

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.

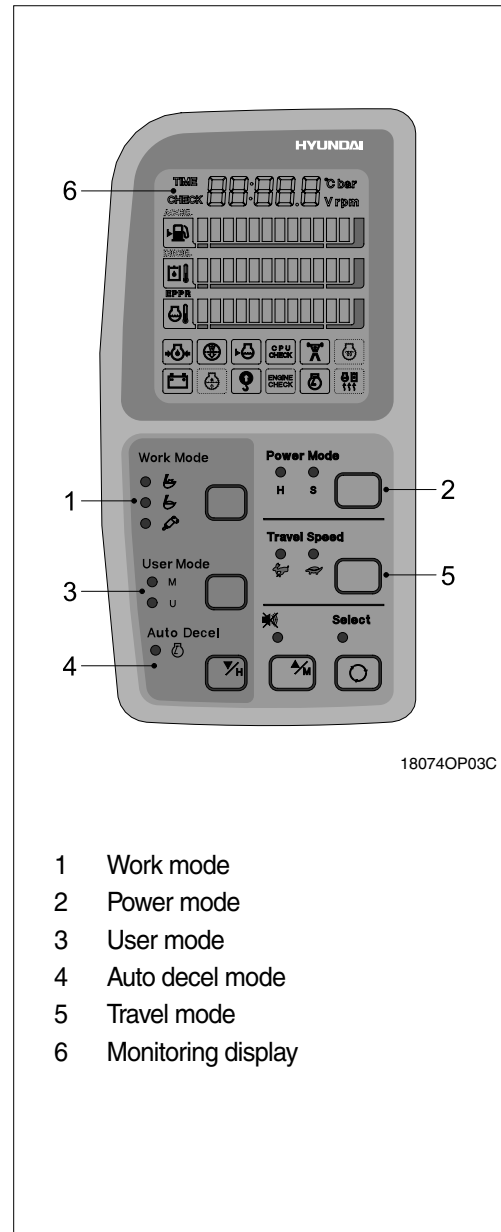
(2) Power mode

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

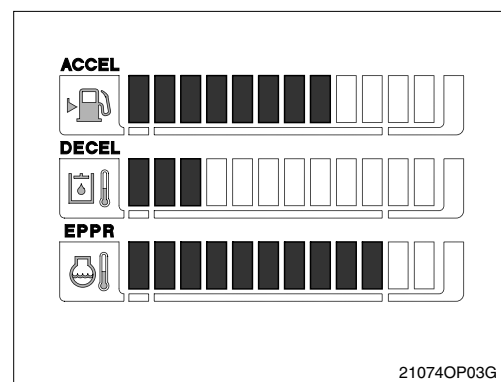
- M : Maximam power
- U : You can change the engine and pump power and memorize it for your preference



- 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 once 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	High idle-900	Low idle		150
		800	*700	
2	High idle-800	1050	*800	200
3	High idle-700	1100	*900	250
4	High idle-600	1150	*1000	300
5	High idle-500	Decel rpm		350
		1200	*1100	
6	High idle-400	1250	*1200	400
7	High idle-300	1300	*1250	450
8	High idle-200	1350	*1300	500
9	High idle-100	1400	*1350	550
10	High idle	1500	*1400	600



* : TIER II only

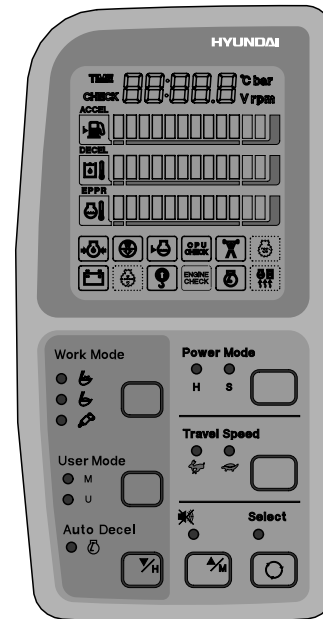
- ⑤ To memorize the final setting, press the USER mode switch and SELECT switch one more time.

(4) Auto decel mode

Engine quick deceleration.

(5) Travel mode

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



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(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.

(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

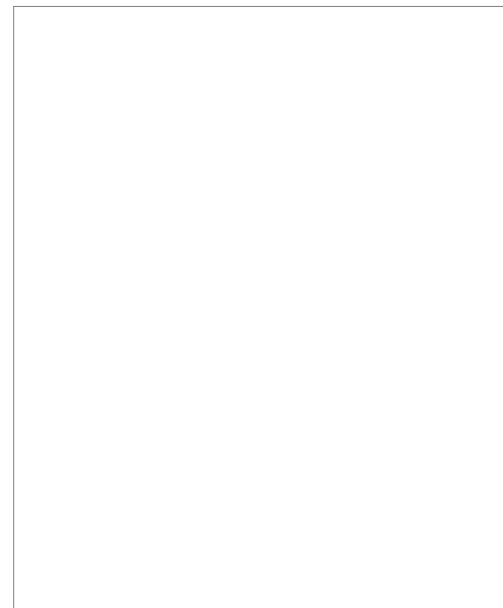
The system protects the starter from inadvertent restarting after the engine is already operational.

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 : 1.5** , 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

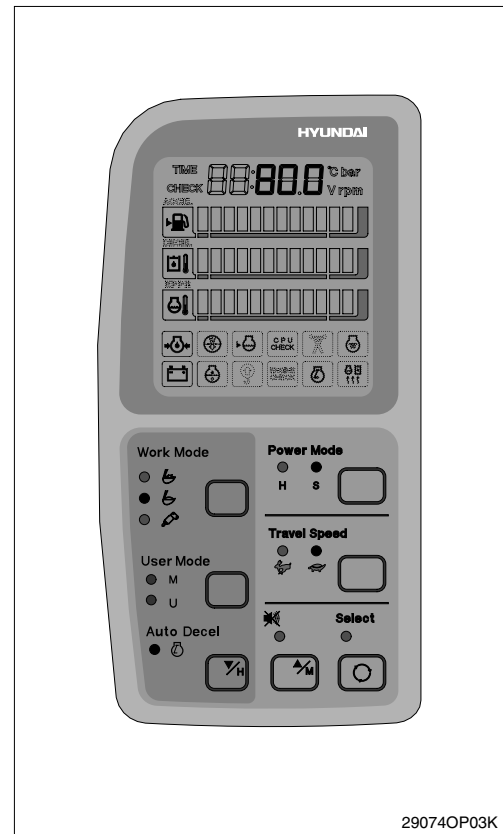
- ① When the engine is started, three lamps are ON as below.

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

- In this condition, tachometer indicates low idle, $800 \pm 100 \text{ rpm} / 700 \pm 100 \text{ rpm}$ (TIER II).
- If coolant temperature is below 30°C , after 10 seconds the engine speed increases to $1200 \pm 100 \text{ rpm} / 1000 \pm 100 \text{ rpm}$ (TIER II) 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

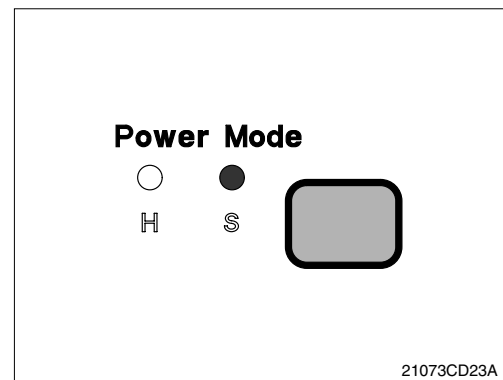
(1) S mode

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

Engine rpm	Effect
1950 \pm 50 *1750 \pm 50	Same power as non 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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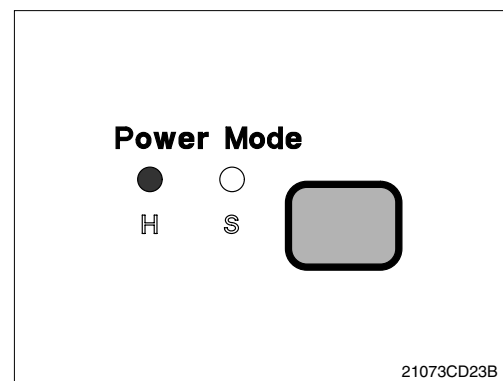
(2) H mode

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

Engine rpm	Effect
2090 \pm 50 *1850 \pm 50	Approximately 110% of power and speed available than non mode type machine or S mode.

* : TIER II only

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



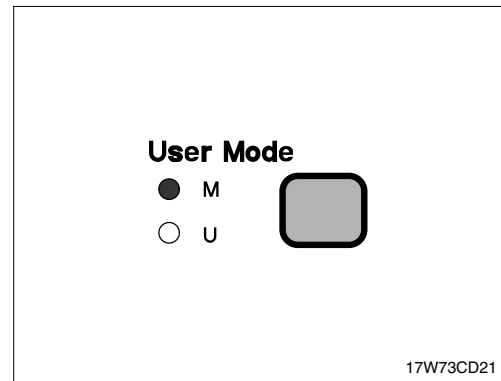
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(3) M mode

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

Engine rpm	Effect
1950 ± 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 50~100rpm 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		
Group 0 (Default)	Way 1 Key switch ON or START Way 2 Touch AUTO DECEL switch while pressing BUZZER STOP at group 1~4.	Initial	Engine rpm	800 rpm
		Touch SELECT 1 time	Time	TIME 12:30
		Touch SELECT 2 times	Power shift pressure (EPPR valve)	EP: 10 bar
		Touch SELECT 3 times	CPU model & version	29C 14
		*Touch SELECT 3 times	CPU model & version	29C52
		Touch SELECT 4 times	Option (Only when a pressure sensor is installed)	P1: 100 bar
		Touch SELECT 5 times		P2: 200 bar
		Touch SELECT 6 times		P3: 30 bar
Group 1 (Volt, temp, EPPR press, version)	Touch SELECT switch once while pressing BUZZER STOP . In this group SELECT LED ON	Default	Battery voltage(V)	b: 24.8 _v
		Touch SELECT 1 time	Potentiometer voltage(V)	Pa: 2.5 _v
		Touch SELECT 2 times	Accel dial voltage(V)	dL: 3.8 _v
		Touch SELECT 3 times	Hydraulic oil temperature(°C)	Hd: 50 ^{°C}
		Touch SELECT 4 times	Coolant temperature(°C)	Ct: 85 ^{°C}
		*Touch SELECT 5 times	Ambient pressure(KPA)	AP: 100
Group 2 (Error code)	Touch SELECT switch twice while pressing BUZZER STOP . In this group BUZZER STOP LED blinks	Default	Current error	CHECK Er: 03
		Touch SELECT 1 time	Recorded error (Only key switch ON)	TIME Er: 03
		Press down(▼) & SELECT at the same time	Recorded error deletion (Only key switch ON)	TIME Er: 00
Group 3 (Switch input)	Touch SELECT switch 3 times while pressing BUZZER STOP . In this group SELECT LED blinks at 0.5sec interval	Default	Pump prolix switch	PP: on or off
		Touch SELECT 1 time	Auto decel pressure switch	dP: on or off
		Touch SELECT 2 times	Power boost switch	Pb: on or off
		Touch SELECT 3 times	Travel oil pressure switch	oP: on or off
		Touch SELECT 4 times	One touch decel switch	od: on or off
		Touch SELECT 5 times	Travel alarm switch	br: on or off
		Touch SELECT 6 times	Preheat switch	PH: on or off

* : TIER II only

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