

## 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 %      |

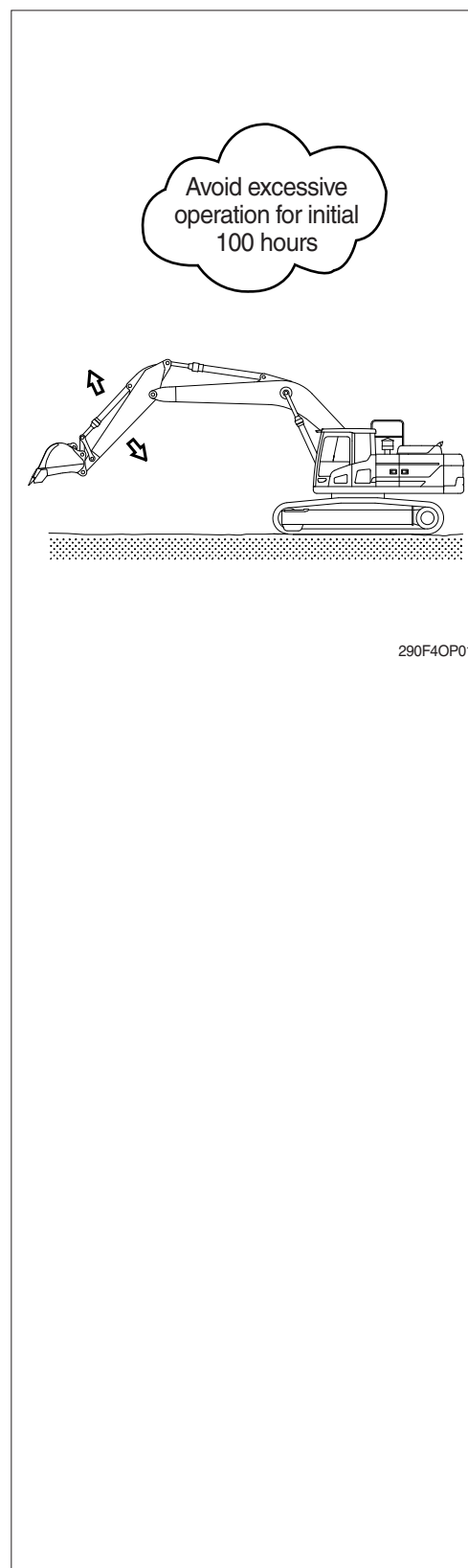
※ **Excessive operation may deteriorate the potential performance of machine and shorten lifetime of the machine.**

### 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.

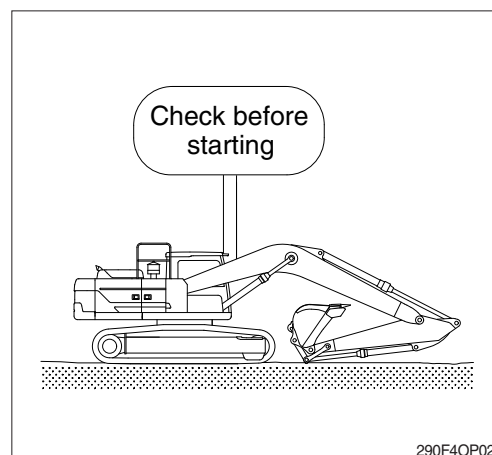
### 4) Replace followings after initial 250 hours of operation

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



## 2. CHECK BEFORE STARTING THE ENGINE

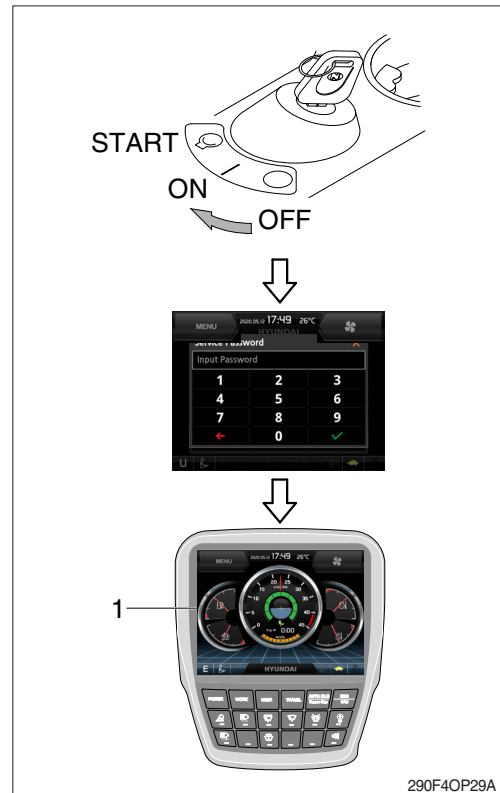
- 1) Look around the machine and under the machine to check for loosen nut or bolts, collection of dirt, or leakage of oil, fuel or coolant and check the condition of the work equipment and hydraulic system. Check also loosen wiring, and collection of dust at places which reach high temperature.  
※ **Refer to the daily check on the chapter 6, maintenance.**
- 2) Adjust seat to fit the contours of the operator's body for the pleasant operation.
- 3) Adjust the rear view mirror.



### 3. STARTING AND STOP THE ENGINE

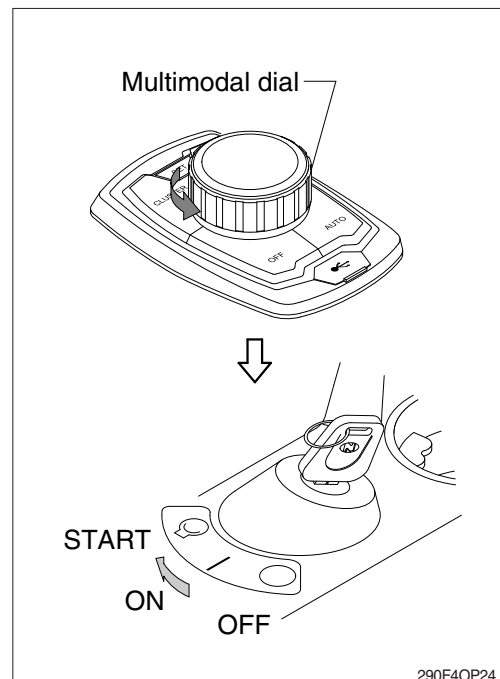
#### 1) CHECK INDICATOR LIGHTS

- (1) Check if all the operating levers are in the neutral position.
- (2) Turn the starting switch to the ON position.  
Buzzer sounding for 4 seconds with HYUNDAI logo on cluster.
- ※ If the ESL mode is set to the enable, enter the password to start engine.
- ※ If the password has failed 5 times, please wait 30 minutes before re-attempting to enter the password.
- ※ Refer to page 3-24 for ESL mode.
- (3) After initialization of cluster, the operating screen is displayed on LCD (1).  
Also, self-diagnostic function is carried out.



#### 2) STARTING ENGINE IN NORMAL TEMPERATURE

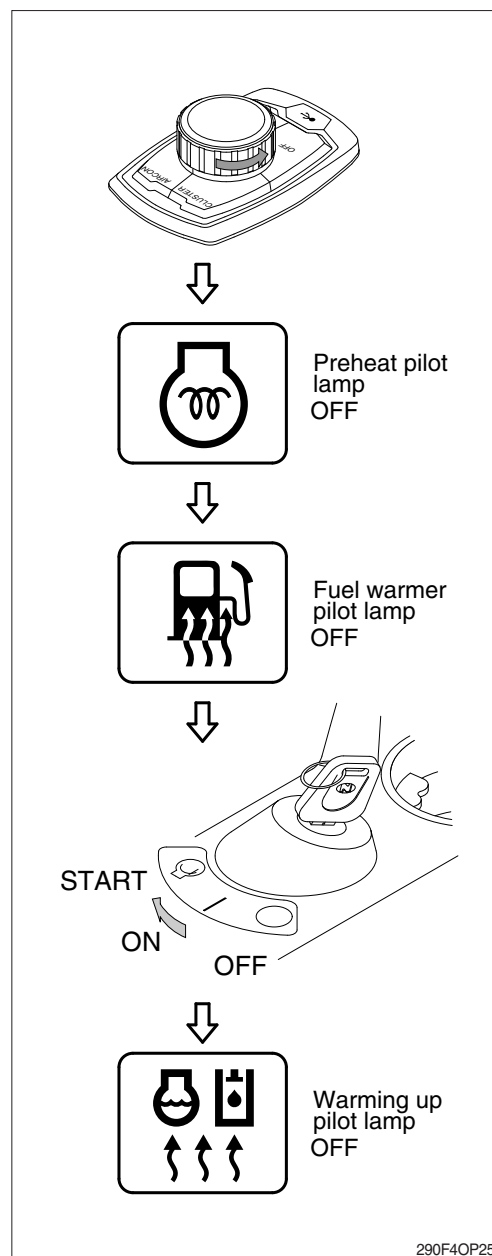
- ※ Sound the horn to warn the surroundings after checking if personnel or obstacles are in the area.
- (1) Turn the multimodal dial to low idle position.
  - (2) Turn the starting switch to START position to start the engine.
  - ※ Do not hold the starting switch in the START position for longer than 20 seconds.  
The start system may be seriously damaged.
  - ※ If the engine does not start, allow the stator to cool for about 2 minutes before re-attempting to start the engine again.
  - (3) Release the starting switch instantly after the engine starts to avoid possible damage to the starting motor.



### 3) STARTING ENGINE IN COLD WEATHER

- ※ Sound horn to warn surroundings after checking if there are obstacles in the area.
- ※ Replace the engine oil and fuel referring to recommended oils at page 2-20.
- ※ Fill the anti-freeze solution to the coolant as required.
- ※ If you turn ON the starting switch, the fuel warmer is automatically operated to heat the fuel by sensing the coolant temperature.

- (1) Check if all the levers are in the neutral position.
  - (2) Turn the multimodal dial to low idle position.
  - (3) Turn the starting switch to the ON position, and wait 1~2 minutes. More time may take according to ambient temperature.
  - (4) Wait for five minutes to warm up the engine after the preheating pilot lamp off, and then turn the starting switch to the START position to start the engine.
- ※ If the engine does not start, allow the starter to cool for about 2 minutes before attempting to start the engine again.
- (5) Release the starting switch immediately after starting engine.
  - (6) If the temperature of the coolant is lower than 30°C the warming up automatically starts.
- ※ Do not operate the working devices, or convert the operation mode into other mode during the warming up.



#### 4) INSPECTION AFTER ENGINE START

Inspect and confirm the following after engine starts.

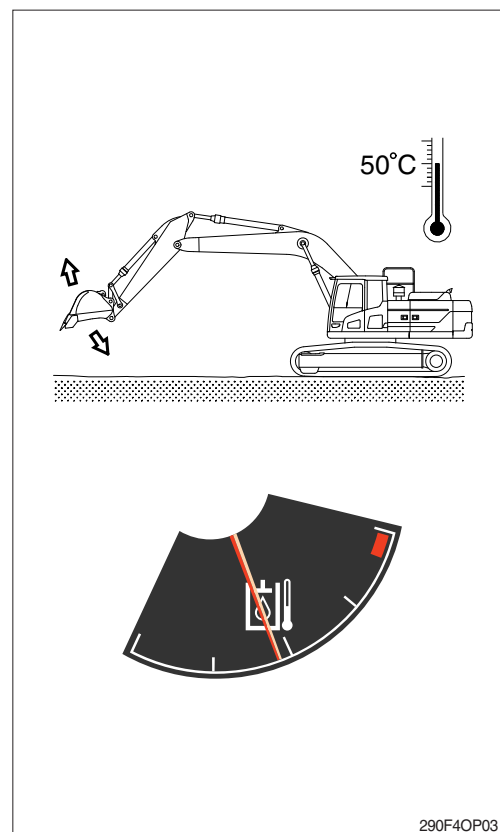
- (1) Is the level gauge of hydraulic oil tank in the normal level?
  - (2) Are there leakages of oil or water?
  - (3) Are all the warning lamps turned OFF (1-13)?  
The seat belt reminder warning lamp (16) pops up and the buzzer sounds until fasten the seat belt.
  - (4) Are the indicator of water temperature gauge (14) and hydraulic temperature gauge (15) in the operating range?
  - (5) Are the engine sound and the color of exhaust gas normal?
  - (6) Are the sound and vibration normal?
- ※ **Do not increase engine speed quickly after starting, it can damage engine or turbocharger.**
  - ※ **If there are problems in the cluster, stop the engine immediately and correct problems as required.**



#### 5) WARMING-UP OPERATION

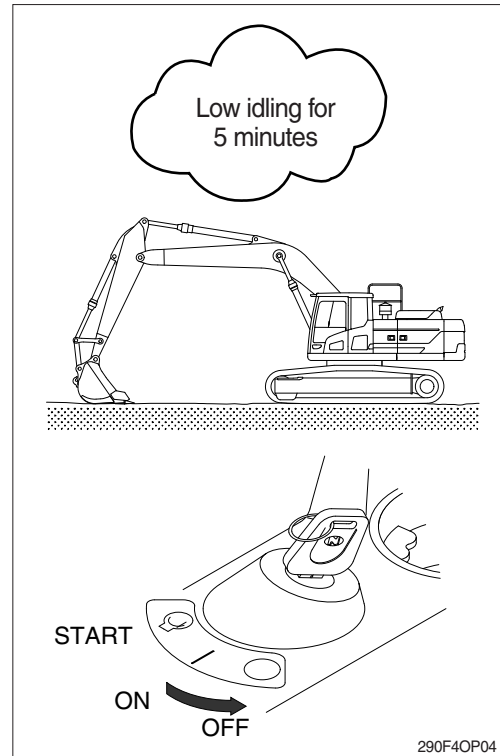
- ※ **The most suitable temperature for the hydraulic oil is about 50°C (122°F).**  
It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25°C (77°F).  
Then temperature must be raised to at least 25°C (77°F) before starting work.

- (1) Run the engine at low idle speed for 5 minutes.
- (2) Speed up the engine by multimodal dial 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.



## 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 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 idle 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 the safety knob.
  - (5) Lock the cab door.



## 4. MODE SELECTION SYSTEM

### 1) STRUCTURE OF MECHATRONICS SYSTEM

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

※ Please refer to chapter 3, cluster for below modes setting.

#### (1) Power mode

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

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

#### (2) Work mode

One of the two work modes can be selected for the optimal work condition of the machine operation.

##### ① General work mode (bucket)

When key switch is turned ON, this mode is selected automatically.

##### ② Work tool mode (breaker, crusher)

It controls the pump flow and system pressure for the optimal operation of breaker or crusher.

#### (3) User mode

① User mode is useful for setting the user preferable power quickly.

(engine speed, power shift and idle speed)

② There are two methods for use of user mode.

##### a. In operation screen

User mode switch is used to memorize the current machine operating status and activate the memorized user mode.

Refer to page 3-16.

##### b. In menu

Engine high idle rpm, auto idle rpm and pump torque (power shift) can be modulated and memorized separately in menu status.

- Each memory mode has a initial set which are mid-range of max engine speed, power shift and auto idle speed.



290F4OP31A

- 1 Power mode switch
- 2 Work mode switch
- 3 User mode switch
- 4 Travel mode switch
- 5 Auto idle mode switch
- 6 LCD



User mode switch

290F4OP32A

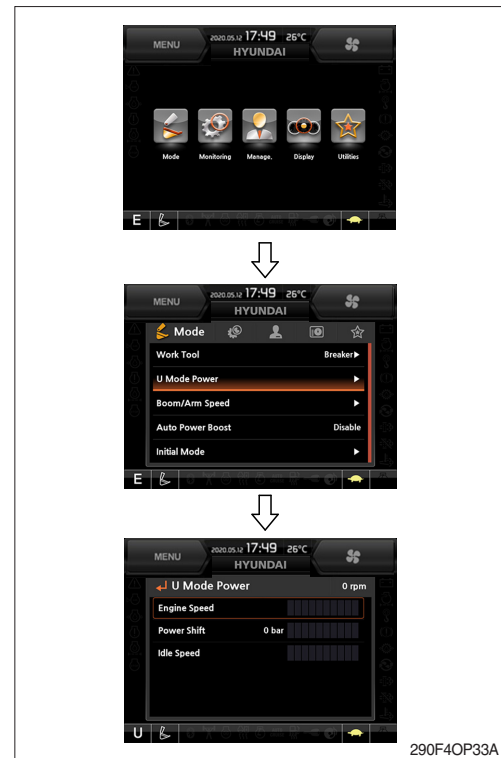
- High idle rpm, auto idle rpm and EPPR pressure can be adjusted and memorized in the U-mode.

※ Refer to the page 3-20 for setting the user mode (available on U mode only).



- LCD segment vs parameter setting

| Step<br>( ) | Engine<br>speed<br>(rpm) | Idle speed<br>(rpm) | Power<br>shift<br>(bar) |
|-------------|--------------------------|---------------------|-------------------------|
| 1           | 1300                     | 700                 | 0                       |
| 2           | 1400                     | 800                 | 3                       |
| 3           | 1450                     | 850                 | 6                       |
| 4           | 1500                     | 900                 | 9                       |
| 5           | 1550                     | 950                 | 12                      |
| 6           | 1600                     | 1000 (auto decel)   | 16                      |
| 7           | 1650                     | 1050                | 20                      |
| 8           | 1700                     | 1100                | 26                      |
| 9           | 1750                     | 1150                | 32                      |
| 10          | 1800                     | 1200                | 38                      |

※ One touch decel & low idle : 900 rpm



#### (4) Travel mode

-  : Low speed traveling.
-  : High speed traveling.

#### (5) Auto idle mode

Pilot lamp ON : Auto idle function is activated.

Pilot lamp OFF : Auto idle function is canceled.



## (6) Monitoring system

Information of machine performance as monitored by the MCU can be displayed on the LCD. Refer to the page 3-22.

## (7) Self diagnostic system

### ① MCU (Machine Control Unit)

The MCU diagnoses machine status and problems and displays fault code in the cluster (fault code detected by MCU is composed of HCESPN and FMI).

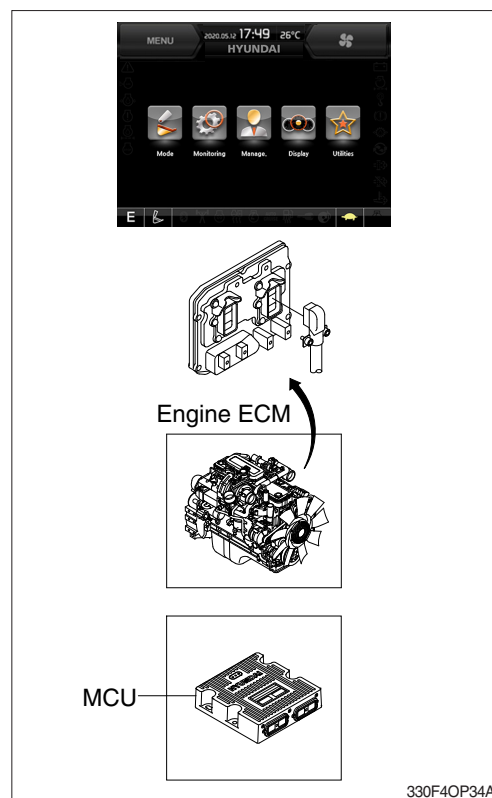
### ② Engine ECM (Electronic Control Module)

If the engine or relevant system has problem, engine ECM detects and displays on the LCD as fault codes (this code is composed of SPN and FMI).

※ Refer to the page 3-22 for LCD display.

## (8) Anti-restart system

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



## 2) HOW TO OPERATE MODE SELECTION SYSTEM

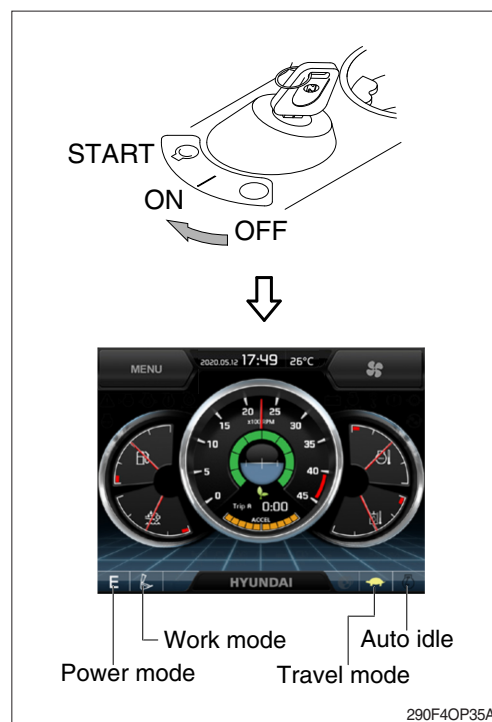
### (1) When start key switch is turned ON

- ① When start key switch is turned on, the cluster turns on and buzzer sounds for 4 seconds. And then main information as gauges and engine speed are displayed on LCD.
- ② Initial default mode settings are displayed in the cluster.

| Mode        |        | Status |
|-------------|--------|--------|
| Power mode  | E      | ON     |
| Work mode   |        | ON     |
| Travel mode | Low () | ON     |
| Auto idle   |        | ON     |

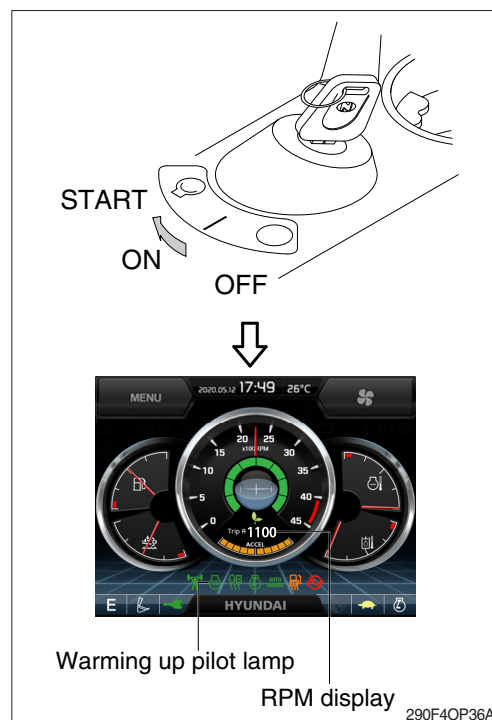
※ These setting can be changed at U mode.

- ③ Self-diagnostic function can be carried out from this point.



## (2) After engine start

- ① When the engine is started, rpm display indicates low idle, 900 rpm.
- ② If coolant temperature is below 30°C, the warming up pilot lamp lights ON and after 4 seconds the engine speed increases to 1000 rpm automatically to warm up the machine.
  - After 2-3 minutes, you can select any mode depending on job requirement.



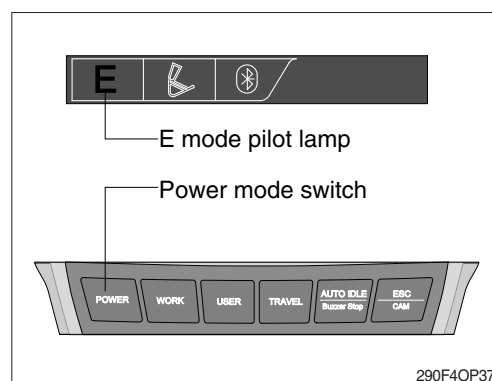
## 3) SELECTION OF POWER MODE

### (1) E mode

The multimodal dial is set 10 and the auto idle mode is canceled.

| Engine rpm | Effect   |
|------------|--|
| 1500       | Variable power control in proportion to lever stroke (improvement in fuel efficiency)<br>※ Same power as S mode in full lever operation. |

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

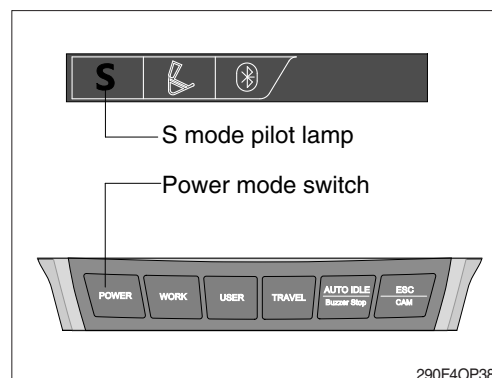


### (2) S mode

The multimodal dial is set 10 and the auto idle mode is canceled.

| Engine rpm | Effect         |
|------------|----------------|
| 1600       | Standard power |

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

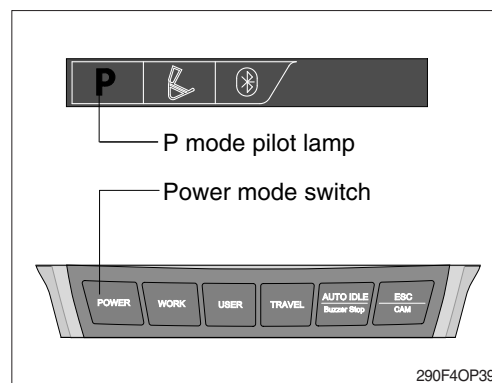


### (3) P mode

The multimodal dial is set 10 and the auto idle mode is canceled.

| Engine rpm | Effect  |
|------------|---|
| 1700       | Approximately 120 % of power and speed available than S mode. |

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



## 5. OPERATION OF THE WORKING DEVICE

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

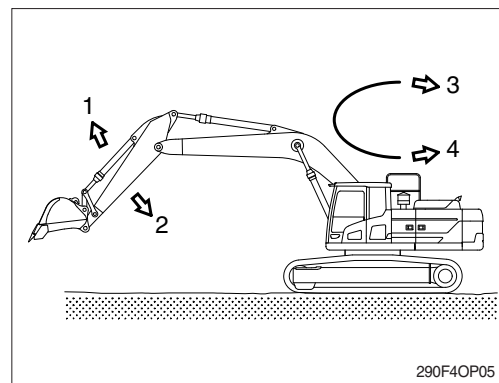
- 1) Left control lever controls arm and swing.
- 2) Right control lever controls boom and bucket.
- 3) When you release the control lever, control lever returns to neutral position automatically.

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



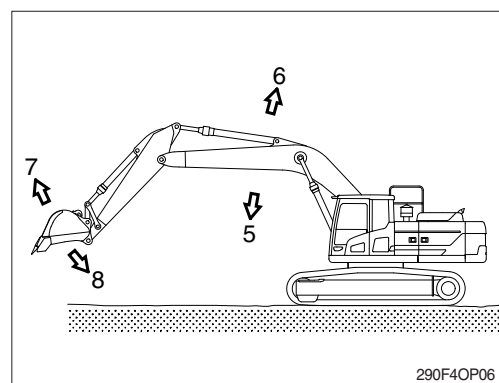
※ **Left control lever**

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



※ **Right control lever**

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



## 6. TRAVELING OF THE MACHINE

### 1) BASIC OPERATION

#### (1) Traveling position

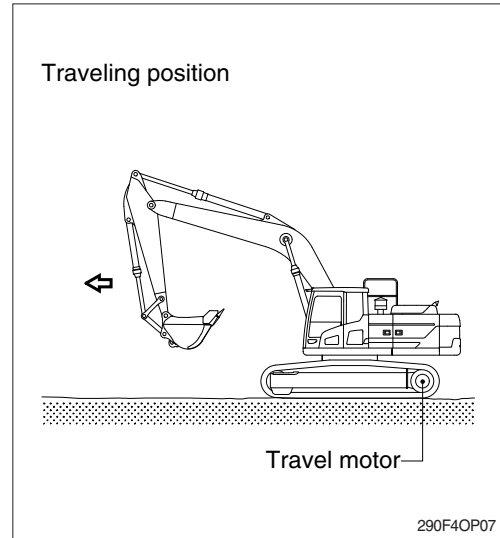
It is the position which the traveling motor is in the rear and the working device is forward.

- ▲ **Be careful as the traveling direction will be reversed when the whole machine is swung 180 degree.**

#### (2) Traveling operation

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

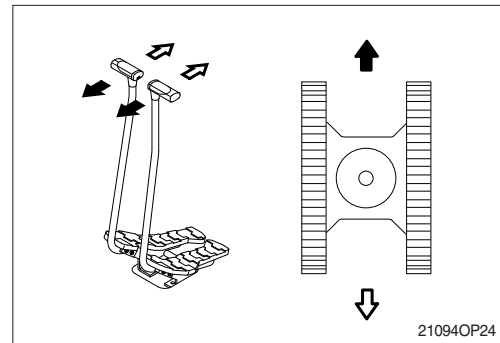
- ※ **Do not travel continuously for a long time.**
- ※ **Reduce the engine speed and travel at a low speed when traveling on uneven ground.**



#### (3) Forward and backward traveling

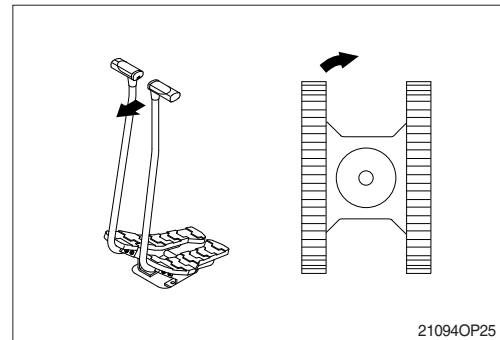
When the left and right travel lever or pedal are pushed at the same time, the machine will travel forward or backward.

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



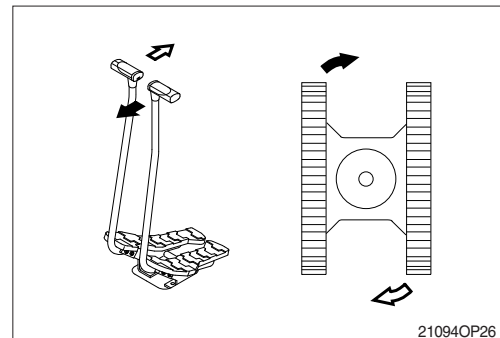
#### (4) Pivot turning

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



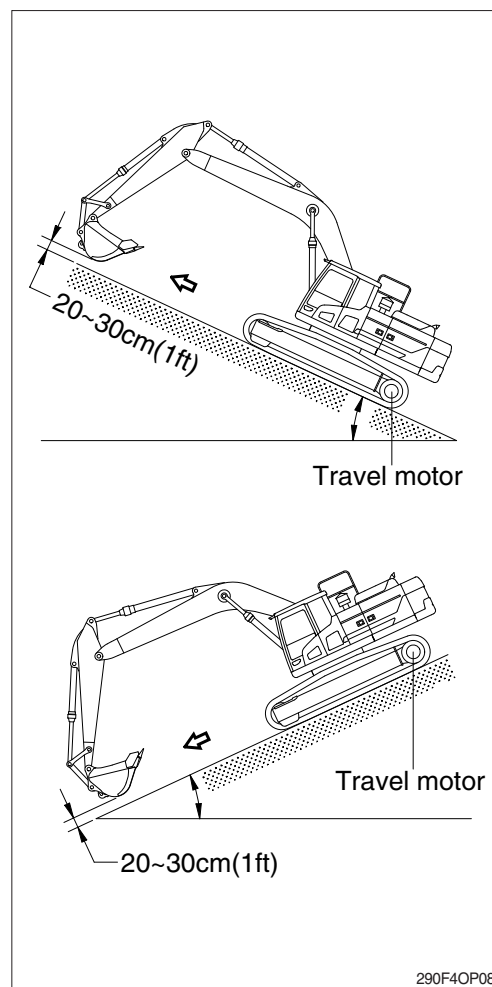
#### (5) Counter rotation

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



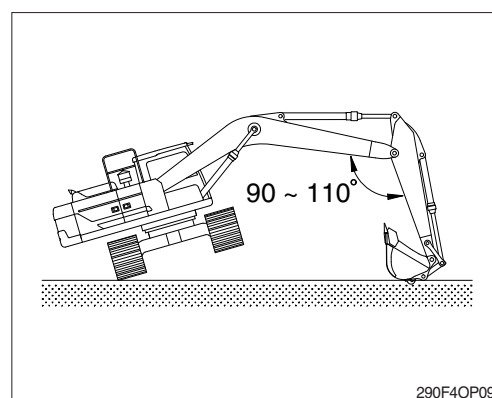
## 2) TRAVELING ON A SLOPE

- (1) Make sure that the travel lever is properly maneuvered by confirming the travel motor is in the right location.
  - (2) Lower the bucket 20 to 30 cm (1 ft) to the ground so that it can be used as a brake in an emergency.
  - (3) If the machine starts to slide or loses stability, lower the bucket immediately and brake the machine.
  - (4) When parking on a slope, use the bucket as a brake and place blocks behind the tracks to prevent sliding.
- ※ Machine cannot travel effectively on a slope when the oil temperature is low. Do the warming-up operation when it is going to travel on a slope.
- ▲ Be careful when working on slopes. It may cause the machine to lose its balance and turn over.
- ▲ Be sure to keep the travel speed switch on the LOW (turtle mark) while traveling on a slope.
- ▲ Be sure to keep the swing lock/fine switch on the LOCK while traveling on a slope (if equipped).



## 3) TRAVELING ON SOFT GROUND

- ※ If possible, avoid to operate on soft ground.
- (1) Move forward as far as machine can move.
  - (2) Take care not to go beyond the depth where towing is impossible on soft ground.
  - (3) When driving becomes impossible, lower bucket and use boom and arm to pull the machine. Operate boom, arm, and travel lever at the same time to avoid the machine sinking.



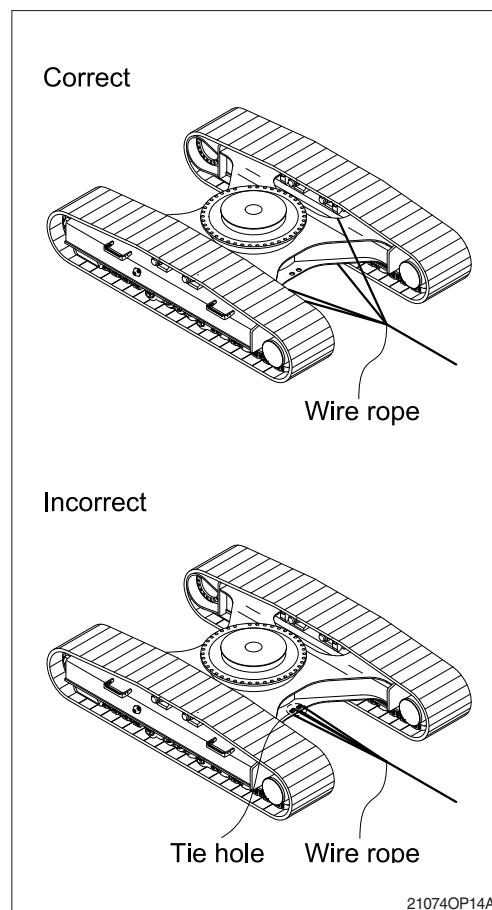
#### 4) TOWING THE MACHINE

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

- (1) Tow the machine by other machine after hook the wire rope to the frame as shown in picture at right.
- (2) Hook the wire rope to the frame and put a support under each part of wire rope to prevent damage.

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

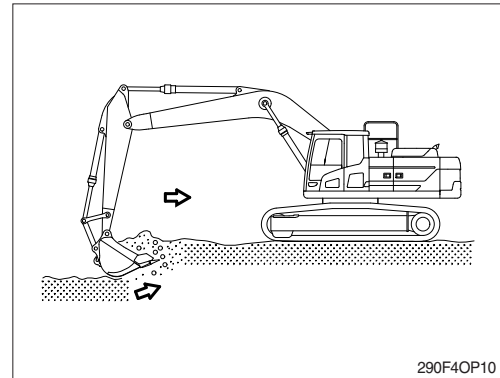
▲ **Make sure no personnel are standing close to the tow rope.**



## 7. EFFICIENT WORKING METHOD

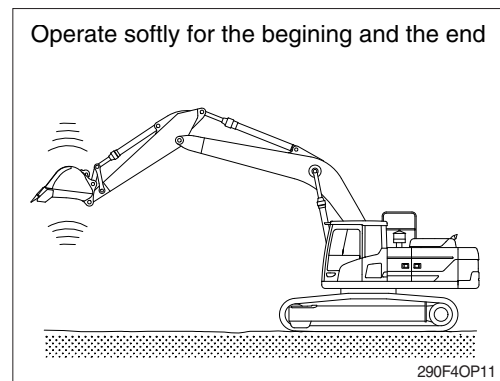
- 1) Do the digging work by arm.

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

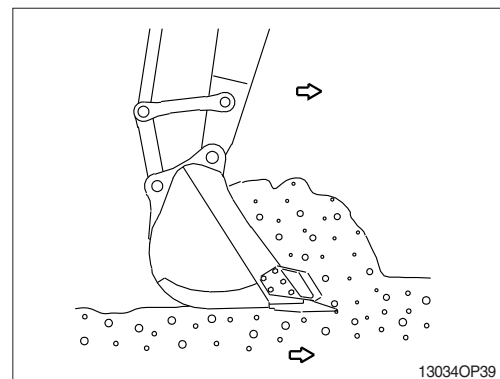


- 2) When lowering and raising the boom operate softly for the beginning and the end.

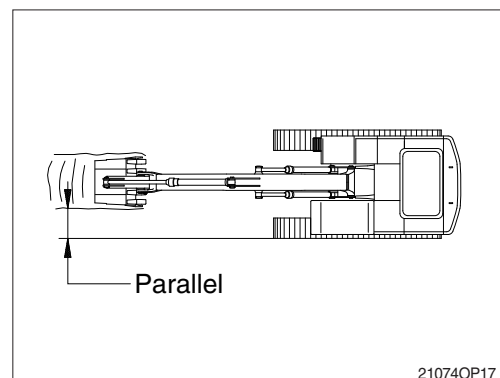
In particularly, sudden stops while lowering the boom may cause damage to the machine.



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

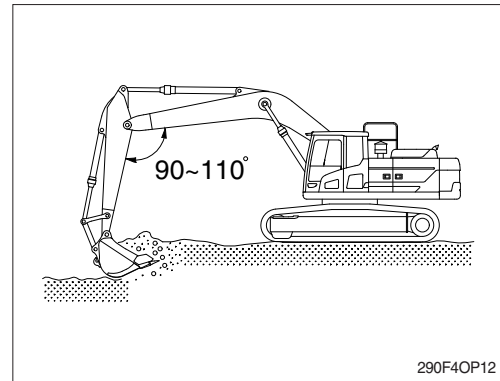


- 4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.

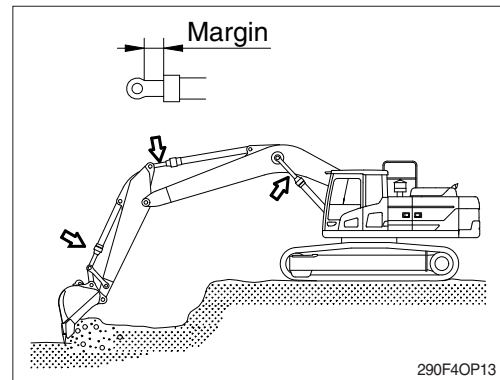




- 5) Dig slowly with keeping the angle of boom and arm, 90-110 degree when maximum digging force is required.

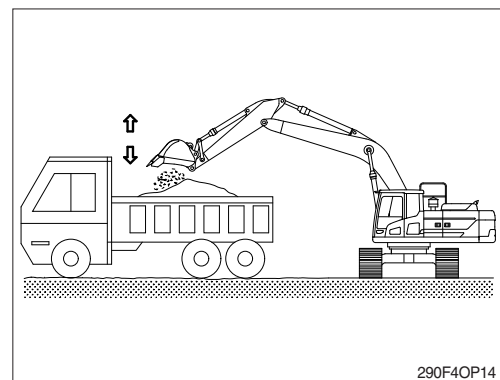


- 6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

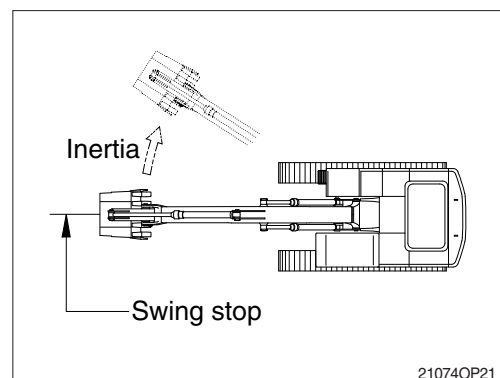


- 7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.  
Operate bucket lever 2 or 3 times when hard to dump.

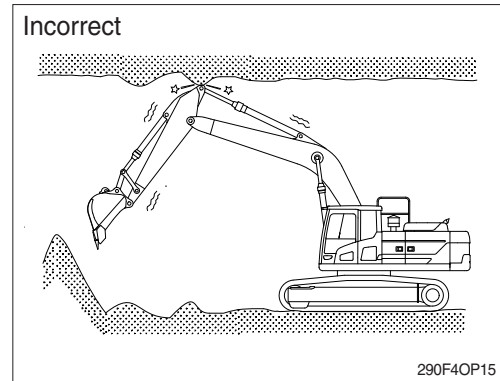
※ Do not use the impact of bucket tooth when dumping.



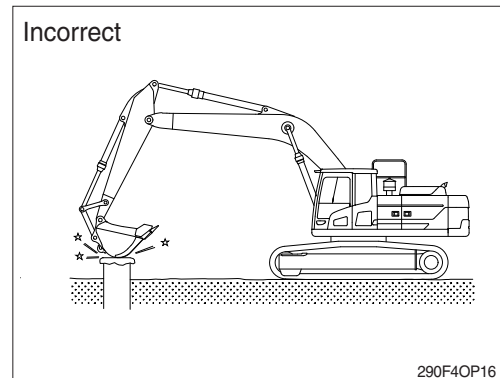
- 8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



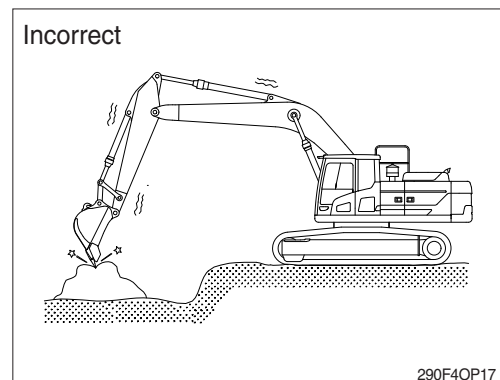
- 9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



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



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



## 12) NEVER CARRY OUT EXCESSIVE OPERATIONS

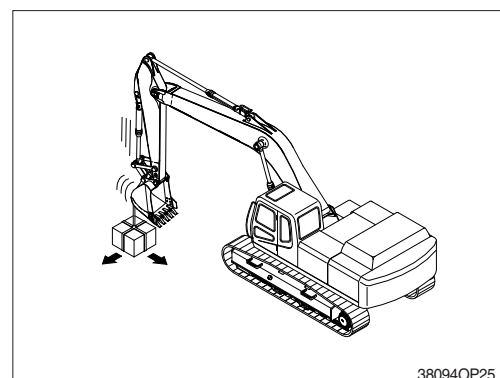
Operation exceeding machine performance may result in accident or failure.

Carry out lifting operation within specified load limit.

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

Never travel while carrying a load.

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



## 12) BUCKET WITH HOOK

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

The following operations are prohibited.

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

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

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

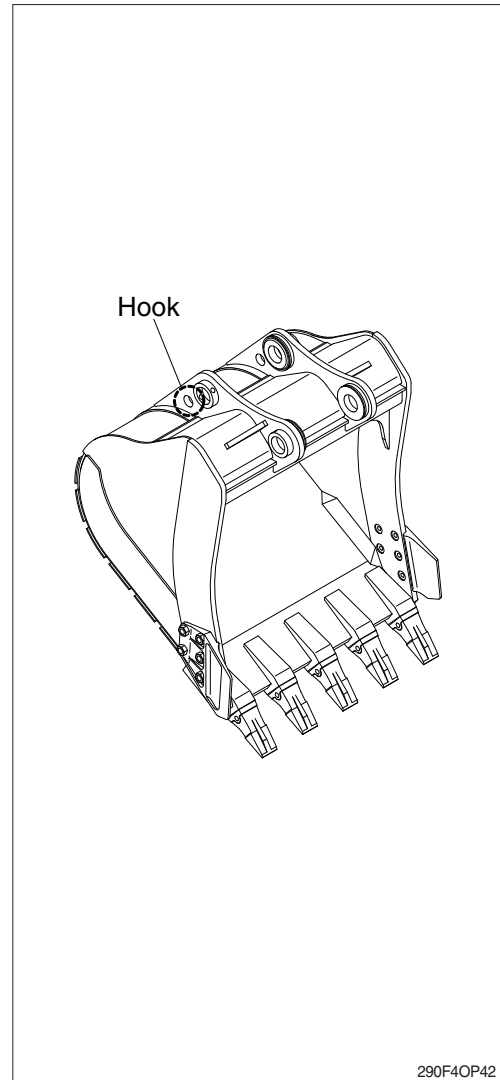
Due to the possible danger of the load falling or of collision with the load, no persons shall be allowed in the working area.

Before performing lifting operation, designate an operation supervisor.

Always execute operation according to his instructions.

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

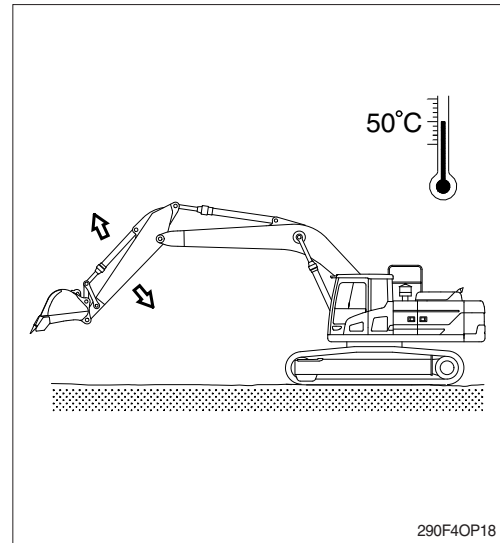
Never leave the operator's seat while lifting a load.



## 8. OPERATION IN THE SPECIAL WORK SITES

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

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



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

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

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

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

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

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

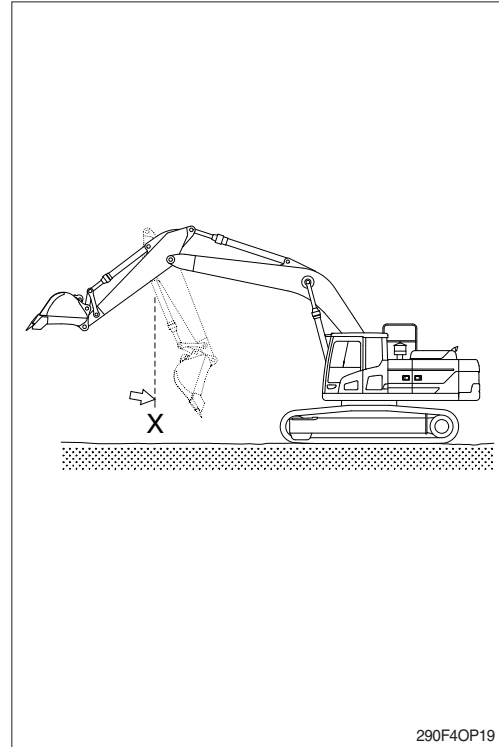
### **5) OPERATION IN ROCKY WORK SITES**

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

## 9. NORMAL OPERATION OF EXCAVATOR

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

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



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

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

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

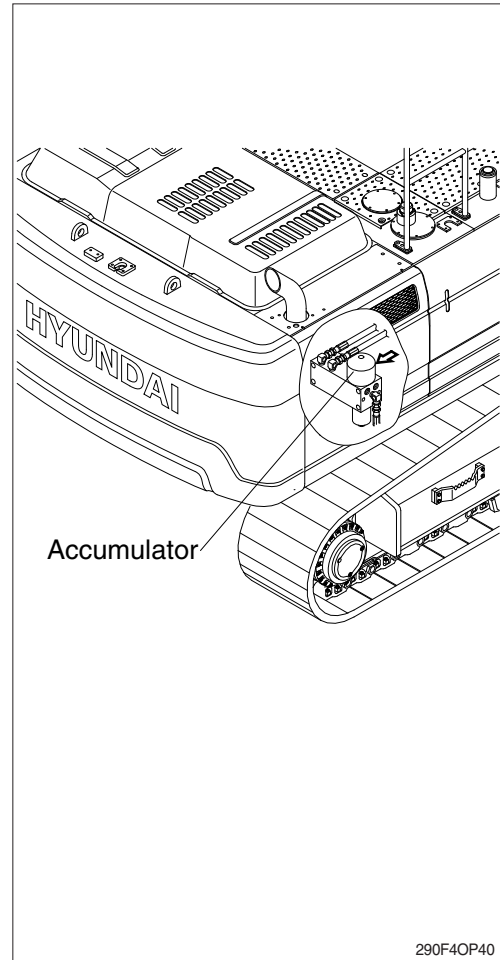
- 2) The accumulator is filled with high-pressure nitrogen gas, and it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions.

**▲ 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 HD Hyundai Construction Equipment distributor.



## 11. STORAGE

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

### 1) BEFORE STORAGE

#### (1) Cleaning the machine

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

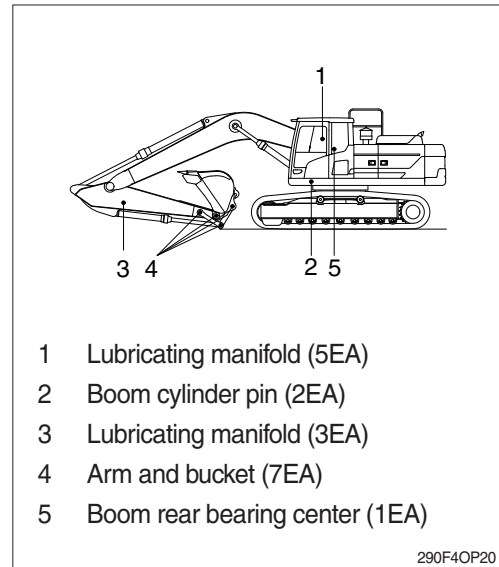
#### (2) Lubrication position of each part

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.



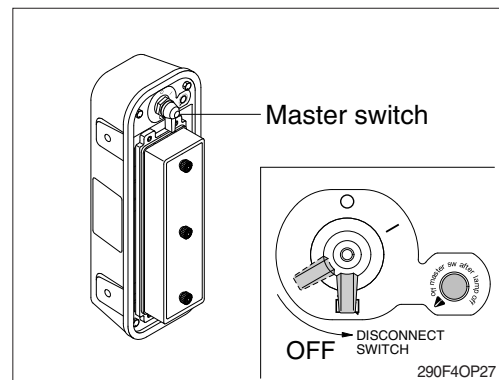
#### (3) Master switch

Turn OFF the master switch mounted electric box and store the machine.

▲ Off the master switch after lamp off.

▲ It may cause severe failure of aftertreatment device.

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

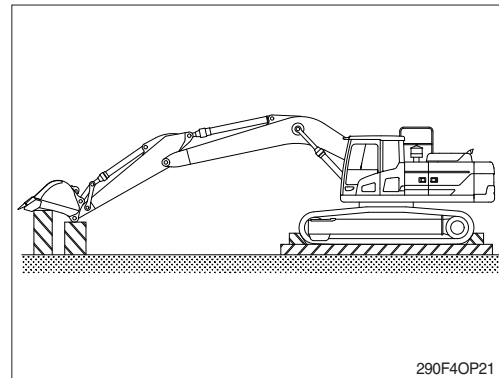


#### (5) Prevention of dust and moisture

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 track.

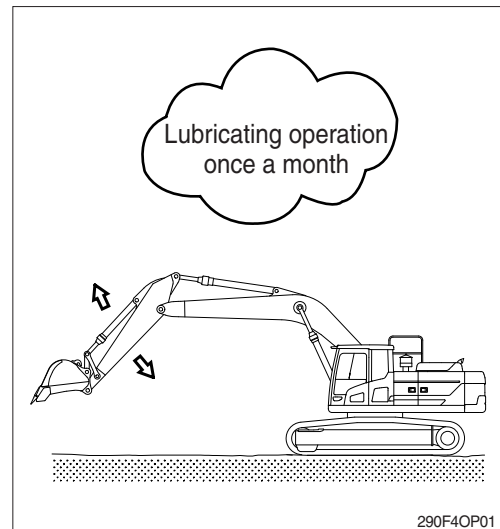




## 2) DURING STORAGE

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

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



### ※ BATTERY

- ① Once a month, start the engine for 15 minutes (or use a charger) to charge the battery.
- ② Every 2 months, check the battery voltage and keep battery voltage over 25.08V.
- ③ If the machine stock period is over 6 months, disconnect the battery negative (-) terminal.

## 3) AFTER STORAGE

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

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

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

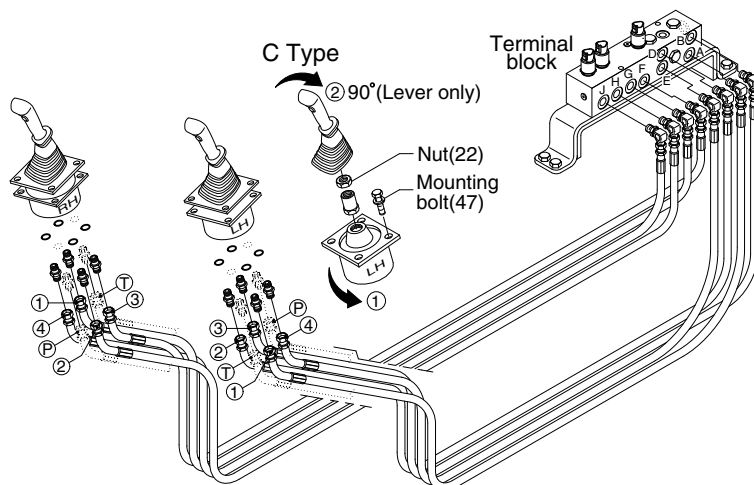
If the machine stock period is over 6 months, carry out the following procedure.

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

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

## 12. RCV LEVER OPERATING PATTERN

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



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

※ The hose modification works must be carried out between RCV lever and terminal block (Not between terminal block and MCV).

380F4OP01

| Pattern                           | Operation        |                 | Control function | Hose connection (port)   |                          |    |   |
|-----------------------------------|------------------|-----------------|------------------|--|--------------------------|----|---|
|                                   | Left RCV lever   | Right RCV lever |                  | RCV lever  | Change of Terminal block |    |   |
|                                   |                  |                 |                  |  | From                     | To |   |
| ISO Type                          |                  |                 | Left             | 1 Arm out  | ②                        | D  | - |
| HD Hyundai Construction Equipment |                  |                 |                  | 2 Arm in   | ④                        | E  | - |
|                                   |                  |                 |                  | 3 Swing right  | ③                        | B  | - |
|                                   |                  |                 |                  | 4 Swing left   | ①                        | A  | - |
|                                   |                  |                 | Right            | 5 Boom lower   | ④                        | J  | - |
| 6 Boom raise                      | ②                | H               |                  | -  |                          |    |   |
| 7 Bucket out                      | ①                | G               |                  | -  |                          |    |   |
| 8 Bucket in                       | ③                | F               |                  | -  |                          |    |   |
| A Type                            |                  |                 | Left             | 1 Boom lower   | ②                        | D  | J |
|                                   |                  | 2 Boom raise    |                  | ④  | E                        | H  |   |
|                                   |                  | 3 Swing right   |                  | ③  | B                        | -  |   |
|                                   |                  | 4 Swing left    |                  | ①  | A                        | -  |   |
|                                   |                  | Right           | 5 Arm out        | ④  | J                        | D  |   |
| 6 Arm in                          | ②                |                 | H                | E  |                          |    |   |
| 7 Bucket out                      | ①                |                 | G                | -  |                          |    |   |
| 8 Bucket in                       | ③                |                 | F                | -  |                          |    |   |
| B Type                            |                  |                 | Left             | 1 Boom lower   | ②                        | D  | J |
|                                   |                  | 2 Boom raise    |                  | ④  | E                        | H  |   |
|                                   |                  | 3 Bucket in     |                  | ③  | B                        | F  |   |
|                                   |                  | 4 Bucket out    |                  | ①  | A                        | G  |   |
|                                   |                  | Right           | 5 Arm out        | ④  | J                        | D  |   |
| 6 Arm in                          | ②                |                 | H                | E  |                          |    |   |
| 7 Swing right                     | ①                |                 | G                | B  |                          |    |   |
| 8 Swing left                      | ③                |                 | F                | A  |                          |    |   |
| C Type                            |                  |                 | Left             | ① Loosen the RCV lever mounting bolt (47) and rotates lever assy 90° counterclockwise; then install.<br>② To put lever in correct position, disassemble nut (22) and rotates only lever 90° clockwise. |                          |    |   |
| Right                             | Same as ISO type |                 |                  |  |                          |    |   |

## 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.

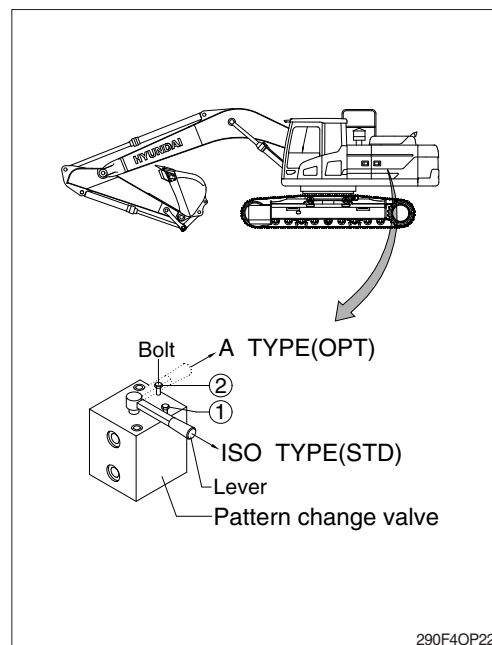
| Operation       | ISO type | A type |
|-----------------|----------|--------|
| Left RCV lever  |          |        |
| Right RCV lever |          |        |

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

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

### (2) Change of operating pattern

- ① Loosen bolt.
- ② Move lever to the "ISO" or "A" position.
- ③ After the lever is set, tighten the bolt in order to secure the lever.
  - Position ① for "ISO" pattern.
  - Position ② for "A" pattern.



290F4OP22

## 14. 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).

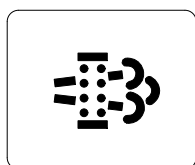
- ▲ Regeneration generates hot exhaust and causes hot exhaust system components.
- ▲ Exhaust system components get very hot and can cause severe burns. Risk for fire.
- ▲ Do not touch the surface of the DPF muffler during or up to 30 minutes after operation.
- ▲ Do not perform regeneration in a flammable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

As regeneration is performed, SCR system cleaning is performed simultaneously.

### SCR system

- ※ The SCR system is used to decrease the mono-nitrogen oxides (NOx) emissions from the machine tailpipe.
- ※ It is unlawful to tamper with, modify, or remove any component of the SCR system.  
It is also unlawful to use DEF/AdBlue® that does not meet the specifications provided or to operate the machine with no DEF/AdBlue®.

#### (1) DPF warning lamp

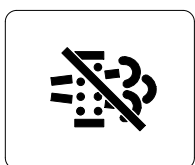


2609A3CD19

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

- ※ Refer to the page 3-9 for details.
- ※ The machine must be in a fireproof area during the entire regeneration process.

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

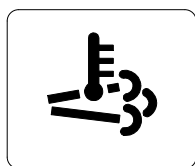


2609A3CD20

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

- ※ Refer to the page 3-9 for details.

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

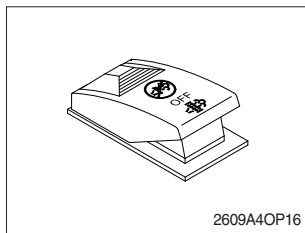


2609A3CD21

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

- ※ Refer to the page 3-10 for details.

#### (4) DPF switch



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

- ※ Refer to the page 3-36 for details.
- ※ Manual regeneration : refer to the page 3-10 for details.

#### (5) DPF cleaning

Every 5000 hours.

- ※ Refer to the page 6-31 for details.