller PCB damaged
Pressure gauge is not going up when pump drives	Check injector pin moving (if all injector pin move)	Open the outlet line and check grease coming out	Pressure gauge damaged
	Check injector pin moving (if all injector pin not move)	Check line leakage	Main line leakage
Injector indicator pin does not move	Check all injector indicator pin (all does not move)	Check pump or pressure gauge	Check pump or pressure gauge effect
	Check all injector indicator pin (some does not move)	Open the outlet fitting from the stucked indicator injector	Injector is damaged (if no grease is coming out)
			Bearing point or injector to bearing point secondary line is blocked.(open the fitting connected to the bearing and run pump several times)
If all bearing are dry	Check low level in controller	Low level alarms on	Replace a new grease can
		Low level alarms off	Check pump, injector effect

9) TROUBLESHOOTING



1	Grease pump assy	16	Male connector	31	Band clamp
2	Injector	17	Bushing	32	Band clamp
3	Injector	18	High pressure hose	33	Band clamp
4	Injector	19	High pressure hose	34	Band clamp
5	Directional valve assy	20	High pressure hose	35	Band clamp
6	Hose reel assy	21	High pressure hose	36	Hex bolt w/ plain washer
7	Hose nipple connector	22	High pressure hose	37	Hex bolt w/ plain washer
8	Hose nipple elbow	23	High pressure hose	38	Hex bolt w/ plain washer
9	Hex plug	24	High pressure hose	39	Hex bolt w/ spring washer
10	Flexible hose	25	High pressure hose	40	Hex bolt w/ spring washer
11	Flexible hose	26	High pressure hose	41	Hex bolt w/ spring washer
12	Flexible hose	27	High pressure hose	42	Hex bolt w/ plain & spring washer
13	Flexible hose	28	High pressure hose	43	Cover
14	Flexible hose	29	Stud and sleeve		
15	Male elbow	30	Stud and sleeve		

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