

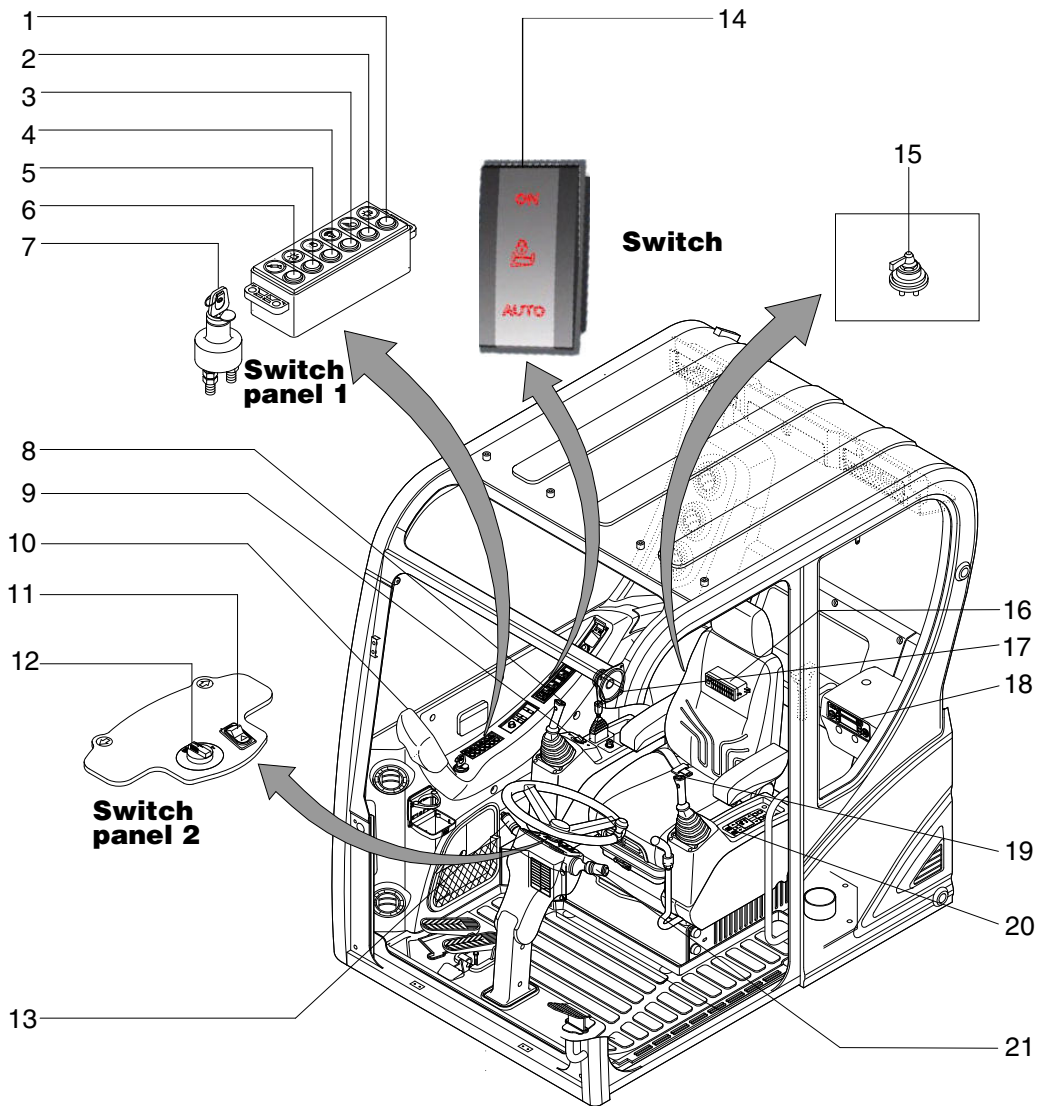
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SECTION 4 ELECTRICAL SYSTEM

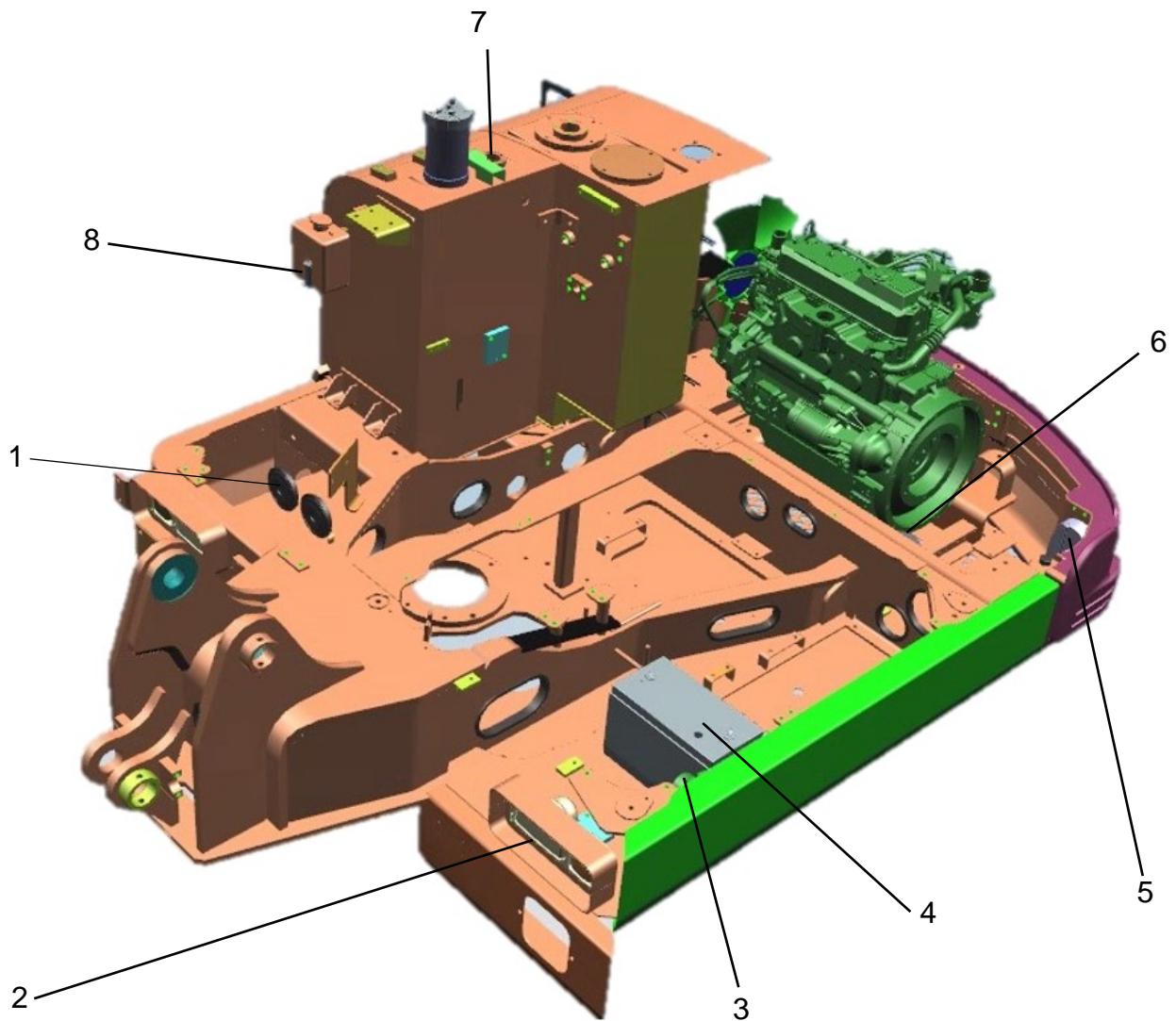
GROUP 1 COMPONENT LOCATION

1. LOCATION 1



- | | | | | | |
|---|--------------------------|----|---------------------------|----|---------------------------|
| 1 | Head light switch | 10 | Cluster | 19 | Horn switch |
| 2 | Work light switch | 11 | Hazard switch | 20 | Aircon and heater switch |
| 3 | Travel alarm switch | 12 | Select switch | 21 | Multifunction switch (LH) |
| 4 | Cab light switch | 13 | Multifunction switch (RH) | | |
| 5 | Beacon switch | 14 | Auto Ram Lock switch | | |
| 6 | Breaker selection switch | 15 | Master switch | | |
| 7 | Start switch | 16 | Fuse box | | |
| 8 | Breaker operation switch | 17 | Speaker | | |
| 9 | Accel dial switch | 18 | Radio & USB player | | |

2. LOCATION 2



- | | | | | | |
|---|---------------|---|---------------------|---|-------------|
| 1 | Horn | 4 | Battery | 7 | Fuel sender |
| 2 | Head lamp | 5 | Combination lamp | 8 | Washer pump |
| 3 | Battery relay | 6 | Travel alarm buzzer | | |

GROUP 2 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



3. CLUSTER FUNCTION

1) GAUGES AND DISPLAYS

(1) Operation screen

When you first turn starting switch ON, the operation screen will appear.

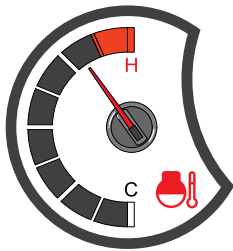




- | | | |
|-----------------------------|--------------------|--------------|
| 1 Engine coolant temp gauge | 3 Fuel level gauge | 5 Accel dial |
| 2 Hydraulic oil temp gauge | 4 Engine rpm | |

※ Operation screen type can be set by the screen type menu of the display.

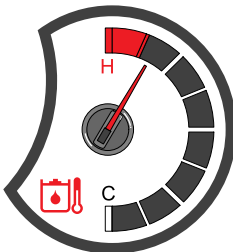
Refer to page 4-22 for details.



(2) Engine coolant temperature gauge



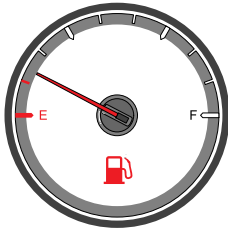
- ① This gauge indicates the temperature of coolant.
 - Black range : 40-115°C (104-239°F)
 - Red range : Above 115°C (239°F)
 - ② If the indicator is in the red range or  lamp lights ON in red, turn OFF the engine and check the engine cooling system.
- ※ If the gauge indicates the red range or  lamp lights ON 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.



(3) Hydraulic oil temperature gauge



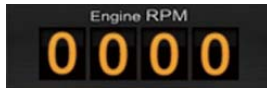
- ① This gauge indicates the temperature of hydraulic oil.
 - Black range : 40-105°C (104-221°F)
 - Red range : Above 105°C (221°F)
 - ② If the indicator is in the red range or  lamp lights ON in red, reduce the load on the system. If the gauge stays in the red range, stop the machine and check the cause of the problem.
- ※ If the gauge indicates the red range or  lamp lights ON 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.

(4) Fuel level gauge



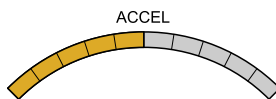
- ① This gauge indicates the amount of fuel in the fuel tank.
- ② Fill the fuel when the red range, or  lamp lights ON in red.
- ※ If the gauge indicates the red range or  lamp lights ON in red even though the machine is on the normal condition, check the electric device as that can be caused by the poor connection of electricity or sensor.

(5) Engine rpm display



- ① This displays the engine speed.

(6) Accel dial display



- ① This displays acceleration dial level from 0 to 10 step.

3) COMMUNICATION ERROR AND LOW VOLTAGE WARNING POP-UP

(1) Communication error pop-up



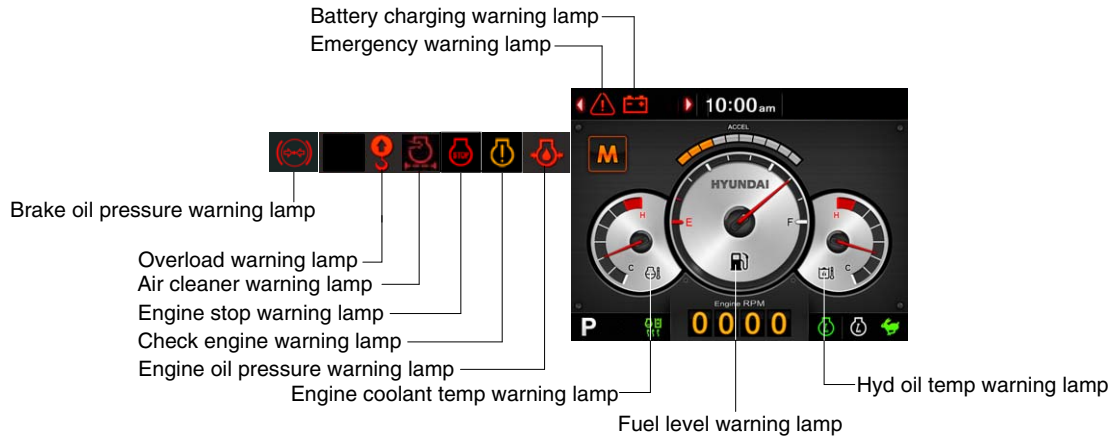
- ① Cluster displays this communication error pop-up when it has communication error with MCU.
- ② Communication error pop-up displays at operation screen only. Just buzzer alarm at the other screen.
- ③ If communication with MCU become normal state, it will disappear automatically.

(2) Low voltage warning pop-up



- ① Cluster displays this low voltage warning pop-up when the battery voltage is low.
- ② Low voltage warning pop-up displays at operation screen only. Just buzzer alarm at the other screen.
- ③ This pop-up will disappear with using touch screen or buzzer stop switch. While the battery voltage is low, buzzer sounds every minute.
- ④ When the battery voltage is higher than 11.5 V, the pop-up off.

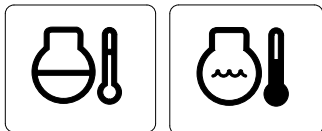
4) WARNING LAMPS



※ Each warning lamp on the left-top of the LCD pops up on the center of LCD and the buzzer sounds when the each warning is happened. The pop-up warning lamp moves to the original position and lights ON when the buzzer stop switch is pushed or the pop-up is touched. And the buzzer stops. Refer to page 4-14 for the switch.

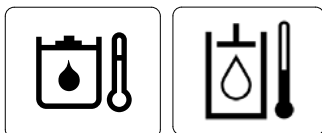
※ When the warning lamps light ON more than 4, you can check all lamps with next page button (◀, ▶) near the warning lamps.

(1) Engine coolant temperature warning lamp



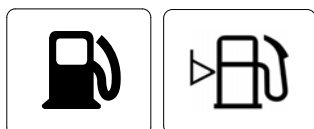
- ① The lamp pops up on the center of LCD and the buzzer sounds when the engine coolant temperature is over 115°C.
- ② The pop-up lamp moves to the original position and lights ON when the buzzer stop switch is pushed or pop-up is touched. Also, the buzzer stops and lamp keeps ON.
- ③ Check the cooling system when the lamp keeps ON.

(2) Hydraulic oil temperature warning lamp



- ① The lamp pops up on the center of LCD and the buzzer sounds when the hydraulic oil temperature is over 105°C.
- ② The pop-up lamp moves to the original position and lights ON when the buzzer stop switch is pushed or pop-up is touched. Also, the buzzer stops and lamp keeps ON.
- ③ Check the hydraulic oil level and hydraulic oil cooling system.

(3) Fuel level warning lamp



- ① This warning lamp lights ON and the buzzer sounds when the level of fuel is below 10%.
- ② Fill the fuel immediately when the lamp is ON.

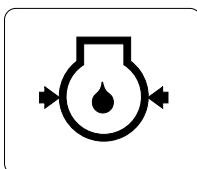
(4) Emergency warning lamp



21093CD30

- ① This lamp pops up and the buzzer sounds when each of the below warnings are happened.
 - Engine coolant overheating (over 115°C)
 - Hydraulic oil overheating (over 105°C)
 - MCU input voltage abnormal
 - Accel dial circuit abnormal or open
- ※ **The pop-up warning lamp moves to the original position and lights ON when the buzzer stop switch is pushed or pop-up is touched. Also the buzzer stops. This is same as following warning lamps.**
- ② When this warning lamp lights ON, machine must be checked and serviced immediately.

(5) Engine oil pressure warning lamp



21093CD32

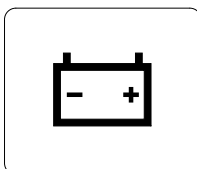
- ① This lamp lights ON when the engine oil pressure is low.
- ② If the lamp lights ON, shut OFF the engine immediately. Check oil level.

(6) Check engine warning lamp



- ① This lamp lights ON when the communication between MCU and engine ECM on the engine is abnormal, or if the cluster received any fault code from engine ECM.
- ② Check the communication line between them. If the communication line is OK, then check the fault codes on the cluster.

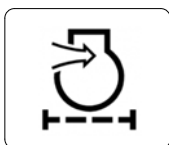
(7) Battery charging warning lamp



21093CD34

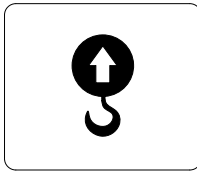
- ① This lamp lights ON when the battery charging voltage is low.
- ② Check the battery charging circuit when this lamp is ON.

(8) Air cleaner warning lamp



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

(9) Overload warning lamp (opt)



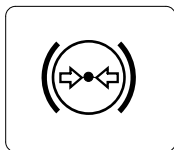
- ① When the machine is overload, the overload warning lamp lights ON during the overload switch is ON. (if equipped)
- ② Reduce the machine load.
Initiate a manual regeneration

(10) Stop engine warning lamp



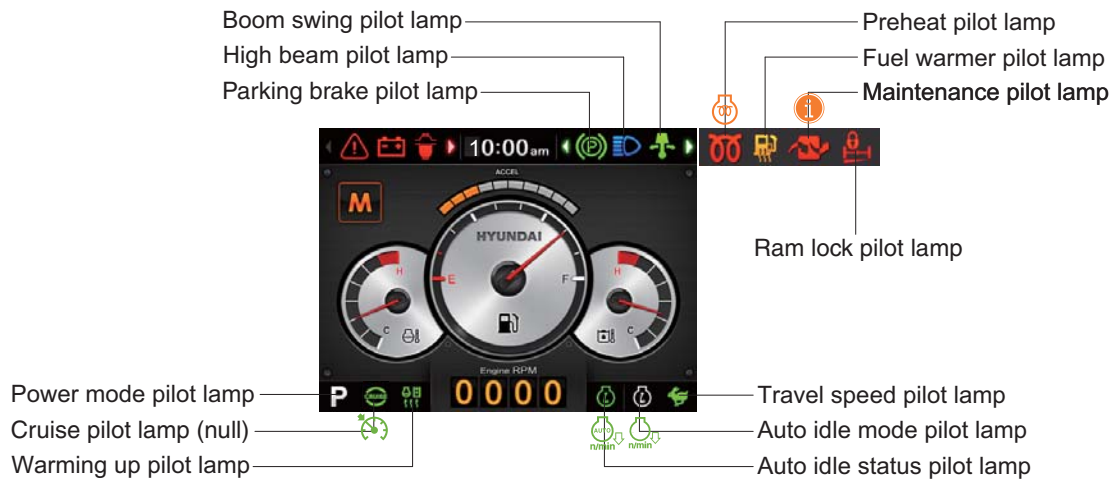
- ① If the lamp lights ON, stop the engine immediately and check the engine.
- ② Check the fault codes on the monitor.
- ※ **Please contact your Hyundai service center or local dealer.**

(11) Brake oil pressure warning lamp









- ① The lamp lights ON when the oil pressure of service brake drops below the normal range.
- ② When the lamp is ON, stop the engine and check for its cause.
- ※ **Do not operate until any problems are corrected.**

5) PILOT LAMPS

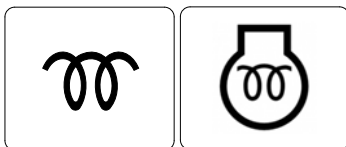


※ When the pilot lamps light ON more than 3, you can check all lamps with next page button (◀, ▶).

(1) Mode pilot lamps

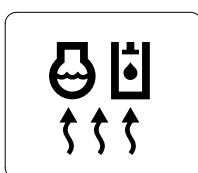
No	Mode	Pilot lamp	Selected mode
1	Power mode		Heavy duty power work mode
			Standard power mode
2	Travel mode		Low speed traveling
			High speed traveling
3	Auto idle mode		Auto idle status
			Auto idle mode

(2) Preheat pilot lamp



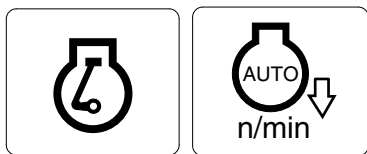
- ① Turning the start key switch ON position starts preheating in cold weather.
- ② Start the engine after this lamp is OFF.

(3) Warming up pilot lamp



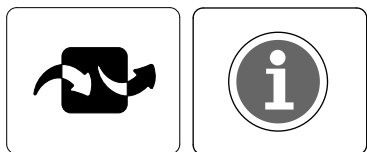
- ① This lamp is turned ON when the coolant temperature is below 30°C (86°F).
- ② The automatic warming up is cancelled when the engine coolant temperature is above 30°C, or when 10 minutes have passed since starting the engine.

(4) Auto idle status/ mode pilot lamp



- ① The auto idle pilot lamp will be ON when the idle mode is selected.
- ② The auto idle status pilot lamp will be ON when all levers and pedals are at neutral position, and the auto idle mode is selected.

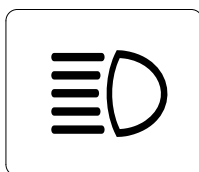
(5) Maintenance pilot lamp



- ① This lamp will be ON when the consuming parts are needed to change or replace. It means that the change or replacement interval of the consuming parts remains below 30 hours.
- ② Check the message in maintenance information of main menu. Also, this lamp lights ON for 3 minutes when the start switch is ON position.

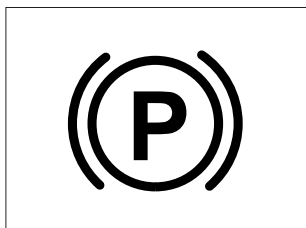
※ Refer to the page 4-20.

(6) High beam pilot lamp



- ① This lamp works when the illuminating direction is upward.
- ② This lamp comes ON when the dimmer switch is operated, e.g., when passing another vehicle.

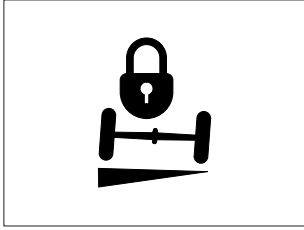
(7) Parking brake pilot lamp



- ① When the parking brake is actuated, the lamp lights ON.

※ Check the lamp is OFF before driving.

(8) Ram lock pilot lamp



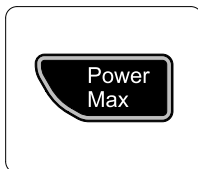
- ① This pilot lamp lights ON when ram lock switch is rear position.
- ② Also, the pilot lamp lights ON when the parking switch is ON or service brake is applied.

6) SWITCHES



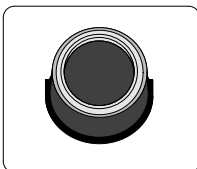
※ When the switches are selected, the pilot lamps are displayed on the LCD. Refer to the page 4-11 for details.

(1) Power mode switch



- ① This switch is to select the machine power mode and selected power mode pilot lamp is displayed on the pilot lamp position.
 - P : Heavy duty power work.
 - S : Standard power work.
- ② The pilot lamp changes S → P → S in order.

(2) Select switch

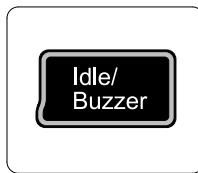


- ① This switch is used to select or change the menu and input value.
- ② Knob push
 - Long (over 2 sec) : Return to the operation screen
 - Medium (0.5~2 sec) : Return to the previous screen
 - Short (below 0.5 sec) : Select menu
- ③ Knob rotation

This knob changes menu and input value.

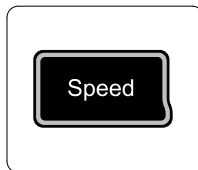
 - Right turning : Down direction / Increase input value
 - Left turning : Up direction / Decreased input value



(3) Auto idle/ buzzer stop switch



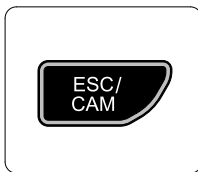
- ① This switch is used to activate or cancel the auto idle function.
※ **Refer to the page 4-12 for details.**
- ② The buzzer sounds when the machine has a problem.
In this case, push this switch and buzzer stops, but the warning lamp blinks until the problem is cleared.

(4) Travel speed control switch



- ① This switch is used to select the travel speed alternatively.
 -  : Low speed
 -  : High speed

(5) Escape/ Camera switch



- ① This switch is used to return to the previous menu or parent menu.
- ② In the operation screen, pushing this switch will display the view of the camera on the machine (if equipped).
Please refer to page 4-24 for the camera.
- ③ If the camera is not installed, this switch is used only ESC function.

7) MAIN MENU

· Operation screen



Main menu screen







Sub menu screen



※ Please refer to select switch, page 4-14 for selection and change of menu and input value.

(1) Structure

No	Main menu	Sub menu	Description
1	 Monitoring 55I3CD51A	Active fault - Machine Active fault - Engine Logged fault - Machine Logged fault - Engine Monitoring (Analog) Monitoring (Digital) - Input Monitoring (Digital) - Output	MCU ECU MCU ECU Machine information Switch status Output status
2	 Management 55I3CD51B	ESL mode setting Change password Maintenance information Machine Information A/S phone number Service menu	ESL mode setting Password change Replacement, Change interval oils and filters Cluster, MCU, Engine, Machine A/S phone number, A/S phone number change Delete logged faults, Software download, Operating hour, power shift
3	 Display 55I3CD51C	Clock Screen type Brightness setting Unit setting Language Calibration	Clock A type, B type, C type Manual, Auto Temperature, Pressure 12 language Calibrating the touch screen
4	 Utilities 55I3CD51D	Camera setting Mode Video	Number of active, Display order, Camera No. Operation mode select Play music and video file

(2) Monitoring

① Active fault - Machine



- The active faults of the MCU can be checked by this menu.

② Active fault - Engine



- The active faults of engine ECU can be checked by this menu.

③ Logged fault - Machine/ Engine



- The logged faults of the MCU or engine ECU can be checked by this menu.
- Only for the service person.

④ Monitoring (Analog)



- The machine status such as the engine rpm, oil temperature, voltage and pressure etc. can be checked by this menu.

⑤ Monitoring (Digital) - Input



- The switch status can be confirmed by this menu.
- The activated switches are blue light ON.

⑥ Monitoring (Digital) - Output



- The output status can be confirmed by this menu.
- The output pilot lamps are blue light ON.

(3) Management

① ESL mode setting



ESL mode setting

- ESL : Engine Starting Limit
- ESL mode is designed to be a theft deterrent or will prevent the unauthorized operation of the machine.
- If the ESL mode was selected Enable, the password will be required when the start switch is turned ON.
- **Disable** : Not used ESL function
- **Enable (always)** : The password is required whenever the operator starts engine.
- **Enable (Interval)**: The password is required when the operator starts engine first.
But the operator can restart the engine within the interval time without inputting the password.
The interval time can be set maximum 2 days.

※ Default password : 00000

※ Password length : 5~10 digit

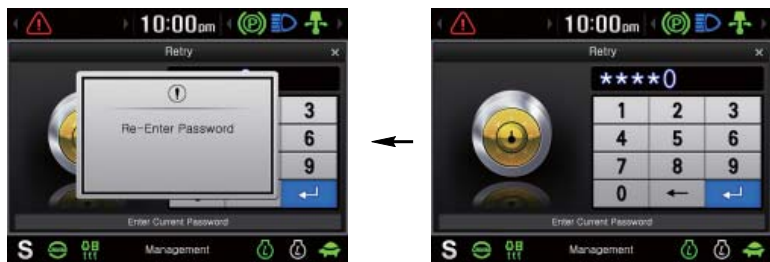
② Change password

- The password is 5~10 digits.



Enter the current password

Enter the new password



The new password is stored in the MCU.

Enter the new password again

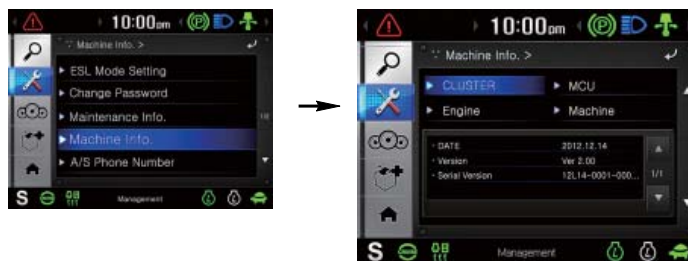
③ Maintenance information



- Elapse : Maintenance elapsed time.
- Interval : The change or replace interval can be changed in the unit of 50 hours.
- History-Hour : Maintenance replacement history.
- Replacement : The elapsed time will be reset to zero (0).
- **Change or relpace interval**

No	Item	Interval
1	Engine oil	500
2	Final gear oil	1000
3	Swing gear oil	1000
4	Hydraulic oil	2000
5	Pilot line filter	1000
6	Hydraulic oil return filter	1000
7	Engine oil filter	500
8	Fuel filter	500
9	Pre-filter	500
10	Hydraulic tank breather	1000
11	Air cleaner	500
12	Radiator coolant	2000
13	Swing gear pinion grease	1000

④ Machine Information



- This can confirm the identification of the cluster, MCU, engine and machine.

⑤ A/S phone number



- The A/S phone number can be checked and changed.

⑥ Service menu



Enter the password

- Delete logged fault : Logged faults of MCU or engine ECU can be deleted.
- S/W download : Update and display software about operating system, application, image and font.
- Operating hours : Operating hours since the machine line out can be checked.
- Power shift : Set power shift mode (standard/option)

(4) Display

① Clock



- The first line's three spots "****-**-**" represent Year/Month/Day each.
- The second line shows the current time. (AM, PM/0:00~12:59)

② Screen type



- The screen type (A,B,C) of the LCD can be selected by this menu.

③ Brightness setting calibration



Manual (1st~10th step)



Auto (day/night)



Auto (time)

- If "Auto" is chosen, brightness for day and night can be differently set up. Also, users can define which day time interval. (Set day starting time and ending time)

④ Unit setting



- Temperature : °C ↔ °F
- Pressure : bar ↔ MPa ↔ kgf/cm² ↔ psi

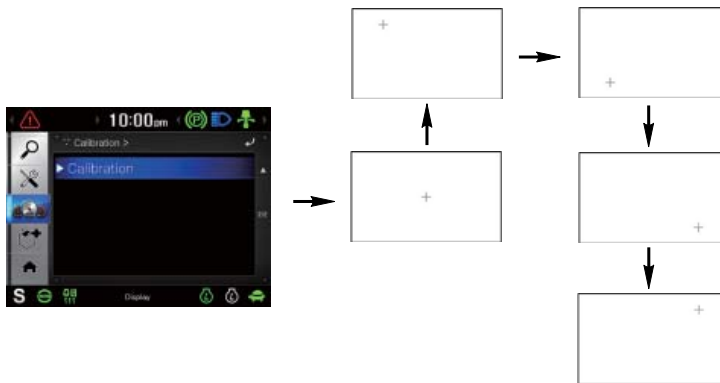
⑤ Language



- User can select preferable language and all displays are changed the selected language.

⑥ Calibration

- When touch awareness goes wrong, this function use.
Fall in the next step if touches the middle point of cross with fingernail.
If touches total five points as follows, the setting is completed.



(5) Utilities

① Camera setting

- Three cameras can be installed on the machine and the display order can be set by this menu.
- If the camera was not equipped, this menu is not useful.



- In the operation screen, if the ESC/CAM switch is pushed, rear view camera display or stop.
- Turning the select switch in clockwise direction, the next ordered will be shown and in counter-clockwise direction, the previously ordered will be shown. Also, you can change camera channel using touch the screen.
- Push the select switch or touch the screen, the displayed screen will be enlargement.



② Mode



- When this cluster's buttons are not work, you can control using touch screen instead of these buttons.
- You can only control in this mode screen.

③ Video

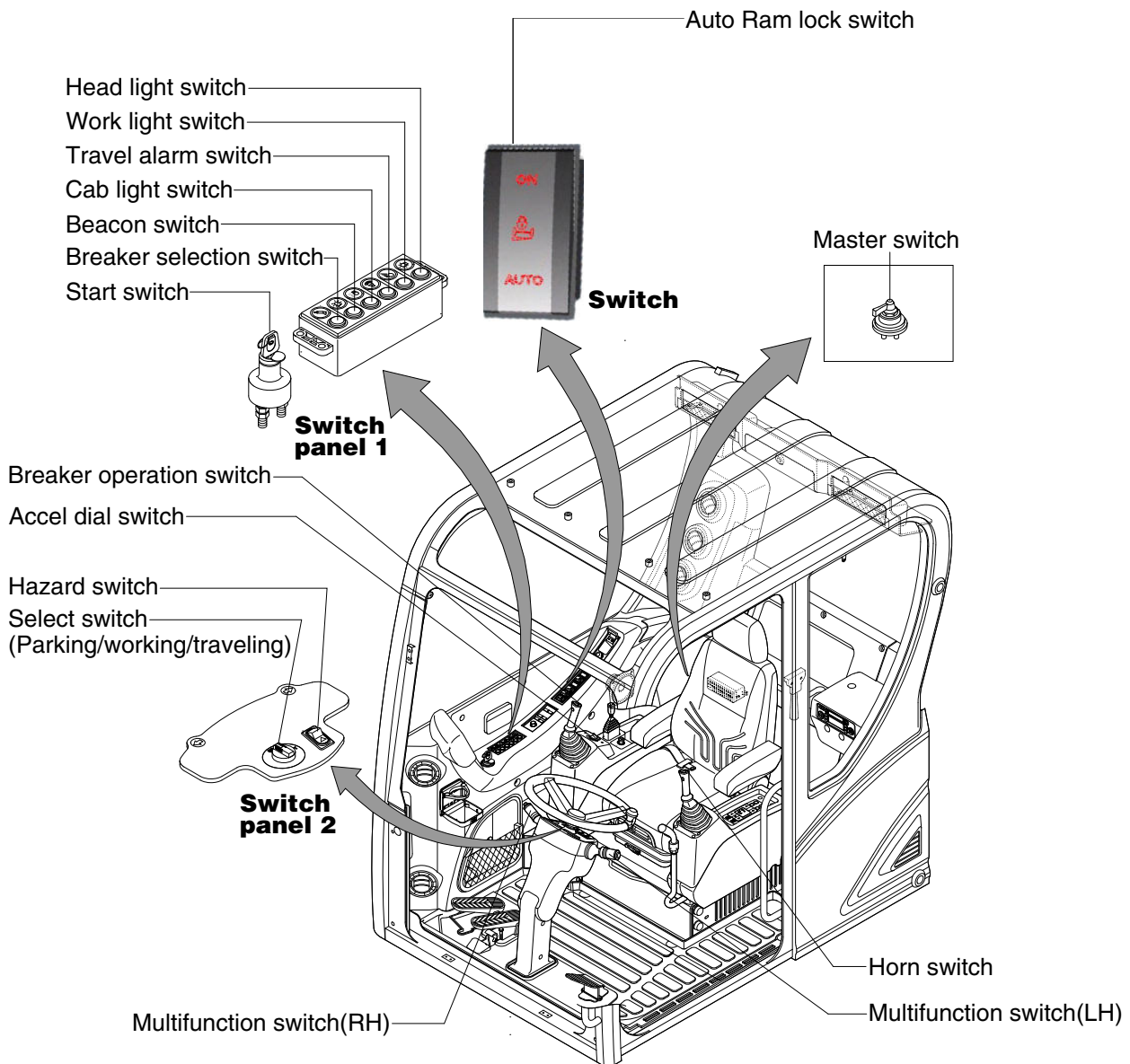
- Play MP4 or codec file of external hard disk through USB port.
- The USB port is located under the cluster.



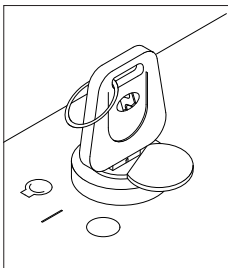
- Over 1100 engine rpm, the screen turns into the operation screen with MP4 or codec file playing for the safety.

No.	Function	Control	No.	Function	Control
1	Previous track	Power mode switch or touch	7	Sound volume	Speed switch or touch
2	Next track	Speed switch or touch	8	Stop	ESC/CAM button or touch
3	Play	Touch	9	File name	-
4	Pause	Touch	10	Current time/ Total time	-
5	Contents display	Touch	11	Current playing time	-
6	Mute	Touch	-	-	-

8. SWITCHES



1) STARTING SWITCH



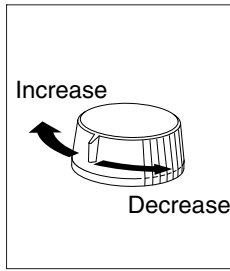
(1) There are three positions, OFF, ON and START.

- (OFF) : None of electrical circuits activate.
- | (ON) : All the systems of machine operate.
- (START) : Use when starting the engine.

Release key immediately after starting.

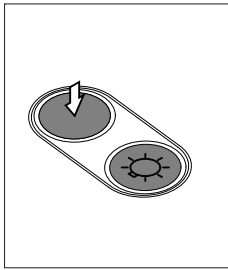
※ Key must be in the ON position with engine running to maintain electrical and hydraulic function and prevent serious machine damage.

2) ACCEL DIAL



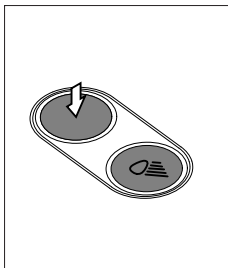
- (1) There are 10 dial setting.
- (2) Setting 1 is low idle and setting 10 is high idle.
 - By rotating the accel dial to right : Engine speed increased.
 - By rotating the accel dial to left : Engine speed decreased.

3) HEAD LIGHT SWITCH



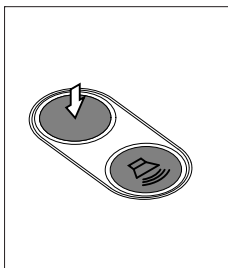
- (1) This switch is used to operate the head light.
 - Press the switch once, the head light comes ON and the pilot lamp ON.
 - Press the switch once more, the head light and pilot lamp turn off.

4) WORK LIGHT



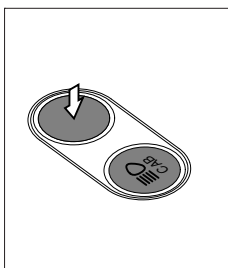
- (1) This switch is used to operate the work light.
 - Press the switch once, the work light comes ON and the pilot lamp ON.
 - Press the switch once more, the work light and pilot lamp turn off.

5) TRAVEL ALARM SWITCH



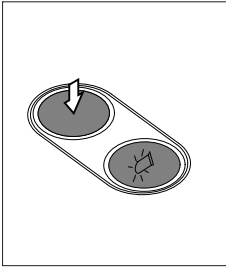
- (1) This switch is used to alarm surroundings when the machine travels to forward and backward.
- (2) On pressing this switch, the alarm operates only when the machine is traveling.

6) CAB LIGHT SWITCH



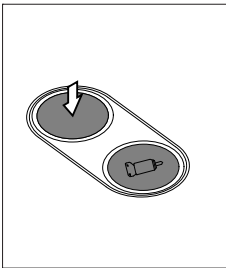
- (1) This switch turns on the cab light on the cab.

7) BEACON SWITCH (option)



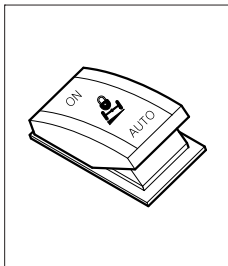
- (1) This switch turns ON the rotary light on the cab.
- (2) The below indicator lamp is turned ON when operating this switch.

8) BREAKER SELECTION SWITCH (option)



- (1) This switch is used to operate breaker.
- ※ **The breaker operates only when this switch is pressed.**

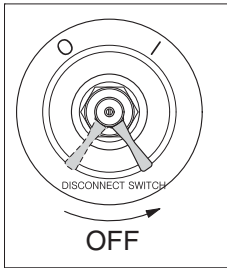
9) AUTO RAM LOCK SWITCH



- (1) This switch activate front axle oscillation cylinder to locking position for increase of stability.
 - ON : Set front axle to locking position for excavation work or travels even ground. Also, the ram lock pilot lamp comes ON at the travel pilot lamp.
 - AUTO : Set front axle to locking or unlocking as table.

Select switch (parking/working/ traveling)	Ram lock	Conditions
Parking (P)	Locking	· Always
Traveling (T)	Unlocking	· Always
Working (W)	Locking	· FNR lever in neutral position · Service brake pedal is depressed.
	Unlocking	· FNR lever in forward/reverse position and service brake pedal is not depressed. · 2 way pedal is equipped and service brake pedal is not depressed.

10) MASTER SWITCH



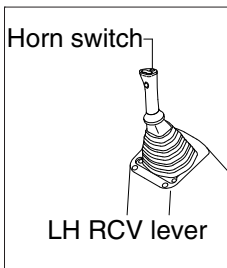
(1) This switch is used to shut off the entire electrical system.

(2) I : The battery remains connected to the electrical system.

O : The battery is disconnected to the electrical system.

※ **Never turn the master switch to O (OFF) with the engine running. It could result in engine and electrical system damage.**

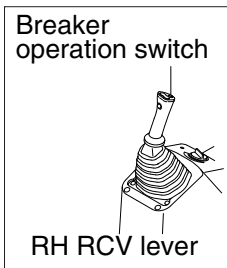
11) HORN SWITCH



(1) This switch is at the top of left side control lever.

On pressing, the horn sounds.

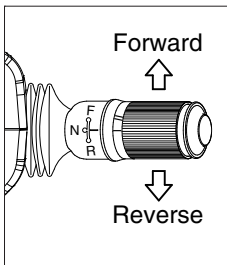
12) BREAKER OPERATION SWITCH



(1) On pressing this switch, the breaker operates only when the breaker selection switch on the switch panel is selected.

13) RH MULTI FUNCTION SWITCH

(1) FNR lever



① This lever changes travel direction of machine.

· F : Machine moves forward

· N : Neutral position

· R : Machine moves backward

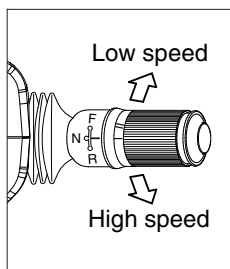
▲ **Travel direction will be reversed if lower structure is positioned with dozer in front.**

② The warning buzzer sounds when the lever is in the reverse position.

▲ **If this lever is not in the neutral position, engine does not started.**

▲ **Be sure to stop the machine when changing the direction forward or backward while traveling.**

(2) Travel speed switch

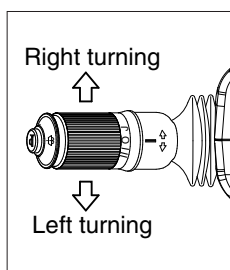


- ① This switch is for selecting travelling speed between high and low.
 - Low speed (—) : 11.3 km/hr (7.0 mph), turtle mark
 - High speed (=) : 30 km/hr (19.0 mph), rabbit mark

▲ In case of changing the travel speed, be sure to stop the machine completely.

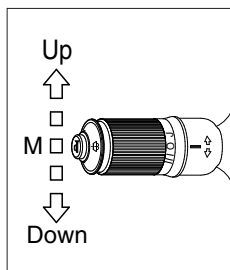
14) LH MULTI FUNCTION SWITCH

(1) Direction indication lamp switch



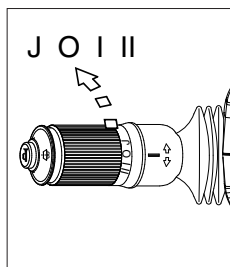
- ① This switch is used to warn or signal the turning direction of the machine to other machines or equipment.
- ② Push the lever to forward for turning right (↗), pull the lever to backward for turning left (↙).
- ③ The turning pilot lamp comes ON at the travel pilot lamp on the steering column.

(2) Dimmer switch



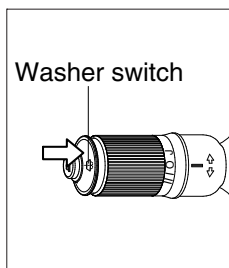
- ① This switch is used to turn the head lights direction.
- ② Switch positions.
 - Up (↗) : To flash for passing
 - Middle (□) : Head lights low beam ON
 - Down (↘) : Head lights high beam ON
- ③ If you release the switch when it's in up position, the switch will return to middle.

(3) WIPER SWITCH



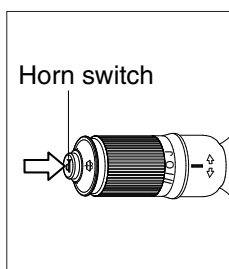
- ① When the switch is in J position, the wiper moves intermittently.
- ② When placed in I or II position, the wiper moves continuously.

(4) WASHER SWITCH



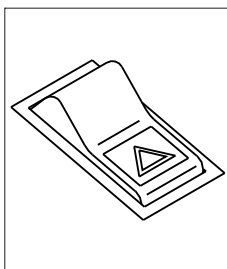
- ① If you push the grip of the lever, washer liquid will be sprayed and the wiper will be activated 2-3 times.
- ※ **Check the quantity of washer liquid in the tank. If the level of the washer liquid is LOW, add the washer liquid (in cold, winter days) or water. The capacity of tank is 1.5 liter.**

(5) HORN SWITCH



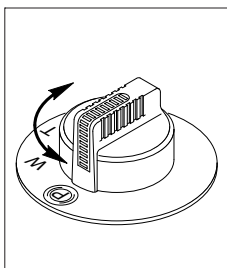
- ① This switch is at the end of left side multifunction switch. On pressing, the horn sounds.

15) HAZARD SWITCH



- (1) Use for parking, or roading machine.
- (2) LH and RH turn signal lamps come ON at the same time by this switch.
- ※ **If the switch is left ON for a long time, the battery may be discharged.**

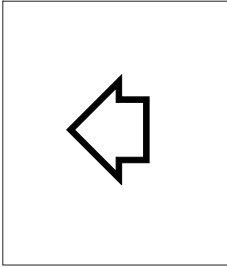
16) SELECT SWITCH (parking / working / traveling)



- (1) This switch is used to select the operation mode as below.
 - Parking (P) : The parking brake is applied.
 - Working (W) : The machine needs to be working.
 - Traveling (T) : The machine needs to be traveling.

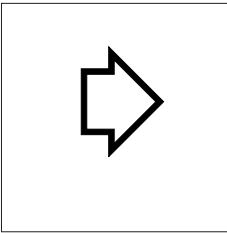
17) TURNING PILOT LAMP

(1) Left turning pilot lamp

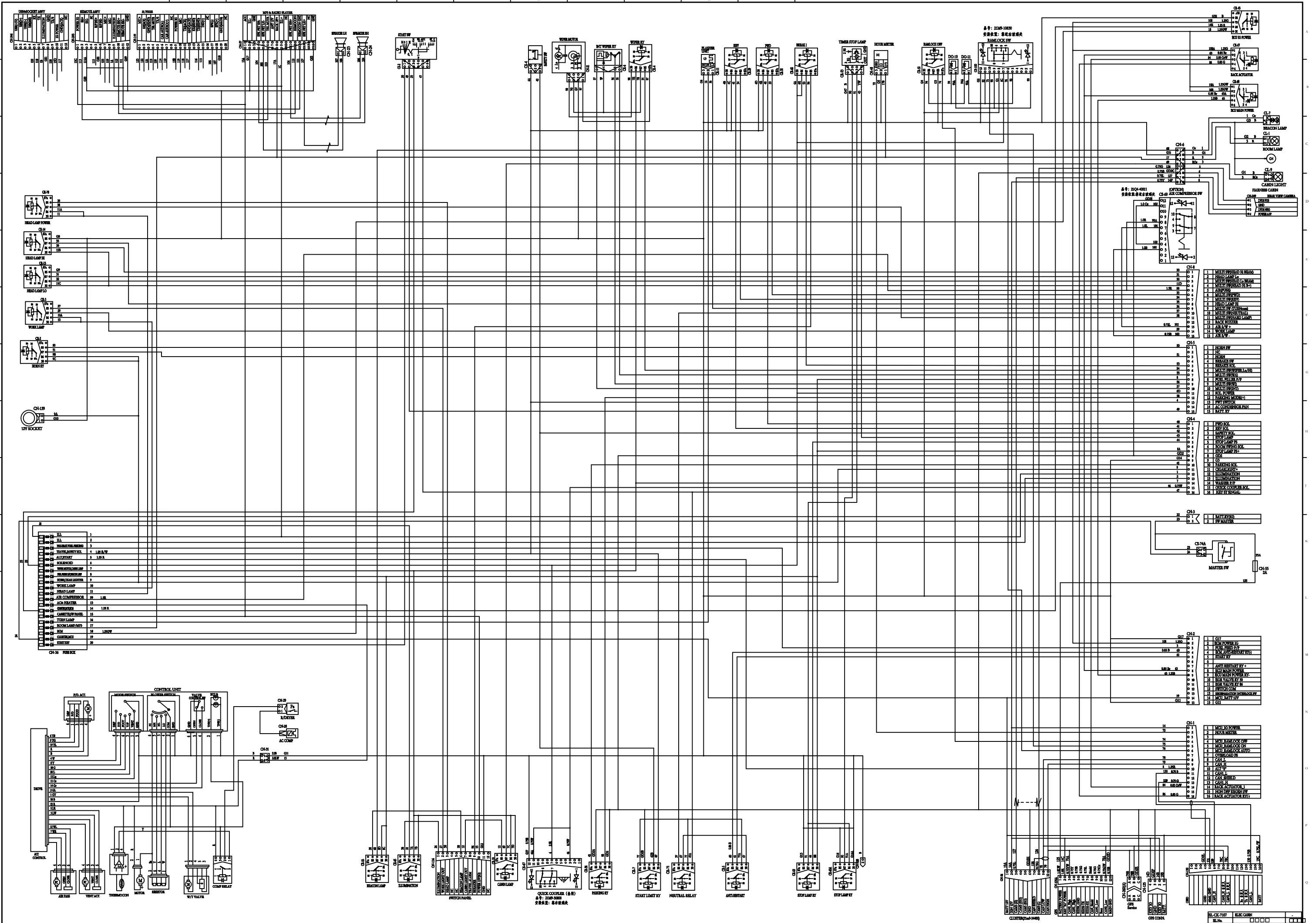


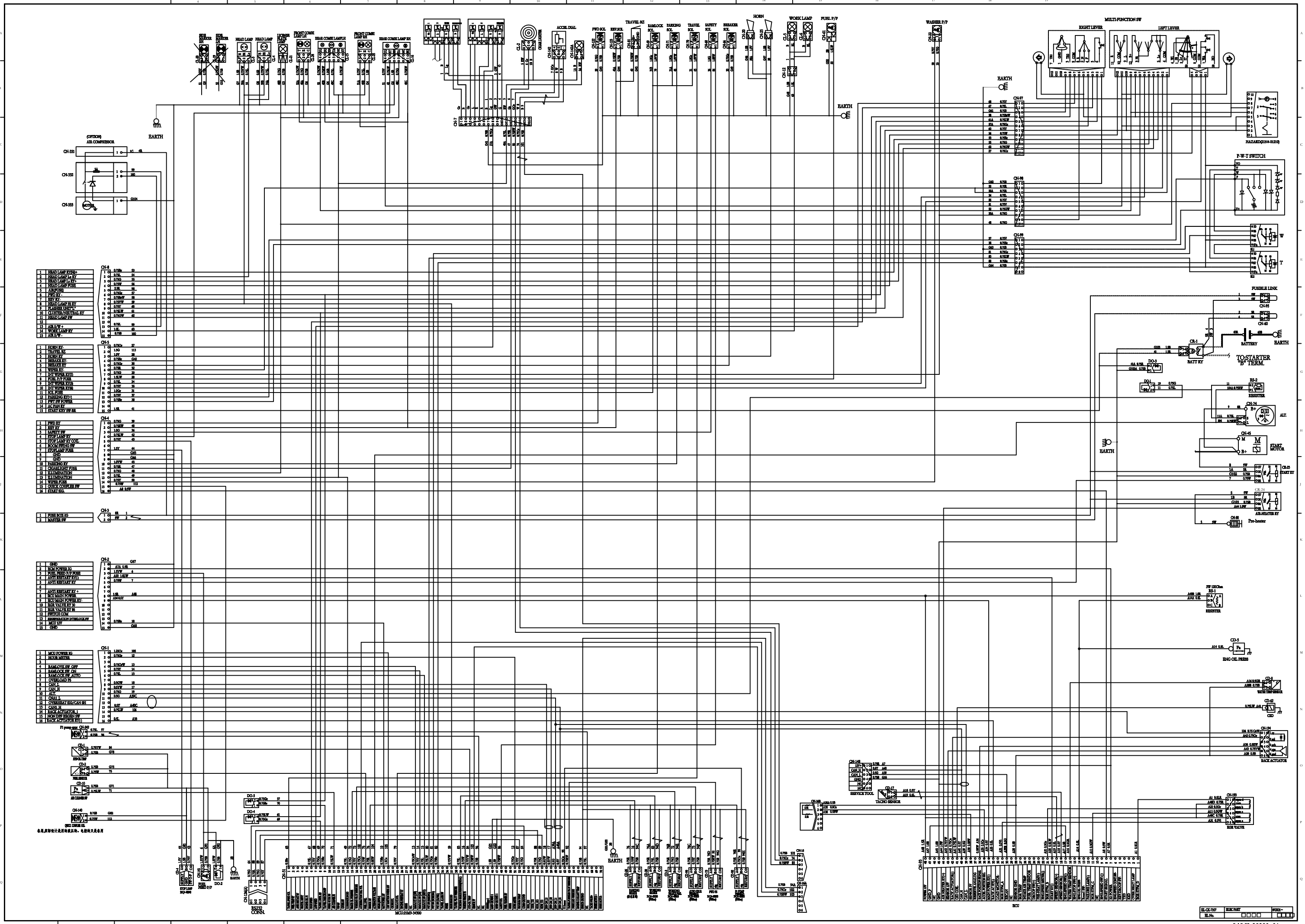
(1) This lamp flashes with sound when the LH multifunction switch is move to backward position.

(2) Right turning pilot lamp

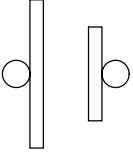
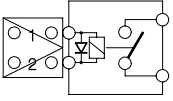
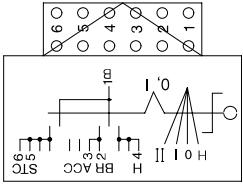
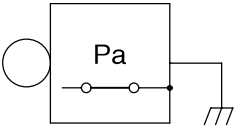
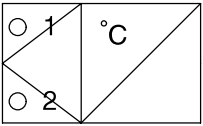


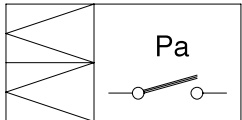
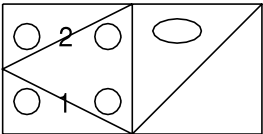
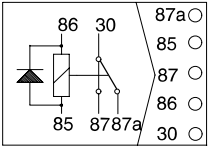
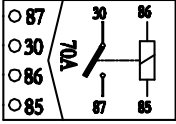
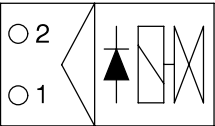
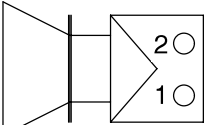
① This lamp flashes with sound when the LH multifunction switch is move to forward position.

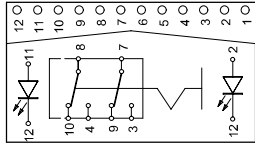
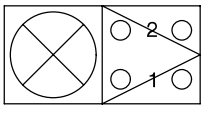
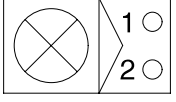
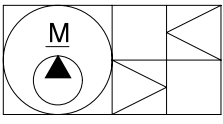
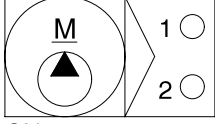
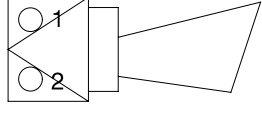


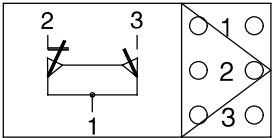
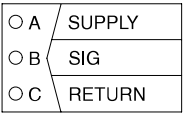
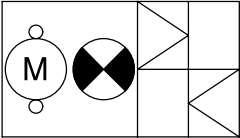
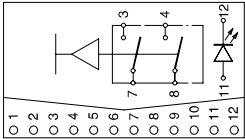
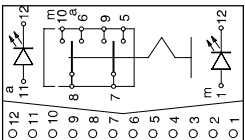
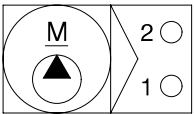


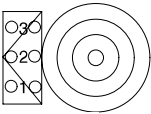
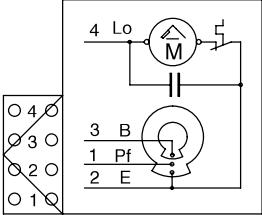
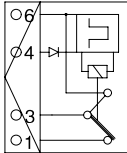
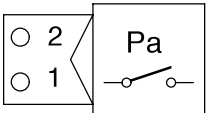
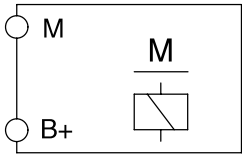
GROUP 4 ELECTRICAL COMPONENT SPECIFICATION

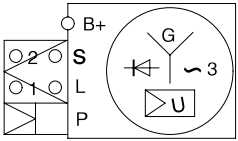
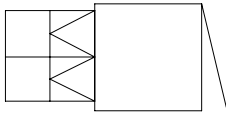
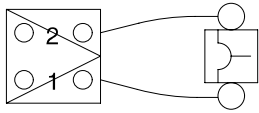
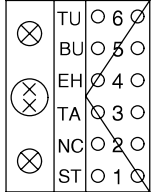
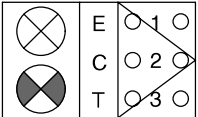
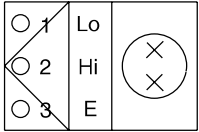
Part name	Symbol	Specification	Check
Battery		12V × 100Ah	※ Check specific gravity 1.280 over : Over charged 1.280 ~ 1.250 : Normal 1.250 below : Recharging
Battery relay	 <p style="text-align: center;">CR-1</p>	Rated load : 12V 100A (continuity) 1000A (30 second)	※ Check coil resistance Normal : about 12Ω ※ Check contact Normal : ∞Ω
Start key	 <p style="text-align: center;">CS-2</p>	12V	※ Check contact OFF : ∞Ω (for each terminal) ON : 0Ω (for terminal 1-3 and 1-2) START : 0Ω (for terminal 1-5)
Pressure switch (for engine oil)	 <p style="text-align: center;">CD-5</p>	0.5 kgf/cm ² (N.C TYPE)	※ Check resistance Normal : 0Ω (CLOSE)
Temperature sensor	 <p style="text-align: center;">CD-1 CD-8</p>	-	※ Check resistance 50°C : 804Ω 80°C : 310Ω 100°C : 180Ω

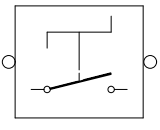
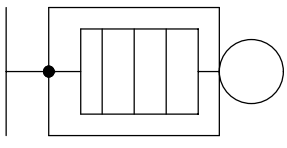
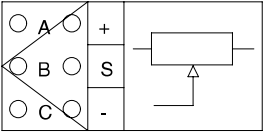
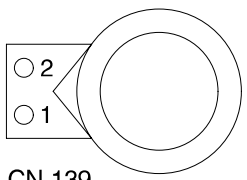
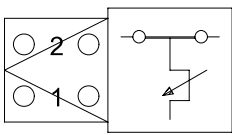
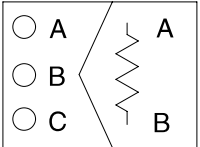
Part name	Symbol	Specification	Check
Air cleaner pressure switch	 <p>CD-10</p>	Pressure: 635mmH ₂ O (N.O TYPE)	※ Check contact Normal : ∞Ω
Fuel sender	 <p>CD-2</p>	-	※ Check resistance Full : 100Ω Low : 500Ω Empty warning : 700Ω
Relay	 <p>CR-2 CR-3 CR-5 CR-7 CR-13 CR-14 CR-29 CR-30 CR-45 CR-62 CR-65 CR-78</p>	12V 20A	※ Check resistance Normal : About 200Ω (for terminal 85-86) : 0Ω (for terminal 30-87a)
Relay	 <p>CR-23 CR-24</p>	12V 60A	※ Rated coil current 1.2±0.3A
Solenoid valve	 <p>CN-66 CN-68 CN-69 CN-70 CN-71 CN-121 CN-122 CN-123 CN-140</p>	12V 1A	※ Check resistance Normal : 15~25Ω (for terminal 1-2)
Speaker	 <p>CN-23(LH) CN-24(RH)</p>	4Ω 20W	※ Check resistance Normal : 4Ω

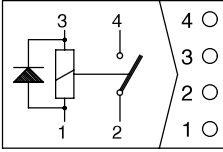
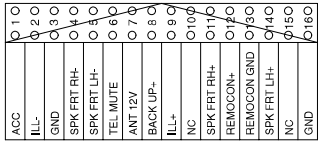
Part name	Symbol	Specification	Check
Switch (looking type)	 <p>CS-67 CS-69</p>	12V 16A	※ Check contact Normal OFF - $\infty \Omega$ (for terminal 1-5,2-6) - 0Ω (for terminal 5-7,6-8)
Work lamp	 <p>CL-5 CL-6 CL-9 CL-19 CL-20</p>	12V 55W (H3 TYPE)	※ Check disconnection Normal : 1.2Ω
Room lamp	 <p>CL-1</p>	12V 10W	※ Check disconnection Normal : A few Ω
Fuel filler pump	 <p>CN-61</p>	12V 35 ℓ /min	※ Check operation Supply power(for terminal 1) : 12V
Fuel feed pump	 <p>CN-145</p>	12V	-
Horn	 <p>CN-20 CN-25</p>	12V	100±5dB

Part name	Symbol	Specification	Check
Safety switch	 <p>CS-4</p>	Micro	※ Check contact Normal : 0Ω (for terminal A-B) : ∞Ω (for terminal A-C) Operating : ∞Ω (for terminal A-B) : 0Ω (for terminal A-C)
Pressure sensor	 <p>CD-3 CD-4 CD-7 CD-26 CD-31 CD-32 CD-38 CD-73 CD-92</p>	8-30V	※ Check contact Normal : 0.1Ω
Beacon lamp	 <p>CL-7</p>	12V (strobe type)	※ Check disconnection Normal : A few Ω
Auto cruise switch	 <p>CS-23</p>	12V 16A	※ Check contact Normal : ∞Ω
Auto ram lock switch	 <p>CS-100</p>	12V 16A	※ Check contact Normal : 0Ω
Washer pump	 <p>CN-22</p>	12V 3.8A	※ Check contact Normal : 3Ω (for terminal 1-2)

Part name	Symbol	Specification	Check																
Cigar lighter	 <p>CL-2</p>	12V 10A 1.4W	※ Check coil resistance Normal : About 1MΩ ※ Check contact Normal : ∞Ω Operating time : 5~15sec																
Wiper motor	 <p>CN-21</p>	12V 3A	※ Check contact Normal : 6Ω (for terminal 2-6)																
Int wiper relay	 <p>CR-6</p>	12V 12A	—																
Radio & USB player	<table border="1" data-bbox="488 1128 679 1339"> <tr><td>USB_5V</td><td>○ 1 ○</td></tr> <tr><td>USB_D-</td><td>○ 2 ○</td></tr> <tr><td>USB_D+</td><td>○ 3 ○</td></tr> <tr><td>USB_GND</td><td>○ 4 ○</td></tr> <tr><td>N.C</td><td>○ 5 ○</td></tr> <tr><td>AUX_L</td><td>○ 6 ○</td></tr> <tr><td>AUX_R</td><td>○ 7 ○</td></tr> <tr><td>AUX_GND</td><td>○ 8 ○</td></tr> </table> <p>CN-27A</p>	USB_5V	○ 1 ○	USB_D-	○ 2 ○	USB_D+	○ 3 ○	USB_GND	○ 4 ○	N.C	○ 5 ○	AUX_L	○ 6 ○	AUX_R	○ 7 ○	AUX_GND	○ 8 ○	12V 3A	※ Check voltage 10 ~ 12.5V (for terminal 10-14,11-14)
USB_5V	○ 1 ○																		
USB_D-	○ 2 ○																		
USB_D+	○ 3 ○																		
USB_GND	○ 4 ○																		
N.C	○ 5 ○																		
AUX_L	○ 6 ○																		
AUX_R	○ 7 ○																		
AUX_GND	○ 8 ○																		
Receiver dryer	 <p>CN-29</p>	12V	※ Check contact Normal : 0Ω																
Starter	 <p>CN-45</p>	12V	※ Check contact Normal : 0.1Ω																

Part name	Symbol	Specification	Check
Alternator	 <p>CN-74</p>	12V 80A	※ Check contact Normal : 0Ω (for terminal B ⁺ -1) Normal : 10 ~ 12.5V
Travel buzzer	 <p>CN-81</p>	12V	-
Circuit breaker manual reset	 <p>CN-60 CN-95</p>	12V, 30A (CN-65) 12V, 60A (CN-95)	-
Rear combination lamp-LH, RH	 <p>CL-15 CL-16</p>	12V 21W × 2 12V 21/5W	※ Normal : 4.8Ω (for terminal 1-4) Normal : 2.1Ω ⁻ (for terminal 2-4, 4-5, 4-6)
Front combination lamp-LH, RH	 <p>CL-24 CL-25</p>	12V 21W 12V 5W	※ Normal : 4.8Ω (for terminal 1-2) Normal : 2.1Ω ⁻ (for terminal 2-3)
Head lamp -LH, RH	 <p>CL-3 CL-4</p>	12V 60/55W	※ Normal : 1.0Ω (for terminal 1-3, 2-3) Normal : 1.5Ω (for terminal 1-2)

Part name	Symbol	Specification	Check
Master switch	 <p>CS-74</p>	12V 1000A	-
Preheater	 <p>CN-80</p>	12V 42A 500W	-
Accel dial	 <p>CN-142</p>	-	<p>※ Check resistance Normal : about 5KΩ (for terminal A-C)</p> <p>※ Check voltage Normal : about 5V (for terminal A-C) : 2-4.5V (for terminal C-B)</p>
12V socket	 <p>CN-139</p>	12V 120W	
Dust sensor (switch)		1°C OFF 4°C ON	<p>※ Check resistance Normal : 0Ω (for terminal 1-2) The atmosphere temp : over 4°C</p>
Resistor	 <p>RS-1</p>	3W	<p>※ Check resistance A-B : 120Ω</p>

Part name	Symbol	Specification	Check
Relay (air con blower)		12V 20A	※ Check resistance Normal : About 200Ω (for terminal 1-3) 0 Ω (for terminal 2-4)
Radio & USB player	 <p>CN-27</p>	12V 2A	※ Check voltage 10~16V - (for terminal 1-3, 3-8)

GROUP 5 FAULT CODES

1. MACHINE FAULT CODE

Fault code		Description
HCESPN	FMI	
101	3	Hydraulic oil temperature sensor circuit - voltage above normal or shorted to high source (or open circuit)
	4	Hydraulic oil temperature sensor circuit - voltage below normal or shorted to low source
105	0	Working pressure sensor data above normal range (or open circuit)
	1	Working pressure sensor data below normal range
	2	Working pressure sensor data error
	4	Working pressure sensor circuit - voltage below normal, or shorted to low source
108	0	Travel oil pressure sensor data above normal range (or open circuit)
	1	Travel oil pressure sensor data below normal range
	2	Travel oil pressure sensor data error
	4	Travel oil pressure sensor circuit - voltage below normal or shorted to low source
122	0	Overload pressure sensor data above normal range (or open circuit)
	1	Overload pressure sensor data below normal range
	2	Overload pressure sensor data error
	3	Overload pressure sensor circuit - voltage below normal or shorted to low source
301	3	Fuel level sensor circuit - voltage above normal or shorted to high source (or open circuit)
	4	Fuel level sensor circuit - voltage below normal or shorted to low source
503	0	Brake pressure sensor data above normal range (or open circuit)
	1	Brake pressure sensor data below normal range
	2	Brake pressure sensor data error
	4	Brake pressure sensor data - voltage below normal or shorted to low source
505	0	Working brake pressure sensor data above normal range (or open circuit)
	1	Working brake pressure sensor data below normal range
	2	Working brake pressure sensor data error
	4	Working brake pressure sensor circuit - voltage below normal, or shorted to low source
530	0	Travel fwd pilot pressure sensor data above normal range (or open circuit)
	1	Travel fwd pilot pressure sensor data below normal range
	2	Travel fwd pilot pressure sensor data error
	4	Travel fwd pilot pressure sensor circuit - voltage below normal, or shorted to low source
	14	Travel fwd pilot pressure sensor circuit - special instructions
	16	Travel fwd pilot pressure sensor circuit - voltage valid but above normal operational range
701	4	Hour meter circuit - voltage below normal, or shorted to low source
705	0	MCU input voltage high
	1	MCU input voltage low
707	1	Alternator node I voltage low (or open circuit)
714	3	Acc. dial circuit - voltage above normal, or shorted to high source (or open circuit)
	4	Acc. dial circuit - voltage below normal, or shorted to low source
840	2	Cluster communication data error
841	2	ECM communication data error
IDSP		Water in fuel warning
Lo bat		Low battery warning

2. ENGINE FAULT CODE

Fault code		Description	
YANMAR SPN	FMI	Area	Status
522400	2	Crankshaft speed sensor	Crankshaft signal error
	5		No signal from crankshaft
522401	2	Camshaft speed sensor	Camshaft signal error
	5		No signal from camshaft
	7		Angle offset error
523249	5	Crankshaft speed sensor, Camshaft speed sensor	Crankshaft/camshaft, speed sensor non-input (simultaneous)
91	3	Accelerator sensor 1	Accelerator sensor 1 error (voltage high)
	4		Accelerator sensor 1 error (voltage low)
28	3	Accelerator sensor 2	Accelerator sensor 2 error (voltage high)
	4		Accelerator sensor 2 error (voltage low)
522624	7	Accelerator sensor 1 + 2	Dual accelerator sensor error (closed position)
522623	7		Dual accelerator sensor error (open position)
29	3	Accelerator sensor 3	Accelerator sensor 3 error (voltage high)
	4		Accelerator sensor 3 error (voltage low)
	8	Pulse sensor	Pulse accelerator sensor error (pulse communication)
28	0	Accelerator sensor 3	Accelerator sensor 3 error (foot pedal in open position)
	1		Accelerator sensor 3 error (foot pedal in closed position)
51	3	Intake throttle position sensor	Intake throttle position sensor error (voltage high)
	4		Intake throttle position sensor error (voltage low)
102	3	EGR low pressure side pressure sensor	ERG low pressure side pressure sensor error (excessive sensor output)
	4		ERG low pressure side pressure sensor error (insufficient sensor output)
	13		ERG low pressure side pressure sensor error (abnormal learning value)
	10		ERG low pressure side pressure sensor error (detected value error)
1209	3	EGR pressure sensor (high-pressure side)	ERG high pressure side pressure sensor error (excessive sensor output)
	4		ERG high pressure side pressure sensor error (insufficient sensor output)
	13		ERG high pressure side pressure sensor error (abnormal learning value)
	10		ERG high pressure side pressure sensor error (detected value error)
110	3	Engine coolant temperature sensor	Engine coolant temperature sensor error (excessive sensor output)
	4		Engine coolant temperature sensor error (insufficient sensor output)
	10		Engine coolant temperature sensor error (detected value error)
	0		Engine coolant temperature high (overheat)
172	3	Ambient air temperature sensor	Ambient air temperature sensor error (voltage high)
	4		Ambient air temperature sensor error (voltage low)

Fault code		Description	
YANMAR SPN	FMI	Area	Status
174	3	Fuel temperature sensor	Fuel temperature sensor error (voltage high)
	4		Fuel temperature sensor error (voltage low)
	0		Fuel temperature high
157	3	Rail pressure sensor	Rail pressure sensor error (voltage high)
	4		Rail pressure sensor error (voltage low)
3251	3	DPF differential pressure sensor	DPF differential pressure sensor error (excessive sensor output)
	4		DPF differential pressure sensor abnormal rise in differential pressure
	0		DPF differential pressure sensor error abnormal rise in differential pressure
	13		DPF differential pressure sensor error (abnormal learning value)
4795	31	DPF substrate/DPF differential pressure sensor	DPF substrate/DPF differential pressure sensor error (DPF substrate removal/DPF differential pressure sensor detected value error)
3609	3	DPF high pressure side pressure sensor	DPF high pressure side pressure sensor error (excessive sensor output)
	4		DPF high pressure side pressure sensor error (insufficient sensor output)
	10		DPF high pressure side pressure sensor error (detected value error)
3242	3	DPF intermediated temperature sensor	DPF inlet temperature sensor error (excessive sensor output)
	4		DPF inlet temperature sensor error (insufficient sensor output)
	10		DPF inlet temperature sensor error (detected value error)
	0		DPF inlet temperature sensor abnormal temperature (abnormally high)
3250	3	DPF intermediate temperature sensor	DPF intermediate temperature sensor error (excessive sensor output)
	4		DPF intermediate temperature sensor error (insufficient sensor output)
	10		DPF intermediate temperature sensor error (detected value error)
	1		DPF intermediate temperature sensor abnormal temperature (abnormally low)
108	3	Atmospheric pressure sensor	Atmospheric pressure sensor error (excessive sensor output)
	4		Atmospheric pressure sensor error (insufficient sensor output)
	10		Atmospheric pressure sensor error (characteristic error)
173	3	Exhaust manifold temperature sensor	Exhaust manifold temperature sensor error (excessive sensor output)
	4		Exhaust manifold temperature sensor error (insufficient sensor output)
	10		Exhaust manifold temperature sensor error (detected value error)
1485	7	Main relay	Main relay contact sticking
	2		Main relay early opening

Fault code		Description	
YANMAR SPN	FMI	Area	Status
522243	5	Starting aid relay	Starting aid relay disconnection
	6		Starting aid relay relay GND short circuit
654	5	Injector (No.1 cylinder)	Disconnection (injector-specific)
	6		Coil short circuit
	3		Short circuit
653	5	Injector (No.2 cylinder)	Disconnection (injector-specific)
	6		Coil short circuit
	3		Short circuit
652	5	Injector (No.3 cylinder)	Disconnection (injector-specific)
	11		Coil short circuit
	3		Short circuit
651	5	Injector (No.4 cylinder)	Disconnection (injector-specific)
	6		Coil short circuit
	3		Short circuit
4257	12	All injectors	Injector drive IC error
2797	6		Injector drive circuit (Bank1) short circuit (4TN: common circuit for No.1, No4 and all 3TN cylinders)
2798	6		Injector drive circuit (Bank2) short circuit (4TN: circuit for No.2 and 3 cylinders)
523462	13	Injector (correction value)	Injector (No.1 cylinder) correction value error
523463	13		Injector (No.2 cylinder) correction value error
523464	13		Injector (No.3 cylinder) correction value error
522465	13		Injector (No.4 cylinder) correction value error
522571	3	SCV (MPROP)	SCV (MPROP) L side VB short circuit
	6		SCV (MPROP) L side GND short circuit
633	3		SCV (MPROP) H side VB short circuit
	6		SCV (MPROP) H side GND short circuit
	5		SCV (MPROP) disconnection
522572	6		SCV (MPROP) drive current (high level)
	11		SCV (MPROP) pump overload error
157	0		Rail pressure error
	18	Rail pressure deviation error (low rail pressure)	
	15	Rail pressure deviation error (high rail pressure)	
	16	PLV open valve	
523469	0	PLV (common rail pressure limit valve)	Rail pressure fault (The times of PLV valve opening error)
523470	0		Rail pressure fault (The time of PLV valve opening error)
523489	0		Rail pressure fault (The actual rail pressure is too high during PRV limp home)
523498	9		Rail pressure fault (controlled rail pressure error after PLV valve opening)
523491	0	Rail pressure control	Rail pressure fault (injector B/F temperature error during PLV4 limp home)
523460	7		Rail pressure fault (operation time error during RPS limp home)

Fault code		Description		
YANMAR SPN	FMI	Area	Status	
190	16	Overspeed	Overspeed	
2950	5	Intake throttle drive circuit	No-load of throttle valve drive H bridge circuit	
	3		Power short circuit of throttle valve drive H bridge output 1	
	4		GND short circuit of throttle valve drive H bridge output 1	
	6		Overload on the drive H bridge circuit of throttle valve	
2951	3		VB power short circuit of throttle valve drive H bridge output 2	
	4		GND short circuit of throttle valve drive H bridge output 1	
2950	7		Throttle valve sticking (sticking open)	
2951	7		Throttle valves sticking (sticking closed)	
522596	9		CAN 2	TSC1 (SA1) reception timeout
522597	9			TSC1 (SA2) reception timeout
522599	9	Y_ECR1 reception timeout		
522600	9	Y_EC reception timeout		
522601	9	Y_RSS reception timeout		
237	31	VI_ reception timeout		
	13	VI_ reception data error		
522609	9	Y_ETCP1 reception timeout		
522618	9	EBC1 reception timeout		
522619	9	Y_DPFIF reception timeout		
522730	12	Immobilizer error (CAN communication)		
1202	2	Immobilizer error (system)		
522610	9	CAN 1		CAN 1 (for EGR): reception timeout from the EGR valve
522611	9			CAN 1 (for exhaust throttle): reception timeout
2791	0	EGR valve		EGR overvoltage error
	1			EGR low voltage error
	7		EGR feedback error	
	9		EGR ECM data error	
	12		Disconnection in EGR motor coils	
522579	12		Short circuit in EGR motor coils	
522580	12		EGR position sensor error	
522581	7		EGR valve sticking error	
522183	7		EGR initialization error	
522184	1		EGR high temperature thermistor error	
522617	1		EGR low temperature thermistor error	
522746	12		EGR target value out of range	
522747	12		Exhaust throttle	Exhaust throttle (voltage fault)
522748	12			Exhaust throttle (motor fault)
522749	12			Exhaust throttle (sensor system fault)
	12			Exhaust throttle (MPU fault)
522750	12	Exhaust throttle (PCB fault)		
522751	19	Exhaust throttle (CAN fault)		

Fault code		Description		
YANMAR SPN	FMI	Area	Status	
630	12	EEPROM	EEPROM memory deletion error	
522576	12		EEPROM memory reading error	
522578	12		EEPROM memory writing error	
522585	12	ECU internal fault	CY 146 SPI communication fault	
522588	12		Excessive voltage of supply 1	
522589	12		Insufficient voltage of supply 1	
522590	12		Sensor supply voltage error 1	
522591	12		Sensor supply voltage error 2	
522592	12		Sensor supply voltage error 3	
522744	4		Actuator drive circuit 1 short to ground	
522994	4		Actuator drive circuit 2 short to ground	
523471	6		Actuator drive circuit 3 short to ground	
523473	12		AD converter fault 1	
523474	12		AD converter fault 2	
523475	12		External monitoring IC and CPU fault 1	
523476	12		External monitoring IC and CPU fault 2	
523477	12		ROM fault	
523478	12		Shutoff path fault 1	
523479	12		Shutoff path fault 2	
523480	12		Shutoff path fault 3	
523481	12		Shutoff path fault 4	
523482	12		Shutoff path fault 5	
523483	12		Shutoff path fault 6	
523484	12		Shutoff path fault 7	
523485	12		Shutoff path fault 8	
523486	12		Shutoff path fault 9	
523487	12		Shutoff path fault 10	
523488	0			Recognition error of engine speed
3059	5		Breather heater (optional parts for 4TNV86CT and 4TNV98CT)	Breather heater disconnection
	4	Breather heater short circuit (GND)		
	3	Breather heater short circuit (VB)		
522323	0	Air cleaner switch	Air cleaner clogged alarm	
522329	0	Water separator switch	Water separator alarm	
167	5	Charge switch	Charge switch disconnection	
	1		Charge alarm	
100	4	Oil pressure switch	Oil pressure switch disconnection	
	1		Low oil pressure alarm	
522573	0	DPF	Excessive PM accumulation (method C)	
522574	0		Excessive PM accumulation (method P)	
522575	7		Regeneration failure (stationary regeneration failure)	
522577	11		Regeneration failure (stationary regeneration not performed)	
3250	0	DPF intermediate temperature sensor	DPF intermediate temperature sensor abnormal rise in temperature (post-injection malfunction)	

Fault code		Description	
YANMAR SPN	FMI	Area	Status
3720	16	DPF OP interface	Ash cleaning request 1
	0		Ash cleaning request 2
3719	16		Stationary regeneration standby
	0		Backup mode
3695	14		Reset regeneration is inhibited
3719	9		Regeneration failure (recovery regeneration failure)
	7		Recovery regeneration is inhibited