1. SUGGESTION FOR NEW MACHINE

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

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

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

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

3) Be careful during the initial 100 hours operation

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

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

(3) Tighten bolts.

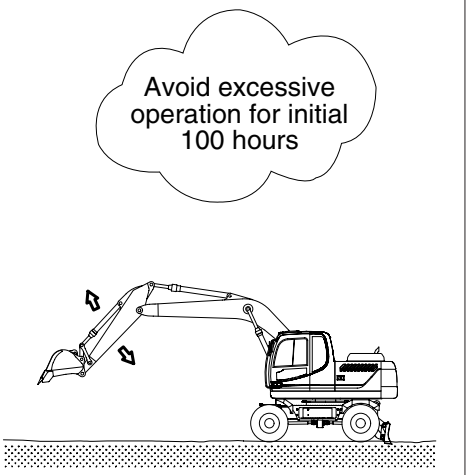
(4) Warm up the machine fully before operation.

(5) Check the gauges occasionally during the operation.

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

4) Replace followings after initial operation hours.

Checking items	Hours
Engine oil	50
Engine oil filter element	
Fuel filter	
Prefilter	
Transmission oil	100
Hydraulic oil return filter element	250
Hydraulic oil tank drain filter cartridge	
Pilot line filter element	
Swing reduction gear oil	
Axle oil	500



17W94OP01

2. CHECK BEFORE STARTING THE ENGINE

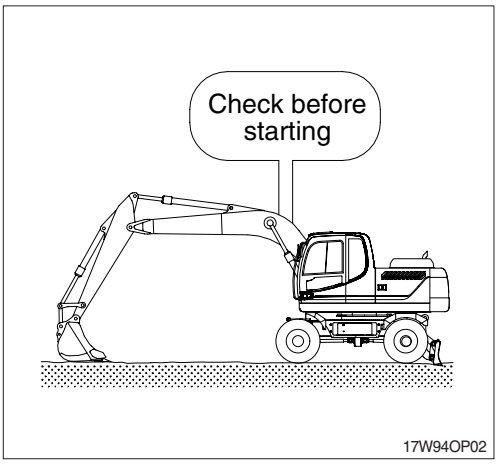
1) Look around the machine and under the machine to check for loosen nut or bolts, collection of dirt, or leakage of oil, fuel or coolant and check the condition of the work equipment and hydraulic system. Check also loosen wiring, and collection of dust at places which reach high temperature.

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

2) After checking air pressure of tire, make sure that around the machine is clear.

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

4) Adjust the rear view mirror.



3. STARTING AND STOP THE ENGINE (CLUSTER TYPE 1)

1) CHECK INDICATOR LIGHTS

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

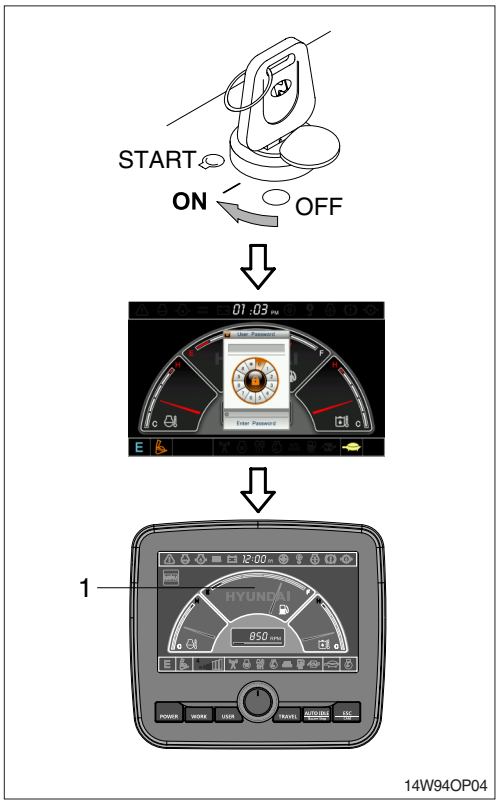
(2) Turn the starting switch to the ON position. Buzzer sounding for 4 seconds with HYUNDAI logo on cluster.

※ **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 3-17 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.**

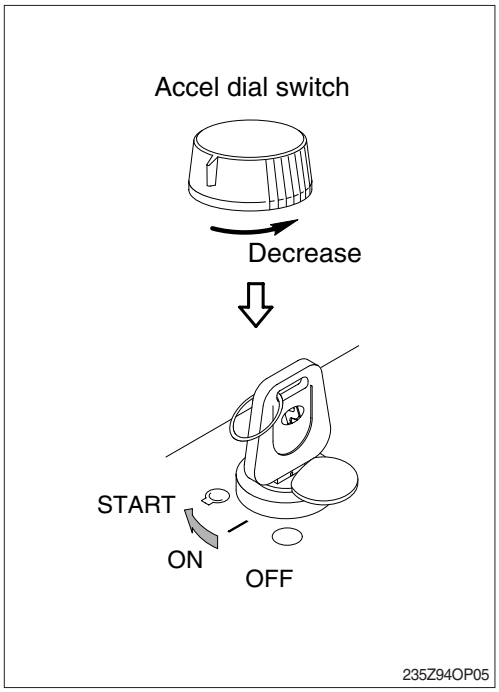
(1) Turn the accel dial switch to low idle position.

(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 starter 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 2-13.**

※ **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 accel dial switch 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.

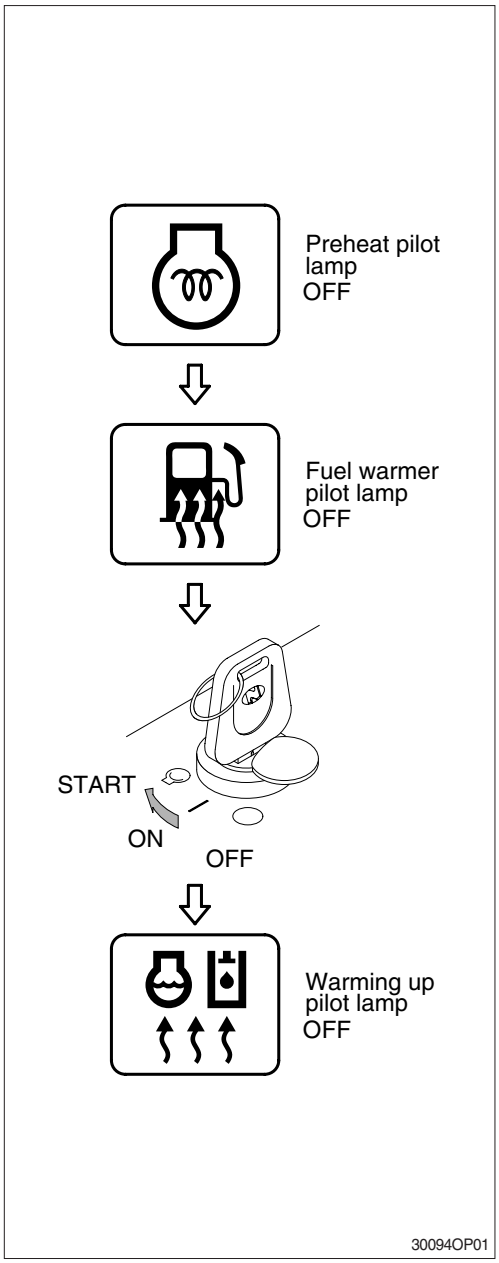
(4) Wait for five minutes to warm up the engine after the preheating pilot lamp off, and than turn the starting switch to the START position to start the engine.

※ **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 (1-11)?

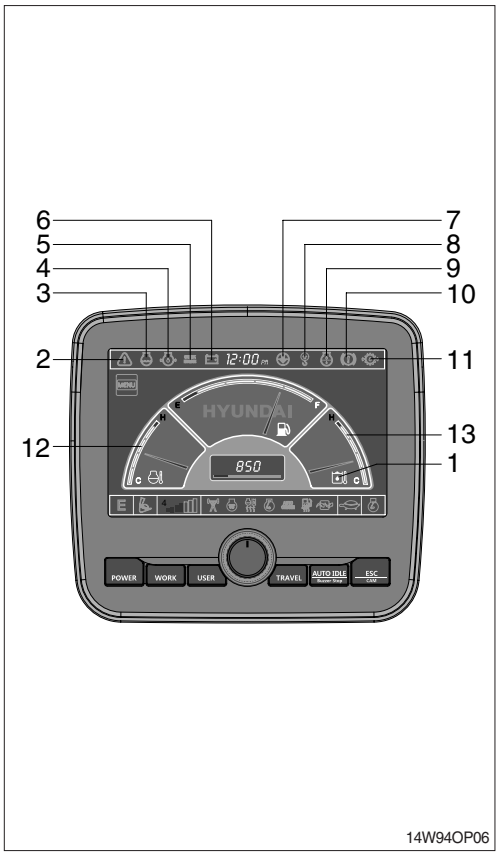
(4) Are the indicator of water temperature gauge (12) and hydraulic temperature gauge (13) in the operating range?

(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.**



14W94OP06

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 accel dial and run the engine at mid-range speed.

(3) Operate bucket lever for 5 minutes.

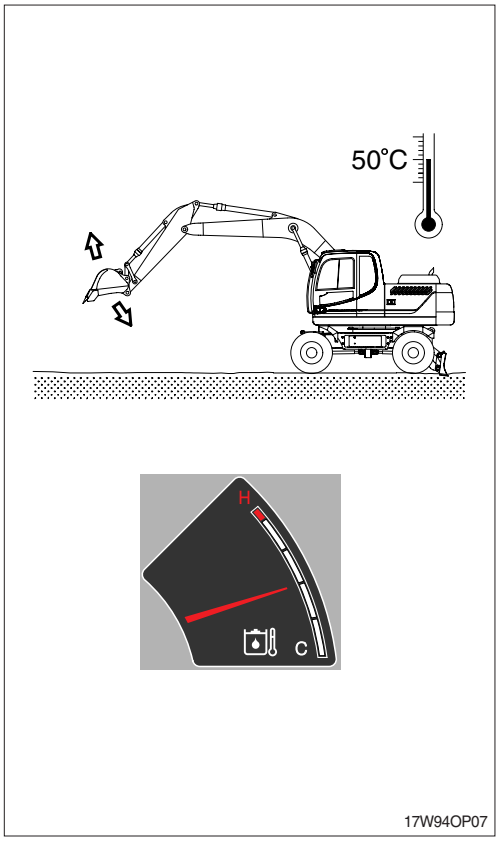
※ **Do not operate anything except bucket lever.**

(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.

※ **Increase the time for warming-up during winter.**



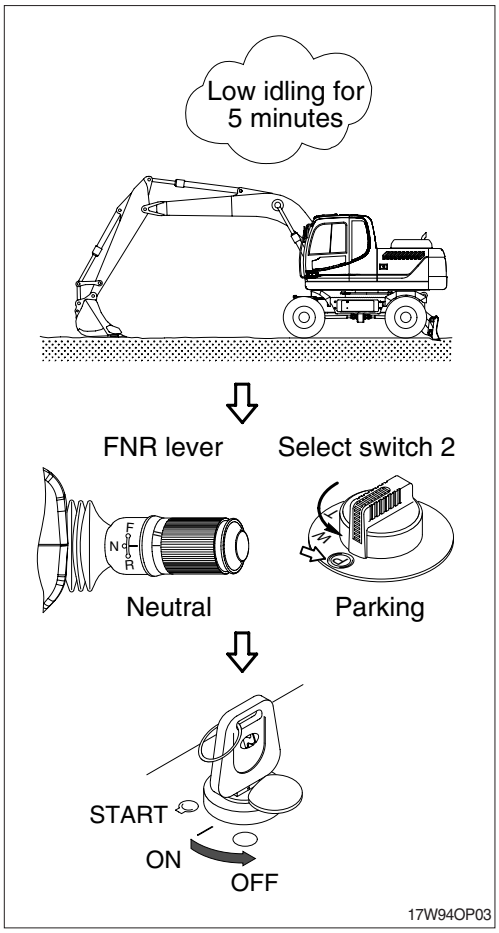
17W94OP07

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



■ STARTING AND STOP THE ENGINE (CLUSTER TYPE 2)

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.

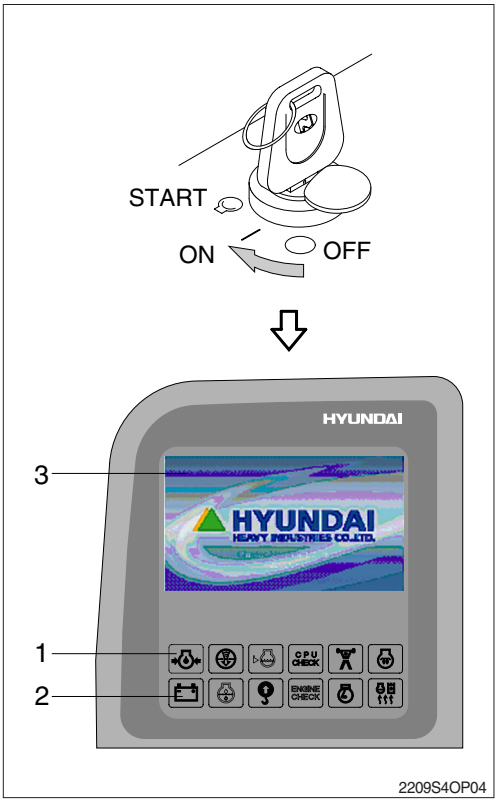
① If all the lamps light ON and buzzer sounding for 2 seconds.

② After lamp check 「1.00」, the version of cluster program, is displayed on 「LCD (3)」 for 5 seconds and the cluster returns to default.

③ 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)



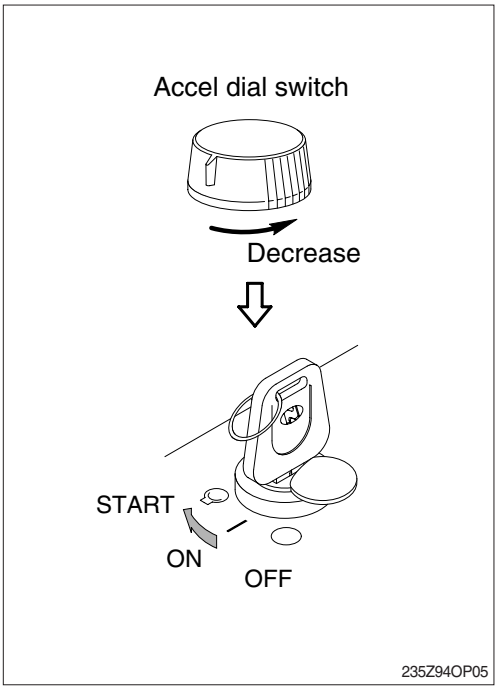
2) STARTING ENGINE IN NORMAL TEMPERATURE

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

(1) Turn the starting switch to 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.**

(2) 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 2-13.**

※ **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 accel dial switch 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.

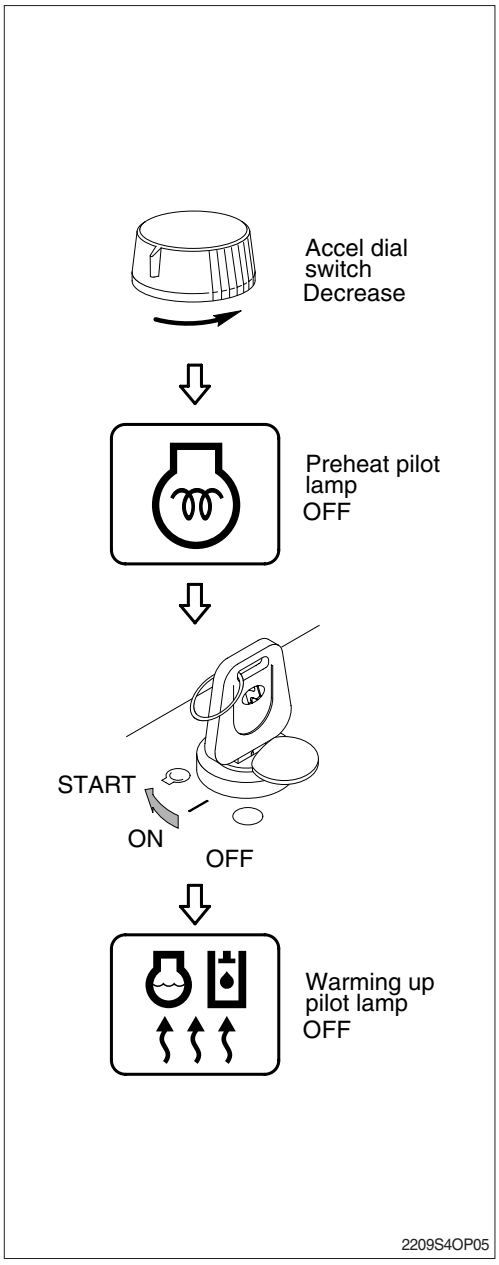
(4) Wait for five minutes to warm up the engine after the preheat pilot lamp OFF, and than turn the starting switch to the START position to start the engine.

※ **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 (1-6)?

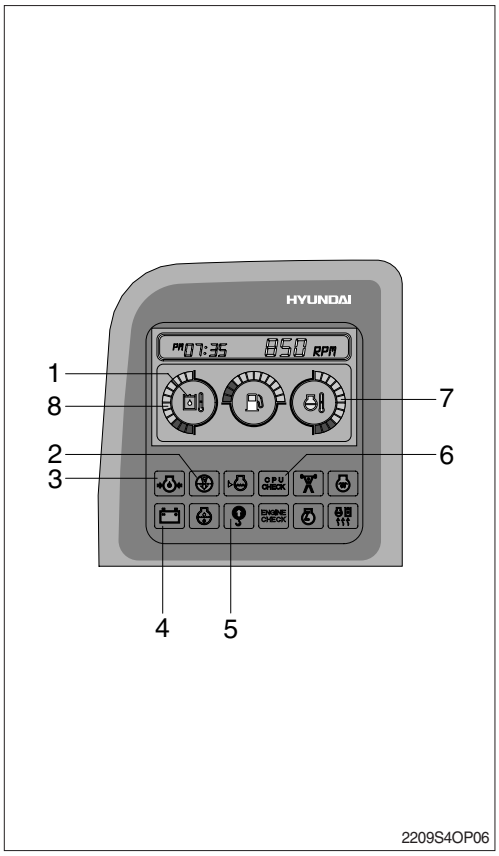
(4) Are the indicator of water temperature gauge (7) and hydraulic temperature gauge (8) in the green zone?

(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 control panel, stop the engine immediately and correct problem as required.**



2209S4OP06

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 idling for 5 minutes.

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

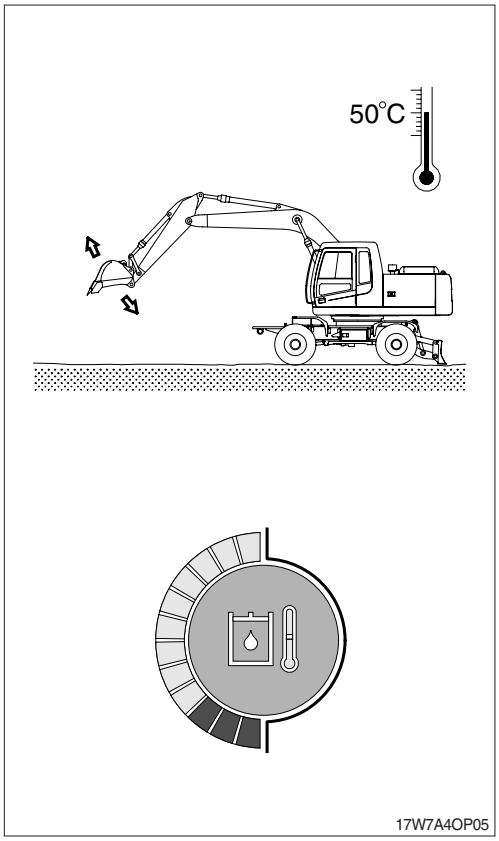
(3) Operate bucket lever for 5 minutes.

※ **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.



17W7A4OP05

4. MODE SELECTION SYSTEM (CLUSTER TYPE 1)

1) STRUCTURE OF MECHATRONICS SYSTEM

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

※ **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

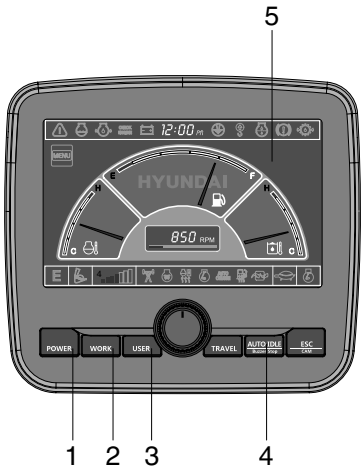
One of the two work modes can be selected for the optimal work condition of the machine operation.

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.



14W94OP10

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

(3) User mode

① User mode is useful for setting the user preperable power quickly.
(engine speed, power shift and idle speed)

② There are two methods for use of user mode.

a. In operation screen

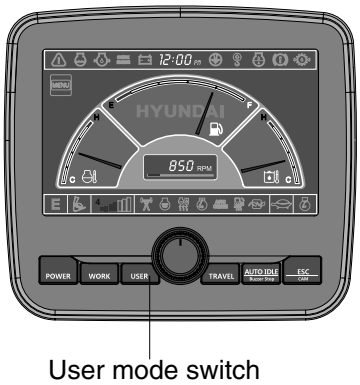
User mode switch is used to memorize the current machine operating status and activate the memorized user mode.

Refer to page 3-10.

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.



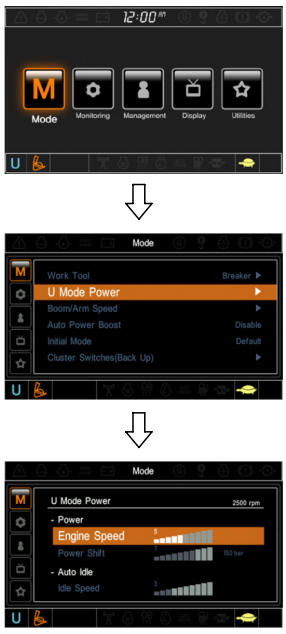
14W94OP11

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

※ **Refer to the page 3-12 for setting the user mode (available on U mode only).**

· LCD segment vs parameter setting

Step (▮)	Engine speed (rpm)	Idle speed (rpm)	Power shift (bar)
1	1500	850	0
2	1600	900 (low idle)	3
3	1700	950	6
4	1800	1000	9
5	1850	1050	12
6	1900	1100 (decel idle)	16
7	1950	1150	20
8	2000	1200	26
9	2050	1250	32
10	2100	1300	38



21094OP12

(4) Auto idle mode

Pilot lamp ON : Auto idle function is activated.

Pilot lamp OFF : Auto idle function is canceled.

(5) Monitoring system

Information of machine performance as monitored by the MCU can be displayed on the LCD. Refer to the page 3-11.

(6) Self diagnostic system

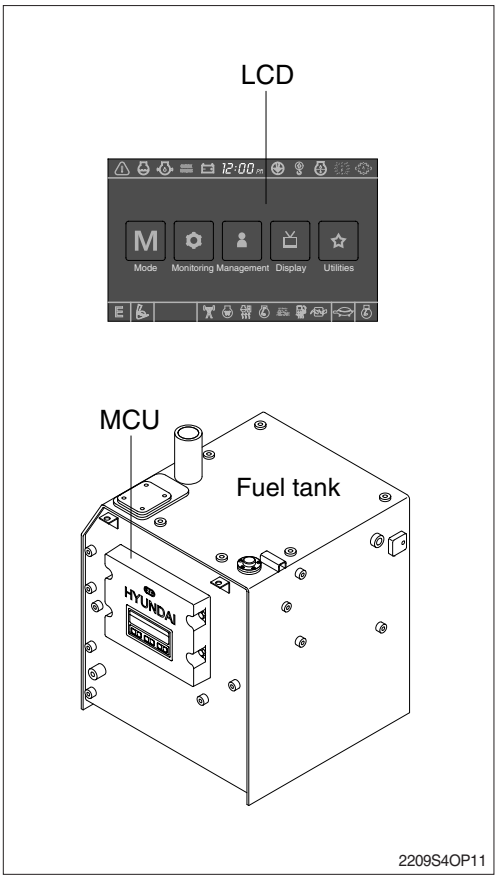
MCU (Machine Control Unit)

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).

※ **Refer to the page 3-11 for LCD display.**

(7) Anti-restart system

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



2209S4OP11

2) HOW TO OPERATE MODE SELECTION SYSTEM

(1) When start key switch is turned ON

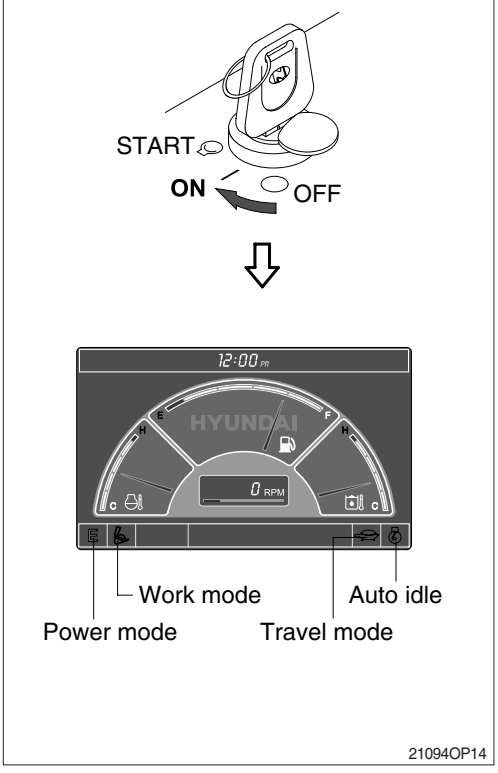
① When start key switch is turned on, the cluster turns on and buzzer sounds for 4 seconds. And then main information as gauges and engine speed are displayed on LCD.

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.



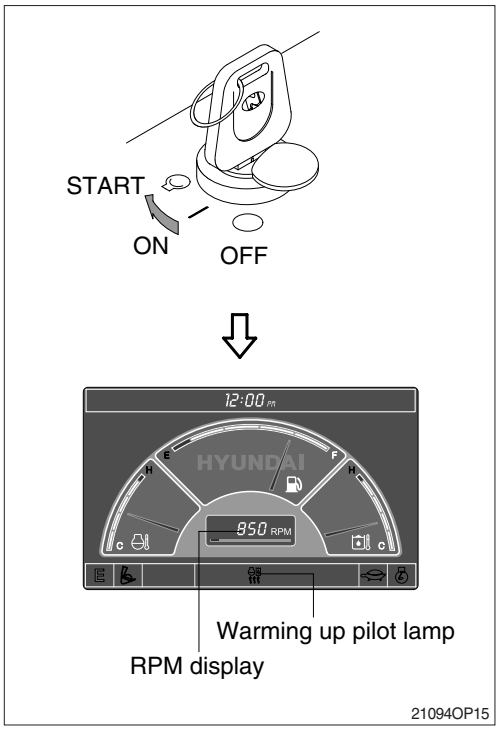
21094OP14

(2) After engine start

① When the engine is started, rpm display indicates low idle, 900±100 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 1100±100 rpm automatically to warm up the machine.

· After 2-3 minutes, you can select any mode depending on job requirement.



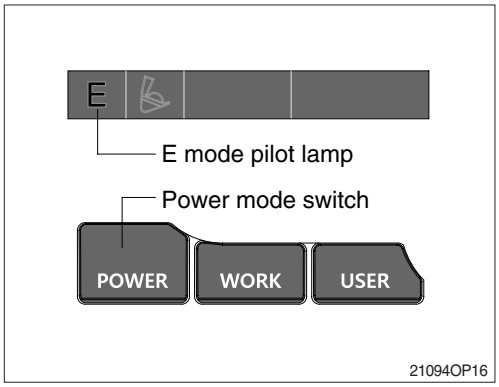
3) SELECTION OF POWER MODE

(1) E mode

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

Engine rpm	Effect
1950 ± 50	Variable power control in proportion to lever stroke (improvement in fuel efficiency) ※ Same power as S mode in full lever operation.

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

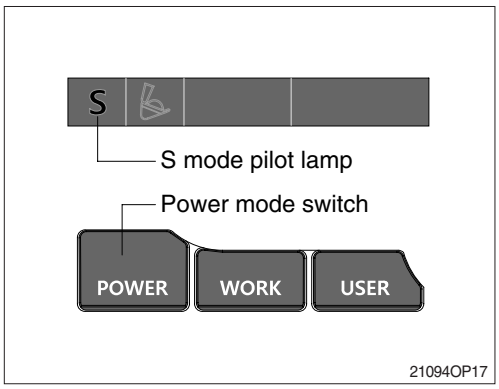


(2) S mode

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

Engine rpm	Effect
2050 ± 50	Standard power

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

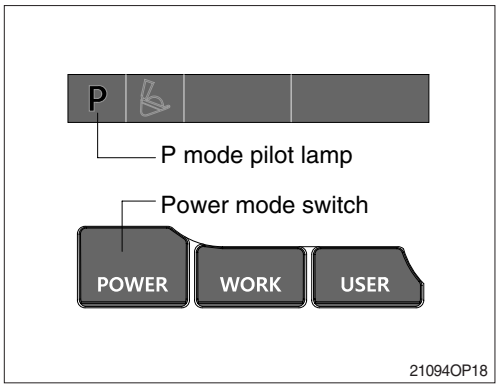


(3) P mode

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

Engine rpm	Effect
2150 ± 50	Approximately 120 % of power and speed available than S mode.

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



■ MODE SELECTION SYSTEM (CLUSTER TYPE 2)

1) STRUCTURE OF CAPO SYSTEM

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

(1) Work mode

2 work modes can be selected for the optimal work speed of the machine operation.

① **Heavy duty work mode**

The boom priority solenoid is activated to make the boom operation speed faster.

② **General work mode**

When key switch is turned ON, this mode is selected automatically and swing operation speed is faster than heavy duty work mode.

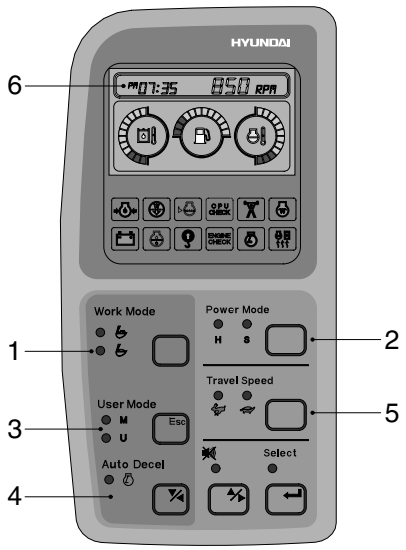
(2) Power mode

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

- H mode : High power
- S mode : Standard power

(3) User mode

- M : Maximum power
- U : You can change the engine and pump power and memorize it for your pre-ference

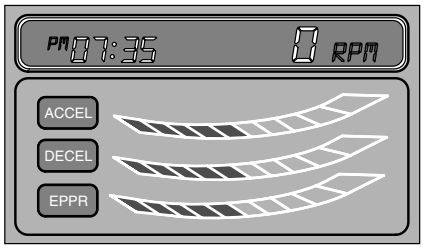


2209S4OP07

1 Work mode
2 Power mode
3 User mode
4 Auto decel mode
5 Travel mode
6 LCD

How to modulate the memory set

① Each memory mode has a initial set which are mid-range of max engine speed, auto decel rpm, and EPPR valve input current.



2507A4OP08

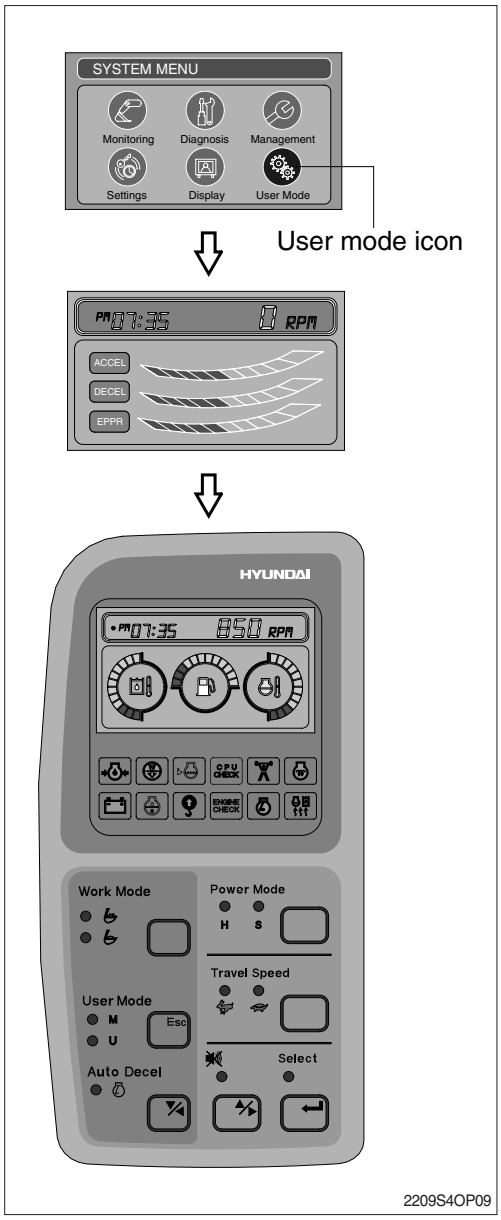
② High idle rpm, auto decel rpm, EPPR pressure can be modulated and memorized separately in the U-mode.

※ **Refer to the page 3-29 for set of user mode.**

· **LCD segment vs parameter setting**

Step (▮)	Engine speed (rpm)	Idle speed (rpm)	EPPR (mA)
1	1500	1000	150
2	1600	1050	200
3	1700	1100 (decel rpm)	250
4	1800	1150	300
5	1850	1200	350
6	1900	1250	400
7	1950	1300	450
8	2000	1350	500
9	2050	1400	550
10	2100	1450	600

※ **Low idle speed : 900 rpm.**



(4) Auto decel mode

Engine quick deceleration.

(5) Travel mode

: Low speed traveling.

: High speed traveling.

(6) Monitoring system

Information of machine performance as monitored by the MCU can be displayed on the **LCD**. Refer to the page 3-26.

(7) Self diagnostic system

① **MCU (Machine Control Unit)**

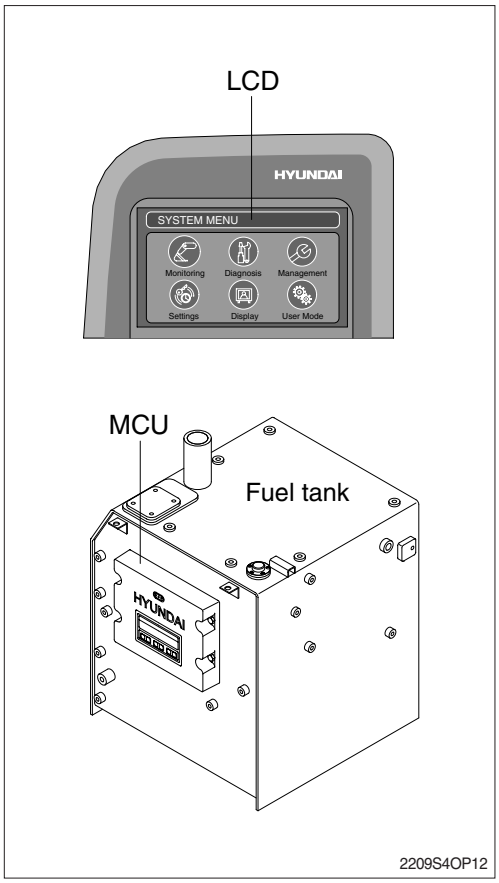
The MCU diagnoses problems in the CAPO system caused by electric parts' malfunction and by open or short circuit, which are displayed on the **LCD** as error codes (2 digit).

※ **Consult hyundai or huyndai dealer for details.**

※ **Refer to the page 3-26 for LCD display.**

(8) Anti-restart system

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



2209S4OP12

2) HOW TO OPERATE MODE SELECTION SYSTEM

(1) When start key switch is turned ON

① When start key is turned ON, all illumination lamps are ON and all lamps are OFF automatically after 5 seconds. But a battery charging warning lamp and an engine oil pressure warning lamp keep turned ON until engine starting.

② After lamp check 「**1.00**」, the version of cluster program, is displayed on **LCD** for 2 seconds.

③ After the version of program is displayed, the cluster returns to default. Exactly engine rpm, battery charging warning lamp and engine oil pressure warning lamp are turned ON and S mode, auto decel, low travel speed (turtle mark) are displayed.

④ In default condition self-diagnostic function including trouble detecting of electric system can be carried out.

2209S4OP13

(2) After engine start

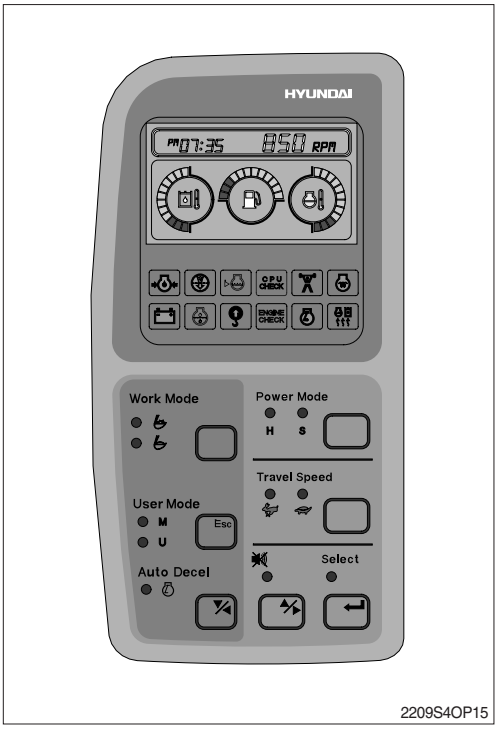
① When the engine is started, three lamps are ON as below.

Mode		Status
Work mode		ON
Power mode	S	ON
Travel mode	Low ( )	ON
Auto decel mode		ON

- In this condition, tachometer indicates low idle, 900±100 rpm.
- If coolant temperature is below 30˚C, after 10 seconds the engine speed increases to 1100±100rpm automatically to warm up the machine.
- After 2-3 minutes, you can select any mode depending on job requirement.

② Self-diagnostic function can be carried out the same as start key is ON.

※ **Refer to the page 3-27 for details.**



2209S4OP15

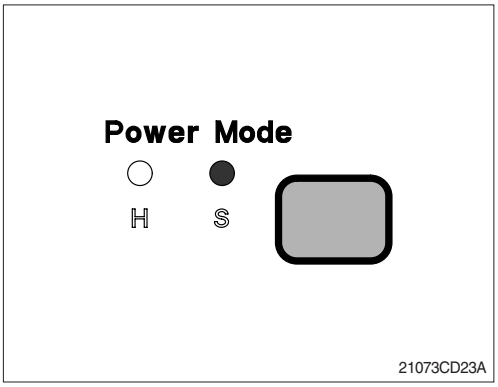
3) SELECTION OF POWER MODE

(1) S mode

When the accel dial is at setting 10 and auto decel mode is cancelled and S mode is selected.

Engine rpm	Effect
1950 ± 50	Same power as **non** mode type machine.

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



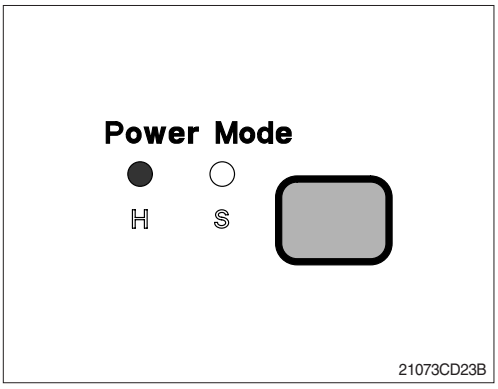
21073CD23A

(2) H mode

When the accel dial is at setting 10 and auto decel mode is cancelled and H mode is selected.

Engine rpm	Effect
2050 ± 50	Approximately 110% of power and speed available than **non** mode type machine or **S** mode.

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



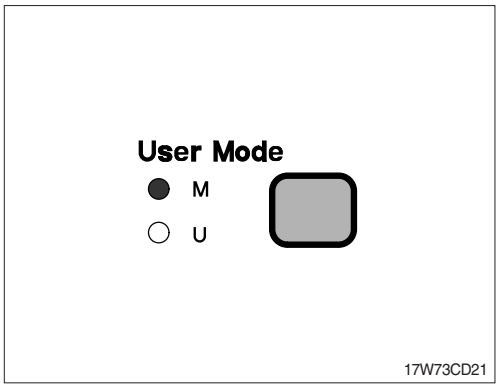
21073CD23B

(3) M mode

When the accel dial is at setting 10 and auto decel mode is cancelled and M mode is selected.

Engine rpm	Effect
2150 ± 50	Approximately 130% of power and speed available than **non** mode type machine or **S** mode.

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



5. OPERATION OF WORKING DEVICE

※ Confirm the operation of control lever and working device.

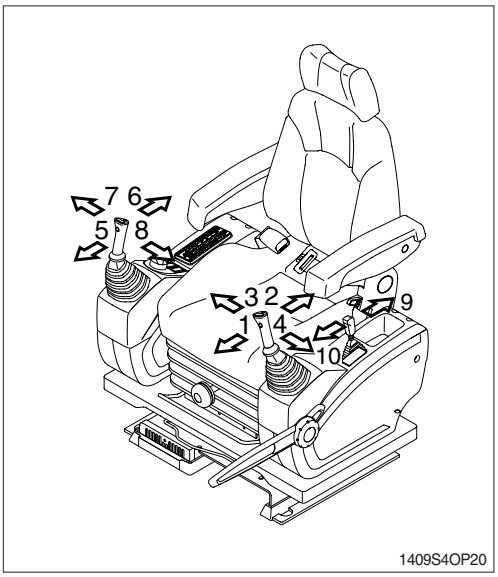
1) Left control lever controls arm and swing.

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.

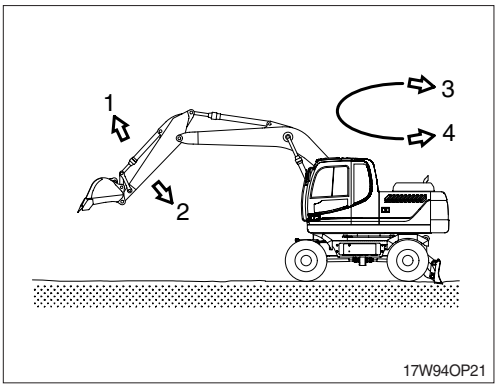
※ Refer to the switching method at page 3-36, when installed dozer or outrigger.



1409S4OP20

※ Left control lever

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



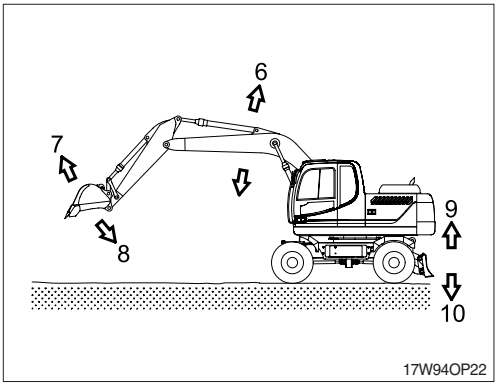
17W94OP21

※ Right control lever

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

※ Dozer and outrigger control lever

9 Dozer blade or outrigger up
10 Dozer blade or outrigger down



17W94OP22

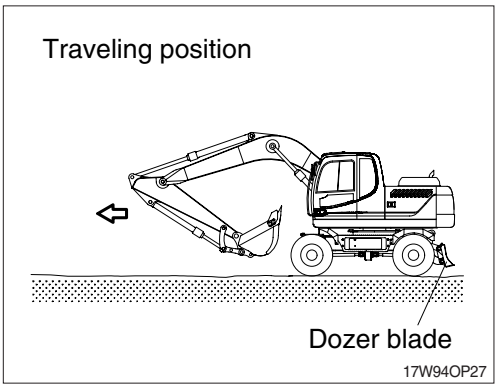
6. TRAVELING OF THE MACHINE

1) BASIC OPERATION

(1) Traveling position

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

⚠ Travel directions will be reversed if lower structure is positioned with dozer in front.



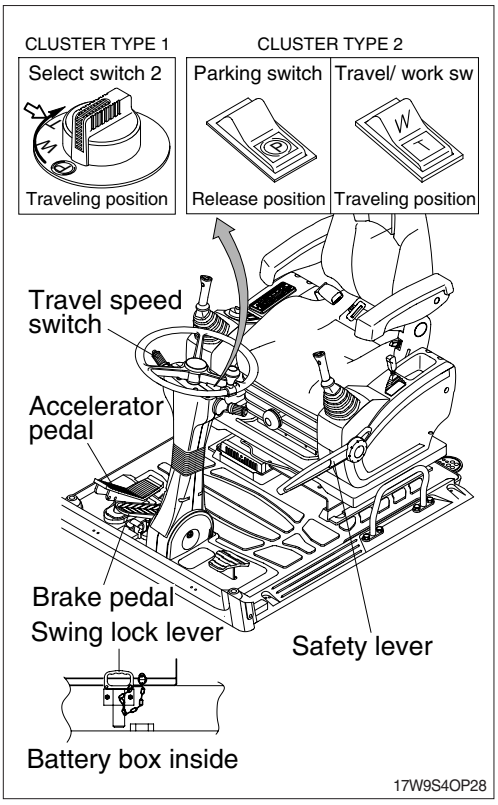
(2) Traveling operation

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

① Set the swing lock lever to lock position.
② Release the safety lever.
③ Put the select switch 2 in the traveling position. (CLUSTER TYPE 1)
Put the parking switch in the traveling position and travel/working switch in the travel position. (CLUSTER TYPE 2)
④ Lift up the dozer blade or outrigger.
⑤ Select traveling direction.
⑥ Place the two speed switch in low speed.
⑦ Press gently the accelerator pedal to move the machine.

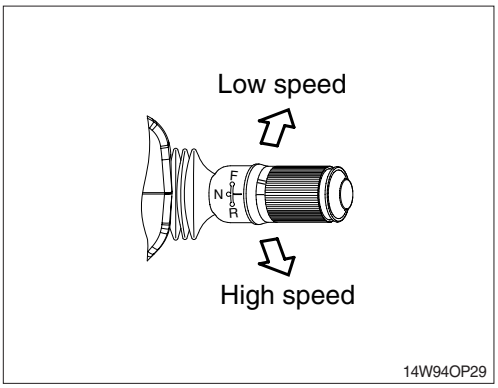
※ When speed up on a slope, a noise for valve of travel motor may occur. It is not out of order in machine but peculiar sound.

※ Be sure that the brake works normally on the safe place before fast traveling.



(3) Changing speed

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



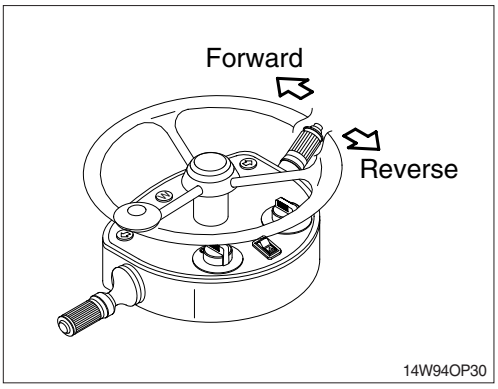
(4) Changing direction (forward/reverse)

① Be sure to stop the machine when changing the direction forward or backward while traveling.

② Put the FNR lever in the desired position to change direction.

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

※ It could be cause of machine failure to change the direction forward or backward while traveling.



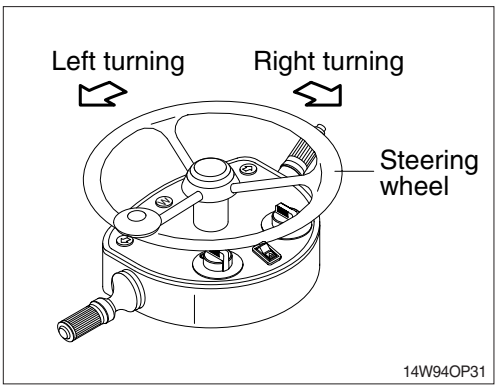
(5) Turning the machine

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

② You can turn the machine to the left or right.

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

⚠ Steering does not function with engine OFF.



(6) Precautions when driving

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

① If the warning lamp lights up on the cluster, stop the machine immediately and check carefully whether the relevant parts are out of order or not.

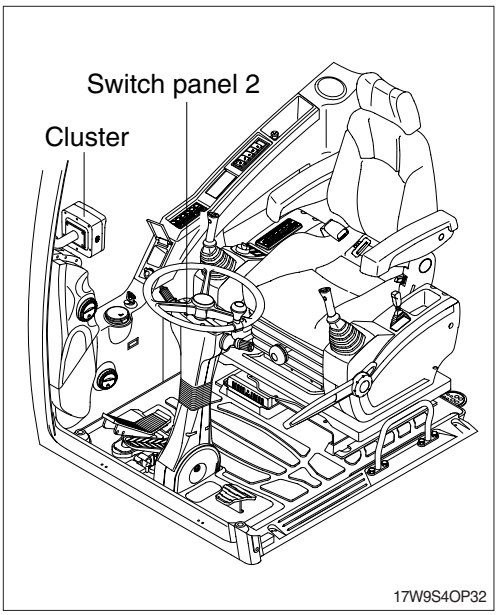
② Do not allow the engine to run at overload.

③ Stop the engine and check as soon as finding out abnormal noise or smell.

④ Check the pilot lamp of switch panel 2 frequently.

⑤ Do not allow passengers or riders on the machine while it is running or in operation.

⑥ Never get on or off the machine while it is moving.



2) TRAVELING ON A SLOPE

(1) Never travel down a slope in neutral.

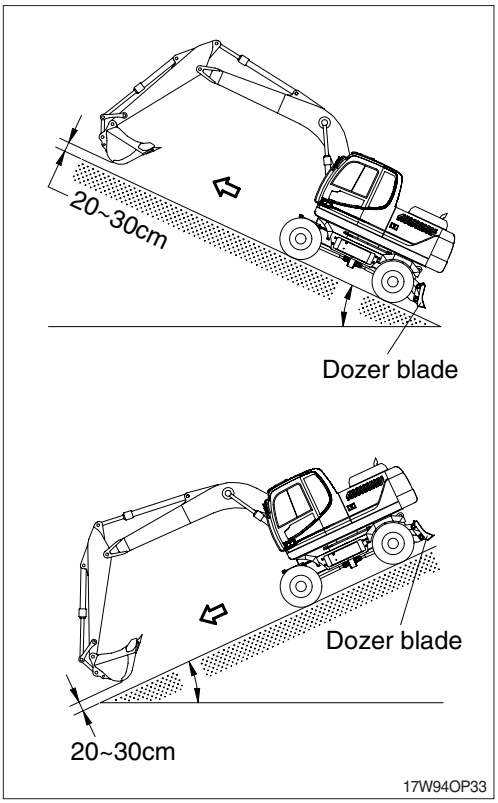
(2) Lower the bucket 20 to 30 ㎝ (1 ft) to the ground so that it can be used as a brake in an emergency.

(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 can not travel effectively on a slope when the oil temperature is low. Do the warming-up operation when it is going to travel on a slope.**

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



3) PARKING THE MACHINE

To park the machine, keep the steps below.

(1) Release the accelerator pedal slowly.

(2) Depress the brake pedal.

(3) Place the FNR lever in the neutral.

(4) Put the select switch 2 in the parking position and release the brake pedal.(CLUSTER TYPE 1) Put the parking switch in the parking position and release the brake pedal.(CLUSTER TYPE 2)

(5) Lower the bucket, outrigger and dozer blade to the ground.

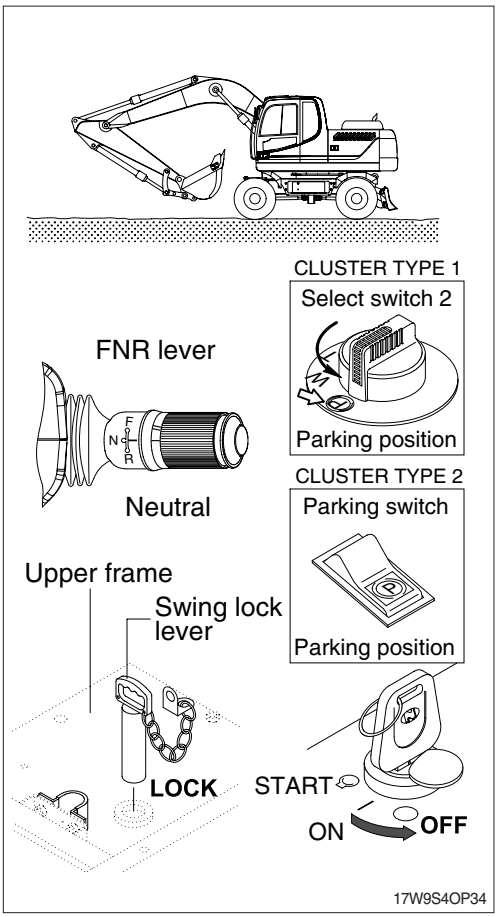
(6) Stop the engine, place the start key switch in the OFF and remove the key.

(7) Lower the safety lever to lock position.

(8) Lock the swing lock lever and the cab door.

※ **Whenever parking on s slope, always block the tires after lowering the bucket to the ground.**

※ **Contain the outrigger lock pin in the tool box to avoid loss.**



4) TOWING THE MACHINE

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

(1) General

① Parking brake cylinder of the machine is operated by the spring force and released by hydraulic pressure.
If the engine does not operate, the brake will be operated to stop the machine.

② When the machine is towed move it for a repair to nearby place at the low speed.
Transport it on a trailer, if it has to be moved for a long distance.

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

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

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

⚠ NEVER allow a disabled machine to be towed on a slope.

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

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

⚠ Never tow machine using a light-duty towing hook.

(2) Towing the machine

① The emergency device is to interrupt the power flow between input and output in case of control pressure failure or a travel motor defect and thus allows an emergency towing of the machine.

Towing speed : Max 10km/h

Towing distance : Max 5km

② Since there is no transmission lubrication, damages may occur due to lacking oil supply if the instruction are no observed. For a long distance it is best to have transported the defective machine on a trailer.

③ Activate the emergency device

· Turn the start key OFF position.

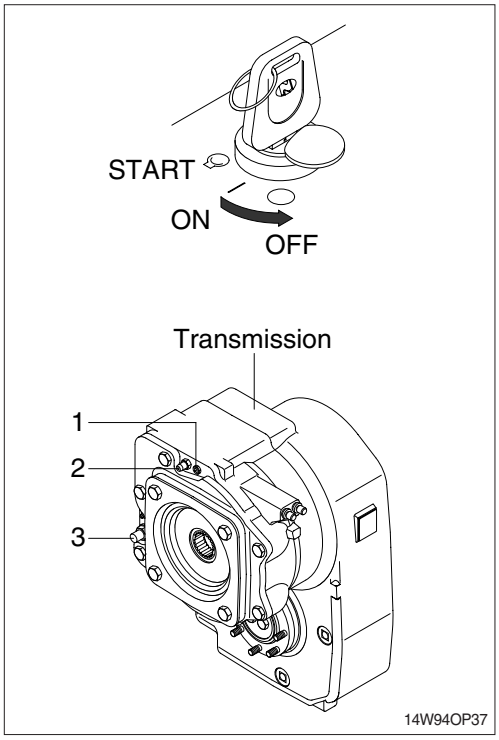
· Block the machine against rolling away.

· By means of a grease gun pump in the grease on the grease nipple(1) until it comes visibly out at the pressure relief valve(3) of the emergency device.

④ Deactivate the emergency device

· The bleeder(2) of the emergency device must be opened and then shift into the road speed(apply a control pressure of 30 to 35 bar at the connection of the brake).

· Then close the bleeder again.

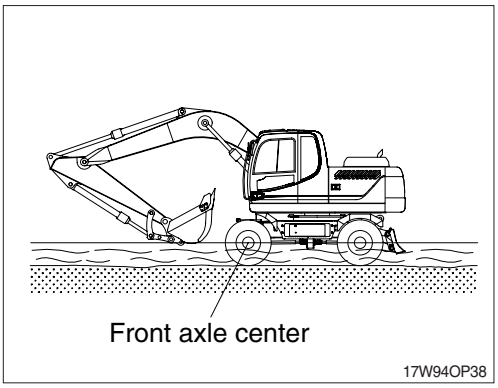


5) PRECAUTIONS FOR OPERATION

(1) Permissible water depth

① Do not immerse the machine in water by more than the permissible depth (axle center).

② For parts that have been immersed in water for a long time, pump in grease until the old grease comes out from the bearings.

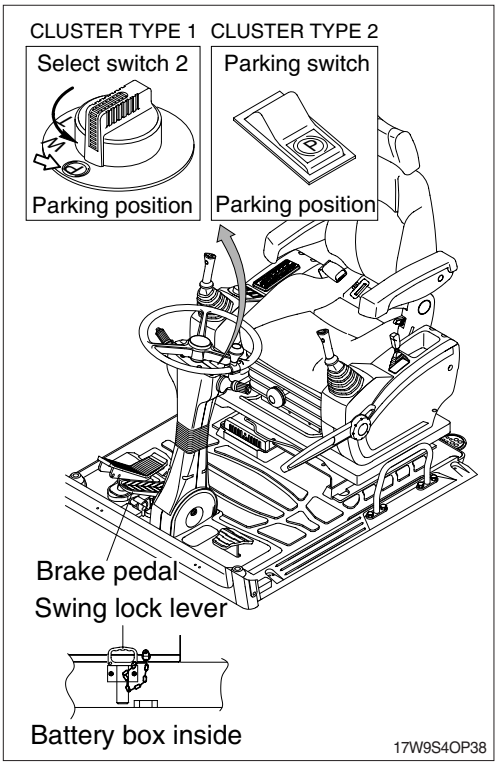


(2) When the brake does not operate

① If the machine does not stop even though the brake pedal is applied, put the parking position to activate the emergency brake by select switch 2.

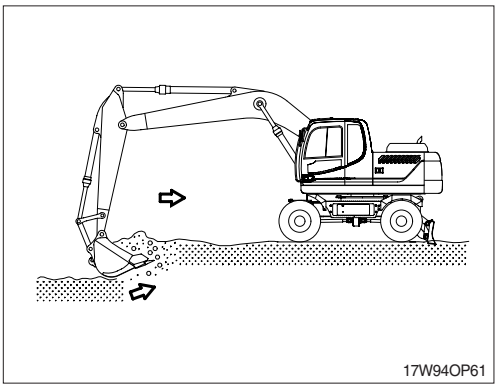
※ **After using the parking brake as an emergency brake, ask Hyundai dealer to check complete brake system.**

⚠ **Never use emergency brake, except when the service brake fails.**

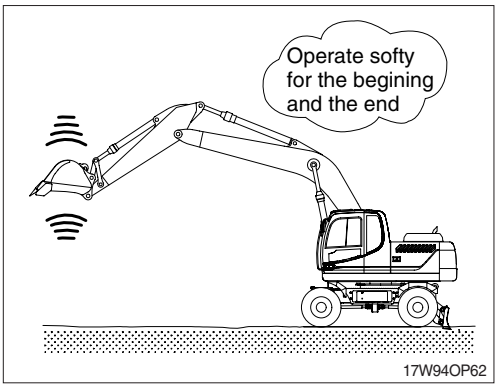


7. EFFICIENT WORKING METHOD

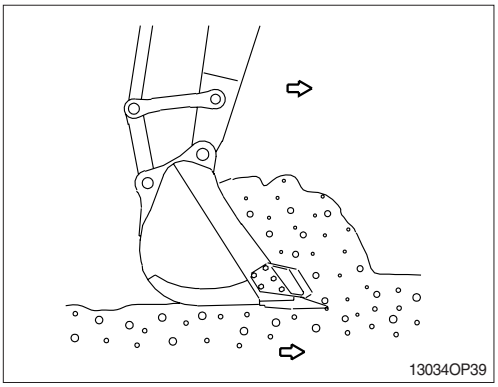
1) Do the digging work by arm.
   Use the pulling force of arm for digging and use together with the digging force of the bucket if necessary.



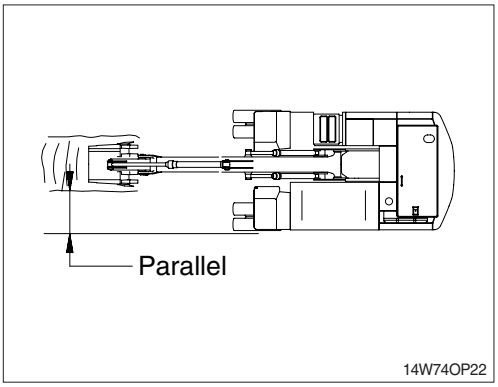
2) When lowering and raising the boom operate softly for the beginning and the end.
   In particularly, sudden stops while lowering the boom may cause damage to the machine.



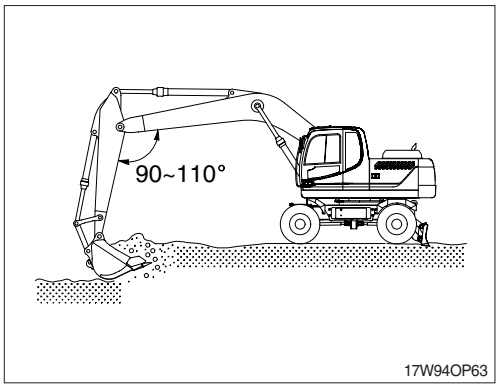
3) The digging resistance and wearing of tooth can be reduced by putting the end of bucket tooth to the digging direction.



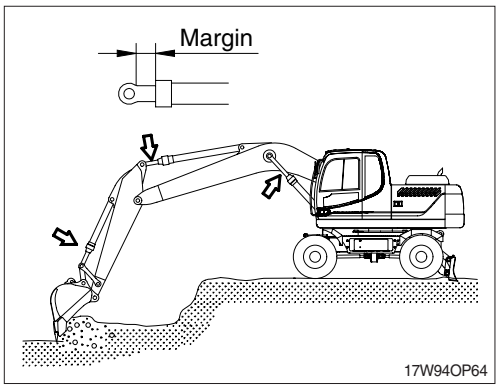
4) Set the tracks parallel to the line of the ditch to be excavated when digging ditch. Do not swing while digging.



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

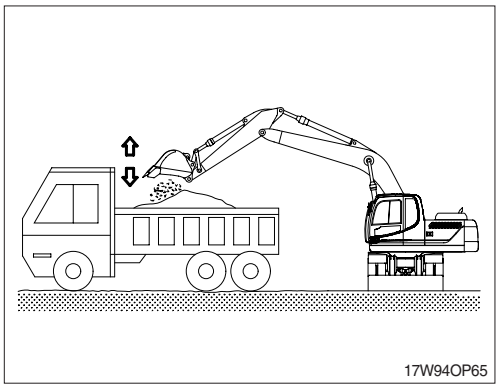


6) Operate leaving a small safety margin of cylinder stroke to prevent damage of cylinder when working with the machine.

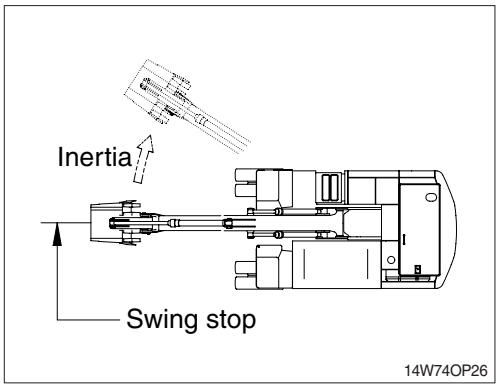


7) Keep the bucket to the dumping position and the arm horizontal when dumping the soil from the bucket.
Operate bucket lever 2 or 3 times when hard to dump.

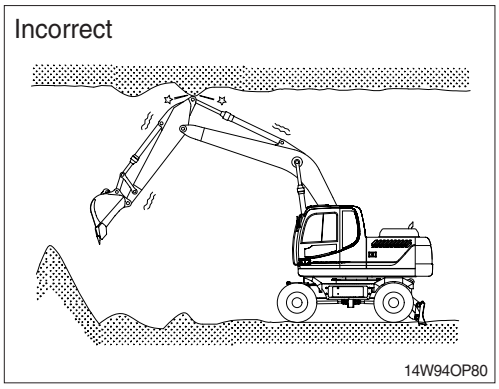
※ **Do not use the impact of bucket tooth when dumping.**



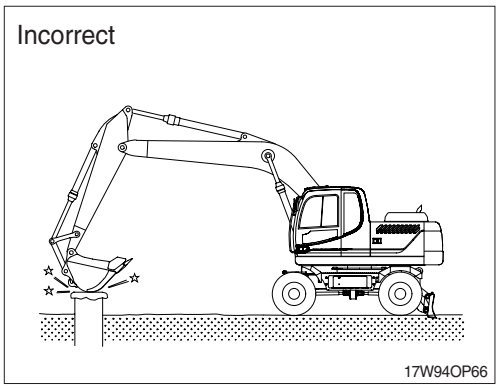
8) Operate stop of swing considering the swing slip distance is created by inertia after neutralizing the swing lever.



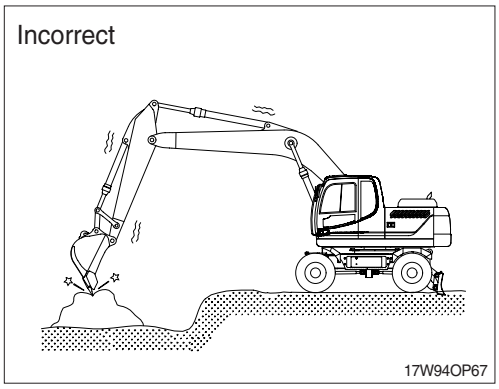
9) If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation.



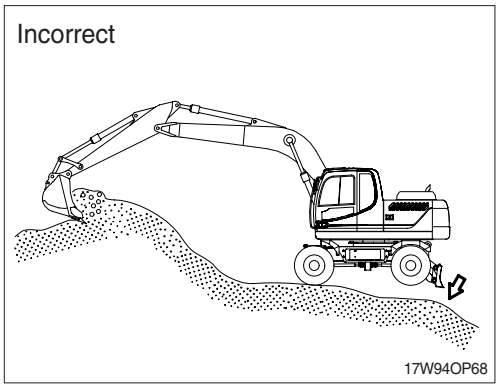
10) Do not use the dropping force of the work equipment for digging.
The machine can be damaged by the impact.



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) Do not use the dropping force of the machine for digging.



13) NEVER CARRY OUT EXCESSIVE OPERATIONS

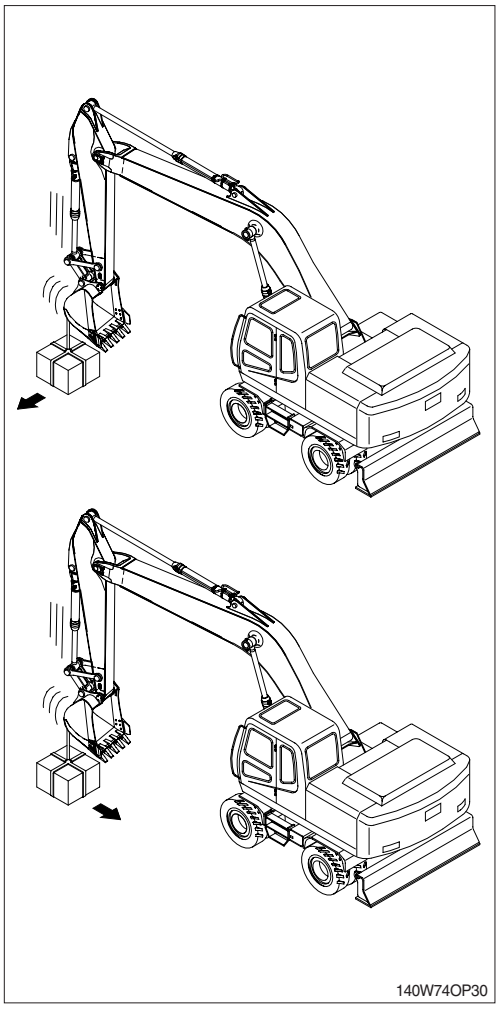
Operation exceeding machine performance may result in accident or failure.

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.



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14) 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.

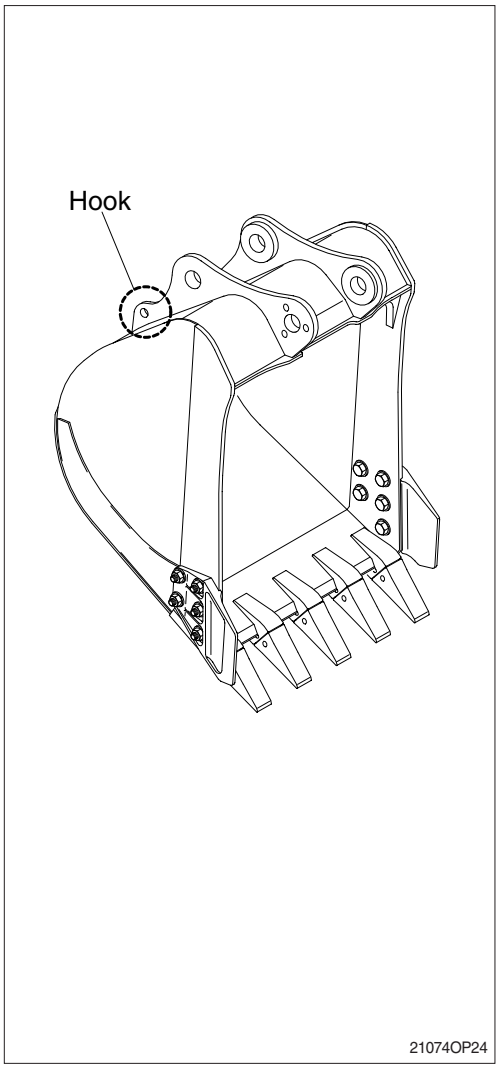
When performing lifting operation, never raise or lower a person.

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 this instructions.

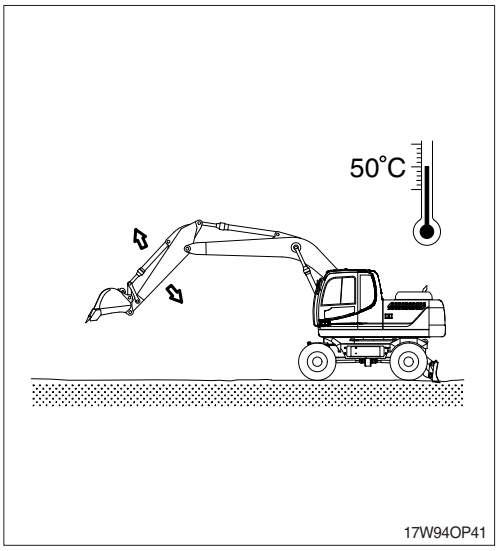
- Execute operating methods and procedures under his direction.
- Select a person responsible for signaling. Operate only on signals given by such person.

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.

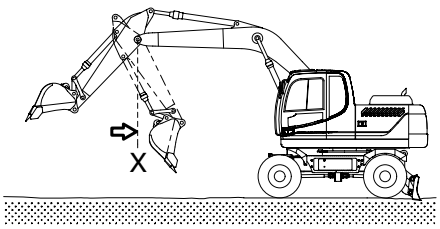
(2) Loosen the track tension a little when working in such areas.

(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.



17W94OP42

10. 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.

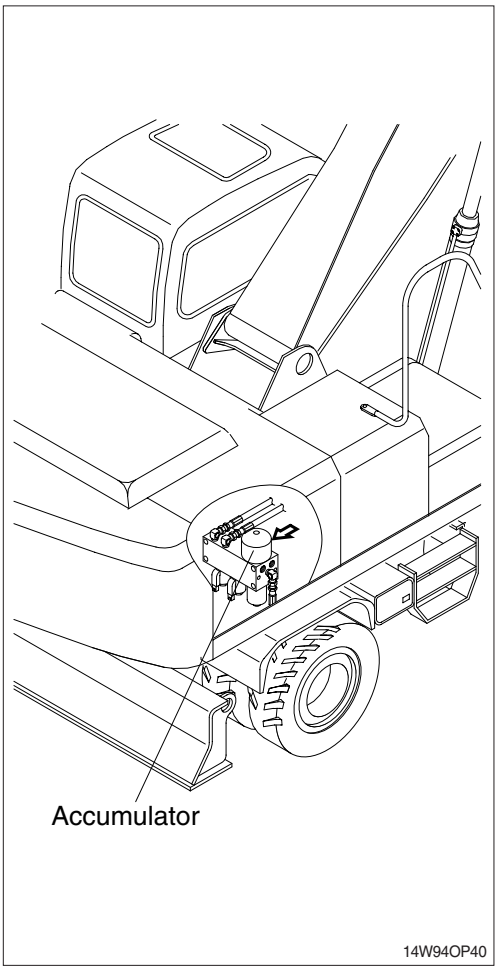
⚠ **Be sure no one is under or near the attachment before lowering the boom.**

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.**



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

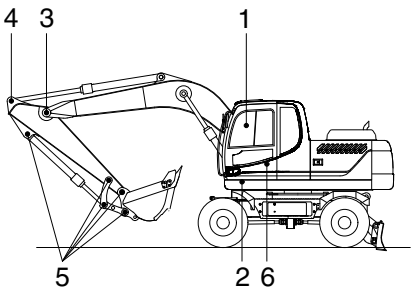
(1) Cleaning the machine

Clean the machine and dried.
Grease each lubrication part.

(2) Lubrication position of each part

Change all oil.

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



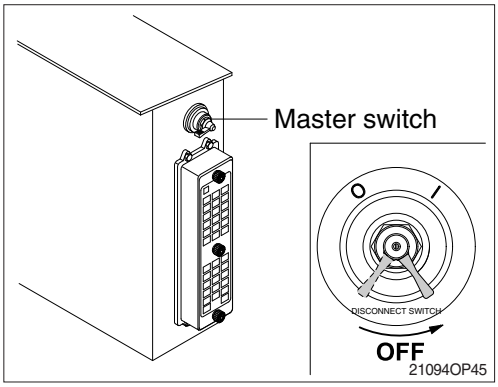
17W94OP43

1 Lubricating manifold(5EA)
2 Boom cylinder pin(2EA)
3 Boom and arm connection pin(1EA)
4 Arm cylinder pin (rod side, 1EA)
5 Arm and bucket(6EA)
6 Boom rear center bearing(1EA)

(3) Master switch

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

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

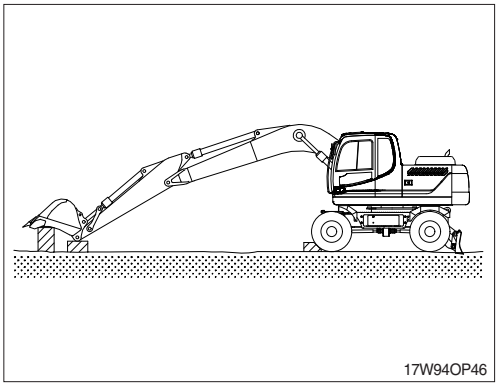


21094OP45

(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.


17W94OP46

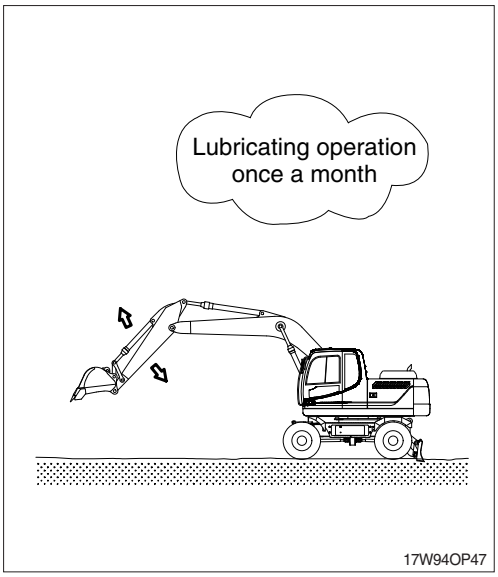
2) DURING STORAGE

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.

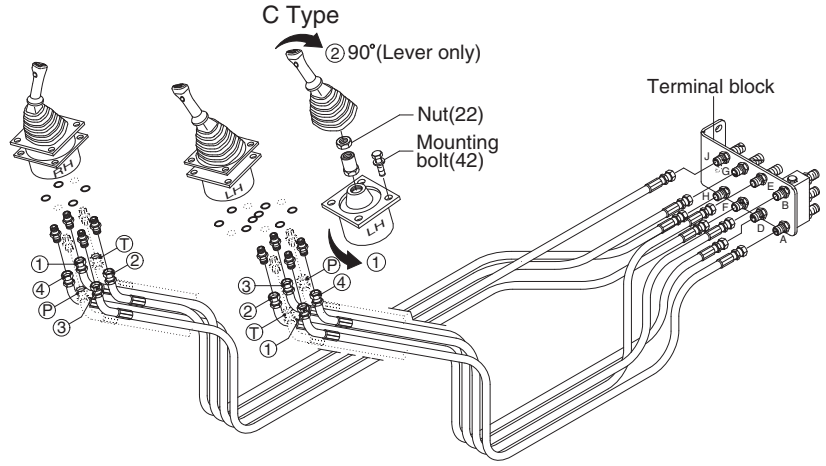
※ **Remove the drain port plug and drain the water until the gear oil comes out and then tighten the drain plug.**

※ **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 Hyundai dealer for service.**

12. RCV LEVER OPERATING PATTERN

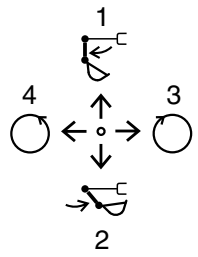
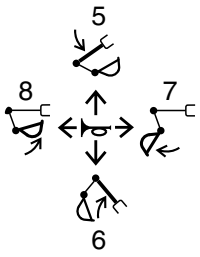
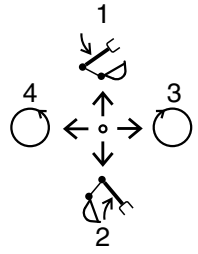
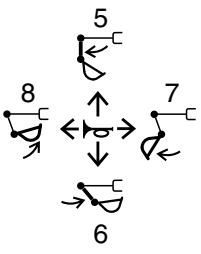
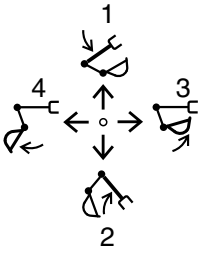
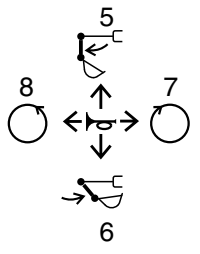
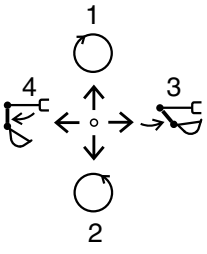
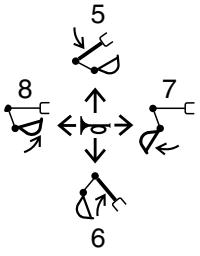
1) PATTERN CHANGE VALVE NOT INSTALL (standard)



※ **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).**

17W9S4OP50

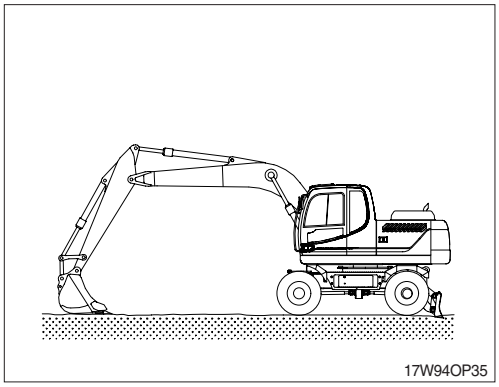
Pattern	Operation		Control function		Hose connection (port)		
	Left RCV lever	Right RCV lever			RCV lever	Change of Terminal block	
						From	To
ISO Type Hyundai			Left	1Arm out	②	D	-
				2Arm in	④	E	-
				3Swing right	③	B	-
				4Swing left	①	A	-
			Right	5Boom lower	④	J	-
				6Boom raise	②	H	-
				7Bucket out	①	G	-
				8Bucket in	③	F	-
A Type			Left	1Boom lower	②	D	J
				2Boom raise	④	E	H
				3Swing right	③	B	-
				4Swing left	①	A	-
			Right	5Arm out	④	J	D
				6Arm in	②	H	E
				7Bucket out	①	G	-
				8Bucket in	③	F	-
B Type			Left	1Boom lower	②	D	J
				2Boom raise	④	E	H
				3Bucket in	③	B	F
				4Bucket out	①	A	G
			Right	5Arm out	④	J	D
				6Arm in	②	H	E
				7Swing right	①	G	B
				8Swing left	③	F	A
C Type			Left	① Loosen the RCV lever mounting bolt (42) and rotates lever assy 90˚ counterclockwise; then install. ② To put lever in correct position, disassemble nut (22) and rotates only lever 90˚ clockwise.			
			Right	Same as ISO type			

13. SWITCHING HYDRAULIC ATTACHMENT CIRCUIT

1) The combined hydraulic attachment circuit is capable of providing single action or double action.

2) The position of 3 way valve selects the single action hydraulic attachment circuit or the double action hydraulic attachment circuit.

3) Before you change the flow mode of hydraulic attachment circuit, place the machine in the servicing position as shown. Stop the engine.



4) Use the spanner to turn the bolt of 3 way valve. Make sure that you turn the bolt between ⓑ and ⓒ.

(1) One way flow (hydraulic breaker)
Position the groove parallel to the piping (ⓑ).

(2) Two way flow (clamshell or shear)
Position the groove perpendicular to the piping (ⓒ).