HYDRAULIC EXCAVATOR

# OPERATOR'S MANUAL

Robex

# 140LS

HYUNDAI

# CONTENTS

# FOREWORD

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

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

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

This machine complies with EC directive "98/37/EEC".

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.

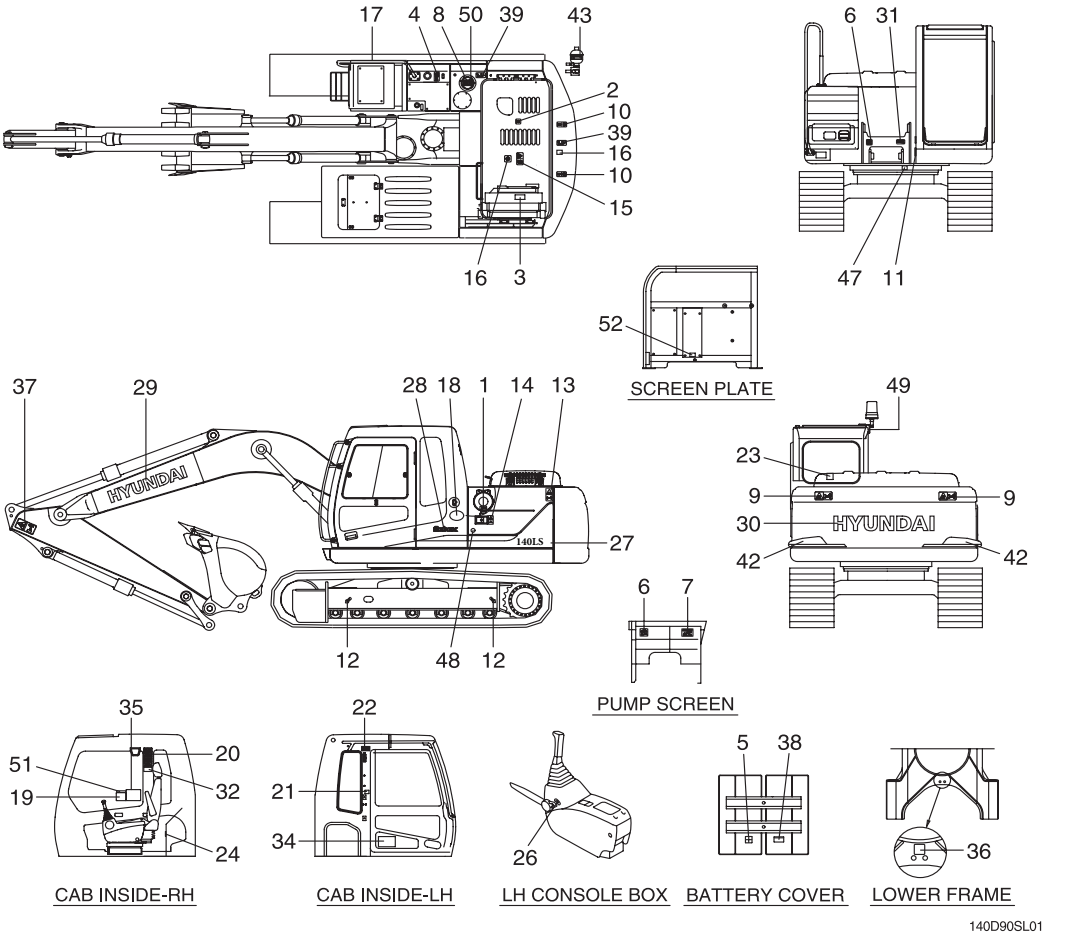
## TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

| | |
|---|---|
| Machine Serial No. | |
| Engine Serial No. | |
| Manufacturing year | |
| Manufacturer<br>Address | Hyundai Construction Equipment India Pvt., Ltd.<br>Plot No. A-2, Chakan industrial area, Vill.<br>Khalumbre, Talut-Khed., Dist.<br>Pune 410 510, India |

# SAFETY LABELS

## 1. LOCATION

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




140D90SL01

| | | | | | |
|---|---|---|---|---|---|
| 1 | Air cleaner filter | 16 | No step-engine hood and CWT | 32 | Clamp-locking |
| 2 | Turbocharger cover | 17 | Transporting | 34 | Service instruction |
| 3 | Radiator cap | 18 | Low emission engine | 35 | Lifting chart |
| 4 | Fueling | 19 | Control ideogram | 36 | Tie |
| 5 | Battery accident | 20 | Ref operator manual-cab RH pillar | 37 | Keep clear-boom/arm |
| 6 | High pressure hose | 21 | Hammer | 38 | Electric welding |
| 7 | Hydraulic oil level | 22 | Safety front window | 39 | Falling |
| 8 | Hydraulic oil lub | 23 | Safety rear window | 42 | Reflecting |
| 9 | Keep clear-rear | 24 | Air conditioner filter | 43 | Accumulator |
| 10 | Lifting eye | 26 | Safety lever | 47 | Swing bearing |
| 11 | Name plate | 27 | Model name | 48 | Battery position |
| 12 | Slinging ideogram | 28 | Logo (ROBEX) | 49 | Beacom lamp |
| 13 | Keep clear-side | 29 | Trade mark (boom) | 50 | Fuel shut off |
| 14 | Stay fix | 30 | Trade mark (CWT) | 51 | Caution (water separator) |
| 15 | Shearing-engine hood | 31 | Reduction gear grease | 52 | MCU connector |

## 2. DESCRIPTION

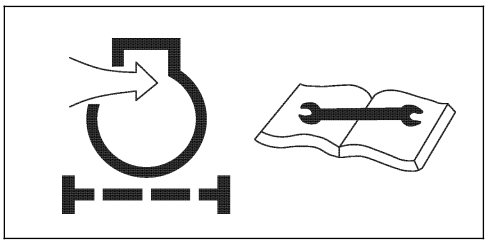
There are several specific warning labels on this machine please become familiarized with all warning labels.

Replace any safety label that is damaged, or missing.

1) AIR CLEANER FILTER (item 1)

This warning label is positioned on the air cleaner cover.

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

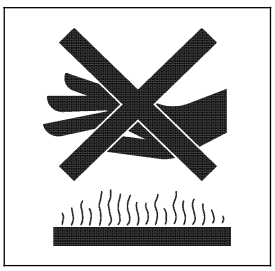


21070FW01

2) TURBOCHARGER COVER (item 2)

This warning label is positioned on the turbocharger cover.

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

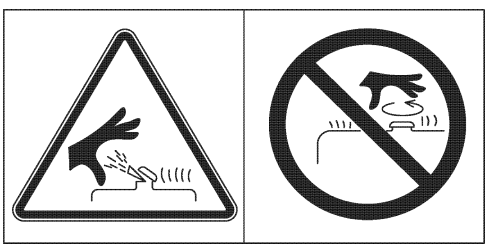


21070FW02

3) RADIATOR CAP (item 3)

This warning label is positioned on the radiator.

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

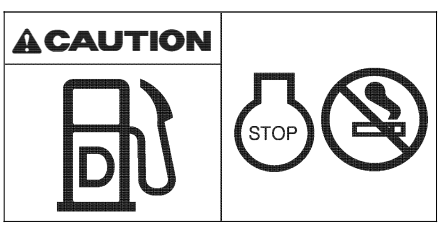


14070FW03

4) FUELING (item 4)

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

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




21070FW04

**5)** BATTERY ACCIDENT (item 5)

This warning label is positioned on the battery cover.

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

※ Maintain the electrolyte at the recommended level.

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.

140D90FW05

6) HIGH PRESSURE HOSE (item 6)

These warning labels are positioned in the front of upper frame and on the screen plate.

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

※ Study the service manual before service job.

140D90FW29

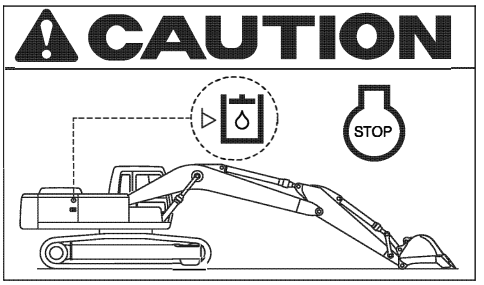
7) HYDRAULIC OIL LEVEL (item 7)

This warning label is positioned on the screen plate.

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

※ Check oil level on the level gauge.

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




21070FW07

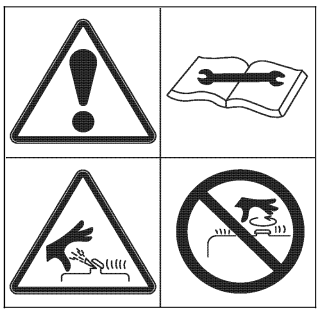
8) HYDRAULIC OIL LUBRICATION (item 8)

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

※ Do not mix with different brand oils.

⚠ Never open the filler cap while high temperature.

⚠ Loosen the cap slowly and release internal pressure completely.



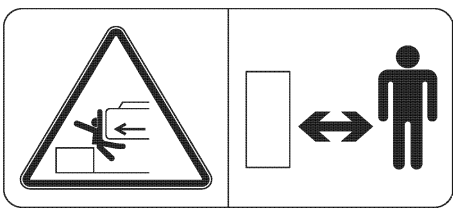
14070FW08

9) REAR KEEP CLEAR (item 9)

This warning label is positioned on the rear of counterweight.

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

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



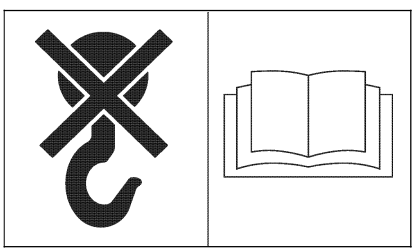
21090FW09

10) LIFTING EYE (item 10)

This warning label is positioned on the counterweight.

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

※ See page 5-8 for proper lifting method of the machine.



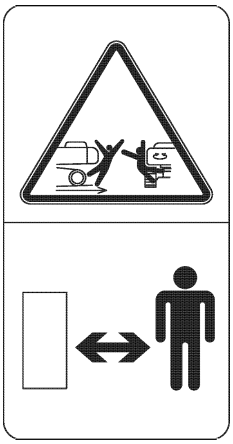
21070FW10

11) SIDE KEEP CLEAR (item 13)

This warning label is positioned on the LH 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.



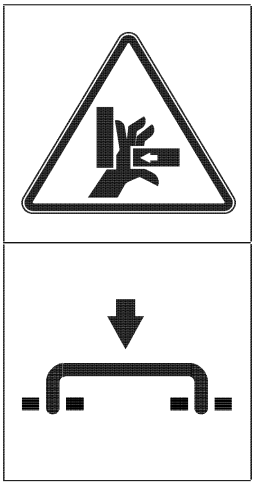
21070FW13

12) STAY FIX (item 14)

This warning label is positioned on the both side cover.

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

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



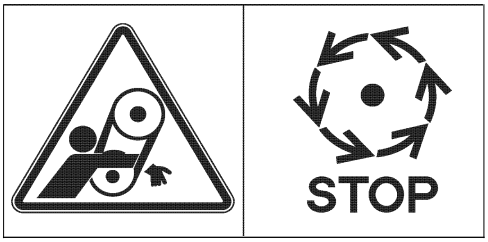
21070FW14

13) SHEARING-ENGINE HOOD (item 15)

This warning label is positioned on the engine hood.

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

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




21070FW15

14) NO STEP-ENGINE HOOD/CWT (item 16)

These warning labels are positioned on the engine hood and counterweight.

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

140D90FW16

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 5-7 for details.


14070FW17

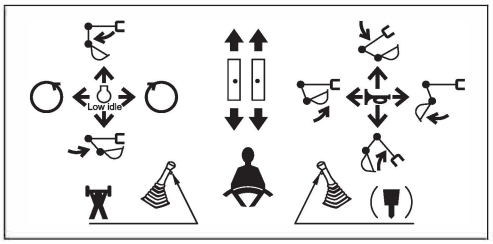
16) CONTROL IDEOGRAM (item 19)

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

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

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

See page 4-11 for details.

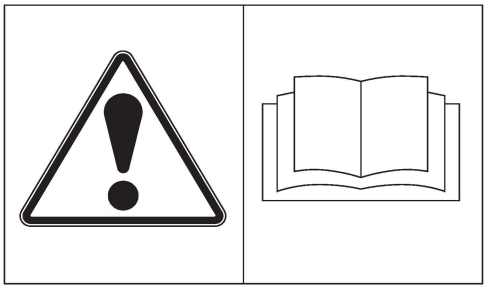



36070FW19

17) REF OPERATOR MANUAL (item 20)

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

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



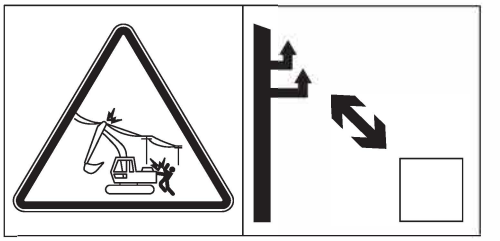
21070FW22

18) MAX HEIGHT (item 20)

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

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

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



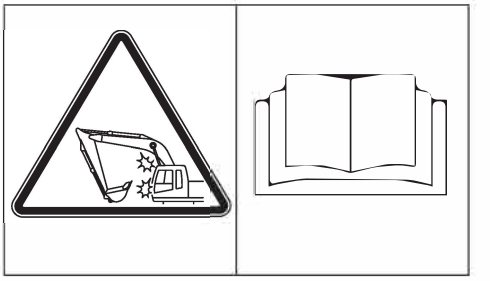
21070FW23

19) INTERFERENCE (item 20)

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

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

⚠ Bucket may hit cab or boom, boom cylinders when it reached vicinity of them.

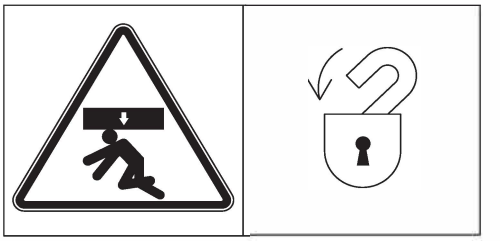


21090FW62

20) SAFETY FRONT WINDOW (item 22)

This warning label is positioned on the left side of the cab.

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



21070FW24

21) SAFETY REAR WINDOW (item 23)

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

※ The rear window serves us an alternate exit.

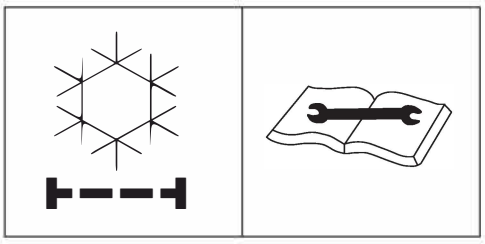
※ To remove rear window, pull the ring and push out the glass.

2609A0SL02

22) 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.

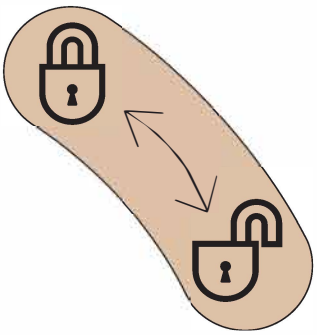


21070FW26

23) SAFETY LEVER (item 26)

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

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

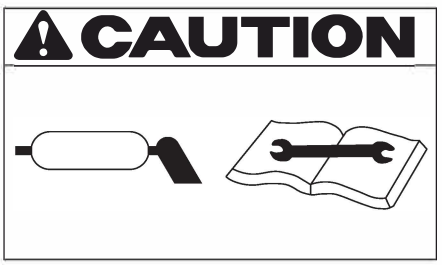


30007A1FW07A

24) REDUCTION GEAR GREASE (item 31)

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

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



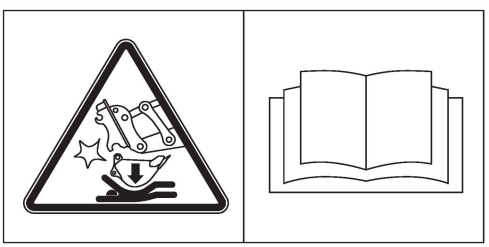

21070FW35

25) 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.



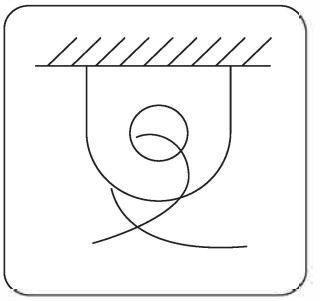
14070FW60

26) TIE (item 36)

This warning label is positioned on the lower frame.

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

⚠ See page 4-14 for detail.



4507A0FW02

27) 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

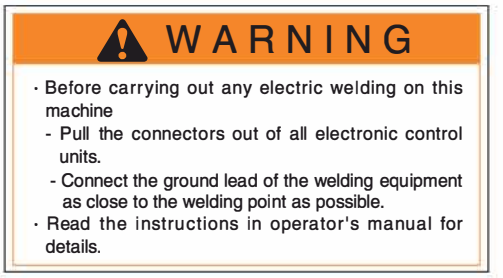
28) ELECTRIC WELDING (item 38)

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 6-40 for detail.




7807AFW20

29) FALLING (item 39)

These warning labels are positioned on the top of the hydraulic tank and counterweight.

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

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

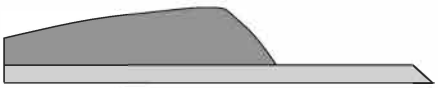
14070FW30

30) REFLECTING (item 42)

This warning label is positioned on the rear of counterweight.

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

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



21090FW70

31) ACCUMULATOR (item 43)

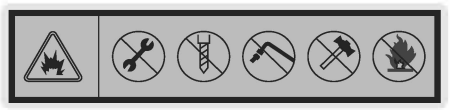
This warning label is positioned on the accumulator of the solenoid valve.

※ 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.

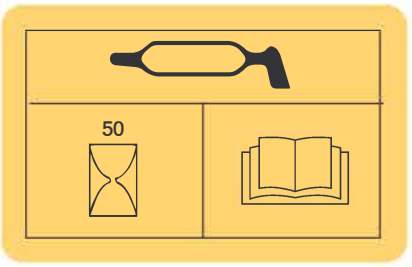


1107A0FW46

32) SWING BEARING (item 47)

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

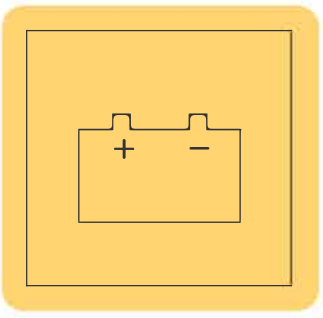
※ See page 6-32 for details.




38090FW02

33) BATTERY POSITION (item 48)

This warning label is positioned left side of LH side cover.




38090FW03

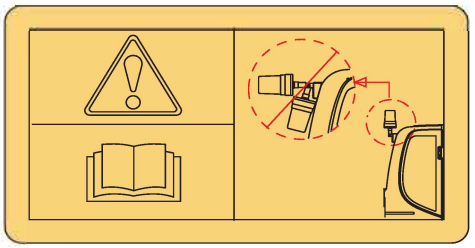
34) BEACON LAMP (item 49)

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.



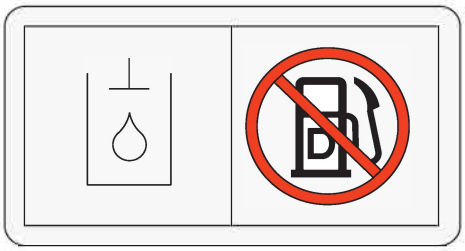
140Z90FW49

35) FUEL SHUT OFF (item 50)

This warning label is positioned on the hydraulic tank.

※ Fill only the hydraulic oil.

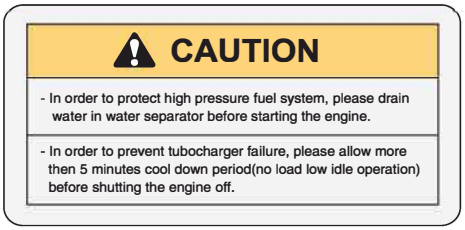
※ Do not fill the diesel fuel.



140WH90FW51

36) CAUTION (WATER SEPARATOR, item 51)
This warning label is positioned in right window of the cab.

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




120090SL02

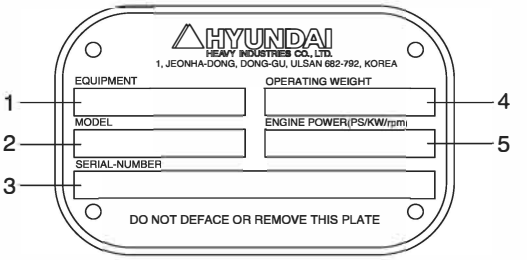
37) MCU CONNECTOR (item 52)
This warning label is positioned on the low cover of the air conditioner in the cab.

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

※ See page 3-23 for details.


1409S0FW52

## MACHINE DATA PLATE



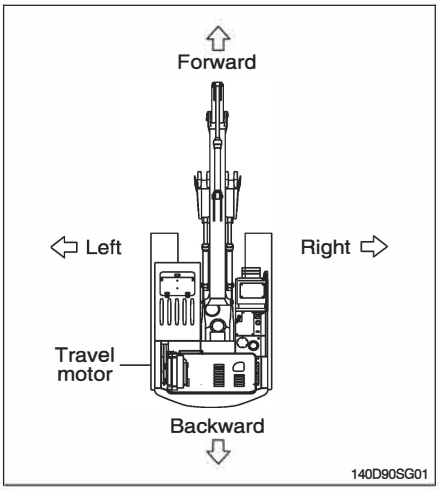

21090FW10

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

※ 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.

## 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.

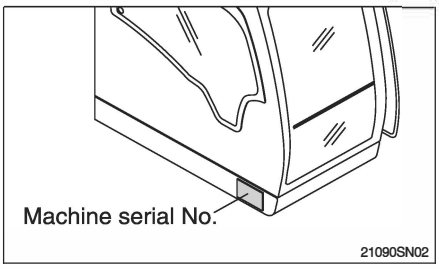



## 2. SERIAL NUMBER

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

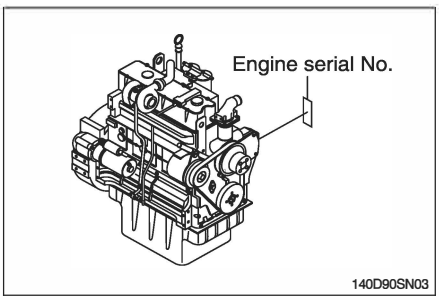
1) MACHINE SERIAL NUMBER

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. Engine number is punched on the name plate, which is fixed on crankcase near to dipstick position




## 3. INTENDED USE

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

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

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

## 4. SYMBOLS

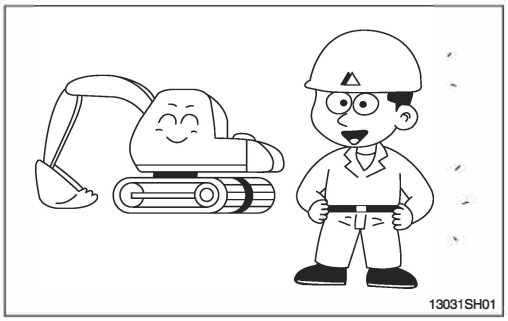
⚠ Important safety hint.

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

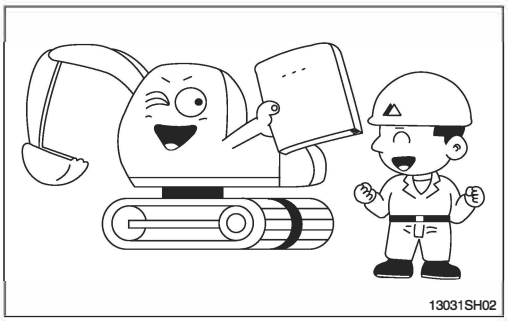
※ It indicates the useful information for operator.

## 1. BEFORE OPERATING THE MACHINE

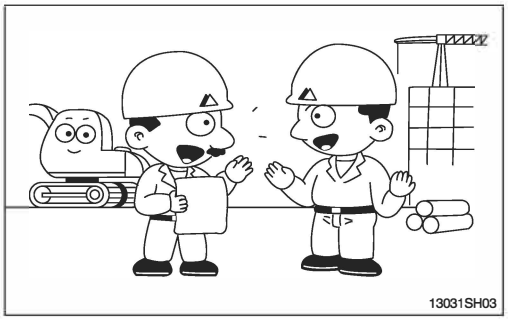
Think-safety first.
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition.
Almost every accident is caused by disregarding the simple and fundamental safety hints.



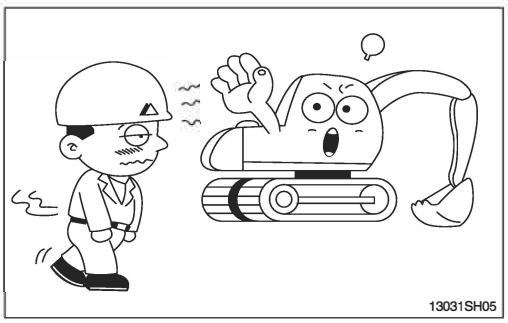

Be sure to understand thoroughly all about the operator's manual before operating the machine.
Proper care is your responsibility.



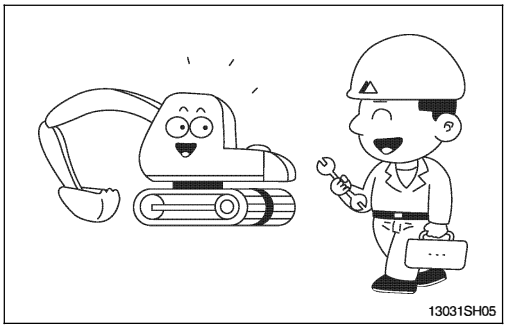

Fully understand the details and process of the construction before starting the work.
If you find anything dangerous on the job, consult with the job supervisor for the preventive measures before operating the machine.



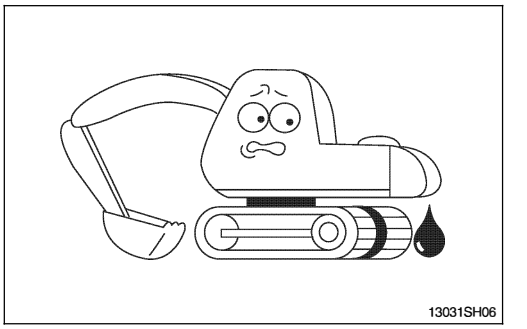

Do not operate when tired, or after drinking alcoholic beverages or any type of drugs.



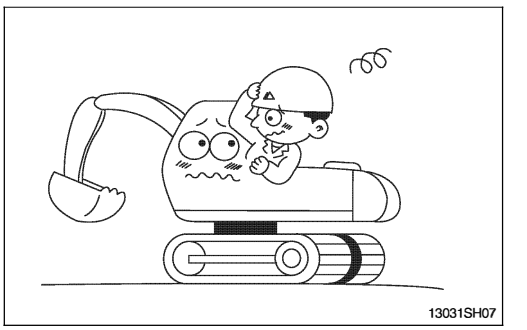
Check daily according to the operation manual.
Repair the damaged parts and tighten the loosened bolts.



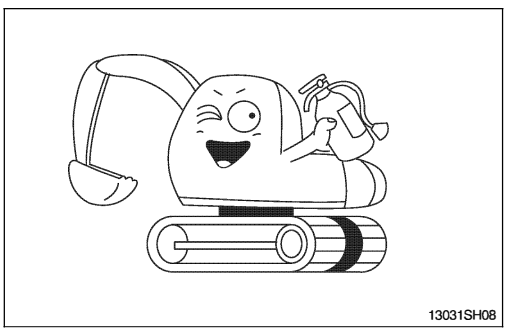

Check for leakage of engine oil, hydraulic oil, fuel and coolant.
Keep machine clean, clean machine regularly.




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




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

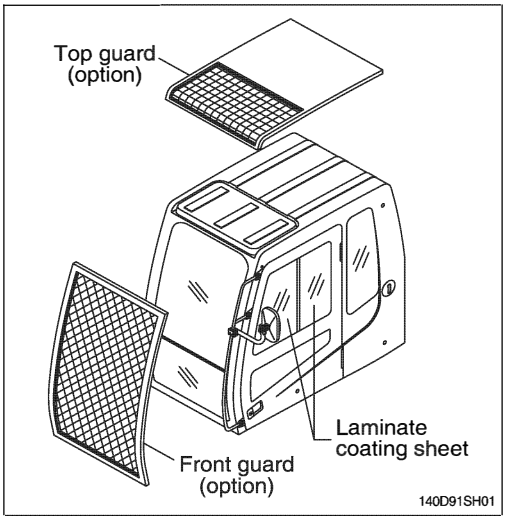


## PROTECTION AGAINST FLYING OBJECTS

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.




## UNAUTHORIZED MODIFICATION

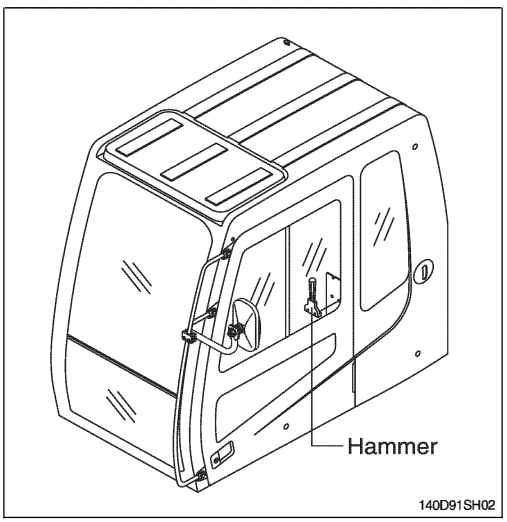
Any modification made without authorization from Hyundai can create hazards.

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.

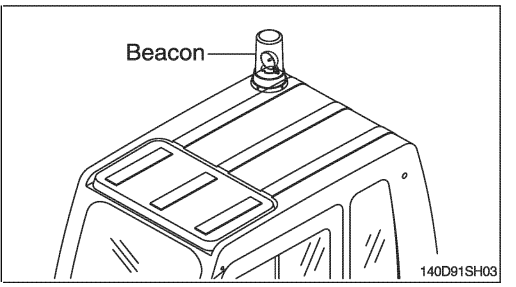
Be sure you know the phone numbers of persons you should contact in case of an emergency.



## 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

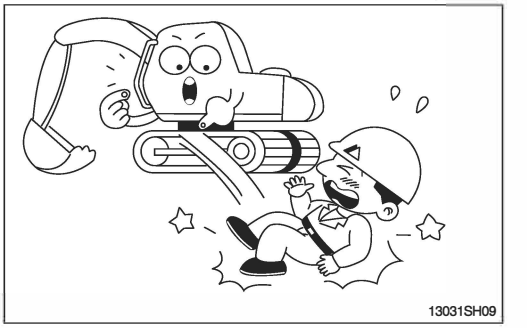
13031SH55

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

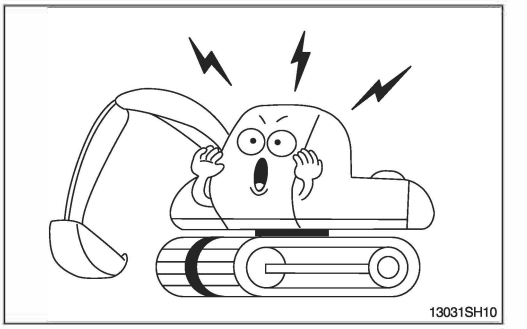
⚠ The wrong loading method can result in serious bodily injury or death.

## 2. DURING OPERATING THE MACHINE

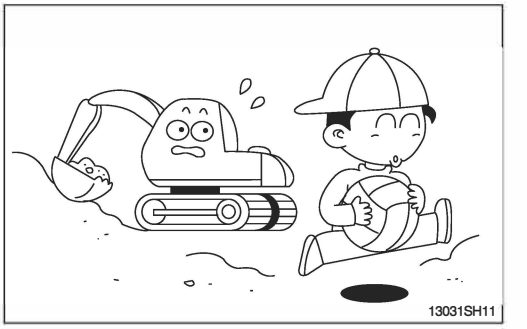
Use the handle and footstep when getting on or off the machine.
Do not jump on or off the machine.



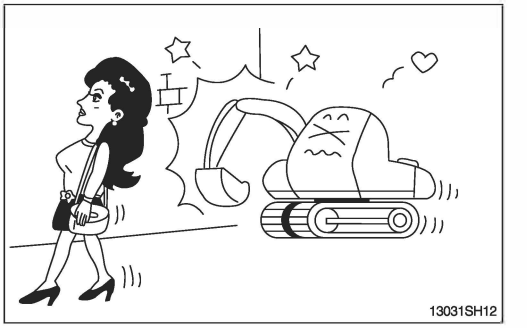

Sound the horn to warn nearby personnel before operating the machine.
Remove all the obstacles like frost on the window before operating the machine for the good visibility.



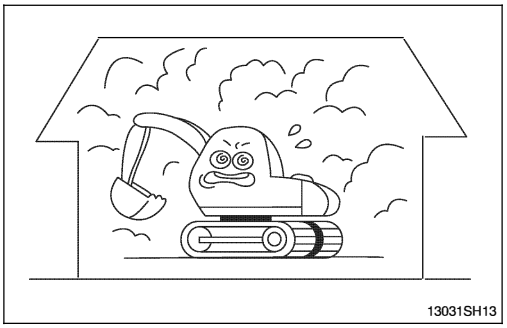

Operate carefully to make sure all personnel or obstacles are clear within the working range of the machine.
Place safety guards if necessary.



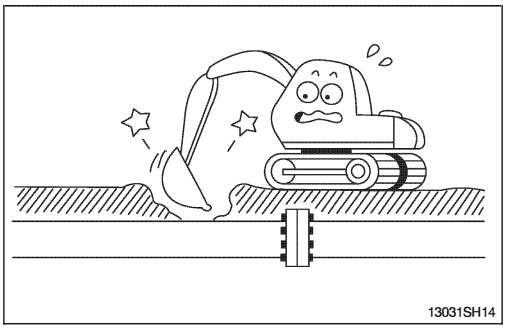

When using the work equipment, pay attention to job site.



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

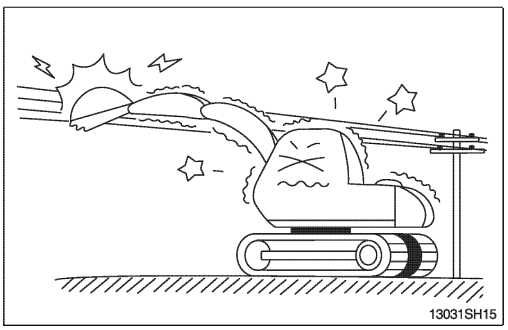



Check the locations of underground gas pipes or water line and secure the safety before operation.

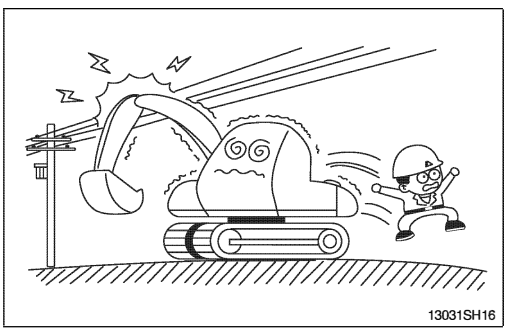



The operating near the electrical lines is very dangerous.
Operate within safe working range permitted as below.

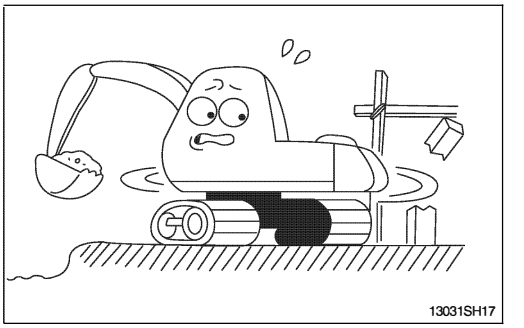
| Supply voltage | Min safe separation |
|---|---|
| 6.6 kV | 3m (10 ft) |
| 33.0 kV | 4m (13 ft) |
| 66.0 kV | 5m (16 ft) |
| 154.0 kV | 8m (26 ft) |
| 275.0 kV | 10m (33 ft) |



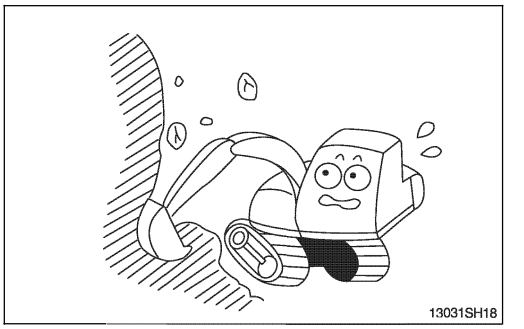

If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current. Jump off the machine without contacting the machine when you need to get off.



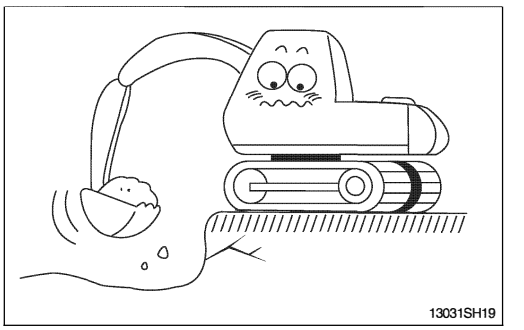
Watch out for obstacles.
Be particularly careful to check the machine clearance during the swing.



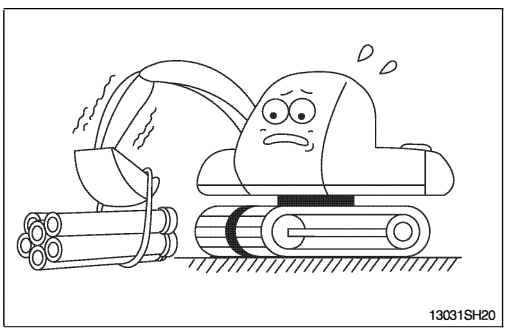

When using the machine as breaker or working in a place where stones may fall down, cab roof guard and head guard should be provided for proper protection.



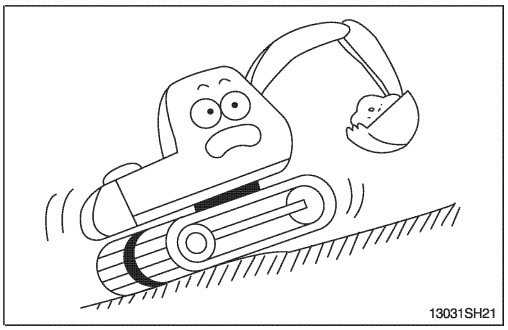

Avoid operating on a cliff or soft ground as there is danger of rolling over.
Make sure to get off easily as keeping the track at a right angle and putting the travel motor into the backward position when working on a cliff or soft ground inevitably.



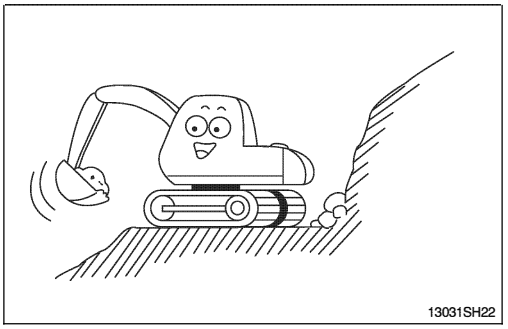

Operate for the lifting work considering the capacity of machine, weight and width of the load.
Be careful not to lift exceeding the machine capacity as it can be the cause of machine damage and safety accident.



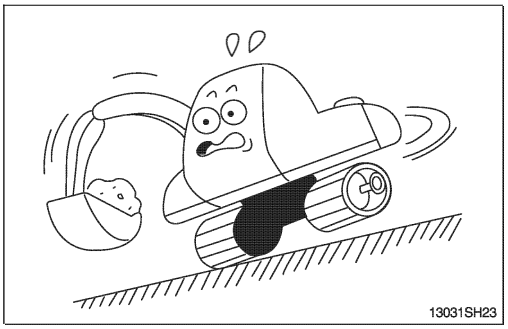
The operation on a slope is dangerous.
Avoid operating the machine on a slope of over 10 degree.



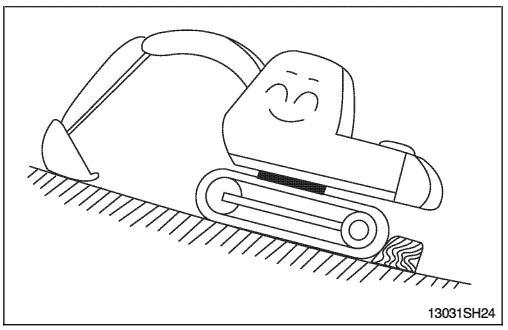

Operate the machine after making ground flat when operation is required on a slope.



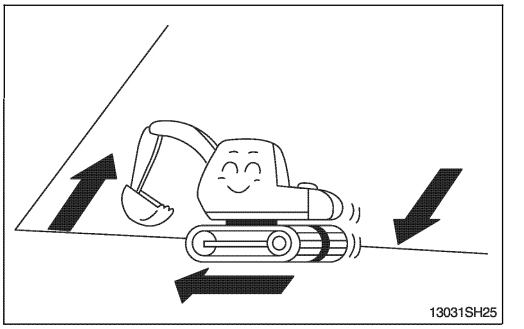

The swing on the slope can be danger of rolling over.
Do not operate to swing the machine with the bucket loaded on a slope since the machine may lose its balance under such an instance.



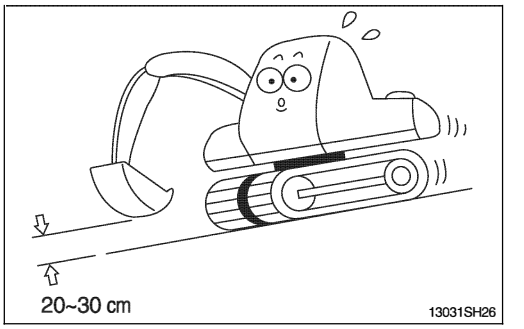

Avoid parking and stopping on a slope.
Lower the bucket to the ground and block the track when parking.



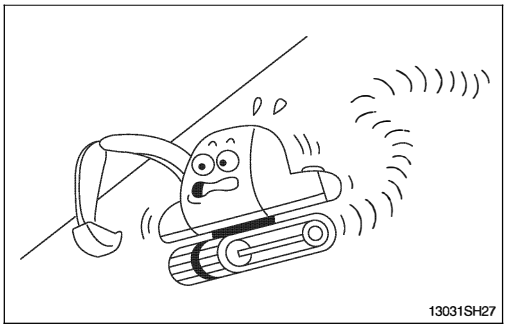
Avoid traveling in a cross direction on a slope as it can cause the danger of rolling over and sliding.



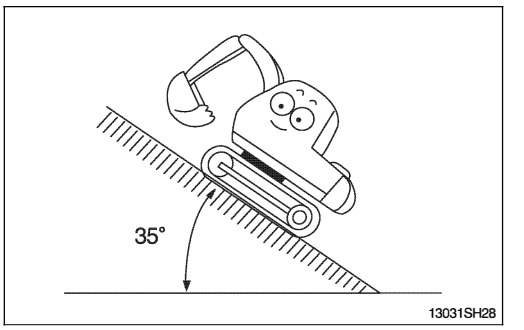

Traveling on a slope is dangerous.
Be sure to operate slowly when traveling down a slope and maintain the bucket at a height of 20~30 cm (1 ft) above the ground so that it can be used as brake in an emergency.



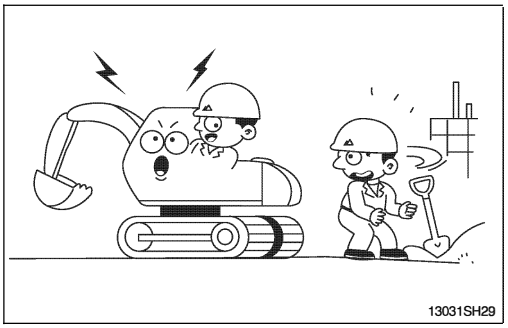

Steering of the machine while traveling on a slope is dangerous.
When an inevitable turning of direction is required, turn on the flat and solid ground.



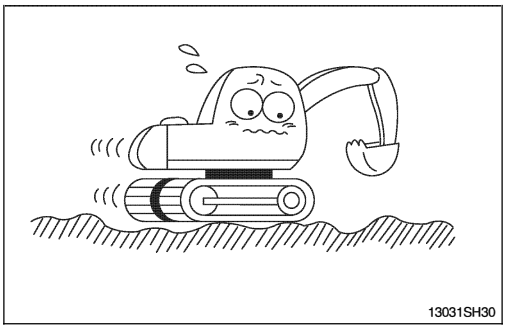

The engine angularity limits are 35 degree.
Do not operate by more than the engine limits in any case.



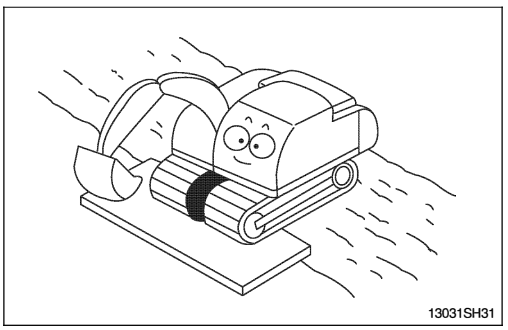
Before traveling the machine, sound the horn to warn nearby personnel.
Operate forward and backward correctly with confirming the location of the travel motor.



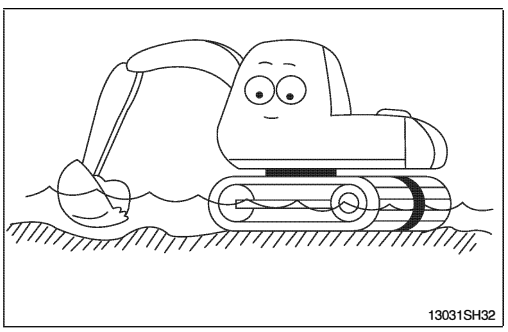

Slow down when traveling through obstacles or uneven ground.




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.

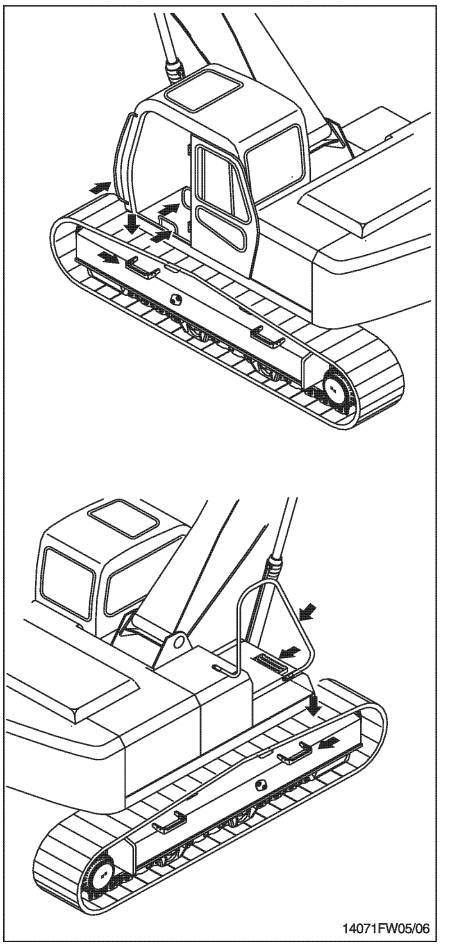
When mounting or dismounting, always face the machine and use the handrails, machine or track frame steps, and track shoes. Additional track frame step can be fitted for wider optional shoe. In this case please contact your Hyundai distributor.

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.



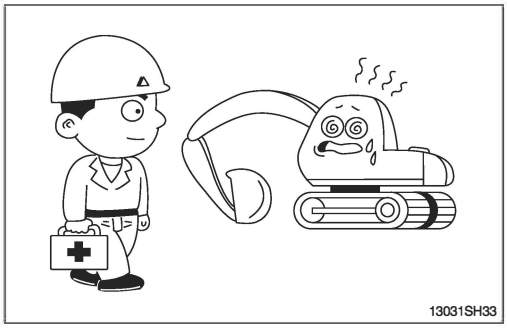

## KEEP RIDERS OFF MACHINE

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

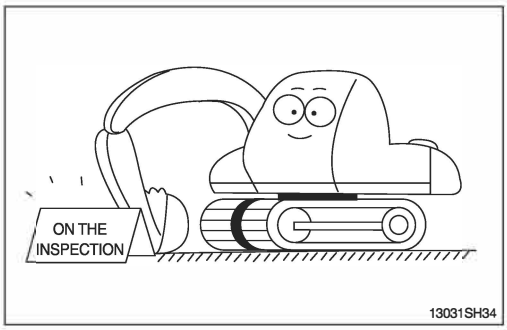
Only allow the operator on the machine. Keep riders off.

## 3. DURING MAINTENANCE

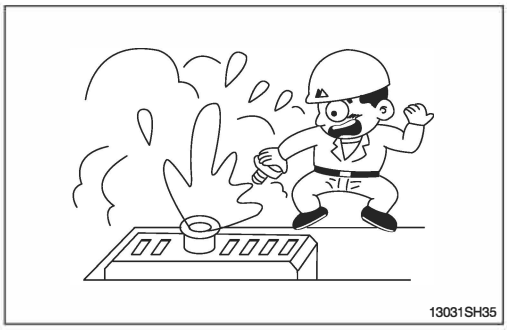
Stop the engine immediately when the trouble of the machine is found.
Inspect immediately the cause of trouble such as vibration, overheating and trouble in the cluster then repair.



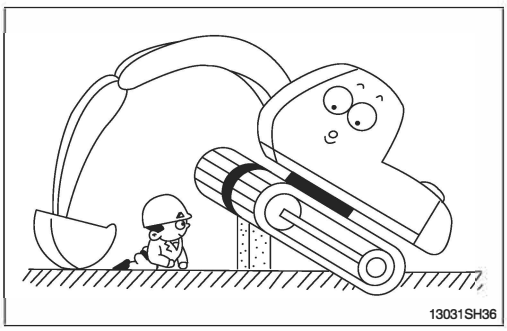

Park on a flat place and stop the engine for inspecting and repairing. Properly TAG machine is not operational. (remove start key)
Extreme care shall be taken during maintenance work. Parts may require additional safe guard.



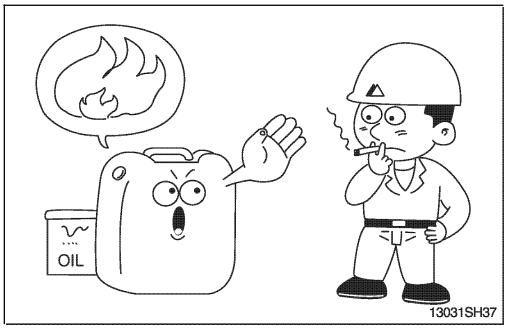

Do not remove the radiator cap from hot engine. Open the cap after the engine cools, below 50 °C(122 °F) to prevent personal injury from heated coolant spray or steam.



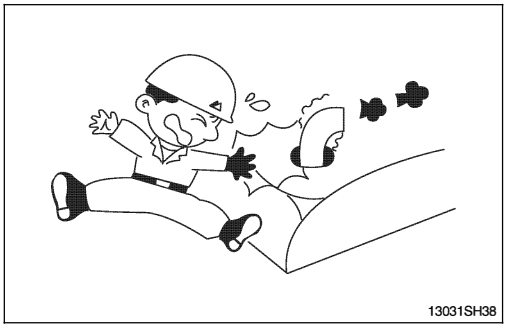

Do not work below the machine.
Be sure to work with proper safety supports.
Do not depend on the hydraulic cylinders to hold up the equipment and attachment.



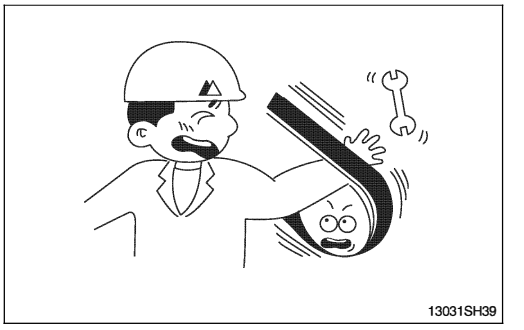
There is the danger of fire in fuel and oil.
Store in cool and dry area, away from any open flames.



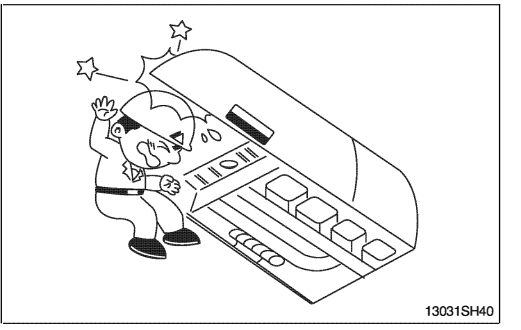

Do not touch exhaust pipe, or may cause severe burn.



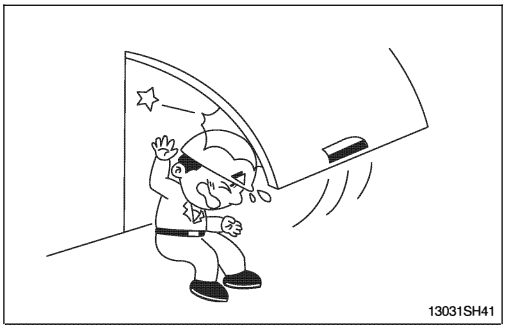

Do not open the engine hood and covers while the engine is running.



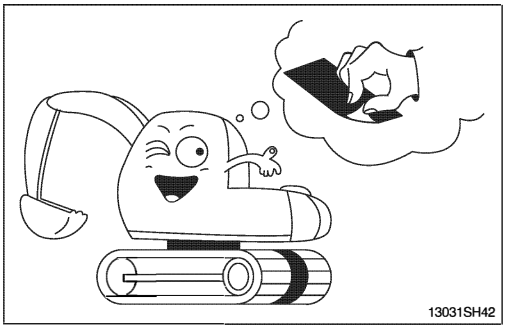

Be careful of not hitting the edges when you service engine.



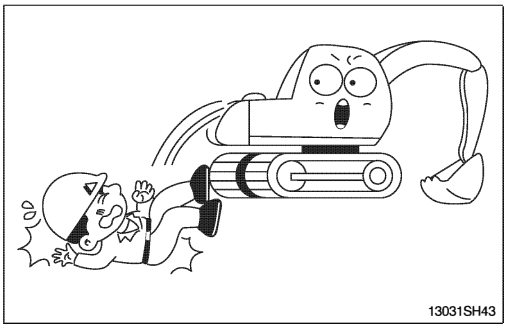
Be careful that the front window may be promptly closed.
Be sure to support stay, when the side door needs to be opened.
Be careful that the open side door may closed by the external or natural force like strong wind.




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

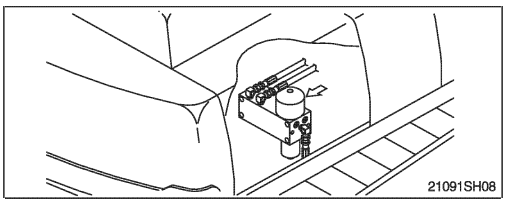



Be careful of not touching slip, fall down etc., when you work at the upper frame to service engine and/or other component.




**HIGH PRESSURE GAS**

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

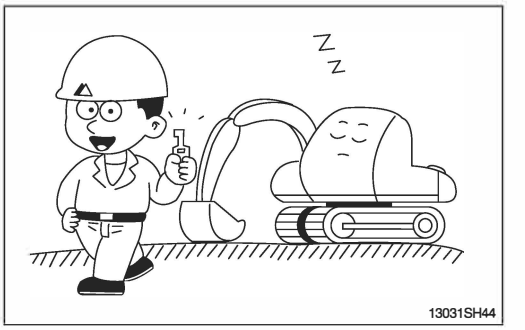



**LIFT EYES CAN FAIL**

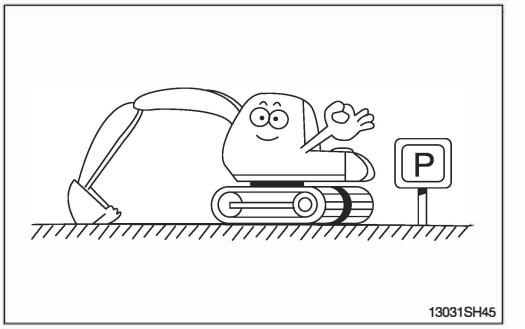
Lift eyes or tank can fail when lifting tank containing fluids resulting in possible personal injury.
Drain tank of all fluids before lifting.

## 4. PARKING

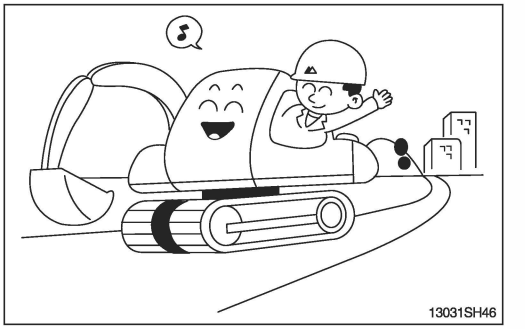
When leaving the machine after parking, lower the bucket to the ground completely and put the safety lever at parking position then remove the key.
Lock the cab door.



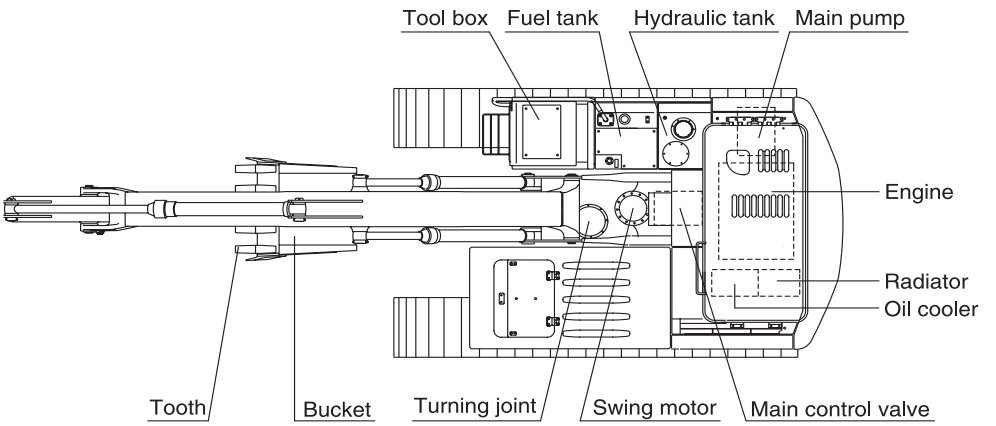

Park the machine in the flat and safe place.

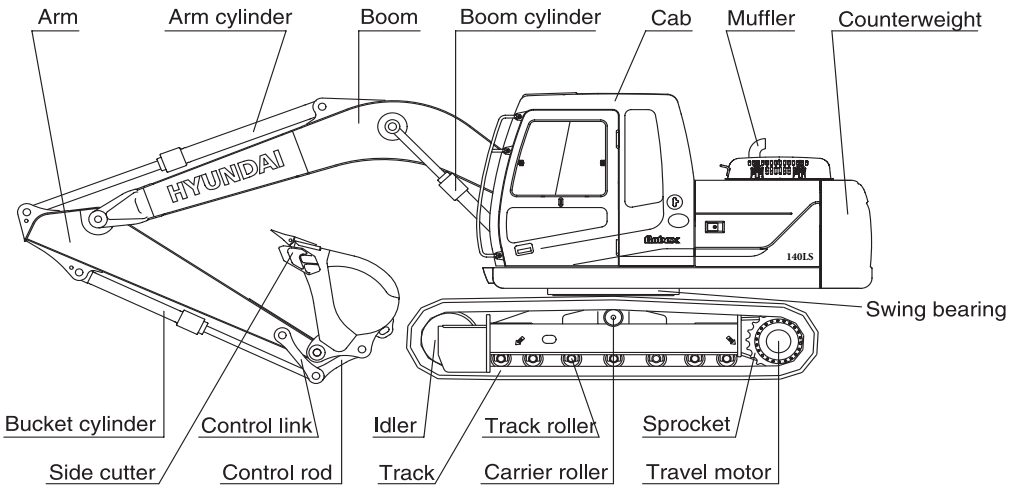



Hope you can work easily and safely observing safety rules.
For safe operation, observe all safety rules.



## 1. MAJOR COMPONENT



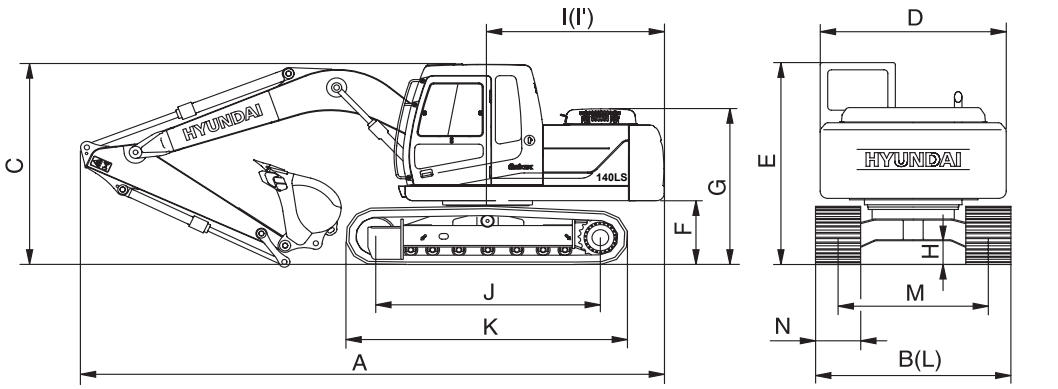




140D92SP01

# 2. SPECIFICATIONS

## 1) R140LS

· 4.60 m (15' 1") BOOM and 2.10 m (6' 11") ARM



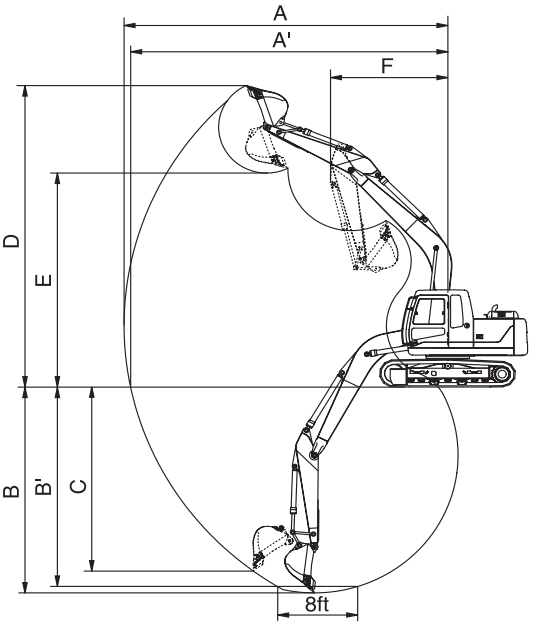

140D92SP02

| Description | | Unit | Specification |
|---|---|---|---|
| Operating weight | | kg (lb) | 13980 (30820) |
| Bucket capacity (SAE heaped), standard | | $m^3$ ($yd^3$) | 0.65 (0.85) |
| Overall length | A | mm (ft-in) | 7850 (25' 8") |
| Overall width, with 600 mm shoe | B | | 2600 (8' 6") |
| Overall height | C | | 2760 (9' 1") |
| Superstructure width | D | | 2600 (8' 6") |
| Overall height of cab | E | | 2860 (9' 4") |
| Ground clearance of counterweight | F | | 940 (3' 1") |
| Engine cover height | G | | 2210 (7' 3") |
| Minimum ground clearance | H | | 440 (1' 5") |
| Rear-end distance | I | | 2330 (7' 7") |
| Rear-end swing radius | I' | | 2330 (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) R140LS

### (1) 4.60 m (15' 1") MONO BOOM




14092SP06

| Description | | ※2.10 m (6' 11") Arm |
|---|---|---|
| Max digging reach | A | 7920 mm (25'11") |
| Max digging reach on ground | A' | 7780 mm (25' 6") |
| Max digging depth | B | 5200 mm (17' 1") |
| Max digging depth (8ft level) | B' | 4950 mm (16' 3") |
| Max vertical wall digging depth | C | 4590 mm (15' 1") |
| Max digging height | D | 8140 mm (26' 8") |
| Max dumping height | E | 5710 mm (18' 9") |
| Min swing radius | F | 2680 mm ( 8'10") |
| Bucket digging force | SAE | 87.3 [94.8] kN |
| | | 8900 [9660] kgf |
| | | 19620 [21300] lbf |
| | ISO | 102 [110.8] kN |
| | | 10400 [11290] kgf |
| | | 22930 [24890] lbf |
| Arm crowd force | SAE | 73.6 [79.9] kN |
| | | 7500 [8140] kgf |
| | | 16530 [17950] lbf |
| | ISO | 77.5 [84.1] kN |
| | | 7900 [8580] kgf |
| | | 17420 [18910] lbf |

※ : STD [ ] : Power boost

## 4. WEIGHT

### 1) R140LS

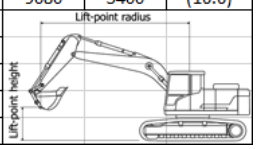
| Item | R140LS | |
|---|---|---|
| | kg | lb |
| Upper structure assembly | 5630 | 12420 |
| Main frame weld assembly | 1120 | 2470 |
| Engine assembly | 550 | 1210 |
| Main pump assembly | 100 | 220 |
| Main control valve assembly | 140 | 310 |
| Swing motor assembly | 120 | 260 |
| Hydraulic oil tank assembly | 160 | 350 |
| Fuel tank assembly | 130 | 290 |
| Counterweight | 1900 | 4190 |
| Cab assembly | 310 | 680 |
| Lower chassis assembly | 5340 | 11760 |
| Track frame weld assembly | 1590 | 3510 |
| Swing bearing | 215 | 475 |
| 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, 2.1 m arm, 0.65 $m^3$ SAE heaped bucket) | 2380 | 5250 |
| 4.6 m boom assembly | 830 | 1830 |
| 2.1 m arm assembly | 370 | 820 |
| 0.65 $m^3$ SAE heaped bucket | 560 | 1235 |
| Boom cylinder assembly | 130 | 290 |
| Arm cylinder assembly | 160 | 350 |
| Bucket cylinder assembly | 100 | 220 |
| Bucket control rod assembly | 90 | 200 |

## 1) R140LS

| Boom type | Length[mm] | Arm type | Length[mm] | BK type | Capa.[㎥] | QC | Swing Post | CWT[kg] | Shoe width[mm] | Outtriger[F] | Outtriger[R] | Cabin type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GP | 4600 | GP | 2100 | GP | 0.65 | NO | NO | 1900 | 500 | NONE | NONE | CABIN |

| Lift-point height (m/ft) | | Lift-point radius | | | | | | | | At max. reach | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.5m (4.9ft) | | 3.0m (9.8ft) | | 4.5m (14.8ft) | | 6.0m (19.7ft) | | Capacity | | Reach |
| | | | | | | | | | | | | m(ft) |
| 6.0m | kg | | | | | *3170 | *3170 | | | *2570 | *2570 | 5.05 |
| 19.7ft | lb | | | | | *6990 | *6990 | | | *5670 | *5670 | (16.6) |
| 4.5m | kg | | | | | *3400 | *3400 | *2760 | 2110 | *2430 | 2050 | 6.09 |
| 14.8ft | lb | | | | | *7500 | *7500 | *6080 | 4650 | *5360 | 4520 | (20.0) |
| 3.0m | kg | | | *5980 | *5980 | *4270 | 3350 | 3330 | 2050 | *2500 | 1690 | 6.64 |
| 9.8ft | lb | | | *13180 | *13180 | *9410 | 7390 | 7340 | 4520 | *5510 | 3730 | (21.8) |
| 1.5m | kg | | | *8270 | 5780 | 5170 | 3090 | 3220 | 1940 | 2600 | 1550 | 6.81 |
| 4.9ft | lb | | | *18230 | 12740 | 11400 | 6810 | 7100 | 4280 | 5730 | 3420 | (22.3) |
| 0.0m | kg | | | *7270 | 5470 | 4960 | 2910 | 3120 | 1860 | 2660 | 1570 | 6.64 |
| 0.0ft | lb | | | *16030 | 12060 | 10930 | 6420 | 6880 | 4100 | 5860 | 3460 | (21.8) |
| -1.5m | kg | *5390 | *5390 | *9650 | 5460 | 4890 | 2840 | 3100 | 1830 | 3030 | 1790 | 6.09 |
| -4.9ft | lb | *11880 | *11880 | *21270 | 12040 | 10780 | 6260 | 6830 | 4030 | 6680 | 3950 | (20.0) |
| -3.0m | kg | *9570 | *9570 | *8390 | 5590 | 4960 | 2900 | | | 4120 | 2450 | 5.05 |
| -9.8ft | lb | *21100 | *21100 | *18500 | 12320 | 10930 | 6390 | | | 9080 | 5400 | (16.6) |

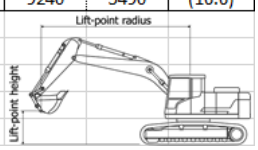
Notes:
1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the Robex Series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The Lift-point is a hook (standard equipment) located on the back of the bucket.
4. (*) indicates load limited by hydraulic capacity.




| Boom type | Length[mm] | Arm type | Length[mm] | BK type | Capa.[㎥] | QC | Swing Post | CWT[kg] | Shoe width[mm] | Outtriger[F] | Outtriger[R] | Cabin type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GP | 4600 | GP | 2100 | GP | 0.65 | NO | NO | 1900 | 600 | NONE | NONE | CABIN |

| Lift-point height (m/ft) | | Lift-point radius | | | | | | | | At max. reach | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.5m (4.9ft) | | 3.0m (9.8ft) | | 4.5m (14.8ft) | | 6.0m (19.7ft) | | Capacity | | Reach |
| | | | | | | | | | | | | m(ft) |
| 6.0m | kg | | | | | *3170 | *3170 | | | *2570 | *2570 | 5.05 |
| 19.7ft | lb | | | | | *6990 | *6990 | | | *5670 | *5670 | (16.6) |
| 4.5m | kg | | | | | *3400 | *3400 | *2760 | 2140 | *2430 | 2080 | 6.09 |
| 14.8ft | lb | | | | | *7500 | *7500 | *6080 | 4720 | *5360 | 4590 | (20.0) |
| 3.0m | kg | | | *5980 | *5980 | *4270 | 3400 | 3380 | 2080 | *2500 | 1720 | 6.64 |
| 9.8ft | lb | | | *13180 | *13180 | *9410 | 7500 | 7450 | 4590 | *5510 | 3790 | (21.8) |
| 1.5m | kg | | | *8270 | 5860 | 5250 | 3140 | 3270 | 1970 | 2650 | 1580 | 6.81 |
| 4.9ft | lb | | | *18230 | 12920 | 11570 | 6920 | 7210 | 4340 | 5840 | 3480 | (22.3) |
| 0.0m | kg | | | *7270 | 5560 | 5040 | 2950 | 3180 | 1890 | 2710 | 1600 | 6.64 |
| 0.0ft | lb | | | *16030 | 12260 | 11110 | 6500 | 7010 | 4170 | 5970 | 3530 | (21.8) |
| -1.5m | kg | *5390 | *5390 | *9650 | 5540 | 4970 | 2890 | 3150 | 1870 | 3080 | 1820 | 6.09 |
| -4.9ft | lb | *11880 | *11880 | *21270 | 12210 | 10960 | 6370 | 6940 | 4120 | 6790 | 4010 | (20.0) |
| -3.0m | kg | *9570 | *9570 | *8390 | 5680 | 5040 | 2950 | | | 4190 | 2490 | 5.05 |
| -9.8ft | lb | *21100 | *21100 | *18500 | 12520 | 11110 | 6500 | | | 9240 | 5490 | (16.6) |

Notes:
1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the Robex Series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The Lift-point is a hook (standard equipment) located on the back of the bucket.
4. (*) indicates load limited by hydraulic capacity.



| Boom type | Length[mm] | Arm type | Length[mm] | BK type | Capa.[㎥] | QC | Swing Post | CWT[kg] | Shoe(wheel)[mm] | Outtriger[F] | Outtriger[R] | Cabin type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GP | 4600 | GP | 2500 | GP | 0.65 | NO | NO | 1900 | 500 | NONE | NONE | CABIN |

| Lift-point height (m/ft) | | Lift-point radius | | | | | | | | At max. reach | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.5m (4.9ft) | | 3.0m (9.8ft) | | 4.5m (14.8ft) | | 6.0m (19.7ft) | | Capacity | | Reach |
| | |  |  |  |  |  |  |  |  |  |  | m(ft) |
| 6.0m | kg | | | | | | | | | *1700 | *1700 | 5.61 |
| 19.7ft | lb | | | | | | | | | *3750 | *3750 | (18.4) |
| 4.5m | kg | | | | | | | *2760 | 2140 | *1590 | *1590 | 6.56 |
| 14.8ft | lb | | | | | | | *6080 | 4720 | *3510 | *3510 | (21.5) |
| 3.0m | kg | | | *5090 | *5090 | *3870 | 3400 | 3340 | 2060 | *1620 | 1490 | 7.07 |
| 9.8ft | lb | | | *11220 | *11220 | *8530 | 7500 | 7360 | 4540 | *3570 | 3280 | (23.2) |
| 1.5m | kg | | | *8130 | 5910 | *5030 | 3110 | 3210 | 1940 | *1750 | 1370 | 7.23 |
| 4.9ft | lb | | | *17920 | 13030 | *11090 | 6860 | 7080 | 4280 | *3860 | 3020 | (23.7) |
| 0.0m | kg | | | *7490 | 5480 | 4950 | 2900 | 3100 | 1830 | *2040 | 1390 | 7.07 |
| 0.0ft | lb | | | *16510 | 12080 | 10910 | 6390 | 6830 | 4030 | *4500 | 3060 | (23.2) |
| -1.5m | kg | *4640 | *4640 | *9680 | 5390 | 4840 | 2800 | 3050 | 1790 | *2610 | 1550 | 6.56 |
| -4.9ft | lb | *10230 | *10230 | *21340 | 11880 | 10670 | 6170 | 6720 | 3950 | *5750 | 3420 | (21.5) |
| -3.0m | kg | *7840 | *7840 | *8850 | 5480 | 4870 | 2830 | | | 3430 | 2030 | 5.61 |
| -9.8ft | lb | *17280 | *17280 | *19510 | 12080 | 10740 | 6240 | | | 7560 | 4480 | (18.4) |
| -4.5m | kg | | | *6280 | 5770 | | | | | *4610 | 3770 | 3.90 |
| -14.8ft | lb | | | *13850 | 12720 | | | | | *10160 | 8310 | (12.8) |

Notes:
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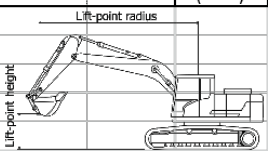
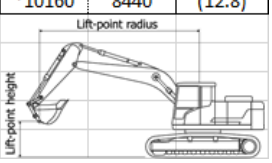
3. The Lift-point is a hook (standard equipment) located on the back of the bucket.
4. (*) indicates load limited by hydraulic capacity.




| Boom type | Length[mm] | Arm type | Length[mm] | BK type | Capa.[㎥] | QC | Swing Post | CWT[kg] | Shoe(rubber track)[mm] | Outtriger[F] | Outtriger[R] | Cabin type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GP | 4600 | GP | 2500 | GP | 0.65 | NO | NO | 1900 | 600 | NONE | NONE | CABIN |

| Lift-point height (m/ft) | | Lift-point radius | | | | | | | | At max. reach | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.5m (4.9ft) | | 3.0m (9.8ft) | | 4.5m (14.8ft) | | 6.0m (19.7ft) | | Capacity | | Reach |
| | |  |  |  |  |  |  |  |  |  |  | m(ft) |
| 6.0m | kg | | | | | | | | | *1700 | *1700 | 5.61 |
| 19.7ft | lb | | | | | | | | | *3750 | *3750 | (18.4) |
| 4.5m | kg | | | | | | | *2760 | 2170 | *1590 | *1590 | 6.56 |
| 14.8ft | lb | | | | | | | *6080 | 4780 | *3510 | *3510 | (21.5) |
| 3.0m | kg | | | *5090 | *5090 | *3870 | 3440 | *3390 | 2090 | *1620 | 1520 | 7.07 |
| 9.8ft | lb | | | *11220 | *11220 | *8530 | 7580 | *7470 | 4610 | *3570 | 3350 | (23.2) |
| 1.5m | kg | | | *8130 | 6000 | *5030 | 3160 | 3270 | 1970 | *1750 | 1400 | 7.23 |
| 4.9ft | lb | | | *17920 | 13230 | *11090 | 6970 | 7210 | 4340 | *3860 | 3090 | (23.7) |
| 0.0m | kg | | | *7490 | 5560 | 5030 | 2940 | 3160 | 1870 | *2040 | 1410 | 7.07 |
| 0.0ft | lb | | | *16510 | 12260 | 11090 | 6480 | 6970 | 4120 | *4500 | 3110 | (23.2) |
| -1.5m | kg | *4640 | *4640 | *9680 | 5480 | 4920 | 2850 | 3100 | 1820 | *2610 | 1580 | 6.56 |
| -4.9ft | lb | *10230 | *10230 | *21340 | 12080 | 10850 | 6280 | 6830 | 4010 | *5750 | 3480 | (21.5) |
| -3.0m | kg | *7840 | *7840 | *8850 | 5570 | 4950 | 2880 | | | 3490 | 2060 | 5.61 |
| -9.8ft | lb | *17280 | *17280 | *19510 | 12280 | 10910 | 6350 | | | 7690 | 4540 | (18.4) |
| -4.5m | kg | | | *6280 | 5860 | | | | | *4610 | 3830 | 3.90 |
| -14.8ft | lb | | | *13850 | 12920 | | | | | *10160 | 8440 | (12.8) |

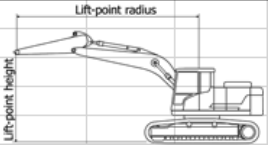
Notes:
1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the Robex Series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The Lift-point is a hook (standard equipment) located on the back of the bucket.
4. (*) indicates load limited by hydraulic capacity.



| Boom type | Length[mm] | Arm type | Length[mm] | BK type | Capa.[㎥] | QC | Swing Post | CWT[kg] | Shoe width[mm] | Outtriger[F] | Outtriger[R] | Cabin type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GP | 4600 | GP | 2100 | GP | 0.65 | NO | NO | 1900 | 500 | NONE | NONE | CABIN |

| Lift-point height (m/ft) | | Lift-point radius | | | | | | | | At max. reach | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.5m (4.9ft) | | 3.0m (9.8ft) | | 4.5m (14.8ft) | | 6.0m (19.7ft) | | Capacity | | Reach |
| | | | | | | | | | | | | m(ft) |
| 6.0m | kg | | | | | *3940 | 3880 | | | *3520 | 3400 | 4.86 |
| 19.7ft | lb | | | | | *8690 | 8550 | | | *7760 | 7500 | (15.9) |
| 4.5m | kg | | | | | *4070 | 3830 | | | *3230 | 2440 | 5.94 |
| 14.8ft | lb | | | | | *8970 | 8440 | | | *7120 | 5380 | (19.5) |
| 3.0m | kg | | | *7060 | 6770 | *4940 | 3640 | 3630 | 2350 | 3200 | 2070 | 6.49 |
| 9.8ft | lb | | | *15560 | 14930 | *10890 | 8020 | 8000 | 5180 | 7050 | 4560 | (21.3) |
| 1.5m | kg | | | | | 5480 | 3410 | 3540 | 2270 | 3010 | 1940 | 6.67 |
| 4.9ft | lb | | | | | 12080 | 7520 | 7800 | 5000 | 6640 | 4280 | (21.9) |
| 0.0m | kg | | | *5900 | *5900 | 5310 | 3270 | 3460 | 2200 | 3090 | 1970 | 6.49 |
| 0.0ft | lb | | | *13010 | *13010 | 11710 | 7210 | 7630 | 4850 | 6810 | 4340 | (21.3) |
| -1.5m | kg | *5140 | *5140 | *9930 | 5940 | 5270 | 3230 | | | 3510 | 2230 | 5.94 |
| -4.9ft | lb | *11330 | *11330 | *21890 | 13100 | 11620 | 7120 | | | 7740 | 4920 | (19.5) |
| -3.0m | kg | | | *8390 | 6070 | 5360 | 3300 | | | 4780 | 2990 | 4.86 |
| -9.8ft | lb | | | *18500 | 13380 | 11820 | 7280 | | | 10540 | 6590 | (15.9) |

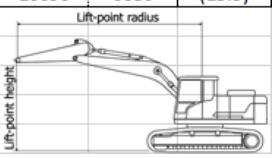
Notes:
1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the Robex Series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The Lift-point is bucket pivot mounting pin on the arm(without bucket mass).
4. (*) indicates load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




| Boom type | Length[mm] | Arm type | Length[mm] | BK type | Capa.[㎥] | QC | Swing Post | CWT[kg] | Shoe width[mm] | Outtriger[F] | Outtriger[R] | Cabin type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GP | 4600 | GP | 2100 | GP | 0.65 | NO | NO | 1900 | 600 | NONE | NONE | CABIN |

| Lift-point height (m/ft) | | Lift-point radius | | | | | | | | At max. reach | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.5m (4.9ft) | | 3.0m (9.8ft) | | 4.5m (14.8ft) | | 6.0m (19.7ft) | | Capacity | | Reach |
| | | | | | | | | | | | | m(ft) |
| 6.0m | kg | | | | | *3940 | 3930 | | | *3520 | 3440 | 4.86 |
| 19.7ft | lb | | | | | *8690 | 8660 | | | *7760 | 7580 | (15.9) |
| 4.5m | kg | | | | | *4070 | 3880 | | | *3230 | 2470 | 5.94 |
| 14.8ft | lb | | | | | *8970 | 8550 | | | *7120 | 5450 | (19.5) |
| 3.0m | kg | | | *7060 | 6850 | *4940 | 3680 | 3680 | 2390 | *3220 | 2100 | 6.49 |
| 9.8ft | lb | | | *15560 | 15100 | *10890 | 8110 | 8110 | 5270 | *7100 | 4630 | (21.3) |
| 1.5m | kg | | | | | 5560 | 3460 | 3590 | 2300 | 3060 | 1970 | 6.67 |
| 4.9ft | lb | | | | | 12260 | 7630 | 7910 | 5070 | 6750 | 4340 | (21.9) |
| 0.0m | kg | | | *5900 | *5900 | 5390 | 3310 | 3520 | 2230 | 3140 | 2000 | 6.49 |
| 0.0ft | lb | | | *13010 | *13010 | 11880 | 7300 | 7760 | 4920 | 6920 | 4410 | (21.3) |
| -1.5m | kg | *5140 | *5140 | *9930 | 6020 | 5350 | 3280 | | | 3560 | 2260 | 5.94 |
| -4.9ft | lb | *11330 | *11330 | *21890 | 13270 | 11790 | 7230 | | | 7850 | 4980 | (19.5) |
| -3.0m | kg | | | *8390 | 6150 | 5440 | 3350 | | | 4850 | 3030 | 4.86 |
| -9.8ft | lb | | | *18500 | 13560 | 11990 | 7390 | | | 10690 | 6680 | (15.9) |

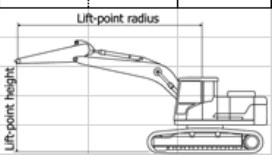
Notes:
1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the Robex Series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The Lift-point is bucket pivot mounting pin on the arm(without bucket mass).
4. (*) indicates load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



| Boom type | Length[mm] | Arm type | Length[mm] | BK type | Capa.[㎥] | QC | Swing Post | CWT[kg] | Shoe[mm] | Outtriger[F] | Outtriger[R] | Cabin type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GP | 4600 | GP | 2500 | GP | 0.65 | NO | NO | 1900 | 500 | NONE | NONE | CABIN |

| Lift-point height (m/ft) | | Lift-point radius | | | | | | | | At max. reach | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.5m (4.9ft) | | 3.0m (9.8ft) | | 4.5m (14.8ft) | | 6.0m (19.7ft) | | Capacity | | Reach |
| | | | | | | | | | | | | m(ft) |
| 6.0m | kg | | | | | *3410 | *3410 | | | *2420 | *2420 | 5.41 |
| 19.7ft | lb | | | | | *7520 | *7520 | | | *5340 | *5340 | (17.7) |
| 4.5m | kg | | | | | *3660 | *3660 | *3400 | 2430 | *2220 | 2170 | 6.39 |
| 14.8ft | lb | | | | | *8070 | *8070 | *7500 | 5360 | *4890 | 4780 | (21.0) |
| 3.0m | kg | | | *6150 | *6150 | *4550 | 3680 | 3640 | 2360 | *2200 | 1870 | 6.91 |
| 9.8ft | lb | | | *13560 | *13560 | *10030 | 8110 | 8020 | 5200 | *4850 | 4120 | (22.7) |
| 1.5m | kg | | | *7530 | 6200 | 5510 | 3430 | 3530 | 2260 | *2310 | 1760 | 7.07 |
| 4.9ft | lb | | | *16600 | 13670 | 12150 | 7560 | 7780 | 4980 | *5090 | 3880 | (23.2) |
| 0.0m | kg | | | *6400 | 5900 | 5300 | 3250 | 3440 | 2180 | *2570 | 1790 | 6.91 |
| 0.0ft | lb | | | *14110 | 13010 | 11680 | 7170 | 7580 | 4810 | *5670 | 3950 | (22.7) |
| -1.5m | kg | *4630 | *4630 | *9720 | 5860 | 5230 | 3190 | 3410 | 2150 | *3110 | 1980 | 6.39 |
| -4.9ft | lb | *10210 | *10210 | *21430 | 12920 | 11530 | 7030 | 7520 | 4740 | *6860 | 4370 | (21.0) |
| -3.0m | kg | *8650 | *8650 | *8960 | 5960 | 5270 | 3230 | | | 4020 | 2530 | 5.41 |
| -9.8ft | lb | *19070 | *19070 | *19750 | 13140 | 11620 | 7120 | | | 8860 | 5580 | (17.7) |
| -4.5m | kg | | | | | | | | | | | |
| -14.8ft | lb | | | | | | | | | | | |

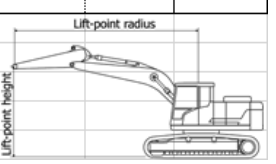
Notes:
1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the Robex Series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The Lift-point is bucket pivot mounting pin on the arm(without bucket mass).
4. (*) indicates load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




| Boom type | Length[mm] | Arm type | Length[mm] | BK type | Capa.[㎥] | QC | Swing Post | CWT[kg] | Shoe[mm] | Outtriger[F] | Outtriger[R] | Cabin type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GP | 4600 | GP | 2500 | GP | 0.65 | NO | NO | 1900 | 600 | NONE | NONE | CABIN |

| Lift-point height (m/ft) | | Lift-point radius | | | | | | | | At max. reach | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1.5m (4.9ft) | | 3.0m (9.8ft) | | 4.5m (14.8ft) | | 6.0m (19.7ft) | | Capacity | | Reach |
| | | | | | | | | | | | | m(ft) |
| 6.0m | kg | | | | | *3410 | *3410 | | | *2420 | *2420 | 5.41 |
| 19.7ft | lb | | | | | *7520 | *7520 | | | *5340 | *5340 | (17.7) |
| 4.5m | kg | | | | | *3660 | *3660 | *3400 | 2460 | *2220 | 2200 | 6.39 |
| 14.8ft | lb | | | | | *8070 | *8070 | *7500 | 5420 | *4890 | 4850 | (21.0) |
| 3.0m | kg | | | *6150 | *6150 | *4550 | 3720 | 3700 | 2400 | *2200 | 1900 | 6.91 |
| 9.8ft | lb | | | *13560 | *13560 | *10030 | 8200 | 8160 | 5290 | *4850 | 4190 | (22.7) |
| 1.5m | kg | | | *7530 | 6290 | 5590 | 3480 | 3590 | 2290 | *2310 | 1790 | 7.07 |
| 4.9ft | lb | | | *16600 | 13870 | 12320 | 7670 | 7910 | 5050 | *5090 | 3950 | (23.2) |
| 0.0m | kg | | | *6400 | 5980 | 5380 | 3300 | 3500 | 2210 | *2570 | 1810 | 6.91 |
| 0.0ft | lb | | | *14110 | 13180 | 11860 | 7280 | 7720 | 4870 | *5670 | 3990 | (22.7) |
| -1.5m | kg | *4630 | *4630 | *9720 | 5940 | 5310 | 3230 | 3460 | 2180 | *3110 | 2010 | 6.39 |
| -4.9ft | lb | *10210 | *10210 | *21430 | 13100 | 11710 | 7120 | 7630 | 4810 | *6860 | 4430 | (21.0) |
| -3.0m | kg | *8650 | *8650 | *8960 | 6040 | 5350 | 3280 | | | 4080 | 2570 | 5.41 |
| -9.8ft | lb | *19070 | *19070 | *19750 | 13320 | 11790 | 7230 | | | 8990 | 5670 | (17.7) |
| -4.5m | kg | | | | | | | | | | | |
| -14.8ft | lb | | | | | | | | | | | |

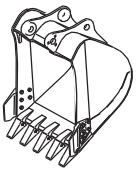
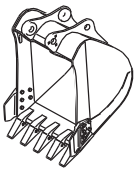
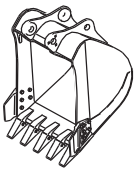
Notes:
1. Lifting capacity are based on ISO 10567.
2. Lifting capacity of the Robex Series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
3. The Lift-point is bucket pivot mounting pin on the arm(without bucket mass).
4. (*) indicates load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



## 6. BUCKET SELECTION GUIDE

### 1) R140LS

#### (1) General bucket

|  |  |  |
|---|---|---|
| 0.52 m³ SAE heaped bucket | ※0.65 m³ SAE heaped bucket | 0.72 m³ SAE heaped bucket |

| MODEL | R140LS | 500mm | 보기 | Grade | 1900 | 1900 |
|---|---|---|---|---|---|---|

| Capacity m3 (yd3) | | | | Width mm (in) | | Weight kg (lb) | | Recommendation mm(ft-in) | |
|---|---|---|---|---|---|---|---|---|---|
| SAE heaped | | CECE heaped | | | | | | 4,600 ( 15′ 1″ ) Boom | 4,600 ( 15′ 1″ ) Boom |
| | | | | | | | | 2,100 ( 6′ 11″ ) Arm | 2,500 ( 8′ 2″ ) Arm |
| 0.52 | (0.68) | 0.45 | (0.59) | 935 | (36.8″) | 510 | (1,120) | ● | ● |
| 0.65 | (0.85) | 0.55 | (0.72) | 1,110 | (43.7″) | 555 | (1,220) | ● | ◐ |
| 0.72 | (0.94) | 0.60 | (0.78) | 1,205 | (47.4″) | 551 | (1,210) | ◐ | ■ |

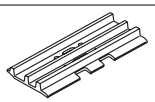
● : Applicable for materials with density of 2,100 kg/m³ (3,500 lb/yd³) or less
◐ : Applicable for materials with density of 1,800 kg/m³ (3,000 lb/yd³) or less
■ : Applicable for materials with density of 1,500 kg/m³ (2,500 lb/yd³) or less
▲ : Applicable for materials with density of 1,200 kg/m³ (2,000 lb/yd³) or less
※ : Not Recommended

# 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 | | |
|---|---|---|---|---|---|
| | | |  | | |
| R140LS | Shoe width | mm (in) | 500 (20) | ※600 (24) | |
| | Operating weight | kg (lb) | 13790 (30400) | 13980 (30820) | |
| | Ground pressure | kgf/cm$^2$ (psi) | 0.43 (6.11) | 0.36 (5.12) | |
| | Overall width | mm (ft-in) | 2500 (8' 2") | 2600 (8' 6") | |

※ : Standard

## 3) NUMBER OF ROLLERS AND SHOES ON EACH SIDE

| Item | Quantity |
|---|---|
| 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 |
| 500 mm triple grouser | Option | A |
| | | |

※ Table 2

| Category | Applications | Applications |
|---|---|---|
| A | Rocky ground, river beds, normal soil | · Travel at low speed on rough ground with large obstacles such as boulders or fallen trees |
| B | Normal soil, soft ground | · These shoes cannot be used on rough ground with large obstacles such as boulders or fallen trees<br>· Travel at high speed only on flat ground<br>· Travel slowly at low speed if it is impossible to avoid going over obstacles |

## 8. SPECIFICATIONS FOR MAJOR COMPONENTS

### 1) ENGINE

| Item | Specification |
|---|---|
| Model | HM4.2 |
| Type | 4-cycle turbocharged diesel engine |
| Cooling method | Water cooling |
| Number of cylinders and arrangement | 4 cylinders, in-line |
| Firing order | 1-3-4-2 |
| Combustion chamber type | Direct injection type |
| Cylinder bore × stroke | 105 × 120 mm |
| Piston displacement | 4160 cc (254 cu in) |
| Compression ratio | 17 : 1 |
| Rated gross horse power (SAE J1995) | 105 Hp (77.2 kW) at 2200 rpm |
| Maximum torque | 38.2 kgf · m (276 lbf · ft) at 1400 rpm |
| Engine oil quantity | 11.5 ℓ (3.03 U.S. gal) |
| Dry weight | 550 kg (1210 lb) |
| High idling speed | 2400 ± 50 rpm |
| Low idling speed | 850 ± 50 rpm |
| Rated fuel consumption | 162.8 g/Hp · hr at 1400 rpm |
| Starting motor | 24 V-4.5 kW |
| Alternator | 24 V-55 A |
| Battery | 2 × 12 V × 80 Ah |

### 2) MAIN PUMP

| Item | Specification |
|---|---|
| Type | Variable displacement tandem axis piston pumps |
| Capacity | 2 × 62 cc/rev |
| Maximum pressure | 350 kgf/cm² (4980 psi) [380 kgf/cm² (5400 psi)] |
| Rated oil flow | 2 × 114.7 ℓ /min (30.3 U.S. gpm / 25.2 U.K. gpm) |
| Rated speed | 2200 rpm |

[ ] : Power boost

### 3) GEAR PUMP

| Item | Specification |
|---|---|
| Type | Fixed displacement gear pump single stage |
| Capacity | 15cc/rev |
| Maximum pressure | 35 kgf/cm$^2$ (500 psi) |
| Rated oil flow | 27.75 ℓ /min (7.3 U.S. gpm / 6.1 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 | Two kinds of displacement axial piston motor | |
| Relief pressure | 350 kgf/cm$^2$ (4980 psi) | 365 kgf/cm$^2$ (5192 psi) |
| Capacity (max / min) | 77/45 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) |
| Braking torque | Min 19.7 kgf · m (143 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 × 840 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 |
|---|---|---|---|---|---|
| **R140LS** | Standard | 600 mm (24") | 0.36 kgf/cm$^2$ (5.12 psi) | 46 | 2600 mm ( 8' 6") |
| | Option | 500 mm (20") | 0.43 kgf/cm$^2$ (6.11 psi) | 46 | 2500 mm ( 8' 2") |
| | | | | | |

### 9) BUCKET

| Item | | Capacity | | Tooth quantity | Width | |
|---|---|---|---|---|---|---|
| | | SAE heaped | CECE heaped | | Without side cutter | With side cutter |
| **R140LS** | Standard | 0.65 m$^3$ (0.85 yd$^3$) | 0.55 m$^3$ (0.72 yd$^3$) | 5 | 1105 mm (43.5") | 1205 mm (47.4") |
| | Option | 0.52 m$^3$ (0.68 yd$^3$) | 0.45 m$^3$ (0.59 yd$^3$) | 5 | 915 mm (36.0") | 1015 mm (40.0") |
| | | 0.7**2** 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) -20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104) |
|---|---|---|---|
| Engine oil pan | Engine oil | 11.5 (3.03) | SAE 30<br>SAE 10W<br>SAE 10W-30<br>SAE 15W-40 |
| Swing drive | Grease | 0.35 (0.09) | NLGI NO.1<br>NLGI NO.2 |
| Swing drive | Gear oil | 2.5 (0.7) | SAE 85W-140 |
| Final drive | Gear oil | 2.2×2 (0.6×2) | SAE 85W-140 |
| Hydraulic tank | Hydraulic oil | Tank : 124 (32.8) System : 210 (55.5) | ISO VG 32<br>ISO VG 46<br>ISO VG 68 LF |
| Fuel tank | Diesel fuel | 270 (71.0) | ASTM D975 NO.1<br>ASTM D975 NO.2 |
| Fitting (Grease nipple) | Grease | As required | NLGI NO.1<br>NLGI NO.2 |
| Radiator (Reservoir tank) | Mixture of antifreeze and water 50 : 50 | 15.5 (4.1) | Ethylene glycol base permanent type |

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

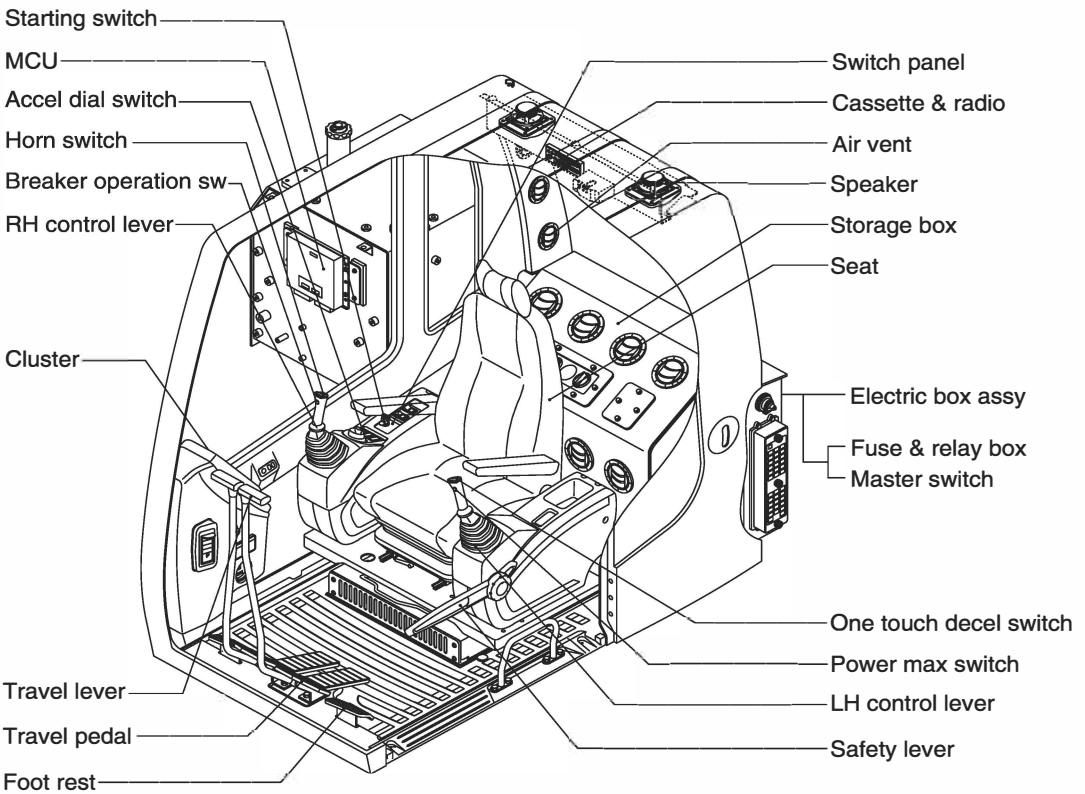
## 1. CAB DEVICES

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.




140D93CD01

## 2. CLUSTER

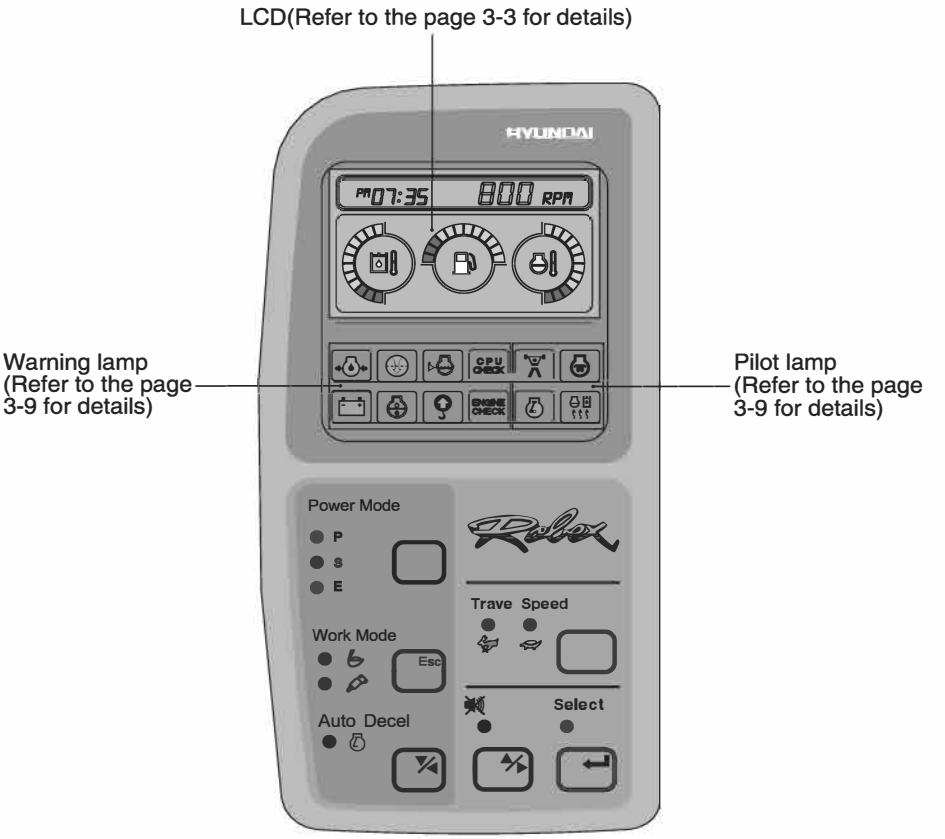
### 1) MONITOR PANEL

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

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

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

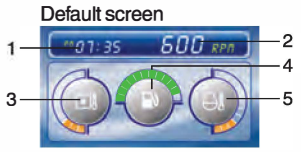
※ When the monitor provides a warning immediately check the problem, and perform the required action.



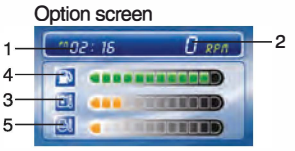

140D93CD02

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

## 2) LCD main operation display



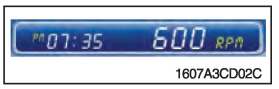
1607A3CD02A



1607A3CD02B

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

### (1) Time display

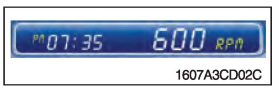


1607A3CD02C

① This displays the current time.

※ **Refer to the page 3-7 to set time for details.**

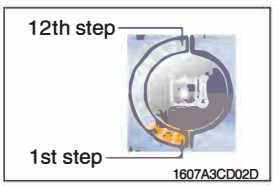
### (2) RPM display



1607A3CD02C

① This displays the engine rpm.

### (3) Hydraulic oil temperature gauge



1607A3CD02D

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

② The gauge between 2nd and 10th steps illuminates when operating.

③ Keep idling engine at low speed until the gauge between 2nd and 10th steps illuminates, before operation of machine.

④ When the gauge of 11th and 12th steps illuminates, reduce the load on the system. If the gauge stays in the 11th~12th steps, stop the machine and check the cause of the problem.

### (4) Fuel level gauge

1607A3CD02E

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

② Fill the fuel when the 1st step or fuel icon blinks in red.

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

### (5) Engine coolant temperature gauge

1607A3CD02F

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

② The gauge between 2nd and 10th steps illuminates when operating.

③ Keep idling engine at low speed until the gauge between 2nd and 10th steps illuminates, before operation of machine.

④ When the gauge of 11th and 12th steps illuminates, turn OFF the engine, check the radiator and engine.

### 3) Warning of main operation screen

#### (1) Warning display

① Engine coolant temperature


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

② Fuel level


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

③ Hydraulic oil temperature


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

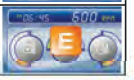
④ All gauge


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

⑤ Communication error

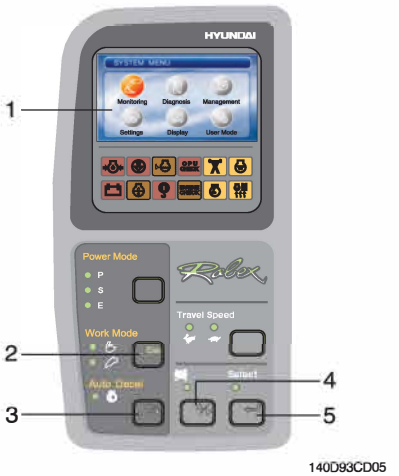

- Communication problem between MCU and cluster makes the lamp blinks and the buzzer sounds.
- Check if any fuse for MCU burnt off. If not check the communication line between them.

#### (2) Pop-up icon display

| No | Switch | Selected mode | Interval |
|---|---|---|---|
| 1 | Work mode switch | General work mode |  |
| | | Breaker operation mode |  |
| 2 | Power mode switch | Heavy duty power work mode |  |
| | | Standard power work mode |  |
| | | Economy power mode |  |

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

## 4) LCD




140D93CD05

1 : LCD

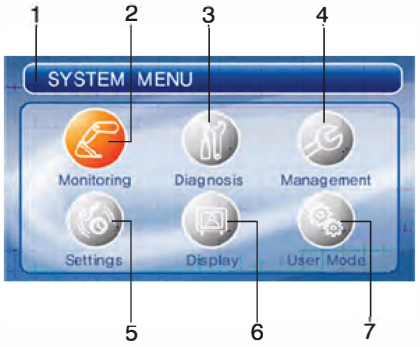
2 : Esc, Return to the previous menu

3 : Down / Left Direction

4 : Up / Right Direction

5 : Select (enter) Activate the currently chosen item

### (1) Main menu




2507A4OP94

1 : Menu information

2 : Monitoring
- Equipment, Switch, Output

3 : Diagnosis
- Current error, Recorded error

4 : Maintenance

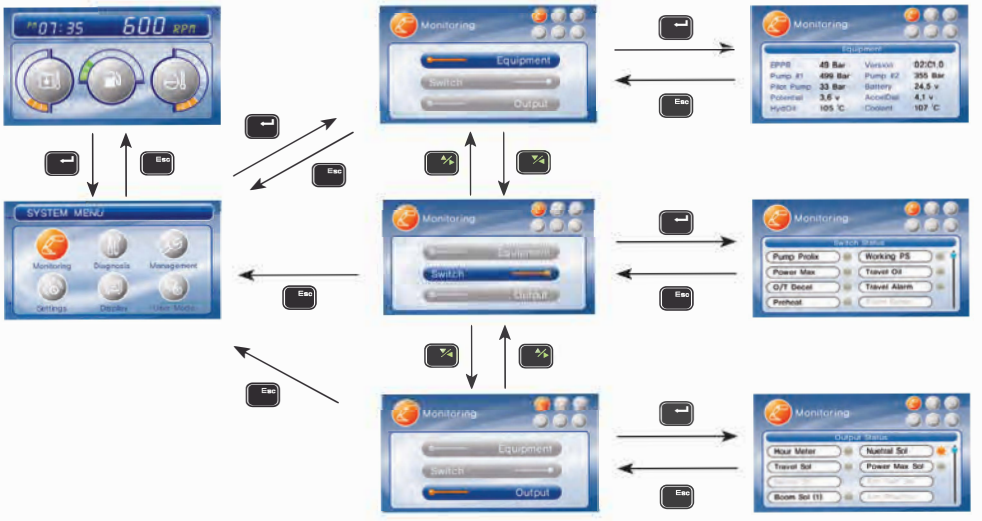
5 : Settings
- Time set, Dual mode
- System lock (reserved)

6 : Display
- Operation skin, Brightness, Language

7 : User mode

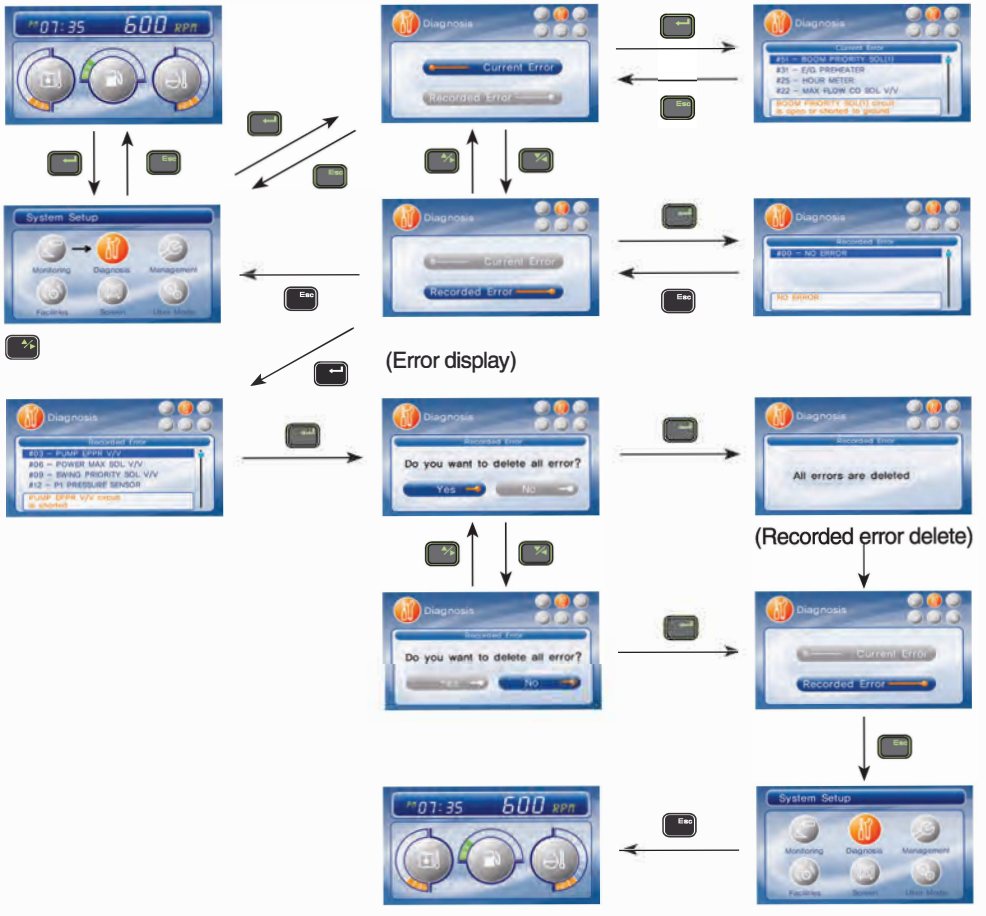
## (2) Display map

### ① Monitoring



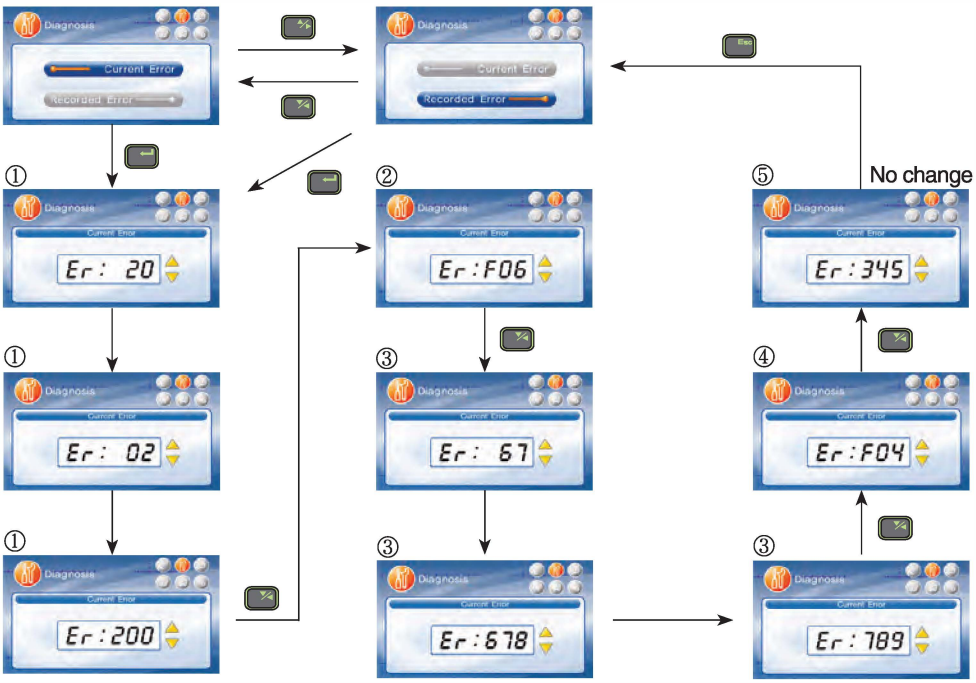

### ② Diagnosis

a. Protocol type 1

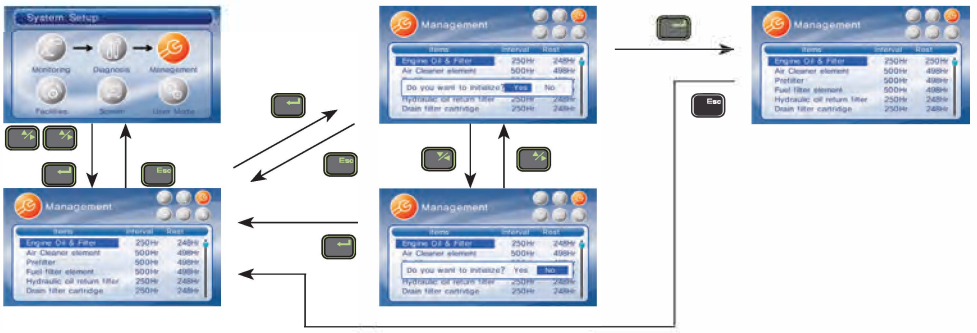


b. Protocol type 2

- If there are more than 2 error codes, each one can be displayed by pressing or switch respectively.
- 3 error codes (①SPN200200, ②FMI06, ③SPN6789, ④FMI04, ⑤345) display.




③ Maintenance




④ Setting

a. Time set


b. System lock - Reserved

c. Dual mode

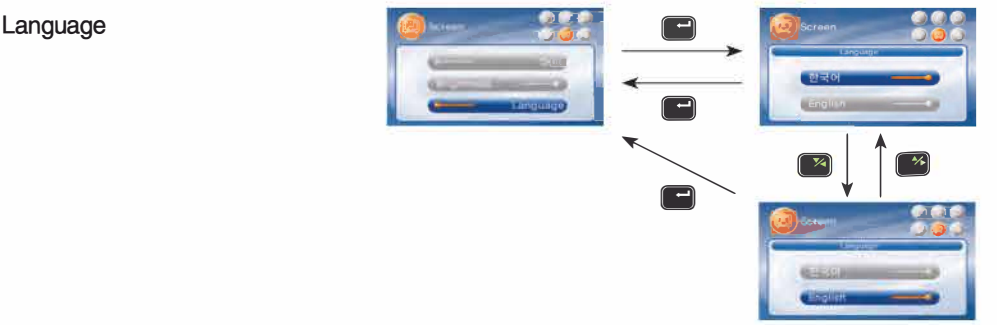
- Changing the MCU mode


⑤ Display

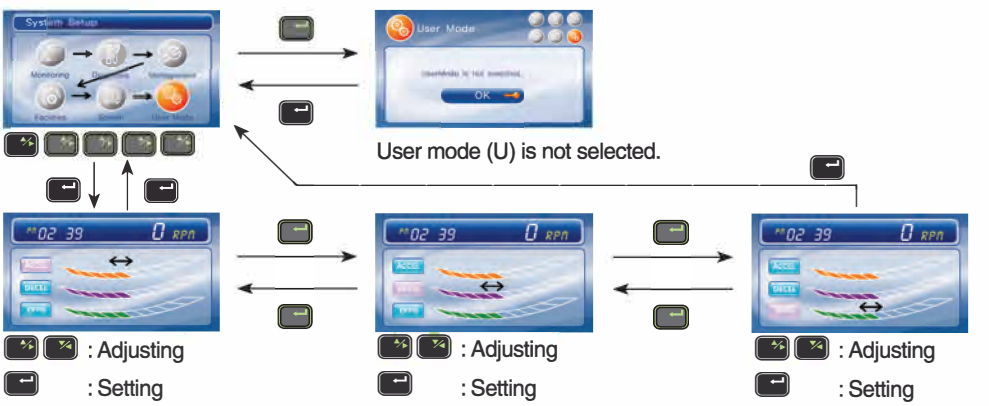
a. Operation skin


b. Brightness


c. Language

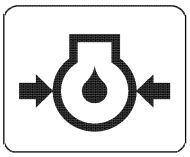



⑥ User mode



5) Warning and pilot lamp

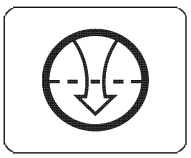
(1) Engine oil pressure warning lamp



21073CD07

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

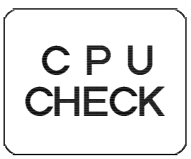
(2) Air cleaner warning lamp



21073CD08

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

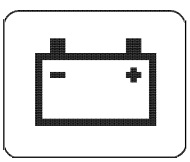
(3) MCU check warning lamp




21073CD10

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

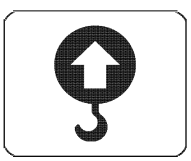
(4) Battery charging warning lamp



21073CD13

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

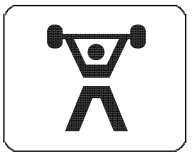
(5) Overload warning lamp (opt)



21073CD15

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

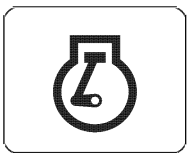
(6) Power max pilot lamp



21073CD11

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

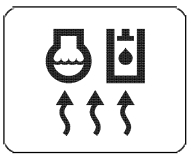
(7) Decel pilot lamp



21073CD17

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

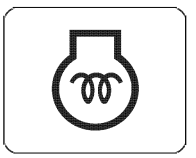
(8) Warming up pilot lamp



21073CD18

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

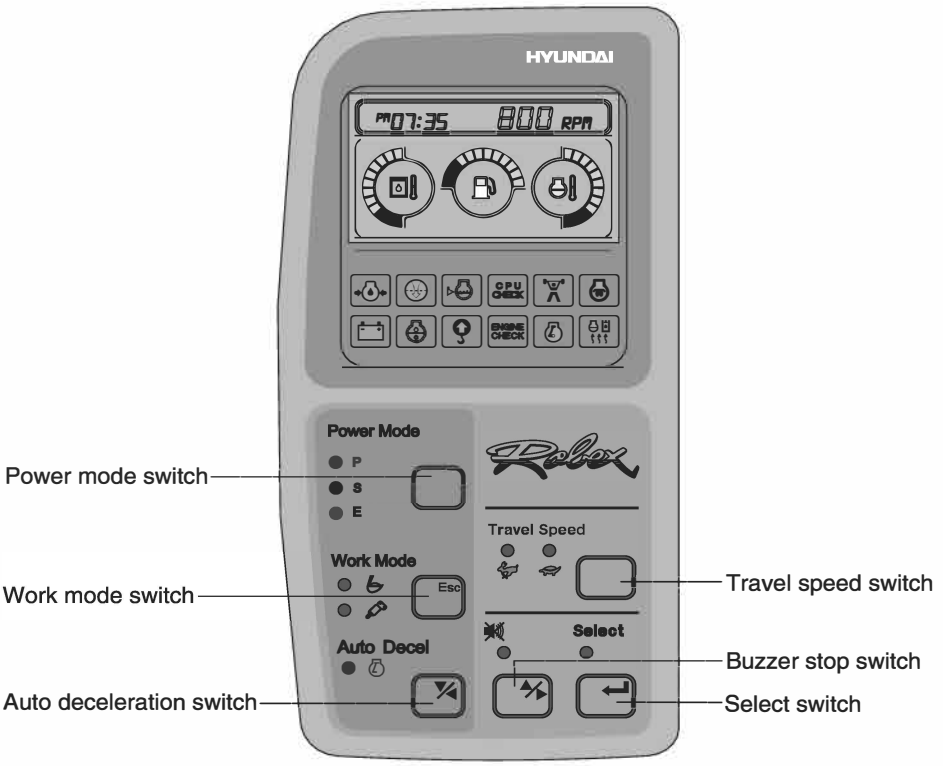
(9) Preheat pilot lamp



21073CD12

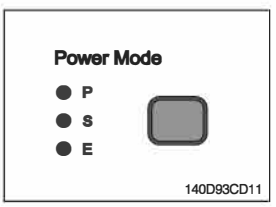
① Turning the start key switch ON position starts preheating in cold weather.
② Start the engine as this lamp is OFF.

## 6) SWITCH PANEL



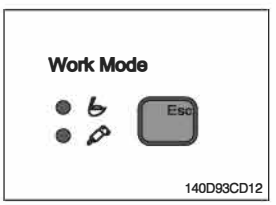

※ When the switches (Work mode, Power mode, Auto decel, Travel speed control) are selected, the pop-up icon is displayed on the LCD.
Refer to the page 3-25 for details.

### (1) Power mode switch




① The lamp of selected mode is turned ON by pressing the switch ( ▭ ).
- P : Heavy duty power work.
- S : Standard power work.
- E : Economy power work.

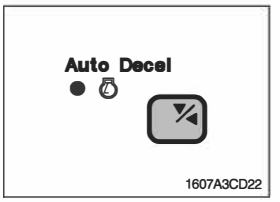
### (2) Work mode switch




① This switch is to select the machine work mode, which shifts from general operation mode to optional attachment operation mode by pressing the switch.
- : General work mode
- : Breaker work mode (if equipped)

※ Refer to the page 4-6 for details.

**(3)** Auto deceleration switch

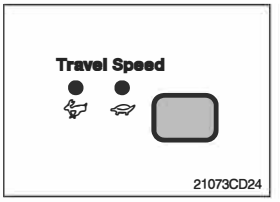



① This switch is used to actuate or cancel the auto deceleration function.

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

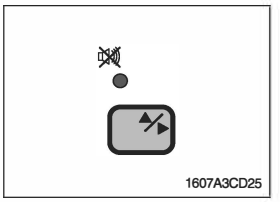
- Light ON : Auto deceleration function is selected.
- Light OFF : a. Auto deceleration function is cancelled so that the engine speed increased to previous setting value.
  b. One touch decel function is available.

(4) Travel speed control switch




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

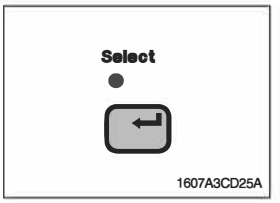
(5) Buzzer stop switch




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

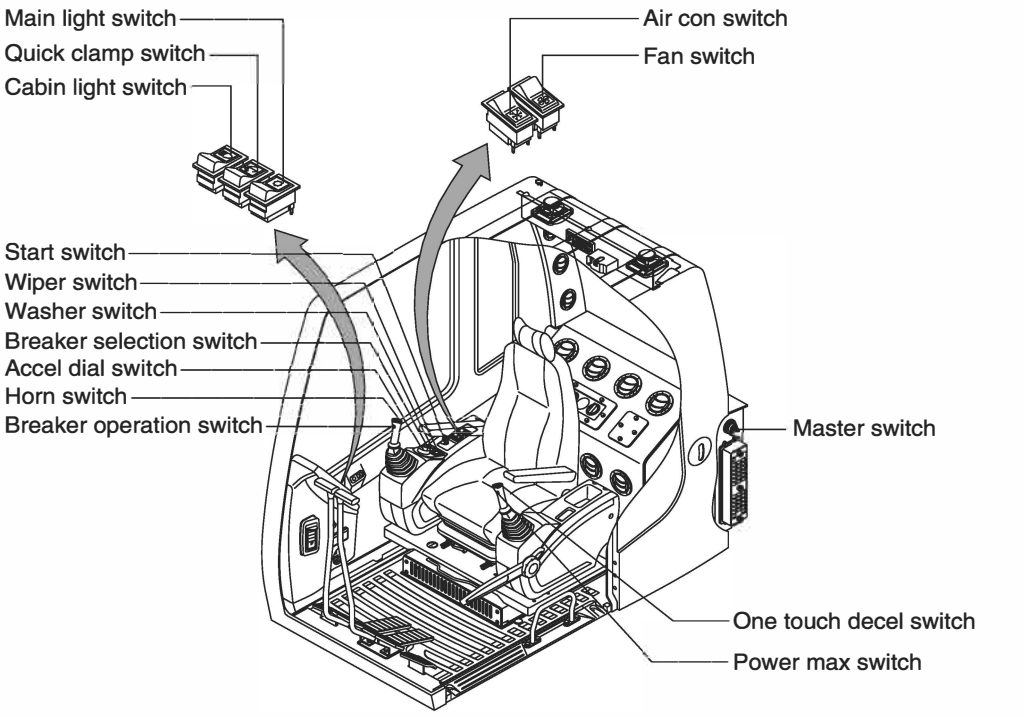
② The red lamp lights ON and the buzzer sounds when the machine has a problem.
In this case, press this switch and buzzer stops, but the red lamp lights until the problem is cleared.

(6) Select switch




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

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




140D93CD47

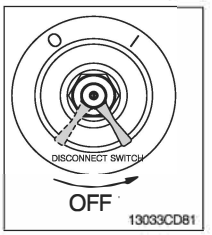
### 1) STARTING SWITCH


(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

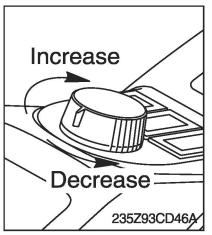



(1) This switch is used to shut off the entire electrical system.

(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.

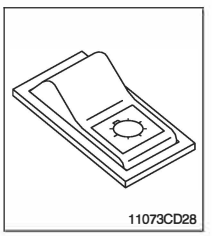
### 3) ACCEL DIAL SWITCH




(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



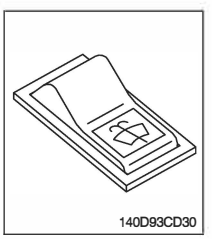

(1) This switch used to operates the head light and work light by two step.
- First step : Head light and cluster illumination lamp comes ON.
- Second step : Work light comes ON. Also, the below indicator lamp comes ON.

### 5) WIPER SWITCH


(1) This switch used to operate wiper.

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

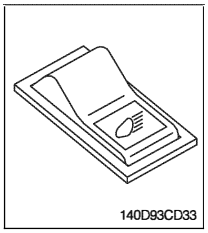
### 6) WASHER SWITCH




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

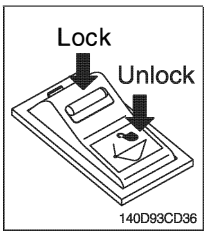
(2) The indicator lamp is turned ON when operating this switch.

### 7) CAB LIGHT SWITCH (option)




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

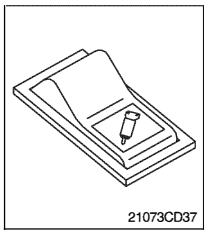
### 8) QUICK CLAMP SWITCH (option)




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

※ Refer to the page 8-6 for details.

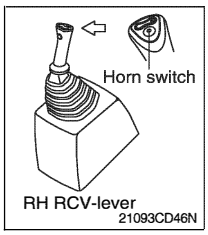
### 9) BREAKER SELECTION SWITCH (option)




(1) This switch is used to select breaker.

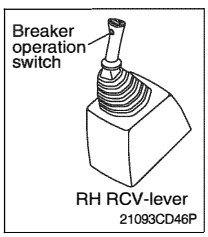
※ The breaker operates only when this switch is selected.

### 10) HORN SWITCH



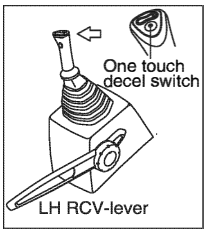

(1) This switch is at the top of right side control lever.
On pressing, the horn sounds.

### 11) BREAKER OPERATION SWITCH




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

### 12) ONE TOUCH DECEL SWITCH

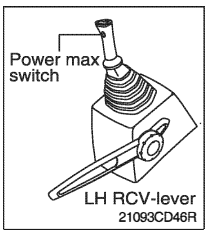



(1) This switch is used to actuate the deceleration function quickly.

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

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

### 13) POWER MAX SWITCH




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

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

※ Do not use for craning purposes.

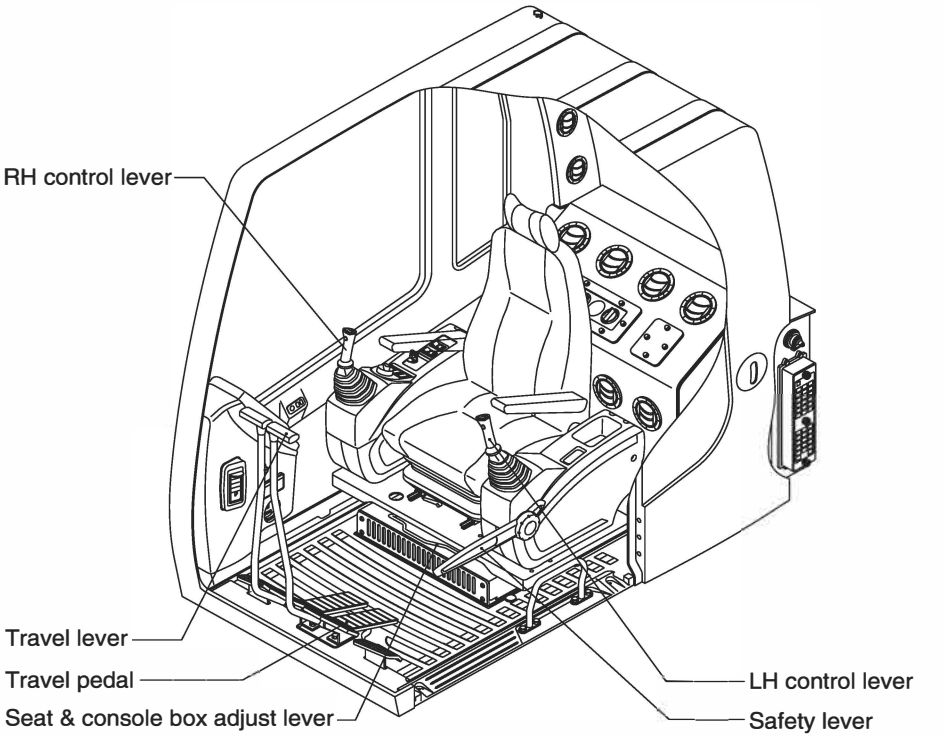
### 14) FAN SWITCH


(1) This switch is used to operate fan.

### 15) AIRCON SWITCH (option)

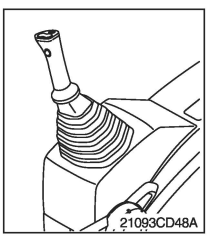

(1) This switch is used to operates the air conditioner.

(2) Refer to the page 3-19 for details.




140D93CD48

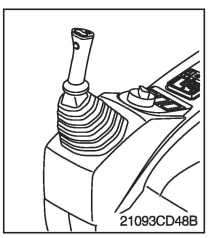
### 1) LH CONTROL LEVER




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

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

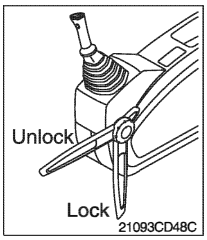
### 2) RH CONTROL LEVER




(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 LEVER



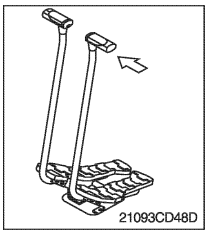

(1) All control levers and pedals are disabled from operation by locating the lever to lock position as shown.

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

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

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

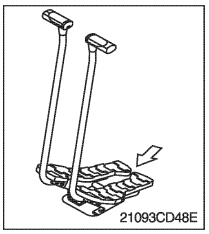
### 4) TRAVEL LEVER




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

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

### 5) TRAVEL PEDAL

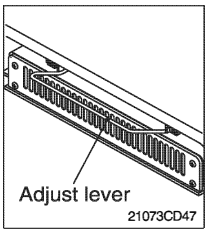



(1) This pedal is used to move the machine forward or backward.

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

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

### 6) SEAT AND CONSOLE BOX ADJUST LEVER



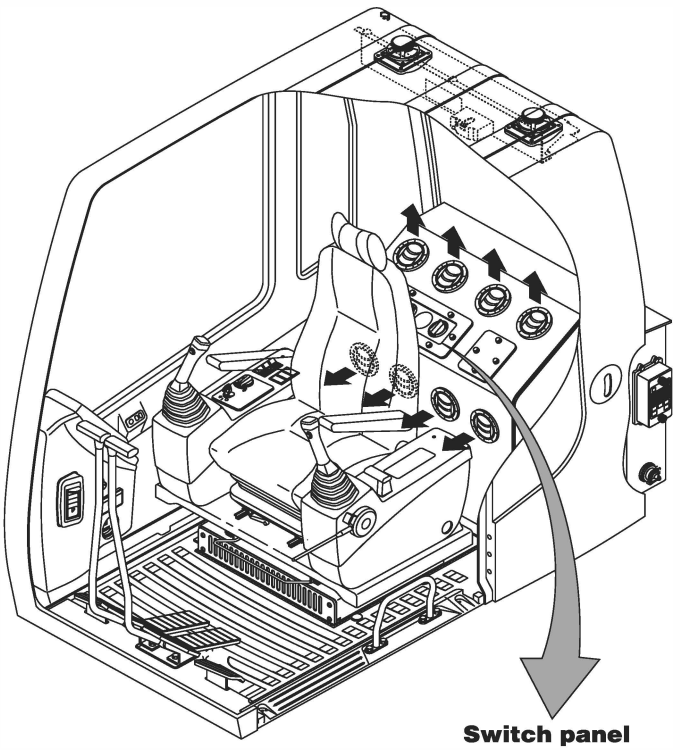

(1) This lever is used to move the seat and console box to fit the contours of the operator's body.

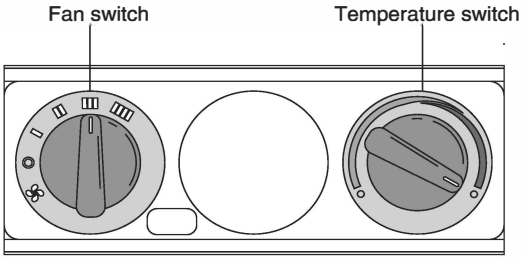
(2) Pull the lever to adjust forward or backward over 170 mm (6.7").

## 5. AIR CONDITIONER AND HEATER

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

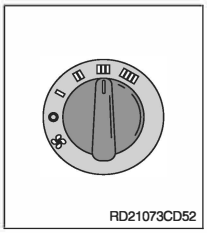
· Location of air flow ducts




RD21073CD48

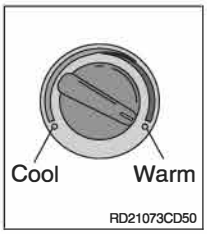
### 1) FAN SWITCH




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

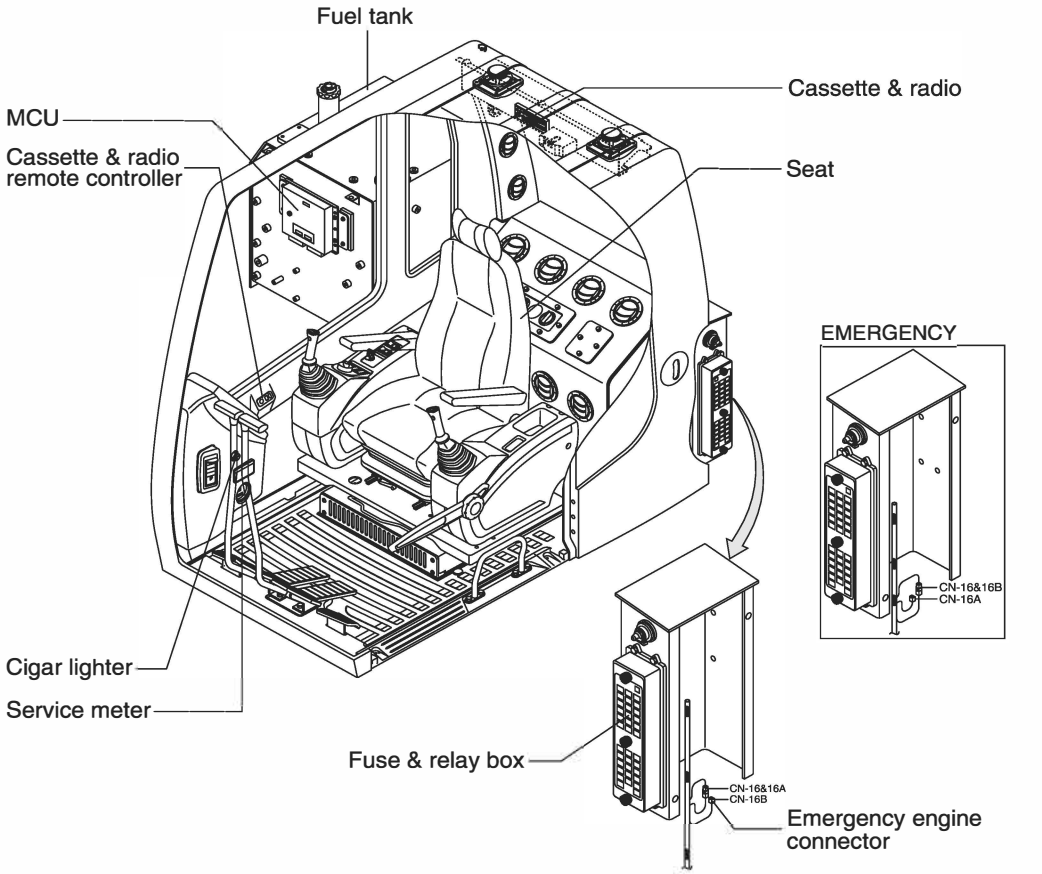
- Turn to right : Fan speed increases
- Turn to left : Fan speed decreases

### 2) TEMPERATURE SWITCH

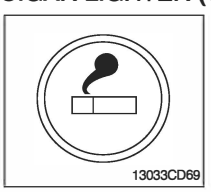



(1) It is possible to control the temperature inside of cab.

- Turn to right : Temperature increases
- Turn to left : Temperature decreases




### 1) CIGAR LIGHTER **(OPTION)**



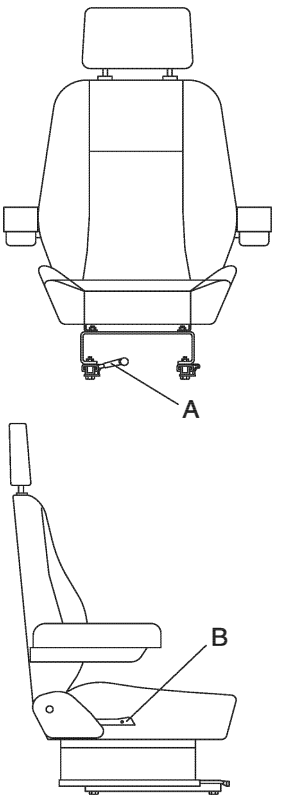

(1) This can be used when the engine starting switch is ON.

(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) SEAT

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




RD21073CD16

(1) Forward / Backward adjustment (A)

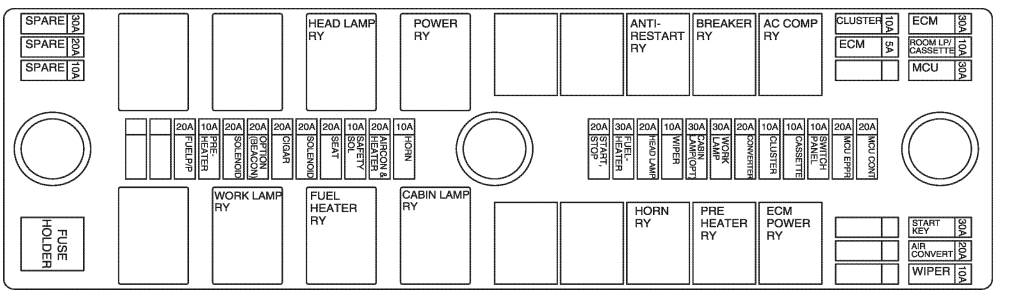
① Pull lever A to adjust seat forward or backward.

② The seat can be moved forward and backward over 140 ㎜ (5.5") in 7 steps.

(2) Reclining adjustment (B)

Pull lever B to adjust seat back rest.

## 3) FUSE & RELAY BOX




21093CD56

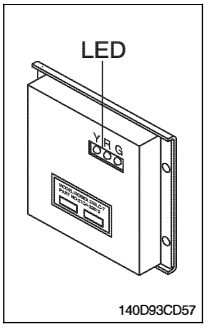
(1) The fuses protect the electrical parts and wiring from burning out.

(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.

### 4) MCU



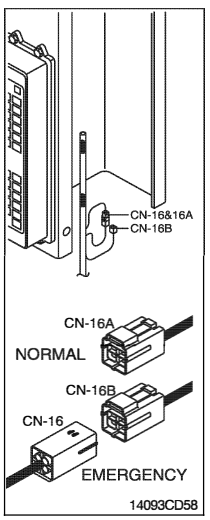

(1) To match the pump absorption torque with the engine torque, MCU varies EPPR valve output pressure, which control pump discharge amount whenever feedbacked engine speed drops under the reference rpm of each mode set.

(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<br>· Check the fuse |

G : green, R : red, Y : yellow

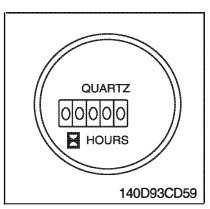
### 5) EMERGENCY ENGINE SPEED CONTROL CONNECTOR




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

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

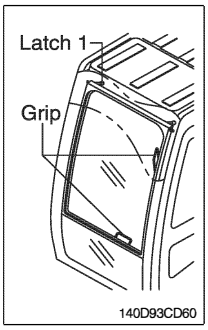
### 6) SERVICE METER




(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.

## 7) UPPER WINDSHIELD

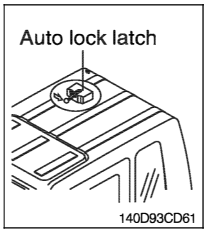



(1) Perform the following procedure in order to open the upper windshield.

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

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

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




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

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

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

## 1. SUGGESTION FOR NEW MACHINE

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

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

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

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

3) Be careful during the initial 100 hours operation

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

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

(3) Tighten bolts.

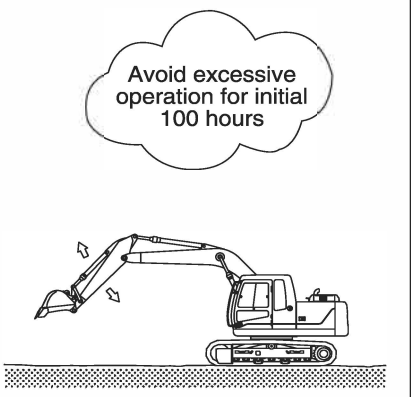
(4) Warm up the machine fully before operation.

(5) Check the gauges occasionally during the operation.

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

4) Replace followings after initial operation hours.

| Checking items | Hours |
|---|---|
| Engine oil | 50 |
| Engine oil filter element | |
| Fuel filter | |
| Prefilter | |
| Hydraulic oil return filter element | 250 |
| Hydraulic oil tank drain filter cartridge | |
| Pilot line filter element | |
| Swing reduction gear oil | |
| Travel reduction gear oil | 500 |




14094OP01

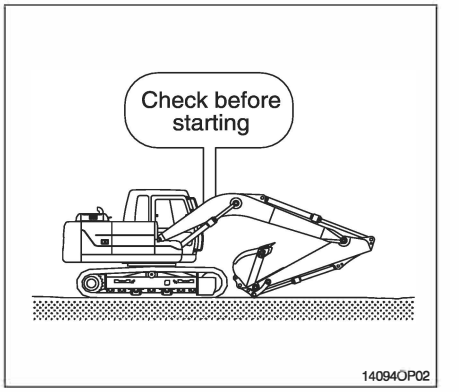
## 2. CHECK BEFORE STARTING THE ENGINE

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 lever is on the neutral position.

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

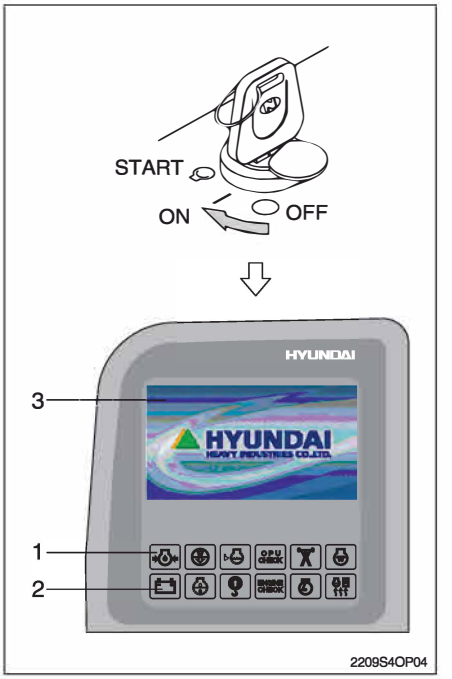
① If all the lamps light ON and buzzer sounding for 2 seconds.

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

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

·Engine oil pressure warning lamp (1)

·Battery charging warning lamp (2)



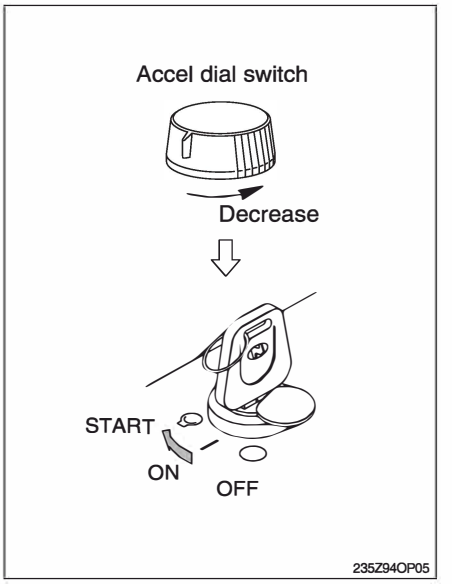

### 2) STARTING ENGINE IN NORMAL TEMPERATURE

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

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

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

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



3) STARTING ENGINE IN COLD WEATHER

※ Sound horn to warn surroundings after checking if there are obstacles in the area.

※ Replace the engine oil and fuel referring to recommended oils at page 2-27.

※ 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.

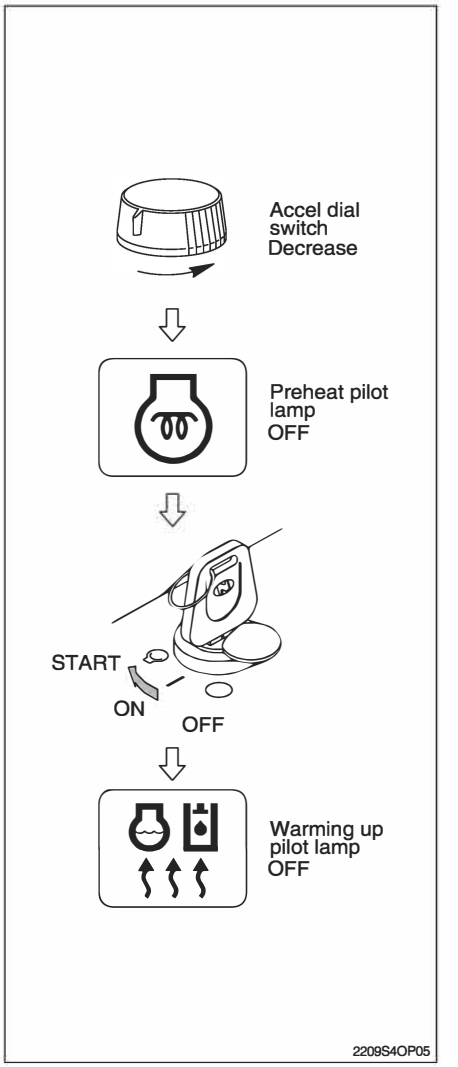
(4) Wait for five minutes to warm up the engine after the preheat pilot lamp OFF, and than turn the starting switch to the START position to start the engine.

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

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

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

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



### 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 (1-6)?

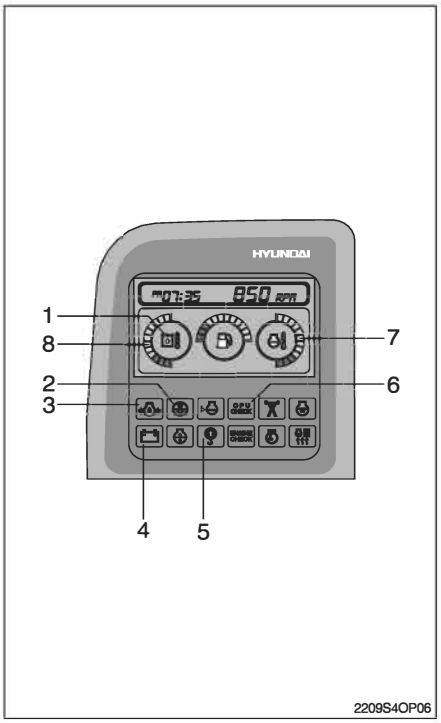
(4) Are the indicator of water temperature gauge (7) and hydraulic temperature gauge (8) in the green zone?

(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 control panel, stop the engine immediately and correct problem as required.




### 5) WARMING-UP OPERATION

※ The most suitable temperature for the hydraulic oil is about 50˚C (122˚F).
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 idling for 5 minutes.

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

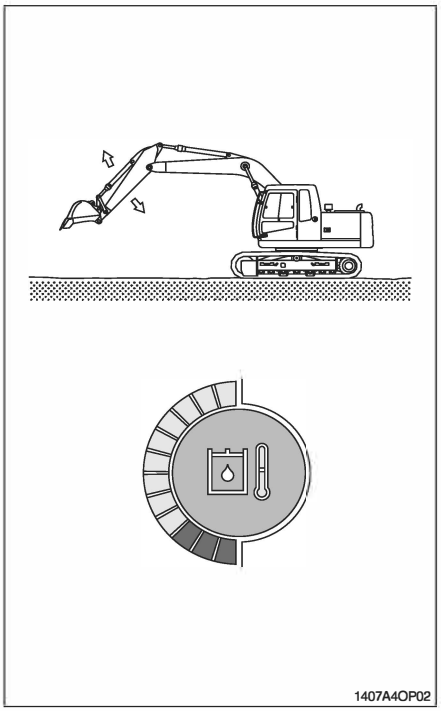
(3) Operate bucket lever for 5 minutes.

※ Do not operate anything except bucket lever.

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

※ Operate only the bucket lever and arm lever.

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



## 4. MODE SELECTION SYSTEM

### 1) STRUCTURE OF CAPO SYSTEM

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

#### (1) Power mode

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

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

#### (2) Work mode

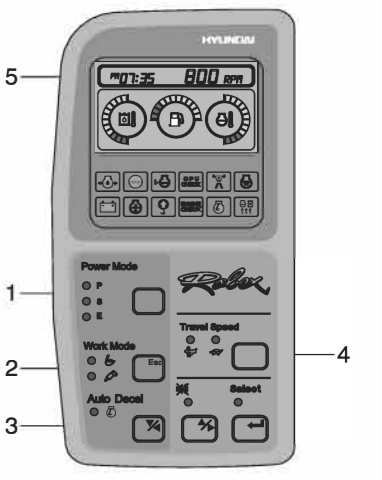
2 work modes can be selected for the optimal work speed of the machine operation.

① General work mode

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

② Breaker operation mode

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




140D94OP07

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

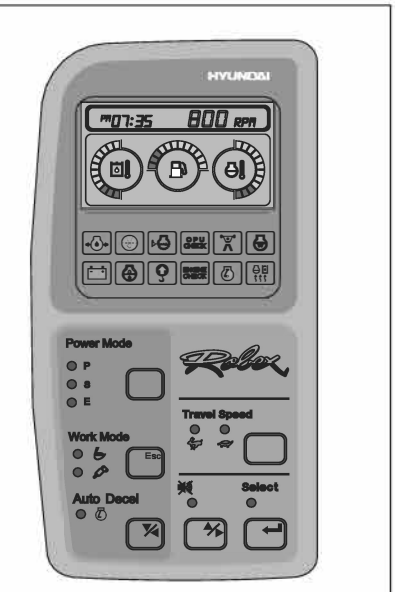
#### (3) Auto decel mode

Engine quick deceleration.

#### (4) Travel mode

: Low speed traveling.

: High speed traveling.




140D94OP09

(5) Monitoring system

Information of machine performance as monitored by the MCU can be displayed on the LCD. Refer to the page 3-26.

(6) Self diagnostic system

① MCU (Machine Control Unit)

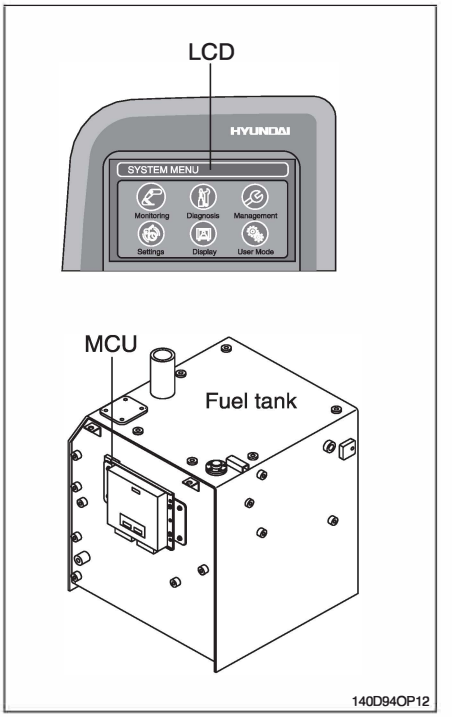
The MCU diagnoses problems in the CAPO system caused by electric parts' malfunction and by open or short circuit, which are displayed on the LCD as error codes (2 digit).

※ Consult hyundai or huyndai dealer for details.

※ Refer to the page 3-26 for LCD display.

(7) Anti-restart system

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




2) HOW TO OPERATE MODE SELECTION SYSTEM

(1) When start key switch is turned ON

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

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

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

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

(2) After engine start

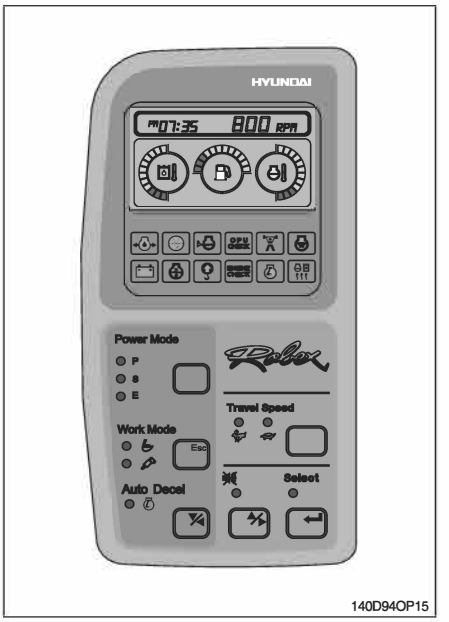
① When the engine is started, three lamps are ON as below.

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

- In this condition, tachometer indicates low idle, 800±100 rpm.
- If coolant temperature is below 30˚C, after 10 seconds the engine speed increases to 1150±100rpm automatically to warm up the machine.
- After 2-3 minutes, you can select any mode depending on job requirement.

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

※ Refer to the page 3-6 for details.



140D94OP15

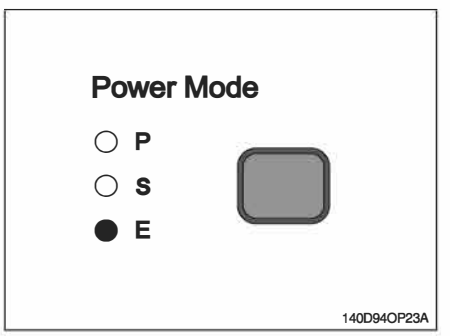
3) SELECTION OF POWER MODE

(1) E mode

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

| Engine rpm | Effect |
|---|---|
| 1150 ± 50 | Same power as **non** mode type machine. |

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



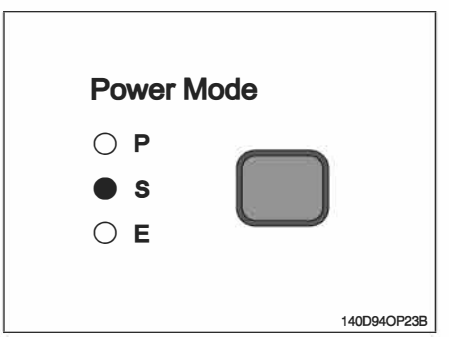
140D94OP23A

(2) **S mode**

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

| Engine rpm | Effect |
|---|---|
| 1900 ± 50 | Approximately 110% of power and speed available than **non** mode type machine or **S** mode. |

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



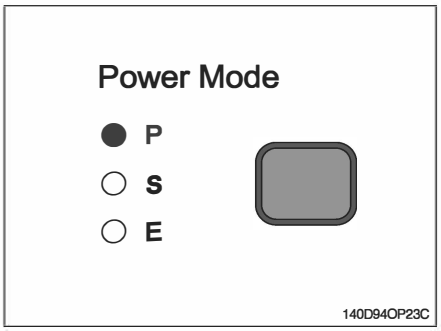
140D94OP23B

(3) P mode

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

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

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



## 5. OPERATION OF THE WORKING DEVICE

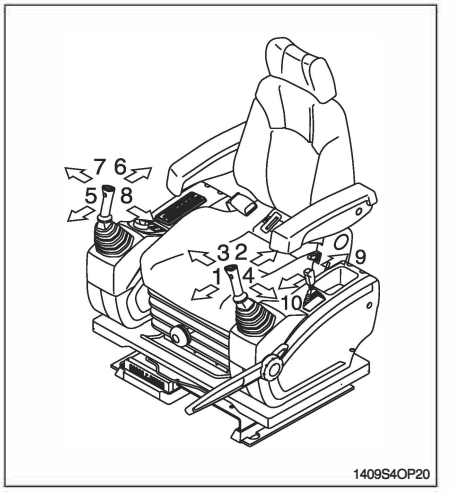
※ Confirm the operation of control lever and working device.

1) Left control lever controls arm and swing.

2) Right control lever controls boom and bucket.

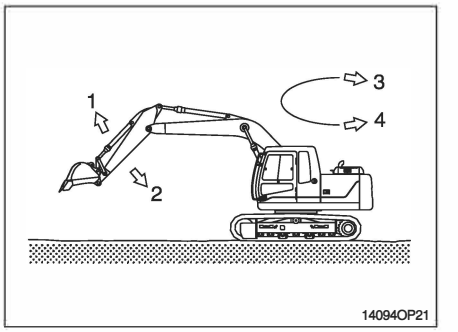
3) When you release the control lever, control lever returns to neutral position automatically.

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



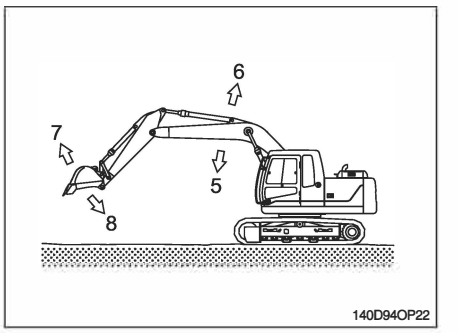
1409S4OP20

※ Left control lever
- 1 Arm roll-out
- 2 Arm roll-in
- 3 Swing right
- 4 Swing left



14094OP21

※ Right control lever
- 5 Boom lower
- 6 Boom raise
- 7 Bucket roll-out
- 8 Bucket roll-in



140D94OP22

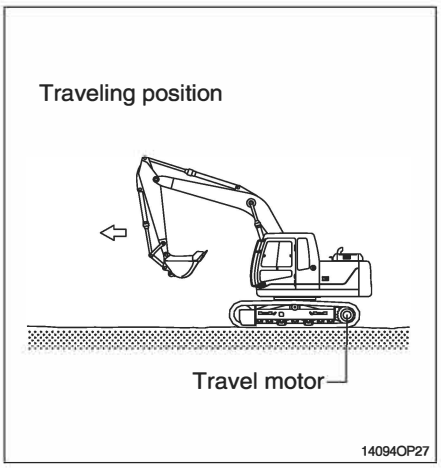
## 6. TRAVELING OF THE MACHINE

### 1) BASIC OPERATION

(1) Traveling position

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

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




(2) Traveling operation

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

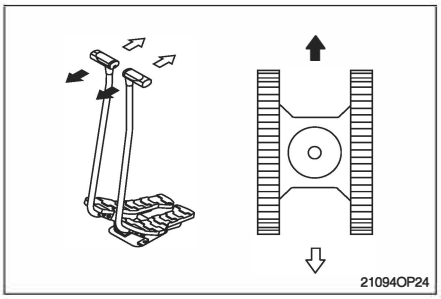
※ Do not travel continuously for a long time.

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

(3) Forward and backward traveling

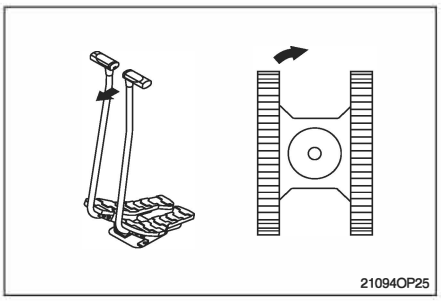
When the left and right travel lever or pedal are pushed at the same time, the machine will travel forward or backward.

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



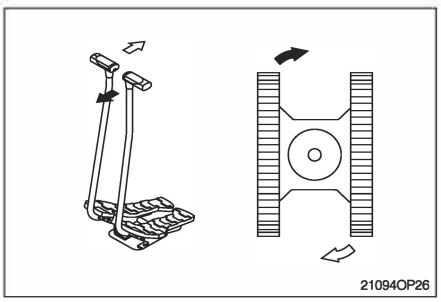

(4) Pivot turning

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




(5) Counter rotation

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



## 2) TRAVELING ON A SLOPE

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

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

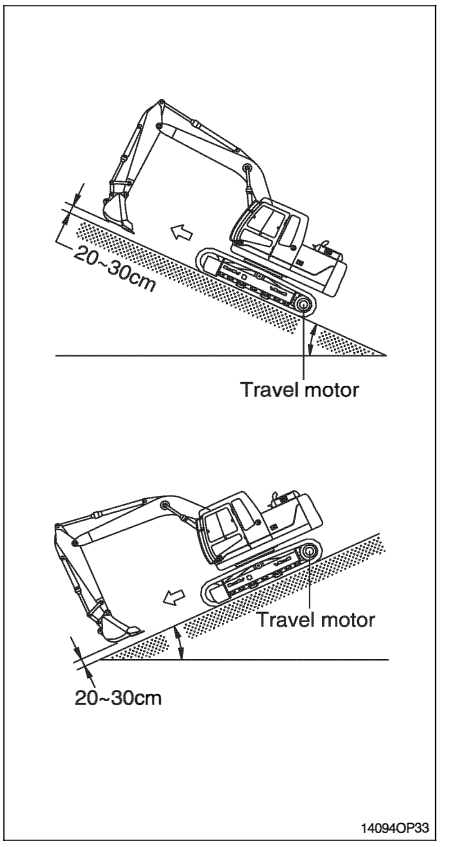
(3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.

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

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

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

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



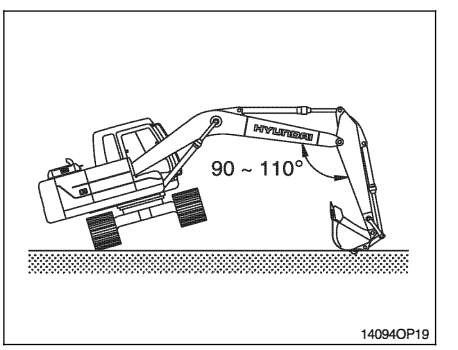

## 3) TRAVELING ON SOFT GROUND

※ If possible, avoid to operate on soft ground.

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

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

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



### 4) TOWING THE MACHINE

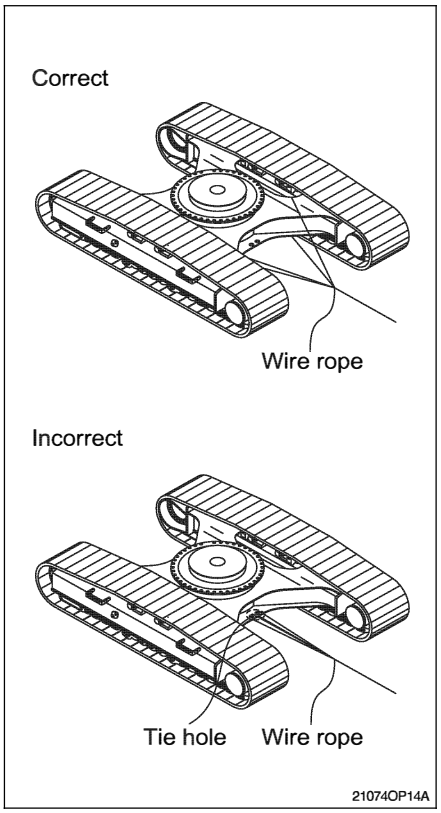
Tow the machine as follows when it can not move on it's own.

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

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

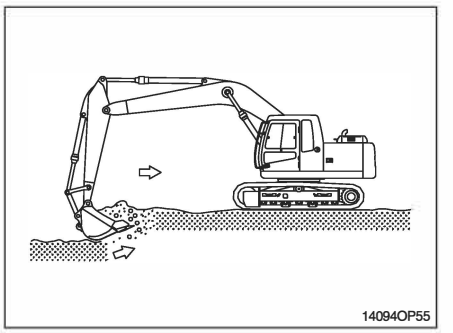
※ Never tow the machine using only the tie hole, because this may break.

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

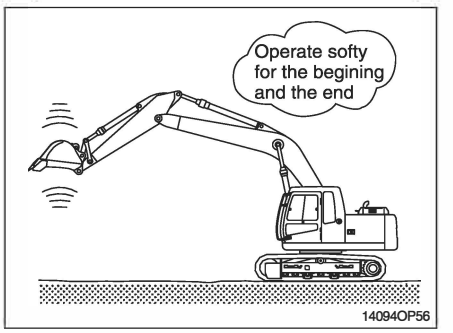


## 7. EFFICIENT WORKING METHOD

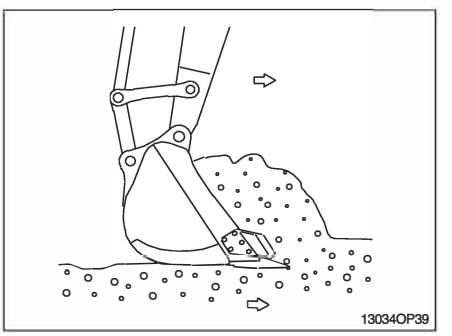
1) Do the digging work by arm.
   Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.



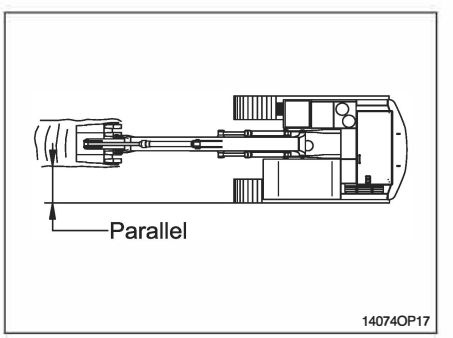

2) When lowering and raising the boom operate softly for the beginning and the end.
   In particularly, sudden stops while lowering the boom may cause damage to the machine.



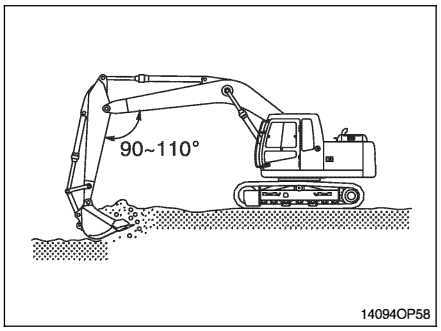

3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



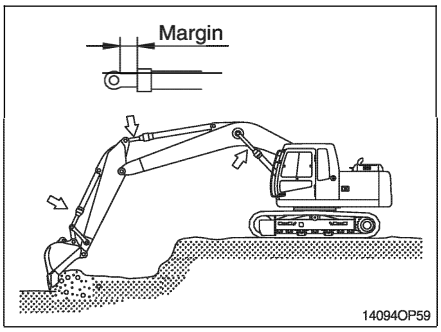

4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



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

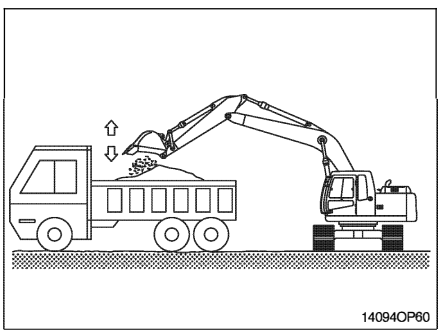



6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

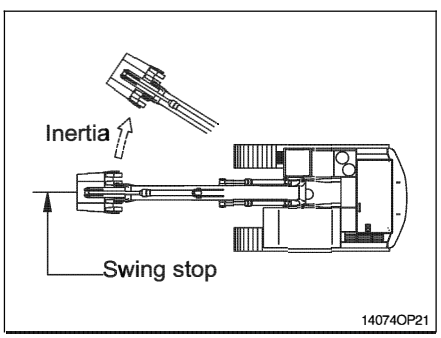



7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

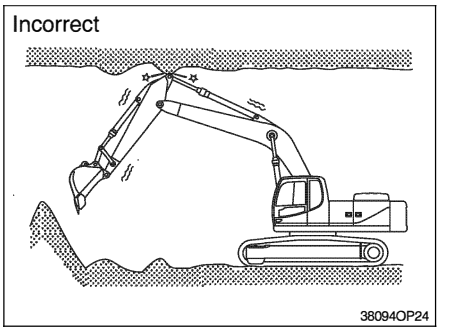
※ Do not use the impact of bucket tooth when dumping.



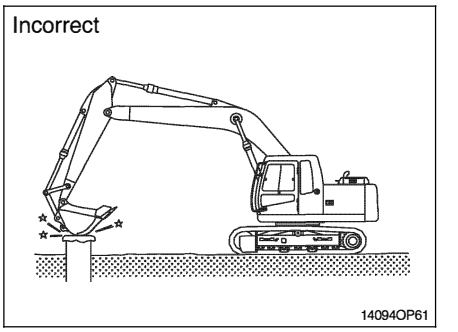

8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



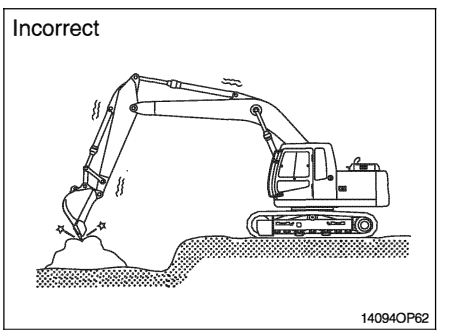
9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



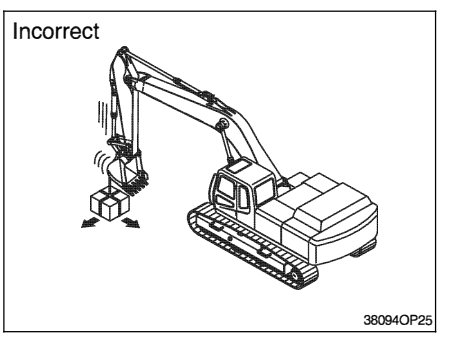

10) Do not use the dropping force of the work equipment for digging.
The machine can be damaged by the impact.




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.

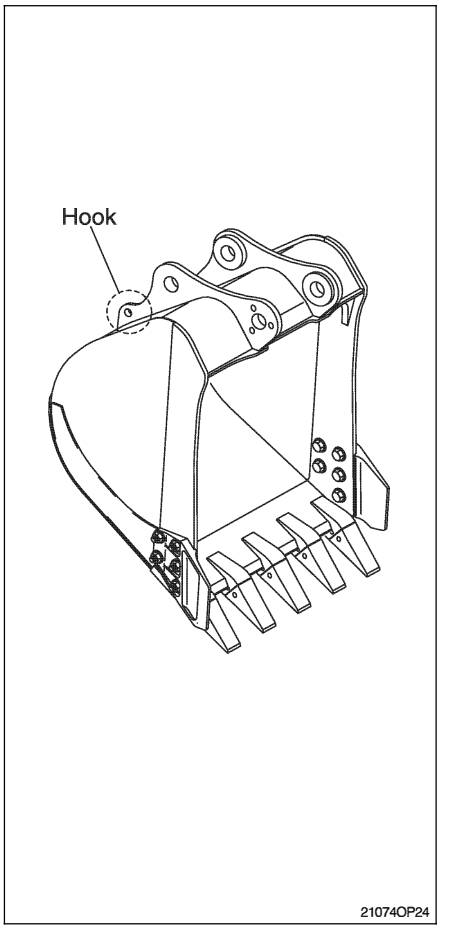
When performing lifting operation, never raise or lower a person.

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.

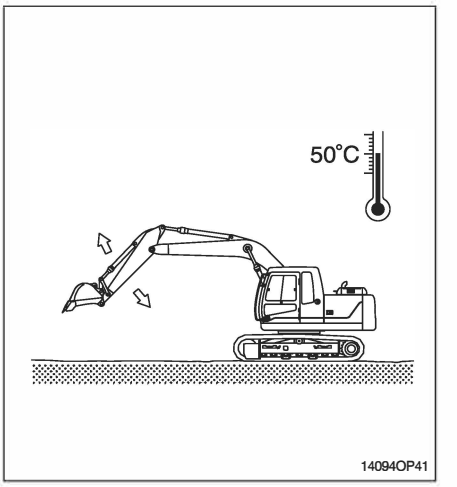
(3) Refer to the starting engine in cold weather. Start the engine and extend the warming up operation.

(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 6 times of cleaning.

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

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

(4) Prevent sand or dust from penetrating into hydraulic circuit by tightly closing breather cap of hydraulic oil tank. Replace hydraulic oil filter frequently.

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

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

### 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.

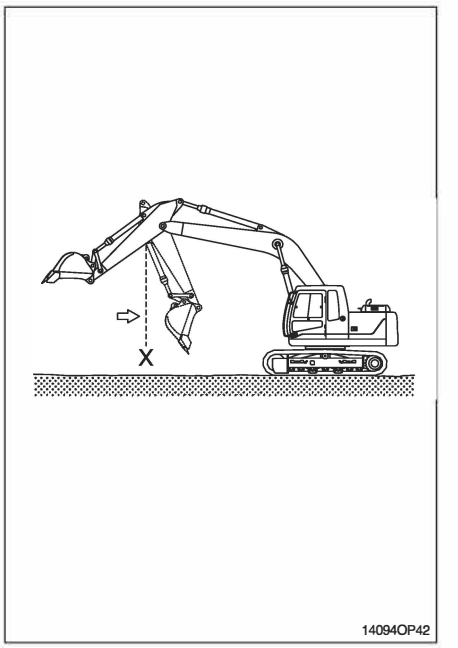
(3) Perform all daily lubrication and service.

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

## 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 lever UNLOCK position. After the engine is stopped, set the safety lever to the LOCK position.

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

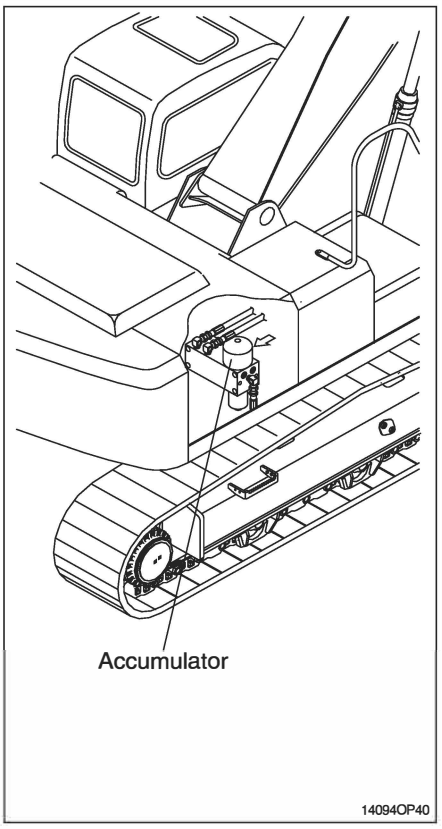
2) The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.

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

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

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

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



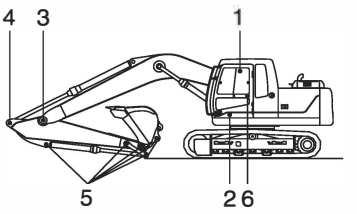
## 11. STORAGE

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

1) CLEANING THE MACHINE
Clean the machine. Check and adjust tracks.
Grease each lubrication part.

2) LUBRICATION POSITION OF EACH PART
Change all oil.

※ Be particularly careful when you reuse the machine.
As oil can be diluted during storage.
Apply an anticorrosive lubricant on the exposed part of piston rod of cylinder and in places where the machine rusts easily.

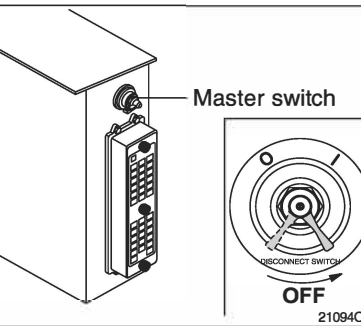



1 Lubricating manifold (5EA)
2 Boom cylinder pin (2EA)
3 Boom and arm connection pin (1EA)
4 Arm cylinder pin (rod side, 1EA)
5 Arm and bucket (6EA)
6 Boom rear bearing center (1EA)

14094OP43

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.

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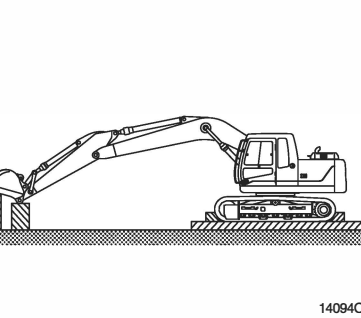
5) PREVENTION OF DUST AND MOISTURE
Keep machine dry. Store the machine setting wood on the ground.

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



14094OP46

6) DURING STORAGE

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

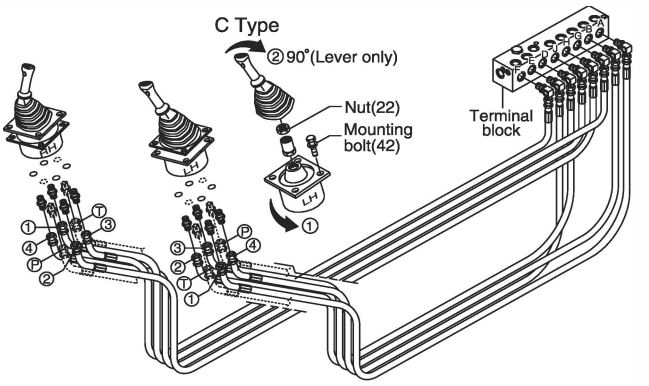
※ Check the level of engine oil and coolant and fill if required when starting engine.

※ 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.

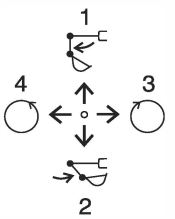
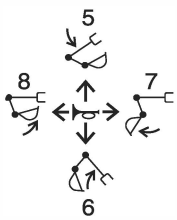
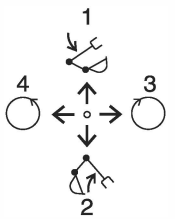
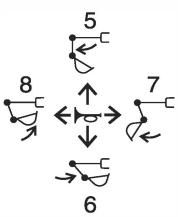
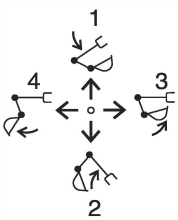
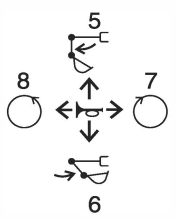
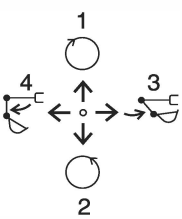
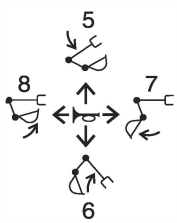
## 12. RCV LEVER OPERATING PATTERN

### 1) PATTERN CHANGE VALVE NOT INSTALL (standard)




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

21094OP50

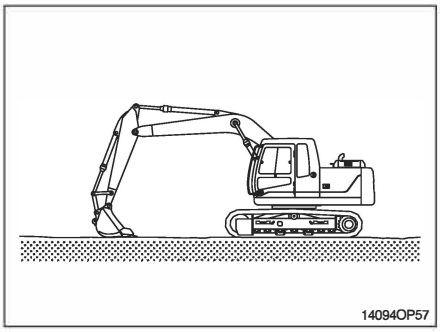
| Pattern | Operation | | Control function | | Hose connection (port) | | |
|---|---|---|---|---|---|---|---|
| | Left RCV lever | Right RCV lever | | | RCV lever | Change of Terminal block From | To |
| ISO Type<br>Hyundai |  |  | Left | 1 Arm out | ② | D | - |
| | | | | 2 Arm in | ④ | E | - |
| | | | | 3 Swing right | ③ | B | - |
| | | | | 4 Swing left | ① | A | - |
| | | | Right | 5 Boom lower | ④ | J | - |
| | | | | 6 Boom raise | ② | H | - |
| | | | | 7 Bucket out | ① | G | - |
| | | | | 8 Bucket in | ③ | F | - |
| A Type |  |  | Left | 1 Boom lower | ② | D | J |
| | | | | 2 Boom raise | ④ | E | H |
| | | | | 3 Swing right | ③ | B | - |
| | | | | 4 Swing left | ① | A | - |
| | | | Right | 5 Arm out | ④ | J | D |
| | | | | 6 Arm in | ② | H | E |
| | | | | 7 Bucket out | ① | G | - |
| | | | | 8 Bucket in | ③ | F | - |
| B Type |  |  | Left | 1 Boom lower | ② | D | J |
| | | | | 2 Boom raise | ④ | E | H |
| | | | | 3 Bucket in | ③ | B | F |
| | | | | 4 Bucket out | ① | A | G |
| | | | Right | 5 Arm out | ④ | J | D |
| | | | | 6 Arm in | ② | H | E |
| | | | | 7 Swing right | ① | G | B |
| | | | | 8 Swing left | ③ | F | A |
| C Type |  |  | Left | ① Loosen the RCV lever mounting bolt (42) and rotates lever assy 90° counterclockwise; then install.<br>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.

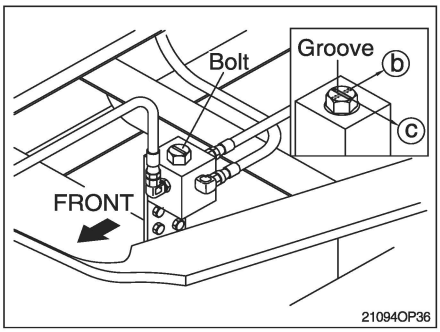
3) Before you change the flow mode of hydraulic attachment circuit, place the machine in the servicing position as shown. Stop the engine.




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

**(1) One way flow** (hydraulic breaker)
Position the groove parallel to the piping (ⓑ).

**(2) Two way flow** (clamshell or shear)
Position the groove perpendicular to the piping (ⓒ).



## 1. PREPARATION FOR TRANSPORTATION

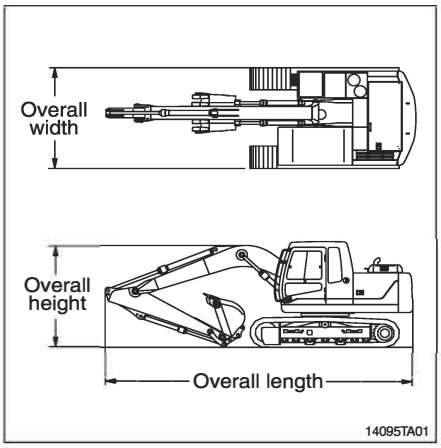
1) When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc.

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

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

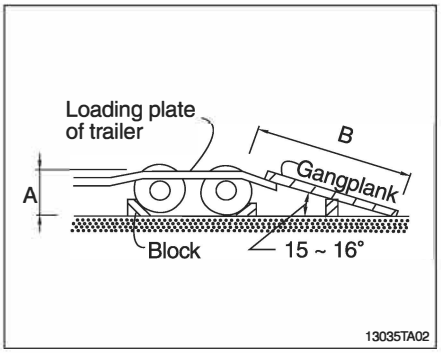
4) Get the permission from the related authority if necessary.

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




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

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

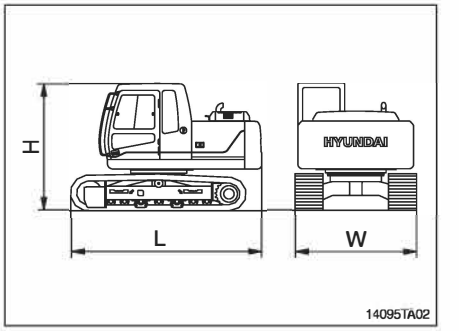


## 2. DIMENSION AND WEIGHT

### 1) BASE MACHINE

| Mark | Description | Unit | Specification |
|---|---|---|---|
| L | Length | mm (ft-in) | 4220 (13'10") |
| H | Height | mm (ft-in) | 2860 ( 9' 5") |
| W | Width | mm (ft-in) | 2600 ( 8' 6") |
| Wt | Weight | kg (lb) | 11600 (25580) |

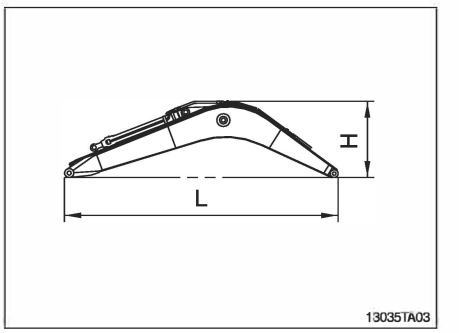
※ With 600 mm (24") triple grouser shoes and 1900 kg (4190 lb) counterweight.




### 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) |

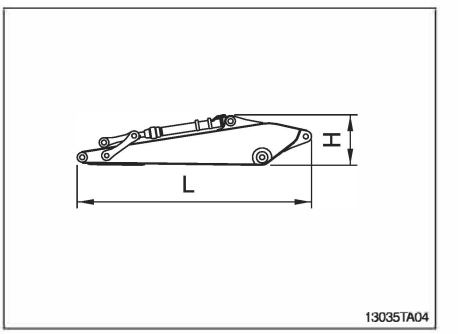
※ 4.6 m (15' 1") boom with arm cylinder (Included piping and pins).




### 3) ARM ASSEMBLY

| Mark | Description | Unit | Specification |
|---|---|---|---|
| L | Length | mm (ft-in) | 2850 (9' 4") |
| H | Height | mm (ft-in) | 750 (2' 6") |
| W | Width | mm (ft-in) | 260 (0' 10") |
| Wt | Weight | kg (lb) | 560 (1230) |

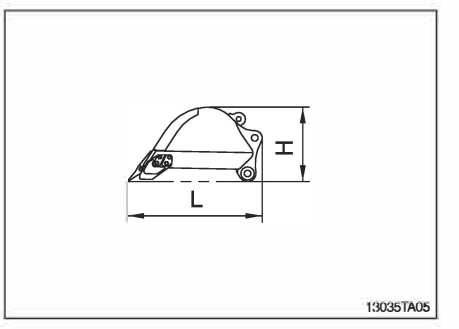
※ 2.10 m (6' 11") arm with bucket cylinder (Included linkage and pins).




### 4) BUCKET ASSEMBLY

| Mark | Description | Unit | Specification |
|---|---|---|---|
| L | Length | mm (ft-in) | 1460 ( 4' 9") |
| H | Height | mm (ft-in) | 870 ( 2' 10") |
| W | Width | mm (ft-in) | 1210 ( 4' 0") |
| Wt | Weight | kg (lb) | 560 (1235) |

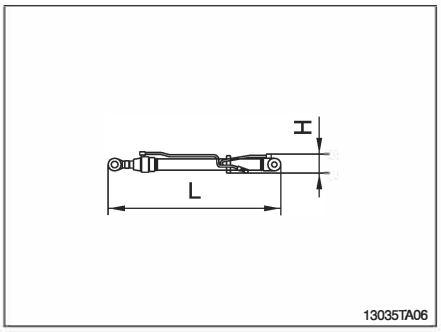
※ 0.65 $m^3$ (0.85 $yd^3$) PCSA heaped bucket (Included tooth and side cutters).



### 5) BOOM CYLINDER

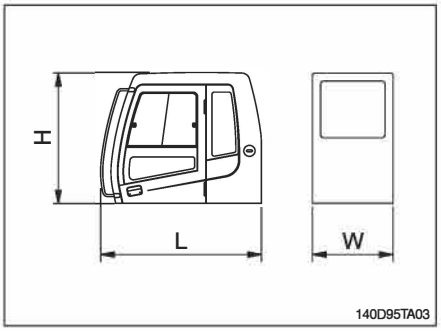
| Mark | Description | Unit | Specification |
|---|---|---|---|
| L | Length | mm (ft-in) | 1760 ( 5' 9") |
| H | Height | mm (ft-in) | 210 ( 0' 8") |
| W | Width | mm (ft-in) | 310 ( 1' 0") |
| Wt | Weight (2 EA) | kg (lb) | 260 (570) |

※ Included piping.



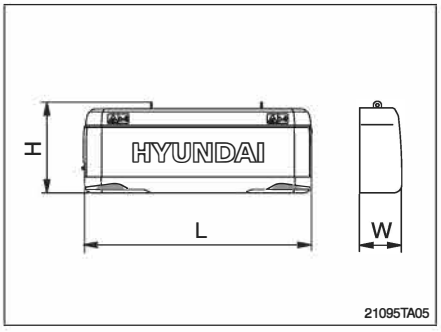

### 6) CAB ASSEMBLY

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




### 7) COUNTERWEIGHT

| Mark | Description | Unit | Specification |
|---|---|---|---|
| L | Length | mm (ft-in) | 2475 ( 8' 1") |
| H | Height | mm (ft-in) | 1050 ( 3' 5") |
| W | Width | mm (ft-in) | 450 ( 1' 6") |
| Wt | Weight | kg (lb) | 1900 (4190) |

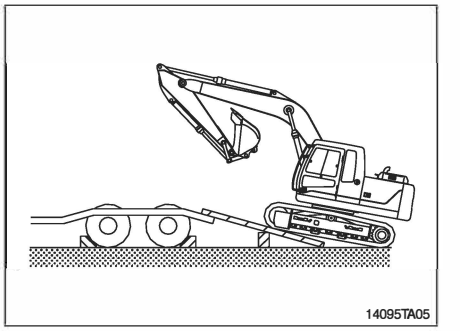


## 3. LOADING THE MACHINE

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

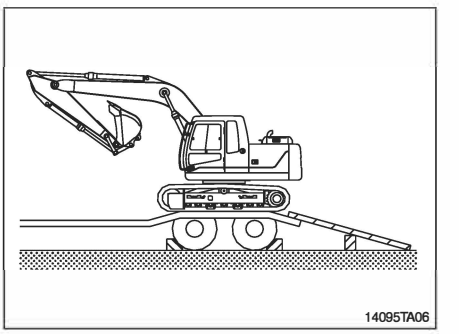
2) Use the gangplank with sufficient length, width, thickness and gradient.

3) Place the swing lock lever to the LOCK position 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.

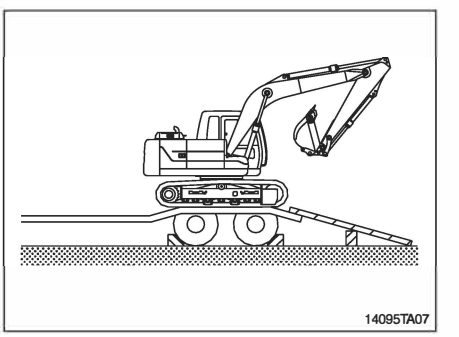



4) Do the following after loading the machine to the trailer.

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




(2) Place the swing lock lever to the LOCK position after the swing the machine 180 degree.



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

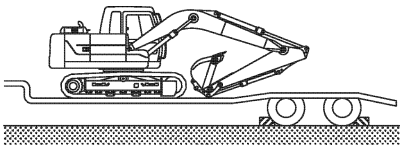
※ Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.

⚠ 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.



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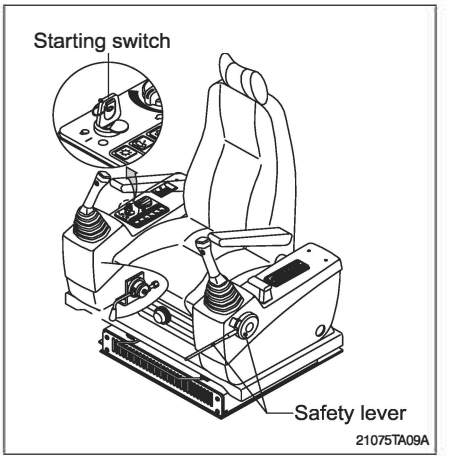
## 4. FIXING THE MACHINE

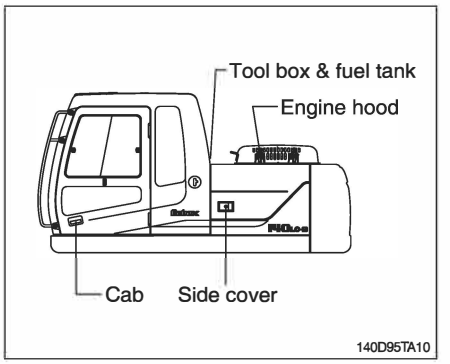
1) Lower down the working device on the loading plate of trailer.

2) Keep the safety lever on the LOCK position.

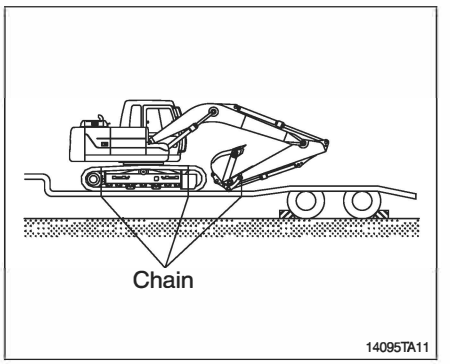
3) Turn OFF all the switches and remove the key.




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.

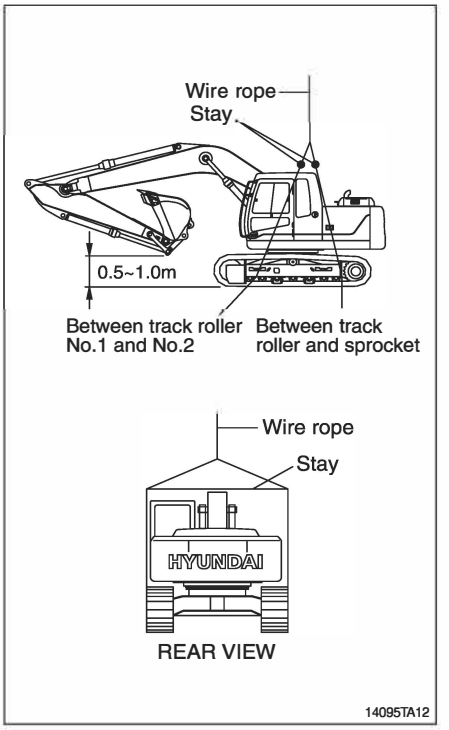
⚠ **Make sure wire rope is proper size.**

⚠ **Place the safety lever 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.**



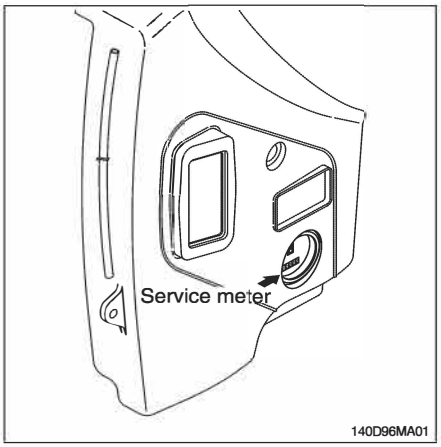
## 1. INSTRUCTION

### 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 cluster support.

(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.

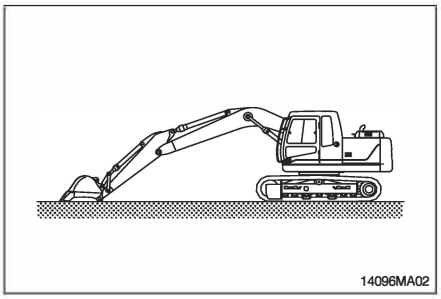
(9) For more detail information of maintenance, please contact local Hyundai dealer.

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

### 4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

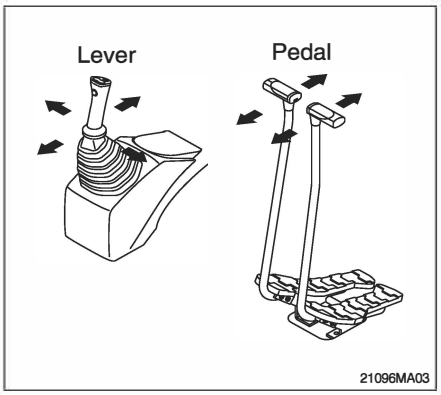
※ Spouting of oil can cause the accident when loosening the cap or hose right after the operating of machine as the machine or oil is on the high pressure on the condition.
Be sure to relieve the pressure in the system before repairing hydraulic system.

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

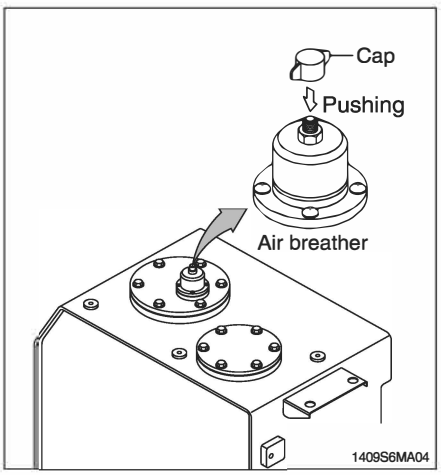



(2) Set the safety lever completely in the release position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ 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, FR) | M14 × 2.0 | 18 ± 0.5 | 130 ± 3.6 |
| 2 | | Engine mounting bolt (engine-bracket, RR) | M12 × 1.75 | 10 ± 0.5 | 72.3 ± 3.6 |
| 3 | | Engine mounting bolt (bracket-frame, FR) | M16 × 2.0 | 30 ± 3.5 | 217 ± 25.3 |
| 4 | | Engine mounting bolt (bracket-frame, RR) | M20 × 2.5 | 55 ± 3.5 | 398 ± 25.3 |
| 5 | | Radiator mounting bolt | M16 × 2.0 | 29.7 ± 4.5 | 215 ± 32.5 |
| 6 | | Coupling mounting socket bolt | M16 × 2.0 | 22 ± 1.0 | 159 ± 7.2 |
| 7 | | Main pump housing mounting bolt | M10 × 1.5 | 6.0 ± 0.3 | 43.4 ± 2.2 |
| 8 | Hydraulic system | Main pump mounting socket bolt | M16 × 2.0 | 22 ± 1.0 | 159 ± 7.2 |
| 9 | | Main control valve mounting bolt | M12 × 1.75 | 12.2 ± 1.3 | 88.2 ± 9.4 |
| 10 | | Fuel tank mounting bolt | M20 × 2.5 | 46 ± 5.1 | 333 ± 36.9 |
| 11 | | Hydraulic oil tank mounting bolt | M20 × 2.5 | 46 ± 5.1 | 333 ± 36.9 |
| 12 | | Turning joint mounting bolt, nut | M12 × 1.75 | 12.3 ± 1.3 | 88.9 ± 9.4 |
| 13 | Power train system | Swing motor mounting bolt | M16 × 2.0 | 29.6 ± 3.2 | 214 ± 23.1 |
| 14 | | Swing bearing upper part mounting bolt | M18 × 2.5 | 41.3 ± 4.0 | 299 ± 28.9 |
| 15 | | Swing bearing lower part mounting bolt | M16 × 1.5 | 29.7 ± 3.0 | 215 ± 21.7 |
| 16 | | Travel motor mounting bolt | M16 × 2.0 | 25.7 ± 4.0 | 186 ± 28.9 |
| 17 | | Sprocket mounting bolt | M16 × 2.0 | 29.7 ± 3.0 | 215 ± 21.7 |
| 18 | Under carriage | Carrier roller mounting bolt, nut | M16 × 2.0 | 29.7 ± 3.0 | 215 ± 21.7 |
| 19 | | Track roller mounting bolt | M16 × 2.0 | 29.7 ± 3.0 | 215 ± 21.7 |
| 20 | | Track tension cylinder mounting bolt | M16 × 2.0 | 21.9 ± 3.3 | 158 ± 23.9 |
| 21 | | Track shoe mounting bolt, nut | 5/8 - 18UNF | 42 ± 4 | 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 | 140 ± 15 | 1013 ± 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 | ISO VG 68 LF |
| Swing and travel reduction gear | SAE 85W-140 (API GL-5) |
| Grease | Lithium base grease NLGI No. 2 |
| Fuel | ASTM D975-No. 2 |
| Coolant | Mixture of 50% ethylene glycol base antifreeze and 50% water. |

**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

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) -20 (-4) / -10 (14) / 0 (32) / 10 (50) / 20 (68) / 30 (86) / 40 (104) |
|---|---|---|---|
| Engine oil pan | Engine oil | 11.5 (3.03) | SAE 30<br>SAE 10W<br>SAE 10W-30<br>SAE 15W-40 |
| Swing drive | Grease | 0.35 (0.09) | NLGI NO.1<br>NLGI NO.2 |
| Swing drive | Gear oil | 2.5 (0.7) | SAE 85W-140 |
| Final drive | Gear oil | 2.2×2 (0.6×2) | SAE 85W-140 |
| Hydraulic tank | Hydraulic oil | Tank: 124 (32.8) System: 210 (55.5) | ISO VG 32<br>ISO VG 46<br>ISO VG 68 LF |
| Fuel tank | Diesel fuel | 270 (71.0) | ASTM D975 NO.1<br>ASTM D975 NO.2 |
| Fitting (Grease nipple) | Grease | As required | NLGI NO.1<br>NLGI NO.2 |
| Radiator (Reservoir tank) | Mixture of antifreeze and water 50 : 50 | 15.5 (4.1) | Ethylene glycol base permanent type |

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

## 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 | 6-27 |
| Engine oil level | Check, Add | 6-18 |
| Coolant level | Check, Add | 6-20 |
| Control panel & pilot lamp | Check, Clean | 6-35 |
| Prefilter | Check, Clean | 6-26 |
| Fan belt tension | Check, Adjust | 6-24 |
| ★ Attachment pin and bushing | Lubricate | 6-34 |
| · 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 | 6-33 |
| Swing reduction gear oil | Check, Add | 6-31 |
| Attachment pin and bushing | Lubricate | 6-34 |
| · Bucket cylinder rod end | | |
| · Bucket + Arm connecting | | |
| · Bucket control link + Arm | | |
| · Bucket control rod | | |

### 3) INITIAL 50 HOURS SERVICE

| Check items | Service | Page |
|---|---|---|
| Engine oil | Change | 6-18, 19 |
| Engine oil filter | Replace | 6-18, 19 |
| Prefilter (water, element) | Replace | 6-26 |
| Fuel filter | Replace | 6-26 |
| 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 | | |

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

### 4) EVERY 200 HOURS SERVICE

| Check items | Service | Page |
|---|---|---|
| ★ Return filter | Replace | 6-29 |
| ★ Pilot line filter | Replace | 6-30 |
| ★ Drain filter cartridge | Replace | 6-30 |

★ Replace 3 filters for continuous hydraulic breaker operation only.

### 5) INITIAL 250 HOURS SERVICE

| Check items | Service | Page |
|---|---|---|
| Pilot line filter | Replace | 6-30 |
| Hydraulic return filter | Replace | 6-29 |
| Drain filter cartridge | Replace | 6-30 |
| Swing reduction gear oil | Change | 6-31 |
| Swing bearing grease | Lubricate | 6-31 |

### 6) EVERY 250 HOURS SERVICE

| Check items | Service | Page |
|---|---|---|
| Battery (voltage) | Check, Clean | 6-35 |
| Aircon & heater fresh air filter | Check | 6-39 |
| Air breather element | Replace | 6-30 |
| 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 | 6-34 |
| · 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) INITIAL 500 HOURS SERVICE

| Check items | Service | Page |
|---|---|---|
| Travel reduction gear oil | Change | 6-32 |

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

### 8) EVERY 500 HOURS SERVICE

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

### 9) EVERY 1000 HOURS SERVICE

| Check items | Service | Page |
|---|---|---|
| Travel motor reduction gear oil | Change | 6-32 |
| Swing reduction gear oil | Change | 6-31 |
| Grease in swing gear and pinion | Change | 6-32 |
| Hydraulic oil return filter | Replace | 6-29 |
| Drain filter cartridge | Replace | 6-30 |
| Pilot line filter | Replace | 6-30 |

### 10) EVERY 5000 HOURS SERVICE

| Check items | Service | Page |
|---|---|---|
| Hydraulic tank | | |
| ★ Oil *1 | Change | 6-28 |
| · Suction strainer | Check, Clean | 6-29 |
| Coolant | Change | 6-20, 21, 22, 23 |

*1 Conventional hydraulic oil

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

### 11) EVERY 5000 HOURS SERVICE

| Check items | Service | Page |
|---|---|---|
| Hydraulic tank | | |
| ★ Oil *2 | Change | 6-28 |

*2 Hyundai genuine long life hydraulic oil

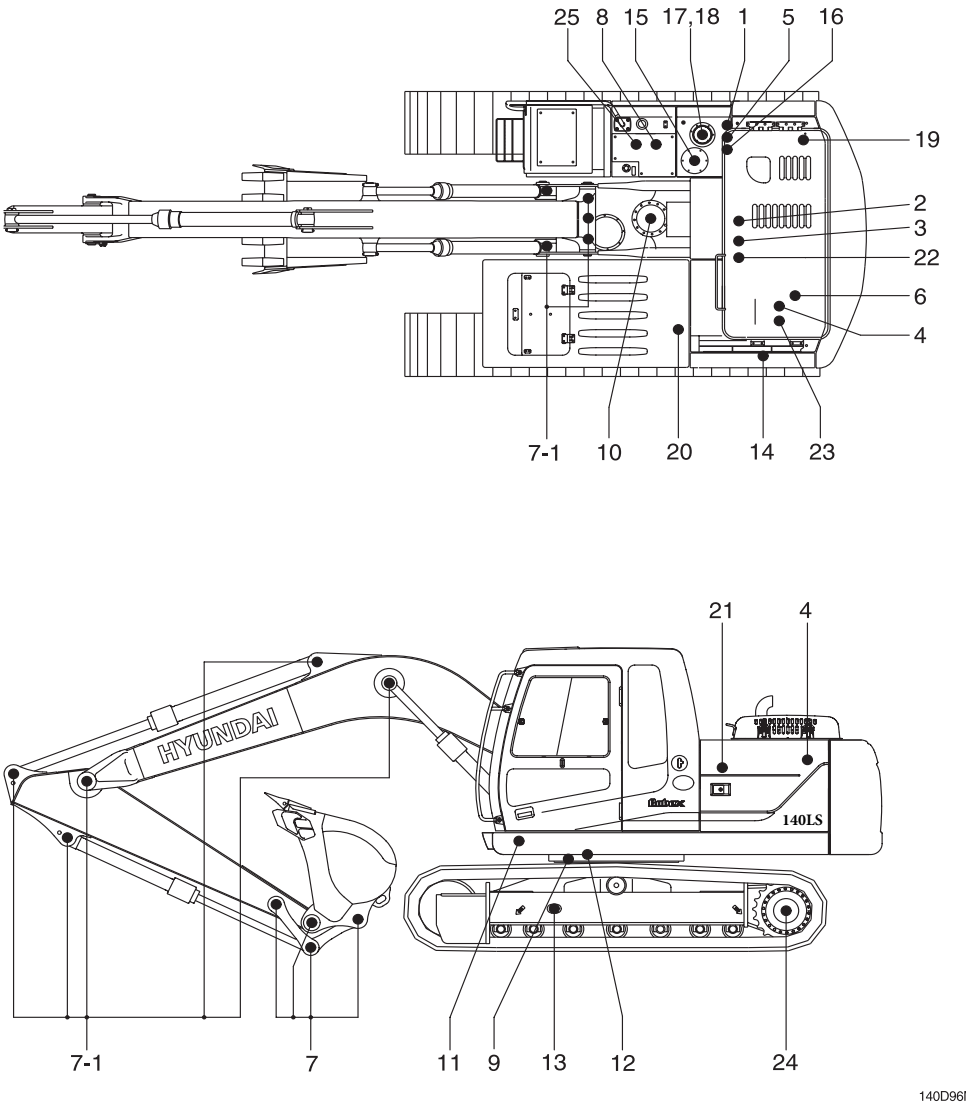
★ Change oil every 1000 hours of continuous hydraulic breaker operation.

### 12) 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 |
| · Prefilter | Clean or Replace | 6-26 |
| · Fuel filter element | Replace | 6-27 |
| Engine lubrication system | | |
| · Engine oil | Change | 6-18, 19 |
| · Engine oil filter | Replace | 6-18, 19 |
| Engine cooling system | | |
| · Coolant | Add or Change | 6-20, 21, 22, 23 |
| · Radiator | Clean or Flush | 6-20, 21, 22, 23 |
| · Charge air cooler | Check | 6-23 |
| Engine air system | | |
| · Air cleaner element | Replace | 6-25 |
| Hydraulic system | | |
| · Hydraulic oil | Add or Change | 6-28 |
| · Return filter | Replace | 6-29 |
| · Drain line filter | Replace | 6-30 |
| · Pilot line filter | Replace | 6-30 |
| · Element of breather | Replace | 6-30 |
| · Suction strainer | Clean | 6-29 |
| Under carriage | | |
| · Track tension | Check, Adjust | 6-33 |
| Bucket | | |
| · Tooth | Replace | 6-35 |
| · Side cutter | Replace | 6-35 |
| · Linkage | Adjust | 6-36 |
| · Bucket assy | Replace | 6-34 |
| Air conditioner and heater | | |
| · Fresh air filter | Clean, Replace | 6-38 |
| · Recirculation filter | Clean | 6-39 |

## 5. MAINTENANCE CHART

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**Caution**

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

| Service interval | No. | Description | Service action | Oil symbol | Capacity ℓ (U.S.gal) | Service points No. |
|---|---|---|---|---|---|---|
| 10 Hours or daily | 1 | Hydraulic oil level | Check, Add | HO | 124 (32.8) | 1 |
| | 2 | Engine oil level | Check, Add | EO | 17.5 (4.6) | 1 |
| | 4 | Radiator coolant | Check, Add | C | 15.5 (4.1) | 1 |
| | 5 | Prefilter (water, element) | Check, Clean | - | - | 1 |
| | 6 | Fan belt tension and damage | Check, Adjust | - | - | 1 |
| | 25 | Fuel tank | Check, Refill | DF | 270 (71) | 1 |
| 50 Hours or weekly | 7 | Attachment pins & bushing | Check, Add | PGL | - | 5 |
| | 8 | Fuel tank (water, sediment) | Check, Clean | - | - | 1 |
| | 10 | Swing reduction gear case | Check, Add | GO | 2.5 (0.66) | 1 |
| | 11 | Swing reduction gear grease | Check, Add | PGL | 0.32 kg (0.7 lb) | 1 |
| | 13 | Track tension | Check, Adjust | PGL | - | 2 |
| 250 Hours | 7-1 | Attachment pins & bushing | Check, Add | PGL | - | 12 |
| | 9 | Swing bearing grease | Check, Add | PGL | - | 3 |
| | 14 | Battery (voltage) | Check, Clean | - | - | 1 |
| | 17 | Air breather element | Replace | - | - | 1 |
| | 20 | Aircon and heater fresh air filter | Check, Clean | - | - | 1 |
| 500 Hours | 2 | Engine oil | Change | EO | 17.5 (4.6) | 1 |
| | 3 | Engine oil filter | Replace | - | - | 1 |
| | 5 | Prefilter | Replace | - | - | 1 |
| | 21 | Air cleaner element (primary) | Check, Clean | - | - | 1 |
| | 22 | Fuel filter element | Replace | - | - | 1 |
| | 23 | Radiator, oil cooler | Check, Clean | - | - | 2 |
| 1000 Hours | 10 | Swing reduction gear case | Change | GO | 2.5 (0.66) | 1 |
| | 11 | Swing reduction gear grease | Change | PGL | 0.32 kg (0.7 lb) | 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 |
| | 19 | Pilot line filter element | Replace | - | - | 1 |
| | 24 | Travel reduction gear case | Change | GO | 2.2 (0.6) | 2 |
| 2000 Hours | 1 | Hydraulic oil *1 | Change | HO | 124 (32.8) | 1 |
| | 4 | Radiator coolant | Change | C | 15.5 (4.1) | 1 |
| | 18 | Hydraulic oil suction strainer | Check, Clean | - | - | 1 |
| 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, safety) | Replace | - | - | 2 |

*1 Conventional hydraulic oil *2 Hyundai genuine long life hydraulic oil

※ Oil symbol

Please refer to the recommended lubricants for specification.

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

C : Coolant PGL : Grease EO : Engine oil

1) CHECK ENGINE OIL LEVEL

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

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

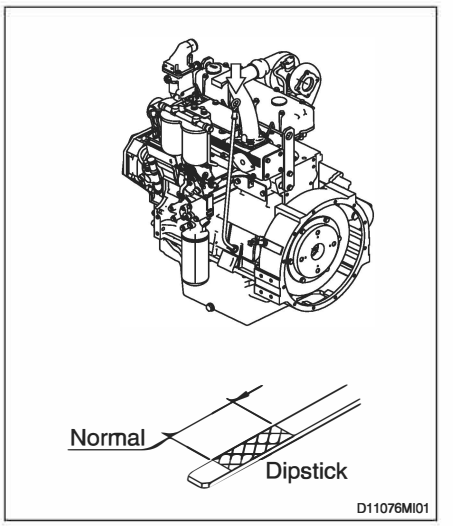
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

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

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

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

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

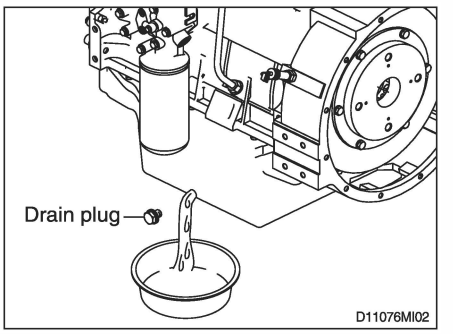



2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

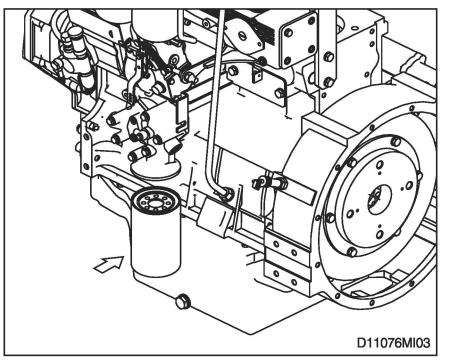
(1) Warm up the engine.

(2) Turn the lever to open position.

※ A drain pan with a capacity of 20 liters (5.0 U.S. gallons) will be adequate.

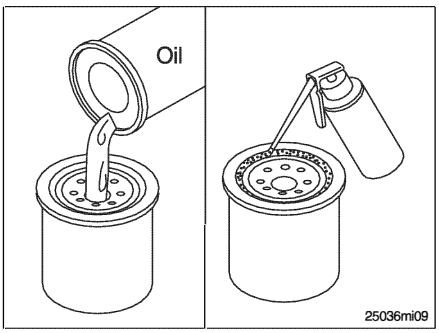



(3) Clean around the filter head, remove the filter with a filter wrench and clean the gasket surface.



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

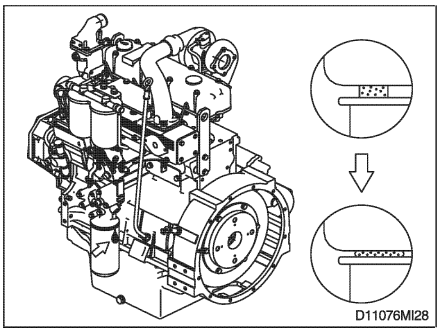
※ Fill the filters with clean lubricating oil.



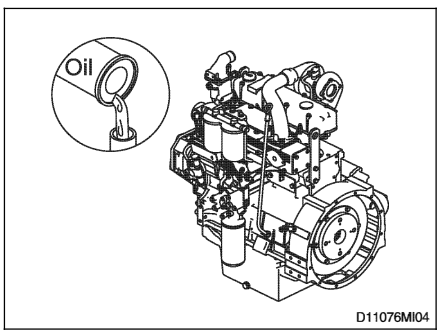

(5) Install the filter to the filter head.

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

· Install the filter as specified by the filter manufacturer.

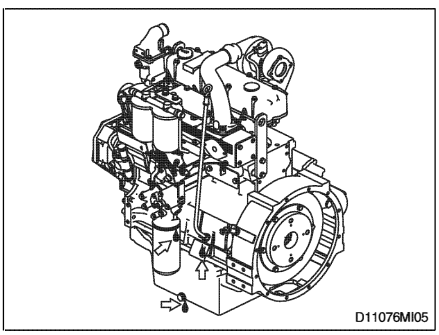



(6) Fill the engine with clean oil to the proper level.




(7) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.

Shut the engine off and check the oil level with the dipstick. Allow 15 minutes for oil to drain down before checking.



3) CHECK COOLANT

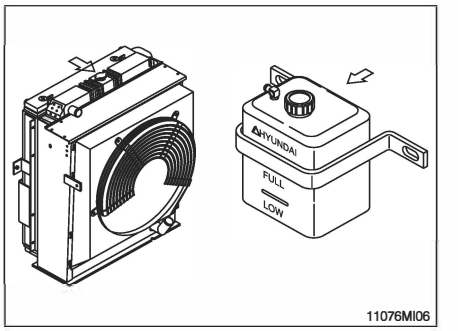
(1) Check if the level of coolant in reservoir tank is between FULL and LOW.

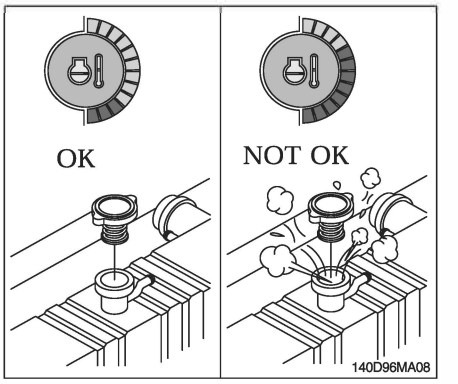
(2) Add the mixture of antifreeze and water after removing the cap of the reservoir tank if coolant is not sufficient.

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

(4) Replace gasket of radiator cap when it is damaged.

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



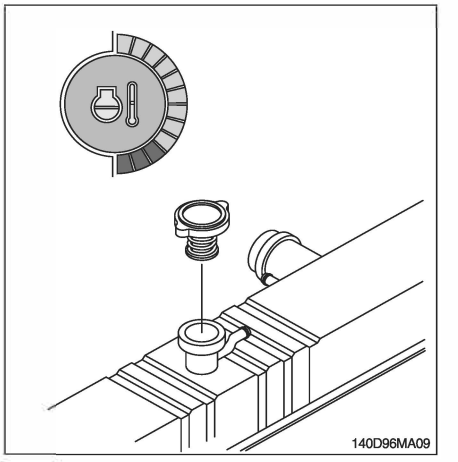




4) FLUSHING AND REFILLING OF RADIATOR

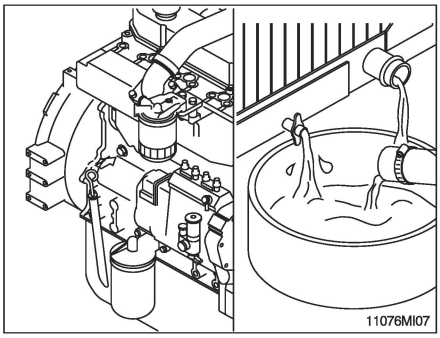
(1) Change coolant

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

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



⚠ Wait until the temperature is below 50 °C (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 40 liters (10 U.S.gallons) will be adequate in most applications.

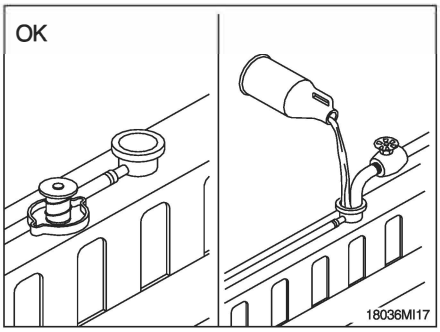



(2) Flushing of cooling system

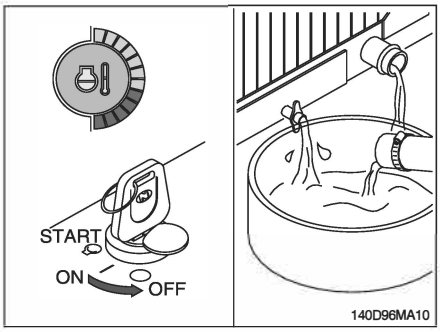
① Fill the system with a mixture of sodium carbonate and water (or a commercially available equivalent).

※ Use 0.5kg (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.



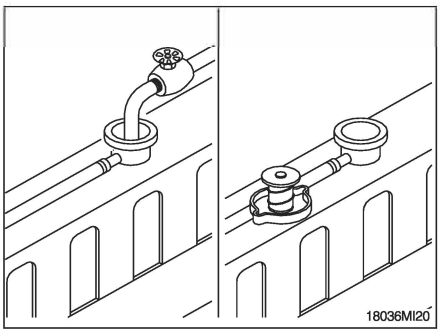

② Operate the engine for 5 minutes with the coolant temperature above 80 °C (176 °F).
Shut the engine off, and drain the cooling system.




③ Fill the cooling system with clean water.

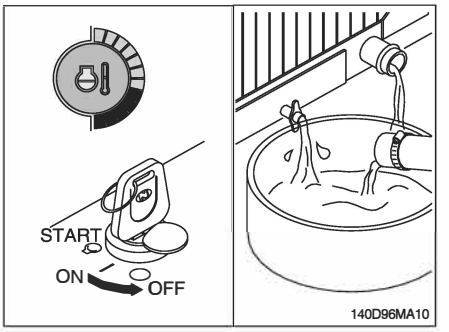
※ Be sure to vent the engine and aftercooler for complete filling.

※ 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.

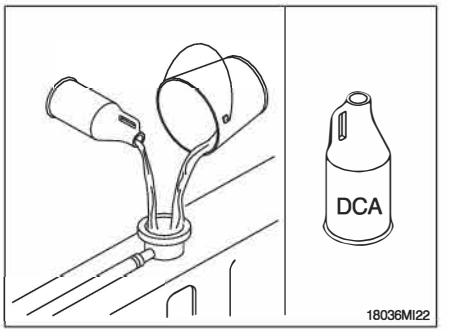
※ If the water being drained is still dirty, the system must be flushed again until the water is clean.




(3) Cooling system filling

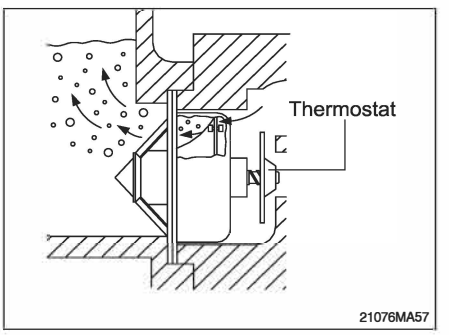
① Use a mixture of 50 percent water and 50 percent ethylene glycol antifreeze to fill the cooling system.
Coolant capacity (engine only) : 6 *l* (1.6 U.S. gallons)

※ Use the correct amount of DCA4 corrosion inhibitor to protect the cooling system.

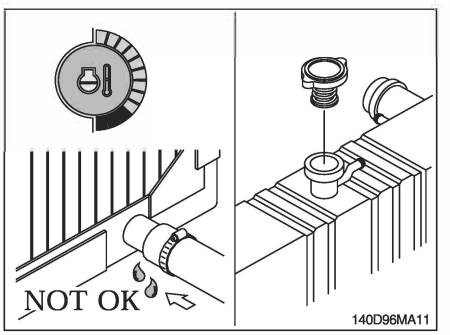



② The system has a maximum fill rate of 14 liters (3.5 U.S. gallons) per minute.
Do not exceed this fill rate.

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




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

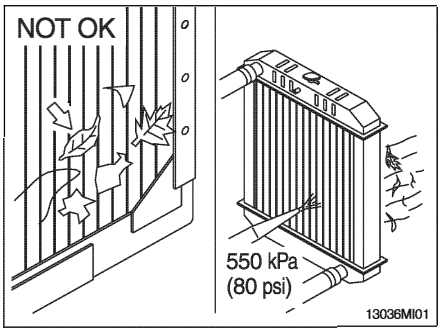


5) CLEAN RADIATOR AND OIL COOLER

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

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

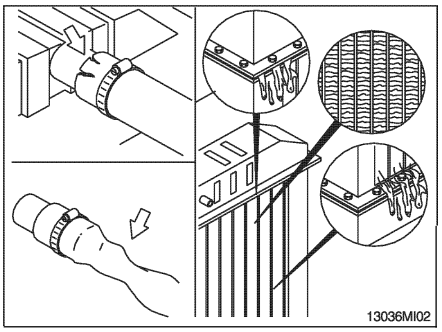
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.




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

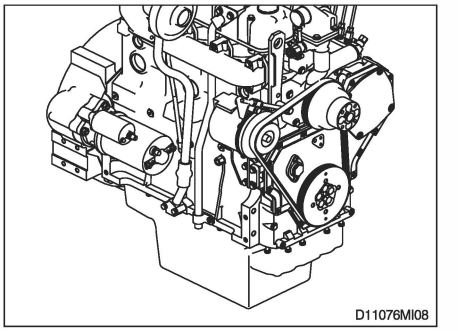
※ If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.

(4) Visually inspect the radiator for core leaks.

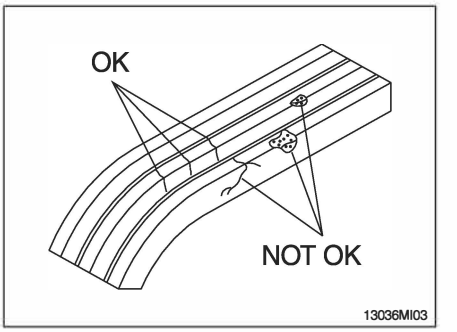


6) FAN BELT TENSION

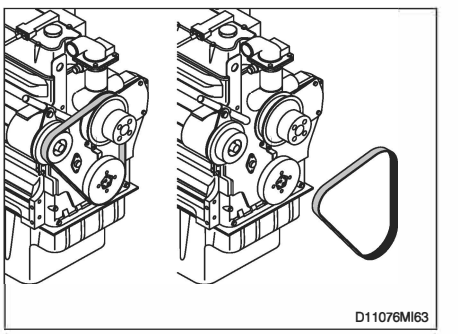
(1) Measure the belt deflection at the longest span of the belt.
·Maximum deflection : 12 mm (0.5 in)




(2) Inspect the drive for damage.




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

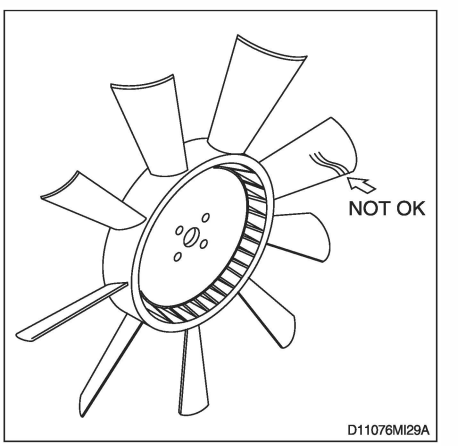



7) INSPECTION OF COOLING FAN

⚠ 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.



### 8) CLEANING OF AIR CLEANER

(1) Primary element

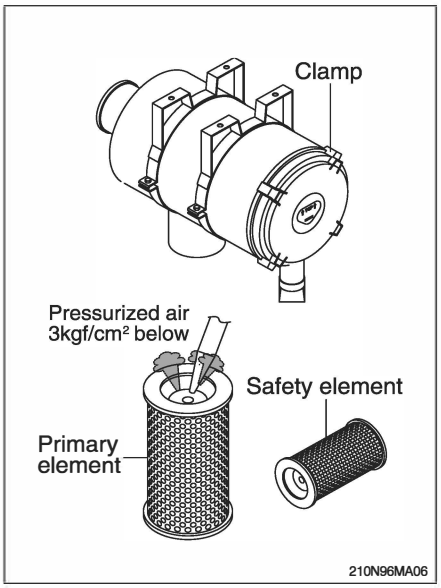
① Loosen the clamps and remove the element.
② Clean the inside of the body.
③ Clean the element with pressurized air.
- Remove the dust inside of the element by the pressurized air (below 3 kgf/cm², 40 psi) forward and backward equally.

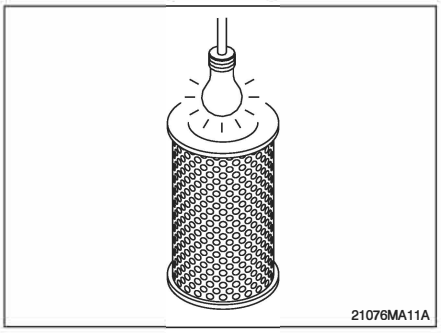
④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
⑤ Insert element and tighten wing nut.

※ **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.**



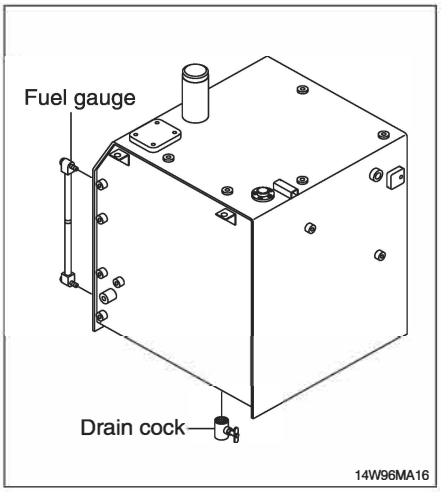

### 9) FUEL TANK

(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.



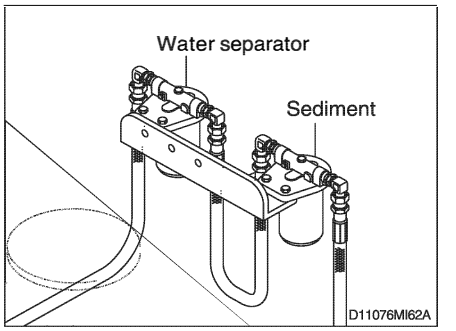
### 10) WATER SEPARATOR

(1) Drain the water and sediment by loosening the drain plug.

(2) Retighten the drain plug.

(3) Check for leakage.

※ Bleed the air if the air is mingled on the fuel line when draining water.




### 11) REPLACEMENT OF FUEL FILTER

(1) Shut-off the engine

(2) Drain the fuel filter bowls by loosening the drain plug situated at bottom of bowls.

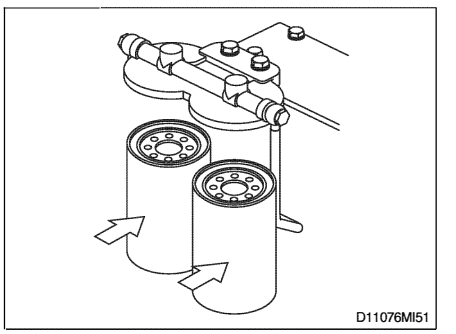
(3) Unscrew the centre bolt & remove bowls and inserts.

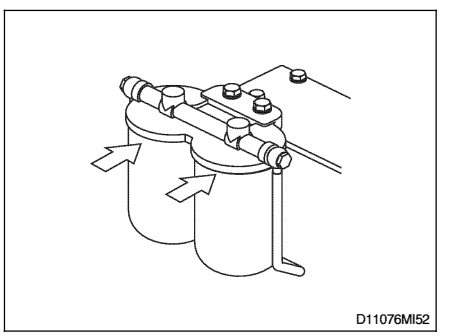
(4) Clean bowls inside as well as outside with clean diesel.

(5) Change prefilter insert only. Do not change prefilter & microfilter simultaneously. Follow routine maintenance schedule-engine manual.

(6) Do not clean filter insert. Always replace the insert.

(7) Complete the filter assy. & bleed the system.




### 12) BLEEDING THE FUEL SYSTEM

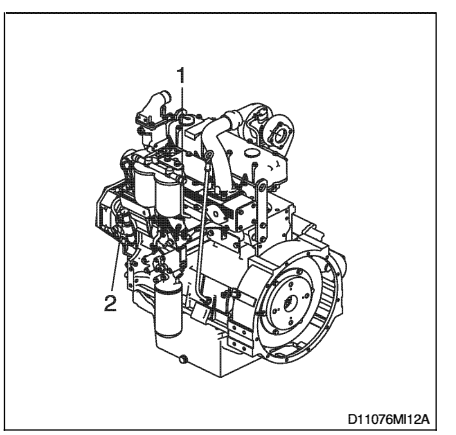
(1) Loosen air vent plug 1 (Approximately 1.5 turns). - on the primary filter.

(2) Unlock priming pump plunger 2 and operate the pump.

(3) When the fuel flows free of air bubbles, lock the priming pump, then tighten the plug.

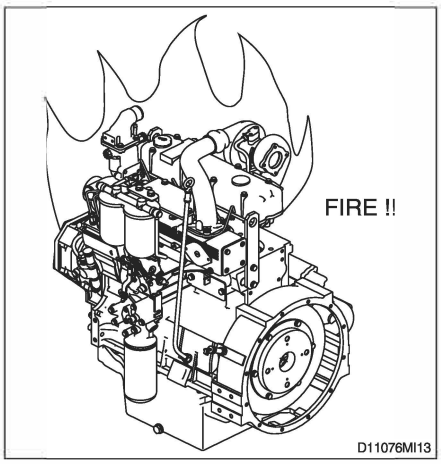
※ If the vent plug is dosed before the priming pump plunger is locked, fuel pressure acts on the feed pump, resulting in inability to restore the plunger.

※ Clean up fuel spillage.



### 13) LEAKAGE OF FUEL

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

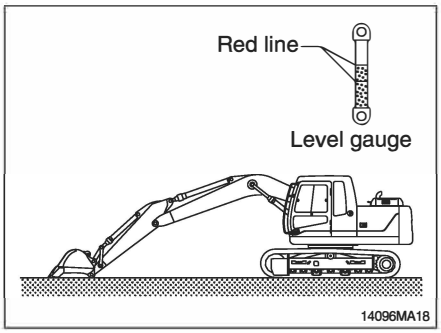



### 14) HYDRAULIC OIL CHECK

(1) Stop the engine after retract the arm and bucket cylinders, then lower the boom and set the bucket on the ground at a flat location as in the illustration.

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

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




### 15) FILLING HYDRAULIC OIL

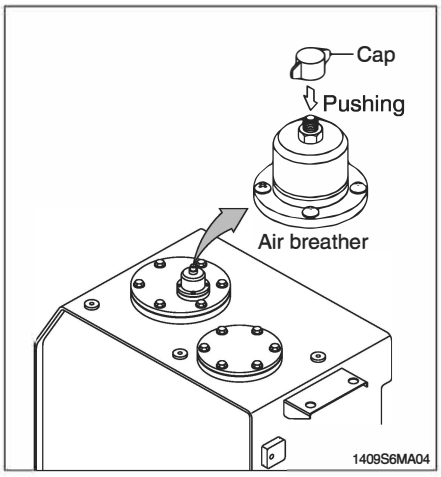
(1) Stop the engine to the position of level check.

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

(3) Remove the breather on the top of oil tank and fill the oil to the specified level.
- Tightening torque : 1.44±0.3 kgf · m
  (10.4±2.1 lbf · ft)

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

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



16) 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±1.4 kgf · m (50±10 lbf · ft)

(4) Prepare a suitable container.

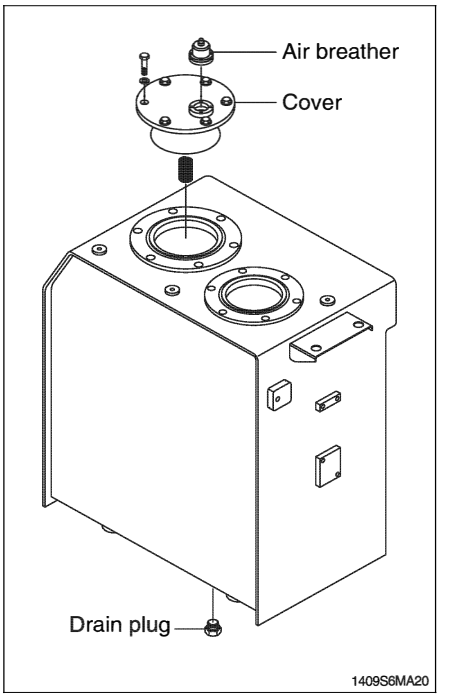
(5) To drain the oil loosen the drain plug at the bottom of the oil tank.

(6) Fill proper amount of recommended oil.

(7) Put the breather in the right position.

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

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




17) 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±1.4 kgf · m (50±10 lbf · ft)

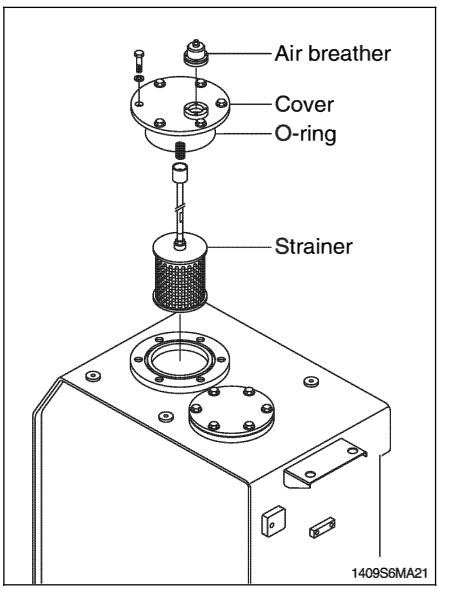
(2) Pull out the strainer in the tank.

(3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.

(4) Replace the suction strainer if it is damaged.

(5) Assemble with reverse order of disassembly. Be sure to install a new O-ring and reinsert in the oil tank.

※ Loosen the bolt slowly at the cover can be spring out by the spring when removing it.



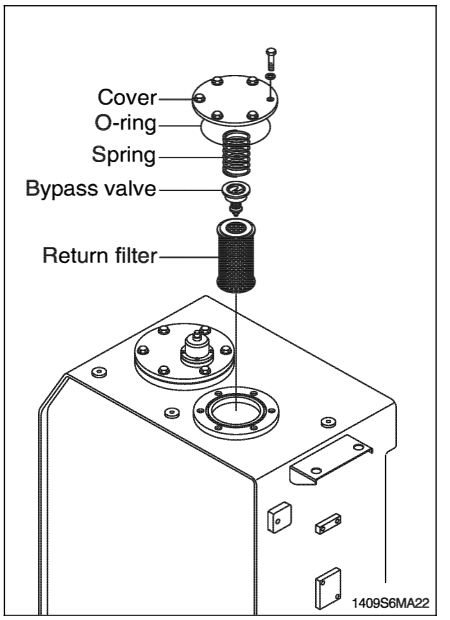
### 18) REPLACEMENT OF RETURN FILTER

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

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

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

(3) Replace the element with new one.




### 19) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

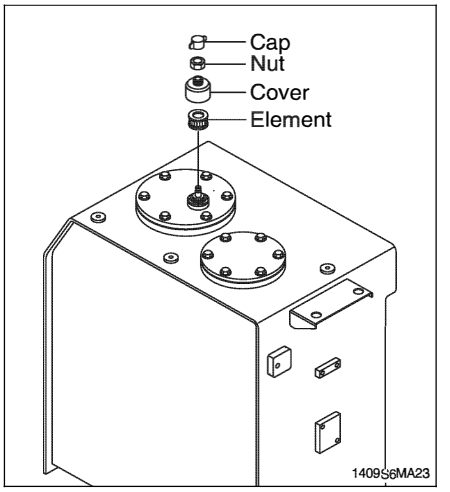
(1) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.

(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)

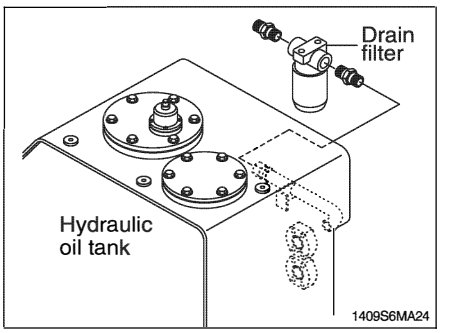



### 20) REPLACE OF DRAIN FILTER CARTRIDGE

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

※ Tighten about 2/3 turn more after the gasket of cartridge contacts seal side of filter body for mounting.

※ Change cartridge after initial 250 hours of operation. Thereafter, change cartridge every 1000 hours.



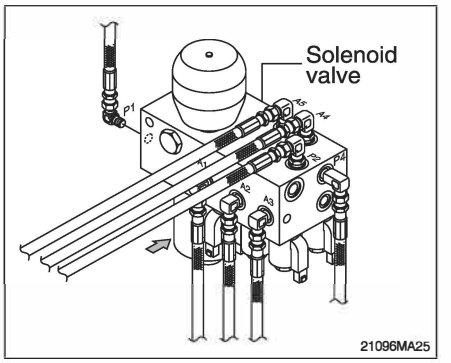
### 21) REPLACE OF PILOT LINE FILTER

(1) Loosen the nut positioned on the filter body.

(2) Pull out the filter element and clean filter housing.

(3) Install the new element and tighten using specified torque.

※ Change cartridge after initial 250 hours of operation. Thereafter, change cartridge every 1000 hours.

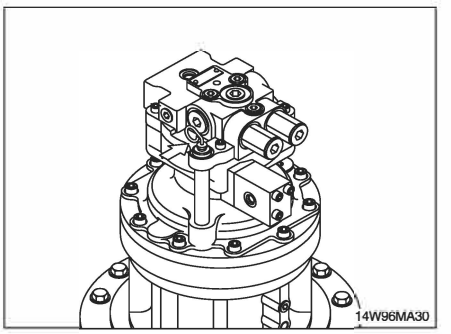



### 22) CHECK THE SWING REDUCTION GEAR OIL

(1) Pull out the dipstick and clean it.

(2) Insert it again.

(3) Pull out one more time to check the oil level and fill the oil if the level is not sufficient.




### 23) CHANGE SWING REDUCTION GEAR OIL

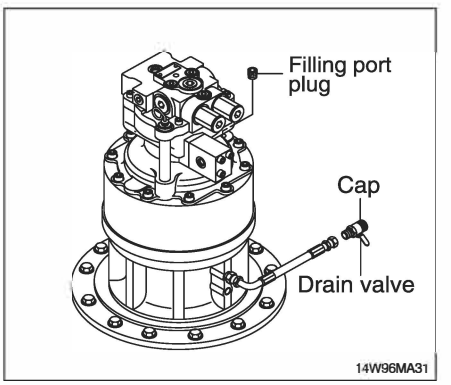
(1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.

(2) 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.

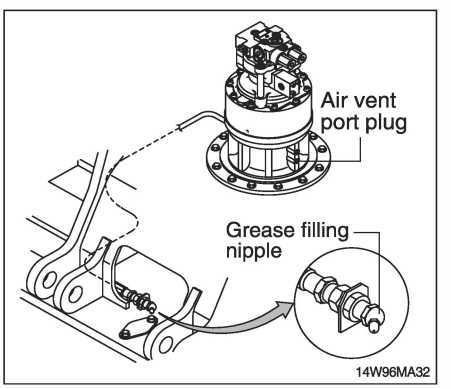
(5) Fill proper amount of recommended oil.
- Amount of oil : 2.5 ℓ (0.7 U.S.gal)




### 24) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

(1) Remove air vent plug.

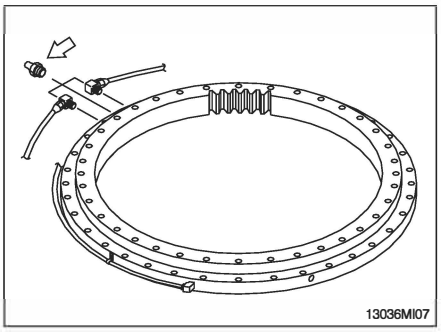
(2) Lubricate NLGI No.2 with grease gun until comes out new grease from air vent port.
- Amount of oil : 0.32 kg (0.7 lb)



### 25) LUBRICATE SWING BEARING

(1) Grease at 3 fitting.

※ Lubricate every 250 hours.




### 26) SWING GEAR AND PINION

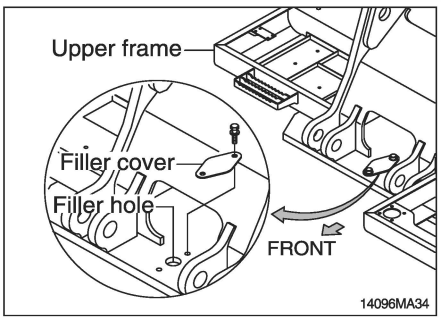
(1) Drain old grease

① Remove under cover of lower frame.

② Remove drain cover of lower frame.

③ Remove filler cover of upper frame.

④ Operate full turn (360˚ )of swing several times.



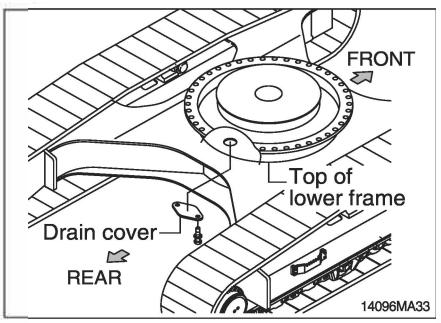

(2) Refill new grease

① Install drain cover.

② Fill with new grease.

③ Install filler cover.

· Capacity : 7.4 kg (16.3 lb)

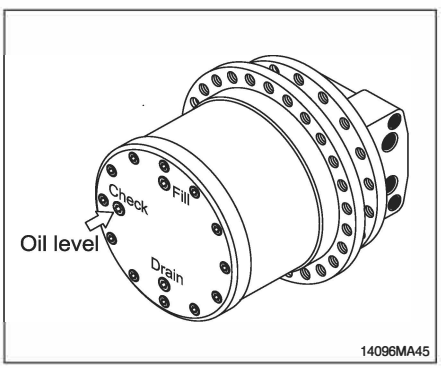



### 27) CHECK THE TRAVEL REDUCTION GEAR OIL

(1) Operate the machine to the position of drain plug down to the flat ground.

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

· Amount of gear oil : 2.2 ℓ (0.6 U.S.gal)



28) CHANGE OF THE TRAVEL REDUCTION GEAR OIL

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

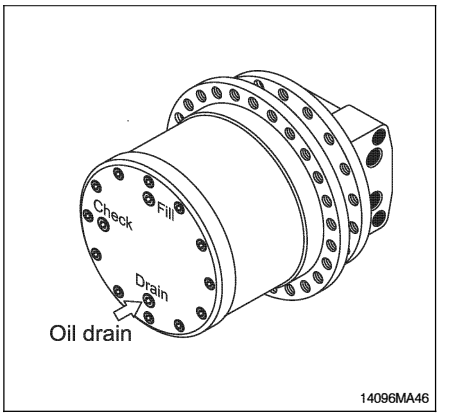
(2) Stop when the position of the drain plug is down.

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

(4) Drain the oil to adequate container.

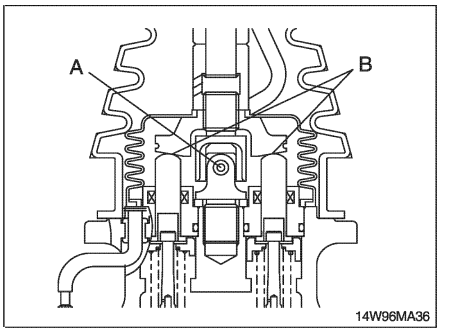
(5) Tighten the drain plug and fill specified amount of oil at filling port.

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




29) LUBRICATE RCV LEVER

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




30) ADJUSTMENT OF TRACK TENSION

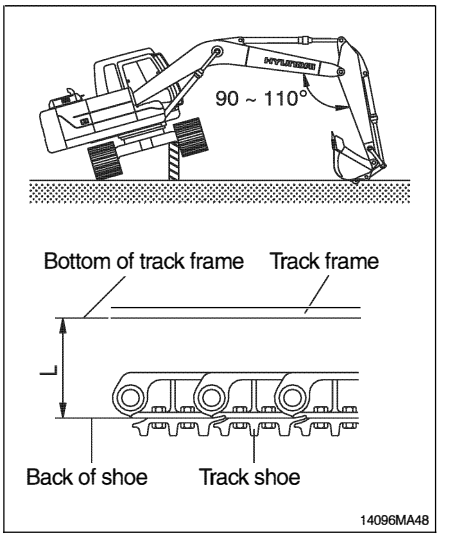
※ It is important to adjust the tension of track properly to extend the lifetime of track and traveling device.

※ The wear of pins and bushings on the 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" |

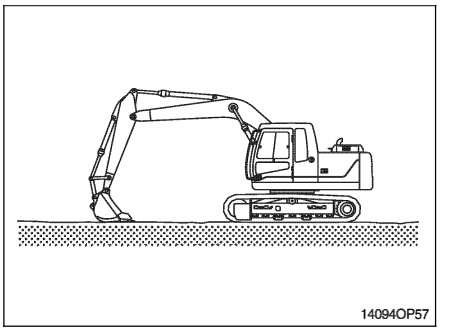
31) REPLACEMENT OF BUCKET

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

※ When the bucket is removed, place it in a stable condition.

※ When performing joint work, make sure signals to each other and work carefully for safety's sake.

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

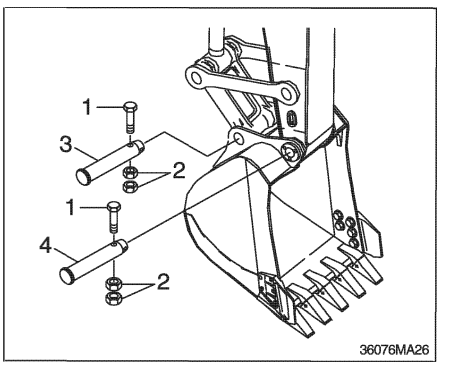



(2) Lock the safety lever to the LOCK position and stop the engine.

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

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

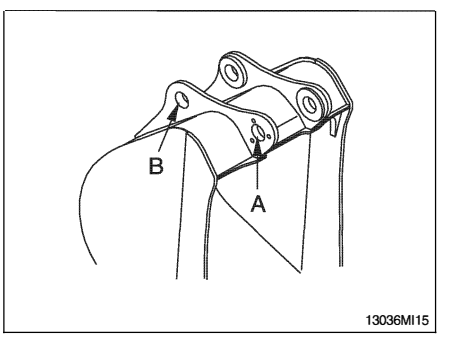
※ If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.



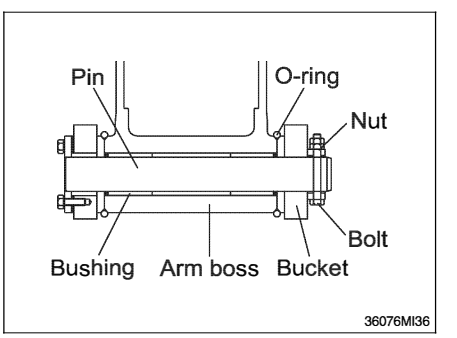

※ After remove the pins, make sure that they do not become contaminated with sand or mud and that the seals of bushing on both sides do not become damaged.

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

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




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

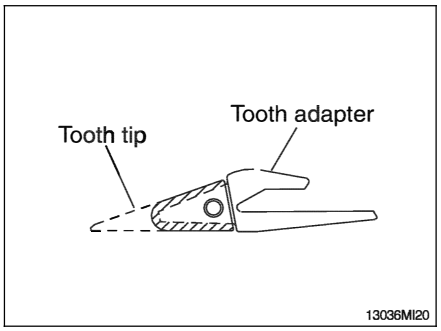


## 32) REPLACEMENT OF BUCKET TOOTH

(1) Timing of replacement

① Check wearing condition as shown in the illustration and replace tooth 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.

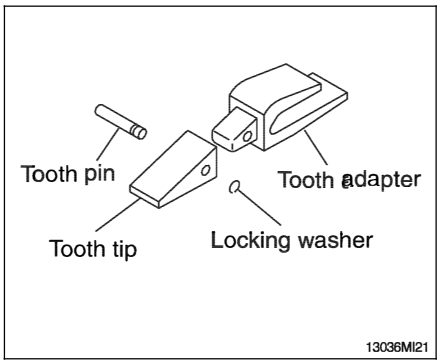
② Remove dust and mud from surface of tooth adapter by using knife.

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.



### 33) 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 lever to the LOCK position and stop the engine.

(4) Measure the clearance (A) between bucket and arm boss. This is the total clearance.

(5) Adjusting

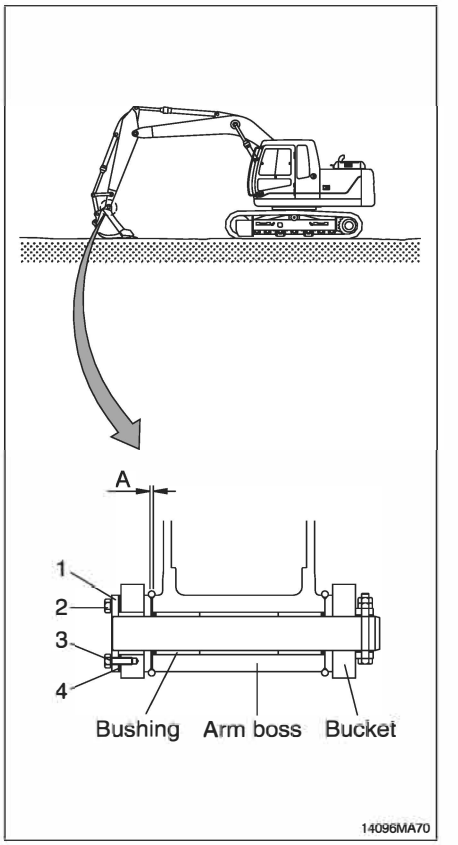
① Loosen bolt (2), and remove washer (3), plate (1) and shim (4).

② Remove the shim equivalent value with measuring value.

③ Assemble the parts in the reverse order of removal.

- Tightening torque : 29.6 ± 3.2 kgf · m (214.0 ± 23.1 lbf · ft)
- Normal clearance : 0.5 ~ 1.0 mm (0.02 ~ 0.04 in)

※ If the bucket is not adjusted correctly, noise and vibration created during operation, and damaged O-ring, pin and bushing quickly.

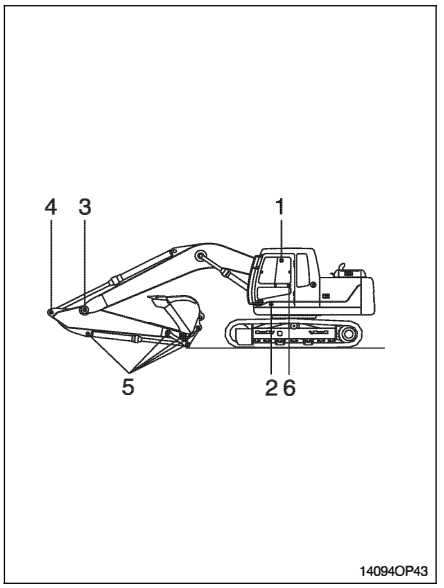


### 34) LUBRICATE PIN AND BUSHING

(1) Lubricate to each pin of working device
Lubricate the grease to the grease nipple according to the lubricating interval.

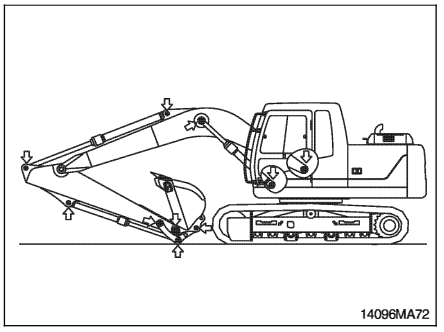
| No. | Description | Qty |
|---|---|---|
| 1 | Lubrication manifold at boom | 5 |
| 2 | Boom cylinder pin | 2 |
| 3 | Boom and arm connection pin | 1 |
| 4 | Arm cylinder pin (rod side) | 1 |
| 5 | Bucket cylinder pin (head side, rod side) | 2 |
| | Bucket link (control rod) | 3 |
| | Arm and control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



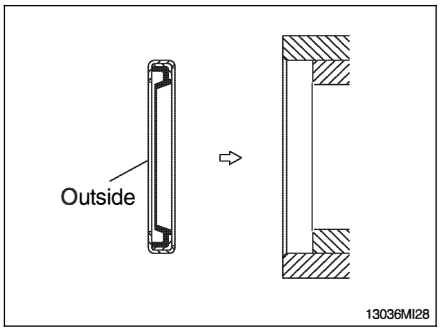

(2) Dust seals are mounted on the rotating part of working device to extend the lubricating interval.

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



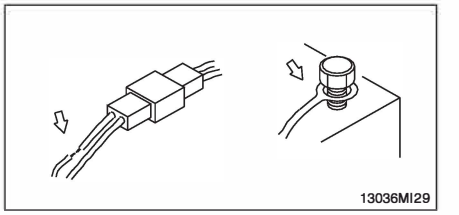

※ If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.

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



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

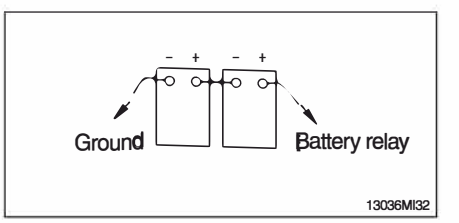
Never discard a battery.

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

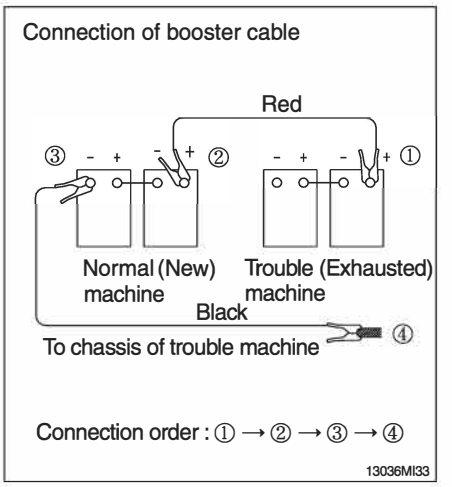
※ Use the same capacity of battery for starting.

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.

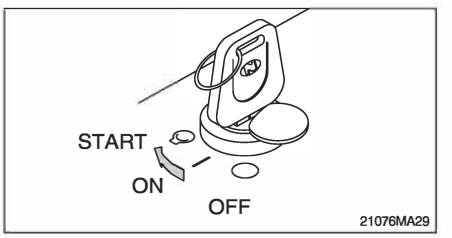



(2) Starting the engine

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.

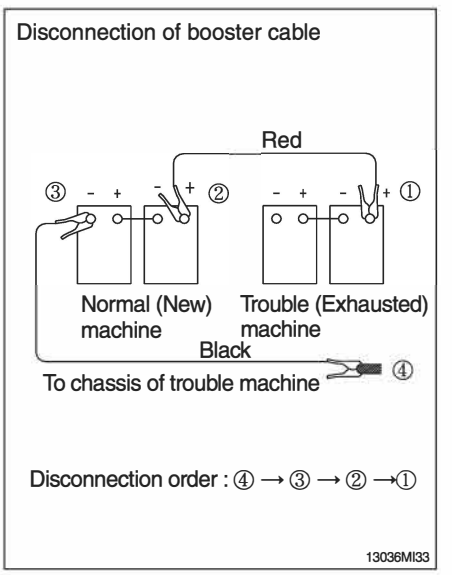
③ Run engine with high idle until charging the exhausted battery by alternator, fully.

⚠ 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.

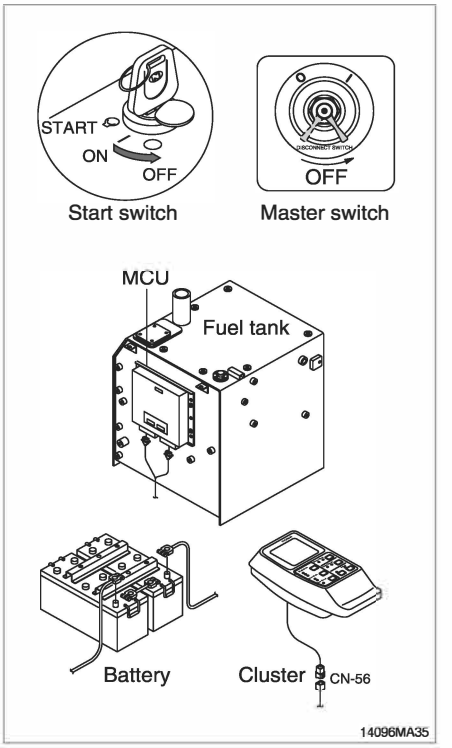
③ Before carrying out any electric welding on the machine, the battery cables should be disconnected and the connectors pulled out of the electronic control units (MCU, cluster etc).

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.

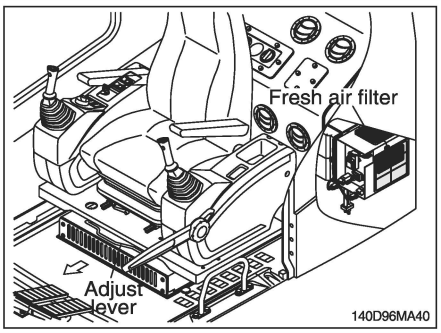
If not, it will caused serious damage at electric system.



1) CLEAN AND REPLACE OF FRESH AIR FILTER

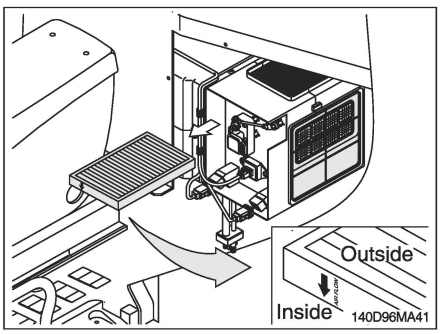
※ Always stop the engine before servicing.

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




(2) Remove the fresh air filter.

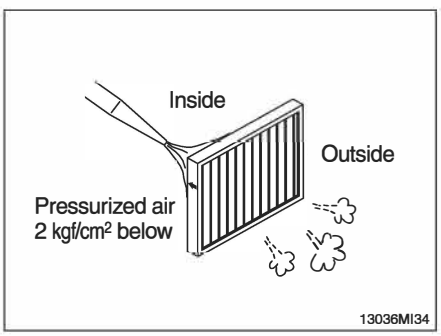
※ When installing a filter, be careful not to change the filter direction.




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

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

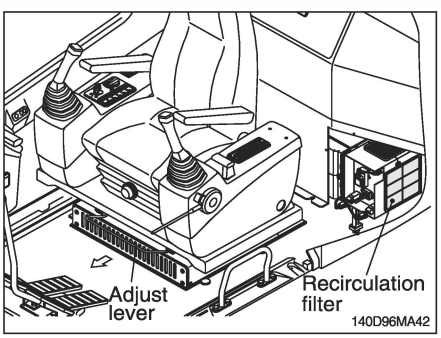
(4) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



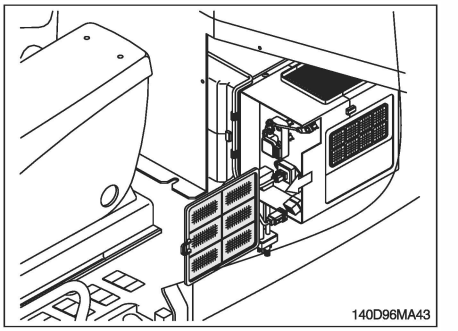

2) CLEAN AND REPLACE OF RECIRCULATION FILTER

※ Always stop the engine before servicing.

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



(2) Remove recirculation filter.

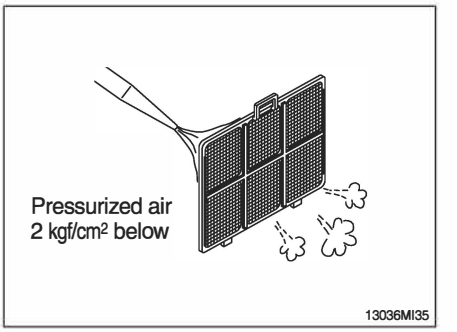



(3) Clean the recirculation filter using a pressurized air (below 2 kgf/cm², 28 psi) or washing with water.

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

※ Dry off after washing with water.

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




### 3) PRECAUTIONS FOR USING AIR CONDITIONER

(1) When using the air conditioner for a long time, open the window once every one hour.

(2) Be careful not to overcool the cab.

(3) The cab is properly cooled if the operator feels cool when entering there from outside (about 5˚C lower than the outside temperature).

(4) When cooling, change air occasionally.

### 4) CHECK DURING SEASON

Ask the service center for replenishment of refrigerant or other maintenance service so that the cooling performance is not damaged.

### 5) CHECK DURING OFF-SEASON

Operate the air conditioner 2 or 3 times a month (each for a few minutes) to avoid loss of oil film in the compressor.

## 1. ENGINE

※ This guide is not intended to cover every conditions, however many of the more common possibilities are listed.

| Trouble | Service | Remark |
|---|---|---|
| The engine oil pressure lamp lights ON when engine speed is raised after completion of warm up. | · Add the oil to the specified level.<br>· Replace the oil filter cartridge.<br>· Check oil leakage from the pipe or the joint.<br>· Replace the monitor. | |
| Steam is emitted from the top part of the radiator (the pressure valve). Coolant level warning lamp lights ON. | · Supply the coolant and check leakage.<br>· Adjust fan belt tension.<br>· Wash out inside of cooling system.<br>· Clean or repair the radiator fin.<br>· Check the thermostat.<br>· Tighten the radiator cap firmly or replace the packing of it.<br>· Replace the monitor. | |
| The engine does not start when the starting motor is turned over. | · Add fuel.<br>· Repair where air is leaking into fuel system.<br>· Check the injection pump or the nozzle.<br>· Check the valve clearance.<br>· Check engine compression pressure.<br>· In cold weather, check if fuel warmer system is working normal. | Refer to the pages 3-8, 3-31 and 4-4, 4-8. |
| Exhaust gas is white or blue. | · Adjust to specified oil quantity.<br>· Replace with specified fuel. | |
| Exhaust gas occasionally turns black. | · Clean or replace the air cleaner element.<br>· Check the nozzle.<br>· Check engine compression pressure.<br>· Clean or replace the turbocharger. | |
| Combustion noise occasionally changes to breathing sound. | · Check the nozzle. | |
| Unusual combustion noise or mechanical noise. | · Check with specified fuel.<br>· Check over-heating.<br>· Replace the muffler.<br>· Adjust valve clearance. | |

## 2. ELECTRICAL SYSTEM

| Trouble | Service | Remark |
|---|---|---|
| Lamp does not glow brightly even when engine runs at high speed.<br>Lamp flickers while engine runs. | · Check for loose terminals and open-circuit wiring.<br>· Adjust belt tension. | |
| Battery charging lamp does not go out even when engine runs at high speed. | · Check the alternator.<br>· Check and repair wiring. | |
| Unusual noise is emitted from the alternator. | · Check the alternator. | |
| Starting motor does not turn when starting switch is turned ON. | · Check and repair the wiring.<br>· Charge the battery.<br>· Check the starting motor.<br>· Check the safety relay. | |
| The pinion of the starting motor keeps going in and out. | · Charge the battery.<br>· Check the safety relay. | |
| Starting motor turns the engine sluggishly. | · Charge the battery.<br>· Check the starting motor. | |
| The starting motor disengages before the engine starts up. | · Check and repair the wiring.<br>· Charge the battery. | |
| The engine warming up lamp does not go ON. | · Check and repair wiring.<br>· Check the monitor. | |
| The engine oil pressure lamp does not light up when engine is stationary (when the starting switch is in ON position.) | · Check the monitor.<br>· Check the caution lamp switch. | |
| Battery charging lamp does not light up when the engine is stationary. (when the starting switch is in ON position.) | · Check the monitor.<br>· Check and repair the wiring. | |

## 3. OTHERS

| Trouble | Service | Remark |
|---|---|---|
| Track slip out of place.<br>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.<br>· Adjust fan belt tension.<br>· Add oil to specified level. | |

## 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.

3) The pressure of the ROBEX140LC-9 system is 330 kgf/cm² (4700 psi).

**4) Adjusting oil quantity**

(1) Use the breaker mode from work mode. Default oil flow quantity is 110 lpm at 2000 rpm. Use accel dial switch to control the oil flow quantity.

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

Oil quantity setting (cluster type 1)

| Engine rpm | Oil flow *l* /min | Oil flow U.S.gpm |
|---|---|---|
| 1900 | 104 | 27.5 |
| 1800 | 99 | 26.2 |
| 1700 | 93 | 24.6 |
| 1600 | 88 | 23.3 |

※ Relief pressure : 200 kgf/cm²

5) The accumulator should be used to the breaker charging and return line.

※ Keep the pressure pulsation of pump below 60 kgf/cm² (853 psi) by installing the accumulator. If the accumulator is not used, it will be damage as the input wave is delivered.

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) Seamless tube should be used for the piping. The hose and seal should be used Hyundai genuine parts.

11) Weld the bracket for pipe clamp to prevent damage caused by vibration.

## 1) MAINTENANCE OF HYDRAULIC OIL AND FILTER

(1) As machine with an hydraulic breaker provides the hydraulic oil becomes severely contaminated.

(2) So, unless frequently maintained, the machine may easily go out of order.

(3) Inspect and maintain hydraulic oil and 4 kinds of filter elements in particular, in order to prolong machine life.

(4) Replace when the breaker work is used for short time according to the standard of right graph.

Service interval

unit : hours

| Attachment | Operating rate | Hydraulic oil | Filter element |
|---|---|---|---|
| Breaker | 100 % | 600 | 100 |

● **Replace following filter same time**

- Hydraulic return filter : 1 EA
- Pilot line filter : 1 EA
- Element in hydraulic tank breather : 1EA
- Drain filter cartridge : 1 EA

## 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.

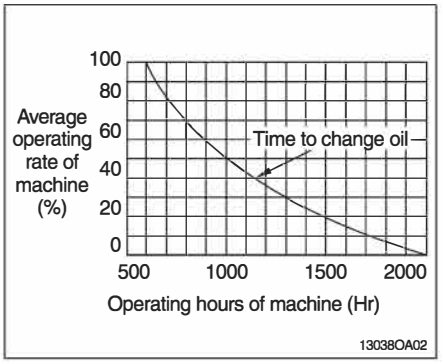
If pressure still remains, the lifetime of the diaphragm in the accumulator will be shortened.

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.

Hyd oil change guide for hydraulic breaker

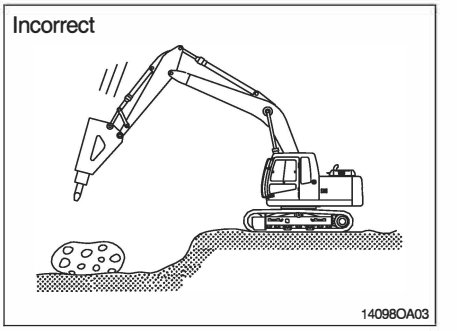


## 4. PRECAUTIONS WHILE OPERATING THE BREAKER

1) DO NOT BREAK ROCK WHILE LOWERING

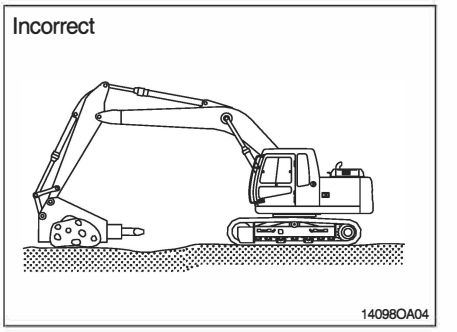
As the breaker is heavy in comparison with bucket, it must be operated slowly.

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



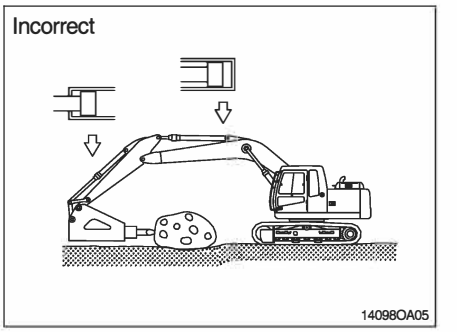

2) DO NOT USE BREAKER TO CARRY BROKEN STONE OR ROCK BY SWING OPERATING

This may damage the operation device and swing system.



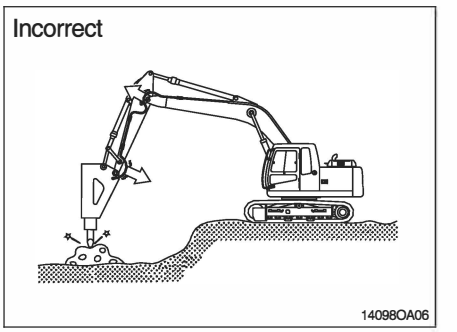

3) OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

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



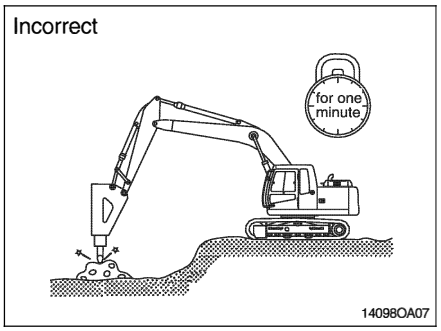

4) IF THE HYDRAULIC HOSES VIBRATE EXCESSIVELY

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



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

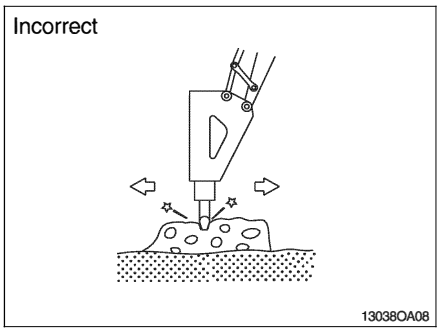
This will increase the temperature of the oil, and cause problem in the accumulator and seals.




6) DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING

Do not move hammer while striking.

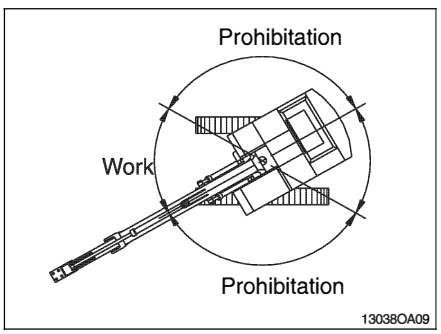
This will cause damage to the working device and the swing system.




7) DO NOT WORK WHILE SWING STATE

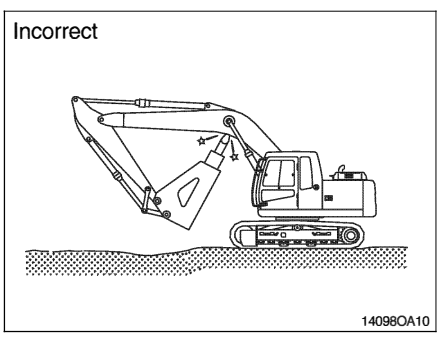
Do not work while swing position of superstructure.

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




8) TAKE CARE OF CHISEL AND BOOM INTERFACE

Make sure of the arm and bucket control lever operation.

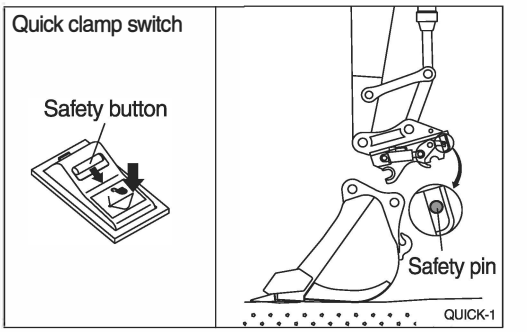


## 5. QUICK CLAMP

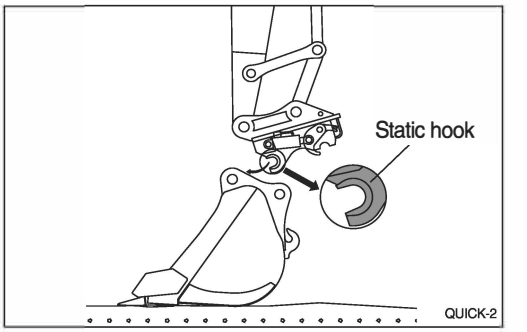
### 1) FIXING BUCKET WITH QUICK CLAMP

(1) Before fixing bucket, remove safety pin of the moving hook.

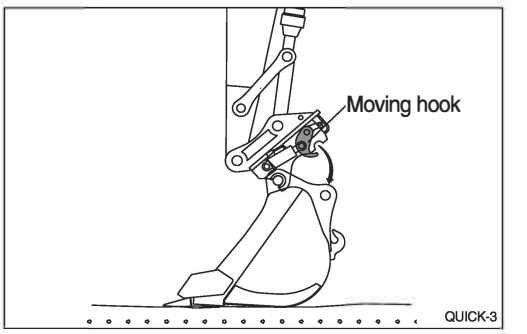
(2) Pulling safety button, press the quick clamp switch to unlock position. Then, the moving hook is placed on release position.




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

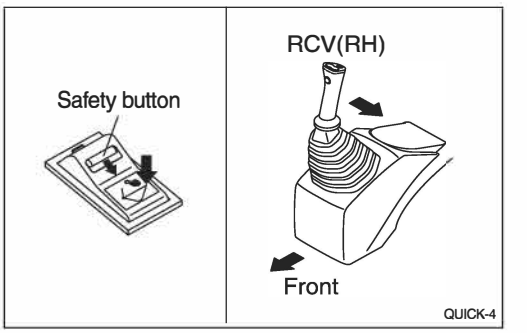



(4) Operate RCV lever to bucket-in position. Then, the moving hook is coupled with the bucket link pin.
Make sure that the moving hook is completely contacted with bucket link pin.

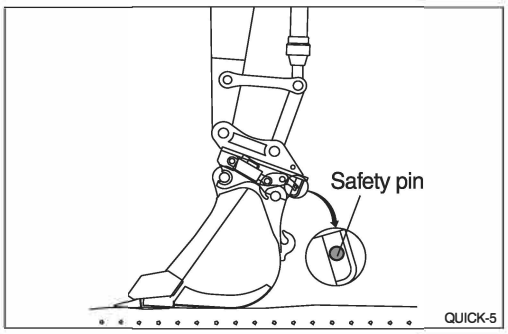



(5) Push safety button to lock position.
Operate RCV lever to bucket-in position.

※ Be sure to check connection status between bucket pins and hooks of quick clamp.



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

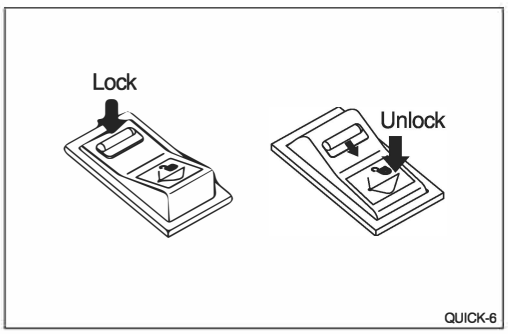



2) REMOVE BUCKET FROM QUICK CLAMP

Removing procedure is reverse of fixing.

3) PRECAUTION OF USING QUICK CLAMP

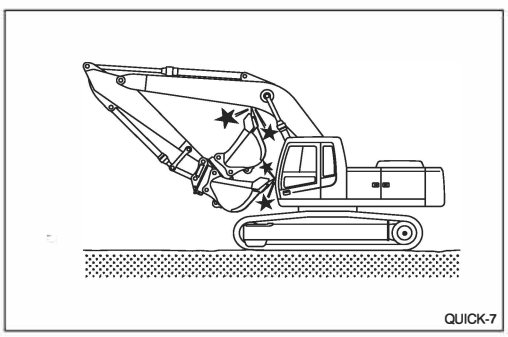
⚠ When operating the machine with quick clamp, confirm that the quick clamp switch is lock position and safety pin of moving hook is inserted.
Operating the machine with quick clamp switch unlocked and without safety pin of moving hook can cause the bucket to drop off and bring about the accident.




⚠ Serious injury or death can result from this accident.

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

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



## Q



## R



## S



## T



## U



## W

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