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.

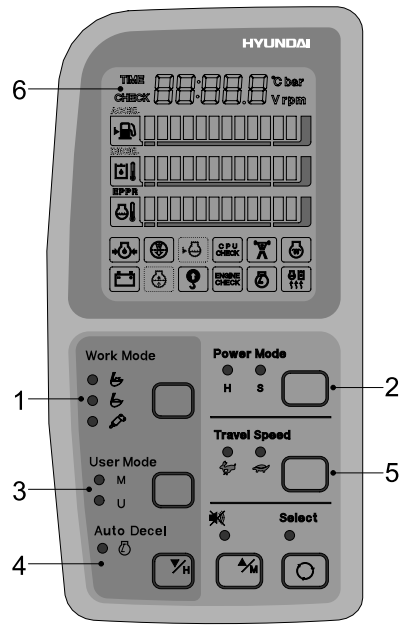
(2) Power mode

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



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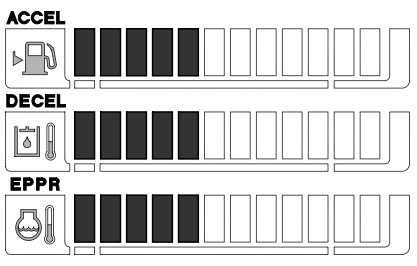
1 Work mode
2 Power mode
3 User mode
4 Auto decel mode
5 Travel mode
6 Monitoring display

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.



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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(800)	150
2	High idle-800	850	200
3	High idle-700	900	250
4	High idle-600	950	300
5	High idle-500	Decel rpm(1000)	350
6	High idle-400	1050	400
7	High idle-300	1100	450
8	High idle-200	1150	500
9	High idle-100	1200	550
10	High idle	1250	600

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

① **CPU controller**

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(2digit).

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

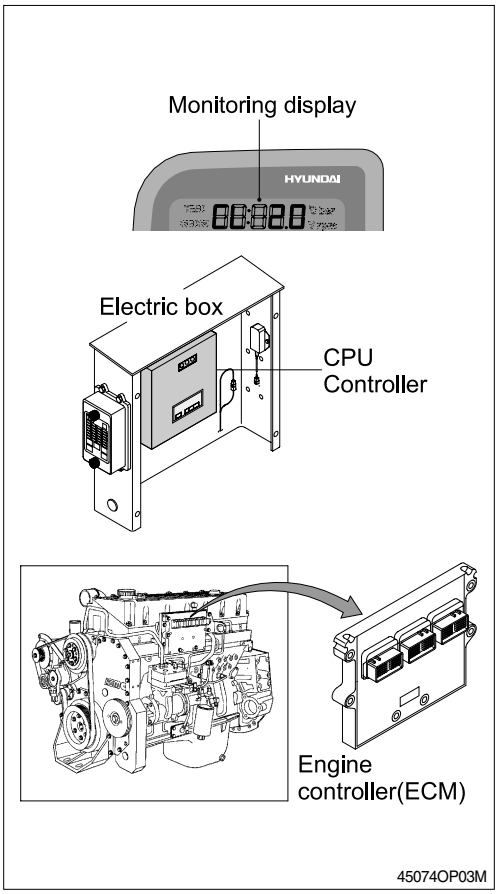
② **Engine controller**(ECM)

If the engine or relevant system has problem, ECM diagnoses and displays on the monitoring display as fault codes(3digit).

※ **Consult Cummins for details.**

(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

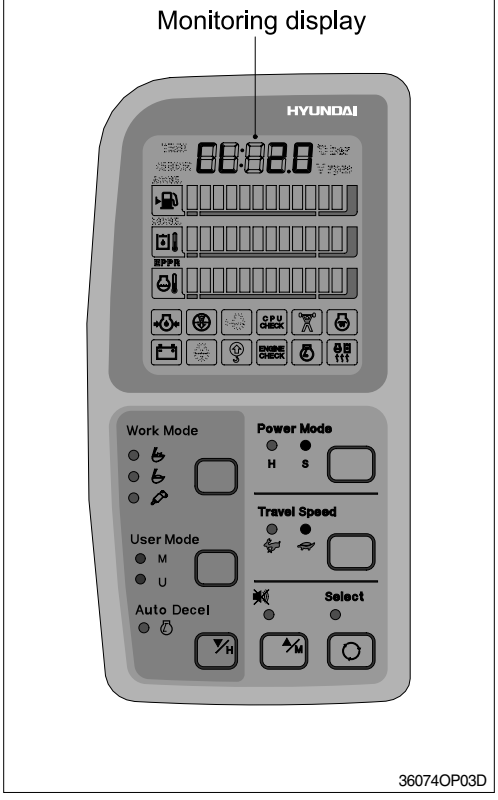
① When start key is turned ON, all illumination lamps are ON and all lamps are OFF automatically after 5 seconds. But the battery charging warning lamp and the engine oil pressure warning lamp keep turned ON until engine starting.

② After lamp check **CL : 1.4**, 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±100rpm.
- If coolant temperature is below 30°C, after 10 seconds the engine speed increases to 1000 ±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 4-10 page for details.**

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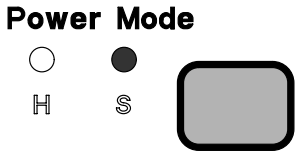
3) SELECTION OF POWER MODE

(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
1750 ± 50	Same power as **non** mode type machine.

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



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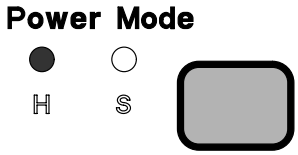
(2) H mode

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

Engine rpm	Effect
1850 ± 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 50~100rpm per dial set.**



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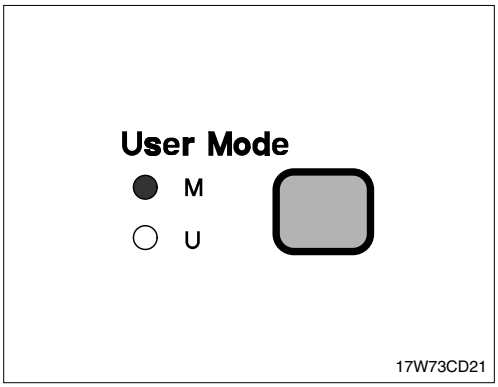
(3) M mode

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	45:C 1.0
		Touch **SELECT** 4 times	Option (Only when a pressure sensor is installed)	Front pump pressure	P 1: 100 bar
		Touch **SELECT** 5 times		Rear pump pressure	P2:200 bar
		Touch **SELECT** 6 times		Pilot pressure	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)	Po: 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 ℃
		Touch **SELECT** 4 times		Coolant temperature(℃)	Ct: 85 ℃
		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

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	AU:on or oFF
		Touch **SELECT** 6 times	Max flow cut off solenoid	FS:on or oFF
		Touch **SELECT** 7 times	Preheat relay	PA:on or oFF

※ By touching **SELECT** switch once while pressing **BUZZER STOP**, display group shifts.
Example : Group 0 → 1 → 2 → 3 → 4 → 0