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FOREWORD

This manual contains a number of instructions and safety recommendations regarding driving, handling, lubrication, maintenance, inspection and adjustment of the excavator.

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.

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 page 3-20 for the cluster.

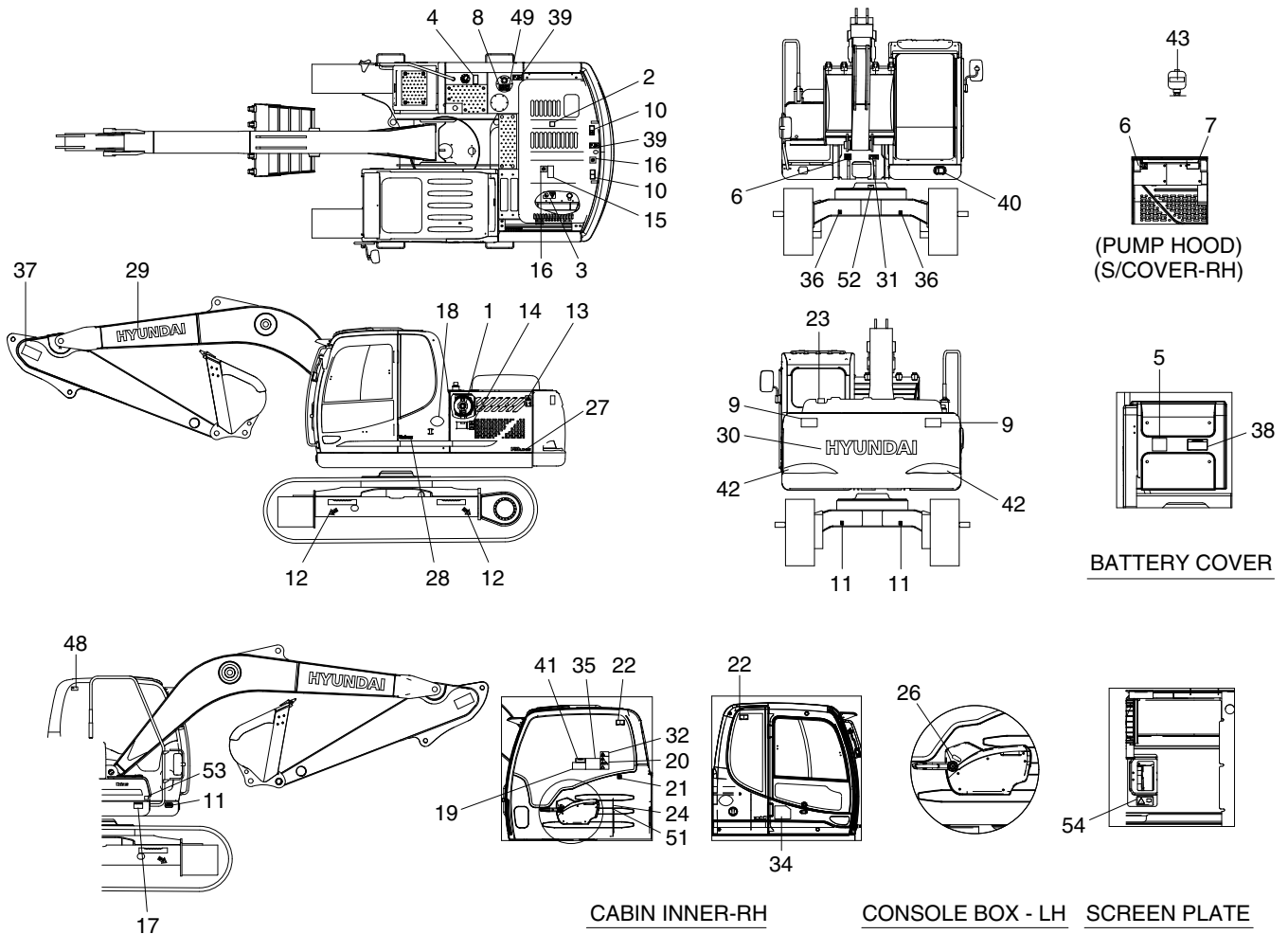
| |
|--|
| TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR |
|--|

| | |
|-------------------------|--|
| Machine Serial No. | |
| Engine Serial No. | |
| Manufacturing year | |
| Manufacturer Address | Hyundai Heavy Industries Brasil - Industria e comercio de equipamentos de construcao Ltda. Rodovia Presidente Dutra, Km315, Itatiaia, RJ, Brasil, 27580-000 |
| Dealer Address | |

SAFETY LABELS

1. LOCATION

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



- 1 Air cleaner filter
- 2 Turbocharger cover
- 3 Radiator cap
- 4 Fueling
- 5 Battery accident
- 6 High pressure hose
- 7 Hydraulic oil level
- 8 Hydraulic oil lubrication
- 9 Keep clear-rear
- 10 Lifting eye
- 11 Name plate
- 12 Sliding ideogram
- 13 Keep clear-side
- 14 Stay fix
- 15 Engine hood shearing
- 16 No step
- 17 Transporting

- 18 Low emission engine
- 19 Control ideogram
- 20 Ref operator's manual
- 21 Hammer
- 22 Safety front window
- 23 Safety rear window
- 24 Air conditioner filter
- 26 Safety lever
- 27 Model name
- 28 Logo (ROBEX)
- 29 Trade mark (boom)
- 30 Trade mark (CWT)
- 31 Reduction gear grease
- 32 Clamp locking
- 34 Service instruction
- 35 Lifting chart
- 36 Tie

- 37 Keep clear-boom/arm
- 38 Electric welding
- 39 Falling
- 40 FOPS FOG plate
- 41 Caution (water separator, turbocharger)
- 42 Reflecting
- 43 Accumulator
- 45 Control ideogram-dozor
- 48 Beacon lamp
- 49 Fuel shut off
- 51 MCU connector
- 52 Swing bearing grease
- 53 Battery position
- 54 RCV lever pattern

1409SB0SL01B

2. DESCRIPTION

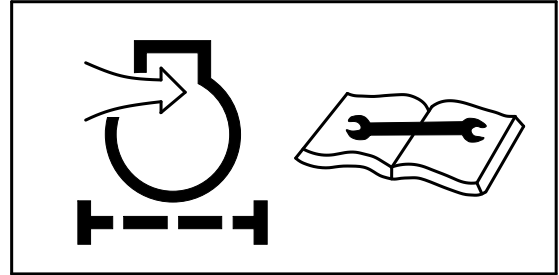
There are several specific warning labels on this machine please become familiarized with all warning labels.

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.

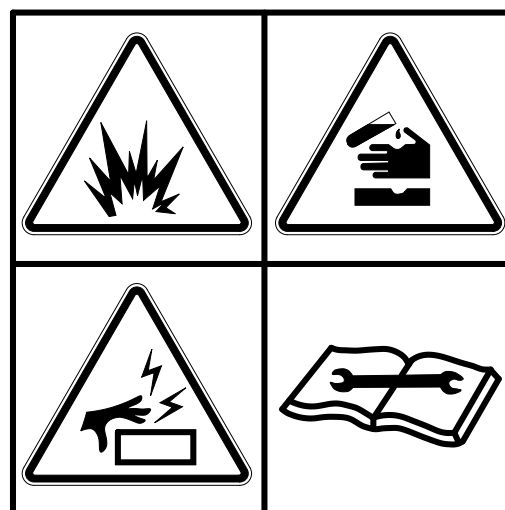


2209SB0FW04

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.
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 pump hood and in the front of upper frame.

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

※ Study the service manual before service job.



14070FW29

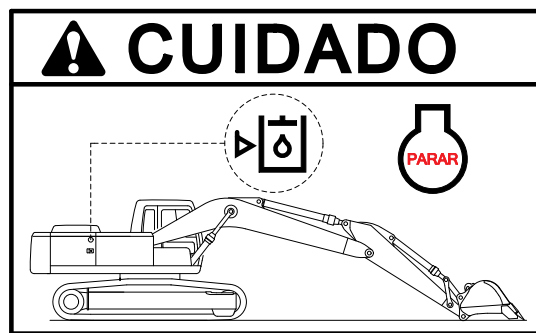
7) HYDRAULIC OIL LEVEL (item 7)

This warning label is positioned on the pump hood.

▲ 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.



2209SB0FW07

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.



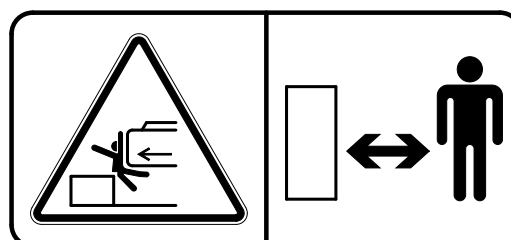
14070FW08

9) REAR KEEP CLEAR (item 9)

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.

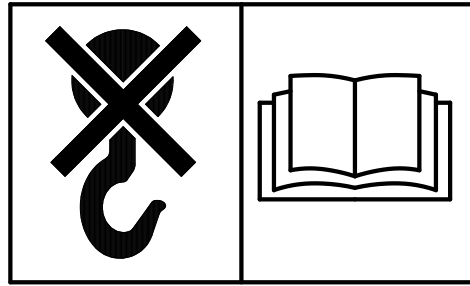


21090FW09

10) LIFTING EYE (item 10)

This warning label is positioned on the counterweight.

- ⚠ Do not lift the machine by using lifting eyes on the counterweight or the lifting eyes may be subject to overload causing its breaking and possible personal injury.
- ※ See page 5-7 for proper lifting method of the machine.

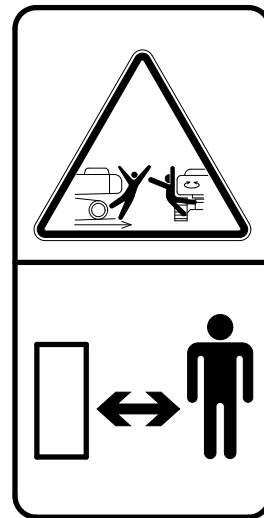


21070FW10

11) 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.

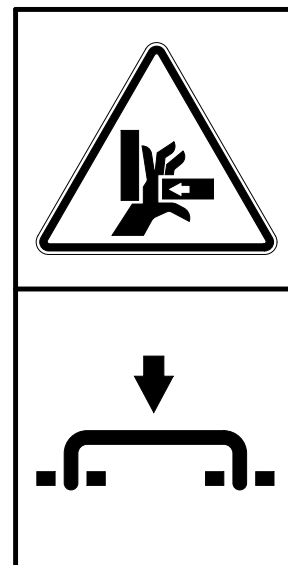


21070FW13

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.

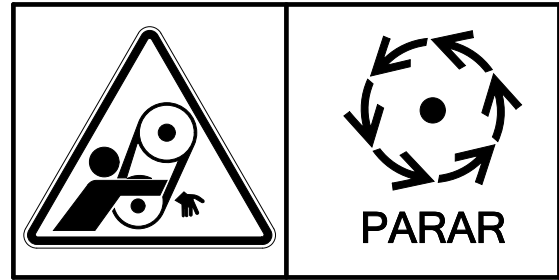


21070FW14

13) ENGINE HOOD SHEARING (item 15)

This warning label is positioned on the engine hood.

- ⚠ Don't open the engine hood during the engine's running.
- ⚠ Don't touch exhaust pipe or it may cause severe burn.

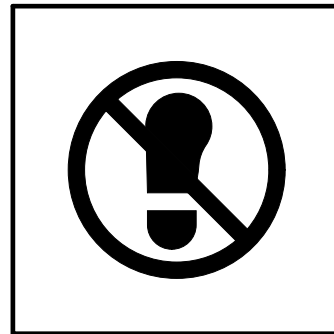


2209SB0FW15

14) NO STEP (item 16)

This warning label is positioned on the engine hood.

- ⚠ Don't step on the engine hood.

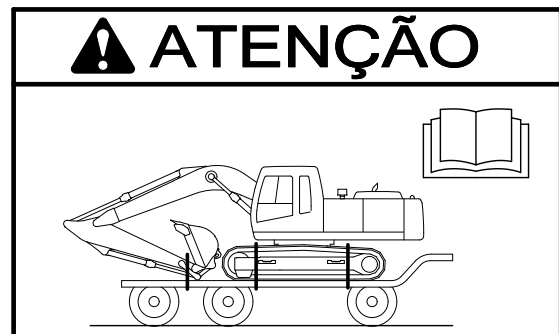


21070FW16

15) TRANSPORTING (item 17)

This warning label is positioned right side of upper frame.

- ⚠ Study the operator's manual before transporting the machine, if provided and tie down arm and track to the carrier with lashing wire.
- See page 5-4 for details.

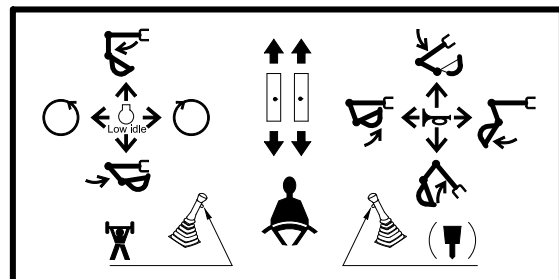


2209SB0FW17

16) CONTROL IDEOGRAM (item 19)

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

- ⚠ Check the machine control pattern for conformance to pattern on this label. If not, change label to match pattern before operating machine.
 - ⚠ Failure to do so could result in injury or death.
- See page 4-12 for details.



36070FW19

17) REF OPERATOR'S MANUAL (item 20)

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

(1) Ref operator manual

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

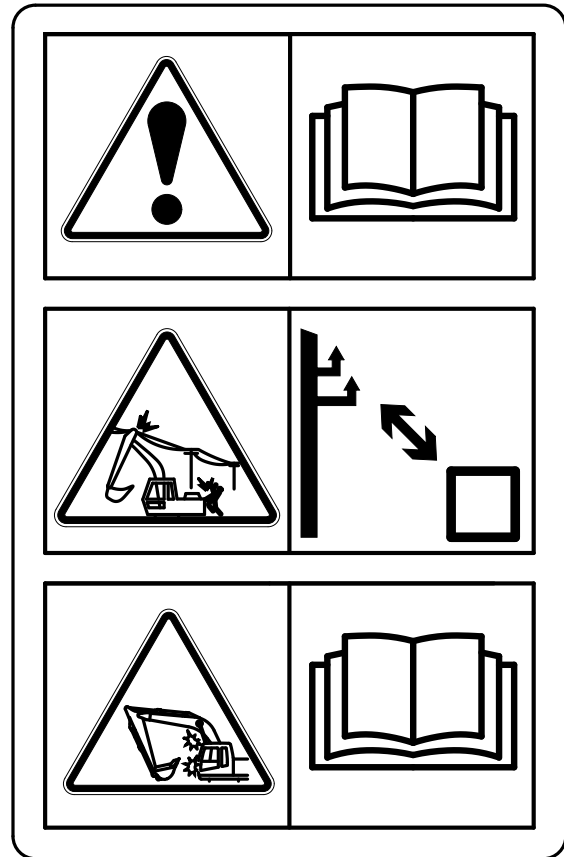
(2) Max height

- ▲ Serious injury or death can result from contact with electric lines.

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

(3) Interference

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

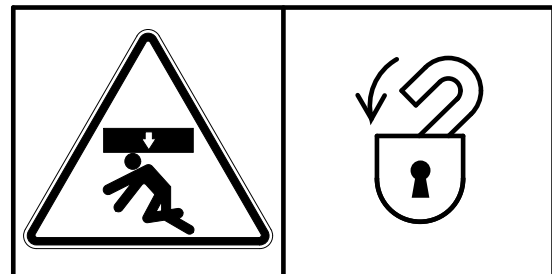


2609A0SL05

18) SAFETY FRONT WINDOW (item 22)

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

- ▲ Be careful that the front window may be promptly closed.



21070FW24

19) SAFETY REAR WINDOW (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.

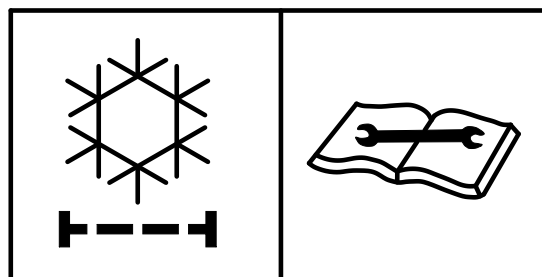


2609A0SL02

20) AIR CONDITIONER FILTER (item 24)

This warning label is positioned on the air conditioner cover.

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

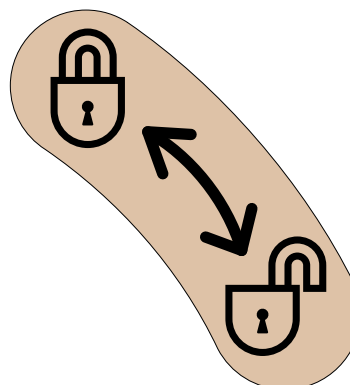


21070FW26

21) SAFETY KNOB (item 26)

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

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

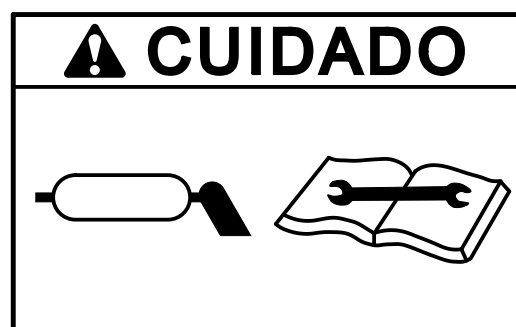


30007A1FW07A

22) REDUCTION GEAR GREASE (item 31)

This warning label is positioned 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.

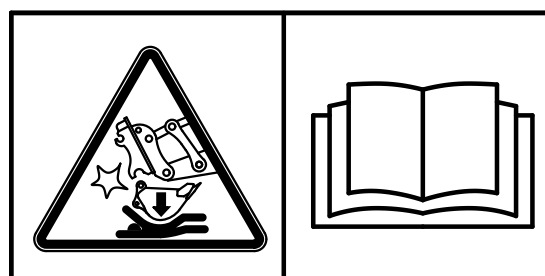


2209SB0FW31

23) CLAMP LOCKING (item 32)

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

- ▲ **Serious injury or death can result from dropping bucket.**
- ▲ **Operating the machine with quick clamp switch unlocked or without safety pin of moving hook can cause the bucket to drop off.**

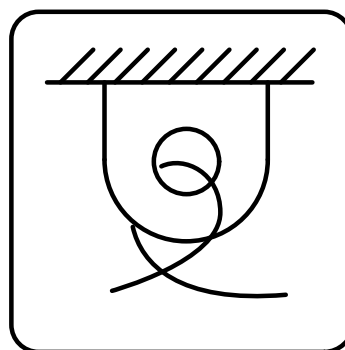


14070FW60

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.**

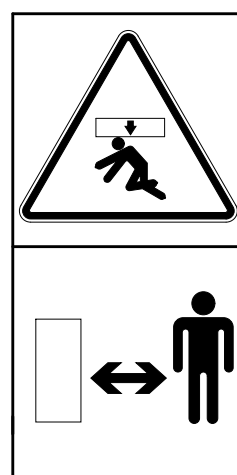


4507A0FW02

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.**

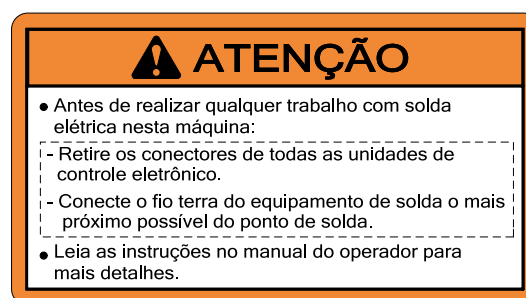


14070FW31

26) ELECTRIC WELDING (item 38)

This warning label is positioned on the battery cover.

- ⚠ **Before carrying out any electric welding on this machine, follow the below procedure.**
 - Pull the connector out of all electric control units.
 - Connector the ground lead of the welding equipment as close to the welding point as possible.
- ※ **See page 6-44 for detail.**

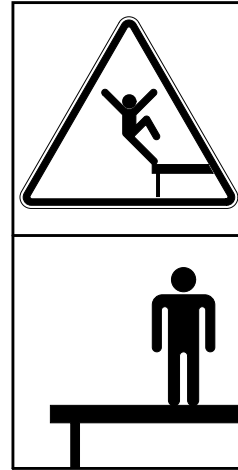


2209SB0FW38

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.

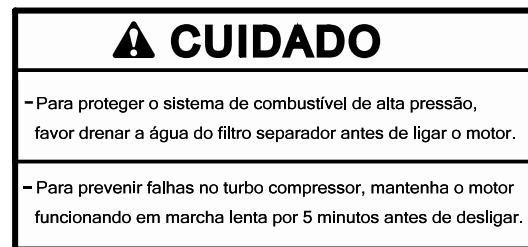


14070FW30

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

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

- ▲ In order to protect high pressure fuel system, please drain water in water separator before starting the engine.
- ▲ In order to prevent turbocharger failure, please allow more than 5 minutes' cool down period (no load low idle operation) before shutting the engine off.



2209SB0FW41

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.

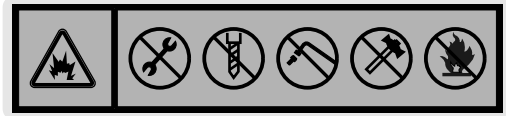


25090FW03

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.

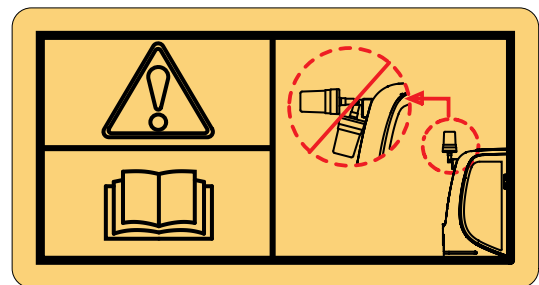


1107A0FW46

31) BEACON LAMP (item 48)

This warning label is positioned on the right 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.

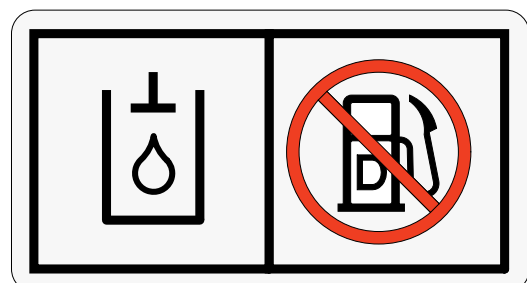


140Z90FW49

32) 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

33) MCU CONNECTOR (item 51)

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.**
- ※ **See page 3-57 for details.**

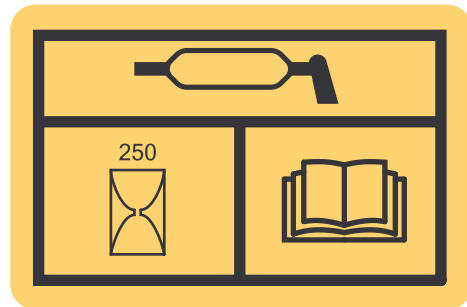
MCU Ferramenta de serviço

2209SB0FW51

34) SWING BEARING GREASE (item 52)

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

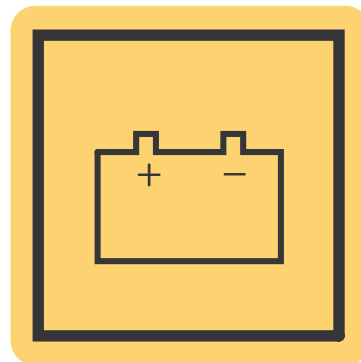
- ※ **See page 6-35 for details.**



38090FW04

35) BATTERY POSITION (item 53)

This warning label is positioned right side of tool box.



38090FW03

36) RCV LEVER PATTERN (item 54)

This warning label is positioned on the screen plate.

- ※ **See page 4-26 for details.**



14W90FW47

MACHINE DATA PLATE

The diagram shows a rectangular machine data plate with rounded corners. At the top center is the Hyundai logo (a stylized 'H' inside a triangle) followed by the text 'HYUNDAI' and 'HEAVY INDUSTRIES CO., LTD.' in smaller text. Below this, the address 'Rodovia Presidente Dutra, km 315, Itatiaia, RJ, Brasil, 27580-000' is printed. The plate is divided into several sections by lines. On the left side, there are three numbered labels with lines pointing to specific fields: '1' points to the 'EQUIPAMENTO' field, '2' points to the 'MODELO' field, and '3' points to the 'NÚMERO DE IDENTIFICAÇÃO DO PRODUTO' field. On the right side, there are two numbered labels with lines pointing to specific fields: '4' points to the 'PESO OPERACIONAL' field, and '5' points to the 'POTÊNCIA DO MOTOR (KW/rpm)' field. At the bottom of the plate, the text 'NÃO DEFORME OU REMOVA ESTA PLACA' is printed.

2209SB0MD01

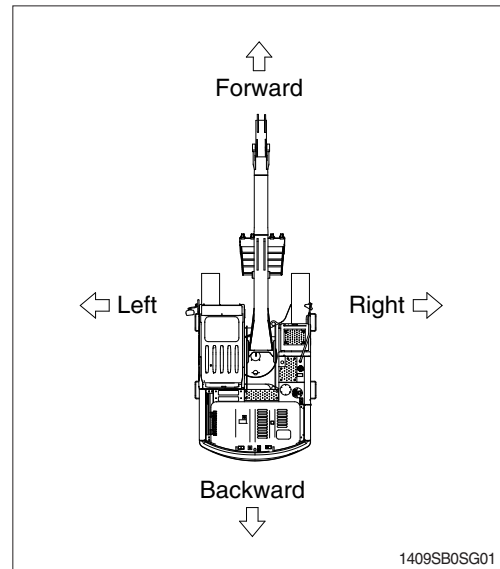
- | | | | | | |
|---|------------|---|------------------|---|--------------|
| 1 | Equipment | 3 | Serial number | 5 | Engine power |
| 2 | Model name | 4 | Operating weight | | |

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

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.

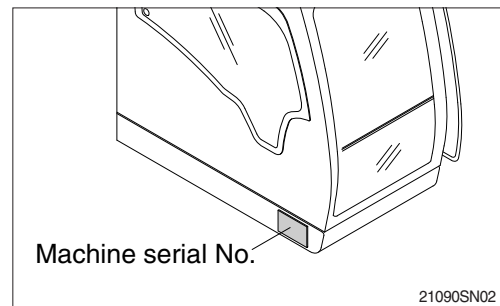


2. SERIAL NUMBER

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

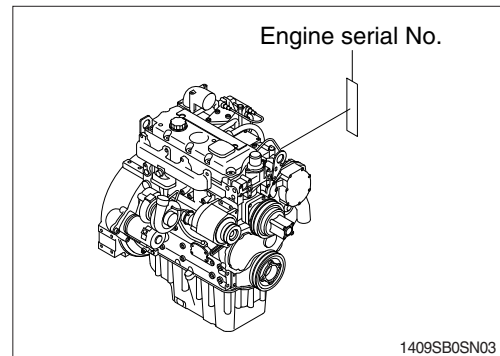
1) MACHINE SERIAL NUMBER

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.

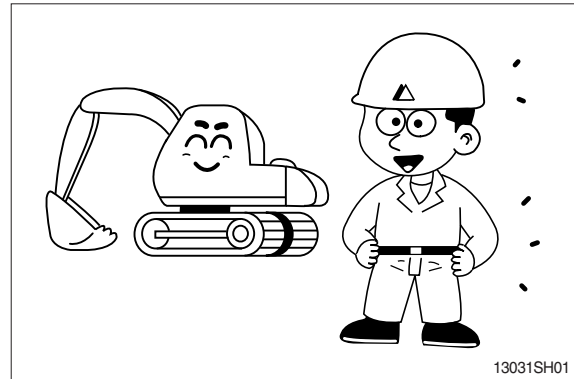
SAFETY HINTS

1. BEFORE OPERATING THE MACHINE

Think-safety first.

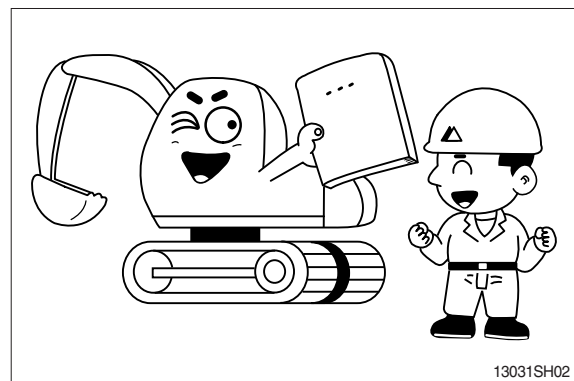
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition.

Almost every accident is caused by disregarding the simple and fundamental safety hints.



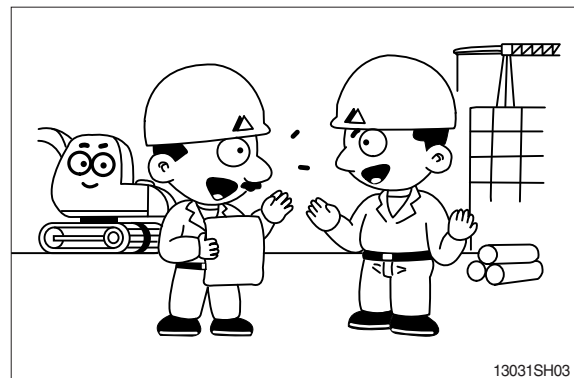
Be sure to understand thoroughly all about the operator's manual before operating the machine.

Proper care is your responsibility.

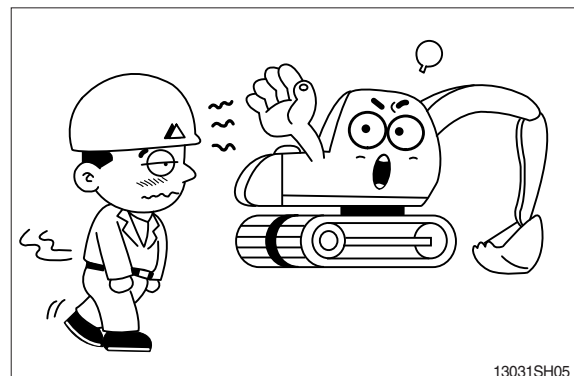


Fully understand the details and process of the construction before starting the work.

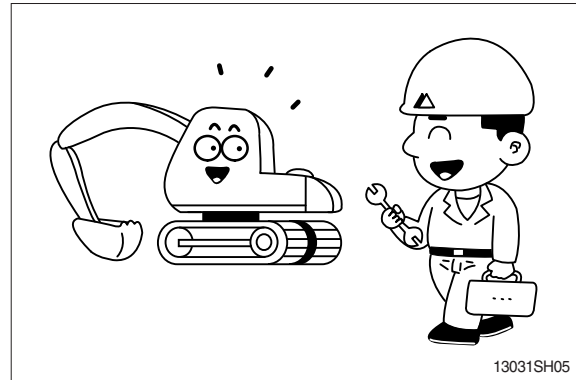
If you find anything dangerous on the job, consult with the job supervisor for the preventive measures before operating the machine.



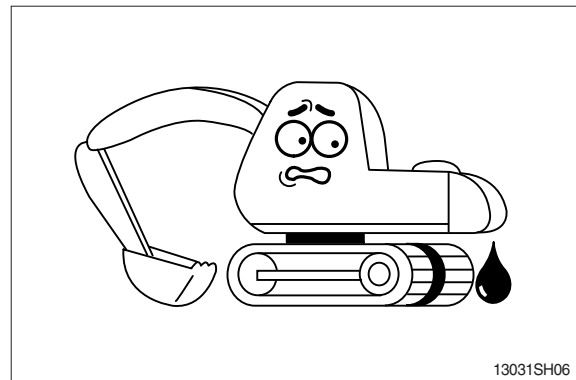
Do not operate when tired, or after drinking alcoholic beverages or any type of drugs.



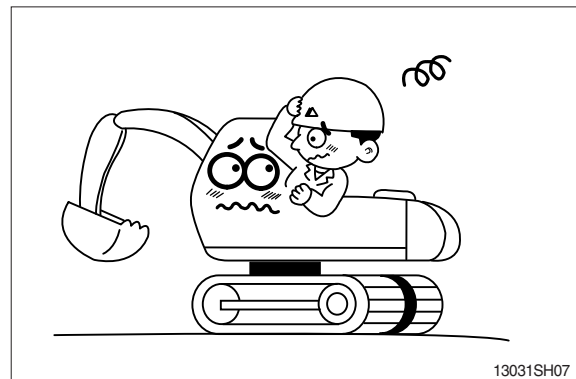
Check daily according to the operation manual.
Repair the damaged parts and tighten the loosened bolts.



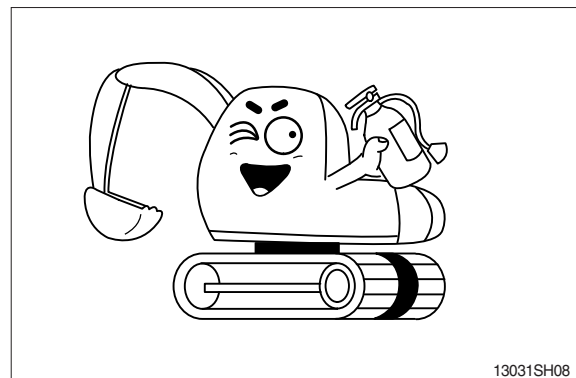
Check for leakage of engine oil, hydraulic oil, fuel and coolant.
Keep machine clean, clean machine regularly.



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



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

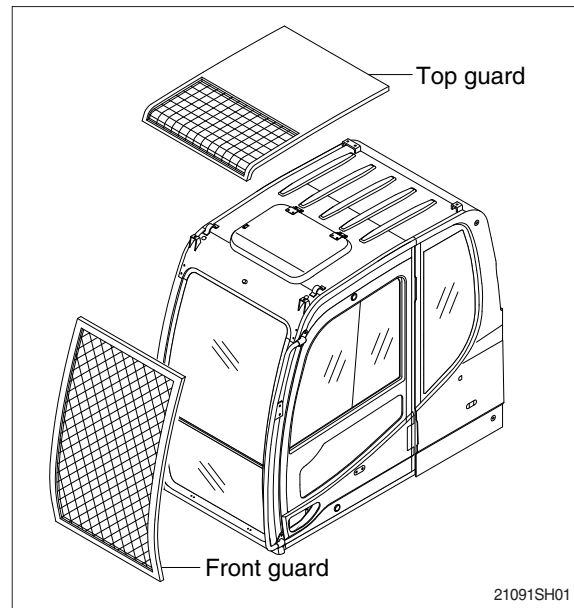


PROTECTION AGAINST FALLING OR FLYING OBJECTS

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

Be sure to close the front window before commencing work.

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



UNAUTHORIZED MODIFICATION

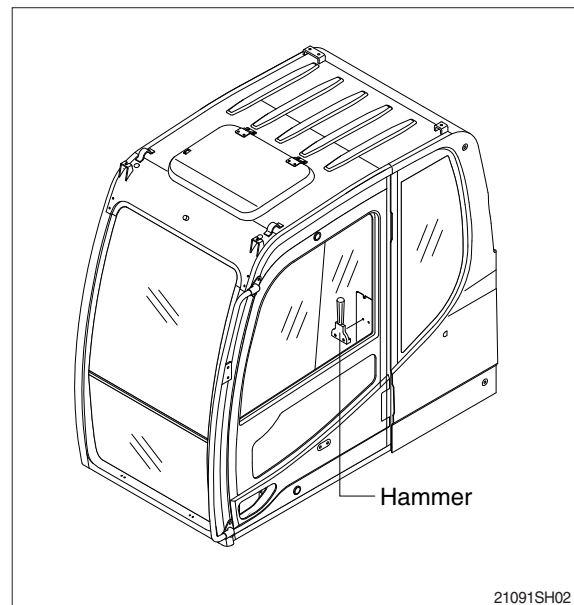
Any modification made without authorization from Hyundai can create hazards.

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.

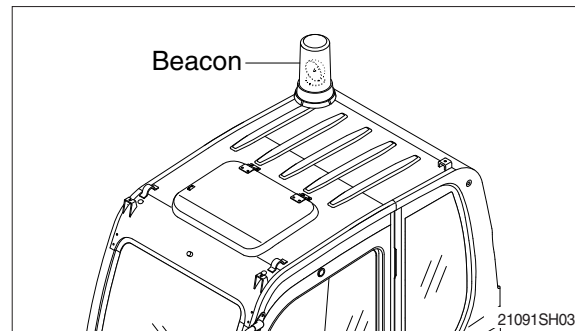
Be sure you know the phone numbers of persons you should contact in case of an emergency.



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

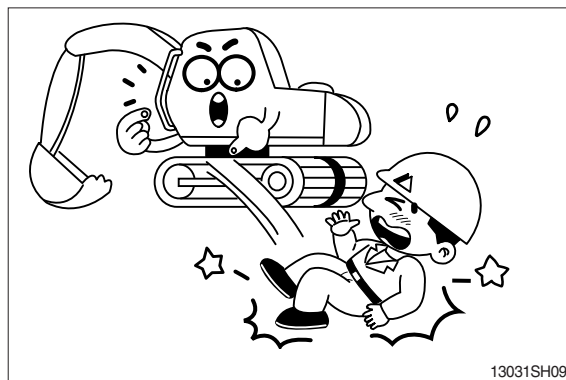
Do not load the machine with the lifting eyes on the counterweight.

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

2. DURING OPERATING THE MACHINE

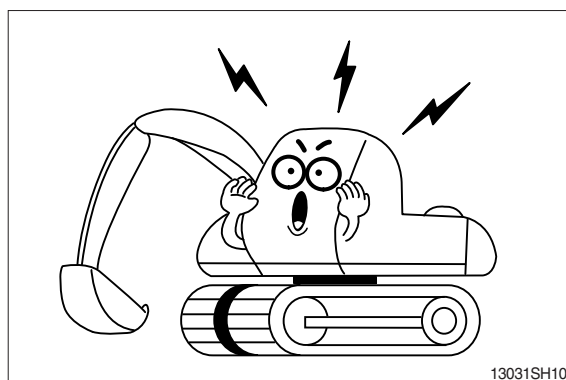
Use the handle and footstep when getting on or off the machine.

Do not jump on or off the machine.



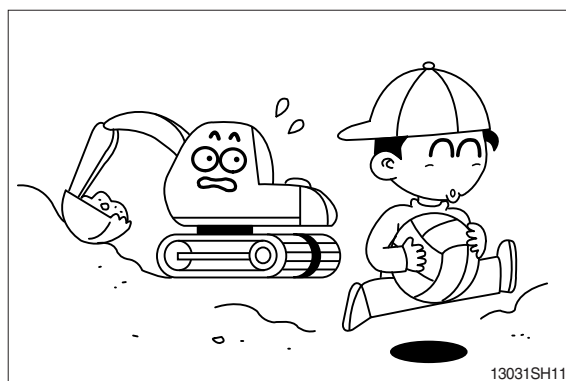
Sound the horn to warn nearby personnel before operating the machine.

Remove all the obstacles like frost on the window before operating the machine for the good visibility.

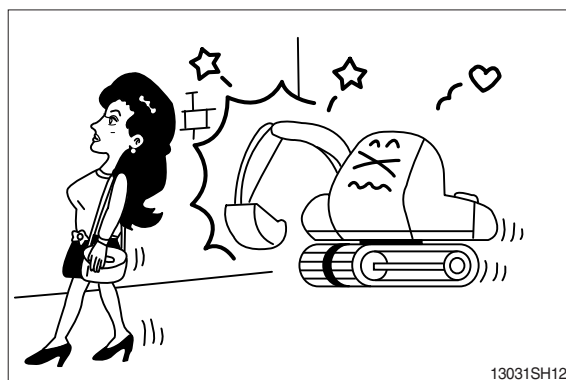


Operate carefully to make sure all personnel or obstacles are clear within the working range of the machine.

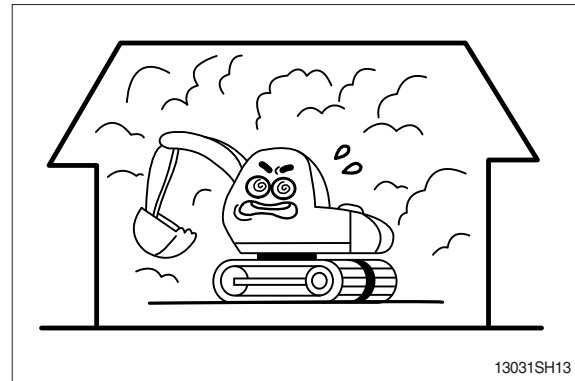
Place safety guards if necessary.



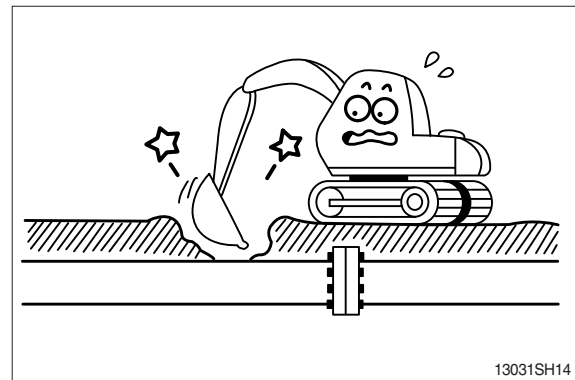
When using the work equipment, pay attention to job site.



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

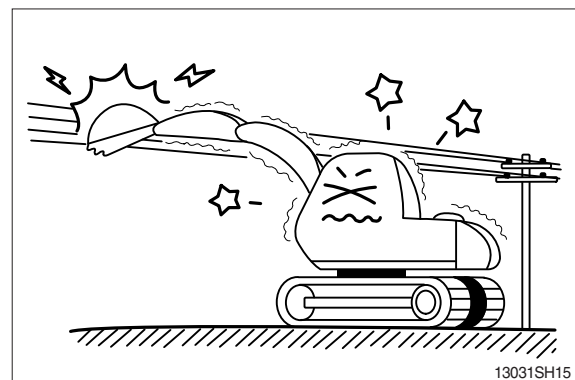


Check the locations of underground gas pipes or water line and secure the safety before operation.

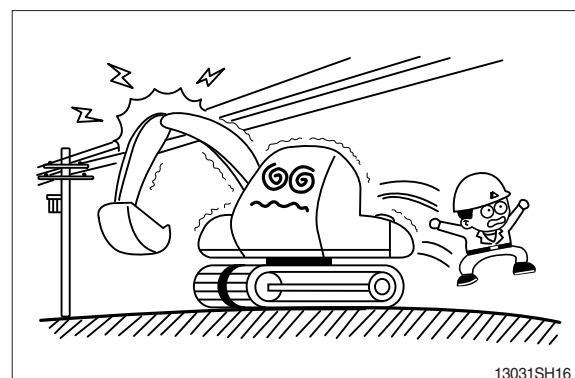


The operating near the electrical lines is very dangerous.
Operate within safe working range permitted as below.

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

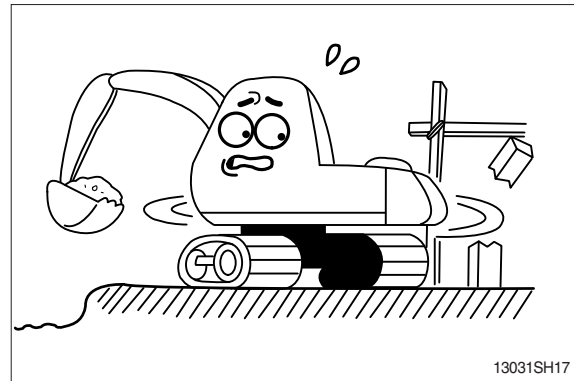


If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current. Jump off the machine without contacting the machine when you need to get off.

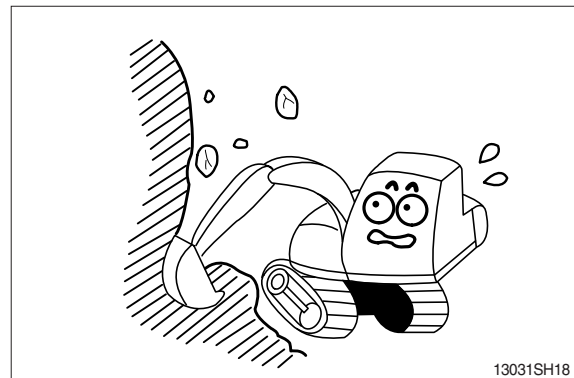


Watch out for obstacles.

Be particularly careful to check the machine clearance during the swing.

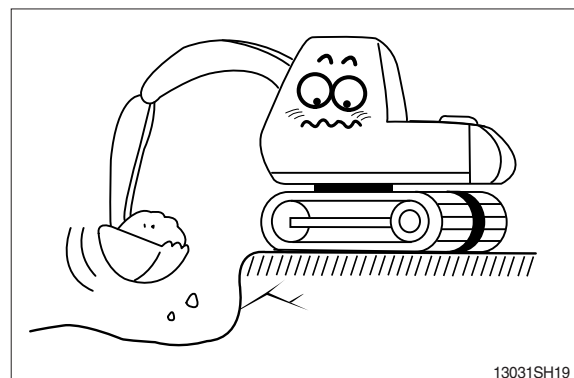


When using the machine as breaker or working in a place where stones may fall down, cab roof guard and head guard should be provided for proper protection.



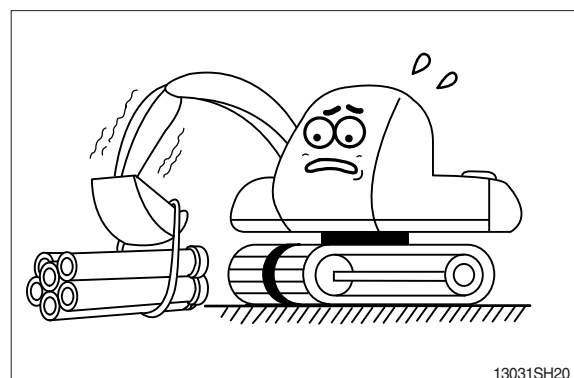
Avoid operating on a cliff or soft ground as there is danger of rolling over.

Make sure to get off easily as keeping the track at a right angle and putting the travel motor into the backward position when working on a cliff or soft ground inevitably.

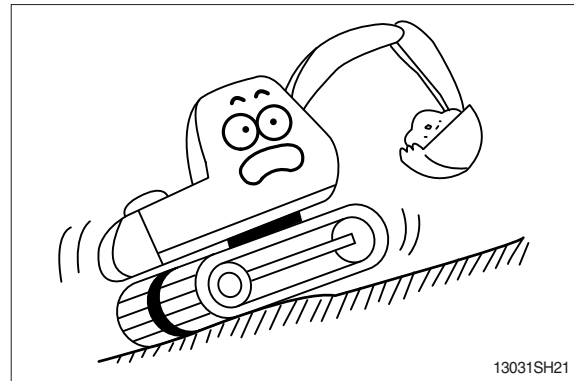


Operate for the lifting work considering the capacity of machine, weight and width of the load.

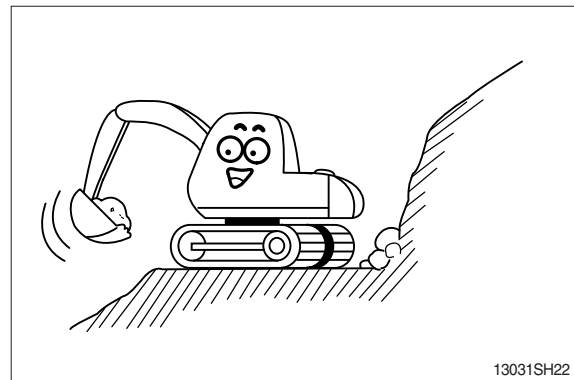
Be careful not to lift exceeding the machine capacity as it can be the cause of machine damage and safety accident.



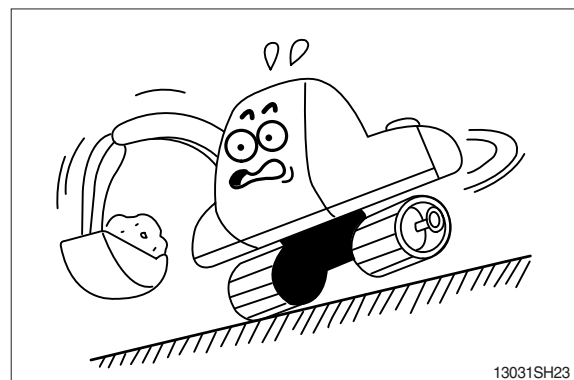
The operation on a slope is dangerous.
Avoid operating the machine on a slope of over 10 degree.



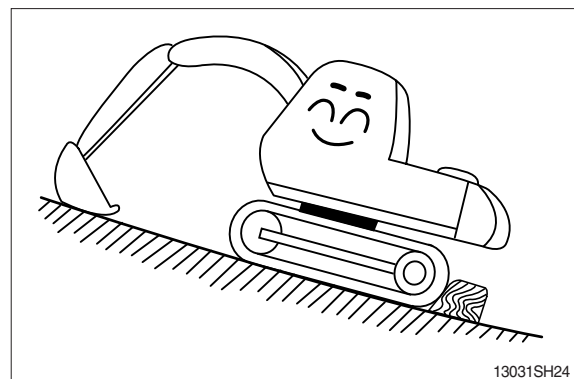
Operate the machine after making ground flat when operation is required on a slope.



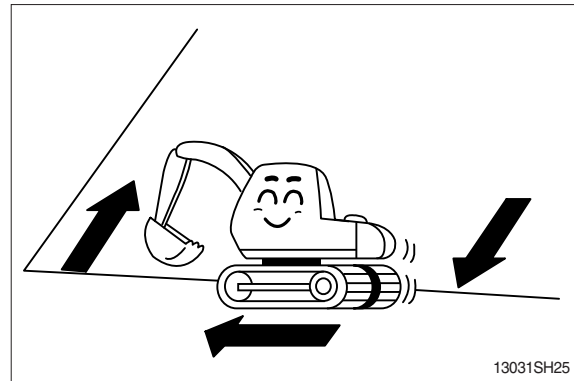
The swing on the slope can be danger of rolling over.
Do not operate to swing the machine with the bucket loaded on a slope since the machine may lose its balance under such an instance.



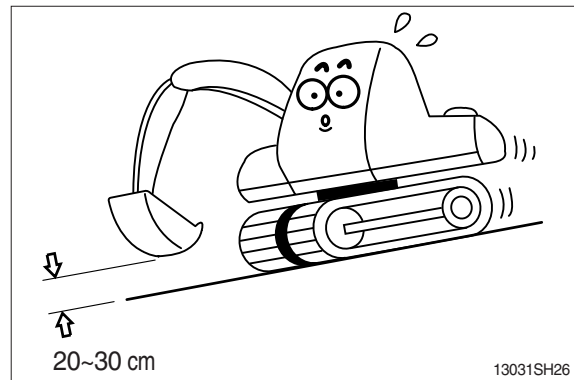
Avoid parking and stopping on a slope.
Lower the bucket to the ground and block the track when parking.



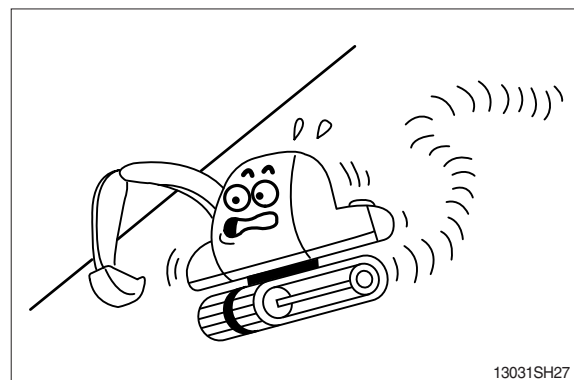
Avoid traveling in a cross direction on a slope as it can cause the danger of rolling over and sliding.



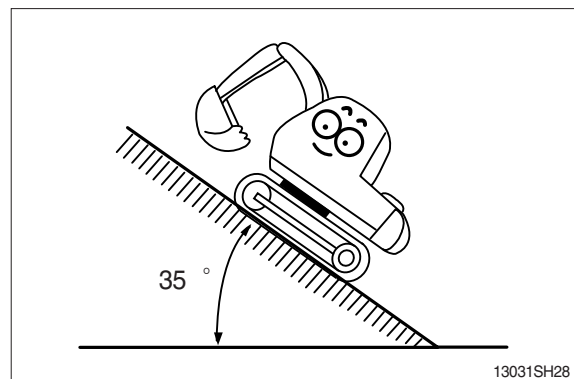
Traveling on a slope is dangerous.
Be sure to operate slowly when traveling down a slope and maintain the bucket at a height of 20~30 cm (1 ft) above the ground so that it can be used as brake in an emergency.



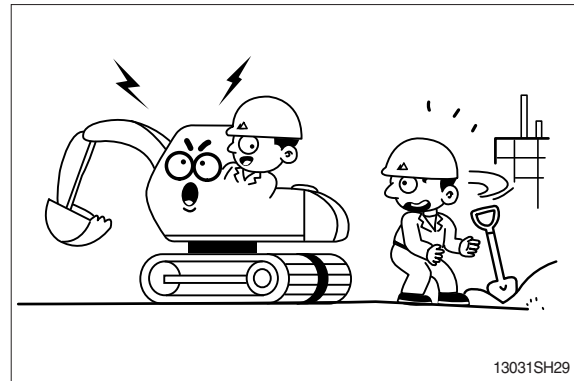
Steering of the machine while traveling on a slope is dangerous.
When an inevitable turning of direction is required, turn on the flat and solid ground.



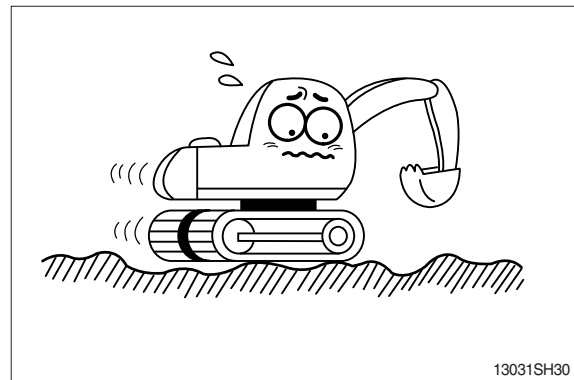
The engine angularity limits are 35 degree.
Do not operate by more than the engine limits in any case.



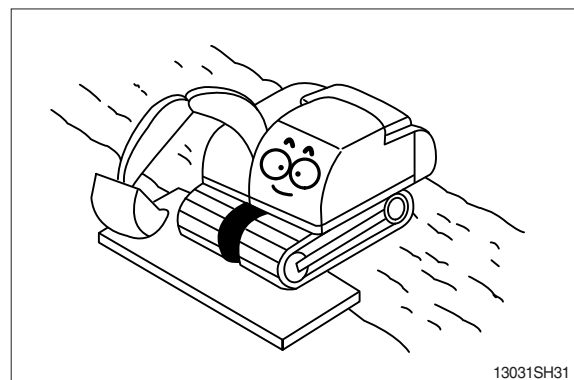
Before traveling the machine, sound the horn to warn nearby personnel.
Operate forward and backward correctly with confirming the location of the travel motor.



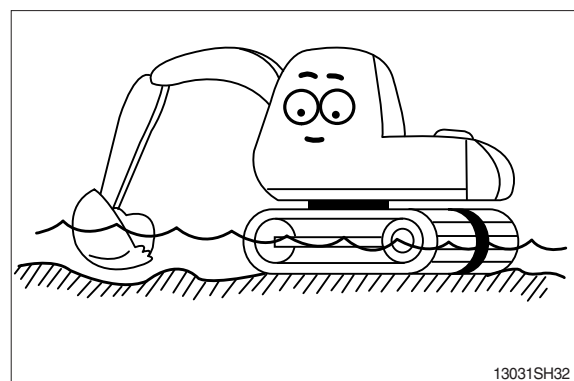
Slow down when traveling through obstacles or uneven ground.



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.

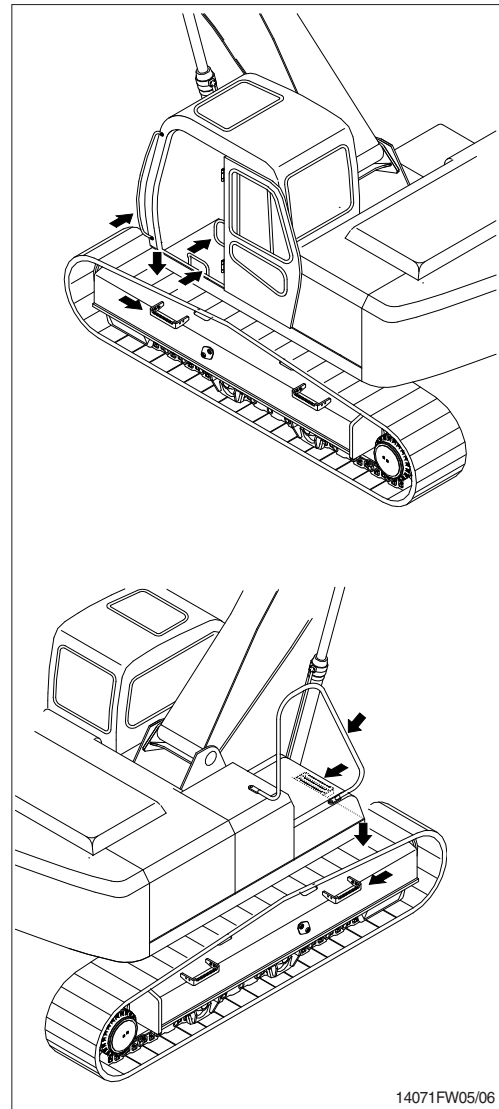
When mounting or dismounting, always face the machine and use the handrails, machine or track frame steps, and track shoes. Additional track frame step can be fitted for wider optional shoe. In this case please contact your Hyundai distributor.

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

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

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

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



KEEP RIDERS OFF MACHINE

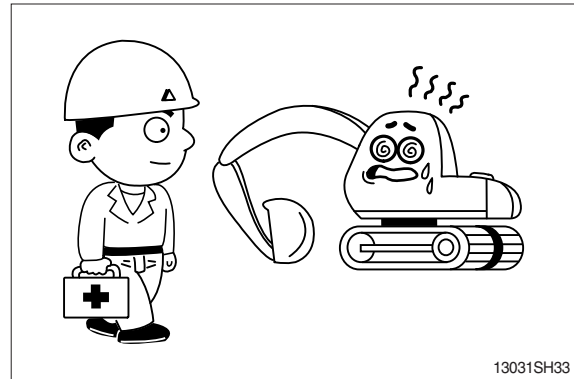
Riders on a machine are subject to injury such as being struck objects and being thrown off the machine.

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

3. DURING MAINTENANCE

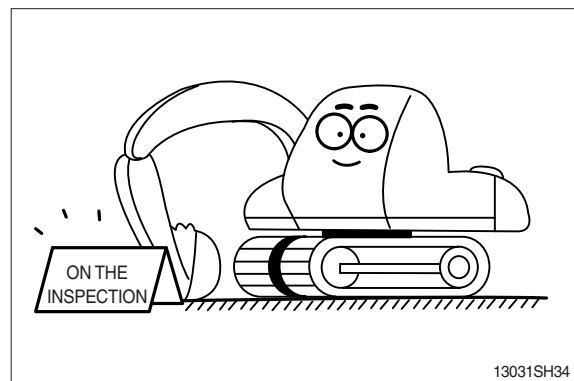
Stop the engine immediately when the trouble of the machine is found.

Inspect immediately the cause of trouble such as vibration, overheating and trouble in the cluster then repair.



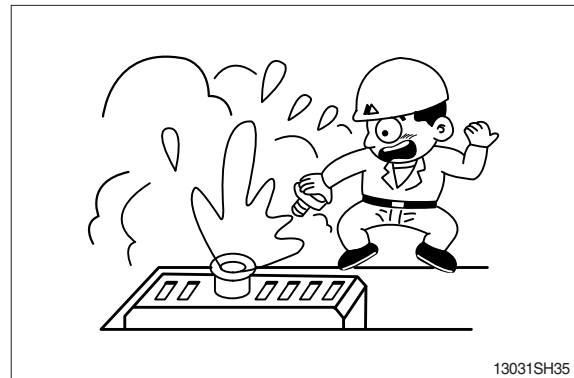
13031SH33

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.



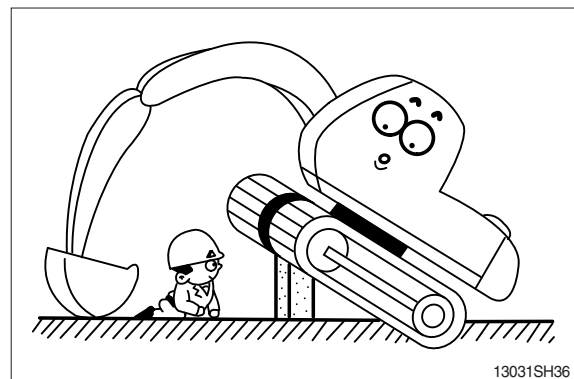
13031SH34

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



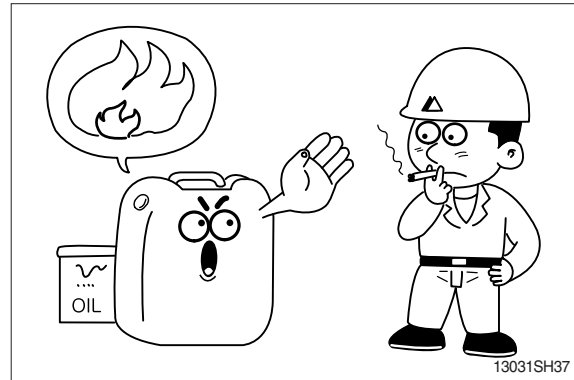
13031SH35

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.

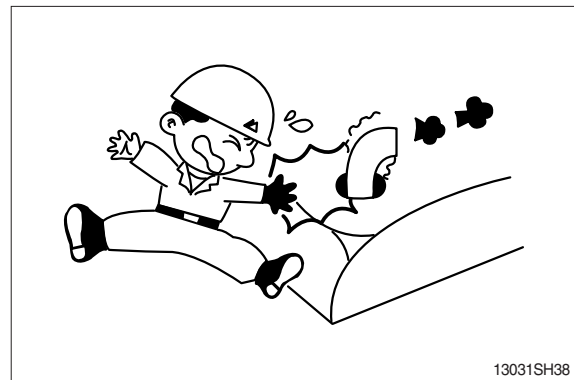


13031SH36

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



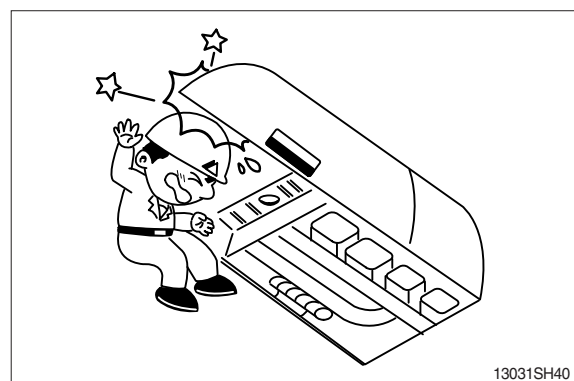
Do not touch exhaust pipe, or may cause severe burn.



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



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



Be careful that the front window may be promptly closed.

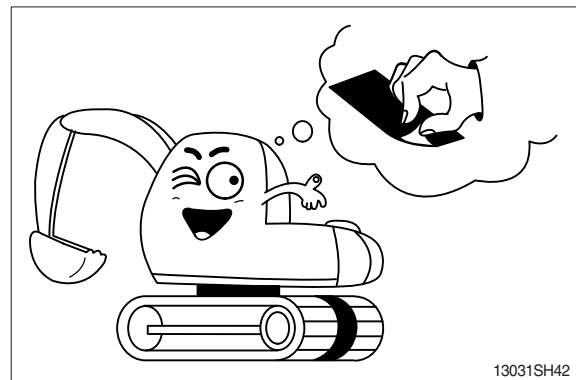
Be sure to support stay, when the side door needs to be opened.

Be careful that the open side door may closed by the external or natural force like strong wind.

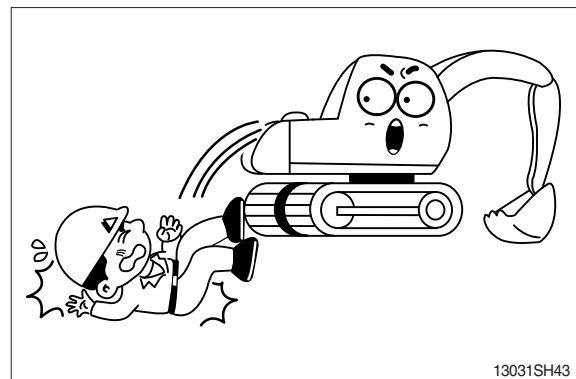


The antislip protection should be replaced if they have become worn or have been printed over.

Be sure to free of oil, water and grease etc.



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

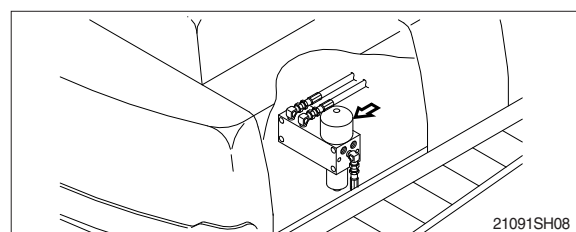


HIGH PRESSURE GAS

Contain high pressure gas.

To avoid explosion and personal injury, do not expose to fire, do not weld, do not drill.

Relieve pressure before discharging.



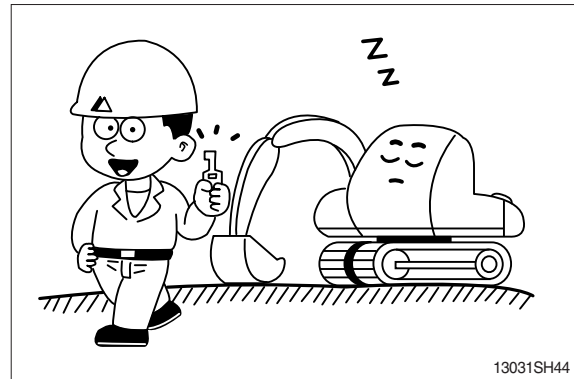
LIFT EYES CAN FAIL

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

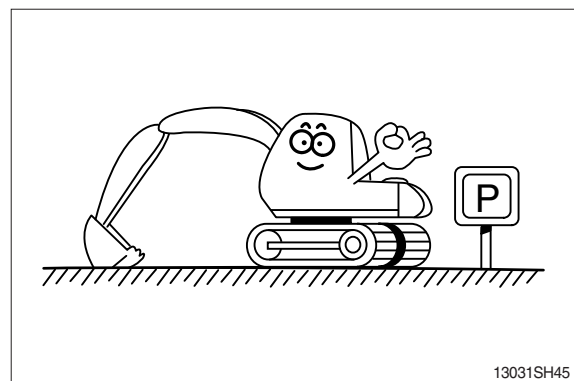
Drain tank of all fluids before lifting.

4. PARKING

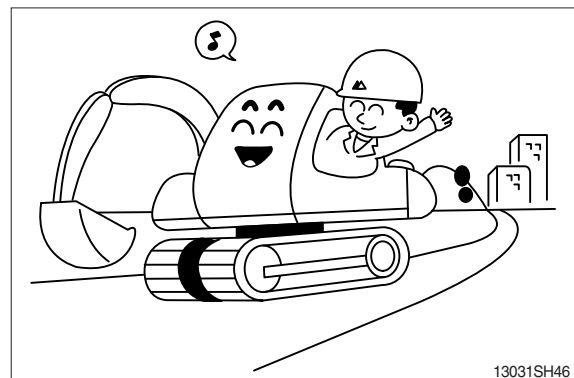
When leaving the machine after parking, lower the bucket to the ground completely and put the safety lever at parking position then remove the key.
Lock the cab door.



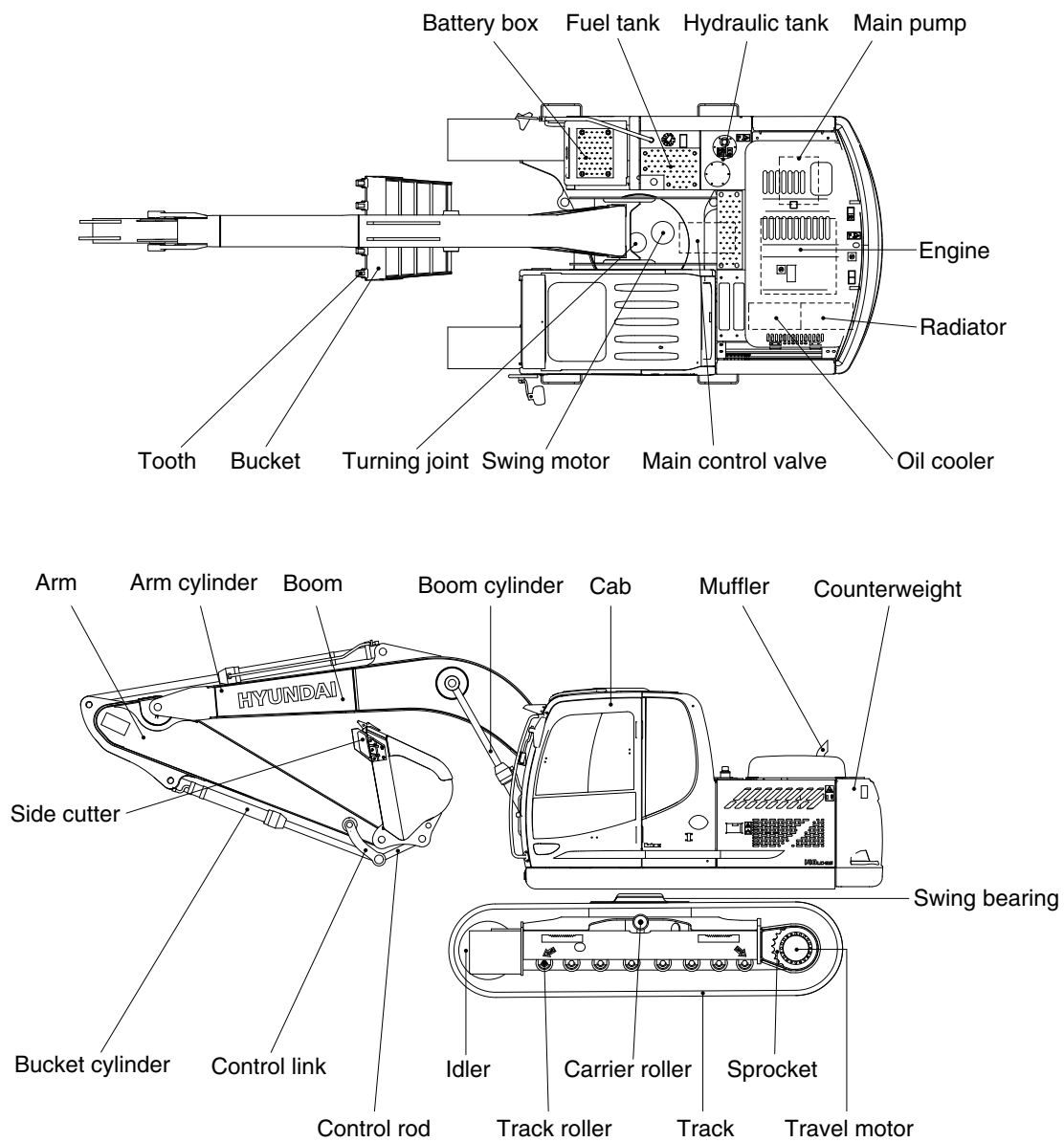
Park the machine in the flat and safe place.



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



1. MAJOR COMPONENT

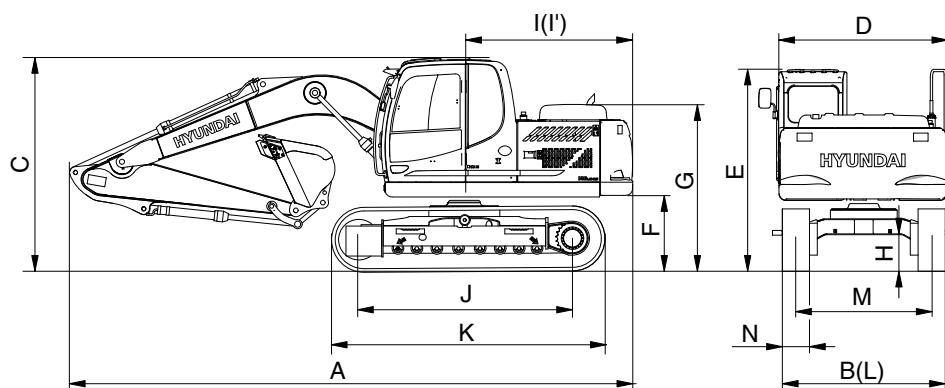


1409SB2SP01B

2. SPECIFICATIONS

1) R150LC-9

· 4.60 m (15' 1") BOOM and 2.50 m (8' 2") ARM

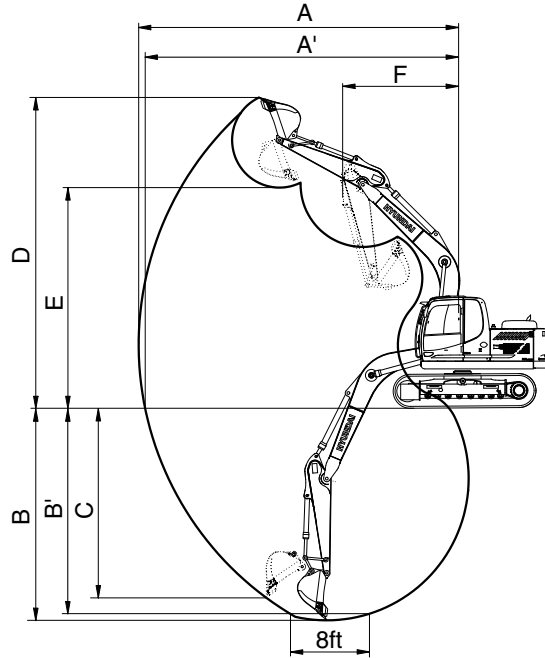


1409SB2SP02

| Description | | Unit | Specification |
|--|----|-----------------------------------|-------------------|
| Operating weight | | kg (lb) | 13980 (30820) |
| Bucket capacity (SAE heaped), standard | | m ³ (yd ³) | 0.58 (0.76) |
| Overall length | A | mm (ft-in) | 7810 (25' 7") |
| Overall width, with 600 mm shoe | B | | 2600 (8' 6") |
| Overall height of boom | C | | 2780 (9' 1") |
| Superstructure width | D | | 2500 (8' 2") |
| Overall height of cab | E | | 2860 (9' 4") |
| Ground clearance of counterweight | F | | 935 (3' 1") |
| Engine cover height | G | | 2050 (6' 7") |
| Minimum ground clearance | H | | 440 (1' 5") |
| Rear-end distance | I | | 2280 (7' 6") |
| Rear-end swing radius | I' | | 2310 (7' 7") |
| Distance between tumblers | J | | 3000 (9' 10") |
| Undercarriage length | K | | 3750 (12' 4") |
| Undercarriage width | L | | 2600 (8' 6") |
| Track gauge | M | | 2000 (6' 7") |
| Track shoe width, standard | N | | 600 (24") |
| Travel speed (low/high) | | km/hr (mph) | 3.2/5.5 (2.0/3.4) |
| Swing speed | | rpm | 12.0 |
| Gradeability | | Degree (%) | 35 (70) |
| Ground pressure (600 mm shoe) | | kgf/cm ² (psi) | 0.36 (5.12) |
| Max traction force | | kgf (lbf) | 13300 (29320) |

3. WORKING RANGE

1) R150LC-9, MONO BOOM



1409SB2SP06

| Description | m (ft-in) | Boom | 4.60 (15' 1") | |
|---------------------------------|------------|------|----------------|----------------|
| | | Arm | 2.50 (8' 2") | 3.0 (9' 10") |
| Max digging reach | mm (ft-in) | A | 8330 (27' 4") | 8790 (28' 10") |
| Max digging reach on ground | | A' | 8180 (26' 10") | 8650 (28' 4") |
| Max digging depth | | B | 5550 (18' 3") | 6050 (19' 10") |
| Max digging depth (8 ft level) | | B' | 5340 (17' 6") | 5870 (19' 3") |
| Max vertical wall digging depth | | C | 5330 (17' 6") | 5850 (19' 2") |
| Max digging height | | D | 8500 (27' 11") | 8780 (28' 10") |
| Max dumping height | | E | 6060 (19' 11") | 6330 (20' 9") |
| Min swing radius | | F | 2650 (8' 8") | 2680 (8' 10") |
| Bucket digging force | kN | SAE | 87.3 [94.8] | 87.3 [94.8] |
| | kgf | | 8900 [9660] | 8900 [9660] |
| | lbf | | 19620 [21300] | 19620 [21300] |
| | kN | ISO | 102 [110.8] | 102 [110.8] |
| | kgf | | 10400 [11290] | 10400 [11290] |
| | lbf | | 22930 [24890] | 22930 [24890] |
| Arm digging force | kN | SAE | 62.8 [68.2] | 55.9 [60.7] |
| | kgf | | 6400 [6950] | 5700 [6190] |
| | lbf | | 14110 [15320] | 12570 [13640] |
| | kN | ISO | 65.7 [71.4] | 57.9 [62.8] |
| | kgf | | 6700 [7270] | 5900 [6410] |
| | lbf | | 14770 [16040] | 13010 [14120] |

[] : Power boost

4. WEIGHT

1) R150LC-9

| Item | R150LC-9 | |
|--|----------|-------|
| | kg | lb |
| Upper structure assembly | 5630 | 12420 |
| Main frame weld assembly | 1160 | 2560 |
| Engine assembly | 420 | 930 |
| Main pump assembly | 100 | 220 |
| Main control valve assembly | 140 | 310 |
| Swing motor assembly | 120 | 260 |
| Hydraulic oil tank assembly | 160 | 350 |
| Fuel tank assembly | 130 | 290 |
| Counterweight | 2000 | 4410 |
| Cab assembly | 500 | 1100 |
| Lower chassis assembly | 5340 | 11760 |
| Track frame weld assembly | 1590 | 3510 |
| Swing bearing | 190 | 410 |
| Travel motor assembly | 480 | 1060 |
| Turning joint | 50 | 110 |
| Track recoil spring | 210 | 460 |
| Idler | 250 | 550 |
| Carrier roller | 40 | 90 |
| Track roller | 490 | 1080 |
| Track-chain assembly (600 mm standard triple grouser shoe) | 1010 | 2230 |
| Front attachment assembly (4.6 m boom, 2.5 m arm, 0.58 m³ SAE heaped bucket) | 2420 | 5330 |
| 4.6 m boom assembly | 830 | 1830 |
| 2.5 m arm assembly | 435 | 960 |
| 0.58 m³ SAE heaped bucket | 480 | 1060 |
| Boom cylinder assembly | 130 | 290 |
| Arm cylinder assembly | 160 | 350 |
| Bucket cylinder assembly | 100 | 220 |
| Bucket control rod assembly | 90 | 200 |



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











※ Refer to Transportation for actual weight information and Specifications for operating weight.

5. LIFTING CAPACITIES

1) R150LC-9

(1) 4.60 m (15' 1") boom, 2.50 m (8' 2") arm equipped with 0.58 m³ (SAE heaped) bucket and 600 mm (24") triple grouser shoe and 2000 kg (4410 lb) counterweight.

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

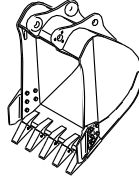
| Load point height | | Load radius | | | | | | | | At max. reach | | |
|-------------------|----------|---|---|---|---|---|---|---|---|---|---|----------------|
| | | 1.5 m (5 ft) | | 3.0 m (10 ft) | | 4.5 m (15 ft) | | 6.0 m (20 ft) | | Capacity | | Reach |
| | |  |  |  |  |  |  |  |  |  |  | m (ft) |
| 6.0 m (20.0 ft) | kg lb | | | | | | | | | *2810 *6190 | 1920 4230 | 6.69 (21.9) |
| 4.5 m (15.0 ft) | kg lb | | | | | | | *2770 *6110 | 2270 5000 | 2440 5380 | 1500 3310 | 7.53 (24.7) |
| 3.0 m (10.0 ft) | kg lb | | | *4930 *10870 | *4930 *10870 | *3830 *8440 | 3570 7870 | *3380 *7450 | 2190 4830 | 2170 4780 | 1310 2890 | 7.95 (26.1) |
| 1.5 m (5.0 ft) | kg lb | | | *8030 *17700 | 6240 13760 | *5010 *11050 | 3300 7280 | 3380 7450 | 2070 4560 | 2100 4630 | 1250 2760 | 8.03 (26.3) |
| Ground Line | kg lb | | | *8780 *19360 | 5800 12790 | 5200 11460 | 3090 6810 | 3270 7210 | 1970 4340 | 2180 4810 | 1300 2870 | 7.77 (25.5) |
| -1.5 m (-5.0 ft) | kg lb | *5740 *12650 | *5740 *12650 | *9910 *21850 | 5700 12570 | 5080 11200 | 2990 6590 | 3220 7100 | 1920 4230 | 2500 5510 | 1500 3310 | 7.15 (23.5) |
| -3.0 m (-10 ft) | kg lb | *8760 *19310 | *8760 *19310 | *9040 *19930 | 5770 12720 | 5100 11240 | 3000 6610 | | | 3340 7360 | 2030 4480 | 6.01 (19.7) |
| -4.5 m (-15.0 ft) | kg lb | | | *6590 *14530 | 6030 13290 | | | | | | | |

- Note
1. Lifting capacity are based on SAE J1097 and 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 load point is a hook located on the back of the bucket.
 4. *indicates load limited by hydraulic capacity.

6. BUCKET SELECTION GUIDE


1) R150LC-9

(1) General bucket




0.58, 0.71 m³ SAE
heaped bucket

| Capacity | | Width | | Weight | Recommendation | | | | | |
|-----------------------|-----------------------|------------------------|---------------------|---------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|
| | | | | | 4.6 m (15' 1") boom | | | | 4.1 m (13' 5") boom | |
| SAE heaped | CECE heaped | Without side cutter | With side cutter | | 1.9 m arm (6' 3") | 2.1 m arm (6' 11") | 2.5 m arm (8' 2") | 3.0 m arm (9' 10") | 1.9 m arm (6' 3") | 2.1 m arm (6' 11") |
| 0.58 m³ (0.76 yd³) | 0.50 m³ (0.65 yd³) | 1030 mm (40.6") | 1130 mm (44.5") | 480 kg (1060 lb) | | | | | | |
| 0.71 m³ (0.93 yd³) | 0.60 m³ (0.78 yd³) | 1205 mm (47.4") | 1305 mm (51.4") | 540 kg (1190 lb) | | | | | | |

 Applicable for materials with density of 2000 kg/m³ (3370 lb/yd³) or less

 Applicable for materials with density of 1600 kg/m³ (2700 lb/yd³) or less

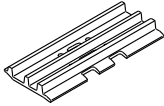
 Applicable for materials with density of 1100 kg/m³ (1850 lb/yd³) or less

7. UNDERCARRIAGE

1) TRACKS

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

2) TYPES OF SHOES

| Model | Shapes | | Triple grouser | |
|----------|------------------|---------------------------|---|---------------|
| | | |  | |
| R150LC-9 | Shoe width | mm (in) | 600 (24) | 700 (28) |
| | Operating weight | kg (lb) | 13980 (30820) | 14210 (31330) |
| | Ground pressure | kgf/cm ² (psi) | 0.36 (5.12) | 0.32 (4.55) |
| | Overall width | mm (ft-in) | 2600 (8' 6") | 2700 (8' 10") |

3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

| Item | Quantity |
|-----------------|----------|
| | R150LC-9 |
| Carrier rollers | 1 EA |
| Track rollers | 7 EA |
| Track shoes | 46 EA |

4) SELECTION OF TRACK SHOE

Suitable track shoes should be selected according to operating conditions.

Method of selecting shoes

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

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

※ **Table 1**

| Track shoe | Specification | Category |
|-----------------------|---------------|----------|
| 600 mm triple grouser | Standard | A |
| 700 mm triple grouser | Option | B |

※ Table 2

| Category | Applications | Applications |
|----------|---|--|
| A | Rocky ground, river beds, normal soil | <ul style="list-style-type: none"> · Travel at low speed on rough ground with large obstacles such as boulders or fallen trees |
| B | Normal soil, soft ground | <ul style="list-style-type: none"> · 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 |
|-------------------------------------|---|
| Maker / Model | Cummins / QSB4.5 |
| Type | 4-cycle, turbocharged, charge air cooled, electronic controlled diesel engine |
| Cooling method | Water cooled |
| Number of cylinders and arrangement | 4 cylinders, in-line |
| Firing order | 1-3-4-2 |
| Combustion chamber type | Direct injection type |
| Cylinder bore × stroke | 107 × 124 mm (4.21" × 4.88") |
| Displacement | 4.5 ℓ (272 cu in) |
| Compression ratio | 17.2 : 1 |
| Gross power | 130 Hp (97 kW) at 2200 rpm |
| Net power | 127 Hp (95 kW) at 2200 rpm |
| Max. power | 140 Hp (104 kW) at 2000 rpm |
| Peak Torque | 622 N · m (459 lbf · ft) at 15300 rpm |
| Engine oil quantity | 11 ℓ (2.9 U.S. gal) |
| Wet weight | 371 kg (818 lb) |
| Starter motor | 24 V-4.8 kW |
| Alternator | 24 V-70 A |

2) MAIN PUMP

| Item | Specification |
|------------------|---|
| Type | Variable displacement tandem axis piston pumps |
| Capacity | 2 × 65 cc/rev |
| Maximum pressure | 350 kgf/cm ² (4980 psi) [380 kgf/cm ² (5400 psi)] |
| Rated oil flow | 2 × 123.5 ℓ /min (32.6 U.S. gpm / 27.2 U.K. gpm) |
| Rated speed | 2000 rpm |

[]: Power boost

3) GEAR PUMP

| Item | Specification |
|------------------|---|
| Type | Fixed displacement gear pump single stage |
| Capacity | 15cc/rev |
| Maximum pressure | 40 kgf/cm ² (570 psi) |
| Rated oil flow | 28.5 ℓ /min (7.5 U.S. gpm / 6.3 U.K. gpm) |

4) MAIN CONTROL VALVE

| Item | Specification |
|--------------------------------|---|
| Type | 11 spools |
| Operating method | Hydraulic pilot system |
| Main relief valve pressure | 350 kgf/cm ² (4980 psi) [380 kgf/cm ² (5400 psi)] |
| Overload relief valve pressure | 400 kgf/cm ² (5690 psi) |

[]: Power boost

5) SWING MOTOR

| Item | Specification |
|------------------------|--|
| Type | Fixed displacement axial piston motor |
| Capacity | 72 cc/rev |
| Relief pressure | 285 kgf/cm ² (4054 psi) |
| Braking system | Automatic, spring applied hydraulic released |
| Braking torque | Minimum 30 kgf · m (217 lbf · ft) |
| Brake release pressure | 15~50 kgf/cm ² (213~711 psi) |
| Reduction gear type | 2 - stage planetary |

6) TRAVEL MOTOR

| Item | Specification | | |
|------------------------|--|------------------------------------|------------------------------------|
| | Type 1 | Type 2 | Type 3, 4 |
| Type | Variable displacement axial piston motor | | |
| Relief pressure | 350 kgf/cm ² (4980 psi) | 365 kgf/cm ² (5190 psi) | 350 kgf/cm ² (4980 psi) |
| Capacity (max / min) | 77/45 cc/rev | 76.6/44.6 cc/rev | 77/44.5 cc/rev |
| Reduction gear type | 2-stage planetary | | |
| Braking system | Automatic, spring applied hydraulic released | | |
| Brake release pressure | 9.5 kgf/cm ² (135 psi) | 8.75 kgf/cm ² (125 psi) | 15.9 kgf/cm ² (226 psi) |
| Braking torque | Min. 33.1 kgf · m (239 lbf · ft) | | |

7) CYLINDER

| Item | | Specification |
|-----------------|-----------------------------|------------------------|
| Boom cylinder | Bore dia × Rod dia × Stroke | Ø 105 × Ø 75 × 1075 mm |
| | Cushion | Extend only |
| Arm cylinder | Bore dia × Rod dia × Stroke | Ø 115 × Ø 80 × 1138 mm |
| | Cushion | Extend and retract |
| Bucket cylinder | Bore dia × Rod dia × Stroke | Ø 100 × Ø 70 × 850 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.

8) SHOE

| Item | | Width | Ground pressure | Link quantity | Overall width |
|----------|----------|--------------|-------------------------------------|---------------|-------------------|
| R150LC-9 | Standard | 600 mm (24") | 0.36 kgf/cm ² (5.12 psi) | 46 | 2600 mm (8' 6") |
| | Option | 700 mm (28") | 0.31 kgf/cm ² (4.41 psi) | 46 | 2700 mm (8' 10") |

9) BUCKET

| Item | | Capacity | | Tooth quantity | Width | |
|----------|----------|---|---|----------------|---------------------|------------------|
| | | SAE heaped | CECE heaped | | Without side cutter | With side cutter |
| R150LC-9 | Standard | 0.58 m ³ (0.76 yd ³) | 0.50 m ³ (0.65 yd ³) | 5 | 1000 mm (39.4") | 1100 mm (43.3") |
| | Option | 0.71 m ³ (0.93 yd ³) | 0.60 m ³ (0.78 yd ³) | 5 | 1190 mm (46.9") | 1290 mm (50.8") |

9. RECOMMENDED OILS

Use only oils listed below or equivalent.

Do not mix different brand oil.

| 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 | 11 (2.9) | | ★SAE OW-30 | | | | | | | |
| | | | | SAE 5W-40 | | | | | | | |
| | | | | SAE 10W-30 | | | | | | | |
| | | | | SAE 15W-40 | | | | | | | |
| Swing drive | Gear oil | 2.5 (0.7) | ★SAE 75W-90 | | | | | | | | |
| Final drive | | 2.3×2 (0.6×2) | | SAE 80W-90 | | | | | | | |
| Hydraulic tank | Hydraulic oil | Tank; 124 (32.8) System; 210 (55.5) | ★ISO VG 15 | | | | | | | | |
| | | | ISO VG 32 | | | | | | | | |
| | | | ISO VG 46 | | | | | | | | |
| | | | ISO VG 68 | | | | | | | | |
| Fuel tank | Diesel fuel | 270 (71.0) | ★ASTM D975 NO.1 | | | | | | | | |
| | | | | | | | ASTM D975 NO.2 | | | | |
| Fitting (grease nipple) | Grease | As required | ★NLGI NO.1 | | | | | | | | |
| | | | | | | NLGI NO.2 | | | | | |
| Radiator (reservoir tank) | Mixture of antifreeze and water | 21 (5.5) | Ethylene glycol base permanent type (50 : 50) | | | | | | | | |
| | | | ★Ethylene glycol base permanent type (60 : 40) | | | | | | | | |

SAE : Society of Automotive Engineers

★ : Cold region

API : American Petroleum Institute

ISO : International Organization for Standardization

NLGI : National Lubricating Grease Institute

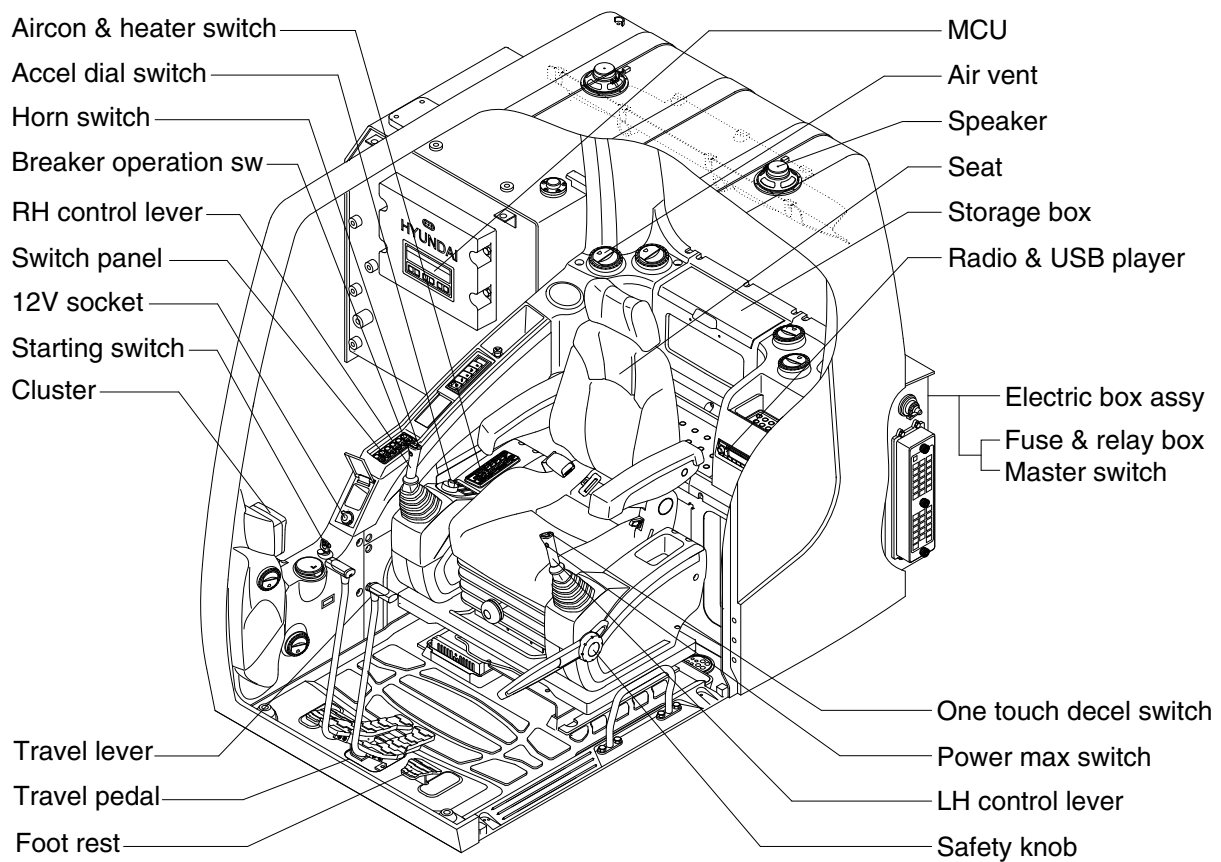
ASTM : American Society of Testing and Material

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.



1409SB3CD01A

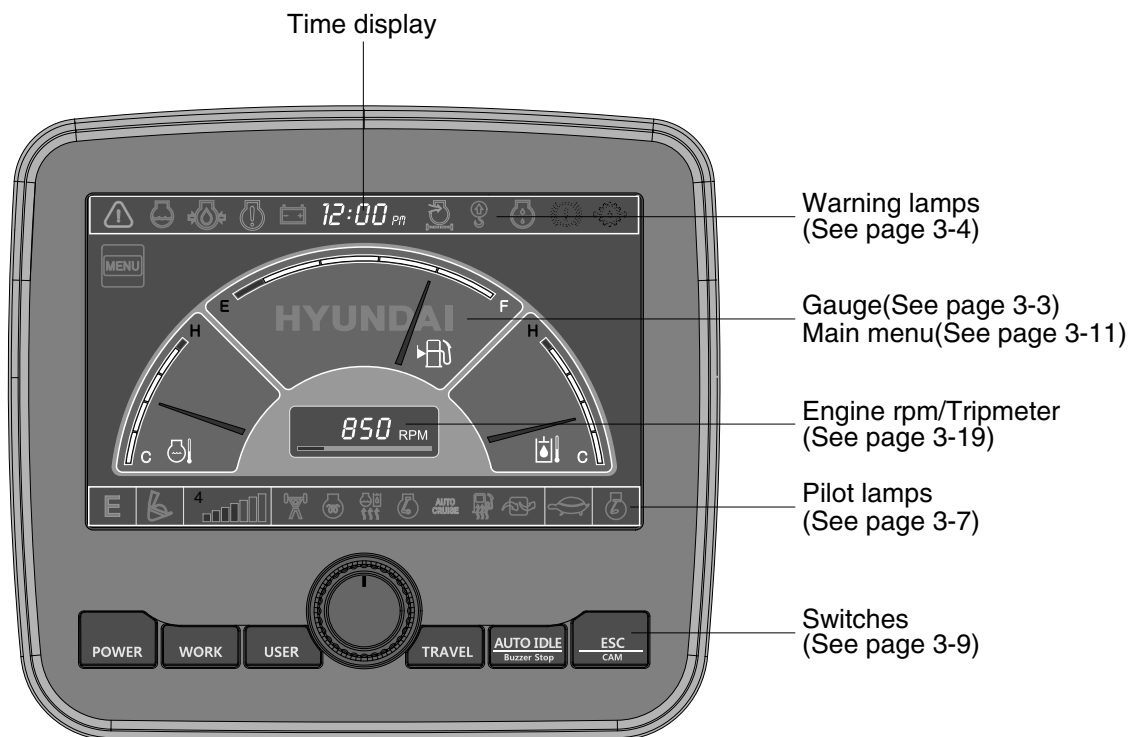
2. CLUSTER

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.



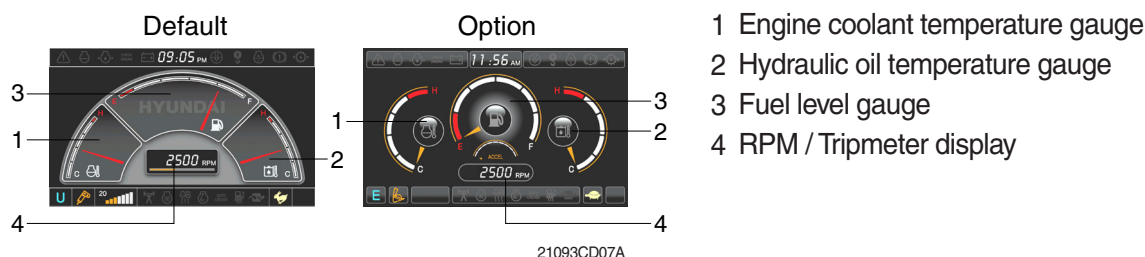
B15093CD07

- ※ 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.

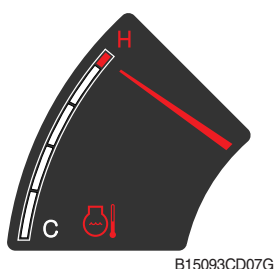
2) GAUGE



(1) Operation screen



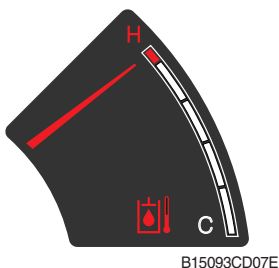
※ Operation screen type can be set by the screen type menu of the display.
Refer to page 3-21 for details.



(2) Engine coolant temperature gauge



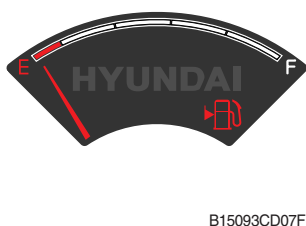
- ① This gauge indicates the temperature of coolant.
 - White range : 40-107°C (104-225°F)
 - Red range : Above 107°C (225°F)
 - ② If the indicator is in the red range or  lamp blinks in red, turn OFF the engine and check the engine cooling system.
- ※ If the gauge indicates the red range or  lamp blinks 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



- 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



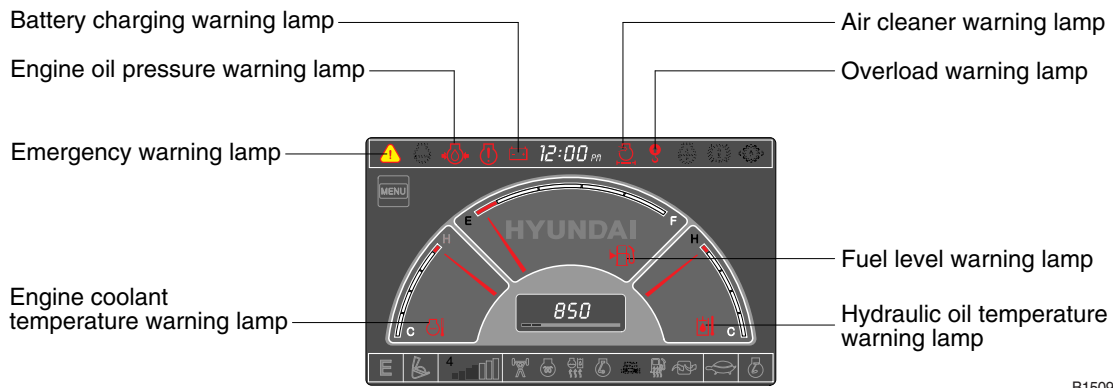
- ① This gauge indicates the amount of fuel in the fuel tank.
 - ② Fill the fuel when the red range, or  lamp blinks in red.
- ※ If the gauge indicates the red range or  lamp blinks in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor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

(5) RPM / Tripmeter display



- ① This displays the engine speed or the tripmeter.
- ※ Refer to page 3-19 for details.

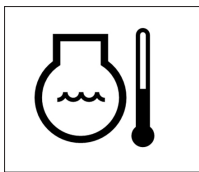
3) WARNING LAMPS



B1509S3CD08D

※ 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.

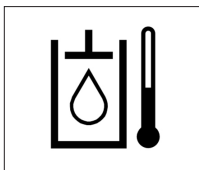
(1) Engine coolant temperature



290F3CD61

- 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.

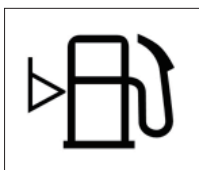
(2) Hydraulic oil temperature



290F3CD62

- 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



290F3CD63

- ① This warning lamp blinks and the buzzer sounds when the level of fuel is below 31 ℓ (8.2 U.S. gal).
- ② Fill the fuel immediately when the lamp blinks.

(4) Emergency warning lamp



21093CD30

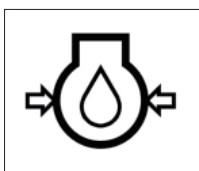
① This lamp pops up and the buzzer sounds when each of the below warnings is happened.

- 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



290F3CD65

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



290F3CD64

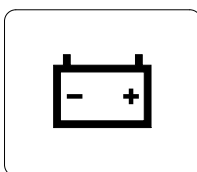
① This lamp blinks when the communication between MCU and engine ECM on the engine is abnormal, or if the cluster received any fault code from engine ECM.

② Check the communication line between them.

If the communication line is OK, then check the fault codes on the cluster.

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

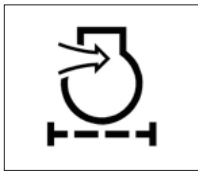


21093CD34

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

② Check the battery charging circuit when this lamp blinks.

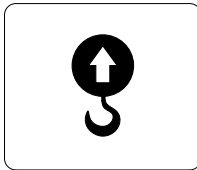
(8) Air cleaner warning lamp



290F3CD68

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

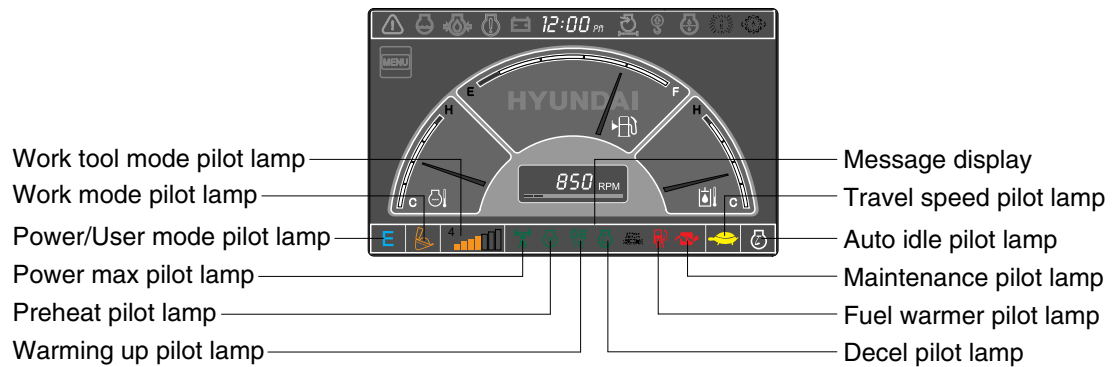
(9) Overload warning lamp (opt)



21093CD36

- ① When the machine is overload, the overload warning lamp blinks during the overload switch is ON. (if equipped)
- ② Reduce the machine load.

4) PILOT LAMPS



B15093CD09

(1) Mode pilot lamps

| No | Mode | Pilot lamp | Selected mode |
|----|-----------------|------------|--|
| 1 | Power mode | | Heavy duty power work mode |
| | | | Standard power mode |
| | | | Economy power mode |
| 2 | User mode | | 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 | | Oil flow level of breaker or crusher mode |
| 7 | Message display | | "Setting is completed" display after selection |

(2) Power max pilot lamp



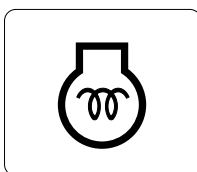
21093CD38

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 page 3-26 for power max function.

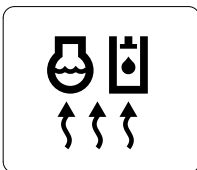
(3) Preheat pilot lamp



21093CD39

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

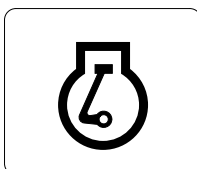
(4) Warming up pilot lamp



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



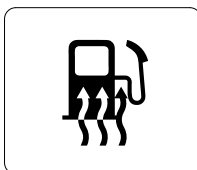
21093CD41

- 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 page 3-27.**

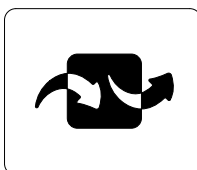
(6) Fuel warmer pilot lamp



21093CD43

- ① This lamp is turned ON when the coolant temperature is below 10°C (50°F) or the hydraulic oil temperature 20°C (68°F).
- ② The automatic fuel warming is cancelled when the engine coolant temperature is above 60°C, or the hydraulic oil temperature is above 45°C since the start switch was ON position.

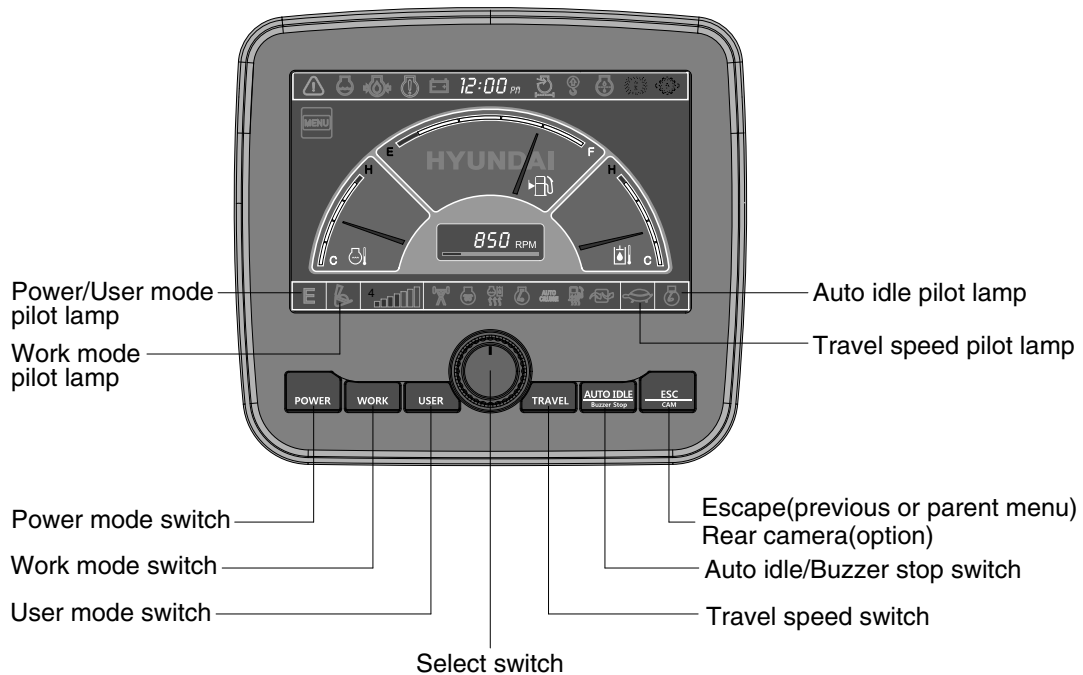
(7) Maintenance pilot lamp



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.

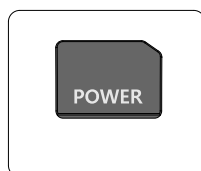
5) SWITCHES



B15093CD45

※ When the switches are selected, the pilot lamps are displayed on the LCD. Refer to 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

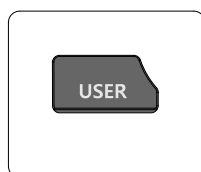


21093CD45C

- 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 page 4-7 for details.

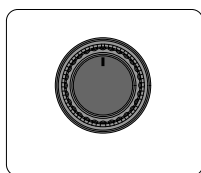
(3) User mode switch



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 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

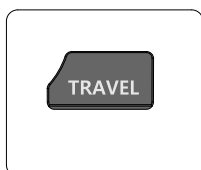


21093CD45F



- 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.

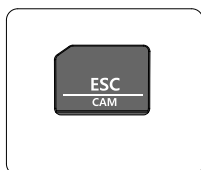
(6) Travel speed control switch



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



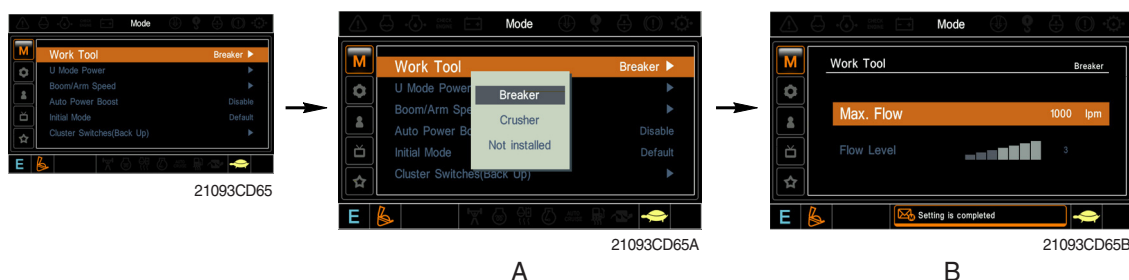
※ Please refer to select switch, page 3-10 for selection and change of menu and input value.

(1) Structure

| No | Main menu | Sub menu | Description |
|----|---|---|---|
| 1 |  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, P 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, 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 Camera setting Message box | 3 kinds (A, B, C) Basic direction, Display switching, Full screen Record for fault, attachment etc. |

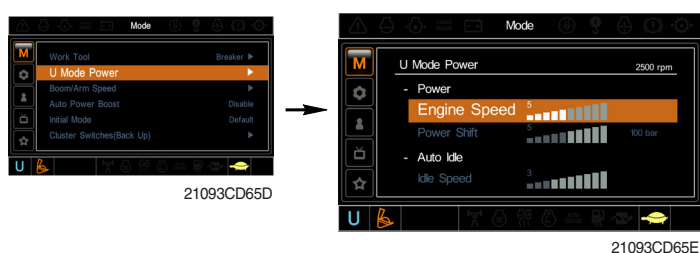
(2) Mode setup

① Work tool



- 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.

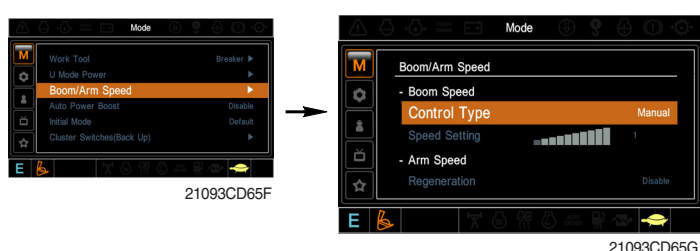
② U mode power



- 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.

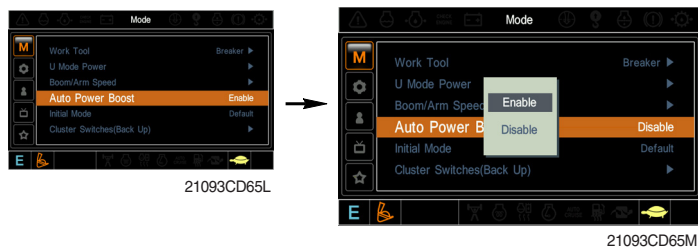
| Step (■) | Engine speed (rpm) | Idle speed (rpm) | Power shift (bar) |
|-------------|--------------------------|---------------------|-------------------------|
| 1 | 1550 | 800 | 0 |
| 2 | 1600 | 850 | 3 |
| 3 | 1650 | 900 | 6 |
| 4 | 1700 | 950 | 9 |
| 5 | 1750 | 1000 | 12 |
| 6 | 1800 | 1050 | 16 |
| 7 | 1850 | 1100 (low idle) | 20 |
| 8 | 1900 | 1150 | 26 |
| 9 | 1950 | 1200 (decel rpm) | 32 |
| 10 | 2000 | 1250 | 38 |

③ Boom/Arm speed



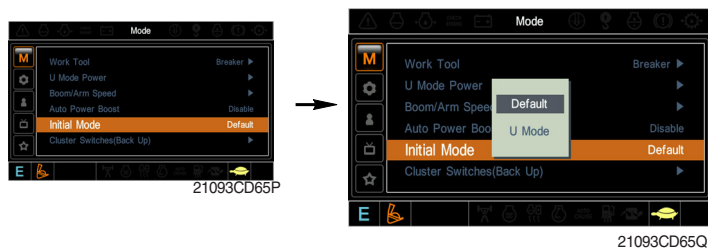
- **Boom speed**
 - Control type
 Manual - Boom up speed is fixed as set steps.
 Auto - Boom up speed is automatically adjusted as working conditions by the MCU.
 - Speed setting - Boom up speed is increased as much as activated steps.
- **Arm speed**
 - Regeneration - Arm regeneration function can be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

④ Auto power boost



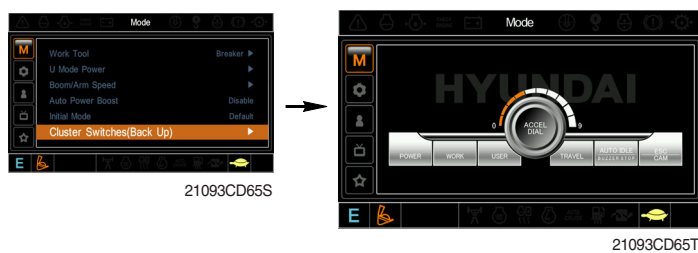
- The power boost function can be activated or cancelled.
- Enable - The digging power is automatically increased as working conditions by the MCU. It is operated max 8 seconds.
- Disable - Not operated.

⑤ Initial mode



- 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.
- P mode - The initial power mode is set P mode when the engine is started.

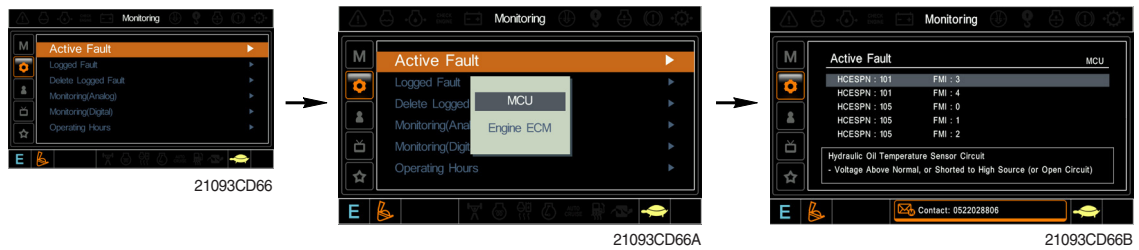
⑥ Cluster switch (back up)



- 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.

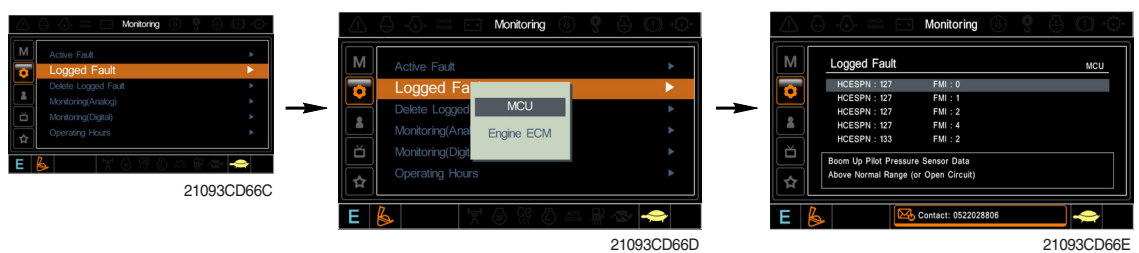
(3) Monitoring

① Active fault



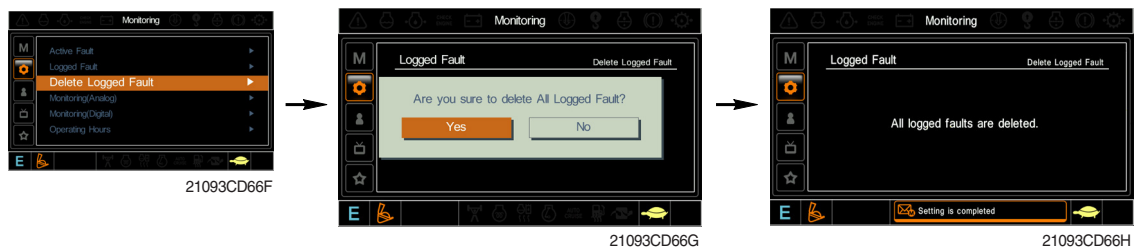
- The active faults of the MCU or engine ECM can be checked by this menu.

② Logged fault



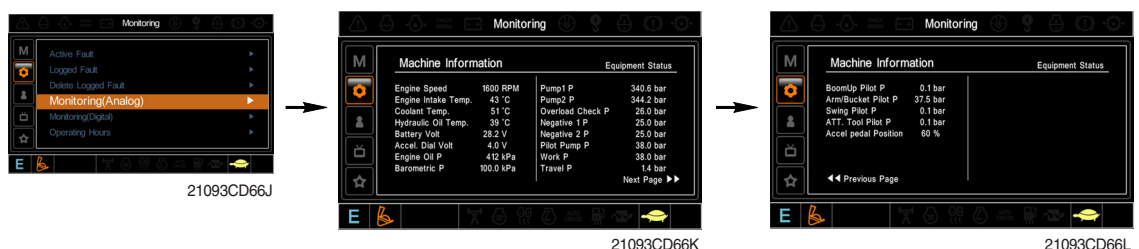
- The logged faults of the MCU or engine ECM can be checked by this menu.

③ Delete logged fault



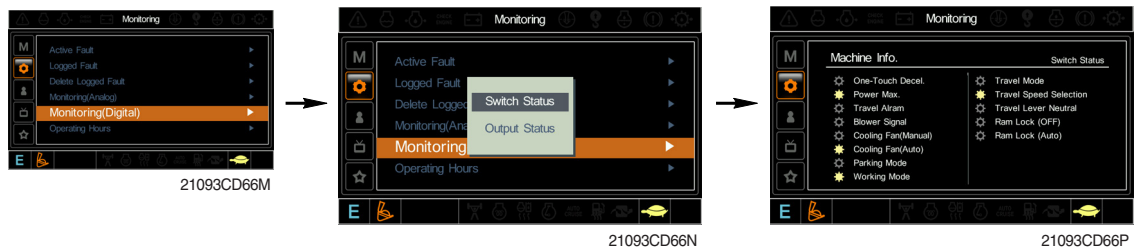
- The logged faults of the MCU or engine ECM can be deleted by this menu.


④ Monitoring(Analog)



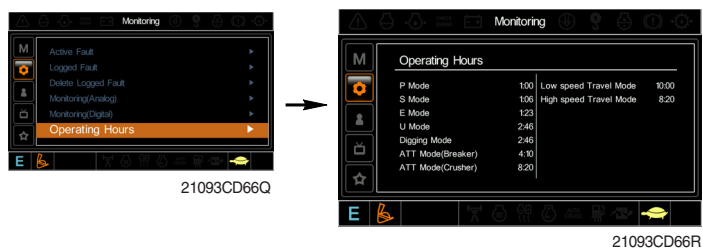
- The machine status such as the engine rpm, oil temperature, voltage and pressure etc. can be checked by this menu.

⑤ Monitoring (digital)



- 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



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

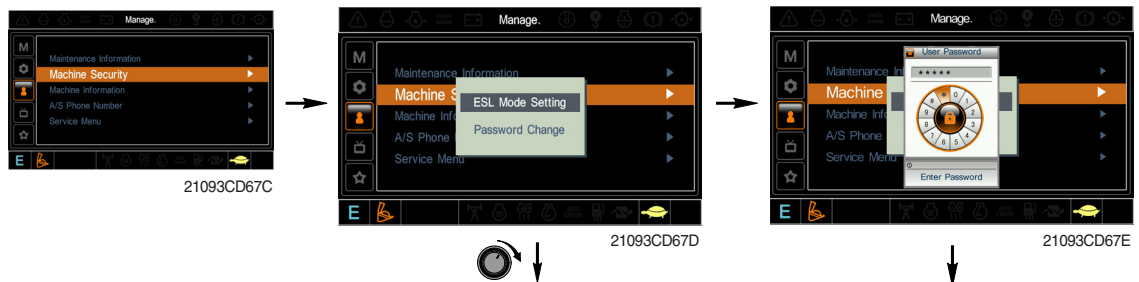
(4) Management

① Maintenance information



- 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.

② Machine security



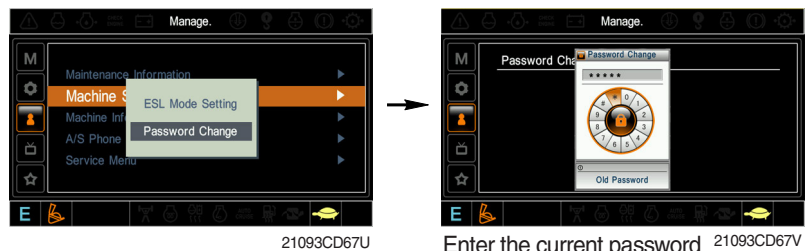
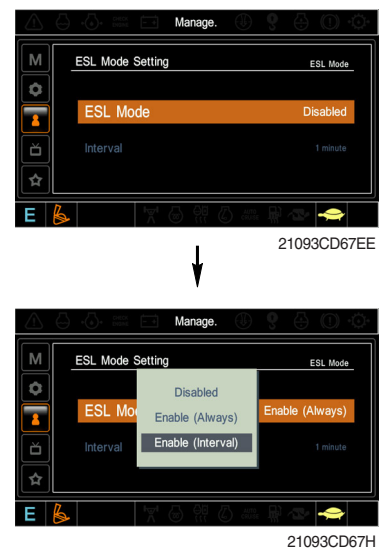
· ESL mode

- ESL : Engine Starting Limit
- ESL mode is designed 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.

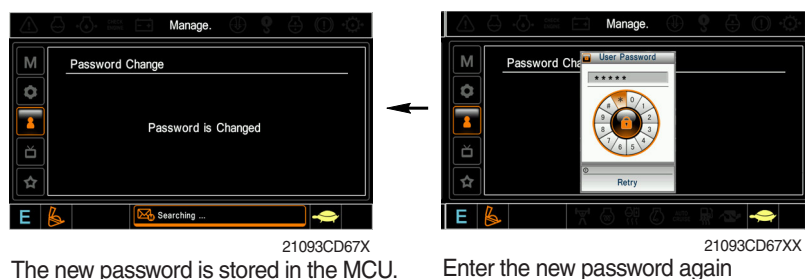
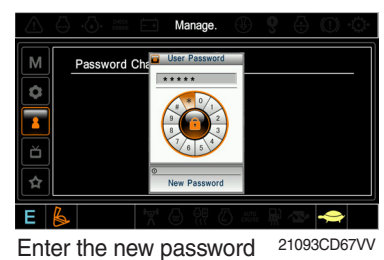
Enable (interval) : The password is required when the operator start engine first. But the operator can restart the engine within the interval time without inputting the password.

The interval time can be set maximum 4 hours.

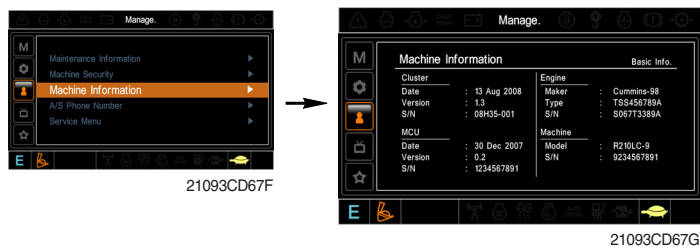


· Password change

- The password is 5~10 digits.



③ Machine Information



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

④ A/S phone number



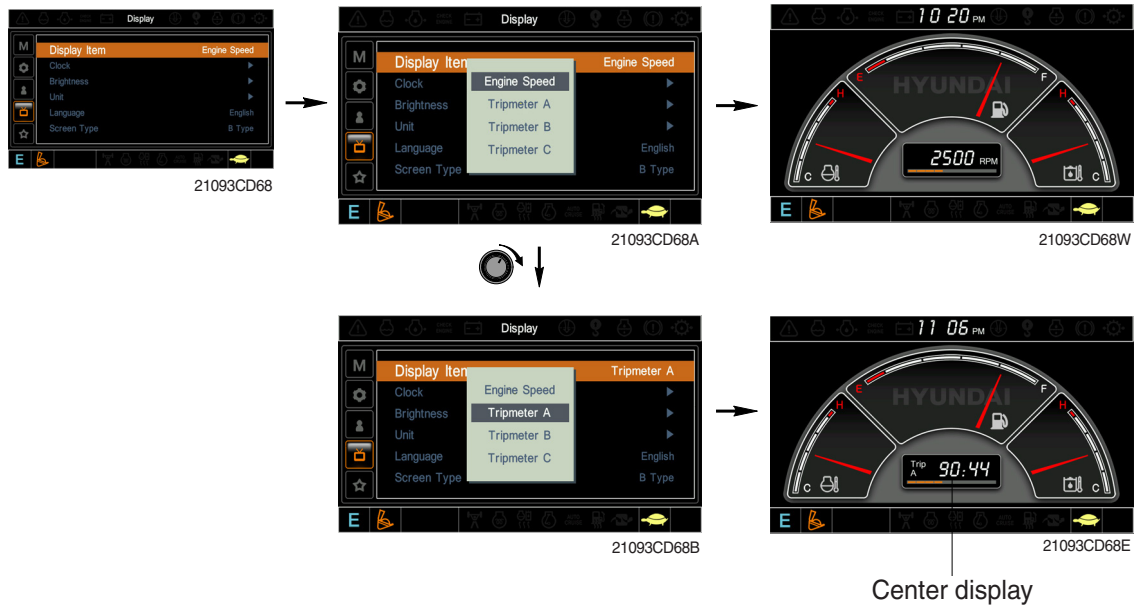
⑤ Service menu



- Power shift (standard/option) : Power shift pressure can be set by option menu.
- Hourmeter : 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)

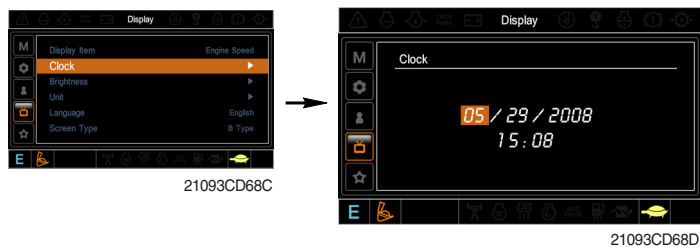
(5) Display

① Display item



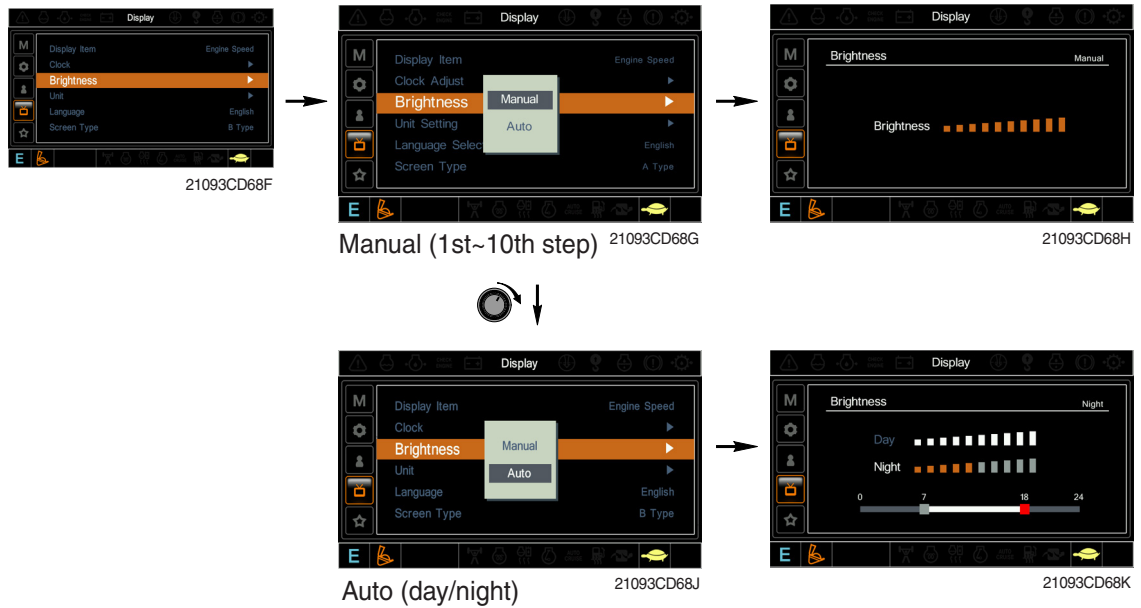
- The center display type of the LCD can be selected by this menu.
- The engine speed or each of the tripmeter (A,B,C) is displayed on the center display.

② Clock



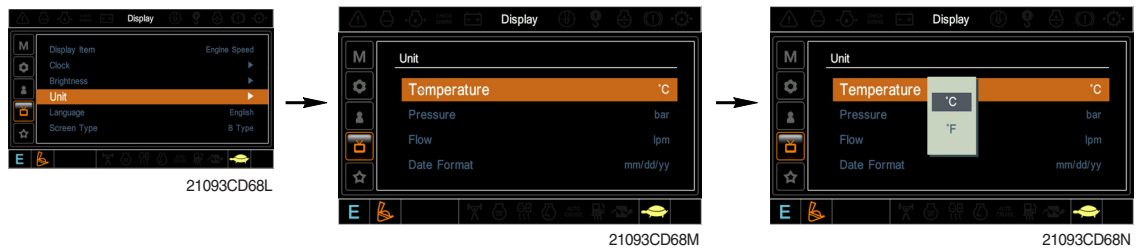
- The first line's three spots "**/**/****" represent Month/Day/Year each.
- The second line shows the current time. (0:00~23:59)

③ Brightness



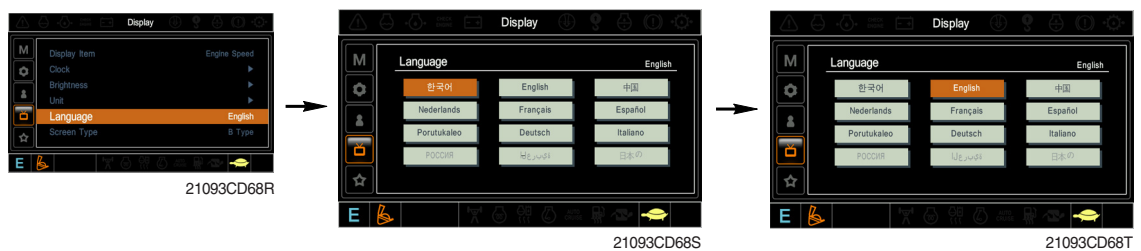
- ※ If "Auto" is chosen, brightness for day and night can be differently set up. Also by using the bar in lower side, users can define which time interval belongs to day and night. (in bar figure, gray area represents night time while white shows day time)

④ Unit



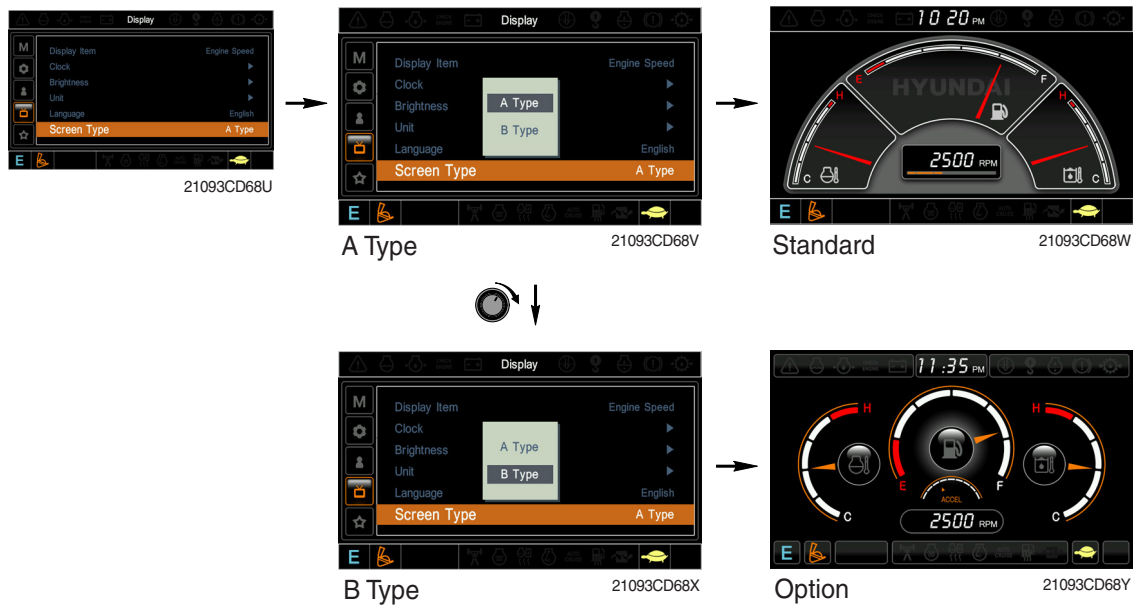
- Temperature : °C ↔ °F
- Pressure : bar ↔ MPa ↔ kgf/cm² ↔ psi
- Flow : lpm ↔ gpm
- Date format : yy/mm/dd ↔ mm/dd/yy ↔ dd-Mar-yy
- Distance : km ↔ mile

⑤ Language



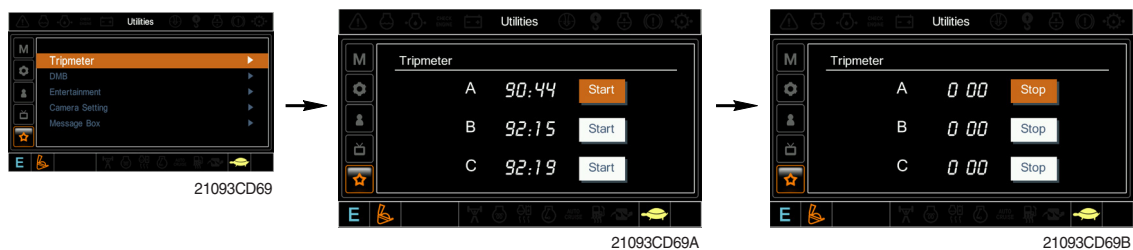
- User can select preferable language and all displays are changed the selected language.

⑥ Screen type



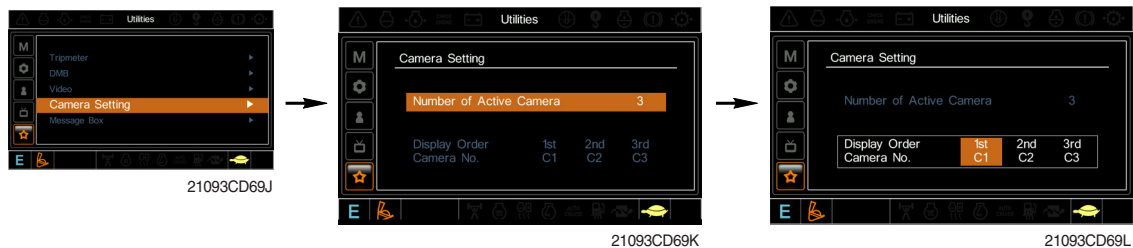
(6) Utilities

① Tripmeter



- 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 Camera setting



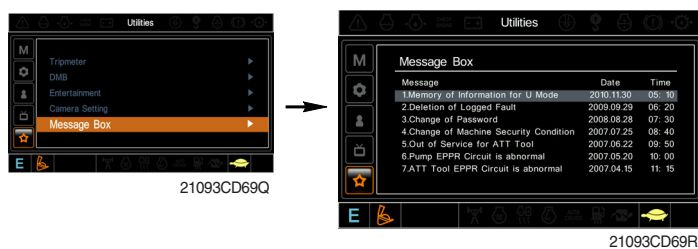
- Three cameras can be installed on the machine.
- The display order can be set by this menu.



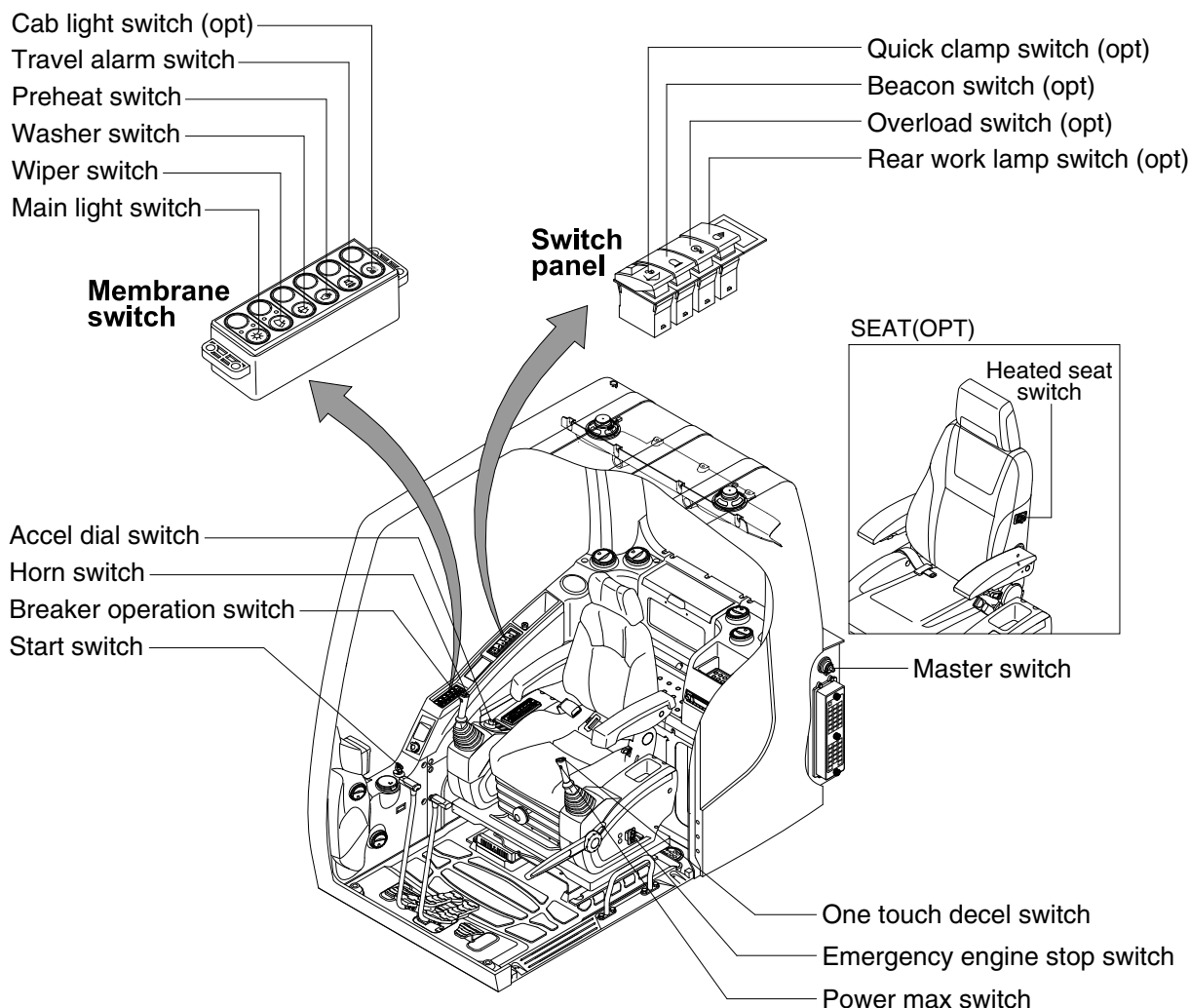
- If the camera was not equipped, this menu is not useful.
- In the operation screen, if the ESC/CAM switch is pushed, the first ordered display camera will be viewed.
- Turning the select switch in clockwise direction, the next ordered will be shown and in counter-clockwise direction, the previously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

③ Message box

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

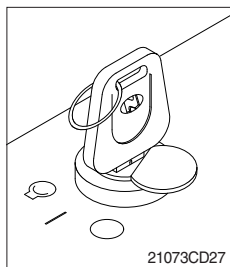


3. SWITCHES



1409SB3CD47A

1) STARTING SWITCH



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

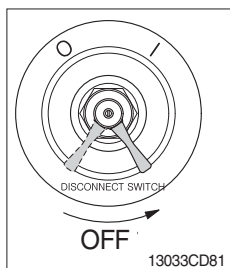
- ○(OFF) : None of electrical circuits activate.
- | (ON) : All the systems of machine operate.
- ○(START) : Use when starting the engine.

Release key immediately after starting.

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

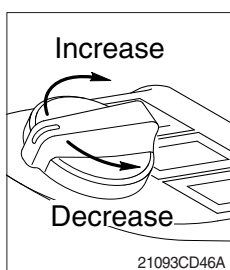
※ Key must be in the ON position with engine running to maintain electrical and hydraulic function and prevent serious machine damage.

2) MASTER SWITCH



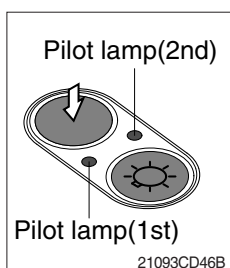
- (1) This switch is used to shut off the entire electrical system.
 - (2) I : The battery remains connected to the electrical system.
O : The battery is disconnected to the electrical system.
- ※ **Never turn the master switch to O (OFF) with the engine running. Engine and electrical system damage could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

3) ACCEL DIAL SWITCH



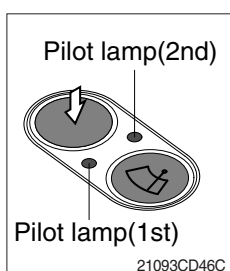
- (1) There are 10 dial setting.
- (2) Setting 1 is low idle and setting 10 is high idle.
 - By rotating the accel dial to right : Engine speed increases
 - By rotating the accel dial to left : Engine speed decreases

4) MAIN LIGHT SWITCH



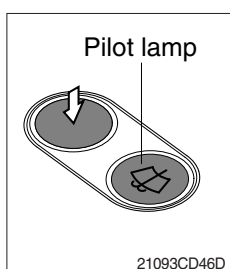
- (1) This switch used to operate the head light and work light.
 - Press the switch once, the head light comes ON and the 1st pilot lamp ON.
 - Press the switch once more, the work light comes ON and the 2nd pilot lamp ON.
 - Press the switch again, return to a first step position.
 - Press the switch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

5) WIPER SWITCH



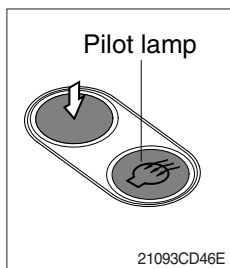
- (1) This switch used to operate wiper.
 - Press the switch once the wiper operates intermittently and the 1st pilot lamp comes ON.
 - Press the switch once more, the wiper operates low speed and the 2nd pilot lamp comes ON.
 - Press the switch again return to a first step position.
 - Press the switch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

6) WASHER SWITCH



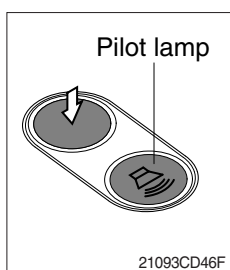
- (1) The washer liquid is sprayed and the wiper is operated only while pressing this switch.
- (2) The pilot lamp is turned ON when operating this switch.

7) PREHEAT SWITCH



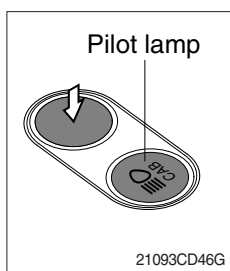
- (1) The pre-heat is manually operated since pressing this switch.
- (2) The pilot lamp is turned on while operating pre-heat function.

8) TRAVEL ALARM SWITCH



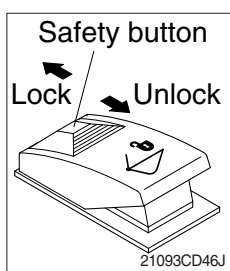
- (1) This switch is to activate travel alarm function surrounding when the machine travels to forward and backward.
- (2) On pressing this switch, the alarm operates only when the machine is traveling.

9) CAB LIGHT SWITCH (option)



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

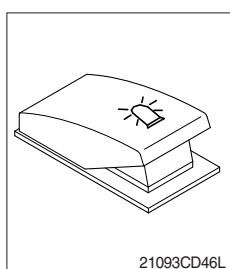
10) QUICK CLAMP SWITCH (option)



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

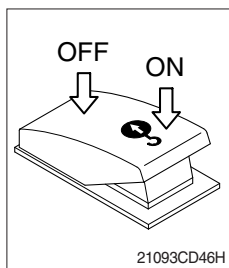
※ Refer to page 8-6 for details.

11) BEACON SWITCH (option)



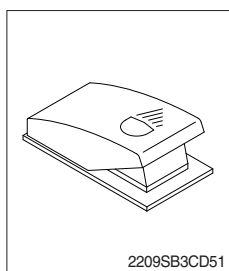
- (1) This switch turns ON the rotary light on the cab.
- (2) The indicator lamp is turned ON when operating this switch.

12) OVERLOAD SWITCH (option)



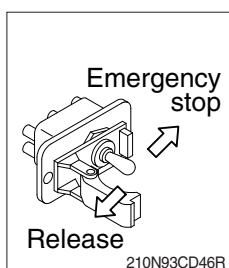
- (1) When this switch turned ON, buzzer makes sound and overload warning lamp comes ON in case that the machine is overload.
- (2) When it turned OFF, buzzer stops and warning lamp goes out.

13) REAR WORK LAMP SWITCH (option)



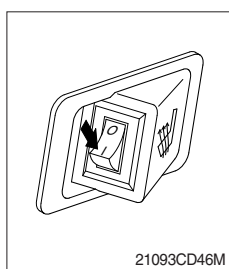
- (1) This switch is used to operate the rear work lamp.
- (2) The indicator lamp is turned on when operating this switch.

14) EMERGENCY ENGINE STOP SWITCH



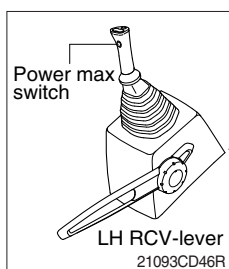
- (1) This switch is used to emergency stop the engine.
- ※ **Be sure to keep the emergency switch on the release position when restart the engine.**

15) HEATED SEAT SWITCH (option)



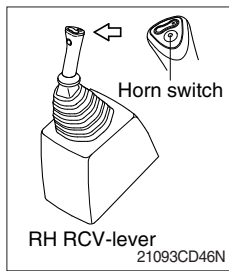
- (1) This switch is used to heat the seat.
 - Heater ON : $10 \pm 3.5^{\circ}\text{C}$
 - Heater OFF : $20 \pm 3^{\circ}\text{C}$
- (2) On pressing the switch, the indicator lamp is turned ON.

16) POWER MAX SWITCH



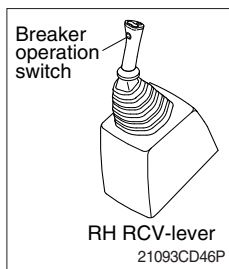
- (1) This switch activate power max function.
When this switch is kept pressed, hydraulic power of work equipment will be increased to approx 110 percent during 8 seconds.
- (2) After 8 seconds, function is cancelled automatically even the switch keeps pressed.
- ※ **Do not use for craning purposes.**

17) HORN SWITCH



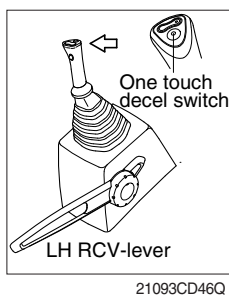
- (1) This switch is at the top of right side control lever.
On pressing, the horn sounds.

18) BREAKER OPERATION SWITCH



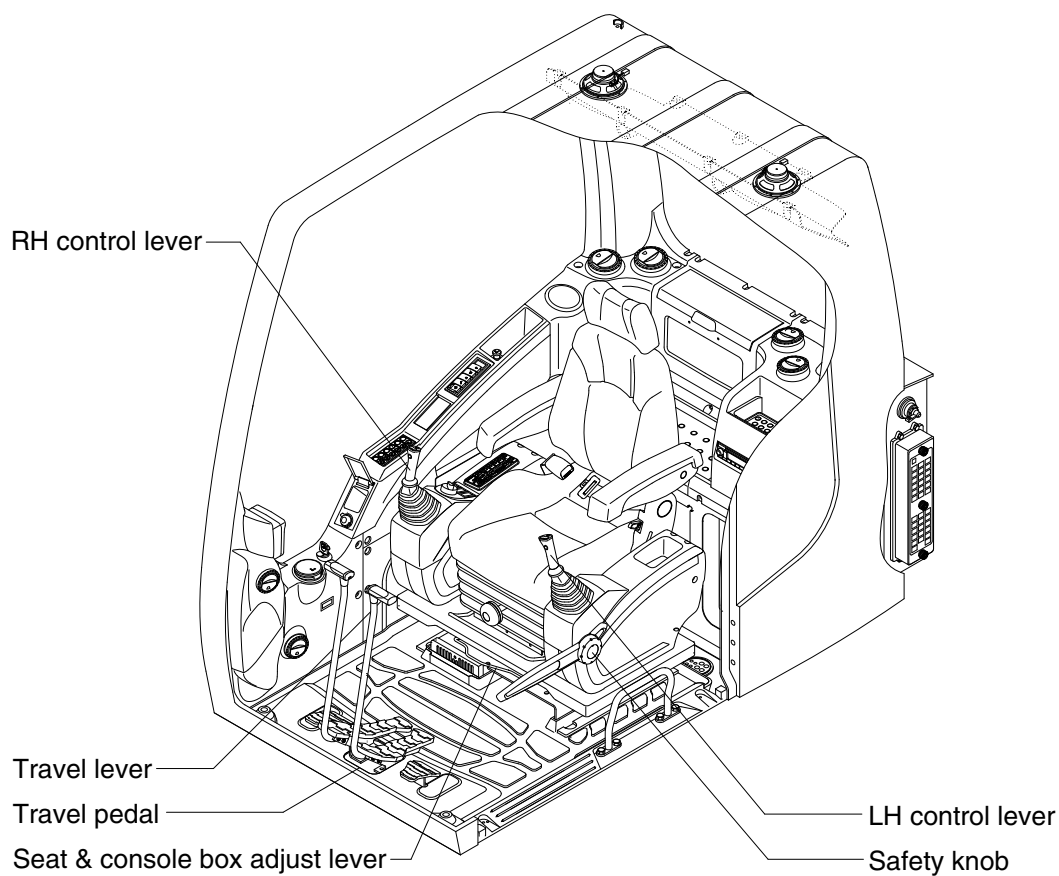
- (1) On pressing this switch, the breaker operates only when the breaker operation mode is selected.

19) ONE TOUCH DECEL SWITCH



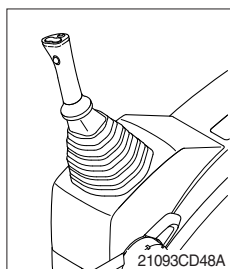
- (1) This switch is used to actuate the deceleration function quickly.
- (2) The engine speed is increased to previous setting value by pressing the switch again.
- (3) One touch decel function is available only when the auto idle pilot lamp is turned OFF.

4. LEVERS AND PEDALS



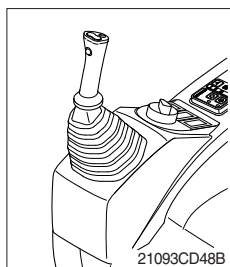
1409SB3CD48A

1) LH CONTROL LEVER



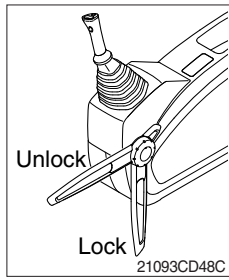
- (1) This joystick is used to control the swing and the arm.
- (2) Refer to operation of working device in chapter 4 for details.

2) RH CONTROL LEVER



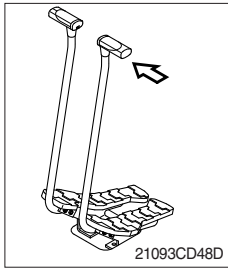
- (1) This joystick is used to control the boom and the bucket.
- (2) Refer to operation of working device in chapter 4 for details.

3) SAFETY KNOB



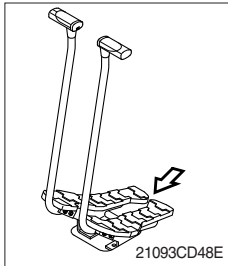
- (1) All control levers and pedals are disabled from operation by locating the safety knob to lock position as shown.
※ **Be sure to lower the safety knob to LOCK position when leaving from operator's seat.**
- (2) By pull the safety knob to UNLOCK position, the machine is operational.
※ **Do not use the safety knob for handle when getting on or off the machine.**

4) TRAVEL LEVER



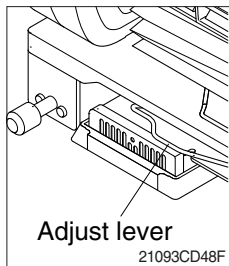
- (1) This lever is mounted on travel pedal and used for traveling by hand. The operation principle is same as the travel pedal.
- (2) Refer to traveling of the machine in chapter 4 for details.

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").

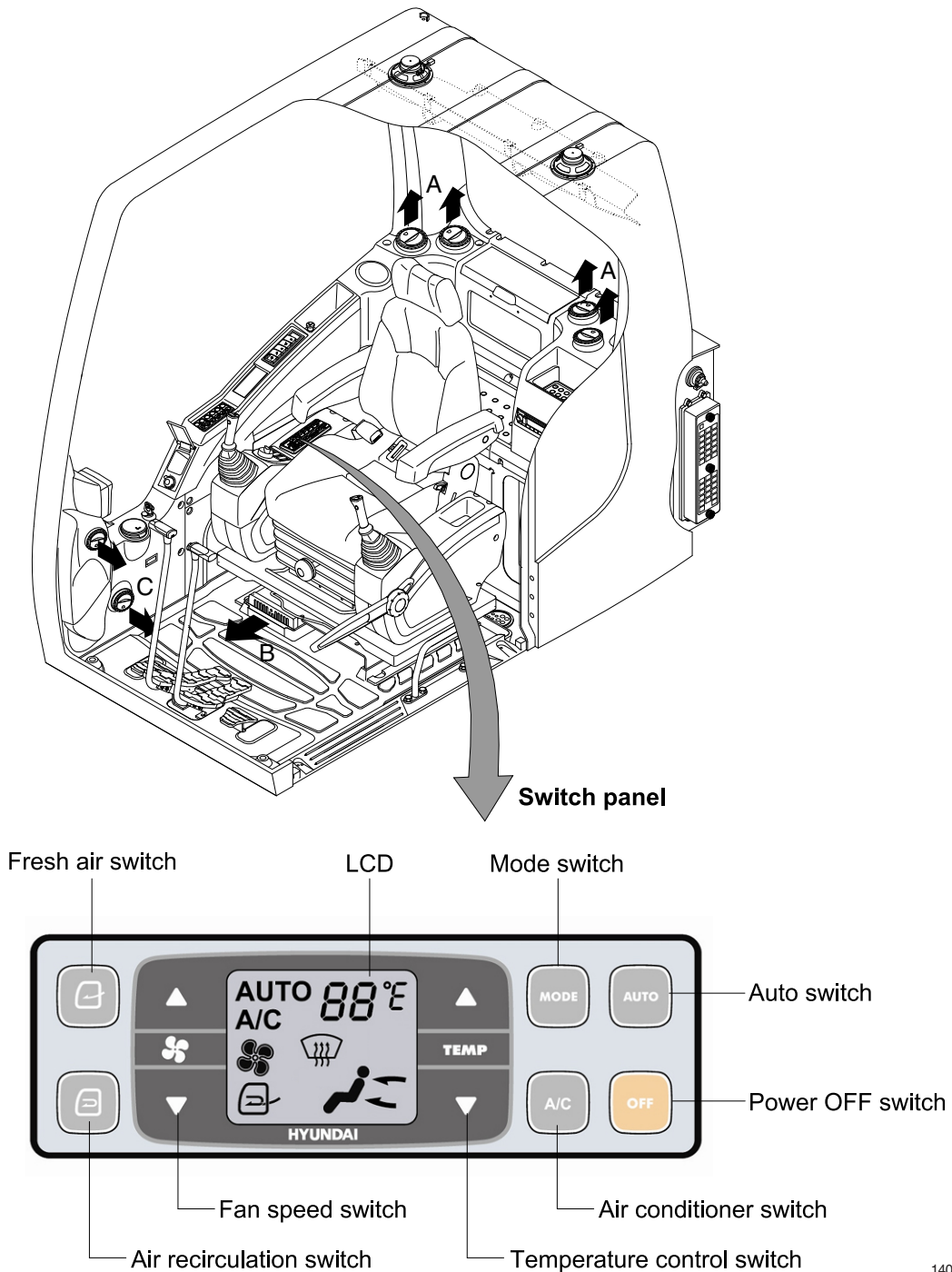
5. AIR CONDITIONER AND HEATER

■ FULL AUTO AIR CONDITIONER AND HEATER (standard)

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.

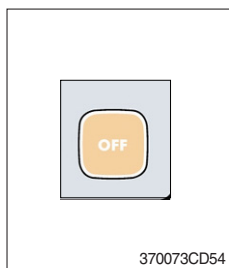
※ Refer to page 3-34 for semi auto air conditioner and heater.

- Location of air flow ducts



1409SB3CD49

1) POWER OFF SWITCH

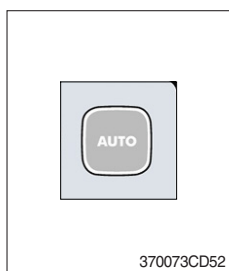


- (1) This switch makes the system and the LED OFF.
Just before the power OFF, set values are stored.

(2) Default setting values

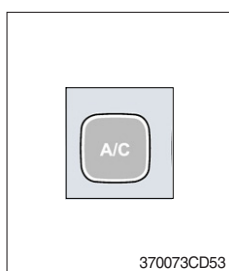
| Function | Air conditioner | In/outlet | LCD | Temperature | Mode |
|----------|-----------------|-----------|-----|-----------------|-----------------|
| Value | OFF | Inlet | OFF | Previous sw OFF | Previous sw OFF |

2) AUTO SWITCH



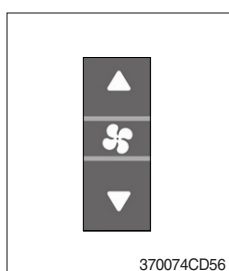
- (1) Turn the starting switch to ON position, LCD lights ON.
Auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.
- (2) This switch can restart system after system OFF.

3) AIR CONDITIONER SWITCH (compressor switch)



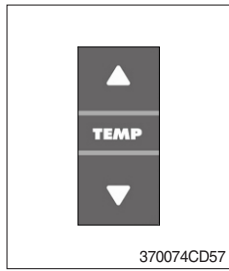
- (1) This switch turns the compressor and the LCD ON.
- (2) In accordance with the temperature sensed by duct (evaporator) sensor, compressor turns ON or OFF automatically.
- ※ **Air conditioner operates to remove vapor and drains water through a drain hose. Water can be sprayed into the cab in case 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 set 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.

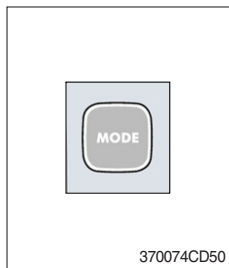
(3) The max cool or the max warm position operates as following table.

| 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

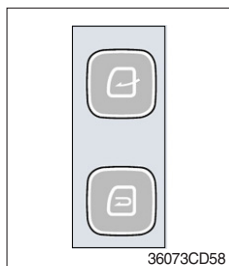
| Mode switch | | Vent | Vent/Foot | Foot | Foot/Def |
|-------------|---|------|-----------|------|----------|
| | | | | | |
| Outlet | A | ● | ● | | |
| | B | | ● | ● | ● |
| | C | | | | ● |

· 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.

Fresh air ()

Inhaling air from the outside.

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

Air recirculation ()

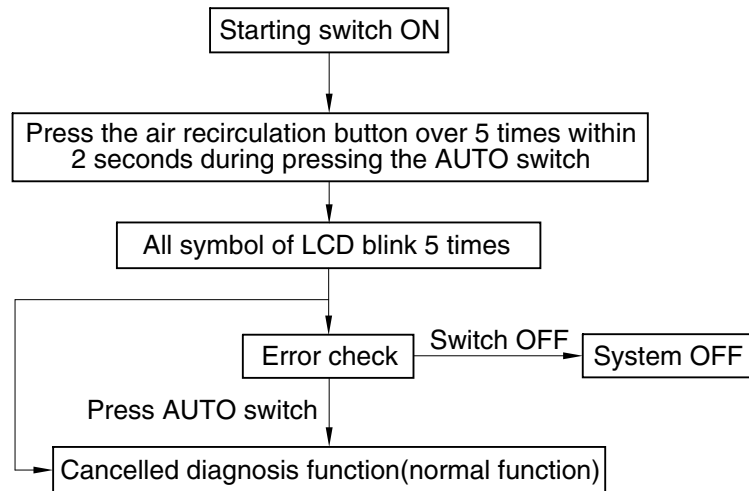
It recycles the heated or cooled air to increase the energy efficiency.

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

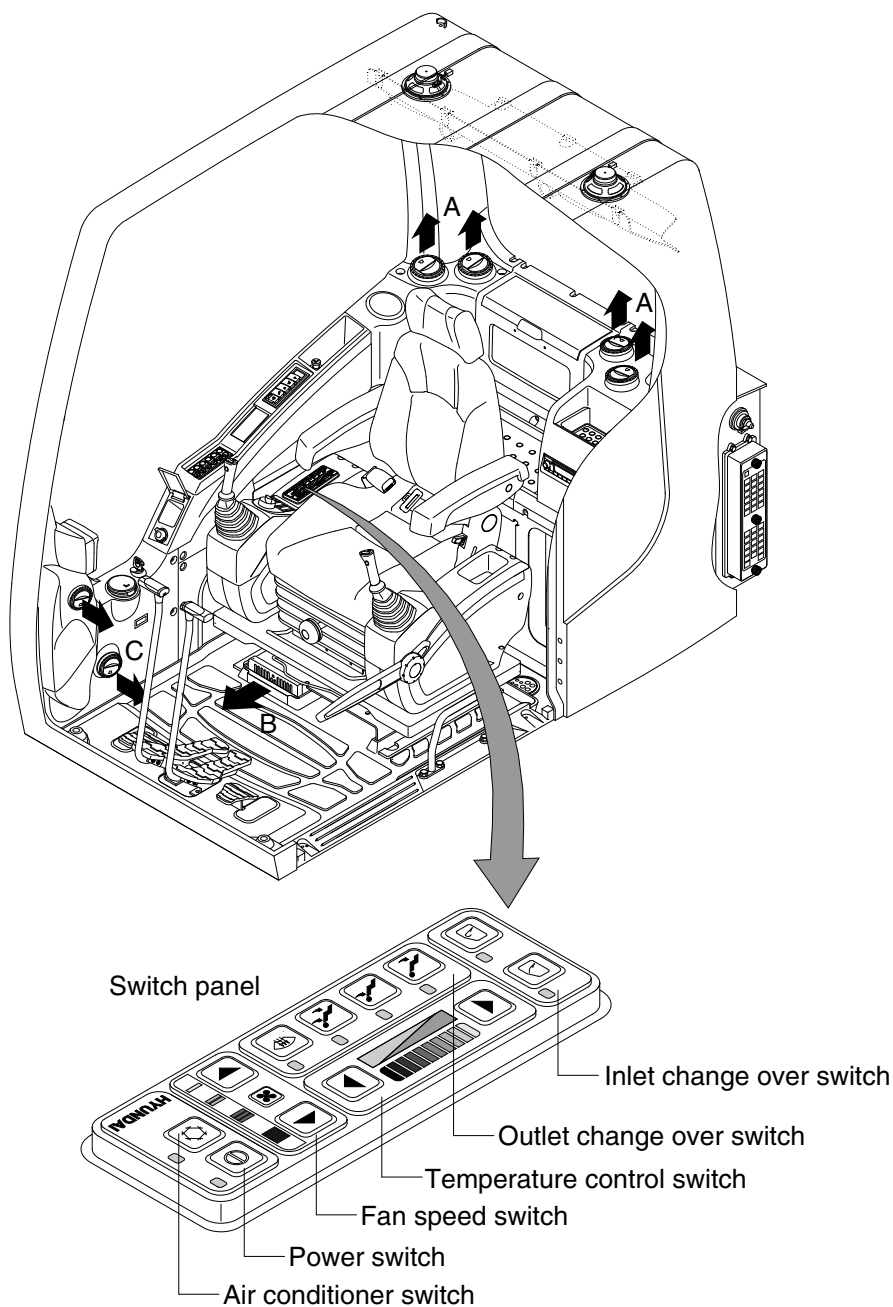
| Error description | Fail safe function |
|-------------------------------|--|
| Cabin inside sensor (11) | 25°C alternate value control |
| Ambient sensor (12) | 20°C alternate value control |
| Duct (evaporator) sensor (14) | 1°C alternate value control |
| Temp actuator (15) | If opening amount is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

■ SEMI AUTO AIR CONDITIONER AND HEATER (option)

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

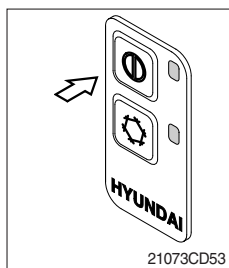
※ Refer to page 3-30 for full auto air conditioner and heater.

- Location of air flow ducts



1409SB3CD53

1) POWER SWITCH

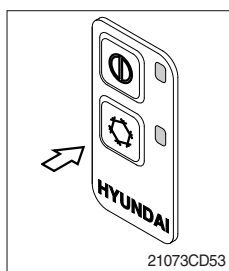


(1) This switch makes the system and the LED simultaneously ON or OFF.

(2) Default setting values

| Function | Air conditioner | Fan speed | Temperature | Outlet | Inlet |
|----------|-----------------|-----------|-------------|--------|---------------|
| Value | OFF | 1 | Max cool | Face | Recirculation |

2) AIR CONDITIONER SWITCH (compressor switch)

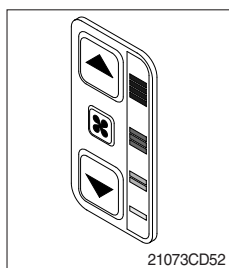


(1) Operating this switch turns the compressor and the LED simultaneously ON or OFF.

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

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

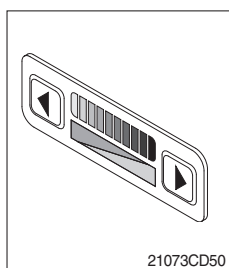
3) FAN SPEED SWITCH



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

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

4) TEMPERATURE CONTROL SWITCH



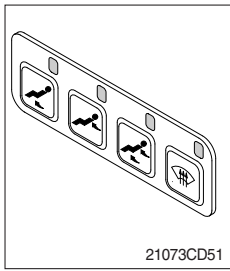
(1) There are 9 steps to control temperature from max cool to max warm controlled up and down by 1 step.

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

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

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

5) OUTLET CHANGE OVER SWITCH



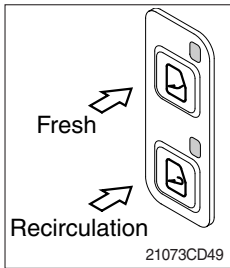
(1) There are four steps of air flow.

| Switch position | | Mode | | | |
|-----------------|---|------|---|---|---|
| | | | | | |
| Outlet | A | | ● | ● | |
| | B | ● | | ● | ● |
| | C | | | | ● |

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

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

6) INLET CHANGE OVER SWITCH



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

① Fresh

Inhaling air from the outside to pressurize cab inside.

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

② Recirculation

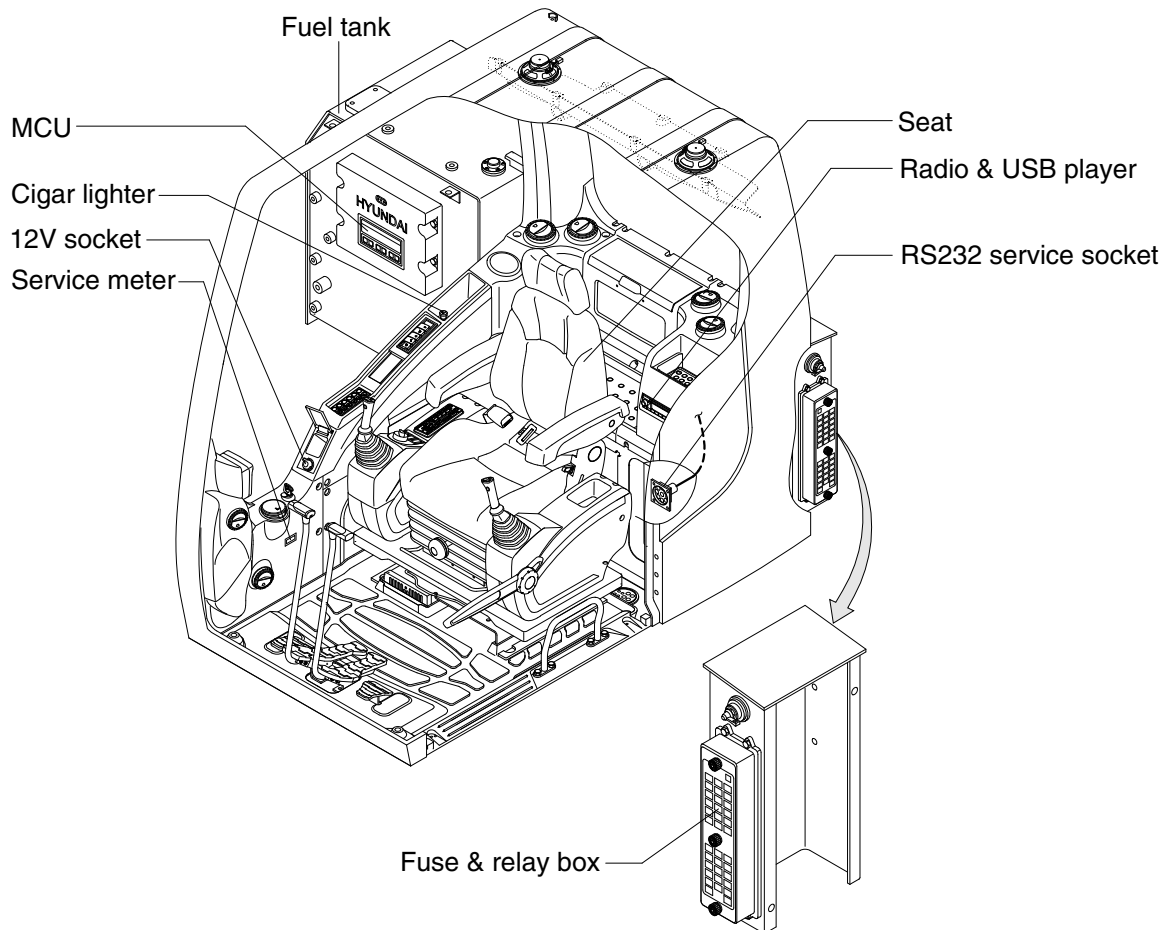
It recycles the heated or cooled air to increase the energy efficiency.

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

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

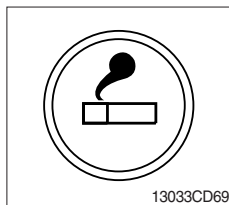
(2) Recirculation function operates when the system is OFF but it can be changed whenever needed.

6. OTHERS



1409SB3CD50

1) CIGAR LIGHTER

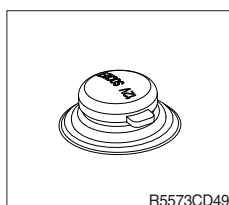


- (1) This can be used when the engine starting switch is ON.
- (2) The lighter can be used when it springs out in a short while after being pressed down.

※ Service socket

**Use cigar lighter socket when you need emergency power.
Do not use the lighter exceeding 24V, 100W.**

2) 12V SOCKET




















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

3) RADIO AND USB PLAYER (WITH BLUETOOTH)



9403CD100

FRONT PANEL PRESENTATION

- | | |
|---|---|
| <p>1  Power ON/OFF, Volume UP/DOWN button</p> <p>2  Manual UP/DOWN Tuning, File search, SEL button</p> <p>3  Mode button, Audio mute button</p> <p>4  Call & Pair button</p> <p>5  Call end button</p> <p>6  Station preset 1 DIS Display button</p> <p>7  Station preset 2</p> <p>8  Station preset 3 RPT Repeat play button</p> <p>9  Station preset 4 RDM Random play button</p> | <p>10  Station preset 5 DIR- Directory down button</p> <p>11  Station preset 6 DIR+ Directory up button</p> <p>12  Scan play button (SCAN) Best station memory (BSM) button</p> <p>13  Auto tune up, Seek up button</p> <p>14  Auto tune down, Track down button</p> <p>15  USB connector</p> <p>16  AUX IN Jack</p> <p>17  MIC hole</p> |
|---|---|

RADIO AND USB PLAYER (WITHOUT BLUETOOTH)



9403CD101

FRONT PANEL PRESENTATION

- | | | | | | |
|---|--|---|----|--|---|
| 1 | | Power ON/OFF, Volume UP/DOWN button | 10 | | Station preset 5 DIR- Directory down button |
| 2 | | Manual UP/DOWN Tuning, File search, SEL button | 11 | | Station preset 6 DIR+ Directory up button |
| 3 | | Mode button, Audio mute button | 12 | | Scan play button (SCAN) Best station memory (BSM) button |
| 4 | | Radio seek up button | 13 | | Track up button |
| 5 | | Radio seek down button | 14 | | Track down button |
| 6 | | Station preset 1 DIS Display button | 15 | | USB connector |
| 7 | | Station preset 2 | 16 | | AUX IN Jack |
| 8 | | Station preset 3 RPT Repeat play button | | | |
| 9 | | Station preset 4 RDM Random play button | | | |

■ GENERAL

(1) Power and volume button



① Power ON / OFF button

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

② Volume UP/DOWN control knob

Turn VOL knob (1) right to increase the volume level.

Turn VOL knob (1) left to decrease the volume.

After 5 seconds the display will return to the previous display mode.

③ Initial volume level set up

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

Then turn button (1) right or left to set the volume level as the I-VOL level.

④ Clock ON/OFF control

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

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

⑤ Clock adjustment

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

(2) Menu Selection



- ① This button can adjust the sound effect and other things.

Each time you press this button (2), LCD displays as follows :

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

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

② Bass control

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

③ Treble control

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

④ Balance control

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

⑤ Fader control

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

⑥ EQ control

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

EQ OFF → CLASSIC → POP → ROCK → JAZZ

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

⑦ Loud control

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

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

⑧ Beep control

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

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

(3) Mute control

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

(4) Mode selection

- ① Repeat press MODE button (3) to switch between FM1, FM2, AM, USB, AUX, BT MUSIC.
- ※ If there is no USB, AUX, Bluetooth Phone connected, it would not display USB, AUX, BT when you press button (3).

■ RADIO

(1) Mode button



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

(2) Manual tuning button



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

(3) Auto tuning button



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

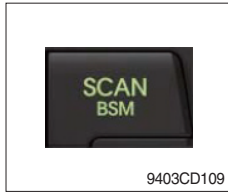


(4) Station preset button



- ① In radio mode, pressing buttons (6) to (11) will recall the radio stations that are memorized. To store desired stations into any of the 6 preset memories, in either the AM or FM bands, use the following procedure :
 - a. Select the desired station.
 - b. Press and hold one of the preset buttons for more than 2 seconds to store the current station into preset memory. Six stations can be memorized on each of FM1, FM2, and AM.

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



① Press BSM button (12) momentarily to scan the 6 preset stations stored in the selected band. When you hear your desired station, press it again to listen to it.

Press BSM button (12) for longer than 2 seconds to activate the Best Station Memory feature which will automatically scan and enter each station into memory.

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

■USB PLAYER

(1) USB playback



- ① The unit was equipped with a front USB jack and also a rear USB Jack.

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

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

(2) Track Up / Down button



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



(3) MP3 directory / File searching



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

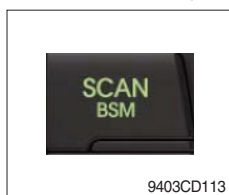
(4) Directory Up / Down button



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

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

(5) Track Scan Play (SCAN) button



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

(6) Track Repeat Play (RPT) button



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

(7) Track Random Play (RDM) button



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

(8) ID3 v2 (DISP)



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

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

* USB Information and Notice

- 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.
- Display up to 32 characters in the LCD display.
- No support any of MULTI-CAED Reader.
- 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.

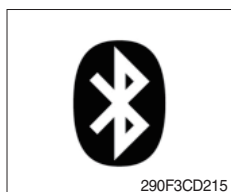
To get the best results when connecting the portable media to the audio system, follow these steps :

- 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)

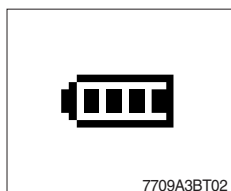
1) Using a bluetooth wireless connection

- (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 connected.



- (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.



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

- ※ When your cellular phone battery is at low charge, the bluetooth connection may occasionally be lost. To maintain good connectivity ensure that your phone battery is adequately charged.
- ※ In case of failure of bluetooth pairing :
 - Delete item in paired list on your phone.
 - Reset both phone by power off/on and the audio unit by ACC off/on.
- ※ Connecting priority of handsfree profile is higher than headset profile.
- ※ The headset mode does not support caller ID, reject call and call Transfer.

5) Using the audio unit as a handsfree device

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



- (2) To accept call
Press CALL button (4), it appears ANSWER CALL and follows TALKING on the display.
- (3) To end call
To end call, press CALL END button (5), it appears REJECT on the display.
- ※ If reject call is activated in your phone, then your cellular phone does not support reject call function.

6) Audio transfer between the audio unit and phone

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



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

- ※ **This function will be a cause of disconnection of bluetooth link in some nokia phones, but you do not worry just press button (4) during private conversation, then switch back to the audio unit automatically.**
- ※ **The quality of calling between cellular phone and audio unit is better than calling between one audio unit and another one.**

7) Last call number dialing



- (1) Press CALL button (4) briefly, it appears CALL TO, then simply press CALL button once again, it would make the last call with phone number display on LCD.

If Reject call is activated in your phone, then your cellular phone does not support Reject Call function.

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

8) To make a call by cellular phone

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

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

9) Using the audio unit as bluetooth music

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

(1) To play music, search the menu on your cellular phone as below :

i.e : Menu → File manager → Music → Option → Play via bluetooth.

It appears BT MP3 on the display.

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

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

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

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

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

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

■ RESET AND PRECAUTIONS

1) Reset function

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

- (1) press and hold   simultaneously for about 5 seconds. (without Bluetooth)

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

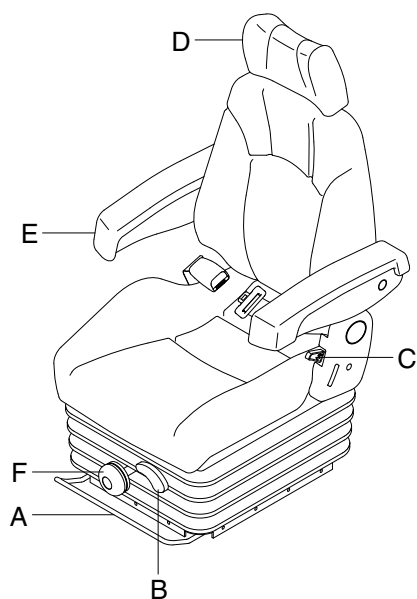
- (5) Bluetooth version : V2.1

- (6) Bluetooth supported profile :

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

4) SEAT (standard)

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.



2209S3CD54

(1) Horizontal adjustment (A)

- ① Pull lever A to adjust seat forward or backward.
- ② The seat can be moved forward and backward over 169 mm (6.7") in 13 steps.

(2) Tilt adjustment (B)

Pull or push lever B to adjust seat cushion upward or downward.

(3) Adjustable Backrest

Pull lever C to adjust seat backrest.

(4) Arm rest adjustment (E)

This can be adjusted by turning the knob E.

(5) Head rest adjustment (D)

This is adjustable vertically to fit operator's requirements, over a 75 mm (3.0") height range and 79.5° angle.

(6) Weight adjustment (F)

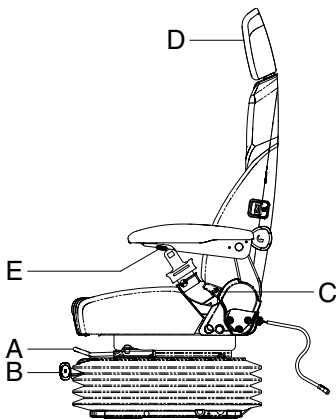
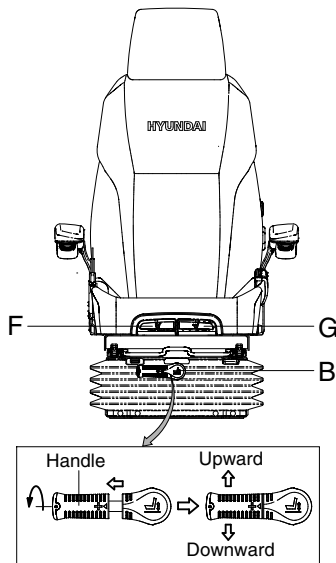
Adjust the handle to the operator's weight (50~130 kg).

▲ 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.

5) SEAT (heated, option)

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)

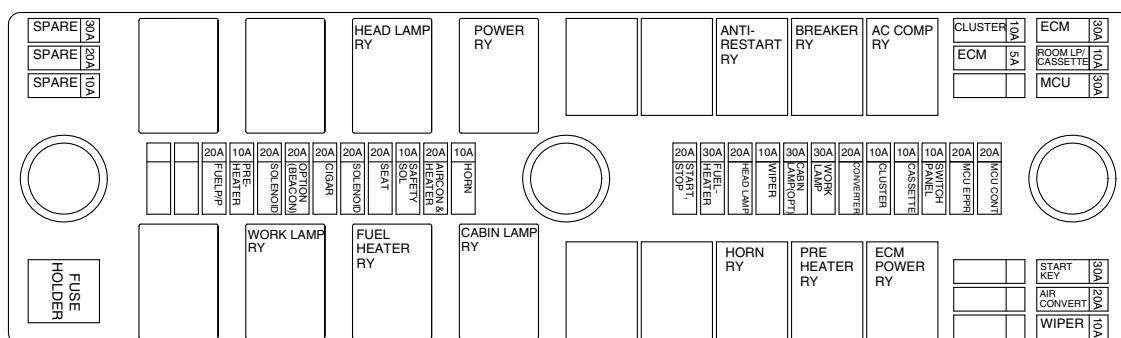
Pull lever F to adjust seat cushion tilting angle.

(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



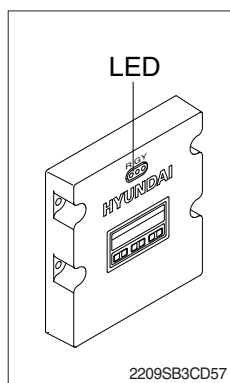
21093CD56

- (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

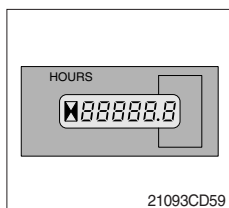


- (1) To match the pump absorption torque with the engine torque, MCU varies EPPR valve output pressure, which control pump discharge amount whenever feedbacked engine speed drops under the reference rpm of each mode set.
- (2) Three LED lamps on the MCU display as below.

| 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 |

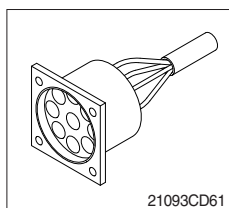
G : green, R : red, Y : yellow

8) SERVICE METER



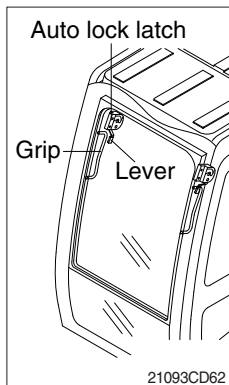
- (1) This meter shows the total operation hours of the machine.
- (2) Always ensure the operating condition of the meter during the machine operation. Inspect and service the machine based on hours as indicated in chapter 6, maintenance.

9) RS232 SERVICE SOCKET



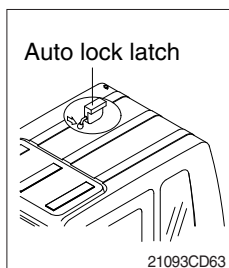
- (1) MCU communicates the machine data with Laptop computer through RS232 service socket.

10) 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 until 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 % |

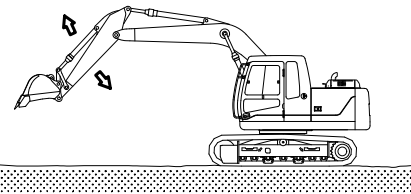
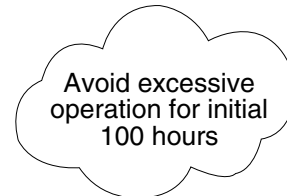
※ **Excessive operation may deteriorate the potential performance of machine and shorten lifetime of the machine.**

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 operation hours.

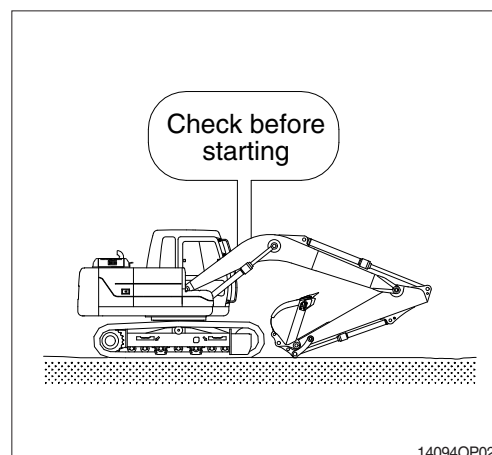
| Checking items | Hours |
|---|-------|
| Engine oil | 250 |
| Engine oil filter element | |
| Fuel filter | |
| Prefilter | |
| Hydraulic oil return filter element | |
| Hydraulic oil tank drain filter cartridge | |
| Pilot line filter element | |
| Swing reduction gear oil | |
| Travel reduction gear oil | |



14094OP01

2. CHECK BEFORE STARTING THE ENGINE

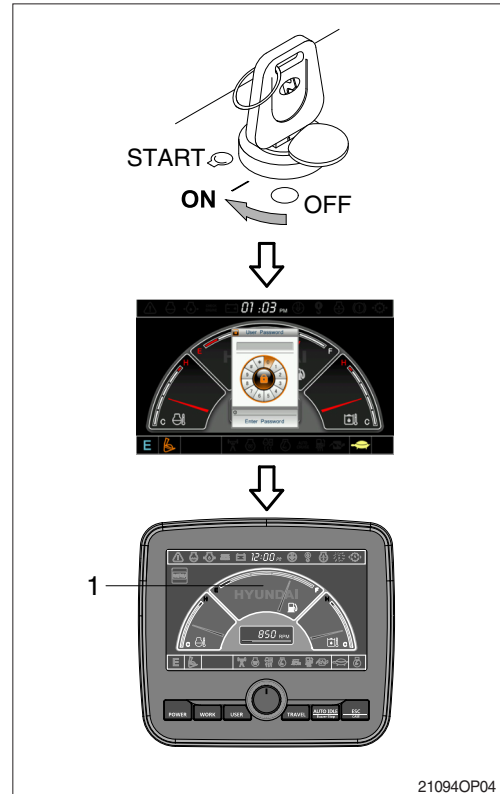
- 1) Look around the machine and under the machine to check for loosen nut or bolts, collection of dirt, or leakage of oil, fuel or coolant and check the condition of the work equipment and hydraulic system. Check also loosen wiring, and collection of dust at places which reach high temperature.
※ **Refer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



3. STARTING AND STOP THE ENGINE

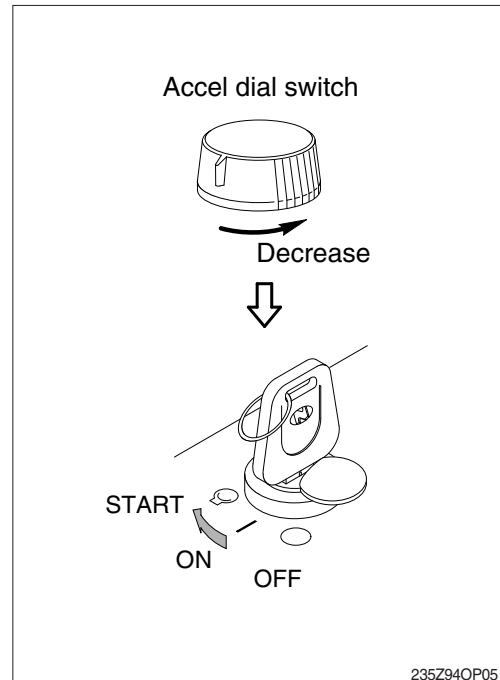
1) CHECK INDICATOR LIGHTS

- (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.
- (3) After initialization of cluster, the operating screen is displayed on LCD (1).
Also, self-diagnostic function is carried out.



2) STARTING ENGINE IN NORMAL TEMPERATURE

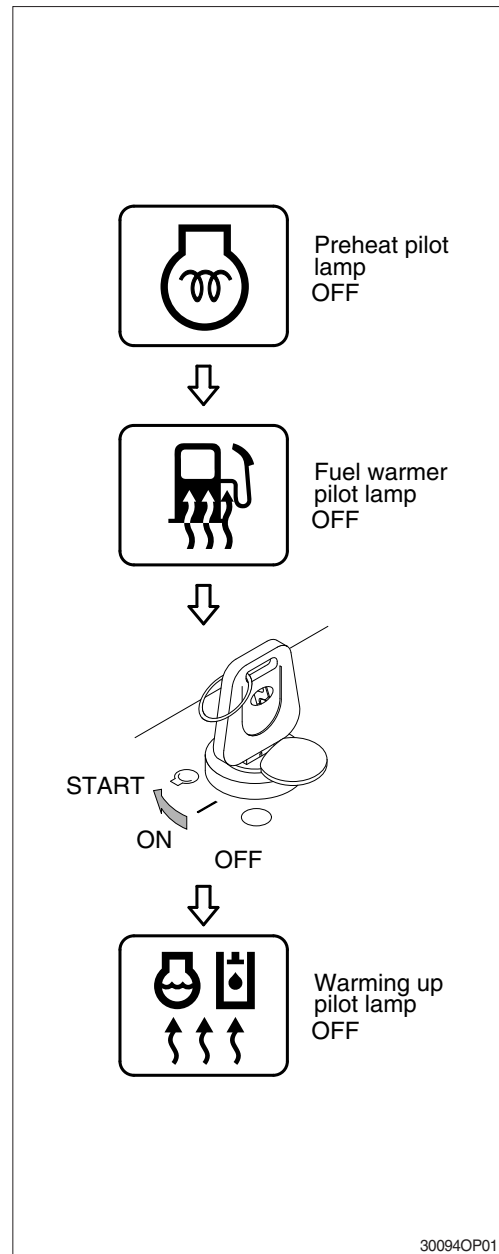
- ※ Sound the horn to warn the surroundings after checking if personnel or obstacles are in the area.
- (1) Turn the accel dial switch to low idle position.
 - (2) Turn the starting switch to START position to start the engine.
 - ※ Do not hold the starting switch in the START position for longer than 20 seconds.
The start system may be seriously damaged.
 - ※ If the engine does not start, allow the starter to cool for about 2 minutes before re-attempting to start the engine again.
 - (3) Release the starting switch instantly after the engine starts to avoid possible damage to the starting motor.



3) STARTING ENGINE IN COLD WEATHER

- ※ 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.
- ※ If you turn ON the starting switch, the fuel warmer is automatically operated to heat the fuel by sensing the coolant temperature.

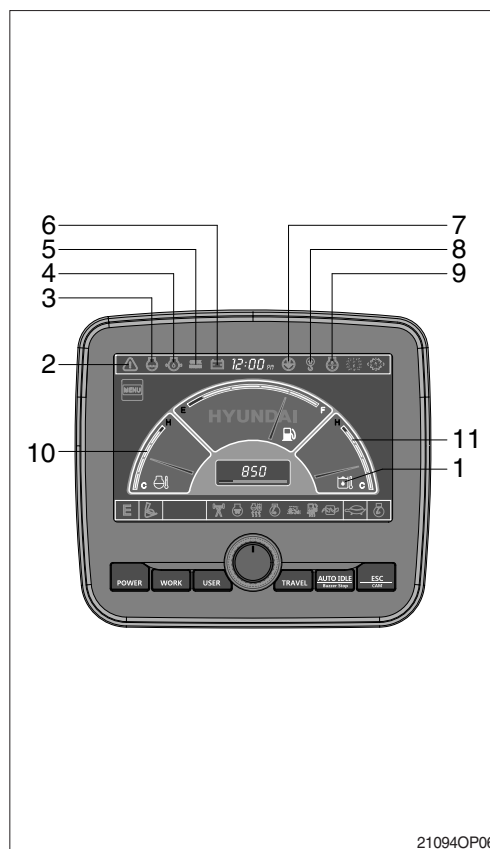
- (1) Check if all the levers are in the neutral position.
 - (2) Turn the accel dial switch to low idle position.
 - (3) Turn the starting switch to the ON position, and wait 1~2 minutes. More time may take according to ambient temperature.
 - (4) Wait for five minutes to warm up the engine after the preheating pilot lamp off, and then turn the starting switch to the START position to start the engine.
- ※ If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.
- (5) Release the starting switch immediately after starting engine.
 - (6) If the temperature of the coolant is lower than 30°C the warming up automatically starts.
- ※ Do not operate the working devices, or convert the operation mode into other mode during the warming up.



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

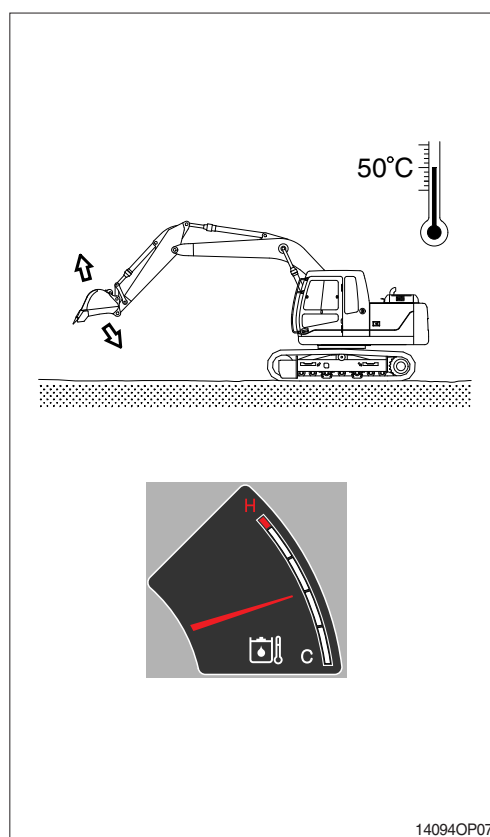
5) WARMING-UP OPERATION

- ※ **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.

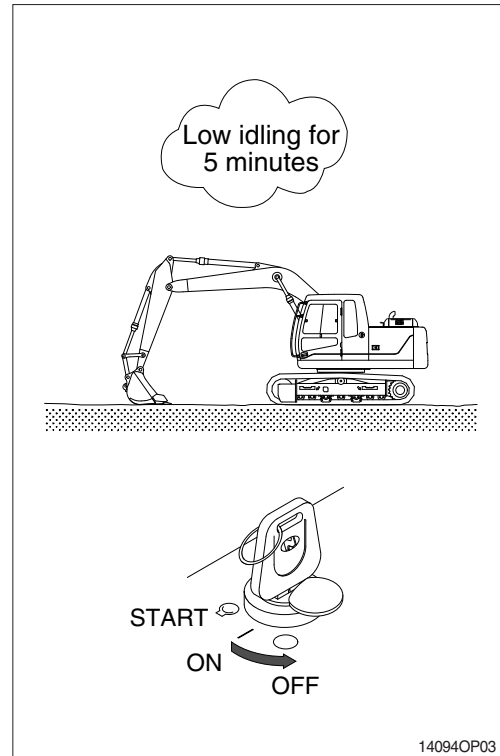
- (1) Run the engine at low idle speed for 5 minutes.
 - (2) Speed up the engine by accel dial and run the engine at mid-range speed.
 - (3) Operate bucket lever for 5 minutes.
- ※ **Do not operate anything except bucket lever.**
- (4) Run the engine at the high speed and operate the bucket lever and 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.



14094OP07

6) TO STOP THE ENGINE

- ※ If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.
 - ※ In particular, if the engine has overheated, do not abruptly stop it but run it at 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 LOCK 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.

(3) User mode

① User mode is useful for setting the user preferable power quickly.

(engine speed, power shift and idle speed)

② There are two methods for use of user mode.

a. In operation screen

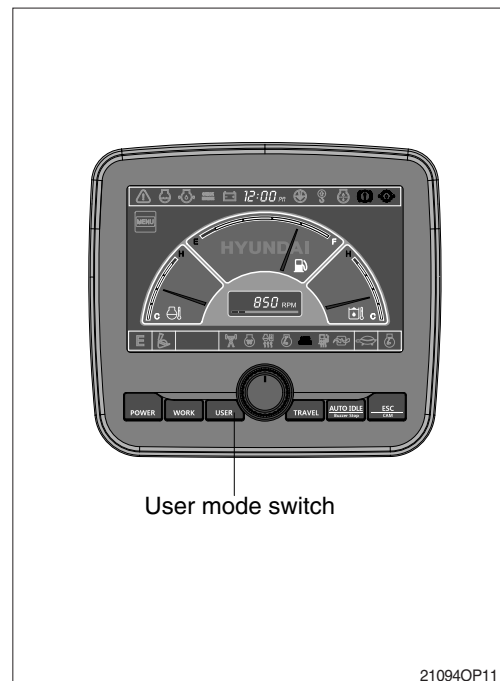
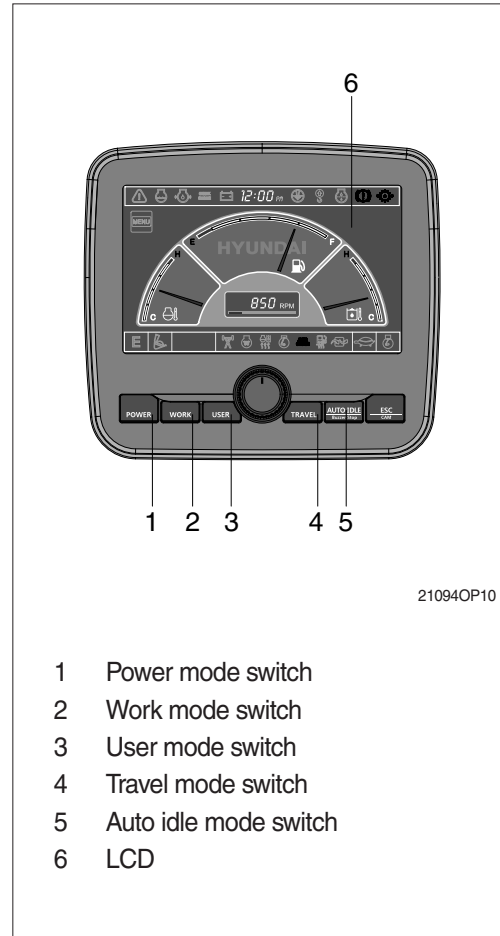
User mode switch is used to memorize the current machine operating status and activate the memorized user mode.

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.

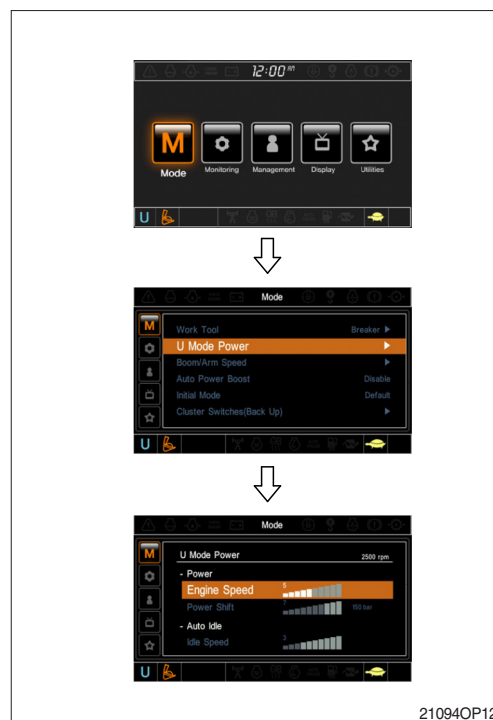


- High idle rpm, auto idle rpm and EPPR pressure can be adjusted and memorized in the U-mode.

※ Refer to 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 | 1550 | 800 | 0 |
| 2 | 1600 | 850 | 3 |
| 3 | 1650 | 900 | 6 |
| 4 | 1700 | 950 | 9 |
| 5 | 1750 | 1000 | 12 |
| 6 | 1800 | 1050 | 16 |
| 7 | 1850 | 1100 (low rpm) | 20 |
| 8 | 1900 | 1150 | 26 |
| 9 | 1950 | 1200 (decel rpm) | 32 |
| 10 | 2000 | 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 page 3-11.

(7) Self diagnostic system

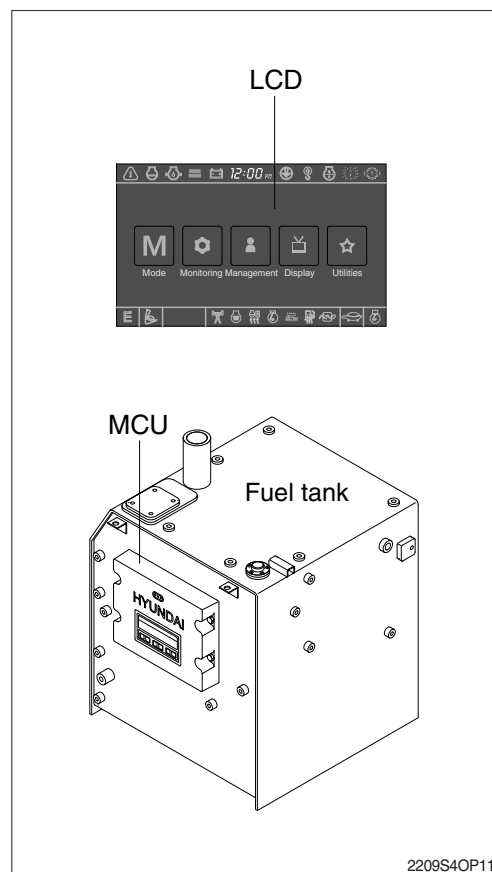
MCU (Machine Control Unit)

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

※ Refer to page 3-11 for LCD display.

(8) Anti-restart system

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



2209S4OP11

2) HOW TO OPERATE MODE SELECTION SYSTEM

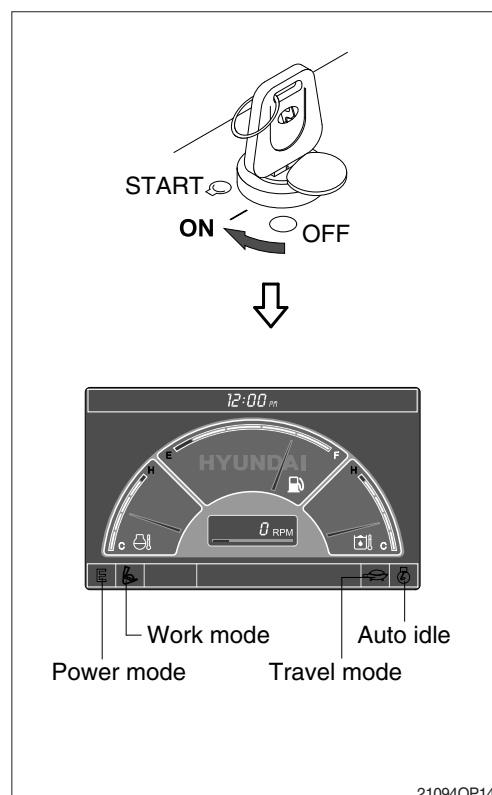
(1) When start key switch is turned ON

- 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 displayed 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.

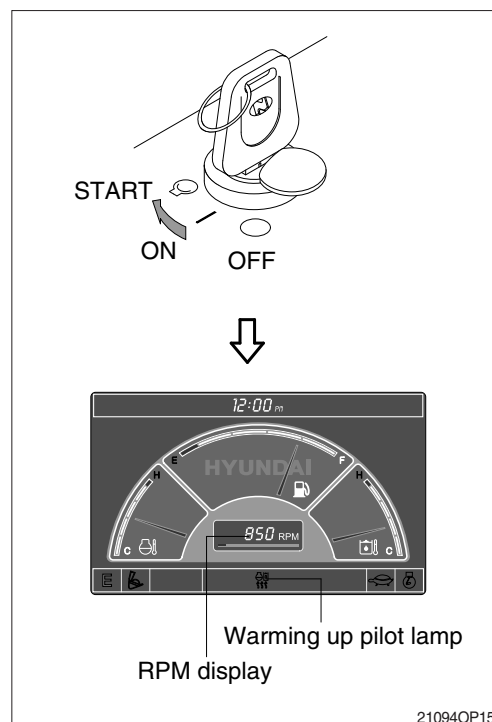
- ③ Self-diagnostic function can be carried out from this point.



21094OP14

(2) After engine start

- ① When the engine is started, rpm display indicates low idle, 1050 ± 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 1150 ± 100 rpm automatically to warm up the machine.
 - After 2-3 minutes, you can select any mode depending on job requirement.



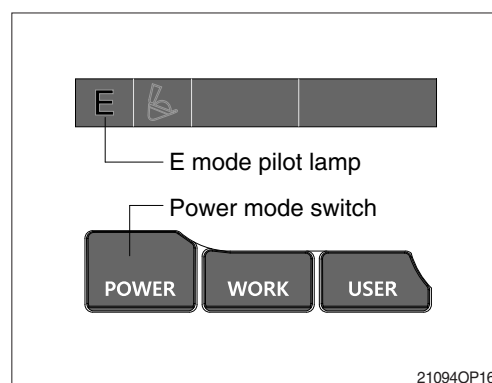
3) SELECTION OF POWER MODE

(1) E mode

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

| Engine rpm | Effect |
|---------------|--|
| 1800 ± 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.

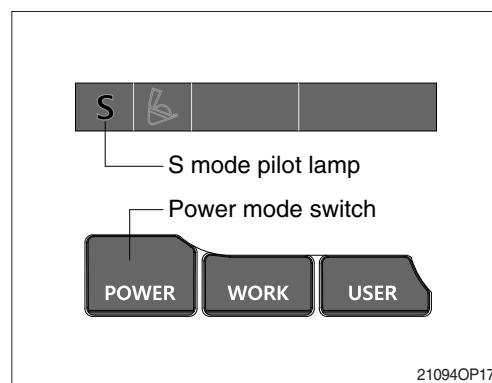


(2) S mode

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

| Engine rpm | Effect |
|---------------|----------------|
| 1950 ± 50 | Standard power |

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

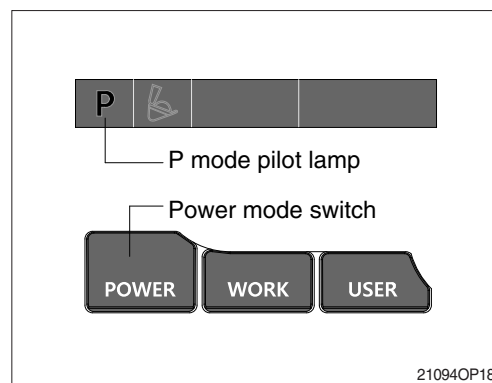


(3) P mode

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

| Engine rpm | Effect |
|---------------|---|
| 2050 \pm 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.

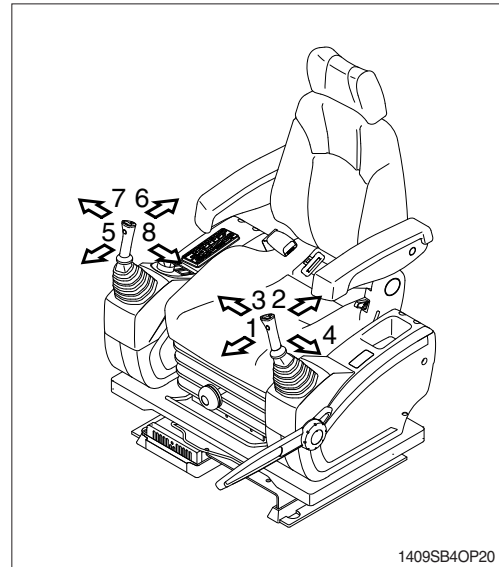


5. OPERATION OF THE WORKING DEVICE

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

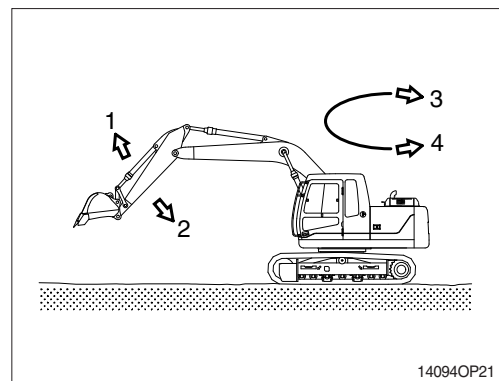
- 1) Left control lever controls arm and swing.
- 2) Right control lever controls boom and bucket.
- 3) When you release the control lever, control lever returns to neutral position automatically.

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



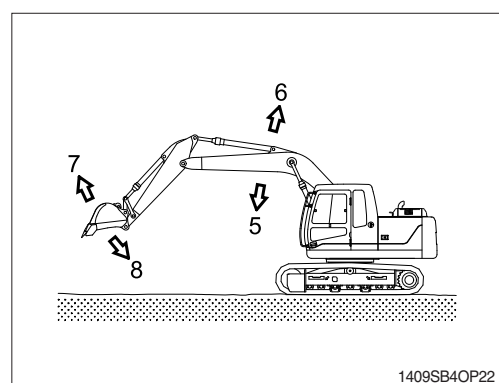
※ **Left control lever**

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



※ **Right control lever**

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



6. TRAVELING OF THE MACHINE

1) BASIC OPERATION

(1) Traveling position

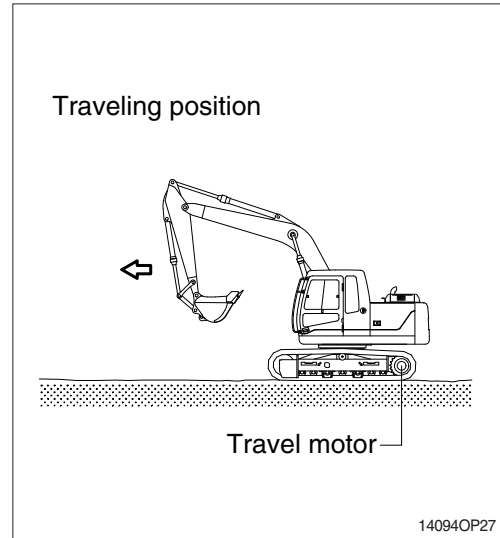
It is the position which the traveling motor is in the rear and the working device is forward.

- ▲ **Be careful as the traveling direction will be reversed when the whole machine is swung 180 degree.**

(2) Traveling operation

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

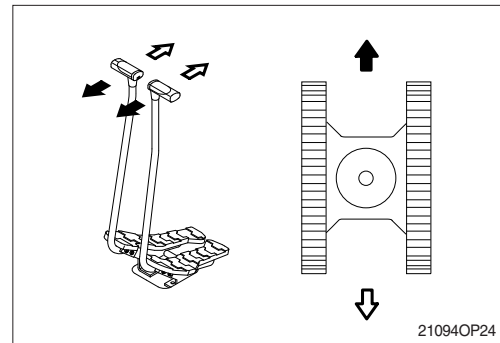
- ※ **Do not travel continuously for a long time.**
- ※ **Reduce the engine speed and travel at a low speed when traveling on uneven ground.**



(3) Forward and backward traveling

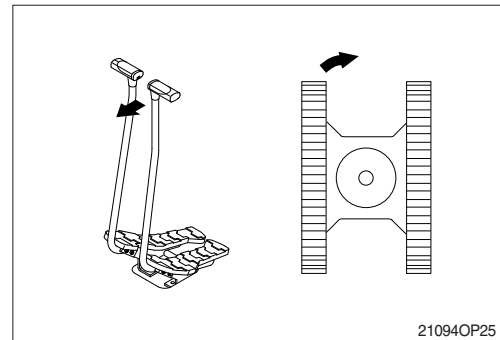
When the left and right travel lever or pedal are pushed at the same time, the machine will travel forward or backward.

- ※ **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.**



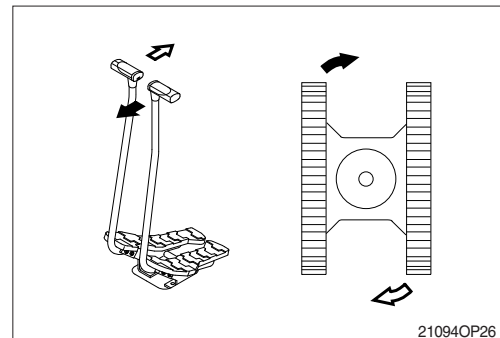
(4) Pivot turning

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



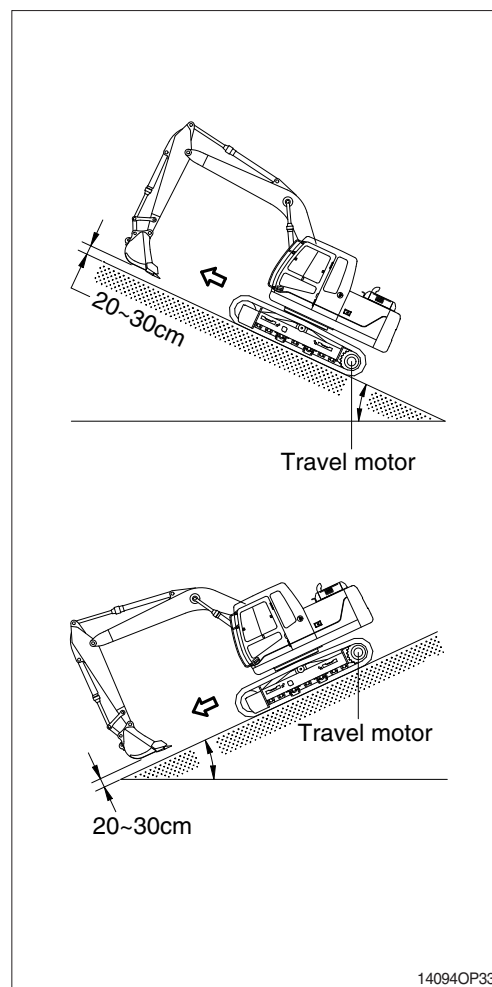
(5) Counter rotation

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.



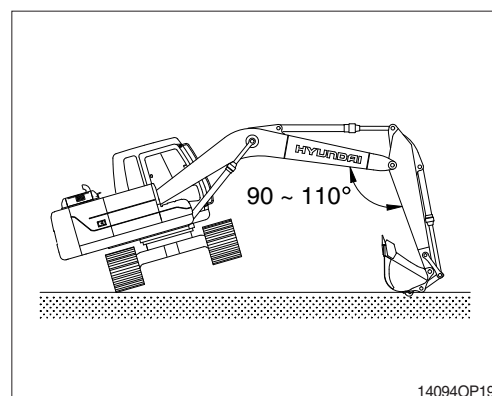
2) TRAVELING ON A SLOPE

- (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

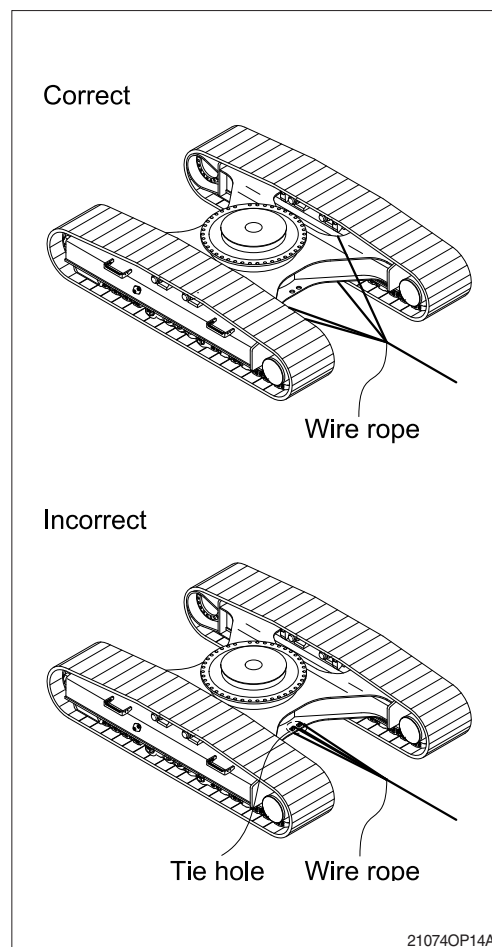
- ※ If possible, avoid to operate on soft ground.
- (1) Move forward as far as machine can move.
 - (2) Take care not to go beyond the depth where towing is impossible on soft ground.
 - (3) When driving becomes impossible, lower bucket and use boom and arm to pull the machine. Operate boom, arm, and 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.

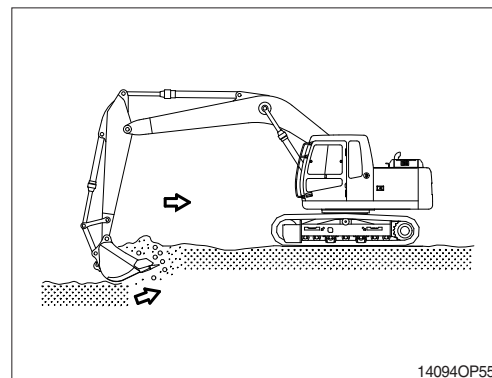
- (1) Tow the machine by other machine after hook the wire rope to the frame as shown in picture at right.
 - (2) Hook the wire rope to the frame and put a support under each part of wire rope to prevent damage.
- ※ **Never tow the machine using only the tie hole, because this may break.**
- ▲ **Make sure no personnel are standing close to the tow rope.**



7. EFFICIENT WORKING METHOD

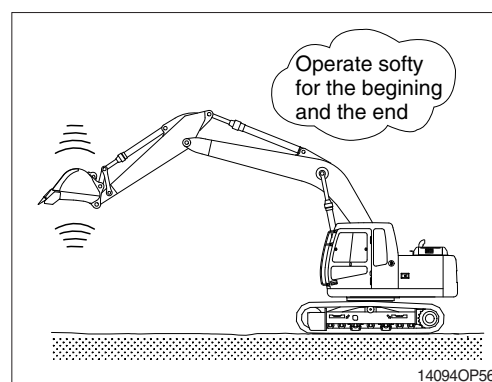
- 1) Do the digging work by arm.

Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.

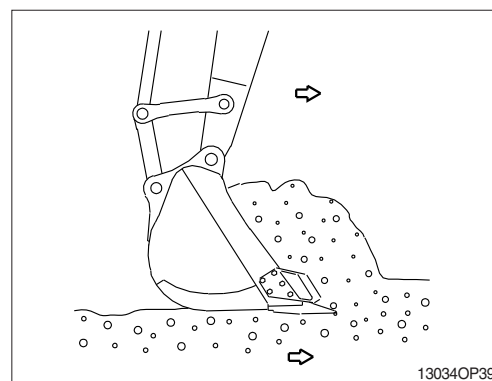


- 2) When lowering and raising the boom operate softly for the beginning and the end.

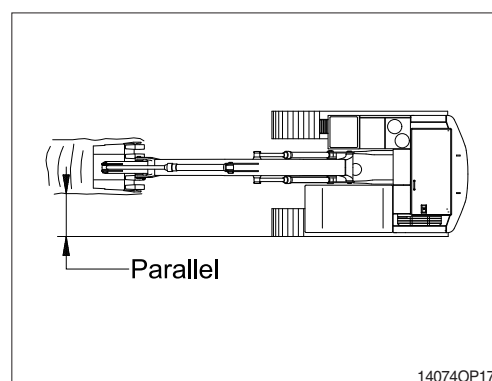
In particularly, sudden stops while lowering the boom may cause damage to the machine.



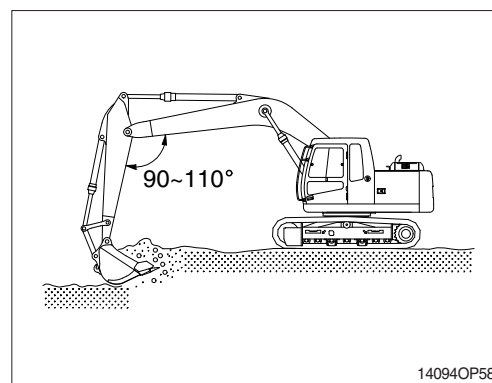
- 3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



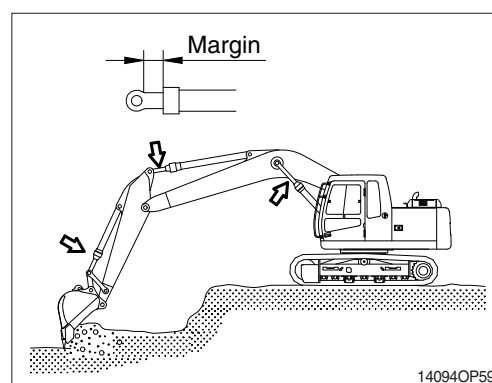
- 4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



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

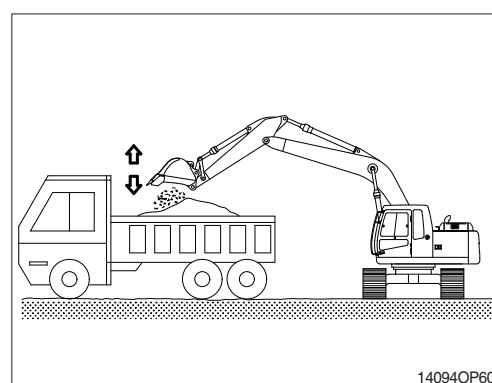


- 6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

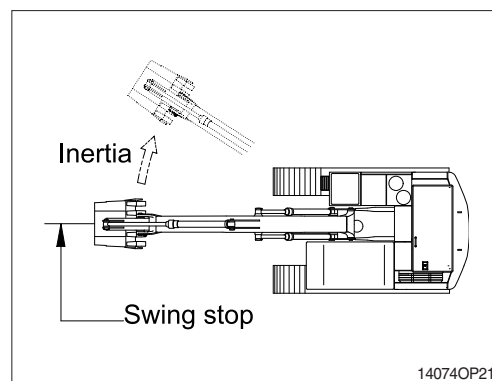


- 7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

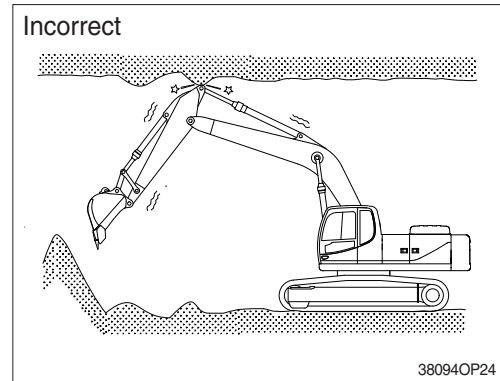
※ Do not use the impact of bucket tooth when dumping.



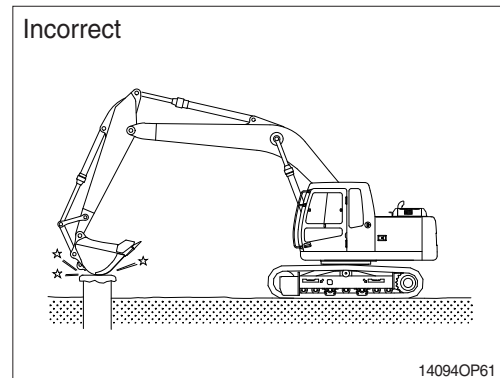
- 8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



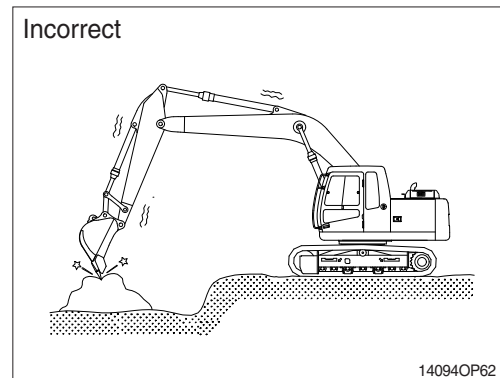
- 9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



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



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



12) NEVER CARRY OUT EXCESSIVE OPERATIONS

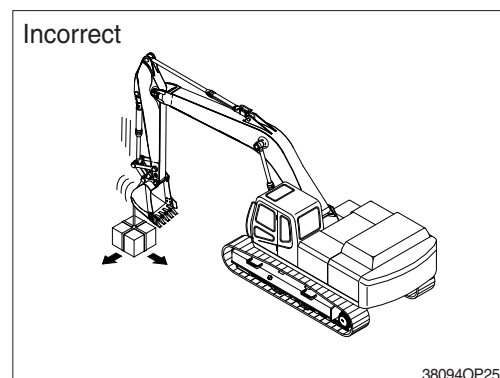
Operation exceeding machine performance may result in accident or failure.

Carry out lifting operation within specified load limit.

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

Never travel while carrying a load.

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



12) BUCKET WITH HOOK

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

The following operations are prohibited.

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

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

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

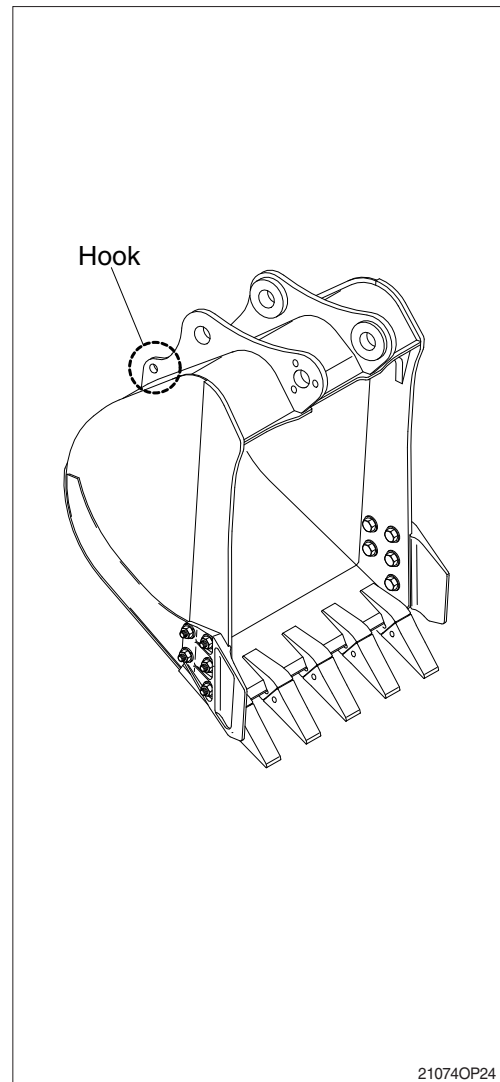
Due to the possible danger of the load falling or of collision with the load, no persons shall be allowed in the working area.

Before performing lifting operation, designate an operation supervisor.

Always execute operation according to his instructions.

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

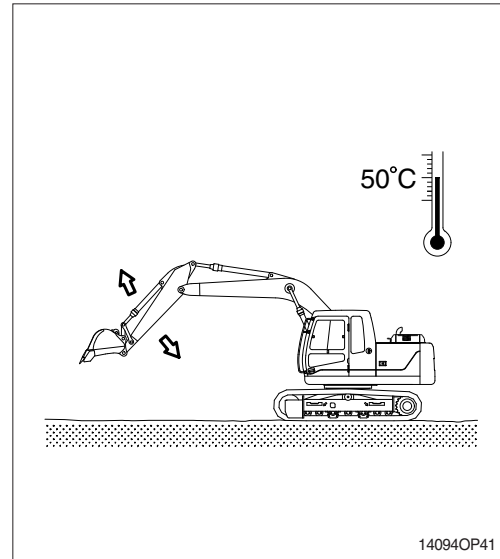
Never leave the operator's seat while lifting a load.



8. OPERATION IN THE SPECIAL WORK SITES

1) OPERATION THE MACHINE IN A COLD WEATHER

- (1) Use proper engine oil and fuel for the weather.
- (2) Fill the required amount of antifreeze in the coolant.
- (3) Refer to the starting engine in cold weather.
Start the engine and extend the warming up operation.
- (4) Be sure to open the heater cock when using the heater.
- (5) Always keep the battery completely charged.
※ **Discharged batteries will freeze more easily than fully charged.**
- (6) Clean the machine and park on the wood plates.



2) OPERATION IN SANDY OR DUSTY WORK SITES

- (1) Inspect air cleaner element frequently. Clean or replace element more frequently, if warning lamp comes ON and buzzer sounds simultaneously, regardless of inspection period.
※ **Replace the inner and outer element after 4 times of cleaning.**
- (2) Inspect radiator, oil cooler and condenser frequently, and keep cooling fins clean.
- (3) Prevent sand or dust from getting into fuel tank and hydraulic tank during refilling.
- (4) Prevent sand or dust from penetrating into hydraulic circuit by tightly closing breather cap of hydraulic oil tank. Replace hydraulic oil filter and air breather element frequently. Also, replace the fuel filter frequently.
- (5) Keep all lubricated part, such as pins and bushings, clean at all times.
- (6) If the air conditioner and heater filters clogged, the heating or cooling capacity will drop. Clean or replace the filter element more frequently.
- (7) Clean electrical components, especially the starting motor and alternator to avoid accumulation of dust.

3) SEA SHORE OPERATION

- (1) Prevent ingress of salt by securely tightening plugs, cocks and bolts of each part.
- (2) Wash machine after operation to remove salt residue.
Pay special attention to electrical parts, and hydraulic cylinders and track tension cylinder to prevent corrosion.
- (3) Inspection and lubrication must be carried out more frequently.
Supply sufficient grease to replace all old grease in bearings which have been submerged in water for a long time.

4) OPERATION IN MUD, WATER OR RAIN WORK SITES

- (1) Perform a walk around inspection to check for any loose fittings, obvious damage to the machine or any fluid leakage.
- (2) After completing operations, clean mud, rocks or debris from the machine. Inspect for damage, cracked welds or loosened parts.
- (3) Perform all daily lubrication and service.
- (4) If the operations were in salt water or other corrosive materials, make sure to flush the affected equipment with fresh water.

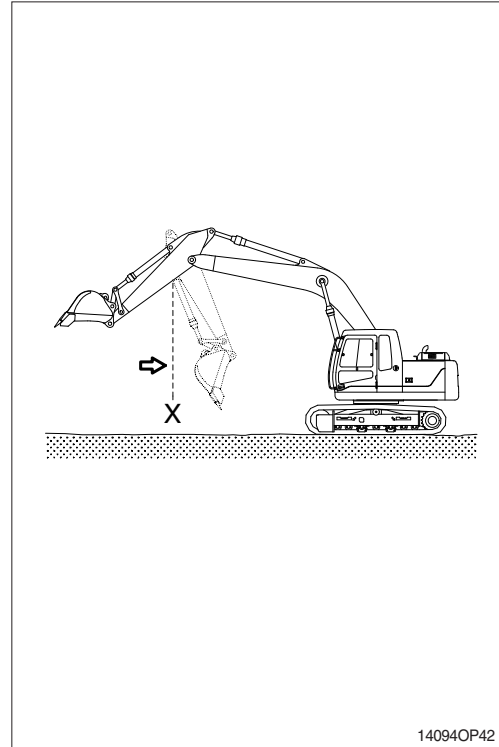
5) OPERATION IN ROCKY WORK SITES

- (1) Check for damage to the undercarriage and for looseness, flaws, wear and damage in bolts and nut.
- (2) Loosen the track tension a little when working in such areas.
- (3) Do not turn the undercarriage directly over the sharp edge rock.

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.



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. That is happen only starting switch ON position and safety knob UNLOCK position. After the engine is stopped, set the safety knob to the LOCK position.

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

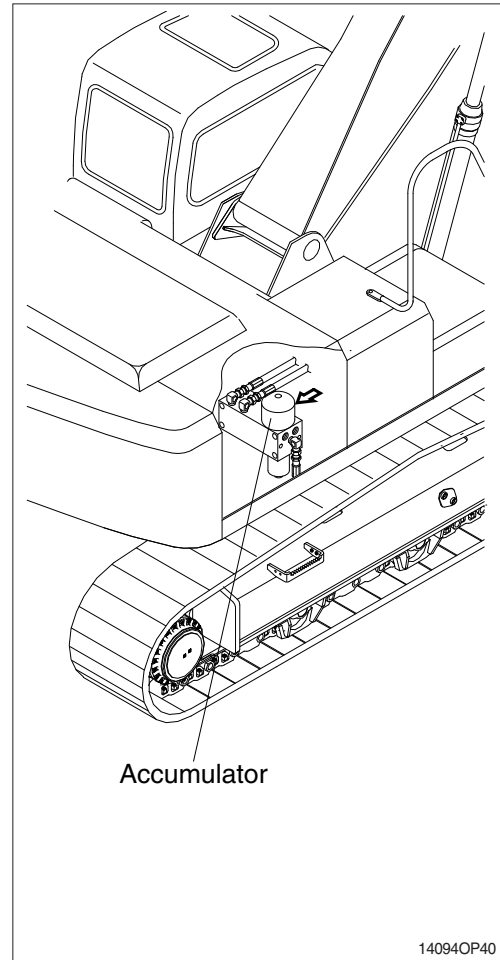
- 2) The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.

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

▲ Do not weld anything to the accumulator.

- ※ When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator, it is necessary to release the gas from the accumulator.

A special air bleed valve is necessary for this operation, so please contact your Hyundai distributor.



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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.

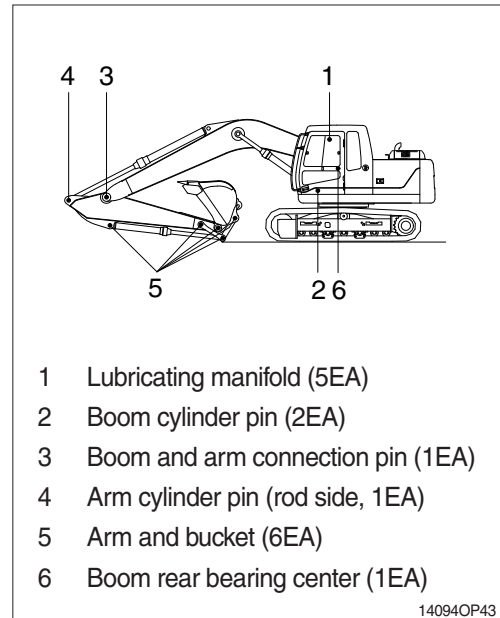
(2) Lubrication position of each part

Change all oil.

※ Be particularly careful when you reuse the machine.

As oil can be diluted during storage.

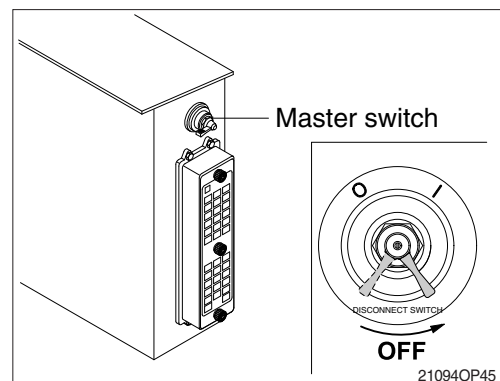
Apply an anticorrosive lubricant on the exposed part of piston rod of cylinder and in places where the machine rusts easily.



(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.

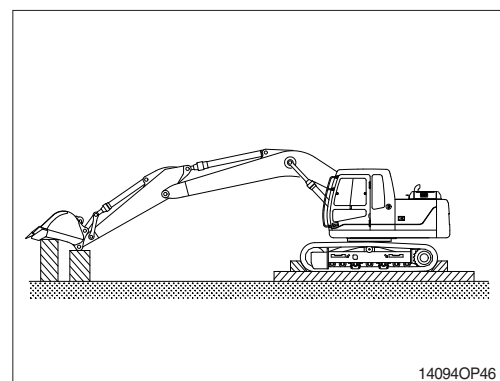


(5) Prevention of dust and moisture

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

※ Cover exposed part of piston rod of cylinder.

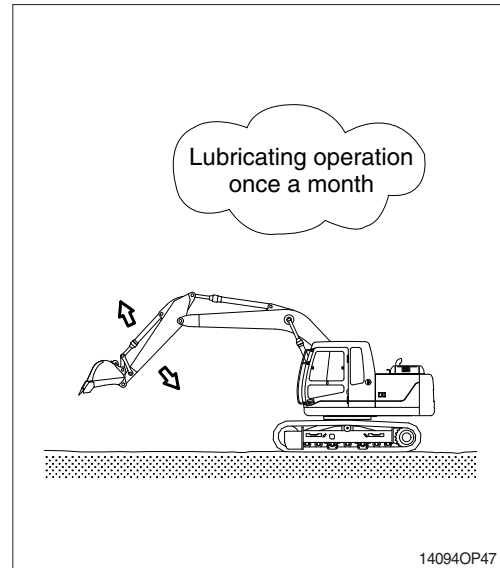
※ Lower the bucket to the ground and set a support under track.



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.



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**

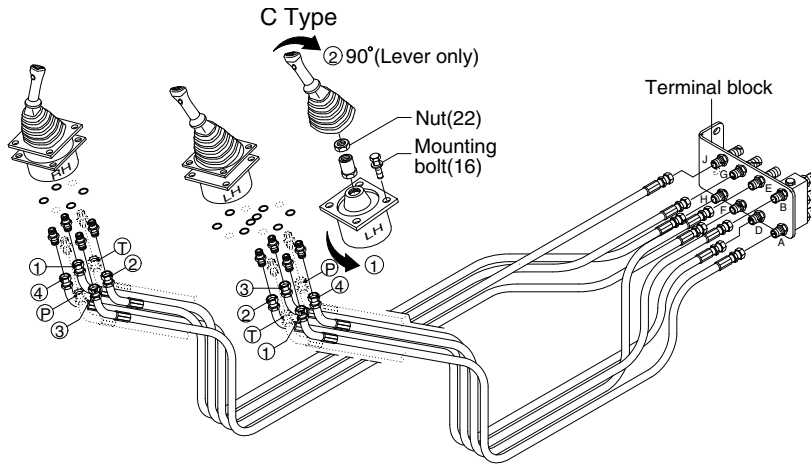
If the machine stock period is over 6 months, carry out the following procedure.

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



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

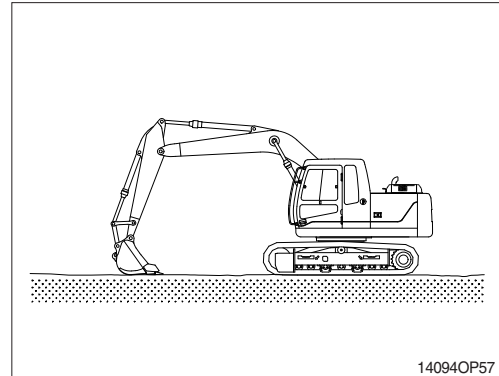
※ The hose modification works must be carried out between RCV lever and terminal block (Not between terminal block and MCV).

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| Pattern | Operation | | Control function | | Hose connection (port) | | |
|--------------|----------------|-----------------|------------------|--|------------------------|--------------------------|----|
| | Left RCV lever | Right RCV lever | | | RCV lever | Change of Terminal block | |
| | | | | | | From | To |
| ISO Type | | | Left | 1Arm out | ② | D | - |
| Hyundai | | | | 2Arm in | ④ | E | - |
| | | | | 3Swing right | ③ | B | - |
| | | | | 4Swing left | ① | A | - |
| | | | Right | 5Boom lower | ④ | J | - |
| 6Boom raise | ② | H | | - | | | |
| 7Bucket out | ① | G | | - | | | |
| 8Bucket in | ③ | F | | - | | | |
| A Type | | | Left | 1Boom lower | ② | D | J |
| | | 2Boom raise | | ④ | E | H | |
| | | 3Swing right | | ③ | B | - | |
| | | 4Swing left | | ① | A | - | |
| | | Right | 5Arm out | ④ | J | D | |
| 6Arm in | ② | | H | E | | | |
| 7Bucket out | ① | | G | - | | | |
| 8Bucket in | ③ | | F | - | | | |
| B Type | | | Left | 1Boom lower | ② | D | J |
| | | 2Boom raise | | ④ | E | H | |
| | | 3Bucket in | | ③ | B | F | |
| | | 4Bucket out | | ① | A | G | |
| | | Right | 5Arm out | ④ | J | D | |
| 6Arm in | ② | | H | E | | | |
| 7Swing right | ① | | G | B | | | |
| 8Swing left | ③ | | F | A | | | |
| C Type | | | Left | ① Loosen the RCV lever mounting bolt (16) and rotates lever assy 90° counterclockwise; then install. ② To put lever in correct position, disassemble nut (22) and rotates only lever 90° clockwise. | | | |
| | | Right | Same as ISO type | | | | |

13. SWITCHING HYDRAULIC ATTACHMENT CIRCUIT

- 1) The combined hydraulic attachment circuit is capable of providing single action or double action.
- 2) The position of 3 way valve selects the single action hydraulic attachment circuit or the double action hydraulic attachment circuit.
- 3) Before you change the flow mode of hydraulic attachment circuit, place the machine in the servicing position as shown. Stop the engine.



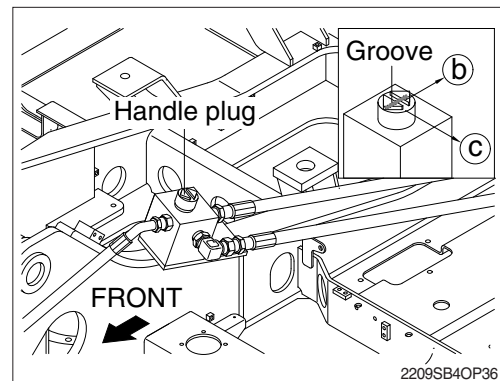
- 4) Use the spanner to turn the bolt of 3 way valve. Make sure that you turn the bolt between (b) and (c).

(1) One way flow (hydraulic breaker)

Position the groove parallel to the piping (b).

(2) Two way flow (clamshell or shear)

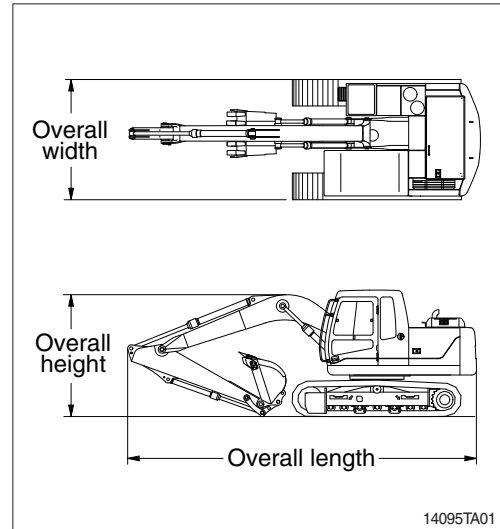
Position the groove perpendicular to the piping (c).



TRANSPORTATION

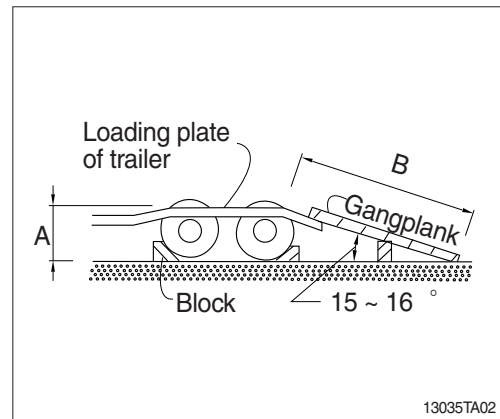
1. PREPARATION FOR TRANSPORTATION

- 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 |

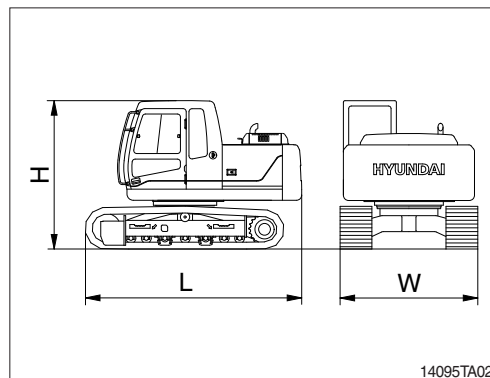


2. DIMENSION AND WEIGHT

1) BASE MACHINE (R150LC-9)

| Mark | Description | Unit | Specification |
|------|-------------|------------|---------------|
| L | Length | mm (ft-in) | 4185 (13' 7") |
| H | Height | mm (ft-in) | 2860 (9' 5") |
| W | Width | mm (ft-in) | 2600 (8' 6") |
| Wt | Weight | kg (lb) | 11600 (25580) |

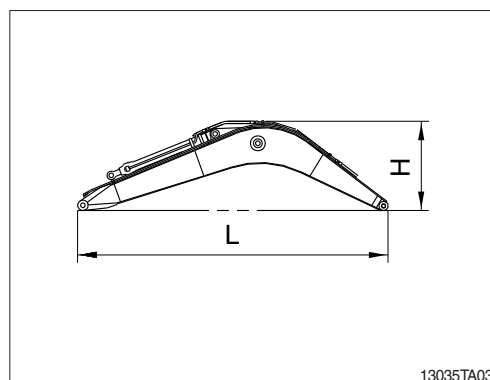
※ With 600 mm (24") triple grouser shoes and 2000 kg (4410 lb) counterweight.



2) BOOM ASSEMBLY

| Mark | Description | Unit | Specification |
|------|-------------|------------|---------------|
| L | Length | mm (ft-in) | 4750 (15' 7") |
| H | Height | mm (ft-in) | 1340 (4' 5") |
| W | Width | mm (ft-in) | 520 (1' 8") |
| Wt | Weight | kg (lb) | 1020 (2250) |

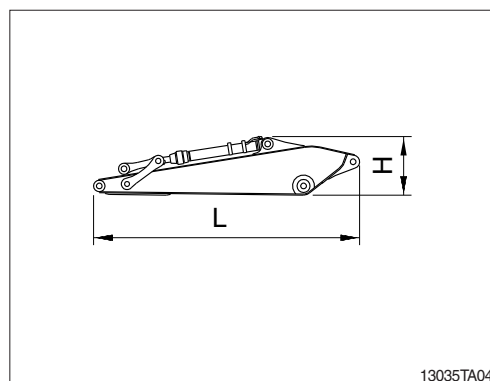
※ 4.6 m (15' 1") boom with arm cylinder (Included piping and pins).



3) ARM ASSEMBLY

| Mark | Description | Unit | Specification |
|------|-------------|------------|---------------|
| L | Length | mm (ft-in) | 3240 (10' 8") |
| H | Height | mm (ft-in) | 740 (2' 5") |
| W | Width | mm (ft-in) | 380 (1' 3") |
| Wt | Weight | kg (lb) | 620 (1370) |

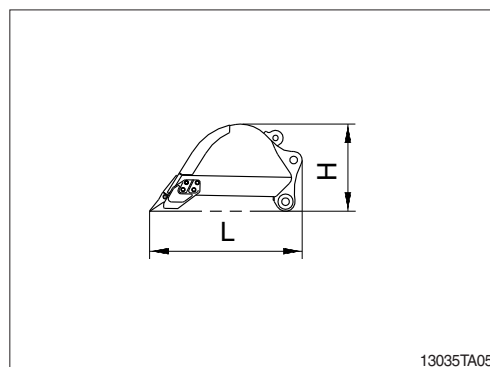
※ 2.50 m (8' 2") arm with bucket cylinder (Included linkage and pins).



4) BUCKET ASSEMBLY

| Mark | Description | Unit | Specification |
|------|-------------|------------|---------------|
| L | Length | mm (ft-in) | 1400 (4' 7") |
| H | Height | mm (ft-in) | 800 (2' 7") |
| W | Width | mm (ft-in) | 1130 (3' 8") |
| Wt | Weight | kg (lb) | 480 (1060) |

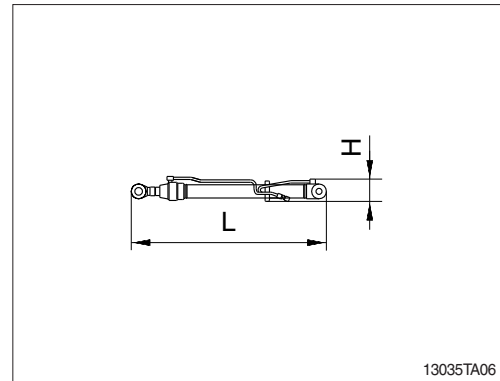
※ 0.58 m³ (0.76 yd³) PCSA heaped bucket (Included tooth and side cutters).



5) BOOM CYLINDER

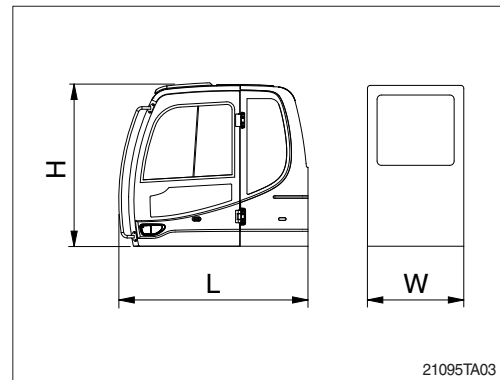
| Mark | Description | Unit | Specification |
|------|---------------|------------|---------------|
| L | Length | mm (ft-in) | 1760 (5' 9") |
| H | Height | mm (ft-in) | 210 (0' 8") |
| W | Width | mm (ft-in) | 310 (1' 0") |
| Wt | Weight (2 EA) | kg (lb) | 260 (570) |

※ Included piping.



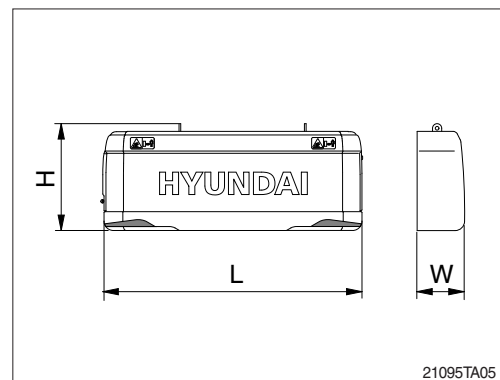
6) CAB ASSEMBLY

| Mark | Description | Unit | Specification |
|------|-------------|------------|---------------|
| L | Length | mm (ft-in) | 2000 (6' 7") |
| H | Height | mm (ft-in) | 1740 (5' 9") |
| W | Width | mm (ft-in) | 1288 (4' 2") |
| Wt | Weight | kg (lb) | 440 (970) |



7) COUNTERWEIGHT

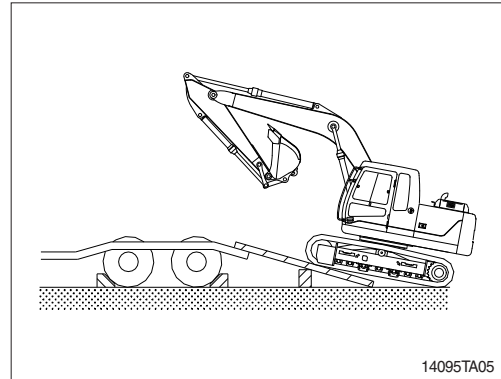
| Mark | Description | Unit | Specification |
|------|-------------|------------|---------------|
| L | Length | mm (ft-in) | 2475 (8' 1") |
| H | Height | mm (ft-in) | 1050 (3' 5") |
| W | Width | mm (ft-in) | 450 (1' 6") |
| Wt | Weight | kg (lb) | 2000 (4410) |



3. LOADING THE MACHINE

- 1) Load and unload the machine on a flat ground.
- 2) Use the gangplank with sufficient length, width, thickness and gradient.
- 3) Place the safety knob to the LOCK position (if equipped) before fixing the machine at the bed of trailer and confirm if the machine parallels the bed of trailer.

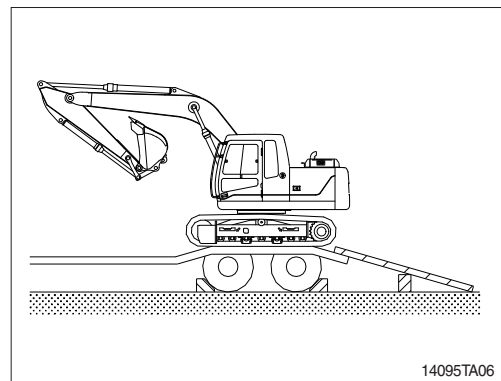
Keep the travel motor in the rear when loading and in the front when unloading.



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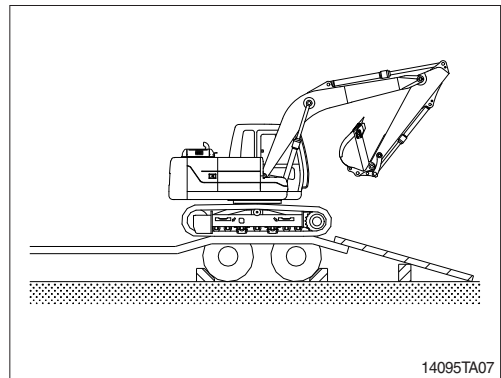
- 4) Do the following after loading the machine to the trailer.

- (1) Stop loading when the machine is located horizontally with the rear wheel of trailer.



14095TA06

- (2) Place the safety knob to the LOCK position (if equipped) after the swing the machine 180 degree.



14095TA07

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

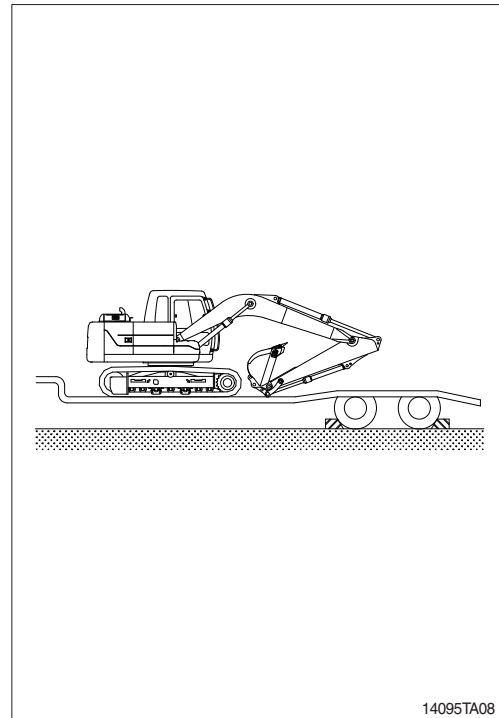
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

▲ **Be sure to keep the travel speed switch on the LOW (turtle mark) while loading and unloading the machine.**

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

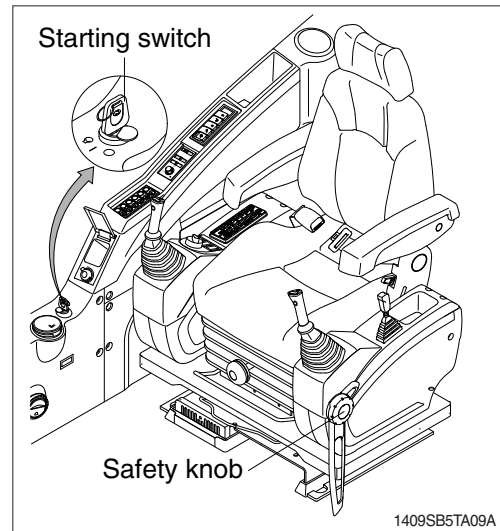
▲ **Do not operate any other device when loading.**

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

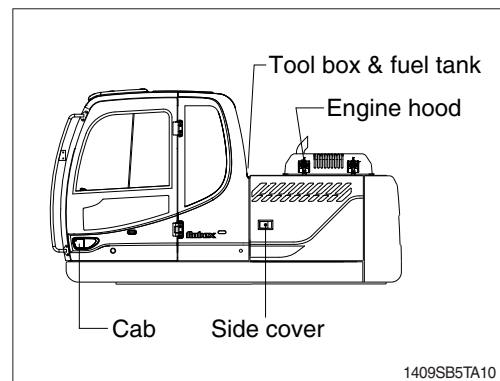


4. FIXING THE MACHINE

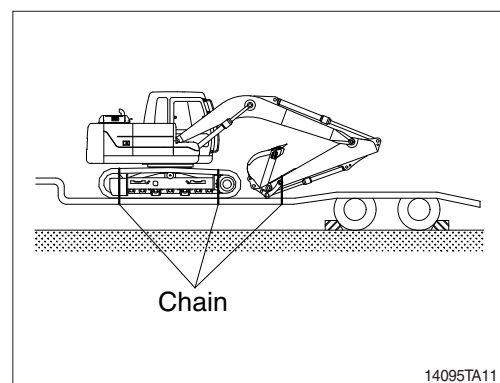
- 1) Lower down the working device on the loading plate of trailer.
- 2) Keep the safety knob on the LOCK position.
- 3) Turn OFF all the switches and remove the key.



- 4) Secure all locks.



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



5. LOADING AND UNLOADING BY CRANE

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

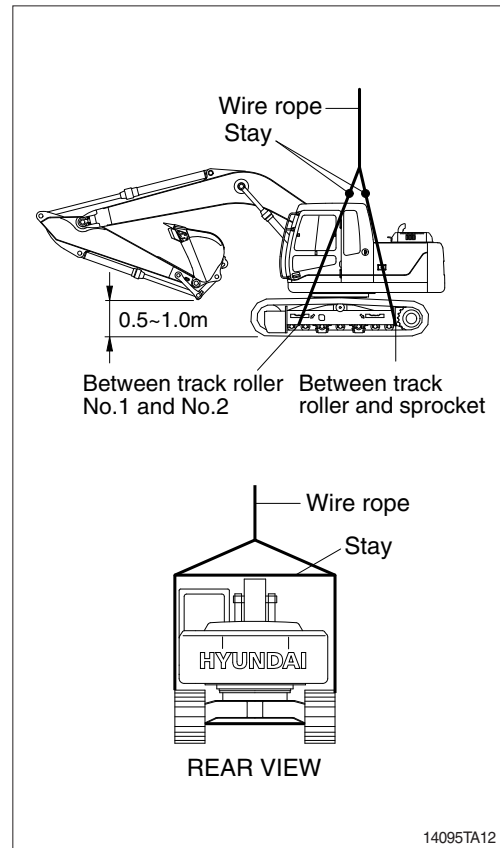
▲ Make sure wire rope is proper size.

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

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

▲ Do not load abruptly.

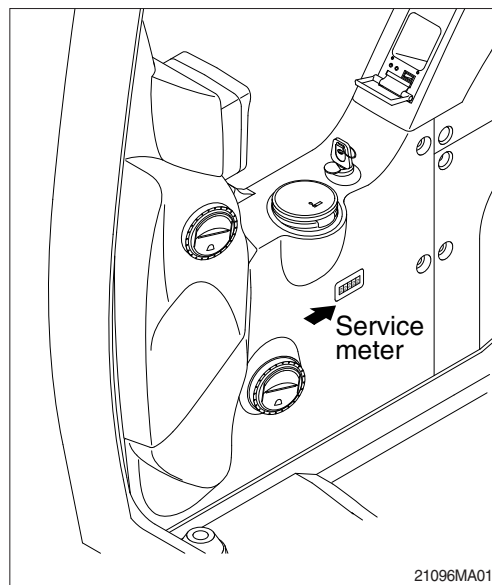
▲ Keep area clear of personnel.



1. INSTRUCTION

1) INTERVAL OF MAINTENANCE

- (1) You may inspect and service the machine by the period as described at page 6-11 based on hour meter at control panel.
- (2) Shorten the interval of inspect and service depending on site condition. (such as dusty area, quarry, sea shore and etc.)
- (3) Practice the entire related details at the same time when the service interval is doubled.
For example, in case of 100 hours, carry out all the maintenance 「Each 100 hours, each 50 hours and daily service」 at the same time.



2) PRECAUTION

- (1) Start to maintenance after you have the full knowledge of machine.
- (2) The monitor installed on this machine does not entirely guarantee the condition of the machine.
Daily inspection should be performed according to clause 4, maintenance check list.
- (3) Engine and hydraulic components have been preset in the factory.
Do not allow unauthorized personnel to reset them.
- (4) 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.

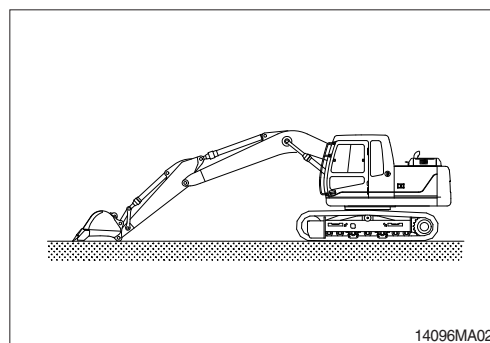
※ **Be sure to start the maintenance after fully understand the chapter 1, safety hints.**

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

- ※ Spouting of oil can cause the accident when loosening the cap or hose right after the operating of machine as the machine or oil is on the high pressure on the condition.

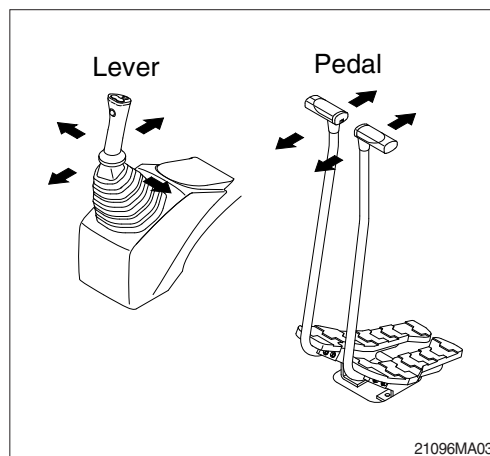
Be sure to relieve the pressure in the system before repairing hydraulic system.

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

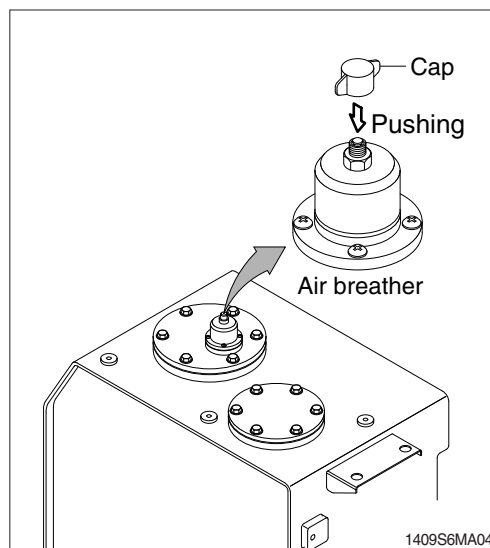


- (2) Set the safety lever completely in the release position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

- ※ 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 (engine-bracket) | M12 × 1.75 | 11.5 ± 1.0 | 83.2 ± 7.2 |
| 2 | | Engine mounting bolt (bracket-frame, FR) | M20 × 2.5 | 52.1 ± 5.0 | 377 ± 36.2 |
| 3 | | Engine mounting bolt (bracket-frame, RR) | M20 × 2.5 | 52.1 ± 5.0 | 377 ± 36.2 |
| 4 | | Radiator mounting bolt | M16 × 2.0 | 29.7 ± 4.5 | 215 ± 32.5 |
| 5 | | Coupling mounting socket bolt | M16 × 2.0 | 32 ± 1.6 | 231 ± 11.6 |
| 6 | | Main pump housing mounting bolt | M10 × 1.5 | 6.5 ± 0.7 | 47.0 ± 5.1 |
| 7 | Hydraulic system | Main pump mounting socket bolt | M16 × 2.0 | 22.1 ± 1.6 | 160 ± 11.6 |
| 8 | | Main control valve mounting bolt | M12 × 1.75 | 12.2 ± 1.3 | 88.2 ± 9.4 |
| 9 | | Fuel tank mounting bolt | M20 × 2.5 | 46 ± 5.1 | 333 ± 36.9 |
| 10 | | Hydraulic oil tank mounting bolt | M20 × 2.5 | 46 ± 5.1 | 333 ± 36.9 |
| 11 | | Turning joint mounting bolt, nut | M12 × 1.75 | 12.8 ± 3.0 | 92.6 ± 21.7 |
| 12 | Power train system | Swing motor mounting bolt | M16 × 2.0 | 29.6 ± 3.2 | 214 ± 23.1 |
| 13 | | Swing bearing upper part mounting bolt | M18 × 2.5 | 41.3 ± 4.0 | 299 ± 28.9 |
| 14 | | Swing bearing lower part mounting bolt | M16 × 1.5 | 31.3 ± 3.2 | 226 ± 23.1 |
| 15 | | Travel motor mounting bolt | M16 × 2.0 | 25.7 ± 4.0 | 186 ± 28.9 |
| 16 | | Sprocket mounting bolt | M16 × 2.0 | 29.7 ± 3.0 | 215 ± 21.7 |
| 17 | Under carriage | Carrier roller mounting bolt, nut | M16 × 2.0 | 29.7 ± 3.0 | 215 ± 21.7 |
| 18 | | Track roller mounting bolt | M16 × 2.0 | 29.7 ± 3.0 | 215 ± 21.7 |
| 20 | | Track tension cylinder mounting bolt | M16 × 2.0 | 29.7 ± 4.5 | 215 ± 32.5 |
| 21 | | Track shoe mounting bolt, nut | 5/8 - 18UNF | 42 ± 4.0 | 304 ± 28.9 |
| 22 | | Track guard mounting bolt | M16 × 2.0 | 29.6 ± 3.2 | 214 ± 23.1 |
| 23 | Others | Counterweight mounting bolt | M27 × 3.0 | 135 ± 15 | 976 ± 108 |
| 24 | | Cab mounting bolt | M12 × 1.75 | 12.8 ± 3.0 | 92.6 ± 21.7 |
| 25 | | 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 15W-40 (API CI-4) |
| Hydraulic oil | Hyundai genuine long life hydraulic oil (ISO VG 32, VG 46, VG 68) Coventional hydraulic oil (ISO VG 15, ★ Cold region) |
| Swing and travel reduction gear | SAE 80W-90 (API GL-5) |
| Grease | Lithium base grease NLGI No. 2 |
| Fuel | ASTM D975-No. 2 |
| Coolant | Mixture of 50% ethylene glycol base antifreeze and 50% water. |

SAE : Society of Automotive Engineers

API : American Petroleum Institute

ISO : International Organization for Standardization

NLGI : National Lubricating Grease Institute

ASTM : American Society of Testing and Material

★ : Cold region

Russia, CIS, Mongolia

2) RECOMMENDED OILS

Use only oils listed below or equivalent.

Do not mix different brand oil.

| 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 | 11 (2.9) | | ★SAE OW-30 | | | | | | | |
| | | | | SAE 5W-40 | | | | | | | |
| | | | | SAE 10W-30 | | | | | | | |
| | | | | SAE 15W-40 | | | | | | | |
| Swing drive | Gear oil | 2.5 (0.7) | ★SAE 75W-90 | | | | | | | | |
| Final drive | | 2.3×2 (0.6×2) | SAE 80W-90 | | | | | | | | |
| Hydraulic tank | Hydraulic oil | Tank; 124 (32.8) System; 210 (55.5) | ★ISO VG 15 | | | | | | | | |
| | | | ISO VG 32 | | | | | | | | |
| | | | ISO VG 46 | | | | | | | | |
| | | | ISO VG 68 | | | | | | | | |
| Fuel tank | Diesel fuel | 270 (71.0) | ★ASTM D975 NO.1 | | | | | ASTM D975 NO.2 | | | |
| | | | | | | | | | | | |
| Fitting (grease nipple) | Grease | As required | ★NLGI NO.1 | | | | | | NLGI NO.2 | | |
| | | | | | | | | | | | |
| Radiator (reservoir tank) | Mixture of antifreeze and water | 21 (5.5) | Ethylene glycol base permanent type (50 : 50) | | | | | | | | |
| | | | ★Ethylene glycol base permanent type (60 : 40) | | | | | | | | |

SAE : Society of Automotive Engineers

★ : Cold region

API : American Petroleum Institute

ISO : International Organization for Standardization

NLGI : National Lubricating Grease Institute

ASTM : American Society of Testing and Material

4. MAINTENANCE CHECK LIST

1) DAILY SERVICE BEFORE STARTING

| Check items | Service | Page |
|------------------------------|---------------|------|
| Visual check | | |
| Fuel tank | Check, Refill | 6-25 |
| Hydraulic oil level | Check, Add | 6-29 |
| Engine oil level | Check, Add | 6-18 |
| Coolant level | Check, Add | 6-20 |
| Control panel & pilot lamp | Check, Clean | 6-41 |
| Prefilter | Check, Clean | 6-26 |
| Fan belt tension and damage | Check, Adjust | 6-24 |
| ★ Attachment pin and bushing | Lubricate | 6-40 |
| · Boom cylinder tube end | | |
| · Boom foot | | |
| · Boom cylinder rod end | | |
| · Arm cylinder tube end | | |
| · Arm cylinder rod end | | |
| · Boom + Arm connecting | | |
| · Bucket cylinder tube end | | |

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

2) EVERY 50 HOURS SERVICE

| Check items | Service | Page |
|-----------------------------|---------------|------|
| Fuel tank (water, sediment) | Drain | 6-25 |
| Track tension | Check, Adjust | 6-35 |
| Swing reduction gear oil | Check, Add | 6-33 |
| Attachment pin and bushing | Lubricate | 6-40 |
| · Bucket cylinder rod end | | |
| · Bucket + Arm connecting | | |
| · Bucket control link + Arm | | |
| · Bucket control rod | | |

3) INITIAL 50 HOURS SERVICE

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

4) EVERY 200 HOURS SERVICE

| Check items | Service | Page |
|--------------------------|---------|------|
| ★ Return filter | Replace | 6-31 |
| ★ Pilot line filter | Replace | 6-33 |
| ★ Drain filter cartridge | Replace | 6-32 |

★ **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 | 6-27 |
| Prefilter element | Replace | 6-26 |
| Pilot line filter | Replace | 6-33 |
| Hydraulic return filter | Replace | 6-31 |
| Drain filter cartridge | Replace | 6-32 |
| Swing reduction gear oil | Change | 6-33 |
| Swing reduction gear grease | Check, Lubricate | 6-33 |
| Travel reduction gear oil | Change | 6-34 |

6) EVERY 250 HOURS SERVICE

| Check items | Service | Page |
|--------------------------------------|--------------|------|
| Battery (voltage) | Check, Clean | 6-41 |
| Aircon & heater fresh air filter | Check | 6-44 |
| Swing bearing grease | Lubricate | 6-34 |
| Bolts & Nuts | Check, Tight | 6-8 |
| · Sprocket mounting bolts | | |
| · Travel motor mounting bolts | | |
| · Swing motor mounting bolts | | |
| · Swing bearing mounting bolts | | |
| · Engine mounting bolts | | |
| · Counterweight mounting bolts | | |
| · Turning joint locating bolts | | |
| · Track shoe mounting bolts and nuts | | |
| · Hydraulic pump mounting bolts | | |
| Attachment pin and bushing | Lubricate | 6-40 |
| · Boom cylinder tube end | | |
| · Boom foot | | |
| · Boom cylinder rod end | | |
| · Arm cylinder tube end | | |
| · Arm cylinder rod end | | |
| · Boom + Arm connecting | | |
| · Bucket cylinder tube end | | |

7) EVERY 500 HOURS SERVICE

| Check items | Service | Page |
|--|--------------|----------|
| ★ Engine oil | Change | 6-18, 19 |
| ★ Engine oil filter | Replace | 6-18, 19 |
| Radiator, oil cooler and charge air cooler | Check, Clean | 6-23 |
| ☆ Air cleaner element (primary) | Check, Clean | 6-25 |
| Fuel filter element | Replace | 6-27 |
| Prefilter element | Replace | 6-26 |

★ 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 |
|---------------------------------|-----------|------|
| Air breather element | Replace | 6-32 |
| Travel reduction gear oil | Change | 6-34 |
| Swing reduction gear oil | Change | 6-33 |
| Swing reduction gear grease | Lubricate | 6-33 |
| Grease in swing gear and pinion | Change | 6-34 |
| Hydraulic oil return filter | Replace | 6-31 |
| Drain filter cartridge | Replace | 6-32 |
| Pilot line filter | Replace | 6-33 |

9) EVERY 2000 HOURS SERVICE

| Check items | Service | Page |
|--|---------------------------|------------------|
| Hydraulic tank oil ^{★1} | Change | 6-30 |
| Hydraulic tank suction strainer | Check, Clean | 6-31 |
| Coolant | Change | 6-20, 21, 22, 23 |
| Hoses, fittings, clamps (fuel, coolant, hydraulic) | Check, Retighten, Replace | - |

^{★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 | 6-30 |

^{★2} Hyundai genuine long life hydraulic oil

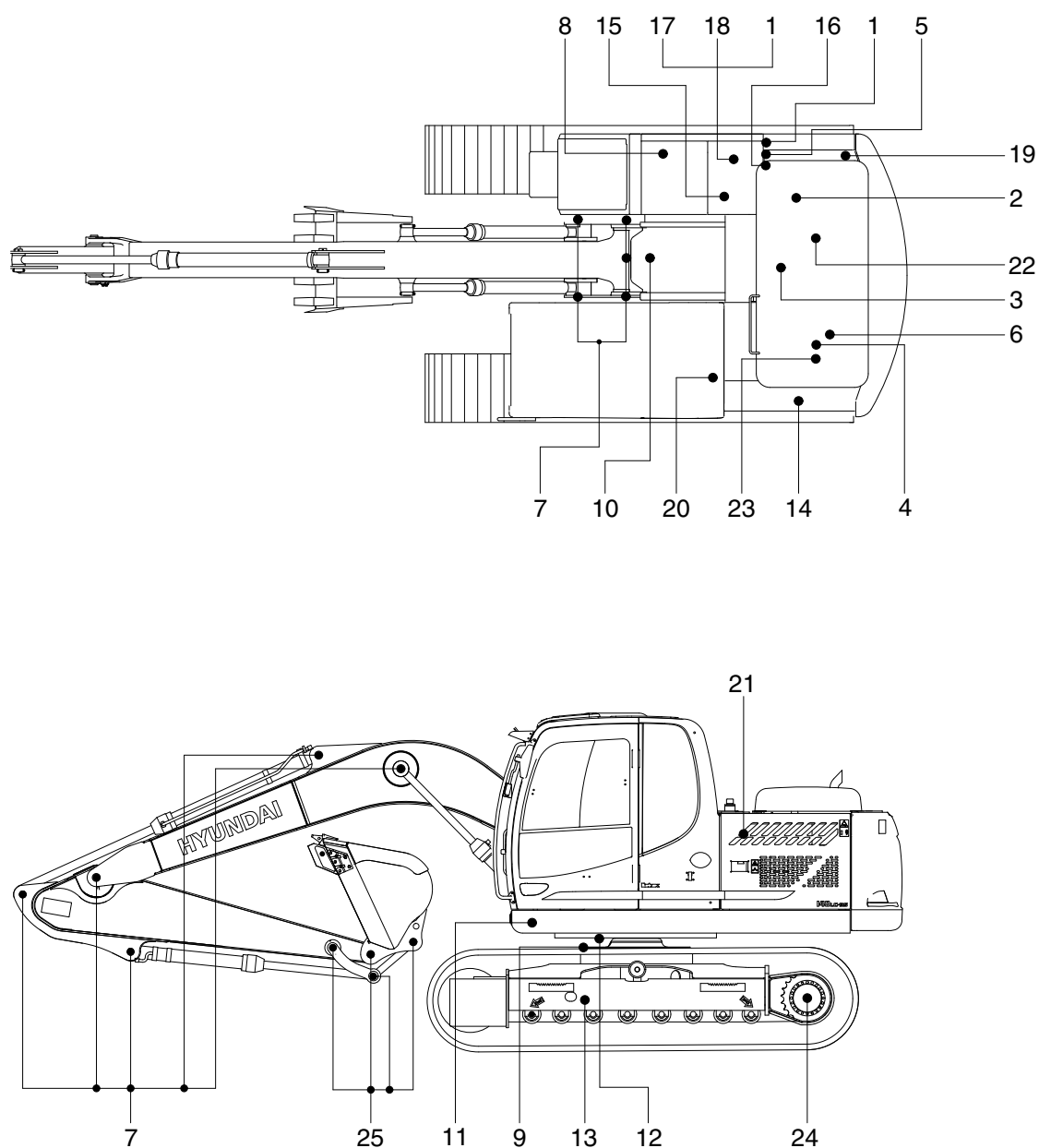
★ Change oil every 1000 hours of continuous hydraulic breaker operation.

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 | 6-25 |
| · Fuel filter element | Replace | 6-27 |
| · Prefilter | Clean or Replace | 6-26 |
| Engine lubrication system | | |
| · Engine oil | Change | 6-18, 19 |
| · Engine oil filter | Replace | 6-18, 19 |
| Engine cooling system | | |
| · Coolant | Add or Change | 6-20, 21, 22, 23 |
| · Radiator | Clean or Flush | 6-20, 21, 22, 23 |
| Engine air system | | |
| · Air cleaner element | Replace | 6-25 |
| Hydraulic system | | |
| · Hydraulic oil | Add or Change | 6-29 |
| · Return filter | Replace | 6-31 |
| · Drain line filter | Replace | 6-32 |
| · Pilot line filter | Replace | 6-33 |
| · Element of breather | Replace | 6-32 |
| · Suction strainer | Clean | 6-31 |
| Under carriage | | |
| · Track tension | Check, Adjust | 6-35 |
| Bucket | | |
| · Tooth | Replace | 6-38 |
| · Side cutter | Replace | 6-38 |
| · Linkage | Adjust | 6-40 |
| · Bucket assy | Replace | 6-37 |
| Air conditioner and heater | | |
| · Fresh air filter | Clean, Replace | 6-44 |
| · Recirculation filter | Clean | 6-44 |

5. MAINTENANCE CHART



1409SB6MA05B

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 | 124 (32.8) | 1 |
| | 2 | Engine oil level | Check, Add | EO | 11 (2.9) | 1 |
| | 4 | Radiator coolant | Check, Add | C | 21 (5.5) | 1 |
| | 5 | Prefilter (water, element) | Check, Clean | - | - | 1 |
| | 6 | Fan belt tension and damage | Check, Adjust | - | - | 1 |
| | 8 | Fuel tank | Check, Refill | DF | 270 (71) | 1 |
| 50 Hours or weekly | 8 | Fuel tank (water, sediment) | Check, Clean | - | - | 1 |
| | 10 | Swing reduction gear case | Check, Add | GO | 2.5 (0.66) * ³ 3.5 (0.92) | 1 |
| | 13 | Track tension | Check, Adjust | PGL | - | 2 |
| | 25 | Bucket linkage | Check, Add | PGL | - | 5 |
| 250 Hours | 7 | Attachment pins & bushing | Check, Add | PGL | - | 12 |
| | 9 | Swing bearing grease | Check, Add | PGL | - | 3 |
| | 14 | Battery (voltage) | Check, Clean | - | - | 1 |
| | 20 | Aircon and heater fresh air filter | Check, Clean | - | - | 1 |
| 500 Hours | 2 | Engine oil | Change | EO | 11 (2.9) | 1 |
| | 3 | Engine oil filter | Replace | - | - | 1 |
| | 5 | Prefilter element | Replace | - | - | 1 |
| | 21 | Air cleaner element (primary) | Check, Clean | - | - | 1 |
| | 22 | Fuel filter element | Replace | - | - | 1 |
| | 23 | Radiator, oil cooler | Check, Clean | - | - | 3 |
| 1000 Hours | 10 | Swing reduction gear case | Change | GO | 2.5 (0.66) * ³ 3.5 (0.92) | 1 |
| | 11 | Swing reduction gear grease * ³ | Check, Add | PGL | 0.35 (0.1) | 1 |
| | 12 | Swing gear and pinion grease | Change | PGL | 5.9 kg (13.1 lb) | 1 |
| | 15 | Hydraulic oil return filter | Replace | - | - | 1 |
| | 16 | Drain filter cartridge | Replace | - | - | 1 |
| | 17 | Air breather element | Replace | - | - | 1 |
| | 19 | Pilot line filter element | Replace | - | - | 1 |
| | 24 | Travel reduction gear case | Change | GO | 2.3 (0.61) | 2 |
| 2000 Hours | 1 | Hydraulic oil * ¹ | Change | HO | 124 (32.8) | 1 |
| | 4 | Radiator coolant | Change | C | 21 (5.5) | 1 |
| | 18 | Hydraulic oil suction strainer | Check, Clean | - | - | 1 |
| | - | Hoses, fittings, clamps (fuel, coolant, hydraulic) | Check, Retighten, Replace | - | - | - |
| 5000 Hours | 1 | Hydraulic oil * ² | Change | HO | 124 (32.8) | 1 |
| As required | 20 | Aircon & heater fresh filter | Replace | - | - | 1 |
| | 20 | Aircon & heater recirculation filter | Clean, Replace | - | - | 1 |
| | 21 | Air cleaner element (primary) | Check, Replace | - | - | 1 |
| | 21 | Air cleaner element (safety) | Replace | - | - | 1 |

*¹ Conventional hydraulic oil

*² Hyundai genuine long life hydraulic oil

*³ Service when the grease inlet exists on the equipment

※ Oil symbol

Please refer to the recommended lubricants for specification.

DF : Diesel fuel

GO : Gear oil

HO : Hydraulic oil

C : Coolant

PGL : Grease

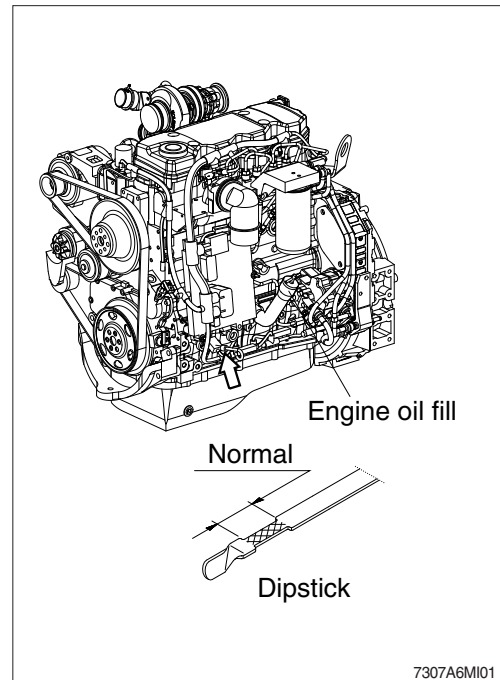
EO : Engine oil

6. SERVICE INSTRUCTION

1) CHECK ENGINE OIL LEVEL

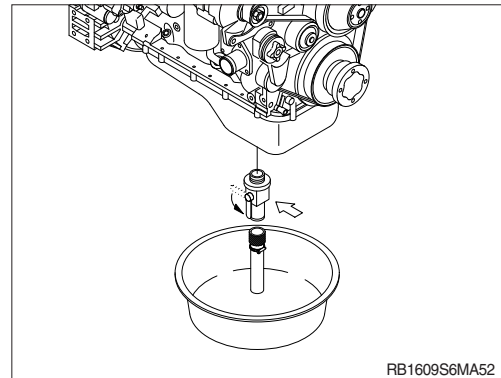
Check the oil level with the machine on a flat ground before starting engine.

- (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.

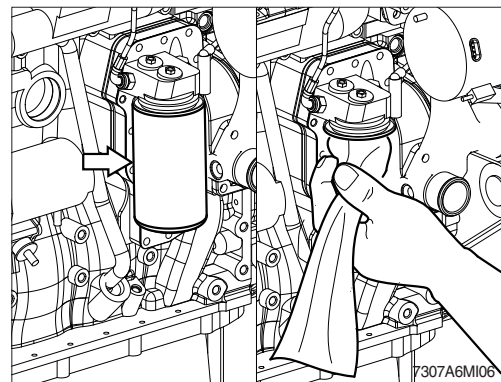


2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

- (1) Warm up the engine.
- (2) Turn the lever to open position.
 - ※ A drain pan with a capacity of 15 liters (4.0 U.S. gallons) will be adequate.

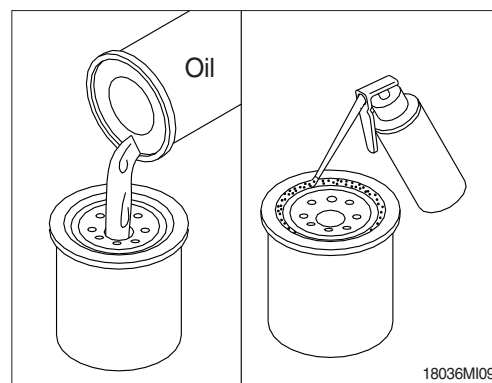


- (3) Clean around the filter head, remove the filter and clean the gasket surface.
 - ※ The O-ring can stick on the filter head; make sure it is removed.



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

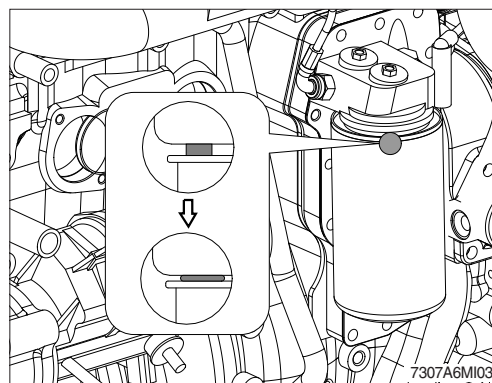
※ **Fill the filters with clean lubricating oil.**



- (5) Install the filter to the filter head.

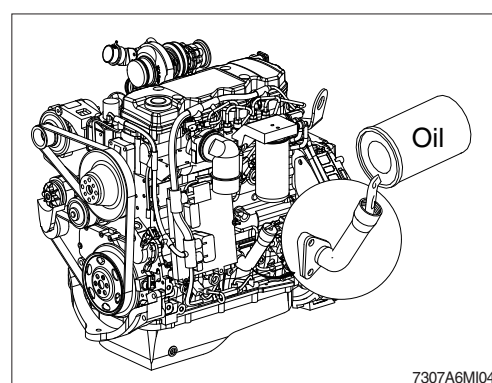
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**

Tighten the filter until the gasket contacts the filter head surface.



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

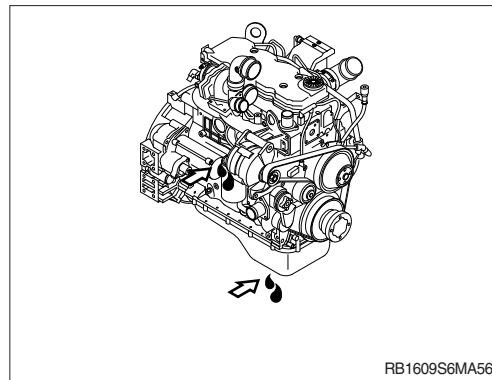
· Quantity : 11 ℓ (2.9 U.S. gallons)



- (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 15 minutes for oil to drain down before checking.

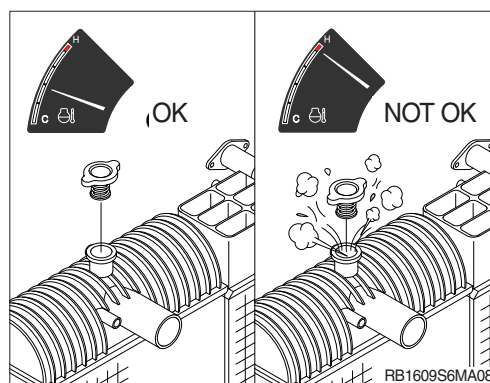
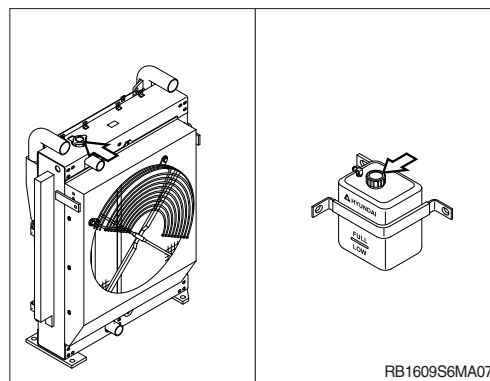
※ **Do not overfill the engine with oil.**



3) CHECK COOLANT

- (1) Check if the level of coolant in reservoir tank is between FULL and LOW.
- (2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.
- (3) Be sure to add the coolant by opening the cap of radiator when coolant level is below LOW.
- (4) Replace gasket of radiator cap when it is damaged.

▲ Hot coolant can spray out if radiator cap is removed while engine is hot. Remove the cap after the engine has cooled down.



4) FLUSHING AND REFILLING OF RADIATOR

- (1) Change coolant

▲ Avoid prolonged and repeated skin contact with used antifreeze. Such prolonged repeated contact can cause skin disorders or other bodily injury.

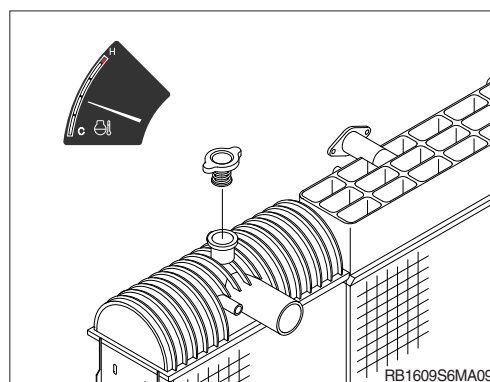
Avoid excessive contact-wash thoroughly after contact.

Keep out of reach of children.

※ Protect the environment : Handling and disposal of used antifreeze can be subject to federal, state, and local law regulation.

Use authorized waste disposal facilities, including civic amenity sites and garages providing authorized facilities for the receipt of used antifreeze.

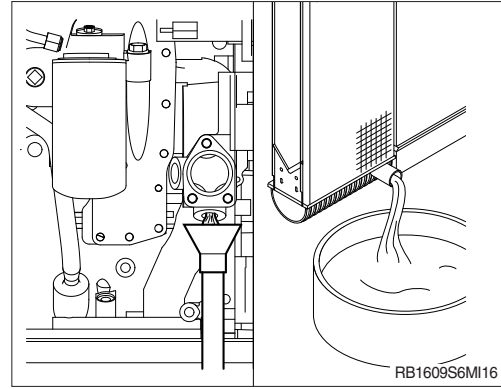
If in doubt, contact your local authorities for guidance as to proper handling of used antifreeze.



- ▲ Wait until the temperature is below 50 °C (122 °F) before removing the coolant system pressure cap.

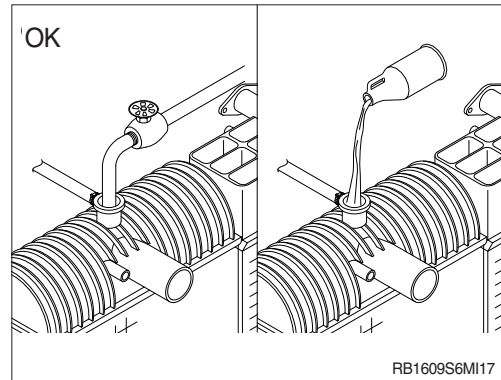
Failure to do so can cause personal injury from heated coolant spray.

Drain the cooling system by opening the drain valve on the radiator and removing the plug in the bottom of the water inlet. A drain pan with a capacity of 19 liters (5 U.S. gallons) will be adequate in most applications.



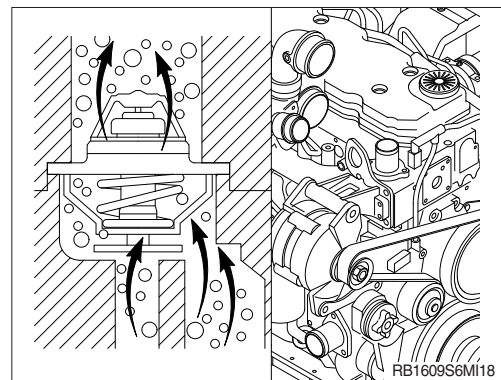
(2) Flushing of cooling system

- ① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).
 - ※ Use 0.5kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S. gallons) of water.
 - ※ Do not install the radiator cap. The engine is to be operated without the cap for this process.

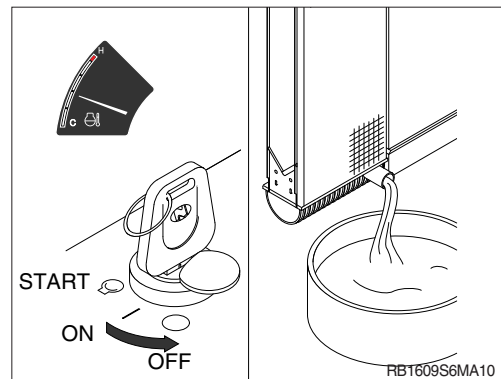


- ※ During filling, air must be vented from the engine coolant passages. Open the engine venting petcock.

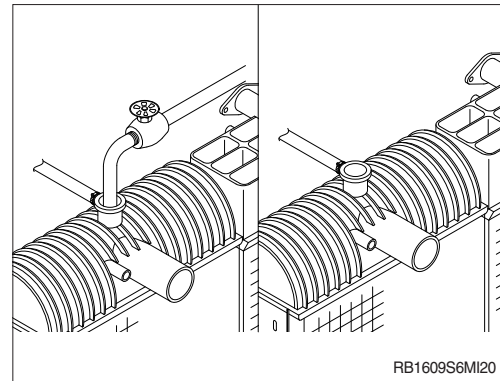
The system must be filled slowly to prevent air locks. Wait 2 to 3 minutes to allow air to be vented, then add mixture to bring the level to the top.



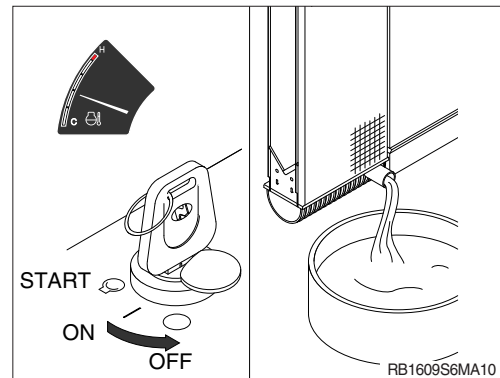
- ② Operate the engine for 5 minutes with the coolant temperature above 80 °C (176 °F). Shut the engine off, and drain the cooling system.



- ③ Fill the cooling system with clean water.
- ※ **Be sure to vent the engine and aftercooler for complete filling.**
- ※ **Do not install the radiator cap or the new coolant filter.**

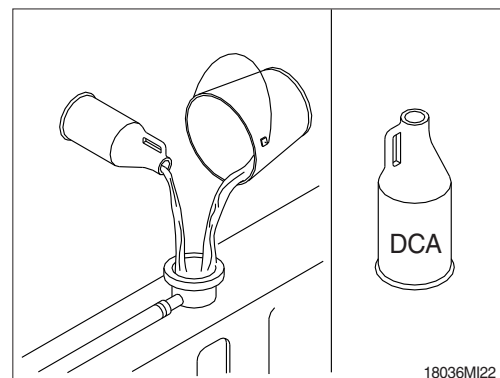


- ④ Operate the engine for 5 minutes with the coolant temperature above 80 °C (176 °F) . Shut the engine off, and drain the cooling system.
- ※ **If the water being drained is still dirty, the system must be flushed again until the water is clean.**

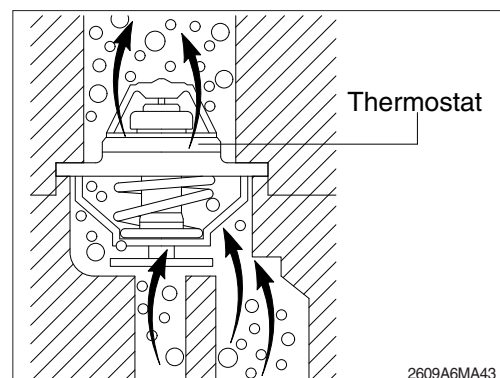


(3) Cooling system filling

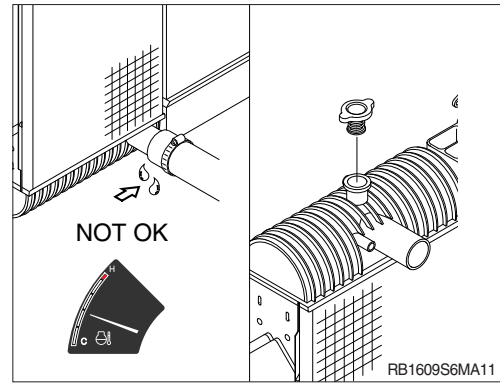
- ① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.
Coolant capacity (engine only) : 19 ℓ (5 U.S. gallons)



- ② The system has a maximum fill rate of 19 liters (5 U.S. gallons) per minute. Do not exceed this fill rate.
- ※ **The system must be filled slowly to prevent air locks.**
During filling, air must be vented from the engine coolant passage.



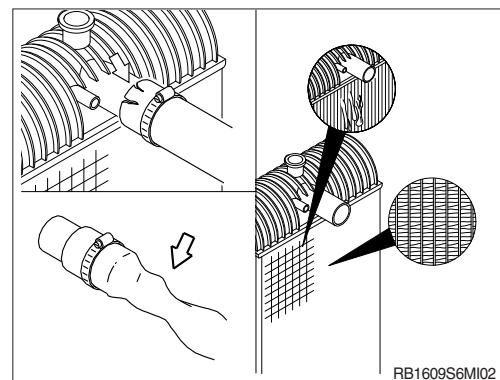
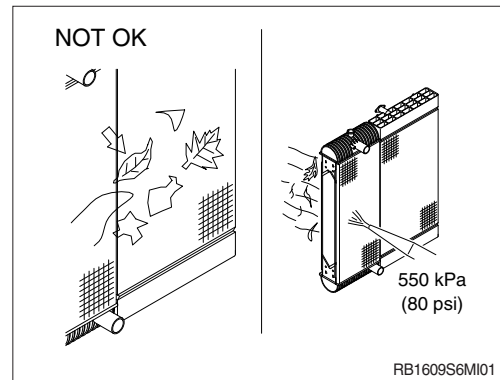
- ③ Install the pressure cap. Operate the engine until it reaches a temperature 80 °C (176 °F), and check for coolant leaks. Check the coolant level again to make sure the system is full of coolant.



5) CLEAN RADIATOR AND OIL COOLER

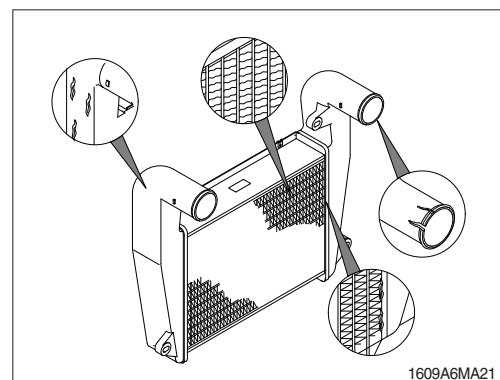
Check, and if necessary, clean and dry outside of radiator and oil cooler. After working in a dusty place, clean radiator more frequently.

- (1) Visually inspect the radiator for clogged radiator fins.
- (2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.
- (3) Visually inspect the radiator for bent or broken fins.
- ※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**
- (4) Visually inspect the radiator for core leaks.



6) CHECK CHARGE AIR COOLER

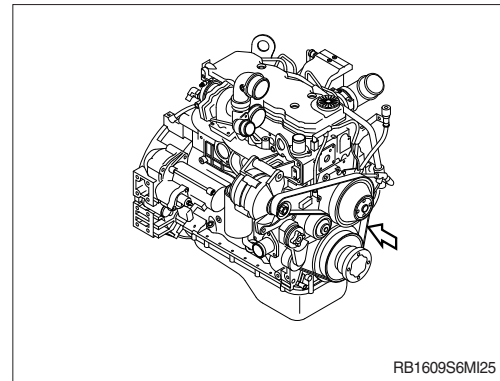
Inspect the charge air cooler for dirt and debris blocking the fins. Check for cracks, holes, or other damage. If damage is found, please contact Hyundai distributor.



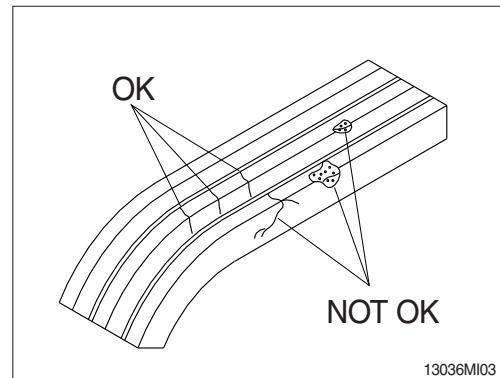
7) FAN BELT TENSION

- (1) Measure the belt deflection at the longest span of the belt.

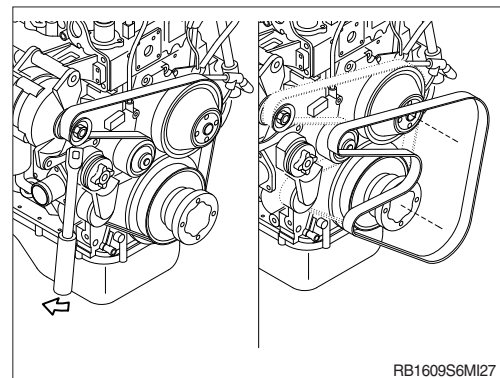
· Maximum deflection : 9.5 - 12.7 mm
(3/8 to 1/2 inch)



- (2) Inspect the drive for damage.



- (3) Inspect the drive belt, tension bearing and fan hub.



8) INSPECTION OF COOLING FAN

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

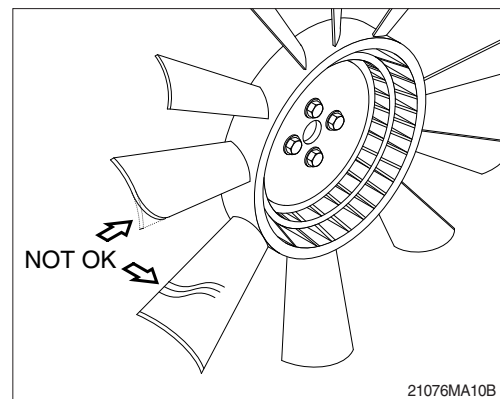
※ Rotate the crankshaft by using the engine barring gear.

※ 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.



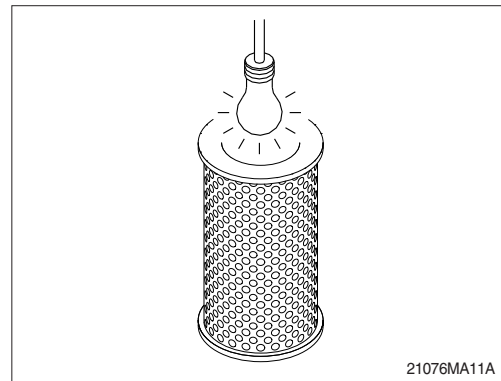
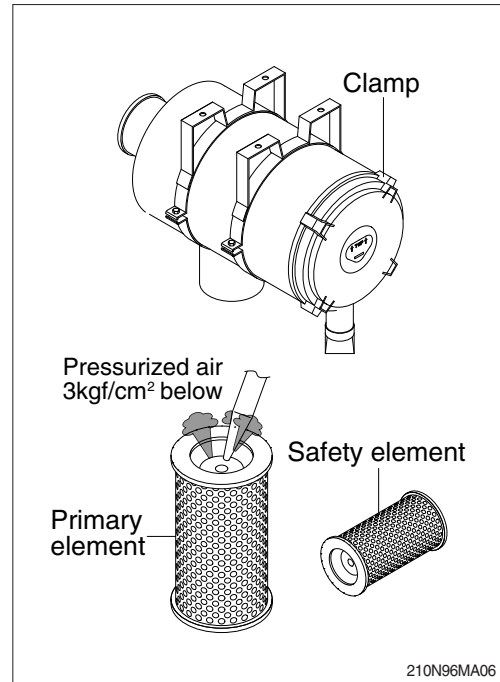
9) CLEANING OF AIR CLEANER

(1) Primary element

- ① Loosen the clamps and remove the element.
 - ② Clean the inside of the body.
 - ③ Clean the element with pressurized air.
 - Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.
 - ④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
 - ⑤ Insert element and tighten wing nut.
- ※ **Replace the primary element after 4 times cleanings.**

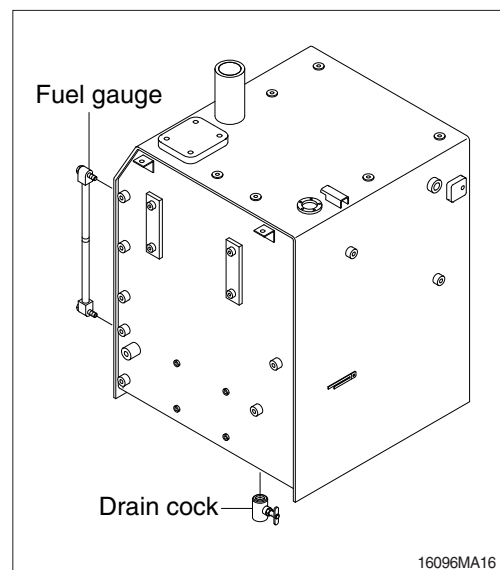
(2) Safety element

- ※ **Replace the safety element only when the primary element is cleaned for the 4 times.**
- ※ **Always replace the safety element. Never attempt to reuse the safety element by cleaning the element.**



10) FUEL TANK

- (1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.
 - (2) Drain the water and sediment in the fuel tank by opening the drain cock.
 - ※ **Be sure to LOCK the cap of fuel tank.**
 - ※ **Remove the strainer of the fuel tank and clean it if contaminated.**
- ▲ **Stop the engine when refueling.**
All lights and flames shall be kept at a safe distance while refueling.

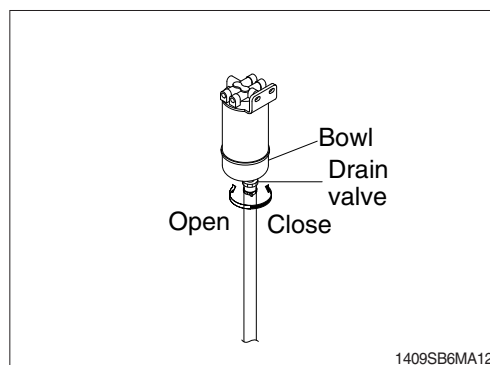


11) PREFILTER

※ Inspect or drain the collection bowl of water daily and replace the element every 500 hours.

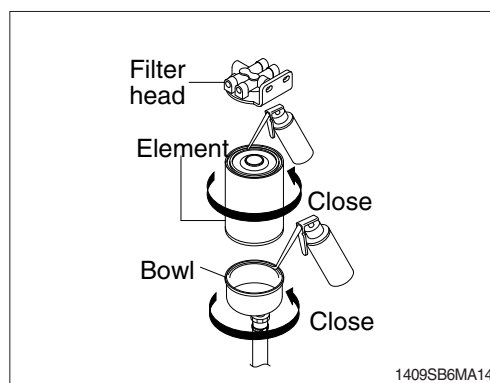
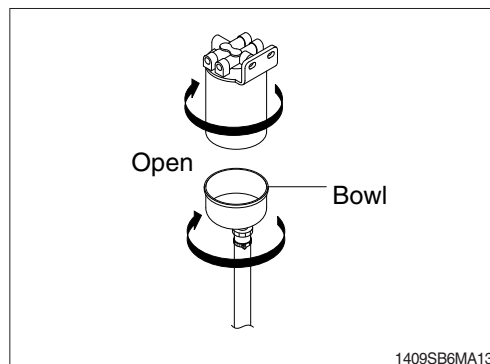
(1) Drain water

- ① Open bowl drain valve to evacuate water.
- ② Close drain valve.



(2) Replace element

- ① Drain the unit of fuel. Follow "Drain water" instructions above.
- ② Remove element and bowl from filter head.
- ※ **The bowl is reusable, do not damage or discard.**
- ③ Separate element from bowl. Clean bowl and seal gland.
- ④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.
- ⑤ Attach bowl to new element firmly by hand.
- ⑥ Lubricate new element seal and place in element top gland.
- ⑦ Attach the element and bowl to the head.

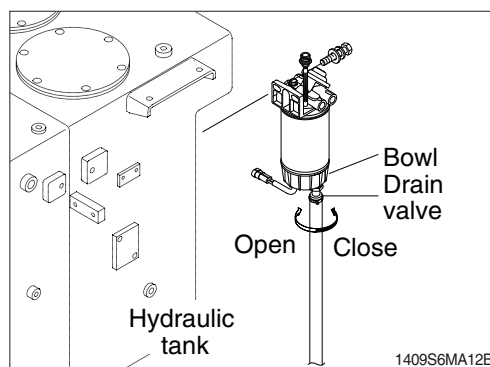


12) REPLACEMENT OF FUEL FILTER

※ Inspect or drain the collection bowl of water daily and replace the element every 500hours.

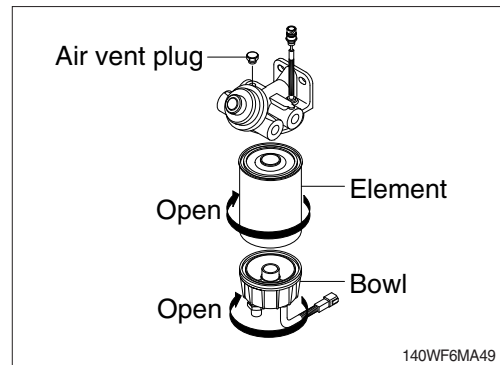
(1) Drain water

- ① Open bowl drain valve to evacuate water.
- ② Close drain valve.
- ※ **Don't tighten up a drain valve so strong.**
- ※ **Please inspect and drain water frequently for remain water volume to be less than 1/3 volume of a collection bowl.**

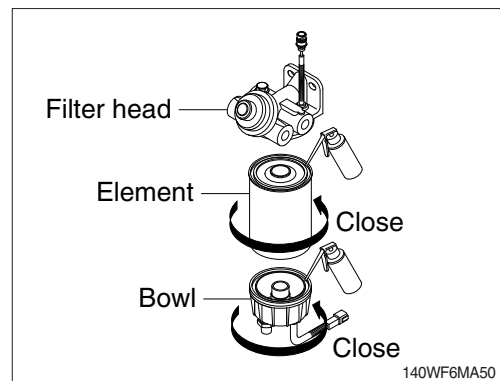


(2) Replace element

- ① Loosen the air vent plug and drain the unit of fuel. Follow "Drain water" instructions above.
- ② Remove element and bowl from filter head.
- ※ **The bowl is reusable, do not damage or discard.**
- ③ Separate element from bowl. Clean bowl and seal gland.

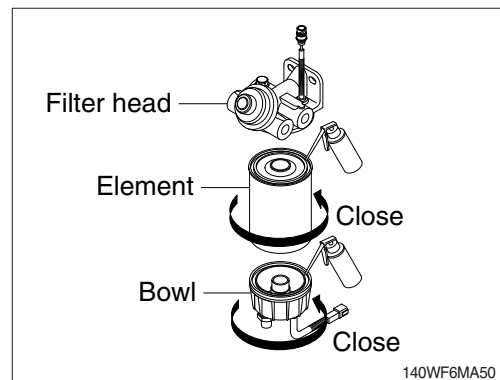


- ④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.
- ⑤ Attach bowl to new element firmly by hand.
- ⑥ Lubricate new element seal and place in element top gland.
- ⑦ Attach the element and bowl to the head.



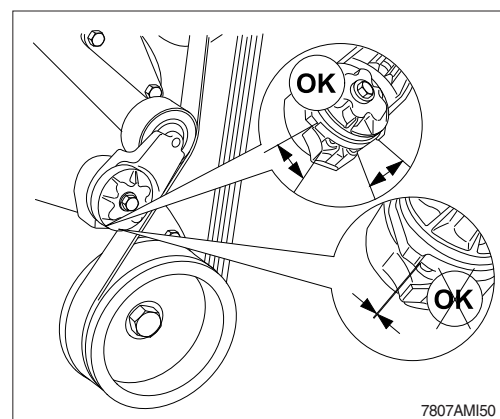
- ⑧ Do hand-priming the lift pump repeatedly until air bubbles comes out from air vent hole completely.
- ⑨ Tighten the air vent plug to its origin position.

▲ The fuel pump, high-pressure fuel lines, and fuel rail contain very high-pressure fuel. Do not loosen any fittings while the engine is running. Personal injury and property damage can result. Wait at least 10 minutes after shutting down the engine before loosening any fittings in the high-pressure fuel system to allow pressure to decrease to a lower level.

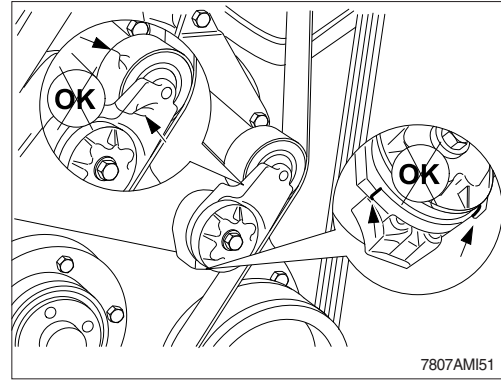


13)BELT TENSIONER, AUTOMATIC ADJUSTMENT

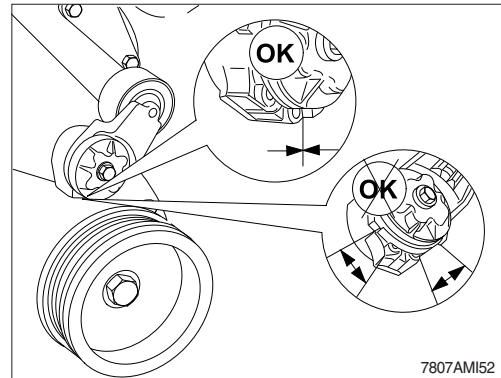
- (1) Every 1000hours, or 1 year, whichever occurs first, inspect the automatic belt tensioner. With the engine turned off, check that neither the top nor bottom tensioner arm stop is touching the cast boss on the tensioner body. If either of the stops is touching a boss, the alternator belt must be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



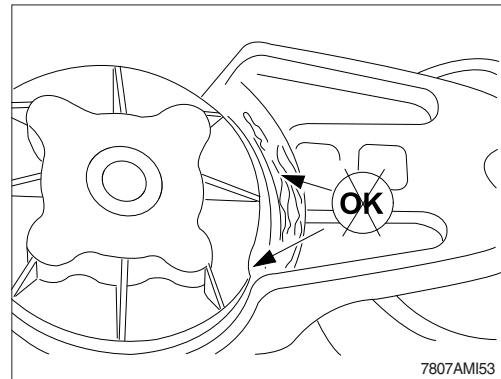
- (2) Check the tensioner pulley and body for cracks. If any cracks are noticed, the tensioner must be replaced. Refer to a Cummins Authorized Repair facility. Check the tensioner for dirt build-up. If this condition exists, the tensioner must be removed and steam-cleaned.



- (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.



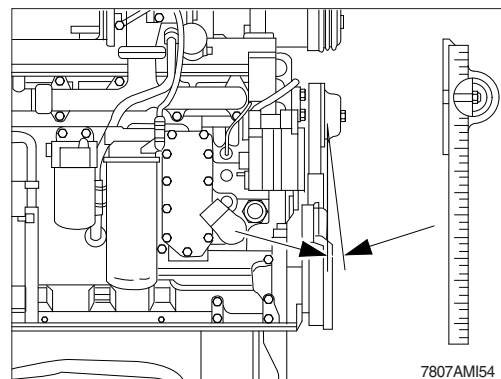
- (4) Inspect the tensioner for evidence of the pivoting tensioner arm contacting the stationary circular base. If there is evidence of these two areas touching, the pivot tube bushing has failed and the tensioner must be replaced.



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

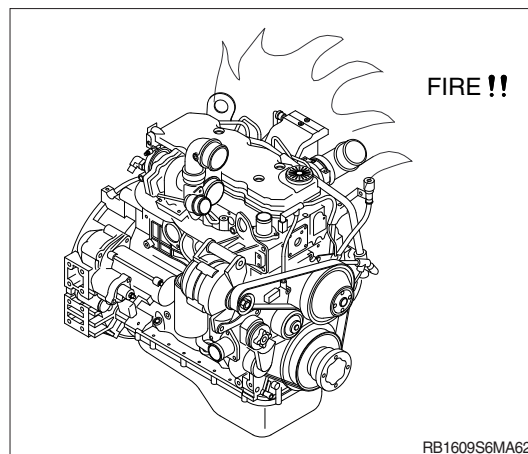
※ **Maximum pulley misalignment is three degrees. This measurement can be taken with a straightedge and an inclinometer.**

- (6) Install the belt.



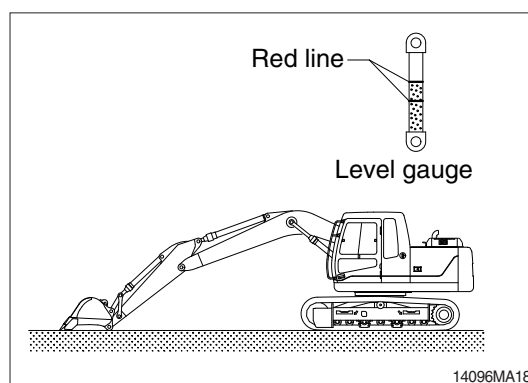
14) LEAKAGE OF FUEL

- ▲ Be careful and clean the fuel hose, injection pump, fuel filter and other connections as the leakage from these part can cause fire.



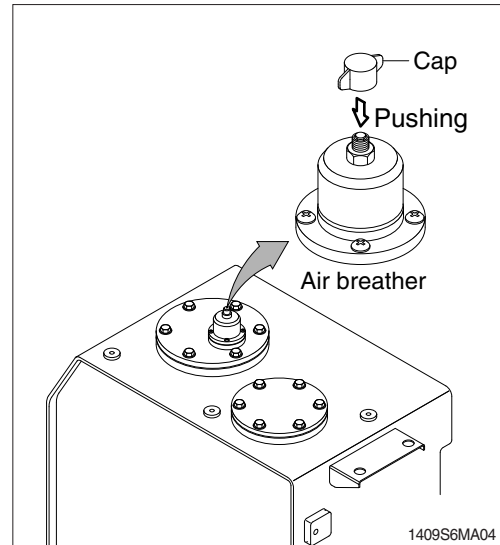
15) HYDRAULIC OIL CHECK

- (1) Stop the engine after retract the arm and bucket cylinders, then lower the boom and set the bucket on the ground at a flat location as in the illustration.
- (2) Check the oil level at the level gauge of hydraulic oil tank.
- (3) The oil level is normal if between the red lines.



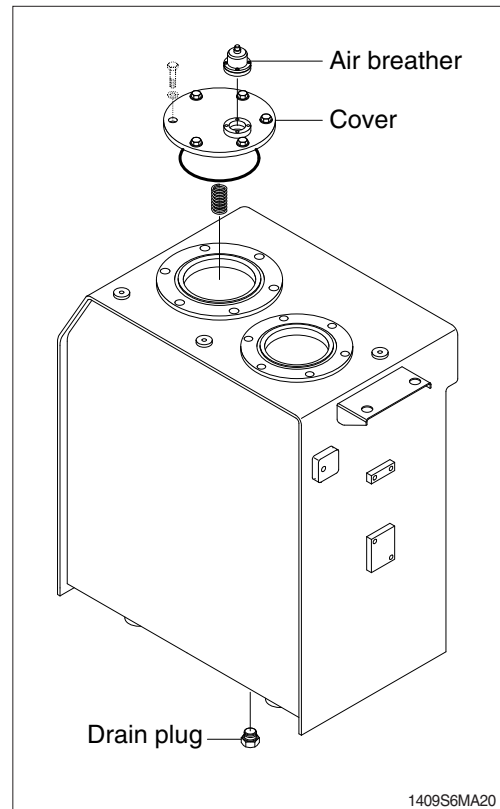
16) FILLING HYDRAULIC OIL

- (1) Stop the engine to the position of level check.
- (2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (3) Remove the breather on the top of oil tank and fill the oil to the specified level.
 - Tightening torque : $1.44 \pm 0.3 \text{ kgf} \cdot \text{m}$
($10.4 \pm 2.1 \text{ lbf} \cdot \text{ft}$)
- (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.



17) CHANGE HYDRAULIC OIL

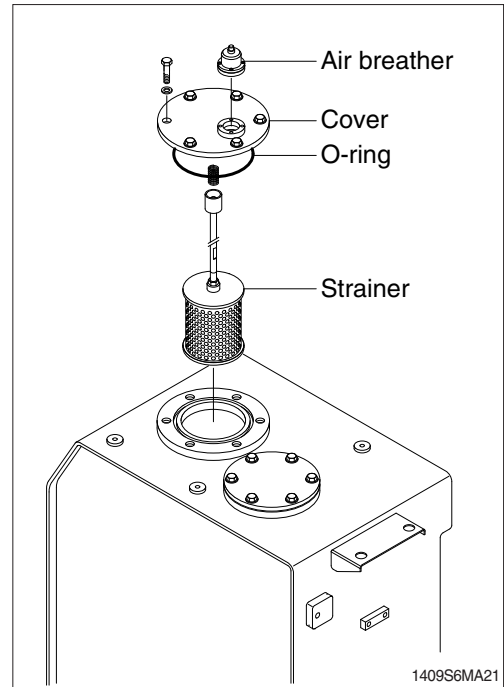
- (1) Lower the bucket on the ground pulling the arm and bucket cylinder to the maximum.
- (2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (3) Remove the cover.
 - Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)
- (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.



18) CLEAN SUCTION STRAINER

Clean suction strainer as follows paying attention to the cause to be kept during oil filling.

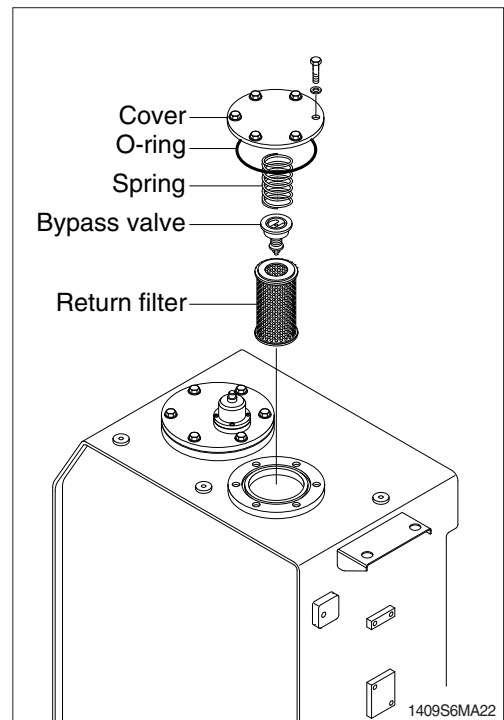
- (1) Remove the cover.
 - Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)
 - (2) Pull out the strainer in the tank.
 - (3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.
 - (4) Replace the suction strainer if it 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.



19) REPLACEMENT OF RETURN FILTER

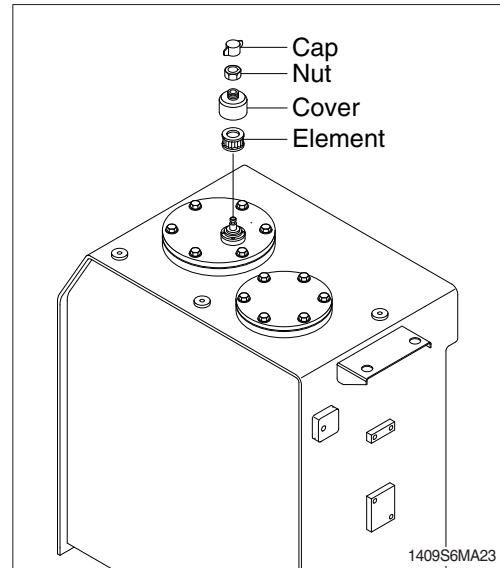
Replace as follows paying attention to the cause to be kept during the replacement.

- (1) Remove the cover.
 - Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($50 \pm 10 \text{ lbf} \cdot \text{ft}$)
- (2) Remove the spring, by-pass valve, and return filter in the tank.
- (3) Replace the element with new one.



20) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

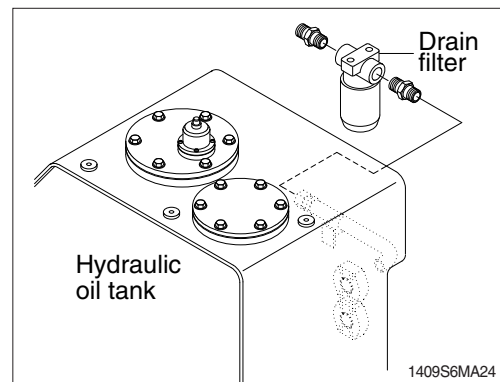
- (1) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (2) Loosen the lock nut and remove the cover.
- (3) Pull out the filter element.
- (4) Replace the filter element new one.
- (5) Reassemble by reverse order of disassembly.
 - Tightening torque : 0.2~0.3 kgf · m
(1.4~2.1 lbf · ft)



21) REPLACE OF DRAIN FILTER CARTRIDGE

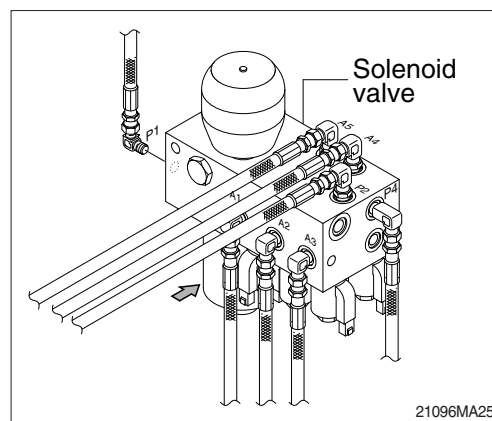
Clean the dust around filter and replace with new one after removing the cartridge.

- ※ 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.



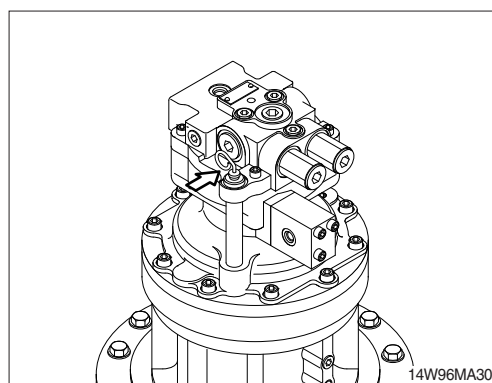
22) REPLACE OF PILOT LINE FILTER

- (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.**



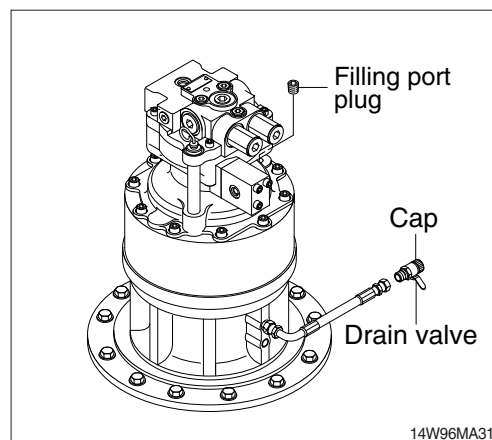
23) CHECK THE SWING REDUCTION GEAR OIL

- (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.



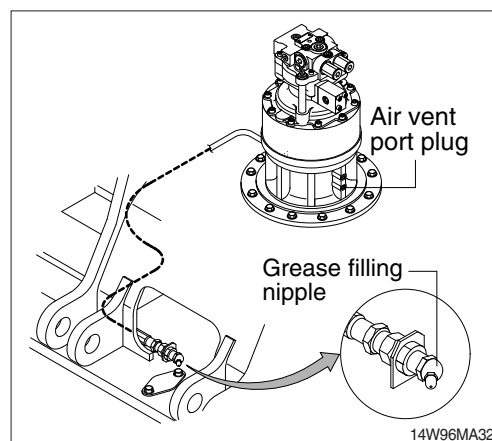
24) CHANGE SWING REDUCTION GEAR OIL

- (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) Remove the cap and open the drain valve.
- (4) Clean around the valve and close the drain valve and cap.
- (5) Fill proper amount of recommended oil.
 - Amount of oil : 2.5 ℓ (0.7 U.S.gal)



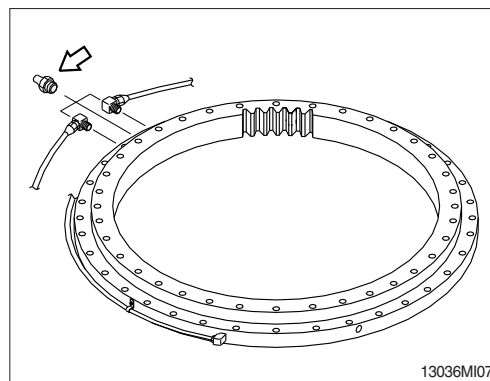
25) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

- (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 : 0.32 kg (0.7 lb)



26) LUBRICATE SWING BEARING

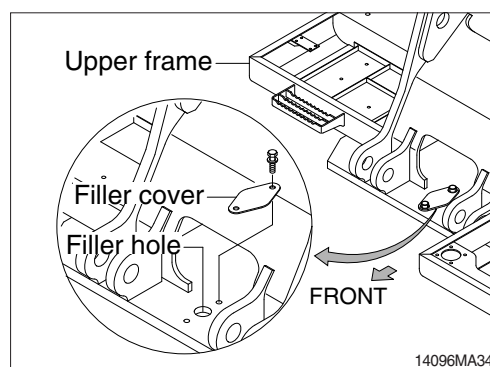
- (1) Grease at 3 fitting.
- ※ Lubricate every 250 hours.



27) SWING GEAR AND PINION

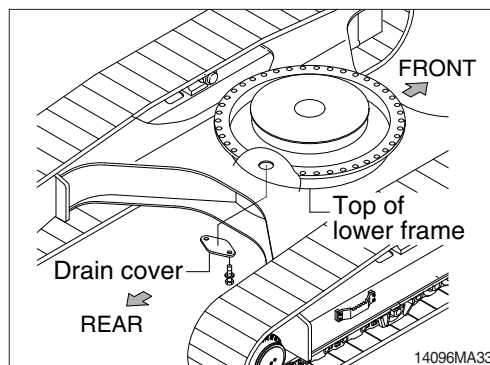
(1) Drain old grease

- 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.



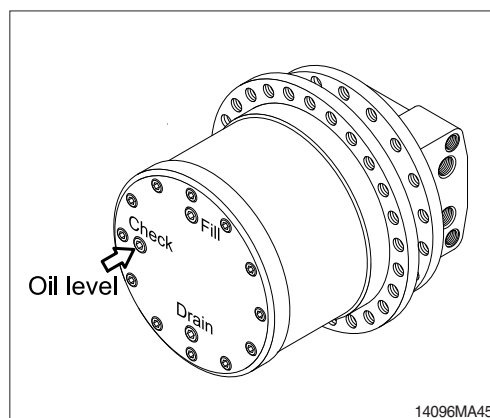
(2) Refill new grease

- ① Install drain cover.
 - ② Fill with new grease.
 - ③ Install filler cover.
- Capacity : 5.9 kg (13.1 lb)



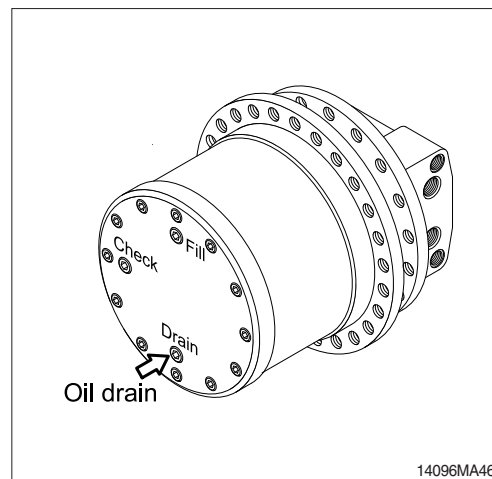
28) CHECK THE TRAVEL REDUCTION GEAR OIL

- (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 gear oil : 2.3 ℓ (0.6 U.S.gal)



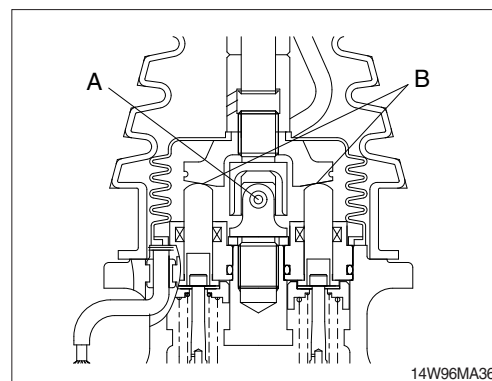
29) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

- (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.



30) LUBRICATE RCV LEVER

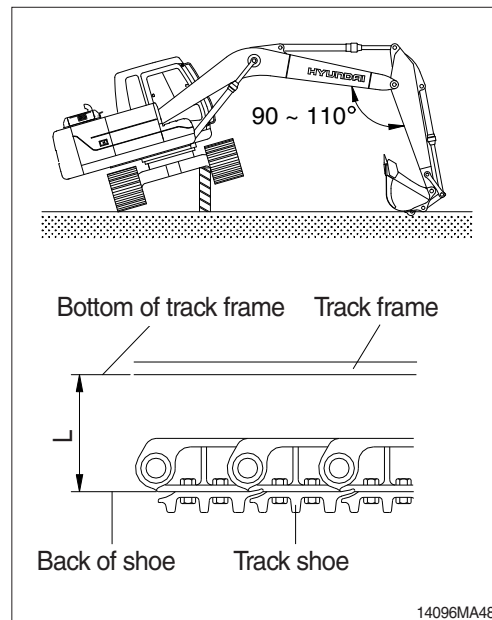
Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



31) 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 measuring.



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

▲ Personal injury or death can result from grease under pressure.

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

※ When the grease is drained, move the track to the forward and backward slightly.

If the track tension is loose even after the grease is charged to the maximum, change the pins and bushings as there are worn seriously.

| Length (L) | |
|------------|------------|
| 270~300 mm | 10.6~11.8" |

32) REPLACEMENT OF BUCKET

⚠ When knocking the pin in with a hammer, metal particles may fly and cause serious injury, particularly if they get into your eyes. When carrying out this operation, always wear goggles, helmet, gloves, and other protective equipment.

- ※ When the bucket is removed, place it in a stable condition.
- ※ When performing joint work, make sure signals to each other and work carefully for safety's sake.

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

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

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

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

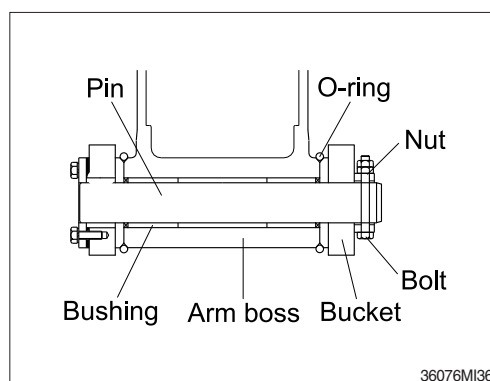
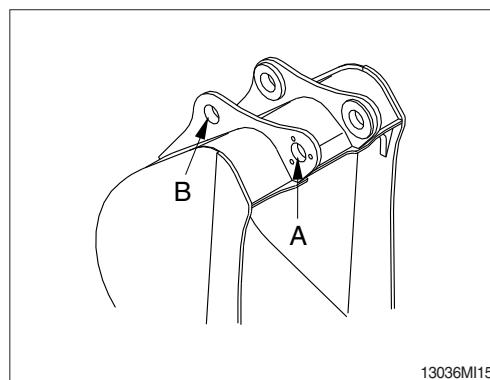
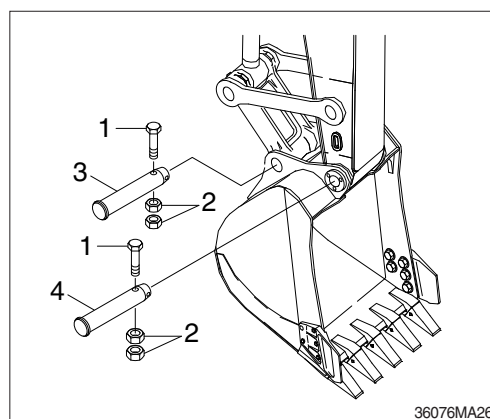
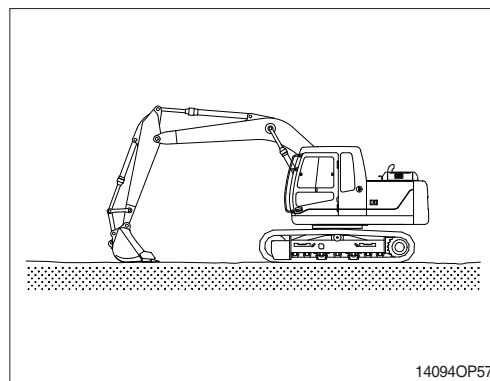
※ If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

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

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

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

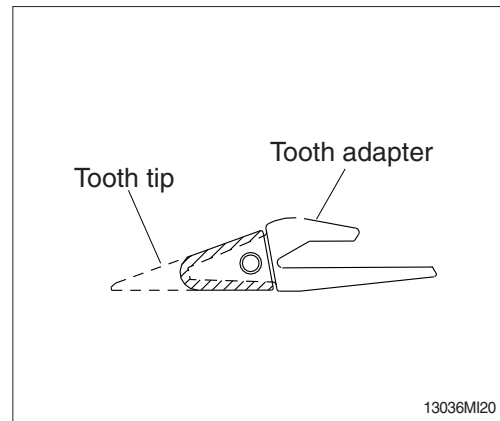
(5) Install the stopper bolt (1) and nuts (2) for each pin, then grease the pin.



33) 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.

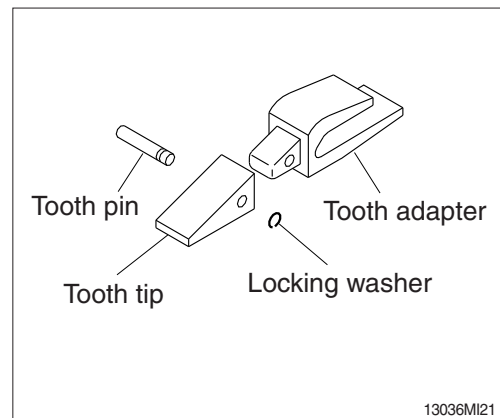


(2) Instructions for replacement

- 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.



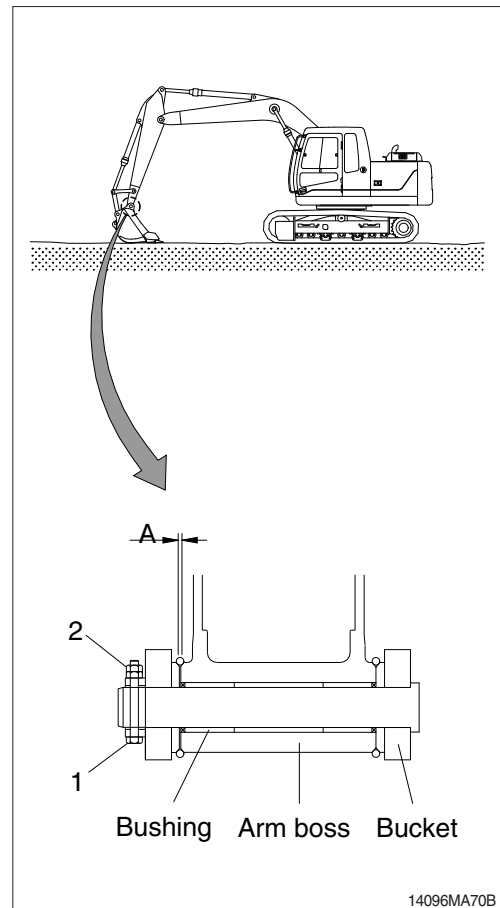
34) ADJUSTMENT OF BUCKET CLEARANCE

- (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 nut (2).
- ② Assemble the hard steel shim (0.5 t) when the gap (A) exceed 1.0 mm.

※ **Assemble hard steel shim in the gap between friction surfaces when inserting pins.**



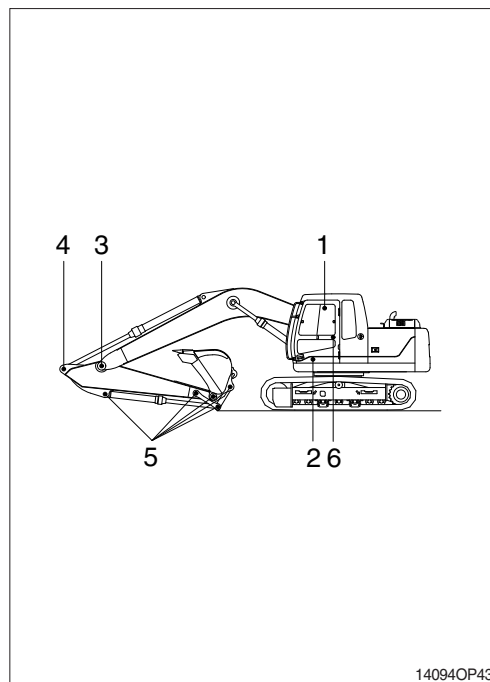
35) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device

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

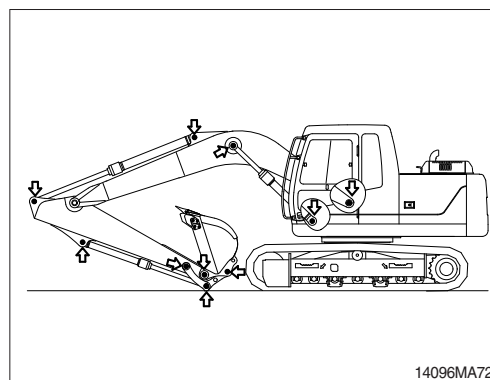
| No. | Description | Qty |
|-----|---|-----|
| 1 | Lubrication manifold at boom | 5 |
| 2 | Boom cylinder pin | 2 |
| 3 | Boom and arm connection pin | 1 |
| 4 | Arm cylinder pin (rod side) | 1 |
| 5 | Bucket cylinder pin (head side, rod side) | 2 |
| | Bucket link (control rod) | 3 |
| | Arm and control link connection pin | 1 |
| | Arm and bucket connection pin | 1 |
| 6 | Boom rear bearing center | 1 |

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



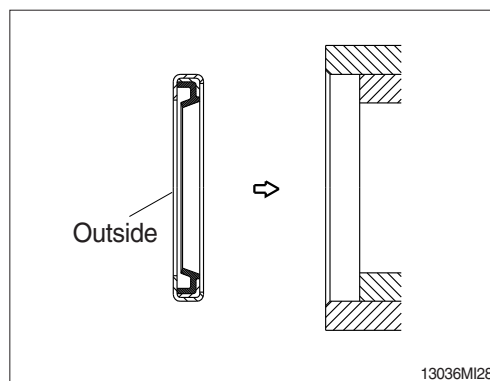
(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

※ Mount the lip to be faced outside when replace the dust seal.



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

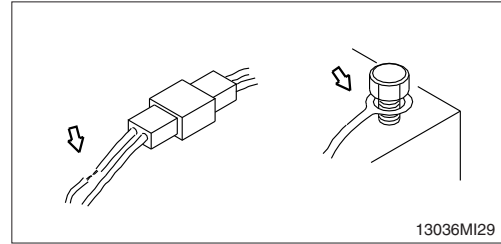
※ Assemble the seal same direction with picture and use with plastic hammer when replace.



7. ELECTRICAL SYSTEM

1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



2) BATTERY

(1) Clean

- ① Wash the terminal with hot water if it is contaminated, and apply grease to the terminals after washing.

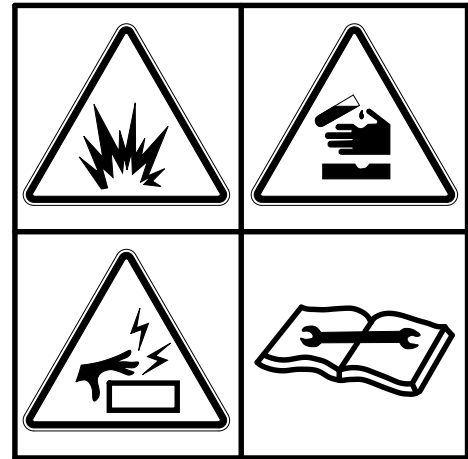
⚠ Battery gas can explode. Keep sparks and flames away from batteries.

⚠ Always wear protective glasses when working with batteries.

⚠ Do not stain clothes or skin with electrolyte as it is acid.

Be careful not to get the electrolyte in eyes.

Wash with clean water and go to the doctor if it enters the eyes.



(2) Recycle

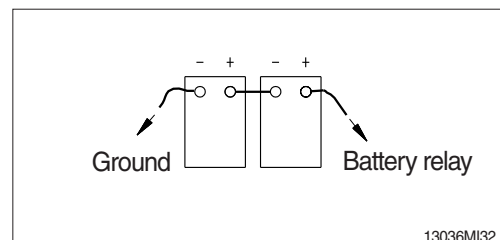
Never discard a battery.

Always return used batteries to one of the following locations.

- A battery supplier
- An authorized battery collection facility
- Recycling facility

(3) Method of removing the battery cable

Remove the cable from the ground connection first (⊖ terminal side) and reconnect it last when reassembling.



3) STARTING THE ENGINE WITH A BOOSTER CABLE

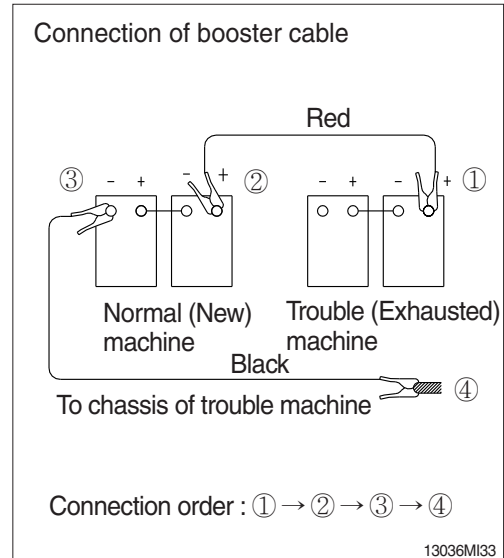
Keep following order when you are going to start engine using booster cable.

(1) Connection of booster cable

※ **Use the same capacity of battery for starting.**

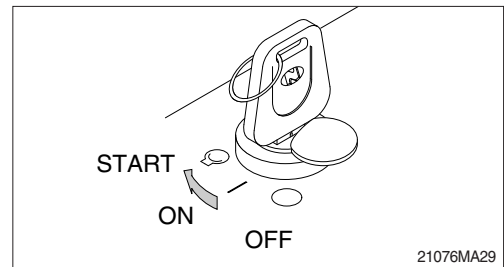
- ① Make sure that the starting switches of the normal machine and trouble machine are both at the OFF position.
- ② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.
- ③ Connect the black terminal of the booster cable between new battery (-) terminal and chassis of trouble machine.

※ **Keep firmly all connection, the spark will be caused when connecting finally.**



(2) Starting the engine

- ① Starting the engine of the normal machine and keep it to run at high idle.
- ② Start engine of the trouble machine with starting switch.
- ③ If you can not start it by one time, restart the engine after 2 minutes.



(3) Taking off the booster cable

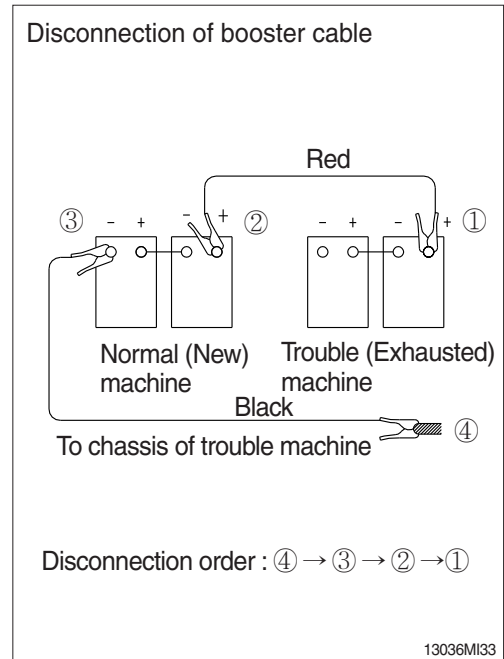
- ① Take off the booster cable (black).
- ② Take off the booster cable (red) connected to the (+) terminal.
- ③ Run engine with high idle until charging the exhausted battery by alternator, fully.

▲ **Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.**

※ **Charge the battery in the well ventilated place.**

※ **Place the machine on the earth or concrete. Avoid charging the machine on the steel plate.**

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



(4) Welding repair

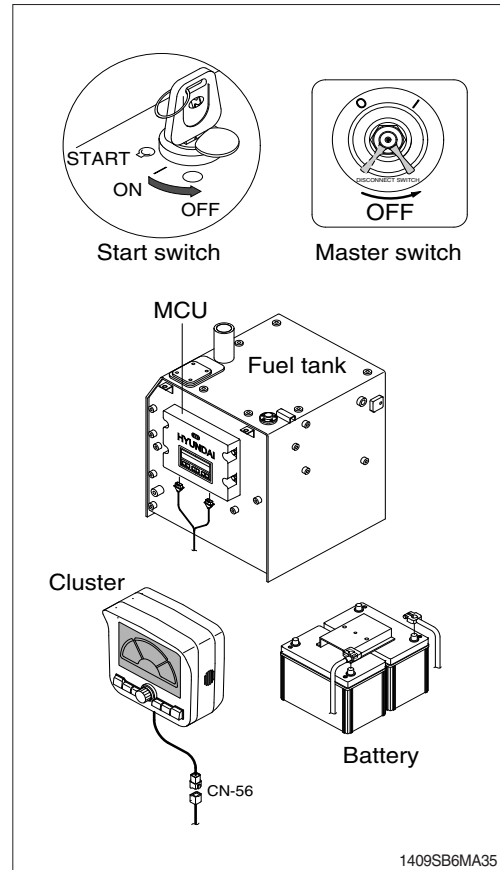
Before start to welding, follow the below procedure.

- ① Shut off the engine and remove the starting switch.
- ② Disconnect ground cable from battery by master switch.
- ③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (MCU, 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.



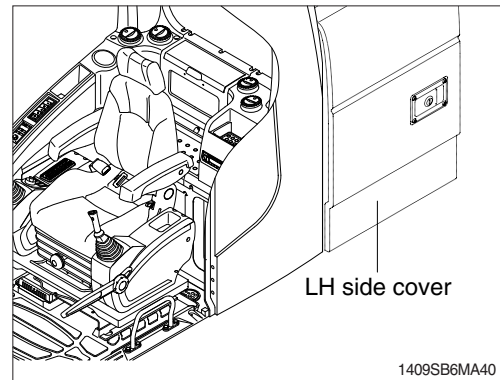
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8. AIR CONDITIONER AND HEATER

1) CLEAN AND REPLACE OF FRESH AIR FILTER

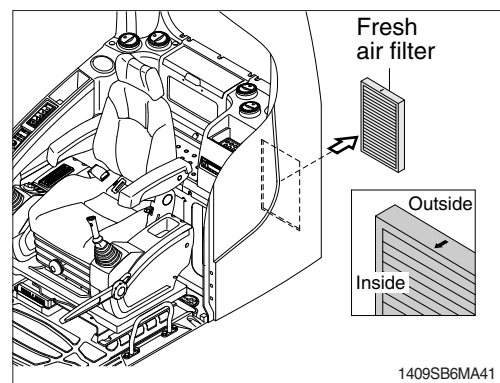
※ **Always stop the engine before servicing.**

- (1) Open the LH side cover.



- (2) Remove the fresh air filter.

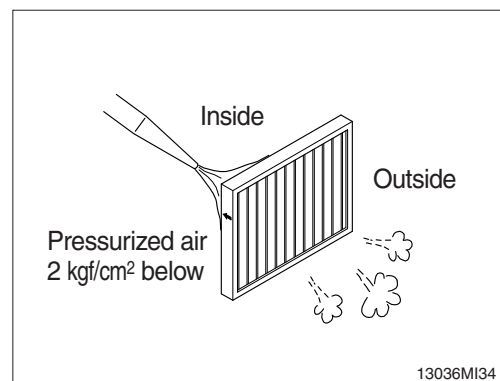
※ **When installing a filter, be careful not to change the filter direction.**



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

△ **When using pressurized air, be sure to wear safety glasses.**

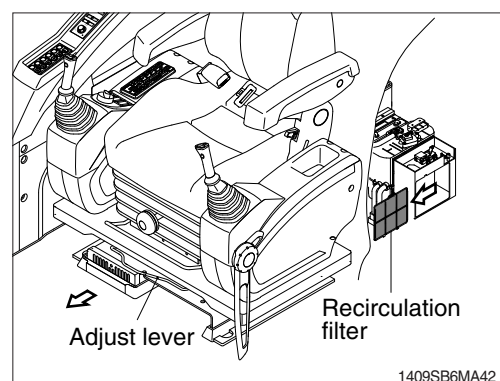
- (4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



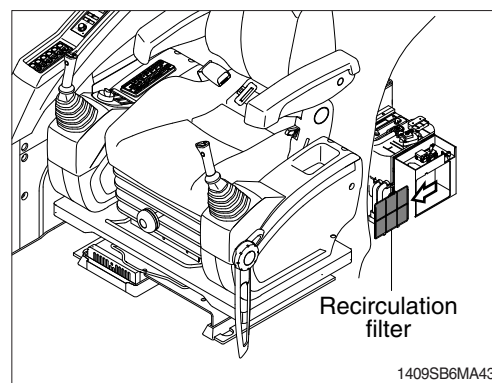
2) CLEAN AND REPLACE OF RECIRCULATION FILTER

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

- (1) Move seat and console box to arrow direction using the adjust lever.



- (2) Remove recirculation filter.

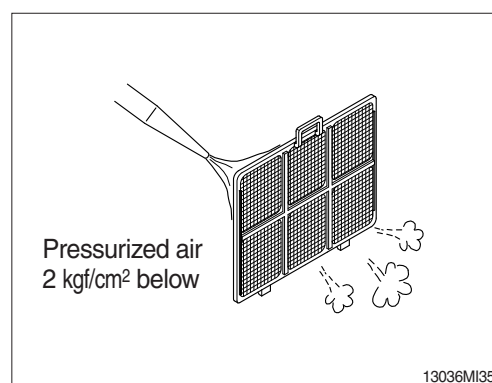


- (3) Clean the recirculation filter using a pressurized air (below 2 kgf/cm², 28 psi) or washing with water.

△ 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 amount : 750 ± 20 g

TROUBLESHOOTING GUIDE

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. | <ul style="list-style-type: none"> · 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. | <ul style="list-style-type: none"> · 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. | <ul style="list-style-type: none"> · Add fuel. · Repair where air is leaking into fuel system. · Check the injection pump or the nozzle. · Check the valve clearance. · Check engine compression pressure. · In cold weather, check if fuel warmer system is working normal. | Refer to the pages 3-8, 3-23 and 4-4 |
| Exhaust gas is white or blue. | <ul style="list-style-type: none"> · Adjust to specified oil quantity. · Replace with specified fuel. | |
| Exhaust gas occasionally turns black. | <ul style="list-style-type: none"> · 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. | <ul style="list-style-type: none"> · Check the nozzle. | |
| Unusual combustion noise or mechanical noise. | <ul style="list-style-type: none"> · 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. | <ul style="list-style-type: none"> · 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. | <ul style="list-style-type: none"> · Check the alternator. · Check and repair wiring. | |
| Unusual noise is emitted from the alternator. | <ul style="list-style-type: none"> · Check the alternator. | |
| Starting motor does not turn when starting switch is turned ON. | <ul style="list-style-type: none"> · 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. | <ul style="list-style-type: none"> · Charge the battery. · Check the safety relay. | |
| Starting motor turns the engine sluggishly. | <ul style="list-style-type: none"> · Charge the battery. · Check the starting motor. | |
| The starting motor disengages before the engine starts up. | <ul style="list-style-type: none"> · Check and repair the wiring. · Charge the battery. | |
| The engine warming up lamp does not go ON. | <ul style="list-style-type: none"> · 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.) | <ul style="list-style-type: none"> · 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.) | <ul style="list-style-type: none"> · Check the monitor. · Check and repair the wiring. | |

3. OTHERS

| Trouble | Service | Remark |
|---|--|--------|
| Track slip out of place. Excessive wear of the sprocket. | · Adjust tension of track. | |
| Bucket either rises slowly or not at all. | · Add oil to specified level. | |
| Slow speed of travel, swing, boom, arm and bucket. | · Add oil to specified level. | |
| Unusual noise emitted from pump. | · Clean the hydraulic tank strainer. | |
| Excessive oil temperature rise of hydraulic oil. | · Clean the oil cooler. · Adjust fan belt tension. · Add oil to specified level. | |

HYDRAULIC BREAKER AND QUICK CLAMP

1. SELECTING HYDRAULIC BREAKER

- 1) Become familiar with the manual and select breakers suitable to machine specifications.
- 2) Make careful selection in consideration of oil quantity, pressure and striking force, to enable satisfied performance.
- 3) When apply a breaker to the machine, consult your local dealer of Hyundai for further explanation.

2. CIRCUIT CONFIGURATION

- 1) As for breaker oil pressure line, use extra spool of main control valve.
- 2) Set proper breaker pressure on load relief valve.
※ The initial setting pressure of load relief valve for breaker is 200 bar.
- 3) The pressure of the ROBEX150LC-9 system is 350 kgf/cm² (4980 psi).

4) Adjusting oil quantity

- (1) Use the breaker mode from work tool of cluster.
Use select switch to control the oil flow quantity.
 - Setting oil quantity (100 lpm)

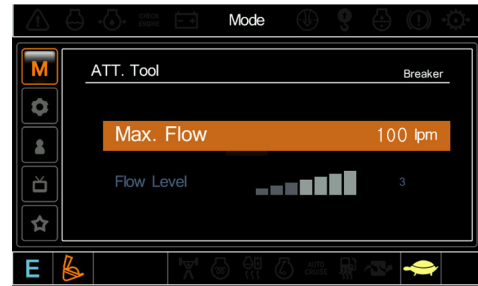
Flow set

- 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.

- (2) If the quantity of hydraulic oil is not controlled properly, it causes short lifecycle of the breaker and the machine by increased breaking force and count.

- 5) The accumulator should be used to the breaker charging and return line.
If the accumulator is not used, it will be damage as the input wave is delivered.
※ **Keep the pressure pulsation of pump below 60 kgf/cm² (853 psi) by installing the accumulator.**
- 6) Do not connect the breaker return line to the main control, but connect to the return line front of the cooler.
- 7) Do not connect the breaker return line to drain lines, such as of swing motor, travel motor or pump, otherwise they should be damaged.
- 8) One of spool of the main control valve should be connected to the tank.
- 9) Select the size of pipe laying considering the back pressure.
- 10) Shimless tube should be used for the piping. The hose and seal should be used Hyundai genuine parts.
- 11) Weld the bracket for pipe clamp to prevent damage caused by vibration.

Oil quantity setting



3. MAINTENANCE

1) MAINTENANCE OF HYDRAULIC OIL AND FILTER

- (1) As machine with an hydraulic breaker provides the hydraulic oil becomes severely contaminated.
- (2) So, unless frequently maintained, the machine may easily go out of order.
- (3) Inspect and maintain hydraulic oil and 4 kinds of filter elements in particular, in order to prolong machine life.

2) RELEASE THE PRESSURE IN BREAKER CIRCUIT

When breaker operating is finished, stop engine and push pedal or switch for breaker to release pressure in breaker circuit.

If pressure still remains, the lifetime of the diaphragm in the accumulator will be shortened.

- 3) Be careful to prevent contamination by dust, sand and etc.
If such pollution become mixed into the oil, the pump moving parts will wear abnormally, shorten lifetime and become damaged.
- 4) When operating breaker, bolts and nuts of main equipment may be loosened by vibration. So, it must be inspected periodically.

Service interval

unit : hours

| Attachment | Operating rate | Hydraulic oil | Filter element |
|------------|----------------|--------------------|----------------|
| Breaker | 100 % | 600* ¹ | 200 |
| | | 1000* ² | |

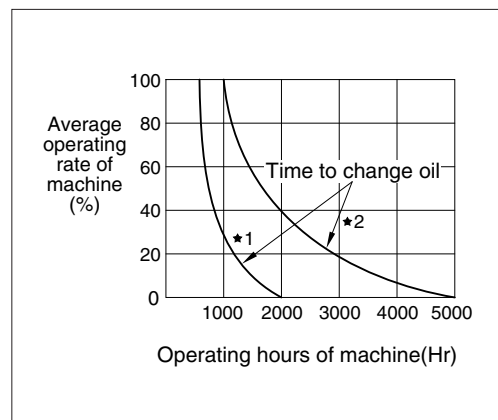
*¹: Conventional hydraulic oil

*²: Hyundai genuine long life hydraulic oil

● Replace following filter same time

- Hydraulic return filter : 1 EA
- Pilot line filter : 1 EA
- Drain filter cartridge : 1 EA

Hyd oil change guide for hydraulic breaker



*¹: Conventional hydraulic oil

*²: Hyundai genuine long life hydraulic oil

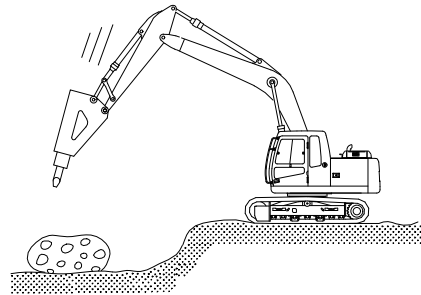
4. PRECAUTIONS WHILE OPERATING THE BREAKER

1) DO NOT BREAK ROCK WHILE LOWERING

As the breaker is heavy in comparison with bucket, it must be operated slowly.

If breaker is rapidly pushed down, working device may be damaged.

Incorrect

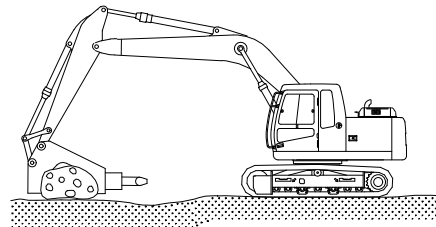


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2) DO NOT USE BREAKER TO CARRY BROKEN STONE OR ROCK BY SWING OPERATING

This may damage the operation device and swing system.

Incorrect

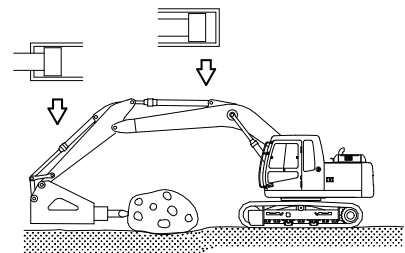


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3) OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

If breaker is operated with the end tip, the cylinder may be damaged.

Incorrect

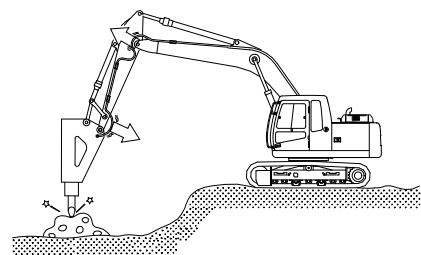


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4) IF THE HYDRAULIC HOSES VIBRATE EXCESSIVELY

If the machine used in this condition continuously this will effect badly on the machine such as loosening bolt, oil leakage, damage of pump pipe and etc.

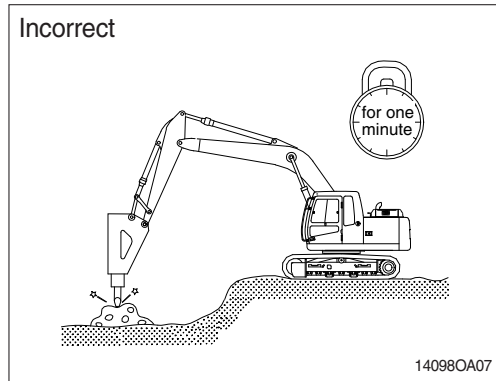
Incorrect



14098OA06

5) DO NOT CONTINUE TO WORKING OVER ONE MINUTE AT SAME POSITION OF BOOM AND ARM

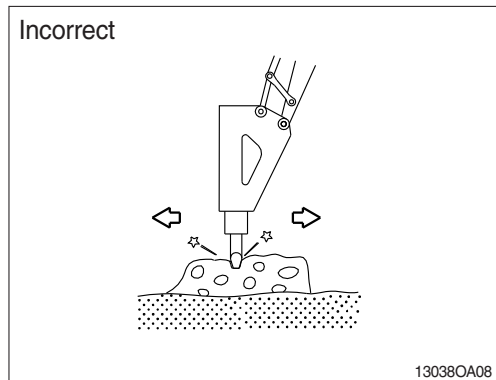
This will increase the temperature of the oil, and cause problem in the accumulator and seals.



6) DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING

Do not move hammer while striking.

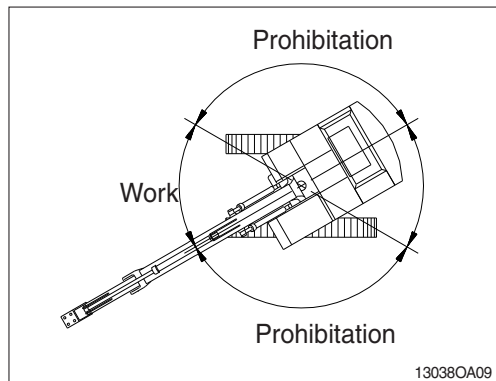
This will cause damage to the working device and the swing system.



7) DO NOT WORK WHILE SWING STATE

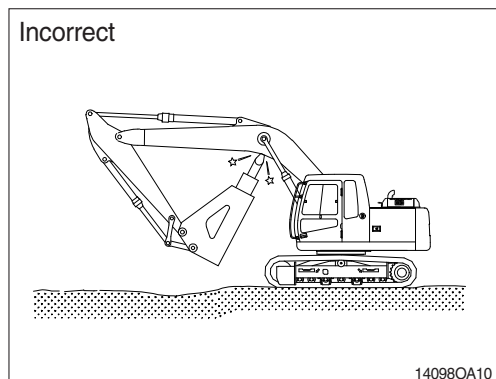
Do not work while swing position of superstructure.

It cause the band of track shoe, oil leakage of roller.



8) TAKE CARE OF CHISEL AND BOOM INTERFACE

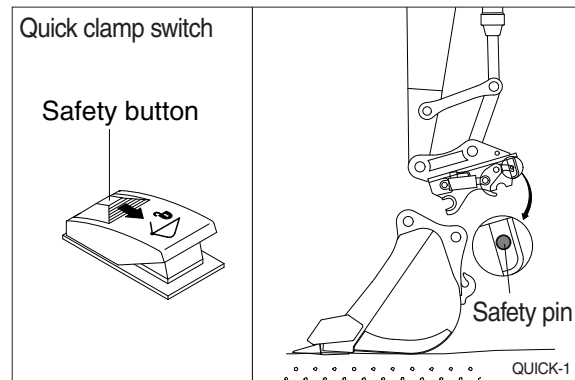
Make sure of the arm and bucket control lever operation.



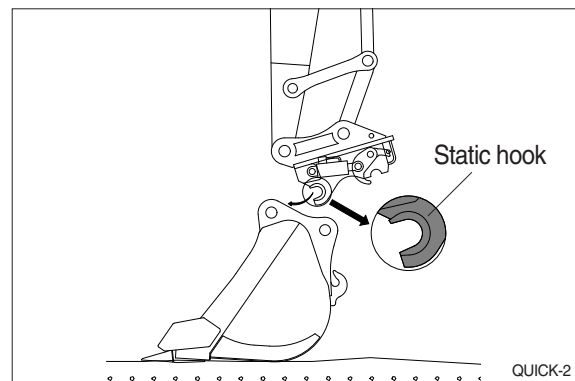
5. QUICK CLAMP

1) FIXING BUCKET WITH QUICK CLAMP

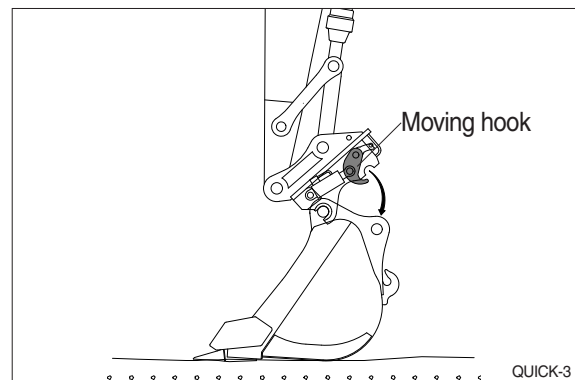
- (1) Before fixing bucket, remove safety pin of the moving hook.
- (2) Pulling safety button, press the quick clamp switch to unlock position. Then, the moving hook is placed on release position.



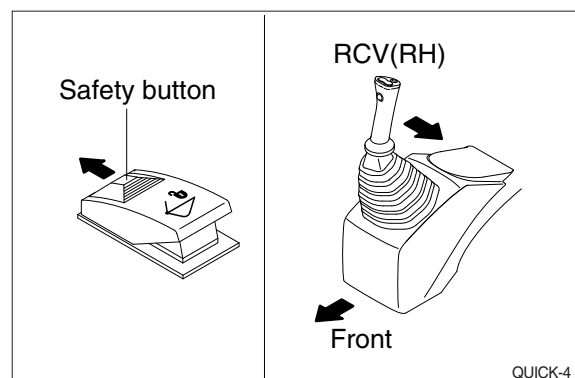
- (3) Aligning the arm and bucket, insert static hook of quick clamp to the bucket pin.



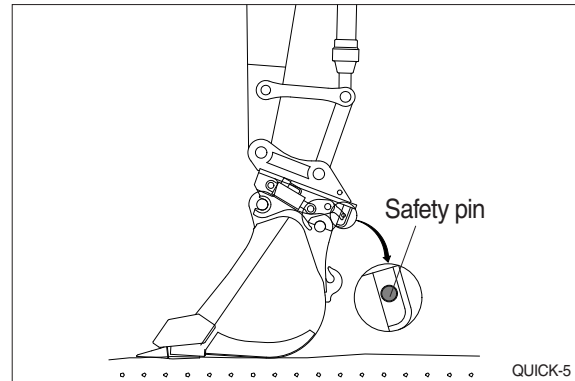
- (4) Operate RCV lever to bucket-in position. Then, the moving hook is coupled with the bucket link pin. Make sure that the moving hook is completely contacted with bucket link pin.



- (5) Push safety button to lock position. Operate RCV lever to bucket-in position.
- ※ **Be sure to check connection status between bucket pins and hooks of quick clamp.**



- (6) After checking the connection status between bucket pins and hooks of quick clamp, **insert safety pin of moving hook to lock position.**



2) REMOVE BUCKET FROM QUICK CLAMP

Removing procedure is reverse of fixing.

3) PRECAUTION OF USING QUICK CLAMP

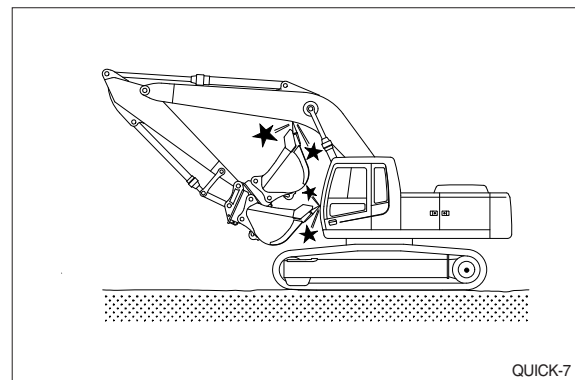
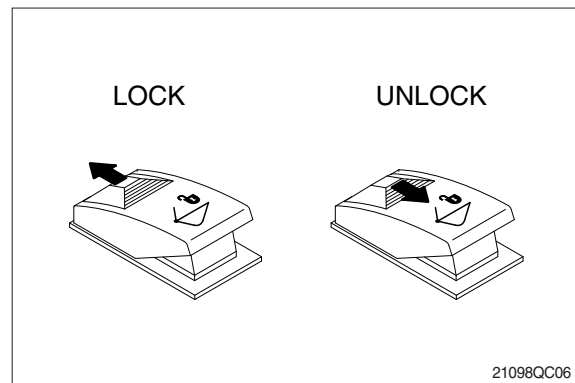
- ⚠ When operating the machine with quick clamp, confirm that the quick clamp switch is lock position and safety pin of moving hook is inserted.

Operating the machine with quick clamp switch unlocked and without safety pin of moving hook can cause the bucket to drop off and bring about the accident.

- ⚠ Serious injury or death can result from this accident.

- ⚠ Be careful to operate the machine equipped with quick clamp. The bucket may hit cab, boom and boom cylinders when it reaches vicinity of them.

HYUNDAI will not be responsible for any injury or damage in case that safety pin is not installed properly.



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