## 1. SUGGESTION FOR NEW MACHINE

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

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

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

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

3) Be careful during the initial 100 hours operation

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

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

(3) Tighten bolts.

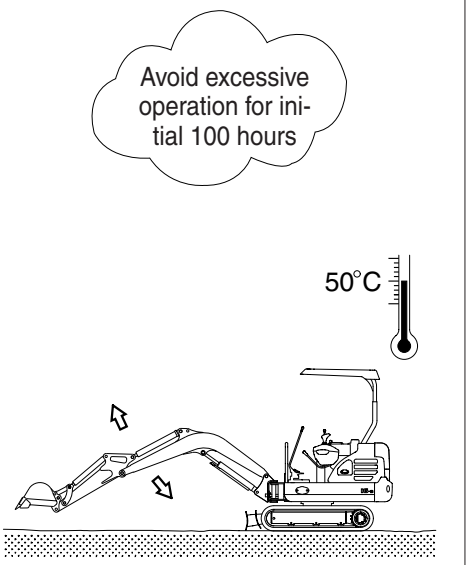
(4) Warm up the machine fully before operation.

(5) Check the gauges occasionally during the operation.

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

4) Replace followings after initial 50 or 250 hours of operation

| Checking items | Hours |
|---|---|
| Engine oil | 50 |
| Engine oil filter element | |
| Fuel filter | |
| Hydraulic oil return filter element | 250 |



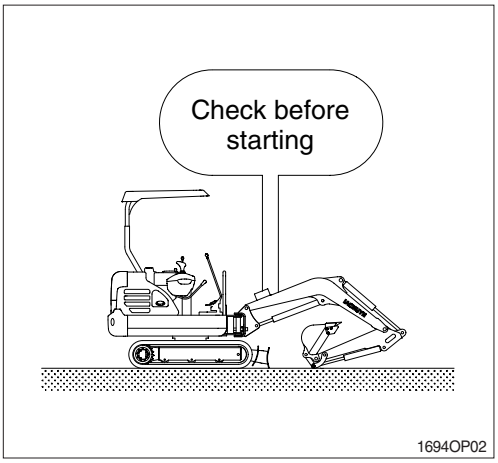

1694OP01

## 2. CHECK BEFORE STARTING THE ENGINE

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

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

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



# 3. STARTING AND STOP THE ENGINE

## 1) CHECK INDICATOR LIGHTS

(1) Check if all the operating lever is on the neutral position.

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

① If all the lamps light ON and buzzer sounding for 6 seconds.

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

- Engine oil pressure warning lamp (1)
- Battery charging warning lamp (2)

## 2) STARTING ENGINE

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

※ **Replace the engine oil and fuel referring to recommended oils at page 2-12.**

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

(1) Check if all levers are on the neutral position.

(2) If the weather temperature is below 10˚C, the start switch turn HEAT position and hold it 15 seconds for preheating.

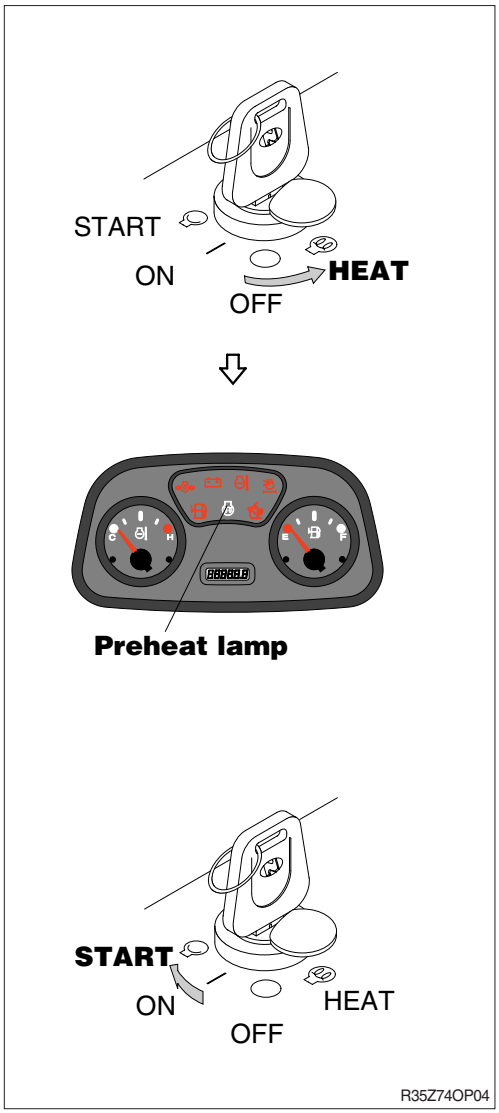
(3) Turn the starting switch to ON position.

(4) Start engine by turning the starting switch to the START position.

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

※ **If the engine does not start, the start switch turn HEAT position for preheating.**
**After the preheating, start the engine again.**

※ **If the engine does not start, allow the starter to cool for 10~20 seconds before attempting to start the engine again.**
**At the cold, allow 2 minute before attempting to start the engine again.**



### 3) INSPECTION AFTER ENGINE START

Inspect and confirm the following after engine starts.

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

(2) Are there leakages of oil or water?

(3) Are all the warning lamps OFF(2~7)?

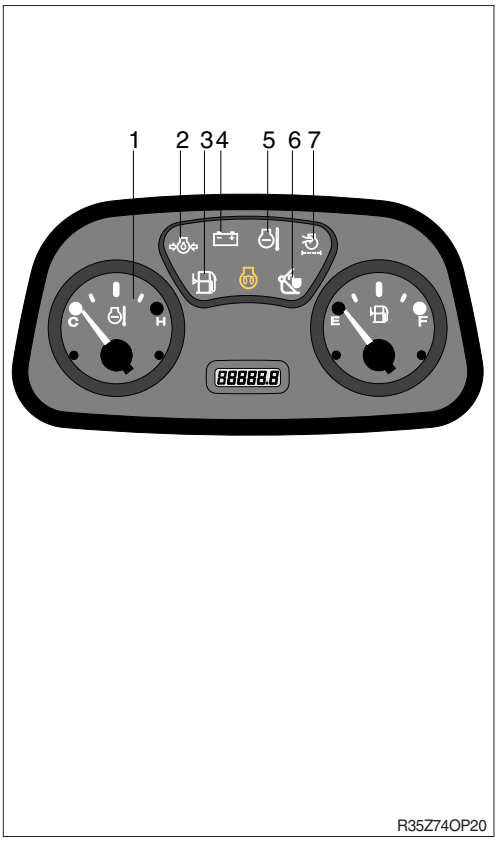
(4) Is the indicator of engine coolant temperature gauge(1) in the normal zone?

(5) Is the engine sound and the color of exhaust gas normal?

(6) Are the sound and vibration normal?

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

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




### 4) WARMING-UP OPERATION

※ **The most suitable temperature for the hydraulic oil is about 50°C (122°F ).**
**It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25°C (77°F ).**
**Then temperature must be raised to at least 25°C (77°F ) before starting work.**

(1) Run the engine at low idling for 5 minutes.

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

(3) Operate bucket lever for 5 minutes.

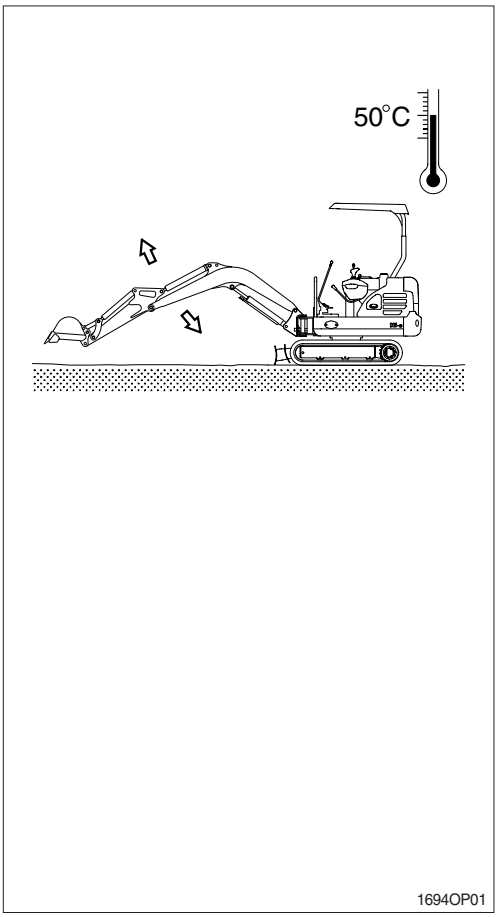
※ **Do not operate anything except bucket lever.**

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

※ **Operate only the bucket lever and arm lever.**

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

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



### 5) TO STOP THE ENGINE

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

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

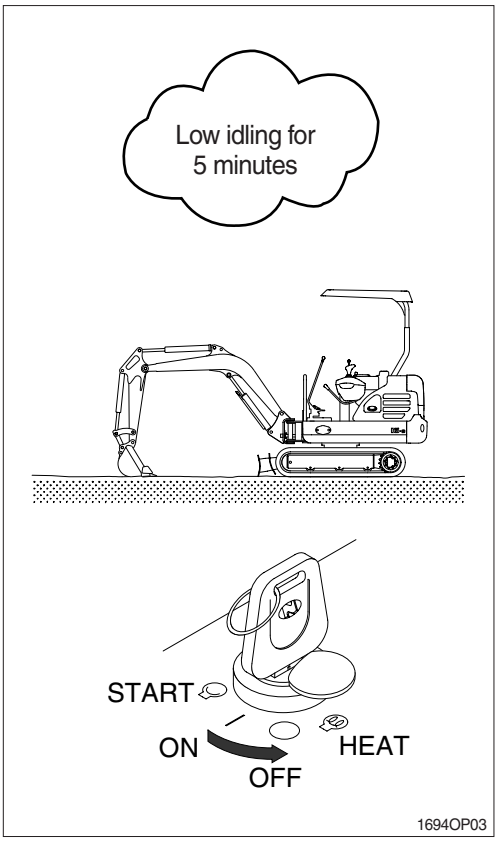
(1) Down the bucket on the ground then put all the levers in the neutral position.

(2) Run the engine at low idling speed for about 5 minutes.

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

(4) Remove the key to prevent other people using the machine and LOCK safety lever.

(5) Lock the cab door.



## 4. OPERATION OF WORKING DEVICE

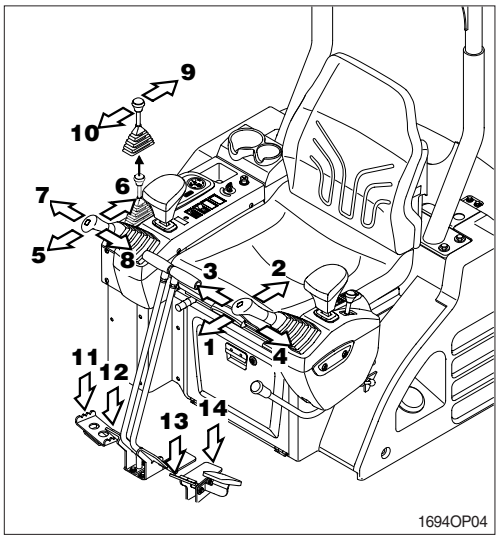
※ **Confirm the operation of control lever and working device.**

1) Left control lever controls arm and swing.

2) Right control lever controls boom and bucket.

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

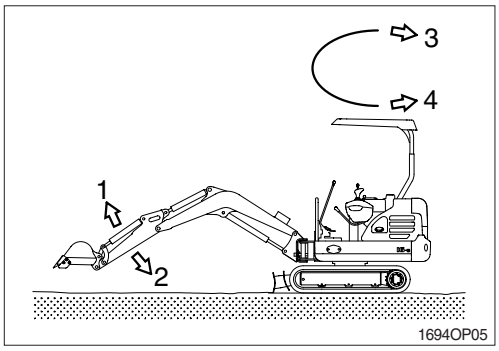
※ **When operating swing, consider the swing distance by inertia.**



1694OP04

※ **Left control lever**

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



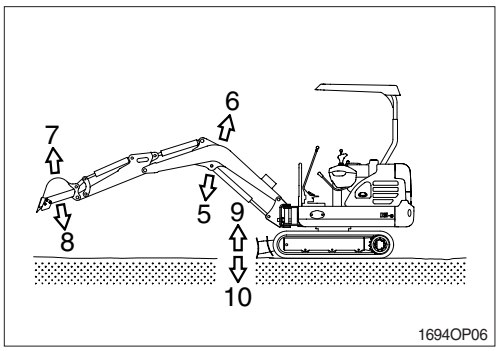
1694OP05

※ **Right control lever**

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

※ **Dozer control lever**

9 Dozer blade up
10 Dozer blade down



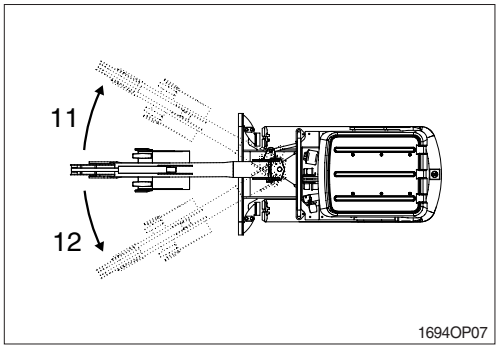
1694OP06

※ **Boom swing pedal**

11 Boom swing right
12 Boom swing left

※ **Double acting pedal**

13, 14 Refer to optional attachment



1694OP07

## 5. TRAVELING OF THE MACHINE

### 1) BASIC OPERATION

**(1) Traveling position**

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

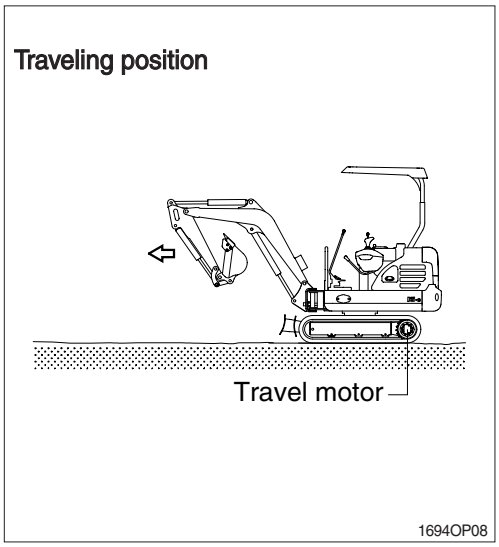
⚠ **Be careful as the traveling direction will be reversed when the whole machine is swinged 180 degree.**

**(2) Traveling operation**

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

※ **Do not travel continuously for a long time.**

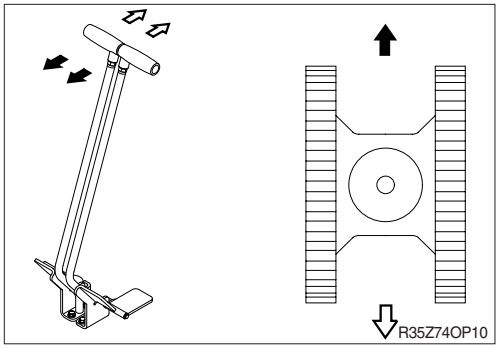
※ **Reduce the engine speed and travel at a low speed when traveling on uneven ground.**




**(3) Forward and backward traveling**

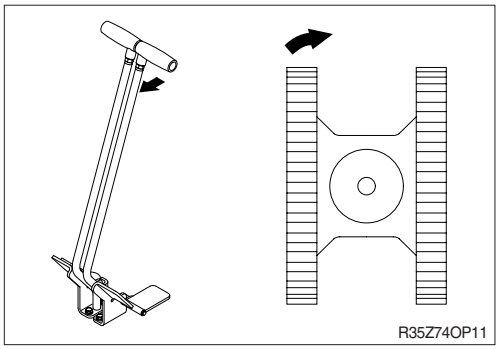
When the left and right travel lever or pedal are pushed at the same time, the machine will travel forward or backward.

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



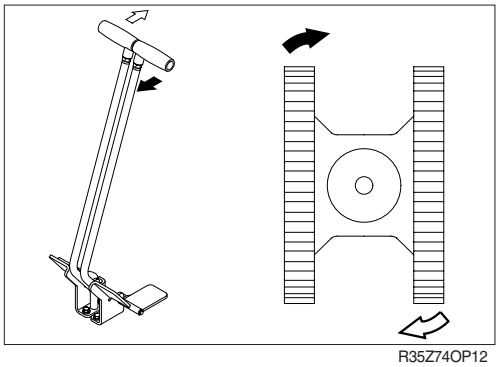

**(4) Pivot turning**

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




**(5) Counter rotation**

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



## 2) TRAVELING ON A SLOPE

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

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

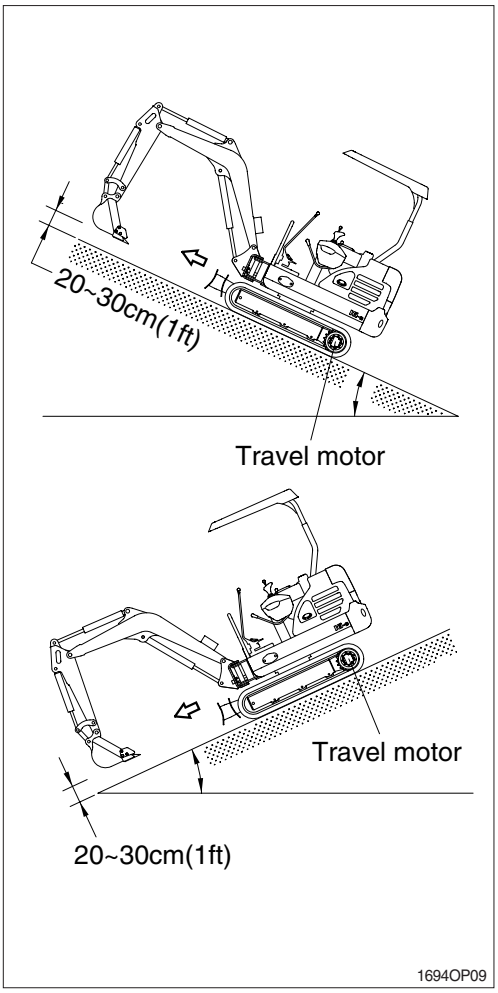
(3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.

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

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

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

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



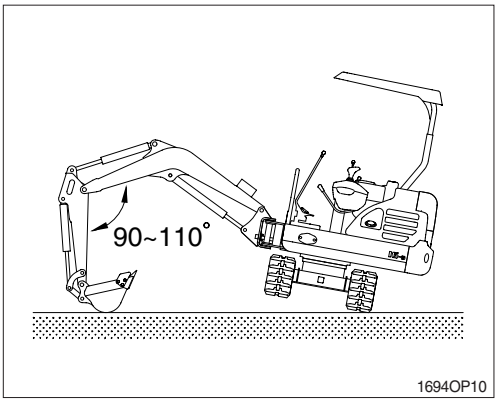

## 3) TRAVELING ON SOFT GROUND

※ **If possible, avoid to operate on soft ground.**

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

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

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



### 4) TOWING THE MACHINE

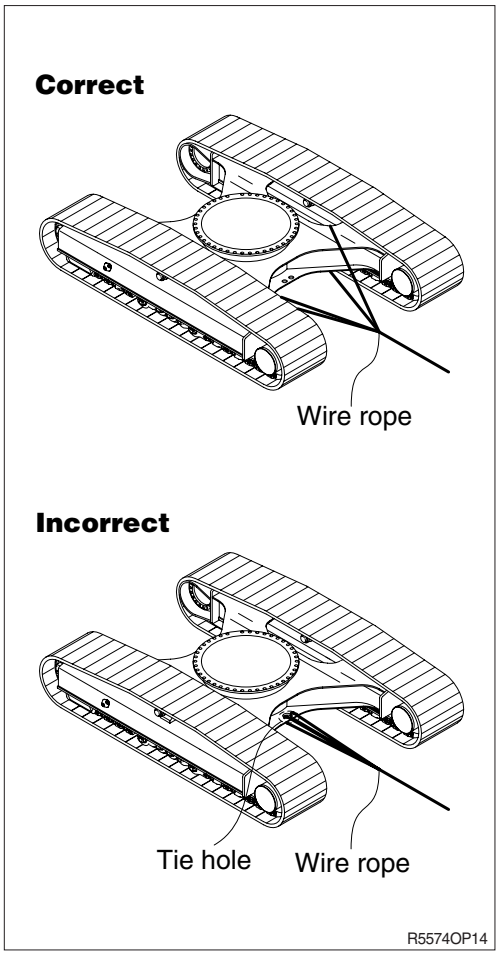
Tow the machine as follows when it can not move on it's own.

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

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

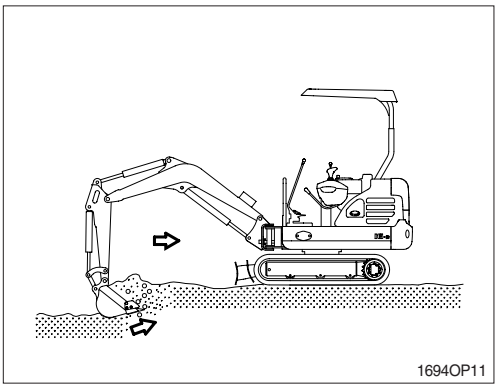
※ **Never tow the machine using the tie hole, because this may break.**

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

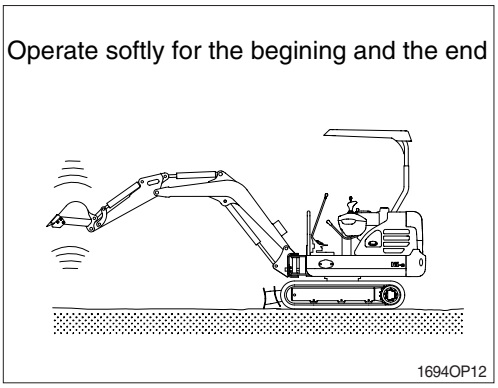


## 6. EFFICIENT WORKING METHOD

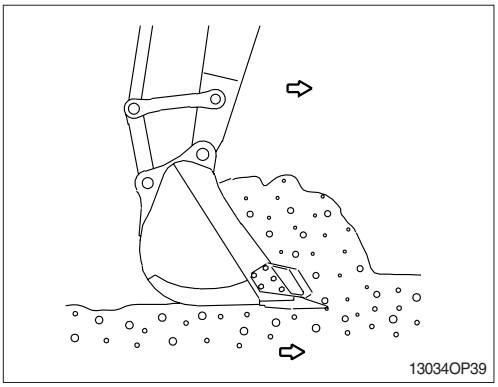
1) Do the digging work by arm.
   Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.



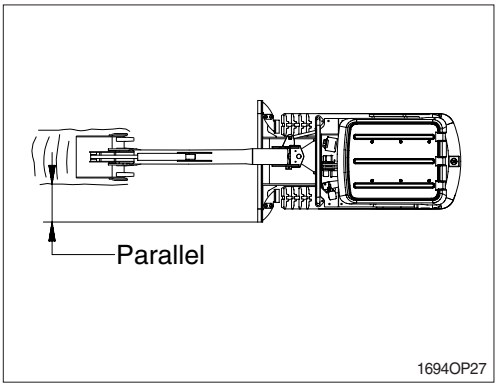

2) When lowering and raising the boom operate softly for the beginning and the end.
   In particularly, sudden stops while lowering the boom may cause damage to the machine.



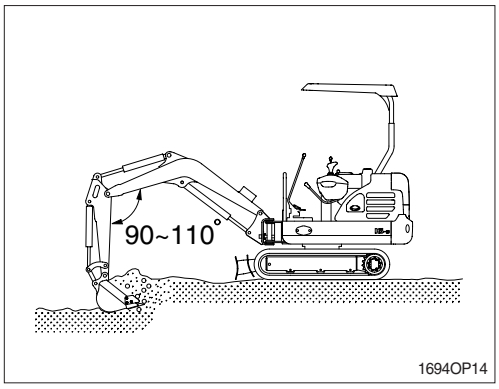

3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



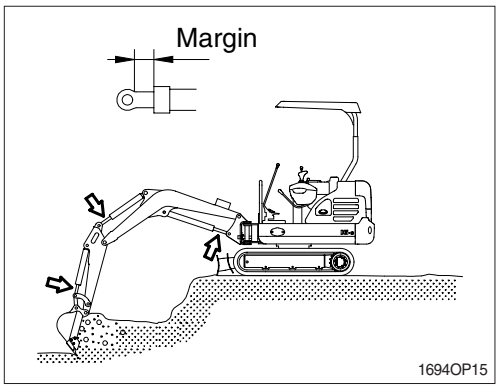

4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



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

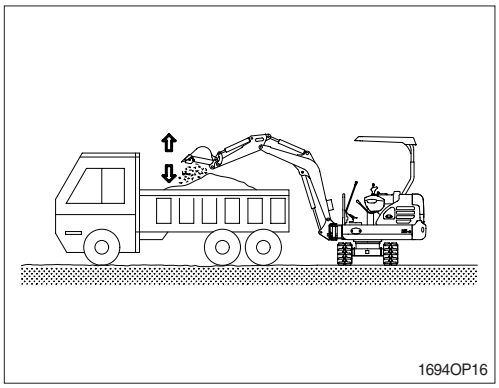



6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

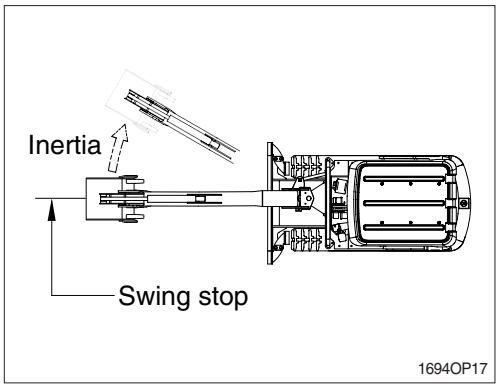



7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
   Operate bucket lever 2 or 3 times when hard to dump.

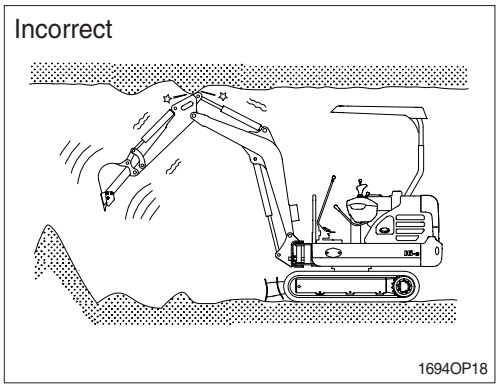
※ **Do not use the impact of bucket tooth when dumping.**



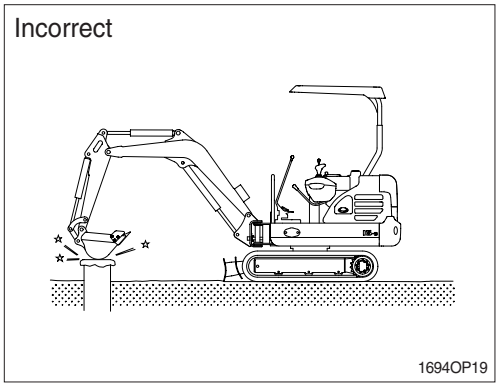

8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



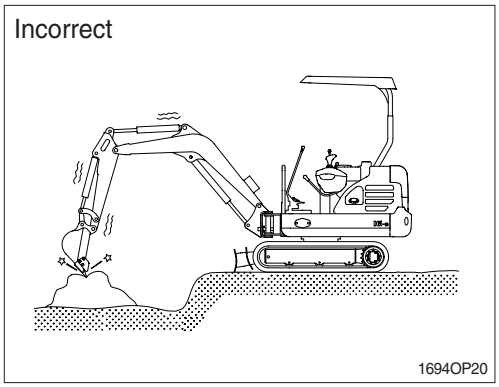
9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.




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




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




**12) NEVER CARRY OUT EXCESSIVE OPERATIONS**

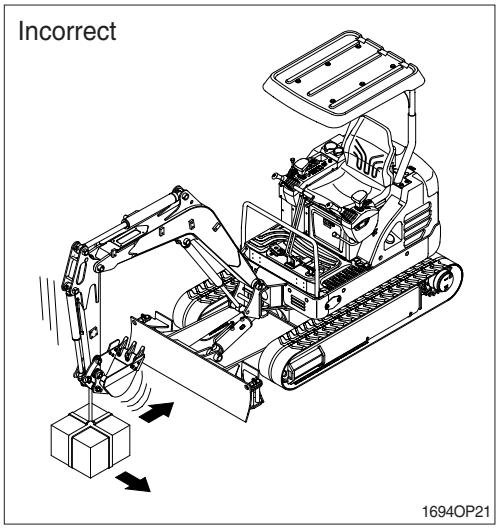
Operation exceeding machine performance may result in accident or failure.

Carry out lifting operation within specified load limit.

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

Never travel while carrying a load.

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



## 13) BUCKET WITH HOOK

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

The following operations are prohibited.

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

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

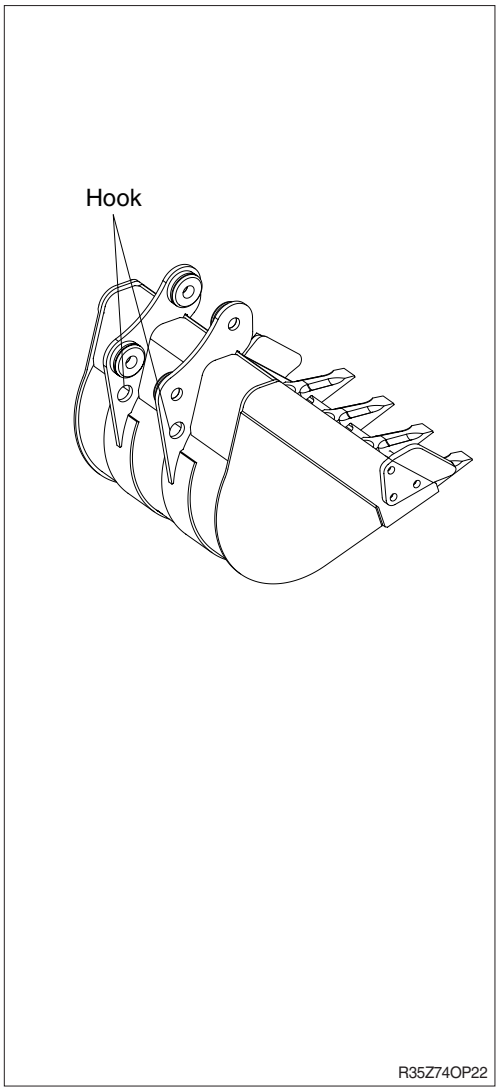
When performing lifting operation, never raise or lower a person.

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

Before performing lifting operation, designate an operation supervisor.
Always execute operation according to his instructions.

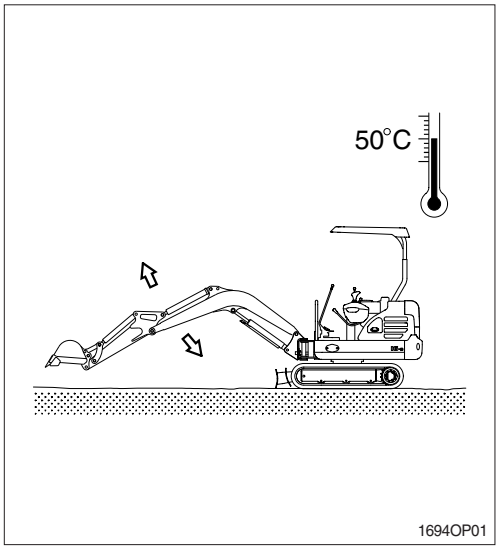
- Execute operating methods and procedures under his direction.
- Select a person responsible for signaling. Operate only on signals given by such person.

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



# 7. OPERATION IN THE SPECIAL WORK SITES

## 1) OPERATION THE MACHINE IN A COLD WEATHER




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

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

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

(4) Be sure to open the heater cock when using the heater.

(5) Always keep the battery completely charged.

※ **Discharged batteries will freeze more easily than fully charged.**

(6) Clean the machine and park on the wood plates.

## 2) OPERATION IN SANDY OR DUSTY WORK SITES

(1) Inspect air cleaner element frequently. Clean or replace element more frequently, if warning lamp comes ON and buzzer sounds simultaneously, regardless of inspection period.

※ **Replace the inner and outer element after 6 times of cleaning.**

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

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

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

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

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

### 3) SEA SHORE OPERATION

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

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

(3) Inspection and lubrication must be carried out more frequently.
Supply sufficient grease to replace all old grease in bearings which have been submerged in water for a long time.

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

(1) Perform a walk around inspection to check for any loose fittings, obvious damage to the machine or any fluid leakage.

(2) After completing operations, clean mud, rocks or debris from the machine. Inspect for damage, cracked welds or loosened parts.

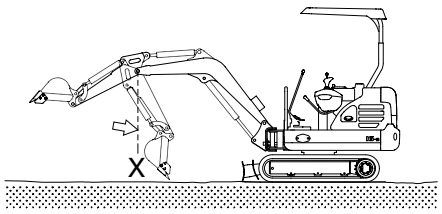
(3) Perform all daily lubrication and service.

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

## 8. NORMAL OPERATION OF EXCAVATOR

Followings may occur during operation due to the nature of a hydraulic excavator.

1) When rolling in the arm, the roll-in movement stop momentary at point **X** in the picture shown, then recovers speed again after passing point **X**.
   The reason for this phenomenon is that movement by the arm weight is faster than the speed of oil flow into the cylinder.
2) When lowering the boom, one may hear continuous sound.
   This is caused by oil flow in the valve.
3) Overloaded movement will produce sound caused by the relief valves, which are for the protection of the hydraulic systems.
4) When the machine is started swing or stopped, a noise near the swing motor may be heard. The noise is generated when the brake valve relieves.




1694OP22

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

1) On machines equipped with an accumulator, for a short time(within 2 minutes) after the engine is stopped, the attachment will lower under its own weight when the attachment control lever is shifted to **LOWER**. That is happen only starting switch **ON** position and safety lever **UNLOCK** position. After the engine is stopped, set the safety lever to the **LOCK** position.

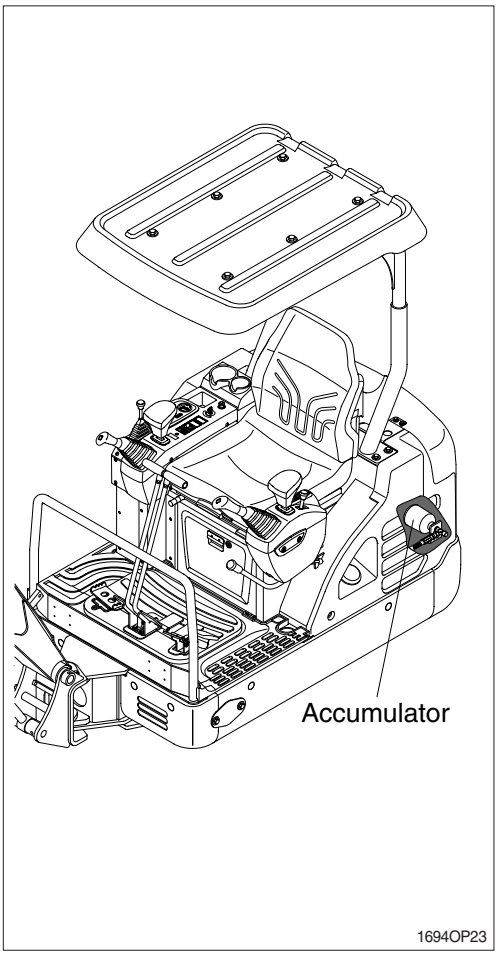
⚠ **Be sure no one is under or near the attachment before lowering the boom.**

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

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

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

※ **When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator, it is necessary to release the gas from the accumulator. A special air bleed valve is necessary for this operation, so please contact your Hyundai distributor.**



# 10. STORAGE

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

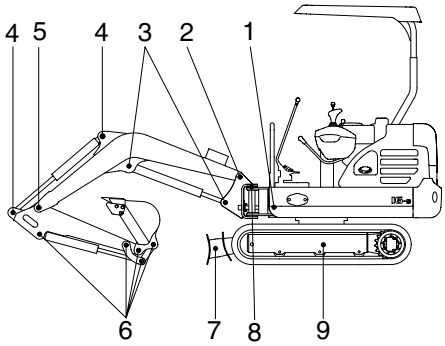
**1) CLEANING THE MACHINE**

Clean the machine. Check and adjust tracks.
Grease each lubrication part.

**2) LUBRICATION POSITION OF EACH PART**

Change all oil.

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



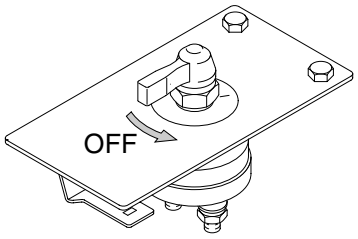

1 Lubricating manifold (3EA)
2 Boom connection pin (2EA)
3 Boom cylinder pin (2EA)
4 Arm cylinder pin (2EA)
5 Boom and arm connection pin (1EA)
6 Arm and bucket (5EA)
7 Dozer blade and cylinder (4EA)
8 Boom swing post (2EA)
9 Extension cylinder pin (2EA)

1694OP24

**3) MASTER SWITCH**

Turn OFF the master switch mounted in the seat base and store the machine.

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

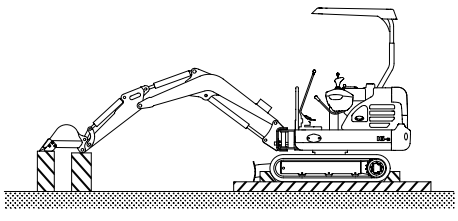



1694OP30

**5) PREVENTION OF DUST AND MOISTURE**

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

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



1694OP25

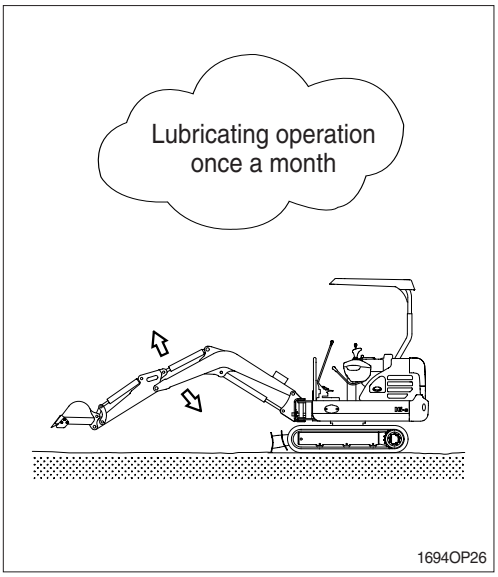
6) DURING STORAGE

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

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

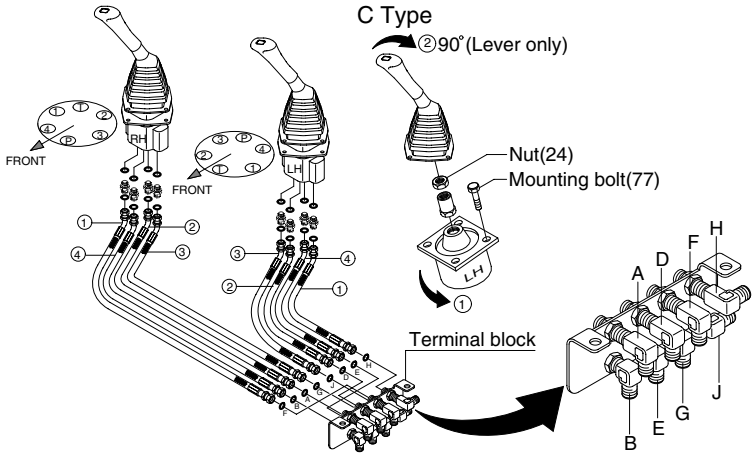
※ **Clean the anticorrosive on the piston rod of cylinder.**

※ **Operate the machine such as traveling, swing and work equipment operation to make sure enough lubrication of all functional components.**



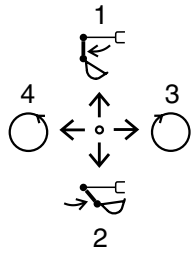
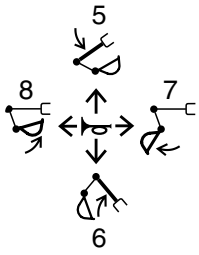
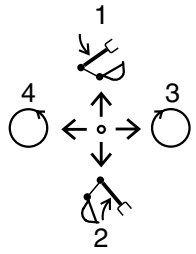
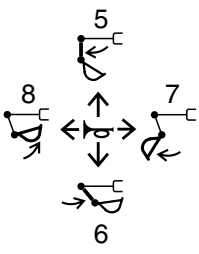
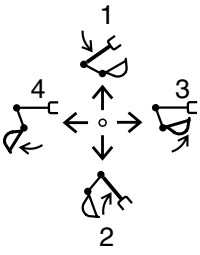
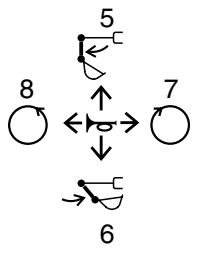
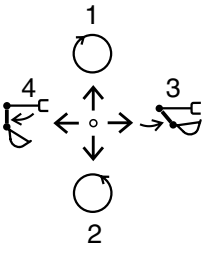
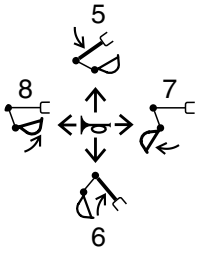
# 11. RCV LEVER OPERATING PATTERN

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




1694OP28

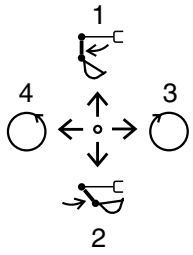
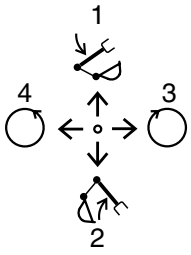
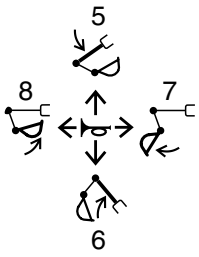
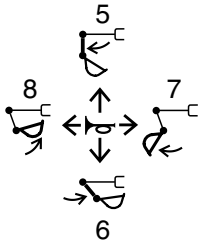
※ **Whenever a change is made to the machine control pattern also exchange the pattern label on the left side of upper frame to match the new pattern.**

| Pattern | Operation | | Control function | | Hose connection (port) | | |
|---|---|---|---|---|---|---|---|
| | Left RCV lever | Right RCV lever | | | RCV lever | Change of Terminal block | |
| | | | | | | From | To |
| ISO Type<br>Hyundai |  |  | Left | 1 Arm out | ② | D | - |
| | | | | 2 Arm in | ④ | E | - |
| | | | | 3 Swing right | ③ | J | - |
| | | | | 4 Swing left | ① | H | - |
| | | | Right | 5 Boom lower | ④ | B | - |
| | | | | 6 Boom raise | ② | A | - |
| | | | | 7 Bucket out | ① | F | - |
| | | | | 8 Bucket in | ③ | G | - |
| A Type |  |  | Left | 1 Boom lower | ② | D | B |
| | | | | 2 Boom raise | ④ | E | A |
| | | | | 3 Swing right | ③ | J | - |
| | | | | 4 Swing left | ① | H | - |
| | | | Right | 5 Arm out | ④ | B | D |
| | | | | 6 Arm in | ② | A | E |
| | | | | 7 Bucket out | ① | F | - |
| | | | | 8 Bucket in | ③ | G | - |
| B Type |  |  | Left | 1 Boom lower | ② | D | B |
| | | | | 2 Boom raise | ④ | E | A |
| | | | | 3 Bucket in | ③ | J | G |
| | | | | 4 Bucket out | ① | H | F |
| | | | Right | 5 Arm out | ④ | B | D |
| | | | | 6 Arm in | ② | A | E |
| | | | | 7 Swing right | ① | F | J |
| | | | | 8 Swing left | ③ | G | H |
| C Type |  |  | Left | ① Loosen the RCV lever mounting bolt (77) and rotates lever assy 90˚ counterclockwise; then install.<br>② To put lever in correct position, disassemble nut (24) and rotates only lever 90˚ clockwise. | | | |
| | | | Right | Same as ISO type | | | |

## 2) PATTERN CHANGE VALVE INSTALL (option)

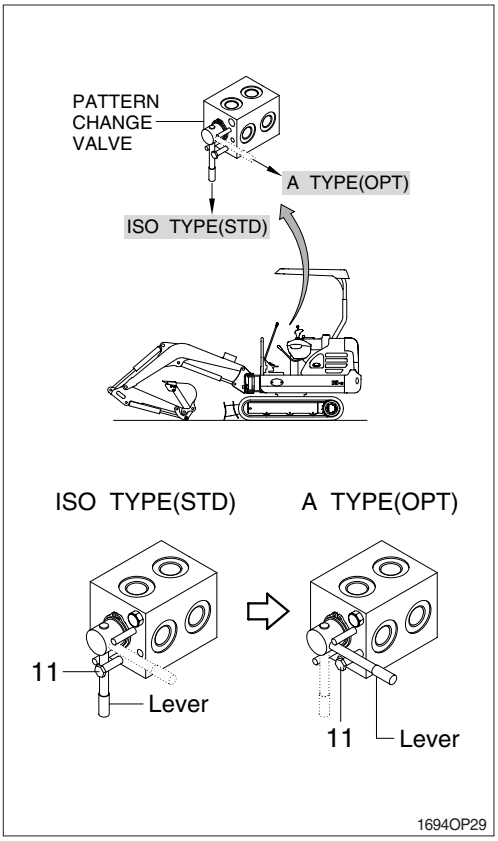
※ If the machine is equipped with the pattern change valve, the machine operation pattern can be easily changed.

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

| Operation | ISO type | A type |
|---|---|---|
| Left RCV lever |  |  |
| Right RCV lever |  |  |

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

⚠ Before starting the machine, check the lever position of pattern change valve and actual operating of attachment.




**(2) Change of operating pattern**

① Loosen the bolt (11).

② Move lever from the "ISO type" to "A type" position.

③ After the lever is set, tighten the bolt in order to secure the lever.