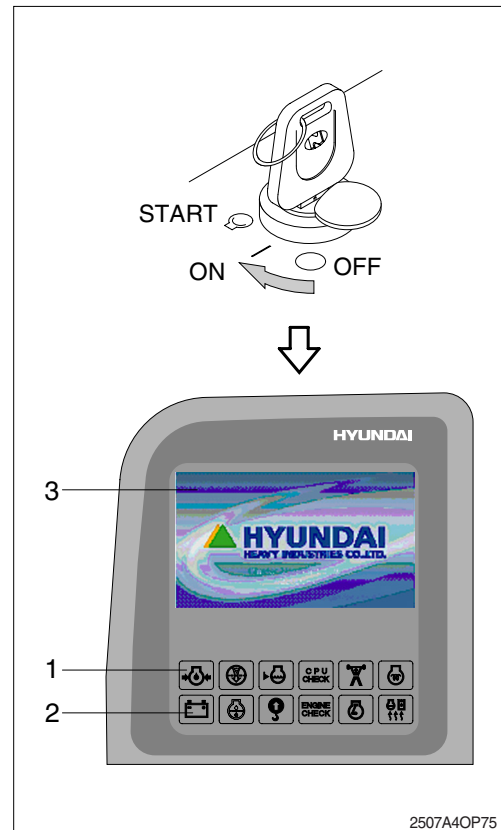


3. STARTING AND STOP THE ENGINE

1) CHECK INDICATOR LIGHTS

- (1) Check if all the operating lever is on the neutral position.
- (2) Turn the starting switch to the ON position, and check following.
 - ① If all the lamps light ON and buzzer sounding for 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)

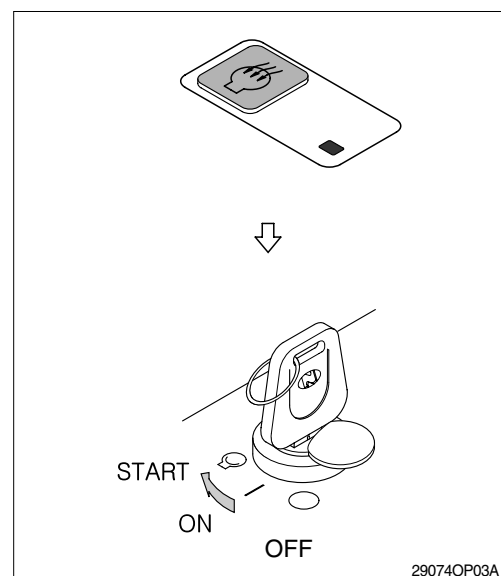
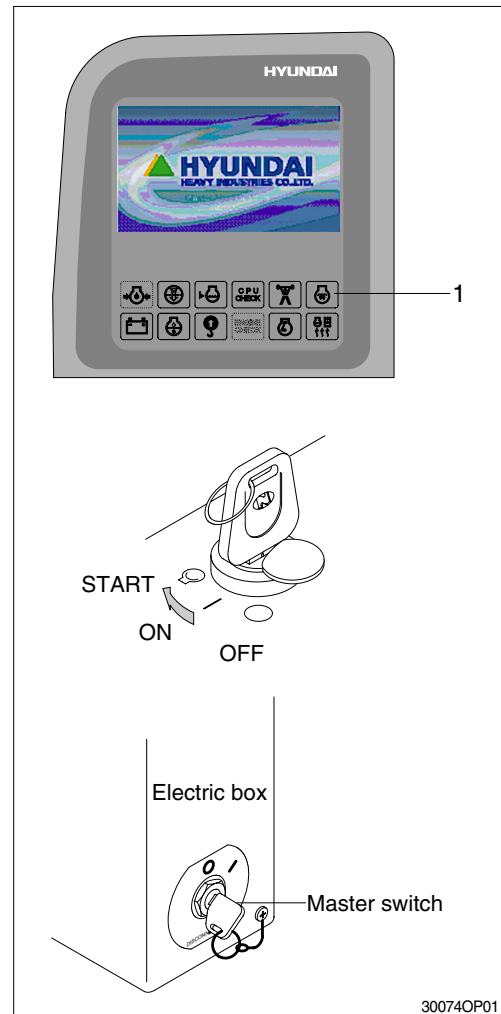


2) STARTING ENGINE

- ※ 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 2-21.
- ※ Fill anti-freeze solution to the coolant as required.

- (1) Check if all the levers are in the neutral position.
- (2) Turn the starting switch to ON position.
- (3) Check if the preheat pilot lamp(1) is turned ON.
 - ※ When the preheat pilot lamp is turned ON, the preheating function is actuated within 20 seconds.
 - ※ After the preheat pilot lamp is turned OFF, engine start within 10 seconds.
- (4) Start engine by turning the starting switch to the START position.
- (5) Release the starting switch immediately after starting engine to avoid possible damage to the starting motor.
 - ※ After engine started, the preheating function is actuated to reduce the white smoke.
 - ※ If the engine does not start, the start switch turn ON position and press the preheat switch (1) for preheating.

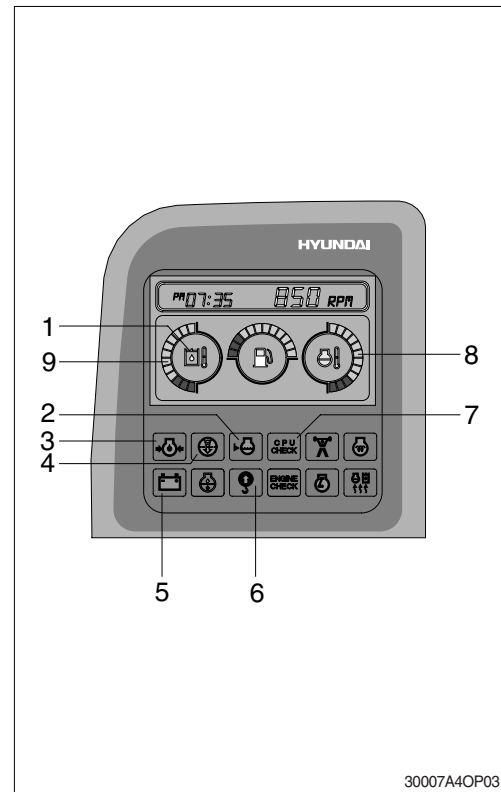
- ※ After the preheating , start the engine again.
If the engine does not start, allow the starter to col for 10~20 seconds before attempting to start the engine again.
At the cold, allow 2 minute before attempting to start the engine again.



3) INSPECTION AFTER ENGINE START

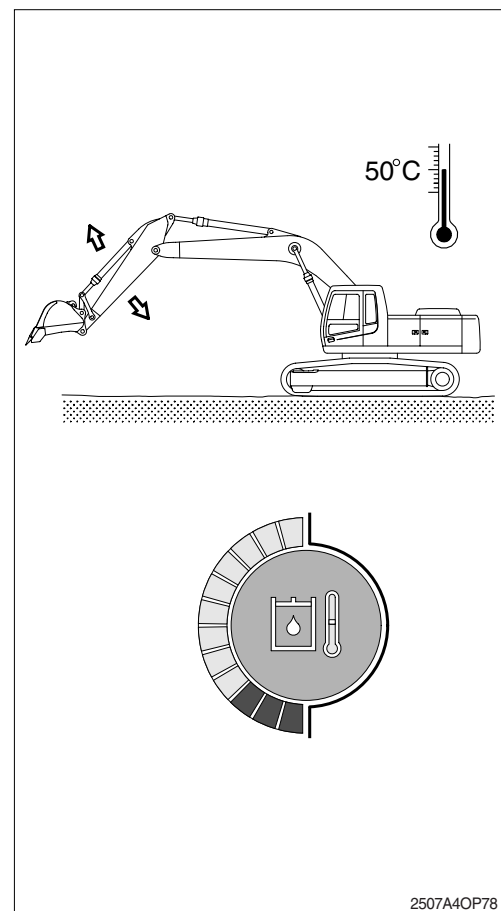
Inspect and confirm the following after engine starts.

- (1) Is the level gauge of hydraulic oil tank in the normal level?
 - (2) Are there leakages of oil or water?
 - (3) Are all the warning lamps OFF(1-7)?
 - (4) Is the indicator of water temperature gauge(8) and hydraulic temperature gauge(9) in the green zone?
 - (5) Is the engine sound and the color of exhaust gas normal?
 - (6) Are the sound and vibration normal?
- ※ **Do not increase engine speed quickly after starting, it can damage engine or turbocharger.**
 - ※ **If there are problems in the control panel, stop the engine immediately and correct problem as required.**



4) WARMING-UP OPERATION

- ※ **The most suitable temperature for the hydraulic oil is about 50°C (122°F). It can cause serious trouble in the hydraulic system by sudden operation when the hydraulic oil temperature is below 25°C (77°F). Then temperature must be raised to at least 25°C (77°F) before starting work.**
- (1) Run the engine at low idling for 5 minutes.
 - (2) Speed up the idling and run the engine at mid-range speed.
 - (3) Operate bucket lever for 5 minutes.
 - ※ **Do not operate anything except bucket lever.**
 - (4) Run the engine at the high speed and operate the bucket lever and arm lever for 5-10 minutes.
 - ※ **Operate only the bucket lever and arm lever.**
 - (5) This warming-up operation will be completed by operation of all cylinders several times, and operation of swing and traveling.
 - ※ **Increase the warming-up operation during winter.**

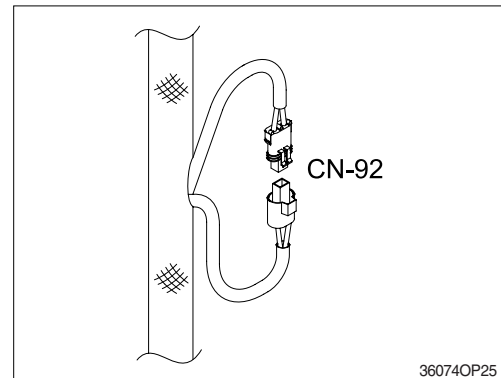


5) OPERATION IN CASE OF MALFUNCTION OF THE MCU CONTROLLER

- ※ The following explains the way to start and to control engine speed in case of malfunction of the MCU controller.

(1) Emergency starting engine

- ① If the MCU controller is removed, the engine does not start
- ② Before starting the engine, connect the connector CN-92 A with B



(2) Engine speed control

Engine speed can be controlled as following.

- ① Connecting the prolix resistor to CN-47 connector.
- ② Connecting the CN-16 connector to CN-16B.
- ③ Engine speed controlled by rotating accel dial switch.

