

## GROUP 12 MONITORING SYSTEM

### 1. OUTLINE

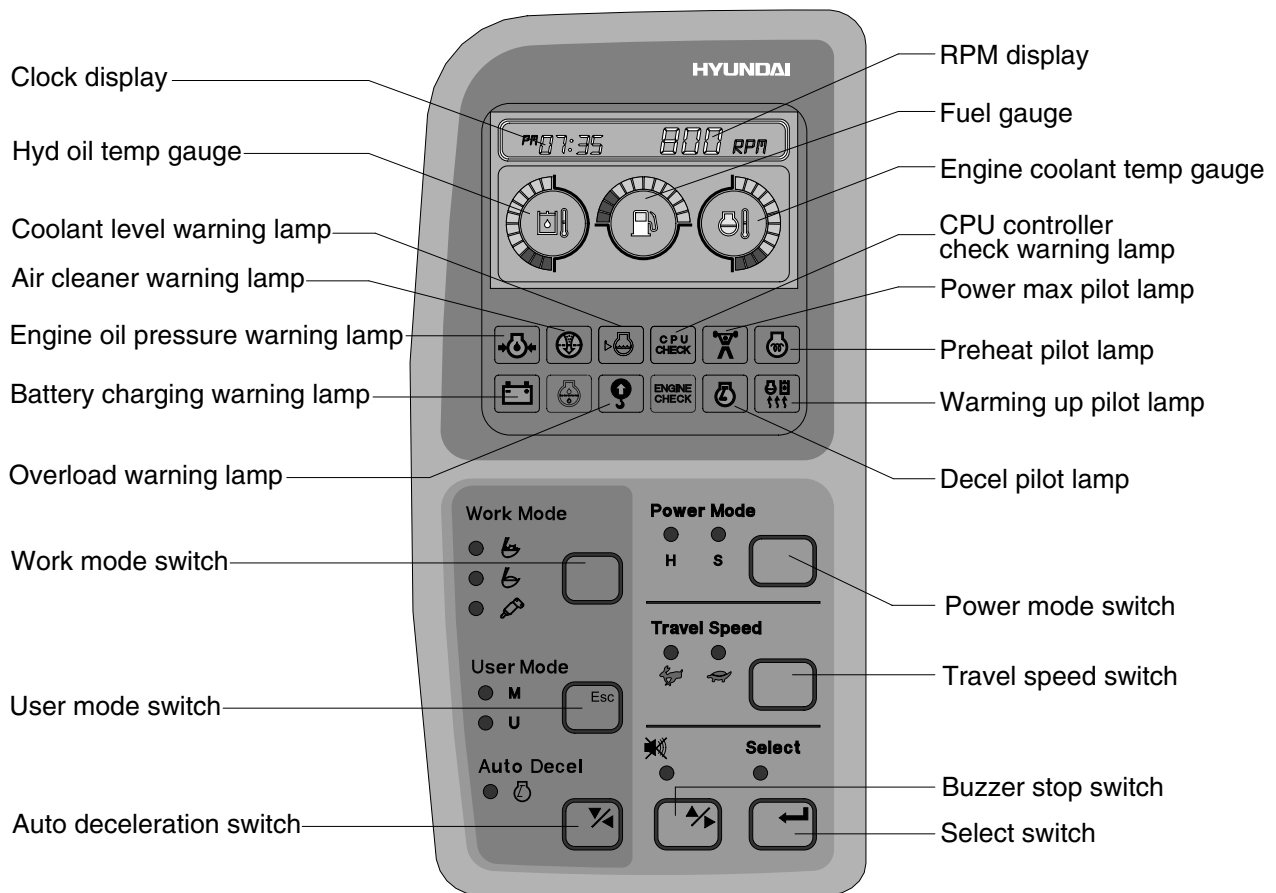
Monitoring system consists of the monitor part and switch part.

The monitor part gives warnings when any abnormality occurs in the machine and informs the condition of the machine.

Various select switches are built into the monitor panel, which act as the control portion of the machine control system.

### 2. CLUSTER

#### 1) MONITOR PANEL



30075MS01A

## 2) CLUSTER CHECK PROCEDURE

### (1) Start key : ON

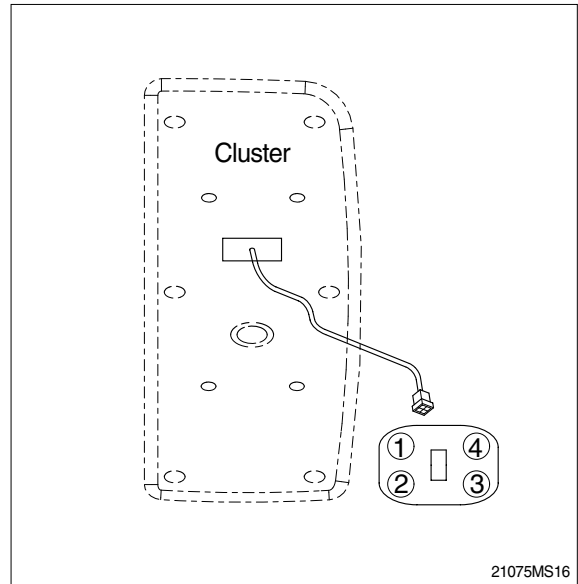
- ① Check monitor initial 5 seconds
  - a. All lamps light up.
  - b. Buzzer sound.
- ② Check monitor after 5 seconds : Indicate cluster version and machine condition
  - a. Cluster program version : 「1.00」 ← Indicates program version 「1.00」 for 5 seconds.
  - b. Tachometer : 0rpm
  - c. Fuel gauge : All light up below appropriate level
  - d. Hydraulic temperature : All light up below appropriate level
  - e. Engine coolant temperature gauge : All light up below appropriate level
  - f. Warning lamp
    - ※ During start key **ON** the engine oil pressure lamp and battery charging lamp go on, but it is not abnormal.
    - ※ When engine coolant temperature below 30°C, the warming up lamp lights up.
- ③ Indicating lamp state
  - a. Work mode selection : General work
  - b. Power mode selection : S mode
  - c. User mode selection : No LED ON
  - d. Auto decel LED : ON
  - e. Travel speed pilot lamp : Low(Turtle)

### (2) Start of engine

- ① Check machine condition
  - a. Tachometer indicates at present rpm
  - b. Gauge and warning lamp : Indicate at present condition.
    - ※ When normal condition : All warning lamp OFF
  - c. Work mode selection : General work
  - d. Power mode selection : S mode
  - e. User mode selection : No LED ON
  - f. Auto decel LED : ON
  - g. Travel speed pilot lamp : Low(Turtle)
- ② When warming up operation
  - a. Warming up lamp : ON
  - b. 10 seconds after engine started, engine speed increases to 1000rpm(Auto decel LED : ON)
    - ※ Others same as above ①.
- ③ When abnormal condition
  - a. The lamp lights up and the buzzer sounds.
  - b. If **BUZZER STOP** switch is pressed, buzzer sound is canceled but the lamp light up until normal condition.

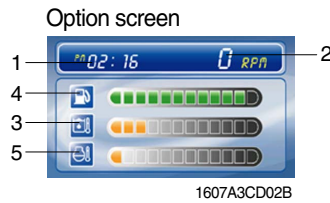
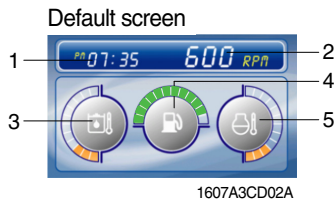
### 3. CLUSTER CONNECTOR

No.	Signal	Input / Output
1	Power IG(24V)	Input(20~32V)
2	GND	Input(0V)
3	Serial-(RX)	Input(Vpp=12V)
4	Serial+(TX)	Output(Vpp=4V)



## 4. CLUSTER FUNCTION

### 1) LCD main operation display



- 1 Time display
- 2 RPM display
- 3 Hydraulic oil temperature gauge
- 4 Fuel level gauge
- 5 Engine coolant temperature gauge

#### (1) Time display



① This displays the current time.

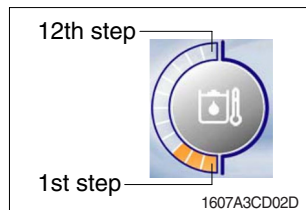
※ Refer to the page 5-31 to set time for details.

#### (2) RPM display



① This displays the engine rpm.

#### (3) Hydraulic oil temperature gauge



① This gauge indicates the temperature of hydraulic oil in 12 step gauge.

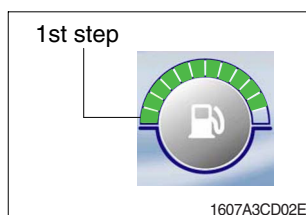
- 1st step : Below 30°C(86°F)
- 2nd~10th step : 30-105 °C(86-221°F)
- 11th~12th step : Above 105°C(221°F)

② The gauge between 2nd and 10th steps illuminates when operating.

③ Keep idling engine at low speed until the gauge between 2nd and 10th steps illuminates, before operation of machine.

④ When the gauge of 11th and 12th steps illuminates, reduce the load on the system. If the gauge stays in the 11th~12th steps, stop the machine and check the cause of the problem.

#### (4) Fuel level gauge

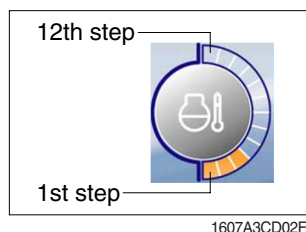


① This gauge indicates the amount of fuel in the fuel tank.

② Fill the fuel when the 1st step or fuel icon blinks in red.

※ If the gauge illuminates the 1st step or fuel icon blinks in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

#### (5) Engine coolant temperature gauge



① This gauge indicates the temperature of coolant in 12 step gauge.

- 1st step : Below 30°C(86°F)
- 2nd~10th step : 30-105 °C(86-221°F)
- 11th~12th step : Above 105°C(221°F)

② The gauge between 2nd and 10th steps illuminates when operating.

③ Keep idling engine at low speed until the gauge between 2nd and 10th steps illuminates, before operation of machine.

④ When the gauge of 11th and 12th steps illuminates, turn OFF the engine, check the radiator and engine.

### 3) Warning of main operation screen

#### (1) Warning display

##### ① Engine coolant temperature



- This lamp blinks and the buzzer sounds when the temperature of coolant is over the normal temperature 105°C ( 221°F ) .
- Check the cooling system when the lamp blinks.

##### ② Fuel level



- This lamp blinks and the buzzer sounds when the level of fuel is below 40 l (10.6 U.S. gal).
- Fill the fuel immediately when the lamp blinks.

##### ③ Hydraulic oil temperature



- This warning lamp operates and the buzzer sounds when the temperature of hydraulic oil is over 105 °C ( 221 °F ) .
- Check the hydraulic oil level when the lamp blinks.
- Check for debris between oil cooler and radiator.

##### ④ All gauge



- This lamp blinks and the buzzer sounds when the all gauge is abnormal.
- Check the each system when the lamp blinks.

##### ⑤ Communication error



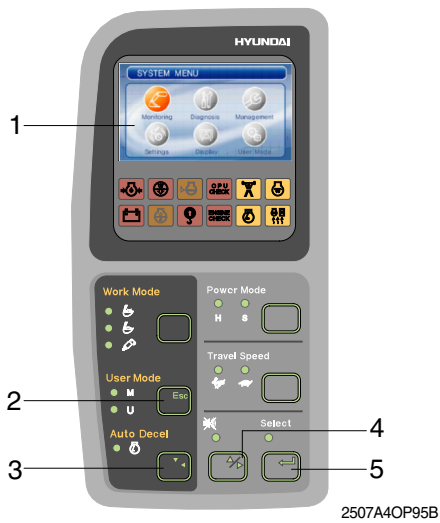
- Communication problem between MCU controller and cluster makes the lamp blinks and the buzzer sounds.
- Check if any fuse for MCU burnt off.  
If not check the communication line between them.






#### (2) Pop-up icon display

No	Switch	Selected mode	Display
1	Work mode switch	General work mode	
		Heavy duty work mode	
		Breaker operation mode	
2	Power mode switch	High power work mode	
		Standard power work mode	

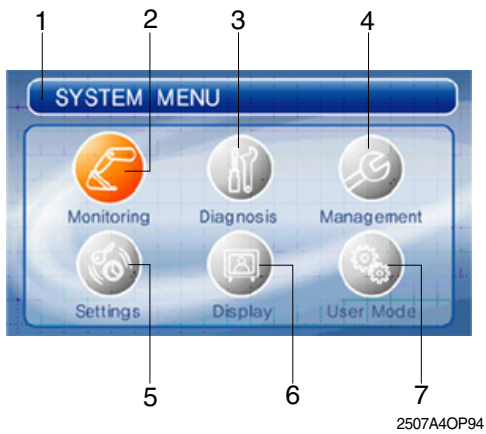
No	Switch	Selected mode	Display
3	Auto deceleration switch	Light ON	
		Light OFF	
4	Travel speed control	Low speed	
		High speed	







## 4) LCD



- 1  : LCD
- 2  : Escape,  
Return to the previous menu
- 3  : Down/Left Direction
- 4  : Up/Right Direction
- 5  : Select(Enter)  
Activate the currently chosen item

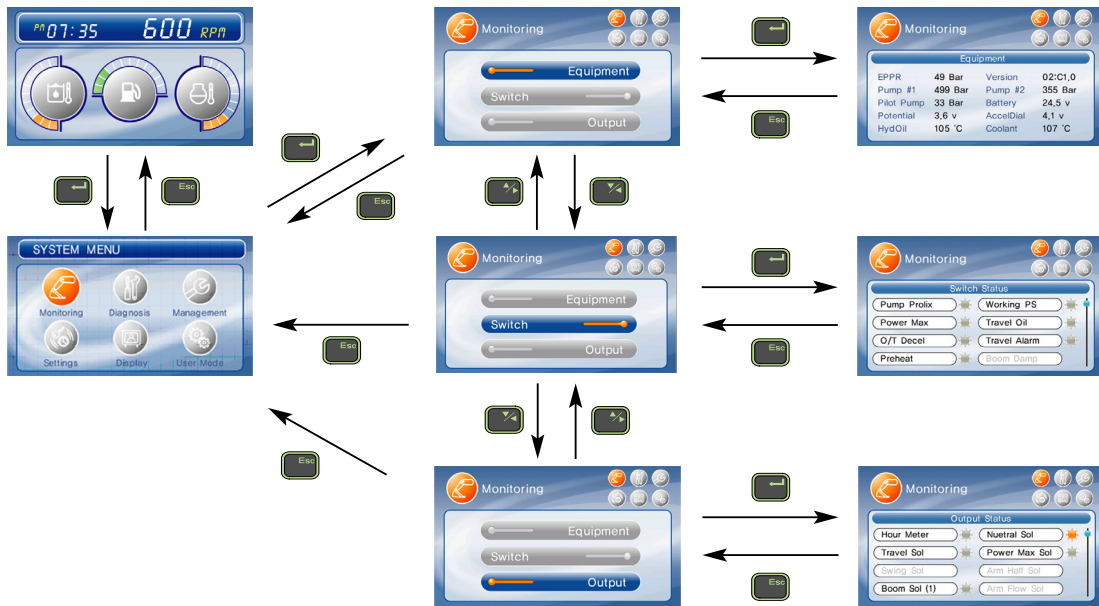
## (1) Main menu



- 1  : Menu information
- 2  : Monitoring  
- Equipment, Switch, Output
- 3  : Diagnosis  
- Current error, Recorded error
- 4  : Maintenance
- 5  : Settings  
- Time set, Dual mode  
- System lock(Reserved)
- 6  : Display  
- Operation skin, Brightness, Language
- 7  : User mode

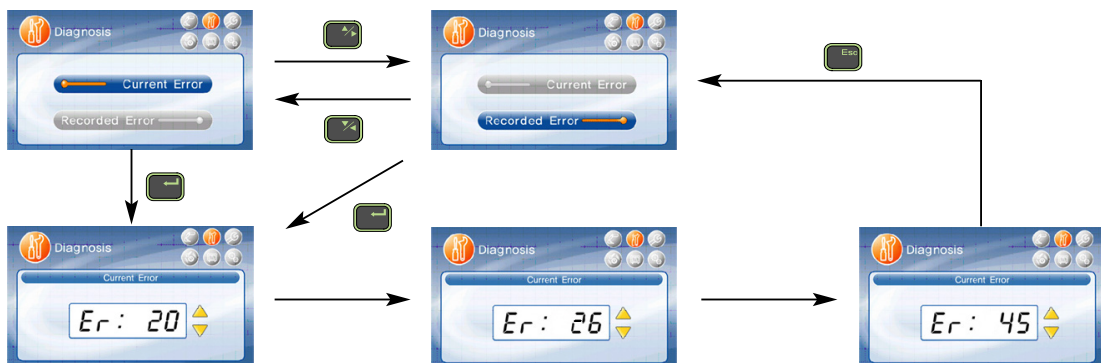
## (2) Display map

### ① Monitoring

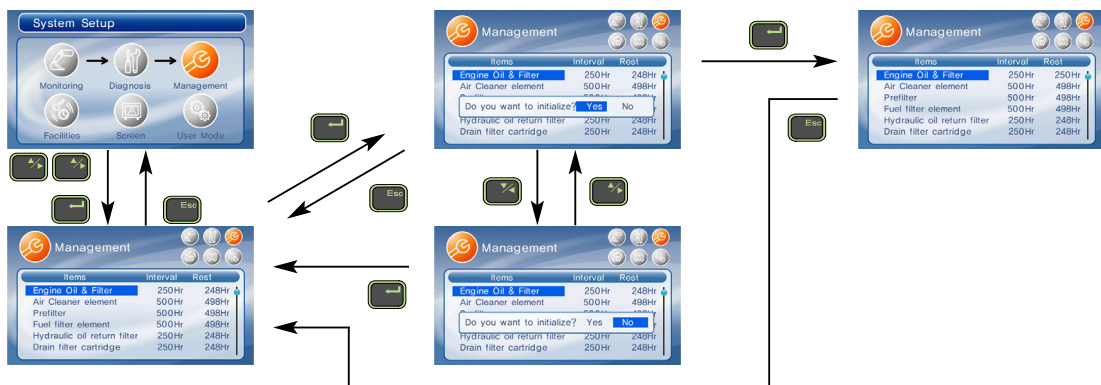


### ② Diagnosis

- If there are more than 2 error codes, each one can be displayed by pressing or switch respectively.



### ③ Maintenance



④ Setting

a. Time set



b. System lock - Reserved

c. Dual mode  
- Changing the MCU mode

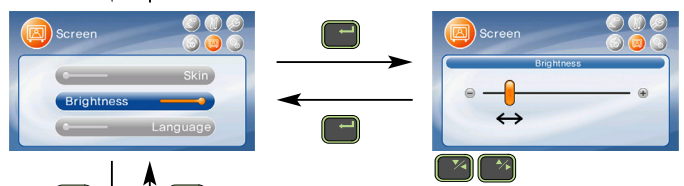


⑤ Display

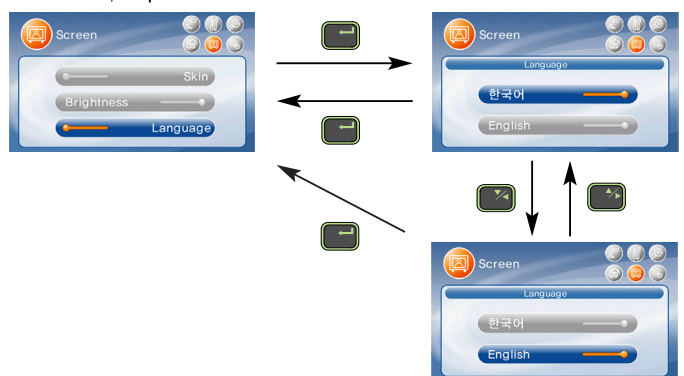
a. Operation skin



b. Brightness

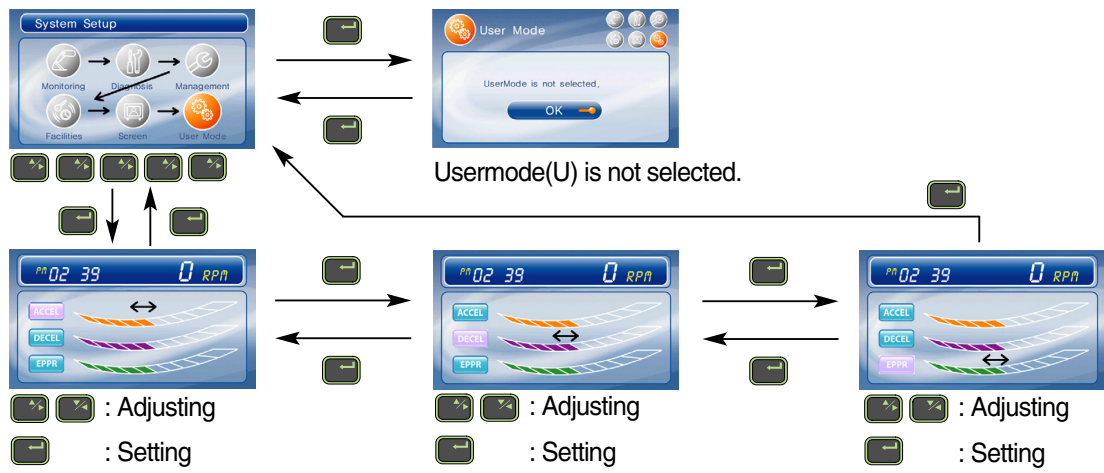


c. Language



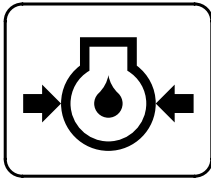


⑥ User mode



## 5) Warning and pilot lamp

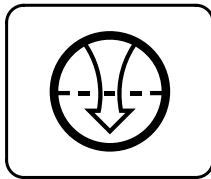
### (1) Engine oil pressure warning lamp



21073CD07

- ① This lamp blinks and the buzzer sounds after starting the engine because of the low oil pressure.
- ② If the lamp blinks during engine operation, shut OFF engine immediately. Check oil level.

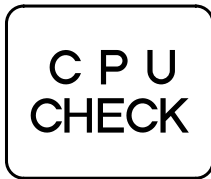
### (2) Air cleaner warning lamp



21073CD08

- ① This lamp blinks and the buzzer sounds when the filter of air cleaner is clogged.
- ② Check the filter and clean or replace it.

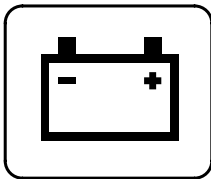
### (3) MCU controller check warning lamp



21073CD10

- ① If any fault code is received from MCU controller, this lamp blinks and the buzzer sounds.
- ② Check the communication line between MCU controller and cluster.

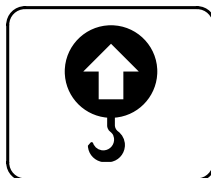
### (4) Battery charging warning lamp



21073CD13

- ① This lamp blinks and the buzzer sounds when the starting switch is ON, it is turned OFF after starting the engine.
- ② Check the battery charging circuit when this lamp blinks during engine operation.

### (5) Overload warning lamp (Option)



21073CD15

- ① When the machine is overload, the overload warning lamp blinks during the overload switch is ON.

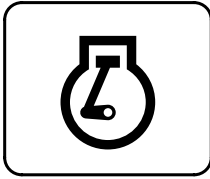
#### (6) Power max pilot lamp



21073CD11

- ① The lamp will be ON when pushing power max switch on the LH RCV lever.

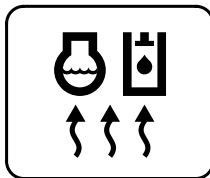
#### (7) Decel pilot lamp



21073CD17

- ① Operating auto decel or one touch decel makes the lamp ON.
- ② The lamp will be ON when pushing one touch decel switch on the LH RCV lever.

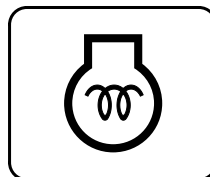
#### (8) Warming up pilot lamp



21073CD18

- ① This lamp is turned ON when the coolant temperature is below 30°C (86 °F).
- ② The automatic warming up is cancelled when the engine coolant temperature is above 30 °C, or when 10 minutes have passed since starting.

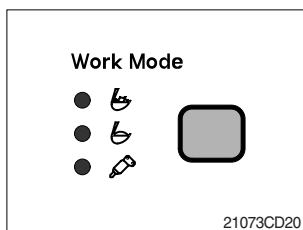
#### (9) Preheat pilot lamp






21073CD12

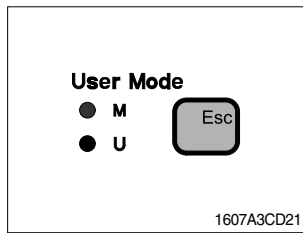
- ① Turning the start key switch ON position starts preheating in cold weather.
- ② Start the engine as this lamp is OFF.

#### (10) Work mode switch



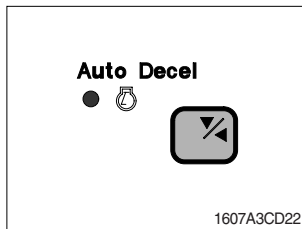
- ① This switch is to select the machine operation mode, which shifts from general operation mode to heavy operation mode and breaker mode in a row by pressing the switch.
    -  : Heavy duty work mode
    -  : General work mode
    -  : Breaker operation mode
- ※ Refer to the page 5-4 for details.

### (11) User mode switch



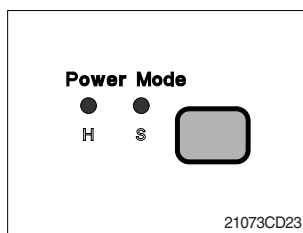
- ① This switch is to select the maximum power or user mode.
    - M : Maximum power
    - U : Memorizing operators preferable power setting.
- ※ Refer to the page 5-5 for details.


### (12) Auto deceleration switch



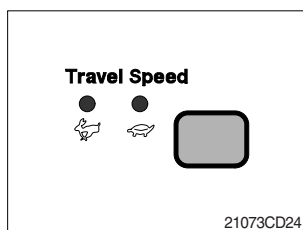
- ① This switch is used to actuate or cancel the auto deceleration function.
- ② When the switch actuated and all control levers and pedals are at neutral position, engine speed will be lowered automatically to save fuel consumption.
  - Light ON : Auto deceleration function is selected.
  - Light OFF : a. Auto deceleration function is cancelled so that the engine speed increased to previous setting value.  
b. One touch decel function is available.

### (13) Power mode switch



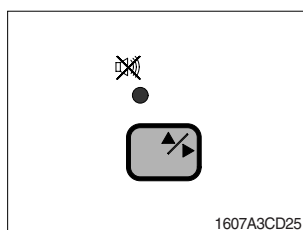
- ① The lamp of selected mode is turned ON by pressing the switch(  ).
  - H : High power work.
  - S : Standard power work.

### (14) Travel speed control switch



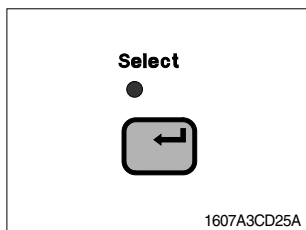
- ① This switch is to control the travel speed which is changed to high speed(Rabbit mark) by pressing the switch and low speed(Turtle mark) by pressing it again.

### (15) Buzzer stop switch



- ① When the starting switch is turned ON first, normally the alarm buzzer sounds for 2 seconds during lamp check operation.
- ② The red lamp lights ON and the buzzer sounds when the machine has a problem.  
In this case, press this switch and buzzer stops, but the red lamp lights until the problem is cleared.

**(16) Select switch**



- ① This switch is used to enter main menu and sub menu of LCD.
- ※ **Refer to the page 5-29 for details.**

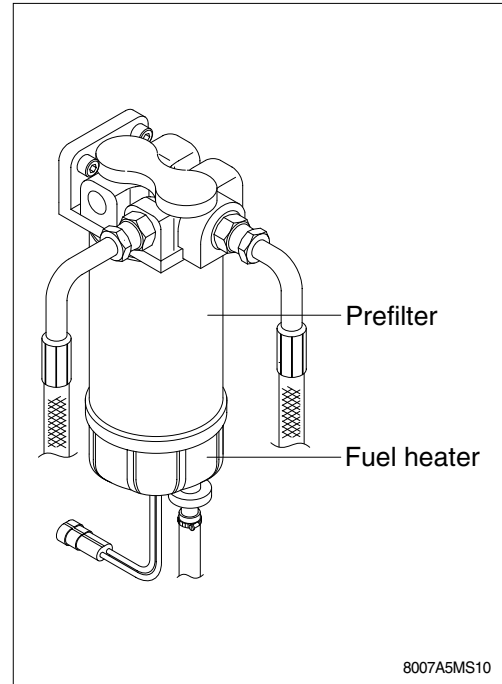
# GROUP 13 FUEL WARMER SYSTEM

## 1. SPECIFICATION

- 1) Operating voltage :  $24 \pm 4V$
- 2) Power :  $200 \pm 50W$
- 3) Current : 15A

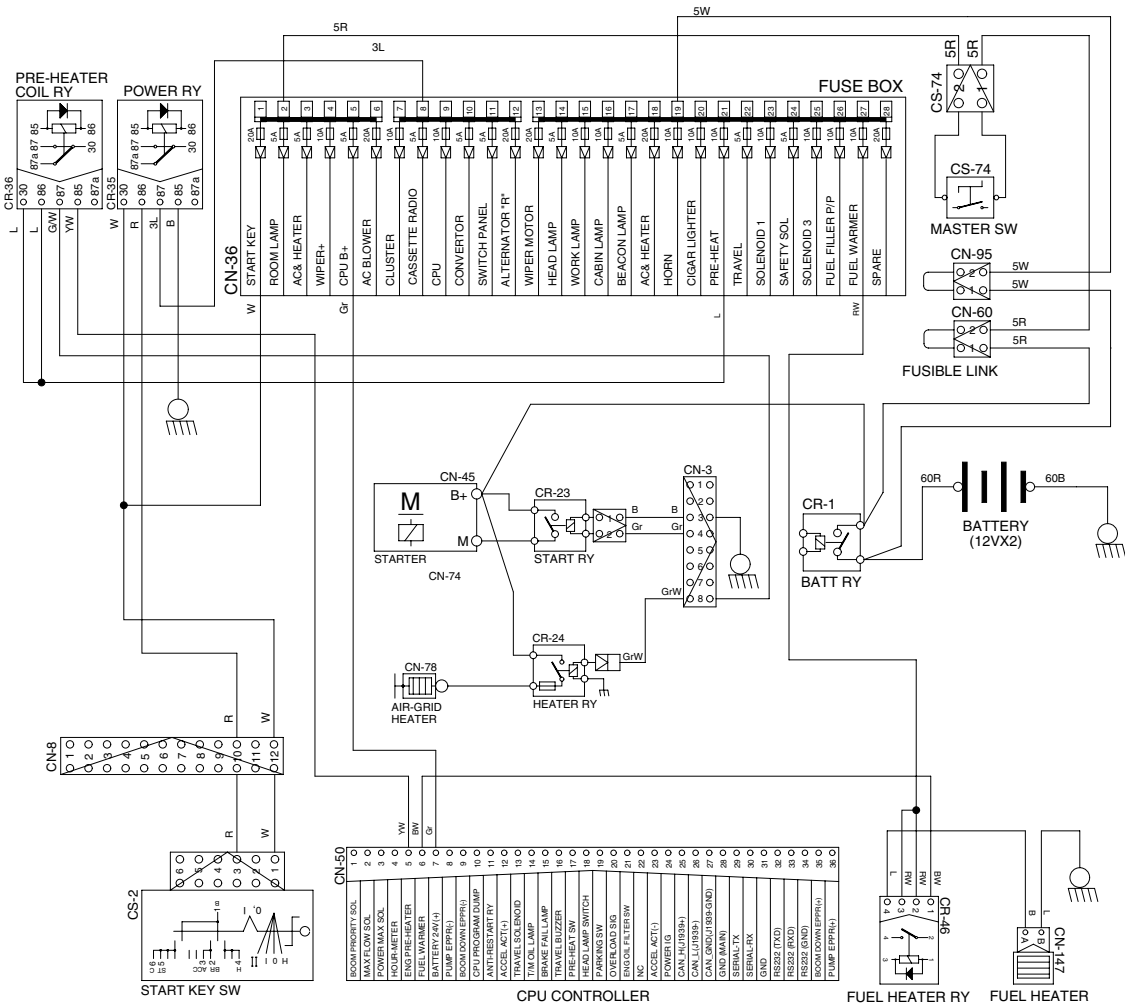
## 2. OPERATION

- 1) The current of fuel warmer system is automatically controlled without thermostat according to fuel temperature.
- 2) At the first state, the 15A current flows to the fuel warmer and engine may be started in 1~2 minutes.
- 3) If the fuel starts to flow, ceramic-disk in the fuel warmer heater senses the fuel temperature to reduce the current as low as 1.5A.  
So, fuel is protected from overheating by this mechanism.



8007A5MS10

## 3. ELECTRIC CIRCUIT



30007A5MS13