

## 4. OPERATION

### 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.

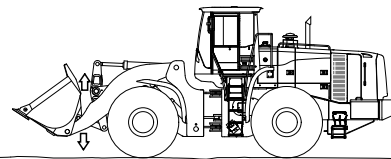
Service meter	Load
Until 10 hours	About 60%
Until 100 hours	About 80%
After 100 hours	100%

※ **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 (front and rear)	
Hydraulic oil return filter	
Pilot line filter element	

Avoid excessive operation for initial 100 hours



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## 2. CHECK BEFORE STARTING THE ENGINE

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

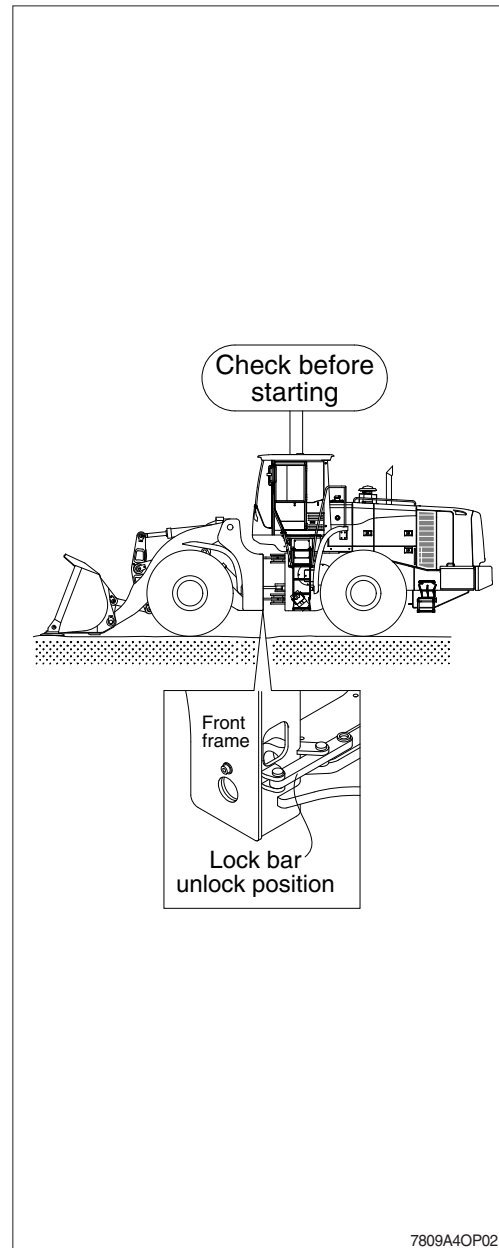
**▲ The steering frame lock bar must be removed in order to steer the machine.**

- 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.**



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### 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.

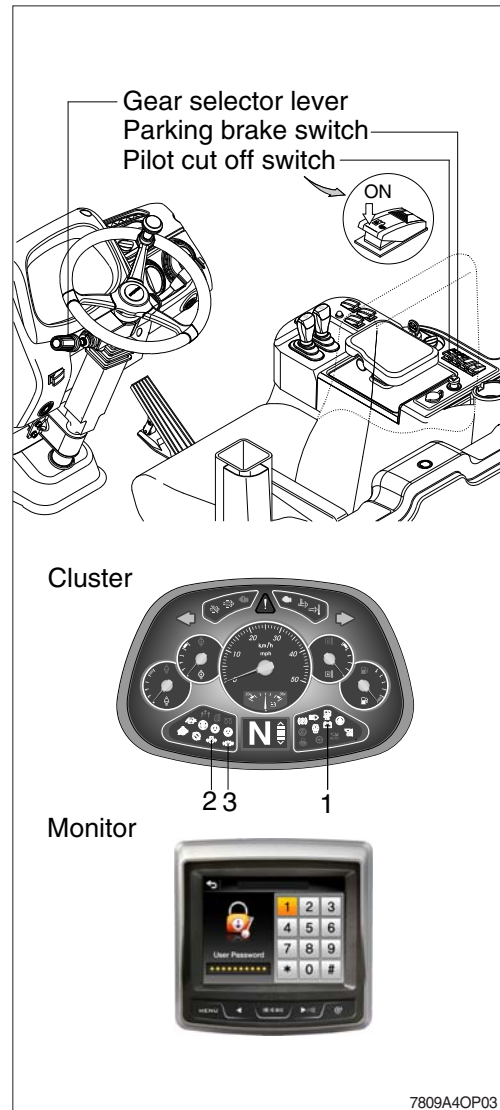
##### · Cluster

- 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.

※ Refer to page 3-25 for ESL system setting.



## 2) STARTING ENGINE IN NORMAL TEMPERATURE

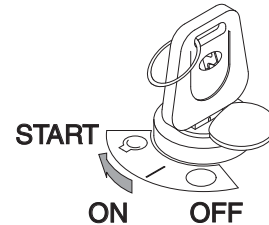
※ **Sound the horn to warn the surroundings after checking if personnel or obstacles are in the area.**

- (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.**




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### 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.

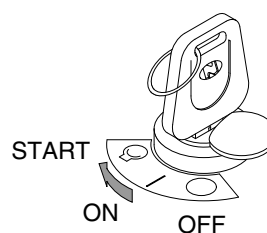
- (1) Check if the parking brake is locked (with the parking switch ON).
  - (2) Check if the gear selector lever is in the neutral position.
  - (3) Check if the pilot cut off switch is locked (with the switch OFF)
  - (4) Turn the starting switch to ON position, and wait 1~2 minutes. More time may take according to ambient temperature.
  - (5) Start the engine by turning the starting switch to START position after the preheater pilot lamp and fuel warmer pilot lamp OFF.
- ※ If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.

- (6) 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.

 Preheat pilot lamp OFF



 Fuel warmer pilot lamp OFF



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#### 4) INSPECTION AFTER ENGINE START

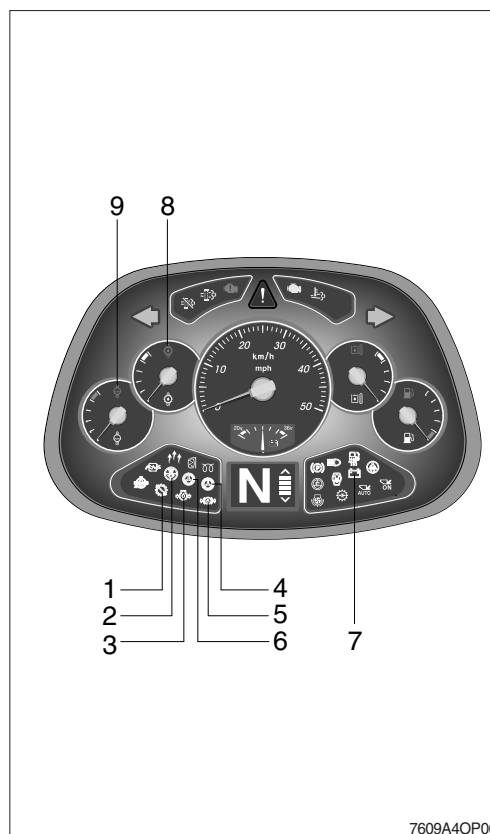
Inspect and confirm the following after engine starts.

- (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.**



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#### 5) TRANSMISSION COLD STARTING

- (1) At an oil temperature in the shifting circuit  $< -12^{\circ}\text{C}$ , 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.

※ **Transmission warning**



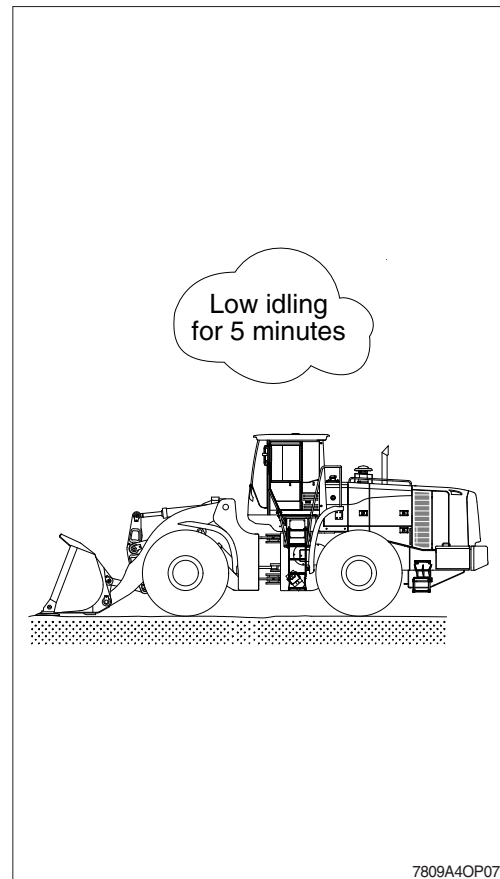
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Symbol	Meaning	Remarks
LF, LR	Limp home gear	-
**	Oil temperature too low, no gear available	Warm up engine/transmission
WS	Warning sump temperature	Alternate between WS and actual gear / direction while driving, in neutral only displayed WS if no 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.

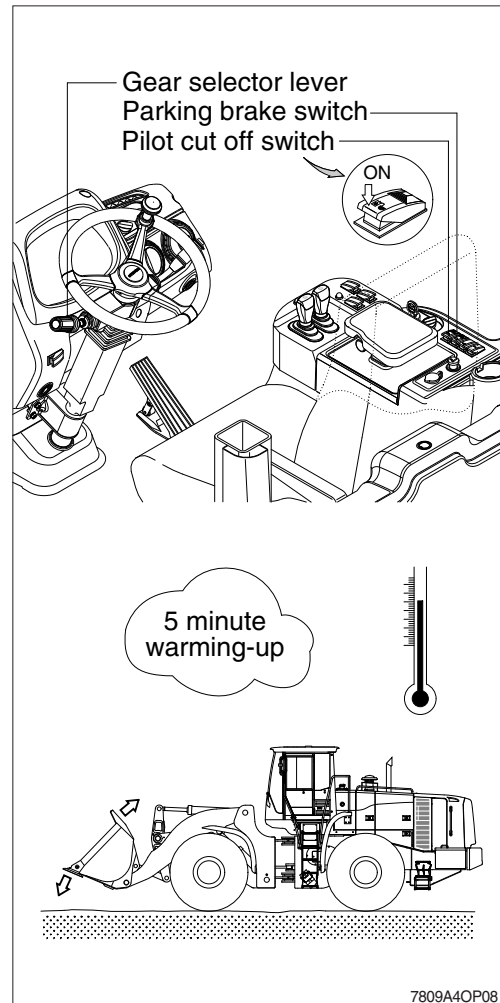
- (1) Place the gear selector lever in neutral.
- (2) Push the parking brake switch to the ON position.
- (3) Run the engine for five minutes at low idle with no load.
- (4) Return the key of starting switch to the OFF position.
- (5) Remove the key to prevent other people using the machine.
- (6) Push 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.

※ **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 backward (or toward the left) in order to tilt the bucket backward.



### **Bucket dump (4)**

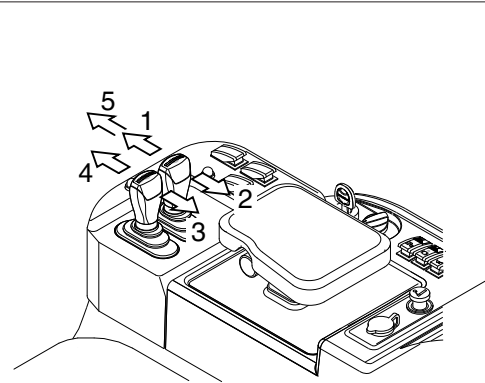
Move the control lever forward (or toward the right) in order to dump a load from the bucket.



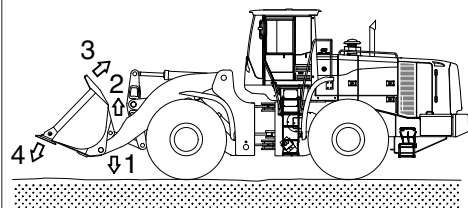
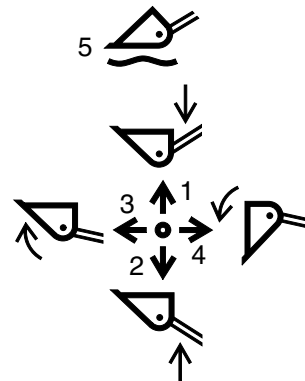
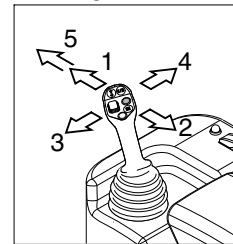
### **Boom float (5)**

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.



FNR RCV



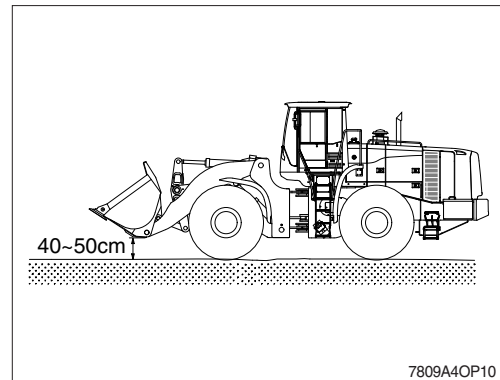
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## 6. TRAVELING OF THE MACHINE

### 1) BASIC OPERATION

#### (1) Traveling posture

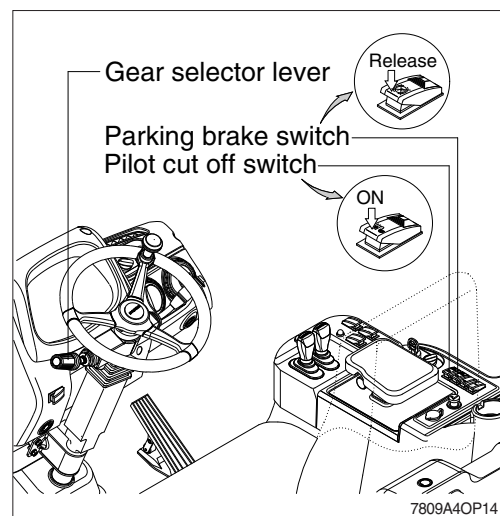
Lift the boom so that the bucket is placed 40-50cm above the ground.



#### (2) Traveling operation

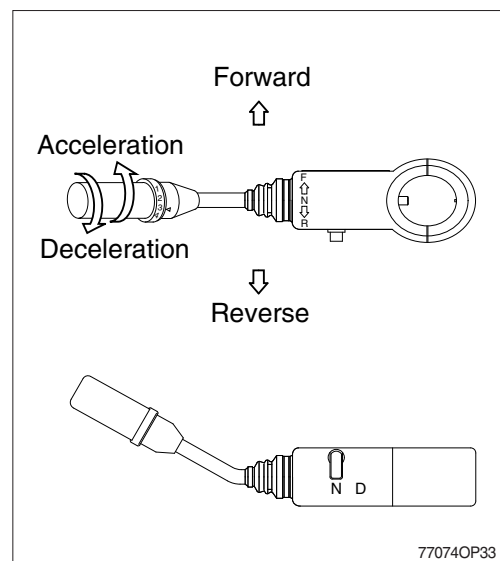
When warm-up operation is completed after the engine is started, move the machine according to the following procedure.

- 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

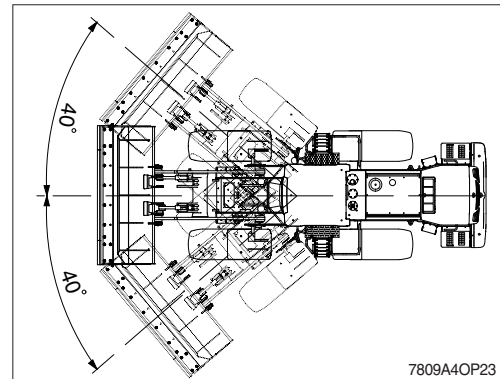
- ① The gear selector is designed for the mounting on the left side of the steering column.
- ② The positions (speeds) 1 to 4 are selected by a rotary motion, the driving direction Forward (F)-Neutral (N)-Reverse (R) by tilting the gear selector lever.
- ③ A neutral lock is installed as protection against 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.

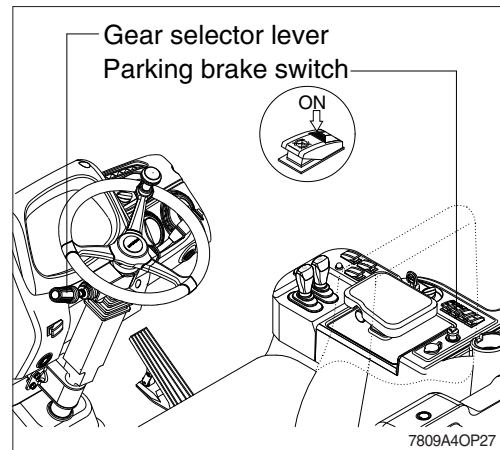


#### (5) Precautions when driving

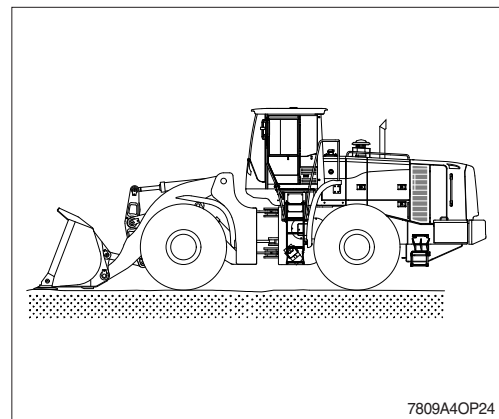
- ① If the monitor warning lamp lights up, put the gear selector lever in the neutral position and stop the machine. Stop the engine after running it at low idling. Then resolve any problems regarding operation of the machine.
- ② When operating the machine, if the load is lightened rapidly, the speed 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

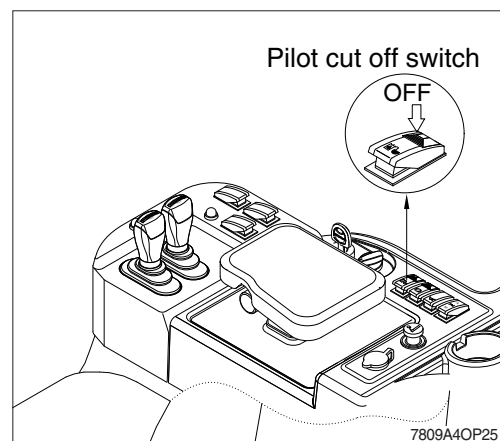
- ① Press the brake pedal to stop the machine.
- ② Put the gear selector lever in the neutral position.
- ③ Push the parking brake switch to the ON position.



- 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

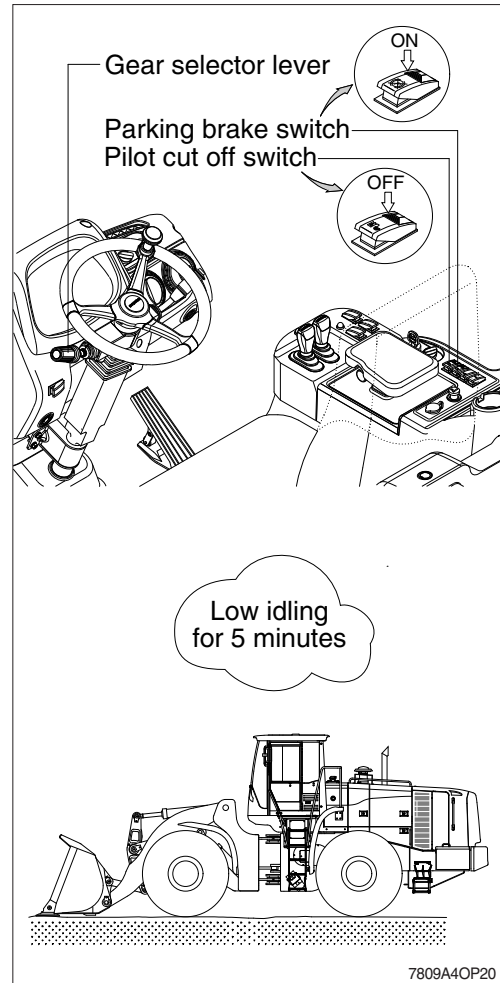
※ If the engine is abruptly stopped before it has cooled down, its service life may be shortened. Avoid sudden stop except an emergency.

※ 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.

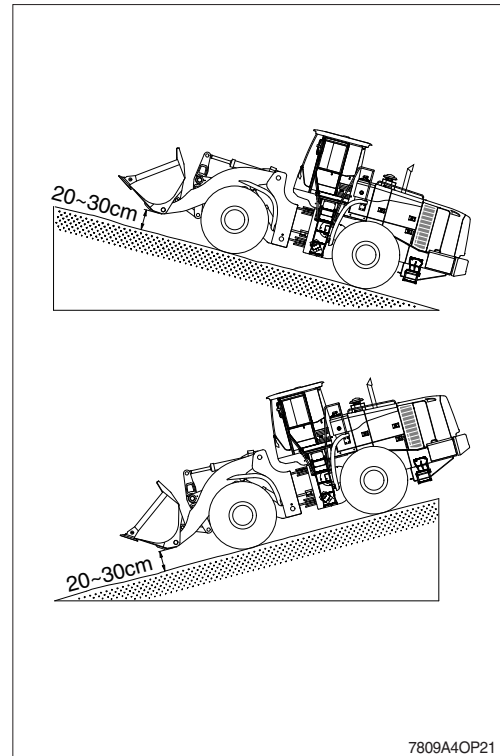
### (8) Checks after the engine stopped

- 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

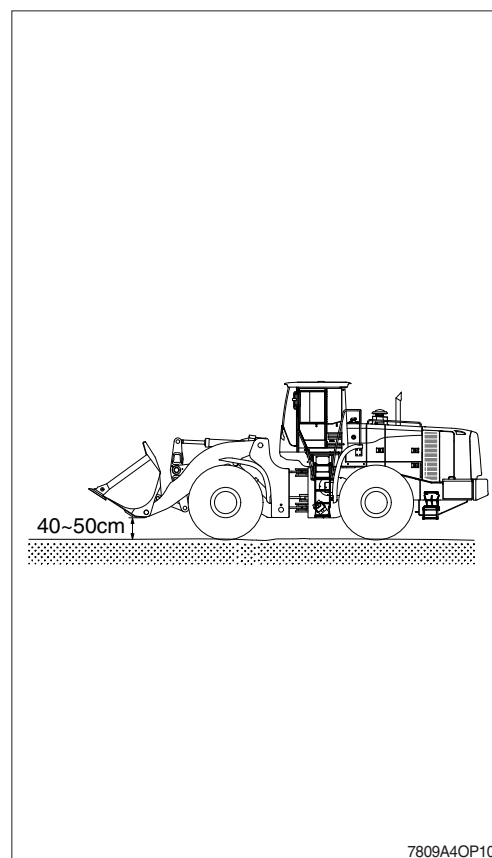
- (1) Never travel down a slope in neutral.
  - (2) Lower the bucket 20-30 cm (1 ft) to the ground so that it can be used as a brake in an emergency.
  - (3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.
  - (4) When parking on a slope, use the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



## 7. EFFICIENT WORKING METHOD

### 1) GENERAL

- (1) Lift the bucket about 40-50 cm (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.

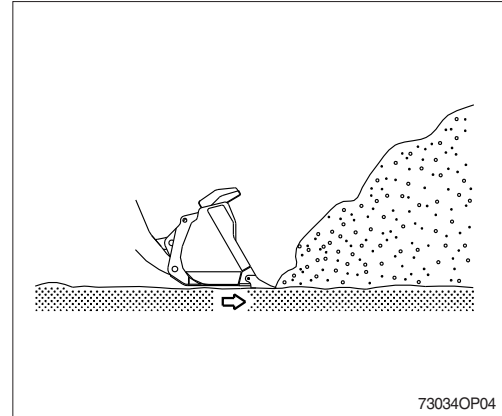


## 2) EXCAVATION WORK

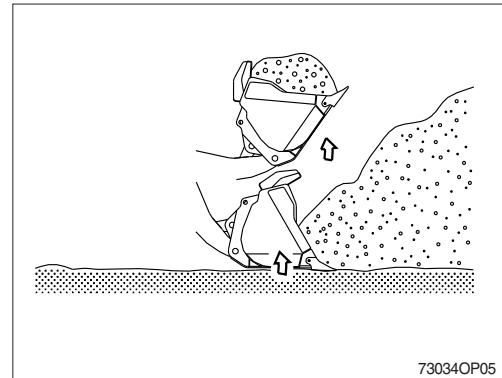
### (1) Shovel work

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.

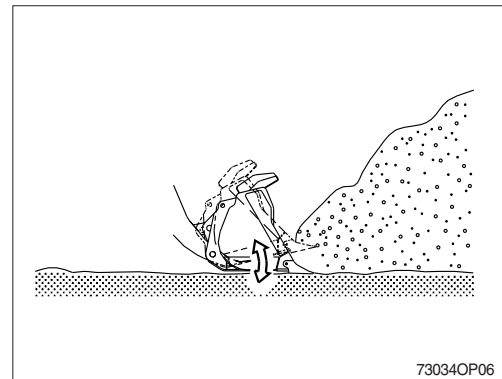
- ① Keep the bucket shovel parallel to the ground (If the bucket is pushed in a non-horizontal position, power may be reduced, and the bucket cannot dig deeply into the heap of soil).



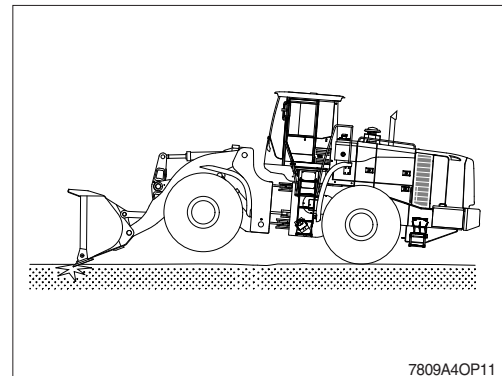
- ② When the bucket is sufficiently deep into the pile, advance the machine with the control lever pulled down. And by placing the control lever in the bucket roll-back position, fill the bucket with soil.



- 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.

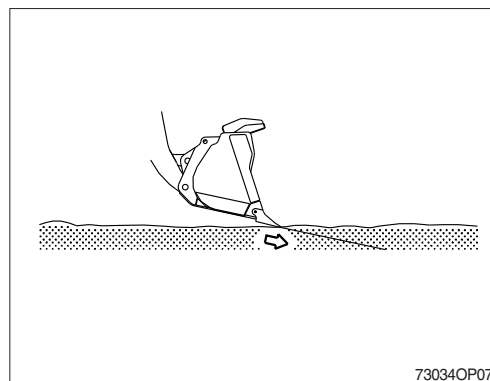




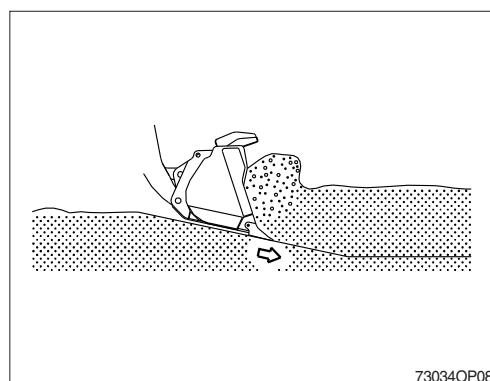
## (2) Excavation on level ground

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

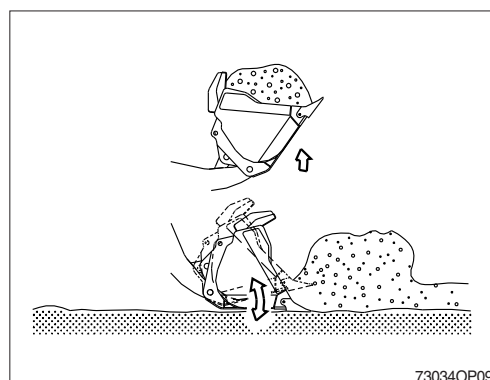
- ① Lower the bucket edge slightly.



- 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

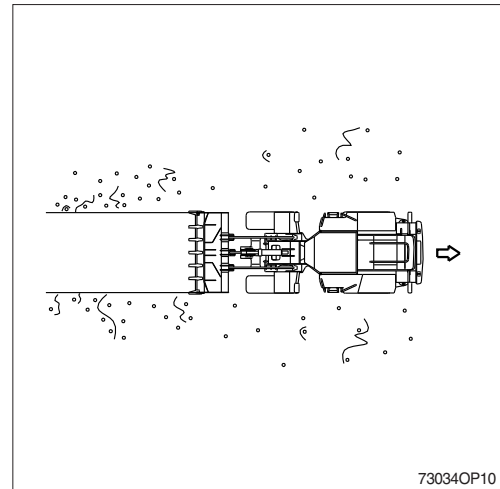
(1) Load the bucket with soil and dump gradually the soil while driving backward.

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

Load the bucket with soil and place the bucket in (3) the horizontal position.

Then put the control lever in the BOOM FLOAT position and move backward.

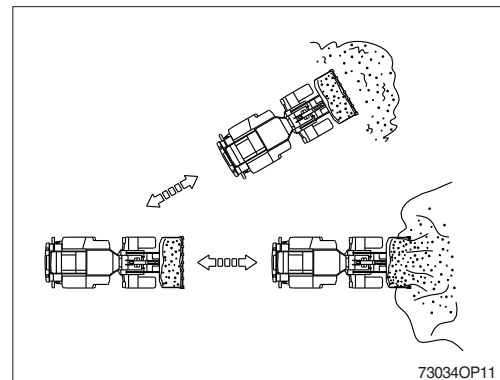
※ **Make sure that the machine moves always backward when doing leveling work.**



### 4) TRANSPORTATION

※ **Make sure that the traveling path is always cleared.**

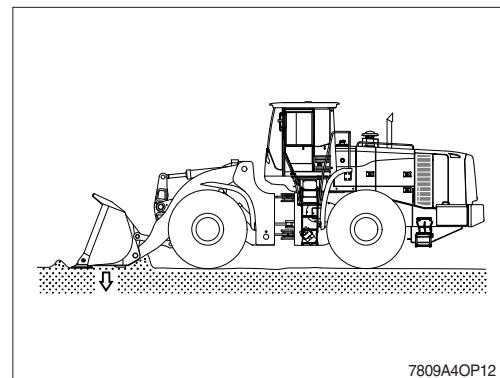
※ **When transporting material, lift the bucket 40-50 cm above the ground.**



### 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.**

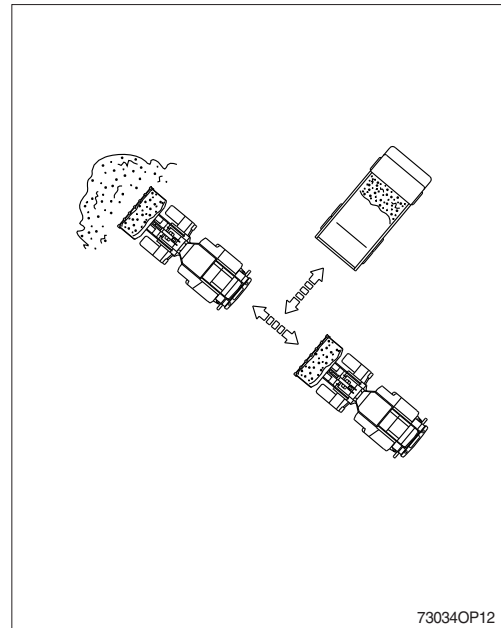


## 6) LOADING

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.

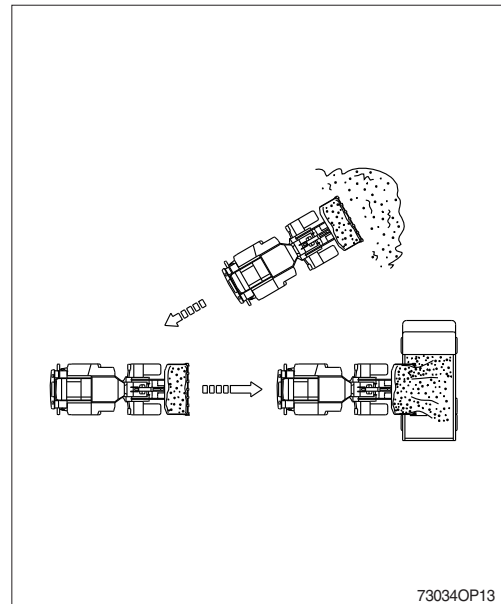
### (1) I method

- 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.**

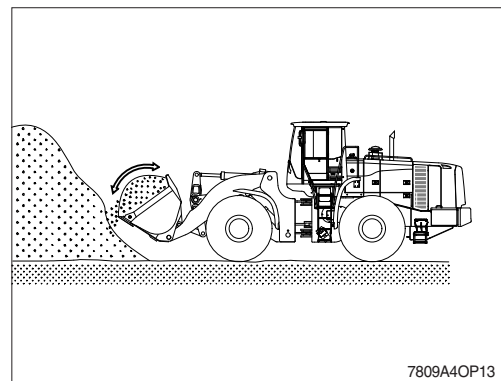


### (2) V method

- 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.



## 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

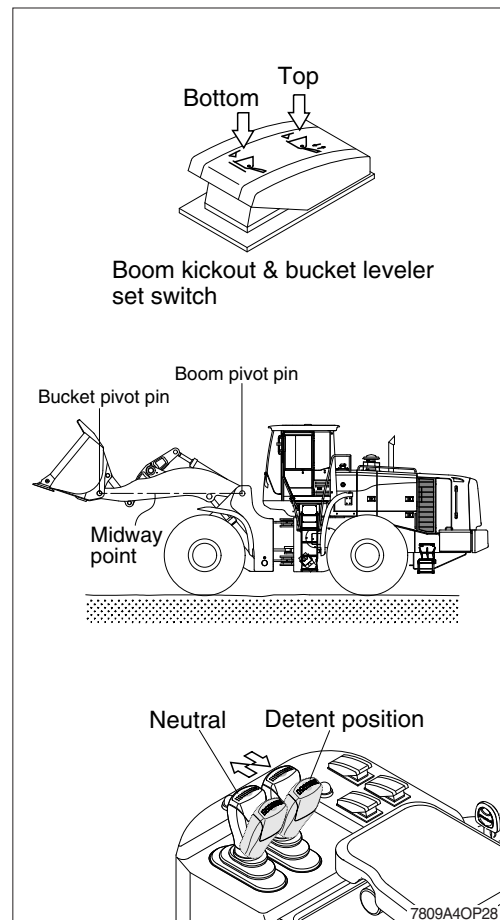
To set the lift kickout, raise the bucket to the desired position above the midway point. Then depress the top of switch for 2~3 seconds. The boom will return to the programmed position when the raise detent is activated and the boom is below the kickout position.

#### (2) Lower kickout position

To set the lower kickout, lower the bucket to the desired position below the midway point. 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

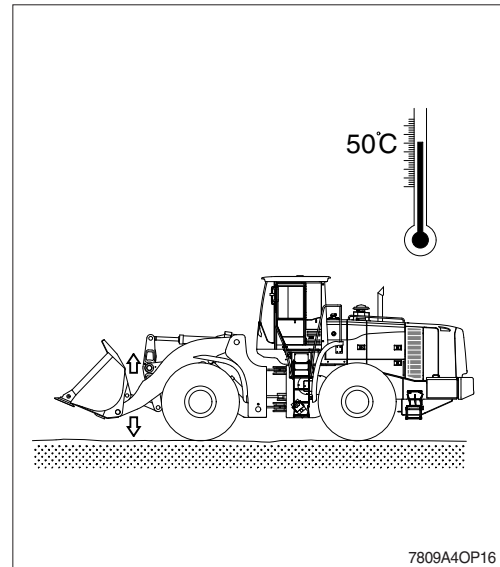
To set the bucket leveler, roll back the bucket to the desired position. Then depress the bottom of switch for 2~3 seconds. The bucket will return to the programmed position when the roll back detent is activated and the bucket is below the leveler position.



## 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.

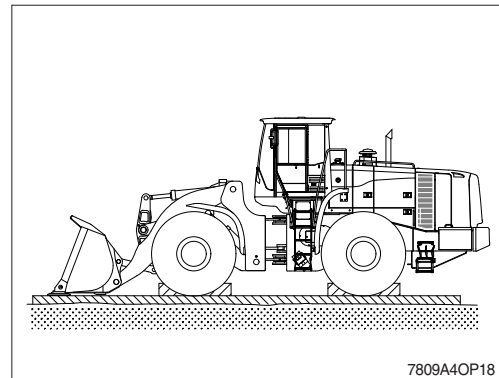
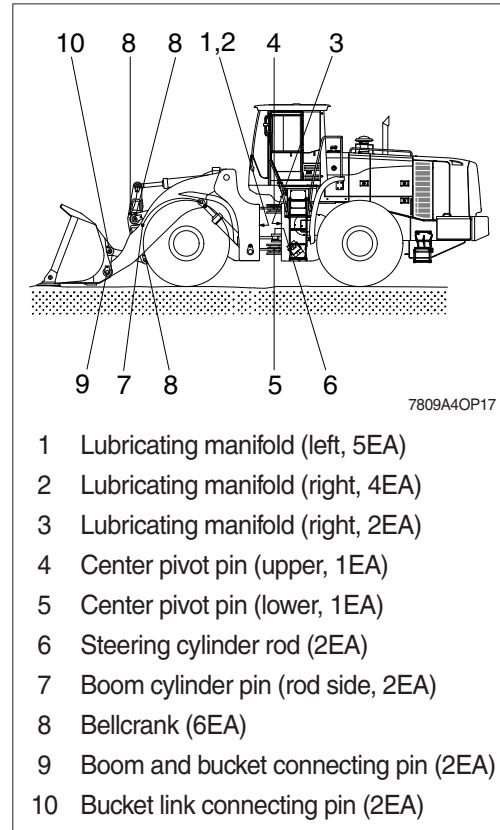
4) Be sure to mix anticorrosive antifreezing solution in the radiator.

### 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.

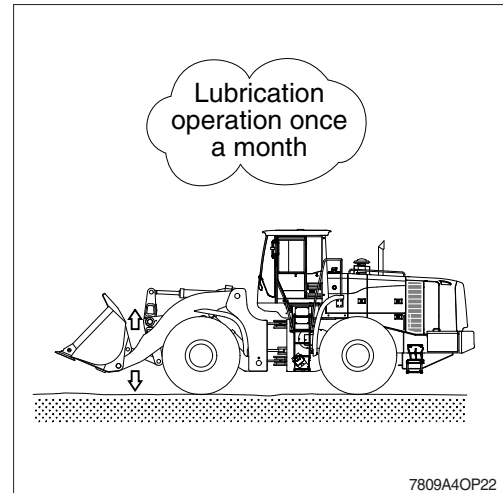
※ Lower the bucket to the ground and set a support under tires.



## 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.



## 11. REGENERATION SYSTEM

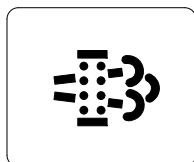
### Regeneration

Particulate matter (mainly soot) filtered in DPF (diesel particulate filter) occurs poor performance caused by increasing exhaust gas pressure, incinerating process to convert from accumulated soot to ash is required. This process named regeneration.

The type of regeneration composes of automatic regeneration (active, auto-play by exhaust gas heat) and manual regeneration (passive play by the artificial aid).

- ▲ **Regeneration generates hot exhaust and causes hot exhaust system components.**
- ▲ **Exhaust system components get very hot and can cause risk for fire.**
- ▲ **Do not touch the surface of the DPF muffler during or up to 30 minutes after operation.**
- ▲ **Do not perform regeneration in a flammable environment.**

#### (1) DPF(diesel particulate filter) warning lamp

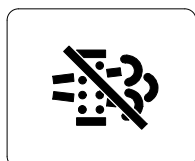


2609A3CD19

This warning lamp will light ON or blink when regeneration is needed.

- ※ Refer to the page 3-7 for details.
- ※ The machine must be in a fireproof area during the entire regeneration process.

#### (2) DPF regeneration inhibit warning lamp

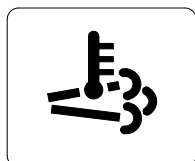


2609A3CD20

This warning lamp will light ON when the DPF switch is pushed inhibit position.

- ※ Refer to the page 3-8 for details.

#### (3) HEST(high exhaust system temperature) warning lamp

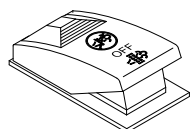


2609A3CD21

This warning lamp will light ON when the exhaust temperatures are high due to regeneration of the DPF.

- ※ Refer to the page 3-8 for details.

#### (4) DPF switch



2609A4OP16

This switch is used to select the regeneration function of the DPF.

- ※ Refer to the page 3-40 for details.
- ※ Manual regeneration : refer to the page 3-8 for details.

#### (5) DPF cleaning

Every 5000 hours.

- ※ Refer to the page 6-25 for details.