

## 4. MODE SELECTION SYSTEM

### 1) STRUCTURE OF CAPO SYSTEM

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

#### (1) Work mode

3 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.

##### ③ Breaker operation mode

It sets the pump flow to the optimal operation of breaker by activating the max flow cut-off solenoid.

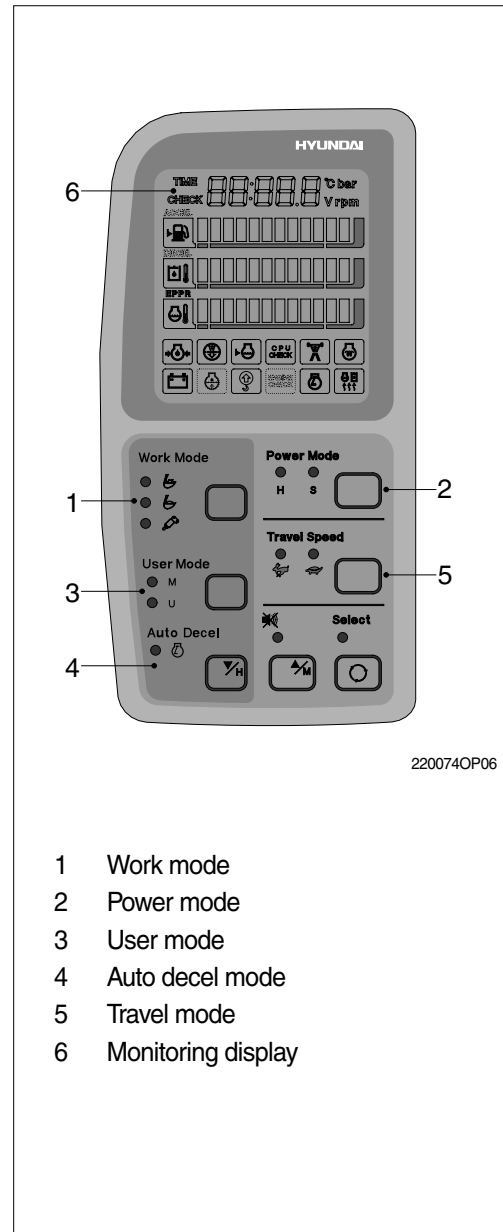
#### (2) Power mode

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

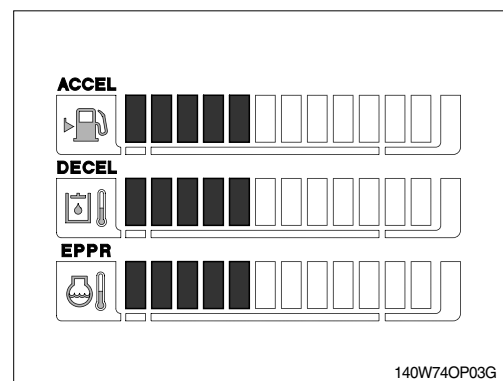
- M : Maximum power
- U : You can change the engine and pump power and memorize it for your preference.



- 1 Work mode
- 2 Power mode
- 3 User mode
- 4 Auto decel mode
- 5 Travel mode
- 6 Monitoring display

### 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. When you select U, cluster LCD displays.



- ② To change the engine high idle speed, press the USER mode switch and SELECT switch at the same time and then ACCEL blinks at 0.5 seconds interval.
- By pressing ▲ or ▼ switch, █ will increase or decrease.
- ③ To change DECEL rpm, press the USER mode switch and SELECT switch once more and then DECEL blinks at 0.5 seconds interval.
- By pressing ▲ or ▼ switch, █ will increase or decrease.
- ④ To change EPPR current, press the USER mode switch and SELECT switch one more and then EPPR blinks at 0.5 seconds interval.
- By pressing ▲ or ▼ switch, █ will increase or decrease.

· LCD segment vs parameter setting

Segment (█)	ACCEL (rpm)	DECEL (rpm)		EPPR (mA)
1	1250	Low idle		150
		950	*1050	
2	1350	1050	*1100	200
3	1450	1100	*1150	250
4	1550	1150	Decel rpm *1200	300
5	1650	Decel rpm 1200	*1250	350
6	1750	1250	*1300	400
7	1850	1300	*1350	450
8	1950	1350	*1400	500
9	2050	1400	*1450	550
10	2150	1500	*1500	600



\* : TIER II only

- ⑤ To memorize the final setting, press the USER mode switch and SELECT switch one more time.

(4) Auto decel mode

Engine quick deceleration.

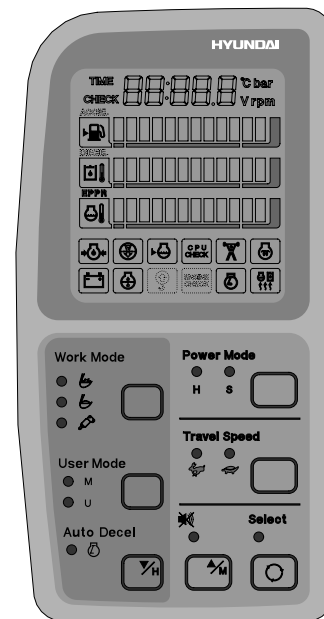
(5) Travel mode

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

(6) Monitoring system

Information of machine performance as monitored by the CPU controller can be displayed on the **monitoring display**.

※ Refer to 4-11 page for details.



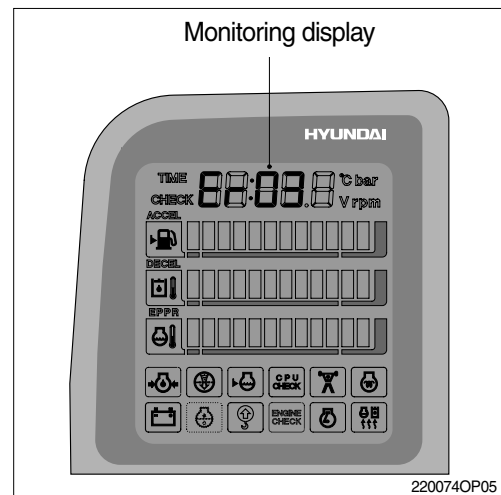
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### (7) Self diagnostic system

The CPU controller diagnoses problems in the CAPO system caused by electric parts' malfunction and by open or short circuit, which are displayed on the **monitoring display** as error codes.

### (8) Anti-restart system

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

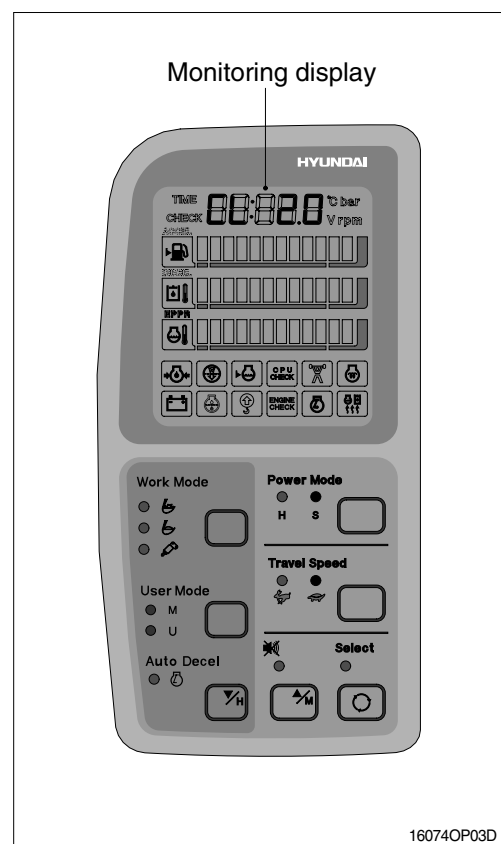


## 2) HOW TO OPERATE MODE SELECTION SYSTEM

### (1) When start key 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 **CL : 2.0** , the version of cluster program, is displayed on **Monitoring display** 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.

※ Refer to 4-11 page for details.



## (2) After engine start

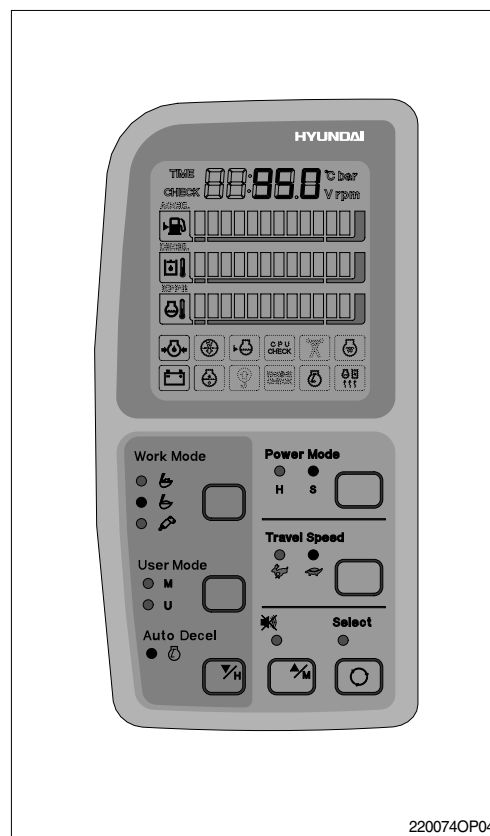
- ① When the engine is started, three lamps are ON as below.

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

- In this condition, tachometer indicates low idle,  $950 \pm 100\text{rpm}$ / $1050 \pm 100\text{rpm}$ (TIER II).
- If coolant temperature is below  $30^{\circ}\text{C}$ , after 10 seconds the engine speed increases to  $1200 \pm 100\text{rpm}$  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 4-11 page for details.



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## 3) SELECTION OF POWER MODE

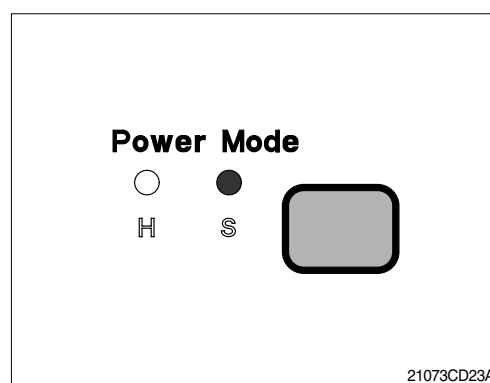
### (1) S mode

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

Engine rpm	Effect
2150 $\pm$ 50 *1950 $\pm$ 50	Same power as <b>non</b> mode type machine.

\*: TIER II only

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



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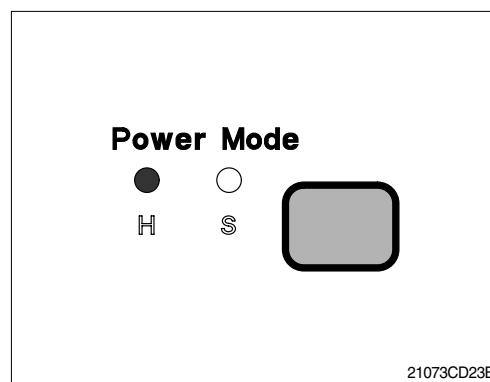
### (2) H mode

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

Engine rpm	Effect
2250 $\pm$ 50 *2050 $\pm$ 50	Approximately 110% of power and speed available than <b>non</b> mode type machine or <b>S</b> mode.

\*: TIER II only

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



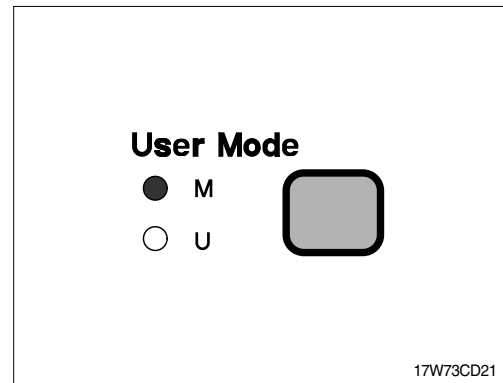
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### (3) M mode

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 <b>non</b> mode type machine or <b>S</b> mode.

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



#### 4) MONITORING DISPLAY

Information of machine performance as monitored by the CPU controller can be displayed on the cluster when the operator selects a display mode by touching **SELECT** switch alone or with **BUZZER STOP** switch on the cluster as below.

Display group	How to select display mode		Name	Display on the cluster
	Group selection	Display mode selection		
<b>Group 0</b> (Default)	Way 1 Key switch <b>ON</b> or <b>START</b>  Way 2 Touch <b>AUTO DECEL</b> switch while pressing <b>BUZZER STOP</b> at group 1~4.	Initial	Engine rpm	1050 rpm
		Touch <b>SELECT</b> 1 time	Time	TIME 12:30
		Touch <b>SECTET</b> 2 times	Power shift pressure (EPPR valve)	EP: 10 bar
		Touch <b>SELECT</b> 3 times	CPU model & version	21C5.1
		Touch <b>SELECT</b> 4 times	Option (Only when a pressure sensor is installed)	P1: 100 bar
		Touch <b>SELECT</b> 5 times		P2: 200 bar
		Touch <b>SELECT</b> 6 times		P3: 30 bar
<b>Group 1</b> (Volt, temp, EPPR press, version)	Touch <b>SELECT</b> switch <b>once</b> while pressing <b>BUZZER STOP</b> . In this group <b>SELECT</b> LED <b>ON</b>	Default	Battery voltage(V)	b: 24.8 v
		Touch <b>SELECT</b> 1 time	Potentiometer voltage(V)	Pa: 2.5 v
		Touch <b>SELECT</b> 2 times	Accel dial voltage(V)	dL: 3.8 v
		Touch <b>SELECT</b> 3 times	Hydraulic oil temperature(°C)	Hd: 50 °C
		Touch <b>SELECT</b> 4 times	Coolant temperature(°C)	Ct: 85 °C
<b>Group 2</b> (Error code)	Touch <b>SELECT</b> switch <b>twice</b> while pressing <b>BUZZER STOP</b> . In this group <b>BUZZER STOP</b> LED blinks	Default	Current error	CHECK Er: 03
		Touch <b>SELECT</b> 1 time	Recorded error (Only key switch ON)	TIME Er: 03
		Press down(▼) & <b>SELECT</b> at the same time	Recorded error deletion (Only key switch ON)	TIME Er: 00
<b>Group 3</b> (Switch input)	Touch <b>SELECT</b> switch <b>3 times</b> while pressing <b>BUZZER STOP</b> . In this group <b>SELECT</b> LED blinks at 0.5sec interval	Default	Pump prolix switch	PP: on or off
		Touch <b>SELECT</b> 1 time	Auto decel pressure switch	dP: on or off
		Touch <b>SELECT</b> 2 times	Power boost switch	Pb: on or off
		Touch <b>SELECT</b> 3 times	Travel oil pressure switch	oP: on or off
		Touch <b>SELECT</b> 4 times	One touch decel switch	od: on or off
		Touch <b>SELECT</b> 5 times	Travel alarm switch	br: on or off
		Touch <b>SELECT</b> 6 times	Preheat switch	Ph: on or off

Display group	How to select display mode		Name	Display on the cluster
	Group selection	Display mode selection		
<b>Group 4</b> (Output)	Touch <b>SELECT</b> switch <b>4 times</b> while pressing <b>BUZZER STOP</b> . In this group <b>SELECT</b> LED blinks at 1sec interval	Default	Hourmeter	Ho:on or oFF
		Touch <b>SELECT</b> 1 time	Neutral relay (Anti-restart relay)	nr:on or oFF
		Touch <b>SELECT</b> 2 times	Travel speed solenoid	tS:on or oFF
		Touch <b>SELECT</b> 3 times	Power boost solenoid (2-stage relief solenoid)	PS:on or oFF
		Touch <b>SELECT</b> 4 times	Boom priority solenoid	bS:on or oFF
		Touch <b>SELECT</b> 5 times	Travel alarm	Al:on or oFF
		Touch <b>SELECT</b> 6 times	Max flow cut off solenoid	FS:on or oFF
		Touch <b>SELECT</b> 7 times	Preheat relay	PR:on or oFF

※ By touching **SELECT** switch once while pressing **BUZZER STOP**, display group shifts.

Example : Group 0 → 1 → 2 → 3 → 4 → 0