CONTENTS

FOREWORD

This manual contains a number of instructions and safety recommendations regarding driving, handling, lubrication, maintenance, inspection and adjustment of the wheel loader.
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 HD 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 HD Hyundai will not accept any responsibility for defects resulting from non-genuine parts or non workmanlike repair.
   In such cases HD 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 HD Hyundai or your HD Hyundai distributor for the latest available information for your machine or for questions regarding information in this manual.

BEFORE SERVICING THIS MACHINE

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

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

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

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

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

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

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

All personnel must remain alert to potential hazards.

Work within your level of training and skill.

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

Use your common sense.

※ How to adjust the language of monitor

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

※ Please refer to the page 3-22 for the monitor.

TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine Serial No.	
Engine Serial No.	
Manufacturing year	
Manufacturer Address	HD Hyundai Construction Equipment Co., Ltd. 477, Bundangsuseo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13553, Korea
Distributor for U.S.A Address	HD Hyundai Construction Equipment U.S.A, Inc 6100 Atlantic Boulevard Norcross GA 30071 U.S.A
Distributor for Europe Address	HD Hyundai Construction Equipment Europe N. V. Hyundailaan 4 3980 Tessenderlo Belgium
Dealer Address	

EC REGULATION APPROVED

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

L_{WA} : 108 dB (EU only)

L_{PA} : 72 dB

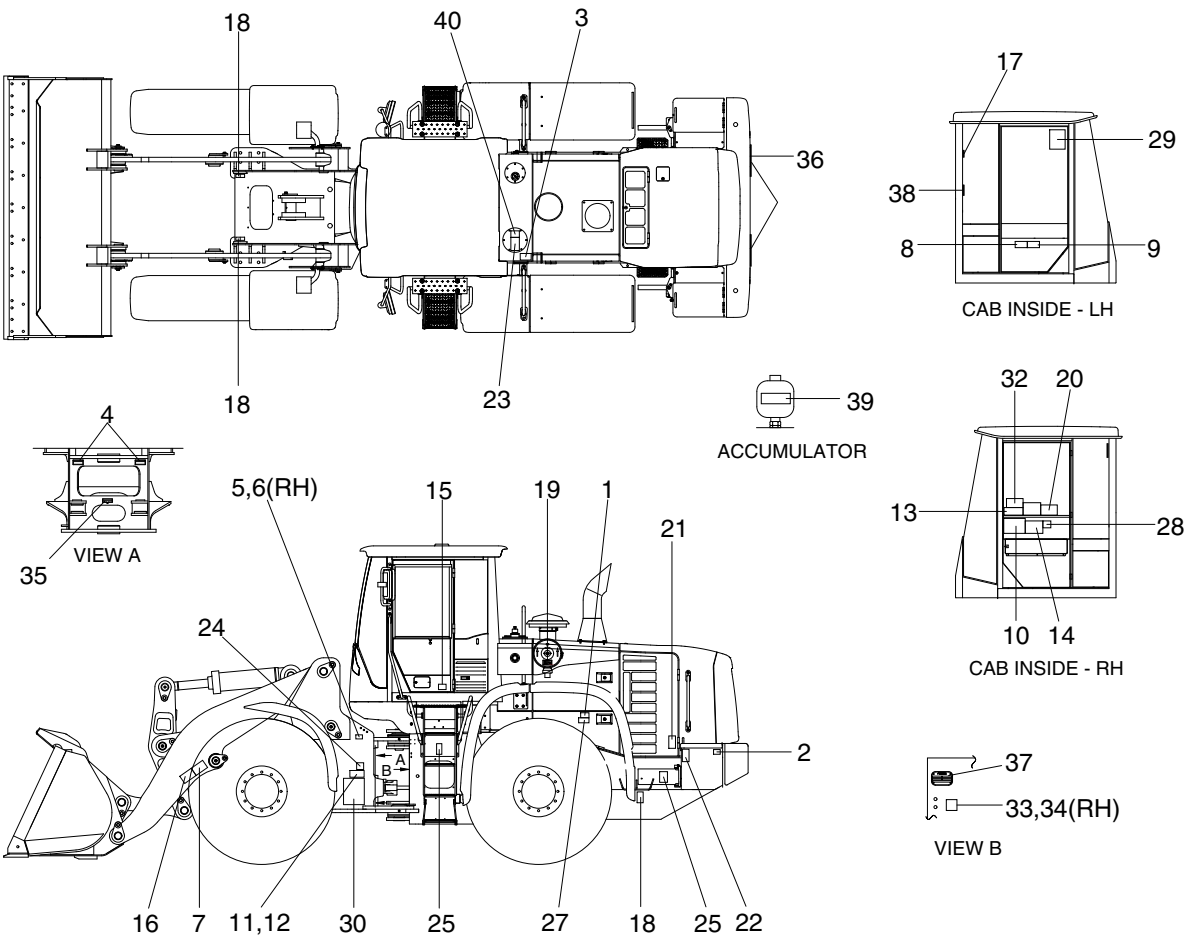
· The value of vibrations transmitted by the operator's seat are lower than standard value of (EN474-1 : 2006 and 2002/44/EC)

CE

SAFETY LABELS

1. LOCATION

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



7759S0FW03

1	Start motor	14	Control ideogram	29	Joystick steering (option)
2	Electric welding	15	Air conditioner filter	30	Service instruction
3	Hyd oil level	16	Quick coupler (option)	32	Caution (water separator, turbocharger)
4	Ride control (option)	17	Hammer		
5	Grease (A)	18	Lift & tie	33	Grease (C)
6	Grease (B)	19	Air cleaner	34	Grease (D)
7	Bucket stopper	21	Fueling	35	Grease-center
8	Max h/reach	22	Battery accident	36	Keep clear/Reflect
9	Roll over	23	Hyd oil lub	37	Name plate
10	ROPS cab (option)	24	High pressure hose	38	ROPS plate (option)
11	Steering warning-LH	25	Falling	39	Accumulator
12	Steering warning-RH	27	Engine door shearing	40	Fuel cut off
13	Engine start caution	28	Emergency exit		

2. DESCRIPTION

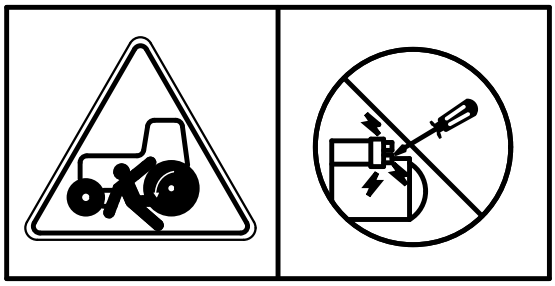
There are several specific warning labels on this machine please become familiarized with all warning labels.

Replace any safety label that is damaged, or missing.

1) START MOTOR (item 1)

This warning label is positioned on the left side of the engine side cover.

⚠ Start the engine only from the operator's compartment. Never short across the starter terminals or across the batteries. Shorting could bypass the engine neutral start system. Shorting could also damage the electrical system.



77070FW05

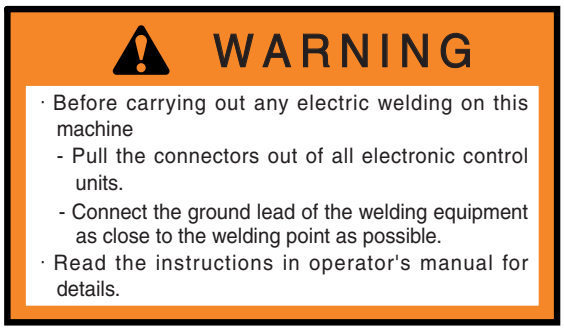
2) ELECTRIC WELDING (item 2)

This warning label is positioned on the side of the battery box.

⚠ Before carrying out any electric welding on this machine

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

※ Refer to the page 6-44 for details.



7803AFW20

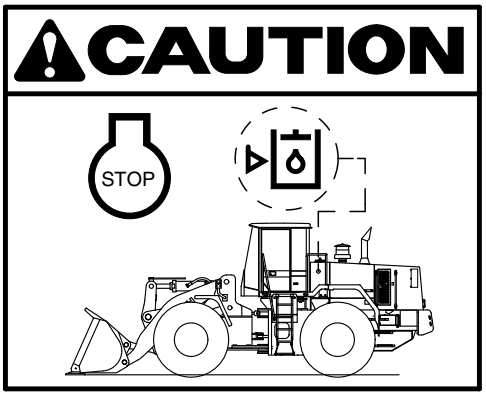
3) HYDRAULIC OIL LEVEL (item 3)

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

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

※ Check oil level on the level gauge.

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



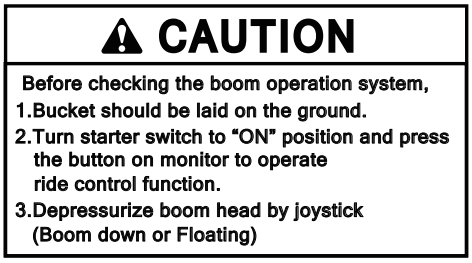
77070FW06

4) RIDE CONTROL (item 4)

This warning label is positioned on the front frame.

Before checking the boom operation system,

1. Bucket should be laid on the ground.
2. Turn start switch to "ON" position and press the button on monitor to operate ride control function.
3. Depressurize boom head by joystick. (boom down or floating)

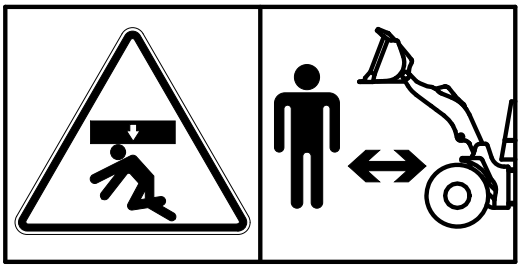


970A0FW90

5) BUCKET STOPPER (item 7)

This warning label is positioned on the middle of the boom.

⚠ **When working under or around the bucket or linkage, with bucket raised, proper support must be provided for the bucket and/or the linkage.**



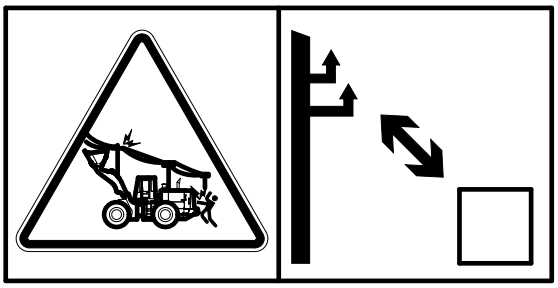
7803AFW05

6) MAX HEIGHT (item 8)

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 1-6.



7803AFW16

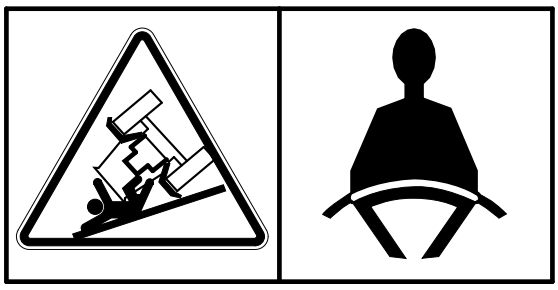
7) ROLL OVER (item 9)

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

⚠ **Structural damage, an overturn, modification, alternation, or improper repair can impair this structure's protection capability thereby voiding this certification.**

⚠ **Always use seat belt when operating your machine.**

Always check the condition of the seat belt and the condition of the mounting hardware before you operate the machine.

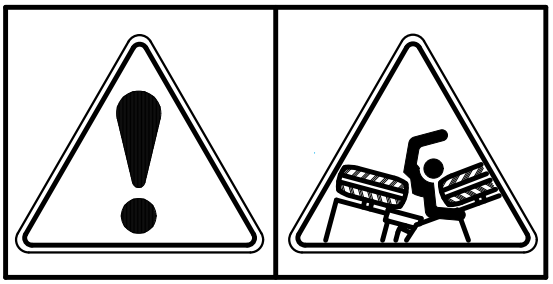


8) **STEERING WARNING** (item 11, 12)

The warning label is positioned on the side of the front frame.

⚠ **No clearance for person in this area when machine turns.**

⚠ **Severe injury or death from crushing could occur.**

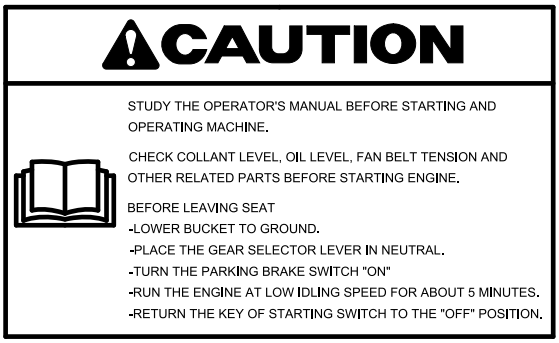


77070FW07

9) **ENGINE START CAUTION** (item 13)

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

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



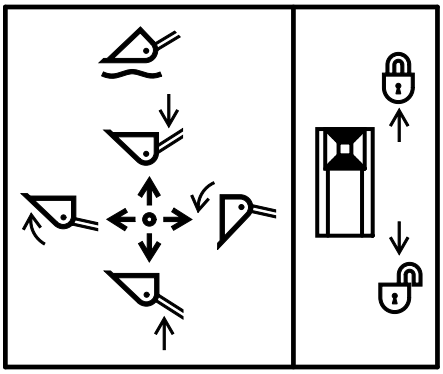
77070FW08

10) **CONTROL IDEOGRAM** (item 14)

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

⚠ **Confirm the operation of control lever and working device before operating the machine.**

※ **Refer to the page 4-9 for details.**

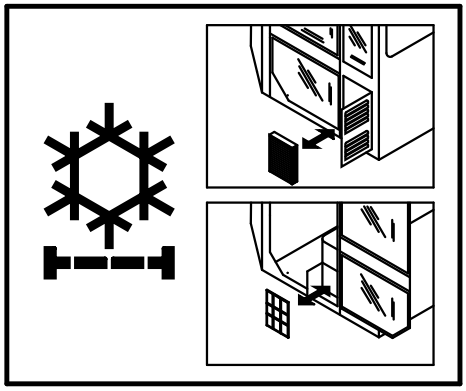


74090FW04

11) **AIR CONDITIONER FILTER** (item 15)

This warning label is positioned on the washer tank cover.

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



77070FW10

12) **QUICK COUPLER** (item 16)

This warning label is positioned on the middle of the boom.

※ **Serious injury or death can result from dropping bucket.**

※ **Operating the machine with attachment switch unlocked or without safety pin of moving hook can cause the bucket to drop off. Refer to the page 8-6.**

757TM9A0FW30

13) **LIFT & TIE** (item 18)

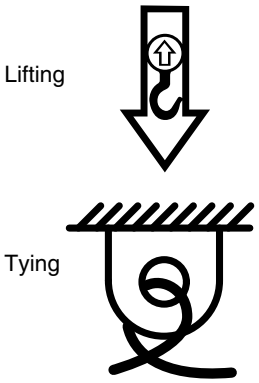
This label is positioned on the both side of the front and rear frame.

- Lifting point

In order to lift the machine, attach the lifting devices to the lifting points.

- Tying point

In order to tie down the machine, attach the tie-downs to the tying points.

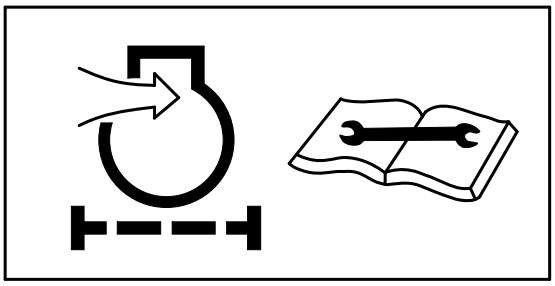


75790FW04

14) **AIR CLEANER** (item 19)

The warning label is positioned on the air cleaner.

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

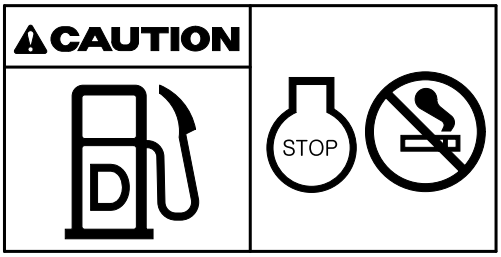


21070FW01

15) **FUELING** (item 21)

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

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



21070FW04

16) **BATTERY ACCIDENT** (item 22)

This warning label is positioned on the battery box.

⚠ **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.

7577A0FW05

17) **HYDRAULIC OIL LUB** (item 23)

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

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

14070FW08

18) **HIGH PRESSURE HOSE** (item 24)

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

⚠ **Escaping fluid under pressure can penetrate the skin causing serious injury.**
⚠ **Avoid the hazard by relieving pressure before disconnecting hydraulic lines or other lines.**
※ **See the maintenance section for details.**

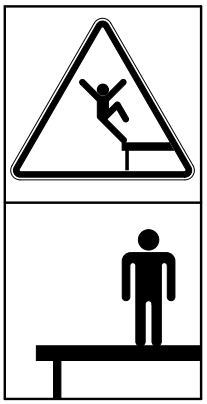
14070FW29

19) **FALLING** (item 25)

This warning label is positioned on the top of the ladder and step.

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

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

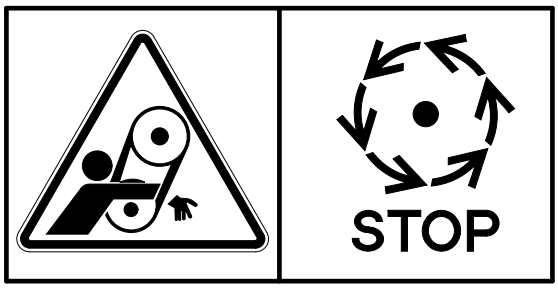


14070FW30

20) **ENGINE DOOR SHEARING** (item 27)

This warning label is positioned on the left side of the engine side cover.

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



21070FW15

21) **EMERGENCY EXIT** (item 28)

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

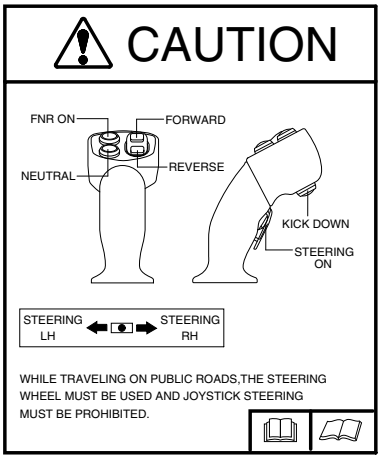
※ **The right door serves as an alternate exit.**

22) **JOYSTICK STEERING** (item 29)

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

※ **While traveling on public roads, the steering wheel must be used and joystick steering must be prohibited.**

※ **Please refer to the page 3-35 for details.**



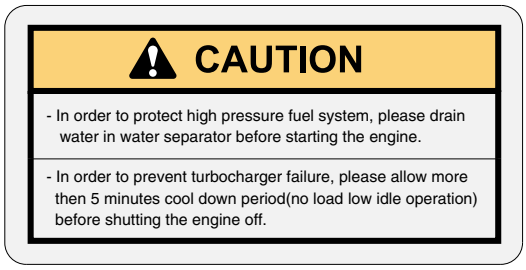
75790FW05

23) CAUTION (WATER SEPARATOR, TURBOCHARGER) (item 32)

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

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

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



120090SL02

24) ACCUMULATOR (item 39)

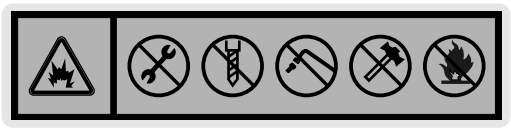
This warning label is positioned on the accumulator of the solenoid valve.

※ 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.



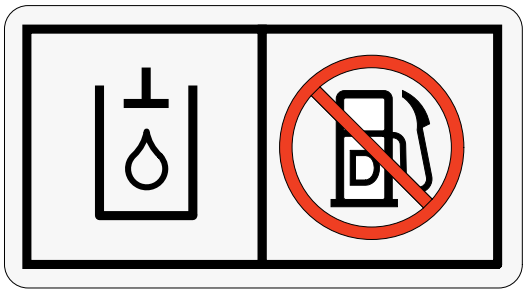
1107A0FW46

25) FUEL SHUT OFF (item 40)

This warning label is positioned on the hydraulic tank.

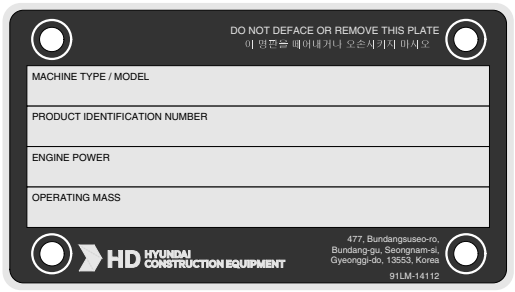
※ Fill only the hydraulic oil.

※ Do not fill the diesel fuel.



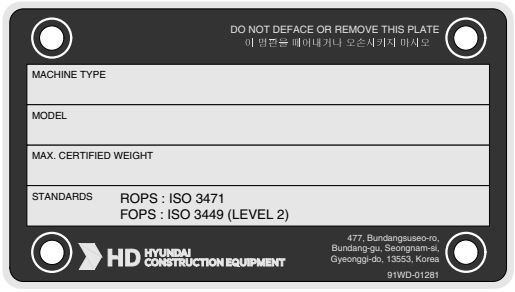
140WH90FW51

MACHINE DATA PLATE



For general

For EU only



For ROPS

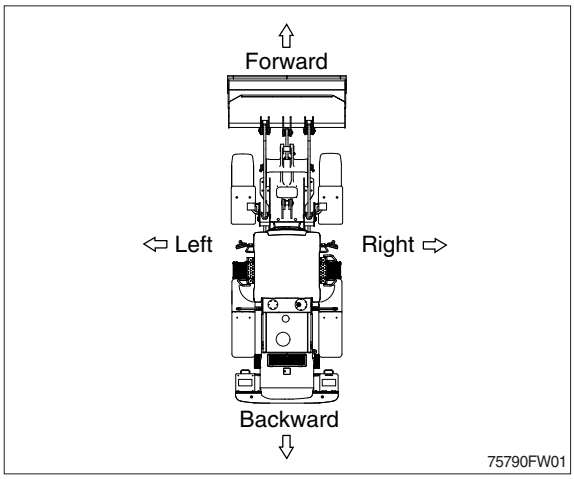
HL0MD01

※ The product identification 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 product identification number is also stamped on the frame.

GUIDE

1. DIRECTION

The direction of this manual indicate forward, backward, right and left, when machine is on the traveling direction.

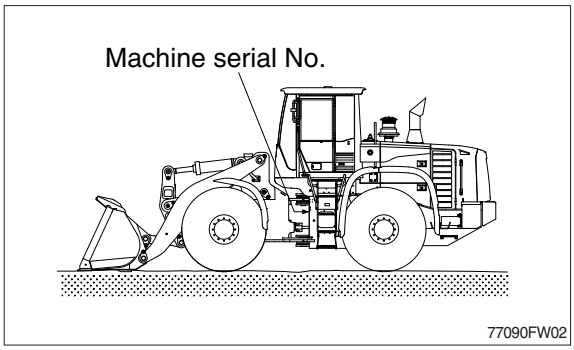


2. SERIAL NUMBER

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

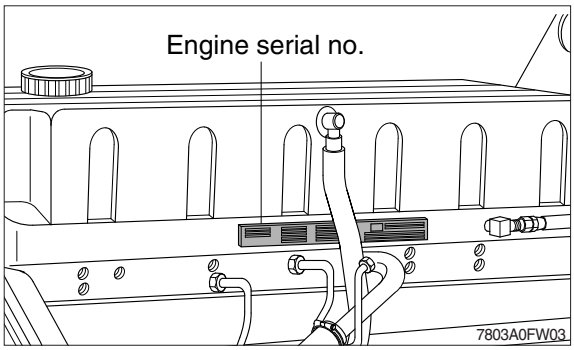
1) MACHINE SERIAL NUMBER

The numbers are located on the left side of the rear frame.



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.

- Excavating work
- Leveling work
- Loading work
- Transporting work

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

4. SYMBOLS

⚠ Important safety hint.

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

※ It indicates the useful information for operator.

1. SAFETY INSTRUCTIONS

Safety Message

Intended Use

Machines should be operated by the procedure the described in the Operator manual.
The products described in the Operator manual are designed and manufactured mainly for the following purposes:

- Loading work
- Leveling work

Do not operate the machine for any purpose other than those stated above or in areas where there are potential risks. Make sure that you comply strictly with the safety regulations at all times. Please contact HD Hyundai Construction Equipment Co., Ltd. or your dealer for more information.

It is strictly prohibited to operate or use the machine in any of the following cases:

- Operation by an unskilled worker
- Lifting a worker up
- Transporting inflammable or dangerous materials
- Driving down or extracting piles with the bucket
- Towing damaged vehicles

Safety guidelines

Most safety accidents related to the operation, maintenance/ inspection, and repair of the machine result from a failure to comply with the safety instructions or to take adequate preventive measures. Safety accidents can be prevented by eliminating potentially hazardous situations. The operator should attend all mandatory training courses on the operation of the machine, and fully understand how to use the tools.

Improper operation, refueling, inspection or repair of this machine may cause serious injury or death.
Do not attempt to operate, refuel, inspect or repair this machine before reading and understanding the product information on such tasks.
This manual describes preventive measures and warnings about the product.
Failure to comply with the warnings about potential risks may result in serious injury or death.

General Safety Information

Unauthorized modification

Any attempt to modify the machine, including the use of unauthorized accessories or spare parts, may have adverse effects on the conditions of the machine and its ability to function as it was designed. Do not attempt to modify the machine in any way without the written consent of the company in advance. The company bears the right to disclaim all quality assurance of a product that is modified without its advance approval.

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

If the user performs unauthorized modification of the product, the user shall fully be responsible for any damages to the machine resulting from the effects of such modification.

1. The attachment, the accessory, or the spare part has been made or distributed by HD Hyundai Construction Equipment and has been installed according to approved methods described in a publication available from HD Hyundai Construction Equipment.
2. Any modification should be approved by the company in writing.

ROPS/FOPS

The cabin is designed to guarantee sufficient space to minimize impacts according to ISO 3471 of Rollover Protective Structures (ROPS). If any additional devices are installed that exceed the Max. certified weight indicated on the ROPS nameplate, the ROPS certification may be nullified. The protective structure of the cabin should be replaced immediately if it is permanently deformed or damaged.

Machines operated in areas where there is a risk of objects falling onto the cabin are fitted with a Falling Object Protective Structure (FOPS) according to ISO 3449.

Fire and Explosion

Preventing fires

The following actions should be taken to minimize the risk of fire:

- Do a visual inspection before operating the machine to check for any risk of fire.
- Do not operate the machine if there is a risk of fire.
- Be sure to identify the primary exit and alternative exit of the machine, and fully understand how to use the exits in the event of a fire.
- Do not perform any welding or drilling work on the engine cover.
- Keep the engine compartment free from the build-up of flammable materials such as dead leaves, small branches, paper, and other types of trash.
- Keep the covers of the major parts of the machine closed. Make sure that the covers operate normally in order to be able to use firefighting equipment in the event of a fire.

- Be careful when handling fuel. Fuel is a highly flammable.
- Always stop the engine when refueling the machine.
- Refuel outdoors.
- Remove any build-up of flammable materials from the machine.
- Do not operate the machine near a flame.

- All fuels and most lubricant and coolant mixtures are flammable materials, so special care should be exercised when handling such materials to prevent fire and explosion.
- Keep all fuels and lubricant in adequate containers.
- Never smoke in the area where refueling is taking place or in the space for handling battery electrolytes and other flammable materials.
- Oil leaked to a hot surface or electronic component may cause a fire.
- Do not operate the machine if there is an oil leak. Repair the source of the oil leak, and wipe clean any leaked oil before operating the machine.
- Always clean all electrical lines, connectors, and clamps, and check whether they are securely connected on a regular basis.
- If any electrical wire or connector is loose or damaged, repair it immediately.

- Do not weld, cut or use a cutting torch through any tubes or lines in which flammable flows. Check all tubes and lines for signs of abrasion or deterioration and replace if damaged.
- Dust or particles generated when repairing the non-metallic hood or fender are flammable or explosive. Repair such parts in a well ventilated area well away from flames or sparks, and be sure to wear suitable PPE (Personal Protective Equipment).

Prevention of explosion

The following actions should be taken to minimize the risk of explosion:

- Preheating function is provided to certain machines that are used in extremely cold environments.
- Never use starting aid fluid in a low-temperature environment as it can environment as it can harm the engine the engine performance and may cause an explosion.

- Do not attempt to recharge a frozen battery. Forcibly recharging a frozen battery may result in an explosion.
- Great care should be exercised when handling the batteries. Never let a tool make contact with the positive pole and the frame of the machine simultaneously. Sparks maybe generated, resulting in an explosion.
- The voltage of the battery to be recharged should be identical to the voltage of the recharger. Incorrect voltage may cause overheating and explosion.
- Do not use or charge the battery if the level of electrolytes in the battery is lower than the minimum level. Regularly check the electrolyte level, and refill the distilled water to the maximum level.

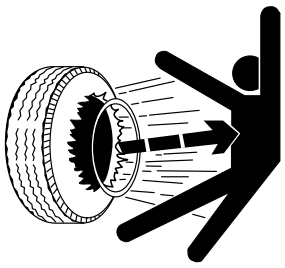
- Do not try to start the engine using an unsuitable booster cable as it may result in an explosion and serious injury.
- Only use the booster cable to start the engine in a ventilated open space, as starting the engine with a booster cable may generate inflammable gas.
- When hydraulic equipment and piping are overheated, flammable gas or airborne particles may explode. Make sure to protect and insulate such parts to prevent over heating.

Corrective Actions Before and After a Fire

In the event of a fire in the machine, the top priority should be the safety of the operator and workers in the work area. In the event of a fire at a level that does not endanger the operator or workers, the following actions should be taken:

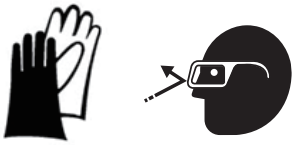
- Move the machine well away from any inflammable materials (e.g., fuel, engine oil, clothes, and bits of wood) and adjacent buildings.
- If the engine is running, it may cause a persistent fire. Immediatly stop the engine.
- In the event of an electric short, disconnect the batteries to eliminate the main ignition source.
  In the event of an electricity leak resulting from damage to the power wiring caused by fire, disconnect the batteries to eliminate the secondary ignition source.

If a fire becomes too large to control, assess the following risks :



- If the machine is equipped with wheels, there is a risk of tire combustion and explosion. If exploded, high-temperature fragments may scatter.
- The tank, accumulator, hose and fitting may burst into flames, splashing fuel and scattering particles throughout the surrounding area.

If you have to handle a machine that has been damaged by fire or one that is exposed to excessively high heat after extinguishing a fire, take the following precautions:



- Wear thick protective gloves and protective goggles.
- Never touch any materials left after combustion with your bare hands.
- Avoid contact with melted polymer materials (e.g., plastics).

Information on fire extinguisher

Fire extinguishers (if equipped) should be kept in a fully operable condition, and be inspected by a qualified person on a regular basis. Workers should complete a training course on the use of fire extinguishers in advance.

Use fire extinguishers in accordance with the following procedures, if required:

① Pull the safety pin of the fire extinguisher first.
② Extend the nozzle, and stand toward the fire.
③ Aim the nozzle at the flames, and firmly press the top and bottom handles.
④ Stand in a downwind position, and evenly spray the foam over the flames.

If the weight of the fire extinguisher exceeds 4.5 kg, mount the extinguisher in a location near the bottom of the cabin. Do not mount the fire extinguisher at a level higher than one third of the height of the cabin.

Do not weld or drill ROPS to mount a fire extinguisher. Contact your dealer or distributor for more information about the correct mounting of fire extinguishers.

Health and Safety

Personal protective equipment

The wearing of personal protective gear is mandatory for protecting the human body from hazardous chemicals and hazardous environments.

The wearing of personal protective gear is a means of preventing injury, and should not interfere with the performance of jobs. It is designed to protect the human body from hazardous environments and hazardous materials, and should be kept in an easily accessible place.

List of personal protection gear

Name	Symbol	Remarks
Safety helmet		Protects the head from falling objects, and reduces risks when falling down.
Dust mask		Air-purifying dust mask should not be worn in workplaces with an oxygen concentration of less than 18%.
Gas mask		Prevents the inhalation of mist, airborne particles, or protects against the spray of hazardous chemicals.
Welding helmet		Blocks airborne dust and slag, and shields the face from bright light during welding.
Protective clothing		Blocks dust, mist and hazardous chemicals, and protects against burns.
Protective gloves		Electric insulation gloves: Should be worn when working in areas with a high risk of electric shock. Chemical protective gloves: Should be worn when working in areas where there is a risk of contact with hazardous chemicals including materials leaked from batteries.
Protective goggles		Protects the eyes from dust, particles and airborne materials in work areas.
Earplugs and earmuffs		Wear earplug and earmuffs separately or in combination depending on the level and duration of noise.
Safety shoes		Protects the feet from falling objects, impacts, and sharp objects.

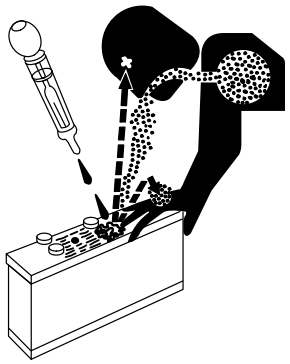
Health and safety instructions in hazardous environments

Comply with the following instructions during operation and maintenance of the machine.

When handling oil

Failure to wear personal protection equipment may result in burns caused by contact with a high-temperature liquid. Make sure you wear protective goggles, protective gloves and protective clothing when handling oils such as hydraulic oil and engine oil.
If the eyes come into contact with oil, wash them with a sufficient amount of water for 15 minutes or longer. If the skin comes into contact with oil, take off contaminated clothes and shoes, and wash the skin with soap and water for 15 minutes or longer.

When handling the battery



If battery electrolyte leaks while handling the battery, the sulfuric acid contained in the electrolyte may cause burns.
The lead components in battery electrolyte are toxic, so be sure to wear protective gloves and protective clothing.
Do not forget to wash your hands after handling the battery.
If a part of your body not protected by personal protective equipment comes into direct contact with battery electrolyte, immediately wash the affected part with flowing water for 20 minutes or more, and then see a doctor without delay.
If you accidentally swallow battery electrolyte, drink lots of water and do not forcibly induce vomiting, and then see a doctor without delay.

When hanlding refrigerant

Make sure you wear protective goggles, protective gloves and other personal protective equipment when handling refrigerant to prevent direct contact of the skin with the refrigerant. Wear protective gloves made of materials that are resistant to chemicals (such as neoprene and butyl rubber).
Never smoke when handing refrigerant.
If refrigerant comes into direct contact with the skin, wash the skin with warm water immediately.

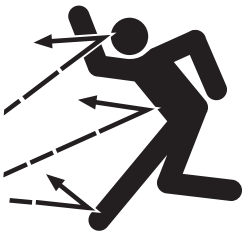
When handling coolants

After operation of the machine the coolant is of high temperature and high pressure, and is retained inside the engine radiator and the heater line. Direct contact of the skin with the coolant may result in serious burns. Open the cap of the radiator only after the engine has sufficiently cooled and the pressure has reduced to a safe level.

Coolant contains toxic and combustible ethylene glycol, and should be handled in a cool, well-ventilated place only when wearing protective goggles, protective gloves, protective clothing, and a gas mask.
Avoid inhaling airborne particles or spray from coolant. If the substances make contact with skin or eyes that are not protected by personal protection gear, immediately wash the skin and eye with flowing water for 20 minutes or longer.

When working in a place subject to airborne particles and falling objects,

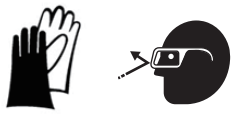
Make sure you wear a safety helmet, protective goggles and safety shoes to prevent injury from such particles and objects. Earplugs or earmuffs may be necessary when working in a noisy place.



When working in places with a high level of noise

When the operator is exposed to the noise exceeding 90 dB (A) for 8 hours or longer, wear earplugs or earmuffs.

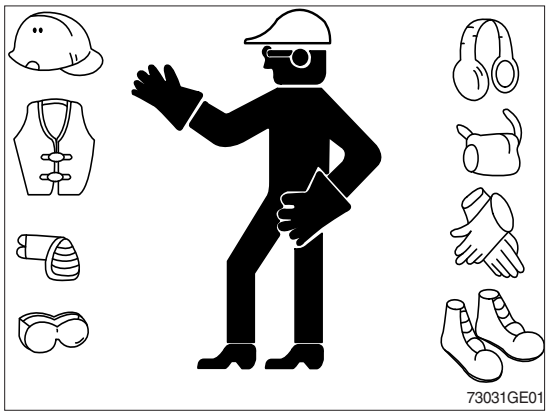
Personal protection gear for various situations

Situation	Symbol
Oil handling	
Battery handling	
Refrigerant handling	
Coolant handling	
Repair by welding	
Working in areas subject to airborne particles and falling objects	
Working in places with a high level of noise	
Handling machines damaged by fire or exposed to excessively high temperature	

WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

- Do not wear loose clothing and accessories. Secure long hair. These items can snag on controls or on other parts of equipment.
- Do not wear oily clothes. They are highly flammable.
- Wear a hard hat, safety shoes, safety goggles, mask, leather gloves, earplugs and other protective equipment, as required.
- While working on machine, never use inadequate tools. They could break or slip, or they may not adequately perform intended.



Noise and Vibration

Information on vibration

This section describes the vibration data of the machine, and methods of calculating the vibration level.

The vibration level of the machine varies according to any of the following conditions:

- Driving habits of the operator (i.e. aggressive/mild temperament when driving)
- Quality of seat and suspension
- Type of machine, attachments, and conditions of machine
- Conditions of work site, working environment, ground surface conditions, and weather

Vibration also varies according to the duration of operation. Accordingly, it is not possible to precisely calculate the vibration level of the machine; however, it is possible to predict the level.

Physical Agents Directive 2002/44/ECdefines the exposure action value as 0.5m/s^2, and the exposure limit value as 1.15 m/s^2. If the predicted value is near the exposure action value or exposure limit value, the predicted value should be assumed to exceed the two latter values, and necessary action should be taken.

As regards the actions to take according to vibrations, refer to the following table :

Daily vibration exposure (A(8))	Vibration exposure range	Actions to be taken
A(8) $\leq$ 0.5 m/s^2	Exposure action value or lower	When approaching the exposure activity value, reasonable measures should be taken to minimize exposure to vibration. The relevant information and opportunities for training on vibration reduction should be provided to the operator.
0.5 m/s^2 < A(8) $\leq$ 1.15 m/s^2	Exceeding the exposure action value, but not exceeding the exposure limit value	It is required to execute certain measures for reducing exposure to and risks of vibration to the minimum. The health of an operator who has been exposed to excessive vibration should be examined.
1.15 m/s^2<A(8)	Exceeding the exposure limit value:	Immediate action is required to reduce the vibration exposure level to below the exposure limit value.

The vibration level can be predicted based on the information in the following table which is used to calculate the daily level of vibration exposure.

Predict the vibration level in the three vibration directions of axes X, Y, and Z. The mean vibration level should be used under normal operation conditions. Scenario factors from mean vibration level based on operation by skilled operator and on smooth terrain are excluded. Scenario factors are included to obtain the mean vibration level based on aggressive operation and severe terrain to assess the expected vibration level.

※ All vibration values are indicated in m/s^2.

Instructions on mitigating vibration

Machines should be correctly adjusted and maintained to ensure smooth operation. The terrain conditions should be observed. The following instructions will help reduce the whole body vibration level:

① Use machines and attachments of the correct types and sizes.

② Maintain the machines pursuant to the manufacturer's recommendations.
- Brake and steering systems
- Controls, hydraulic system and linkage
- Tire pressure

③ Maintain and provide good terrain conditions.
- Remove any large rocks or obstacles.
- Fill gutters or holes.
- Keep the vibration level minimal by adjusting the speed and driving path

④ Use a driver's seat that satisfies ISO 7096.
- Adjust the driver's seat and suspension for the weight and the size of the operator.
- Inspect the suspension and adjusting devices of the driver's seat.

⑤ Perform the following maneuvers without using excessive force :
- Steering
- Braking
- Accelerating
- Gear shifting

⑥ Move the attachments smoothly.

⑦ Adjust the speed and path of machine to keep the vibration level minimal.
- Operate the machine so as to avoid obstacles and rough terrain.
- Decelerate the machine when driving on rough terrain.

⑧ Keep the level of vibration minimal when working for a long time or driving for a long distance.
- Use a machine mounted with suspension system.
- Use the machine's drive control system (optional).
- If the machine is not fitted with a drive control system, reduce the speed.
- Transport the machine when moving between worksites; do not drive the machine to get to another worksite.

⑨ The operator's convenience may be reduced by various risk factors. Comply with the following conditions to effectively ensure the operator's comfort and convenience.

- Adjust the driver's seat adjustment device to allow a convenient posture.
  Adjust the angles of the mirrors to minimize awkward, compromised posture
- Avoid working for an excessively long time, and take regular breaks.
- Do not jump on or from the cabin.
- Minimize repeated handling of loads and lifting of loads.
- The vibration information and calculation procedures are based on <ISO/TR 25398>, which has been defined according to the emission of vibrations measured under the actual working conditions of the machines.

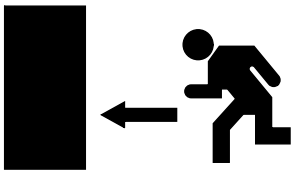
Information on noise

Noise level (EN 474-1:2018 and 2000/14/EC) are as follows :

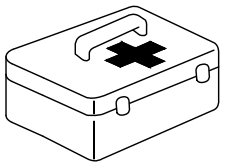
- Sound pressure level (LpA)
- Sound power level (LwA)

Emergency situations

In the event of an emergency situation, use the emergency hammer installed inside the cabin to break the windshield of the cabin, and carefully escape from the cabin. The emergency hammer should always be kept inside the cabin for emergencies, and should not be removed or used for other purposes. If the emergency hammer is lost, replace it immediately.



Keep a first-aid kit inside the cabin or in another place at the worksite for safety accidents.



Keep contact information (e.g., phone number) to request help with an emergency situation or injury.

Safety Information on the Machines and Operation

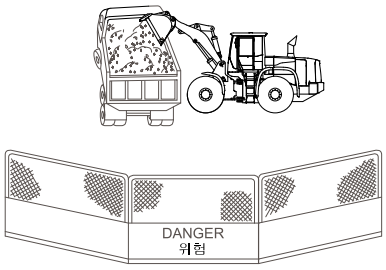
Before Operating the Machine

Visual inspection shall be performed for identifying potential hazards and obstruction of visibility around the machine.

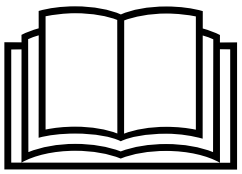
Carefully examine the following conditions and take the necessary actions, if required, to prevent risk factors before operating the machine:

Checking the worksite

- Check the weather condition at the worksite (e.g., fog, rain, etc.). Fog or heavy rain may narrow the operator's field of vision, or render the machine inoperable. In particular, the operator should bring the bucket down to the ground in the event of thunder and lightning, and evacuate to a safe place.
- Check the worksite for obstacles, and avoid collisions with such obstacles during operation. Check the surroundings of the machine for any obstacles that may hinder operation.
- Check the worksite for buried waterlines, telecommunication cables, power cables and oil pipelines in advance, and avoid damaging them.
- If the terrain of the worksite is too rough for normal operation of the machines, flatten the terrain before operating the machines. Make sure that the ground of the worksite is not soft as it may cause hazards during operation.
- If the worksite is a marshy place (e.g., shallow river, large or small lake, swamp, etc), check the conditions and the depth of marshy areas, and the flow rate before driving or operating the machines. Do not operate the machines underwater.
- Do not operate the machines on cliffs or at the end of a road on soft ground as the machine may overturn.
- When operating the machine in areas with pedestrian or vehicle traffic, or in a zone in the vicinity of such an area, appoint workers exclusively responsible for controlling the traffic, or install fences or blocking wall to separate the worksite from the traffic area. Workers responsible for vehicle control in the traffic area or exposed to public vehiclar traffic shall be worn with warning vests or clothing made of reflective or high-visibility materials. Prevent unauthorized workers or machines from accessing the worksite.



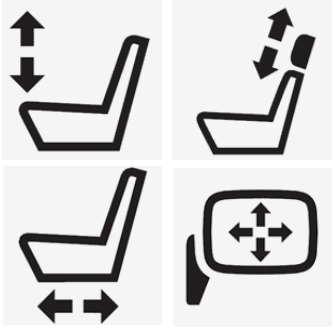
Operator conditions to be checked before operating the machine



- The machine shall be operated by authorized and skilled operators only.
- The operator should wear clothes and personal protection gear that are appropriate for the work environment.
- The operator should only be permitted to operate the machine under normal conditions after checking the state of the operator. Operator under the influence of alcohol or drugs, or an extremely exhausted operator should not operate the machine.
- The operator should read and fully understand the operator's manual before operating the machine.
- The operator should fully understand the details and procedures of the work to be performed.
- If a risk of a safety accident is suspected, consult sufficiently with the responsible worker, and only perform the work after taking the necessary preventive measures.

Machine conditions to be checked before operating the machine

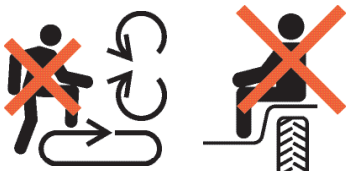
- When defects make continued operation hazardous to operator and workers around the worksite, the defective items of the machine shall not be operated and placed in a designed area posted for that purpose, or a tag or other effectice method of marking the defective items shall be used to prohibit further use untile the defects are corrected.
- If damaged windows obscure visibility necessary for safe operation, or crated hazard to the equipment operator, the windows shall be replaced or corrected.
- Check the machine for abnormal noise, vibration or heat, and for the leakage of engine oil, hydraulic oil, fuel or refrigerant.
- Remove any substances (e.g., inflammable materials such as wooden chips, dead leaves, and pieces of paper) from the engine and the battery. The buildup of such substances may cause a fire.
- Do not operate a machine that needs repairing without taking actions for repair.
  Operate the machine only after making sure that the regular inspection and service recommended in the operator's manual have been executed.



- Adjust the operator’s seat to suit the physical condition of the operator. Check the seatbelt for damage, and replace it if damaged. Do not store unnecessary objects or tools in the cabin.
- Keep clean all parts related to the visibility, such as the windshield and rearview mirror. In particular, adjust the rearview mirror to ensure that the operator’s field of vision is clear.
- Check the acoustic alarms (e.g., the horn and warning signal when driving backward or moving) for normal operation.

During Operation of the Machine

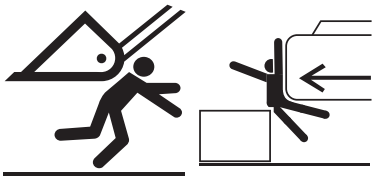
Getting on and off



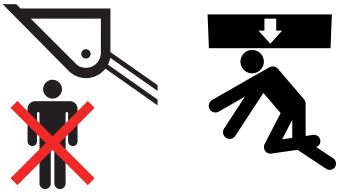
- Do not jump on or off the machine.
  Do not try to get on or off the machine while it is moving.
- Get on or off the machine using the handrail and step (or stepladder, if any). Always keep the handrail and step clean and free from mud or oil.
- Wear anti-slip shoes.
- Comply with the principle of three-point contact* by contacting the machine with either both hands and one foot or vice versa when getting on or off the machine.
- Do not sit on a seat not suited or intended for sitting.

※ **Three-point contact means making contact with the machine with both hands and one foot, or with one hand and both feet.**

During operation

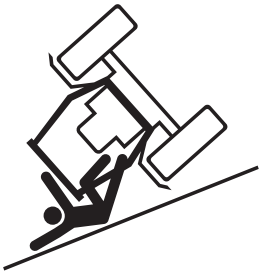


- The operator should start the engine only after sitting on the operator's seat. Make sure that all levers are shifted to the neutral position before starting the engine.
- If there are any obstacles at the worksite, pay attention to prevent collision of the machine with such obstacles, particularly when turning and moving backward. Make sure that there are no obstacles when turning and moving backward.
- When lifting a load, the capacity of the machine and the size and weight of the object to be lifted must be considered. Do not lift a heavy object with slings by suspending the slings on the tooth of the bucket.
- Do not allow any worker to stand under the bucket.



Operation on a slope

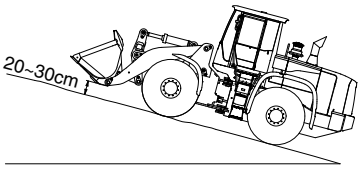
Comply with the following conditions when operating the machine on a slope:

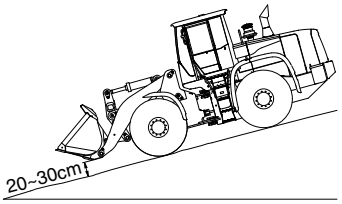


- Do not work on slopes of 10˚ or more.
- The maximum climbing angle of the machine on a slope is 30˚. Do not operate the machine at an angle exceeding this value.
- If operation of the machine on a slope is unavoidable, perform the work after flattening the ground.

- When operating the machine laterally on a slope, there is a high risk of machine overturning or slipping. Do not operate the machine in such conditions.

- Do not operate the machine on a slope covered with wet grass or a thick layer of dead leaves, as the machine may slip.
- Do not park or stop the machine on a slope.
  If parking or stopping the machine on a slope is unavoidable, bring the bucket down to the ground, and support the wheels with wheel chocks.





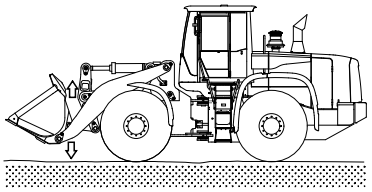
- When traveling up a slope, operate the machine at a slow speed with the attachment extended forward to keep the machine balanced, and with the bucket raised at least 20 ~30 cm from the ground.
- Never travel down a slope in neutral. Keep the bucket 20~30 cm above the ground and use the bucket as a brake in an emergency situation.
- If the engine suddenly stalls, immediately bring the bucket to the ground.
- If the fuel gauge reaches the red zone while operating the machine, immediately refill with fuel. (If the machine operates on a slope under these conditions, air may be introduced into the engine, causing it to stall suddenly.)

Cautions to Be Taken When Driving the Machine

- If you operate the machine with the parking brake on, it may cause serious damage to the parking brake disk.
- Select the appropriate gear for the driving speed.
- Do not change direction when driving the machine at max. speed as this may cause serious damage to the transmission.

- Only drive the machine for short distances on the road.
- Make sure you fully comply with the local road traffic regulations and legislation of your country when driving on the road.
- Please note that the machine is wider and travels at a lower driving speed than other vehicles on the roads.
- Pay attention to any vehicles behind your vehicle, and allow them to overtake your vehicle safely.

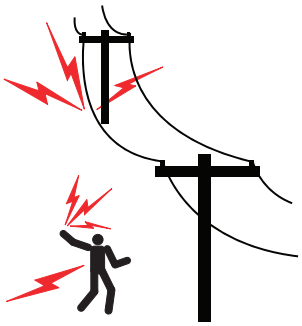
Driving position



- Check the following conditions before driving the machine on the public road :
  - Remove any dirt and sand from the machine.
  - Empty the bucket and move it to the driving position (40~ 50 cm above the ground) and fix it.
  - Close the windshield. Turn the working light off.
  - Wear the seat belt.
  - Use the lighting devices, such as the headlights, emergency warning light and rotating beacon, pursuant to the local road traffic legislation.
  - Pay attention to people in the vicinity of the machine.
  - Do not operate the machine on roads or bridges where the machine exceeds the weight limit.
  - Familiarize yourself fully with the width, length and height of the machine.
  - Check the tire pressure.
  - When traveling for a long distance, stop the machine after every 40 km or on an hourly basis, and take a break.
  - Check the level of fuel and coolant.
  - Never shift the gear to the neutral position when driving down a slope.
  - Changing direction when operating the machine on a slope is dangerous.
  - Do not drive on a slope of 30˚ or more.
  - Drive slowly when traveling the machine on rough terrain or moving over obstacles.
  - Install chains on the tires when operating the machine on slippery roads covered with snow or rainwater, and do not attempt to start, stop or turn the machine suddenly.
  - Be sure to avoid any obstacles when traveling the machine on paths.

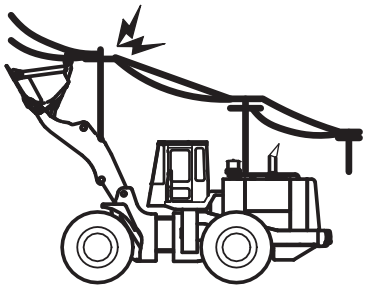
Operations to be avoided or prohibited

· Pay attention when operating the machine in an enclosed space as this may result in the risk of a buildup of hazardous gases.

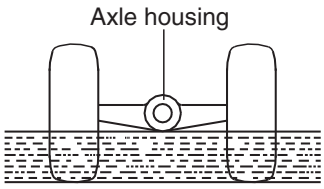


· If the machine is operated in the vicinity of a high-voltage line, there is a risk of death or serious injury.
· Make sure you are fully aware of the height and working radius of the machine, and maintain the minimum safety distance.

Voltage	Minimum safety distance
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)



· In the event of contact with a high-voltage line, keep sitting on the operator's seat until the electric current has been shut down.
· Warn any workers on the ground in the vicinity of the machine not to make contact with the machine.
· If leaving the machine is unavoidable, jump down to a place free from any contact with the machine.
· Do not operate the machine too close to the edge of cliffs, overhangs and deep ditches for preventing falling down or tipping over. Avoid operating on loose ground, especially the ground near ditch is likely to collapse. Pay special attention when it is raining as the heavy rainfall may soften the ground.
· Avoid operating the machine on soft ground, a slope or cliff as there is a risk that it may overturn. Pay special attention when it is raining as the rainfall may soften the ground.

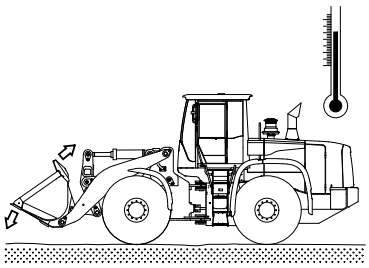


· When operating or driving the machine underwater, check the floor conditions, depth of water and flow rate, and make sure that the top roller and axle housing are not immersed in water.
· Do not operate the machine under adverse weather conditions caused by overcast skies, snow, and rainfall.
· Do not turn or travel the machine when the bucket is stuck in the ground.
· Do not excavate too deeply under the front of the machine for preventing from falling or tipping over.

Cautions when operating in specific areas

Operating in extremely cold environments

- Do not attempt to start, stop or turn the machine suddenly as this may cause it to slip. There is potential for the machine to slip.
- Snow-covered or frozen ground may be slippery and dangerous.
- Idle operation of the machine may be required to elevate the engine temperature during startup.
- An impact resulting from a sudden movement of the boom or the attachments at an extremely low temperature may cause serious damage to the machine.
- The working cycle or loading weight might be reduced to lower than those under normal conditions.
- Check the following conditions before operating the machine :



  - Warm up the engine for 3~4 seconds when starting up the engine.
  - Always fully charge the battery. A discharged battery will freeze earlier than a fully charged battery.
  - Use engine oil and fuel that are appropriate for the temperature.
  - Keep the fuel tank full.
  - Remove any moisture from the fuel tank, and change the fuel filter regularly.
  - If the fuel filter is frozen, the flow of fuel may be blocked.
  - Pour the proper volume of antifreeze into the coolant.
  - Wait until the various parts of the machine reach the operating temperature after starting the engine.
  - Make sure that every controller and function of the machine operates normally.
  - Remove any dirt, snow and ice from the machine after completing the operation, and park the machine on a wooden pallet.

Operating in extremely hot environments

- Continuous operation of the machine for a long period of time may cause the machine to overheat. Pay special attention to prevent the overheating of respective parts such as the engine and the hydraulic system, and stop the machine and take a break if necessary.
  Check the following conditions frequently :

  - Check the level of the coolant in the radiator.
  - Check the radiator grill for clogging by foreign pollutant, and remove them, if any.
  - Check the level of the battery electrolyte.
  - If the battery will not be used for a long period of time, store it in a cool place.
  - Check the hydraulic system for oil leakage.
  - Check the lubrication oil on the respective parts, and top up the oil if necessary.
  - If the paint coating of any parts has been effaced or damaged, coat the parts with paints or treat them with an anti-rust additive.
  - Do not park the machine under direct light for a long period of time.
  - When parking or storing the machine outdoors, use the proper cover to protect the machine from sunlight and dust.

Operating in dusty or sandy environments

- Check the radiator grill for clogging by pollutant, and remove them, if any.
- Check the fuel system, and protect it from dust or sand when refueling.
- Inspect the air cleaner regularly, and replace it if necessary.
- If the gauge lamp on the dashboard lights up and the buzzer sounds at the same time, clean or replace the air cleaner independently of the usual inspection cycle.
- Frequently check consumables such as hydraulic oil and lubrication oil, and change them if necessary. Pay attention care to prevent the introduction of dust or sand when changing the consumables.
- Check the air-conditioner and the heater filters regularly, and clean or replace them if necessary.
- When parking or storing the machine outdoors, use the proper cover to protect the machine from dust and sand.

Operating in rainy or humid environments

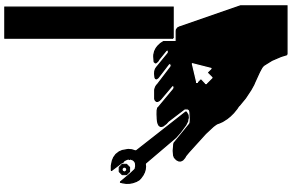
- Do not operate the machine in areas where there is heavy rainfall or thick fog.
- If operating the machine in such areas is unavoidable, perform operation after ensuring sufficient field of vision.
  - Use lighting devices such as the head lamp and working light.
  - Warn any workers within the radius of operation of the machine.
- Pay attention when operating the machine on smooth ground as there is a risk of it overturning.
- If the paint coating on any parts has been effaced or damaged, coat the parts with paints or treat them with an anti-rust additive.

Operating the machine in coastal areas

- Special care should be taken when operating the machine in coastal areas as exposed parts may be corroded easily.
- If the paint coating on any parts has been effaced or damaged, coat the parts with paints or treat them with an anti-rust additive.
- Perform inspection and maintenance of the parts promptly.

Cautions during maintenance

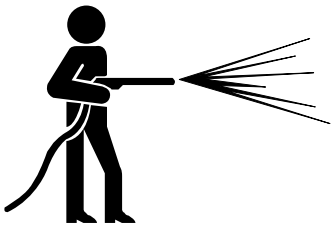
Tools



- Use the correct tools for each type of work.
- Using improper tools may damage the machine and its parts.
- Using deteriorated or damaged tools may result in bodily injury.

Inspection and servicing

- Prevent access to the machine by all unauthorized workers (other than those authorized during operation of the machine).
- In the event of an inspection park the machine in a flat area and attach it with an 'Under Inspection' sign.
- Clean the machine before inspection or maintenance.
  - When performing inspection or maintenance on a dirty machine, it may be difficult to diagnosis or detect the cause of a problem with the machine, if any.
  - Dust or dirt accumulated on the machine may cause a worker to slip or fall.
  - Wear protective goggles and protective clothes when cleaning the machine using a compressed water jet.
  - Do not spray water directly on sensors or electric connectors (sensors or electrical connection units, etc.). If water gets into the electrical system, it can cause operational problems.

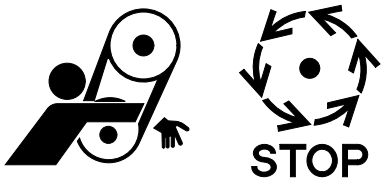


- Use proper lighting devices when operating the machine in a dark area.
- Use lighting devices that satisfy the explosion-proof requirements when handling inflammable materials such as fuel and hydraulic oil.
- Never attempt to use a direct flame such as a cigarette lighter in lieu of the lighting device.

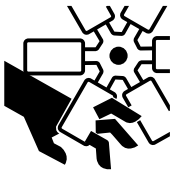
- Check the level of the cooling water after stopping and sufficiently cooling down the engine.
- Sufficiently relieve the inside pressure before opening the cooling water cap.
- The cooling system contains basic components. Pay attention to prevent the skin or eyes coming into contact with the basic components.

- Pay attention to protect the body from contact with hot fluid or parts.
- Replace the filters only after stopping off and sufficiently cooling down the engine.
- Slowly remove the hydraulic oil filter plug to relieve the inside pressure.
- Relieve the pressure from the hydraulic system before disconnecting the lines and fittings.

Collision or cutting



- Never open or remove the engine hood while the machine is in operation.
- Two workers should perform the job while the engine is running:
- One worker should be ready to operate the machine or to turn the engine off from the cabin.
- Keep areas in the vicinity of rotating or moving parts clean.
- Keep articles in the vicinity of the fan clean.
  - Wear safety gloves when handling the wire cables.
  - Wear protective goggles and protective clothes, if required.

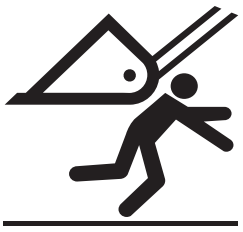


Preventing fire and explosion

- All fuels and most lubrication oils and coolant mixtures are inflammable materials, so special care should be exercised when handling such materials to prevent fire and explosion.
- Oil that leaks on to a hot surface or electronic components may cause a fire.
- Keep all fuels and lubrication oils in adequate containers.
- Do not smoke while refueling fuels, or at the refueling point.

- Do not smoke in a space where battery electrolyte and other inflammable materials are handled.
- Always keep all electrical lines, connectors, and clamps clean, and check whether they are securely connected on a regular basis.
- If any electrical wire or connector is loose or damaged, repair it immediately.
- Do not weld or cut with gas cutter pipes or tubes that contains flammable fluids.

Cautions on decoupling the attachments



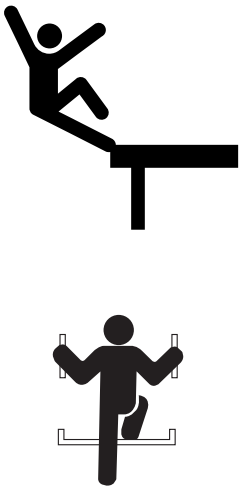
- Do not allow unauthorized workers to access the machine.
- Place the operating machine in a safe position.
- Install safety fences around the operating machine.

Repair by welding

- Perform repairs by welding in an area where adequate facilities for welding are available.
- Welding work may be subject to risks of gas leak, flame and electric shock.
  Welding should be performed only by a qualified welder.
- Take the following precautions when welding:
  - Separate and remove the battery to prevent battery explosion.
  - Perform direct heating in a place free from the risk of explosion.
  - Cover parts such as rubber hoses subject to damage by welding with flame-resistant materials.
  - Wear a welding helmet, protective clothes, protective gloves, and safety shoes.
  - Perform welding work in a well-ventilated place.
  - Remove all inflammable materials from areas in the vicinity of welding work.
  - Provide fire extinguishers.

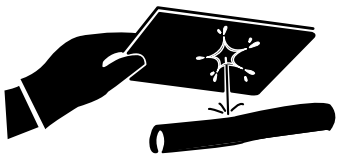
Precautions to take when working on the machine

- There is a risk of falling when working on the machine.
- Keep the area around the workers' feet clean and tidy.
- Do not spill oil or grease.
- Do not leave tools lying on the floor.
- Be careful on the floor when moving.
- Never jump from the machine.
- When getting off the machine, use the step or handrail and get off the machine while keeping to the principle of three-point contact.
- Wear protective clothes if necessary.
- Do not perform maintenance work in an area where no anti-slipping pads have been installed.
- Replace anti-slipping pads and step treads with new ones if they have deteriorated or no longer function.

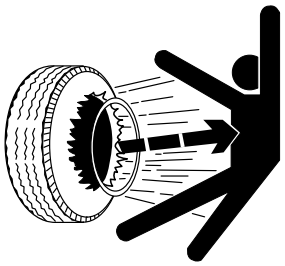


Cautions when working with the high-pressure line or hose

- Make sure that the internal pressure is released before replacing or checking the high-pressure line or hose.
- If the internal pressure is not released, serious injury may result.
- Be careful in the following conditions:
  - Provide fire extinguishers.
  - Leaked oil may penetrate the skin or cause serious injury.
  - Never check for oil leaks with your bare hands.
  - Check an oil leak using a wooden plate or cardboard.
  - Never bend or hit the high-pressure line hard.
  - Do not install a bent or damaged line or hose.
  - Make sure that all of the clamps and protective devices are properly installed.
- Check the pipes and hoses regularly and replace any damaged parts if necessary.



Cautions on inspecting the tire

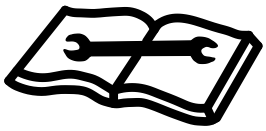


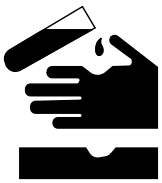
- Always keep the tires inflated to the proper pressure.
- Overheating or rupture of the tires may result in serious injury.
- Repairing or changing the tires requires exclusive facilities and expertise. Please contact a professional tire repair shop if repairs are necessary.

Cautions on inspecting the counterweight

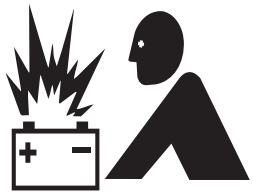
- Never stand beneath the counterweight when installing or removing it.
- Make sure that the status and conditions of the lifting device are normal.

Battery





- The battery contains flammable materials.
- Never smoke in the vicinity of the battery.
- The battery electrolyte is strong acid. Pay attention to prevent the skin and eyes from coming into contact with the electrolyte.
- If the battery electrolyte accidentally comes into contact with the body or clothes, immediately wash off the electrolyte with water.
- If the battery electrolyte is frozen, do not use other devices to start the engine up.
- Always wear protective goggles and protective gloves when working on the battery.
- Always keep the switch in the 'OFF' position when working on the battery.
- Securely fasten the battery cap.
- Always disconnect the battery from the machine before charging the battery.
- Disconnect the cathode (-) first when removing the battery.
- Connect the anode (+) first when connecting the battery.
- Follow the safety procedures when jump starting or charging the battery. Improper connection of the cable may result in an explosion and serious injury.
- Use a voltmeter when inspecting the charging system.
- Regularly inspect the battery cable, and replace it if damaged.
- A battery cable with exposed wires may cause a short if it comes into contact with the grounding surface.
- A short circuit of the battery cable may cause heat from the battery current and result in a fire.
- If the wires of the ground cable are exposed between the battery and the master switch, the exposed wires make contact with the grounding surface and the current may bypass to the master switch. This may destabilize the machine operation.
  Repair or replace the part before operating the machine.



Battery disconnection switch

- Do not turn off the battery disconnect switch while engine is running. There is a risk of damaging electrical system.
- The battery disconnect switch can be found under the left-hand door of the machine.
- Make sure to turn off the battery disconnect switch when welding or servicing electrical systems, and before clocking out.

Switchboard

- The relay and fuse can be found on the switchboard at the rear of the cab.
- Do not use the fuse that has a higher amperage than indicated on the decal. There is a risk of damaging electric circuits or catching fire.

Parking and Storage

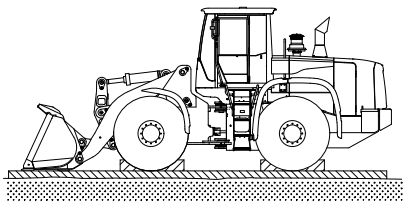
Cautions on parking

- Park the machine on the flat ground as possible.
- If parking the machine on a slope is unavoidable, use wheel chocks to prevent the machine from moving.
- Bring the bucket right down to the ground.
- Make sure that all of the switches are turned to the 'OFF' position.
- Make sure that all of the controllers are turned to the neutral position.
- Activate the parking brake.
- Stop the engine, and withdraw the ignition key.
- Close and lock the windshield, door and cover completely.
- Install fences around the machine when parking it on a public road, and put up a warning sign.

Cautions on storage for a long period of time

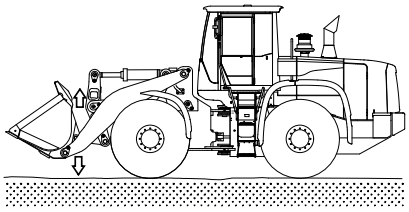
- Park the machine in accordance with the cautions for parking.
- When storing the machine for a month or longer, pay attention the following conditions to prevent deterioration of the machine performance :

  - Thoroughly clean the machine before storing.
  - Inject sufficient lubrication oil and grease into the injection ports.
  - If the lubrication oil is deficient, top it up. If the oil is contaminated, change it.
  - The lubrication oil may deteriorate during storage. Pay special attention to reusing the oil.
  - The density of the oil may drop during storage.
  - Apply an anti-rust additive to the exposed area of the piston rod of the cylinder in areas where it is likely to rust quickly.
  - Keep the master switch mounted in the power box (or the toolbox on the left of the rear frame of the machine) turned 'OFF'.
  - Top up the antifreeze in the radiator.
  - Keep the machine in a dry indoor environment.
    If storing the machine outdoors is unavoidable, store it on a wooden pallet.
  - Keep the exposed area of the piston load of the cylinder covered.
  - Bring the attachments right down to the ground, and keep the wheels and the track immobile by placing wheel chocks.

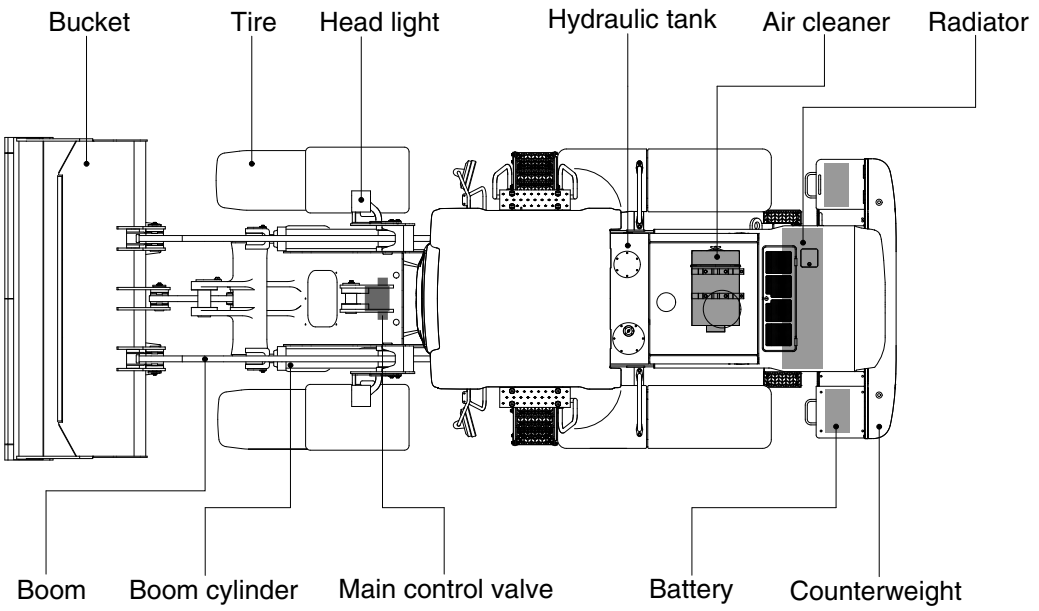


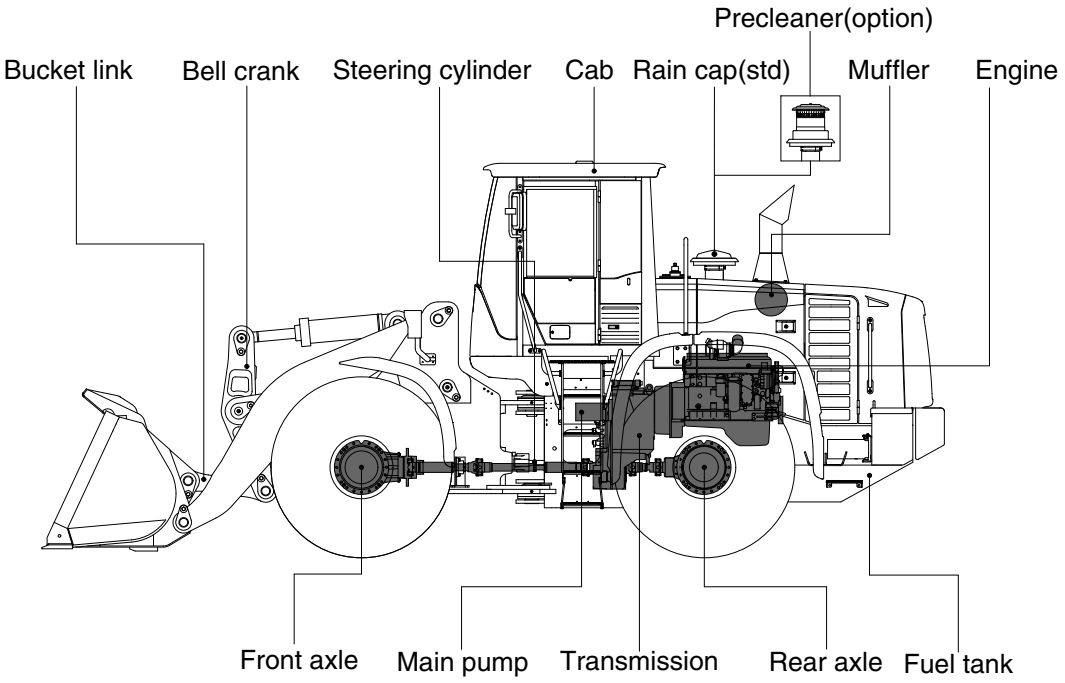
Regular lubrication (during storage)

- Breaking the lubrication film on parts may cause abnormal abrasion during the next operation.
- Start up the engine once a month, perform all of the functions, and apply lubrication oil to every part.
- Check the level of the engine oil and coolant when starting the engine up, and top them up if necessary.
- Thoroughly wipe off any rust-proofing oil from the cylinder and piston rod.
- Sufficiently warm up the engine after starting the engine and repeat the operation of the attachments several times to wear in the parts sufficiently.
- Fully charge and store the battery.
- Store the battery separately for a long period of time under extremely cold weather conditions.
- Check the tire pressure.
- The machine shall not be lubricated manually while it is in motion where application of the lubricant may expose persons to injury.



1. MAJOR COMPONENTS

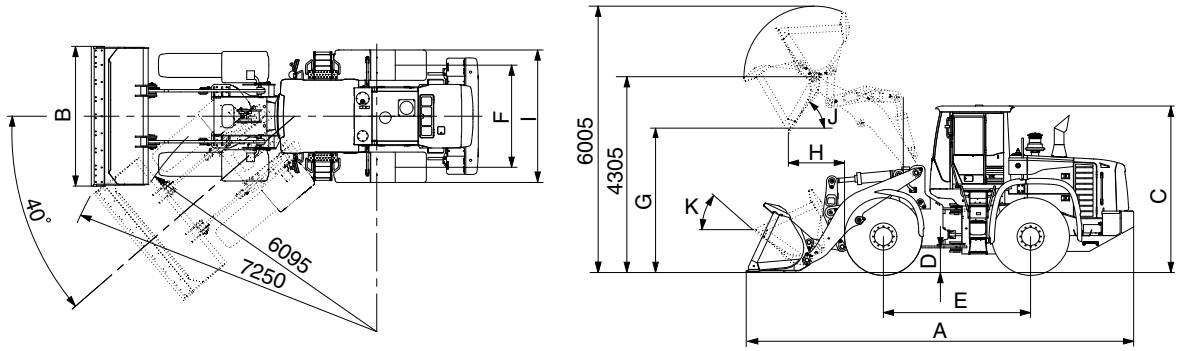




7709S2SE01

2. SPECIFICATIONS

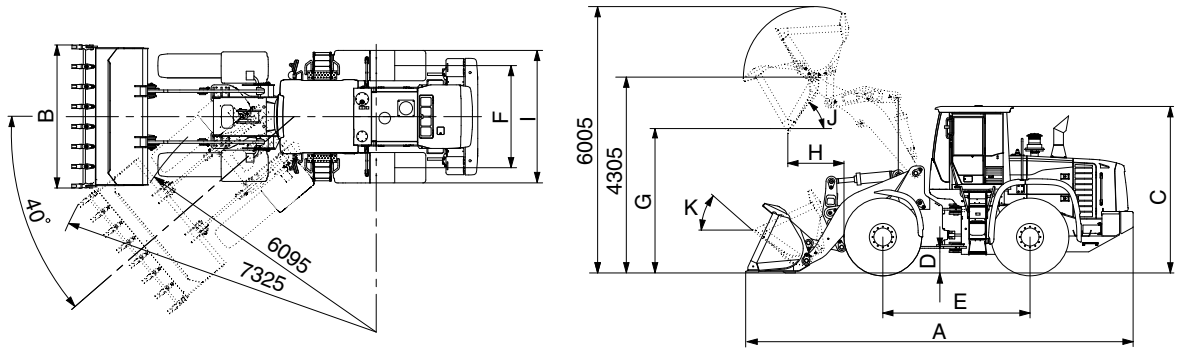
1) WITH BOLT-ON CUTTING EDGE TYPE BUCKET (HL775-9)



77592SE03

Description			Unit	Specification
Operating weight			kg (lb)	24670 (54390)
Bucket capacity		Struck	m^3 (yd^3)	4.0 (5.2)
		Heaped		4.7 (6.1)
Overall length		A	mm (ft-in)	9060 (29' 9")
Overall width		B		3250 (10' 8")
Overall height		C		3600 (11' 10")
Ground clearance		D		443 (1' 5")
Wheelbase		E		3520 (11' 7")
Tread		F		2300 (7' 7")
Dump clearance at 45˚		G		3040 (9' 12")
Dump reach (full lift)		H		1330 (4' 4")
Width over tires		I		2980 (9' 9")
Dump angle		J	degree (˚)	48
Roll back angle (carry position)		K		48
Cycle time		Lift (with load)	sec	5.4
		Dump (with load)		1.3
		Lower (empty)		3.4
Maximum travel speed			km/hr (mph)	39.0 (24.2)
Braking distance			m (ft-in)	12.7 (41' 8")
Minimum turning radius (center of outside tire)				6.095 (19' 11")
Gradeability			degree (˚)	30
Breakout force			kg (lb)	20650 (45530)
Travel speed	Forward	First gear	km/hr (mph)	7.1 (4.4)
		Second gear		12.5 (7.8)
		Third gear		26.7 (16.6)
		Fourth gear		39.0 (24.2)
	Reverse	First gear		7.1 (4.4)
		Second gear		12.5 (7.8)
		Third gear		26.7 (16.6)

2) WITH TOOTH TYPE BUCKET (HL775-9)



77592SE04

Description		Unit	Specification
Operating weight		kg (lb)	24600 (54235)
Bucket capacity	Struck	m^3 (yd^3)	3.8 (4.97)
	Heaped		4.5 (5.89)
Overall length	A	mm (ft-in)	9210 (30' 3")
Overall width	B		3300 (10' 10")
Overall height	C		3600 (11' 10")
Ground clearance	D		443 (1' 5")
Wheelbase	E		3520 (11' 7")
Tread	F		2300 (7' 7")
Dump clearance at 45˚	G		2915 (9' 7")
Dump reach (full lift)	H		1415 (4' 8")
Width over tires	I		2980 (9' 9")
Dump angle	J	degree (˚)	48
Roll back angle (carry position)	K		48
Cycle time	Lift (with load)	sec	5.4
	Dump (with load)		1.3
	Lower (empty)		3.4
Maximum travel speed		km/hr (mph)	39.0 (24.2)
Braking distance		m (ft-in)	12.7 (41' 8")
Minimum turning radius (center of outside tire)			6.095 (19' 11")
Gradeability		degree (˚)	30
Breakout force		kg (lb)	21820 (48105)
Travel speed	Forward	First gear	km/hr (mph)	7.1 (4.4)
		Second gear		12.5 (7.8)
		Third gear		26.7 (16.6)
		Fourth gear		39.0 (24.2)
	Reverse	First gear		7.1 (4.4)
		Second gear		12.5 (7.8)
		Third gear		26.7 (16.6)

3. WEIGHT

Item	kg	lb
Front frame assembly	2127	4690
Rear frame assembly	2532	5585
Front fender (LH/RH)	46	105
Rear fender (LH/RH)	32	75
Counterweight	1800	3970
Cab assembly	1167	2575
Engine assembly	984	2170
Transmission assembly	753	1665
Drive shaft (front)	41	95
Drive shaft (center)	37	85
Drive shaft (rear)	21	50
Front axle (include differential)	1200	2650
Rear axle (include differential)	1200	2650
Tire assy (26.5 R25 ★★ L3), 1EA	711	1570
Hydraulic tank assembly	289	640
Fuel tank assembly	270	595
Main pump assembly	84	190
Fan & brake pump assembly	14	35
Main control valve (2 spool/3 spool)	58/100	130/225
Steering valve (priority valve)	28	65
Boom assembly	1629	3595
Bell crank assembly	487	1075
Bucket link	81	179
Quick coupler assy (ISO Type)	678	1,495
Bolt-on cutting Edge (4.4 m^3)	2,266	5,000
Bolt-on cutting Edge (4.7 m^3)	2,339	5,160
Bolt-on cutting Edge (4.4 m^3), Quick coupler	2,241	4,945
1-Bolt-on tooth (4.2 m^3)	2,207	4,870
1-Bolt-on tooth (4.5 m^3)	2,267	5,000
1-Bolt-on tooth (4.2 m^3), Quick coupler	2,182	4,815
Boom cylinder assembly (LH / RH)	204	450
Bucket cylinder assembly (LH / RH)	206	455
Steering cylinder assembly (LH / RH)	43	95
Seat (Including suspension and armrest)	33	75
Battery (1EA)	53	120
Under Guard Kit / Cowl assy	81 / 490	180 / 1085
Mud Guard Assy (LH / RH)	67	150

4. SPECIFICATION FOR MAJOR COMPONENTS

1) ENGINE

Item	Specification
Model	Cummins QSM11
Type	4-cycle turbocharged, charge air cooled diesel engine
Control type	Electronic control
Cooling method	Water cooling
Number of cylinders and arrangement	6 cylinders, in-line
Firing order	1-5-3-6-2-4
Combustion chamber type	Direct injection type
Cylinder bore × stroke	125×147 mm(4.92"×5.79")
Piston displacement	10800cc (659 cu in)
Compression ratio	16.3 : 1
Gross power	335 hp (250 kW) at 2100 rpm
Net power	330 hp (246 kW) at 2100 rpm
Maximum power	365 hp (272 kW) at 1800 rpm
Peak gross torque	171 kgf · m (1235 lbf · ft) at 1400 rpm
Engine oil quantity	34 ℓ (9.0 U.S. gal)
Wet weight	984 kg (2170 lb)
Starting motor	24 V - 7.8 kW
Alternator	24 V - 70 Amp
Battery	2×12 V×220 Ah

2) MAIN PUMP

Item	Specification
Type	Load sensing hydraulic system
Pump	Variable piston pump
Rated oil quantity	368 ℓ /min (97.2 U.S.gpm)
System pressure	280 kgf/cm^2 (4061 psi)

3) STEERING PUMP

Item	Specification
Type	Load sensing hydrostatic articulated steering
Pump	Variable piston pump
Rated oil quantity	237 ℓ /min (62.6 U.S.gpm)
System pressure	210 kgf/cm^2 (3046 psi)

4) MAIN CONTROL VALVE

Item	Specification
Type	2 spool / 3 spool
Operating method	Hydraulic pilot assist
Main relief valve pressure	280 kgf/cm^2 (3980 psi)
Overload relief valve pressure	340 kgf/cm^2 (4840 psi)

5) REMOTE CONTROL VALVE

Item		Specification
Type		Pressure reducing type
Operating pressure	Minimum	5 kgf/cm^2 (71 psi)
	Maximum	30 kgf/cm^2 (427 psi)
Single operation angle	degree	17

6) CYLINDER

Item		Specification
Boom cylinder	Bore dia × Rod dia × Stroke	Ø160 × Ø95 × 765 mm
Bucket cylinder	Bore dia × Rod dia × Stroke	Ø180 × Ø95 × 570 mm
Steering cylinder	Bore dia × Rod dia × Stroke	Ø100 × Ø50 × 480 mm

7) DYNAMIC POWER TRANSMISSION DEVICES

Item			Specification
Transmission	Model		ZF 4WG260
	Type	Converter	Single-stage, single-phase
		Transmission	Full-automatic power shift
	Gear shift		Forward fourth gear, reverse third gear
	Control		Electrical single lever type, kick-down system Automatic kick down from 2nd to 1st gear
Axle	Drive devices		4-wheel drive
	Front		Front fixed location
	Rear		Oscillation ±12° of center pin-loaded
Wheels	Tires		26.5 R25 ★★ L3
Brakes	Travel		Four-wheel, wet-disc type, full hydraulic
	Parking		Spring applied, hydraulic released brake
Steering	Type		Full hydraulic, articulated
	Steering angle		40° to both right and left angle, respectively

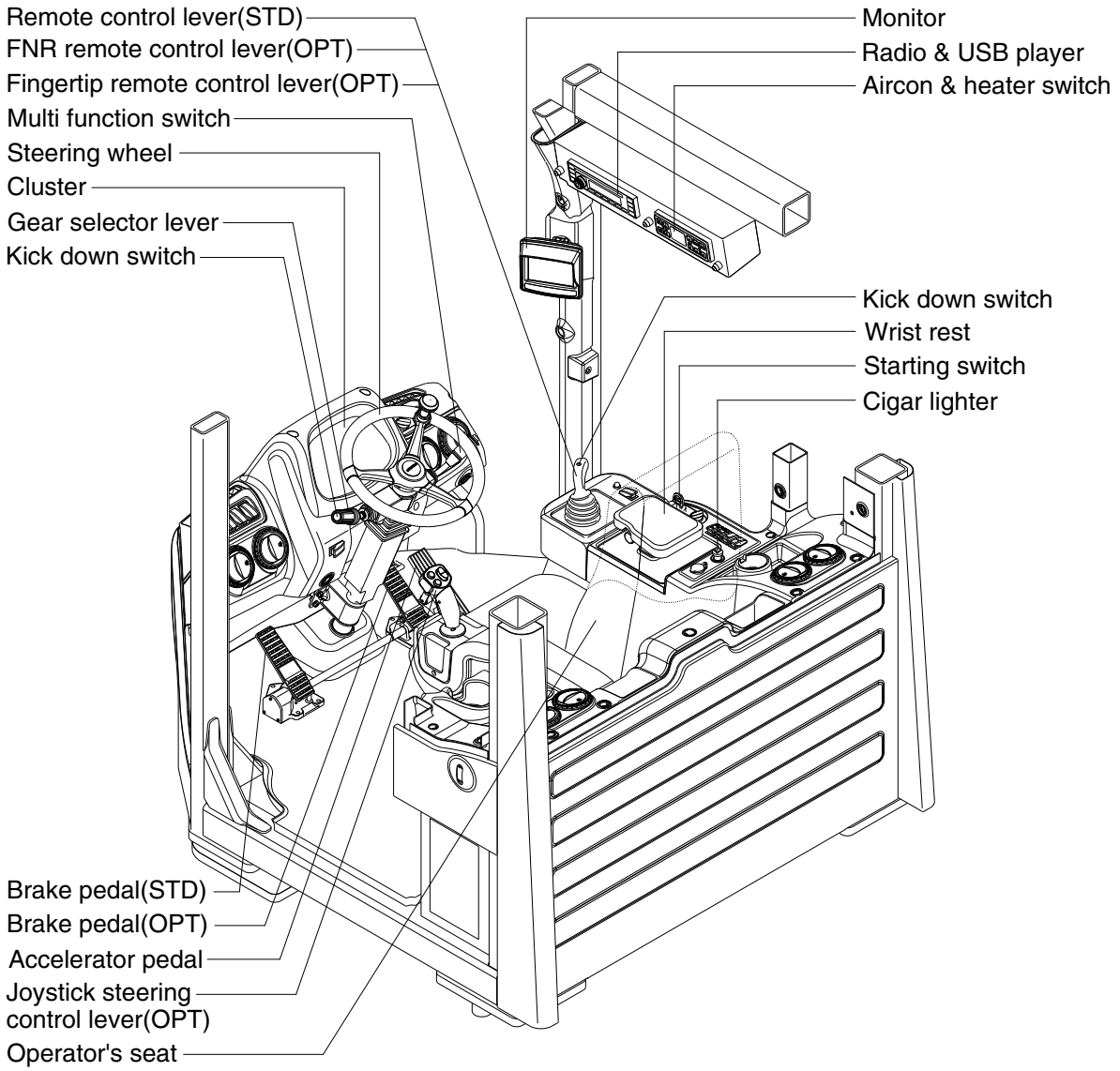
1. CAB DEVICES

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.



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2. CLUSTER

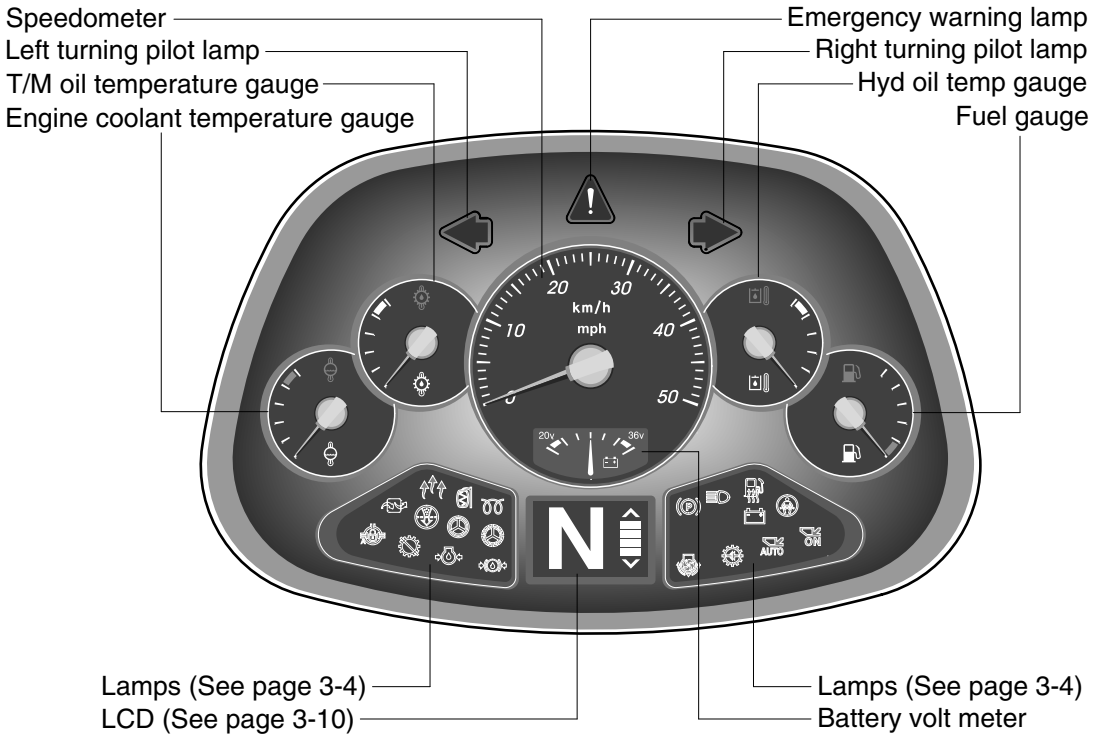
1) STRUCTURE

The cluster consists of gauges, lamps and LCD 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 lamps : Indicate abnormality of the machine.
- Pilot lamps : Indicate operating status of the machine.
- LCD : Indicates selected the driving speed and direction.

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

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



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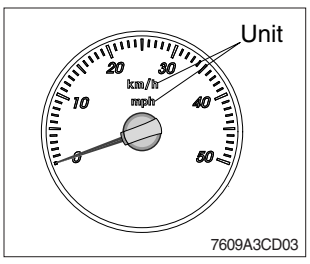
2) GAUGE

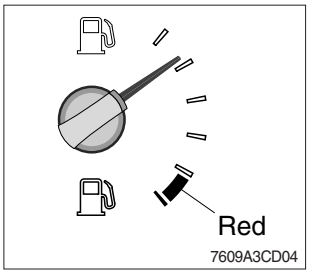
(1) Speedometer



① The speedometer displays the speed of machine in mph and km/h.

※ The unit (km/h or mph) can be set by the display set up menu of the monitor and selected unit is displayed.
Refer to page 3-23.

(2) Fuel gauge

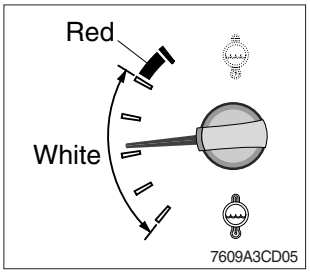


① This gauge indicates the amount of fuel in the fuel tank.

② Fill the fuel when the indicator moves red range or lamp blinks in red, refuel as soon as possible to avoid running out of fuel.

※ If the gauge indicates below red range 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.

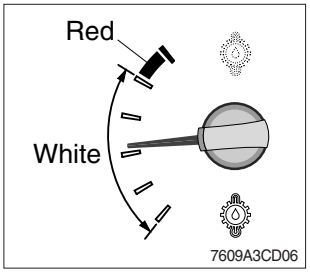
(3) Engine coolant temperature gauge



① This gauge indicates the temperature of coolant.
- White range : 40~104˚C (104~219˚F)
- Red range : Above 104˚C (219˚F)

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

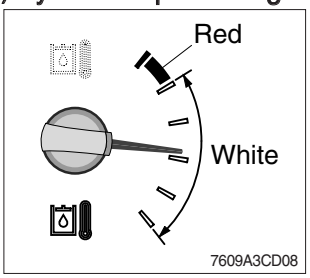
(4) Transmission oil temperature gauge



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

② If the indicator is in the red range or lamp blinks in red, it means the transmission is overheated. Be careful that the indicator does not move into the red range.

(5) Hyd oil temperature gauge

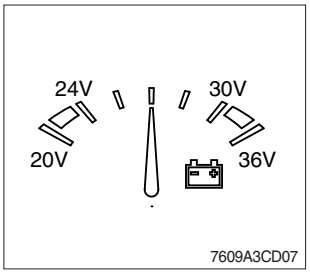


① This gauge indicates the temperature of hydraulic oil.
- White range : 40~105˚C (104~221˚F)
- Red range : Above 105˚C (221˚F)

② If the indicator is in the red range or lamp blinks in red, reduce the load on the system.

③ If the gauge stays in the red range, stop the machine and check the cause of the problem.

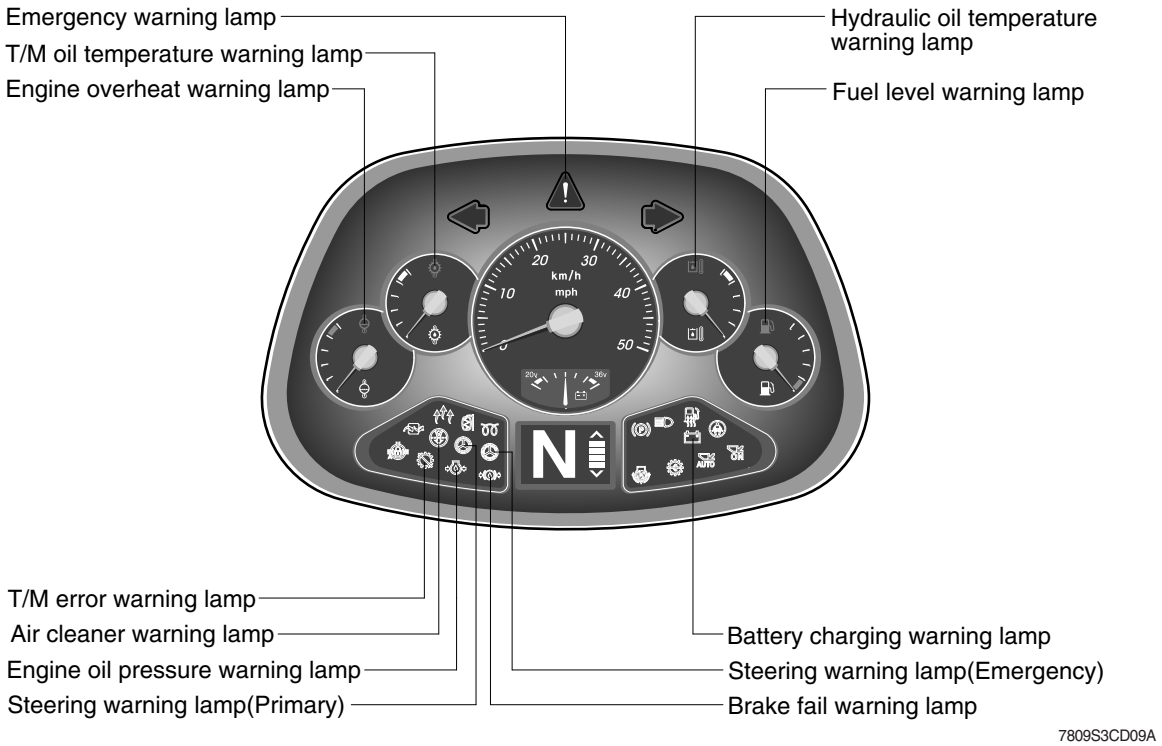
(6) Battery volt meter



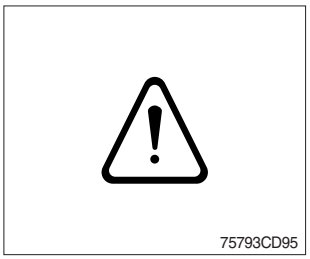
① This gauge indicates the voltage in the charging system when the engine is running.

② If the indicator is below 24V, it means that the electricity is being discharged. If the indicator is above 30V, an unusually high voltage may damage the alternator.
Check the charging system in both cases.

3) WARNING LAMPS



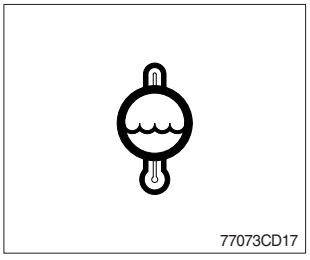
(1) Emergency warning lamp



① This warning lamp blinks and the buzzer sounds when communication error occur between monitor and MCU.

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

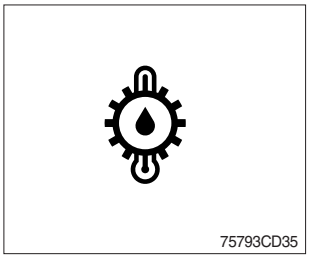
(2) Engine overheat warning lamp



① This lamp is turned ON when the temperature of coolant is over the normal temperature (106˚C, 223˚F).

② Check the cooling system when the lamp is ON.

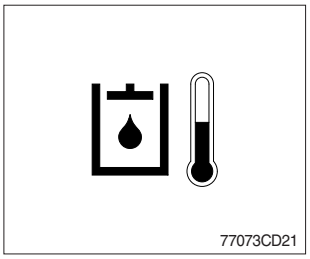
(3) Transmission oil temperature warning lamp



① This lamp informs the operator that transmission oil is above the specified temperature.

② When this lamp lights up during operation, stop the engine and check the machine.

(4) Hydraulic oil temperature warning lamp

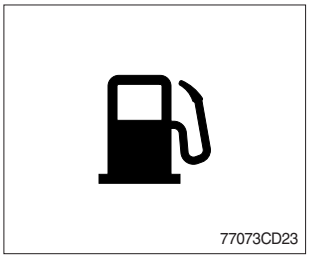


① This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105˚C (221˚F).

② Check the hydraulic oil level when the lamp is turned ON.

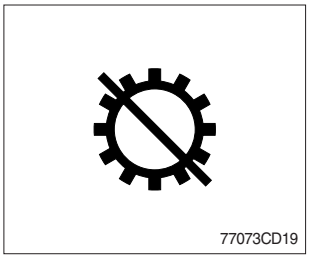
③ Check for debris between oil cooler and radiator.

(5) Fuel level warning lamp



① This warning lamp lights ON when the fuel level is low.
Refuel the machine as soon as possible.

(6) Transmission error warning lamp

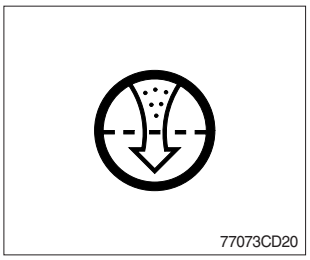


① This lamp lights ON and the LCD display show the error codes when an error occurs in the transmission.

② Immediately pull the machine to a convenient stop. Stop the engine. Investigate the cause.

※ Consult a HYUNDAI dealer to investigate the cause.
※ Do not operate until the cause has been corrected.

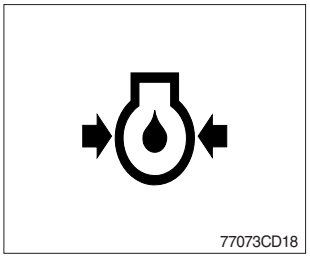
(7) Air cleaner warning lamp



① This lamp lights ON when the filter of air cleaner is clogged.

② Check the filter and clean or replace it when the lamp is ON.

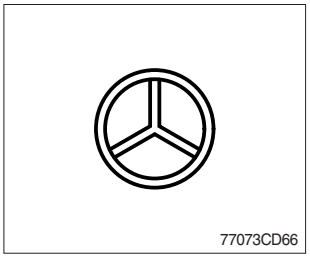
(8) Engine oil pressure warning lamp



① This lamp is comes ON after starting the engine because of the low engine oil pressure.

② If the lamp comes ON during engine operation, shut OFF engine immediately. Check engine oil level.

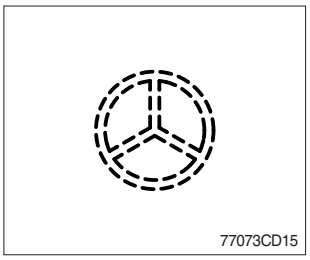
(9) Steering warning lamp



① **Primary**

This lamp indicates that the primary steering has failed. When the indicator comes on and the action alarm sounds, steer the machine immediately to a convenient location and stop the machine. Stop the engine and investigate the cause.

※ **Do not operate the machine until the cause has been corrected.**



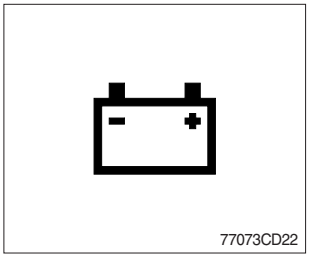
② **Emergency**

This lamp indicates the emergency steering system is active.

※ **Immediately pull the machine to a convenient stop and stop the engine.**

※ **The emergency steering system can be manually tested. Refer to page 3-28.**

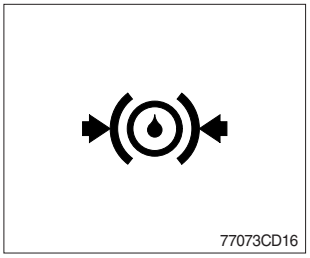
(10) Battery charging warning lamp



① This lamp is ON when key ON, it is turned OFF after starting the engine.

② Check the battery charging circuit when this lamp comes ON, during engine operation.

(11) Brake fail warning lamp

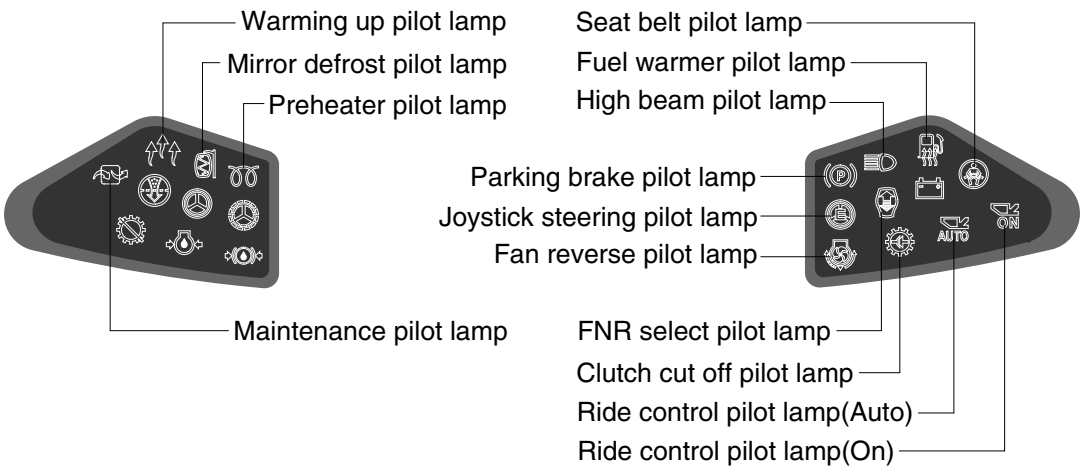


① The lamp lights ON when the oil pressure of service brake drops below the normal range.

② When the lamp is ON, stop the engine and check for its cause.

※ **Do not operate until any problems are corrected.**

4) PILOT LAMPS



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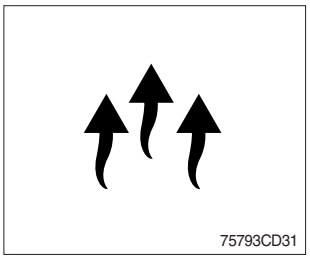
(1) Warming up pilot lamp



75793CD31

① This lamp is turned ON when the coolant temperature is below 30˚C (86˚F).

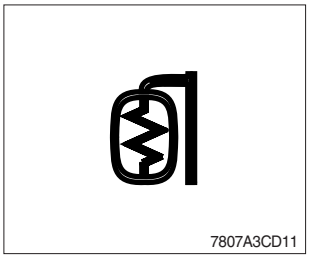
② The automatic warming up is cancelled when the engine coolant temperature is above 30˚C, or when 10 minutes have passed since starting the engine.

(2) Seat belt pilot lamp

75793CD17

① This lamp lights ON for the first five seconds after starting the engine.

(3) Mirror defrost pilot lamp



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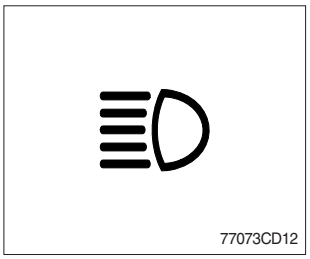
① This lamp comes ON when mirror defrost switch is pressed.

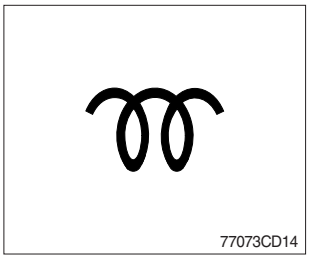
(4) High beam pilot lamp



① This lamp works when the illuminating direction is upward.

② This lamp comes ON when the dimmer switch is operated, e.g., when passing another vehicle.

(5) Preheat pilot lamp

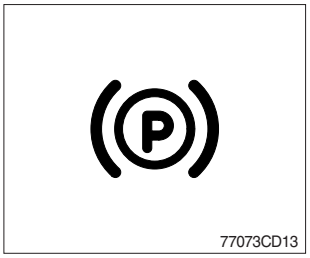


① This lamp lights ON when start switch is turned clockwise to the ON position. Light will turn off after approximately 5~45 seconds, depending on engine temperature, indicating that preheating is completed.

② When the lamp goes out the operator should start cranking the engine.

※ **Refer to page 4-5.**

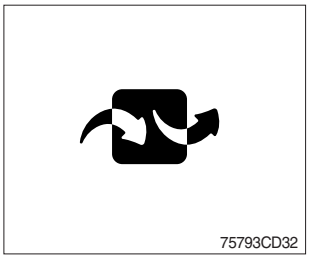
(6) Parking brake pilot lamp



① When the parking brake is actuated, the lamp lights ON.

※ **Check the lamp is OFF before driving.**

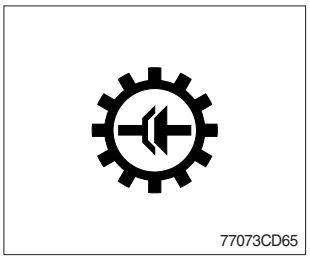
(7) Maintenance pilot lamp



① This lamp will be ON when the consuming parts are needed to change or replace. It means that the change or replacement interval of the consuming parts remains below 30 hours.

② Check the message in maintenance information of the monitor menu. Also, this lamp lights ON for 3 minutes when the start switch is ON position.

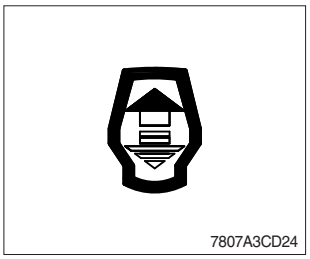
(8) Clutch cut off pilot lamp



① This lamp lights ON when the clutch cut off mode switch is positioned L, M, H.

※ **Refer to page 3-29.**

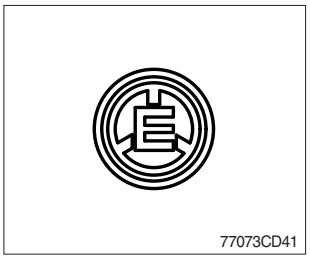
(9) FNR select pilot lamp (option)



① The lamp comes ON when FNR select button on the optional FNR remote control lever is pressed.

※ **Refer to page 3-33.**

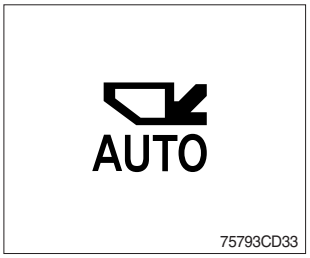
(10) Joystick steering pilot lamp (option)



① This lamp lights ON when joystick steering is activated.
It is then possible to steer the machine and select gears from the armrest to the left of the operator's seat.

※ **Refer to page 3-35.**

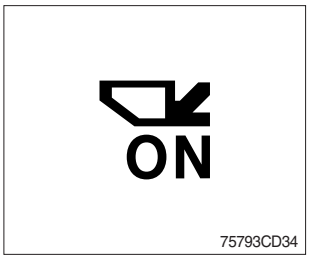
(11) Ride control pilot lamp (option)



① Auto ride control

This lamp lights ON when push in the bottom of the ride control switch (auto position).

※ **Refer to page 3-28.**



② Manual ride control

This lamp lights ON when push in the top of the ride control switch (manual position)

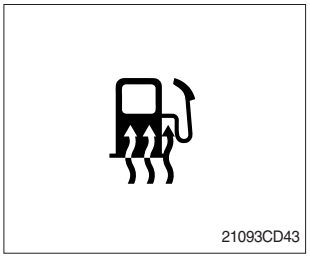
※ **Refer to page 3-28.**

(12) Fan reverse pilot lamp

① This lamp lights ON when the fan control switch is pressed.

※ **Refer to page 3-27.**

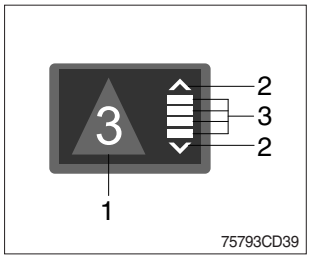
(13) Fuel warmer pilot lamp



① This lamp is turned ON when the coolant temperature is below 10˚C (50˚F) or the hydraulic oil temperature 20˚C (68˚F).

② The automatic fuel warming is cancelled when the engine coolant temperature is above 60˚C and the hydraulic oil temperature is above 45˚C since the start switch was ON position.

5) LCD

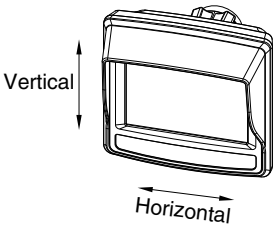


(1) The LCD can be used with the gear selector.
It indicates speed and driving direction.

No	Symbol	Meaning	Remark
1	△, ▽, □	Actual gear display	Forward, reverse, neutral
	1, 2, 3, 4		Actual gear
	P		Parking brake mode active
2	^, v	Forward, reverse	Automatic mode
3	▮	Gear range display	Automatic mode

3. MONITOR

· The monitor is adjustable.
- Vertical : 14˚
- Horizontal : 30˚



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1) BUTTONS

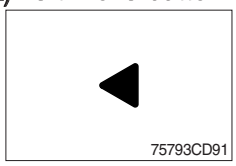
(1) Menu button

75793CD90

① Main display to main menu, main menu to main display.

② AEB cancel button in AEB setting.

(2) Left move button



75793CD91

① Move in menu (left, up).

(3) Camera / ESC button

75793CD92

① Enter rear camera mode in main display.

② Cancel button except in main display (move previous menu).

(4) Right move / Buzzer stop button

75793CD93

① Move in menu (right, down).

② Buzzer stop.

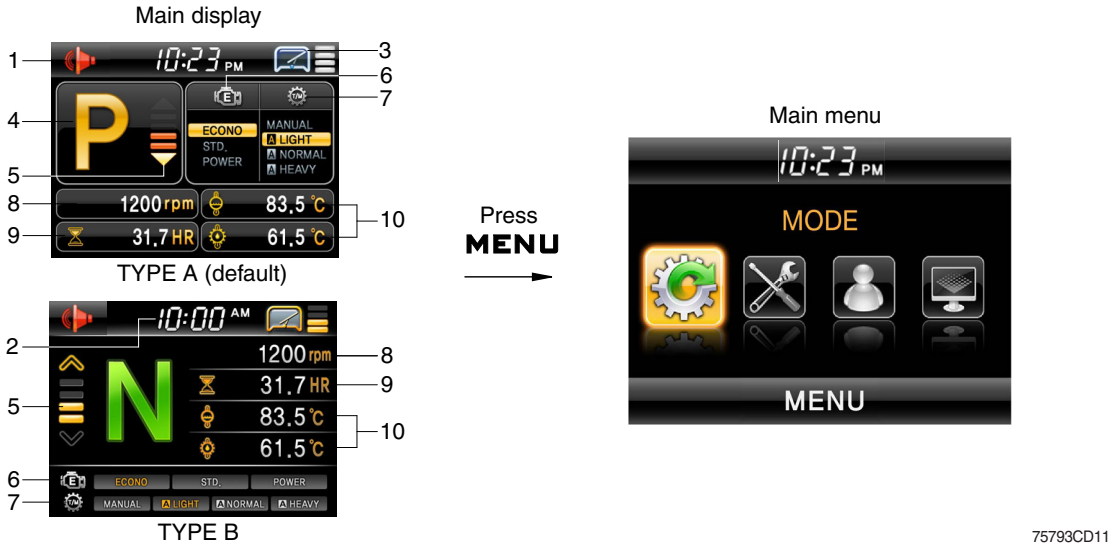
(5) Enter button

75793CD94

① Select menu (enter).

② AEB cancel button in AEB setting.

2) MAIN MENU



1	Buzzer	5	Select gear	9	Hour meter, odometer
2	Clock	6	Engine mode	10	Monitoring
3	Wiper speed	7	Transmission mode		
4	Actual gear	8	Engine rpm		

※ **Display type can be changed by operator. See page 3-23.**

(1) Structure

No	Main menu	Sub menu	Description
1	 MODE 75793CD12	Engine setting Kick down setting Wiper speed setting Fan-auto mode AEB setting Speed meter setting Sensor calibration	Engine warming up, Engine speed Mode 1 (down/up), Mode 2 (down only) 4 steps Interval and time setting AEB setting Pulse setting Boom/bucket angle, Boom pressure, Brake pedal senser
2	 MONITORING 75793CD13	Fault code Machine monitoring Record monitoring	Machine, TCU, ECU, SCU Hyd temp, Battery, Coolant temp T/M oil temp, Weighing system Hour meter, ODO meter
3	 MANAGEMENT 75793CD14	Machine security Maintenance Machine information Service contact Service	ESL system setting, Change password Replacement, Change interval (oils and filters) Version, Status Service contact S/W download, Speed limit setting
4	 DISPLAY SET UP 75793CD13	Clock Display setting Unit setting Rear camera setting Language setting	Clock Brightness setting (Manual/Automatic) Type display (A or B type) Temp (˚F/˚C), Distance (km/mile), Pressure (bar, Mpa, kgf/m², psi) Reverse mode, Active camera, Display order 12 languages

(2) Mode

① Engine setting

75793CD16 75793CD16A 75793CD16B

Set low idling speed

75793CD16C 75793CD16D

② Kick down setting

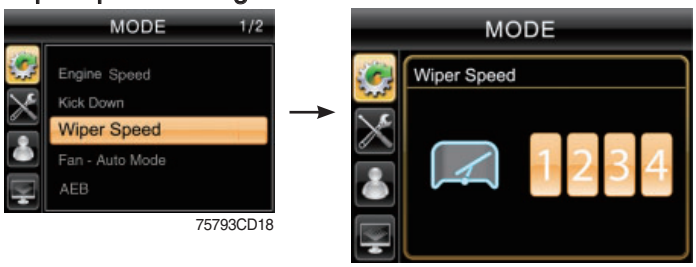
75793CD17 75793CD17A

· Mode 1 (down/up) : Press kick down button once, shift down and press button again, shift up.

· Mode 2 (down only) : Press kick down button every time, shift to lower gear respectively.

※ Refer to page 3-31.

③ Wiper speed setting



75793CD18 75793CD18A

· Setting wipe speed 1 to 4.

④ Fan-auto mode

75793CD110 75793CD111 75793CD112

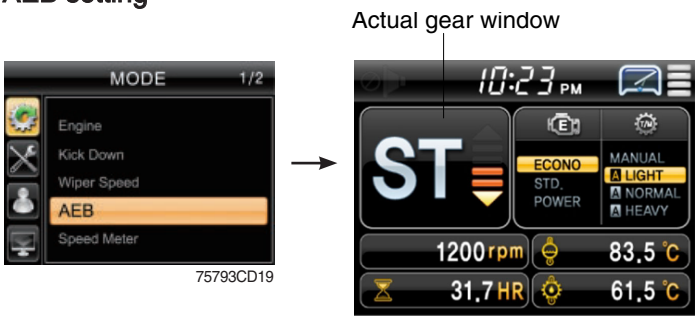
· Select reverse interval or reverse time.

· Set reverse interval (30~300 min) or reverse time (30~300 sec).

※ Default : Interval (60 min), time (120 sec)

※ Refer to page 3-27, fan control switch.

⑤ AEB setting



75793CD19

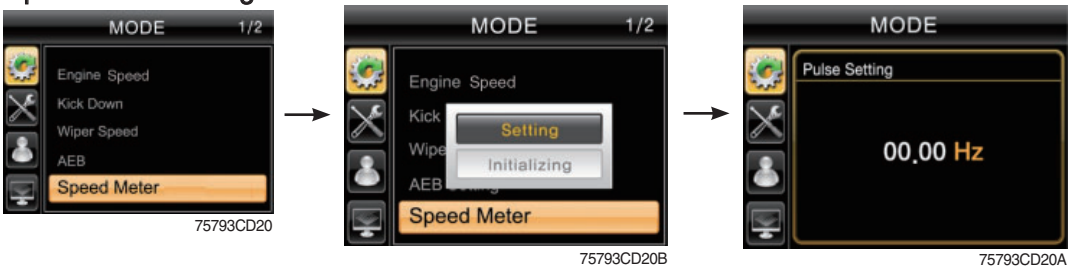
75793CD19A

- AEB mode controls the disk clearance of the transmission, automatically.
- To start AEB setting, press ↵ and hold for 3 seconds.
- To cancel AEB setting, press **MENU**, ▣/**ESC** or ↵.
- If "OK" in actual gear window, press **MENU**, ▣/**ESC** or ↵ to complete AEB setting.
- **Display during AEB mode**

Symbol	Meaning
ST	Start AEB
K1~K4, KV, KR	Calibrating clutch K1~K4, KV or KR respectively
OK*	Calibration for all clutches finished
Spanner and Kx*	Kx couldn't be calibrated, AEB finished
△E	Engine speed too low - Raise engine speed
▽E	Engine speed too high - Lower engine speed
△T	Transmission oil temperature too low - Heat up transmission
▽T	Transmission oil temperature too high - Cool down transmission
FO*	Output speed not zero
FN*	Shift lever not in neutral position
FP*	Parking brake not applied

* : Transmission stays in neutral, you have to restart the TCU (ignition off/on).

⑥ Speed meter setting



75793CD20

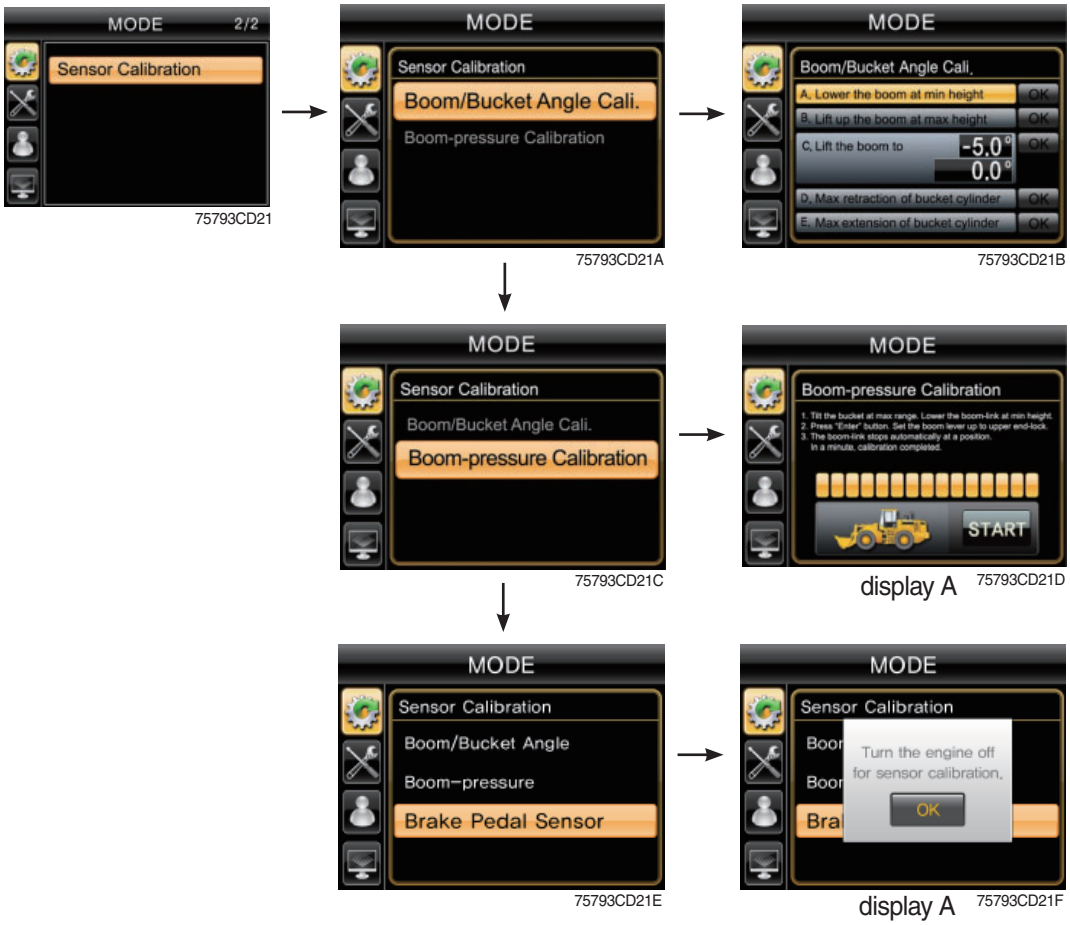
75793CD20B

75793CD20A

- Press ↵ and hold for 3 seconds.
- To change the pulse value, press ◀ or ▶/🔇.
- To change the position, press ↵.

※ Only for the serviceperson.

⑦ Sensor calibration



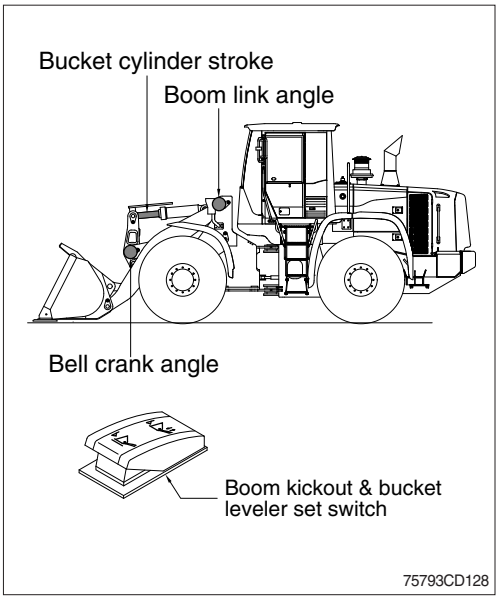
· **Boom / Bucket angle calibration**

– CPU get sensing signal from boom link angle and bell crank angle and calculate bucket cylinder stroke and boom link position angle from ground real time basis.

– Boom link angle position and bucket cylinder stroke is set by boom kickout & bucket leveler set switch in cab.

– Individual setting position is done by lever solenoid (detent, release operation).

– Angle sensor calibration is basically carried out before delivery of the machine.
When angle sensor is replaced or actual value is different compared to setting value, this function can be done.



The calibration must be carried out as follows :

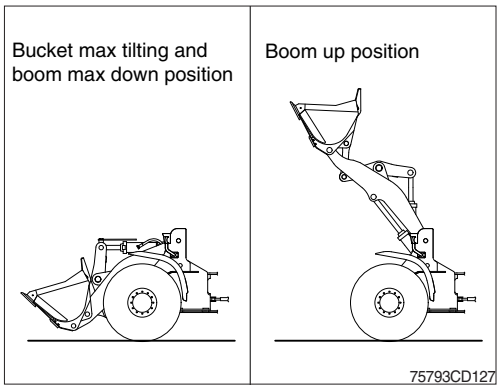
① Lower the boom at maximum low position and select ↵ (bucket must be max tilting position).
② Raise boom at maximum high position and select ↵ .
③ Position boom at -5˚ and select ↵.
④ Retract bucket cylinder length (to minimum position) at -5˚ boom position and select ↵.
⑤ Extend bucket cylinder length (to maximum position) at -5˚ boom position and select ↵.
⑥ In case above steps are carried normally, "complete" message is shown. Then angle sensor calibration is finished after selecting ↵.

Boom down / boom up / bucket position setting : Refer to page 4-22.

· **Boom pressure calibration**

– It is used when bucket weight is changed or measured weight is inaccurate.
– The calibration must be carried out as follows :

① Increase hydraulic temperature (about 30 ~ 60˚C).
② Select "Boom-pressure calibration".
③ Place the boom at low position with bucket completely rolled in (max tilting position).
④ Press ↵.
⑤ Raise boom to maximum position. Boom up must be finished before stepping advance in "display A".
⑥ If it show "Succeed" message in a moment, press ↵.



※ Raise hydraulic temperature enough when checking work load / boom pressure sensor calibration (recommendation : about 30 ~ 60˚C).
※ Check if pressure sensor or angle sensor is in normal condition for accurate work load algorism or pressure sensor calibration (pressure sensors at boom cylinder head area and rod area, boom link angle sensor (CD-80), bell crank angle sensor (CD-81).
※ Sensor error message during pressure sensor calibration : sensor need to be checked.

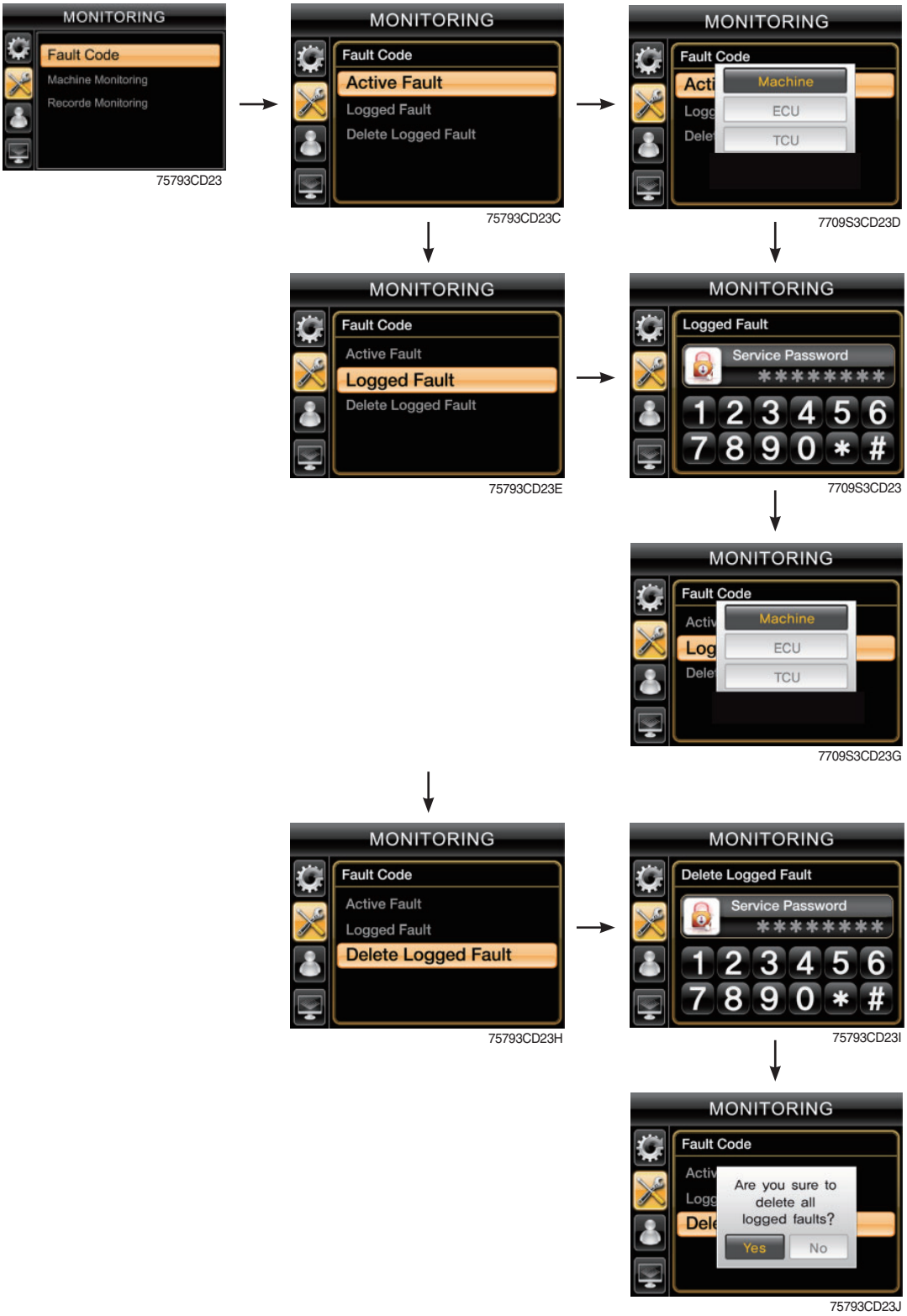
· **Brake pedal sensor calibration**

- Turn the engine OFF and turn the starting switch ON position.
- Press OK button, then calibration will be started.
- When display " IP ▼ " on main display, press slowly the brake pedal completely.
- Release the brake pedal when display " IP ▲" on main display.
- For cancel, press MENU/HOME switch.

※ When the brake pedal or sensor is replaced, **brake pedal sensor calibration must be performed.**

(3) Monitoring

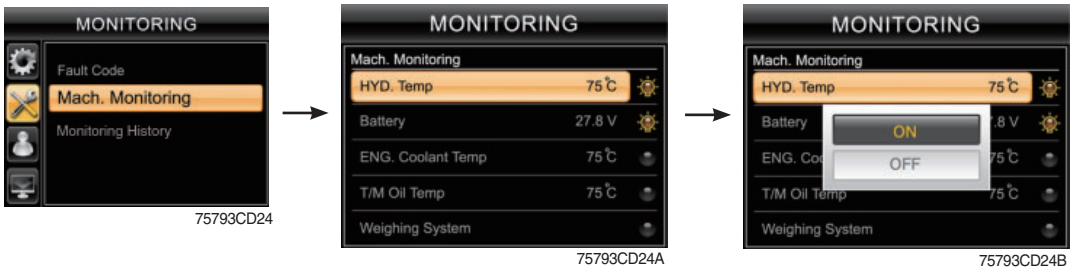
① Fault code



· Monitor the fault code of the Machine / ECU / TCU.

※ **Not define will be indicated in case of that there's no fault.**

② Machine monitoring



75793CD24 75793CD24A 75793CD24B

- Monitor the status of the machine.
- To check the item in main display, choose it and press ↵ .
- The right icon shows ON/OFF status.

※ Priority in the main display

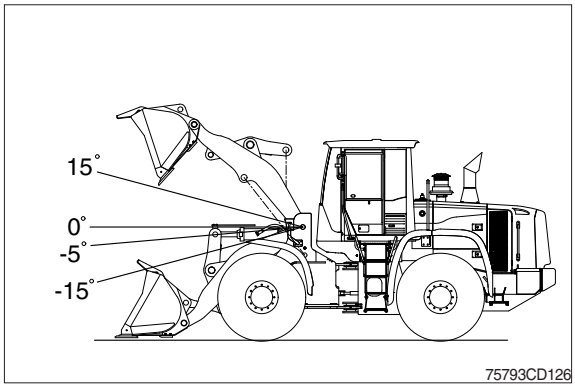
The example of the weighing system

- The priority of the weighing system is the highest.
- If selected the weighing system, the other items are not available.
- To check the other items, the weighing system should not be selected.

※ Weighing system

1. PRINCIPLE

1) The weight indication in bucket is calculated by measuring boom position and boom pressure.
   (1) The weight is '0.0 ton' when the boom is placed at below -15˚.
   (2) The weight is indicated when the boom is placed at the range (-5˚→15˚).
   (3) The weight is calculated when the boom is placed at above -5˚ and boom is lowered below -15˚ after dumping operation.
   In order to re check weight, go to the (2) after changing boom position (below -15˚).
   (The other way is to select ↵ of monitor and go to (2) in case boom is placed at above -5˚).
2) Dump operation : It is checked by bucket cylinder's stroke change (below 250 mm).



75793CD126

2. MONITOR DISPLAY

1) When pressing work load button for over 2 seconds, the weight is shown sequence basis. (main display 1 → 2 → 3 → 4 → 1)

Main display 1

75793CD115

Press

Main display 2

75793CD116

Press

Press

Main display 4

75793CD118

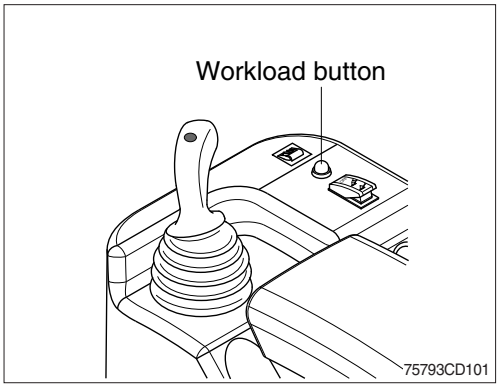
Press

Main display 3

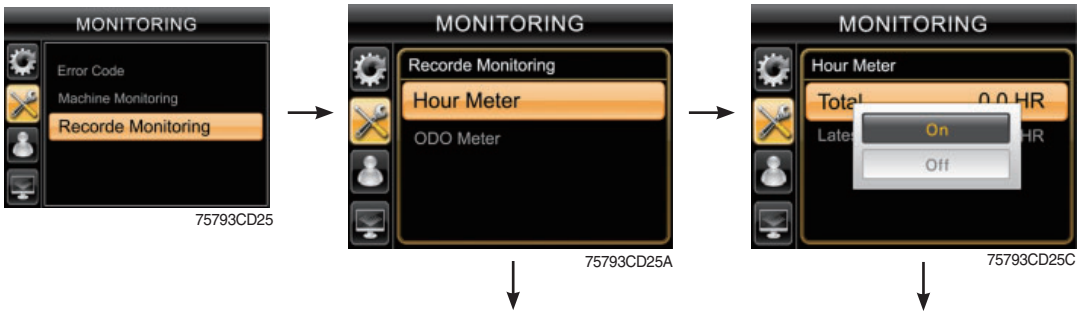
75793CD117

D	Work weight (today)
D-1	Work weight (previous day)
A Total B Total C Total	Total weight accumulated in memory A, B, C individually regardless of date
	Current weight

2) Default accumulated value at memory A, B, C when pressing work load button for over 2 seconds (default : 0.0 ton).



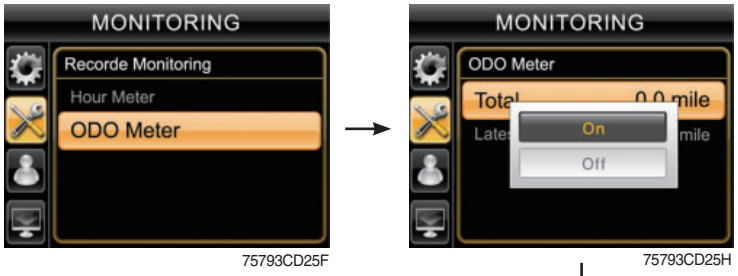
③ Record monitoring



75793CD25 75793CD25A 75793CD25C 75793CD25D

· **Hour meter**

- **Total** : total hour meter
  To show the item in the main display, select "ON" and press ↵ (this item could not reset).
- **Latest** : the latest hour meter after reset.
  To show the item in the main display, select "ON" and press ↵.
  To reset the latest hour meter, select "initializing" and press ↵.



75793CD25F 75793CD25H 75793CD25J

· **ODO meter**

- **Total** : total ODO meter
  To show the item in the main display, select "ON" and press ↵ (this item could not reset).
- **Latest** : the latest ODO meter after reset.
  To show the item in the main display, select "ON" and press ↵.
  To reset the latest odometer, select "initializing" and press ↵.

(4) Management

① Machine security

75793CD26

75793CD26A

75793CD26B

· **ESL system setting**

- ESL : Engine Starting Limit
- ESL mode is designed to be a theft deterrent or will prevent the unauthorized operation of the machine.
- If the ESL mode was selected Enable, the password will be required when the start switch is turned ON.
- Disable : Not used ESL function
  Enable : The password is required whenever the operator start engine.
  Interval mode : The password is required when the operator start engine first. But the operator can restart the engine within the interval time without inputting the password.
  The interval time can be set maximum 2 days.

※ **Default password : 00000 ∗**

75793CD26C

75793CD26D

· Interval setting

- If set interval setting to 5 minutes, ESL system is activated after 5 minutes.
  Therefore, the password does not need to restart engine within 5 minutes.

75793CD26J

75793CD26K

· **Change password**

- Input 5 to 10 digits and press *.

75793CD26G

75793CD26H

Enter the current password.

75793CD26L

Enter the new password.

75793CD26M

Enter the new password again.

75793CD26N

The new password is stored in the MCU.

② Maintenance

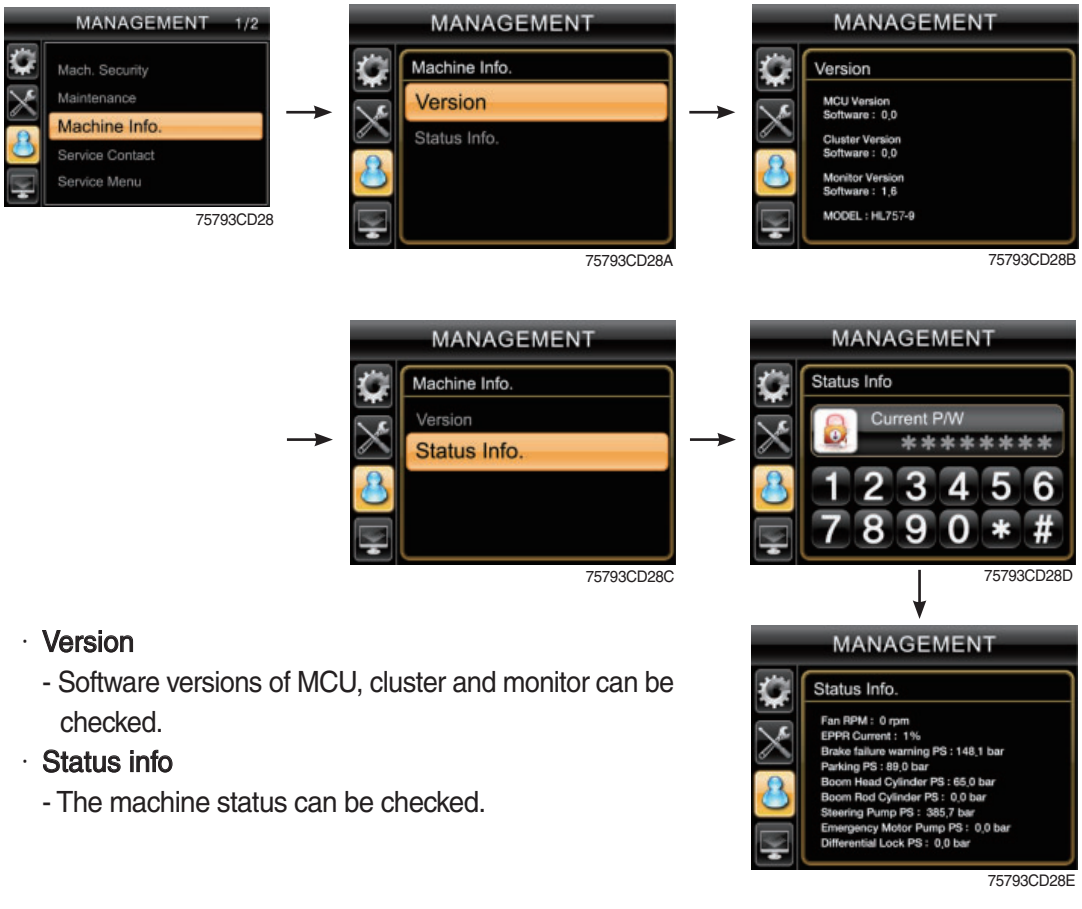
75793CD27 75793CD27A 75793CD27B 75793CD27C 75793CD27D

· Alarm (☼) : Warning
Replacement : The elapsed time will be reset to zero.
Change cycle : The change or replace cycle can be changed in the unit of 50 hours.

· To change cycle, press ◀ or ▶/🔇.

· **Change or replace interval : Refer to the page 6-10.**

③ Machine information

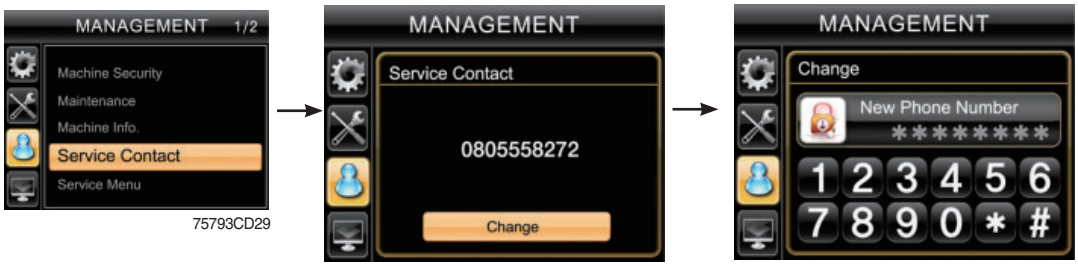


75793CD28 75793CD28A 75793CD28B 75793CD28C 75793CD28D 75793CD28E

· **Version**
- Software versions of MCU, cluster and monitor can be checked.

· **Status info**
- The machine status can be checked.

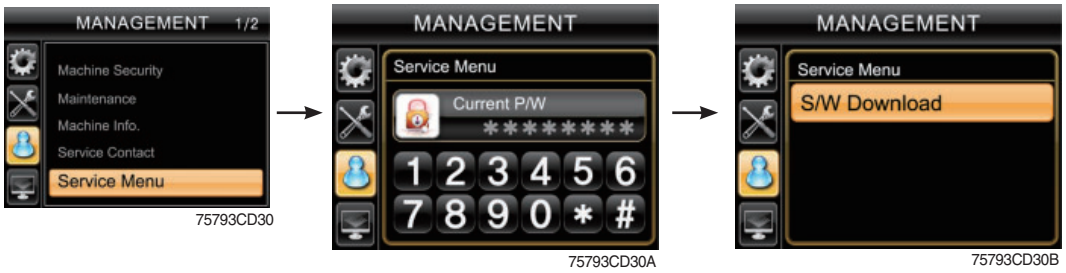
④ Service contact



75793CD29 75793CD29A 75793CD29B

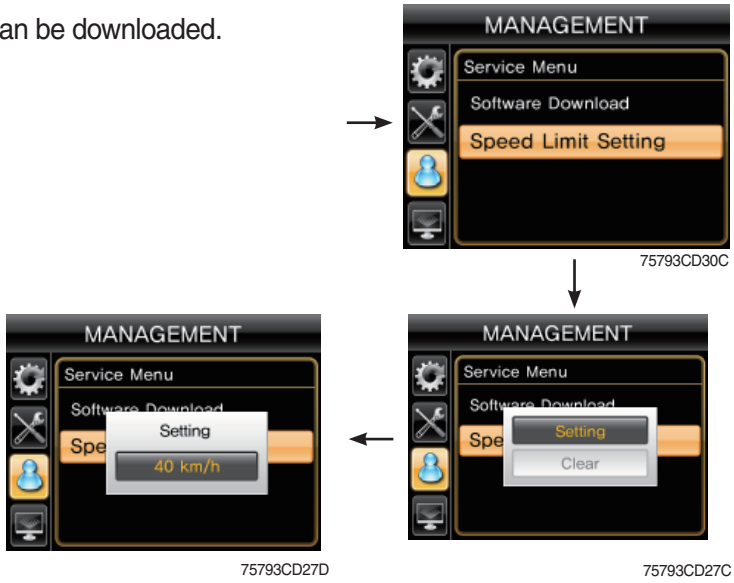
· The phone number of the service man can be checked and changed.

⑤ Service menu



75793CD30 75793CD30A 75793CD30B

· The software of monitor can be downloaded.

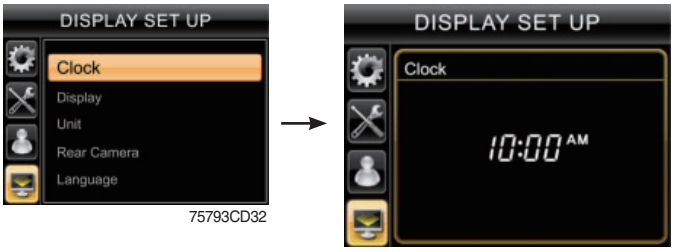


75793CD30C 75793CD27C 75793CD27D

· **Speed limit setting** : 20~40 km/h (5 km/h intervals)

(5) DISPLAY SET UP

① Clock

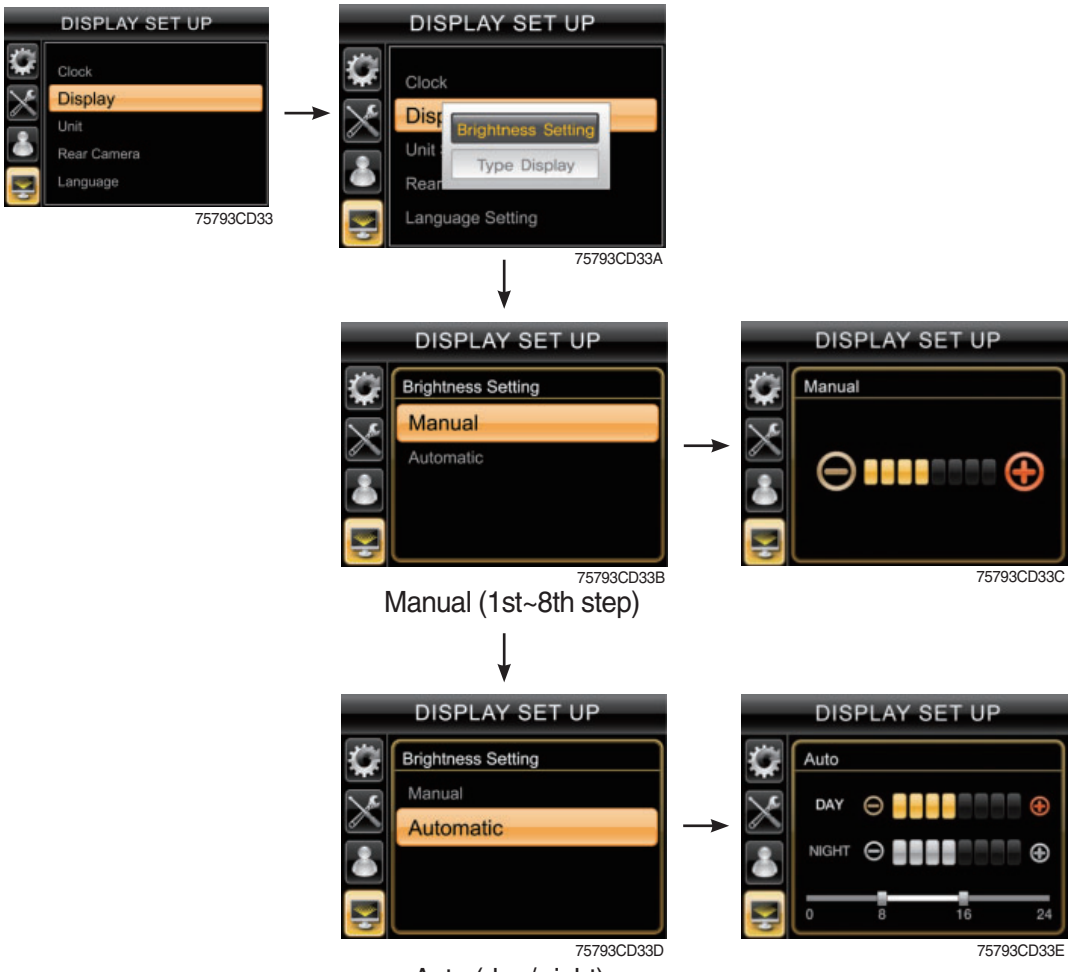


· To set time, press ◀ or ▶/🔇.

· To move position, press ↵.

② Display setting

· **Brightness setting**



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

· Display type setting

75793CD33F 75793CD33G 75793CD33H

A type

75793CD33I

B type

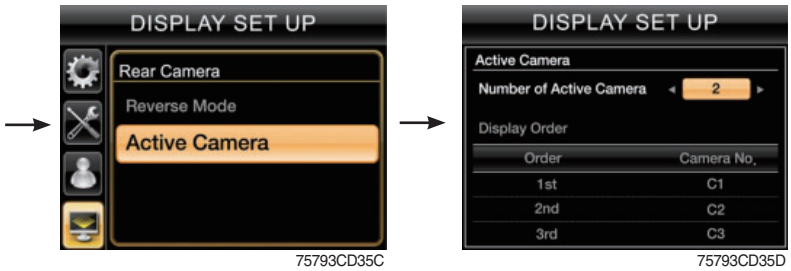
③ Unit setting

75793CD34 75793CD34A 75793CD34B

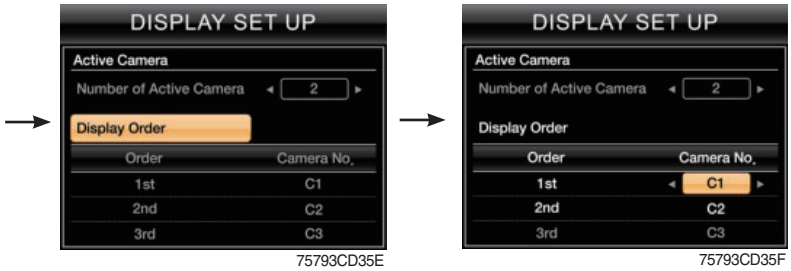
· Temperature : ˚C ↔ ˚F
· Distance : km ↔ mile
· Pressure : bar ↔ Mpa ↔ kgf/m^2 ↔ psi

④ Rear camera setting

75793CD35 75793CD35A 75793CD35B



75793CD35C 75793CD35D



75793CD35E 75793CD35F

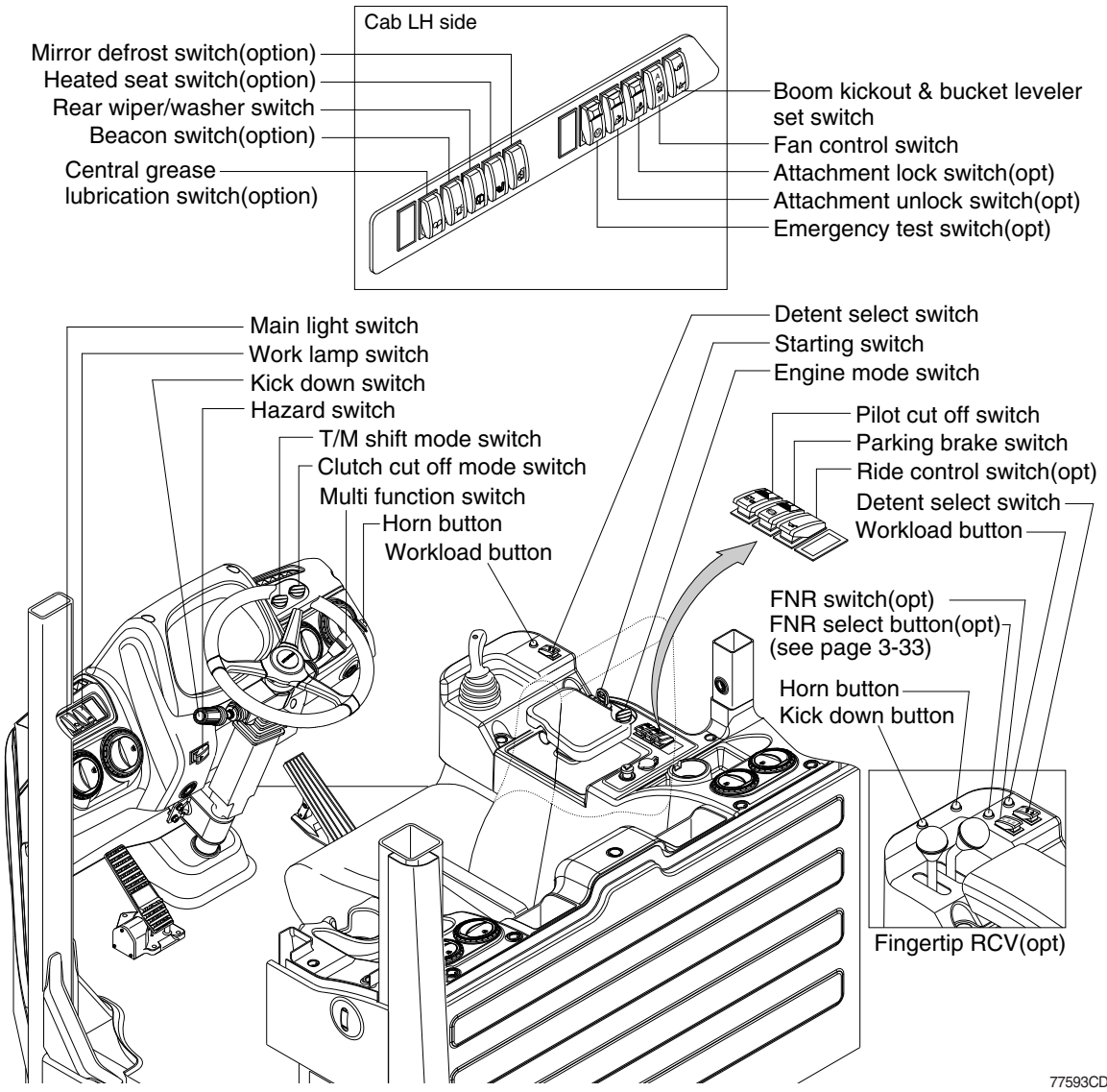
· **Reverse mode**
  - If transmission engages the reverse gear (R1~R3), the camera mode is displayed automatically in main display.
· **Active camera**
  - Three cameras can be installed on the machine.
  - The display order can be set by this menu.
· If the camera was not equipped, this menu is not useful.
· In main display, if the ▣/ESC button is pushed, the first ordered display camera will be viewed.

⑤ Language setting

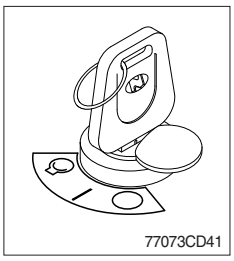
75793CD36 75793CD36A 75793CD36B

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

4. SWITCHES



1) STARTING SWITCH

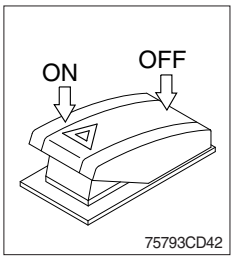


(1) There are three positions, OFF, ON and START.
- ◯ (OFF) : None of electrical circuits activate.
- | (ON) : All the systems of machine operate.
- ◯ (START) : Use when starting the engine.
  Release key immediately after starting.

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

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

2) HAZARD SWITCH

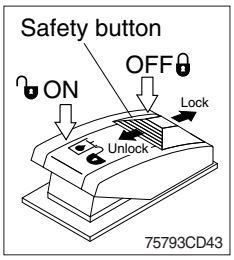


(1) Use for parking, or roading the machine.

(2) Both turn signal lights will flash simultaneously.

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

3) PILOT CUT OFF SWITCH



(1) When the switch is pressed to OFF position, the hydraulic pilot line will be cut off, so the work equipment will not operate.

(2) Press the ON position in order to unlock the hydraulic pilot line.

※ **This switch can be set to ON or OFF position only when the safety button is pulled to the unlock position.**

4) PARKING BRAKE SWITCH

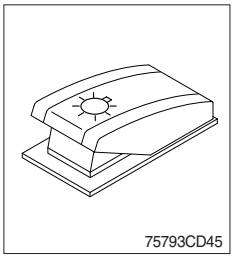
(1) When the switch is pressed to ON position, the parking brake will start to operate and the cluster warning lamp will comes ON.

(2) Press the release position in order to disengage the parking brake.

※ **When operating the gear selector lever, be sure to release the parking brake. If the machine is operated with the parking brake engaged, the brake will overheat and may cause the brake system to go out of order.**

※ **This switch can be set to ON or Release position only when the safety button is pulled to the unlock position.**

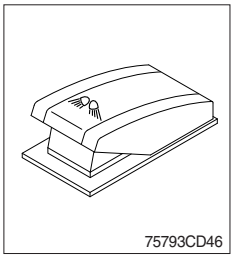
5) MAIN LIGHT SWITCH



(1) This switch use to operates the clearance lamp and head light by two step.

- **First step** : Clearance lamp and cluster illumination lamp comes ON. Also, all indicator lamp of switches come ON.
- **Second step** : Head light comes ON.

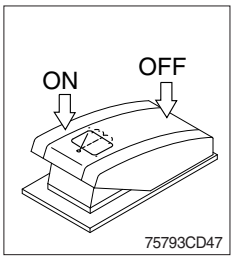
6) WORK LAMP SWITCH



(1) This switch use to operates the front and rear work lamps by two step.

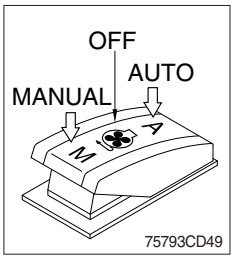
- **First step** : Front work lamp located on the cab comes ON.
- **Second step** : Rear work lamp located on the cowl comes ON.

7) REAR WIPER AND WASHER SWITCH



(1) The switch use to operates the rear wiper and washer by two step.
- **First step** : The rear wiper operates.
- **Second step** : The washer liquid is sprayed and the rear wiper is operated only while pressing. If release the switch, return to the first step position.

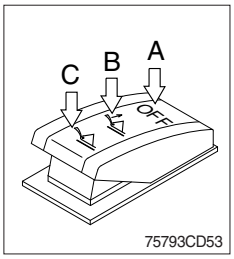
8) FAN CONTROL SWITCH



(1) This switch use to control the cooling fan.
(2) This switch has three positions.
- **AUTO** : The fan automatically work in reverse according to set up interval and time.
  ※ Refer to page 3-14.
- **OFF** : Only forward rotation is possible.
- **MANUAL** : The fan rotates reverse only while pressing this position. If release the switch, return to the OFF position.

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

9) DETENT SELECT SWITCH

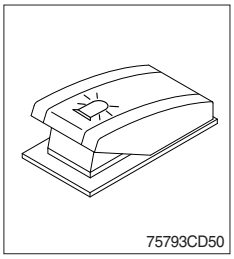


(1) This switch is used to select the detent functions.
(2) This switch has three positions.
- **A :** Detent functions are not operated.
- **B :** Only boom detent function is operated.
- **C :** Boom and bucket detent functions are operated.

10) MIRROR DEFROST SWITCH (option)

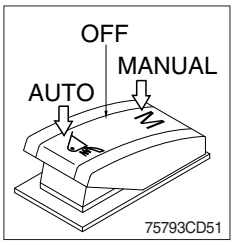
(1) If the mirror defrost switch is pressed in condition of key ON, it operates for 15 minutes. After 15 minutes, the defrost function stops automatically.
(2) One more pressing the switch in operation also stops defrost function.
(3) On pressing the switch, the indicator lamp is turned ON.

11) BEACON SWITCH (option)



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

12) RIDE CONTROL SWITCH (option)



(1) AUTO

Press in the bottom of the ride control switch in order to turn on the automatic ride control. The automatic ride control automatically turns on when the travel speed exceeds a preset speed of approximately 7 km/h. The automatic ride control automatically shuts off during low speed travel (below 7 km/h).

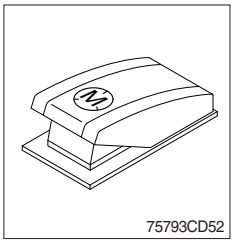
(2) MANUAL

Press in the top of the ride control switch in order to turn on the system for ride control regardless speed. The ride control will smooth the ride of the machine during travel.

(3) OFF

Press the ride control switch to the middle position in order to turn off the system for the ride control.

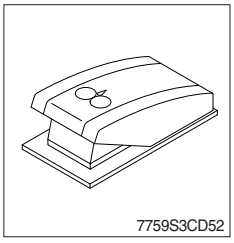
13) EMERGENCY TEST SWITCH (option)



(1) The emergency steering system can be manually tested. Push the switch in order to determine if the emergency steering and the emergency steering lamp are functional.

(2) When the switch is pressed, the emergency steering pump motor will run. The emergency steering lamp will light. If the emergency steering lamp does not light, do not operate the machine.

14) CENTRAL GREASE LUBRICATION SWITCH (option)

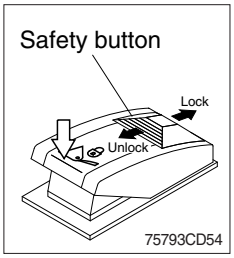


(1) This switch is used to operate the central grease lubrication system.

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

※ Refer to the page 8-1 for details.

15) ATTACHMENT LOCK SWITCH (option)



(1) Press this switch in order to engage the quick coupler pins.

(2) If this switch is pressed for 5 seconds, the quick coupler pins move in the engaged position.
If the switch is released, the quick coupler pins will remain in the engaged position.

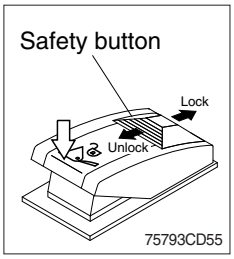
※ This switch can be pressed only when the safety button is pulled to the unlock position.

※ Check for engagement as followings.

① Put down pressure on the attachment.

② Back up the machine and make sure that there is no movement between the quick coupler and attachment.

16) ATTACHMENT UNLOCK SWITCH (option)

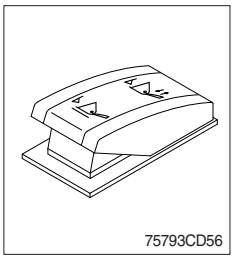


(1) Press this switch in order to disengage the quick coupler pins.

(2) If this switch is pressed for 5 seconds, the quick coupler pins move in the disengaged position.
If the switch is released, the quick coupler pins will remain in the disengaged position. (Machine serial No. : ~#0683)
If the switch is released, the quick coupler pins will slowly extend to the engaged/locked position. (Machine serial No. : #0684~)

※ **This switch can be pressed only when the safety button is pulled to the unlock position.**

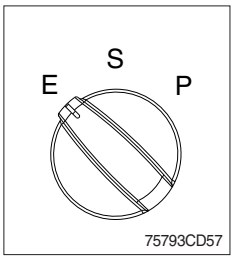
17) BOOM KICK OUT AND BUCKET LEVELER SET SWITCH



(1) Press this switch in order to set the boom kickout and bucket leverer.

※ **Refer to page 4-22.**

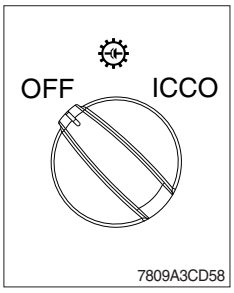
18) ENGINE MODE SWITCH



(1) The operator can adjust the machine's performance with this dial switch.

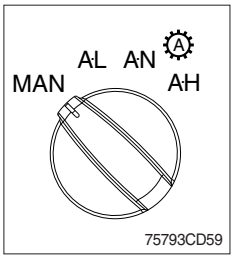
- P (Power) : Maximum power output for hard digging operation or hill climb.
- S (Standard) : General digging and loading operation.
- E (Econo) : Maximum fuel efficiency for general loading.

19) CLUTCH CUT OFF MODE SWITCH



- OFF position : The clutch cut off function is disable.
- ICCO position : It will cut off the clutch when brake operation.

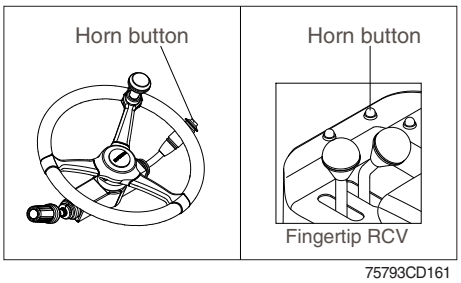
20) TRANSMISSION SHIFT MODE SWITCH



(1) Four modes are available for operator's preference and job condition.

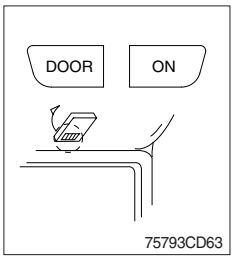
- MAN (Manual) : Machine is operated by selected gear on lever.
- AL (Auto Light) : Automatic shifting point is fast for long-distance transportation and fuel efficiency.
- AN (Auto Normal) : Automatic shifting point is normal without automatic kick-down to 1st gear for general digging and loading operation.
- AH (Auto Heavy) : Automatic shifting point is normal with automatic kick-down to 1st gear for more powerful operation.

21) HORN BUTTON



(1) If you press the button on the top of the multi-function switch, the horn will sound.

22) CAB LAMP SWITCH



(1) This switch turns ON the cab room lamp.

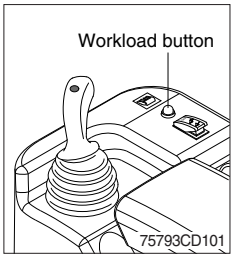
① DOOR

The lamp comes ON when the door is opened.
When the door is closed the lamp is OFF.

② ON

This switch is used to turn the lamp ON or OFF.

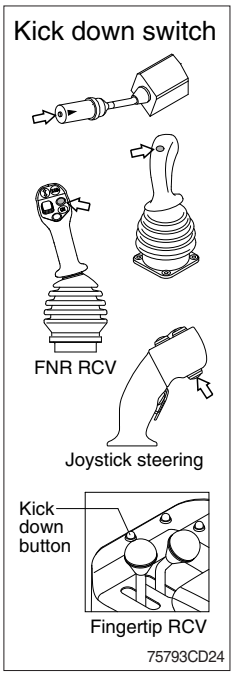
23) WORKLOAD BUTTON



(1) Press the button in order to set "Total" display at zero.

※ See page 3-16, weighing system.

23) KICK DOWN SWITCH



(1) Manual mode

It is effective 2nd speed to 1st speed only and recover to 2nd speed quickly when push the switch one more time.

(2) Automatic mode

① **Mode 1** (down/up)

It shifts down quickly from current gear to one step lower speed by pushing the switch and recover to current speed quickly when push the switch one more time.

② **Mode 2** (down)

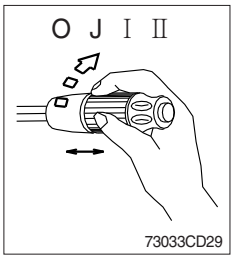
It shifts down from current gear to one step lower speed when push the switch every time.

The kick down function is released in only 1st speed.

※ **Refer to page 3-13 for the kick down setting.**

※ **The normal autoshift function continues after the kick down switch is released.**

24) MULTI FUNCTION SWITCH



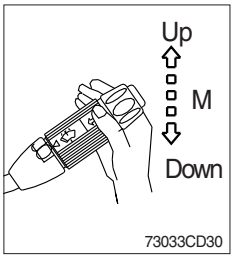
(1) Front wiper and washer switch

① When the switch is in **J** position, the wiper moves intermittently.

② When placed in Ⅰ or Ⅱ position, the wiper moves continuously.

③ 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 the tank is 1 liter.**



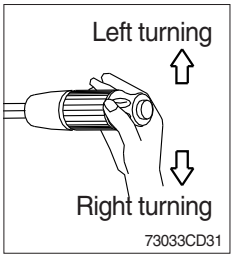
(2) Dimmer switch

① This switch is used to turn the head lights direction.

② Switch positions

- Up : To flash for passing
- Middle : 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.

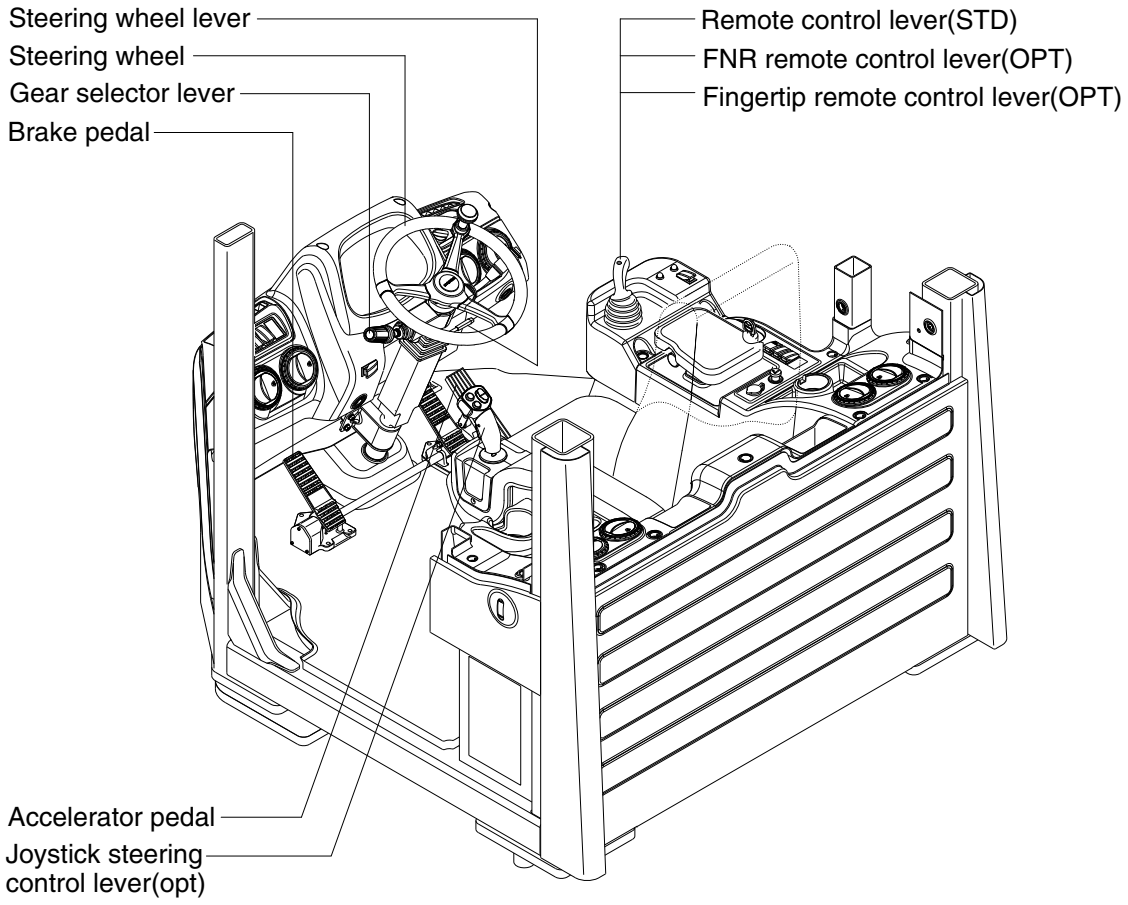


(3) Turning switch

① This switch is used to warn or signal the turning direction of the machine to other vehicles or equipment.

② Push the lever up for turning left, pull the lever down for turning right.

5. CONTROL DEVICE



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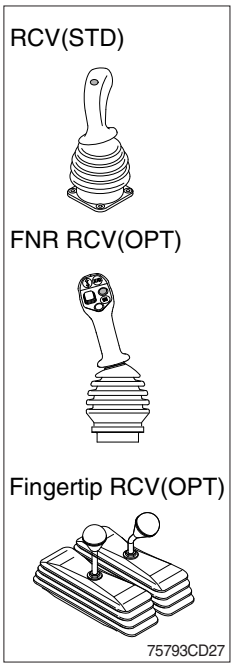
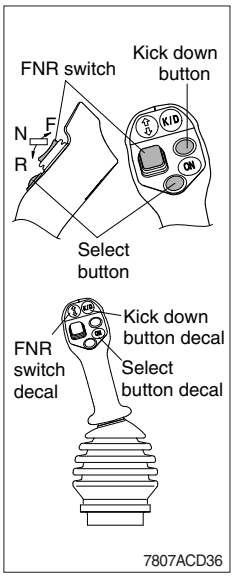
1) REMOTE CONTROL LEVER



(1) These joystick are used to control the boom and the bucket.

(2) Refer to operation of working device in chapter 4 at page 4-9.

2) FNR REMOTE CONTROL LEVER (option)



(1) This switch is used for froward and backward drive.

※ **Gear range can be selected by gear selector lever.**

(2) Select button

① If the select button is pressed, the indication lamp on the cluster will be ON and this FNR switch will start to operate.

※ **When the engine is running, the machine is on standstill(0 speed), parking brake is released, gear selector lever is in the neutral position, you can use this function after pressing the select button.**

(3) FNR switch

· F : Forward drive

· N : Neutral

· R : Reverse drive

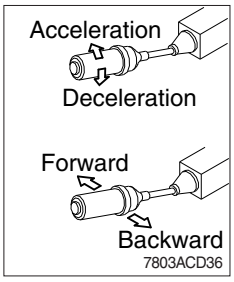
① If the upper side of this switch is pushed, the machine moves forward.

② If the down side of this switch is pushed, the machine moves backward.

③ This function is automatically released when the engine is stopped, parking brake is ON or gear selector lever is out of neutral.

(4) Kick down button : Refer to page 3-31.

3) GEAR SELECTOR LEVER

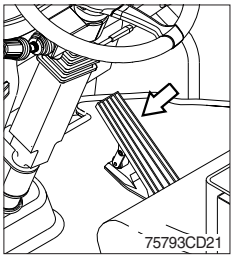


(1) This lever is used for gear selection, forward 4 stages and reverse 3 stages.

(2) If you push the gear selector lever, the machine moves forward, but if pull the gear selector lever, the machine moves backward.

(3) If you turn the gear selector lever forward, the machine increases the speed, but if you turn the gear selector lever backward, the machine reduces the speed.

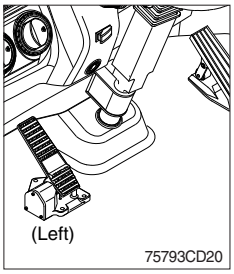
4) ACCELERATOR PEDAL

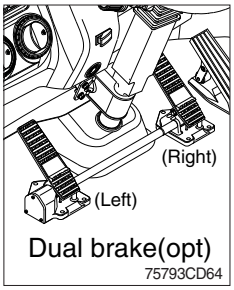


(1) This pedal controls the engine speed. The engine speed will increase in proportion to the degree of force applied to this pedal.

(2) Unless this pedal is pressed, the machine will run at low idling.

5) BRAKE PEDAL





(1) Left brake pedal (service brake + clutch cut off function)

① If the pedal is pushed down, this will generate braking force and bring the machine to a stop.

② If the power train operation is to be cut off, set the clutch cut off mode switch to ON (L, M, H) and press the pedal.

⚠ Even if the brake is applied while clutch cut off mode switch is OFF, power train will not cut off.

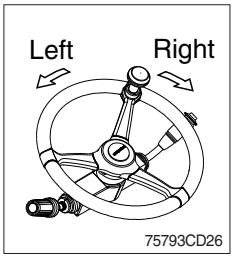
※ Do not operate the machine with foot the brake pedal unnecessarily, or bring premature wear of brake disc.

③ Clutch cut off function : Refer to page 3-29.

(2) Right brake pedal (service brake function only)

This pedal functions as service brake only.

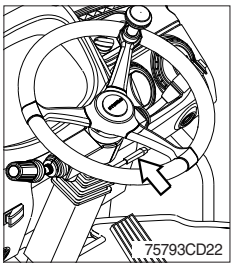
6) STEERING WHEEL

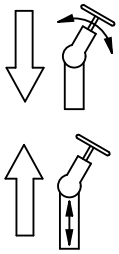


(1) Two multi-motion cylinders in the center of the machine will operate the steering function.

(2) 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.

7) STEERING WHEEL LEVER

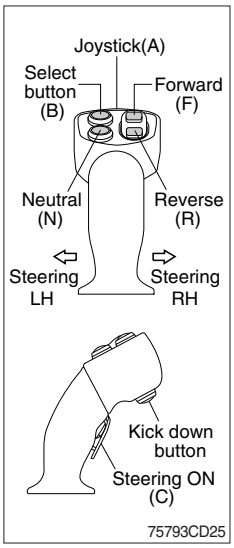




(1) By pulling down the lever, the wheel is adjustable to tilt.
· Tilting : 40˚

(2) By pulling up the lever, the wheel is adjustable to telescope.
· Telescoping : 80 ㎜

8) JOYSTICK STEERING CONTROL LEVER (option)



(1) The system has the following functions concentrated to a collapsible arm rest : steering, forward / reverse selection and kickdown function.

(2) This means that during normal loading work, the operator does not need to touch the steering wheel.

(3) The joystick steering pilot lamp on the cluster will be ON when the lever steering is activated.

⚠ As a safety precaution, the joystick steering is functioned while pressing the steering ON button (C).

⚠ When operating on a public road, the steering wheel should always be used and the joystick steering be disconnected. Also when operating at high speeds (above 20 km/h) on a work site, always use the steering wheel.

(4) Joystick (A)

① Activate the lever-controlled steering by pushing in the steering ON button (C).
The steering wheel works as usual, even if the joystick steering is activated.

② The joystick steering pilot lamp on the cluster will be ON when the steering ON button (C) is pushed.

(5) Forward / reverse selection button

F : Forward drive
N : Neutral
R : Reverse drive

① To be able to operate the forward / reverse selection and kick-down button the system must first be activated using select button (B).

※ The ordinary gear selector control should be in neutral.

② When this function is engaged, it is possible to operate the forward -reverse selection. If the ordinary gear selector control is activated at the same time as the joystick steering is activated, the ordinary gear selector control overrides any selection made by the joystick steering.
To reactivate the joystick steering, the ordinary gear selector control must first be moved to neutral and the system again be activated.

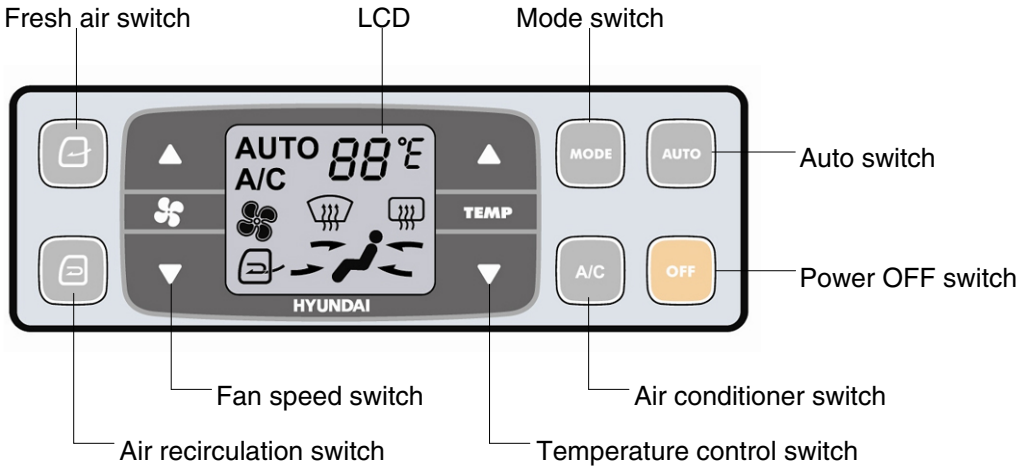
③ The FNR select pilot lamp on the cluster will be ON when the forward / reverse selection is activated.

(6) Kick-down button : Refer to page 3-31.

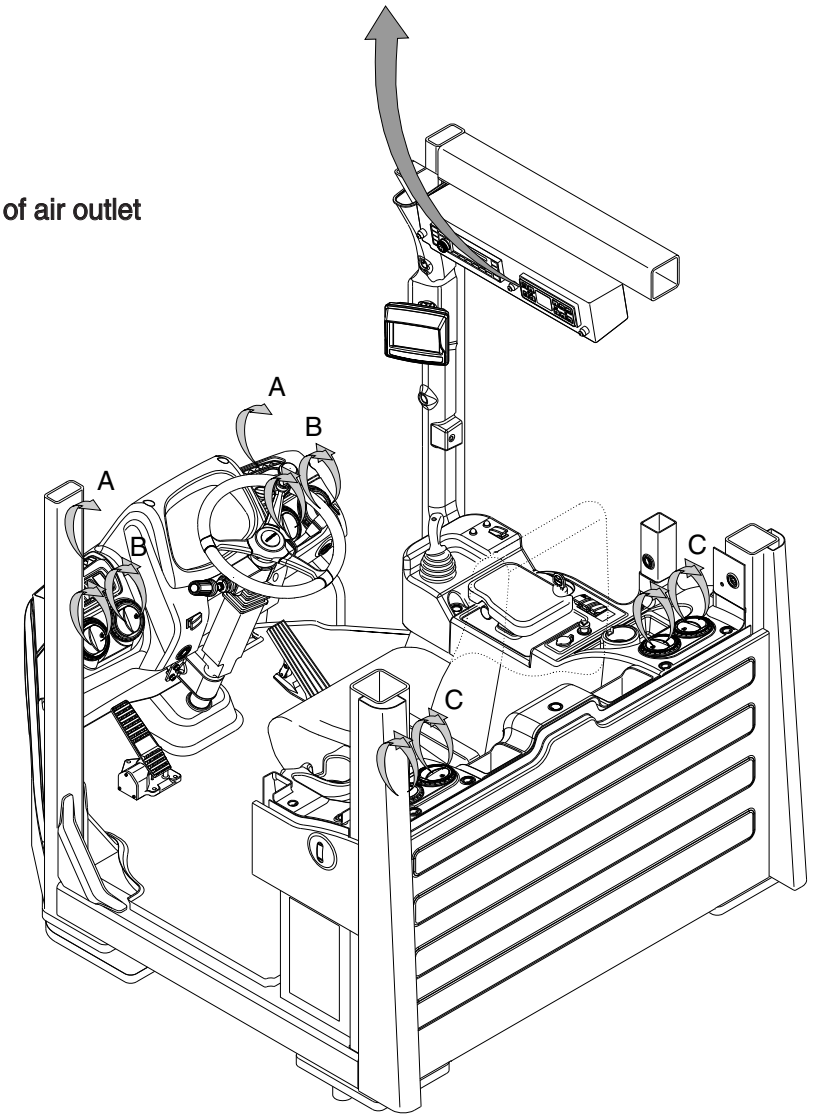
6. AIR CONDITIONER AND HEATER

■ 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 outlet



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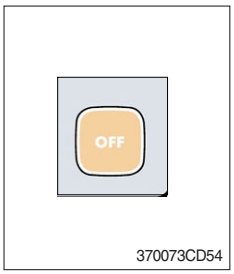
1) POWER OFF SWITCH

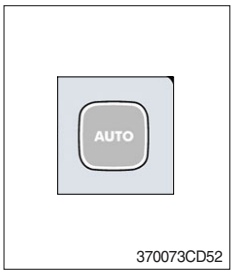


(1) This switch makes the system and the LCD OFF.
Just before the power OFF, set values are stored.

(2) Default setting values

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

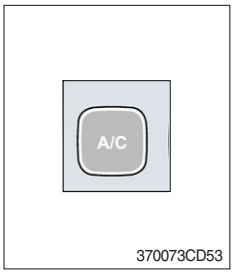
2) AUTO SWITCH



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

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

3) AIR CONDITIONER SWITCH (compressor switch)

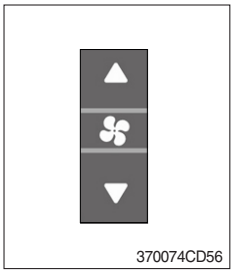


(1) This switch turns the compressor and the LCD ON.

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

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

4) FAN SPEED SWITCH

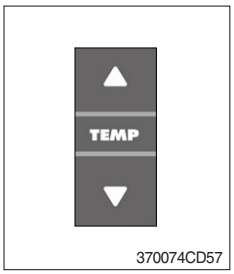


(1) Fan speed is controlled automatically by setted temperature.

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

(3) This switch makes the system ON.

5) TEMPERATURE CONTROL SWITCH



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

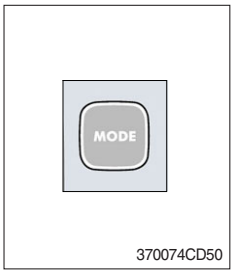
(2) Max cool and max warm beeps 5 times.

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

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

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

6) MODE SWITCH



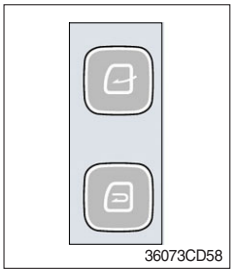
(1) Operating this switch, it beeps and displays symbol of each mode in order. (Human → Human/Rear → Human/Def → Def/Rear)

Mode switch		Human	Human/Rear	Human/Def	Def/Rear
					
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.

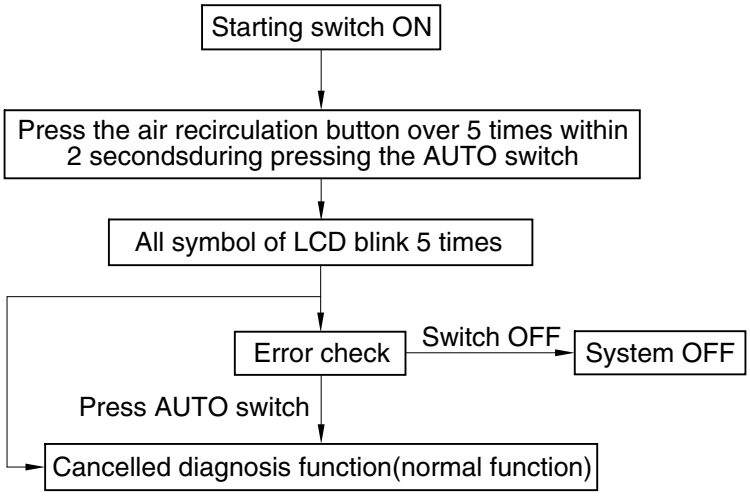
7) FRESH AIR/AIR RECIRCULATION SWITCH



(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

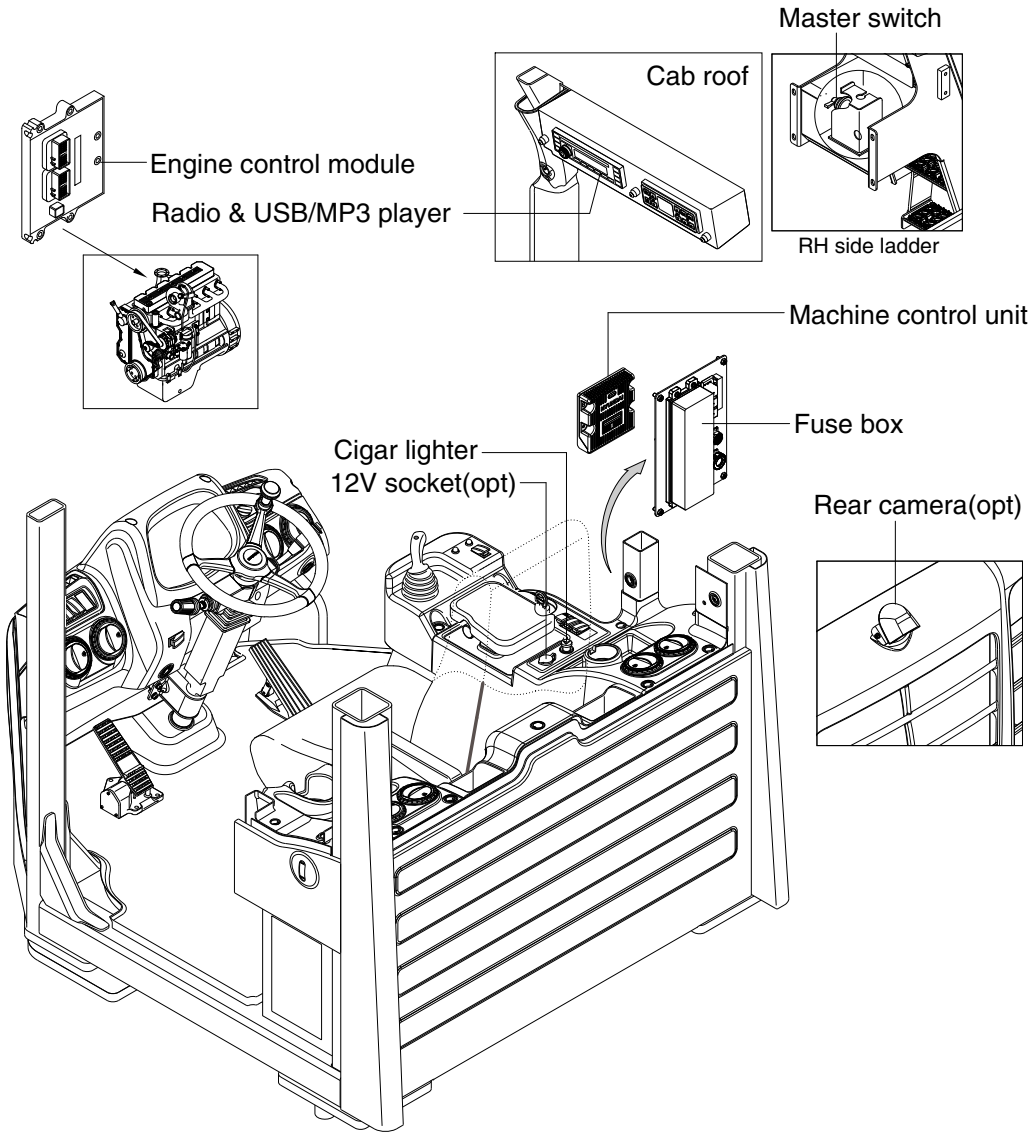
- The corresponding error code flickers on the setup temperature display panel, the other symbol will turn OFF.
- Error code flickers every 0.5 second.
- If error code is more than two, each code flickers 2 times in sequence.
- Error code

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

(3) Fail safe function

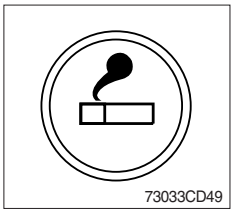
Error description	Fail safe function
Cabin inside sensor (11)	25˚C alternate value control
Ambient sensor (12)	20˚C alternate value control
Coolant temp sensor (13)	More than 10 minutes after engine start up, the alternate value is ON
Duct (evaporator) sensor (14)	1˚C alternate value control
Temp actuator (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

7. OTHERS



77593CD38

1) CIGAR LIGHTER



73033CD49

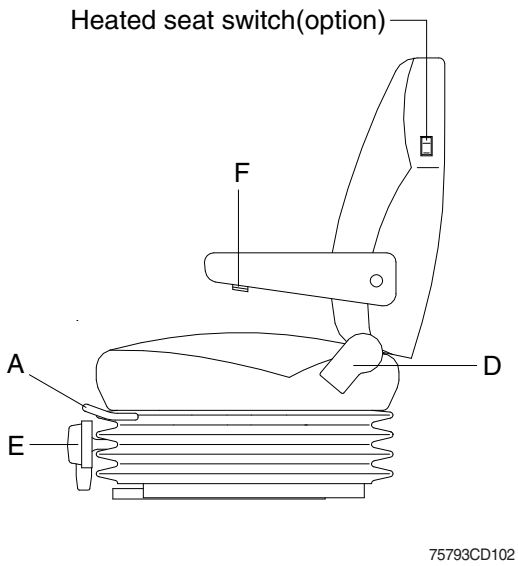
(1) This can be used when the engine starting switch is ON.

(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 24 V, 100 W.

2) SEAT

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



(1) Forward/Backward adjustment

① Pull lever A to adjust seat forward or backward.

② The seat can be moved forward and backward over 210 mm (8 in) in 21 steps.

(2) Reclining adjustment

Pull lever D to adjust seat back rest.

(3) Arm rest adjustment

This can be adjusted by turning the handle F to right and left.

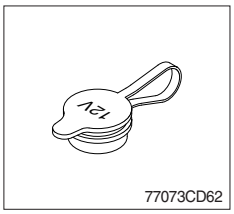
(4) Weight adjustment (E)

Adjusting handle to the operator's weight.

(5) Heated seat switch (option)

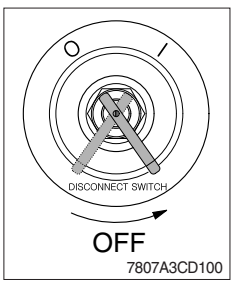
Press this switch in order to heat the seat.

3) 12V SOCKET (option)



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

4) MASTER SWITCH

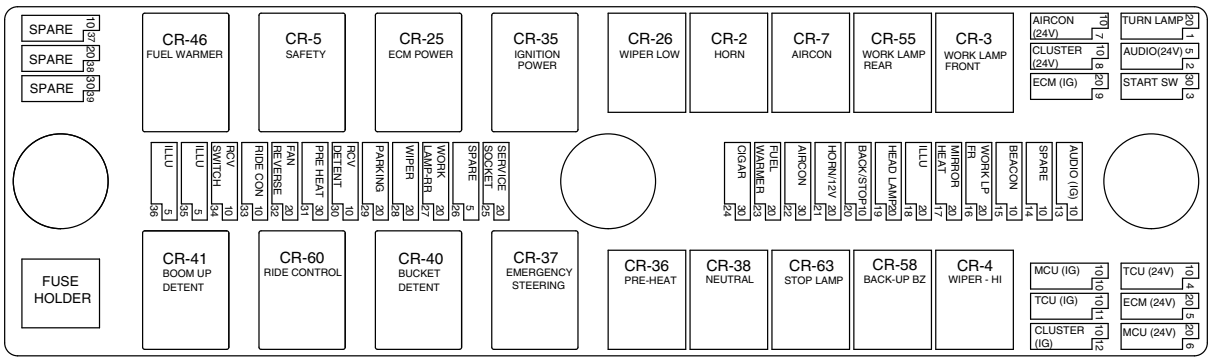


(1) This switch is used to shut off the entire electrical system.

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

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

5) FUSE BOX



77593CD107

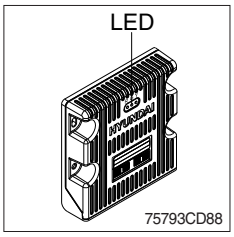
(1) The fuses protect the electrical parts and wiring from burning out.

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

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

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

6) MACHINE CONTROL UNIT (MCU)



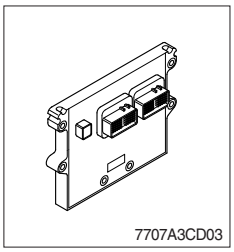
(1) It consists of electronic parts and controls all lamps and buzzers on cluster in accordance with signals transmitted from the switches, the ECM, TCU, the engine and the hydraulic pressure sensors.

(2) Three LED lamps on the MCU display as below.

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

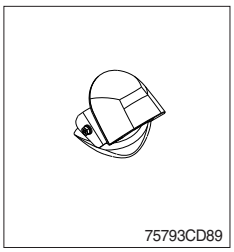
G : green, R : red, Y : yellow

7) ENGINE CONTROL UNIT (ECU)



(1) The engine control unit (ECU) is the control center of the engine system.

8) REAR CAMERA (option)



(1) The rear camera is available as a option.

※ **Refer to page 3-24.**

9) RADIO AND USB PLAYER (WITH BLUETOOTH)

9403CD100

■FRONT PANEL PRESENTATION

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

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

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

4 ····· Call & Pair button

5 ····· Call end button

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

7 ····· Station preset 2

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

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

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

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

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

13 ····· Auto tune up, Seek up button

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

15 ····· USB connector

16 ····· AUX IN Jack

17 ····· MIC hole

RADIO AND USB PLAYER (WITHOUT BLUETOOTH)

9403CD101

■FRONT PANEL PRESENTATION

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

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

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

4 ····· Radio seek up button

5 ····· Radio seek down button

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

7 ····· Station preset 2

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

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

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

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

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

13 ····· Track up button

14 ····· Track down button

15 ····· USB connector

16 ····· AUX IN Jack

■GENERAL

(1) Power and volume button

① Power ON / OFF button

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

② Volume UP/DOWN control knob

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

③ Initial volume level set up

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

④ Clock ON/OFF control

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

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

⑤ Clock adjustment

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

(2) Menu Selection

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

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

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

② Bass control

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

③ Treble control

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

④ Balance control

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

⑤ Fader control

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

⑥ EQ control

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

EQ OFF → CLASSIC → POP → ROCK → JAZZ

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

⑦ **Loud control**

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


9403CD110

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

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

(2) Track Up / Down button

9403CD106

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

9403CD107

(3) MP3 directory / File searching

9403CD111

① Button (2) is used to select a particular directory and file in the device. Turn button (2) right or left to display the available directories. Press button (2) momentarily when the desired directory is 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

9403CD112

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

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

(5) Track Scan Play (SCAN) button

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

(6) Track Repeat Play (RPT) button

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

(7) Track Random Play (RDM) button

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

(8) ID3 v2 (DISP)

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

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

* USB Information and Notice

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

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

c. No support any of MULTI-CAED Reader.

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

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

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

■AUX OPERATION

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

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

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

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

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

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

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

■**BLUETOOTH** (if equipped)

1) Using a bluetooth wireless connection

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

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

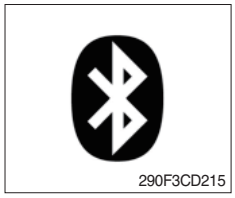
※ Since this audio unit is on standby to connect with your cellular phone via bluetooth wireless technology, using this audio unit without running the engine can result battery drainage.

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

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

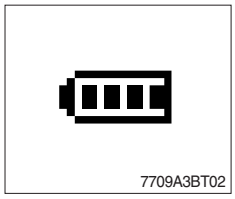
※ Digital Noise & Echo suppression system provides the best sound clarity with little or no distortion (Echo & side tone will happen depending on cellular phone or service network).

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



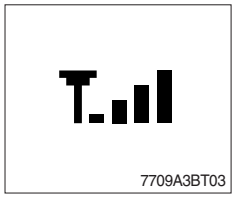
① Bluetooth icon

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



② Battery icon

It indicates the battery status of the connected bluetooth device.



③ Single strength icon

It indicates the signal strength of the connected bluetooth device.

2) Pairing in hands free modes

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

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

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

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

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

3) Cellular phone pairing mode

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

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

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

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

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

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

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

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

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

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

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

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

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

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

4) Bluetooth connection and disconnection

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


9403CD118

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


9403CD117

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

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

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

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

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

5) Using the audio unit as a handsfree device

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


9403CD117/8

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

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

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

6) Audio transfer between the audio unit and phone

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

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

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

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

7) Last call number dialing

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

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

8) To make a call by cellular phone

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

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

9) Using the audio unit as bluetooth music

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

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

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

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

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

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

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

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

■RESET AND PRECAUTIONS

1) Reset function

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

(1) press and hold 

simultaneously for about 5 seconds. (without Bluetooth)

Press and hold 


simultaneously for about 5 seconds. (with Bluetooth)

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

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

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

2) Precautions

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

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

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

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

(3) Tuning range

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

● AREA Selection :

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

(4) USB version : USB 1.1

(5) Bluetooth version : V2.1

(6) Bluetooth supported profile :

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

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 during operation.

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

4) Replace followings after initial operation hours.

Checking items	Hours
Engine oil and filter	250
Fuel filter element	
Fuel pre-filter	
Transmission oil and filter	
Axle oil	
Hydraulic oil return filter	
Pilot line filter element	

77094OP01

2. CHECK BEFORE STARTING THE ENGINE

1) Make sure that the steering frame lock bar is stored in the unlocked position.

⚠ **The steering frame lock bar must be removed in order to steer the machine.**

2) Look around the machine and under the machine to check for loose 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 loose wiring, and collection of dust at places which reach high temperature.

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

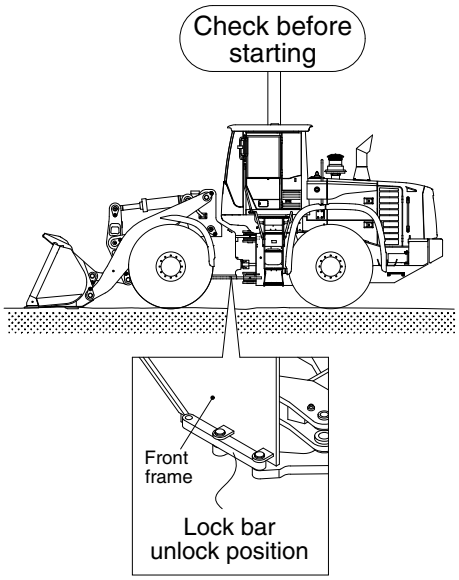
3) Adjust seat to fit the contours of the operator's body for the pleasant operation.

4) Make sure that the machine is equipped with a lighting system that is adequate for the job conditions. Ensure that all lights are in proper working condition.

5) Adjust the rear view mirror.

6) Make sure that there are no personnel in the area before you start the engine. Make sure that there are no personnel in area before you move the machine. Make sure that there are no personnel on the machine, underneath the machine, or around the machine.

⚠ **If a warning tag is attached to the starting switch or to the controls, do not start the engine. Also, do not move any controls.**



77094OP02

3. STARTING AND STOPPING THE ENGINE

1) CHECK INDICATOR LIGHTS

(1) Check if the parking brake switch is ON.

(2) Check if the gear selector lever is in neutral position.

(3) Check if the pilot cut off switch is OFF.

(4) Turn the key to the ON position, and check followings.

· **Cluster**

① If all the lamps light ON after sounding buzzer for 3 seconds.

※ **If the lamps do not light or the buzzer is not sounded, check disconnection of wire.**

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

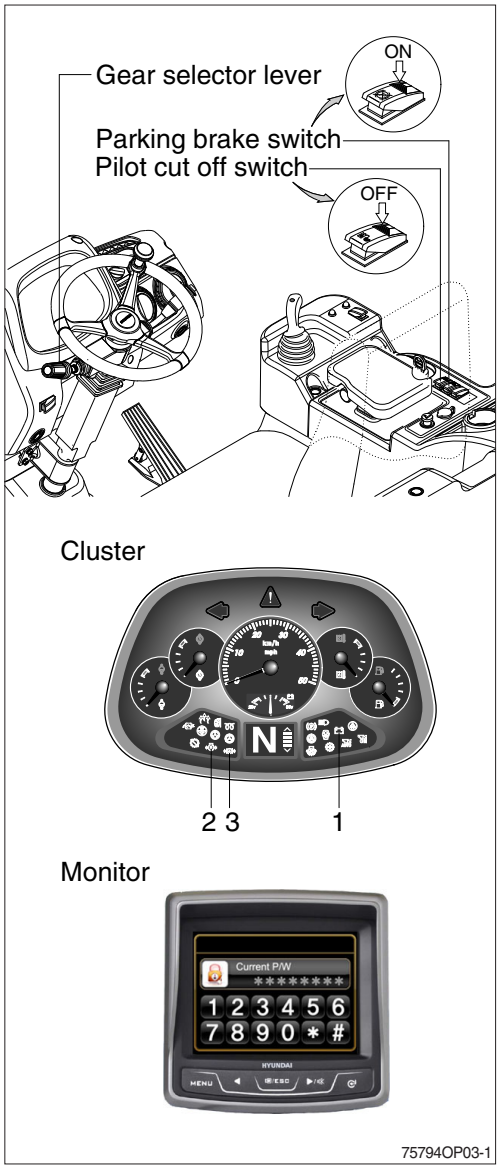
- Charging warning lamp (1)
- Engine oil pressure warning lamp (2)
- Brake fail warning lamp (3)

· **Monitor**

① The buzzer sounds for 3 seconds with HYUNDAI logo on monitor.

② If the ESL mode is set to the enable, enter the password to start engine.

③ If the password has failed 5 times, please wait 30 minutes before re-attempting to enter the password.



2) STARTING ENGINE IN NORMAL TEMPERATURE

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

(1) Check if the parking brake is locked (with the parking switch ON).

(2) Check if the gear selector lever is in the neutral position.

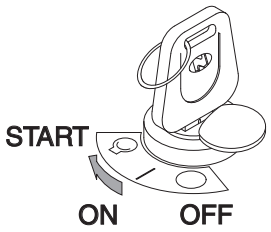
(3) Check if the pilot cut off switch is locked (with the switch OFF)

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

※ **Do not crank the engine for more than 20 seconds. If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.**

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

※ **Refer to the START PROCEDURE on the page 0-12.**



77074OP04

3) STARTING ENGINE IN A COLD WEATHER

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

※ **Replace the engine oil, coolant and fuel referring to recommended oils at page 6-9.**

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

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

(1) Check if the parking brake is locked (with the parking switch ON).

(2) Check if the gear selector lever is in the neutral position.

(3) Check if the pilot cut off switch is locked (with the switch OFF)

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

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

(6) After the preheater pilot lamp goes out, wait 5 minutes more for heating of fuel heater.

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

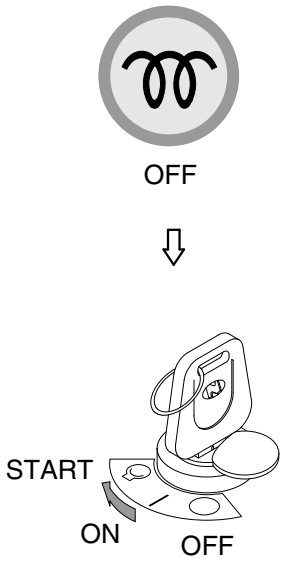
(7) Release starting switch immediately after starting engine. The starting switch will automatically return to the ON position.

※ **After engine started, the preheating function is actuated to reduce the white smoke.**

※ **Before the warming-up operation is completed, do not operate the equipment.**

※ **Operate machine at less than normal loads and at slow idle speed, right after engine warming-up.**

※ **Run the engine for 10~15 minutes at low idle when the ambient temperature is below -15˚C.**



77074OP05

4) INSPECTION AFTER ENGINE START

Inspect and confirm the following after engine starts.

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

(2) Are there leakages of oil or water?

(3) Are all the warning lamps (1-7) OFF?

(4) Check the following after warming up operation.

① Is the indicator of water temperature gauge (8) in the operating range?

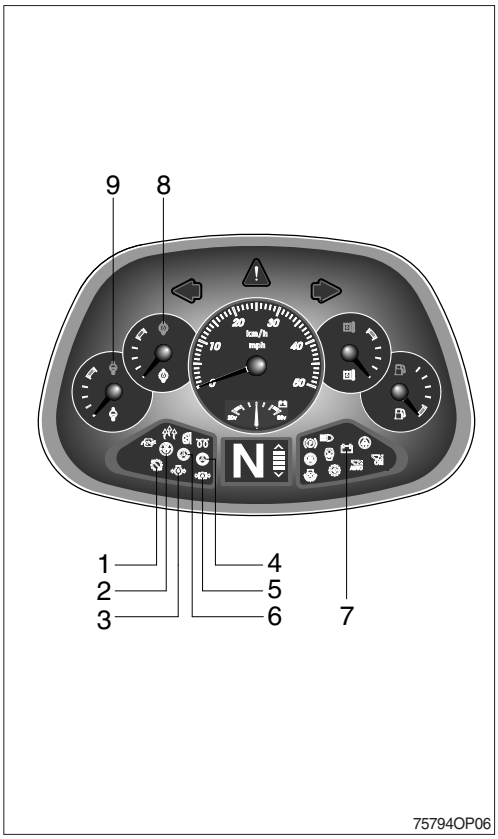
② Is the indicator of transmission oil temperature gauge (9) in the operating range?

③ Is the engine sound and the color of exhaust gas normal?

④ Are the sound and vibration normal?

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

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



75794OP06

5) TRANSMISSION COLD STARTING

(1) At an oil temperature in the shifting circuit < -12˚C, the transmission must be warmed-up for some minutes.

(2) This must be carried out in neutral with an increased engine speed.

(3) Until this oil temperature is reached, the electronics remains in neutral, and the symbol of the cold start phase will be indicated on the display.

· Indication on the display : ✳✳

(4) After the indication on the display is extinguished, the full driving program can be utilized out of NEUTRAL.


75794OP15

※ **Transmission warning**

Symbol	Meaning	Remarks
LF, LR	Limp home gear	-
✳✳	Oil temperature too low, no gear available	Warm up engine/transmission
WS	Warning sump temperature	Alternate between WS and actual gear/direction while driving, in neutral only displayed WS if no fault is detected ※Cool down transmission
WT	Warning torque converter temperature	Alternate between WS and actual gear/direction while driving, in neutral only displayed WS if no fault is detected ※Cool down transmission

6) TO STOP THE ENGINE

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

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

(1) Place the gear selector lever in neutral.

(2) Push the parking brake switch to the ON position.

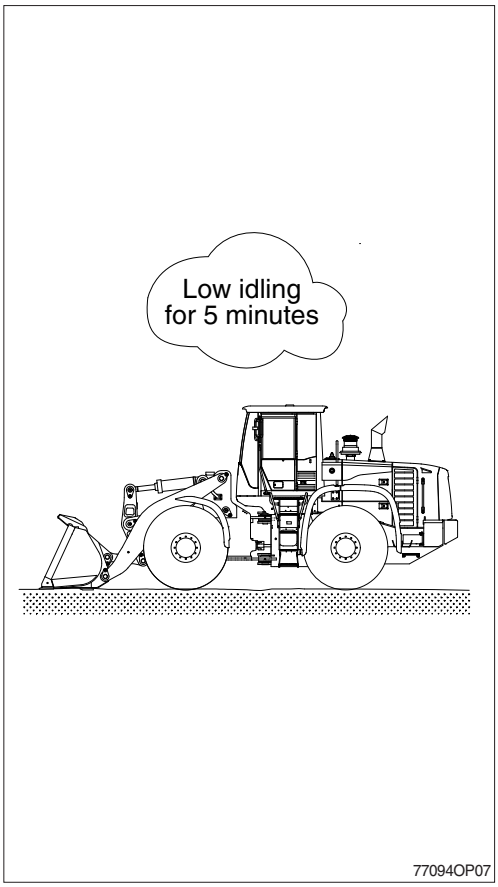
(3) Run the engine for five minutes at low idle with no load.

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

(5) Remove the key to prevent other people using the machine.

(6) Push the pilot cut off switch to the OFF position.

(7) Lock the cab door.



4. WARMING-UP OPERATION

※ The most suitable temperature for the hydraulic oil is about 50˚C (112˚F). It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25˚C (77˚F). The 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) Push the pilot cut off switch to the ON position.

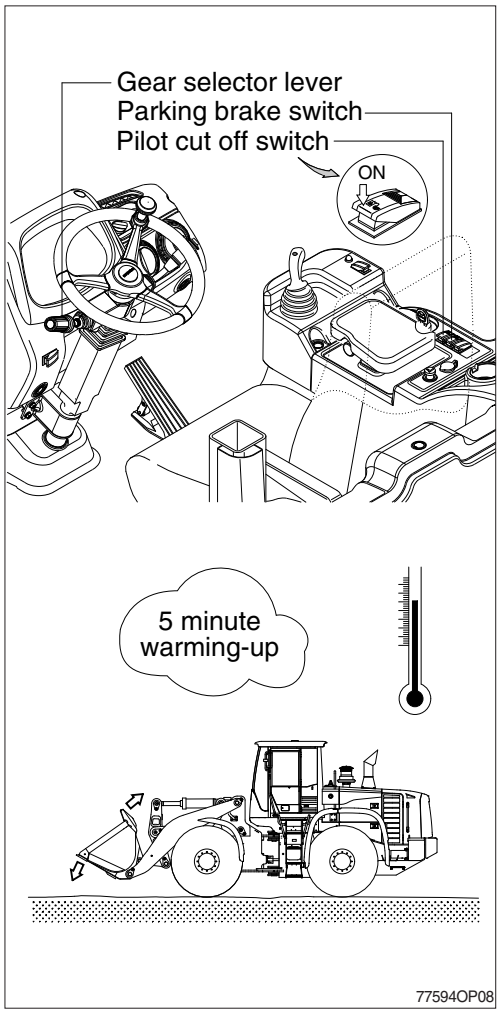
4) Lift the boom slightly and extend the bucket cylinder to the stroke end to relieve hydraulic pressure.

※ Do not leave hydraulic pressure relieved for more than 30 seconds.

5) Shorten the bucket cylinder to the stroke end to relieve hydraulic pressure.

※ Do not leave hydraulic pressure relieved for more than 30 seconds.

6) Repeat the procedure 4) - 5) several times until warm-up operation is completed.



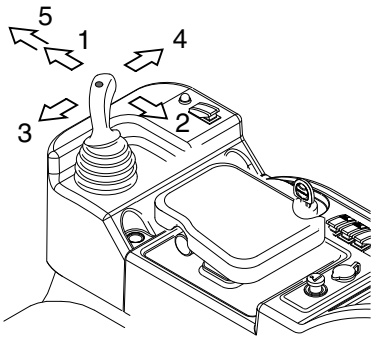
5. OPERATION OF THE WORKING DEVICE

※ Confirm the operation of control lever and working device.

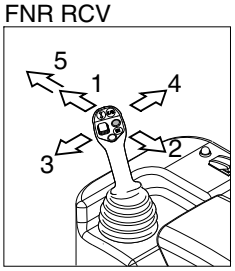
1) Control lever operates the boom and the bucket.

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

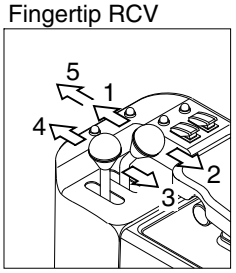
3) When the control lever operates to the position of boom float, boom kick out and bucket leveler ; these function is completed, then the control lever returns to the neutral position.



FNR RCV



Fingertip RCV



※ Control lever

Boom lower (1)

Push the control lever forward in order to lower the boom.

Boom raise (2)

Pull the control lever backward in order to raise the boom.

Bucket roll back (3)

Move the control lever toward the left in order to tilt the bucket backward.

Bucket dump (4)

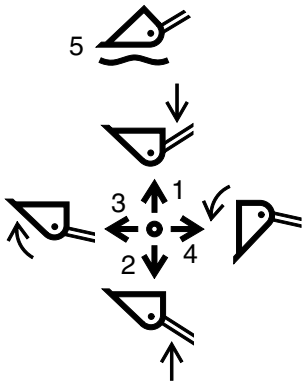
Move the control lever toward the right in order to dump a load from the bucket.

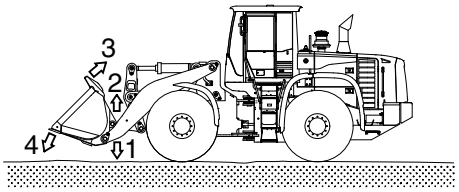
Boom float (5)

Push the control lever forward into the detent.

The boom will lower to the ground.

The boom will float along the contour of the ground.





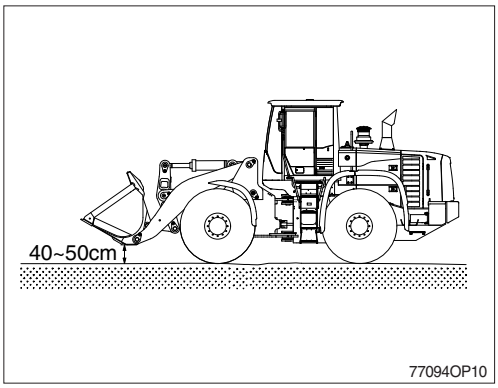
77094OP09

6. TRAVELING OF THE MACHINE

1) BASIC OPERATION

(1) Traveling posture

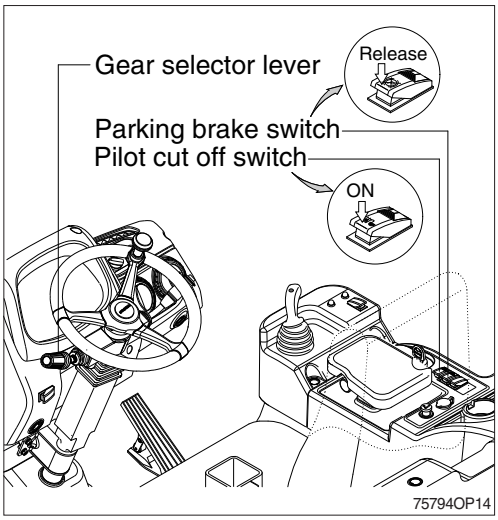
Lift the boom so that the bucket is placed 40-50㎝ above the ground.



(2) Traveling operation

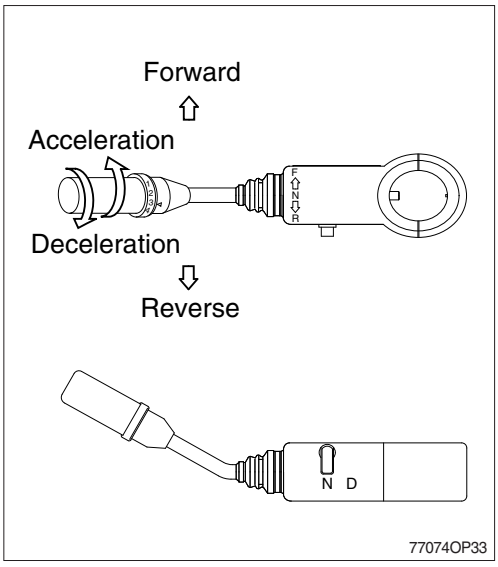
When warm-up operation is completed after the engine is started, move the machine according to the following procedure.

① Push the pilot cut off switch to the ON position.
② Release the parking brake.
③ Put the gear selector lever in the 1st stage of forward or backward direction and press gently the accelerator pedal to move the machine.



(3) Changing direction and speed

① The gear selector is designed for the mounting on the left side of the steering column.
② The positions (speeds) 1 to 4 are selected by a rotary motion, the driving direction Forward (F)-Neutral (N)-Reverse (R) by tilting the gear selector lever.
③ A neutral lock is installed as protection against inadvertent drive off.
  · Position N - Gear selector lever blocked in this position
  · Position D - Driving
④ When doing digging or dumping work, run the machine in the 1st or 2nd speed.



※ When traveling at high speed, do not abruptly decelerate by using the transmission lever, to slow down instead press the brake pedal.

※ When changing direction, check beforehand there is no obstacle in the direction you will be headed.

※ Avoid changing direction at high speed.

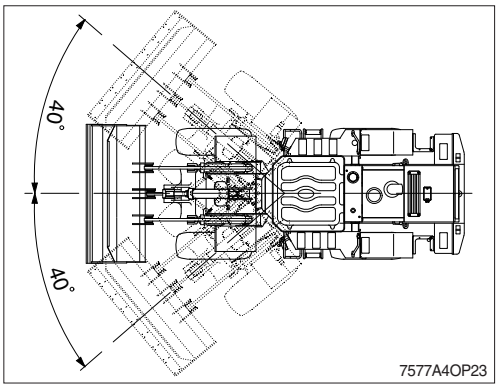
(4) Turning the machine

① Turn the machine by moving the steering wheel into the desired direction.

② You can turn the machine to the left or right by 40 degree.

※ Do not turn the machine abruptly when traveling at high speed and avoid turn on a slope.

⚠ Steering does not function with engine OFF.



(5) Precautions when driving

① If the monitor warning lamp lights up, put the gear selector lever in the neutral position and stop the machine. Stop the engine after running it at low idling. Then resolve any problems regarding operation of the machine.

② When operating the machine, if the load is lighten rapidly, the speed of the machine will increase. So, be careful.

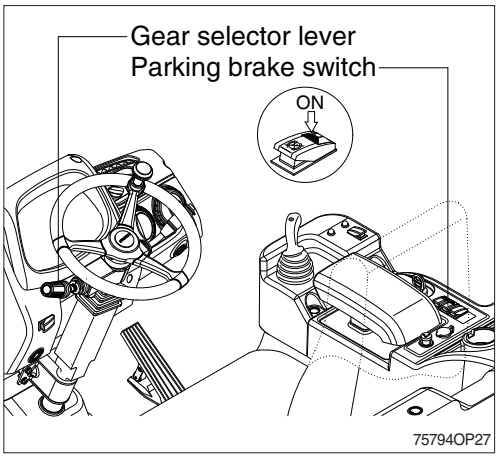
③ When the machine travels on uneven ground, keep the machine traveling at low speed.

(6) Stopping the machine

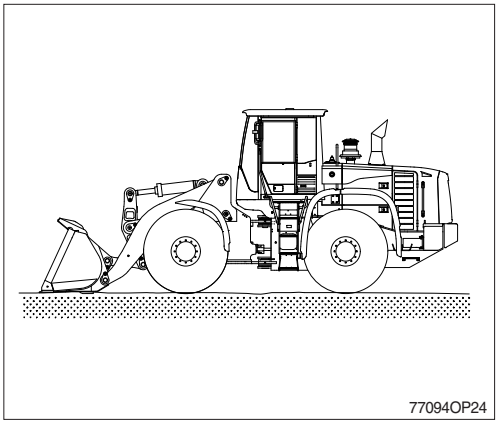
① Press the brake pedal to stop the machine.

② Put the gear selector lever in the neutral position.

③ Push the parking brake switch to the ON position.

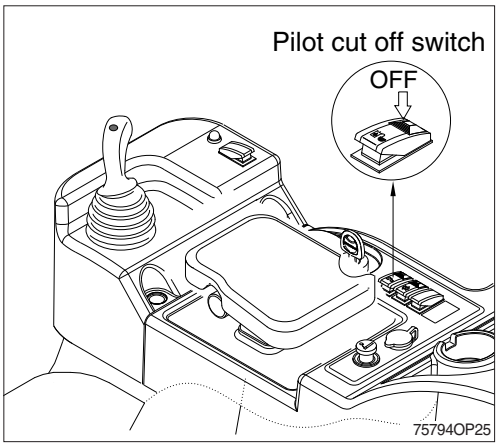


④ Lower the bucket to the ground.



⑤ Push the pilot cut off switch to the OFF position.

※ **When parking on a slope, block the tires.**



(7) Stopping engine

※ If the engine is abruptly stopped before it has cooled down, its service life may be shortened. Avoid sudden stop except an emergency.

※ When the engine is overheated, do not stop immediately. Run the engine at a mid range speed to allow it to cool down, then stop it.

① Check if the parking brake switch is ON.

② Check if the gear selector lever is in the neutral position.

③ Check if the pilot cut off switch is OFF.

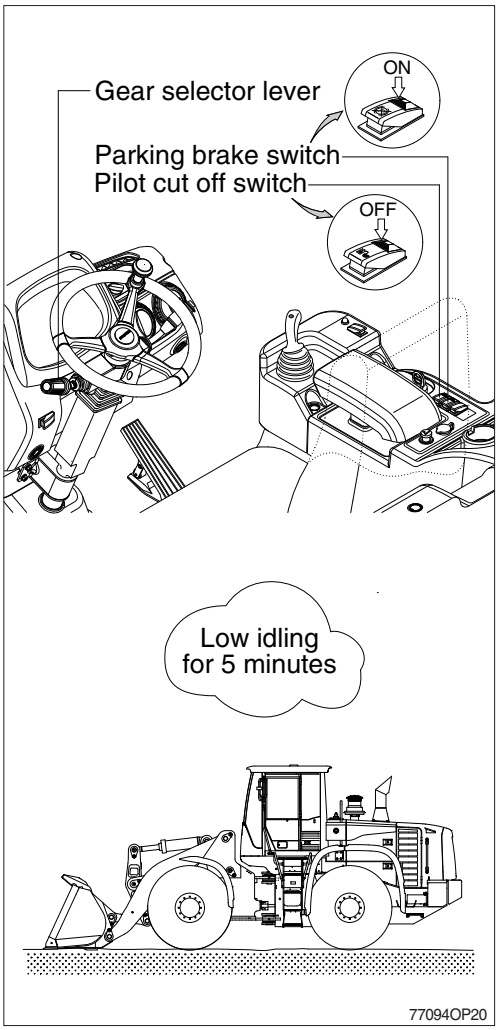
④ Run the engine at low speed without operating the equipment for about 5 minutes.
Turn the starting key to the OFF position and remove the key.

(8) Checks after the engine stopped

① Check the leakage of oil and water, the work equipment and the exterior of the machine.

② Refill the fuel tank.

③ Remove any debris inside of the engine room and attached to the machine.



2) TRAVELING ON A SLOPE

(1) Never travel down a slope in neutral.

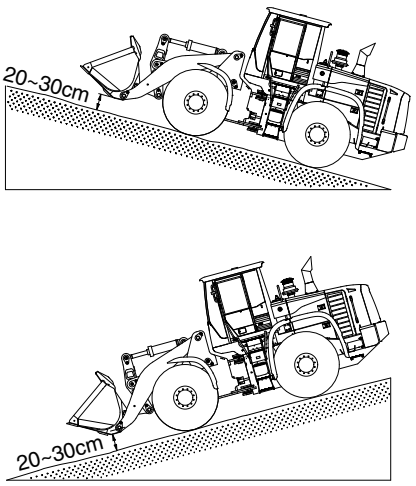
(2) Lower the bucket 20-30 cm (1 ft) to the ground so that it can be used as a brake in an emergency.

(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.



77094OP21

7. EFFICIENT WORKING METHOD

1) GENERAL

(1) Lift the bucket about 40-50 ㎝ (2 ft) above the ground to ensure safety and to gain a good range of view.

(2) Clear the jobsite and level the ground.

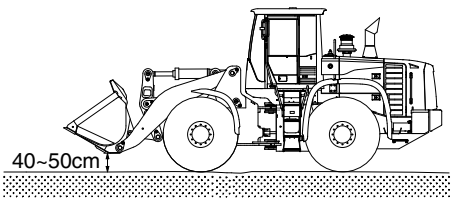
(3) Be careful that excessive force is not applied to the bucket.

(4) When handling hard materials, use bucket teeth or bolt on cutting edge.

(5) When doing dumping work, put the control lever in the DUMP position, then return it to a former state. Repeat this procedure until the work is finished.

(6) Position the machine with its back against the wind so that dust does not get into the engine.

(7) Check if the proper bucket is used for the work. If the capacity of the bucket exceeds that of the machine, the machine's service life may be shortened.



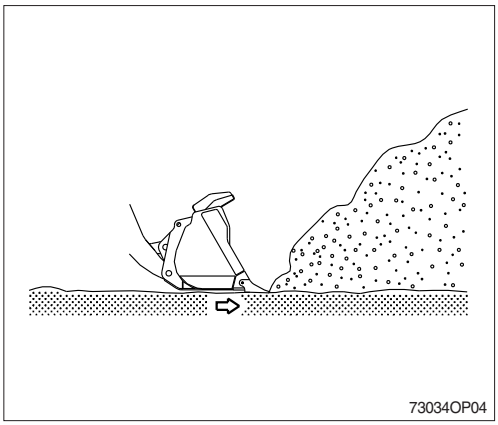
77094OP10

2) EXCAVATION WORK

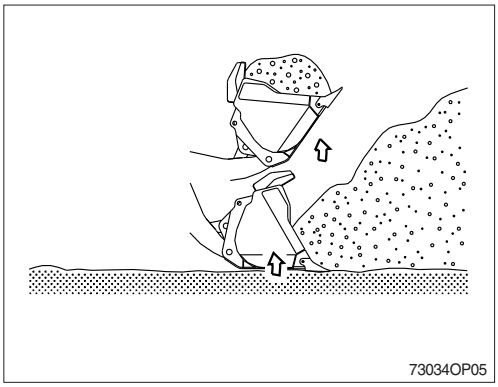
(1) Shovel work

As the machine loads on the bucket with traveling, tires may start to slip because of heavy load. Then lift the bucket slightly to reduce load.

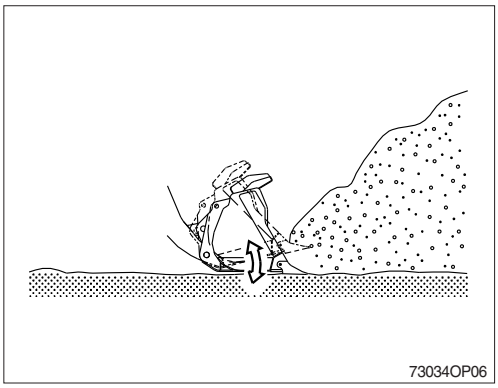
① Keep the bucket shovel parallel to the ground (If the bucket is pushed in a non-horizontal position, power may be reduced, and the bucket cannot dig deeply into the heap of soil).



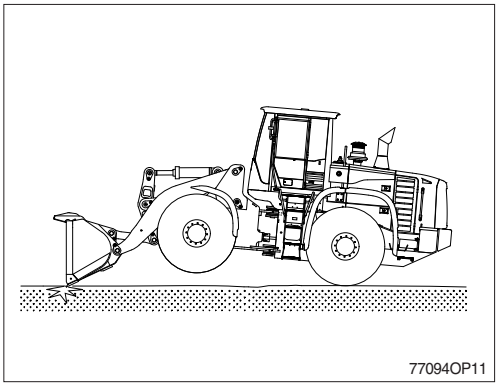
② When the bucket is sufficiently deep into the pile, advance the machine with the control lever pulled down. And by placing the control lever in the bucket roll-back position, fill the bucket with soil.



③ When it is difficult to dig into the soil, move the bucket control lever forward and backward to move the bucket teeth up and down.



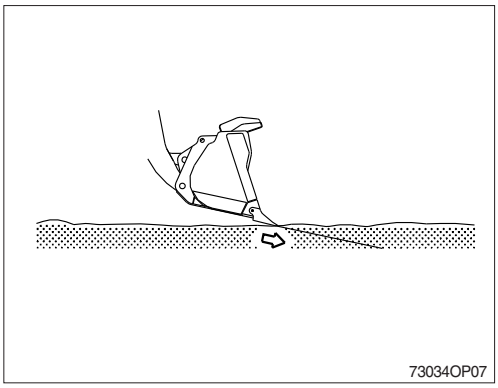
※ If the machine operates with its front tires lifted, its driving force will deteriorate and excessive force will be applied to the rear tires. Avoid operating in that posture.



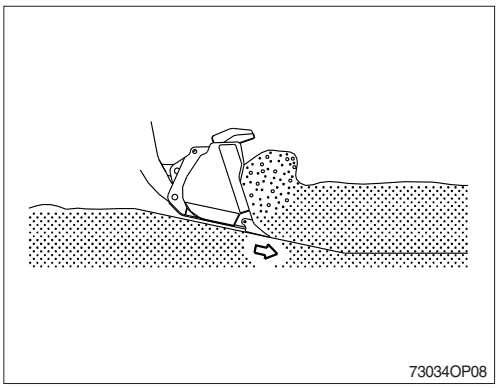
(2) Excavation on level ground

Advance the machine with the bucket lowered slightly and make sure that the bucket is evenly loaded on both sides.

① Lower the bucket edge slightly.



② Advance the machine and lift the bucket using the bucket control lever to dig out the soil.

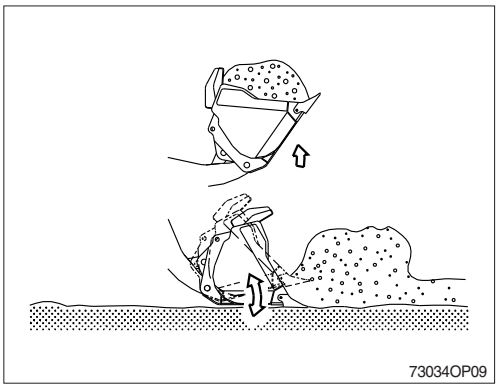


③ Advance the machine while controlling the depth of digging with the control lever.

※ Do not press the bucket heavily into the ground. It may damage its driving force.

※ Use the bucket suitable to the working condition.

※ When excavating, prevent the excavation force from applying only one side of the bucket.



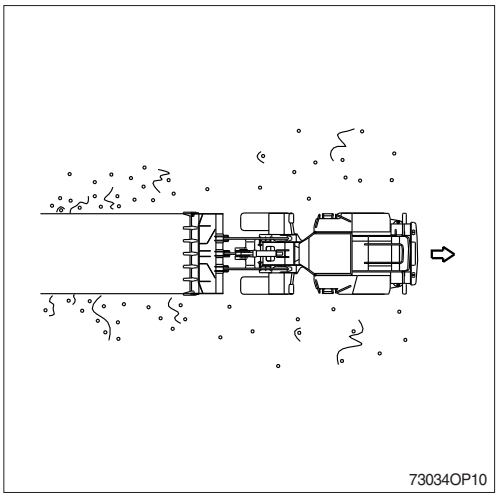
3) LEVELING

(1) Load the bucket with soil and dump gradually the soil while driving backward.

(2) After dumping the soil, move backward with the bucket lowered to the ground to level the ground.

(3) Load the bucket with soil and place the bucket in the horizontal position.
Then put the control lever in the BOOM FLOAT position and move backward.

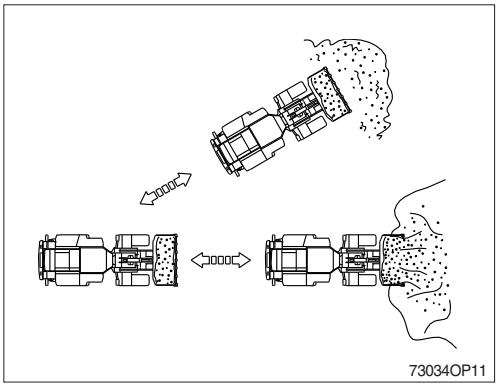
※ Make sure that the machine moves always backward when doing leveling work.



4) TRANSPORTATION

※ Make sure that the traveling path is always cleared.

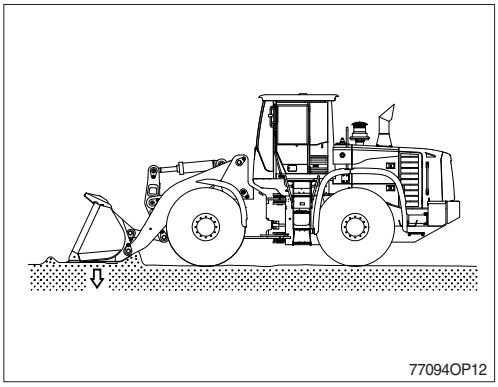
※ When transportating material, lift the bucket 40-50 ㎝ above the ground.



5) COMPACTION

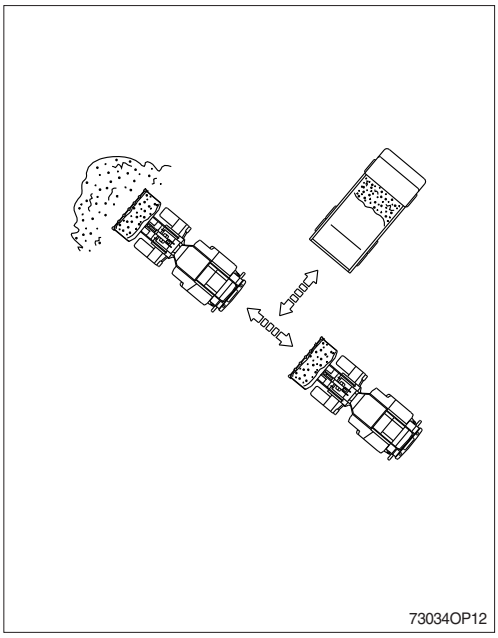
When operating, keep the bottom of the bucket horizontal to the ground.

※ Do not work with the bucket set in the DUMP position.



6) LOADING

Maximum efficiency can be attained by carrying out work in such a way that the swinging angle and the traveling distance are kept as small and short as possible in accordance with the terrain.



(1) I method

① After digging out the soil, move backward and position the dump truck between the heap of soil and the machine to load the soil into the truck.

② This is the fastest and most efficient way to load material.

※ The ground of the jobsite should be always level and do not swing or step on a brake pedal abruptly with the boom raised.

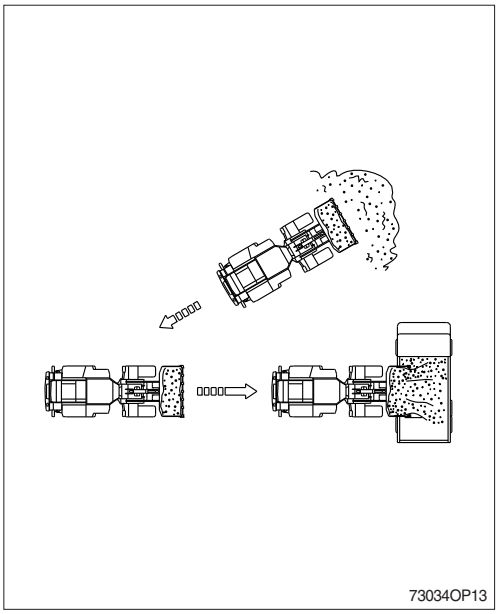
(2) V method

① Park the truck at an angle of 60 degrees toward the machine. After digging out, drive backward and position the machine at a right angle with the truck and load the truck with the soil.

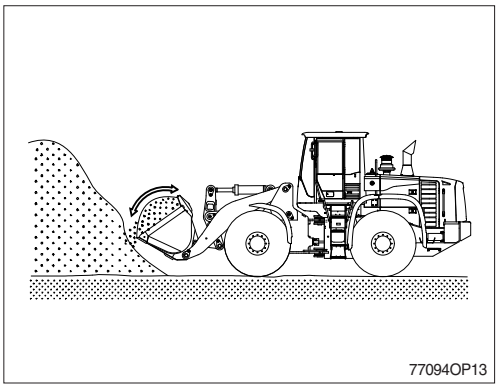
② Position the machine so that the soil can be dumped in the center of the truck.
If the length of the truck is more than double the width of the bucket, perform the dumping work from forward to backward.

③ Move the control lever to the right and dump the bucket.

④ Shake the bucket to throw off the soil stuck inside. Move the bucket control lever to the left and right and attach the bucket to the stopper.



⑤ Shake the bucket before setting it to the DUMP position so that loaded materials are evenly distributed inside the bucket. This will prevent materials from slipping back when the bucket is placed in the DUMP position.

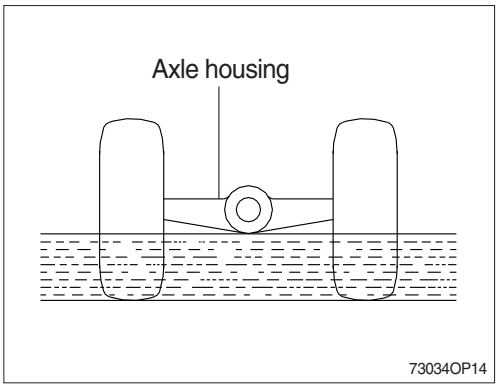


7) PRECAUTIONS DURING OPERATION

(1) Permissible water level

① Do not work in water or damp ground deeper than the permissible depth (Up to lower part of the axle housing).

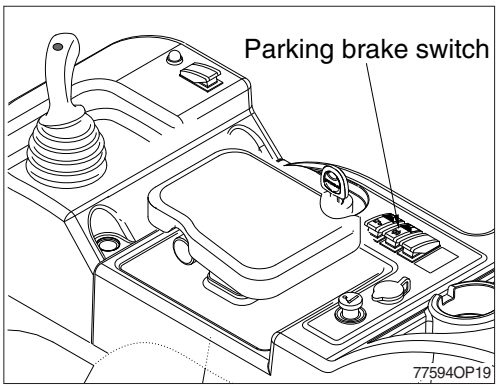
② After the work is completed, grease parts which has been immersed in water.



(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.

※ After using the parking brake as an emergency brake, ask Hyundai dealer to check complete brake system.



(3) Precautions when driving on a slope

① When turn on a slope, lower the work equipment to lower its center of gravity. Avoid turn on a slope if possible.

② **When traveling down a slope**

a. If the main brake is used to often when traveling down a slope, it may be overheated and damaged. So put the transmission lever in the low speed position and use the engine as a brake.

b. If there is a mismatch of speed, torque converter oil temperature may be overheated. Set the speed in 1st speed position to allow the temperature to drop.

c. When the gauge does not move into the green range at the 1st speed, stop the machine and put it in neutral. Run the engine at a mid range speed until the gauge moves into the green range.

③ **When the engine stops**

If the engine stops on a slope, press the parking brake switch immediately and lower the work equipment to stop the machine.

(4) Precautions when traveling

Do not travel a long distance at high speed. It may overheat tires and cause premature damage. If it is necessary to travel a long distance at high speed, observe the following.

① Comply with the regulations concerning this machine to ensure safety.

② Do the pre-inspection before starting off.

③ As the optimum air pressure of tire and optimum driving speed is different according to the kinds of tires and road conditions, consult Hyundai dealer or tire distributor.

④ Check the air pressure of tire before driving.

⑤ After 1 hour driving, stop for 30 minutes to check any abnormality of tires and other parts, and level of oil and coolant.

⑥ Travel with the bucket empty.

8. ADJUSTMENT OF THE WORK EQUIPMENT

The bucket can be adjusted to a height desired by using the boom kick-out device.

⚠ **Park the machine on level ground and block the tires to prevent sudden movement of the machine.**

⚠ **Press the parking brake switch.**

⚠ **Fix the front and rear frames by using the safety lock bar.**

⚠ **Do not work underneath the work equipment.**

1) ADJUSTMENT OF THE BOOM KICKOUT

(1) Lift kickout position

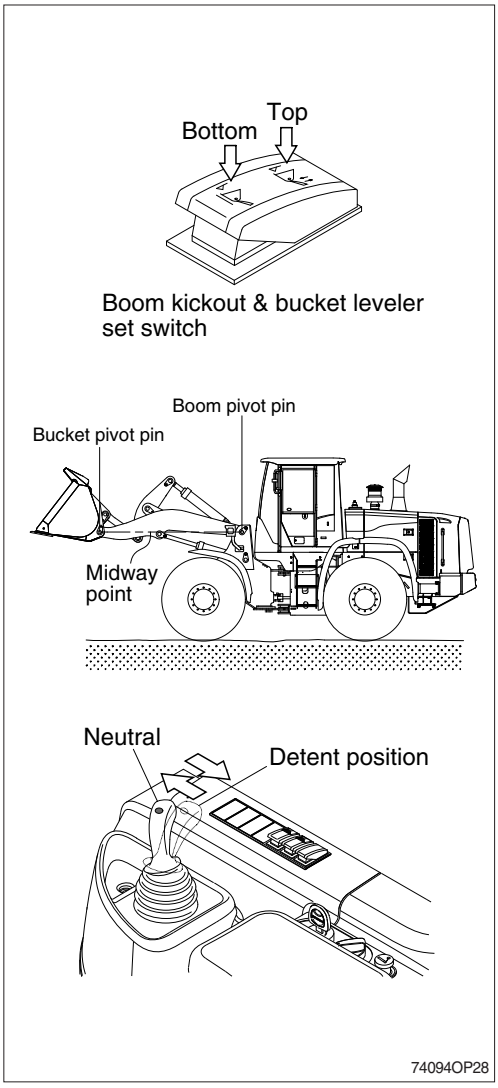
To set the lift kickout, raise the bucket to the desired position above the midway point (if boom is placed at below midway point, boom up position setting is not possible). Then depress the top of switch for 2~3 seconds. The boom will return to the programmed position when the raise detent is activated and the boom is below the kickout position.

(2) Lower kickout position

To set the lower kickout, lower the bucket to the desired position below the midway point (if boom is placed at above midway point, boom down position setting is not possible). Then depress the top of switch for 2~3 seconds. The boom will return to the programmed position when the float detent is activated and the boom is at least a foot above the kickout position.

(3) Bucket leveler position

To set the bucket leveler, roll back the bucket to the desired position. Then depress the bottom of switch for 2~3 seconds. The bucket will return to the programmed position when the roll back detent is activated and the bucket is below the leveler position.



9. OPERATION IN THE SPECIAL WORK SITES

1) OPERATION THE MACHINE A COLD WEATHER

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

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

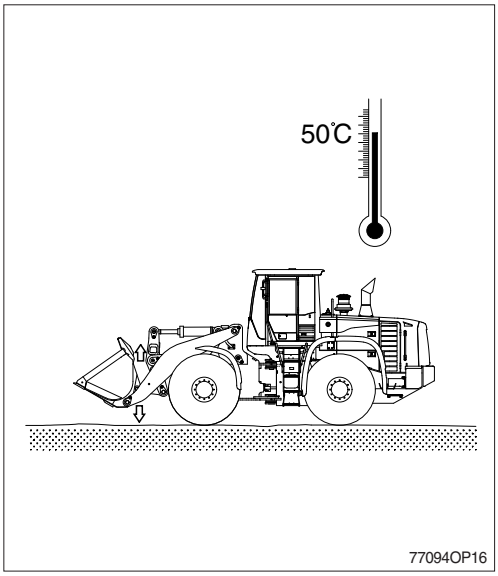
(3) Refer to the starting engine in cold weather. Start the engine and extend the warming-up operation.

(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.

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

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

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

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

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

3) SEA SHORE OPERATION

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

(2) Wash machine after operation to remove salt residue.
Pay special attention to electrical parts and hydraulic cylinders 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.

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) CLEANING THE MACHINE

Clean the machine.

Grease each lubrication part.

2) LUBRICATION POSITION OF EACH PART

Change all oil.

※ Be particularly careful when you reuse the machine.

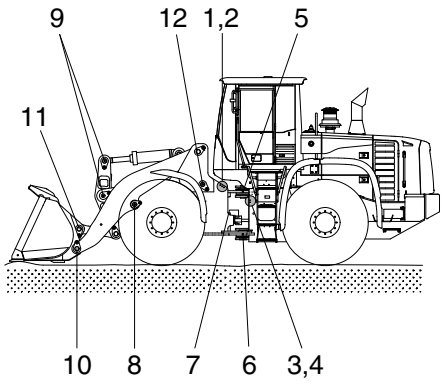
As oil can be diluted during storage.

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

3) MASTER SWITCH

Turn OFF the master switch and store the machine.

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



77094OP17

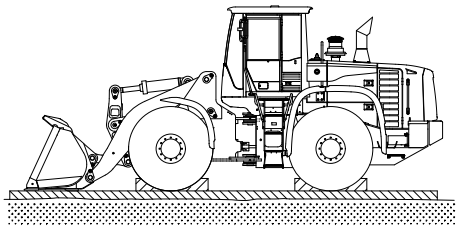
1 Lubricating manifold (left, 2EA)
2 Lubricating manifold (right, 2EA)
3 Lubricating manifold (left, 2EA)
4 Lubricating manifold (right, 2EA)
5 Center pivot pin (upper, 1EA)
6 Center pivot pin (lower, 1EA)
7 Steering cylinder rod (2EA)
8 Boom cylinder pin (rod side, 2EA)
9 Bellcrank (6EA)
10 Boom and bucket connecting pin (2EA)
11 Bucket link connecting pin (2EA)
12 Boom cylinder pin (frame side, 2EA)

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 tires.



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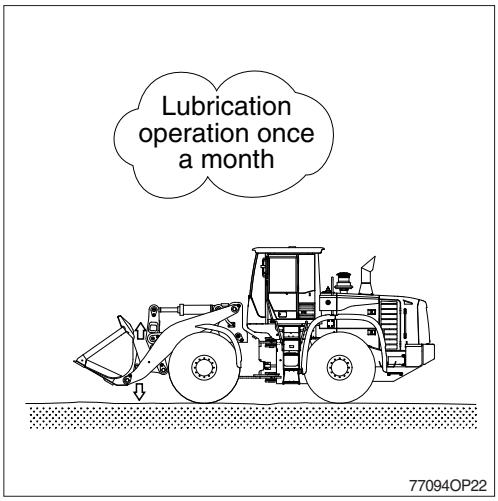
6) DURING STORAGE

Start engine and move the machine and working 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, turning, and work equipment operation to make sure enough lubrication of all functional components.



※ BATTERY

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

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

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

1. ROAD TRAVELING

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) Check the air pressure of tires and traveling speed limitations.

· Air pressure

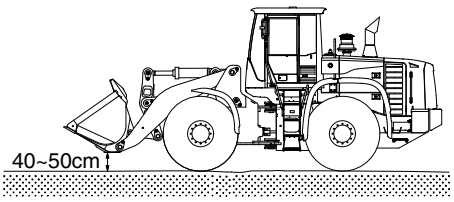
Size	Pressure	
26.5-25, 20PR, L3	3.5 kgf/cm^2 (50 psi)	
26.5 R25 L3, ★★ 26.5 R25 L5, ★★	Front	5.1 kgf/cm^2 (73 psi)
	Rear	4.6 kgf/cm^2 (65 psi)

· Maximum speed : 39.0 km/hr (24.2 mph)

4) When traveling for a long distance, stop every hour or every 40 km (25 mile) to allow tires and other components to cool down and check any abnormality.

5) Drive with the bucket empty.

6) Travel at a mid-range speed and be careful to drive within the limited speed when driving on a public road.



77094OP10

2. PREPARATION FOR TRANSPORTATION

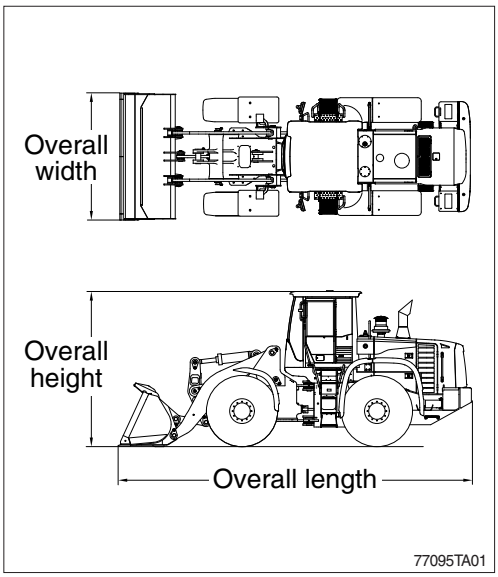
1) When transporting the machine, observe the various road rules, road transportation vehicle laws and vehicle limit ordinances, etc.

2) Make sure the cooling system has proper anti-freeze if moving machine to a cold climate.

3) Select proper trailer after confirming the weight and dimension from the page 2-2~2-5.

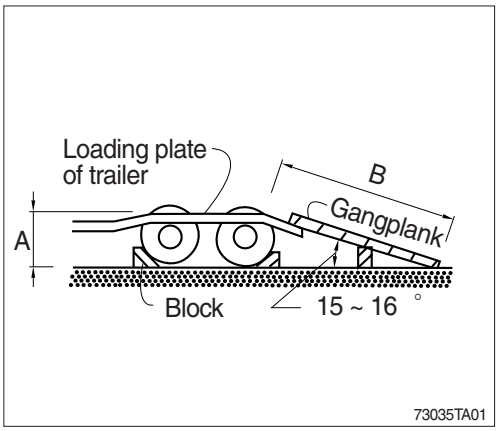
4) Check the whole route such as the road width, the height of bridge and limit of weight and etc., which will be passed.

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



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

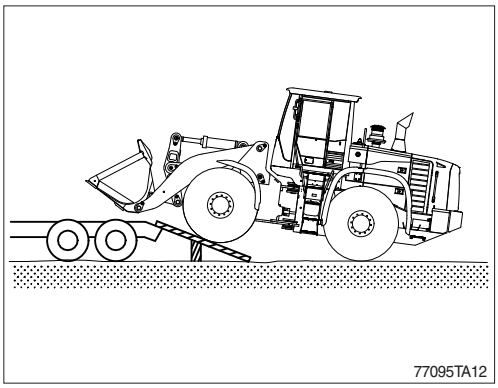


3. LOADING THE MACHINE

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

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

3) Move slowly and carefully when the machine is on the gangplank.
   Do not change the direction of the machine while it is on the gangplank.



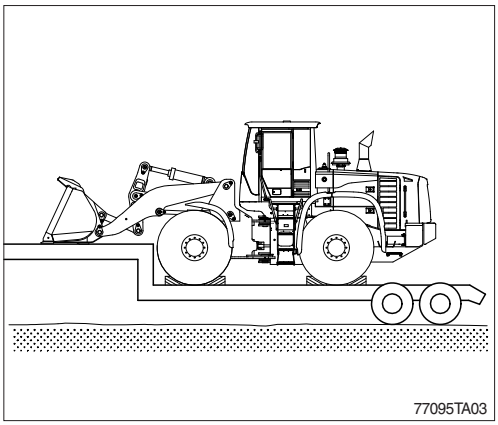
4) Do the following after loading the machine to the trailer.

(1) 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.**

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

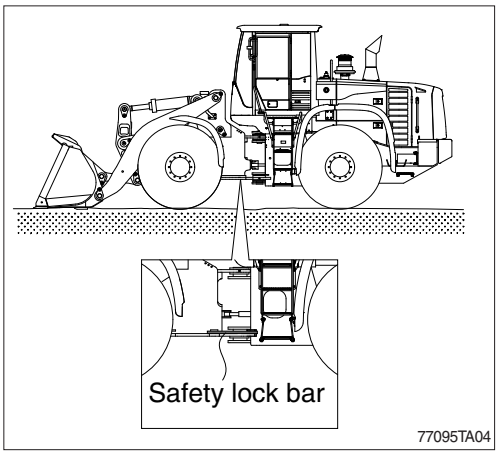
⚠ **Balance the load.**



4. FIXING THE MACHINE

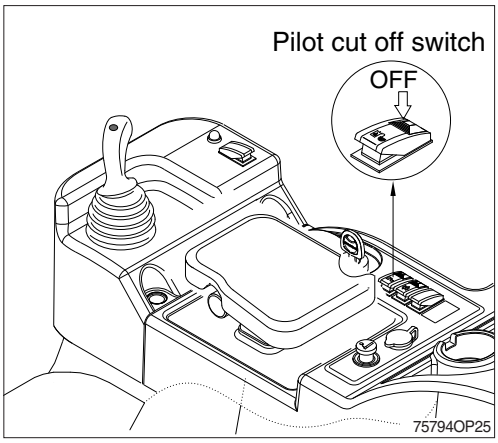
1) Fix front and rear frame by linking safety lock bar.

2) Push the parking brake switch.

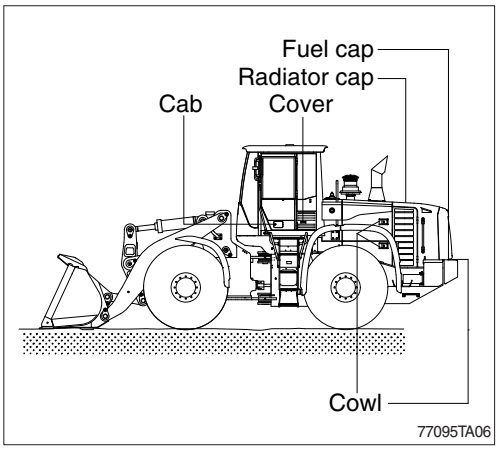


3) Push the pilot cut off switch to the OFF position to prevent the hydraulic system from operating.

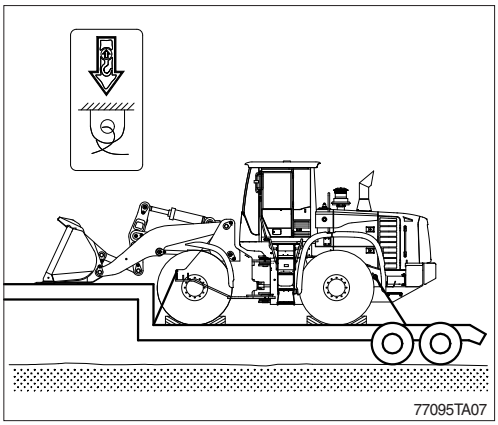
4) Stop the engine, turn the starting switch off and remove the key.



5) Secure all locks.



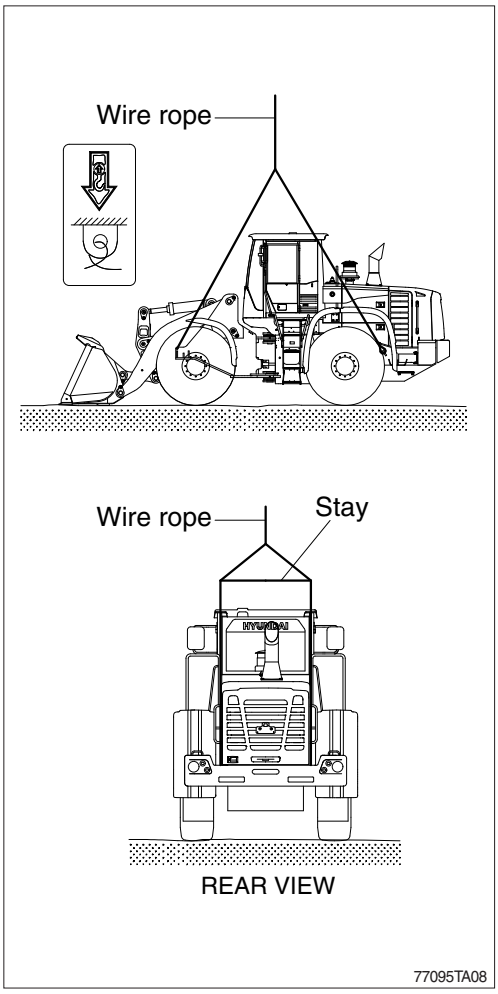
6) Block the tires and fix firmly with wire rope or chain to prevent the machine from moving during transportation.



5. LOADING AND UNLOADING BY CRANE

1) Check the weight, length, width and height of the machine referring to 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 to touch 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 lock bar and pilot cut off switch to the OFF 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.



6. TOWING THE MACHINE

⚠ **Personal injury or death could result when towing a disabled machine incorrectly.**

⚠ **Block the machine to prevent movement before releasing the brakes. The machine can roll free if it is not blocked.**

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 speed less than 2 km/hr (1.2 mph). Transport it on a trailer, if it has to be moved for a long distance.

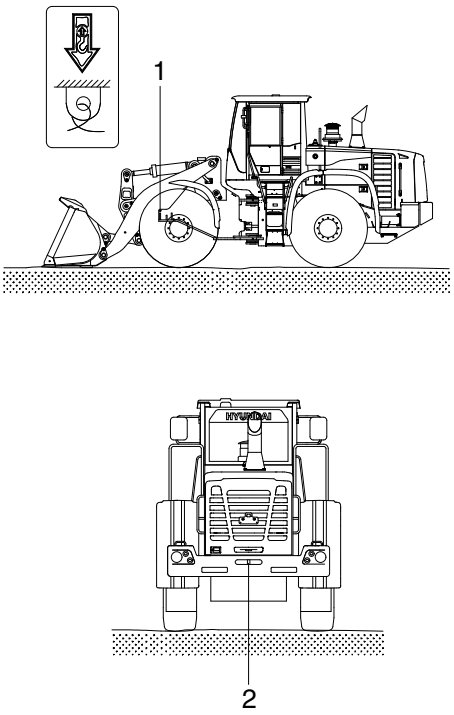
(3) When the steering device and the brake of the machine to be towed can not be operated, transport by trailer.

⚠ **Be careful when towing.**

⚠ **Be careful that the brake will not work if there is any disorder in the braking system.**

(4) When you tow the machine from the front, attach the tow line to the tow eyes on the front frame (1).
When you tow the machine from the rear, use the tow rear eyes provided for lift & tie (2).

(5) Do not use a chain for pulling a disabled machine. A chain link can break. This may cause personal injury. Use a wire rope cable with ends that have loops or rings. Place an observer in a safe position in order to watch the pulling procedure. The observer can stop the procedure, if necessary. The procedure should be stopped if the cable starts to break. Also, stop the procedure if the cable starts to unravel. Stop pulling whenever the towing machine moves without moving the towed machine.



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(6) Keep the tow line angle to a minimum. Do not exceed a 30 degree angle from the straight ahead position.

(7) Quick machine movement could overload the tow line or the tow bar. This could cause the tow line or the tow bar to break. Gradual, steady machine movement will be more effective.

(8) Normally, the towing machine should be as large as the disabled machine. Make sure that the towing machine has enough brake capacity, enough weight, and enough power. The towing machine must be able to control both machines for the grade that is involved and for the distance that is involved.

(9) You must provide sufficient control and sufficient braking when you are moving a disabled machine downhill. This may require a larger towing machine or additional machines that are connected to the rear of the disabled machine. This will prevent the machine from rolling away out of control.

(10) All situation requirements cannot be listed. Minimal towing machine capacity is required on smooth, level surfaces. On inclines or on surfaces in poor condition, maximum towing machine capacity is required.

(11) When any towed machine is loaded, this machine must be equipped with a brake system that is operable from the operator compartment.

※ **Consult your HYUNDAI dealer for the equipment that is necessary for towing a disabled machine.**

2) WHEN THE ENGINE WORKS

(1) When the transmission system or steering wheel is workable and the engine is running, the machine can be towed only for a short distance.
For example, pull the machine out of mud or pull the machine to side of the road.

(2) The operator of the towed machine should turn the steering wheel into the direction in which the machine is towed.

3) WHEN THE ENGINE DOES NOT WORK

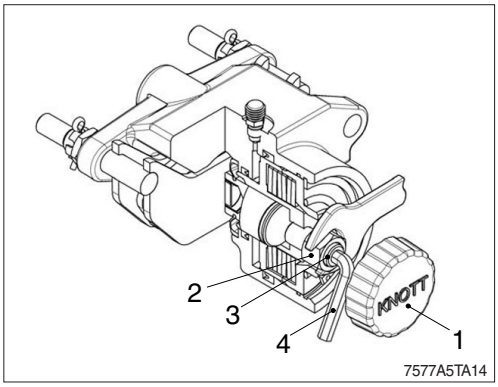
When towing the machine with the engine stopped, do it in the following order.

(1) The transmission oil does not lubricate the system, so remove the front and rear drive shafts.

(2) Loosen the steering cylinder as the steering operation is not workable.
Even if the brake is in good condition, the brakes can only be used a limited number of times.
There is no change in the operating force for the brake pedal, but the braking force is reduce each time the pedal is depressed.

(3) The parking brake is activated by spring and released by hydraulic pressure. If the engine does not work, the brake will be activated.

① Release the screw cap(1) and unscrew.
② Release the lock nut(2) and turn the adjusting screw(3) with socket wrench(4) manually counter-clockwise until the brake disc is free.



(4) Connect firmly between the traction machine and the towed machine.
Position each traction machine at the front and rear of the machine to be towed.

1. INSTRUCTIONS

1) INTERVAL OF MAINTENANCE

(1) You may inspect and service the machine by the period as described at page 6-10 based on service meter of monitor.

(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 250 hours, carry out all the maintenance 「each 250 hours, each 100 hours and daily service」 at the same time.

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2) PRECAUTION

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

(2) The cluster and monitor installed on this machine do not entirely guarantee the condition of the machine.
Daily inspection should be performed according to chapter 6, Maintenance.

(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 maintenance advise 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, cutting edge, 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 by opening of breather when repairing the hydraulic system.

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

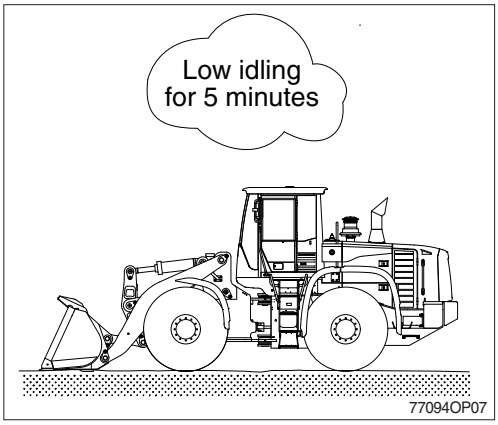
(9) For more detail information of maintenance, please contact local Hyundai dealer.

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

4) RELIEVING THE PRESSURE IN THE HYDRAULIC SYSTEM

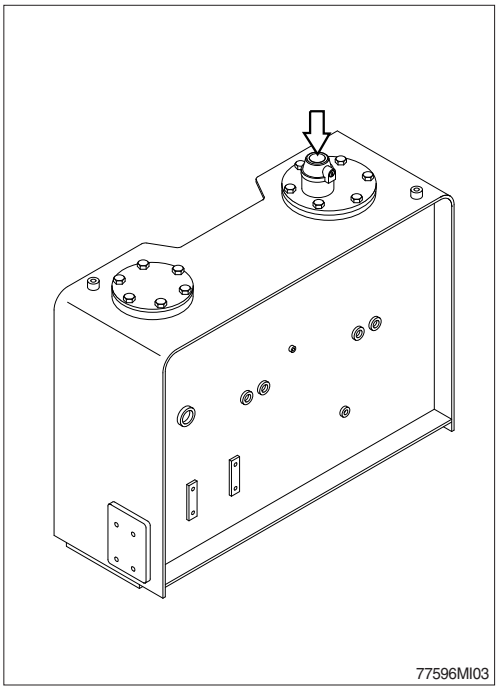
※ **Spouting of oil can cause the accident when loosening the cap or hose right after the operating of the machine as the machine or oil is on the high pressure on the condition.**
Be sure to relieve the pressure in the system before repairing hydraulic system.

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



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

※ **Due to high pressure inside the tank, cover maybe blown up.**
Take caution before removing cover.



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) These are the parts which the operator can not judge the remained lifetime of them by visual inspection.

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

Periodical replacement of safety parts	Interval
Fuel hose (engine-tank)	Every 2 years
Hose of steering system	
Packing, seal and O-ring of steering cylinder	
Hose of brake system	
Piston seal and packing of boom, bucket cylinder	

※ 1. **Replace the O-ring and gasket at the same time when replace 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	2.73 ~ 4.12	19.5 ~ 29.8
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 ~ 79.5	9.8 ~ 15.8	71 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 167
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 ~ 343
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	350 ~ 457	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 ~ 1655
M36 × 4.0	174 ~ 236	1261 ~ 1703	250 ~ 310	1808 ~ 2242

(2) Fine thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · ft
M 8 × 1.0	2.17 ~ 3.37	15.7 ~ 24.3	3.04 ~ 4.44	22.0 ~ 32.0
M10 × 1.25	4.46 ~ 6.66	32.3 ~ 48.2	5.93 ~ 8.93	42.9 ~ 64.6
M12 × 1.25	7.78 ~ 11.58	76.3 ~ 83.7	10.6 ~ 16.0	76.6 ~ 115
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 130	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 194	26.6 ~ 36.0	193 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 390	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 515	70.7 ~ 95.7	512 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 664	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1338	182 ~ 248	1314 ~ 1795
M36 × 3.0	192 ~ 260	1389 ~ 1879	262 ~ 354	1893 ~ 2561

2) PIPE AND HOSE (FLARE type)

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

3) PIPE AND HOSE (ORFS type)

Thread size	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

5) TIGHTENING TORQUE OF MAJOR COMPONENT

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt, nut (rubber, 2EA)	M24×3.0	100±15	723±108
2		Engine mounting bolt (bracket, 6EA)	M10×1.5	6.9	49.9
3		Engine mounting bolt (flywheel housing, 12EA)	3/8-16UNC	5.6±1.0	40.5±7.2
4		Radiator mounting bolt	M16×2.0	29.7±4.5	215±32.5
5		Fuel tank mounting bolt, nut	M16×2.0	29.7±4.5	215±32.5
6	Hydraulic system	Main pump housing mounting bolt	M16×2.0	29.7±4.5	215±32.5
7		Fan & brake pump housing mounting bolt	M10×1.5	6.9±1.4	50±10.1
8		Main control valve mounting bolt	M12×1.75	12.8±3.0	92.6±21.7
9		Steering unit mounting bolt	M10×1.5	6.9±1.4	50±10.1
10		Flow amplifier mounting bolt	M10×1.5	6.9±1.4	50±10.1
11		Brake valve mounting bolt	M8×1.25	2.5±0.5	18.1±3.6
12		Cut-off valve mounting bolt	M12×1.75	12.8±3.0	89±21.7
13		Remote control lever mounting bolt	M6×1.0	1.1±0.2	8.0±1.4
14		Safety valve	M8×1.25	2.5±0.5	18.1±3.6
15		Hydraulic oil tank mounting bolt	M20×2.5	57.9	419
16	Power train system	Transmission bolt, nut (rubber, 4EA)	M24×3.0	100±15	723±108
17		Transmission bolt (bracket, engine side)	M16×2.0	28.5±3.0	206±21.7
18		Transmission bolt (bracket, T/M side)	M20×2.5	57.0±5.0	412±36.2
19		Front axle mounting bolt, nut	M33×2.0	225±20	1630±144
20		Rear axle support mounting bolt, nut	M36×3.0	308±46.2	2228±334
21		Tire mounting nut	M22×1.5	79±2.5	571±18
22	Others	Drive shaft joint mounting bolt, nut	1/2-20UNF	15±2.0	108±14.5
23		Counterweight mounting bolt	M30×3.5	199±30	1439±217
24		Operator's seat mounting bolt	M8×1.25	3.4±0.8	24.6±5
25		Cab mounting bolt (4EA)	M30×3.5	199±30	1440±217
26		Cab mounting nut (4EA)	M16×2.0	20.5±4.7	148±40

3. SPECIFICATION OF 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 VG 32, VG 46, VG 68) Conventional hydraulic oil (ISO VG 15★)
Transmission oil	SAE 15W-40 / ★ Dextron ATF
Axle oil	★Refer to below list
Grease	Lithium base grease NLGI No. 2
Fuel	ASTM D975-No. 2
Coolant (DCA4)	ASTM D6210 Mixture of 50% ethylene glycol base antifreeze and 50% water. Mixture of 60% ethylene glycol base antifreeze and 40% water.★

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

★ Recommended oil list
- BP TERRAC SUPER TRANSMISSION 10W-30
- CASTROL AGRI TRANS PLUS 10W-30
- MOBILFLUID 426
- SHELL DONAX TD 10W-30
- TOTAL DYNATRANS MPV

★Cold region
Russia, CIS, Mongolia

2) RECOMMENDED LUBRICANTS

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

Please use HYUNDAI genuine oil and grease

Service point	Kind of fluid	Capacity ℓ (U.S. gal)	Ambient temperature ˚C(˚F) -50 (-58) -30 (-22) -20 (-4) -10 (14) 0 (32) 10 (50) 20 (68) 30 (86) 40 (104)
Engine oil pan	Engine oil	34 (9.0)	★1SAE 5W-40 SAE 30 SAE 10W SAE 10W-30 SAE 15W-40
Transmission	Engine oil	51 (13.5)	SAE 10W-30 SAE 15W-40 ★1Dextron ATF
Axle	UTTO	Front : 42 (11.1) Rear : 42 (11.1)	★Refer to below list
Hydraulic tank	Hydraulic oil	Tank: 227 (60.0) System: 361 (95.4)	★1ISO VG 15 ISO VG 32 ISO VG 46 ISO VG 68
Fuel tank	Diesel fuel	362 (95.6)	★1ASTM D975 NO.1 ASTM D975 NO.2
Fitting (grease nipple)	Grease	As required	★1 NLGI NO.1 NLGI NO.2
Radiator (reservoir tank)	Mixture of antifreeze and soft water★2	46 (12.1)	Ethylene glycol base permanent type (50 : 50) ★1 Ethylene glycol base permanent type (60 : 40)

· SAE : Society of Automotive Engineers
· API : American Petroleum Institute
· ISO : International Organization for Standardization
· NLGI : National Lubricating Grease Institute
· ASTM : American Society of Testing and Material
· UTTO : Universal Tractor Transmission Oil

★ Recommended oil list
- BP TERRAC SUPER TRANSMISSION 10W-30
- CASTROL AGRI TRANS PLUS 10W-30
- MOBILFLUID 426
- SHELL DONAX TD 10W-30
- TOTAL DYNATRANS MPV

★1 Cold region : Russia, CIS, Mongolia
★2 Soft water : City water or distilled water

4. MAINTENANCE CHECK LIST

Scheduled maintenance is the normal maintenance necessary to provide proper and efficient machine operation. To protect your investment and prolong the service life of your machine, follow the scheduled maintenance list below.

1) EVERY 10 HOURS SERVICE

Check items	Service	Page
Hydraulic oil level	Check, Add	6-27
Engine oil level	Check, Add	6-15
Radiator coolant level	Check, Add	6-17
Belt tension & damage	Check	6-21, 22
Fuel pre-filter (water)	Drain	6-26

2) EVERY 50 HOURS SERVICE

Check items	Service	Page
Attachment pins	Lubricate	6-40
Tire (air)	Check, Add	6-30, 31
Steering cylinder pins	Lubricate	6-37
Rear axle pivot	Lubricate	6-37
Fuel tank (water, sediment)	Drain	6-23

3) INITIAL 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-15, 16, 17
Engine oil filter	Replace	6-15, 16, 17
Fuel filter element	Replace	6-24
Fuel pre-filter	Replace	6-26
Transmission oil	Change	6-33, 34
Transmission oil filter	Replace	6-33, 34
Front axle oil	Change	6-35, 36
Rear axle oil	Change	6-35, 36
Hydraulic oil return filter	Replace	6-28
Pilot line filter element	Replace	6-28

4) EVERY 250 HOURS SERVICE

Check items	Service	Page
Engine oil	Change	6-15, 16, 17
Engine oil filter	Replace	6-15, 16, 17
Drive shaft (flange bearing)★	Lubricate	6-37
Drive shaft (front, center, rear)★	Lubricate	6-37
Pilot line filter element	Replace	6-28
Wheel nuts	Check, Tight	6-30, 31
Battery (voltage)	Check	6-42, 43
Air conditioner and heater inner, outer filter	Check, Clean	6-45

★ Under harsh, corrosive, dusty, wet working condition : Lubricate every 50 hours.

5) EVERY 500 HOURS SERVICE

Check items	Service	Page
Radiator, oil cooler, charge air cooler	Check, Clean	6-20
Coolant test (DCA4 concentration)	Test, Add	6-20-1, 2
Air cleaner element (primary)★	Clean	6-23
Fuel filter element	Replace	6-24
Fuel pre-filter element	Replace	6-26
Coolant filter (corrosion resistor)	Replace	6-25

★ When working in dusty environments, more frequent cleaning is highly recommended.

6) EVERY 1000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil return filter	Replace	6-28
Hydraulic tank air breather element	Replace	6-28
Transmission oil	Change	6-33, 34
Transmission oil filter	Replace	6-33, 34
Center pivot pin	Lubricate	6-37
Aircon and heater inner and outer filter	Replace	6-45

7) EVERY 1500 HOURS SERVICE

Check items	Service	Page
Front axle oil	Change	6-35, 36
Rear axle oil	Change	6-35, 36

8) EVERY 2000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil *1	ChangeChange	6-27
Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-

*1 Conventional hydraulic oil

9) EVERY 5000 HOURS SERVICE

Check items	Service	Page
Hydraulic oil *2	Change	6-27

*2 Hyundai genuine long life hydraulic oil

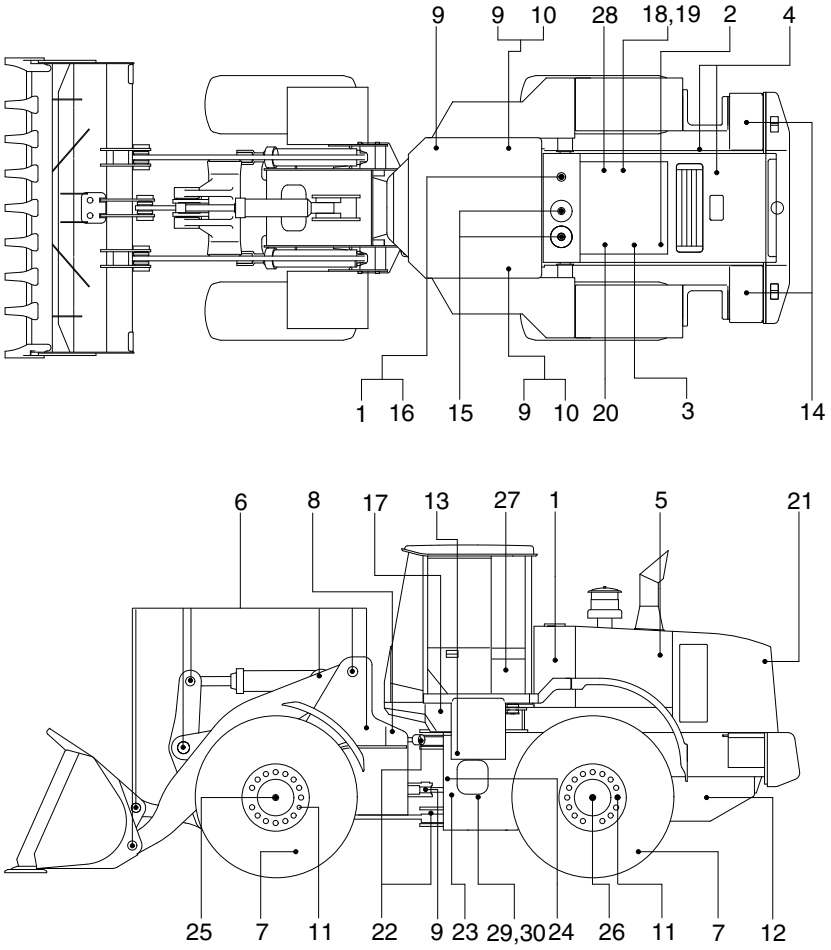
10) EVERY 6000 HOURS SERVICE

Check items	Service	Page
Radiator coolant	Change	6-17, 18, 19, 20

11) WHEN REQUIRED

Check items	Service	Page
Air cleaner element		
· Safety	Check, Replace	6-23
· Primary	Check, Clean, Replace	6-23
Air conditioner and heater		
· Outer filter	Check, Clean, Replace	6-45
· Inner filter	Check, Replace	6-45

5. MAINTENANCE CHART



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Caution

1. Service intervals are based on the hour meter reading.
2. The number of each item shows the lubrication point on the machine.
3. Stop engine while filling oil, and use no open flames.
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.
10 Hours or daily	1	Hydraulic oil level	Check, Add	HO	227 (60.0)	1
	2	Engine oil level	Check, Add	EO	34 (9.0)	1
	4	Radiator coolant level	Check, Add	C	46 (12.1)	1
	5	Fan belt tension & damage	Check, Adjust	-	-	2
	19	Fuel pre-filter element (water)	Drain	-	-	1
50 Hours or weekly	6	Attachment pins	Lubricate	PGL	-	13
	7	Tire (air)	Check, Add	-	-	4
	9	Steering cylinder pin	Lubricate	PGL	-	4
	10	Rear axle pivot	Lubricate	PGL	-	2
	12	Fuel tank (water, sediment)	Drain	-	-	1

Service interval	No.	Description	Service action	Oil symbol	Capacity ℓ (U.S.gal)	Service points No.
250 Hours	2	Engine oil	Change	EO	34 (9.0)	1
	3	Engine oil filter	Replace	-	-	1
	8	Drive shaft (flange bearing)	Lubricate	-	-	1
	11	Wheel nuts	Check, Tight	-	-	80
	13	Brake line filter (strainer)	Clean	-	-	1
	14	Battery (voltage)	Check, Add	-	-	2
	17	Pilot line filter element	Replace	-	-	1
	27	Aircon and heater inner and outer filter	Check, Clean	-	-	2
	29	Drive shaft sleeve yoke	Lubricate	-	-	2
	30	Drive shaft journal bearing	Lubricate	-	-	5
Initial 250 Hours	2	Engine oil	Change	EO	34 (9.0)	1
	3	Engine oil filter	Replace	-	-	1
	17	Pilot line filter element	Replace	-	-	1
	18	Fuel filter element	Replace	-	-	1
	19	Fuel pre-filter element	Replace	-	-	1
	23	Transmission oil	Change	EO	51 (13.5)	1
	24	Transmission oil filter	Replace	-	-	2
	25	Axle oil (front)	Change	UTTO	42 (11.1)	3
	26	Axle oil (rear)	Change	UTTO	42 (11.1)	3
500 Hours	18	Fuel filter element	Replace	-	-	1
	19	Fuel pre-filter element	Replace	-	-	1
	20	Coolant filter (corrosion resistor)	Replace	-	-	1
	20	Coolant test (DCA4 concentration)	Test, Add	DCA4	-	1
	21	Radiator, oil cooler, CAC, condenser	Clean	-	-	3
	28	Air cleaner element (primary)	Clean	-	-	1
1000 Hours	15	Hydraulic oil return filter	Replace	-	-	2
	16	Hydraulic tank air breather element	Replace	-	-	1
	22	Center pivot pin	Lubricate	PGL	-	2
	23	Transmission oil	Change	EO	51 (13.5)	1
	24	Transmission oil filter	Replace	-	-	2
	27	Air conditioner, heater inner/outer filter	Replace	-	-	2
1500 Hours	25	Axle oil (front)	Change	UTTO	42 (11.1)	3
	26	Axle oil (rear)	Change	UTTO	42 (11.1)	3
2000 Hours	1	Hydraulic oil *1	Change	HO	227 (60.0)	1
	-	Hoses, fittings, clamps (fuel, coolant, hydraulic)	Check, Retighten, Replace	-	-	-
5000 Hours	1	Hydraulic oil *2	Change	HO	227 (60.0)	1
6000 Hours	4	Radiator coolant	Change	C	46 (12.1)	1
When required	27	Air conditioner and heater outer filter	Clean, Replace	-	-	1
		Air conditioner and heater inner filter	Clean, Replace	-	-	1
	28	Air cleaner element (safety)	Replace	-	-	1
		Air cleaner element (primary)	Clean, Replace	-	-	1

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

※ **Oil symbol** : Refer the recommended lubricants for specification.

· EO : Engine oil · GO : Gear oil · C : Coolant

· HO : Hydraulic oil · PGL : Grease · UTTO : Refer to page 6-9.

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.

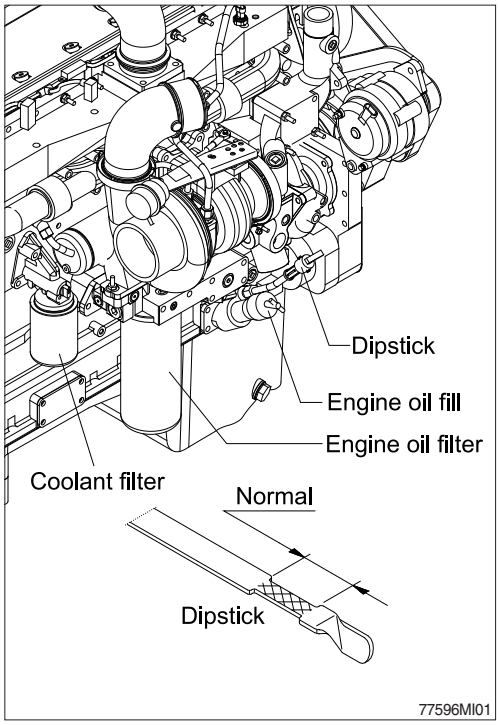
(2) Check the oil level by inserting the dipstick completely into the hole and pulling out again.

(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.**



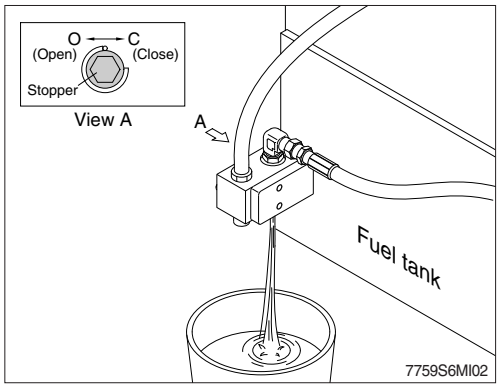
2) REPLACEMENT OF ENGINE OIL AND OIL FILTER

(1) Operate the engine until the coolant temperature reaches 60˚C (140˚F). Shut off the engine.

(2) Turn the stopper to the open position and allow the oil to drain.

· Wrench size : 10 mm

※ **A drain pan with a capacity of 40 liters(10.6 U.S.gallons)will be adequate.**

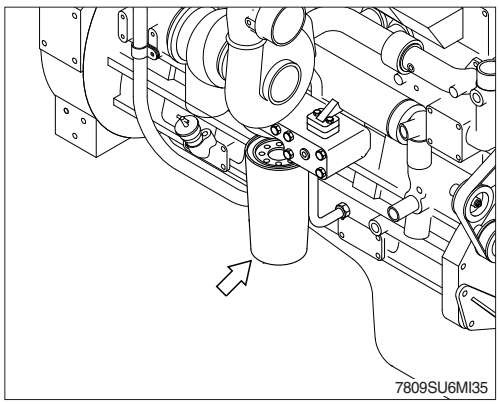


(3) Clean the area around the oil filter head.

(4) Use oil filter wrench to remove the oil filter.

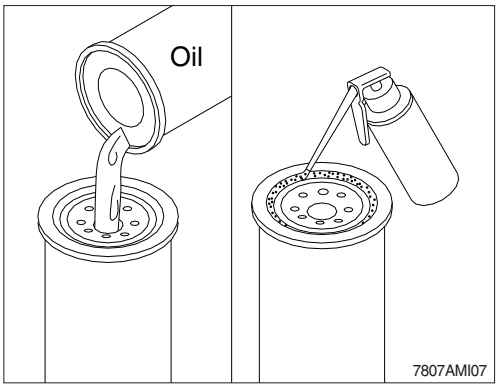
(5) Clean the gasket surface of oil filter head.

※ **The O-ring can stick on the filter head; make sure it is removed.**



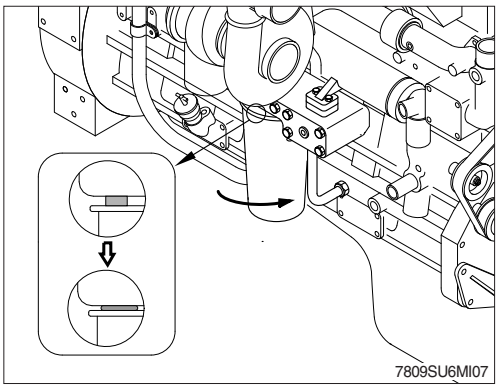
(6) Apply a light film of lubricating oil to the gasket sealing surface before installing the filter.

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

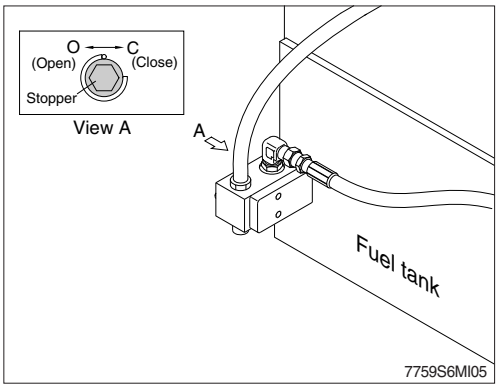


(7) Install the filler to the filter head.
Tighten the filter until the gasket contacts the filter head surface.

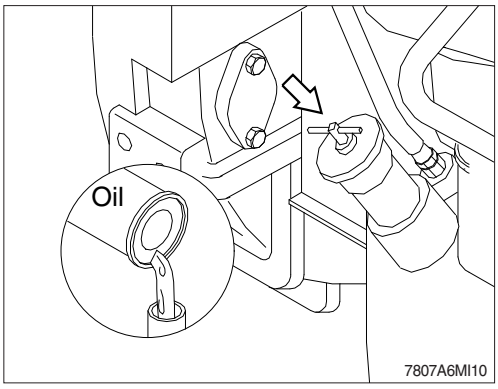
※ **Mechanical over-tightening may distort the threads or damage the filter element seal.**



(8) Turn the stopper to the close position.

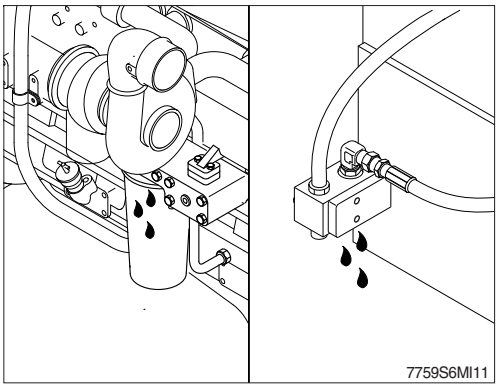


(9) Fill the engine with clean oil to the proper level.
· Quantity : 34 ℓ (9.0 U.S.gallons)



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

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



3) CHECK COOLANT LEVEL

(1) Check the coolant level at the sight gauge.

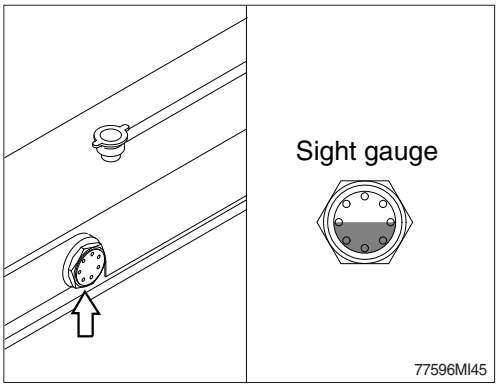
(2) Add the mixture of antifreeze and water if coolant is not sufficient.

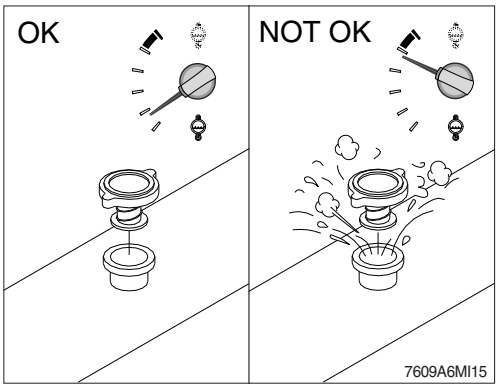
(3) The sight gauge should indicate the middle position.

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

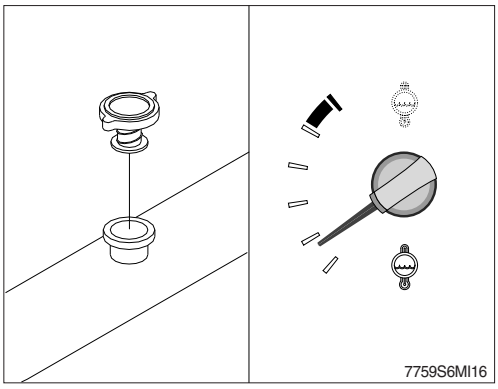
⚠ **Do not remove the radiator cap from a hot engine. Wait until the coolant temperature is below 50˚C (120˚F) before removing the radiator cap. Heated coolant spray or steam can cause personal injury.**

※ **Do not add cold coolant to a hot engine ; engine castings can be damaged. Allow the engine to cool to below 50˚C (120˚F) before adding coolant.**





4) FLUSHING AND REFILLING OF RADIATOR

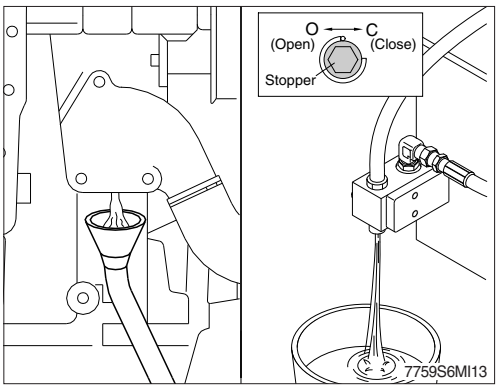


(1) Change coolant

⚠ 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 handing of used antifreeze.

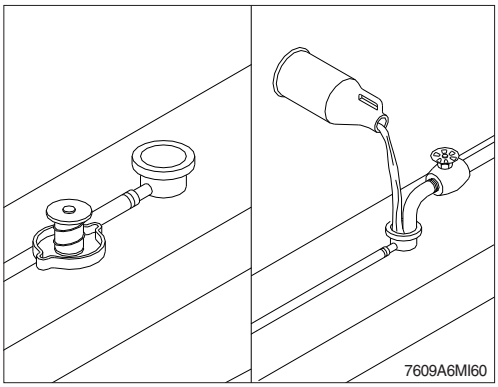
⚠ Wait until the temperature is below 50˚C (120˚F) before removing the coolant system radiator cap. Failure to do so can cause personal injury from heated coolant spray.
Drain the cooling system by turning the stopper to the open position.
A drain pan with a capacity of 50 liters (13.2 U. S.gallons) will be adequate in most applications.



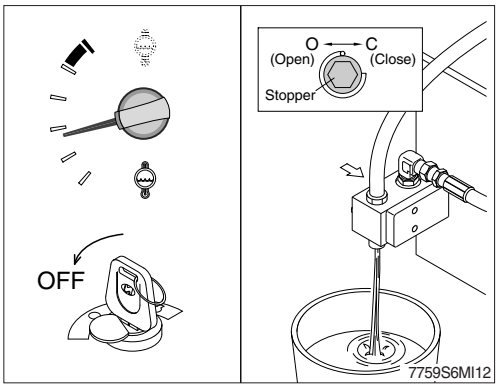
(2) Flushing of cooling system

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

※ Use 0.5 kg (1.0pound) 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.



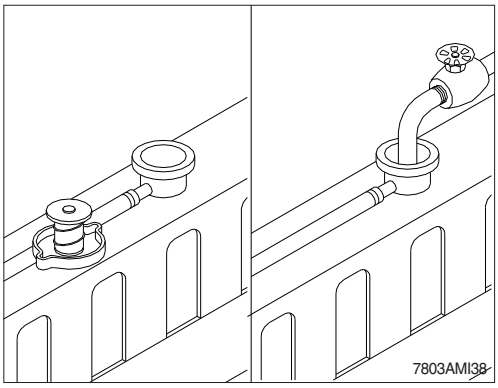
② Operate the engine for 5 minutes with the coolant temperature above 80˚C (176˚F).
Shut the engine off, and drain the cooling system.



③ Fill the cooling system with clean water.

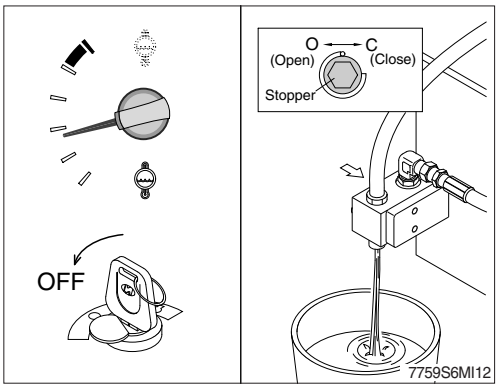
※ **Be sure to vent the engine and aftercooler for complete filling.**

※ **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.**



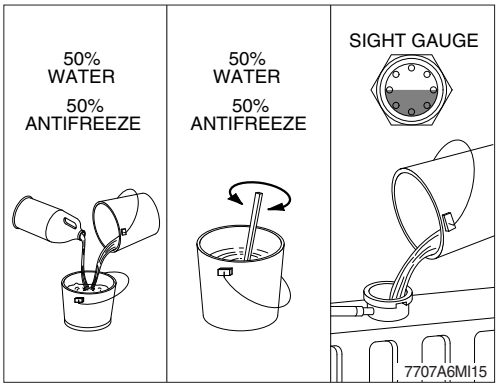
(3) Cooling system filling

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.

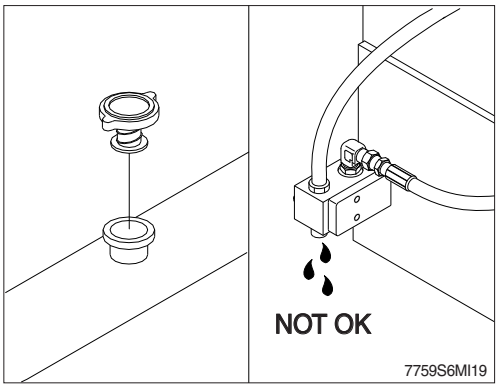
※ **Use the correct amount of DCA4 corrosion inhibitor to protect the cooling system.**

※ **Never use water alone for coolant.**
This can result in damage from corrosion.

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



② Install the radiator 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.

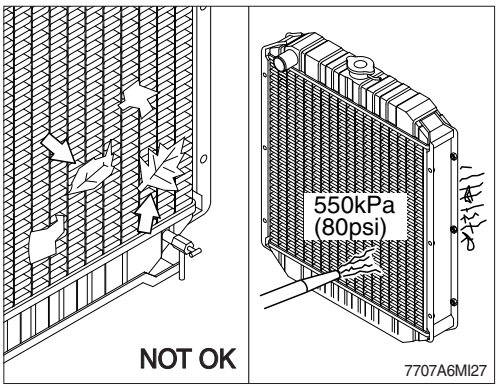


5) CLEAN RADIATOR AND OIL COOLER

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.

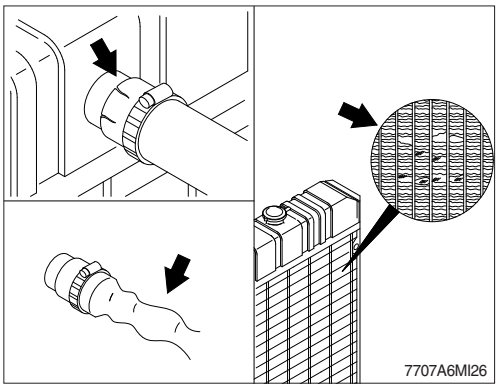
(2) Use 550 kPa (80 psi) air pressure to blow the dirt and debris from the fins.
Blow the air in the opposite direction of the fan air flow.



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

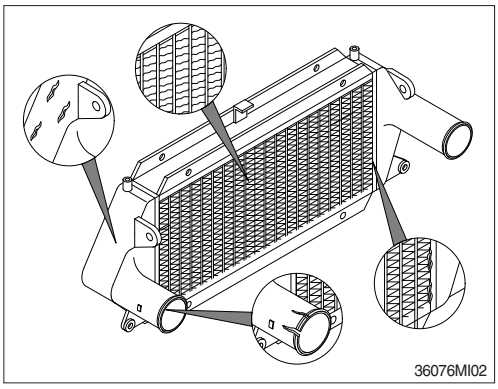
※ **If the radiator must be replaced due to bent or broken fins which can cause the engine to overheat, refer to the manufacturer's replacement procedures.**

(4) Visually inspect the radiator for core and gasket leaks.



6) CHECK CHARGE AIR COOLER

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



6-1) COOLANT TEST STRIPS INSTRUCTIONS

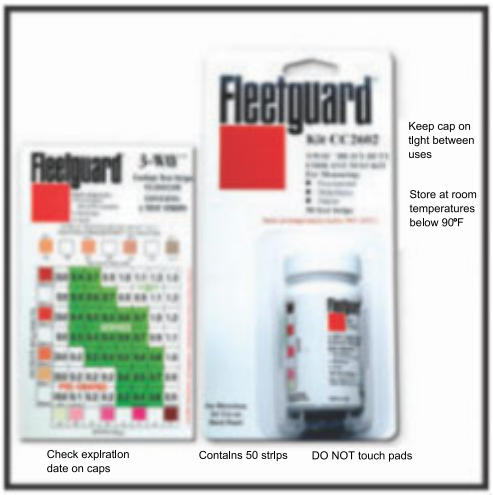
(1) Pre-test instruction

Recommended testing frequency - at every coolant filter change interval.

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

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

③ Record and track results.

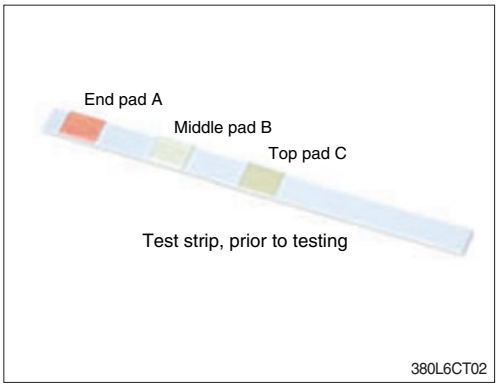


380L6CT01

(2) Test instruction

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

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



380L6CT02

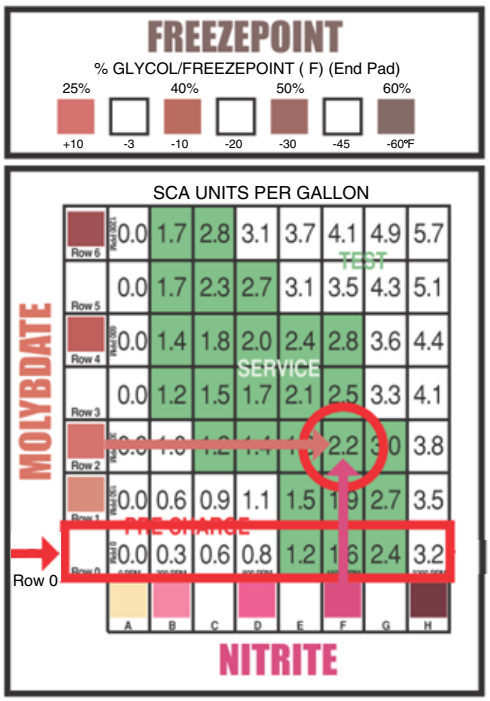
③ 45 seconds after dipping strip, compare results to color chart and record in the following order:

for DCA4:

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

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

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



380L6CT03

(3) Maintenance actions based on results

① Above normal

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

- Test at every subsequent coolant filter change interval.

② Normal

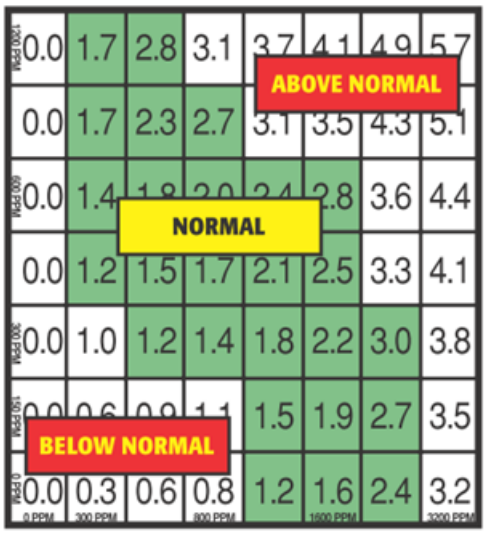
NORMAL - Continue to replace the coolant filter at your normal interval.

③ Below normal

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

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

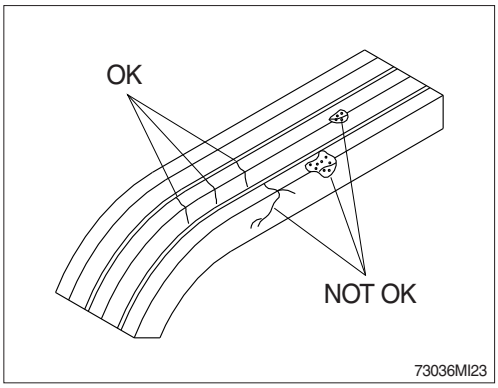
※ If you need part number of Test kit or DCA4, please see Parts Manual.



380L6CT04

7) DRIVE BELT

(1) Inspect the belts daily. Check the belts for intersecting cracks. Transverse (across the belt width) cracks are acceptable.
Longitudinal (direction of belt length) cracks that intersect the transverse cracks are not acceptable. Replace a belt if is frayed or has pieces of material missing.

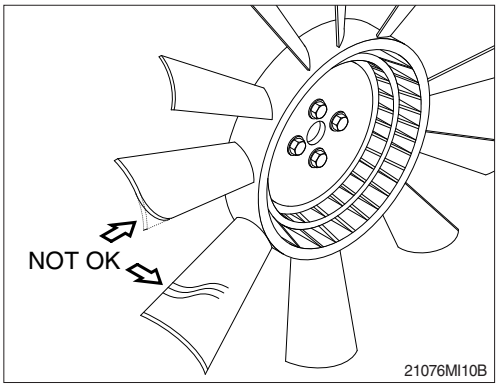


8) INSPECTION OF COOLING FAN

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

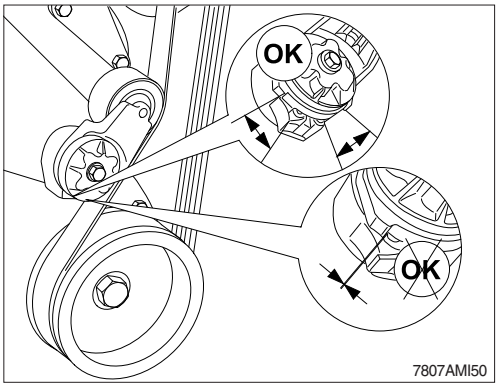
※ **Rotate the crankshaft by using the engine barring gear.**

※ **A visual inspection of the cooling fan is required daily.**
Check for cracks, loose rivets, and bent or loose blades.
Check the fan to make sure it is securely mounted. Tighten the capscrews if necessary.
Replace any fan that is damaged.

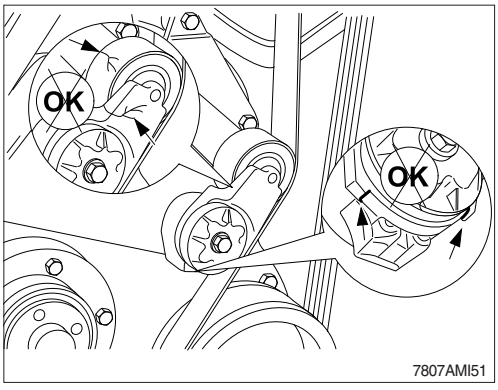


9) BELT TENSIONER, AUTOMATIC ADJUSTMENT

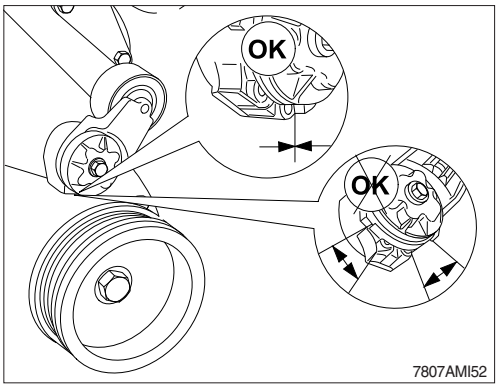
(1) Every 1000hours, or 1 year, whichever occurs first, inspect the automatic belt tensioner.
With the engine turned off, check that neither the top nor bottom tensioner arm stop is touching the cast boss on the tensioner body. If either of the stops is touching a boss, the alternator belt must be replaced.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



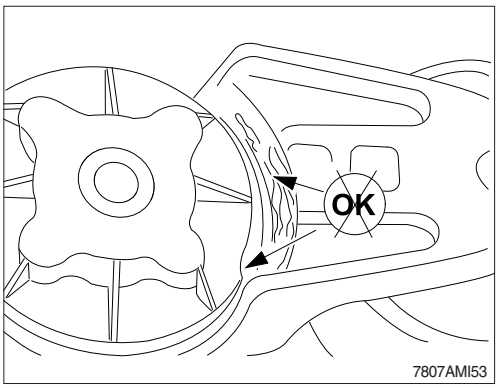
(2) Check the tensioner pulley and body for cracks.
If any cracks are noticed, the tensioner must be replaced. Refer to a Cummins Authorized Repair facility. Check the tensioner for dirt buildup.
If this condition exists, the tensioner must be removed and steam-cleaned.



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



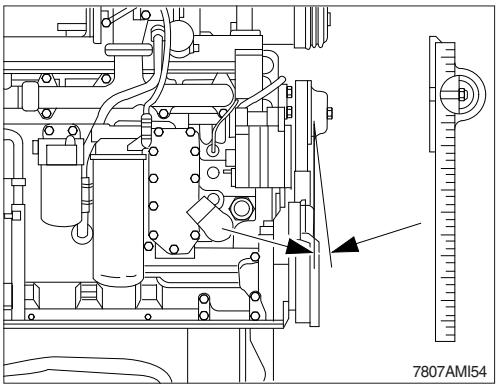
(4) Inspect the tensioner for evidence of the pivoting tensioner arm contacting the stationary circular base. If there is evidence of these two areas touching, the pivot tube bushing has failed and the tensioner must be replaced.



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

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

(6) Install the belt.

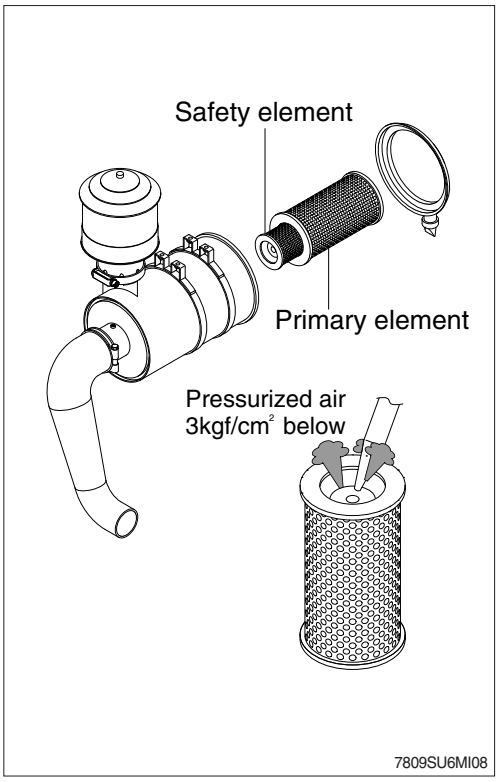


10) CLEANING OF AIR CLEANER

(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 3 kgf/cm², 40 psi) forward and backward equally.
④ Inspect for cracks or damage of element by putting a light bulb inside of the element.
⑤ Insert element and tighten wing nut.

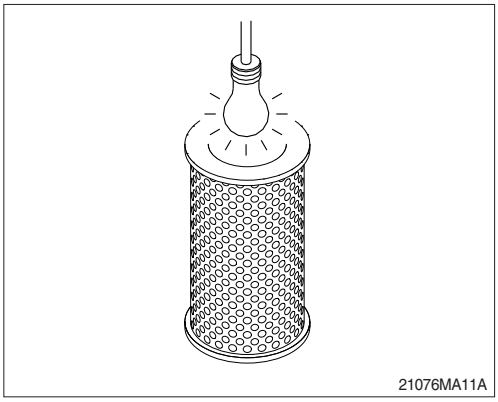
※ When the air cleaner warning lamp is ON, clean the primary element.
※ The primary element should be replaced if the warning lamp is ON after installation of a clean primary element, or if the exhaust smoke is still black.
※ Replace the primary element after 4 times cleanings.



(2) Safety element

※ The safety element should be replaced at the time the primary element is replaced.

※ Always replace the safety element.
Never attempt to reuse the safety element by cleaning the element.

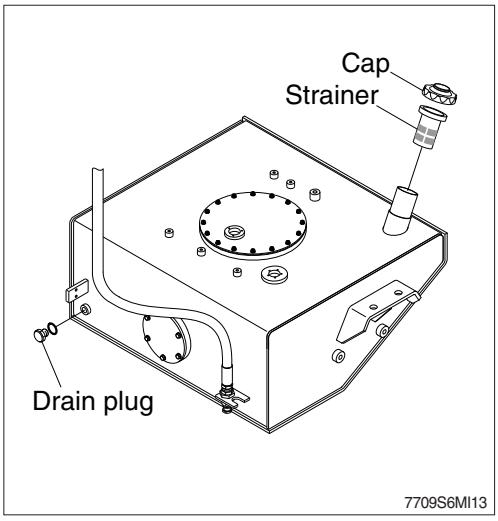


11) FUEL TANK

(1) Fill fuel fully when system the operation to minimize water condensation, and check it with fuel gauge before starting the machine.

(2) Drain the water and sediment in the fuel tank by opening the plug.

※ Be sure to LOCK the cap of fuel tank.
※ Remove the strainer of the fuel tank and clean it if contaminated.
⚠ Stop the engine when refueling.
All lights and flames shall be kept at a safe distance while refueling.



12) FUEL WATER SEPARATOR

※ **Drain the fuel water separator into a container, and dispose of contents in accordance with local environmental regulations.**

(1) Drain the water and sediment from the separator daily. Shut off the engine.

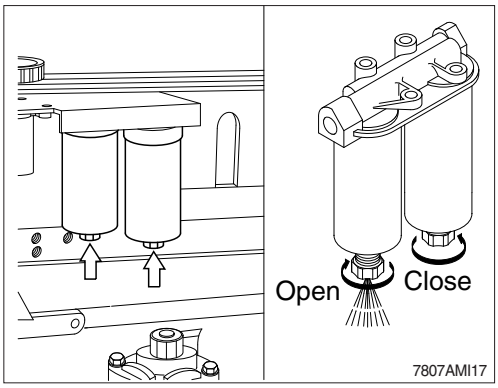
(2) Use your hand to open the drain valve.

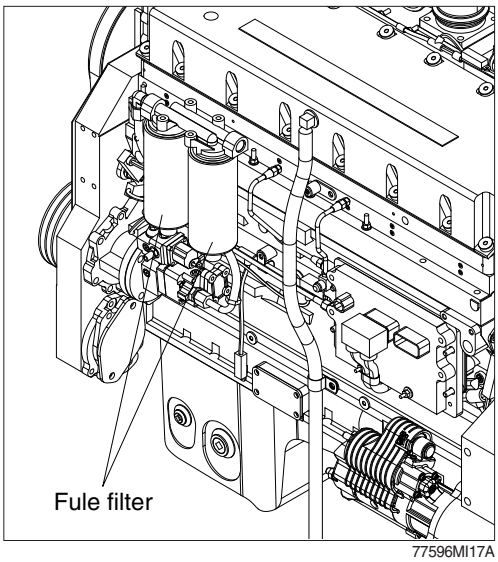
(3) Turn the valve counterclockwise approximately 3 1/2 turns until the valve drops down 25.4 mm (1 inch) and draining occurs.

(4) Drain the filter sump until clear fuel is visible.

※ **When closing the drain, do not overtighten the valve. Overtightening can damage the threads.**

(5) To close the valve, lift the valve and turn clockwise until it is hand-tight.





13) REPLACEMENT OF FUEL FILTER

(1) Clean the area around the fuel filter and fuel filter head.

(2) Remove the fuel filter with filter wrench.

(3) Replace the sealing ring.

(4) Lubricate the fuel filter gasket with clean engine oil.

(5) Fill the new filter with clean diesel fuel.

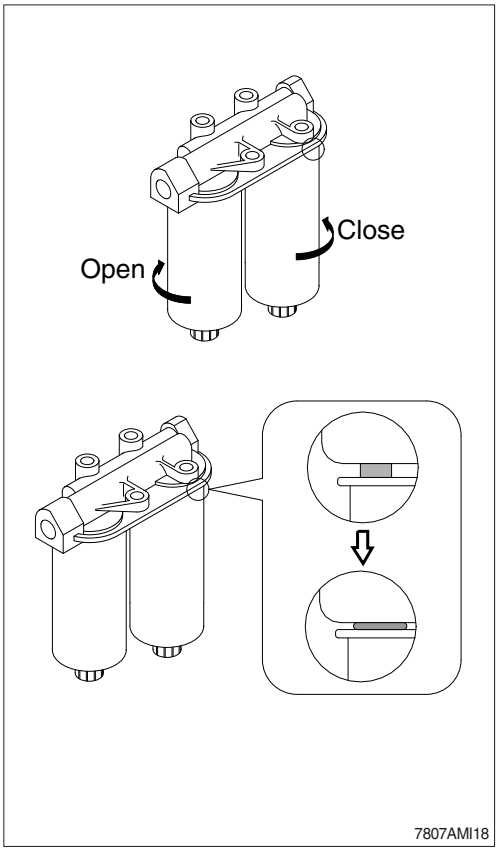
(6) Install the filter on the filter head.
Turn the filter until the gasket contacts the filter head surface.

(7) Tighten the filter, by hand, an additional 1/2 to 3/4 of a turn after gasket contacts the filter head surface.

※ **If the filter canister is damaged in any way, do not use it. Dents or scrapes can lead to a rupture or premature failure of the filter.**

※ **Mechanical overtightening of filter can distort the threads and damage the fuel filter seal.**

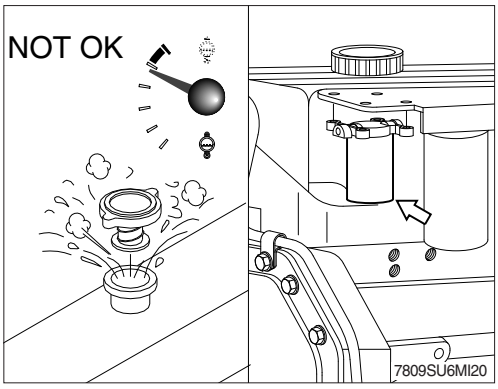
※ **Check for fuel leakage after the engine starts.**



14) COOLANT FILTER (CORROSION RESISTOR)

⚠ **Do not remove the radiator cap from a hot engine. Wait until the coolant temperature is below 50˚C (120˚F) before removing the radiator cap. Heated coolant spray or steam can cause personal injury**

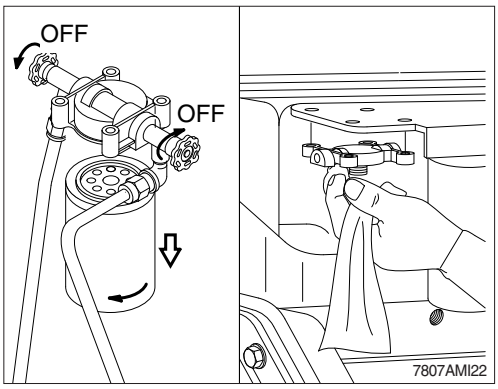
(1) Remove the radiator cap.



(2) Turn the valve to the OFF position.

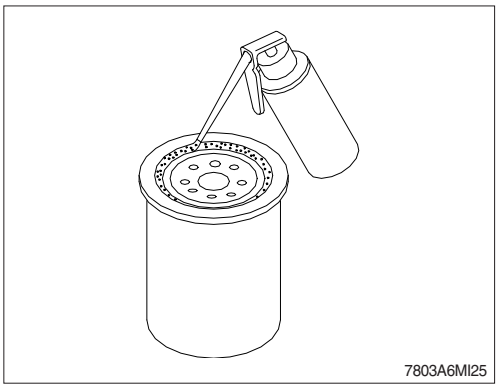
(3) Remove and discard the filter.
Clean the coolant filter head gasket's surface.

⚠ **A small amount of coolant can leak when servicing the filter with the shutoff valve in the OFF position. To avoid personal injury, avoid contact with hot coolant.**



(4) Apply a thin film of clean engine oil to the gasket sealing surface before installing the new filter.

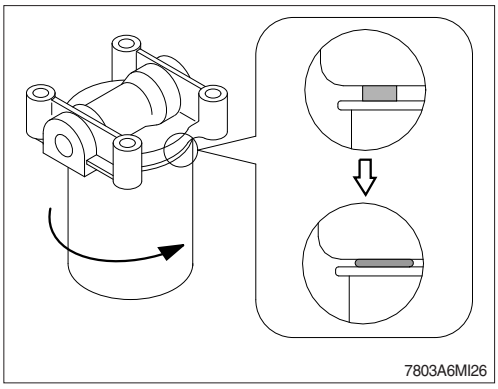
※ **If the filter canister is damaged in any way, do not use it. Dents or scrapes can lead to a rupture or premature failure of the filter.**



(5) Install a new filter on the filter head.
Tighten the filter until the gasket contacts the filter head surface.

(6) Tighten the filter an additional 1/2 to 3/4 of a turn.

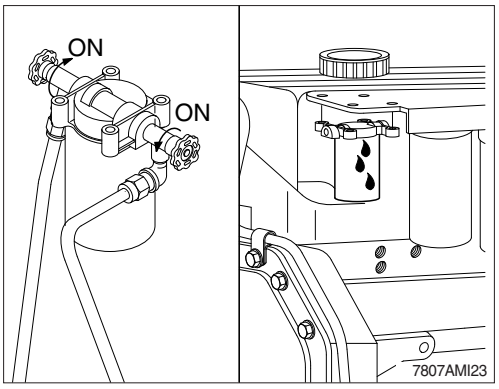
※ **Mechanical over tightening can distort the filter threads or damage the filter head.**



(7) Turn the valve to the ON position, and install the radiator cap.

(8) Operate the engine and check for leaks.

※ **The valve must be in the ON position to prevent engine damage.**



15) FUEL PRE-FILTER

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

(1) Drain water

① Open bowl drain valve to evacuate water.

② Close drain valve.

(2) Replace element

① Drain the unit of fuel. Follow "Drain water" instructions above.

② Remove element / bowl from filter head.

※ **The bowl is reusable, do not damage or discard.**

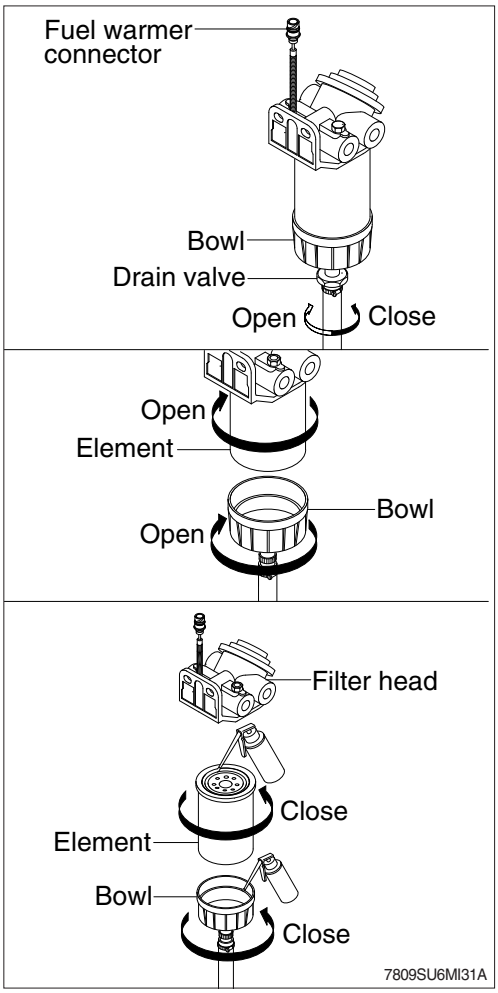
③ Separate element from bowl. Clean bowl and seal gland.

④ Lubricate new bowl seal with clean fuel or motor oil and place in bowl gland.

⑤ Attach bowl to new element firmly by hand.

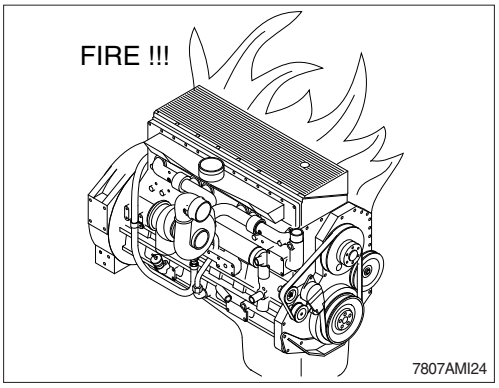
⑥ Lubricate new element seal and place in element top gland.

⑦ Attach the element and bowl to the head.



16) LEAKAGE OF FUEL

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



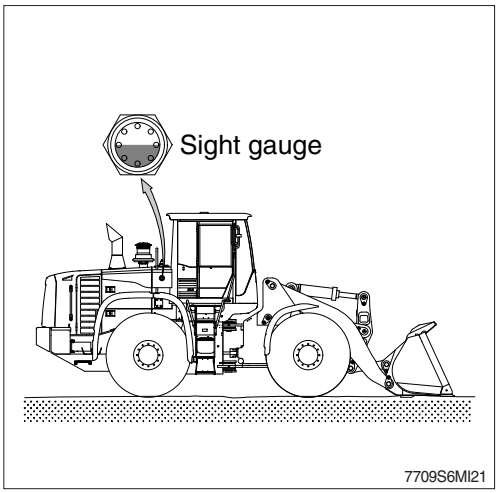
17) HYDRAULIC OIL CHECK

(1) Lower the bucket on the ground at a flat location as in the illustration.
Stop the engine and then leave for about 5 minutes.

(2) Check the oil level at the sight gauge. The sight gauge is located on the right side of the hydraulic oil tank.

(3) The sight gauge should indicate the middle position.

※ **Add hydraulic oil, if necessary.**



18) FILLING HYDRAULIC OIL

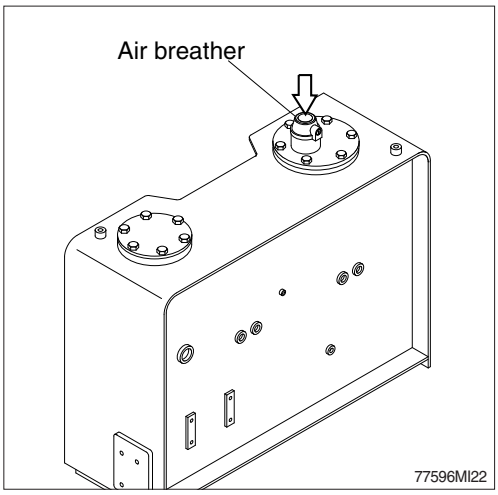
(1) Stop the engine to the position of level check.

(2) Relieve the pressure in the tank by pressing the top of the air breather.

(3) Remove the breather on the top of oil tank and fill the oil to the specified level.

(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.



19) CHANGE THE HYDRAULIC OIL

(1) Lower the bucket on the ground extend the bucket cylinder to the maximum.

(2) Relieve the pressure in the tank by pressing the top of the air breather.

(3) Prepare a suitable container.

(4) To drain the oil loosen the drain plug at the fuel tank block.

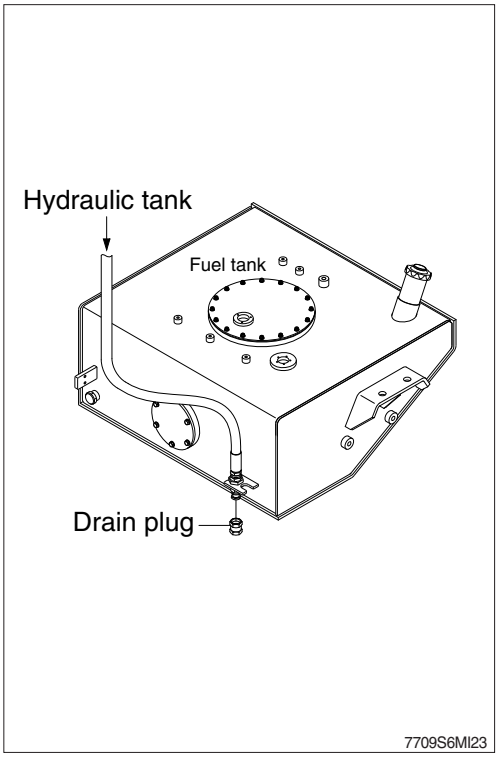
(5) Tighten the drain plug.

(6) Fill proper amount of recommended oil.

(7) Put the breather in the right position.

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

※ **The oil must be free of bubbles. If bubbles are present in the oil, air is entering the hydraulic system. Inspect the suction hoses and hose clamps.**



20) CLEANING AND REPLACING RETURN FILTER

Clean and replace the return filter in the following manner.

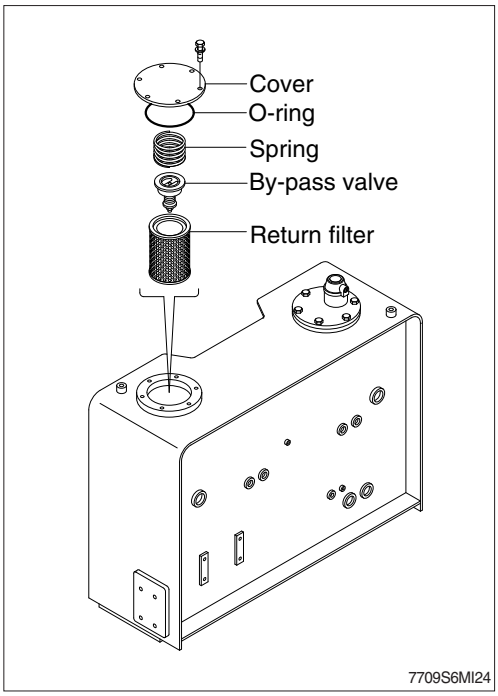
(1) Remove the cover.

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

(3) Replace element with new one and assemble spring and by-pass valve after cleaning.

(4) Install the cover on the tank.

· Tightening torque : 6.9±1.4 kgf · m
(50±10lbf · ft)



21) REPLACEMENT OF ELEMENT IN HYDRAULIC TANK BREATHER

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

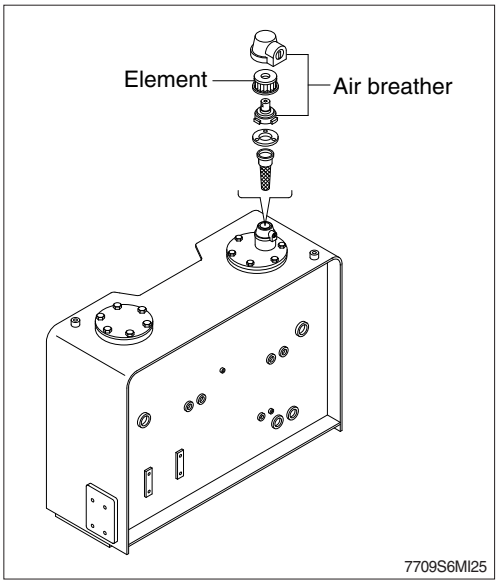
(2) Remove the cover.

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

(4) Replace the filter element with new one.

(5) Apply oil on the O-ring and reassemble by reverse order of disassembly.

· Tightening torque : 0.7~0.9 kgf · m (5~6 lbf · ft)

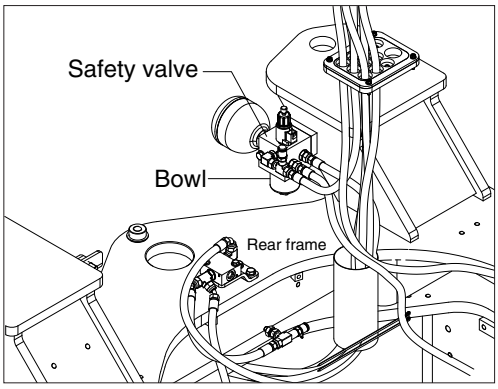


22) REPLACE OF PILOT LINE FILTER

(1) Loosen the bowl positioned on the safety valve.

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

(3) Install the new element and tighten the bowl using spanner.
- Spanner size : 27 mm



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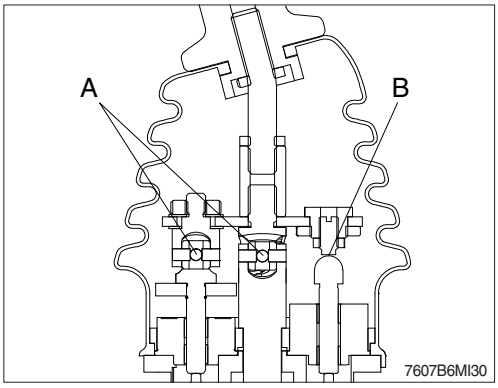
23) LUBRICATE RCV LEVER

Remove bellows and grease the joint (A) and the sliding parts (B).



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24) TIRE PRESSURE

(1) Inappropriate tire pressure is a primary cause for tire damage. Insufficient tire pressure will damage internal carcass of tire. Repeated excessive bending will damage or break the carcass. Excessive pressure will also cause premature damage of tire.

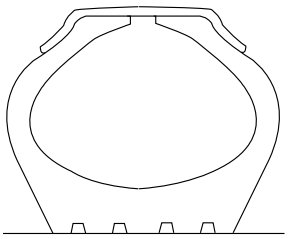
(2) Recommended tire pressure (when tire is cooled) : Refer to the page 5-1.

(3) Continuous operation will produce heat and increase pressure on tire. But such phenomenon was already taken into account when designing a tire. Do not try to remove normally increased air because tires may be crushed or overinflated.

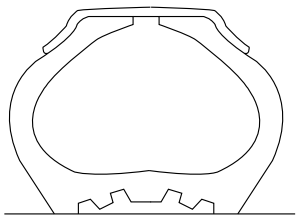
(4) The three major causes for excessive heat and pressure of tire are insufficient pressure, excessive load and overspeed. Avoid excessive load and overspeed in order to keep tires in good shape.

⚠ Do not inflate tires using flammable gases or alcohol injector.
⚠ This cause explosion or personal injury.
Inflate tires at the pressure level recommended by the manufacturer, and check periodically pressure and wear of tires.
⚠ When replacing the inflated tire, do not stand near the tire. Contact a tire repair shop.
※ Check the tire when the tire is at normal temperature and the machine is not loaded.
⚠ Do not use recycled wheel parts.
⚠ When removing lockering or inflating tire, use safety cable or chain to ensure safety.
Be sure to bleed air before removing lockering.Never inflate tires unless the lockering is assembled in its place.

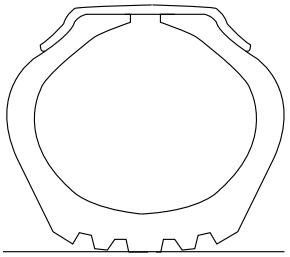
※ Avoid the followings when traveling.
① Rubbing tires against road bank or rack at cargo-unloading spot.
② Tires slippage during working.
③ Abrupt starting of machine.
④ When oil, grease or gasoline smeared on tire, clean those. Otherwise it may cause of permanent deformation.



Normal



Too low pressure



Excess pressure

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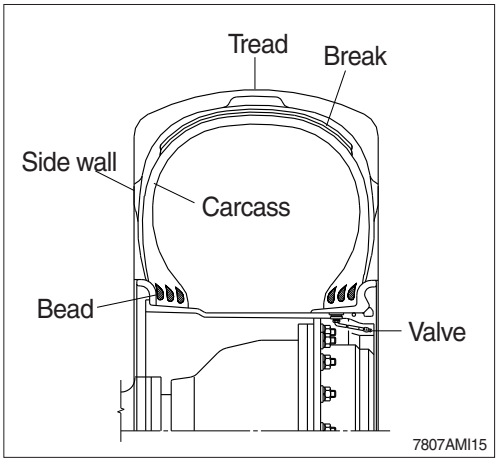
25) REPLACEMENT OF TIRE

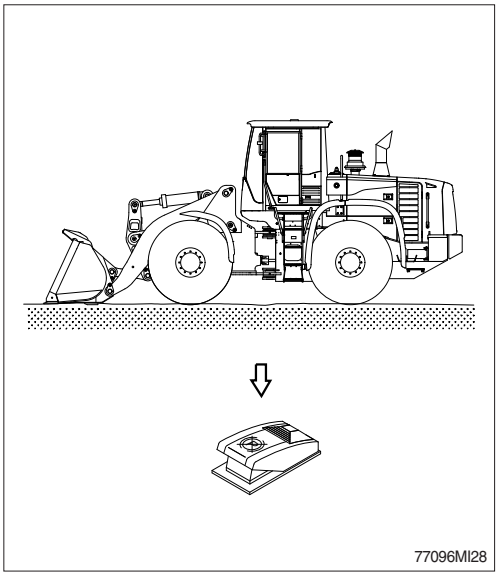
⚠ Disassembly, reassembly, replacement and repair of tire requires special skills and equipment. Contact a tire repair shop.

(1) Tires to be replaced

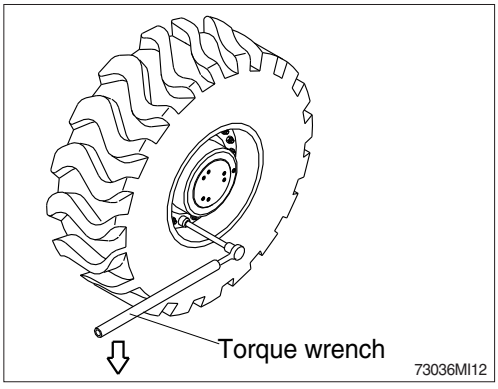


① Tires with broken or bent bead wires
② Tires exposed more than 1/4 of carcass fly.
③ Tires whose carcass is damaged more than 1/3 of the tire width.
④ Tires which show fly separation.
⑤ Tires which has a radial crack near the carcass.
⑥ Tires which are judged to be unsuitable for use because of deformation or damage.

(2) Separation of tire



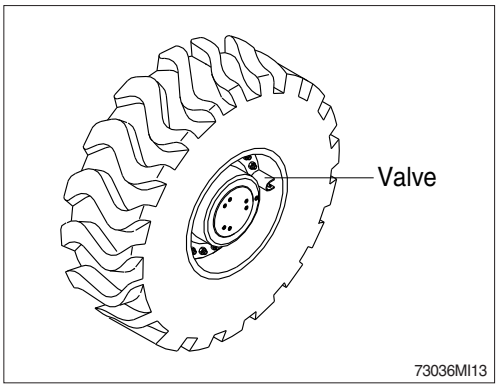
① After moving the machine to flat ground, lower the bucket to the ground and press the parking brake.



② Loosen slightly all wheel mounting.
· Tools : Socket 32 mm
Torque wrench
Extension bar
③ Lift the machine with a jack.
④ Loosen all wheel mounting nuts and replace the tire.

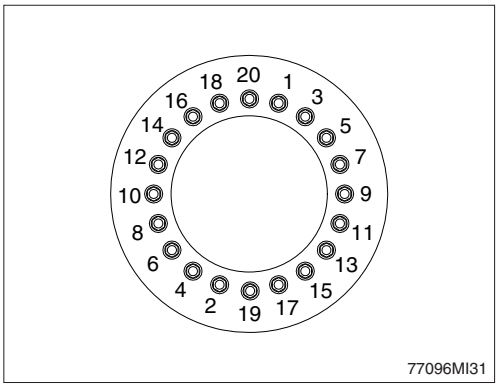
(3) Direction of tire to be installed

① Be careful that the valve should be facing the outside.



(4) Mounting of tire

① Lightly tighten nuts as shown in the illustration.
② Lower the jack after tire is replaced.
③ Tighten nuts according to the specified tighten torque.
· Tightening torque : 79±2.5 kgf · m
(571±18 lbf · ft)

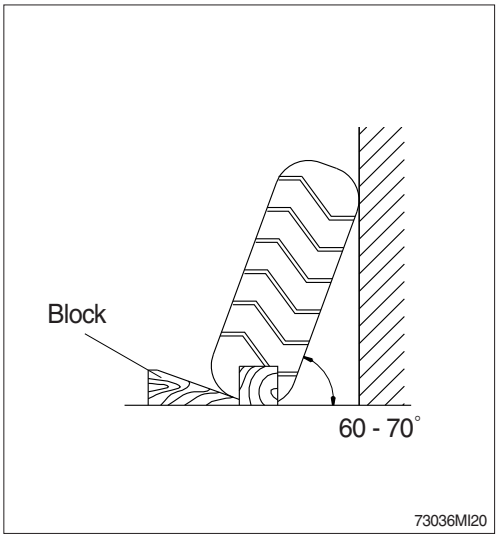


26) STORING TIRES AFTER REMOVAL

As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter. If the tire are stored outside, always erect a fence around the tires and put up "No Entry" and other warning signs that even young children can understand.

Stand the tire on level ground, and block it securely so that it cannot roll or fall over.

If the tire should fall over, get out of the way quickly. The tires for construction equipment are extremely heavy, so trying to hold the tire may lead to serious injury.



27) CHECK TRANSMISSION OIL LEVEL

(1) The oil level check must be carried out as follows; oil level check (weekly).

(2) Before the oil level check, transmission must have been running to warm up enough.

(3) When the oil level is checked, machine must be on flat ground and engine must be at idling speed, transmission must be in neutral position.

(4) Check the oil level on level (sight) gauge.

(5) Oil level

- Operating temperature (about 80~90˚C)
  : The Oil level must be lying in zone HOT (between two red lines).
- Cold phase (about 40˚C)
  : The Oil level must be lying near cold mark (blue line).

⚠ **When checking, press the parking brake switch and fix the front and rear frames with the safety lock bar.**

28) REPLACEMENT OF TRANSMISSION OIL AND FILTER ELEMENT

(1) Operate the machine for a few minutes in order to warm the transmission oil.

(2) Move the machine to flat ground. Lower the bucket to the ground and slightly apply downward force.

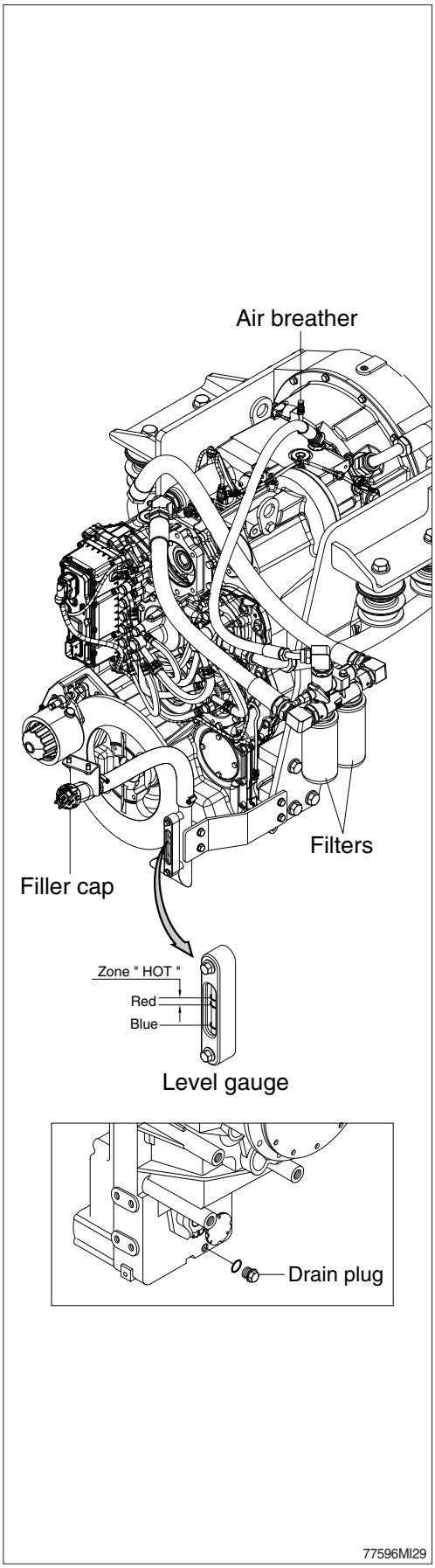
(3) Press the parking brake switch and stop the engine.

(4) Open transmission air breather to relieve internal air pressure.

(5) Remove the transmission drain plug. Allow the transmission oil to drain into a suitable container.

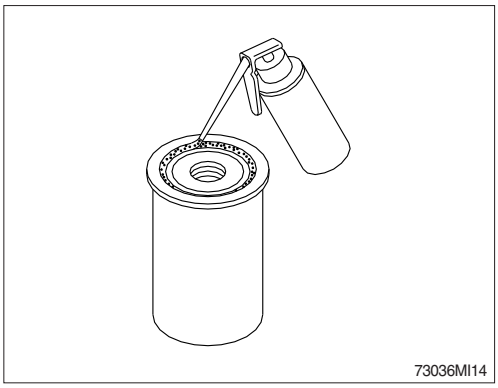
(6) Remove the transmission oil filter cartridge. Dispose of the used transmission oil filter cartridge properly.

(7) Clean the filter cartridge mounting base. Remove any part of the filter cartridge gasket that remains on the filter cartridge mounting base.



(8) Apply a light coat of oil to the gasket of a new transmission oil filter cartridge.

(9) Install the new transmission oil filter cartridge. Screw the filter in until contacts with the sealing surface is obtained and tighten it now by hand about 1/3 to 1/2 turn.



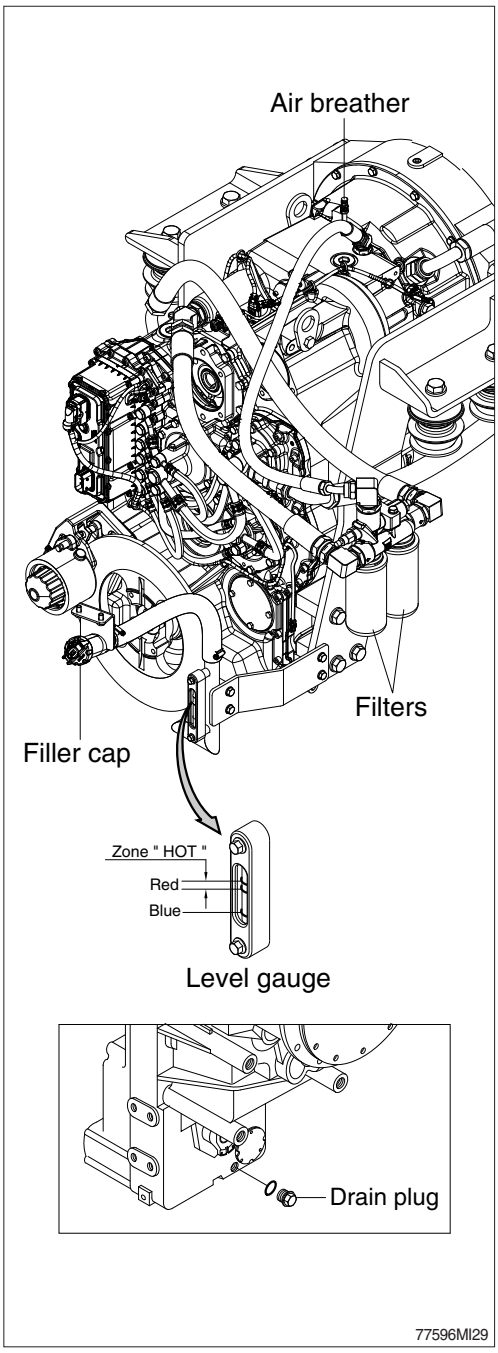
(10) Mount the drain plug of transmission after cleaning it.

(11) Fill the oil through filler cap and check if the oil is at the appropriate level.

(12) The proper oil amount is 51 liters (13.5 U.S. gallons)

⚠ **As the machine is hot after operation wait until the temperature has dropped.**

⚠ **It is imperative to pay attention to absolute cleanliness of oil and filter.**
Binding is in any case the marking on the oil level gauge.



29) CLEANING TRANSMISSION AIR BREATHER

(1) Remove dust or debris around the air breather.

(2) Remove the air breather and wash it with cleaning oil.

30) CHECK AND SUPPLYING AXLE OIL

(1) Move the machine to flat ground.

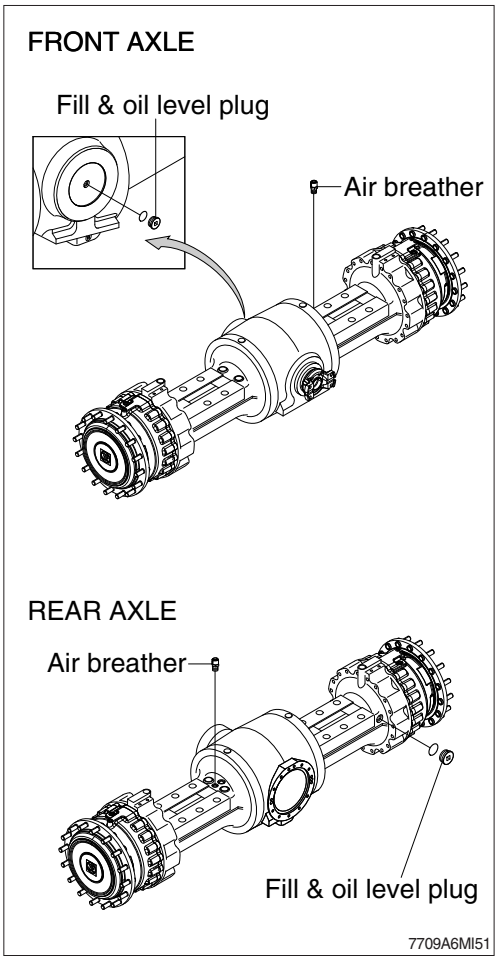
(2) Open the axle air breather to relieve internal air pressure.

(3) Remove the plug and check the oil amount.
If the oil level is at the hole of the plug, it is normal.

※ **Provide fill & level plug with O-ring and install it.**

⚠ **When checking the oil level, press the parking brake switch and fix front and rear frames using the safety lock bar.**

⚠ **As the machine is hot after operation, wait until the temperature has dropped.**



31) CHANGE THE AXLE OIL

(1) Place a case under drain plug to catch oil.

(2) Remove the air breather to relieve internal pressure.

(3) The basic condition for a correct oil change of the axle is horizontal plane of installation in every direction. Place machine in a horizontal position

(4) All plugs must be cleaned carefully before opening.

(5) Loosen drain plugs and drain oil.

(6) Provide drain plugs with new O-ring and install them.

(7) Fill up oil to the overflow on fill & level plug.

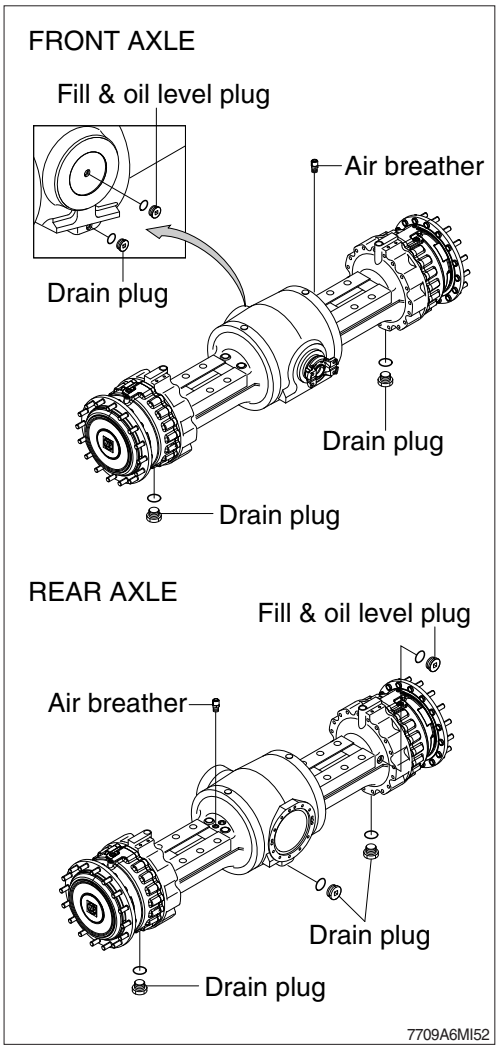
· Oil amount

Front axle : 51 ℓ (13.5 U.S. gal)

Rear axle : 51 ℓ (13.5 U.S. gal)

⚠ **As the machine is hot after operation, wait until the temperature has dropped.**

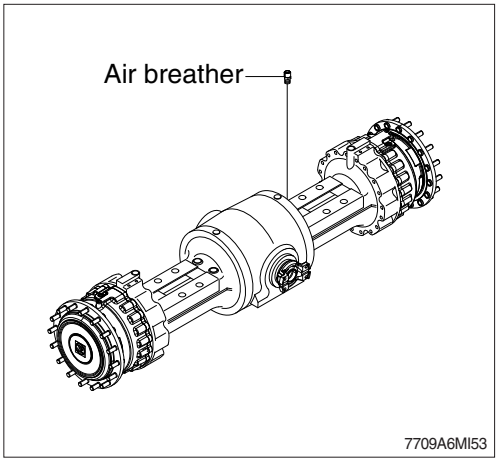
※ If a work requires frequent use of brake, replace it earlier than normal change interval.



32) CLEANING AXLE BREATHER

(1) Remove dust or debris around the breather.

(2) Remove the breather and wash it with cleaning oil.



33) LUBRICATION

(1) Supply grease through the grease nipple, using grease gun.

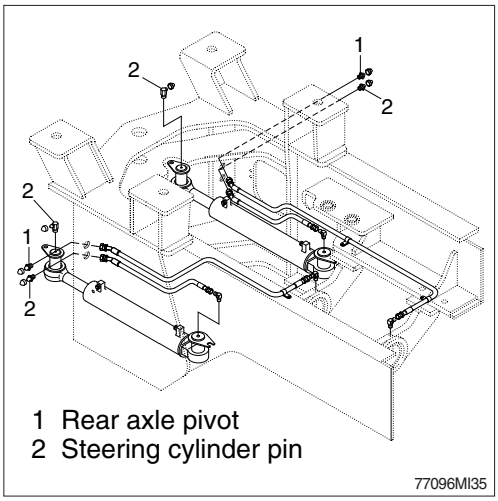
(2) After lubricating, clean off spilled grease.

⚠ **Press the parking brake switch and fix front and rear frames using the safety lock bar.**

⚠ **Set the work equipment in a stable position and turn the hydraulic safety lever into the lock position.**

(3) Rear axle pivot : 2EA

(4) Steering cylinder pin : 4EA



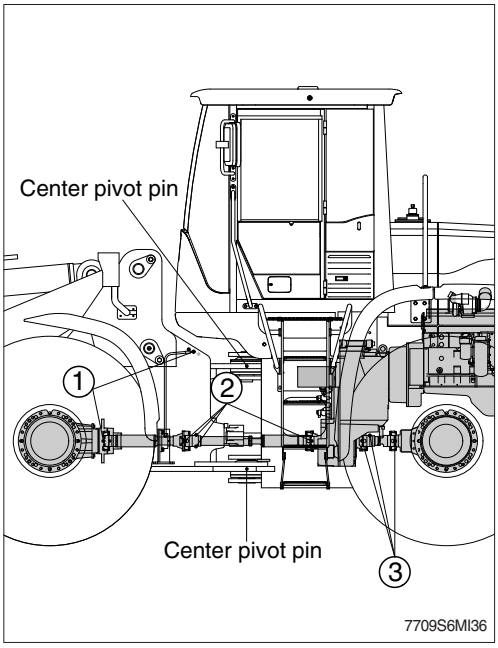
(5) Center pivot pin : 2EA

(6) Drive shaft

① Front (flange bearing, journal bearing) : 2EA

② Center (sleeve yoke, journal bearing) : 4EA

③ Rear (sleeve yoke, journal bearing) : 3EA



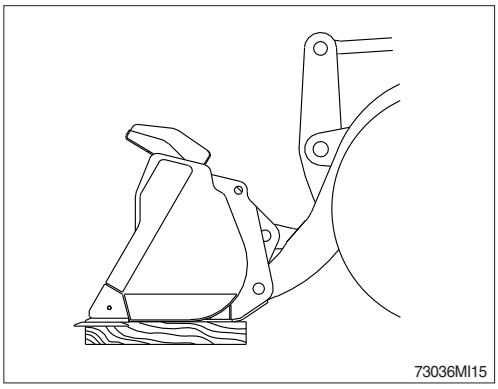
34) REPLACEMENT OF BOLT ON CUTTING EDGE

(1) Replacement time

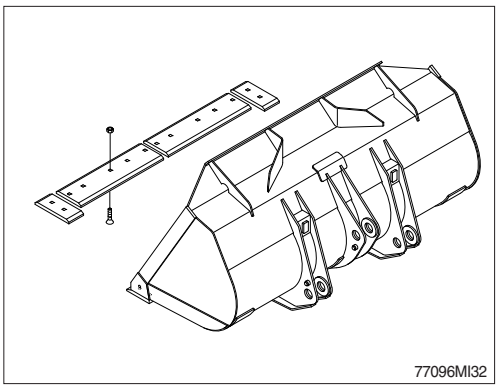
Replace the cutting edge before it has worn out to the end of bucket.

(2) Replacement method

⚠ Make sure the work equipment does not move when replacing the cutting edge.
Set the work equipment in a stable position, put the hydraulic safety lever in the LOCK position and stop the engine.



① Lift the bucket to a proper height and insert blocks so that the bucket does not fall down.
② Loosen bolts and nuts, and remove the cutting edge.
③ Clean the contacted surface.
④ Turn the cutting edge and install on the bucket.
※ If both sides have worn out, replace it with new ones.
※ If the contacted face of cutting edge has worn out, repair the contacted face of it.
⑤ Tighten evenly bolts and nuts to remove the clearance between bucket and cutting edge.
· Tightening torque : 83.2±12.5kgf · m
(602±90lbf · ft)
⑥ After a few hours of operation, retighten bolts.



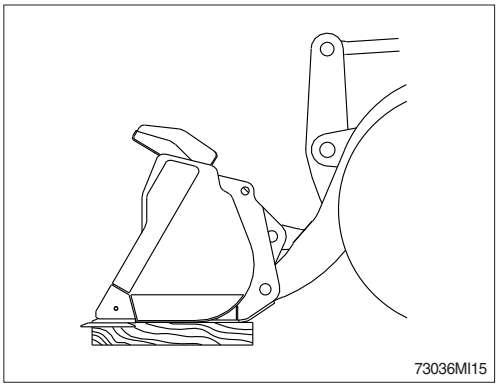
35) REPLACEMENT OF BUCKET TOOTH

(1) Replacement time

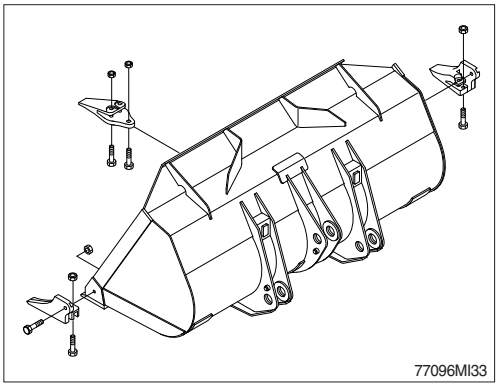
Replace the bucket tooth before it has worn out to the end of the bucket.

(2) Replacement method

⚠ Make sure the work equipment does not move when replacing the bucket tooth.
Set the work equipment in a stable position, put the hydraulic safety lever in the LOCK position and stop the engine.



① Lift the bucket to a proper height and insert blocks so that the bucket does not fall down.
② Loosen bolts and nuts, and remove bucket tooth.
③ Clean the contacted surface.
※ If the contacted face of bucket tooth has worn out, repair the contacted face of it.
④ Install new bucket tooth on the bucket, and tighten bolts and nuts.
· Tightening torque : 83.2±12.5kgf · m
(602±90lbf · ft)
⑤ After a few hours of operation, retighten bolts.

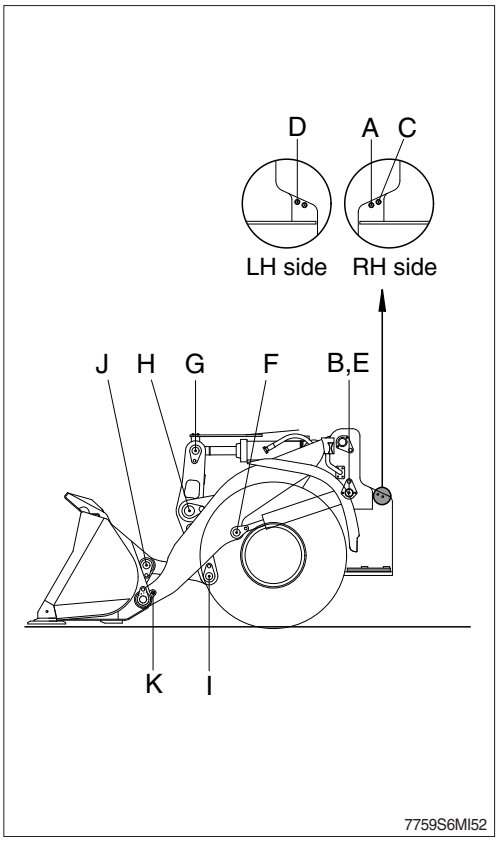


36) MAINTENANCE OF WORK EQUIPMENT

(1) Lubricate to each pin of working device.
Lubricate the grease to grease nipple in accordance with lubrication intervals.

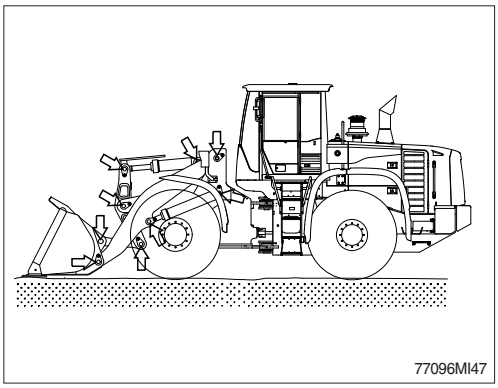
No.	Description	Qty
A	Bucket cylinder (Front frame side) pin	1
B	Boom cylinder (Front frame side) right pin	1
C	Boom-front frame right connection pin	1
D	Boom-front frame left connection pin	1
E	Boom cylinder (Front frame side) left pin	1
F	Boom cylinder-boom connection pin	2
G	Bucket cylinder-bell crank connection pin	1
H	Boom-bell crank connection pin	1
I	Bell crank-bucket link connection pin	1
J	Bucket-Bucket link connection pin	2
K	Bucket-boom connection pin	2

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



(2) Check for wear and tear of work equipment pins and bushings.

(3) Check for damage of boom and bell crank.

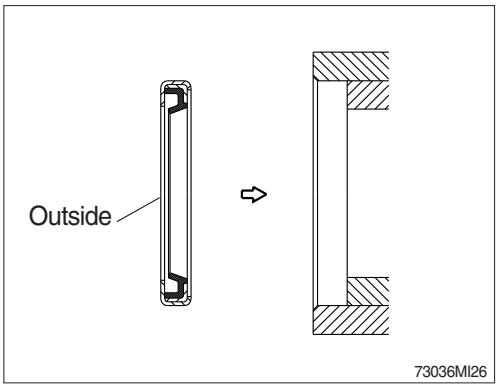


(4) Dust seal are mounted on the rotating part of working device to extend the lubricating interval.

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

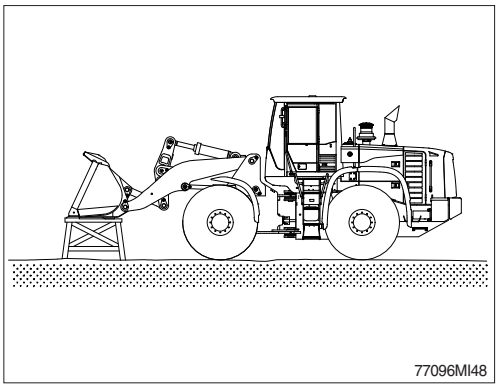
※ If it is assembled in wrong direction, it will cause fast wear of pin and bushing, and create noise and vibration during operation.

※ Make sure the seals are not damaged or deformed.



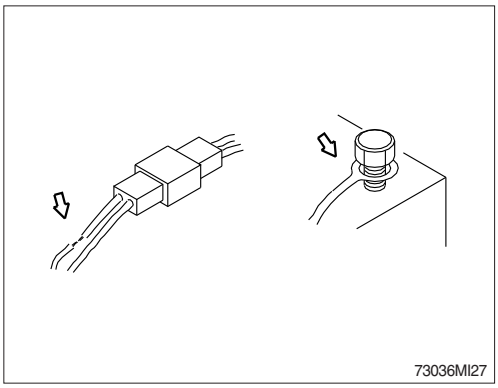
37) WORK EQUIPMENT SUPPORT

When carrying out inspection and maintenance with the equipment raised, fit a stand under the lift arm securely to prevent the work equipment from coming down. In addition, set the work equipment control levers to the Hold position and Lock position the hydraulic safety lever.



1) WIRING, GAUGES

Check regularly and repair loose or malfunctioning gauges when found.



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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.

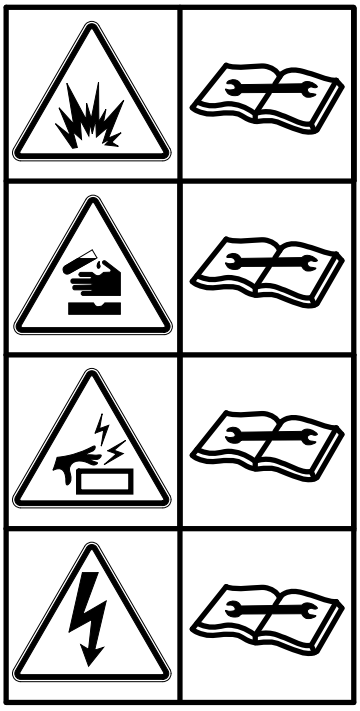
⚠ Do not stain clothes or skin with electrolyte as it is acid.
Be careful not to get the electrolyte in eyes.
Wash with clean water and go to the doctor if it enters the eyes.

⚠ Avoid short-circuiting the battery terminals through accidental contact with metallic objects, such as tools, across the terminals.

⚠ Do not store tools, bucket tooth and other flammable things in battery box. They could cause a fire.

⚠ Tighten the battery terminals securely.
Loosened terminals can generate sparks and lead to explosion.

⚠ Make sure that the battery terminal's caps always are installed.



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(2) Recycle

Never discard a battery.

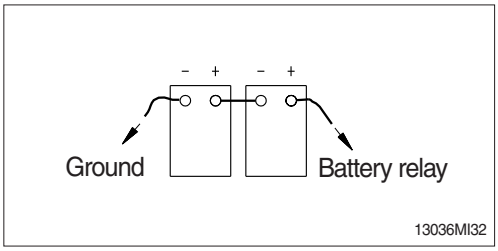
Always return used batteries to one of the following locations.

- · 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 las when reassembling.

※ **Pay attention to the correct polarity.**



3) STARTING THE ENGINE WITH A BOOSTER CABLE

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

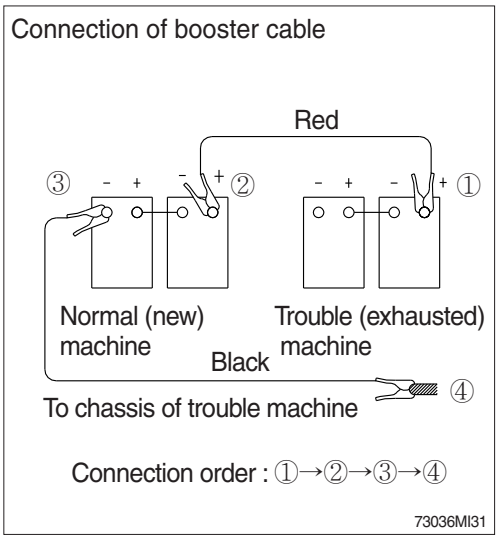
(1) Connection of booster cable

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

① Connect the red terminal of booster cable to the battery(+) terminal between exhausted and new battery.

② Connect the black terminal of the booster cable to the battery (-) terminal between exhausted and new battery.

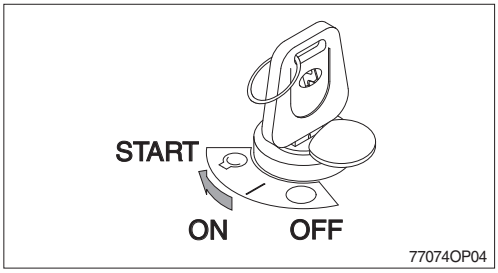
※ **Keep firmly all connection, the spark will be caused when connecting finally.**



(2) Starting the engine

① Start engine with starting key.

② 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.

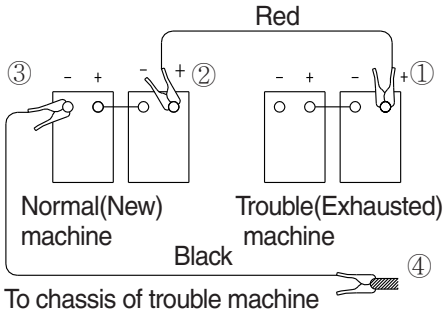
⚠ Explosive gas is generated while using the battery or charging it. Keep away flame and be careful not to cause the spark.

※ Charge the battery in the well ventilated place. Place the machine on the earth or concrete.

※ Avoid to charge the machine on the steel plate.

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

Disconnection of booster cable



Disconnection order : ④→③→②→①

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4) Welding repair

Before start to welding, follow the below procedure.

(1) Shut off the engine and remove the starting switch.

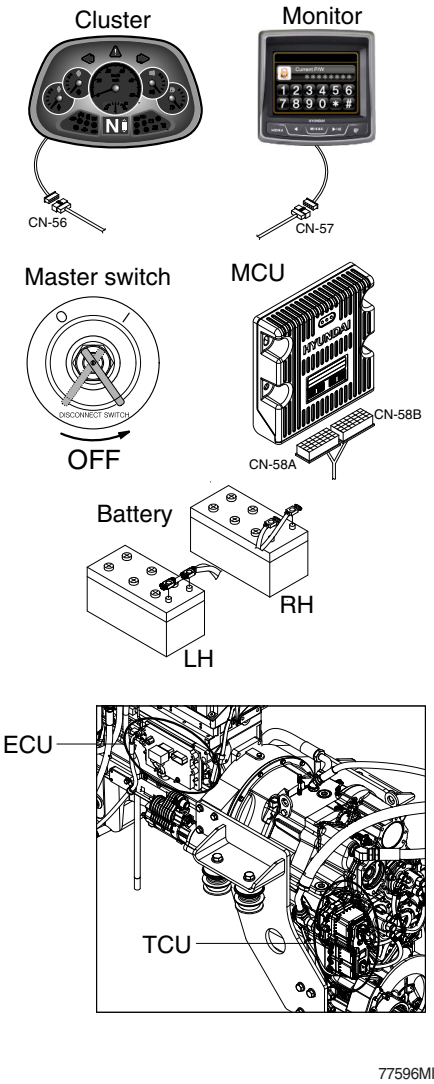
(2) Disconnect ground cable from battery by master switch.

(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, TCU, ECU, cluster etc).

(4) Connect the earth (ground) lead of the welding equipment as close to the welding points as possible.

※ Do not weld or flame cut on pipes or tubes that contain flammable fluids.
Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.

⚠ Do not attempt to welding work before carry out the above. If not, it will caused serious damage at electric system.



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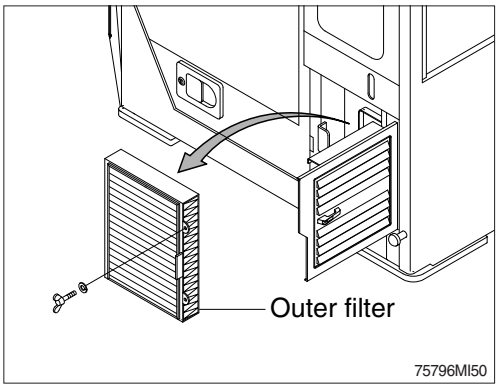
1) CLEAN AND REPLACE OF OUTER FILTER

※ Always stop the engine before servicing.

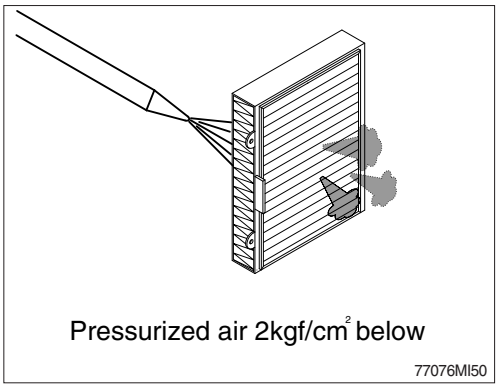
(1) Open the door, loosen the wing bolt and remove the outer filter.



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

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

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

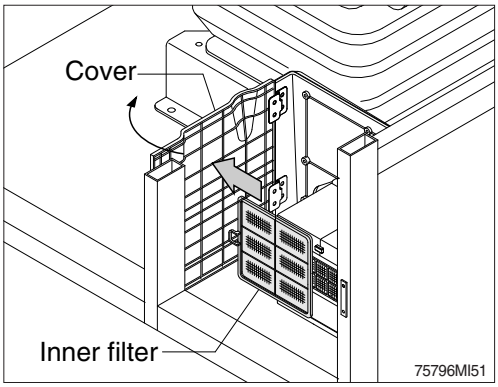


2) CLEAN AND REPLACE OF INNER FILTER

※ Always stop the engine before servicing.

(1) Open the cover.

(2) Remove the inner filter.

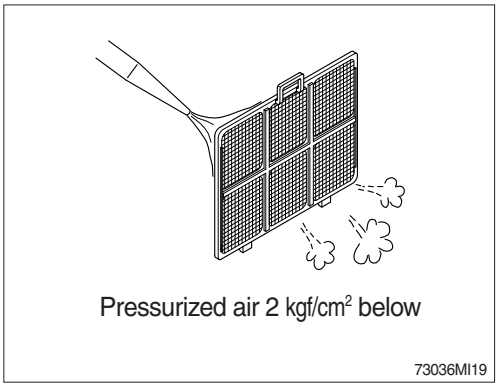


(3) Clean the inner filter using a pressurized air (below 2 kgf/cm^2, 28 psi) or washing with water.

△ **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.

※ Dry off after washing with water.



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 : 850±30 g (with receiver drier)

(1) Environmental precautions

The air conditioning system of the machine is filled with R-134a refrigerant at the factory.
HFC-134a refrigerant is a flourinated greenhouse gas and contributes to global warming.
Do not release refrigerant into the environment.

(2) Safety precautions

Work on the air conditioning system must only be performed by a qualified service technician.
Do not attempt to preform work on the air conditioning system.
Wear safety goggles, chemical resistant gloves and appropriate personal protective equipment to protect bare skin when there is a risk of contact with refrigerant.

(3) Action in case of exposure

① Eye contact / Limited skin contact
Rinse with warm water and apply a light bandage. Seek medical attention immediately.
② Extensive skin contact
Rinse with warm water and carefully heat the area with warm water or warm clothing.
Seek medical attention immediately.
③ Inhalation
Leave the area and find fresh air. Seek medical attention immediately.

7) COMPRESSOR LUBRICANT OIL (SYNTHETIC OIL) : 265mL

1. ENGINE

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

Trouble	Service	Remark
Engine oil pressure lamp fails to go off immediately after the engine is started.	· Add the oil to the specified level. · Replace the oil filter. · Check oil leakage from the tube or the joint.	
Steam is emitted from the top part of the radiator (The pressure valve). Engine coolant temperature gauge indicates red range.	· Supply the cooling water and check leakage. · Adjust fan belt tension. · Wash out inside of cooling system. · Clean or repair the radiator fin. · Check the thermostat. · Check the engine coolant temperature gauge. · Tighten the radiator cap firmly or replace the gasket of it.	
Engine does not start when the starting motor is turned over.	· Add fuel · Repair where air is inhaled into fuel system. · Check the injection pump or the nozzle. · In cold weather, check if fuel warmer system is working normal. · Check the valve clearance.	Refer to the pages 4-5.
Exhaust gas is white or blue.	· Adjust to specified oil quantity. · Replace with specified fuel.	
Exhaust gas occasionally turns black.	· Clean or replace the air cleaner element. · Check the nozzle. · Check engine compression pressure. · Check or replace the turbocharger.	
Combustion noise occasionally changes to breathing sound.	· Check the nozzle. · Check the injection pump.	
Unusual combustion noise or mechanical noise.	· Check with specified fuel. · Check overheating. · Check the muffler. · Adjust valve clearance.	

2. ELECTRICAL SYSTEM

Trouble	Service	Remark
Voltmeter fluctuates largely even with the engine running at a constant speed. Lamp does not glow brightly even when engine runs at high speed. Lamp flickers while engine runs.	· Check for loose terminals open-circuit wiring. · Adjust belt tension.	
Voltmeter does not fluctuate even with an increase in the engine speed.	· Check the alternator. · Inspect and repair wiring.	
Starting motor does not turn when starting switch is turned on.	· Inspect and repair the wiring. · Charge the battery. · Check starting switch. · Check battery relay switch. · Place the gear selector lever in the neutral.	
Starting motor turns the engine sluggishly.	· Charge the battery. · Check the starting motor.	
Starting motor disengages before the engine starts up.	· Check and repair the wiring. · Charge the battery.	
Engine oil pressure lamp does not light up when engine is stationary (When the starting switch is in ON position).	· Check the lamp. · Check the oil pressure switch.	
Charge lamp does not light up when the engine is stationary. (When the starting switch is in ON position.)	· Check the lamp. · Check and repair the wiring.	

3. POWER TRAIN SYSTEM

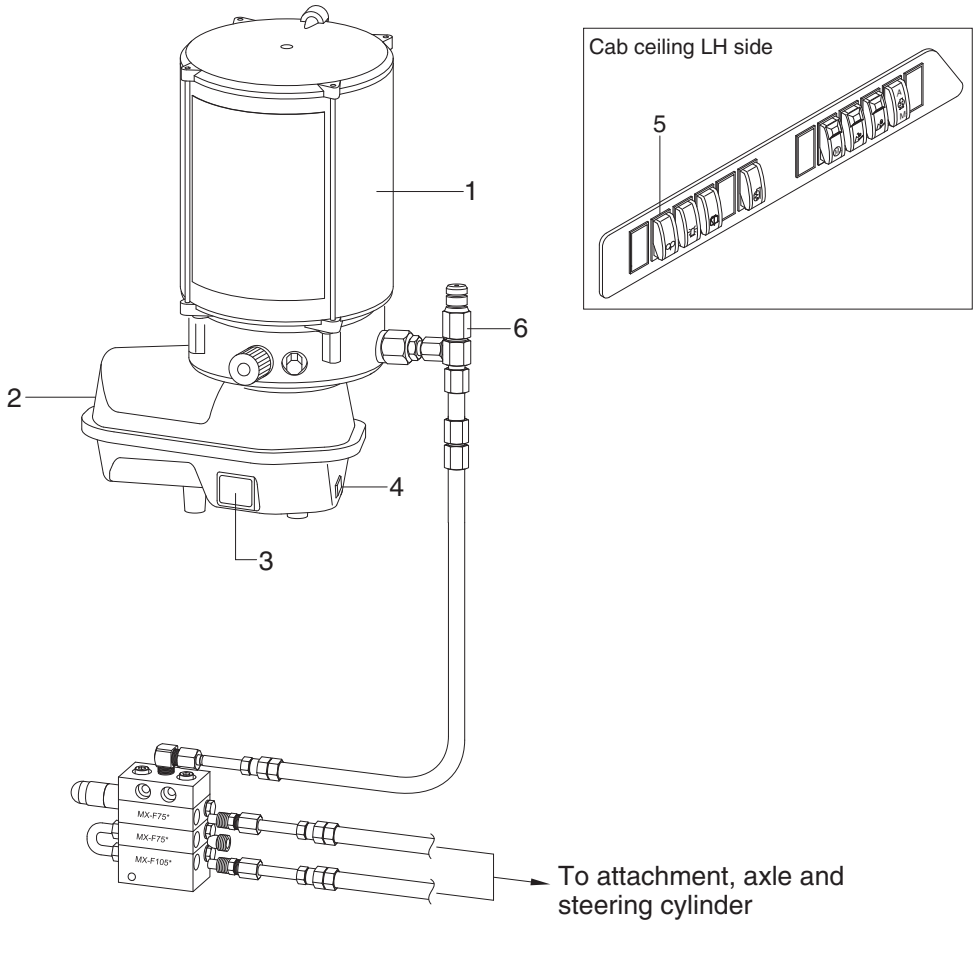
Trouble	Service	Remark
Engine is running but machine will not move.	· Release parking brake. · Put gear selector lever in position properly. · Add oil to transmission case to the specified level.	
Even at full throttle, machine moves slowly and lacks power.	· Add oil to transmission case to the specified level. · Disassemble transmission strainer and clean.	
Transmission oil overheats.	· Add oil to transmission case to the specified level or drain oil. · Use a suitable gear speed. · Reduce time using torque converter at stall speed. Check engine.	
Abnormal noise is produced.	· Add oil to transmission case to the specified level. · Add oil to axle case to the specified level.	
Brake does not work when pedal is depressed.	· Raise hydraulic oil pressure to specified level. · Add brake oil. · Bleed hydraulic oil from brake system.	
Brake drags or stay when applied.	· Clean breather and bleed air from brake system.	
Brake slips.	· Raise hydraulic oil pressure to the specified level.	
Brake does not work properly.	· Adjust linkage. · Clean brake pad. · Replace spring in hydraulic oil cylinder. · Adjust or replace brake pad.	
Steering wheel is heavy.	· Repair or replace the pump. · Repair, clean and reset the relief valve. · Coat a grease to connections and bearings of steering gear. · Check the mounting of the steering column.	
Steering wheel turning by itself.	· Replace leaf springs.	
Slow steering.	· Clean spool and sleeve. · Replace leaf springs.	
Impossible to turn the steering wheel into neutral position.	· Check the monitor. · Check and repair the wiring.	

4. HYDRAULIC SYSTEM

Trouble	Service	Remark
Bucket lacks lifting power. Bucket lifting speed is slow.	· Check the hydraulic oil level and add if necessary. · Replace filter in hydraulic tank.	
Bubbles in oil.	· Replace with specified oil. · Add oil if needed.	
Oil pressure is too low.	· Bleed air from oil line. · Add oil and bleed air.	
Cylinder vibrates when operating.	· Add oil.	

1. CENTRAL GREASE LUBRICATION SYSTEM

1) MAJOR COMPONENT



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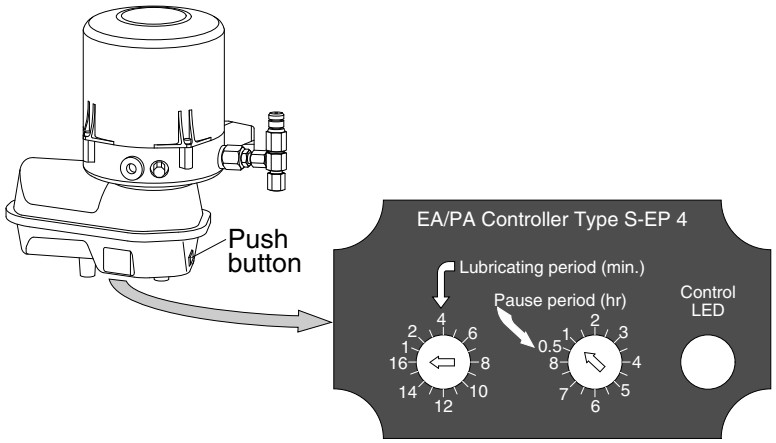
1 Grease tank
2 Grease pump
3 Control unit
4 Push button
5 Central grease lubrication switch
6 Pump element

2) ELECTRONIC CONTROL UNIT



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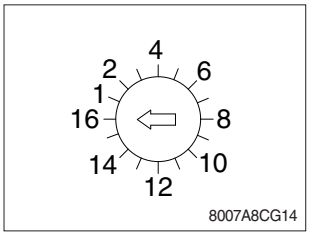
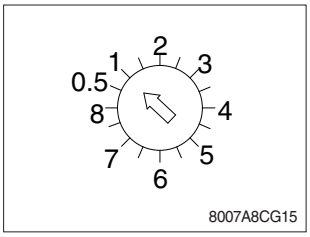
(1) Lubricating period setting dial



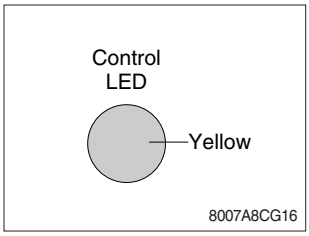
① This dial use to set the greasing period from 1 to 16 minutes.
② Default period is 16 minutes.
※ **Use a minus(-) screw driver to change settings.**

(2) Pause period setting dial



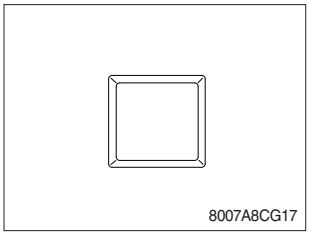
① This dial is use to set the pause period from 0.5 to 8 hours.
② Default period is one hour.

(3) Control LED



① This LED indicates operating status of the central grease lubrication system.
② Turn the starting switch ON, the LED will light up for 1.5 seconds.
③ During the central grease lubrication system is operated, it will blink at 0.5 second intervals.
④ When the lubrication system is failed, the LED is light up continuously.

3) PUSH BUTTON



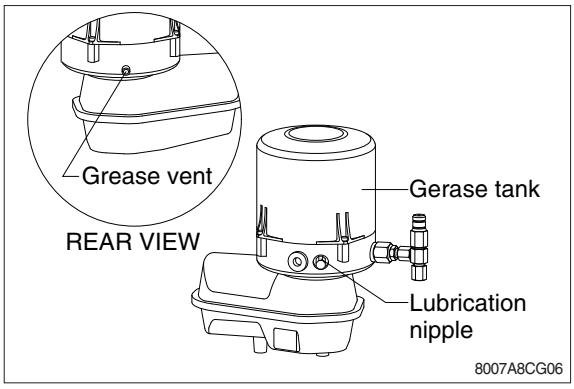
① This button use to operate the central grease lubrication system.
② Pushing the button, the central grease lubrication system is operated for 16 minutes once.

4) FILLING THE GREASE TANK

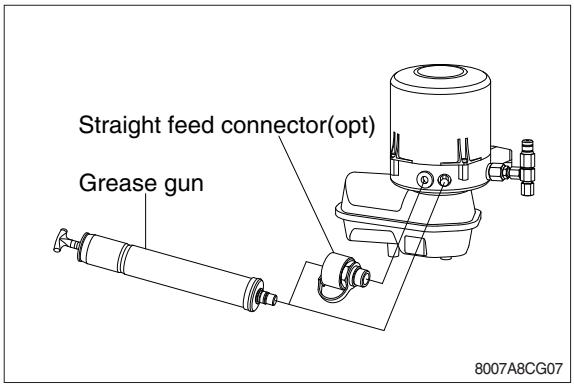
(1) Standard filling via lubrication nipple with manual or pneumatic grease gun.

※ **Lubricate the grease until it flows out to the grease vent.**

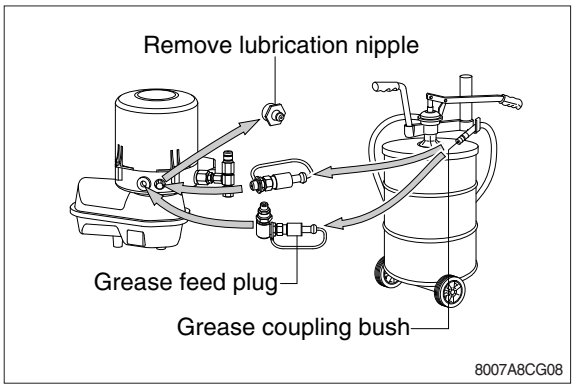
· Capacity : 4 kg (8.8 lb)



(2) Manual hand grease gun.



(3) Pneumatic grease pump (option).



5) REPAIR INSTRUCTIONS

(1) Case of system blockage

① A creased or clogged lubricant pipe
② Grease points overfilled or clogged by lubricant
③ Lubricant not suitable for central lubrication system
④ Distributor outlet closed
⑤ Blocked distributor

(2) Message signalling a blockage

The system pressure is exceeded (265 kgf/cm^2), a blockage may exist in the system and will be signalled by one of the followings.

① The pressure indicator at grease pump.
② The pressure indicator at secondary distributor.

(3) Repair of a distributor when blocked :

① Remove the main distributor from the system, nothing the sequence of removal.
② Remove the plugscrews from the piston holes and move the pistons to and fro (don't expel them); re-insert the plug-screws.
③ If the main distributor is not blocked, do the secondary distributor as above mentioned.
④ Push the piston of the blocked distributor outside and check the drilling and the piston surface for scratches and deficiencies.
⑤ Renew the distributor affected by serious deficiencies.

※ Pistons are not interchangeables for main and secondary distributor.

※ Deposits of hardened grease detected at pistons and drillings of distributor must be eliminated by washing and blowing. The drillings in distributor must be free of residues of grease. This should be checked by use of some thin wire.

※ Hardening of grease indicates that the lubricant being used is not suitable for the central grease lubrication system. Ask for advice by the supplier of the lubricant. After having checked both distributor, re-assemble the distributor complying with the sequence noted down previously. In order to preclude jamming of pistons, tighten the plug-screws to the specified tightening torque.

· Tightening torque : 1.2 kgf·m (8.7 lbf·ft)

① Check the distributor for correct operation, using oil or grease.
② Install the distributor in the system.
③ Start the machine and check it for correct operating pressure (150kgf/cm^2).

※ The repair work has to be done under maximum cleanliness.

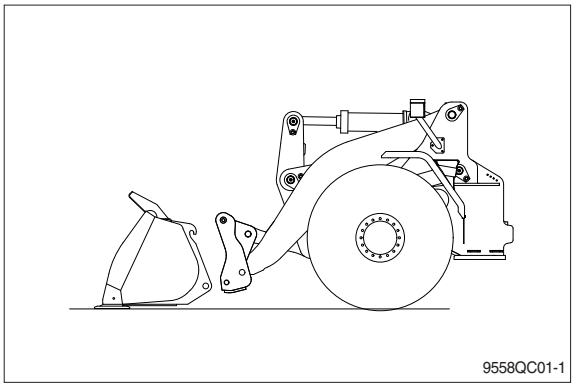
6) TROUBLESHOOTING

Category	Applications	Service
Pump does not work	Defective electronic control unit Electric cable is broken Pump is defective	Replace the control unit Renew the electric cable Replace the pump
Pump is working, but does not supply of lubrication	Air in the feed piston filling Grease level dropped below minimum level Defective pump element	Bleed the pump Refill the grease tank Replace the pump element
No grease at all points of lubrication	Pump does not work. Inoperative time is too long or period of lubrication is too short. System is blocked.	Refer to "Pump does not work". Reduce the inoperative time or increase the period of lubrication. Refer to "Excessive pressure (above 265 kgf/cm^2) of the pressure indicator".
No grease at some points of lubrication	Some pipes are burst or leakage Leakage at screwed unions	Renew the pipes Retighten or renew the screwed union
No grease at one point of lubrication	The lubrication pipe is burst or leakage Leakage at screwed unions	Renew the pipe Retighten or renew the screwed union
Reduced pump speed	High pressure in the system Low ambient temperature	Check the system / bearing points Not a defective (1 or 2 intermediate lubrication cycles may be useful)
Excessive pressure (above 265 kgf/cm^2) of the pressure indicator	Excessive pressure in the system Progressive distributor is blocked System is blocked Defective valve spring	Check the system Replace the distributor Repair clogged / seized greasing points Replace the pressure relief valve
Signal of the LED	The LED of control unit is light up continuously	Check electrical system and control unit

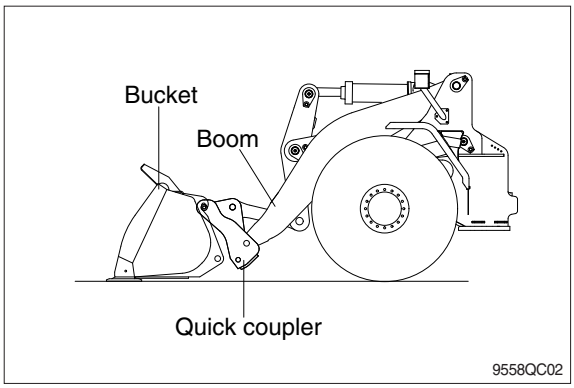
2. QUICK COUPLER

1) FIXING BUCKET WITH QUICK COUPLER

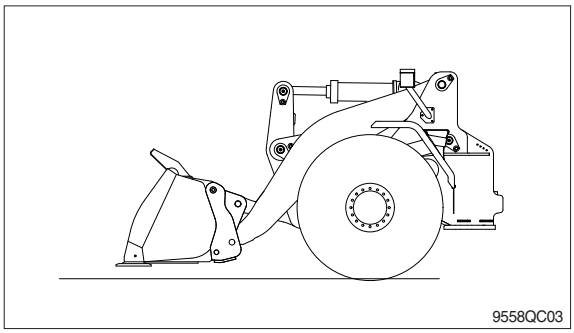
(1) Release the lock pins by pressing the attachment unlock switch.



(2) Tilt quick coupler forward and align the upper attaching points of the quick coupler with upper attaching points on the bucket. Raise the boom until the bucket rests in the quick coupler and tilt the quick coupler rearward until the bucket is level.



(3) Lock the bucket with the attachment lock switch. The quick coupler pins move in the engaged position and buzzer sounds.



※ Check for engagement as followings.

a. Put down pressure on the attachment.

b. Back up the machine and make sure that there is no movement between the quick coupler and attachment.

⚠ Always check that the attachment is properly secured to the quick coupler by pressing the front part of the attachment against the ground.

⚠ Never use an attachment before you have checked its mounting.

※ If you are uncertain if the attachment is securely locked, you must visually check that the lock pins of the quick coupler are in the lock position.

2) REMOVE BUCKET FROM QUICK COUPLER

(1) The attachment should be in a level position on the ground.
(2) Release the lock pins by pressing the switch.
(3) Lower the boom so that it disengage from the attachment.
(4) Reverse away from the attachment.

3) PRECAUTION OF USING QUICK COUPLER

⚠ **When operating the machine with quick coupler, confirm that the attachment lock switch is lock position.**
Operating the machine with attachment lock switch unlock position can cause the bucket to drop off and bring about the accident.

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

9. INDEX