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## FOREWORD

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

The manual is to promote safety maintenance and enhance machine performance.

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

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

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

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

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

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

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

The procedures and precautions given in this manual apply only to intended uses of the machine.

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

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

3. Use **genuine Hyundai spare parts** for the replacement of parts.

We expressly point out that Hyundai will not accept any responsibility for defects resulting from non-genuine parts or non workmanlike repair.

In such cases Hyundai cannot assume liability for any damage.

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

## BEFORE SERVICING THIS MACHINE

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

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

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

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

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

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

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

All personnel must remain alert to potential hazards.

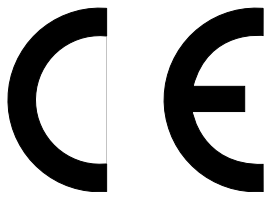
Work within your level of training and skill.

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

Use your common sense.

## EC REGULATION APPROVED

- Noise level (EN474-1 : 2006 and 2000/14/EC) are as followings.  
LWA : 98dB (EU only)  
LPA : 78dB
- The value of vibrations transmitted by the operator's seat are lower than standard value of (EN474-1 : 2006 and 2002/44/EC)





## EC Declaration of Conformity

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

certifies that the construction equipment machinery.

Machine Type : \*\*\*\*\*

Brand : HYUNDAI

Model : \*\*\*\*\*

Serial No : \*\*\*

Year of Manufacturing : 20\*\*

2. Manufacturer

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

Authorized representative :  
Owner of the technical file for  
machine production

HYUNDAI CONSTRUCTION EQUIPMENT EUROPE N.V.  
VOSSENDAAL 11, 2440 GEEL  
BELGIUM

3. Harmonized European directives :

2006/42/EC (Machinery), 97/68/EC (Exhaust Gas Emission),  
2004/108/EC (Electromagnetic Compatibility), 200/14/EC (Noise  
Emission)

4. Engine Manufacturer :

\*\*\*\*\*

Engine Type :

\*\*\*\*\*

Gross Power :

\*\*\* kW / \*\*\*\* rpm (SAE J1995)

Net Power :

\*\*\* kW / \*\*\*\* rpm (SAE J1349)

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

Certificate No :

\*\*\*\*\*

Issue Date :

DD/MM/YYYY

Conformity Assessment Procedure :

\*\*\*\*\*

Notified Body Involved :

\*\*\*\*\*

\*\*\*\*\*

\*\*\*\*\*

Measured Sound Power Level :

\*\* dB(A)

Guaranteed Sound Power Level :

\*\* dB(A)

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

Certificate No :

\*\*\*\*\*

Issued Date :

DD/MM/YYYY

Notified Body Involved :

\*\*\*\*\*

\*\*\*\*\*

Standard(s) :

\*\*\*\*\*

7. Remarks

J. C. JUNG

MANAGING DIRECTOR

Place and date of issue :

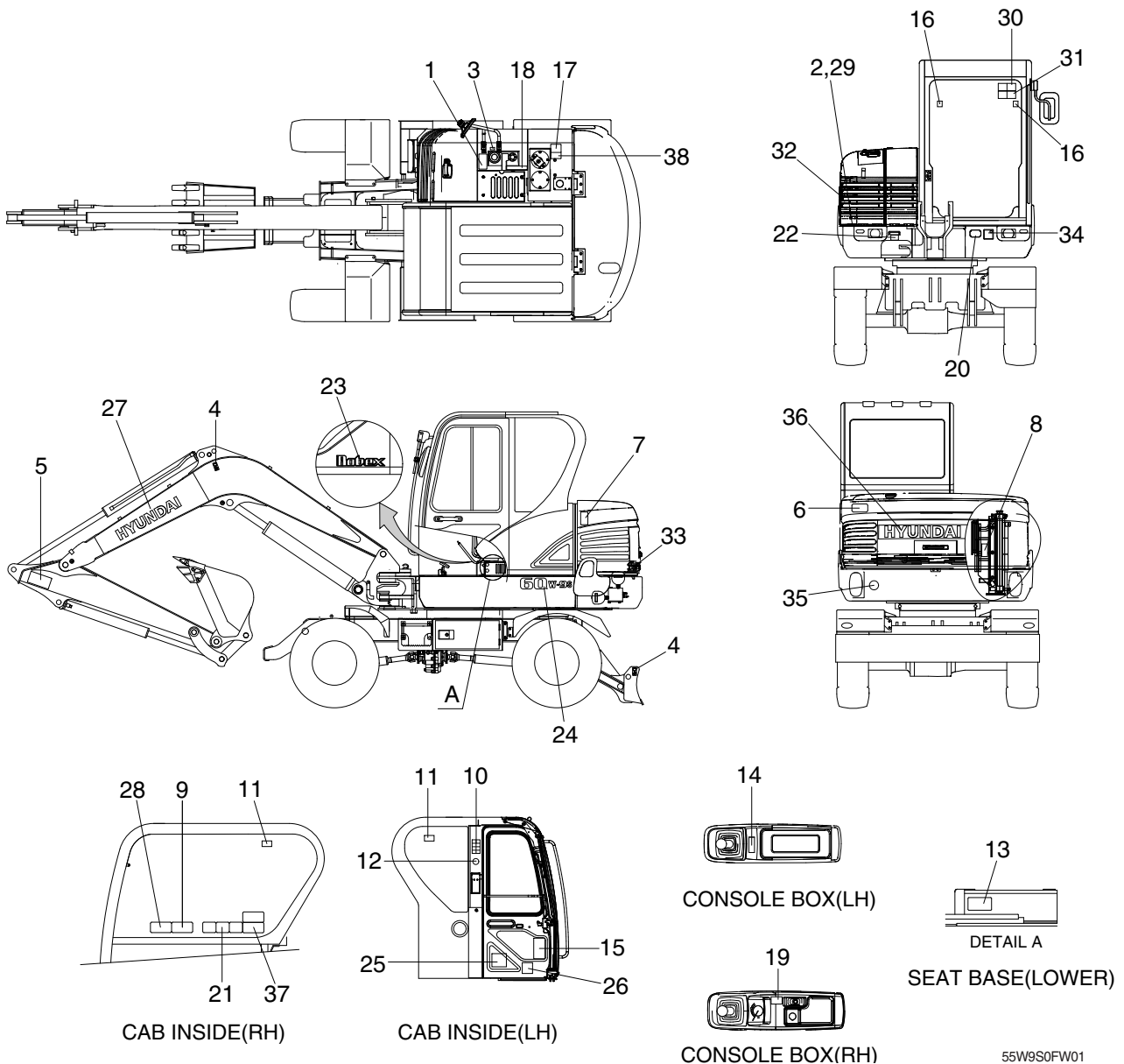
|                                                  |
|--------------------------------------------------|
| <b>TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR</b> |
|--------------------------------------------------|

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

## SAFETY LABELS

### 1. LOCATION

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



55W9S0FW01

- |                              |                              |                                             |
|------------------------------|------------------------------|---------------------------------------------|
| 1 Fueling                    | 14 Console tilting           | 27 Trade mark (boom)                        |
| 2 Battery accident           | 15 Machine control (cab)     | 28 Swing lock                               |
| 3 Low sulfur fuel            | 16 Stay fix (cab)            | 29 Connector                                |
| 4 Lifting point ideogram     | 17 Hydraulic oil lubrication | 30 Warning front window                     |
| 5 Keep clear (boom/arm)      | 18 Air compressor            | 31 Caution-sliding                          |
| 6 Keep clear (rear)          | 19 Control ideogram-dozer    | 32 Battery position                         |
| 7 Keep clear (side)          | 20 Name plate                | 33 Accumulator                              |
| 8 Caution-engine room        | 21 General warning-frame     | 34 Noise level Lwa                          |
| 9 Control ideograms (swivel) | 22 Indicate-grease           | 35 Reflecting                               |
| 10 General caution (cab)     | 23 Logo (ROBEX)              | 36 Trade mark (CWT)                         |
| 11 Safety front window       | 24 Model name                | 37 Caution (water separator, control speed) |
| 12 Hammer                    | 25 Service instruction       | 38 Fuel shut off                            |
| 13 Air conditioner filter    | 26 Lifting chart             |                                             |

## 2. DESCRIPTION

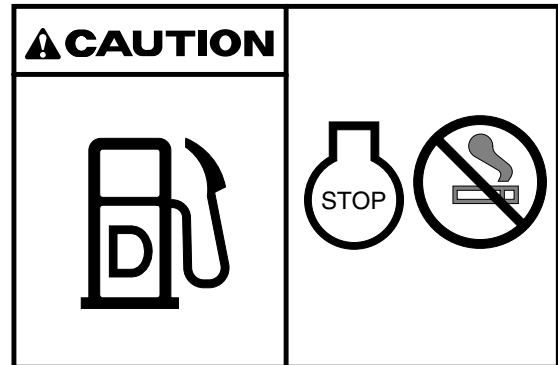
There are several specific warning labels on this machine please become familiarized with all warning labels.

Replace any safety label that is damaged, or missing.

### 1) FUELING (item 1)

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.



5591FW02

### 2) BATTERY ACCIDENT (item 2)

This warning label is positioned on the battery cover.

- ▲ Electrolyte containing sulfuric acid cause severe burns. Avoid being in contact with skin, eyes or clothes. In the event of accident flush with sufficient water, call a physician immediately.
- ※ Maintain the electrolyte at the recommended level. Add distilled water to the battery only when starting up, never when shutting down.  
With electrolyte at proper level, less space may cause the gases to be accumulated in the battery.
- ▲ Extinguish all smoking materials and open flames before checking the battery.
- ▲ Do not use matches, lighters or torches as a light source near the battery for the probable presence of explosive gas.
- ▲ Do not allow unauthorized personnel to change the battery or to use booster cables.
- ▲ For safety from electric shock, do not battery terminals with a wet hand.

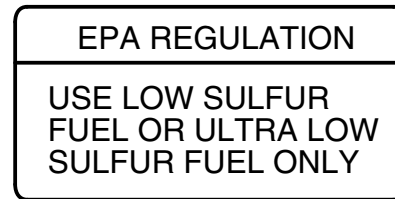


36070FW05

### 3) LOW SULFUR FUEL (item 3)

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

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



5591FW09

### 4) KEEP CLEAR-BOOM/ARM (item 5)

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

- ⚠ **Serious injury or death can result from falling of the attachment.**
- ⚠ **To prevent serious injury or death, keep clear the underneath of attachment.**

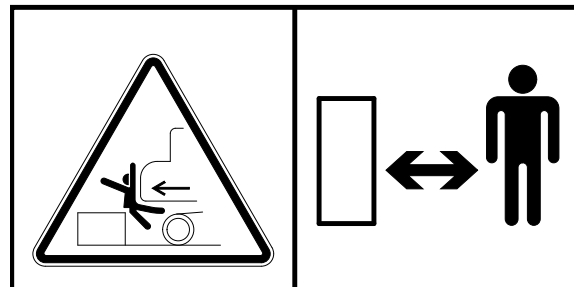


R5570FW31

### 5) KEEP CLEAR-REAR (item 6)

This warning label is positioned on the rear of engine hood.

- ⚠ **To prevent serious personal injury or death keep clear of machine swing radius.**
- ⚠ **Do not deface or remove this label from the machine.**

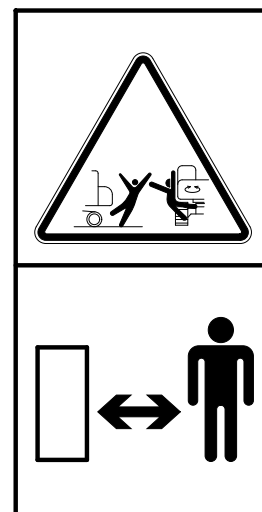


R5570FW09A

### 6) KEEP CLEAR-SIDE (item 7)

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

- ⚠ **To prevent serious personal injury or death keep clear of machine swing radius.**
- ⚠ **Do not deface or remove this label from the machine.**

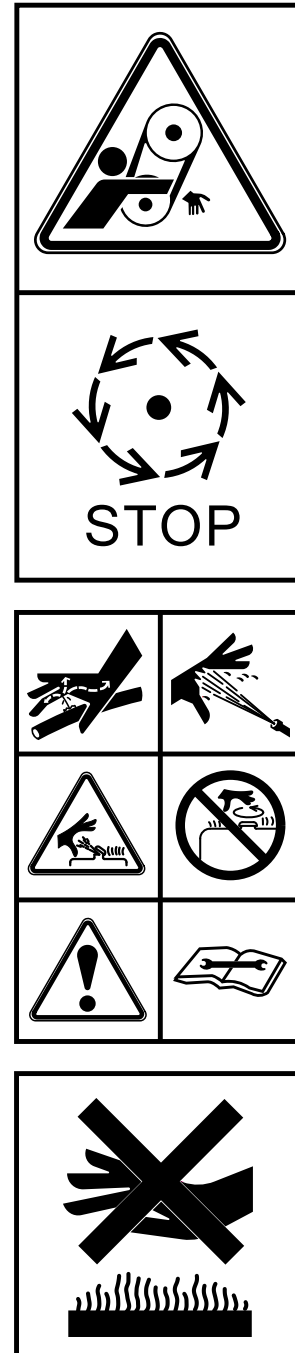


R5570FW13

### 7) CAUTION-ENGINE ROOM (item 8)

This warning label is positioned on the side of radiator.

- ⚠ Do not open the engine hood during the engine's running.
- ⚠ Escaping fluid under pressure can penetrate the skin causing serious injury.
- ✳ Study the service manual before service job.
- ⚠ Never open the filler cap while engine running or at high coolant oil temperature.
- ⚠ Study the operator's manual before starting and operating machine.
- ⚠ Do not touch exhaust pipe or it may cause severe burn.

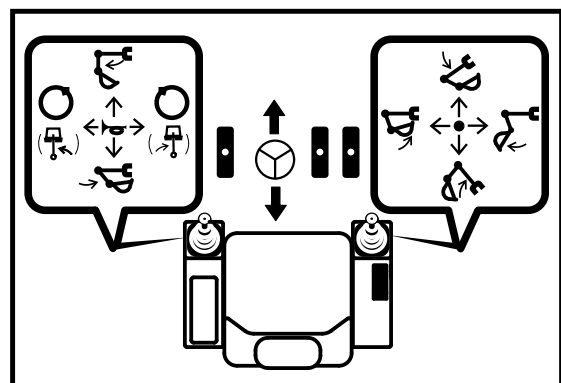


R5570FW14

### 8) CONTROL IDEOGRAM-SWIVEL (item 9)

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 4-7 for details.

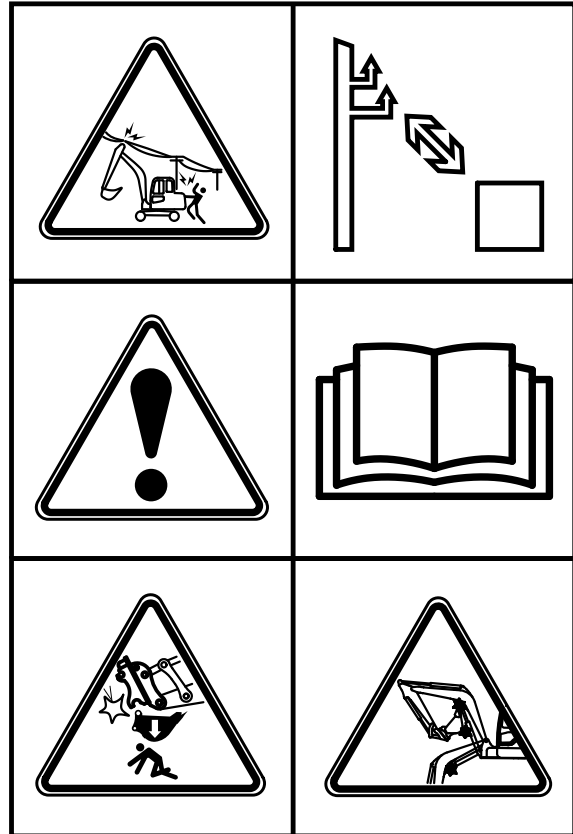


55W9S0FW02

### 9) GENERAL CAUTIONS-CAB (item 10)

This warning label is positioned on the left 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.
- ⚠ **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.**
- ⚠ **Bucket may hit cab, boom or boom cylinder when it reached vicinity of them.**

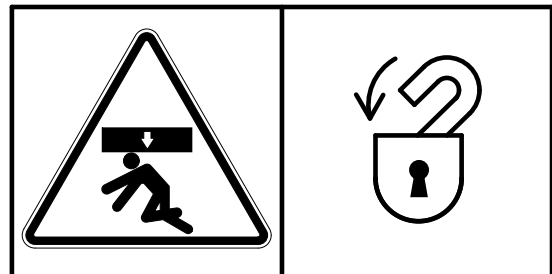


55W9S0FW15

### 10) SAFETY FRONT WINDOW (item 11)

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

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

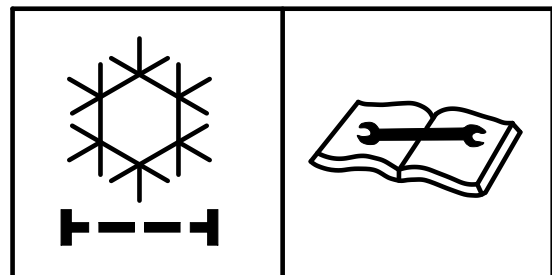


21070FW24

### 11) AIRCON FILTER (item 13)

This warning label is positioned on the lower seat base.

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

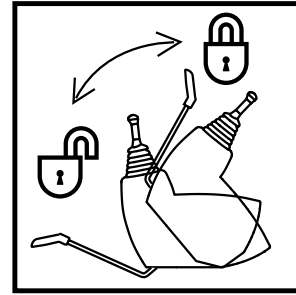


21070FW26

## 12) CONSOLE TILTING (item 14)

This warning label is positioned on the LH console box.

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

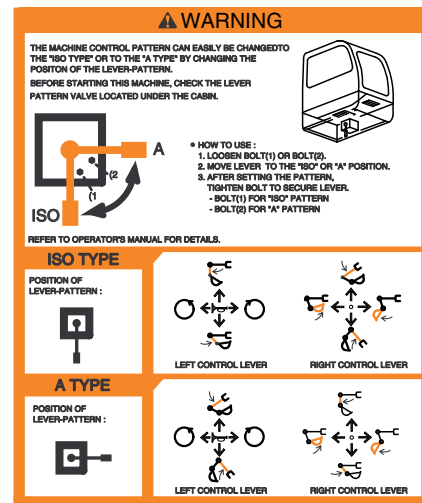


R5570FW17

## 13) MACHINE CONTROL-CAB (item 15)

This warning label is positioned on the right side door 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.



5591FW07A

## 14) STAY FIX-CAB (item 16)

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

- ⚠ Be sure to support the stay when the window needs to be opened.
- ⚠ Be careful that the opened window may be closed by the external or natural force.



5591FW06

## 15) HYDRAULIC OIL LUBRICATION (item 17)

This warning label is positioned on the right side of air breather.

- ※ Do not mix with different brand oils.
- ⚠ Never open the filler cap while engine running or at high hydraulic oil temperature.
- ⚠ Loosen the cap slowly and release internal pressure completely.



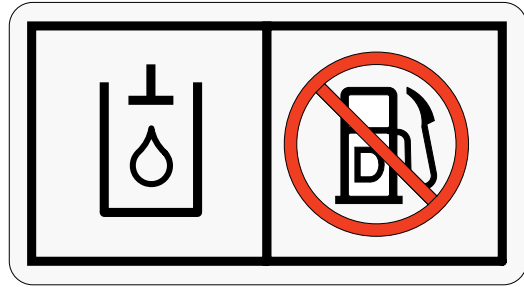
21070FW08



#### 16) FUEL SHUT OFF (item 38)

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

- ※ Fill only the hydraulic oil.
- ※ Do not fill the diesel fuel.

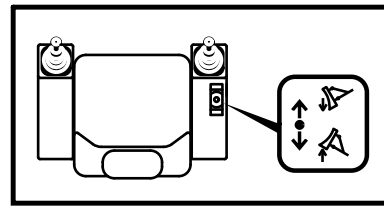


140WH90FW51

#### 17) CONTROL IDEOGRAM-DOZER (item 19)

This warning label is positioned on the RH console box.

- ※ See page 4-12 for details.
- ※ Guidelines for using the general dozer blade.
  - Be careful not to apply an excessive load when using a blade.
  - Avoid impacts and loads on the bottom due to machine modification or excessive working conditions.
  - Check the BLADE UP status before traveling the machine.
  - Avoid any collision with the upper working device and the blade.
  - Do not move machine in the blade jack up state.
  - When using blade jack up, use it in an environment where the ground is not rough and the machine and ground are same level.

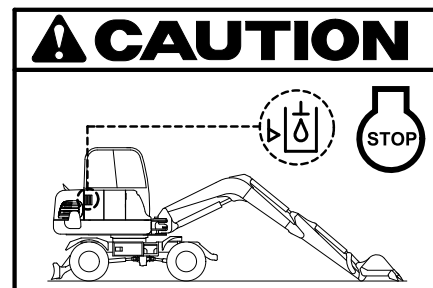
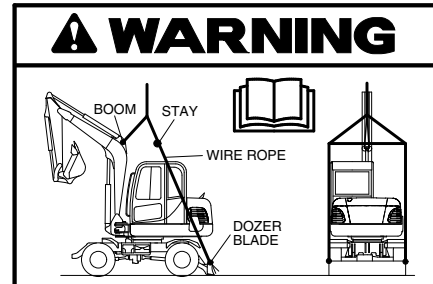
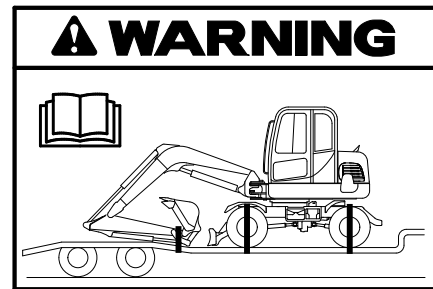


5510FW06

18) **GENERAL WARNING-FRAME** (item 21)

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

- ⚠ **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.
- ⚠ **Make sure wire rope is proper size and keep correct hoisting method.**
- ※ See page 5-8 for details.
- ⚠ **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.

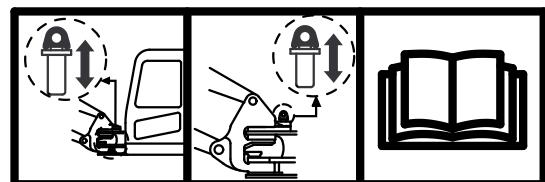


55W70FW21

19) **BOOM SWING LOCK** (item 28)

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

- ⚠ **Before operating the machine, be sure to release the swing lock device in the tool box.**



55W91FW03

## 20) CONNECTOR (item 29)

This warning label is positioned on the battery cover.

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

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

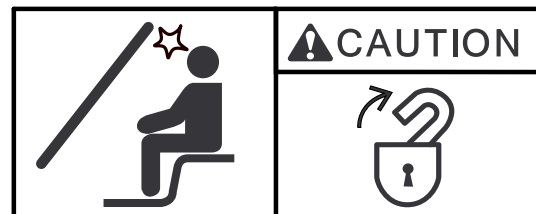
※ See page 6-40 for detail.



7807AFW20

## 21) WARNING FRONT WINDOW (item 30)

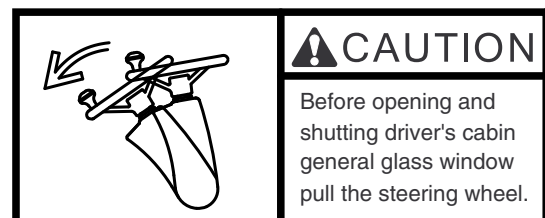
This warning label is positioned on the front window of the cab.



5591FW05

## 22) CAUTION-SLIDING (item 31)

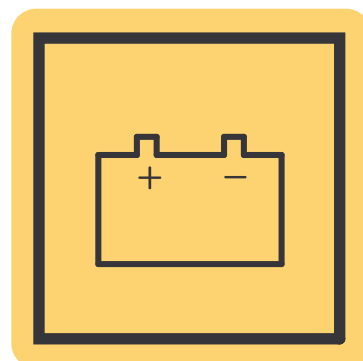
This warning label is positioned on the front window of the cab.



55W91FW04A

## 23) BATTERY POSITION (item 31)

This warning label is positioned right side of tool box.



38090FW03

## 24) ACCUMULATOR (item 30)

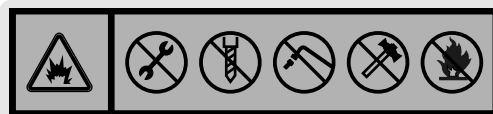
This warning label is positioned on the accumulator of the solenoid valve.

- ※ 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

## 25) CAUTION-WATER SEPARATOR, CONTROL SPEED (item 37)

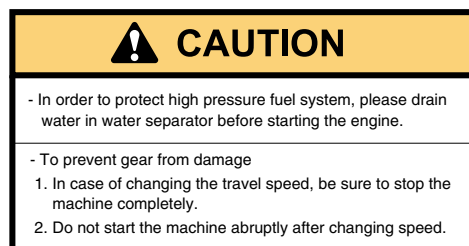
This warning label is positioned on the right window of the cab.

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

- ※ To prevent gear from damage


1. In case of changing the travel speed, be sure to stop the machine completely.

2. Do not start the machine abruptly after changing speed.




55W9S0FW16


## MACHINE DATA PLATE

|                                                                                                                                                                               |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| DO NOT DEFACE OR REMOVE THIS PLATE<br>이 명판을 훼손하거나 오손시키지 마시오                                                                                                                   |  |
| MACHINE TYPE / MODEL                                                                                                                                                          |  |
| PRODUCT IDENTIFICATION NUMBER                                                                                                                                                 |  |
| ENGINE POWER                                                                                                                                                                  |  |
| OPERATING MASS                                                                                                                                                                |  |
|  477, Bundanguseo-ro,<br>Bundang-gu, Seongnam-si,<br>Gyeonggi-do, 13553, Korea<br>91LM-14112 |  |


For general

|                                                                                                                                                                                |                               |                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------|
| DO NOT DEFACE OR REMOVE THIS PLATE<br>이 명판을 훼손하거나 오손시키지 마시오                                                                                                                    |                               |                   |
| MACHINE TYPE / MODEL                                                                                                                                                           |                               |                   |
| PRODUCT IDENTIFICATION NUMBER / VEHICLE IDENTIFICATION NUMBER                                                                                                                  |                               |                   |
| ENGINE POWER                                                                                                                                                                   | MAX. AXLE LOAD (FRONT / REAR) |                   |
| OPERATING MASS / GROSS VEHICLE WEIGHT                                                                                                                                          | MFG. YEAR                     | YEAR INTO SERVICE |
|  477, Bundanguseo-ro,<br>Bundang-gu, Seongnam-si,<br>Gyeonggi-do, 13553, Korea<br>91LM-14142 |                               |                   |

For EU only

|                                                                                                                                                                               |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| DO NOT DEFACE OR REMOVE THIS PLATE<br>이 명판을 훼손하거나 오손시키지 마시오                                                                                                                   |  |
| MACHINE TYPE                                                                                                                                                                  |  |
| MODEL                                                                                                                                                                         |  |
| MAX. CERTIFIED WEIGHT                                                                                                                                                         |  |
| STANDARDS ROPS : ISO 12117-2 TOPS : EN 13531 / ISO 12117<br>FOG : ISO 10262 (LEVEL 1)                                                                                         |  |
|  477, Bundanguseo-ro,<br>Bundang-gu, Seongnam-si,<br>Gyeonggi-do, 13553, Korea<br>91M3-01282 |  |

For ROPS

|                                                                                                                                                                                |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| DO NOT DEFACE OR REMOVE THIS PLATE<br>이 명판을 훼손하거나 오손시키지 마시오                                                                                                                    |  |
| MACHINE TYPE                                                                                                                                                                   |  |
| MODEL                                                                                                                                                                          |  |
| STANDARDS<br>FOG : ISO 10262 (LEVEL 1)                                                                                                                                         |  |
|  477, Bundanguseo-ro,<br>Bundang-gu, Seongnam-si,<br>Gyeonggi-do, 13553, Korea<br>94MS-01281 |  |

For FOG

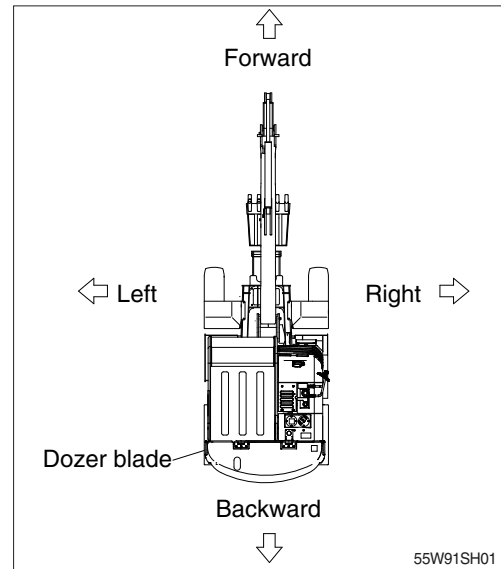
MEXOMD01

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

## GUIDE

### 1. DIRECTION

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

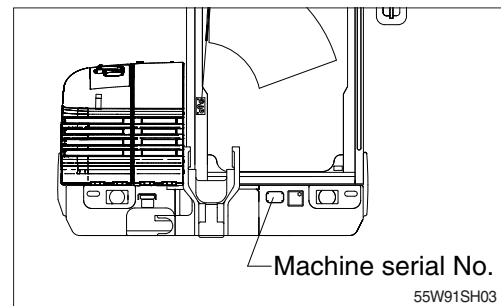


### 2. SERIAL NUMBER

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

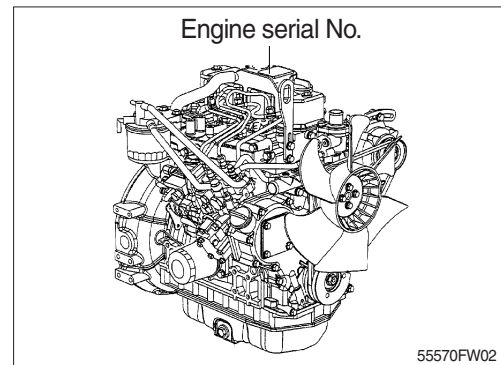
#### 1) MACHINE SERIAL NUMBER

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



#### 2) ENGINE SERIAL NUMBER

The numbers are located on the engine name plate.



### 3. INTENDED USE

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

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

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

### 4. SYMBOLS

▲ Important safety hint.

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

※ It indicates the useful information for operator.

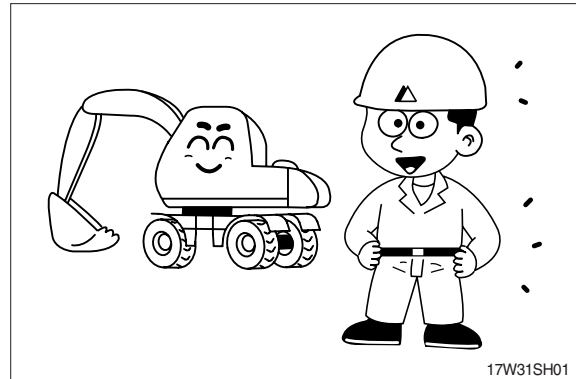
# SAFETY HINTS

## 1. BEFORE OPERATING THE MACHINE

Think-safety first.

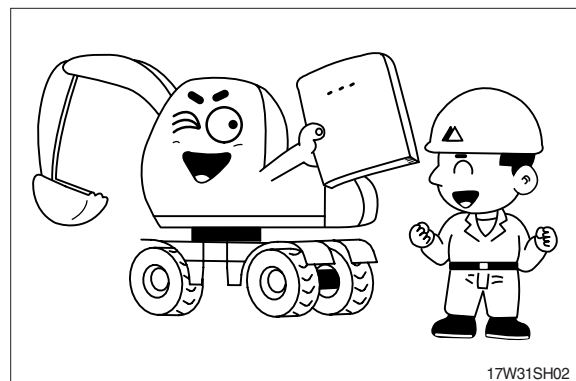
In special situation, wear protective clothing including a safety helmet, safety shoes, gloves, safety glasses and ear protection as required by the job condition.

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



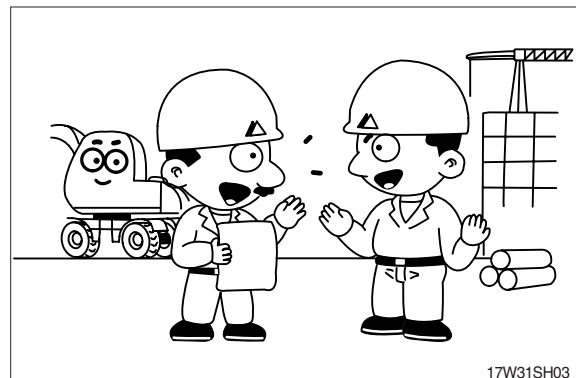
Be sure to understand thoroughly all about the operator's manual before operating the machine.

Proper care is your responsibility.

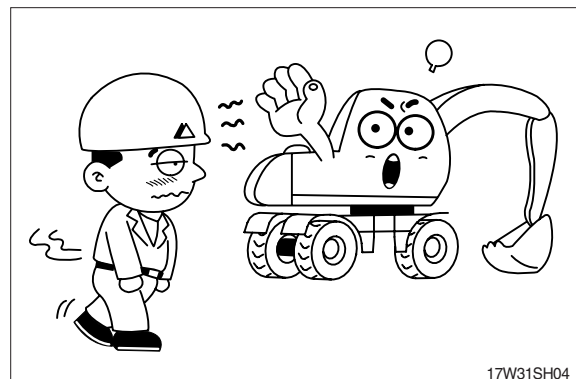


Fully understand the details and process of the construction before starting the work.

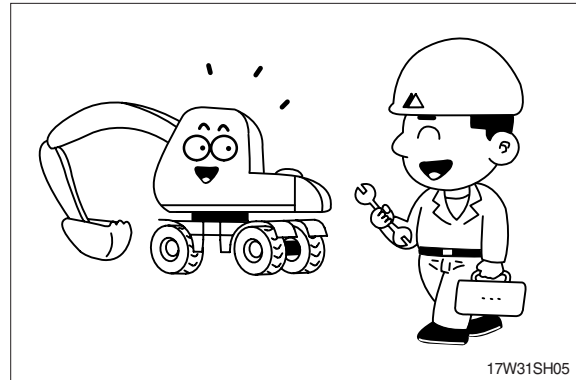
If you find anything dangerous on the job, consult with the job supervisor for the preventive measures before operating the machine.



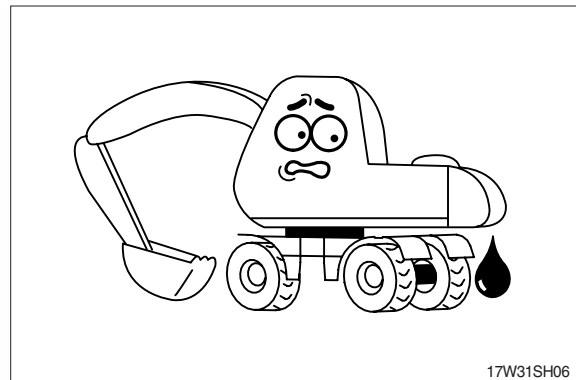
Do not operate when tired, or after drinking alcoholic beverages or any type of drugs.



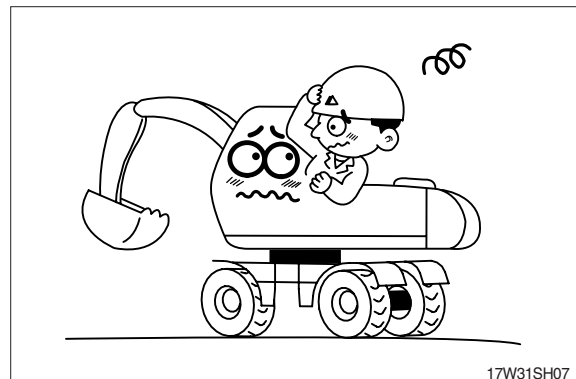
Check daily according to the operation manual.  
Repair the damaged parts and tighten the loosened bolts.



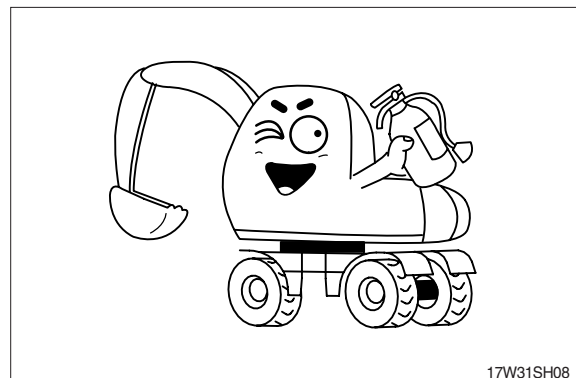
Check for leakage of engine oil, hydraulic oil,  
fuel and coolant.  
Keep machine clean, clean machine regularly.



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



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

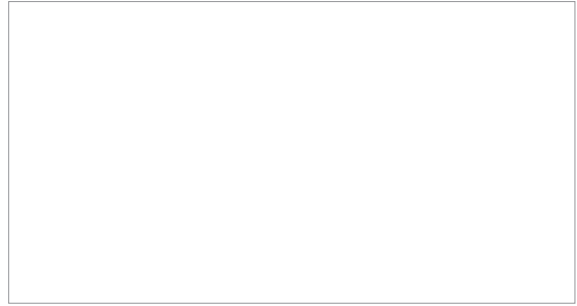




## UNAUTHORIZED MODIFICATION

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.



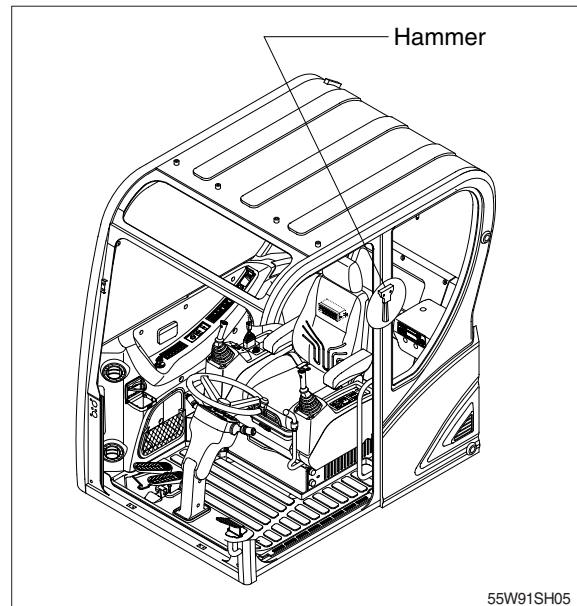
## PREPARE FOR EMERGENCY

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

Have a fire extinguisher and first aid kit ready for emergencies such as fires or accidents.

Learn how to use the fire extinguisher.

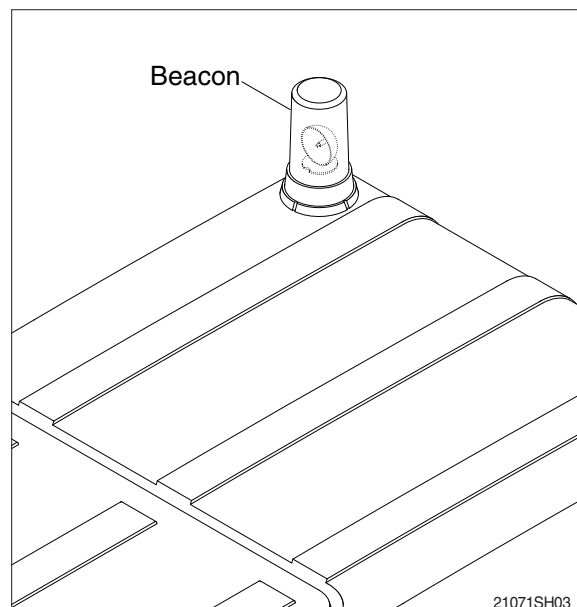
Be sure you know the phone numbers of persons you should contact in case of an emergency.



## 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.**

## ELECTRICAL STORM INJURY PREVENTION

When lightning is striking in the vicinity of the machine, the operator should never attempt the following procedures.

- Mount the machine
- Dismount the machine

If you are in the cab during an electrical storm, stay in the cab. If you are on the ground during an electrical storm, stay away from the vicinity of the machine.

## FIRE PREVENTION AND EXPLOSION PREVENTION

### Regeneration

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

### General

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

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

Always perform a Walk-Around Inspection, which may help you identify a fire hazard.

Do not operate a machine when a fire hazard exists. Contact your dealer for service.



3001SH01

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

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

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

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

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

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

Do not operate the machine near any flame.

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

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

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

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

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



3001SH02

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



3001SH03

### Battery and battery cables

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



3001SH04

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

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

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

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

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

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

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

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

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

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

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

## **Wiring**

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

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

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

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

Consult your Hyundai dealer for repair or for replacement parts.

Keep wiring and electrical connections free of debris.

## **Lines, Tubes, and Hoses**

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

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

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

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

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

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

## **Ether**

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

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

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

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

## Fire Extinguisher

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

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

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

## Fire Safety

※ **Locate secondary exits and how to use the secondary exits before you operate the machine.**

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

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

Move the machine away from nearby combustible material such as fuel/oil stations, structures, trash, mulch and timber.

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

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

Notify emergency personnel of the fire and your location.

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

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

Use the on-board fire extinguisher and use the following procedure :

1. Pull the pin.
2. Aim the extinguisher or nozzle at the base of the fire.
3. Squeeze the handle and release the extinguishing agent.
4. Sweep the extinguisher from side to side across the base of the fire until the fire is out.

Remember, if you are unable to do anything else, shut off the machine before exiting. By shutting off the machine, fuels will not continue to be pumped into the fire.

If the fire grows out of control, be aware of the following risks :

- Tires on wheeled machines pose a risk of explosion as tires burn. Hot shrapnel and debris can be thrown great distances in an explosion.
- Tanks, accumulators, hoses, and fittings can rupture in a fire, spraying fuels and shrapnel over a large area.

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



## **Fire extinguisher Location**

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

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

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

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

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

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

### Vibration Data for Earth-moving Machines

#### Information Concerning Hand/Arm Vibration Level

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

#### Information Concerning Whole Body Vibration Level

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

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

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

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

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

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

※ All vibration levels are in meter per second squared.

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

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

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

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

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

## **Guidelines for Reducing Vibration Levels on Earthmoving Equipment**

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

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

## **Sources**

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

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

## MODIFICATIONS

Modifications to the machine, including use of unauthorized accessories and spare parts, may affect the machine's condition and its ability to function as it was designed. No changes of any kind may be performed without first obtaining written approval from Hyundai Heavy Industries. Hyundai Heavy Industries reserves the right to refuse all warranty claims that have resulted due to or can be attributed to unauthorized modifications.

Never modify the operator's cabin by welding, grinding, drilling holes or adding attachments unless instructed by Hyundai Heavy Industries in writing. Changes to the cabin can cause loss of operator protection from roll-over and falling objects, and result in death or serious injury.

The person who performs unauthorized modifications assumes all responsibility for consequences that arise due to the modification or can be attributed to the modification, including damage to the machine.

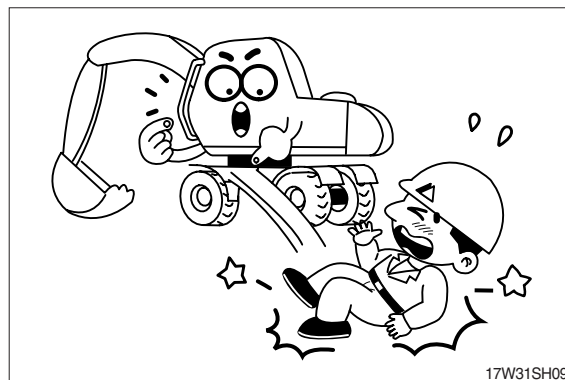
Modifications may be considered to be officially approved, if at least one of the following conditions has been met :

1. The attachment, the accessory, or the spare part has been made or distributed by Hyundai Heavy Industries and has been installed according to approved methods described in a publication available from Hyundai Heavy Industries; or
2. The modification has been approved in writing by the Engineering Department at each product company within Hyundai Heavy Industries.

## 2. DURING OPERATING THE MACHINE

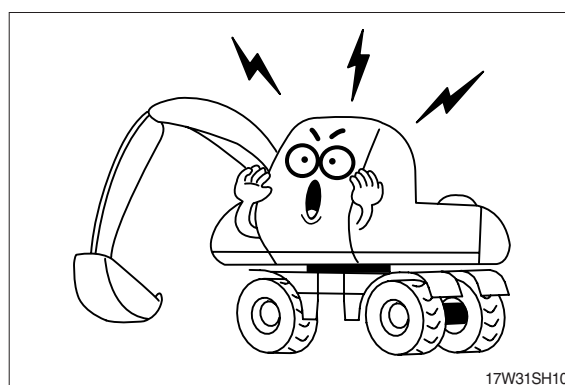
Use the handle and footstep when getting on or off the machine.

Do not jump on or off the machine.



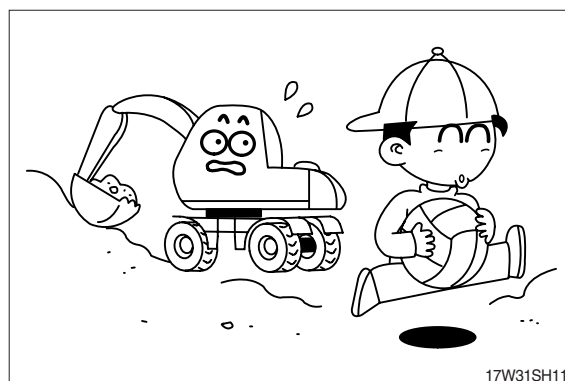
Sound the horn to warn nearby personnel before operating the machine.

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.

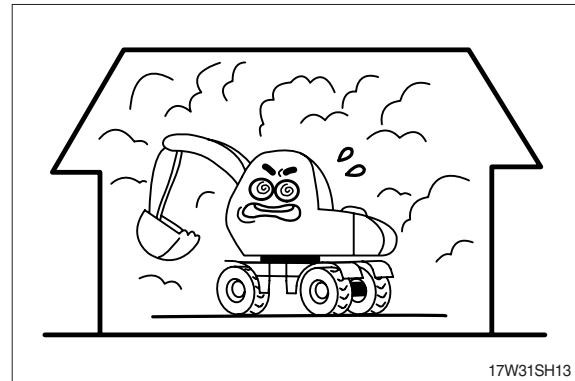
Place safety guards if necessary.



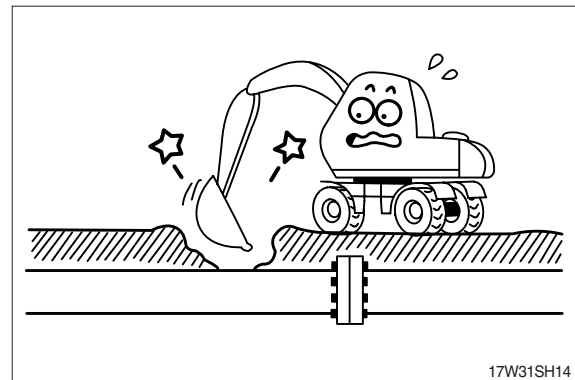
When using the work equipment, pay attention to job site.



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

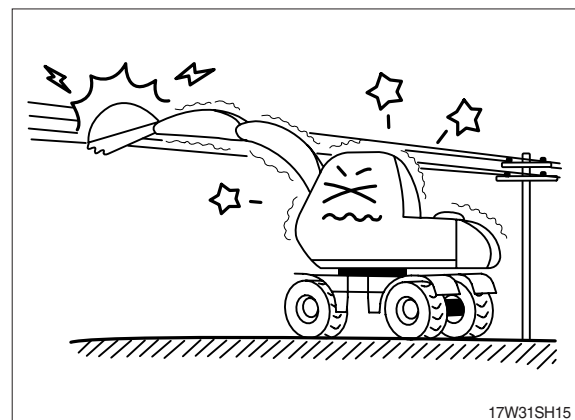


Check the locations of underground gas pipes or water line and secure the safety before operation.

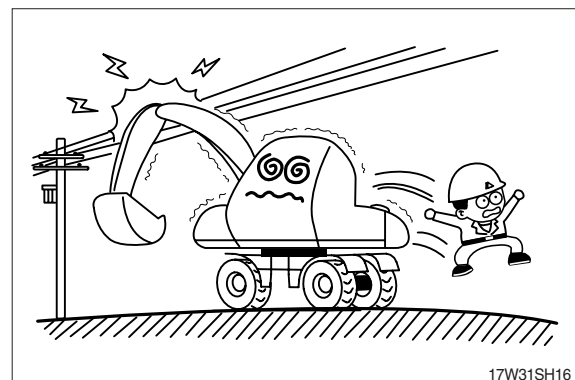


The operating near the electrical lines is very dangerous.  
Operate within safe working range permitted as below.

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

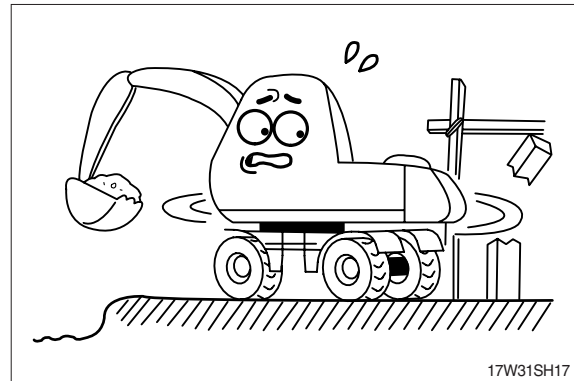


If the machine touches the electric power lines, keep sitting on the operator's seat and make sure the personnel on the ground not to touch the machine until turning off the electric current. Jump off the machine without contacting the machine when you need to get off.

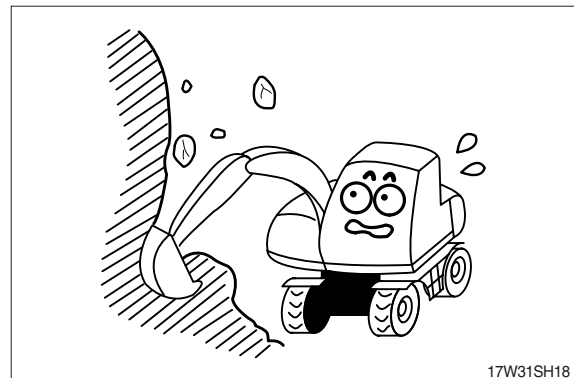


Watch out for obstacles.

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

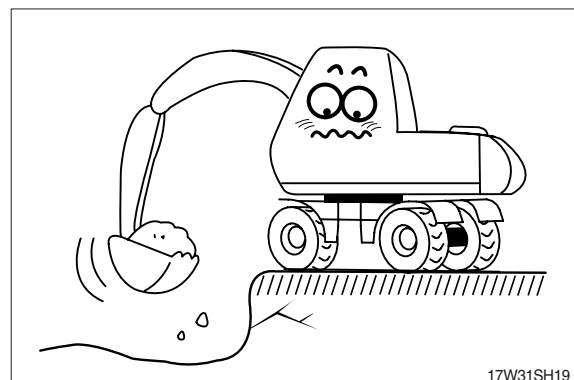


When using the machine as breaker or working in a place where stones may fall down, cab roof guard and head guard should be provided for proper protection.



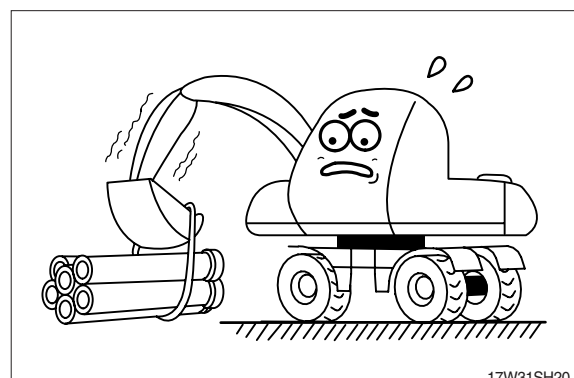
Avoid operating on a cliff or soft ground as there is danger of rolling over.

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.



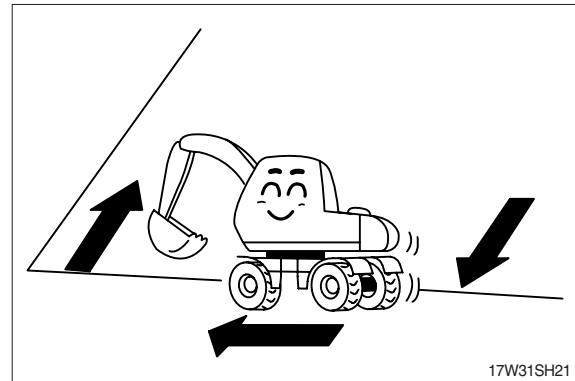
Operate for the lifting work considering the capacity of machine, weight and width of the load.

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

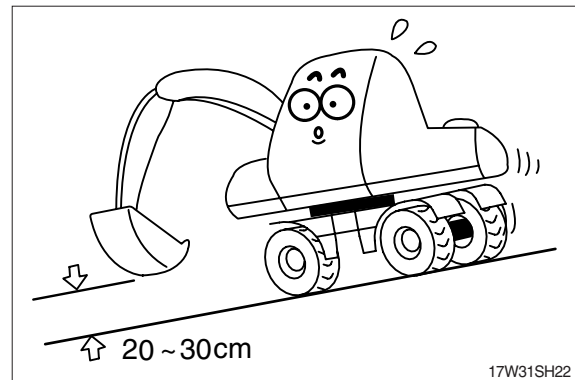




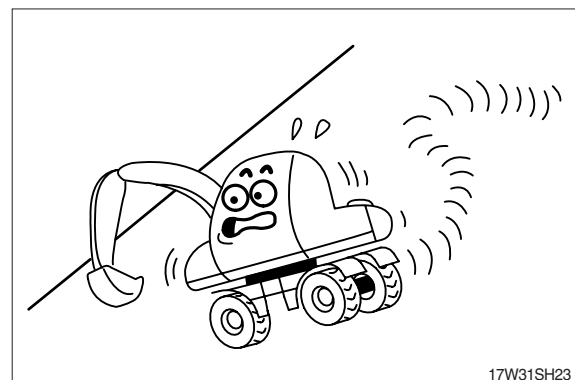
Avoid traveling in a cross direction on a slope as it can cause the danger of rolling over and sliding.



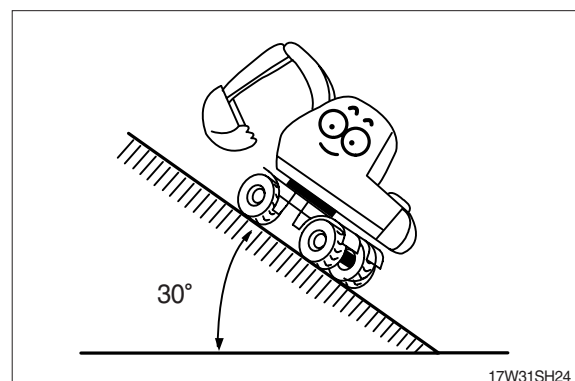
Traveling on a slope is dangerous.  
Be sure to operate slowly when traveling down a slope and maintain the bucket at a height of 20~30 cm (1 ft) above the ground so that it can be used as brake in an emergency.



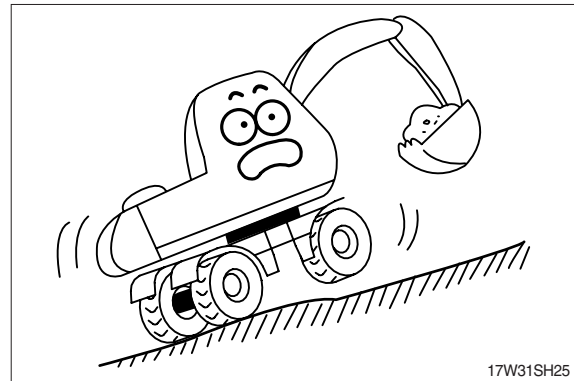
Steering of the machine while traveling on a slope is dangerous.  
When an inevitable turning of direction is required, turn on the flat and solid ground.



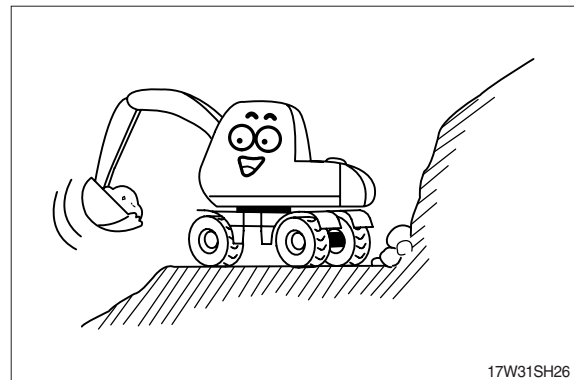
The engine angularity limits are 30 degree.  
Do not operate by more than the engine limits in any case.



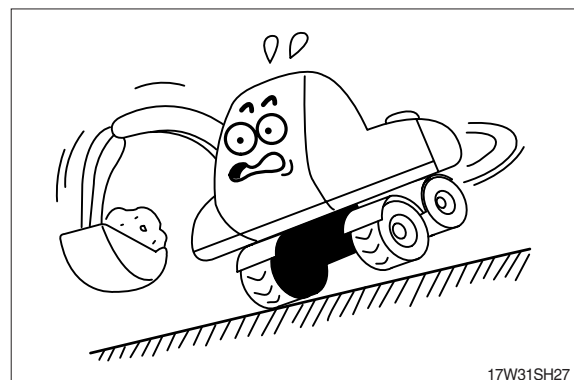
The operation on a slope is dangerous.  
Avoid operating the machine on a slope of over  
10 degree.



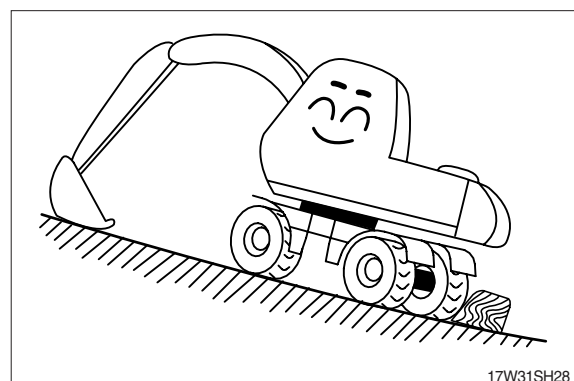
Operate the machine after making ground flat  
when operation is required on a slope.



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.

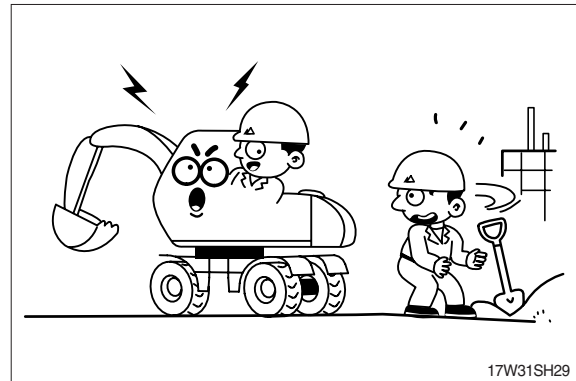


Avoid parking and stopping on a slope.  
Lower the bucket to the ground and block the  
tires when parking.

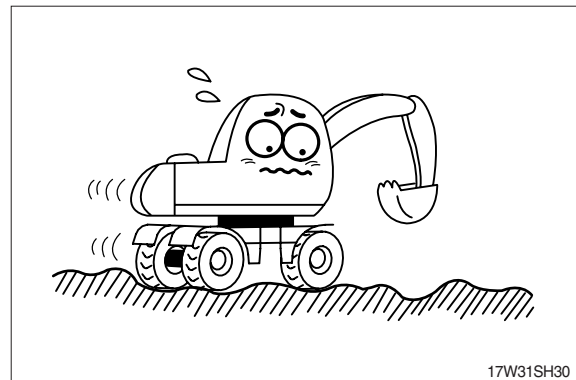


Before traveling the machine, sound the horn to warn nearby personnel.

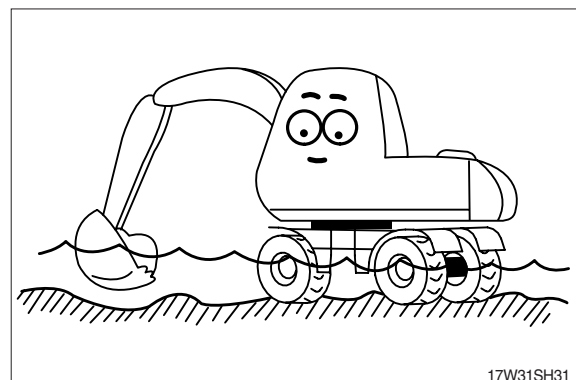
Operate forward and backward correctly with confirming the location of the travel motor.



Slow down when traveling through obstacles or uneven ground.



When 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 axle center.



## MOUNTING AND DISMOUNTING

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

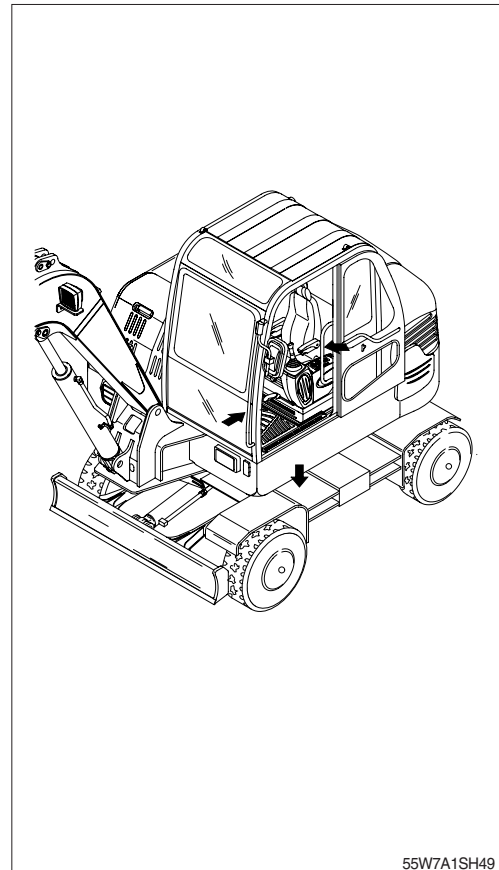
When mounting or dismounting, always face the machine and use the handrails, machine or foot steps. In this case please contact your Hyundai distributor.

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, foot steps.

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

If grasping the door handrail when mounting or dismounting or moving on the tires, 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.

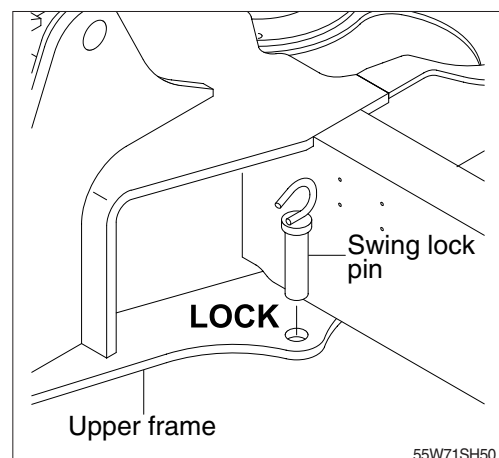
Only allow the operator on the machine. Keep riders off.

## ALWAYS APPLY LOCK WHEN LEAVING MACHINE

When leaving the machine, always place the swing lock pin securely in the LOCK position.

If you accidentally touch the travel or swing lever when they are not locked, the work equipment may suddenly move and cause serious injury or damage.

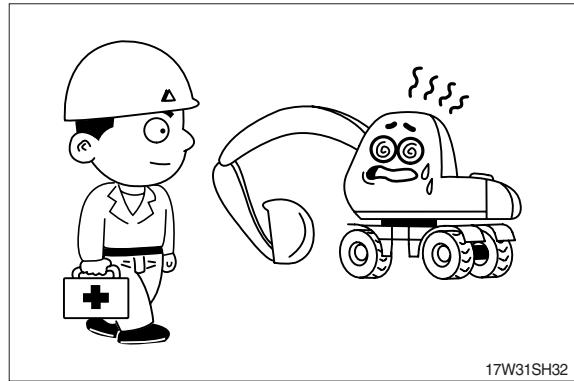
When leaving the machine, lower the work equipment completely to the ground, stop the engine and use the key to lock all the equipment. Then set the swing lock pin to the lock position. Always take the key with you.



### 3. DURING MAINTENANCE

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

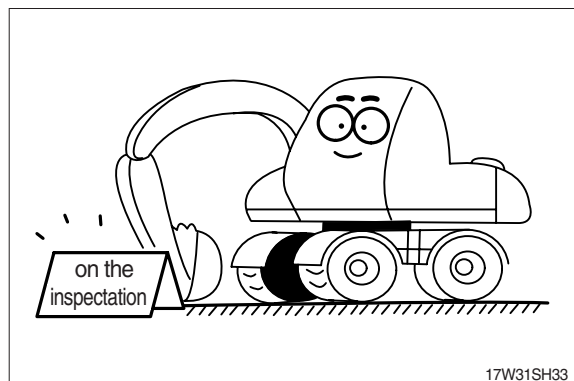
Inspect immediately the cause of trouble such as vibration, overheating and trouble in the cluster then repair.



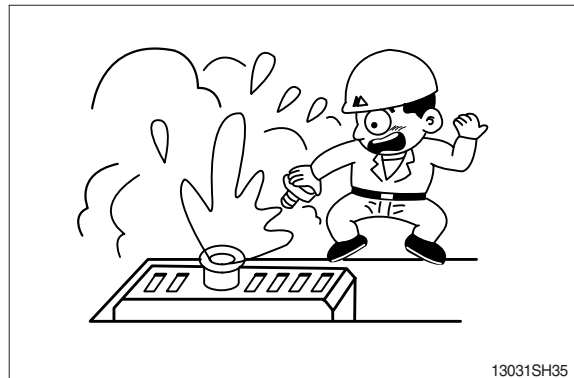
Park on a flat place and stop the engine for inspecting and repairing. Properly TAG machine is not operational. (remove start key)

Extreme care shall be taken during maintenance work. Parts may require additional safe guard.

Lower the dozer blade and/or outrigger to the ground.



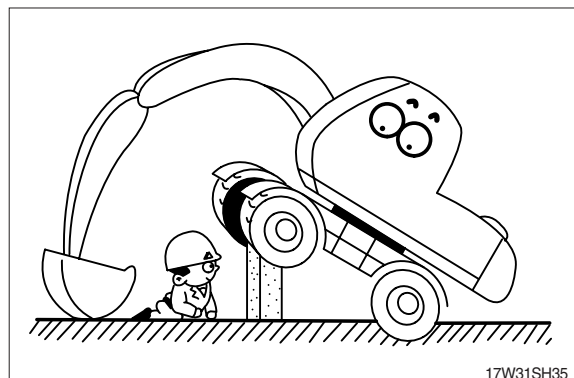
Do not remove the radiator cap from hot engine. Open the cap after the engine cools, below 50°C (122°F) to prevent personal injury from heated coolant spray or steam.



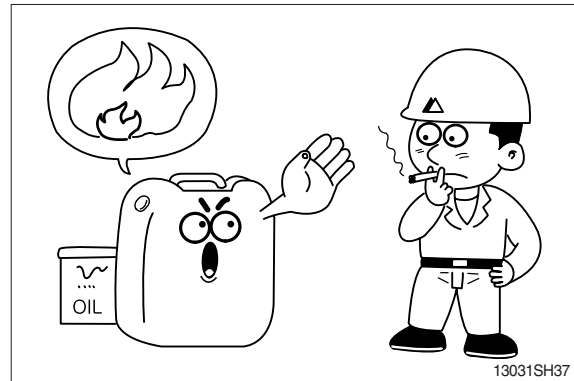
Do not work below the machine.

Be sure to work with proper safety supports.

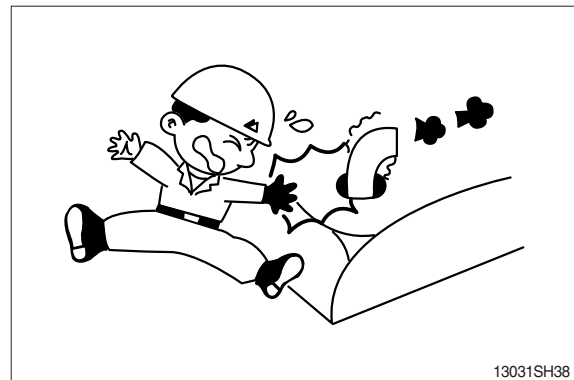
Do not depend on the hydraulic cylinders to hold up the equipment and attachment.



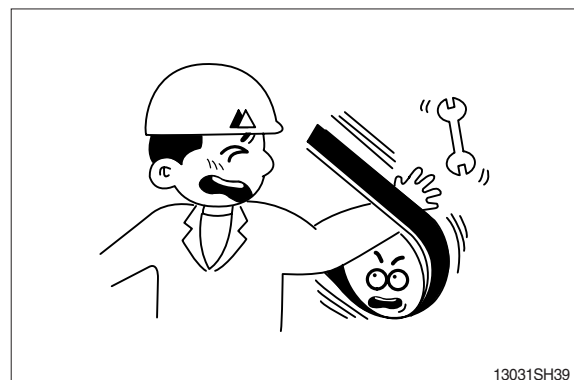
There is the danger of fire in fuel and oil.  
Store in cool and dry area, away from any open flames.



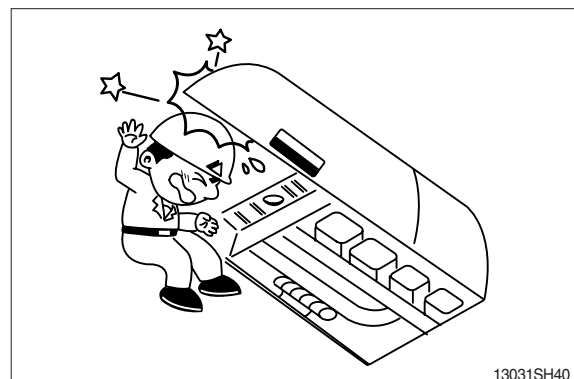
Do not touch exhaust pipe, or may cause severe burn.



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.

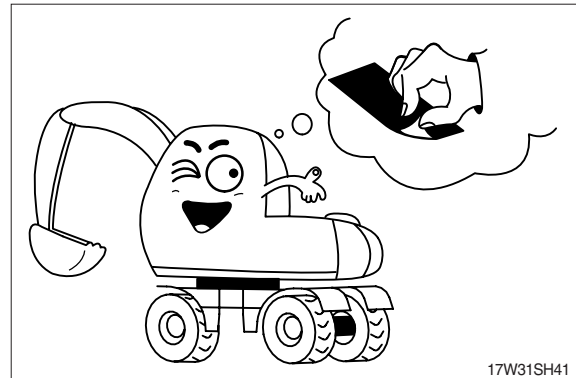
Be sure to support stay, when the side door needs to be opened.

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

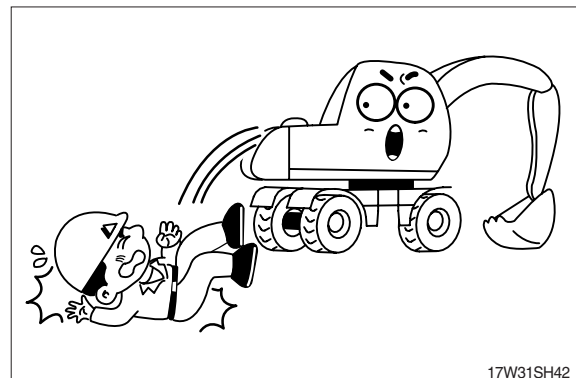


The antislip protection should be replaced if they have become worn or have been printed over.

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.

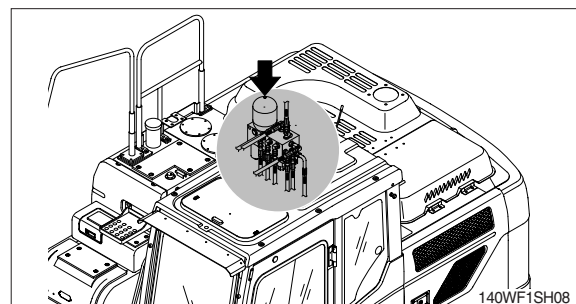


## HIGH PRESSURE GAS

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

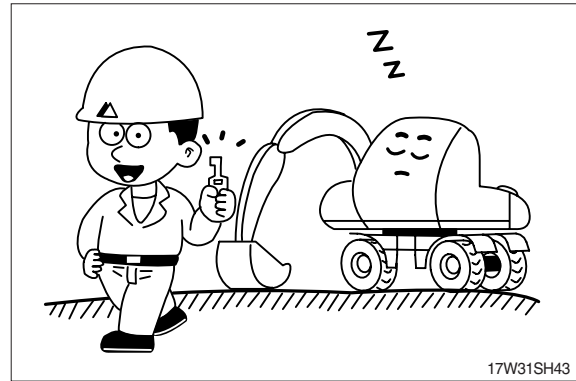
Lift eyes or tank can fail when lifting tank containing fluids resulting in possible personal injury.

Drain tank of all fluids before lifting.

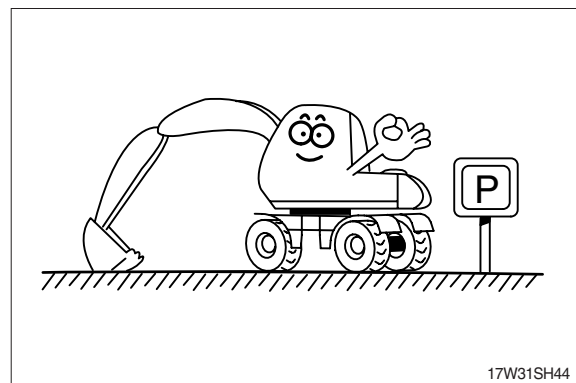
## 4. PARKING

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.

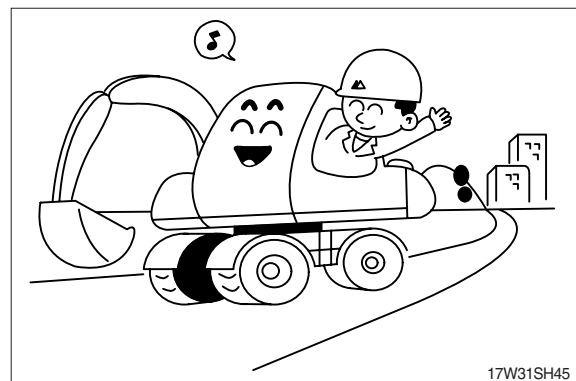


Park the machine in the flat and safe place.



Hope you can work easily and safely observing safety rules.

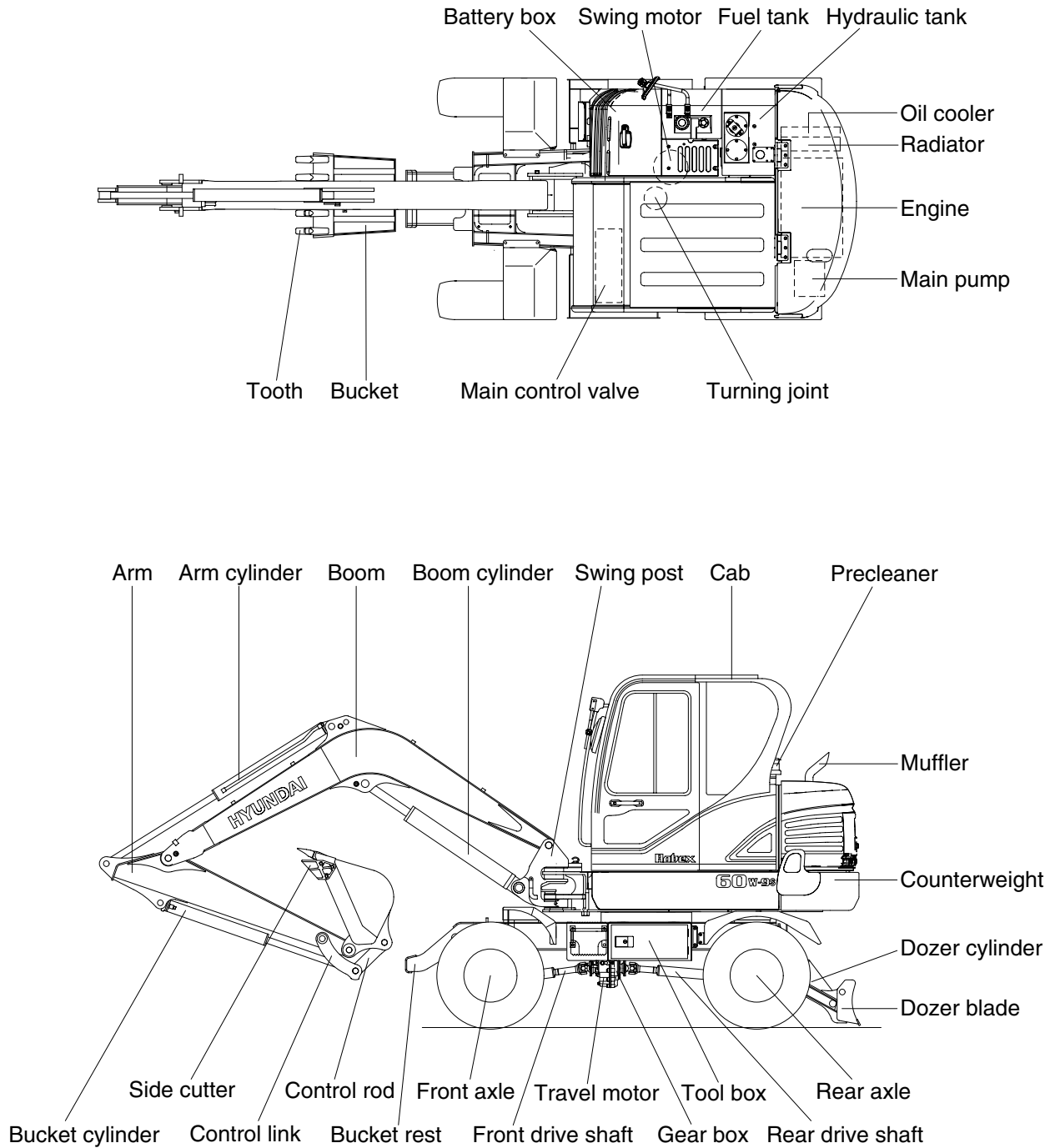
For safe operation, observe all safety rules.





# SPECIFICATIONS

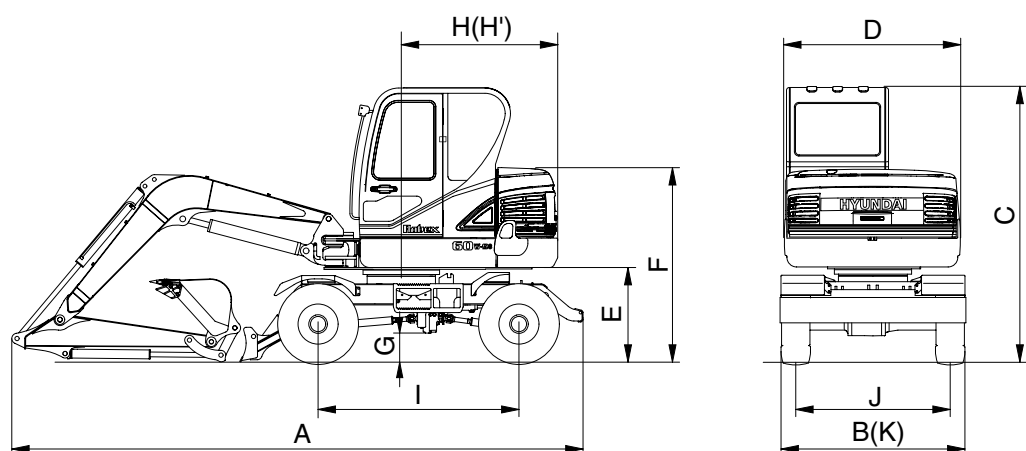
## 1. MAJOR COMPONENTS



55W9S2SP01

## 2. SPECIFICATIONS

### 1) 3.0 m (9'10") MONO BOOM, 1.6 m (5' 3") ARM WITH BOOM SWING SYSTEM

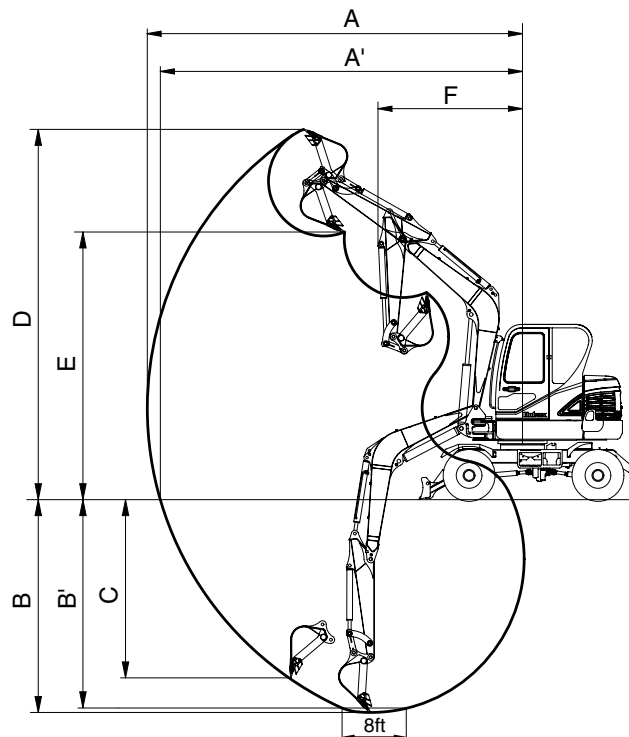


55W9S2SP02

| Description                           |      | Unit                              | Specification |
|---------------------------------------|------|-----------------------------------|---------------|
| Operating weight                      |      | kg (lb)                           | 5550 (12240)  |
| Bucket capacity(SAE heaped), standard |      | m <sup>3</sup> (yd <sup>3</sup> ) | 0.18 (0.24)   |
| Overall length                        | A    | mm (ft-in)                        | 5970 (19' 6") |
| Overall width                         | B    |                                   | 1925 ( 6' 4") |
| Overall height                        | C    |                                   | 2850 ( 9' 4") |
| Upperstructure width                  | D    |                                   | 1850 ( 6' 1") |
| Ground clearance of counterweight     | E    |                                   | 986 ( 3' 3")  |
| Engine cover height                   | F    |                                   | 1970 ( 6' 6") |
| Minimum ground clearance              | G    |                                   | 290 (11.4")   |
| Rear-end distance                     | H    |                                   | 1650 ( 5' 5") |
| Rear-end swing radius                 | H'   |                                   | 1650 ( 5' 5") |
| Wheel base                            | I    |                                   | 2100 ( 6'11") |
| Tread                                 | J    |                                   | 1600 ( 5' 3") |
| Dozer blade width                     | K    |                                   | 1925 ( 6' 4") |
| Travel speed                          | Low  | km/hr (mph)                       | 11.3 (7.0)    |
|                                       | High |                                   | 27 (16.8)     |
| Swing speed                           |      | rpm                               | 9.1           |
| Gradeability                          |      | Degree (%)                        | 35 (70)       |
| Max traction force                    |      | kg (lb)                           | 3500 (7720)   |

### 3. WORKING RANGE

#### 1) 3.0 m (9'10") MONO BOOM WITH BOOM SWING SYSTEM



55W92SP03

| Description                     |     | 1.6 m (5' 3") Arm |
|---------------------------------|-----|-------------------|
| Max digging reach               | A   | 6150 mm (20' 2")  |
| Max digging reach on ground     | A'  | 5980 mm (19' 7")  |
| Max digging depth               | B   | 3500 mm (11' 6")  |
| Max digging depth (8 ft level)  | B'  | 3100 mm (10' 2")  |
| Max vertical wall digging depth | C   | 2960 mm ( 9' 9")  |
| Max digging height              | D   | 6070 mm (19' 11") |
| Max dumping height              | E   | 4340 mm (14' 3")  |
| Min swing radius                | F   | 2350 mm ( 7' 9")  |
| Boom swing radius (left/right)  |     | 80°/50°           |
| Bucket digging force            | SAE | 37.7 kN           |
|                                 |     | 3850 kgf          |
|                                 |     | 8490 lbf          |
|                                 | ISO | 42.4 kN           |
|                                 |     | 4330 kgf          |
|                                 |     | 9550 lbf          |
| Arm crowd force                 | SAE | 28.4 kN           |
|                                 |     | 2900 kgf          |
|                                 |     | 6390 lbf          |
|                                 | ISO | 31.9 kN           |
|                                 |     | 3260 kgf          |
|                                 |     | 7190 lbf          |

## 4. WEIGHT











| Item                                                                                     | R60W-9S |      |
|------------------------------------------------------------------------------------------|---------|------|
|                                                                                          | kg      | lb   |
| Upperstructure assembly                                                                  | 2680    | 5910 |
| Main frame weld assembly                                                                 | 600     | 1320 |
| Engine assembly                                                                          | 280     | 620  |
| Main pump assembly                                                                       | 30      | 70   |
| Main control valve assembly                                                              | 40      | 90   |
| Swing motor assembly                                                                     | 80      | 180  |
| Hydraulic oil tank assembly                                                              | 90      | 200  |
| Fuel tank assembly                                                                       | 60      | 130  |
| Boom swing post                                                                          | 110     | 240  |
| Counterweight                                                                            | 180     | 400  |
| Cab assembly                                                                             | 350     | 770  |
| Lower chassis assembly                                                                   | 2080    | 4590 |
| Lower frame weld assembly                                                                | 550     | 1210 |
| Swing bearing                                                                            | 94      | 210  |
| Travel motor assembly                                                                    | 50      | 110  |
| Turning joint                                                                            | 60      | 130  |
| Gear box                                                                                 | 63      | 140  |
| Front axle assembly                                                                      | 280     | 610  |
| Rear axle assembly                                                                       | 200     | 430  |
| Dozer blade assembly                                                                     | 200     | 440  |
| Front attachment assembly (3.0 m boom, 1.6 m arm, 0.18 m <sup>3</sup> SAE heaped bucket) | 790     | 1740 |
| 3.0 m boom assembly                                                                      | 240     | 530  |
| 1.6 m arm assembly                                                                       | 130     | 290  |
| 0.18 m <sup>3</sup> SAE heaped bucket assembly                                           | 170     | 370  |
| Boom cylinder assembly                                                                   | 70      | 155  |
| Arm cylinder assembly                                                                    | 60      | 130  |
| Bucket cylinder assembly                                                                 | 35      | 80   |
| Bucket control link assembly                                                             | 40      | 90   |
| Boom swing cylinder assembly                                                             | 40      | 90   |
| Blade cylinder assembly                                                                  | 30      | 70   |

## 5. LIFTING CAPACITIES











1) 3.0 m ( 9'10") boom, 1.6 m( 5' 3") arm equipped with 0.18m³ (SAE heaped) bucket and the dozer blade down.

·  : Rating over-front

·  : Rating over-side or 360 degree

| Load point height |          | Load radius                                                                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | At max. reach                                                                       |                                                                                     |                |
|-------------------|----------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|----------------|
|                   |          | 2.0 m (7 ft)                                                                      |                                                                                   | 3.0 m (10 ft)                                                                     |                                                                                   | 4.0 m (13 ft)                                                                     |                                                                                   | 5.0 m (16 ft)                                                                     |                                                                                     | Capacity                                                                            |                                                                                     | Reach          |
|                   |          |  |  |  |  |  |  |  |  |  |  | m (ft)         |
| 5.0 m (16 ft)     | kg<br>lb |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     | *960<br>*2120                                                                       | *960<br>*2120                                                                       | 4.47<br>(14.7) |
| 4.0 m (13 ft)     | kg<br>lb |                                                                                   |                                                                                   |                                                                                   |                                                                                   | *1020<br>*2250                                                                    | *1020<br>*2250                                                                    |                                                                                   |                                                                                     | *990<br>*2180                                                                       | 720<br>1590                                                                         | 5.26<br>(17.3) |
| 3.0 m (10 ft)     | kg<br>lb |                                                                                   |                                                                                   |                                                                                   |                                                                                   | *1150<br>*2540                                                                    | 1120<br>2470                                                                      | *990<br>*2180                                                                     | 760<br>1680                                                                         | *1020<br>*2250                                                                      | 620<br>1370                                                                         | 5.69<br>(18.7) |
| 2.0 m (7 ft)      | kg<br>lb |                                                                                   |                                                                                   | *1900<br>*4190                                                                    | 1690<br>3730                                                                      | *1400<br>*3090                                                                    | 1070<br>2360                                                                      | *1200<br>*2650                                                                    | 740<br>1630                                                                         | *1070<br>*2360                                                                      | 570<br>1260                                                                         | 5.86<br>(19.2) |
| 1.0 m (3 ft)      | kg<br>lb |                                                                                   |                                                                                   | *2500<br>*5510                                                                    | 1580<br>3480                                                                      | *1670<br>*3680                                                                    | 1020<br>2250                                                                      | *1310<br>*2890                                                                    | 720<br>1590                                                                         | *1110<br>*2450                                                                      | 570<br>1260                                                                         | 5.81<br>(19.1) |
| Ground Line       | kg<br>lb | *2690<br>*5930                                                                    | *2690<br>*5930                                                                    | *2720<br>*6000                                                                    | 1530<br>3370                                                                      | *1820<br>*4010                                                                    | 990<br>2180                                                                       | *1350<br>*2980                                                                    | 700<br>1540                                                                         | *1160<br>*2560                                                                      | 620<br>1370                                                                         | 5.51<br>(18.1) |
| -1.0 m (-3 ft)    | kg<br>lb | *4040<br>*8910                                                                    | 3040<br>6700                                                                      | *2610<br>*5750                                                                    | 1520<br>3350                                                                      | *1760<br>*3880                                                                    | 980<br>2160                                                                       |                                                                                   |                                                                                     | *1180<br>*2600                                                                      | 740<br>1630                                                                         | 4.92<br>(16.1) |
| -2.0 m (-7 ft)    | kg<br>lb | *3400<br>*7500                                                                    | 3100<br>6830                                                                      | *2090<br>*4610                                                                    | 1550<br>3420                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                |

2) 3.0 m ( 9'10") boom, 1.6 m ( 5' 3") arm equipped with 0.18m³ (SAE heaped) bucket and the dozer blade up.

| Load point height |          | Load radius                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       | At max. reach                                                                         |                                                                                       |                |
|-------------------|----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------|
|                   |          | 2.0 m (7 ft)                                                                        |                                                                                     | 3.0 m (10 ft)                                                                       |                                                                                     | 4.0 m (13 ft)                                                                       |                                                                                     | 5.0 m (16 ft)                                                                       |                                                                                       | Capacity                                                                              |                                                                                       | Reach          |
|                   |          |  |  |  |  |  |  |  |  |  |  | m (ft)         |
| 5.0 m (16 ft)     | kg<br>lb |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                       | *960<br>*2120                                                                         | 880<br>1940                                                                           | 4.47<br>(14.7) |
| 4.0 m (13 ft)     | kg<br>lb |                                                                                     |                                                                                     |                                                                                     |                                                                                     | *1020<br>*2250                                                                      | *1020<br>*2250                                                                      |                                                                                     |                                                                                       | 760<br>1680                                                                           | 650<br>1430                                                                           | 5.26<br>(17.3) |
| 3.0 m (10 ft)     | kg<br>lb |                                                                                     |                                                                                     |                                                                                     |                                                                                     | *1150<br>*2540                                                                      | 1010<br>2230                                                                        | 810<br>1790                                                                         | 690<br>1520                                                                           | 650<br>1430                                                                           | 550<br>1210                                                                           | 5.69<br>(18.7) |
| 2.0 m (7 ft)      | kg<br>lb |                                                                                     |                                                                                     | 1770<br>3900                                                                        | 1510<br>3330                                                                        | 1130<br>2490                                                                        | 960<br>2120                                                                         | 790<br>1740                                                                         | 670<br>1480                                                                           | 610<br>1340                                                                           | 510<br>1120                                                                           | 5.86<br>(19.2) |
| 1.0 m (3 ft)      | kg<br>lb |                                                                                     |                                                                                     | 1660<br>3660                                                                        | 1410<br>3110                                                                        | 1080<br>2380                                                                        | 910<br>2010                                                                         | 760<br>1680                                                                         | 640<br>1410                                                                           | 610<br>1340                                                                           | 510<br>1120                                                                           | 5.81<br>(19.1) |
| Ground Line       | kg<br>lb | *2690<br>*5930                                                                      | 2630<br>5800                                                                        | 1610<br>3550                                                                        | 1360<br>3000                                                                        | 1040<br>2290                                                                        | 880<br>1940                                                                         | 750<br>1650                                                                         | 630<br>1390                                                                           | 650<br>1430                                                                           | 550<br>1210                                                                           | 5.51<br>(18.1) |
| -1.0 m (-3 ft)    | kg<br>lb | 3210<br>7080                                                                        | 2650<br>5840                                                                        | 1600<br>3530                                                                        | 1350<br>2980                                                                        | 1040<br>2290                                                                        | 870<br>1920                                                                         |                                                                                     |                                                                                       | 790<br>1740                                                                           | 660<br>1460                                                                           | 4.92<br>(16.1) |
| -2.0 m (-7 ft)    | kg<br>lb | 3270<br>7210                                                                        | 2700<br>5950                                                                        | 1630<br>3590                                                                        | 1380<br>3040                                                                        |                                                                                     |                                                                                     |                                                                                     |                                                                                       |                                                                                       |                                                                                       |                |

- Note
1. Lifting capacity are based on SAE J1097 and ISO 10567.
  2. Lifting capacity of the ROBEX series does not exceed 75% of tipping load with the machine on firm, level ground or 87% of full hydraulic capacity.
  3. The load point is a hook located on the back of the bucket.
  4. \*indicates load limited by hydraulic capacity.

## 6. BUCKET SELECTION GUIDE

|                                                                                   |                                                                                     |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|  |  |
| 0.07m <sup>3</sup> SAE<br>heaped bucket                                           | 0.18 m <sup>3</sup> SAE<br>heaped bucket                                            |

| Capacity                                       |                                                | Width                  |                     | Weight             | Recommendation                                                                                         |
|------------------------------------------------|------------------------------------------------|------------------------|---------------------|--------------------|--------------------------------------------------------------------------------------------------------|
|                                                |                                                |                        |                     |                    | 3.0 m (9' 10") boom                                                                                    |
| SAE<br>heaped                                  | CECE<br>heaped                                 | Without<br>side cutter | With<br>side cutter |                    | 1.6 m (5' 3") arm                                                                                      |
| 0.07 m <sup>3</sup><br>(0.09 yd <sup>3</sup> ) | 0.06 m <sup>3</sup><br>(0.08 yd <sup>3</sup> ) | 315 mm<br>(12.4")      | 360 mm<br>(14.2")   | 115 kg<br>(255 lb) | Applicable for materials with density of 1600 kgf/m <sup>3</sup><br>(2700 lb/yd <sup>3</sup> ) or less |
| 0.18 m <sup>3</sup><br>(0.24 yd <sup>3</sup> ) | 0.15 m <sup>3</sup><br>(0.20 yd <sup>3</sup> ) | 670 mm<br>(26.4")      | 740 mm<br>(29.1")   | 170 kg<br>(375 lb) |                                                                                                        |

## 7. SPECIFICATIONS FOR MAJOR COMPONENTS

### 1) ENGINE

| Item                                | Specification                            |
|-------------------------------------|------------------------------------------|
| Model                               | Yanmar 4TNV94L-PHYBY                     |
| Type                                | 4-cycle diesel engine, low emission      |
| 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              | 94 × 110 mm (3.7" × 4.3")                |
| Piston displacement                 | 3054 cc (186 cu in)                      |
| Compression ratio                   | 19 : 1                                   |
| Rated gross horse power(SAE J1995)  | 57 Hp at 2400 rpm (42 kW at 2400 rpm)    |
| Maximum torque at 1440rpm           | 20.6 kgf · m (149 lbf · ft)              |
| Engine oil quantity                 | 11.6 ℓ (3.1 U.S. gal)                    |
| Dry weight                          | 280 kg (617 lb)                          |
| High idling speed                   | 2400+ 50 rpm                             |
| Low idling speed                    | 1000 ± 100 rpm                           |
| Rated fuel consumption              | 175 g/ps · hr at 2400 rpm                |
| Starting motor                      | 12 V-3.0 kW                              |
| Alternator                          | 12 V-100 A (-#0039), 12 V-110 A (#0040-) |
| Battery                             | 1 × 12 V × 100 Ah                        |

### 2) MAIN PUMP

| Item             | Specification                                  |
|------------------|------------------------------------------------|
| Type             | Variable displacement tandem axis piston pumps |
| Capacity         | 2 × 25 cc/rev                                  |
| Maximum pressure | 220 kgf/cm <sup>2</sup> (3130 psi)             |
| Rated oil flow   | 2 × 60 ℓ /min (15.9 U.S. gpm/ 13.2 U.K. gpm)   |
| Rated speed      | 2400 rpm                                       |

### 3) GEAR PUMP

| Item             | Specification                                         |
|------------------|-------------------------------------------------------|
| Type             | Fixed displacement gear pump single stage             |
| Capacity         | 16.2/6.5 cc/rev                                       |
| Maximum pressure | 220/30 kgf/cm <sup>2</sup> (3130/430 psi)             |
| Rated oil flow   | 38.9/15.6 ℓ /min (10.3/4.1 U.S. gpm/8.6/3.4 U.K. gpm) |

### 4) MAIN CONTROL VALVE

| Item                           | Specification                                 |
|--------------------------------|-----------------------------------------------|
| Type                           | 10 spools sectional block (+1 optional block) |
| Operating method               | Hydraulic pilot system                        |
| Main relief valve pressure     | 220 kgf/cm <sup>2</sup> (3130 psi)            |
| Overload relief valve pressure | 240 kgf/cm <sup>2</sup> (3410 psi)            |

[ ]: Power boost

### 5) SWING MOTOR

| Item                   | Specification                                |
|------------------------|----------------------------------------------|
| Type                   | Two fixed displacement axial piston motor    |
| Capacity               | 32.3 cc/rev                                  |
| Relief pressure        | 220 kgf/cm <sup>2</sup> (3130 psi)           |
| Braking system         | Automatic, spring applied hydraulic released |
| Braking torque         | 14 kgf · m (101 lbf · ft)                    |
| Brake release pressure | 20~40 kgf/cm <sup>2</sup> (284~570 psi)      |
| Reduction gear type    | 2 - stage planetary                          |

### 6) TRAVEL MOTOR

| Item                 | Specification                                             |
|----------------------|-----------------------------------------------------------|
| Type                 | Bent axis design variable displacement axial piston motor |
| Relief pressure      | 220 kgf/cm <sup>2</sup> (3130 psi)                        |
| Counterbalance valve | Applied                                                   |
| Capacity             | 80 cc                                                     |



## 7) POWER TRAIN

| Item          | Description           |     | Specification                            |
|---------------|-----------------------|-----|------------------------------------------|
| Gear box      | Type                  |     | 2 speed hydrostatic                      |
|               | Gear ratio            | 1st | 4.06                                     |
|               |                       | 2nd | 1.31                                     |
| Parking brake | Type                  |     | Multi disc brake integrated in rear axle |
|               | Maximum braking power |     | 945 kgf · m (6835 lbf · ft)              |
| Axle          | Type                  |     | 4 wheel drive with differential          |
|               | Gear ratio            |     | 8.67                                     |
|               | Brake                 |     | Multi disc brake                         |

## 8) CYLINDER

| Item                |                             | Specification         |
|---------------------|-----------------------------|-----------------------|
| Boom cylinder       | Bore dia × Rod dia × Stroke | Ø 110 × Ø 60 × 715 mm |
|                     | Cushion                     | Extend only           |
| Arm cylinder        | Bore dia × Rod dia × Stroke | Ø 90 × Ø 55 × 850 mm  |
|                     | Cushion                     | Extend and retract    |
| Bucket cylinder     | Bore dia × Rod dia × Stroke | Ø 80 × Ø 50 × 660 mm  |
|                     | Cushion                     | -                     |
| Dozer cylinder      | Bore dia × Rod dia × Stroke | Ø 110 × Ø 60 × 189 mm |
|                     | Cushion                     | -                     |
| Boom swing cylinder | Bore dia × Rod dia × Stroke | Ø 95 × Ø 50 × 527 mm  |
|                     | Cushion                     | -                     |

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

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

## 9) BUCKET

| Item    |     | Capacity                                    |                                             | Tooth quantity | Width               |                  |
|---------|-----|---------------------------------------------|---------------------------------------------|----------------|---------------------|------------------|
|         |     | SAE heaped                                  | CECE heaped                                 |                | Without side cutter | With side cutter |
| R60W-9S | STD | 0.18 m <sup>3</sup> (0.24 yd <sup>3</sup> ) | 0.15 m <sup>3</sup> (0.20 yd <sup>3</sup> ) | 5              | 670 mm (26.4")      | 740 mm (29.1")   |
|         | OPT | 0.07 m <sup>3</sup> (0.09 yd <sup>3</sup> ) | 0.06 m <sup>3</sup> (0.08 yd <sup>3</sup> ) | 3              | 315 mm (12.4")      | 360 mm (14.2")   |

## 9. RECOMMENDED OILS

Use only oils listed below or equivalent.  
Do not mix different brand oil.

| Service point                | Kind of fluid                                          | Capacity<br>ℓ (U.S. gal)                       | Ambient temperature °C (°F) |                                     |           |            |            |            |             |
|------------------------------|--------------------------------------------------------|------------------------------------------------|-----------------------------|-------------------------------------|-----------|------------|------------|------------|-------------|
|                              |                                                        |                                                | -20<br>(-4)                 | -10<br>(14)                         | 0<br>(32) | 10<br>(50) | 20<br>(68) | 30<br>(86) | 40<br>(104) |
| Engine oil pan               | Engine oil                                             | 11.6 (3.1)                                     |                             |                                     |           | SAE 30     |            |            |             |
|                              |                                                        |                                                | SAE 10W                     |                                     |           |            |            |            |             |
|                              |                                                        |                                                | SAE 10W-30                  |                                     |           |            |            |            |             |
|                              |                                                        |                                                | SAE 15W-40                  |                                     |           |            |            |            |             |
|                              |                                                        |                                                |                             |                                     |           |            |            |            |             |
| Swing drive                  | Gear oil                                               | 1.5(0.4)                                       |                             | SAE 85W-140                         |           |            |            |            |             |
|                              | Grease                                                 | 0.2 (0.05)                                     | NLGI NO.1                   |                                     |           |            |            |            |             |
|                              |                                                        |                                                |                             | NLGI NO.2                           |           |            |            |            |             |
| Gear box case                | Gear oil                                               | 1.8 (0.5)                                      |                             |                                     |           |            |            |            |             |
| Front axle                   |                                                        | Center : 4.5 (1.19)<br>Hub : 0.4×2<br>(0.11×2) |                             | SAE 85W-90                          |           |            |            |            |             |
| Rear axle                    |                                                        | Center : 4.5 (1.19)<br>Hub : 0.4×2<br>(0.11×2) |                             |                                     |           |            |            |            |             |
| Hydraulic tank               | Hydraulic oil                                          | Tank :<br>70(18.5)                             | ISO VG 32                   |                                     |           |            |            |            |             |
|                              |                                                        |                                                | ISO VG 46                   |                                     |           |            |            |            |             |
|                              |                                                        |                                                | ISO VG 68                   |                                     |           |            |            |            |             |
| Fuel tank                    | Diesel fuel                                            | 120 (31.7)                                     | ASTM D975 NO.1              |                                     |           |            |            |            |             |
|                              |                                                        |                                                |                             | ASTM D975 NO.2                      |           |            |            |            |             |
| Fitting<br>(grease nipple)   | Grease                                                 | As required                                    | NLGI NO.1                   |                                     |           |            |            |            |             |
|                              |                                                        |                                                |                             | NLGI NO.2                           |           |            |            |            |             |
| Radiator<br>(reservoir tank) | Mixture of<br>antifreeze and<br>soft water★<br>50 : 50 | 9.5 (2.5)                                      |                             | 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

★ Soft water

City water or distilled water

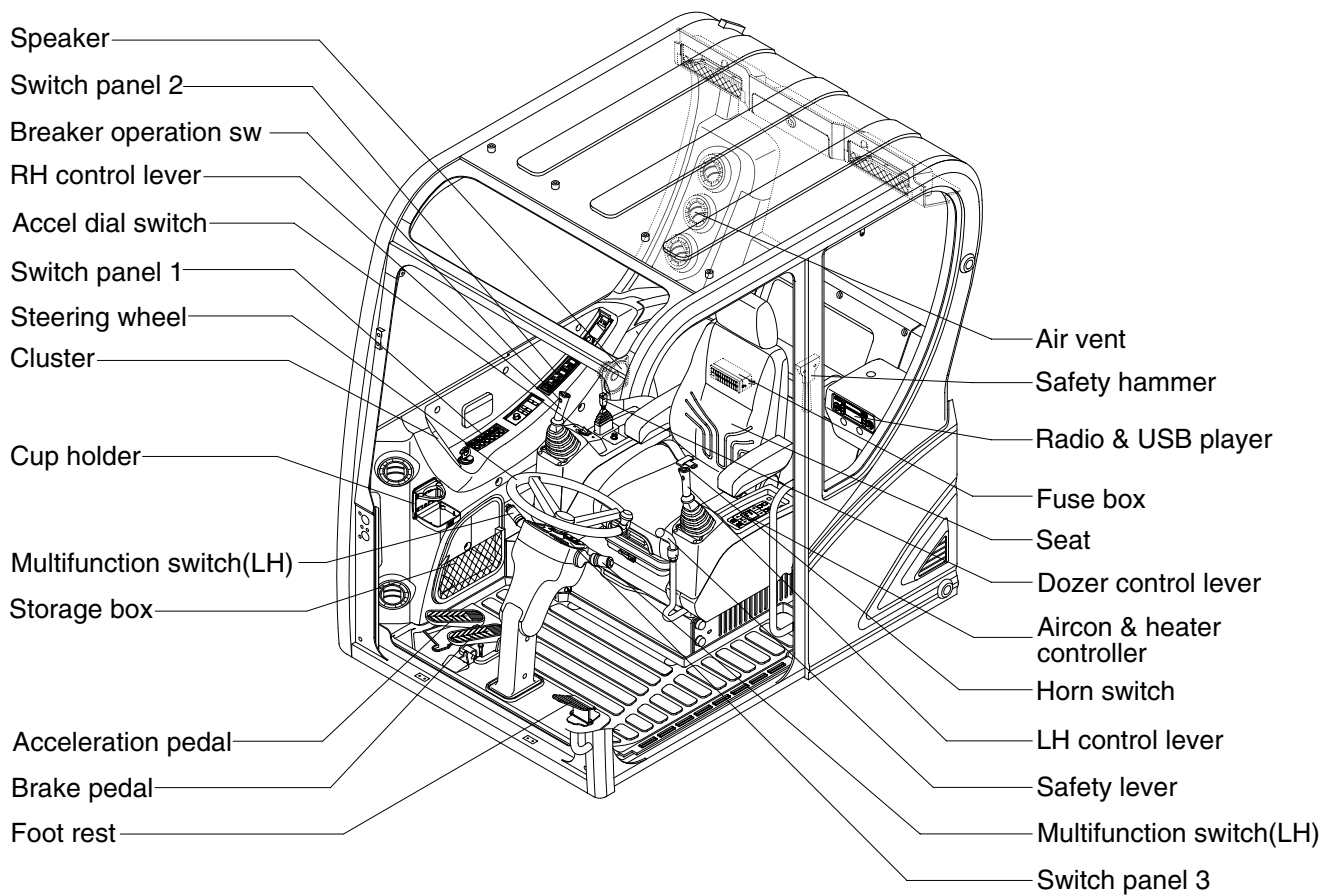
# CONTROL DEVICES

## 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.



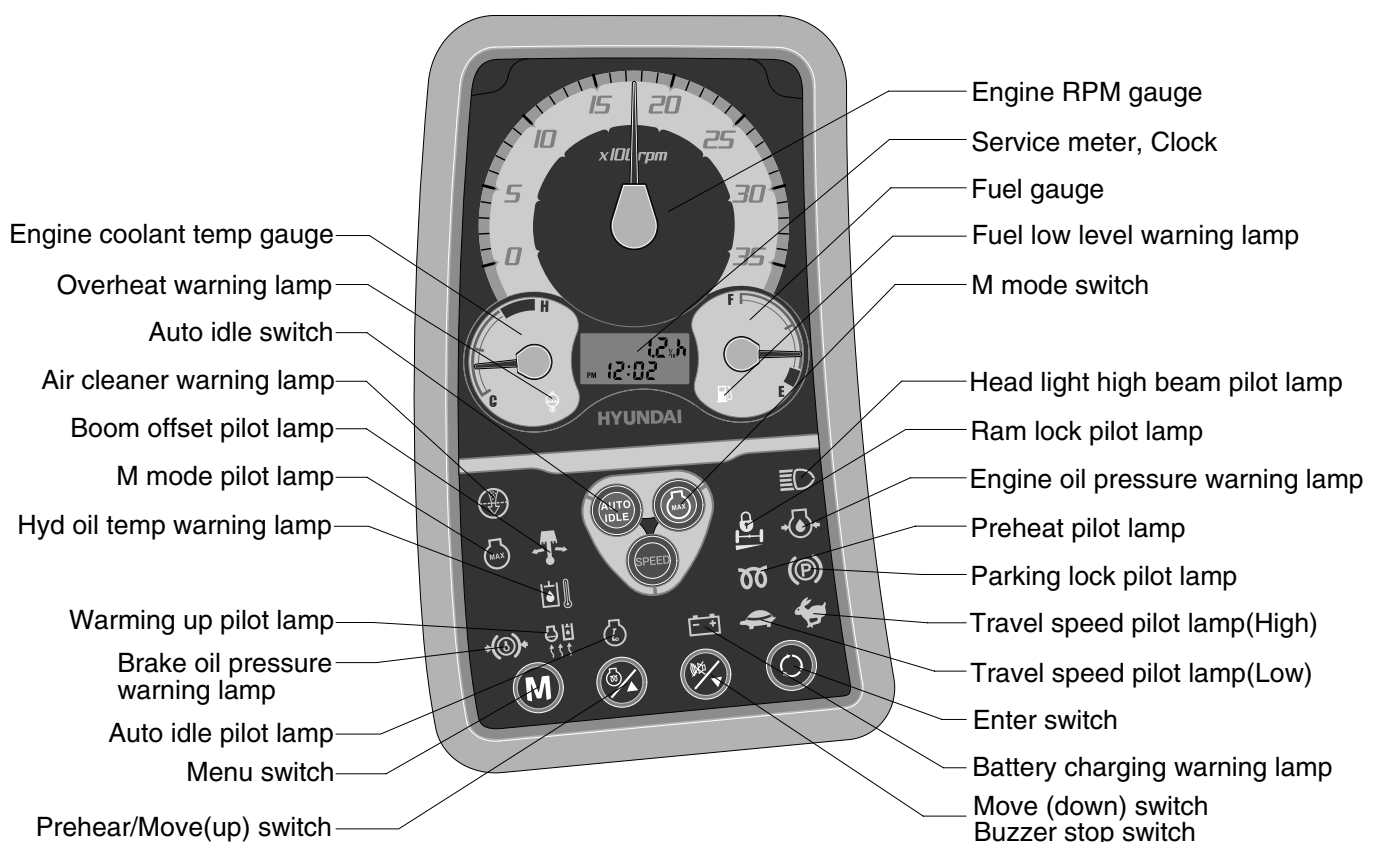
55W9S3CD01

## 2. CLUSTER

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

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

- ※ 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.

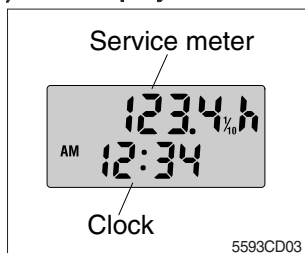


55W9S3CD02

- ※ 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.

## 1) GAUGES AND DISPLAYS

### (1) LCD display



① **Service meter** : This meter shows the total operation hours of the machine.

※ Always ensure the operating condition of the meter during the machine operation.

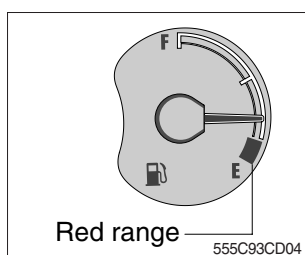
※ The last unit  $\frac{1}{10}$  indicates 1/10 of 4 hours.

(for example :  $\frac{1}{10}$  indicates 6 minutes)

② **Clock** : This displays the current time.


※ Refer to the "menu switch" for the setting time/ESL switch.

### (2) Fuel gauge

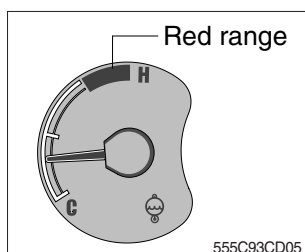


① This gauge indicates the amount of fuel in the fuel tank.


② Fill the fuel when the red range or warning lamp  blinks.

※ **If the gauge indicate the red range or warning lamp  ON. Even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.**

### (3) Engine coolant temperature gauge



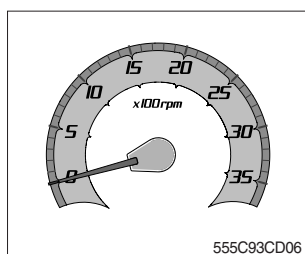
① This indicates the temperature of coolant.

② When the red range pointed or warning lamp  blinks, engine do not abruptly stop but run it at medium speed to allow it to cool gradually, then stop it.

Check the radiator and engine.

※ **If the engine is stopped without cooled down running, the temperature of engine parts will rise suddenly, this could cause severe engine trouble.**

### (4) Engine rpm gauge



① This gauge displays the number of engine revolutions per minute.

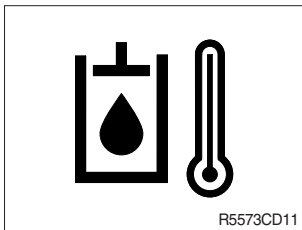
## 2) WARNING AND PILOT LAMPS

### (1) Fuel low level warning lamp



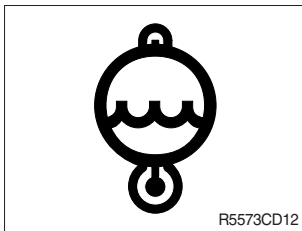
- ① This lamp blinks and the buzzer sounds when the level of fuel is below 18 ℓ (4.8 U.S. gal).
- ② Fill the fuel immediately when the lamp blinks.

### (2) Hydraulic oil temperature warning lamp



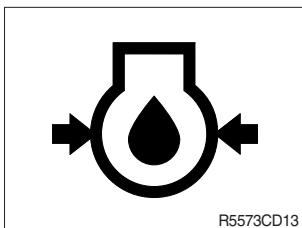
- ① This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105°C (221°F) .
- ② Check the hydraulic oil level when the lamp blinks.
- ③ Check for debris between oil cooler and radiator.

### (3) Overheat warning lamp



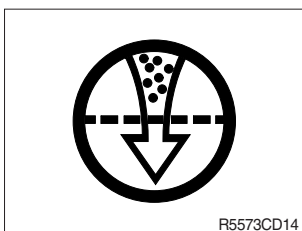
- ① This lamp blinks and the buzzer sounds when the temperature of coolant is over the normal temperature 110°C (230°F) .
- ② Check the cooling system when the lamp blinks.

### (4) Engine oil pressure warning lamp



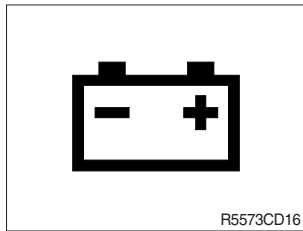
- ① This lamp blinks and the buzzer sounds after starting the engine because of the low oil pressure.
- ② If the lamp blinks during engine operation, shut OFF engine immediately. Check oil level.

### (5) Air cleaner warning lamp



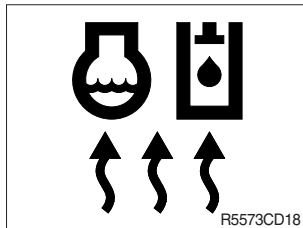
- ① This lamp blinks and the buzzer sounds when the filter of air cleaner is clogged.
- ② Check the filter and clean or replace it.

**(6) Battery charging warning lamp**



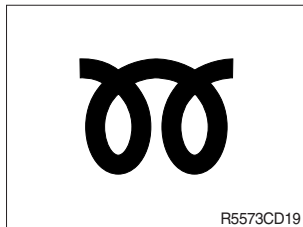
- ① This lamp blinks and the buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
- ② Check the battery charging circuit when this lamp blinks during engine operation.

**(7) Warming up pilot lamp**



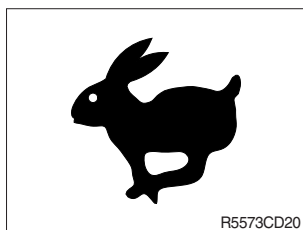
- ① This lamp is turned ON when the coolant temperature is below 30°C (86°F).
- ② The automatic warming up is cancelled when the engine coolant temperature is above 30°C, or when 10 minutes have passed since starting.

**(8) Preheat pilot lamp**



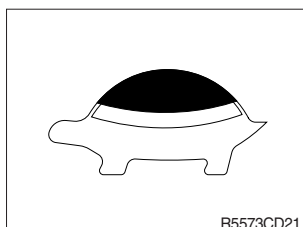
- ① When engine preheating switch is turned ON, pilot lamp comes ON.
- ② Refer to the page 3-8, 4-4.

**(9) Travel speed pilot lamp (high)**



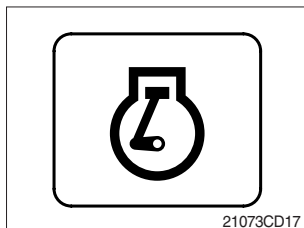
- ① When this lamp turned ON, the machine travel high speed.
- ② Refer to the travel speed select switch for details.

**(10) Travel speed pilot lamp (low)**



- ① When this lamp turned ON, the machine travel low speed.
- ② Refer to the travel speed select switch for details.

#### (11) Auto idel pilot lamp



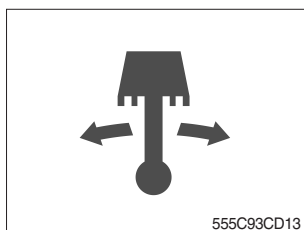
- ① If the control lever and pedal are not moved for several seconds with auto idle switch pressed, the indicator illuminates and engine speed is decelerated.
- ② If the auto idle switch is pressed once more or the control lever or pedal is moved, the indicator turns off and the number of engine revolution is turned to the previous condition.

#### (12) M mode pilot lamp



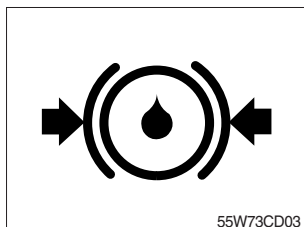
- ① This lamp is ON when the M mode switch is pressed.
- ② Engine is operated with a maximum speed.

#### (13) Boom offset pilot lamp



- ① This lamp is ON when the boom swing switch is pressed.
- ※ **Refer to the page 3-14.**

#### (14) Brake oil pressure warning lamp



- ① The lamp lights ON when the oil pressure of service brake drops below the normal range.
- ② When the lamp is ON, stop the engine and check for its cause.
- ※ **Do not operate until any problems are corrected.**

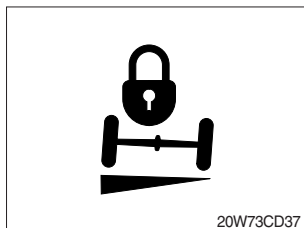
#### (15) Parking lock pilot lamp



- ① When the parking brake is actuated, the lamp lights ON.
- ※ **Check the lamp is OFF before driving.**

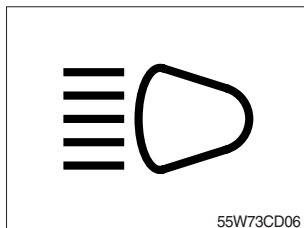


#### (16) Ram lock pilot lamp



- ① This pilot lamp lights ON when ram lock switch is rear position.
- ② Also, the pilot lamp lights ON when the parking switch is ON or service brake is applied.

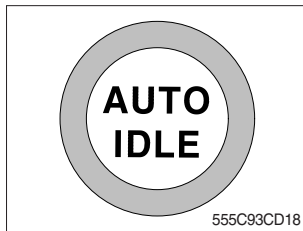
#### (17) Head light high beam pilot lamp



- ① This lamp is ON when the head light switch is high beam position or passing function.
- ② When passing other machines ahead, this lamp must be used for a few seconds to give other machines warning for a few seconds.

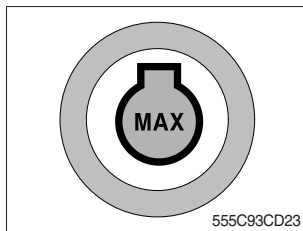
### 3) SWITCHES

#### (1) Auto idle switch



- ① This switch is used to actuate or cancel the auto idle 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.

#### (2) M mode switch



- ① This switch is used to maximum power.
- ② When this switch is pressed, the M mode pilot lamp is ON or OFF.

#### (3) Move (down) & buzzer stop switch



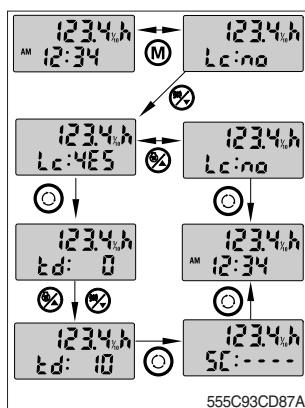
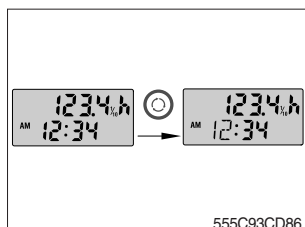
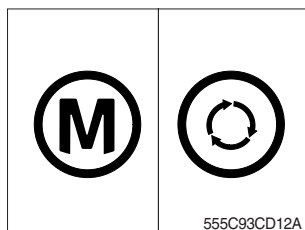
- ① When the starting switch is turned ON first, normally the alarm buzzer sounds for 6 seconds during lamp check operation.
  - ② The lamp lights ON and the buzzer sounds when the machine has a problem.  
In this case, press this switch and buzzer stops, but the lamp lights until the problem is cleared.
  - ③ This switch is used to move down or decrease input value.
- ※ Refer to page 3-9.

#### (4) Preheat/Move (up) switch



- ① When the preheat switch is pressed, the preheating function is actuated within 15 seconds.
  - ② After the preheat pilot lamp is turned OFF, engine start.
  - ③ This switch is used to move up or increase input value.
- ※ Refer to page 3-9.

## (6) Menu and enter switch



① These switches are used to set time or set ESL (Engine Start Limit) function.

- The Enter button (⊙) is used to select a function.
- The Menu button (M) is used to select a menu or return to the time display menu.

## ② Setting time

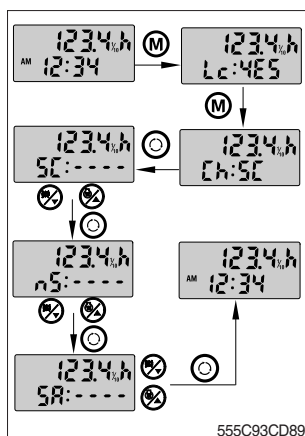
- Press Enter button (⊙) to set time, then the screen will be changed to a display for time setting as a following picture and time cipher will blink.
- **Set hours** : When the cipher for hour blinks, press up (↗) or down (↘) button and set the hour.
- **Set minutes** : When the cipher for minute blinks, press up (↗) or down (↘) button and set the minute.

## ③ Set ESL (Engine Start Limit) function

- Press Menu button (M), the display is changed from the time display menu to ESL function menu.
- Select YES or NO by Move button (↗, ↘) and set the ESL function by the Enter button (⊙).
  - YES : ESL function is activated.
  - NO : ESL function is cancelled.

## ④ Set the interval time

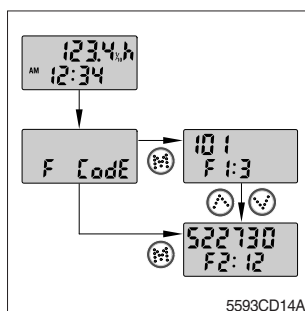
- Select ESL function to YES and press the Enter button (⊙), then the display is changed to the interval time set menu.
  - Set the interval time by move button (↗, ↘) and press the Enter button (⊙).
  - You can finish setting the interval time by inputting the password and pressing the Enter button (⊙) once more.
  - Interval times : 5 kinds (0, 10, 30, 60 minutes, 1 day)
- ※ If the ESL function is set to YES, the password is required when a operator starting engine first.  
But the operator can restart the engine within the interval time period without inputting the password.



### ⑤ Change password

- Select ESL function to YES and press the Menu button (M), the display is shifted to the password change menu.
- Input a new password (Sn : - - - -) after enter the current password successfully (SC : - - - -).
- Push enter (C) button for a second to finish the setting after the new password is entered once again (SA : - - - -).
- When the setting is done, the display will blink 3 times and return to the time display screen.

※ **Default password : 0000**



### ⑥ Check machine diagnostic codes

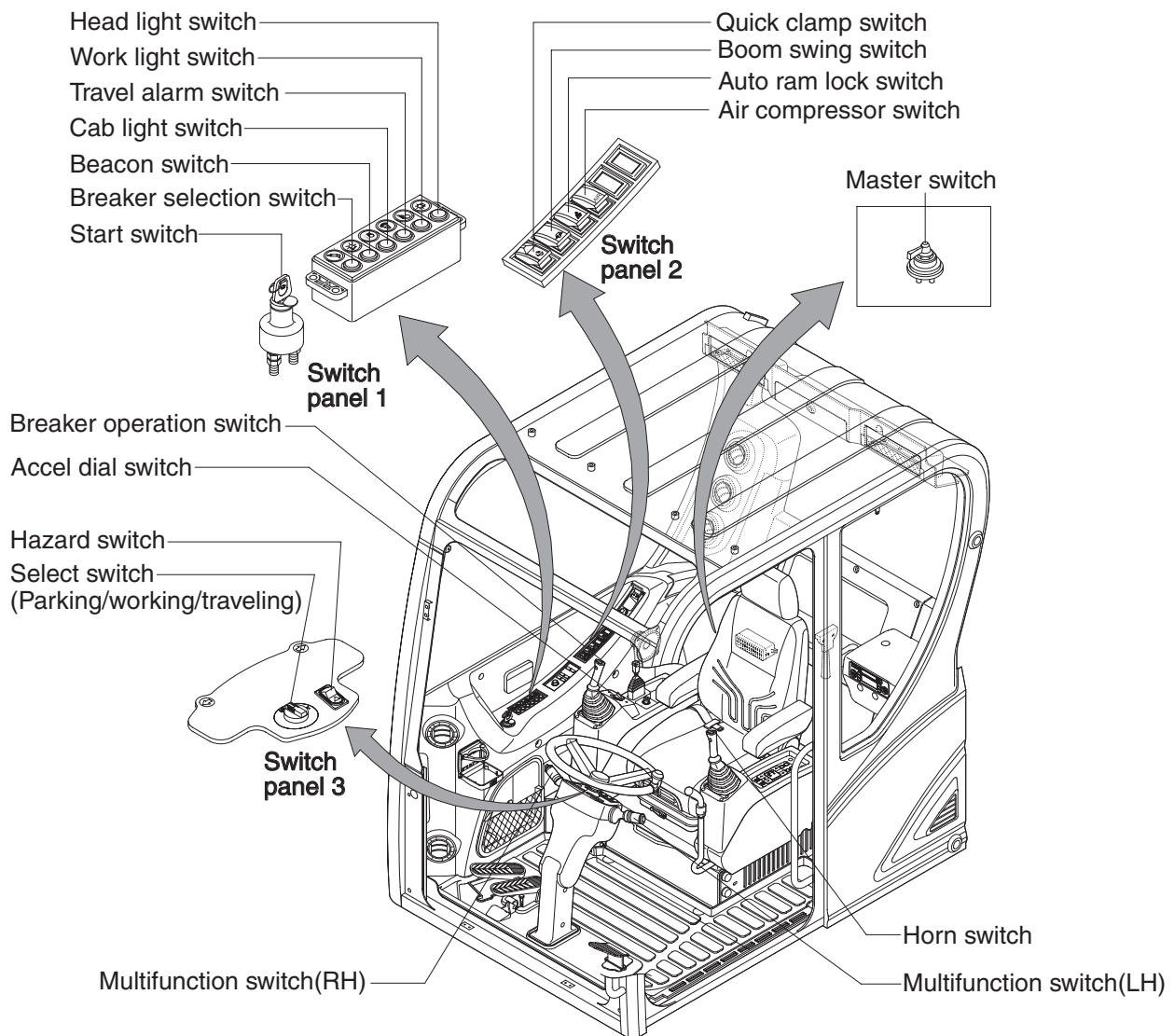
- If the F : Code is displayed on the LCD display, you can check faults of the machine.
- The machine fault code is displayed by pressing the Menu button (M).
- Other fault codes can be displayed by using the Move up / down button (↑, ↓).

※ **Refer to the following pages for the fault codes.**

## ⑦ Machine fault code

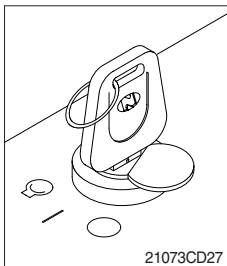
| Fault code |     | Description                                                                                      |
|------------|-----|--------------------------------------------------------------------------------------------------|
| HCESPN     | FMI |                                                                                                  |
| 105        | 0   | Working pressure sensor data above normal range (or open circuit)                                |
|            | 1   | Working pressure sensor data below normal range                                                  |
|            | 2   | Working pressure sensor data error                                                               |
|            | 4   | Working pressure sensor circuit - voltage below normal, or shorted to low source                 |
|            | 14  | Working pressure sensor circuit - special instructions                                           |
|            | 16  | Working pressure sensor circuit - voltage valid but above normal operational range               |
|            | 18  | Working pressure sensor circuit - voltage valid but below normal operational range               |
| 167        | 4   | Travel speed solenoid circuit - voltage below normal, or shorted to low source (or open circuit) |
|            | 6   | Travel speed solenoid circuit - current above normal                                             |
| 503        | 0   | Brake pressure sensor data above normal range (or open circuit)                                  |
|            | 1   | Brake pressure sensor data below normal range                                                    |
|            | 2   | Brake pressure sensor data error                                                                 |
|            | 4   | Brake pressure sensor data - voltage below normal, or shorted to low source                      |
|            | 16  | Brake pressure sensor data - voltage valid but above normal operational range                    |
|            | 18  | Brake pressure sensor data - voltage valid but below normal operational range                    |
| 505        | 0   | Working brake pressure sensor data above normal range (or open circuit)                          |
|            | 1   | Working brake pressure sensor data below normal range                                            |
|            | 2   | Working brake pressure sensor data error                                                         |
|            | 4   | Working brake pressure sensor circuit - voltage below normal, or shorted to low source           |
|            | 16  | Working brake pressure sensor circuit - voltage valid but above normal operational range         |
|            | 18  | Working brake pressure sensor circuit - voltage valid but below normal operational range         |
| 525        | 4   | Ram lock solenoid circuit - voltage below normal, or shorted to low source (or open circuit)     |
|            | 6   | Ram lock solenoid circuit - current above normal                                                 |
| 530        | 0   | Travel fwd pilot pressure sensor data above normal range (or open circuit)                       |
|            | 1   | Travel fwd pilot pressure sensor data below normal range                                         |
|            | 2   | Travel fwd pilot pressure sensor data error                                                      |
|            | 4   | Travel fwd pilot pressure sensor circuit - voltage below normal, or shorted to low source        |
|            | 14  | Travel fwd pilot pressure sensor circuit - special instructions                                  |
|            | 16  | Travel fwd pilot pressure sensor circuit - voltage valid but above normal operational range      |
|            | 18  | Travel fwd pilot pressure sensor circuit - voltage valid but below normal operational range      |
| 701        | 4   | Hour meter circuit - voltage below normal, or shorted to low source                              |
| 705        | 0   | MCU input voltage high                                                                           |
|            | 1   | MCU input voltage low                                                                            |
| 707        | 1   | Alternator node I voltage low (or open circuit)                                                  |
| 714        | 3   | Acc. dial circuit - voltage above normal, or shorted to high source (or open circuit)            |
|            | 4   | Acc. dial circuit - voltage below normal, or shorted to low source                               |
| 830        | 12  | MCU internal memory error                                                                        |
| 840        | 2   | Cluster communication data error                                                                 |
| 841        | 2   | ECM communication data error                                                                     |
| 850        | 2   | RMCU communication data error                                                                    |

### 3. SWITCHES



55W9S3CD20

#### 1) STARTING SWITCH



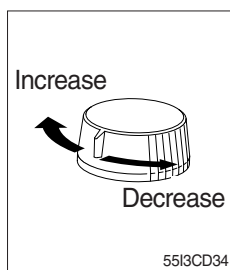
(1) There are three positions, OFF, ON and START.

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

Release key immediately after starting.

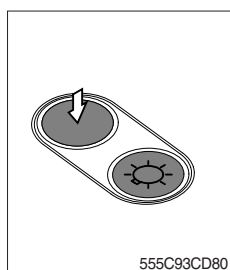
※ **Key must be in the ON position with engine running to maintain electrical and hydraulic function and prevent serious machine damage.**

## 2) ACCEL DIAL



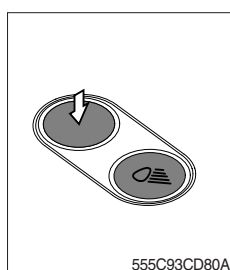
- (1) There are 10 dial setting.
- (2) Setting 1 is low idle and setting 10 is high idle.
  - By rotating the accel dial to right : Engine speed increased.
  - By rotating the accel dial to left : Engine speed decreased.

## 3) HEAD LIGHT SWITCH



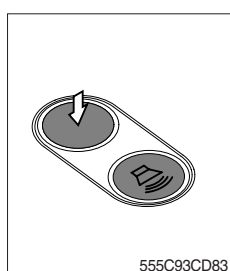
- (1) This switch is used to operate the head light.
  - Press the switch once, the head light comes ON and the pilot lamp ON.
  - Press the switch once more, the head light and pilot lamp turn off.

## 4) WORK LIGHT



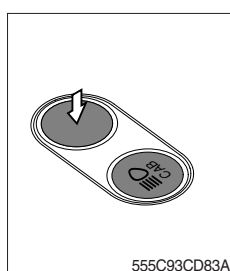
- (1) This switch is used to operate the work light.
  - Press the switch once, the work light comes ON and the pilot lamp ON.
  - Press the switch once more, the work light and pilot lamp turn off.

## 5) TRAVEL ALARM SWITCH



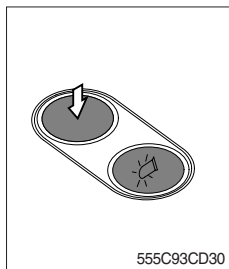
- (1) This switch is used to alarm surroundings when the machine travels to forward and backward.
- (2) On pressing this switch, the alarm operates only when the machine is traveling.

## 6) CAB LIGHT SWITCH



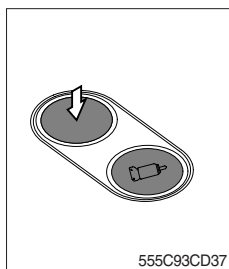
- (1) This switch turns on the cab light on the cab.

### 7) BEACON SWITCH (option)



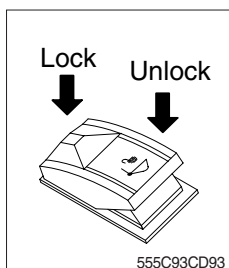
- (1) This switch turns ON the rotary light on the cab.
- (2) The below indicator lamp is turned ON when operating this switch.

### 8) BREAKER SELECTION SWITCH (option)



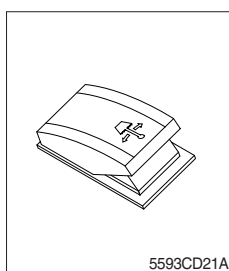
- (1) This switch is used to operate breaker.
- ※ The breaker operates only when this switch is pressed.

### 9) 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.

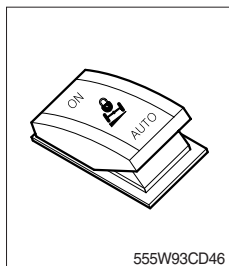
### 10) BOOM SWING SWITCH



- (1) This switch is used to swing the boom to the right or left direction.
- (2) The indicator lamp turned ON when selected this switch.
- ※ Refer to the page 4-7 for the operation.



## 11) AUTO RAM LOCK SWITCH



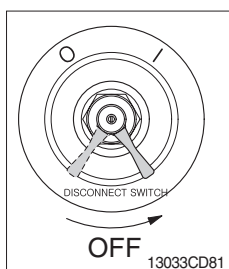
(1) This switch activate front axle oscillation cylinder to locking position for increase of stability.

- ON : Set front axle to locking position for excavation work or travels even ground. Also, the ram lock pilot lamp comes ON at the travel pilot lamp.
- AUTO : Set front axle to locking or unlocking as table.

※ Refer to page 3-18 for select switch.

| Select switch<br>(parking/working/<br>traveling) | Ram lock  | Conditions                                                                                                                                               |
|--------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parking (P)                                      | Locking   | · Always                                                                                                                                                 |
| Traveling (T)                                    | Unlocking | · Always                                                                                                                                                 |
| Working (W)                                      | Locking   | · FNR lever in neutral position<br>· Service brake pedal is depressed.                                                                                   |
|                                                  | Unlocking | · FNR lever in forward/reverse position and service brake pedal is not depressed.<br>· 2 way pedal is equipped and service brake pedal is not depressed. |

## 12) MASTER SWITCH

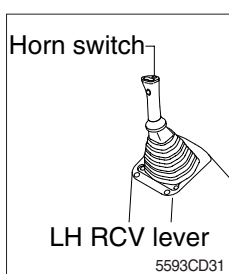


(1) This switch is used to shut off the entire electrical system.

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

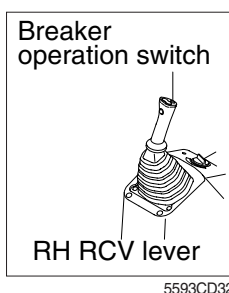
※ **Never turn the master switch to O (OFF) with the engine running. It could result in engine and electrical system damage.**

## 13) HORN SWITCH



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

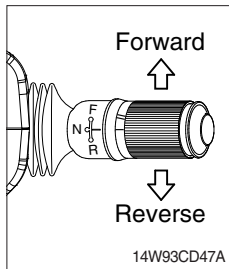
## 14) BREAKER OPERATION SWITCH



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

## 15) RH MULTI FUNCTION SWITCH

### (1) FNR lever



① This lever changes travel direction of machine.

- F : Machine moves forward
- N : Neutral position
- R : Machine moves backward

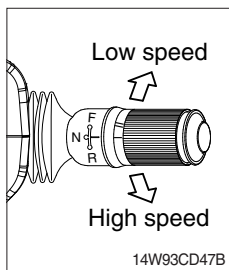
**▲ Travel direction will be reversed if lower structure is positioned with dozer in front.**

② The warning buzzer sounds when the lever is in the reverse position.

**▲ If this lever is not in the neutral position, engine does not started.**

**▲ Be sure to stop the machine when changing the direction forward or backward while traveling.**

### (2) Travel speed switch

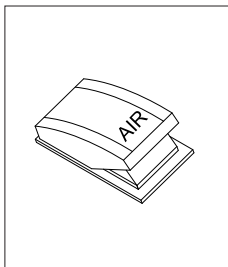


① This switch is for selecting travelling speed between high and low.

- Low speed (—) : 11.3 km/hr (7.0 mph), turtle mark
- High speed (=) : 30 km/hr (19.0 mph), rabbit mark

**▲ In case of changing the travel speed, be sure to stop the machine completely.**

## 16) AIR COMPRESSOR SWITCH (option)

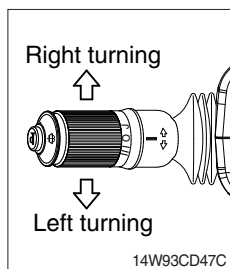


(1) This switch is used to activate the air compressor.

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

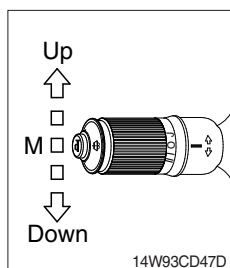
## 17) LH MULTI FUNCTION SWITCH

### (1) Direction indication lamp switch



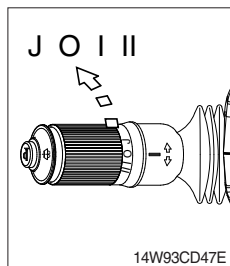
- ① This switch is used to warn or signal the turning direction of the machine to other machines or equipment.
- ② Push the lever to forward for turning right (↗), pull the lever to backward for turning left (↖).
- ③ The turning pilot lamp comes ON at the travel pilot lamp on the steering column.

### (2) Dimmer switch



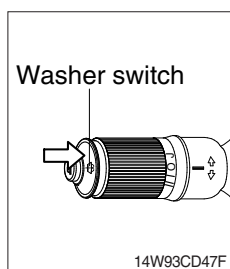
- ① This switch is used to turn the head lights direction.
- ② Switch positions.
  - Up (↗) : To flash for passing
  - Middle (M) : Head lights low beam ON
  - Down (↘) : Head lights high beam ON
- ③ If you release the switch when it's in up position, the switch will return to middle.

### (3) WIPER SWITCH



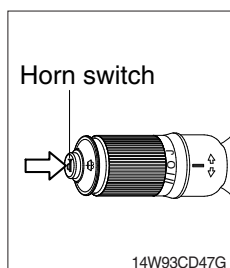
- ① When the switch is in J position, the wiper moves intermittently.
- ② When placed in I or II position, the wiper moves continuously.

### (4) WASHER SWITCH



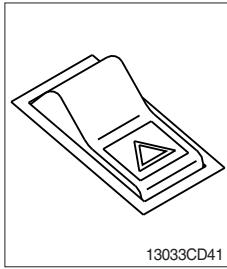
- ① If you push the grip of the lever, washer liquid will be sprayed and the wiper will be activated 2-3 times.
- ※ Check the quantity of washer liquid in the tank. If the level of the washer liquid is LOW, add the washer liquid ( in cold, winter days) or water. The capacity of tank is 1.5 liter.

### (5) HORN SWITCH



- ① This switch is at the end of left side multifunction switch. On pressing, the horn sounds.

## 18) HAZARD SWITCH

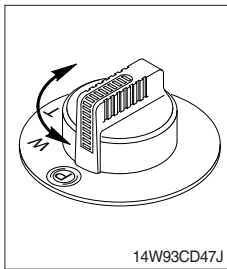


(1) Use for parking, or roading machine.

(2) LH and RH turn signal lamps come ON at the same time by this switch.

※ If the switch is left ON for a long time, the battery may be discharged.

## 19) SELECT SWITCH (parking / working / traveling)

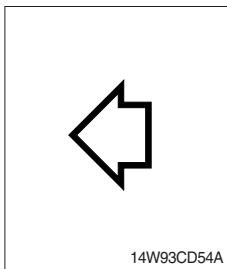


(1) This switch is used to select the operation mode as below.

- Parking ((P)) : The parking brake is applied.
- Working (W) : The machine needs to be working.
- Traveling (T) : The machine needs to be traveling.

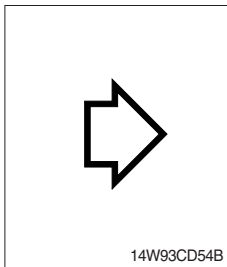
## 20) TURNING PILOT LAMP

### (1) Left turning pilot lamp



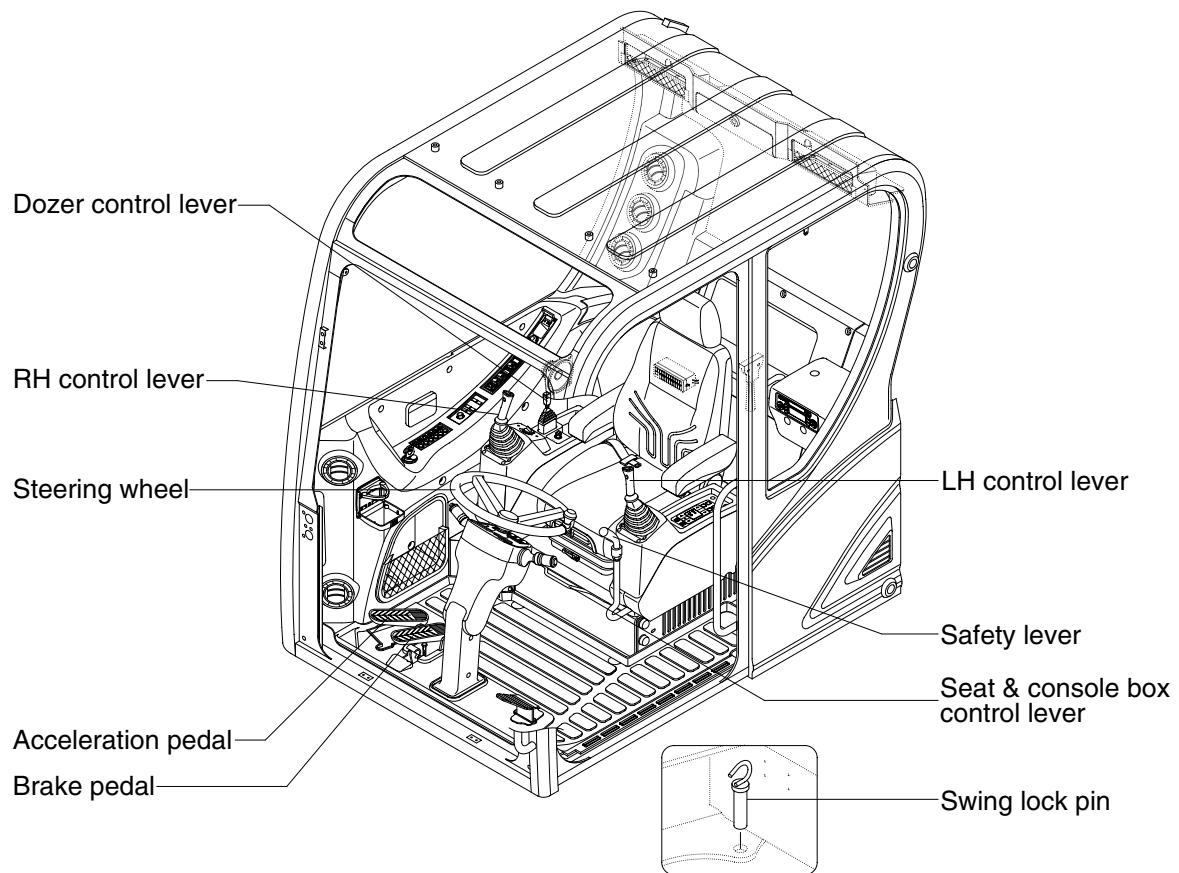
(1) This lamp flashes with sound when the LH multifunction switch is move to backward position.

### (2) Right turning pilot lamp



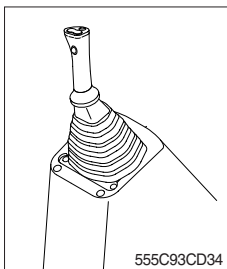
① This lamp flashes with sound when the LH multifunction switch is move to forward position.

## 4. LEVERS AND PEDALS



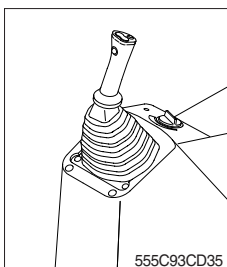
55W93CD04

### 1) LH CONTROL LEVER



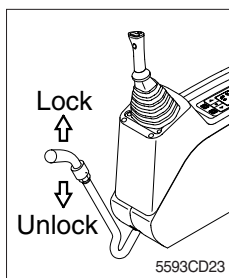
- (1) This joystick is used to control the swing and the arm.
- (2) Refer to **operation of working device** in chapter 4 for details.

### 2) RH CONTROL LEVER



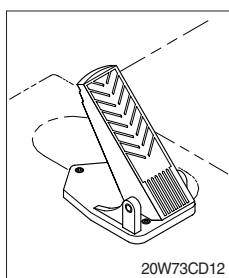
- (1) This joystick is used to control the boom and the bucket.
- (2) Refer to **operation of working device** in chapter 4 for details.

### 3) SAFETY LEVER



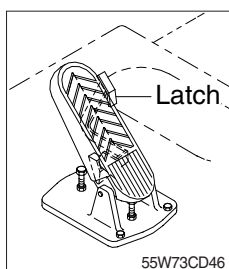
- (1) All control levers and pedals are disabled from operation by locating the lever to lock position as shown.
  - ※ **Be sure to raise the lever to LOCK position and tilt LH console box when leaving from operator's seat.**
- (2) By pushing lever to UNLOCK position, machine is operational.
  - ※ **Do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

### 4) ACCELERATION PEDAL



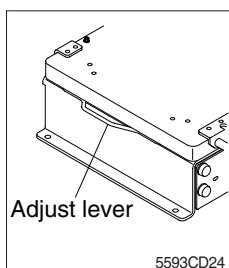
- (1) When this pedal is stepped, the machine starts traveling.
  - ▲ **Before starting the machine with stepping on the pedal, check if the underframe is certainly in the traveling direction.**

### 5) BRAKE PEDAL



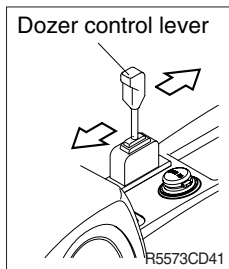
- (1) Pedal and latch provide two kinds of service brake function.
- (2) To operate service brake, push pedal with latch by foot.
  - ▲ **Push pedal and latch at once to avoid unexpected locking of pedal in traveling condition.**
  - ▲ **During travel, do not push pedal only in full stroke. It is dangerous due to the locking of service brake.**
- (3) If you want to choose working brake, just push pedal in full stroke without latch then the latch locks pedal and service brake is working continuously until you push the latch to release the pedal.
- (4) Push latch to release working brake.

### 6) SEAT AND CONSOLE BOX ADJUST LEVER



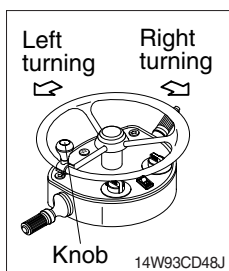
- (1) This lever is used to move the seat and console box to fit the contours of the operator's body.
- (2) Pull the lever to adjust forward or backward over 90 mm (3.5").

## 7) DOZER CONTROL LEVER



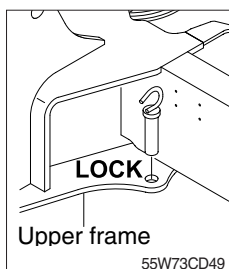
- (1) This lever is used to operate the dozer blade.
- (2) If the lever is pushed forward, the dozer blade will be going down.  
If the lever is pulled back, the dozer blade will be going up.

## 8) STEERING WHEEL



- (1) If the steering wheel is turned to left, the machine will move to the left and turn it to the right, the machine will move to the right.
- (2) As the handle is equipped with a knob, it is convenient to operate with one hand or quickly.

## 9) SWING LOCK PIN

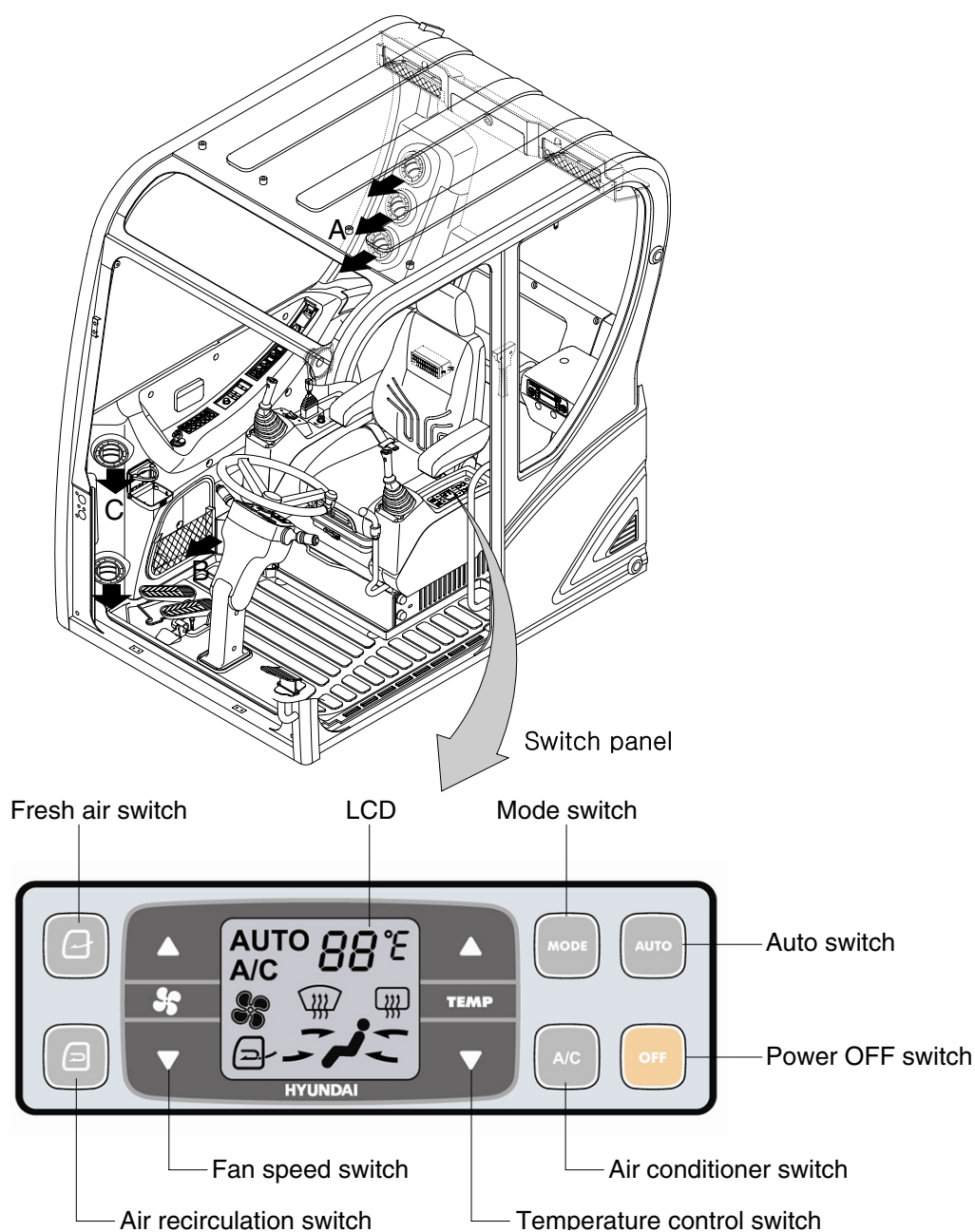


- (1) This is the system to lock the swing by connecting the upper swing part and the lower frame mechanically.
- (2) The swing is locked when the lever is down and released when the lever is up.
- ※ **Before operating the machine, be sure to release the swing lock device.**

## 5. FULL AUTO AIR CONDITIONER AND HEATER

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

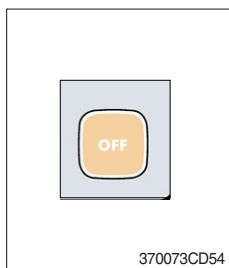
### · Location of air flow ducts



55W93CD05



## 1) POWER OFF SWITCH

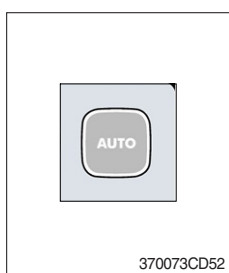


- (1) This switch makes the system and the LED OFF.  
Just before the power OFF, set values are stored.

### (2) Default setting values

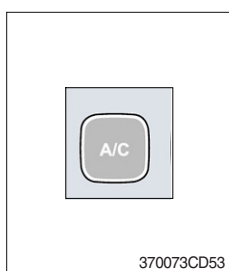
| Function | Air conditioner | In/outlet | LCD | Temperature     | Mode            |
|----------|-----------------|-----------|-----|-----------------|-----------------|
| Value    | OFF             | Inlet     | OFF | Previous sw OFF | Previous sw OFF |

## 2) AUTO SWITCH



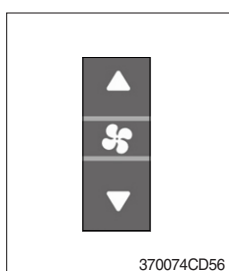
- (1) Turn the starting switch to ON position, LCD lights ON.  
Auto air conditioner and heater system automatically keeps the optimum condition in accordance with operator's temperature configuration sensing ambient and cabin inside temperature.
- (2) This switch can restart system after system OFF.

## 3) AIR CONDITIONER SWITCH (compressor switch)



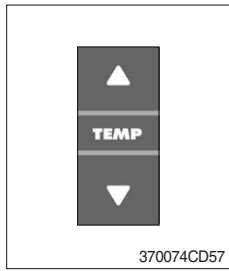
- (1) This switch turns the compressor and the LCD ON.
- (2) In accordance with the temperature sensed by duct (evaporator) sensor, compressor turns ON or OFF automatically.
- ※ **Air conditioner operates to remove vapor and drains water through a drain hose. Water can be sprayed into the cab in case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

## 4) FAN SPEED SWITCH



- (1) Fan speed is controlled automatically by set temperature.
- (2) This switch controls fan speed manually.
- There are 8 up/down steps to control fan speed.
  - The maximum step or the minimum step beeps 5 times.
- (3) This switch makes the system ON.

## 5) TEMPERATURE CONTROL SWITCH

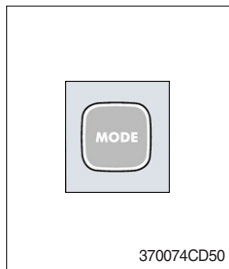


- (1) Setting temperature indication (17~32°C, scale : 1°C)
- (2) Max cool and max warm beeps 5 times.
- (3) The max cool or the max warm position operates as following table.

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

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

## 6) MODE SWITCH

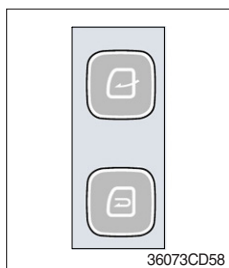


- (1) Operating this switch, it beeps and displays symbol of each mode in order. (Vent → Vent/Foot → Foot → Foot/Def → Vent)

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

- (2) When defroster switch operating, FRESH AIR/AIR RECIRCULATION switch turns to FRESH AIR mode and air conditioner switch turns ON.
- (3) When this switch ON, the system operates with previous configuration.

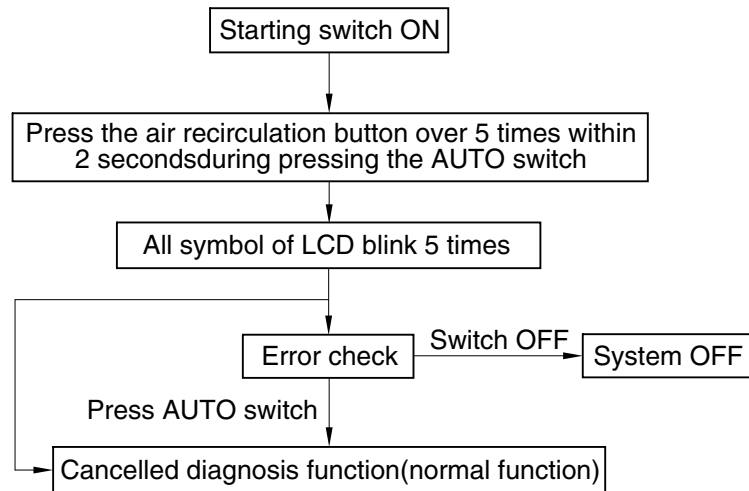
## 7) FRESH AIR/AIR RECIRCULATION SWITCH



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

## 8) SELF DIAGNOSIS FUNCTION

### (1) Procedure



3607A3CD69

### (2) Error check

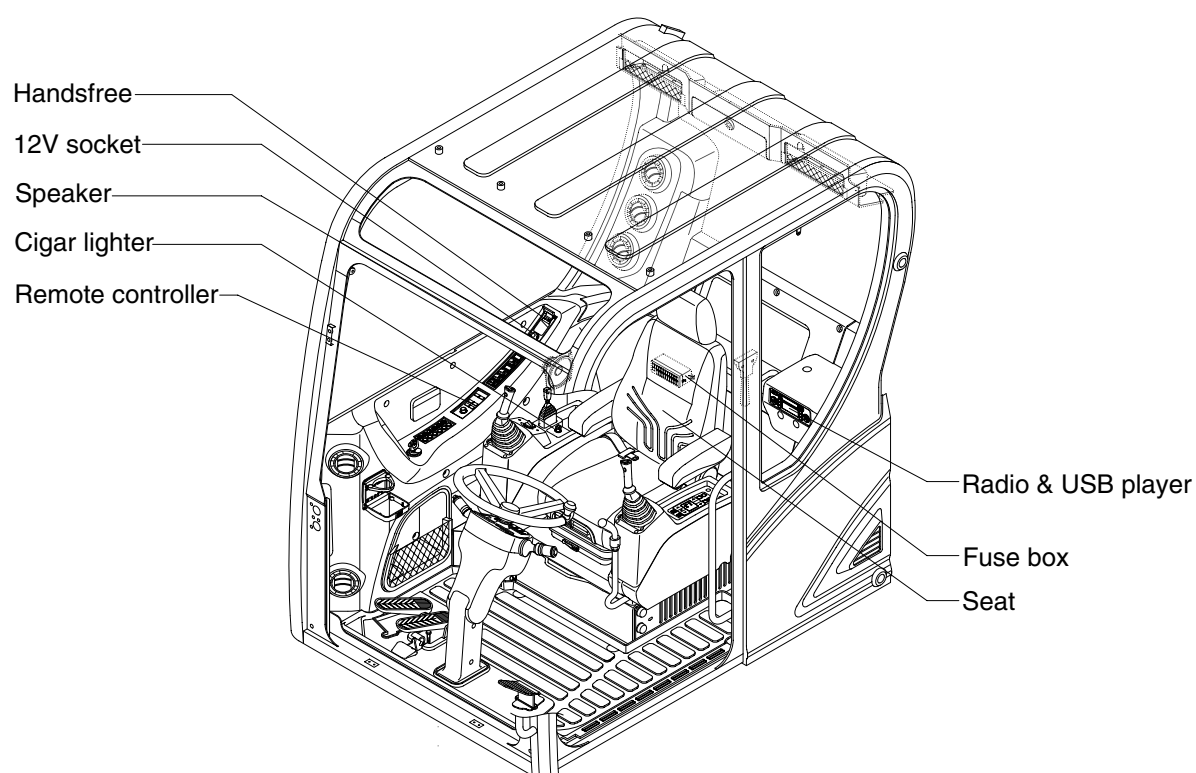
- The corresponding error code flickers on the setup temperature display panel, the other symbol will turn OFF.
- Error code flickers every 0.5 second.
- If error code is more than two, each code flickers 2 times in sequence.
- Error code

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

### (3) Fail safe function

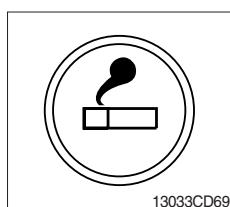
| Error description             | Fail safe function                                   |
|-------------------------------|------------------------------------------------------|
| Cabin inside sensor (11)      | 25°C alternate value control                         |
| Ambient sensor (12)           |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

## 6. OTHERS



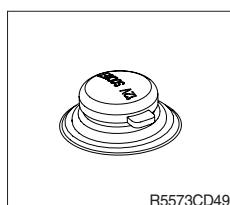
55W9S3CD06

### 1) CIGAR LIGHTER



- (1) This can be used when the engine starting switch is ON.
- (2) The lighter can be used when it springs out in a short while after being pressed down.
- ※ **Service socket**  
**Use cigar lighter socket when you need emergency power.**  
**Do not use the lighter exceeding 12V, 120W.**

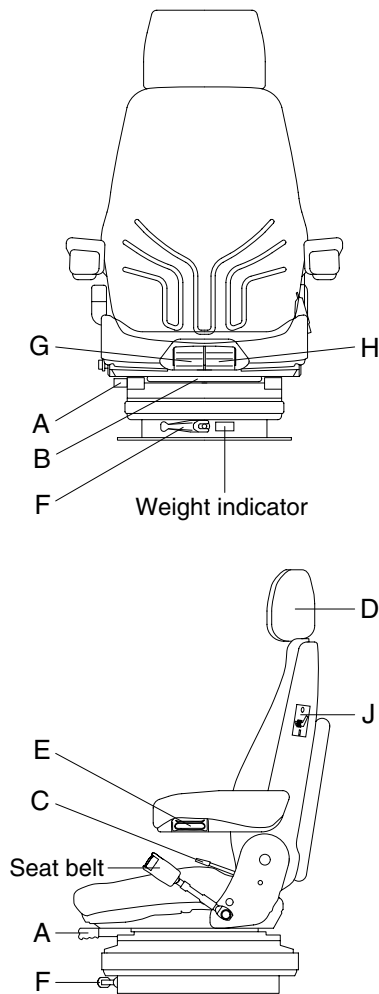
### 2) 12V SOCKET (option)



- (1) Utilize the power of 12V as your need and do not exceed power of 12V, 120W.

### 3) 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.



140Z93CD55

#### (1) Forward/Backward adjustment (A)

- ① Pull lever A to adjust seat forward or backward.
- ② The seat can be moved forward and backward over 130 mm (5.1") in 13 steps.

▲ Do not lift the locking lever with you leg or calf.

#### (2) Upward/Downward adjustment (B)

- ① Pull lever B to adjust seat upward or downward over 60 mm (2.4").
- ② Forward or backward side adjustment only can be made, tilting to one side, by moving lever B respectively.

#### (3) Reclining adjustment (C)

Pull lever C to adjust seat back rest.

#### (4) Armrest adjustment (E)

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

#### (5) Headrest adjustment (D)

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

#### (6) Weight adjustment (F)

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

#### (7) Seat depth adjustment (G)

- ① The depth of the seat pan can be individually adjusted.
- ② To adjust the depth of the seat cushion, pull the right handle upward. By moving the seat cushion backwards or forwards the desired seating position can be reached.

#### (8) Seat pan angle adjustment (H)

- ① The angle of the seat pan can be individually adjusted.
- ② To adjust the angle of the seat pan, pull the left handle upwards. By exerting pressure on or off the front or rear part of the seat pan it can be moved to the desired position.

#### (9) Seat heater (J)

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

0 = Seat heater OFF

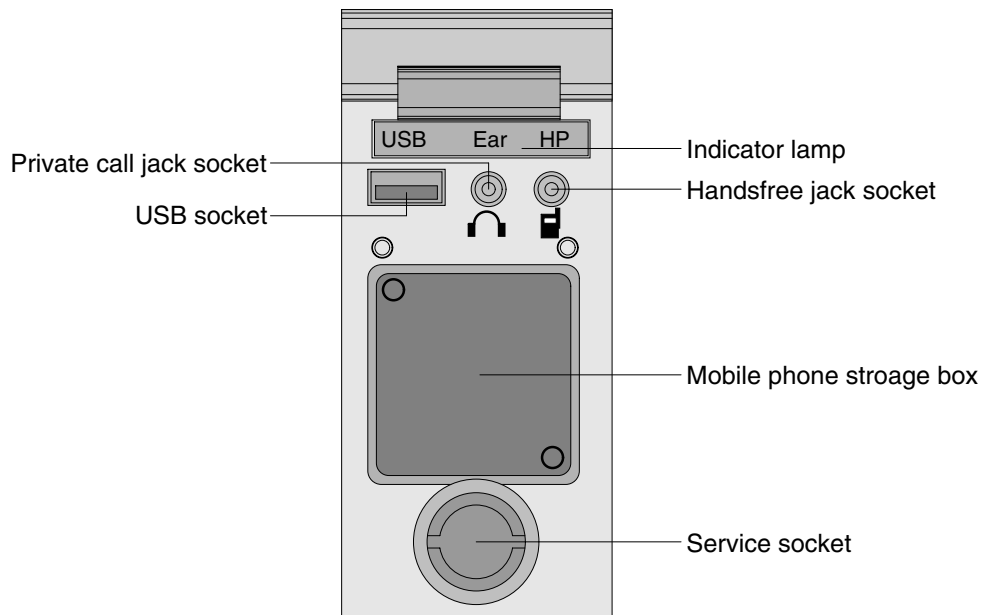
I = Seat heater ON

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

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

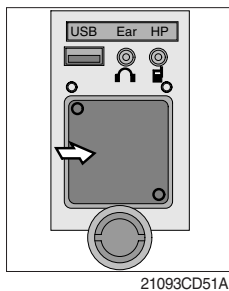
#### 4) HANDSFREE

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



21093CD51

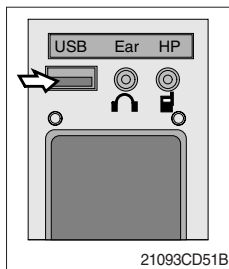
##### (1) Mobile phone storage box



21093CD51A

- ① Mobile phone can be stored when call by handsfree.

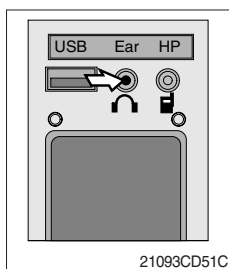
##### (2) USB socket



21093CD51B

- ① This socket is used to charging the mobile phone.

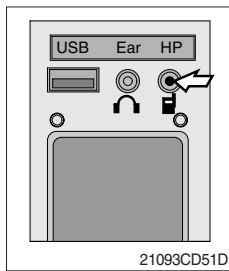
##### (3) Private call jack socket



21093CD51C

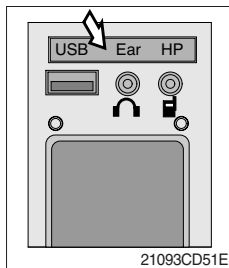
- ① This can be used protect you privacy calling by using ear phone.
- ② The mobile phone must be connected handsfree jack socket.

#### (4) Handsfree jack socket



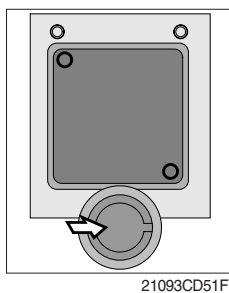
- ① Connect the jack cable when call by handsfree.
- ② Use the special adapter when jack cable is not interchangeable.
- ③ Check the jack type of mobile phone before use.

#### (5) Indicator lamp



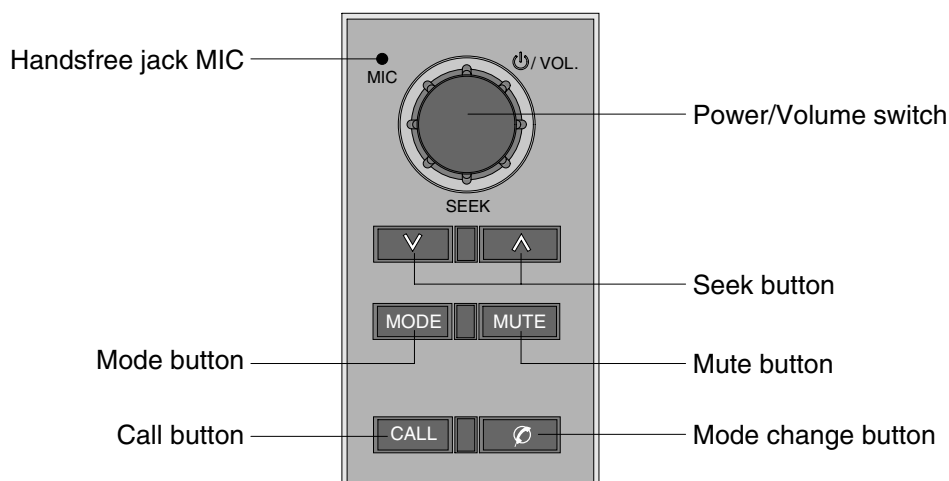
- ① This lamp is turned ON when the handsfree mode selected.

#### (6) Service socket



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

## 5) REMOTE CONTROLLER



21093CD52

### (1) Power and volume switch



21093CD52A

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

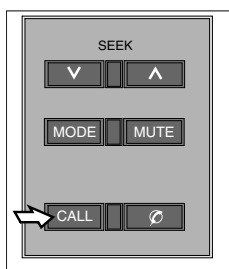
### (2) Mode change button



21093CD52B

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

### (3) Call button

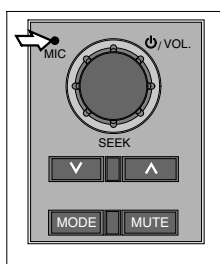


21093CD52C

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



#### (4) Handsfree MIC





21093CD52D

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

#### (5) Seek button



21093CD52E

- ① If this button pressed, the radio automatically stops at the next frequency of broadcasting for your listening.
- ② Press  to turn a station of a higher frequency or  to a lower frequency.

#### (6) Mute button



21093CD52G

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

#### (7) Mode button



21093CD52F

- ① Press the mode button to select the desired mode.
- ② FM1 → FM2 → AM → CD → FM1
- ※ The LCD displayed each mode.

## 6) FUSE BOX

|                         |     |                         |     |
|-------------------------|-----|-------------------------|-----|
| WORK LAMP               | 10A | START KEY               | 30A |
| FUEL PUMP HORN          | 20A | CASSETTE CLUSTER        | 20A |
| CIGAR LIGHT WIPER MOTOR | 10A | AIRCON HEATER ROOM LAMP | 30A |
| AIR-CON HEATER          | 5A  | CONTROLLER              | 10A |
| SOLENOID                | 20A | CASSETTE RADIO          | 10A |
| ALT START               | 10A | CLUSTER SWITCH PANEL    | 20A |
| SAFETY SOL              | 20A | CONTROLLER              | 10A |
| ROTARY LAMP             | 10A | FUEL CUT                | 30A |
| PRE-HEAT                | 10A | AIRCON FAN              | 20A |
| FEED P/P                | 10A | HEAD LAMP               | 20A |
| FUSE HOLDER             |     | SPARE                   | 10A |
|                         |     | SPARE                   | 20A |

5593CD29

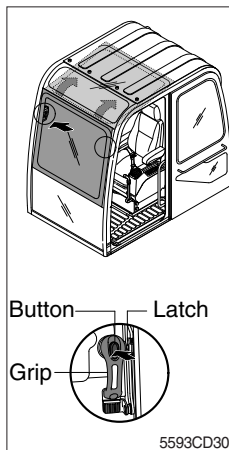
(1) The fuses protect the electrical parts and wiring from burning out.

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

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

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

## 7) UPPER WINDSHIELD



5593CD30

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

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

② Hold both grips that are located at both side 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 is engaged.

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

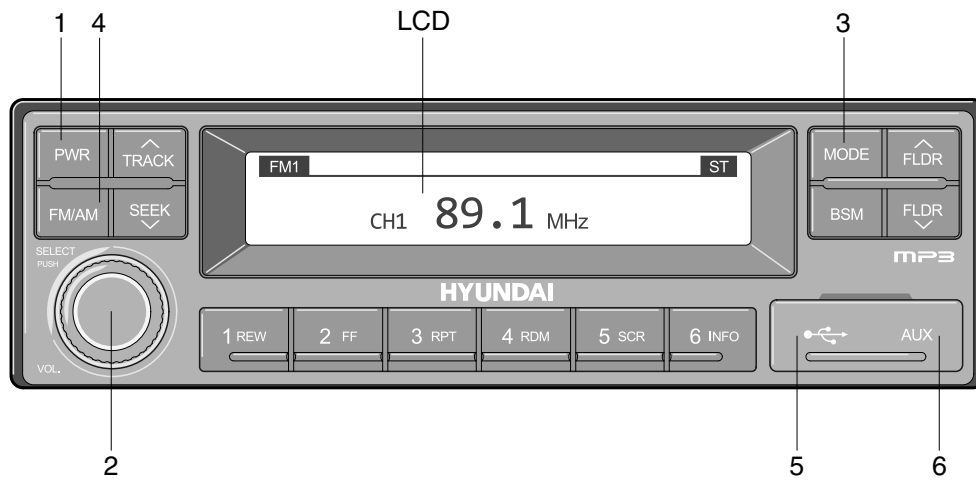
(2) Perform the following procedure in order to close the upper windshield.

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

※ **Do not operate the wiper while the upper windshield is opening.**

## 8) RADIO AND USB PLAYER (MACHINE SERIAL NO.: ~#0267)

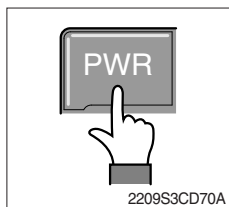
### ■BASIC FUNCTIONS



2209S3CD70

- |                               |                                  |
|-------------------------------|----------------------------------|
| 1 Power (PWR) button          | 4 Radio (FM/AM) selection button |
| 2 Volume/Sound setting button | 5 USB slot                       |
| 3 Mode selection button       | 6 AUX terminal                   |

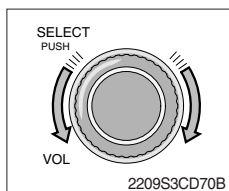
#### (1) Power (PWR) button



- ① Press the PWR button to turn on the audio. While the audio is operating, press the button to turn the power off.

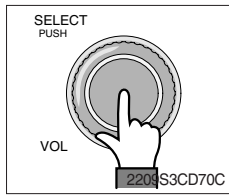
#### (2) Volume/Sound setting button

##### · Volume (VOL) button



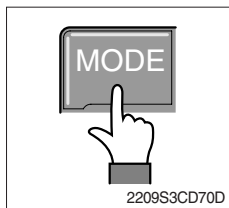
- ① Turn the VOL button clockwise to increase the volume and counter-clockwise to decrease the volume.

## · Sound setting



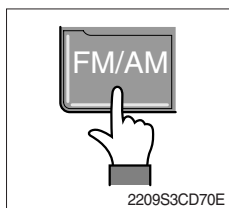
- ① Press the SELECT button to conduct sound setting.  
Each press of the button will change the sound setting in the following order.  
BASS → MIDDLE → TREBLE → BALANCE → EQ → BEEP
- ② After selecting the desired setting, turn the SELECT button clockwise/counter-clockwise to adjust the sound setting value.
- ③ **BASS adjustment**  
Turn the SELECT button clockwise to increase the bass and counter-clockwise to decrease the bass. BASS can be adjusted from max +10/min -10. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
- ④ **MIDDLE adjustment**  
Turn the SELECT button clockwise to increase the middle and counter-clockwise to decrease the middle. MIDDLE can be adjusted from max +10/min -10. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
- ⑤ **TREBLE adjustment**  
Turn the SELECT button clockwise to increase the treble and counter-clockwise to decrease the treble. TREBLE can be adjusted from max +10/min -10. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
- ⑥ **Left/Right BALANCE adjustment**  
Turn the SELECT button clockwise to increase the right-side speaker volume and counter-clockwise to increase the left-side speaker volume. BALANCE can be adjusted from 10L/10R. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.
- ⑦ **EQ (EQUALIZER) adjustment**  
Turn the SELECT button clockwise/counter-clockwise to select the desired EQ. EQ settings are as shown below.  
Cls (classic) → Pop → Rock → Jazz → off  
If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.  
※ Upon selecting EQ, the BASS, MIDDLE and TREBLE values will be turned off.  
The BASS, MIDDLE, TREBLE values can be set only when EQ Off is selected.
- ⑧ **BEEP sound adjustment**  
Turn the SELECT button clockwise/counter-clockwise to the beep sound ON/OFF. If there are no adjustments for 3 seconds, the changes will be saved and the previous mode will be restored.

### (3) MODE selection button



- ① Press the MODE button to change to RADIO/USB/AUX/iPod modes. However, the mode can be selected only when the respective media is connected.
  - ② If iPod is connected to the audio, the mode will change in the following order.  
RADIO → iPod → USB (handfree)
  - ③ If USB, AUX is connected to the audio, the mode will change in the following order.  
RADIO → USB(front) → USB(handfree) → AUX
- ※ **USB and AUX mode will operate only when corresponding devices are connected.**
  - ※ **When connecting iPod, AUX and front USB cannot be connected.**
  - ※ **The iPod is connected to the USB in the machine handfree.**

### (4) Radio (FM/AM) selection button



- ① Each press of the FM/AM button will change the radio mode in the following order.  
FM1 → FM2 → FM3 → AM
- ② Preset memory of up to FM : 18 stations, AM : 6 stations

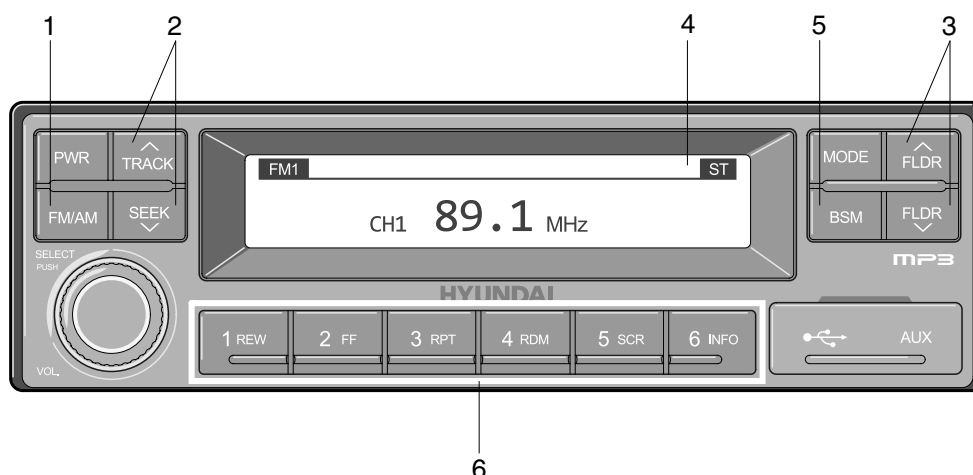
### (5) USB slot

Connects USB to play USB music files.

### (6) AUX terminal

Connects AUX cable to play AUX music files.

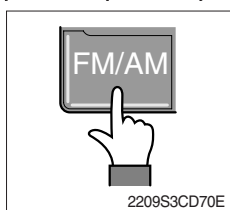
## ■ RADIO



2209S3CD71

- |                                         |                                                  |
|-----------------------------------------|--------------------------------------------------|
| 1 Radio (FM/AM) selection button        | 4 LCD display                                    |
| 2 TRACK/SEEK button                     | 5 BSM (Best Station Memory) button               |
| 3 Broadcast manual search (FLDR) button | 6 Saving broadcast frequencies to PRESET numbers |

### (1) Radio (FM/AM) selection button



- ① Each press of the FM/AM button will change the radio mode in the following order.  
FM1 → FM2 → FM3 → AM

- ② In addition, pressing the FM/AM button when the starting switch is in ON state will turn the power on and activate the radio.

### ③ Setting regional Radio Frequency

#### ► North America Frequency

Press the FM/AM and Preset 1 button simultaneously to set frequency in accordance to the North America Frequency settings. "nA" will become displayed on the LCD for one second.

FM : 87.7 ~ 107.9 MHz (200 KHz)

AM : 530 ~ 1710 KHz (10 KHz)

#### ► Local/Middle East/Asia Frequency

Press the FM/AM and Preset 2 button simultaneously to set frequency in accordance to the Local/Middle East/Asia Frequency settings. "InT" will become displayed on the LCD for one second.

FM: 87.5 ~ 108 MHz (100 KHz)

AM: 531 ~ 1602 KHz (9 KHz)

#### ► Europe Frequency

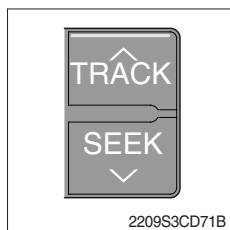
Press the FM/AM and Preset 3 button simultaneously to set frequency in accordance to the North America Frequency settings. "Eu" will become displayed on the LCD for one second.

FM: 87.5 ~ 108 MHz (50 KHz)

MW: 531 ~ 1602 KHz (9 KHz)

LW: 153 ~ 279 KHz (1 KHz)

## (2) TRACK/SEEK button



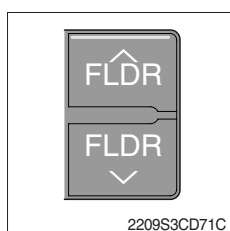
- ① As buttons used to automatically search broadcasts, pressing the button will automatically search and stop at a frequency with superior reception.

TRACK  $\wedge$  : Searches frequencies higher than current frequency

SEEK  $\vee$  : Searches frequencies lower than current frequency

※ When frequencies cannot be properly found due to weak broadcast reception, try using manual FLDR button. (Refer to manual FLDR button explanation below)

## (3) Broadcast manual search (FLDR) button



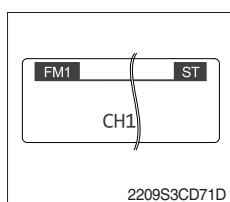
- ① As button used to search frequencies manually, a press of the SEEK step (refer to note below) will change the frequency. Pressing and holding the button will continue changing the frequency. Releasing the button will stop the search at the current frequency.

FLDR  $\wedge$  : Searches frequencies higher than current frequency

FLDR  $\vee$  : Searches frequencies lower than current frequency

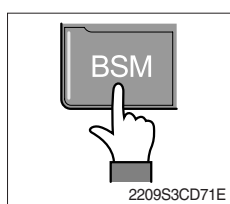
※ SEEK STEP : FM-100KHz, AM-9KHz

## (4) LCD display



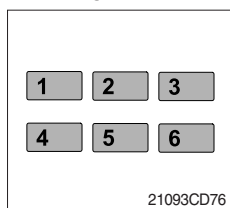
- ① The currently received broadcast frequency info and status are displayed.

## (5) BSM (Best Station Memory) button



- ① Press and hold the BSM button to listen to the presets saved in FM BAND FM1, FM2, and FM3 or AM BAND AM for 5 seconds each. When you find a station you wish to listen to, press the BSM button again to receive the selected broadcast.
- ② Shortly press the BSM button to automatically save frequencies with superior reception in presets (1REW~6INFO). The BSM feature will save AM frequencies in AM mode and FM frequencies in FM mode.

## (6) Saving broadcast frequencies to PRESET numbers

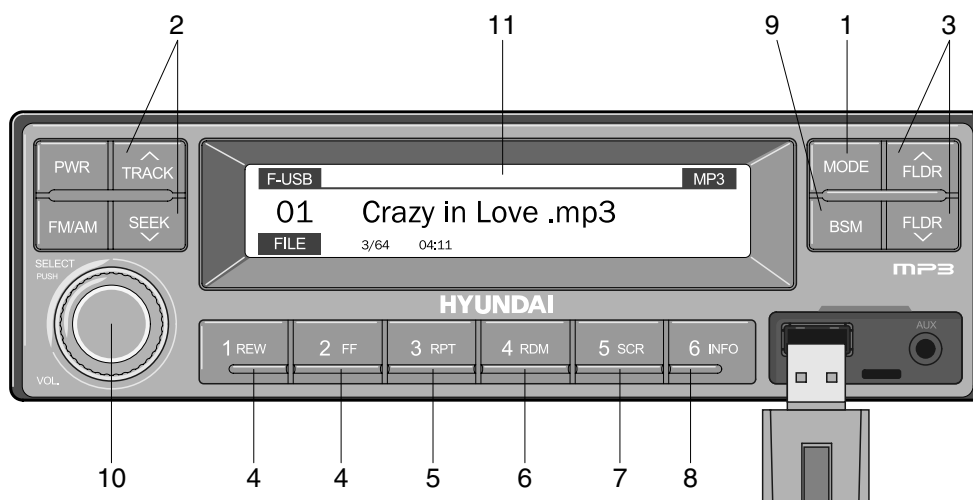


Up to 18 FM broadcasts and 6 AM broadcasts can be saved.

- ① Use the auto/manual search buttons to find the desired frequency.
  - ② Select the preset button (1REW~ 6INFO) to which you wish to save the selected frequency. Press and hold the preset button.
  - ③ The frequency will be saved to the preset button to a sound of a beep. The saved frequency number will be displayed on the LCD DISPLAY. (However, the beep will not sound if the beep function has been turned off in sound setting. )
  - ④ After saving is complete, pressing the preset button will play the corresponding broadcast frequency.
- ※ No beep sound signifies that the preset has not been saved. In this case, try again from the first step. (However, the beep will not sound if the beep function has been turned off in sound setting.)



## ■ USB CONNECTION

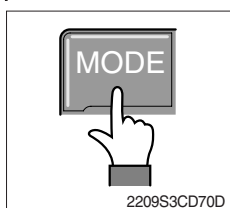


2209S3CD72

- |                             |                                             |
|-----------------------------|---------------------------------------------|
| 1 USB selection button      | 7 Scroll (SCR) button                       |
| 2 TRACK UP/SEEK DOWN button | 8 View music info (INFO) button             |
| 3 FLDR UP/DOWN button       | 9 Scan button (BSM)                         |
| 4 FF/REW button             | 10 Finding and playing file (SELECT) button |
| 5 RPT/FOLDER RPT button     | 11 LCD display                              |
| 6 RDM/FOLDER RDM button     |                                             |

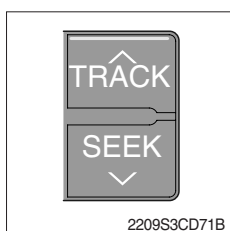
- Operates only when a USB is connected. Connecting a USB to the audio will automatically convert to USB mode.
- Connecting the USB when the starting switch is in ON state will turn the power on and automatically play the songs within the USB.

### (1) USB selection button



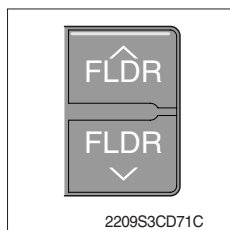
- ① While playing a different mode, press the MODE button to convert to USB mode. Connecting a USB to the audio will automatically convert to USB mode even if another mode is playing and automatically play the songs within the USB.
- ② If the USB is connected to both the front USB and handfree, then MODE is converted in the following order.  
RADIO → USB(front) → USB(handfree)

### (2) TRACK UP/SEEK DOWN button



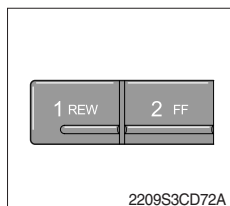
- ① While playing USB, press the TRACK ^ button to play the beginning of the next song.  
Press the SEEK ^ button to return to the beginning of the current song. Press the button again to play the beginning of the previous song.

### (3) FLDR UP/DOWN button



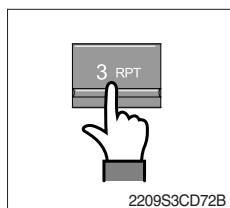
- ① If there are more than 2 folders in the USB, pressing the FLDR UP/DOWN button will move to the previous or next folder.
- ② If there are no folders in the USB, then pressing the button will move up/down within the folder in 10 file increments.

### (4) FF/REW button



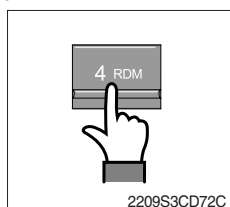
- ① While a USB is operating, press and hold the FF button to fast-forward the song. When fast-forward is complete, the next song will properly play from the beginning even if you continue holding the button. Press and hold the REW button to rewind the song. When rewind is complete, the current song will properly play from the beginning even if you continue holding the button. Shortly pressing the buttons will not operate the FF/REW.

### (5) RPT/FOLDER RPT button



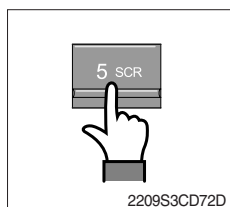
- ① While music is playing, shortly press the RPT button to repeat the currently playing song.
- ② (RPT function) Press and hold the RTP button to sequentially repeat all songs within the current folder. (FOLDER RPT, however, music files in the USB must be saved in folder format.)

### (6) RDM/FOLDER RDM button



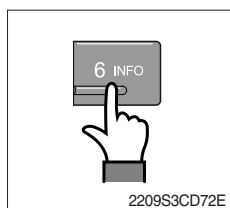
- ① While music is playing, shortly press the RDM button to randomly play the songs in the current folder. (RDM)
- ② While music is playing, press and hold the RDM button to randomly play the songs in the current folder. (FOLDER RDM, however, music files in the USB must be saved in folder format.)

### (7) Scroll (SCR) button



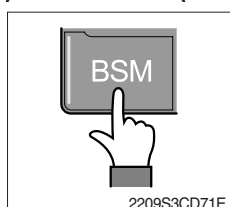
- ① Press the SCR button to turn ON/OFF the scroll function which scrolls the file name of the currently playing song on the LCD from right to left.

### (8) View music info (INFO) button



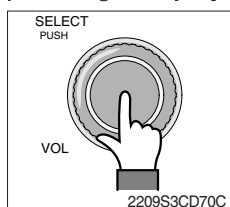
- ① Each time the INFO button is pressed, the info on the currently playing song will be displayed in the following order.  
FILE NAME → TITLE → ARTIST → ALBUM → DIR

### (9) Scan button (BSM)



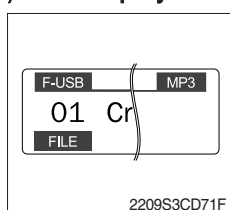
- ① While music is playing, shortly press the BSM button to scan each song within the USB for 10 seconds in sequential order. (SCN)
- ② Press and hold the BSM button to scan each song within the current folder for 10 seconds in sequential order. (FOLDER SCN, however, music files in the USB must be saved in folder format.)

### (10) Finding and playing file (SELECT) button



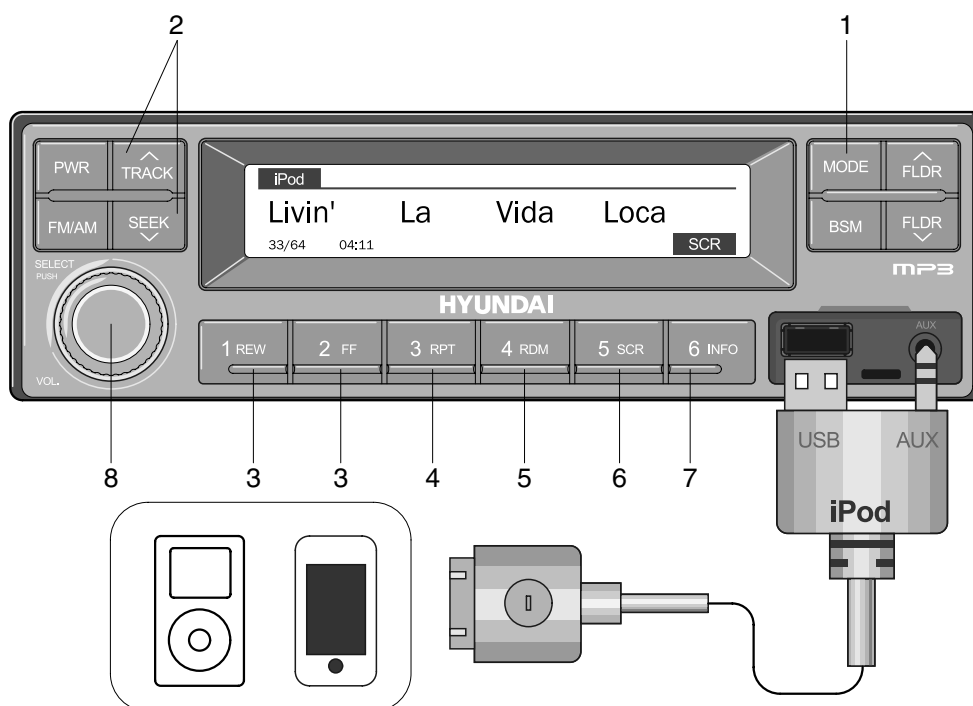
- ① While USB is playing, press and hold the SELECT button for over 3 seconds to enter FILE BROWSER mode and search for desired files.  
After entering FILE BROWSER mode, turn the SELECT button left/right to find the desired folder. After finding the folder, press the SELECT button to select the folder. Turn the SELECT button left/right to find the desired song and press the SELECT button to play.
- ③ If there are no adjustments for 3 seconds after pressing the SELECT button, the function will be turned off and the USB play screen will be displayed.

### (11) LCD display



- ① Displays the info of the currently playing song.
  - F-USB : Displays USB is connected to the Audio Front
  - R-USB : Displays USB is connected to the handfree
  - RPT : Displays that repeat function is turned on
  - 📁 RPT : Displays that folder repeat function is turned on
  - RDM : Displays that random play is turned on
  - 📁 RDM : Displays that folder random play is turned on
  - SCR : Displays that SCROLL is turned on

## ■iPOD CONNECTION

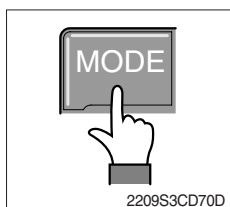


2209S3CD73

- |                             |                                            |
|-----------------------------|--------------------------------------------|
| 1 iPod selection button     | 5 Random play (RDM) button                 |
| 2 TRACK UP/SEEK DOWN button | 6 Scroll (SCR) button                      |
| 3 FF/REW button             | 7 View music info (INFO) button            |
| 4 Repeat (RPT) button       | 8 Finding and playing file (SELECT) button |

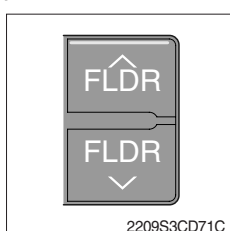
- Operates only when an iPod is connected. Connecting an iPod to the audio will automatically convert to iPod mode. Connecting the USB when the starting switch is in ON state will turn the power on and automatically play the songs within the iPod.
- The iPod cable is supplied separately.

### (1) iPod selection button



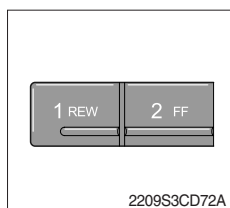
- ① While playing a different mode, press the MODE button to convert to iPod mode. Connecting an iPod to the audio will automatically convert to iPod mode even if another mode is playing and automatically play the songs within the iPod.

### (2) TRACK UP/SEEK DOWN button



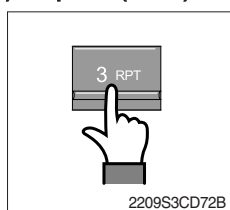
- ① While playing music, press the TRACK ^ button to play the beginning of the next song. Press the SEEK v button to return to the beginning of the current song. Press the button again to play the beginning of the previous song.

### (3) FF/REW button



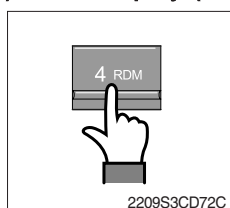
- ① While an iPod is operating, press and hold the FF button to fast-forward the song.
- ② When fast-forward is complete, the next song will properly play from the beginning even if you continue holding the button. Press and hold the REW button to rewind the song.
- ③ When rewind is complete, the current song will properly play from the beginning even if you continue holding the button.
- ④ Shortly pressing the buttons will not operate the FF/REW.

### (4) Repeat (RPT) button



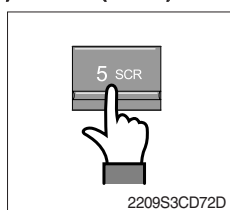
- ① While music is playing, press the RPT button to repeat the currently playing song.

### (5) Random play (RDM) button



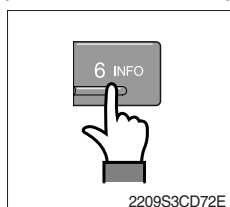
- ① While music is playing, press the RDM button to randomly play the songs.

### (6) Scroll (SCR) button



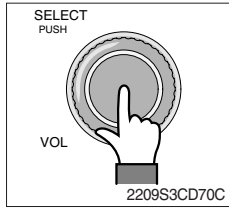
- ① Displays the file name of the currently playing song on the LCD. Here, the SCR button turns the file name SCROLL ON/OFF.

### (7) View music info (INFO) button



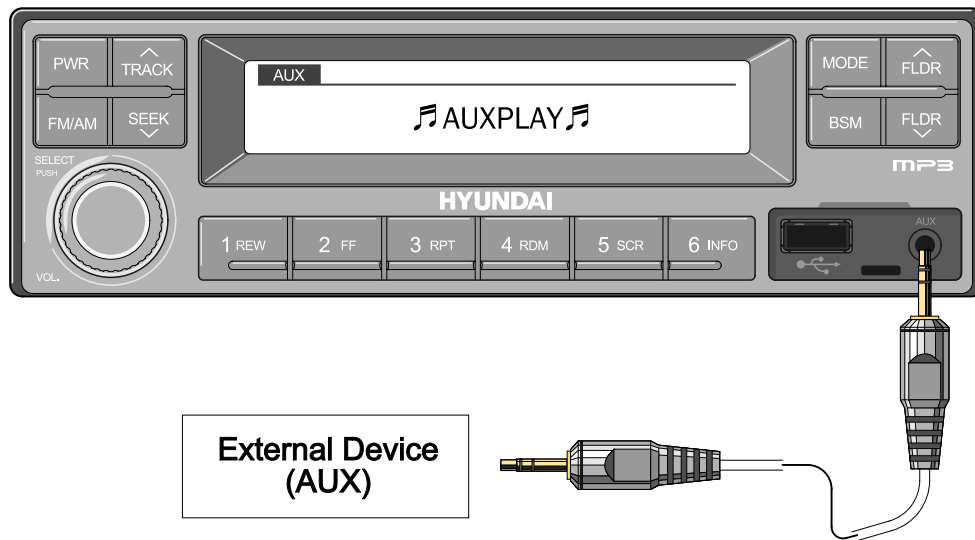
- ① Each time the INFO button is pressed, the info on the currently playing song will be displayed in order of ARTIST → ALBUM → TITLE.

### (8) Finding and playing file (SELECT) button



- ① While iPod is playing, press and hold the SELECT button for over 3 seconds to enter CATEGORY mode and search for desired files.
- ② After entering CATEGORY mode, turn the SELECT button left/right to find the desired category.
- ③ Category will be displayed in the following order.  
PLAYLISTS → ARTISTS → ALBUMS → GENRES → SONGS → COMPOSERS → AUDIOBOOKS → PODCASTS
- ④ After finding the category, press the SELECT button to select the category. Turn the SELECT button left/right to find the desired song and press the SELECT button to play.
- ⑤ If there are no adjustments for 3 seconds after pressing the SELECT button, the function will be turned off and the iPod play screen will be displayed.

## ■AUX connection



2209S3CD74

- Operates only when an external device is connected to AUX. Connecting an AUX device to the audio using the AUX cable will automatically convert to AUX mode.
- When an external device is connected, only the PWR, FM/AM, MODE, and VOL buttons can be operated.
- Settings can be made only through the external device connected to AUX.
- The AUX cable is supplied separately.

### (1) Connecting an external device using the AUX cable

















- ① While playing a different mode, press the MODE button to convert to AUX mode.
- ② If an external device is connected to the Audio through the AUX terminal, AUX mode will automatically be converted and play music from AUX. Connecting the AUX when the starting switch is in ON state will turn the power on and automatically play the songs within the AUX.

## 8) RADIO AND USB PLAYER (MACHINE SERIAL NO.: #0268~#0910)



9403CD101

### FRONT PANEL PRESENTATION

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



## ■ GENERAL

### (1) Power and volume button



#### ① Power ON / OFF button

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

#### ② Volume UP/DOWN control knob

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

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

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

#### ③ Initial volume level set up

I-VOL is the volume level the unit will play at when next turned on.

To adjust the I-VOL level, press and hold VOL button (1) for longer than 2 seconds. The current volume level displays on the display panel.

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

#### ④ Clock ON/OFF control

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

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

#### ⑤ Clock adjustment

With CLOCK ON selected, press VOL knob again after CLOCK ON display, the hour will blink, turn VOL knob right or left to adjust hour.

Simply press VOL again, the minute will blink, turn VOL knob to adjust minute. Then press VOL again to confirm the clock once finished.

## (2) Menu Selection



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

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

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

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

### ② Bass control

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

### ③ Treble control

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

### ④ Balance control

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

### ⑤ Fader control

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

### ⑥ EQ control

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

EQ OFF → CLASSIC → POP → ROCK → JAZZ

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

### ⑦ Loud control

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

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

### ⑧ Beep control

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

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

### (3) Mute control

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

### (4) Mode selection

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

## ■ RADIO

### (1) Mode button



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

### (2) Manual tuning button



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

### (3) Auto tuning button



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

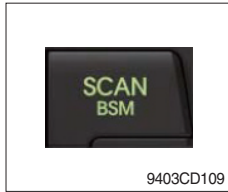


### (4) Station preset button



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

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



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

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

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

## ■ USB PLAYER

### (1) USB playback



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

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

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

### (2) Track Up / Down button



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



### (3) MP3 directory / File searching



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

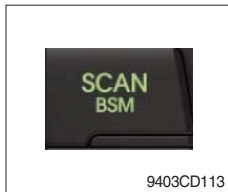
### (4) Directory Up / Down button



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

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

#### (5) Track Scan Play (SCAN) button



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

#### (6) Track Repeat Play (RPT) button



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

#### (7) Track Random Play (RDM) button



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

#### (8) ID3 v2 (DISP)



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

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

\* USB Information and Notice

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

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

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

## ■ AUX OPERATION

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

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

- Use a 3.5 mm stereo plug cable to connect the media player headphone socket at each end as follows.
  - Adjust the portable media player to approximately 3/4 volume and start playback.
  - Press the MODE button (3) on the audio unit to change into AUX mode.
  - The volume and tone can now be adjusted on the audio unit to the desired level.
- ※ The audio quality of your media player and the audio tracks on it may not be of the same sound quality as the audio system is CD Player.
  - ※ If the sound of the media player is too low compared with the radio or CD, increase the volume of the player.
  - ※ If the sound of the media player is too loud and/or distorted, decrease the volume of the player.
  - ※ When in AUX mode, only the Volume, Bass, Treble, EQ and Mode functions of the audio unit can be used.



## ■ RESET AND PRECAUTIONS

### (1) Reset function

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

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

② Take out the fuse for the audio system in the vehicle once and then plug it back in.

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

※ After resetting the player, ensure all functions are operating correctly.

### (2) Precautions

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

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

- ① Operation voltage : 9~32 volts DC, negative
- ② Output power : 40 watts maximum (20 watts x 2 channels)
- ③ Tuning range

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

#### ● AREA Selection :

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

④ USB version : USB 1.1

## 8) RADIO AND USB PLAYER (MACHINE SERIAL NO. : #0911-)

### ■ WITH BLUETOOTH



19A3RD02

- 1 USB port with cover : Open the cover and connect the USB storage device.
- 2 ENTER/AST button with tune dial.
- 3 Display window for play / reception / menu state and information.
- 4 POWER button with VOLUME dial : turns power on, mute function on/off or selects a menu item (press), control the volume level or menu item.
- 5 AUX port with cover : Open the cover and plugging the external audio device.
- 6 Call / call end button :
  - when a call comes in : accepts a call (press); rejects a call (press and hold)
  - during a call connection : ends a call (press) ; switches between hands-free and private call modes (press and hold)
  - in standby mode: opens call list (press) ; makes a call a recently connected number (press and hold)
- 7 BAND button : enters Radio mode or changes the radio band (press).
- 8 Preset button :
  - Radio: Recall each stored station (press) ; store each station (press and hold).
  - USB : changes playback mode (press 1 II, 2 RPT or 3 RDM buttons); shows available information about the current track (press 4 INFO button) ; move to folder down/up (press 5 D-/6 D+ buttons).
  - Bluetooth audio : pause/resume playback (press 1 II) ; shows information of the connected Bluetooth device (press 4 INFO button).
- 9 MODE button : selects USB, Bluetooth audio or AUX play mode (press).
- 10 MENU button : enters Menu setting mode or returns to the previous menu (press).

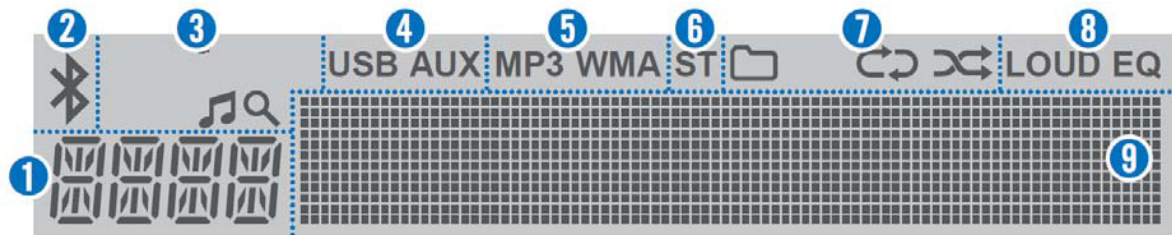
## ■ WITHOUT BLUETOOTH






19A3RD01

- 1 USB port with cover : Open the cover and connect the USB storage device.
- 2 ENTER/AST button with tune dial.
- 3 Display window for play/reception/menu state and information.
- 4 POWER button with VOLUME dial : turns power on, mute function on/off or selects a menu item (press), control the volume level or menu item.
- 5 AUX port with cover : Open the cover and plugging the external audio device.
- 6 FM button : enters FM Radio mode.
- 7 AM button : enters AM Radio mode.
- 8 Preset button :
  - Radio : Recall each stored station (press) ; store each station (press and hold).
  - USB : changes playback mode (press 1 II, 2 RPT or 3 RDM buttons) ; shows available information about the current track (press 4 INFO button) ; move to folder down/up (press 5 D-/6 D+ buttons).
- 9 MODE button : selects USB or AUX play mode (press).
- 10 MENU button : enters Menu setting mode or returns to the previous menu (press).

## ■ DISPLAY WINDOW (LCD)

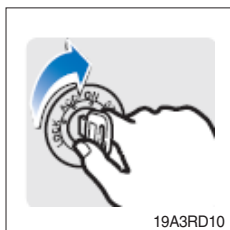


19A3RD03

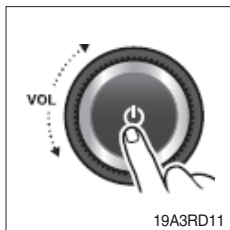
- |                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1 Function display area for showing the function mode.</p> <p>2 Bluetooth indicator for the Bluetooth connection.</p> <p>3 Search indicator for USB play list.</p> <p>4 USB/AUX indicators for the USB or External device connection.</p> <p>5 MP3/WMA indicators for USB's Audio Stream detections.</p> <p>6 ST (Stereo) indicators for FM stereo reception.</p> | <p>7 Playback mode indicators for USB playback mode.</p> <p style="margin-left: 20px;">  : Folder mode.<br/>  : Repeat playback.<br/>  : Random playback.         </p> <p>8 LOUD/EQ indicators for sound effect.</p> <p style="margin-left: 20px;">LOUD : Loudness mode.<br/>EQ : EQ mode.</p> <p>9 Multi-function display area for showing the play, reception or menu information.</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## ■ GENERAL

### (1) Power and volume button



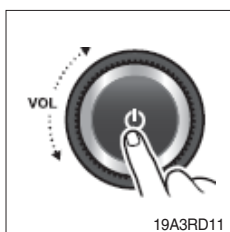
- ① Turn the starting switch to ON position.



- ② Press the POWER button to turn the power on.

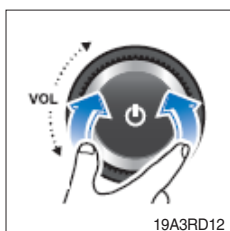
- If the source is ready, playback also starts.
- To turn on the power directly.

By connecting an USB into the USB port or pressing the BAND, MODE (while the USB is connected), you can also turn on the power and the unit then plays.



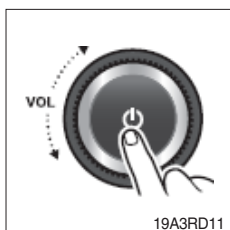
- ③ When power is on, press and hold the POWER button to turn power off.

### (2) Adjusting volume directly



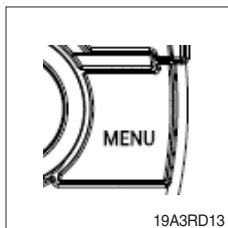
- ① Turn the VOLUME dial to control volume.
  - Available volume range : 00 (mute)~41.

### (3) Muting the sound quickly

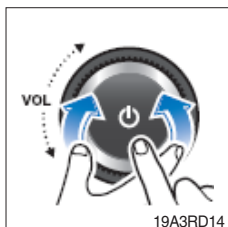


- ① Press the MUTE button to turn mute on.
  - "MUTE" will flash on the display and mute the sound.
  - Press the MUTE button again or turn VOLUME dial to restore sound.

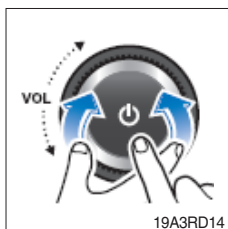
#### (4) Setting the sound



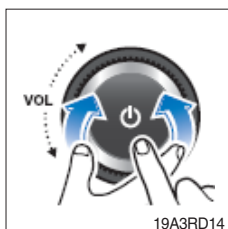
- ① Press MENU button to enter the Settings menu mode.
  - After entering MENU mode, press MENU button to return to the previous item.



- ② Turn VOLUME dial to select the "SOUND" or "EQUALIZER" as below, then press this dial.
  - SOUND : sets the sound mode.
  - EQUALIZER : selects the equalizer style.

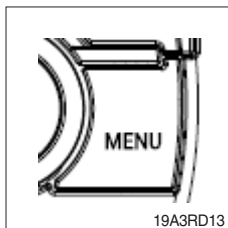


- ③ Turn VOLUME dial to select the desired Sound setting mode, then press this dial.
  - BASS : sets the bass sound level (-5~+5).
  - MIDDLE : sets the middle sound level (-5~+5).
  - TREBLE : sets the treble sound level (-5~+5).
  - BALANCE : sets the sound balance between the right and left speakers (LEFT 15~RIGHT 15).
  - EQUALIZER : selects the one of the 7 EQ styles (EQ OFF, POP, ROCK, COUNTRY, VOICE, JAZZ, CLASSIC).
  - PREVIOUS : Return to previous menu screen.

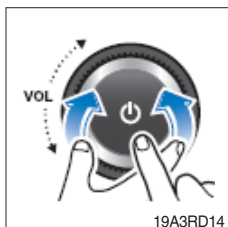


- ④ Turn VOLUME dial to adjust the value of the level, balance or style, then press this dial.

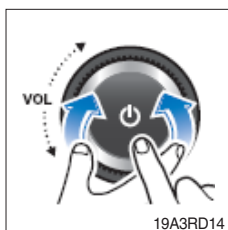
## (5) Setting the system functions



- ① Press MENU button to enter the Settings menu mode. Turn VOLUME dial to select "SYSTEM" as below, then press this dial.



- ② Turn the VOLUME dial to select the "BT ON/OFF", "SCROLL", "LOUD" or "BEEP" then press this dial.
  - BT (Bluetooth) ON/OFF : activate (On) or deactivate (Off) the Bluetooth function. – (only ARA-9010HB).
  - SCROLL : activate (On) or deactivate (Off) the text scroll feature for LCD display screen.
  - LOUD : activate (On) or deactivate (Off) the loudness sound effect.
  - BEEP : activate (On) or deactivate (Off) the beep sound feature.
  - PREVIOUS : Return to previous menu screen.

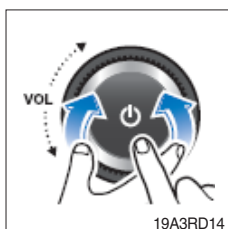


- ③ Turn VOLUME dial to select ON or OFF, then press this dial.

## (6) Setting the region



- ① Press MENU button to enter the Settings menu mode. Turn VOLUME dial to select "AREA" as below, then press this dial.
  - AREA : sets the region for radio.



- ② Turn the VOLUME dial to select the desired area as below, then press this dial.
  - If the region setting is not selected correctly to your country or region, the radio reception can not be received. Retry the setting the region of radio reception correctly.
  - The region setting is required only for the first time.

- **ASIA/M.East**

FM : 87.5~108.0 MHz (100 kHz step)

AM : 531~1,602 kHz (9 kHz step)

- **AMERICA**

FM : 87.5~107.9 MHz (200 kHz step)

AM : 530~1,710 kHz (10 kHz step)

- **LATIN**

FM : 87.5~108.0 MHz (100 kHz step)

AM : 530~1,710 kHz (10 kHz step)

- **EUROPE**

FM : 87.5~108.0 MHz (50 kHz step)

AM : 531~1,620 kHz (9 kHz step)

- **JAPAN**

FM : 76~90 MHz (100 kHz step)

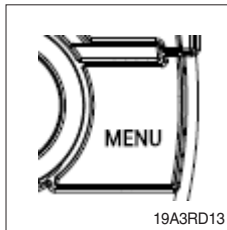
AM : 522~1,629 kHz (9 kHz step)

- **Russia (OIRT)**

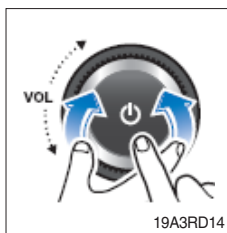
FM : 65.0~74.0 MHz (30 kHz step)

AM : 522~1,602 kHz (9 kHz step)

## (7) Checking/updating the system Software



- ① Press MENU button to enter the Settings menu mode. Turn VOLUME dial to select "SOFTWARE" as below, then press this dial.
  - SOFTWARE : check/update the system software.



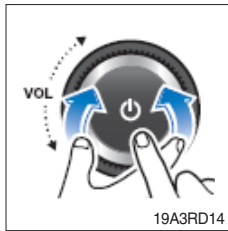
- ② To check the system software, turn the VOLUME dial to select the "VERSION CHECK", then press this dial.
- ③ To update the system software, turn the VOLUME dial to select the "UPDATE", then press this dial.
  - Download the latest system software to a USB device for update to this unit, then open the cover and plug the USB device to the USB port.
  - Perform update with the start switch "ON" when the battery is sufficiently charged by driving the vehicle. When the battery is discharged while updating, the system may get damaged with the update stopped.

## (8) Setting the Bluetooth mode (only ARA-9010HB)



- ① Press MENU button to enter the Settings menu mode. Turn VOLUME dial to select "BLUETOOTH" as below, then press this dial.
  - Bluetooth: Bluetooth setting mode.

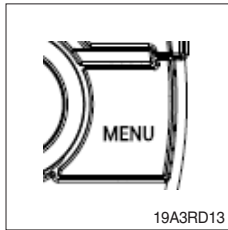




- ② Turn VOLUME dial to select the desired Bluetooth setting mode, then press this dial.
  - PAIR : register a Bluetooth device.
  - SELECT : selects/connects a device from registered Bluetooth devices.
  - DELETE : removes a device from registered Bluetooth device.
  - MIC VOL : adjusts the Bluetooth microphone.
  - H/F VOL : adjusts the Bluetooth hands-free volume.
  - Phone Book : activates/deactivates the phone book download feature from connected device.
  - BT INFO : shows the Bluetooth information of this system.
  - PREVIOUS : returns to previous menu screen.
- ③ To change the connected Bluetooth device, turn the VOLUME dial to select the "SELECT", then press this dial. Turn the VOLUME dial to select the desired device list, then press this dial.
- ④ To delete the Bluetooth device, turn the VOLUME dial to select the "DELETE", then press this dial. Turn the VOLUME dial to select the desired device list, then press this dial.
  - If the currently connected device is delete, this unit attempts to connect with the following priority Bluetooth device automatically.
- ⑤ To adjust the Bluetooth microphone initial volume, turn the VOLUME dial to select the "MIC VOL", then press this dial. Turn the VOLUME dial to set desired Bluetooth microphone initial volume level, then press this dial.
  - The default setting is 3, the volume range is 1~5.
- ⑥ To adjust the Bluetooth hands-free initial volume, turn the VOLUME dial to select the "H/F VOL", then press this dial. Turn the VOLUME dial to set desired Bluetooth hands-free initial volume level, then press this dial.
  - The default setting is 15, the volume range is 6~32.
- ⑦ To download the phone book, turn the VOLUME dial to select the "phone book", then press this dial. Turn the VOLUME dial to select the "ENABLE", then press this dial.
  - The phone book can download up to 1,000 phone numbers.

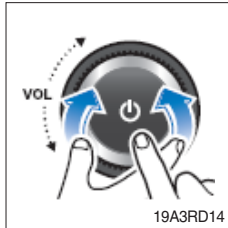
## ■ BLUETOOTH

### (1) Pairing/Connecting your device




- ① Firstly, set up the Bluetooth device to be connected from the Bluetooth settings menu to enable other devices to search for the Bluetooth device.

Press MENU button to enter the Menu settings mode.





- ② Turn VOLUME dial to select the "BLUETOOTH" as below, then press this dial.

- ③ Turn the VOLUME dial to select the "PAIR", then press this dial.

- When you first register, appear the "BT Pairing" on the display window, then search the Bluetooth devices for connection.
- If a Bluetooth device is not connected, press and hold the  button to enter the pairing mode directly.

- ④ Search and select device "Device Name" in your Bluetooth device, then confirm.

- The Bluetooth registration standby proceeds for 1 minute. If the registration is failed during 1minute, restart over from the beginning.
- After a while, the Bluetooth device is automatically registered. When pairing is successful, the "Connected" and "Device name" will be displayed 3 seconds.
- When your Bluetooth device is connected,  appear on the display.
- If the Bluetooth device is disconnected,  disappear.

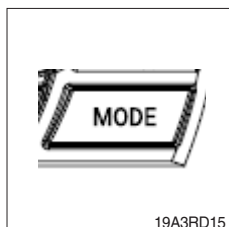
- ⑤ Repeat items 1~4 to register to add another Bluetooth device.


- Up to 5 devices can be paired to this unit.
- The last device connected to this unit is set to automatically connect to the highest priority.

## (2) Playing the Bluetooth music

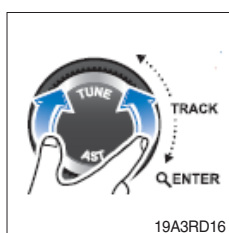
To play Bluetooth music

- ※ A2DP (Advanced Audio Distribution Profile) : This function only operates with Bluetooth devices that support A2DP version 1.2 or above.
- ※ Should be set to Stereo Headset in Bluetooth device type menu of your device

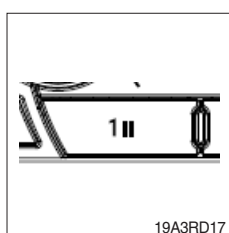


- ① Press the MODE button repeatedly to select the BT Audio mode. Appears  on display window and start playback.
  - If a Bluetooth device is not connected, you can not select.
  - If music is not yet playing from your mobile device after switching to Bluetooth Music (streaming audio) mode or after pressing Play on the mobile device itself, try to start music playback by pressing the Play button again.
  - The output music playback from Bluetooth devices with this unit.
  - There will be music playback automatically play upon entering since once played. It stops automatically when you exit from the music.
  - You can also phone or Bluetooth device other than the home screen mode, Bluetooth music play mode when entering and exiting, the device does not play automatically.

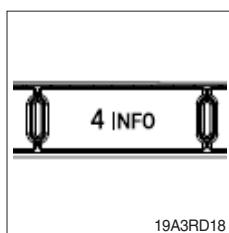
## (3) Controlling the playback



- ① While playing, turn the TUNE/TRACK dial to moves to the previous or next track.
  - Clockwise : move to the next file.
  - Counter-clockwise : move to beginning of the current file or previous file.



- ② While playing, press the [1 II] button to pause the track with "PAUSE" indicator.
  - Press this button again to play the current track.





- ③ Press the [4 INFO] button to check the information of current connected device.
  - About the music files are not displayed.
  - During Bluetooth music playback, do not operate the music changes too quickly. Allow enough time for the machine-to-machine communication.

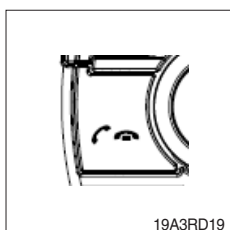
#### (4) Answering a call


- ※ When a call comes in, the audio source is muted, and display the call information with ring tone.
- ※ If the phonebook is not downloaded, only incoming phone number is displayed without the caller information.

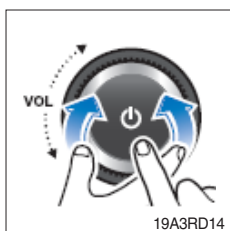



- ① To answer a call, press the  button or to reject a call press and hold the  button.
  - When a call comes in, the audio source is muted.
  - When a call is ended, this unit returns to the previous state media playback.

#### (5) Making a call from recent number

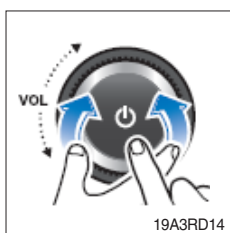


- ① To call the recent connected number, press the  button to display recent call number.
  - The recent calls list is displayed. Turn the VOLUME dial to select a recent call number, then press this dial to make a call.
  - The recent calls list displays up to 10.



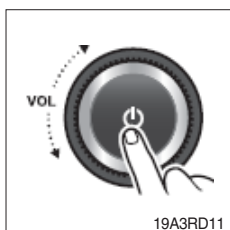
- ② To call the last connected number directly, press and hold the  button.



#### (6) During a call ...




- ① To adjust the a call volume, turn the VOLUME dial.
  - The call volume works with Bluetooth devices, and operates separately from the volume of this unit.

- ② To deactivate the microphone, press the POWER button.

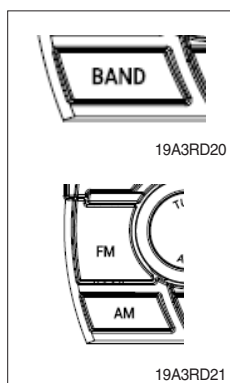


- ③ To switch from hands-free mode to the phone handset mode, press and hold the  button.  
To returns the phone conversation to hands-free mode, press and hold the  button.

- ④ To end a call, press the  button.
  - • End a call, then return to the playing state.

## ■ RADIO

### (1) Tuning in a radio station

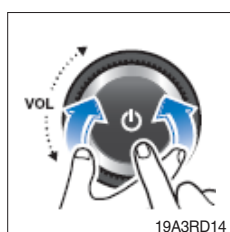


① Press the BAND or FM/AM button repeatedly to enter the radio band in order of FM1, FM2, FMA, AM1, AM2 or AMA.

- You can select the FM1, FM2, FMA or AM1, AM2, AMA radio band.

While the Auto Store stations(AST) are stored, you can select the AMA or FMA band by additional.

- The previously chosen broadcasting station will be received.

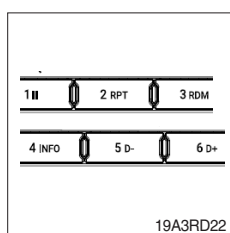


② Turn the TUNE/TRACK dial to select the station.

- Briefly turn this dial, plays previous/next frequency.
- Turn and hold this dial, automatically search for station with superior reception.
- Press this dial, starting from the current station, stations with superior reception are scanned for 5 seconds and the previous station is restored. During the seeking or scanning, if press or turn the dial left/right again, the selected station will begin playing.
- During the FM reception, the Stereo [ST] indicator is on.

### (2) Saving radio stations manually

※ You can save up to 6 preset channels each for FM1, FM2, AM1,AM and AM2 band. If change the stations while driving, use preset button to prevent accidents.



① Press the BAND or FM/AM button repeatedly to select the band.

② After selecting the frequency, press and hold the PRESET [1II]~[6 D+] button.

③ The frequency is saved to the selected preset button.

- A total of 24 frequencies with 6 preset frequencies each for FM1/FM2/AM1/AM2 modes can be saved.

### (3) Saving radio stations automatically

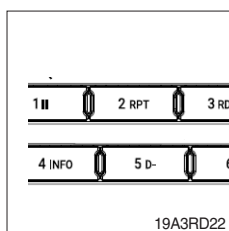
※ You can save up to 6 preset channels automatically each for FMA and AMA band.



- ① Press the BAND or FM/AM button repeatedly to enter the radio band.
  - The previously chosen broadcasting station will be received.
- ② Press and hold the AST button to automatically save receivable frequencies to Preset button.
  - Up to 6 stations can be stored in each of the FMA and AMA band.

### (4) Listening to a preset station

- ① Press the BAND or FM/AM button repeatedly to enter the radio band in order of FM1, FM2, FMA, AM1, AM2 or AMA.
  - You can select the FM1, FM2, FMA or AM1, AM2, AMA radio band.
  - While the Auto Store stations(AST) are stored, you can select the AMA or FMA band by additional.
  - The previously chosen broadcasting station will be received.



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

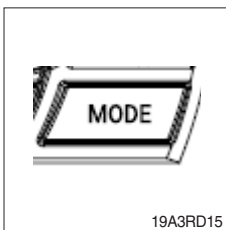
## ■ USB PLAYER

### (1) Playing an USB device



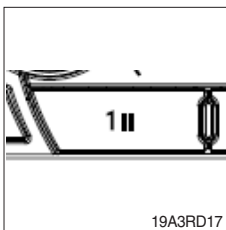
① Open the cover, plug the USB device(included MP3/WMA media file) to the USB port.

- Once a USB is connected, USB will automatically start playing from the first file within the USB.
- If a previously played USB is reconnected, then the file after the most recently played file is played.
- If a different USB is connected or the file information within the USB was changed, then the USB will start playing from the first song within the USB.



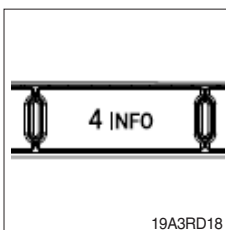
② When an USB device to be played is already connected, press the MODE button to play USB device.

- The previously selected file is played.



③ While playing, press the [1||] button to pause the file.

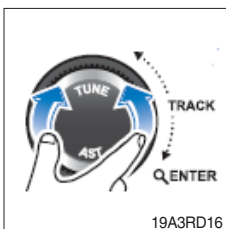
### (2) Changing the song information



① Press the [4 INFO] button repeatedly to display information about the file being played.

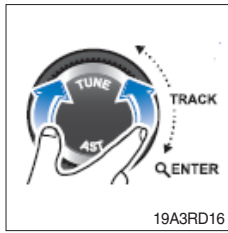
- The information displayed includes the file name, playing time, ID3 Tag or folder name information saved with the song.
- If there is no information on the playing file, the unit will display "NO INFO", and then file name.

### (3) Controlling the playback



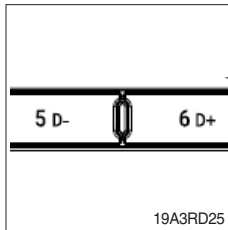
① While playing, turn the ►► I TRACK I ◀◀ dial left/right to moves to the previous or next track.

- Clockwise : move to the next file.
- Counter-clockwise : move to the previous file.



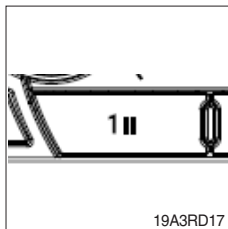
② While the ►►| TRACK |◀◀ dial is being turned and held, the file will rewind or fast forward at high speed. Once released, the file will begin playing at normal speed.

- Clockwise : fast forward.
- Counter-clockwise : fast rewind
- The search function works but search speed is not constant. While fast forwarding or rewinding, the playback sound is not output.



③ Press the [5 D-] or [6 D+] button to moves to the previous or next folder.

- [5 D-] press : move to previous folder.
- [6 D+] press : move to next folder.
- While folder moving, the folder name will be displayed briefly.



④ While playing, press the [1 II] button to pause the track.

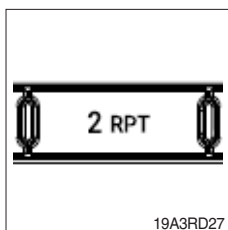
- Press the button again to play the current track.





④ To find the song you want to play directly, press the Q (Search) button.

- Turn the ►►| TRACK |◀◀ dial to select the desired file name, then press this dial.

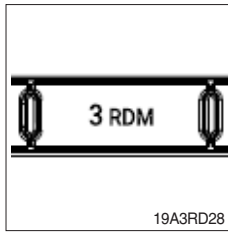
#### (4) Change the playback mode






① Press the [2 RPT] button to select the Repeat playback mode.

-  On : The current file plays repeatedly.
-  On : The current folder plays repeatedly.
- Off : Cancels repeat playback.





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

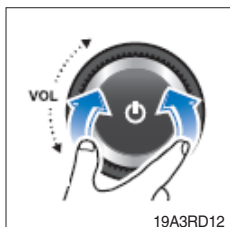
#### (5) Handling precautions for USB device

- The device will only recognize USB devices formatted in FAT 16/32. When formatting the external USB device, the device may not properly recognize a Byte/Sector selection other than 512 Bytes or 2,048 Bytes.
- The amount of time required to recognize the external USB device may differ depending on the type, size, or file formats stored on the USB. Such differences in the required time are not indications of malfunction. Please wait the period of time required to recognize the device.
- This unit can recognize maximum 9,999 files and 256 folders into the USB device.
- The device may not recognize the USB device if separately purchased USB hubs and extension cables are being used.
- The device may not support normal operation when using formats such as HDD Type, CF, or SD Memory.
- The device will not support files locked by DRM (Digital Rights Management).

## ■ AUX PLAYER

### (1) Listening to auxiliary audio equipment

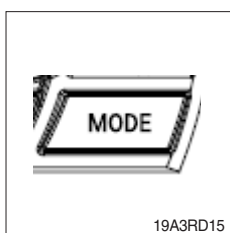
※ By connecting an optional portable audio device to the AUX input jack (stereo 3.5 pi) on the unit and then simply selecting the source, you can listen on your car speakers.



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



- ② Turn the external audio equipment off. Open the cover, connect the audio output of the external audio equipment to AUX input terminal on the unit.
- ③ Turn the external audio equipment on. Start playback of the external audio equipment at a moderate volume.



- ④ Press the MODE button repeatedly to select the AUX function.
- ⑤ Set your usual listening volume by turn the VOLUME dial left/right on the unit.
  - Once the connector is disconnected, the previous mode will be restored.
  - AUX mode can be used only when an external audio player has been connected.

## 1. 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%      |

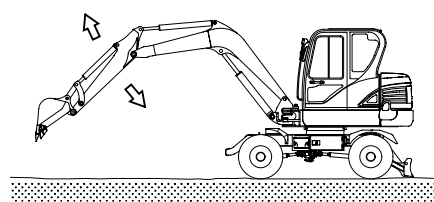
※ **Excessive operation may deteriorate the potential performance of machine and shorten lifetime of the machine.**

### 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.

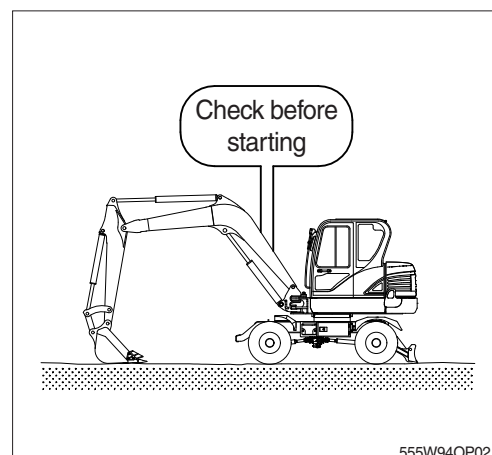
| Checking items                      | Hours |
|-------------------------------------|-------|
| Engine oil                          | 50    |
| Engine oil filter element           |       |
| Fuel prefilter element              |       |
| Fuel filter element                 |       |
| Hydraulic oil return filter element | 250   |
| Pilot line filter element           |       |
| Swing reduction gear oil            |       |



555W94OP01

## 2. CHECK BEFORE STARTING THE ENGINE

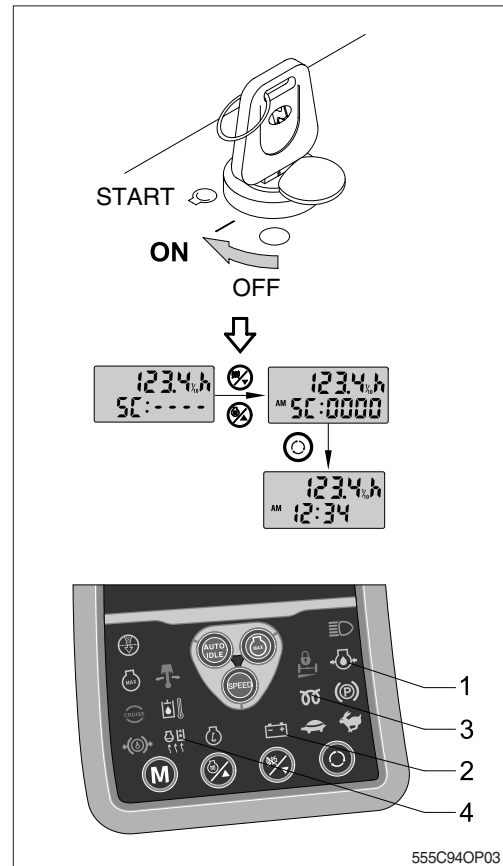
- 1) Look around the machine and under the machine to check for loosen nut or bolts, collection of dirt, or leakage of oil, fuel or coolant and check the condition of the work equipment and hydraulic system. Check also loosen wiring, and collection of dust at places which reach high temperature.  
※ **Refer to the daily check on the chapter 6, maintenance.**
- 2) After checking air pressure of tire, make sure that around the machine is clear.
- 3) Adjust seat to fit the contours of the operator's body for the pleasant operation.
- 4) 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 6 seconds.
    - ② Only below lamps will light ON and all the other lights will turn OFF after 2 seconds.
      - Battery charging warning lamp (2)
      - Engine oil pressure warning lamp (1)
    - ③ The preheat pilot lamp (3) will light ON when the coolant temperature is below 10°C .
    - ④ The warming up pilot lamp (4) will light ON when the coolant temperature is below 30°C .
- ※ If the ESL function is set to the YES, enter the password to start engine.
- ※ If the password has failed 5 times, please wait 30 minutes before re-attempting to enter the password.
- ※ Refer to page 3-9 for the ESL function.

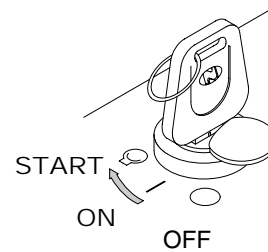
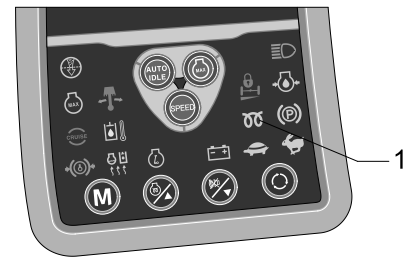


## 2) STARTING ENGINE

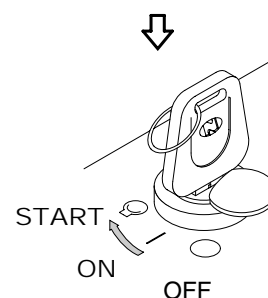
- ※ Sound horn to warn surroundings after checking if there are obstacles in the area.
- ※ Replace the engine oil and fuel referring to recommended oils at page 2-12.
- ※ Fill anti-freeze solution to the coolant as required.

- (1) Check if all levers are on the neutral position.
  - (2) Turn the starting switch to ON position.
  - (3) Check if the preheat pilot lamp (1) is turned ON.
    - ※ **When the preheat pilot lamp is turned ON, the preheating function is actuated within 15 seconds.**
    - ※ **After the preheat pilot lamp is turned OFF, engine start within 10 seconds.**
  - (4) Start engine by turning the starting switch to the START position.
  - (5) Release the starting switch immediately after starting engine to avoid possible damage to the starting motor.
- ※ **If the engine is started before the preheat pilot lamp goes OFF, it keeps the lamp ON within 15 seconds even after the engine is started.**
  - ※ **Be aware that battery can be easily discharged after long time with head light, work lamp and air-conditioner turned on together under the condition of the low engine rpm.**

- ※ If the engine does not start, the start switch turn ON position and press the preheat switch (2) for preheating.  
After the preheating, start the engine again.
- ※ If the engine does not start, allow the starter to cool for 10~20 seconds before attempting to start the engine again.  
At the cold, allow 2 minute before attempting to start the engine again.



555C94OP03A



555C94OP03C

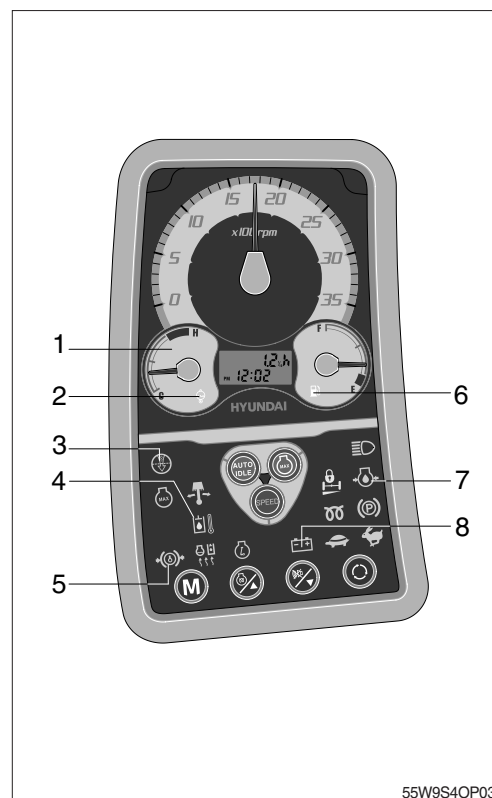
### 3) INSPECTION AFTER ENGINE START

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 OFF (2~8)?
- (4) Is the indicator of engine coolant temperature gauge (1) in the normal zone?
- (5) Is the engine sound and the color of exhaust gas normal?
- (6) Are the sound and vibration normal?

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

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



55W9S4OP03

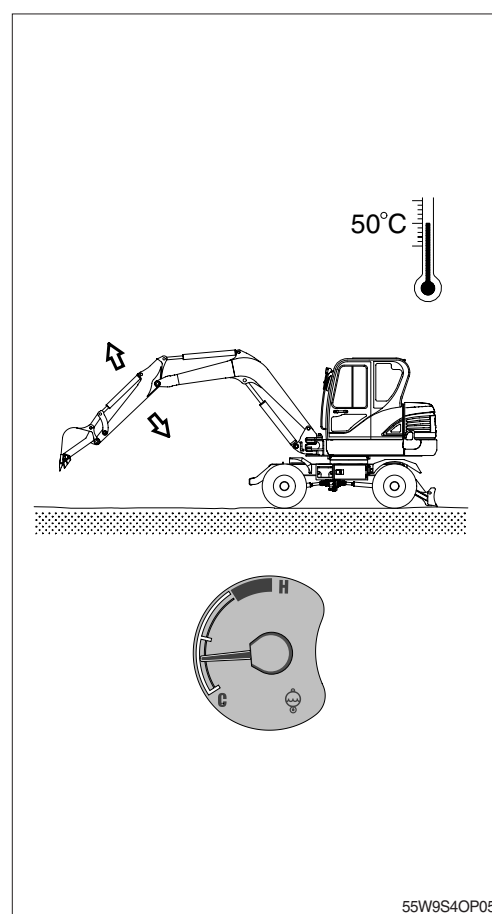
### 4) WARMING-UP OPERATION

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

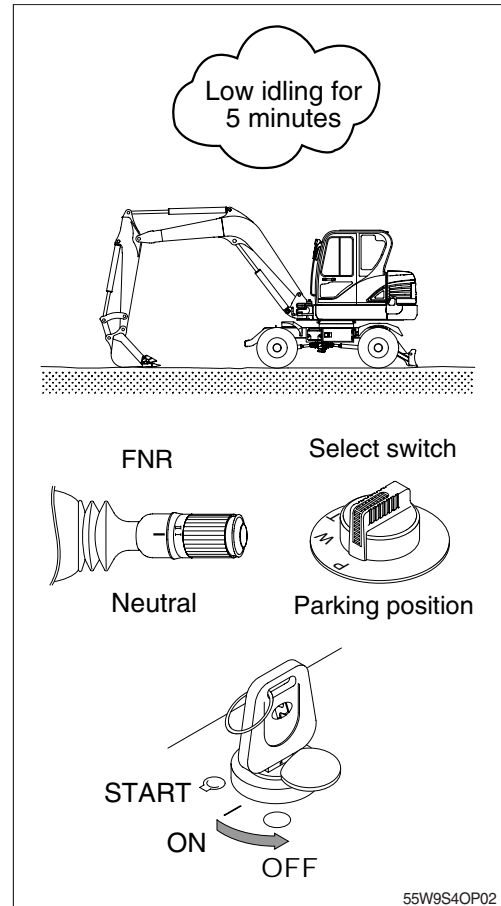


55W9S4OP05

## 5) TO STOP THE ENGINE

- ※ If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.
- ※ In particularly if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.

- (1) Place the FNR lever in the neutral.
- (2) Down the bucket and dozer blade on the ground then put all the levers in the neutral position.
- (3) Put the select switch in the parking position.
- (4) Run the engine at low idling speed for about 5 minutes.
- (5) Return the key of starting switch to the OFF position.
- (6) Remove the key to prevent other people using the machine and LOCK safety lever.
- (7) Lock the cab door.



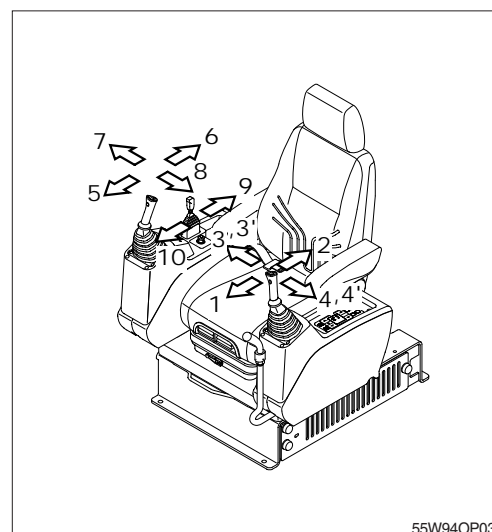


## 4. OPERATION OF WORKING DEVICE

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

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

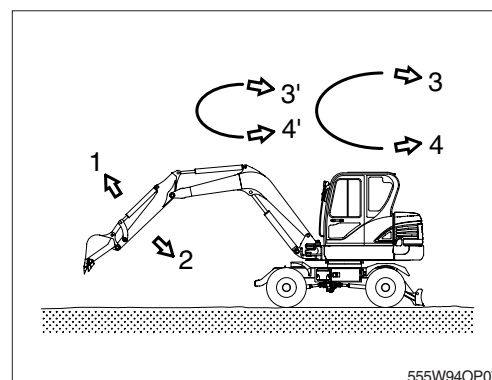
※ **When operating swing, consider the swing distance by inertia.**



※ **Left control lever**

- 1 Arm roll-out
- 2 Arm roll-in
- 3 Swing right
- 4 Swing left
- 3' Boom right (boom swing switch selected)
- 4' Boom left (boom swing switch selected)

※ **Refer to page 3-14 for boom swing switch.**

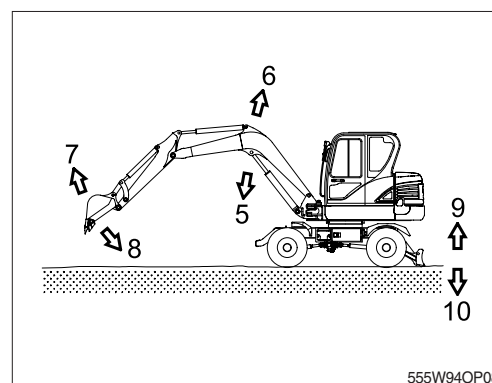


※ **Right control lever**

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

※ **Dozer control lever**

- 9 Dozer blade up
- 10 Dozer blade down



## 5. TRAVELING OF THE MACHINE

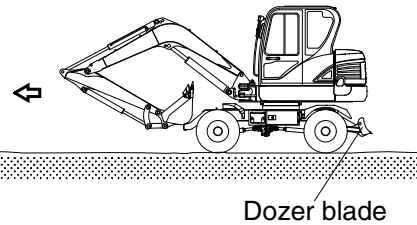
### 1) BASIC OPERATION

#### (1) Traveling position

It is the position which the dozer and rear axle is in the rear and the working device is forward.

- ▲ **Travel directions will be reversed if lower structure is positioned with dozer in front.**

Traveling position

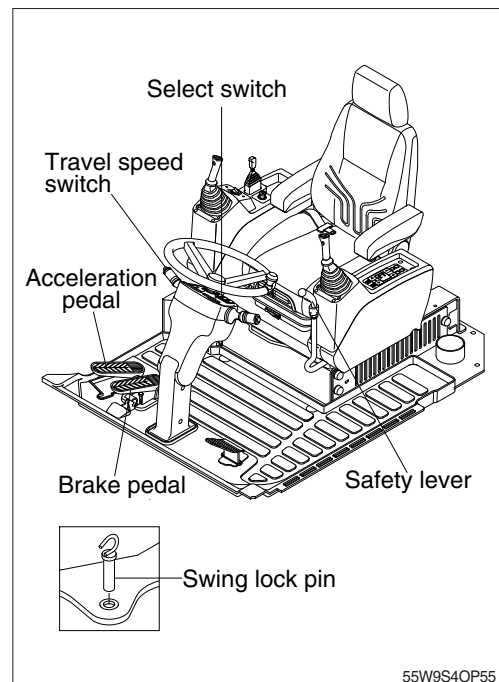


55W94OP04

#### (2) Traveling operation

When warm-up operation is completed after the engine is started, move the machine according to the following procedure.

- ① Set the swing lock pin to release position.
  - ② Release the safety lever.
  - ③ Put the select switch in the traveling position.
  - ④ Lift up the dozer blade.
  - ⑤ Select traveling direction.
  - ⑥ Place the travel speed switch in low speed.
  - ⑦ Press gently the acceleration pedal to move the machine.
- ※ **When speed up on a slope, a noise for valve of travel motor may occur. It is not out of order in machine but peculiar sound.**
  - ※ **Be sure that the brake works normally on the safe place before fast traveling.**

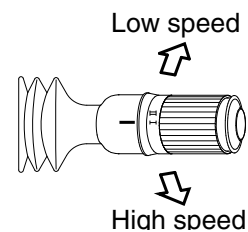


55W9S4OP55

#### (3) Changing speed

If you want to change the speed, select the travel speed switch desired position.

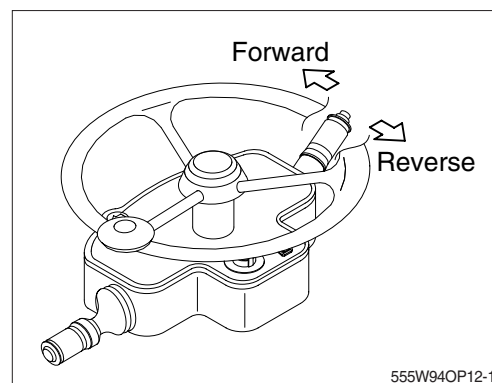
- ※ **Foot operated park brake needs to be fully applied before machine will allow change from low speed to high speed or opposite.**
- ▲ **Do not start the machine abruptly after changing speed.**



55W74OP11

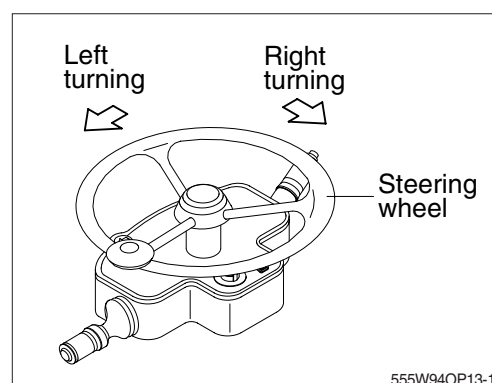
#### (4) Changing direction (forward/reverse)

- ① **Be sure to stop the machine** when changing the direction forward or backward while traveling.
  - ② Put the levers in the desired position to change direction.
- ※ **When changing direction, check beforehand there is no obstacle in the direction you will be headed.**
  - ※ **It could be cause of machine failure to change the direction forward or backward while traveling.**



#### (5) Turning the machine

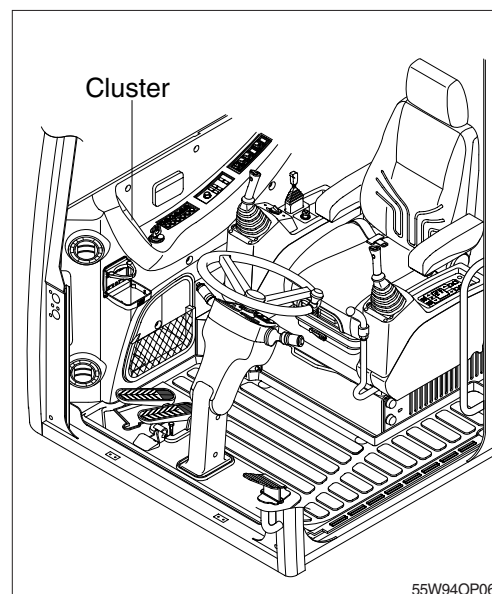
- ① Turn the machine by moving the steering wheel into the desired direction.
  - ② You can turn the machine to the left or right.
- ※ **Do not turn the machine abruptly when traveling at high speed and avoid turn on a slope.**
  - ▲ **Steering does not function with engine OFF.**



#### (6) Precautions when driving

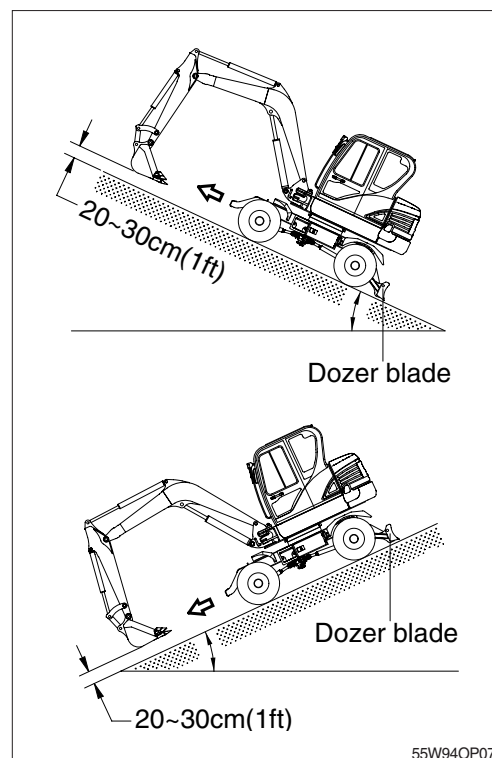
The operators must be familiar with the following precautions including general safety hints.

- ① If the warning lamp lights up on the cluster, stop the machine immediately and check carefully whether the relevant parts are out of order or not.
- ② Do not allow the engine to run at overload.
- ③ Stop the engine and check as soon as finding out abnormal noise or smell.
- ④ Check the gauges frequently.
- ⑤ Do not allow passengers or riders on the machine while it is running or in operation.
- ⑥ Never get on or off the machine while it is moving.



## 2) TRAVELING ON A SLOPE

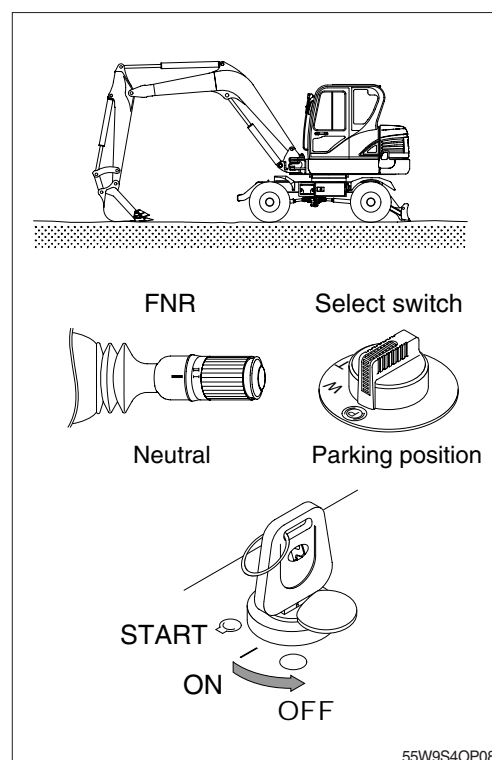
- (1) Never travel down a slope in neutral.
  - (2) Lower the bucket 20 to 30 cm (1 ft) to the ground so that it can be used as a brake in an emergency.
  - (3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.
  - (4) When parking on a slope, use the bucket as a brake and place blocks behind the tires 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.**



## 3) PARKING THE MACHINE

To park the machine, keep the steps below.

- (1) Release the acceleration pedal slowly.
  - (2) Depress the brake pedal.
  - (3) Place the FNR lever in the neutral.
  - (4) Put the select switch in the parking position and release the brake pedal.
  - (5) Lower the bucket and dozer blade to the ground.
  - (6) Stop the engine, place the start key switch in the OFF and remove the key.
  - (7) Lock the swing lock pin and the cab door.
- ※ **Whenever parking on a slope, always block the tires after lowering the bucket to the ground.**
- ※ **Contain the swing lock pin in the tool box to avoid loss.**



#### 4) TOWING THE MACHINE

Except for an emergency, do not tow this machine.  
If it is inevitable to tow this machine, observe the following.

##### (1) General

- ① Parking brake cylinder of the machine is operated by the spring force and released by hydraulic pressure.  
If the engine does not operate, the brake will be operated to stop the machine.
- ② When the machine is towed move it for a repair to nearby place at the low speed.  
Transport it on a trailer, if it has to be moved for a long distance.
- ③ When the steering device and the brake of the machine to be towed can not be operated, transport by trailer.

**▲ Injury or death could result if a disabled machine is towed incorrectly.**

**▲ If your machine is towed by another machine, ALWAYS use a wire rope with a sufficient towing capacity.**

**▲ NEVER allow a disabled machine to be towed on a slope.**

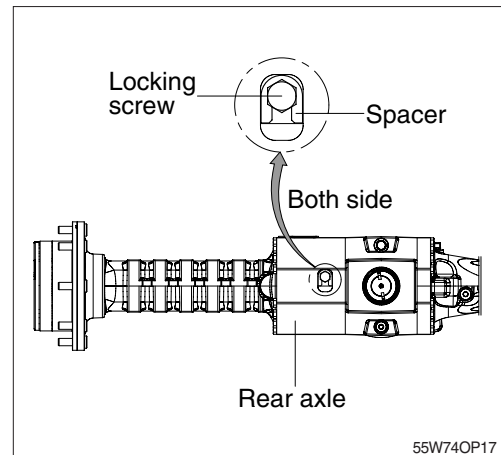
**▲ When connecting up a towing machine, do not let anyone enter the area between the towing machine and the equipment being towed.**

**▲ Set the towing machine and the towing connection of the equipment being towed in a straight line when connecting it.**

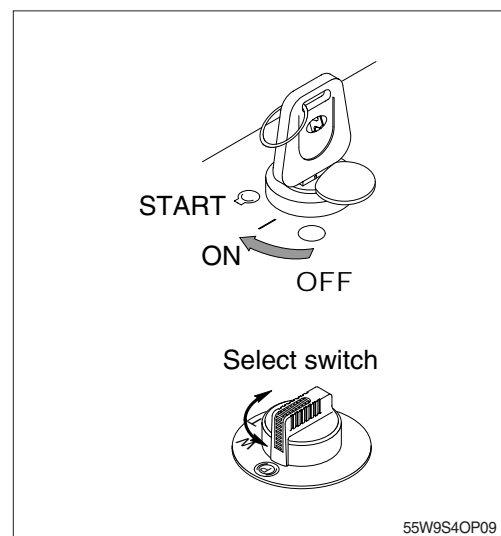
**▲ Never tow machine using a light-duty towing hook.**

## (2) Towing the machine

- ① When moving the machine or in case of an emergency towing, the power flow between final drive (spur gear drive) and travel motor will be interrupted.
- ② For this purpose, loosen the locking screw and remove the spacer of rear axle.
- ③ Tighten locking screw both side.
- ▲ **Both sides of locking screw must be tightened more and more by turns.**



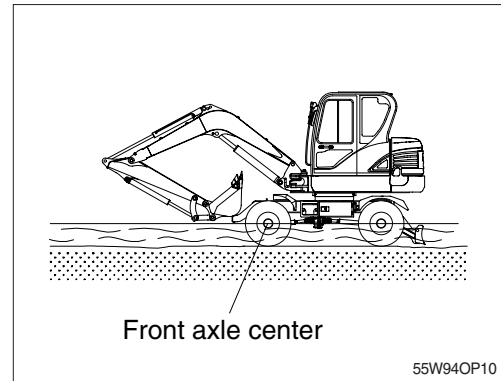
- ④ Turn start key ON position, place select switch at traveling position to release brake.



## 5) PRECAUTIONS FOR OPERATION

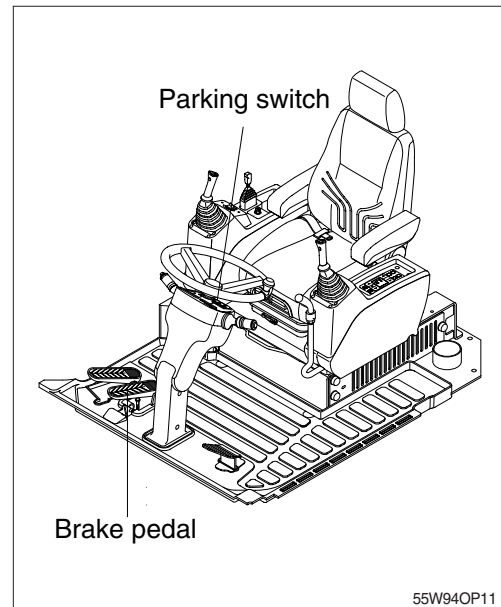
### (1) Permissible water depth

- ① Do not immerse the machine in water by more than the permissible depth (axle center).
- ② For parts that have been immersed in water for a long time, pump in grease until the old grease comes out from the bearings.



### (2) When the brake does not operate

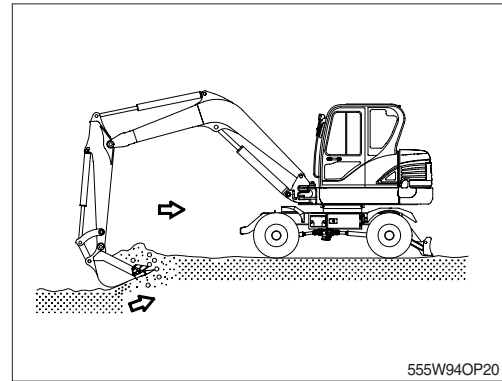
- ① If the machine does not stop even though the brake pedal is applied, use the parking brake to activate the emergency brake by parking switch.
- ※ **After using the parking brake as an emergency brake, ask Hyundai dealer to check complete brake system.**
- ▲ **Never use emergency brake, except when the service brake fails.**



## 6. EFFICIENT WORKING METHOD

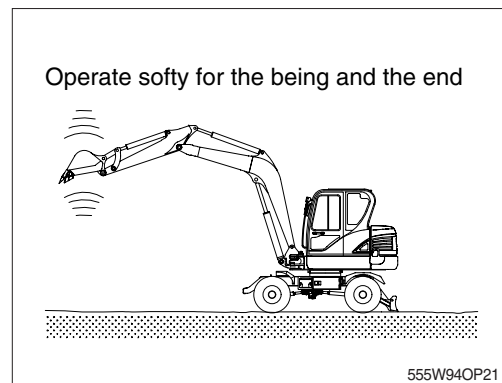
1) Do the digging work by arm.

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

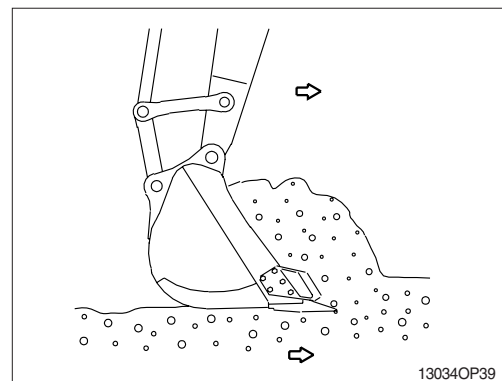


2) When lowering and raising the boom operate softly for the beginning and the end.

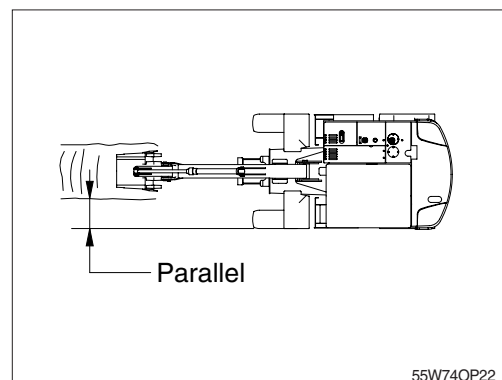
In particularly, sudden stops while lowering the boom may cause damage to the machine.



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

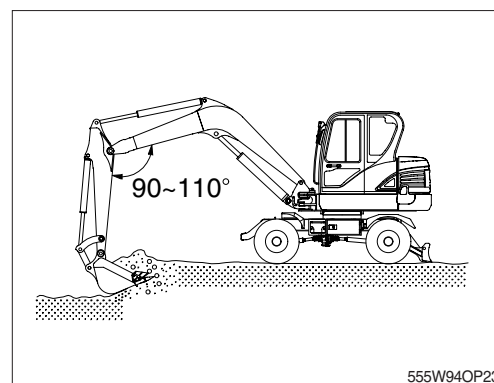


4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.

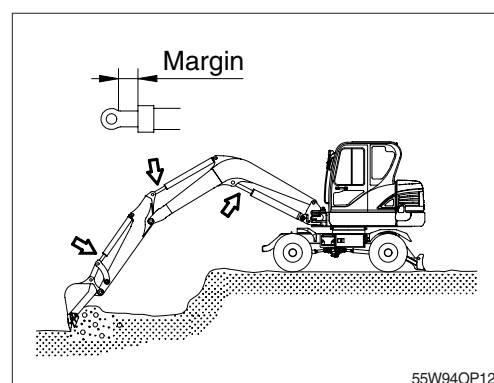




- 5) Dig slowly with keeping the angle of boom and arm, 90-110 degree when maximum digging force is required.

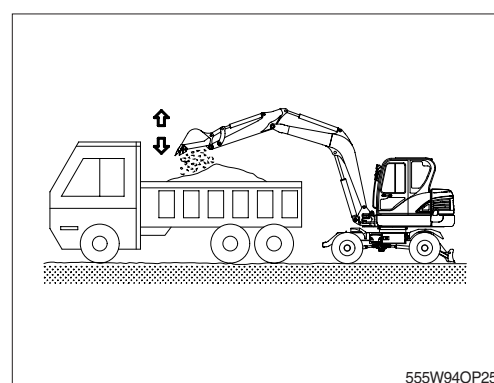


- 6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

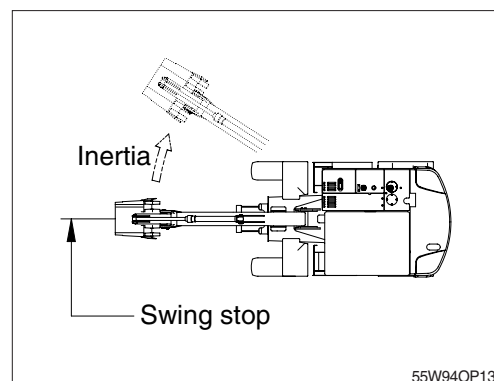


- 7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.  
Operate bucket lever 2 or 3 times when hard to dump.

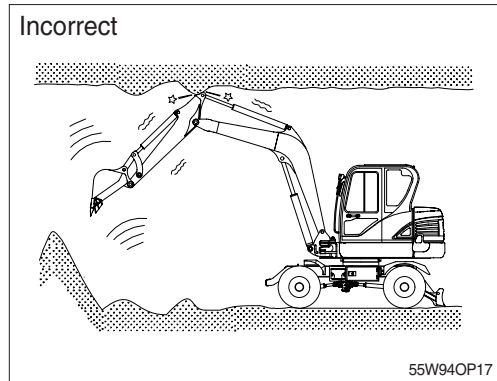
※ Do not use the impact of bucket tooth when dumping.



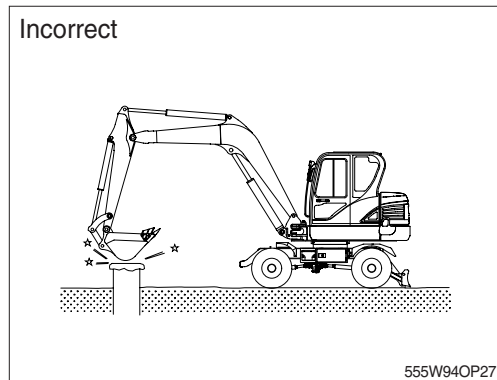
- 8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



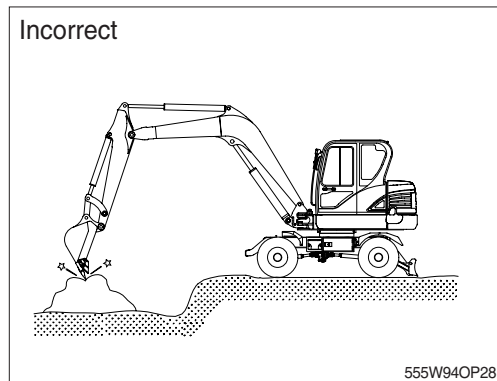
- 9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



- 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.

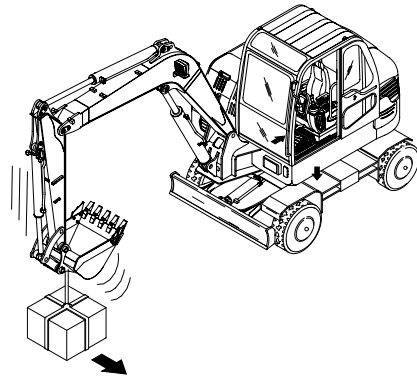
Carry out lifting operation within specified load limit.

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

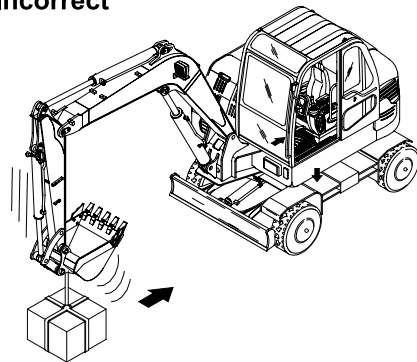
Never travel while carrying a load.

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

**Incorrect**



**Incorrect**



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### 13) BUCKET WITH HOOK

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

The following operations are prohibited.

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

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

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

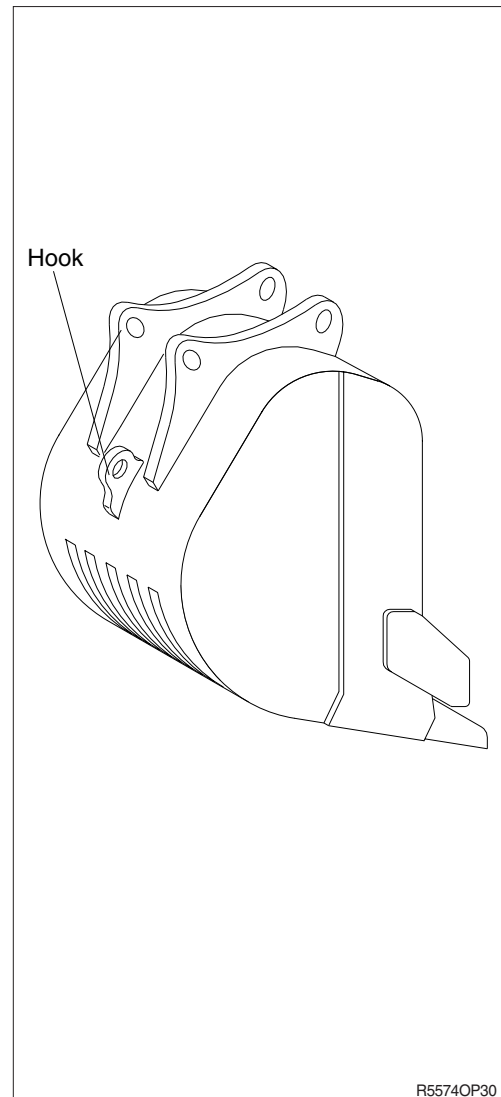
Due to the possible danger of the load falling or of collision with the load, no persons shall be allowed in the working area.

Before performing lifting operation, designate an operation supervisor.

Always execute operation according to his instructions.

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

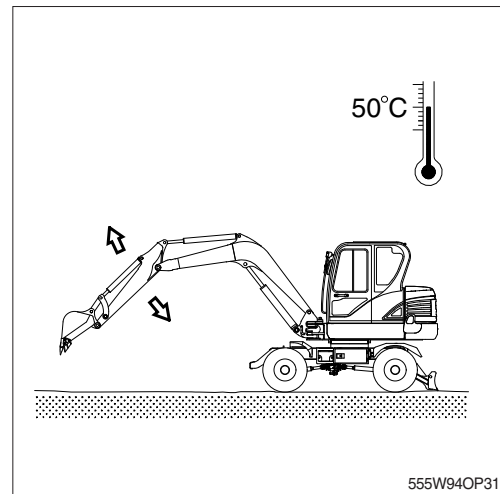
Never leave the operator's seat while lifting a load.



## 7. OPERATION IN THE SPECIAL WORK SITES

### 1) OPERATION THE MACHINE IN A COLD WEATHER

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



### 2) OPERATION IN SANDY OR DUSTY WORK SITES

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

### **3) SEA SHORE OPERATION**

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

### **4) OPERATION IN MUD, WATER OR RAIN WORK SITES**

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

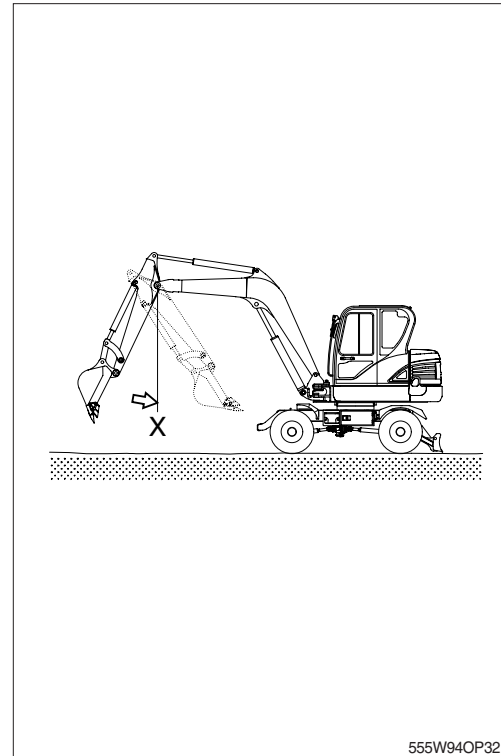
### **5) OPERATION IN ROCKY WORK SITES**

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

## 8. 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.



## 9. ATTACHMENT LOWERING (when engine is stopped)

- 1) On machines equipped with an accumulator, for a short time (within 2 minutes) after the engine is stopped, the attachment will lower under its own weight when the attachment control lever is shifted to LOWER. 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.

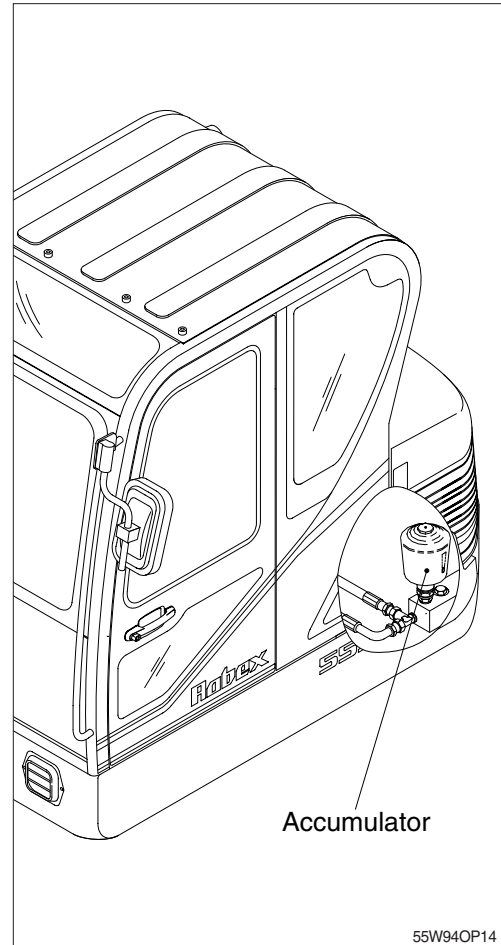
**▲ Be sure no one is under or near the attachment before lowering the boom.**

- 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.**





## 10. STORAGE

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

### 1) BEFORE STORAGE

#### (1) Cleaning the machine

Clean the machine and dried.  
Grease each lubrication part.

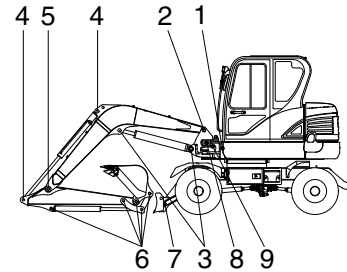
#### (2) Lubrication position of each part

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.



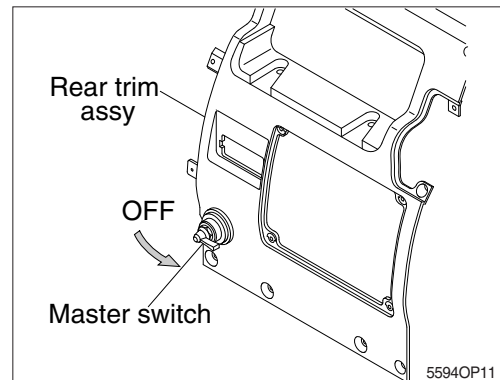
- 1 Lubricating manifold(4EA)
- 2 Boom connection pin(2EA)
- 3 Boom cylinder pin(2EA)
- 4 Arm cylinder pin(2EA)
- 5 Boom and arm connection pin(1EA)
- 6 Arm and bucket(5EA)
- 7 Dozer blade and cylinder(4EA)
- 8 Boom swing post pin(2EA)
- 9 Boom swing cylinder pin(1EA)

555W94OP33

#### (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.

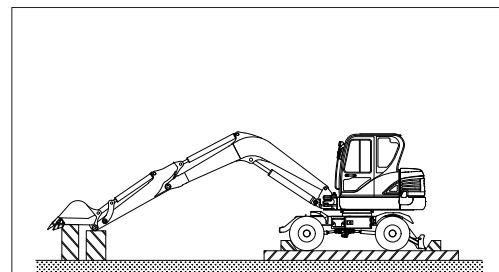


5594OP11

#### (5) Prevention of dust and moisture

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

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

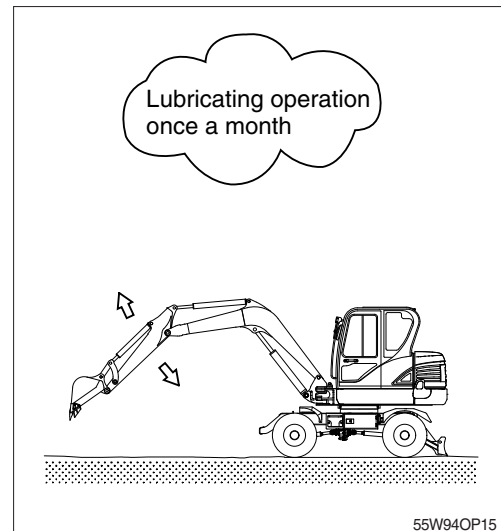


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## 2) DURING STORAGE

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

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



### ※ BATTERY

- ① Once a month, start the engine for 15 minutes (or use a charger) to charge the battery.
- ② Every 2 months, check the battery voltage and keep battery voltage over 12.54V.
- ③ If the machine stock period is over 6 months, disconnect the battery negative (-) terminal.

## 3) AFTER STORAGE

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

- (1) Wipe off the anticorrosive lubricant on the hydraulic piston rod.
- (2) Completely fill fuel tank, lubricate and add oil.

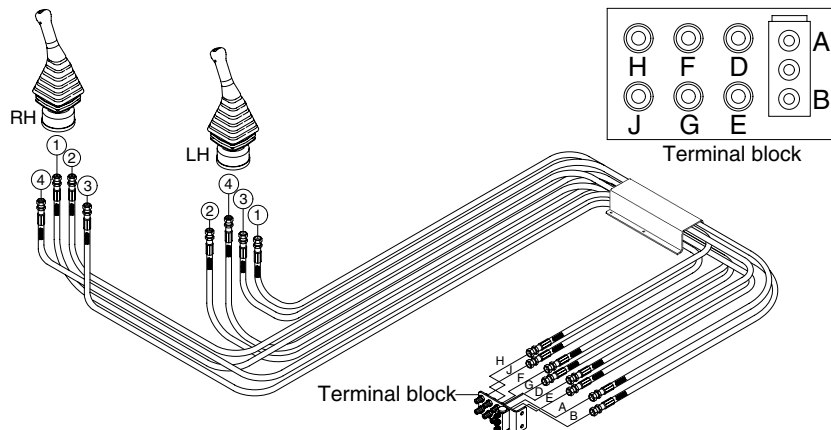
### (3) When storage period is 6 months over

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

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

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

## 11. RCV LEVER OPERATING PATTERN

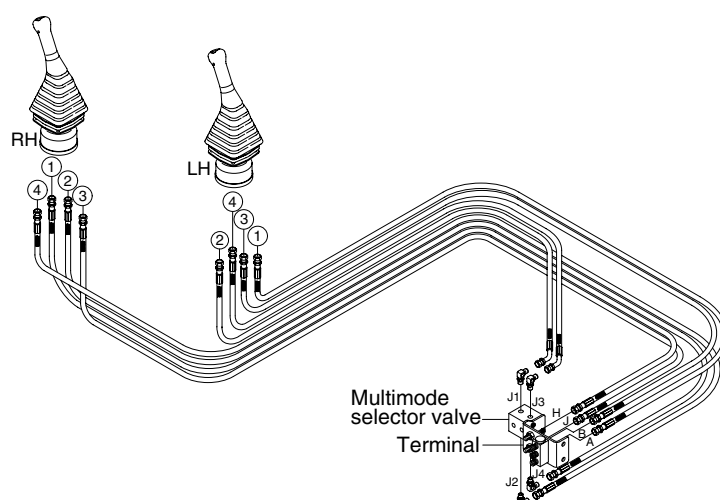


※ Whenever a change is made to the machine control pattern also exchange the pattern label in the cab to match the new pattern.

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

## RCV LEVER OPERATING PATTERN (option, A type)

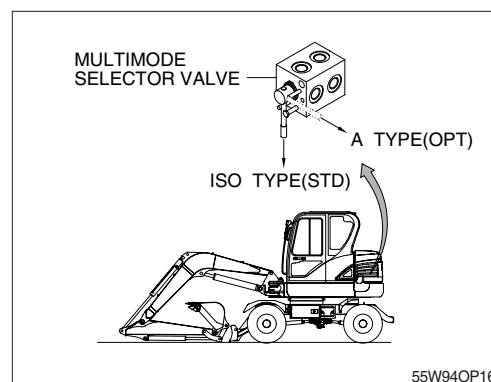


5594OP14

| Pattern | Operation |       | Control function | Hose connection (port) |          |    |
|---------|-----------|-------|------------------|------------------------|----------|----|
|         | Left      | Right |                  | RCV lever              | MCV port |    |
| A ype   |           |       | Left             | 1 Boom lower           | ②        | J1 |
|         |           |       |                  | 2 Boom raise           | ④        | J3 |
|         |           |       |                  | 3 Bucket out           | ③        | B  |
|         |           |       |                  | 4 Bucket in            | ①        | A  |
|         |           |       | Right            | 5 Arm out              | ④        | J2 |
|         |           |       |                  | 6 Arm in               | ②        | J4 |
|         |           |       |                  | 7 Swing right          | ①        | H  |
|         |           |       |                  | 8 Swing left           | ③        | J  |

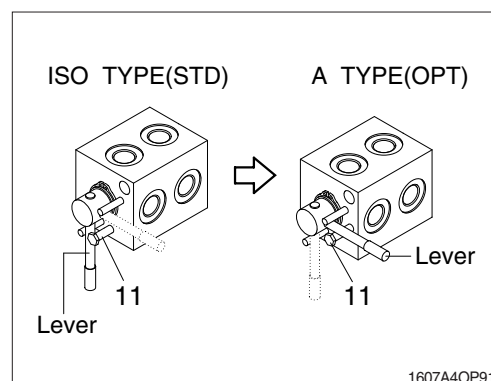
1) The machine control pattern can easily be changed from the "ISO" type to the "A" type by changing the position of the lever.

**▲ Before starting the machine, check the lever position of multimode selector valve and actual operating of attachment.**



### 2) Change of operating pattern (ISO → A type)

- (1) Loosen bolt (11).
- (2) Move lever from the "ISO" type to "A" type position.
- (3) After setting the lever, tighten bolt to secure lever.



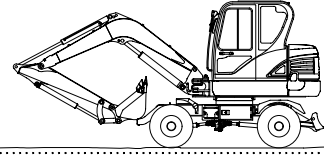
## 1. ROAD TRAVELING

As this machine can run at the maximum speed of 30.5km/h, it is not necessary to transport the machine on trailer in a short distance.

But the transportation by the trailer is convenient in a long distance.

If it is necessary to travel on a road, observe the followings.

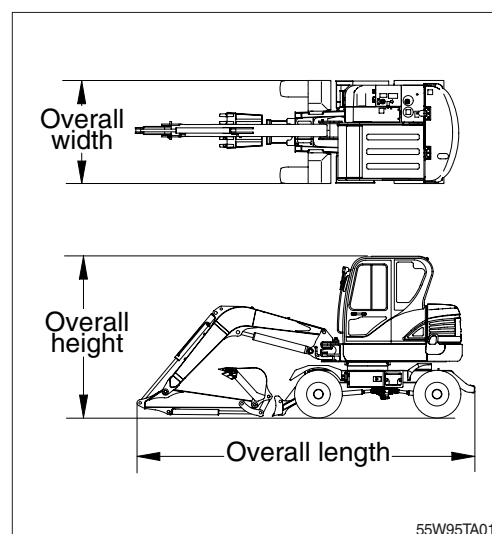
- 1) Comply with regulations regarding this machine for the sake of safety.
- 2) Perform daily inspection before starting the machine.
- 3) Cross the bridge after checking that it will safely support the machine weight. If the bridge can not support, a detour must be prepared or the bridge must be reinforced.
- 4) When traveling for a long distance, stop every hour to allow tires and other components to cool down and check any abnormality.
- 5) Drive with the bucket empty.



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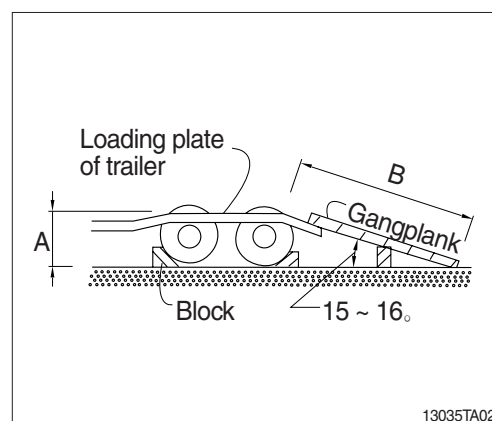
## 2. PREPARATION FOR TRANSPORTATION

- 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 |

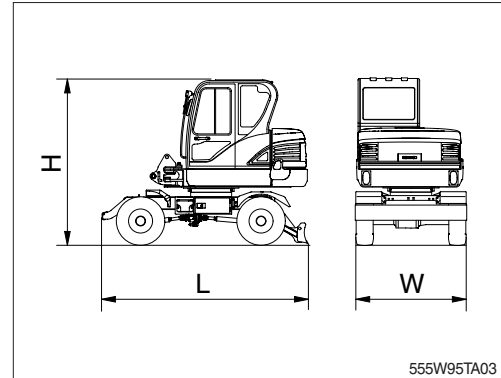


### 3. DIMENSION AND WEIGHT

#### 1) Base machine

| Mark | Description | Unit       | Specification |
|------|-------------|------------|---------------|
| L    | Length      | mm (ft-in) | 3580 (11' 9") |
| H    | Height      | mm (ft-in) | 2850 ( 9' 4") |
| Wd   | Width       | mm (ft-in) | 1925 ( 6' 4") |
| Wt   | Weight      | kg (lb)    | 4760 (10490)  |

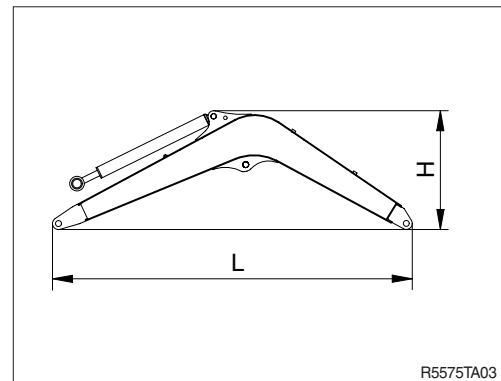
※ With 180 kg (400 lb) counterweight.



#### 2) Boom assembly

| Mark | Description | Unit       | Specification |
|------|-------------|------------|---------------|
| L    | Length      | mm (ft-in) | 3120 (10' 3") |
| H    | Height      | mm (ft-in) | 1140 ( 3' 9") |
| Wd   | Width       | mm (ft-in) | 250 ( 0'10")  |
| Wt   | Weight      | kg (lb)    | 300 (660)     |

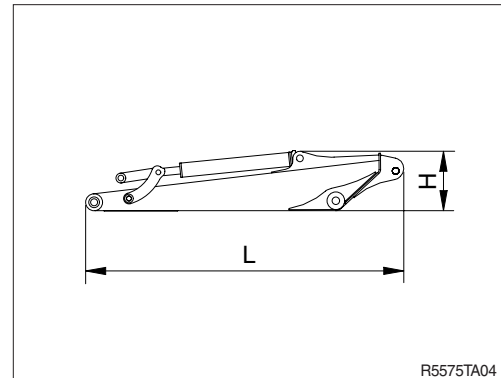
※ 3.0 m (9'10") boom with arm cylinder (included piping and pins).



#### 3) Arm assembly

| Mark | Description | Unit       | Specification |
|------|-------------|------------|---------------|
| L    | Length      | mm (ft-in) | 2130 ( 7' 0") |
| H    | Height      | mm (ft-in) | 450 ( 1' 6")  |
| Wd   | Width       | mm (ft-in) | 170 ( 0' 7")  |
| Wt   | Weight      | kg (lb)    | 205 (450)     |

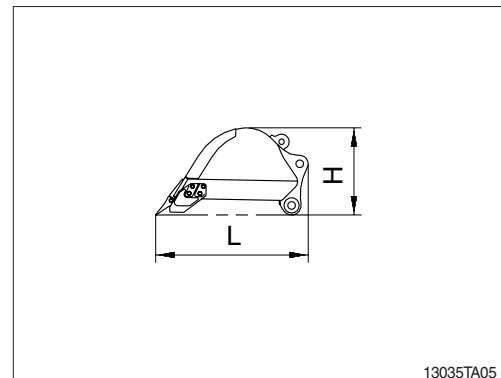
※ 1.6 m (5' 3") arm with bucket cylinder (included linkage and pins).



#### 4) Bucket assembly

| Mark | Description | Unit       | Specification |
|------|-------------|------------|---------------|
| L    | Length      | mm (ft-in) | 1020 ( 3' 4") |
| H    | Height      | mm (ft-in) | 570 ( 1' 10") |
| Wd   | Width       | mm (ft-in) | 740 ( 2' 5")  |
| Wt   | Weight      | kg (lb)    | 170 (380)     |

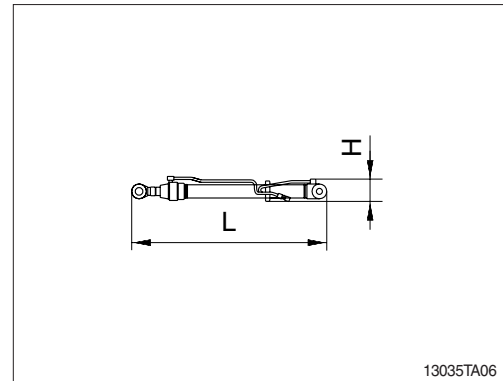
※ 0.18 m<sup>3</sup> (0.24 yd<sup>3</sup>) SAE heaped bucket (Included tooth and side cutters).



### 5) Boom cylinder

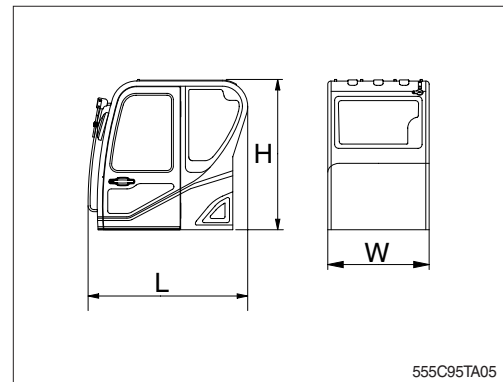
| Mark | Description | Unit       | Specification |
|------|-------------|------------|---------------|
| L    | Length      | mm (ft-in) | 1210 ( 4' 0") |
| H    | Height      | mm (ft-in) | 150 ( 0' 6")  |
| Wd   | Width       | mm (ft-in) | 280 ( 0'11")  |
| Wt   | Weight      | kg (lb)    | 70 (155)      |

※ Included piping.



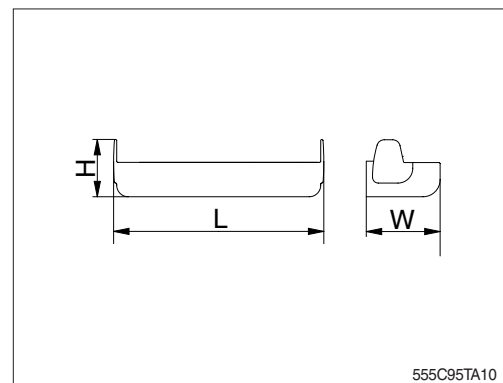
### 6) Cab assembly

| Mark | Description | Unit       | Specification |
|------|-------------|------------|---------------|
| L    | Length      | mm (ft-in) | 1650 ( 5' 5") |
| H    | Height      | mm (ft-in) | 1530 ( 5' 0") |
| Wd   | Width       | mm (ft-in) | 1060 ( 3' 6") |
| Wt   | Weight      | kg (lb)    | 350 (770)     |



### 7) Counterweight

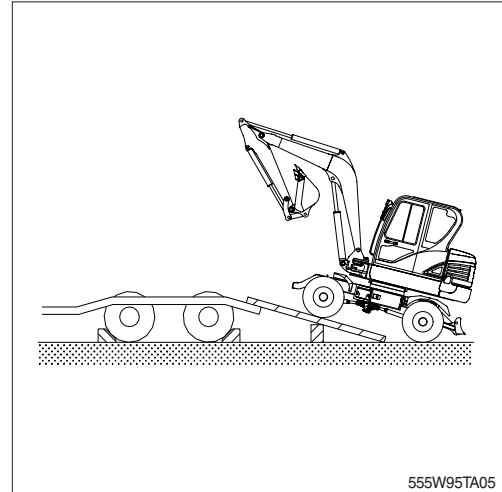
| Mark | Description | Unit       | Specification |
|------|-------------|------------|---------------|
| L    | Length      | mm (ft-in) | 1850 ( 6' 1") |
| H    | Height      | mm (ft-in) | 420 ( 1' 5")  |
| Wd   | Width       | mm (ft-in) | 645 ( 2' 1")  |
| Wt   | Weight      | kg (lb)    | 180 (400)     |



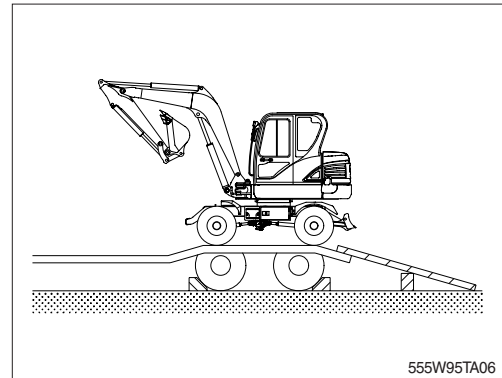


## 4. LOADING THE MACHINE

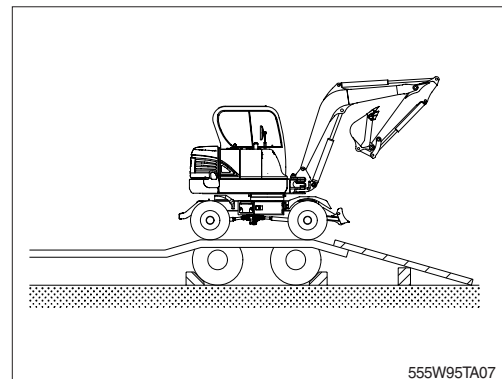
- 1) Load and unload the machine on a flat ground.
- 2) Use the gangplank with sufficient length, width, thickness and gradient.
- 3) Place block tires of the truck and the trailer not to move the trailer.
- 4) Place the swing lock device to the **LOCK** position before fixing the machine at the bed of trailer and confirm if the machine parallels the bed of trailer.
- 5) Drive straight and depress the acceleration pedal slowly on the gangplank with the two speed switch positioned as low speed.



- 6) 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 device to the **LOCK** position after the swing the machine 180 degree.



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

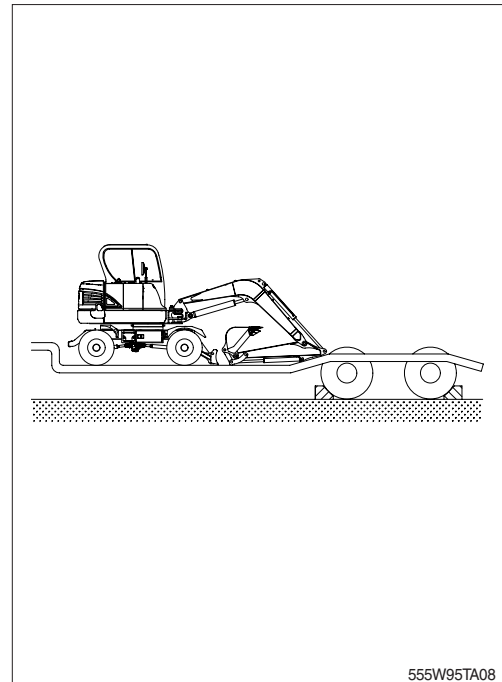
※ **Place rectangular timber under the bucket cylinder to prevent the damage of it during transportation.**

▲ **Be sure to keep the travel speed switch on the low speed while loading and unloading the machine.**

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

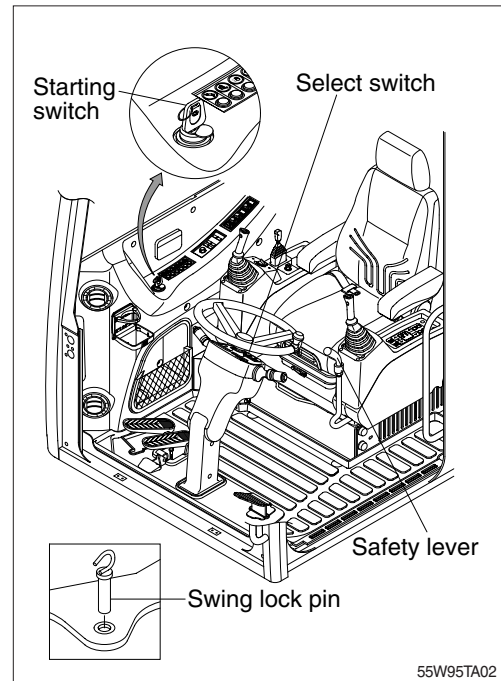
▲ **Do not operate any other device when loading.**

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

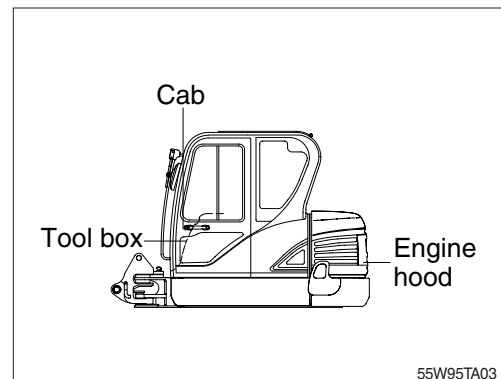


## 5. FIXING THE MACHINE

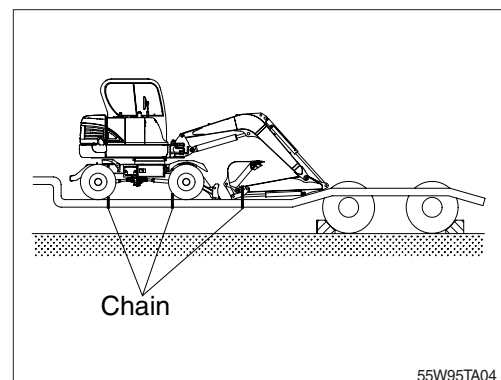
- 1) Place the swing lock pin on the LOCK position.
- 2) Place the select switch to the parking position.
- 3) Keep the safety lever on the SAFETY position.
- 4) Turn OFF all the switches and remove the key.



- 5) Secure all locks.



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



## 6. 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.

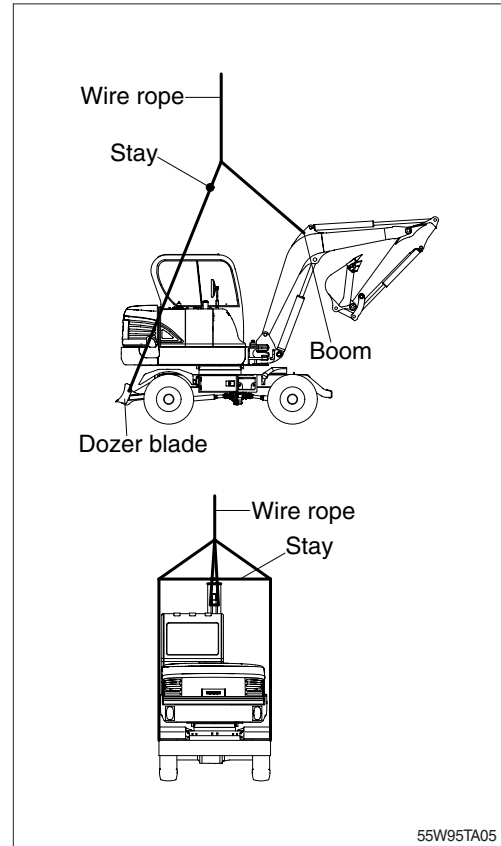
**⚠ Make sure wire rope is proper size.**

**⚠ 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.**

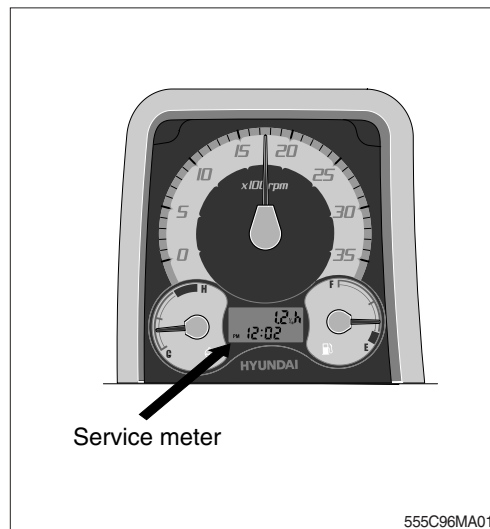
**⚠ Keep area clear of personnel.**



## 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.
- (2) Shorten the interval of inspect and service depending on site condition.(Such as dusty area, quarry, sea shore and etc.)
- (3) Practice the entire related details at the same time when the service interval is doubled.  
For example, in case of 100hours, carry out all the maintenance 「Each 100hours, each 50 hours and daily service」 at the same time.



### 2) PRECAUTION

- (1) Start to maintenance after you have the full knowledge of machine.
- (2) The monitor installed on this machine does not entirely guarantee the condition of the machine.  
Daily inspection should be performed according to clause 4, maintenance check list.
- (3) Engine and hydraulic components have been preset in the factory.  
Do not allow unauthorized personnel to reset them.
- (4) Ask to your local dealer or Hyundai for the maintenance advice if unknown.
- (5) Drain the used oil and coolant in a container and handle according to the method of handling for industrial waste to meet with regulations of each province or country.

### 3) PROPER MAINTENANCE

#### (1) Replace and repair of parts

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

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

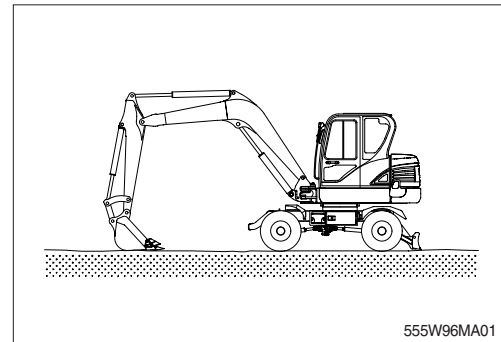
- (2) Use genuine parts.
  - (3) Use the recommended oil.
  - (4) Remove the dust or water around the inlet of oil tank before supplying oil.
  - (5) Drain oil when the temperature of oil is warm.
  - (6) Do not repair anything while operating the engine.  
Stop the engine when you fill the oil.
  - (7) Relieve hydraulic system of the pressure before repairing the hydraulic system.
  - (8) Confirm if the cluster is in the normal condition after completion of service.
  - (9) For more detail information of maintenance, please contact local Hyundai dealer.
- ※ **Be sure to start the maintenance after fully understand the chapter 1, safety hints.**

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

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

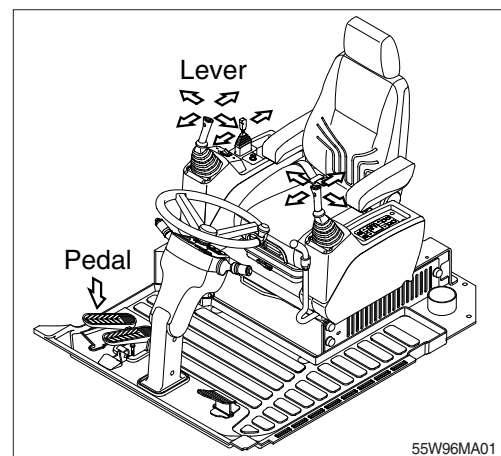
Be sure to relieve the pressure in the system before repairing hydraulic system.

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

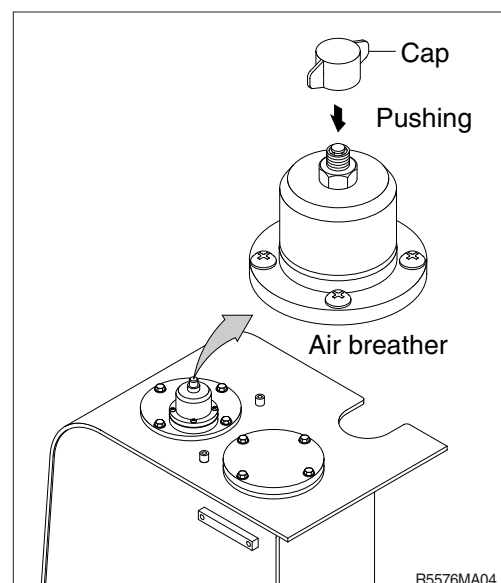


- (2) Set the safety lever completely in the release position, operate the control levers and pedals fully to the front, rear, left and right, to release the pressure in the hydraulic circuit.

※ **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   |               |
|                                        | Brake line     | Service brake line hose     | Every 2 years |
|                                        |                | Parking brake line hose     |               |
|                                        |                | Steering 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) | M10 × 1.5  | 7.0±1.0  | 50.6±7.2  |
| 2   |                    | Engine mounting bolt (bracket-Frame)  | M16 × 2.0  | 25±2.5   | 181±18.1  |
| 3   |                    | Radiator mounting bolt, nut           | M10 × 1.5  | 6.9±1.4  | 50±10.0   |
| 4   |                    | Coupling mounting socket bolt         | M14 × 2.0  | 14±1.0   | 101±7.2   |
|     |                    | Coupling mounting clamp bolt          | M16 × 2.0  | 11±1.0   | 79.6±7.2  |
| 5   | Hydraulic system   | Main pump mounting bolt               | M12 × 1.75 | 12.3±3.0 | 92±22.0   |
| 6   |                    | Main control valve mounting bolt      | M12 × 1.75 | 12.8±3.0 | 93±22.0   |
| 7   |                    | Travel motor mounting bolt            | M12 × 1.75 | 14.7±2.2 | 106±15.9  |
| 8   |                    | Fuel tank mounting bolt               | M16 × 2.0  | 29.7±4.5 | 215±33    |
| 9   |                    | Hydraulic oil tank mounting bolt      | M16 × 2.0  | 29.7±4.5 | 215±33    |
| 10  |                    | Turning joint mounting bolt, nut      | M12 × 1.75 | 14.7±2.2 | 106±16.0  |
| 11  | Power train system | Swing motor mounting bolt             | M16 × 2.0  | 29.7±4.5 | 215±33.0  |
| 12  |                    | Swing bearing upper mounting bolt     | M16 × 2.0  | 29.7±4.5 | 215±33.0  |
| 13  |                    | Swing bearing lower mounting bolt     | M16 × 2.0  | 29.7±4.5 | 215±33.0  |
| 15  |                    | Front axle mounting bolt, nut         | M16 × 2.0  | 29.7±4.5 | 215±33.0  |
| 16  |                    | Rear axle mounting bolt, nut          | M16 × 2.0  | 29.7±4.5 | 215±33.0  |
| 17  |                    | Gear box mounting bolt                | M14 × 2.0  | 19.6±2.9 | 142±21.0  |
| 18  |                    | Oscillating cylinder mounting bolt    | M16 × 2.0  | 29.7±4.5 | 215±33.0  |
| 19  |                    | Oscillating cylinder support bolt     | M12 × 1.75 | 12.8±3.0 | 92.6±22.0 |
| 20  |                    | Wheel nut                             | M18 × 1.5  | 46.0±3.0 | 333±22.0  |
| 21  |                    | Front drive shaft mounting bolt, nut  | M10 × 1.25 | 7.4±1.5  | 53.5±11.0 |
| 22  |                    | Rear drive shaft mounting bolt, nut   | M10 × 1.25 | 7.4±1.5  | 53.5±11.0 |
| 23  | Others             | Counterweight mounting bolt           | M20 × 2.5  | 57.8±6.4 | 418±46.3  |
| 24  |                    | Cab mounting bolt, nut                | M12 × 1.75 | 12.8±3.0 | 92±22.0   |
| 25  |                    | Operator's seat mounting bolt         | M 8 × 1.25 | 1.17±0.1 | 8.5±0.7   |

### 3. FUEL, COOLANT AND LUBRICANTS

#### 1) NEW MACHINE

New machine used and filled with following lubricants.

| Description               | Specification                                                                                           |
|---------------------------|---------------------------------------------------------------------------------------------------------|
| Engine oil                | SAE 15W-40 (API CH-4)                                                                                   |
| Hydraulic oil             | Hyundai genuine long life hydraulic oil (ISO VG32, VG46, VG68)<br>Conventional hydraulic oil (ISO VG15) |
| Swing reduction gear oil  | SAE 85W-140 (API GL-5)                                                                                  |
| Gear box oil              | SAE 85W-90 (API GL-5)                                                                                   |
| Axle and differential oil | SAE 85W-90 (API GL-5)                                                                                   |
| Grease                    | Lithium base grease NLGI No. 2                                                                          |
| Fuel                      | ASTM D975-No. 2 (low sulfur fuel or ultra low sulfur fuel)                                              |
| Coolant                   | Mixture of 50% ethylene glycol base antifreeze and 50% water.                                           |

SAE : Society of Automotive Engineers

API : American Petroleum Institute

ISO : International Organization for Standardization

NLGI : National Lubricating Grease Institute

ASTM : American Society of Testing and Material

· Low sulfur fuel : sulfur content  $\leq 500$  ppm

· Ultra low sulfur fuel : sulfur content  $\leq 15$  ppm

## 2) RECOMMENDED OILS<sub>v</sub>

Use only oils listed below or equivalent.

Do not mix different brand oil.

| Service point                | Kind of fluid                                                  | Capacity<br>ℓ (U.S. gal)                       | Ambient temperature °C (°F) |             |           |            |            |            |             |
|------------------------------|----------------------------------------------------------------|------------------------------------------------|-----------------------------|-------------|-----------|------------|------------|------------|-------------|
|                              |                                                                |                                                | -20<br>(-4)                 | -10<br>(14) | 0<br>(32) | 10<br>(50) | 20<br>(68) | 30<br>(86) | 40<br>(104) |
| Engine oil pan               | Engine oil                                                     | 11.6 (3.1)                                     |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
| Swing drive                  | Gear oil                                                       | 1.5 (0.4)                                      |                             |             |           |            |            |            |             |
|                              | Grease                                                         | 0.2 (0.05)                                     |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
| Gear box case                | Gear oil                                                       | 1.85 (0.5)                                     |                             |             |           |            |            |            |             |
| Front axle                   |                                                                | Center : 4.5 (1.19)<br>Hub : 0.4×2<br>(0.11×2) |                             |             |           |            |            |            |             |
| Rear axle                    |                                                                | Center : 4.5 (1.19)<br>Hub : 0.4×2<br>(0.11×2) |                             |             |           |            |            |            |             |
| Hydraulic tank               | Hydraulic oil                                                  | Tank:<br>70(18.5)                              |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
| Fuel tank                    | Diesel fuel                                                    | 120 (31.7)                                     |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
| Fitting<br>(grease nipple)   | Grease                                                         | As required                                    |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |
| Radiator<br>(reservoir tank) | Mixture of<br>antifreeze<br>and water<br>50 : 50★ <sup>1</sup> | 9.5 (2.5)                                      |                             |             |           |            |            |            |             |
|                              |                                                                |                                                |                             |             |           |            |            |            |             |

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

★<sup>1</sup> : Soft water

City water or distilled water

## 4. MAINTENANCE CHECK LIST

### 1) DAILY SERVICE BEFORE STARTING

| Check items                  | Service       | Page |
|------------------------------|---------------|------|
| Visual check                 |               |      |
| Fuel tank                    | Check, Refill | 6-24 |
| Hydraulic oil level          | Check, Add    | 6-26 |
| Engine oil level             | Check, Add    | 6-17 |
| Coolant level                | Check, Add    | 6-19 |
| Control panel & pilot lamp   | Check, Clean  | 6-38 |
| Prefilter (water, element)   | Check, Drain  | 6-24 |
| Fan belt tension & damage    | Check, Adjust | 6-22 |
| ★ Attachment pin and bushing | Lubricate     | 6-37 |
| · 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   |               |      |
| · Boom swing post pin        |               |      |
| · Boom swing cylinder        |               |      |

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

### 2) EVERY 50 HOURS SERVICE

| Check items                                | Service        | Page |
|--------------------------------------------|----------------|------|
| Fuel tank (water sediment)                 | Drain          | 6-24 |
| Drive shaft joint (flange bearing)         | Check, Add     | 6-30 |
| Swing reduction gear oil                   | Check, Add     | 6-28 |
| Swing gear & pinion                        | Check, Add     | 6-29 |
| Gear box case oil                          | Check, Add     | 6-34 |
| Wheel nut                                  | Check, Tight   | 6-31 |
| Tire air pressure                          | Check, Inflate | 6-31 |
| Front & rear axle gear oil                 | Check, Add     | 6-32 |
| Front axle steering case grease            | Lubricate      | 6-30 |
| Bucket linkage & blade pins                | Lubricate      | 6-37 |
| · Bucket cylinder rod end                  |                |      |
| · Arm + Bucket connecting                  |                |      |
| · Arm + Bucket control link                |                |      |
| · Bucket control rod                       |                |      |
| · Bucket link connecting                   |                |      |
| · Boom swing cylinder head and rod         |                |      |
| · Boom swing post pin                      |                |      |
| · Dozer blade cylinder (rod end, tube end) | Lubricate      | 6-31 |
| · Dozer blade pivot pin                    | Lubricate      | 6-31 |
| · Drive shaft (front and rear)             | Lubricate      | 6-30 |
| · Axle pivot                               | Lubricate      | 6-30 |
| · Hub pivot                                | Lubricate      | 6-30 |
| · Steering links                           | Lubricate      | 6-31 |

### 3) INITIAL 50 HOURS SERVICE

| Check items                     | Service      | Page     |
|---------------------------------|--------------|----------|
| Engine oil                      | Change       | 6-17, 18 |
| Engine oil filter               | Replace      | 6-17, 18 |
| Prefilter (water, element)      | Replace      | 6-25     |
| Fuel filter                     | Replace      | 6-25     |
| Bolts & Nuts                    | Check, Tight | 6-8      |
| · Power train mounting bolts    |              |          |
| · Swing motor mounting bolts    |              |          |
| · Swing bearing mounting bolts  |              |          |
| · Engine mounting bolts         |              |          |
| · Counterweight mounting bolts  |              |          |
| · Turning joint locating bolts  |              |          |
| · Hydraulic pump mounting bolts |              |          |

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

### 4) INITIAL 100 HOURS SERVICE

| Check items                | Service | Page |
|----------------------------|---------|------|
| Gear box                   | Change  | 6-34 |
| Front & rear axle gear oil | Change  | 6-33 |

### 5) EVERY 100 HOURS SERVICE

| Check items                          | Service | Page |
|--------------------------------------|---------|------|
| ★ Element in hydraulic tank breather | Replace | 6-28 |

★ Replace filter for continuous hydraulic breaker operation only.

### 6) INITIAL 250 HOURS SERVICE

| Check items                 | Service    | Page |
|-----------------------------|------------|------|
| Swing reduction gear oil    | Change     | 6-29 |
| Swing reduction gear grease | Check, Add | 6-29 |
| ★ Pilot line filter         | Replace    | 6-28 |
| ★ Hydraulic return filter   | Replace    | 6-27 |

★ Replace 2 filters for continuous hydraulic breaker operation only.



## 7) EVERY 250 HOURS SERVICE

| Check items                      | Service      | Page |
|----------------------------------|--------------|------|
| Battery (voltage)                | Check        | 6-38 |
| Aircon & heater fresh air filter | Check, Clean | 6-41 |
| Swing bearing grease             | Lubricate    | 6-29 |
| Attachment pin & bushing         | Lubricate    | 6-37 |
| · 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       |              |      |
| · Boom swing cylinder            |              |      |
| · Boom swing post pin            |              |      |

## 8) EVERY 500 HOURS SERVICE

| Check items                                | Service        | Page     |
|--------------------------------------------|----------------|----------|
| ★ Engine oil                               | Change         | 6-17, 18 |
| ★ Engine oil filter                        | Replace        | 6-17, 18 |
| Prefilter (water, element)                 | Replace        | 6-24     |
| ☆ Air cleaner element (primary)            | Inspect, Clean | 6-23     |
| Fuel filter element                        | Replace        | 6-25     |
| Radiator, cooler fin and charge air cooler | Check, Clean   | 6-22     |

★ 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 |
|-------------------------------------|---------|------|
| Hydraulic tank air breather element | Replace | 6-28 |
| Swing reduction gear oil            | Change  | 6-29 |
| Swing reduction gear grease         | Change  | 6-29 |
| Axle oil (front & rear)             | Change  | 6-33 |
| Gear box oil                        | Change  | 6-34 |
| Hydraulic oil return filter         | Replace | 6-27 |
| Pilot line filter                   | Replace | 6-28 |

## 11) EVERY 2000 HOURS SERVICE

| Check items                                        | Service                   | Page             |
|----------------------------------------------------|---------------------------|------------------|
| ★ Hydraulic oil* <sup>1</sup>                      | Change                    | 6-26             |
| Hydraulic tank suction strainer                    | Check, Clean              | 6-27             |
| Coolant                                            | Change                    | 6-19, 20, 21, 22 |
| Hoses, fittings, clamps (fuel, coolant, hydraulic) | Check, Retighten, Replace | -                |

\*<sup>1</sup> Conventional hydraulic oil

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

## 12) EVERY 5000 HOURS SERVICE

| Check items                    | Service | Page |
|--------------------------------|---------|------|
| ★ Hydraulic oil * <sup>2</sup> | Change  | 6-26 |

\*<sup>2</sup> Hyundai genuine long life hydraulic oil

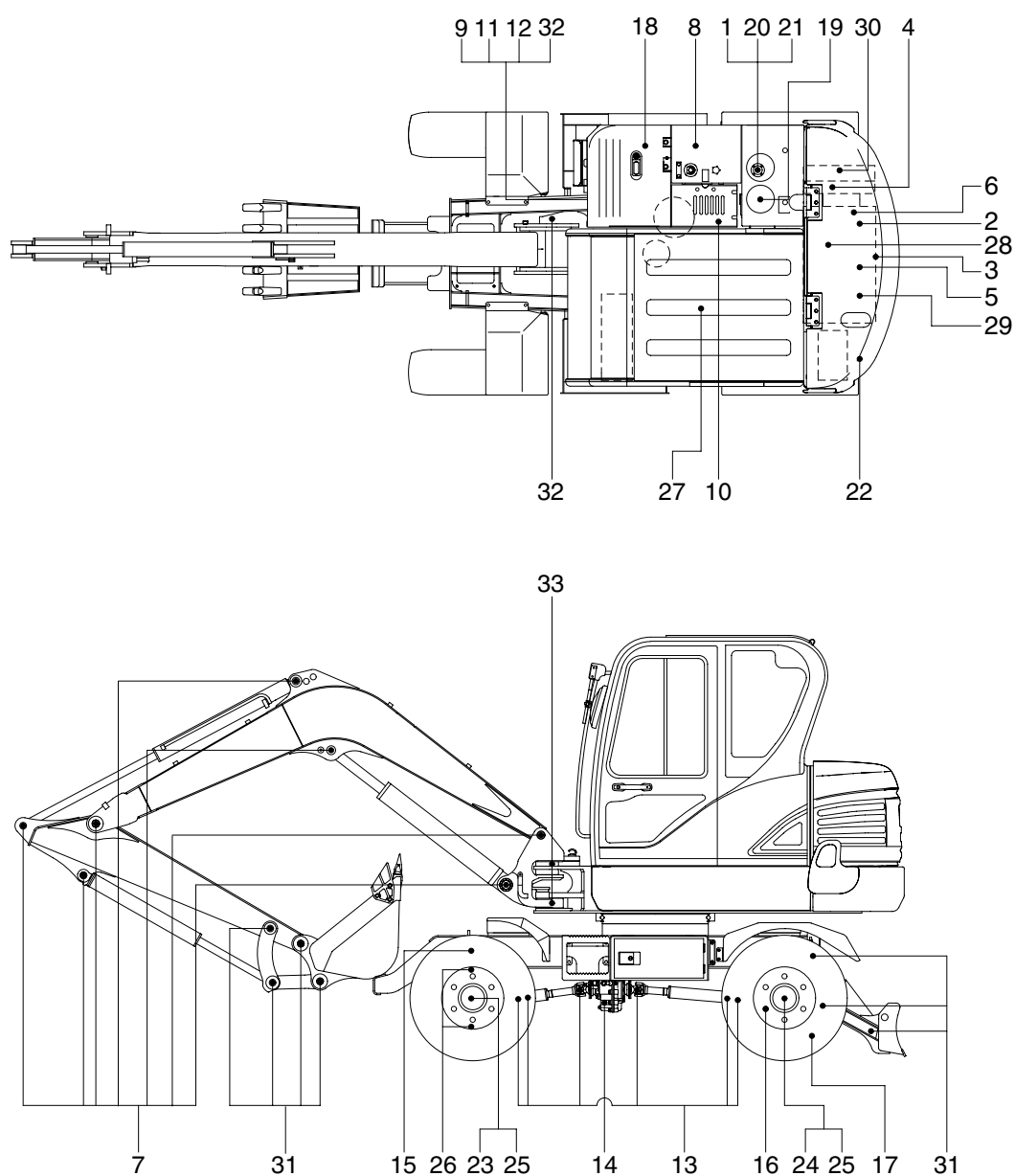
★ **Change oil every 1000 hours of continuous hydraulic breaker operation.**

## 13) 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   | 6-24             |
| · Fuel prefilter           | Drain or Replace | 6-24             |
| · Fuel filter              | Replace          | 6-25             |
| Engine lubrication system  |                  |                  |
| · Engine oil               | Change           | 6-17, 18         |
| · Engine oil filter        | Replace          | 6-17, 18         |
| Engine cooling system      |                  |                  |
| · Coolant                  | Add or Change    | 6-19, 20, 21, 22 |
| · Radiator                 | Clean or Flush   | 6-19, 20, 21, 22 |
| Engine air system          |                  |                  |
| · Air cleaner              | Replace          | 6-23             |
| Hydraulic system           |                  |                  |
| · Hydraulic oil            | Add or Change    | 6-26             |
| · Return filter            | Replace          | 6-27             |
| · Pilot line filter        | Replace          | 6-28             |
| · Element of breather      | Replace          | 6-28             |
| · Suction strainer         | Clean            | 6-27             |
| Tire pressure              | Check, Inflate   | 6-31             |
| Bucket                     |                  |                  |
| · Tooth                    | Replace          | 6-36             |
| · Side cutter              | Replace          | 6-36             |
| · Linkage                  | Adjust           | 6-35             |
| · Bucket assy              | Replace          | 6-35             |
| Air conditioner and heater |                  |                  |
| · Fresh air filter         | Clean, Replace   | 6-41             |
| · Recirculation filter     | Clean            | 6-41             |

## 5. MAINTENANCE CHART



55W9S6MA02

### 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.
4. For other details, refer to the service manual.

| Service interval   | No. | Description                                        | Service action            | Oil symbol | Capacity ℓ (U.S.gal) | Service points No. |
|--------------------|-----|----------------------------------------------------|---------------------------|------------|----------------------|--------------------|
| 10Hours or daily   | 1   | Hydraulic oil level                                | Check, Add                | HO         | 70 (18.5)            | 1                  |
|                    | 2   | Engine oil level                                   | Check, Add                | EO         | 11.6 (3.1)           | 1                  |
|                    | 4   | Radiator coolant level                             | Check, Add                | C          | 9.5 (2.5)            | 1                  |
|                    | 5   | Prefilter (water, element)                         | Check, Clean              | -          | -                    | 1                  |
|                    | 6   | Fan belt tension and damage                        | Check, Adjust             | -          | -                    | 1                  |
| 50 hours or weekly | 8   | Fuel tank (water, sediment)                        | Check, Clean              | -          | -                    | 1                  |
|                    | 10  | Swing reduction gear case (gear oil)               | Check, Add                | GO         | 1.5 (0.4)            | 1                  |
|                    | 12  | Swing gear and pinion                              | Lubricate                 | PGL        | -                    | 1                  |
|                    | 13  | Drive shaft (flange bearing)                       | Lubricate                 | PGL        | -                    | 6                  |
|                    | 14  | Gear box case                                      | Check, Add                | GO         | 1.85 (0.5)           | 1                  |
|                    | 15  | Front axle pivot pin bushing                       | Check, Add                | PGL        | -                    | 1                  |
|                    | 16  | Wheel nut                                          | Check, Tighten            | -          | -                    | 40                 |
|                    | 17  | Tire air pressure                                  | Check, Add                | -          | -                    | 8                  |
|                    | 23  | Front axle differential gear case                  | Check, Add                | GO         | 4.5 (1.19)           | 1                  |
|                    | 24  | Rear axle differential gear case                   | Check, Add                | GO         | 4.5 (1.19)           | 1                  |
|                    | 25  | Axle planetary gear case (front, rear)             | Check, Add                | GO         | 0.4 (0.11)           | 4                  |
|                    | 26  | Front axle steering case                           | Lubricate                 | PGL        | -                    | 4                  |
| 250 Hours          | 31  | Bucket linkage & blade pins                        | Lubricate                 | PGL        | -                    | 8                  |
|                    | 7   | Attachment pins (swivel type)                      | Lubricate                 | PGL        | -                    | 7                  |
|                    | 9   | Swing bearing                                      | Lubricate                 | PGL        | -                    | 3                  |
|                    | 18  | Battery (voltage)                                  | Check                     | -          | -                    | 1                  |
|                    | 27  | Air conditioner filter (outer)                     | Clean                     | -          | -                    | 1                  |
|                    | 32  | Boom swing cylinder                                | Lubricate                 | -          | -                    | 2                  |
| 500 Hours          | 33  | Boom swing post pin                                | Lubricate                 | -          | -                    | 2                  |
|                    | 2   | Engine oil                                         | Change                    | EO         | 11.6 (3.1)           | 1                  |
|                    | 3   | Engine oil filter                                  | Replace                   | -          | -                    | 1                  |
|                    | 5   | Prefilter (water, element)                         | Replace                   | -          | -                    | 1                  |
|                    | 28  | Air cleaner element (primary)                      | Check, Clean              | -          | -                    | 1                  |
|                    | 29  | Fuel filter element                                | Replace                   | -          | -                    | 1                  |
| 1000 Hours         | 30  | Radiator, cooler fin and charge air cooler         | Check, Clean              | -          | -                    | 3                  |
|                    | 10  | Swing reduction gear case (gear oil)               | Change                    | GO         | 1.5 (0.4)            | 1                  |
|                    | 11  | Swing reduction gear case (grease)                 | Change                    | PGL        | 0.2 (0.05)           | 1                  |
|                    | 14  | Gear box case                                      | Change                    | GO         | 1.85 (0.5)           | 1                  |
|                    | 20  | Hydraulic oil return filter                        | Replace                   | -          | -                    | 1                  |
|                    | 20  | Air breather element                               | Replace                   | -          | -                    | 1                  |
|                    | 22  | Pilot line filter element                          | Replace                   | -          | -                    | 1                  |
|                    | 23  | Front axle differential gear case                  | Change                    | GO         | 4.5 (1.19)           | 1                  |
|                    | 24  | Rear axle differential gear case                   | Change                    | GO         | 4.5 (1.19)           | 1                  |
| 2000 Hours         | 25  | Axle planetary gear case (front, rear)             | Change                    | GO         | 0.4 (0.11)           | 4                  |
|                    | 1   | Hydraulic tank oil* <sup>1</sup>                   | Change                    | HO         | 70 (18.5)            | 1                  |
|                    | 4   | Radiator coolant                                   | Change                    | C          | 9.5 (2.5)            | 1                  |
|                    | 21  | Hydraulic oil suction strainer                     | Check, Clean              | -          | -                    | 1                  |
| 5000 hours         | -   | Hoses, fittings, clamps (fuel, coolant, hydraulic) | Check, Retighten, Replace | -          | -                    | -                  |
|                    | 1   | Hydraulic tank oil* <sup>2</sup>                   | Change                    | HO         | 70 (18.5)            | 1                  |
| As required        | 27  | Air conditioner filters                            | Check, Replace            | -          | -                    | 2                  |
|                    | 28  | Air cleaner element (primary, safety)              | Check, Replace            | -          | -                    | 2                  |

\*<sup>1</sup> Conventional hydraulic oil

\*<sup>2</sup> Hyundai genuine long life hydraulic oil

★ **Severely dusty area operation only.**

※ **Oil symbol**

Please refer the recommended lubricants for specification.

DF : Diesel fuel

GO : Gear oil

HO : Hydraulic oil

C : Coolant

PGL : Grease

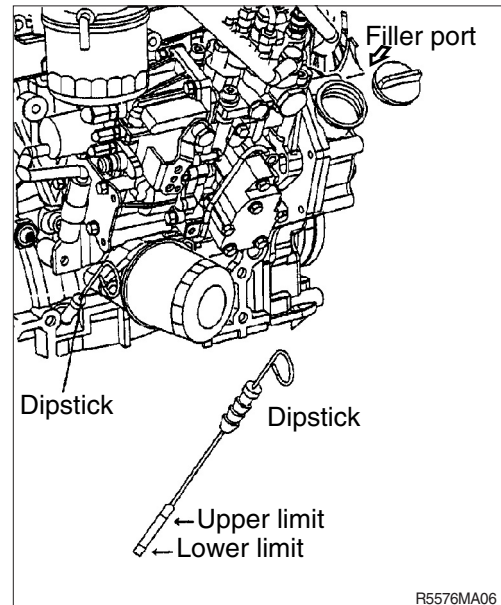
EO : Engine oil

## 6. SERVICE INSTRUCTION

### 1) CHECK ENGINE OIL LEVEL

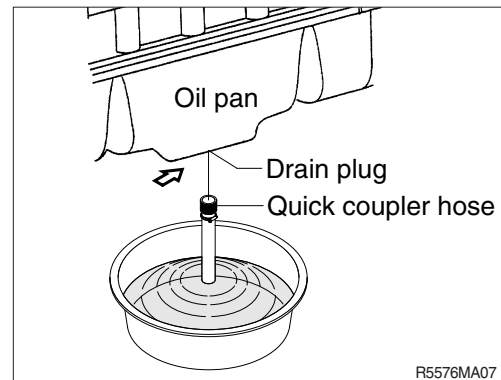
Check the oil level with the machine on a flat ground before starting engine.

- (1) Pull out the dipstick and wipe with a clean cloth.
- (2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.
- (3) If oil level is LOW, add oil and then check again.
  - ※ If the oil is contaminated or diluted, change the oil regardless of the regular change interval.
  - ※ Check oil level after engine has been stopped for 15 minutes.
  - ▲ Do not operate unless the oil level is in the normal range.

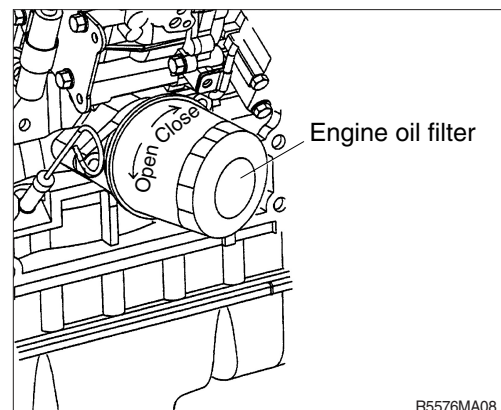


### 2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

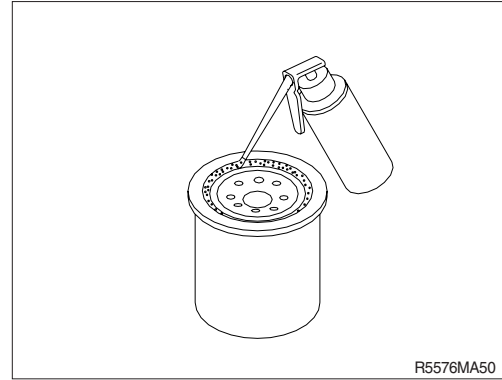
- (1) Warm up the engine.
- (2) Remove the cover of drain plug and connect the quick coupler hose.
  - ※ A drain pan with a capacity of 20 liters (5 U.S. gallons) will be adequate.
  - ▲ Use API CI-4 or better grade oil.



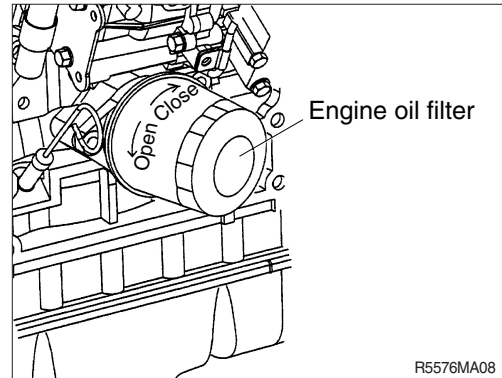
- (3) Clean around the filter head, remove the filter with a filter wrench and clean the gasket surface.



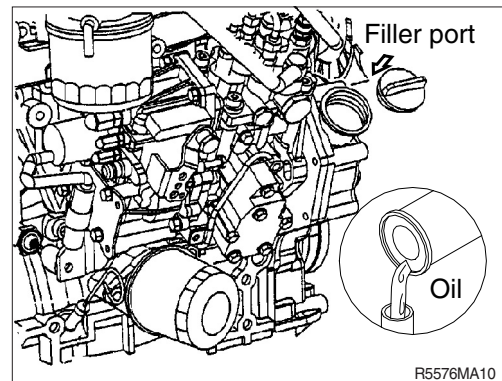
- (4) Apply a light film of lubricating oil to the gasket sealing surface before installing the filters.



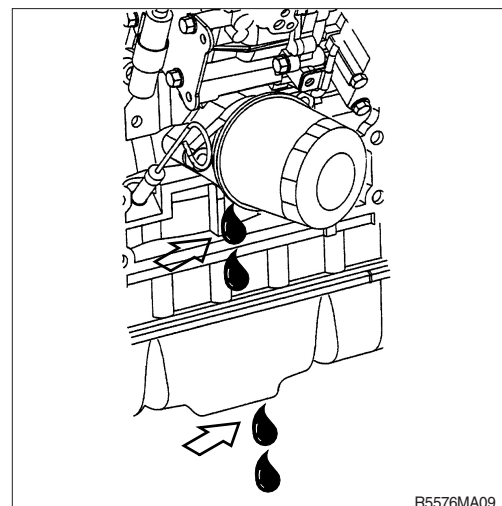
- (5) Install the filter to the filter head.  
Remove the quick coupler hose.
- ※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**
- Install the filter as specified by the filter manufacturer.
  - Tightening torque : 2.0~2.4 kgf · m  
(14.5~17.4 lbf · ft)



- (6) Fill the engine with clean oil to the proper level.  
· Quantity : 11.6 ℓ (3.1 U.S.gallons)



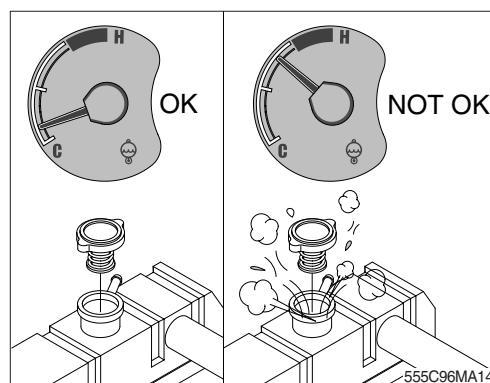
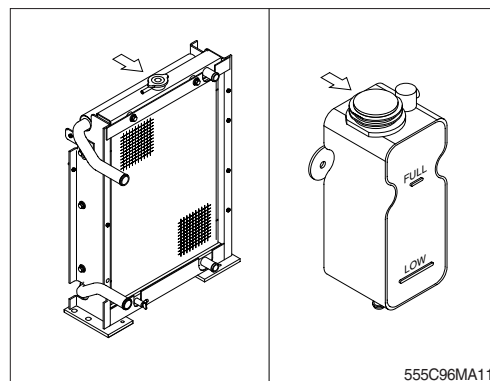
- (7) Operate the engine at low idle and inspect for leaks at the filters and the drain plug.  
Shut the engine off and check the oil level with the dipstick. Allow 15minutes for oil to drain down before checking.



### 3) 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.**

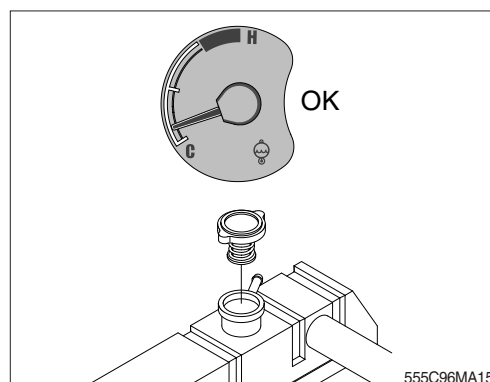


### 4) FLUSHING AND REFILLING OF RADIATOR

- (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.**

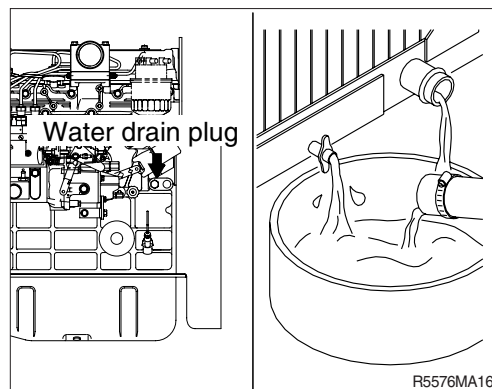




**▲ Wait until the temperature is below 50°C (122°F) before removing the coolant system pressure cap.**

**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 20 liters (5 U.S.gallons) will be adequate in most applications.

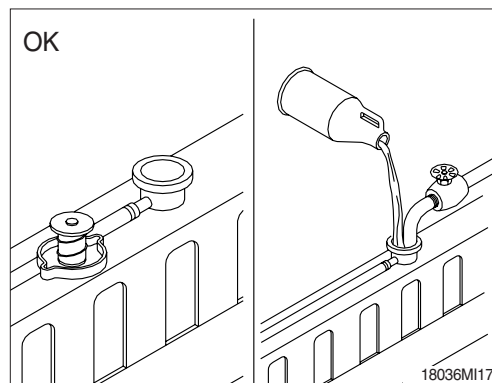


## (2) Flushing of cooling system

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

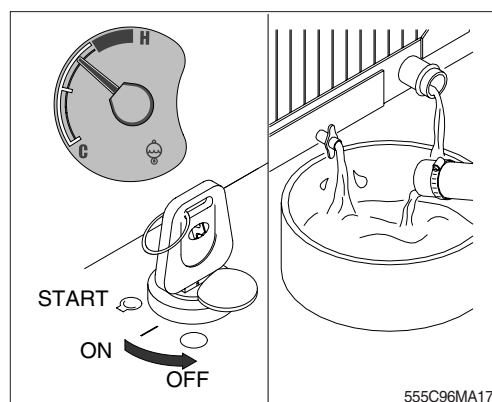
※ Use 0.5 kg (1.0 pound) of sodium carbonate for every 23 liters (6.0 U.S.gallons) of water.

※ Do not install the radiator cap. The engine is to be operated without the cap for this process.



② Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F) .

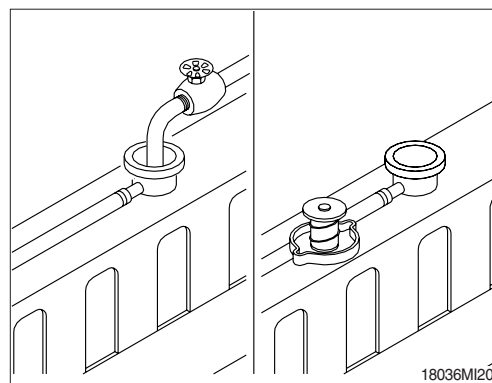
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

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

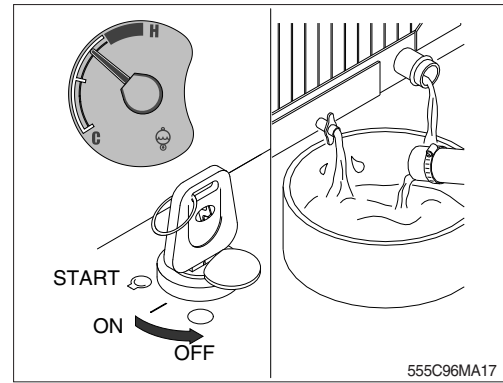
※ Do not install the radiator cap or the new coolant filter.





- ④ Operate the engine for 5 minutes with the coolant temperature above 80°C (176°F). Shut the engine off, and drain the cooling system.

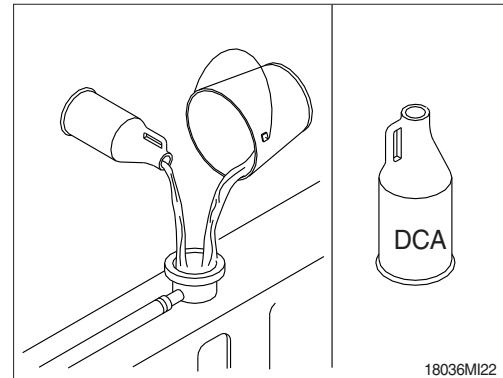
※ If the water being drained is still dirty, the system must be flushed again until the water is clean.



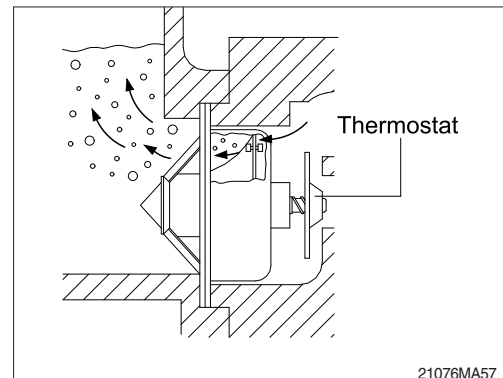
### (3) Cooling system filling

- ① Use a mixture of 50 percent soft water and 50 percent ethylene glycol antifreeze to fill the cooling system. Refer to the page 6-9. Coolant capacity (engine only) : 4.2 ℓ (1.1 U.S. gallons)

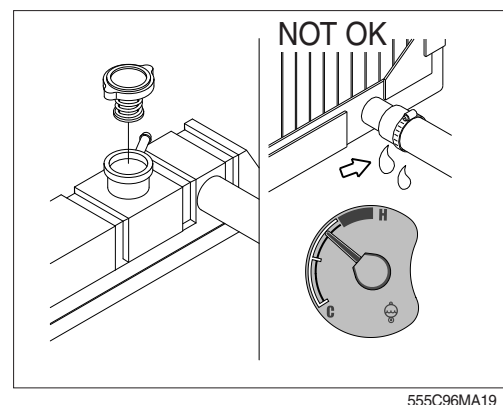
※ Do not use hard water such as river water or well water.



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



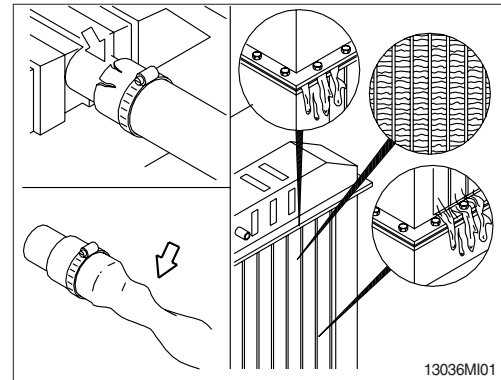
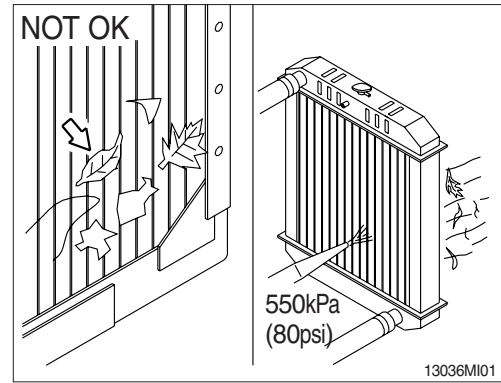
- ③ Install the pressure cap. Operate the engine until it reaches a temperature 80°C (176°F), and check for coolant leaks. Check the coolant level again to make sure the system is full of coolant.



## 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 and gasket leaks.



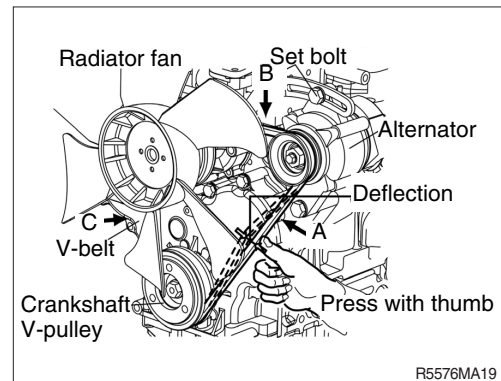
## 6) FAN BELT TENSION

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

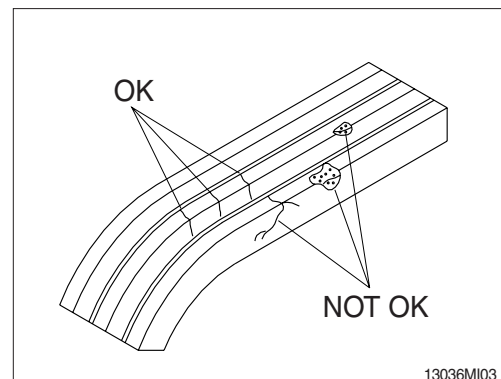
· Deflection

(Unit : mm)

|           | A     | B    | C    |
|-----------|-------|------|------|
| Used belt | 10~14 | 7~10 | 9~13 |
| New belt  | 8~12  | 5~8  | 7~11 |



- (2) Inspect the drive for damage.



## 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.

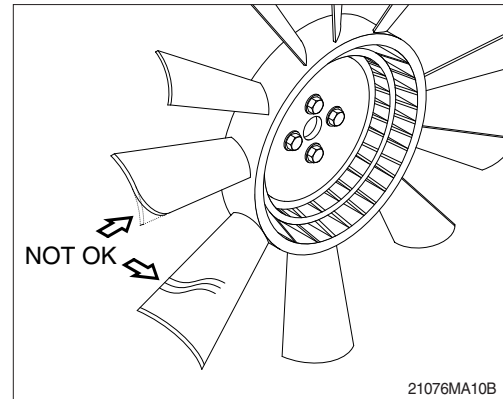
※ Rotate the crankshaft by using the engine barring gear.

※ 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

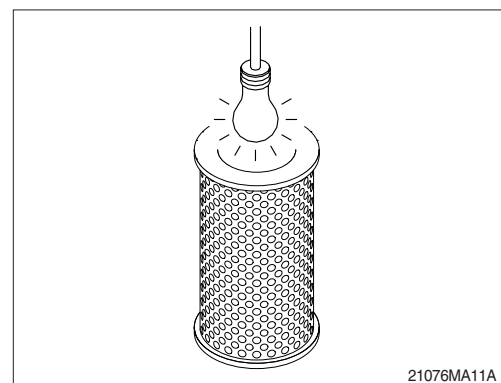
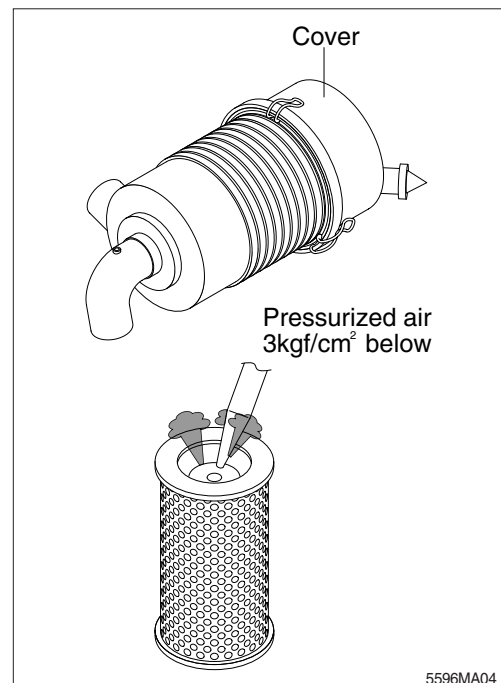
### (1) Primary element

- ① Loosen the wing nut 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 3kgf/cm<sup>2</sup>, 40 psi) forward and backward equally.
- ④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
- ⑤ Insert element and close cover.

※ Replace the primary element after 4 times cleanings.

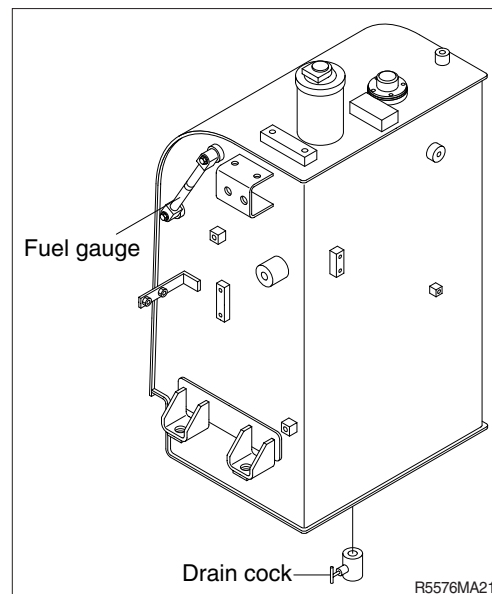
### (2) Safety element

- ※ 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.



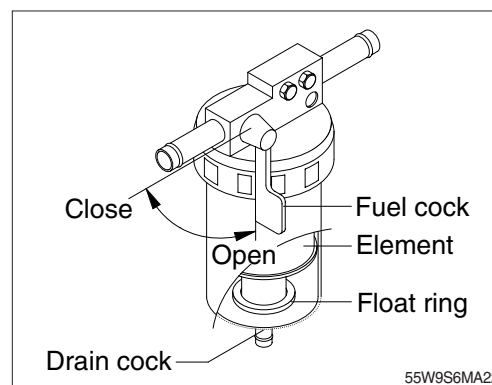
## 9) FUEL TANK

- (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) PREFILTER

- (1) Prepare a waste oil container.
- (2) Close the fuel cock.
- (3) Loosen the drain cock at bottom of the water separator and drain off any water collected inside.
- (4) Be sure to bleed air in the fuel system.
  - ※ **Wash the element and inside cup with clean fuel oil.**
  - ※ **Replace the element with a new one if any damaged.**

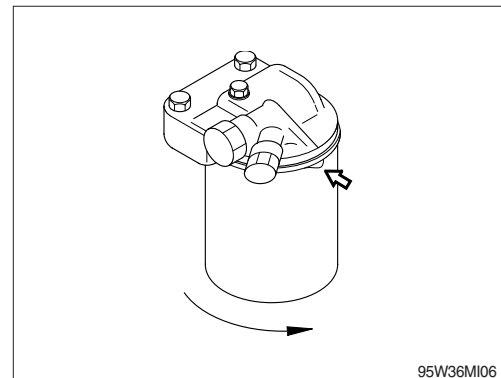
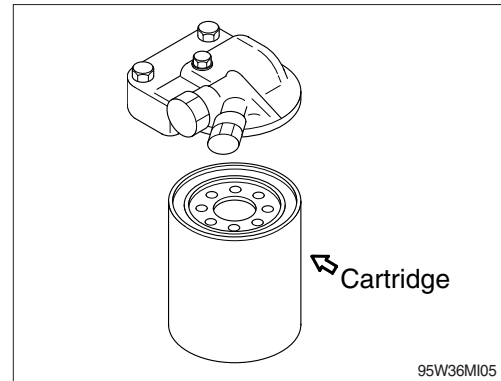


## 11) REPLACEMENT OF FUEL FILTER

- (1) Clean around the filter head, remove the filter with a filter wrench and clean the gasket surface.
- (2) Apply a small amount of fuel to the O-ring of new cartridge.
- (3) Install the new fuel filter manually turning until it comes into contact with the mounting surface and tighten it further to 1/2 of a turn using a filter wrench.

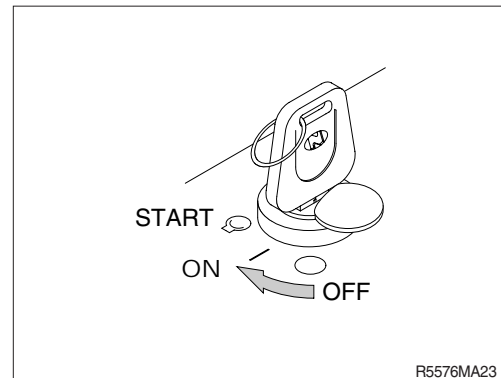
· Tightening torque : 2.0~2.4 kgf · m  
(14.5~17.4 lbf · ft)

- ※ Do not add fuel to the new cartridge. Invisible particles of dirt which might get inside the injection pump can damage its finely finished parts.
- (4) Relieve the air after mounting.
- ※ Check for fuel leakage after the engine starts.
- ※ If air is in the fuel system, the engine will not start. Start engine after bleeding the air according to the method of bleeding air.



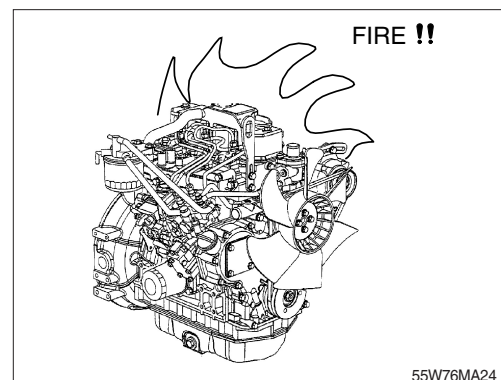
## 12) BLEEDING THE FUEL SYSTEM

- (1) Turn the start switch to the ON position and hold it in the position for 10~15 seconds to operate the fuel feed pump.



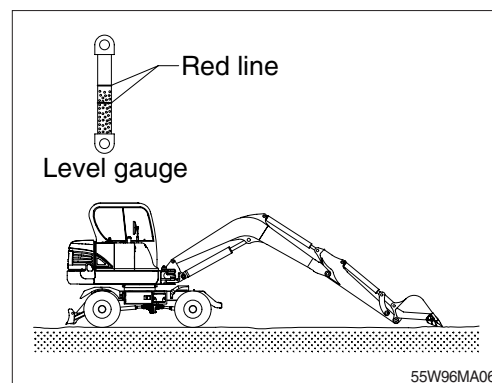
## 13) LEAKAGE OF FUEL

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



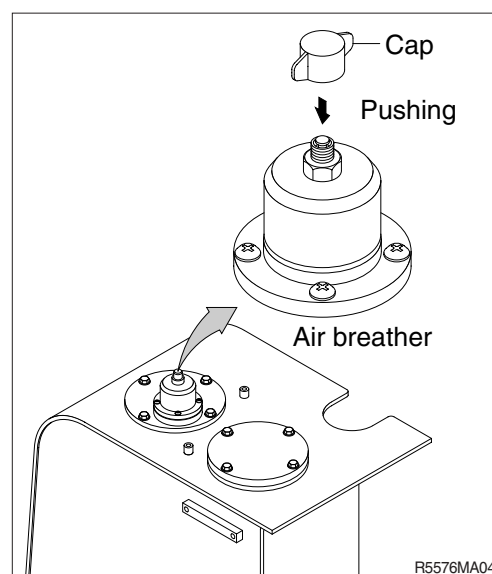
#### 14) HYDRAULIC OIL CHECK

- (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.



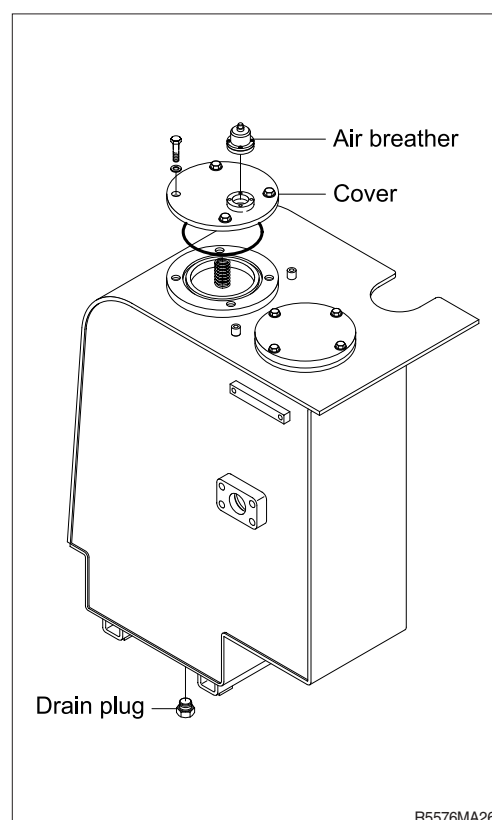
#### 15) FILLING HYDRAULIC OIL

- (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 :  $1.44 \pm 0.3 \text{ kgf} \cdot \text{m}$   
( $10.4 \pm 2.1 \text{ lbf} \cdot \text{ft}$ )
- (4) Start engine after filling and operate the work equipment several times.
- (5) Check the oil level at the level check position after engine stops.



#### 16) CHANGE HYDRAULIC OIL

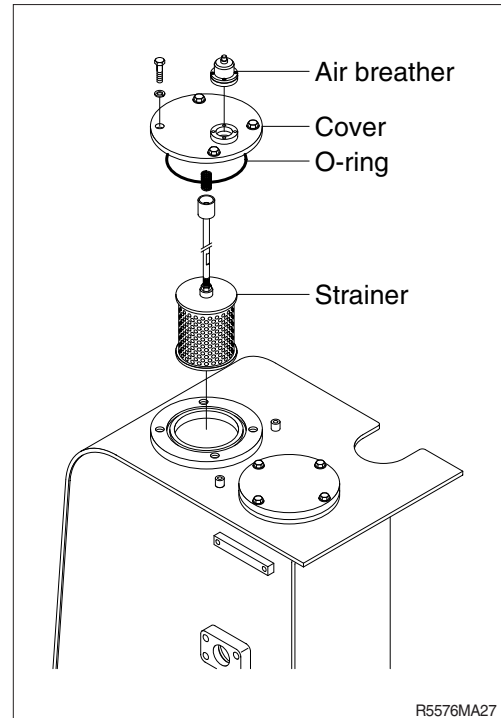
- (1) Lower the bucket on the ground pulling the arm and bucket cylinder to the maximum.
- (2) Loosen the cap and relieve the pressure in the tank by pushing the top of the air breather.
- (3) Remove the cover.
  - Tightening torque :  $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$   
( $50 \pm 10 \text{ lbf} \cdot \text{ft}$ )
- (4) Prepare a suitable container.
- (5) To drain the oil loosen the drain plug at the bottom of the oil tank.
- (6) Fill proper amount of recommended oil.
- (7) Put the breather in the right position.
- (8) **Bleed air hydraulic pump loosen the air breather at top of hydraulic pump assembly.**
- (9) Start engine and run continually. Release the air by full stroke of each control lever.



### 17) CLEAN SUCTION STRAINER

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

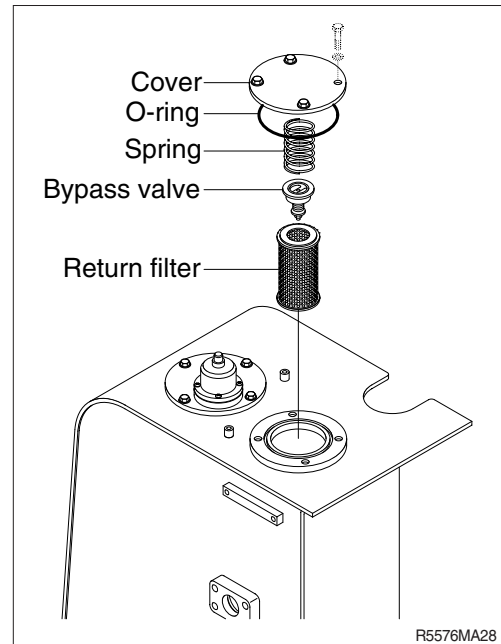
- (1) Remove the cover on the top of the oil tank.  
· Tightening torque :  $6.9 \pm 1.4$  kgf·m  
( $50 \pm 10$  lbf·ft)
  - (2) Pull out the strainer in the tank.
  - (3) Wash the foreign material on the suction strainer with gasoline or cleaning oil.
  - (4) Replace the suction strainer if it is damaged.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

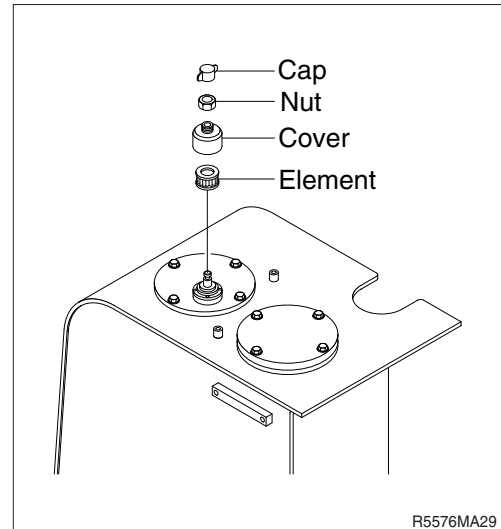
Replace as follows paying attention to the cause to be kept during the replacement.

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



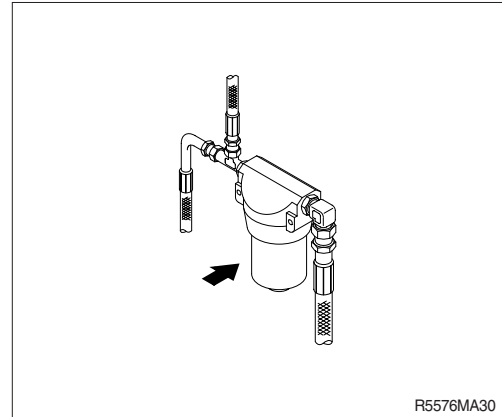
### 19) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

- (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)



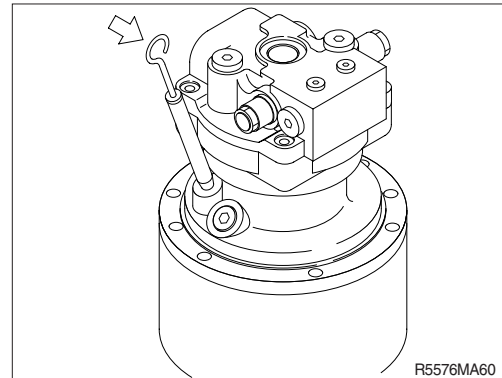
### 20) REPLACE OF PILOT LINE FILTER

- (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.**



### 21) CHECK THE SWING REDUCTION GEAR OIL

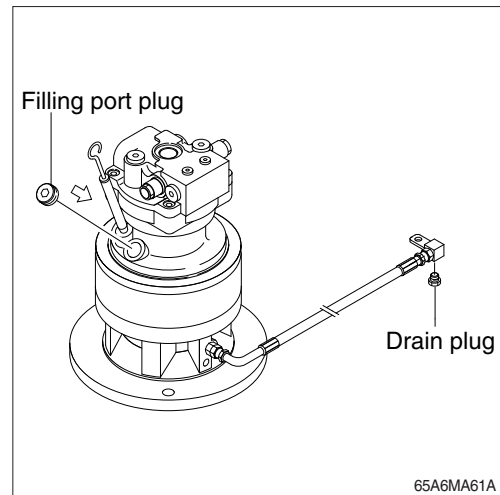
- (1) Pull out the dipstick and clean it.
- (2) Insert it again.
- (3) Pull out one more time to check the oil level and fill the oil if the level is not sufficient.





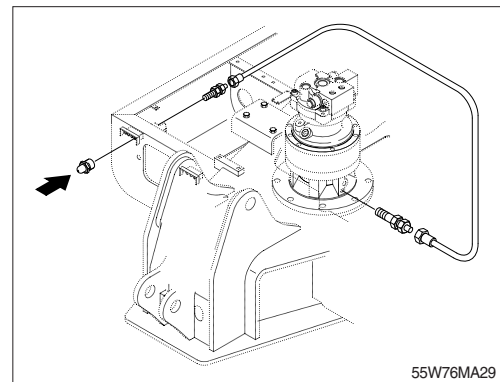
## 22) CHANGE SWING REDUCTION GEAR OIL

- (1) Raise the temperature of oil by swinging the machine before replace the oil and park the machine on the flat ground.
- (2) Loosen the plug.
- (3) Drain into a proper container.
- (4) Wash the drain plug and reinstall it with sealing tape.  
Fill proper amount of recommended oil.  
· Amount of oil : 1.5 ℓ (0.4 U.S.gal)



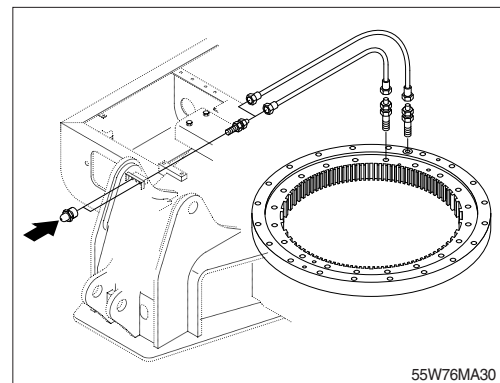
## 23) LUBRICATE BEARING OF OUTPUT SHAFT IN REDUCTION GEAR

- (1) Grease at fitting.
- ※ Lubricate every 50 hours.

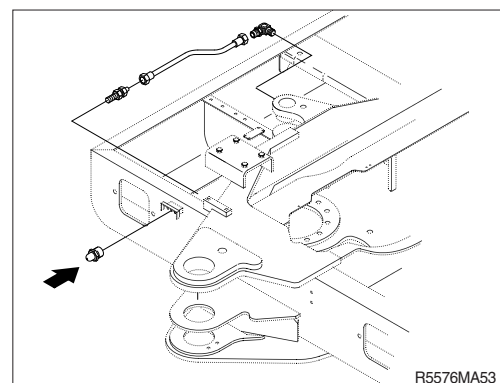


## 24) MANIFOLD

- (1) Swing bearing  
Grease at 2 fitting.
- ※ Lubricate every 250 hours.

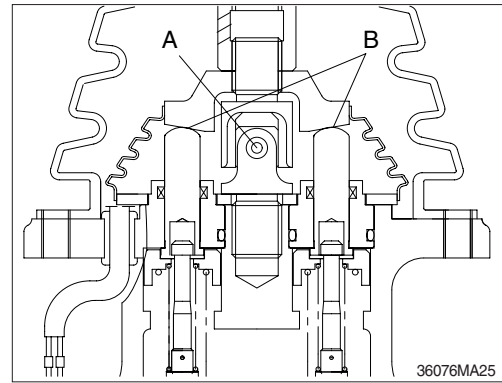


- (2) Boom swing cylinder  
Grease at fitting.
- ※ Lubricate every 250 hours.



## 25) LUBRICATE RCV LEVER

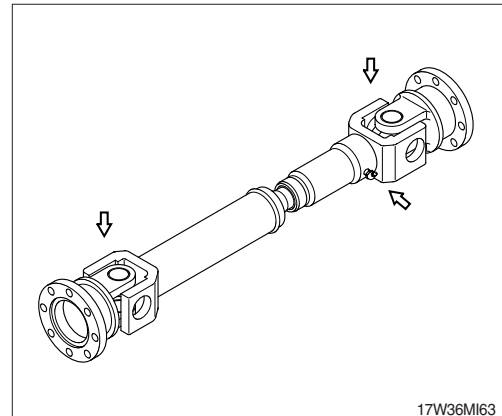
Remove the bellows and with a grease gun grease the joint part (A) and sliding parts (B).



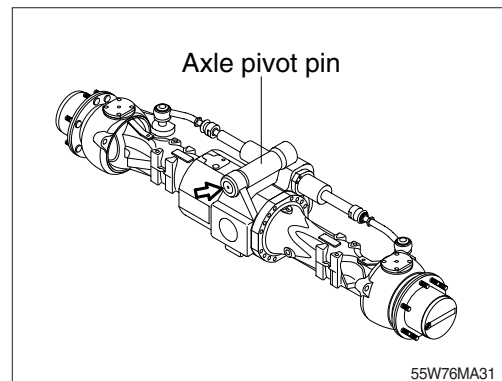
## 26) LUBRICATE

### (1) Drive shaft

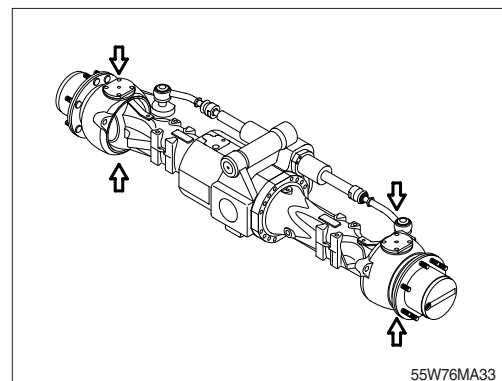
- ① Front drive shaft : 3 point
- ② Rear drive shaft : 3 point



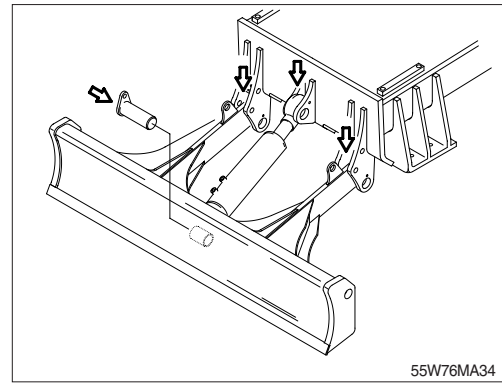
### (2) Front axle : 1 point



### (3) Steering link : 4 point



#### (4) Dozer blade : 4 point



## 27) TIRE

### (1) Air pressure

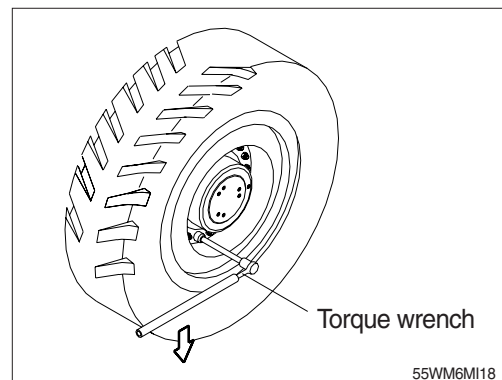
It is important to keep air pressure properly for maximizing tire life. Both excessive and insufficient air pressure of tires should be avoided not to damage tires.

· Specification : 5.25 kgf/cm<sup>2</sup> (75 psi)

### (2) Handling of tire

#### ① Removal of tire

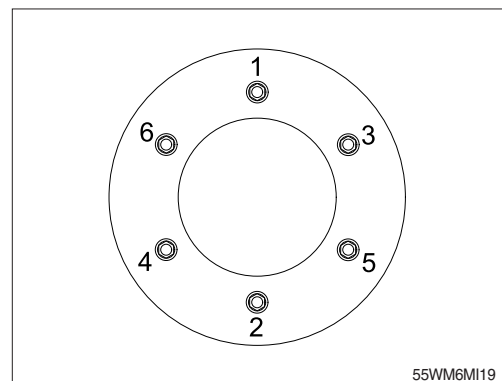
- Lift the main body until a tire separate from the ground, and place the block under front and rear axle.
- Loosen wheel nut with torque wrench and remove tire.



#### ② Installation of tire

- Coat some grease on wheel stud and nut screw.
- Install the tires and tighten a nut slightly and get down a tire on the ground, and then tighten the torque in the order as figure.

· Tightening torque : 43~49 kgf·m  
(311~354 lbf·ft)

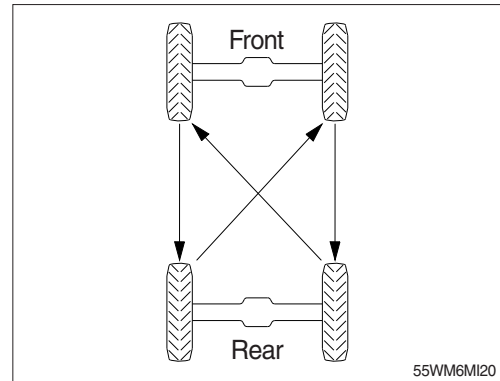


### ③ Position change of tire

- Tire is worn out differently part by part according to installing position, so change position regularly as figure.

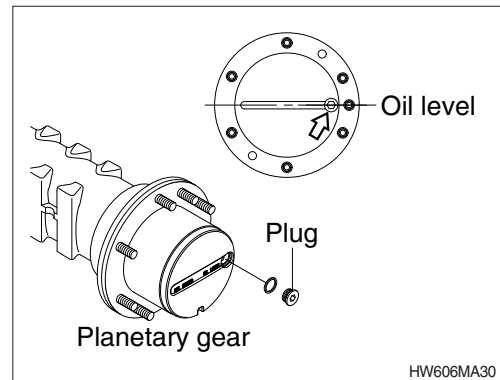
**Keep air pressure at standard.**

**Use same pattern of groove and same maker's tire.**



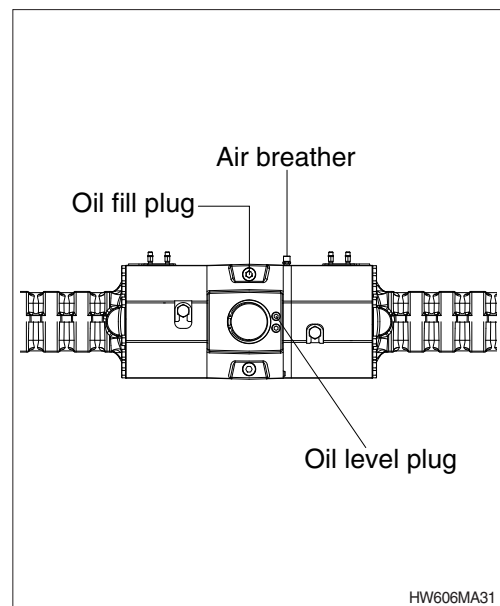
## 28) CHECK PLANETARY GEAR OIL LEVEL

- (1) Move the machine to flat ground.
  - (2) Remove the plug and check the oil amount.
  - (3) If the oil level is below the plug hole, supply oil through a plug hole.
- ※ **Set the plug of planetary gear in parallel to the ground.**
- (4) After checking, install plug.



## 29) CHECK AND SUPPLYING AXLE OIL

- (1) Move the machine to flat ground.
  - (2) Open the axle air breather to relieve internal air pressure.
  - (3) Remove the oil level plug and check the oil amount. If the oil level is at the hole of the plug, it is normal.
  - (4) If the oil level is below the plug hole, supply oil through a oil fill plug hole.
- ▲ **When checking the oil level, press the service brake.**
- ▲ **As the machine is hot after operation, wait until the oil temperature has dropped.**



### 30) CHANGE THE AXLE OIL

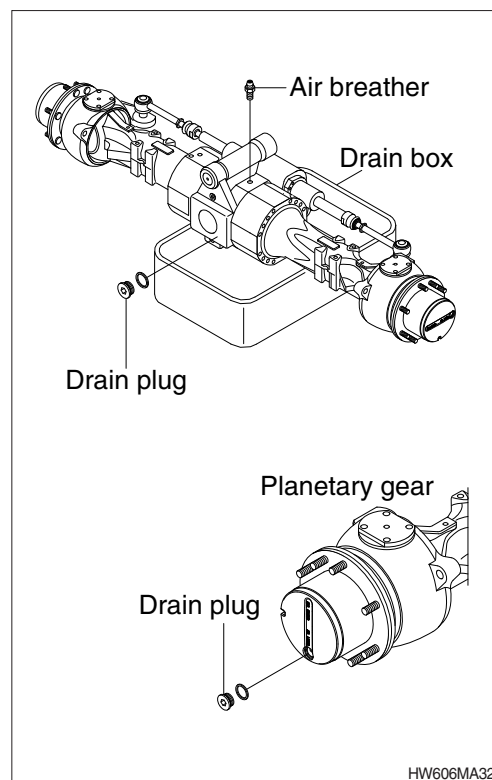
- (1) Place a drain box under drain plug to catch oil.
- (2) Remove the air breather to relieve internal pressure.

#### (3) Drain oil into the differential gear

- ① Remove the drain plug to drain oil off.
- ② Wash drain plug and install it.

#### (4) Drain oil into the planetary gear

- ① Drain oil by removing drain plug.
- ※ The drain plug should be facing to the ground.



- (5) Supply oil into the differential gear and the planetary gear.

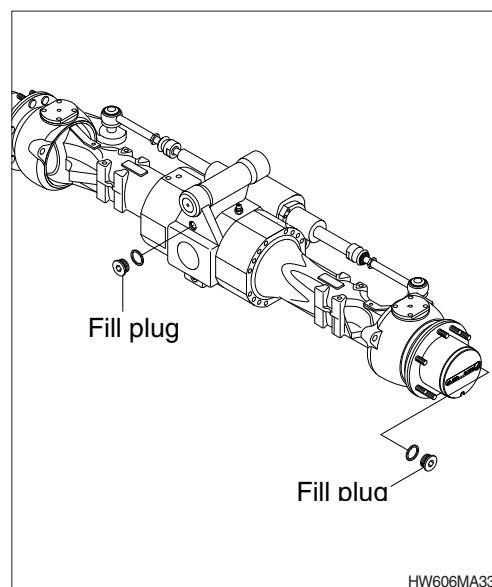
- Oil amount

| Description                  | Capacity              |
|------------------------------|-----------------------|
| Front axle differential gear | 4.5 l (1.19 U.S. gal) |
| Rear axle differential gear  | 4.5 l (1.19 U.S. gal) |
| Planetary gear case (each)   | 0.4 l (0.11 U.S. gal) |

- (6) Supply oil until it overflows from the oil filler, then install the plug.

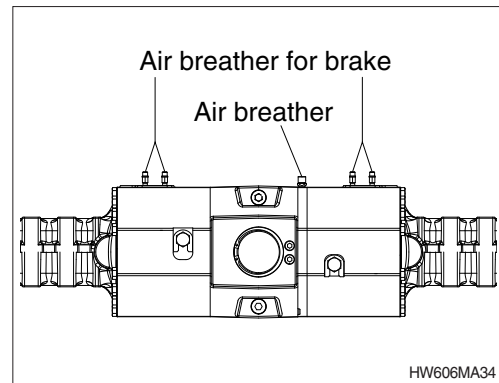
▲ As the machine is hot after operation, wait until the temperature has dropped.

- ※ If a work requires frequent use of brake, replace it earlier than normal change interval.



### 31) CLEANING AXLE BREATHER

- (1) Remove dust or debris around the breather.
- (2) Remove the breather and wash it with cleaning oil.



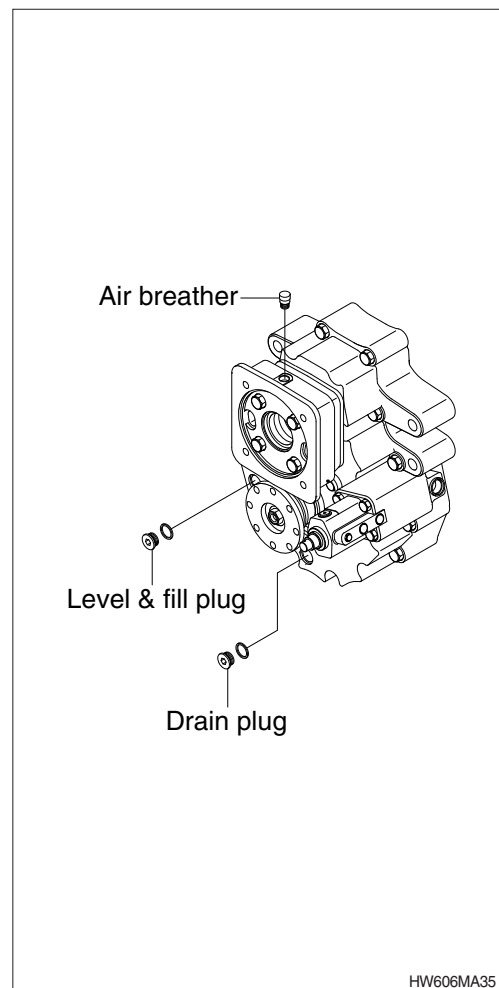
### 32) CHECK AND SUPPLYING GEAR BOX OIL

- (1) Move the machine to flat ground.
- (2) Open the gear box air breather to relieve internal air pressure.
- (3) Remove the level & fill plug and check the oil amount. If the oil level is at the hole of the plug, it is normal.
- (4) If the oil level is below the plug hole, supply oil through a plug hole.

**▲ As the machine is hot after operation, wait until the oil temperature has dropped.**

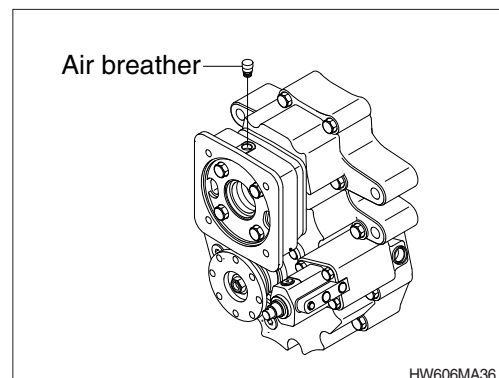
### 33) CHANGE THE GEAR BOX OIL

- (1) Place a drain box under drain plug to catch oil.
- (2) Open gear box air breather to relieve internal air pressure.
- (3) Remove the drain plug to drain oil.
- (4) Wash drain plug and install it.
- (5) Supply oil into the transmission case.
  - Oil amount : 1.85 l (0.5 U.S. gal)



### 34) CLEANING GEAR BOX AIR BREATHER

- (1) Remove dust or debris around the air breather.
- (2) Remove the air breather and wash it with cleaning oil.



### 35) 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.

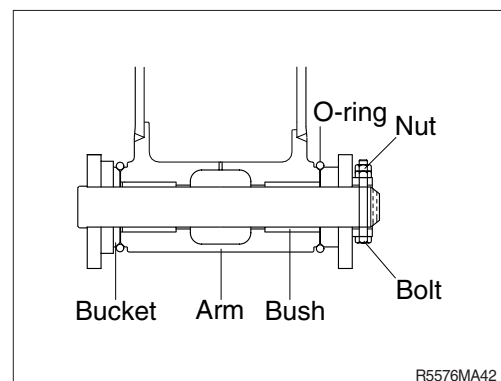
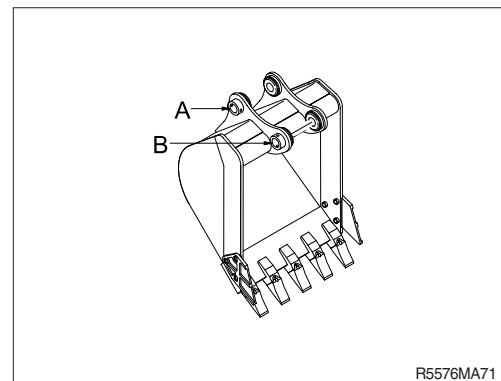
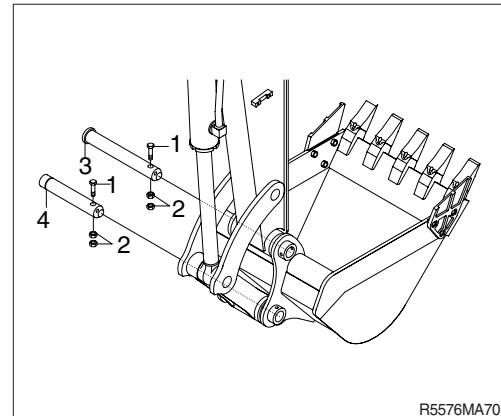
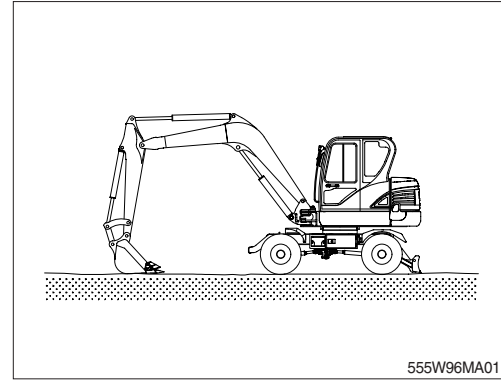
※ If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

※ 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.

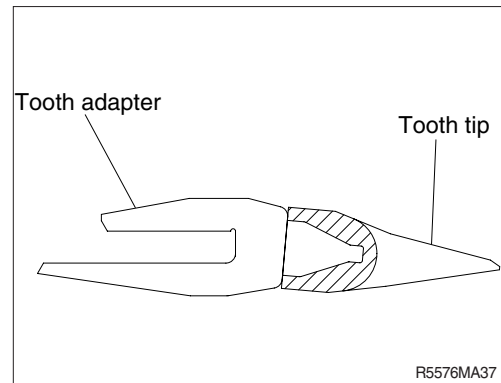
(5) Install the stopper bolt (1) and nuts (2) for each pin, then grease the pin.



### 36) 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.

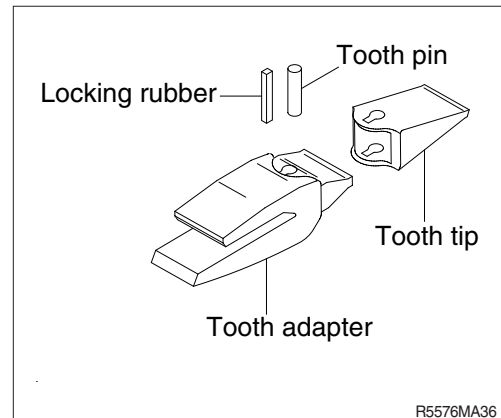


#### (2) Instructions for replacement

- ① Pull out pin by striking pin with punch or hammer, avoiding damage to locking rubber.
- ② Remove dust and mud from surface of tooth adapter by using knife.
- ③ Place locking rubber in its proper place, and fit tooth tip to adapter.
- ④ Insert pin until locking rubber is positioned at tooth pin groove.

▲ Personal injury can result from bucket falling.

▲ Block the bucket before changing tooth tips or side cutters.





### 37) 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 upper frame | 4   |
| 2   | Boom connection pin                 | 2   |
| 3   | Boom cylinder pin                   | 2   |
| 4   | Arm cylinder pin                    | 2   |
| 5   | Boom and arm connection pin         | 1   |
| 6   | Bucket cylinder pin(Head and rod)   | 2   |
|     | Bucket link(Control rod)            | 1   |
|     | Arm and bucket connection pin       | 1   |
|     | Arm and control link connection pin | 1   |
| 7   | Dozer connection pin                | 2   |
|     | Dozer cylinder pin                  | 2   |
| 8   | Boom swing post pin                 | 2   |
| 9   | Boom swing cylinder pin             | 1   |

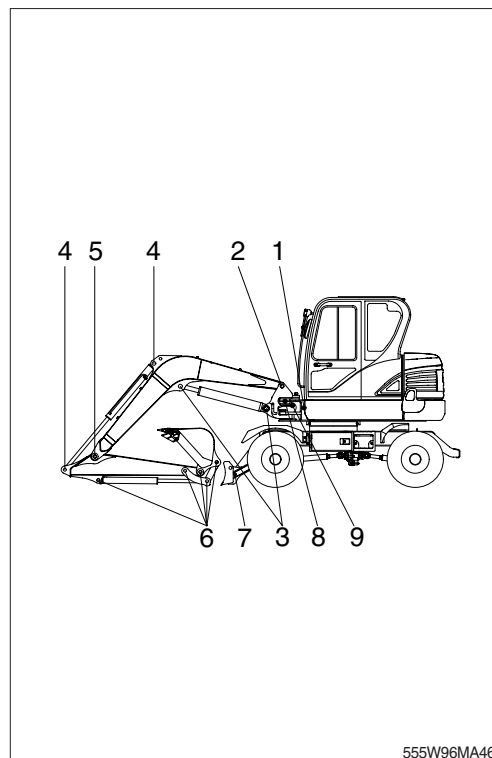
※ **Shorten lubricating interval when working in the water or dusty place.**

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

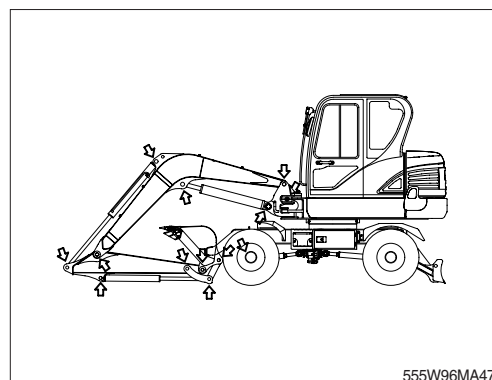
※ **Mount the lip to be faced outside when replace the dust seal.**

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

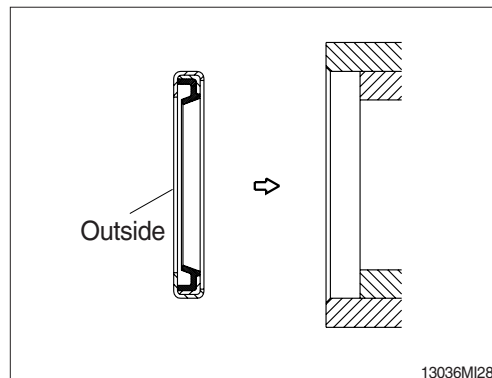
※ **Assemble the seal same direction with picture and use with plastic hammer when replace.**



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555W96MA47

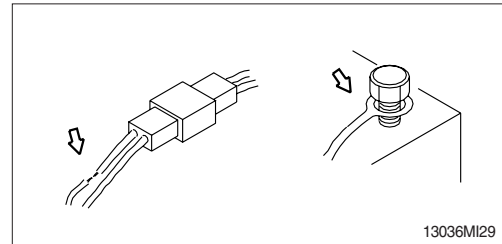


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## 7. ELECTRICAL SYSTEM

### 1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



### 2) BATTERY

#### (1) Clean

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

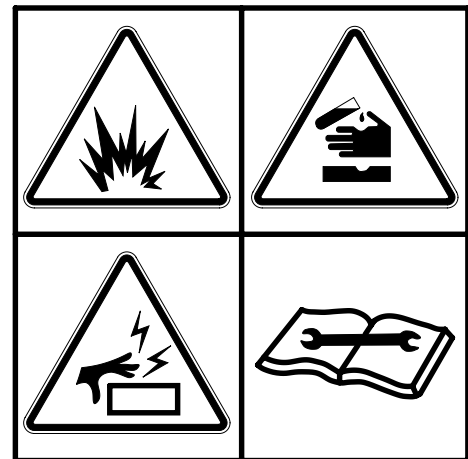
⚠ **Battery gas can explode. Keep sparks and flames away from batteries.**

⚠ **Always wear protective glasses when working with batteries.**

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

Be careful not to get the electrolyte in eyes.

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



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#### (2) Recycle

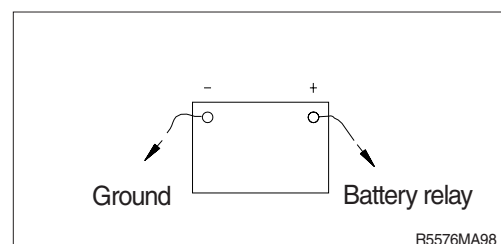
Never discard a battery.

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

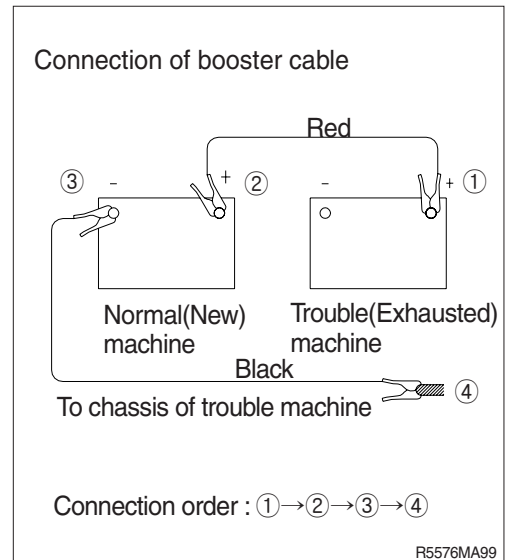
Keep following order when you are going to start engine using booster cable.

#### (1) Connection of booster cable

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

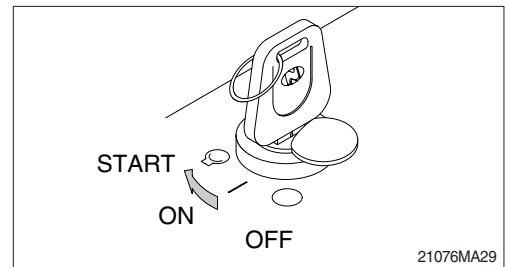
- ① Make sure that the starting switches of the normal machine and trouble machine are both at the OFF position.
- ② Connect the red terminal of booster cable to the battery (+) terminal between exhausted and new battery.
- ③ Connect the black terminal of the booster cable between new battery (-) terminal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

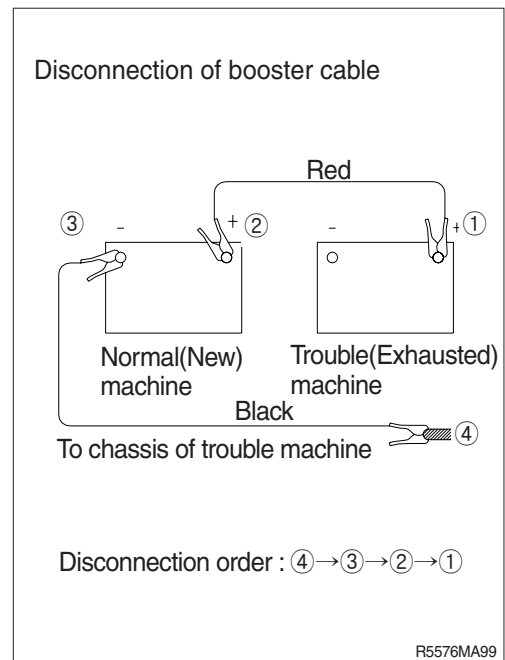
- ① Take off the booster cable(black).
- ② Take off the booster cable(red) connected to the (+) terminal.
- ③ Run engine with high idle until charging the exhausted battery by alternator, fully.

▲ **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

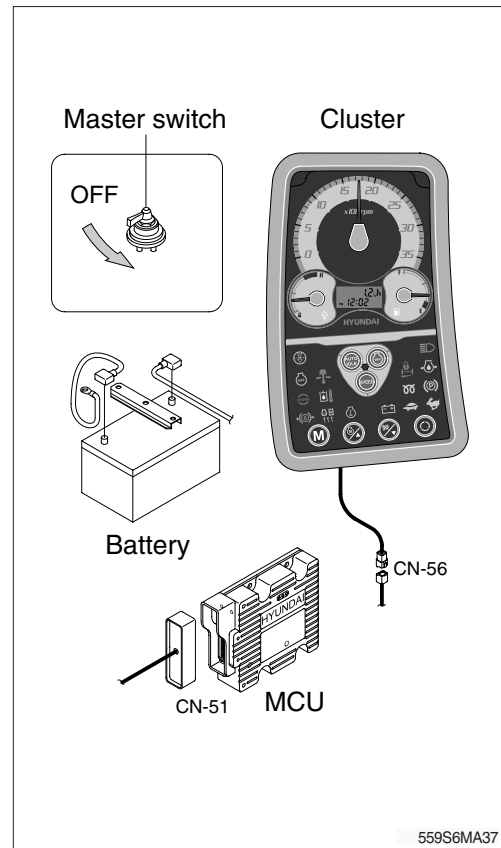
Before start to welding, follow the below procedure.

- 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.

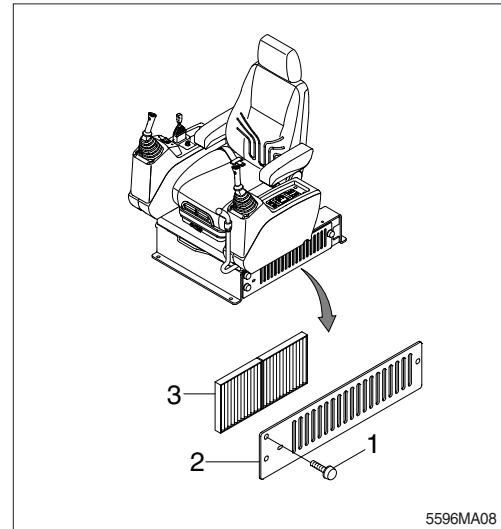


## 8. AIR CONDITIONER AND HEATER

### 1) CLEAN AND REPLACE OF THE CIRCULATION FILTER

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

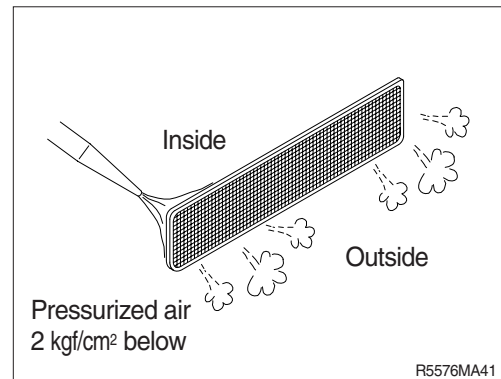
- (1) Remove the screw (1) and cover (2) on the seat base.
- (2) Remove the circulation filter (3).



- (4) Clean the filter using a pressurized air (Below 2 kgf/cm<sup>2</sup>, 28psi).

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

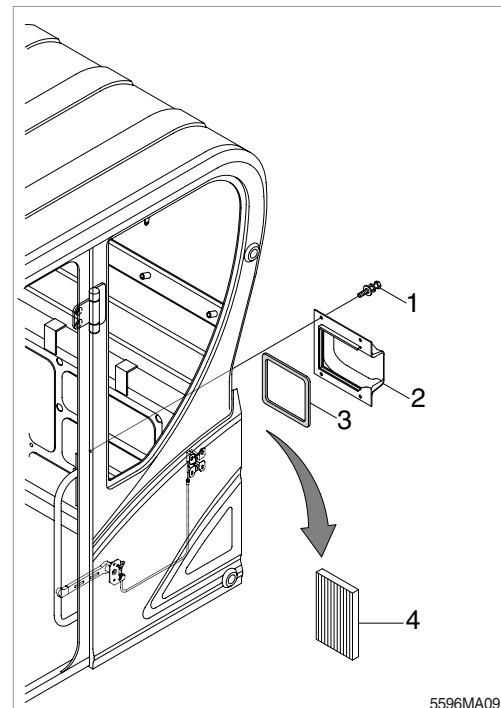
- (5) Inspect the filter after cleaning. If it is damaged or badly contaminated, use a new filter.



### 2) CLEAN AND REPLACE OF THE RECIRCULATION FILTER

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

- (1) Remove the screw (1), cover (2) and pad (3).
- (2) Remove the recirculation filter (4).

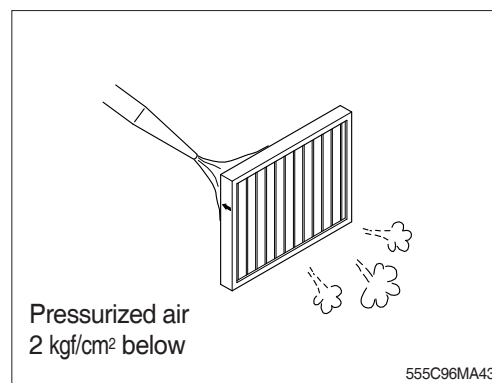


- (3) Clean the recirculation filter using a pressurizes are (Below 2 kgf/cm<sup>2</sup>, 28psi) or washing with water.



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

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



### 3) PRECAUTIONS FOR USING AIR CONDITIONER

- (1) When using the air conditioner for a long time, open the window once every one hour.
- (2) Be careful not to overcool the cab.
- (3) The cab is properly cooled if the operator feels cool when entering there from outside (about 5°C lower than the outside temperature).
- (4) When cooling, change air occasionally.

### 4) CHECK DURING SEASON

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

### 5) CHECK DURING OFF-SEASON

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

### 6) REFRIGERANT (R134-a) AMOUNT : 950 g (with receiver drier)

### 7) COMPRESSOR LUBRICANT OIL (SYNTHETIC OIL) : 265mL

# TROUBLESHOOTING GUIDE

## 1. ENGINE

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

| Trouble                                                                                                        | Service                                                                                                                                                                                                                                                                                                                                                            | Remark |
|----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| The engine oil pressure lamp lights ON when engine speed is raised after completion of warm up.                | <ul style="list-style-type: none"> <li>· Add the oil to the specified level.</li> <li>· Replace the oil filter cartridge.</li> <li>· Check oil leakage from the pipe or the joint.</li> <li>· Replace the monitor.</li> </ul>                                                                                                                                      |        |
| Steam is emitted from the top part of the radiator (the pressure valve). Coolant level warning lamp lights ON. | <ul style="list-style-type: none"> <li>· Supply the coolant and check leakage.</li> <li>· Adjust fan belt tension.</li> <li>· Wash out inside of cooling system.</li> <li>· Clean or repair the radiator fin.</li> <li>· Check the thermostat.</li> <li>· Tighten the radiator cap firmly or replace the packing of it.</li> <li>· Replace the monitor.</li> </ul> |        |
| The engine does not start when the starting motor is turned over.                                              | <ul style="list-style-type: none"> <li>· Add fuel.</li> <li>· Repair where air is leaking into fuel system.</li> <li>· Check the injection pump or the nozzle.</li> <li>· Check the valve clearance.</li> <li>· Check engine compression pressure.</li> </ul>                                                                                                      |        |
| Exhaust gas is white or blue.                                                                                  | <ul style="list-style-type: none"> <li>· Adjust to specified oil quantity.</li> <li>· Replace with specified fuel.</li> </ul>                                                                                                                                                                                                                                      |        |
| Exhaust gas occasionally turns black.                                                                          | <ul style="list-style-type: none"> <li>· Clean or replace the air cleaner element.</li> <li>· Check the nozzle.</li> <li>· Check engine compression pressure.</li> <li>· Clean or replace the turbocharger.</li> </ul>                                                                                                                                             |        |
| Combustion noise occasionally changes to breathing sound.                                                      | <ul style="list-style-type: none"> <li>· Check the nozzle.</li> </ul>                                                                                                                                                                                                                                                                                              |        |
| Unusual combustion noise or mechanical noise.                                                                  | <ul style="list-style-type: none"> <li>· Check with specified fuel.</li> <li>· Check over-heating.</li> <li>· Replace the muffler.</li> <li>· Adjust valve clearance.</li> </ul>                                                                                                                                                                                   |        |

## 2. ELECTRICAL SYSTEM

| Trouble                                                                                                                | Service                                                                                                                                                                                 | Remark |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Lamp does not glow brightly even when engine runs at high speed.<br>Lamp flickers while engine runs.                   | <ul style="list-style-type: none"> <li>· Check for loose terminals and open-circuit wiring.</li> <li>· Adjust belt tension.</li> </ul>                                                  |        |
| Battery charging lamp does not go out even when engine runs at high speed.                                             | <ul style="list-style-type: none"> <li>· Check the alternator.</li> <li>· Check and repair wiring.</li> </ul>                                                                           |        |
| Unusual noise is emitted from the alternator.                                                                          | <ul style="list-style-type: none"> <li>· Check the alternator.</li> </ul>                                                                                                               |        |
| Starting motor does not turn when starting switch is turned ON.                                                        | <ul style="list-style-type: none"> <li>· Check and repair the wiring.</li> <li>· Charge the battery.</li> <li>· Check the starting motor.</li> <li>· Check the safety relay.</li> </ul> |        |
| The pinion of the starting motor keeps going in and out.                                                               | <ul style="list-style-type: none"> <li>· Charge the battery.</li> <li>· Check the safety relay.</li> </ul>                                                                              |        |
| Starting motor turns the engine sluggishly.                                                                            | <ul style="list-style-type: none"> <li>· Charge the battery.</li> <li>· Check the starting motor.</li> </ul>                                                                            |        |
| The starting motor disengages before the engine starts up.                                                             | <ul style="list-style-type: none"> <li>· Check and repair the wiring.</li> <li>· Charge the battery.</li> </ul>                                                                         |        |
| The engine warming up lamp does not go ON.                                                                             | <ul style="list-style-type: none"> <li>· Check and repair wiring.</li> <li>· Check the monitor.</li> </ul>                                                                              |        |
| The engine oil pressure lamp does not light up when engine is stationary (when the starting switch is in ON position.) | <ul style="list-style-type: none"> <li>· Check the monitor.</li> <li>· Check the caution lamp switch.</li> </ul>                                                                        |        |
| Battery charging lamp does not light up when the engine is stationary. (when the starting switch is in ON position.)   | <ul style="list-style-type: none"> <li>· Check the monitor.</li> <li>· Check and repair the wiring.</li> </ul>                                                                          |        |



### 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. |        |

# HYDRAULIC BREAKER AND QUICK CLAMP

## 1. SELECTING HYDRAULIC BREAKER

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

## 2. CIRCUIT CONFIGURATION

- 1) As for breaker oil pressure line, use extra spool of main control valve.
- 2) Set proper breaker pressure on load relief valve.
- 3) The pressure of the ROBEX60W-9S system is 220 kgf/cm<sup>2</sup> (3130 psi).
- 4) The accumulator should be used to the breaker charging and return line.  
If the accumulator is not used, it will be damage as the input wave is delivered.  
※ **Keep the pressure pulsation of pump below 60 kgf/cm<sup>2</sup> (853 psi) by installing the accumulator.**
- 5) Do not connect the breaker return line to the main control, but connect to the return line front of the cooler.
- 6) Do not connect the breaker return line to drain lines, such as of swing motor, travel motor or pump, otherwise they should be damaged.
- 7) One of spool of the main control valve should be connected to the tank.
- 8) Select the size of pipe laying considering the back pressure.
- 9) Shimless tube should be used for the piping. The hose and seal should be used Hyundai genuine parts.
- 10) Weld the bracket for pipe clamp to prevent damage caused by vibration.

### 3. MAINTENANCE

#### 1) MAINTENANCE OF HYDRAULIC OIL AND FILTER

- (1) As machine with an hydraulic breaker provides the hydraulic oil becomes severely contaminated.
- (2) So, unless frequently maintained, the machine may easily go out of order.
- (3) Inspect and maintain hydraulic oil and 3 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.

#### 2) RELEASE THE PRESSURE IN BREAKER CIRCUIT

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

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

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

Service interval unit : hours

| Attachment | Operating rate | Hydraulic oil      | Filter element |
|------------|----------------|--------------------|----------------|
| Breaker    | 100 %          | 600* <sup>1</sup>  | 250            |
|            |                | 1000* <sup>2</sup> |                |

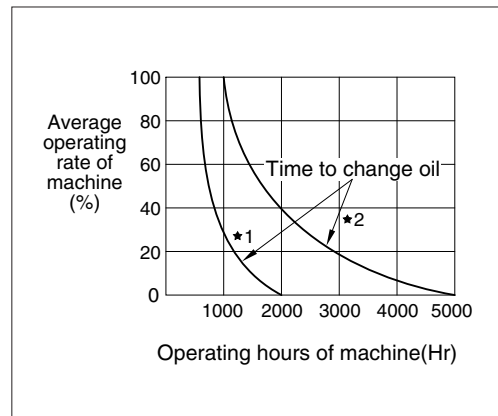
\*<sup>1</sup>: Conventional hydraulic oil

\*<sup>2</sup>: Hyundai genuine long life hydraulic oil

#### ● Replace following filter same time

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

Hyd oil change guide for hydraulic breaker



\*<sup>1</sup>: Conventional hydraulic oil

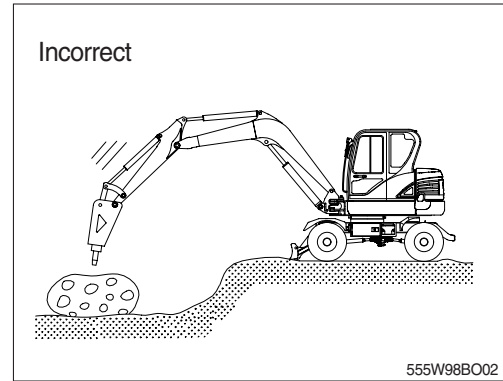
\*<sup>2</sup>: Hyundai genuine long life hydraulic oil

## 4. PRECAUTIONS WHILE OPERATING THE BREAKER

### 1) DO NOT BREAK ROCK WHILE LOWERING

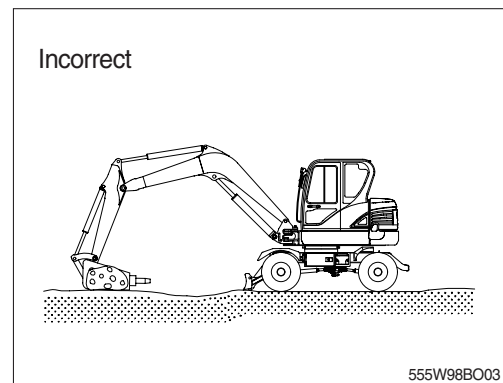
As the breaker is heavy in comparison with bucket, it must be operated slowly.

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



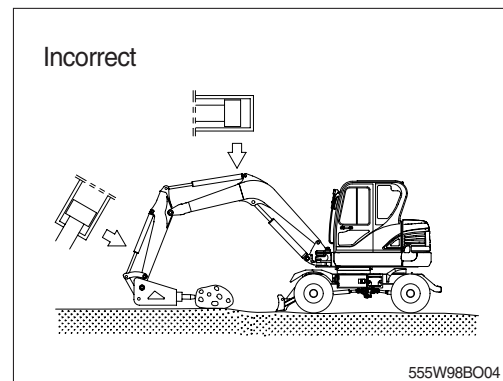
### 2) DO NOT USE BREAKER TO CARRY BROKEN STONE OR ROCK BY SWING OPERATING

This may damage the operation device and swing system.



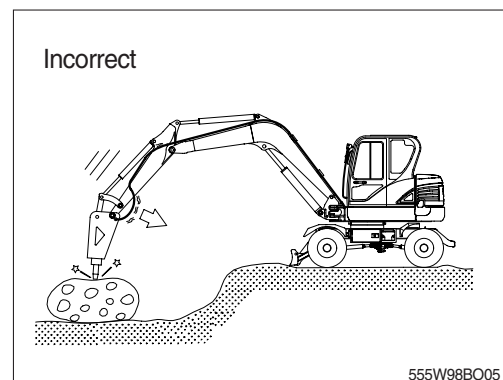
### 3) OPERATE BREAKER WITH A GAP IN EXCESS OF 100 mm (4 inches) FROM THE END OF THE STROKE TIP

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



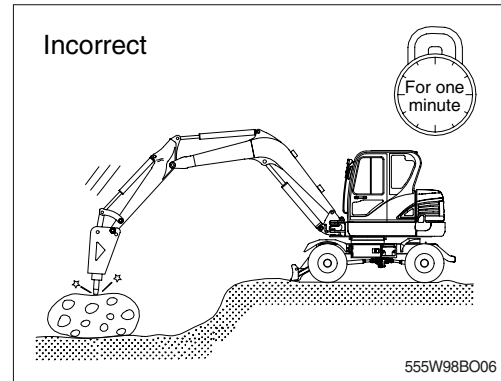
### 4) IF THE HYDRAULIC HOSES VIBRATE EXCESSIVELY

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



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

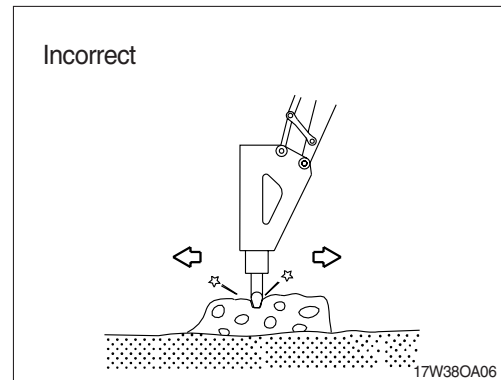
This will increase the temperature of the oil, and cause problem in the accumulator and seals.



**6) DO NOT MOVE MACHINE OR BREAKER WHILE STRIKING**

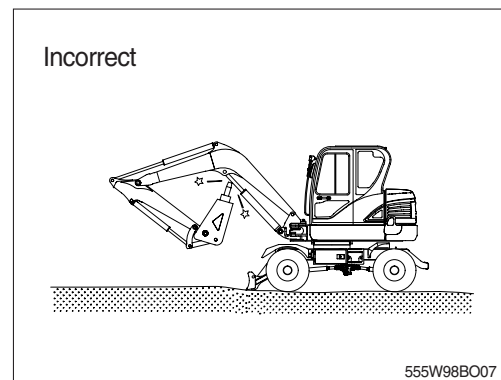
Do not move hammer while striking.

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

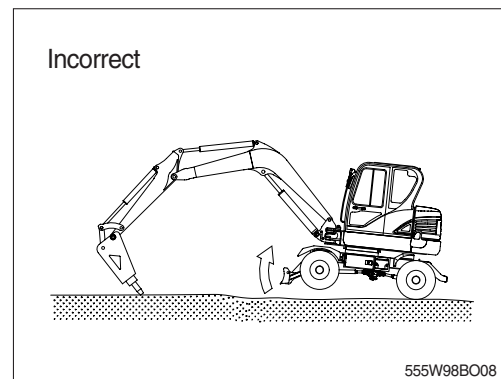


**7) TAKE CARE OF CHISEL AND BOOM INTERFACE**

Make sure of the arm and bucket control lever operation.



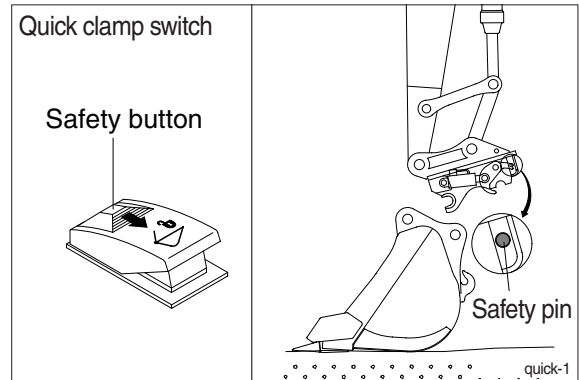
**8) Do not extend the bucket cylinder fully and thrusting to raise the machine off the ground.**



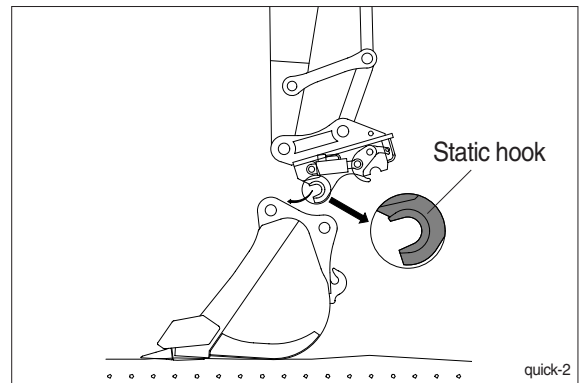
## 5. QUICK CLAMP

### 1) FIXING BUCKET WITH QUICK CLAMP

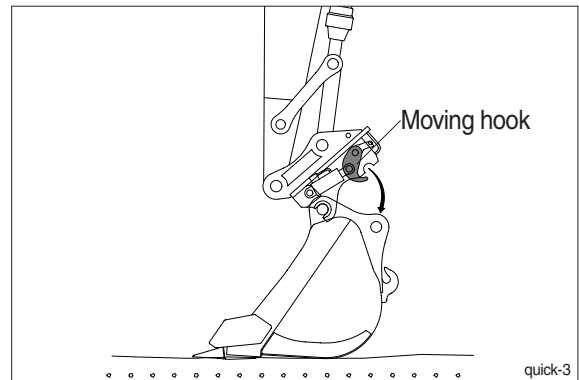
- (1) Before fixing bucket, remove safety pin of the moving hook.
- (2) Pulling safety button, press the quick clamp switch to unlock position. Then, the moving hook is placed on release position.



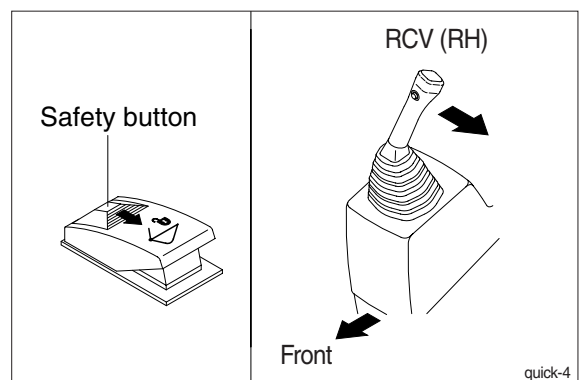
- (3) Aligning the arm and bucket, insert static hook of quick clamp to the bucket pin.



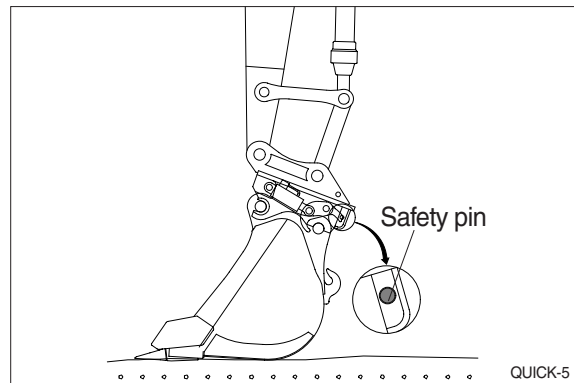
- (4) Operate RCV lever to bucket-in position. Then, the moving hook is coupled with the bucket link pin. Make sure that the moving hook is completely contacted with bucket link pin.



- (5) Press quick clamp switch 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) PRE-CAUTION OF USING QUICK CLAMP

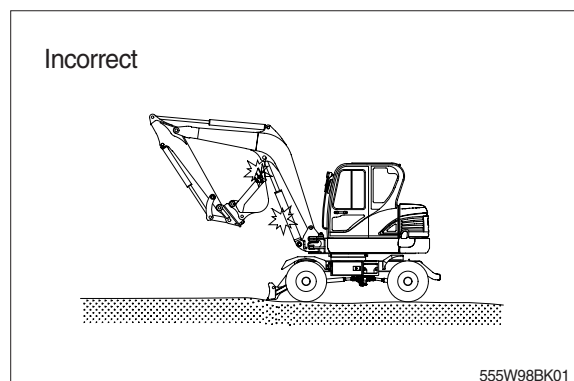
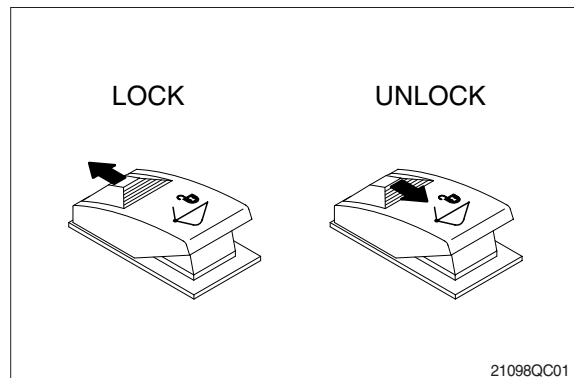
- ⚠ When operating the machine with quick clamp, confirm that the quick clamp switch is lock position and safety pin of moving hook is inserted.

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

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

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

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





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