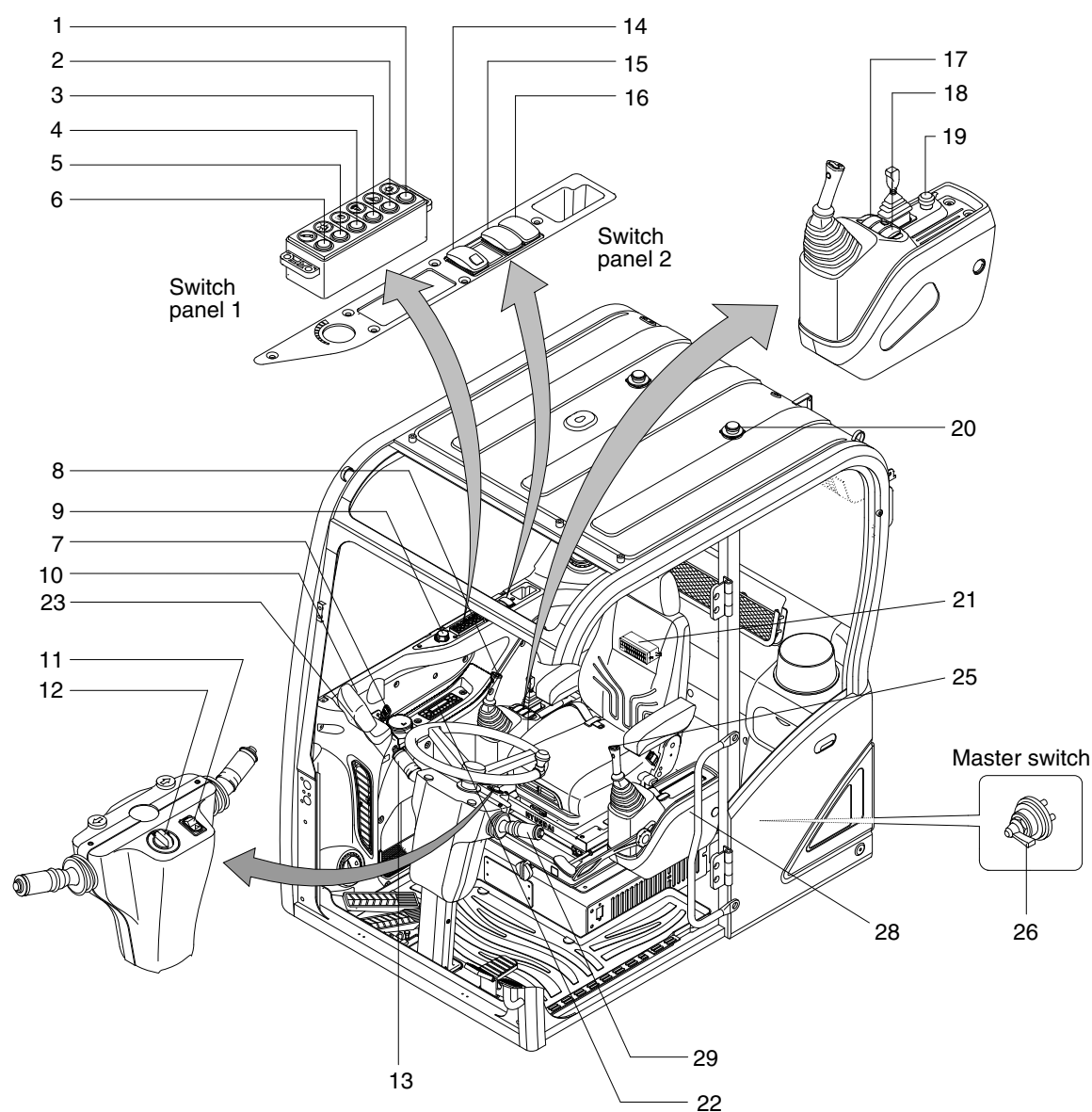


SECTION 4 ELECTRICAL SYSTEM

Group 1 Component Location	4-1
Group 2 Monitoring system	4-3
Group 3 Electrical Circuit	4-62
Group 4 Electrical Component Specification	4-82
Group 5 Connectors	4-90
Group 6 Fault codes	4-110

GROUP 1 COMPONENT LOCATION

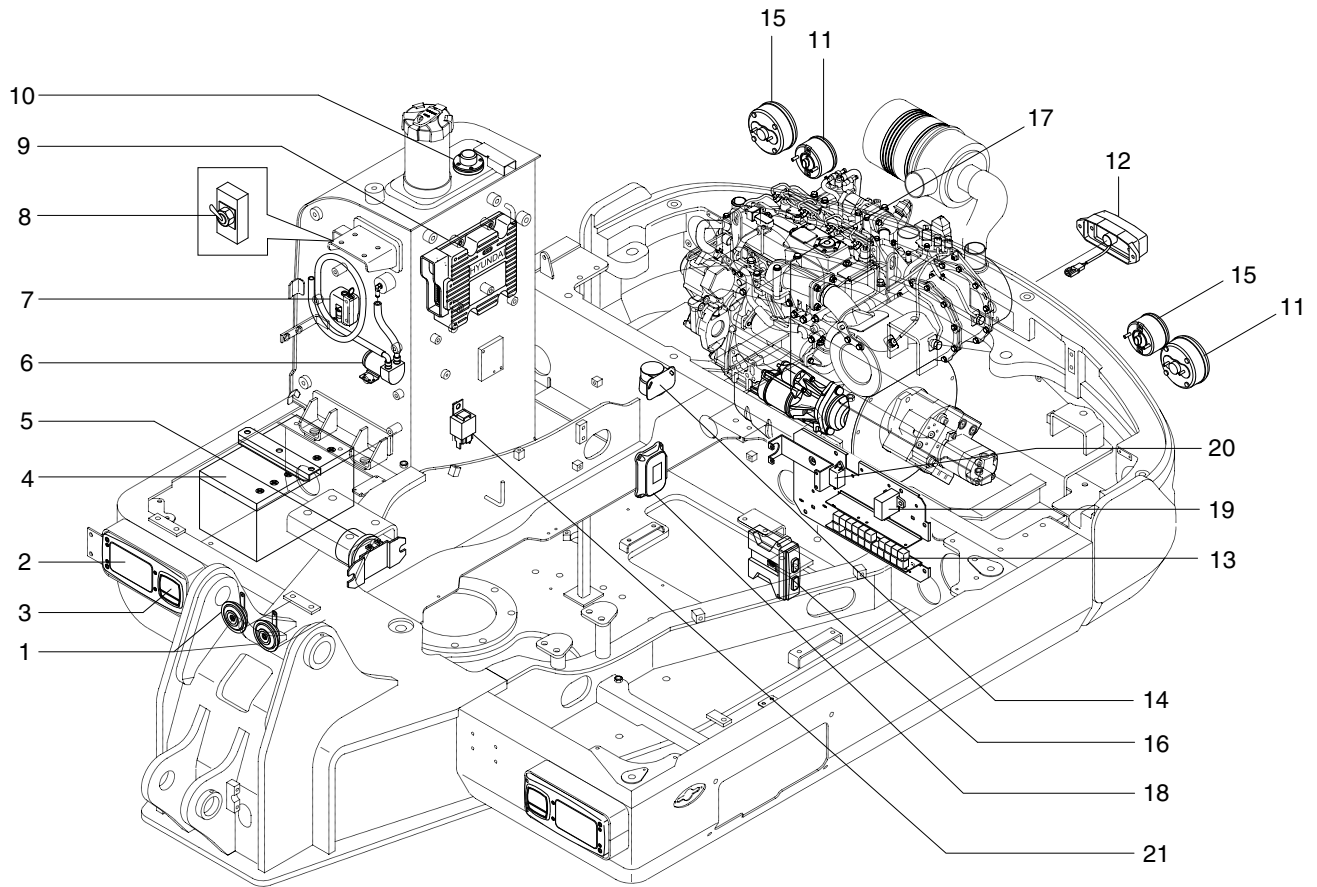
1. LOCATION 1



HW65AH4EL01

- | | | |
|----------------------------------|-------------------------------|------------------------------|
| 1 Head light switch | 11 Hazard switch | 21 Fuse box |
| 2 Work light switch | 12 Select switch | 22 Radio & USB player |
| 3 Travel alarm switch | 13 Multifunction switch (RH) | 23 Service motor |
| 4 Cab light switch | 14 Auto ram lock switch | 25 Horn switch |
| 5 Beacon switch (opt) | 15 Auto cruise switch | 26 Master switch |
| 6 Breaker selection switch (opt) | 16 Overload switch (opt) | 27 Aircon and heater switch |
| 7 Start switch | 17 DPF switch | 28 Travel alarm switch |
| 8 Breaker operation switch | 18 Quick coupler switch (opt) | 29 Multifunction switch (LH) |
| 9 Accel dial switch | 19 12V socket | |
| 10 Cluster | 20 Speaker | |

2. LOCATION 2



HW65AH4EL02

- | | | | | | |
|---|-----------------------|----|----------------------------|----|-----------------|
| 1 | Horn | 8 | Filler pump toggle switch | 15 | Reverse lamp |
| 2 | Head lamp | 9 | Machine control unit (MCU) | 16 | AVCU |
| 3 | Flasher position lamp | 10 | Fuel sender | 17 | Alternator |
| 4 | Battery | 11 | Combination lamp | 18 | RMCU |
| 5 | Battery relay | 12 | Number plate lamp | 19 | Int wiper relay |
| 6 | Fuel filler pump | 13 | 12V mini relay | 20 | Flaher unit |
| 7 | Washer pump | 14 | Travel alarm buzzer | 21 | Power relay |

GROUP 2 MONITORING SYSTEM

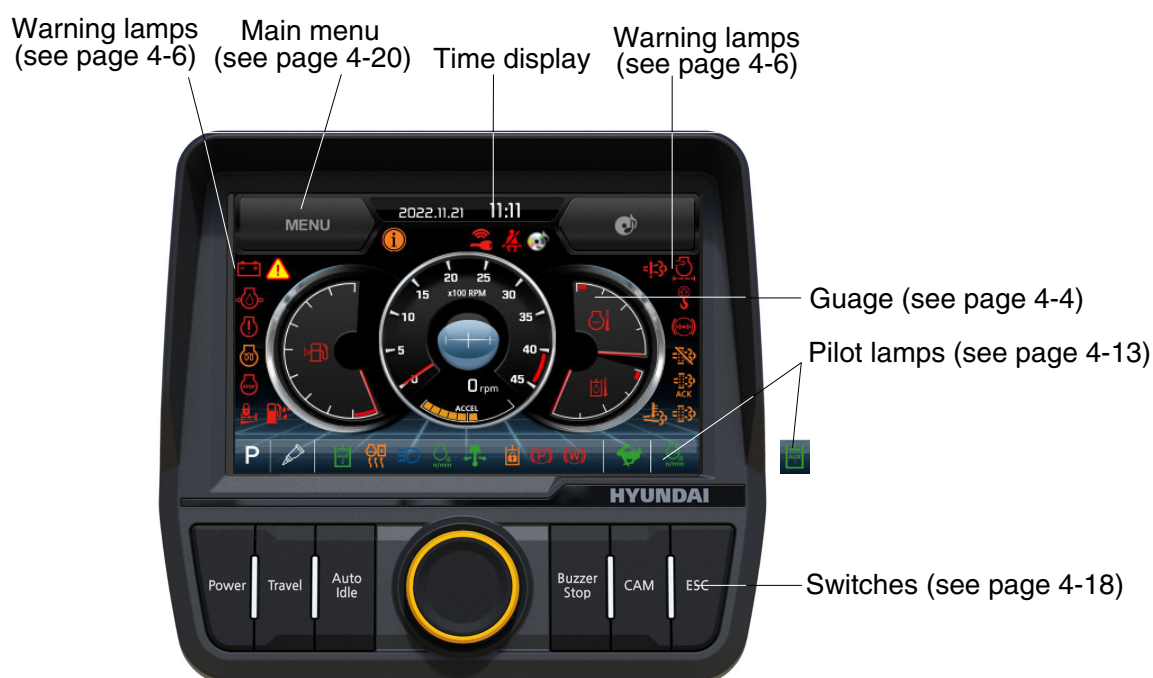
1) STRUCTURE

The cluster consists of LCD and switches as shown below. The LCD is to warn the operator in case of abnormal machine operation or conditions for the appropriate operation and inspection.

Also, The LCD is to set and display for modes, monitoring and utilities with the switches.

The switches or touch screen are to set the machine operation modes.

- ※ The cluster installed on this machine does not entirely guarantee the condition of the machine. Daily inspection should be performed according to chapter 6, Maintenance.
- ※ When the cluster provides a warning immediately check the problem, and perform the required action.



HW65AH4EL100D

- ※ The warning lamp pops up, lights ON (on the left-top side) and the buzzer sounds when the machine has a problem. The warning lamp lights ON until the problem is cleared. Refer to page 4-6 for details.

2) GAUGE

(1) Operation screen

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



HX60A3CD101A

- | | | |
|-----------------------------|--------------------|--------------|
| 1 Engine coolant temp gauge | 3 Fuel level gauge | 5 Accel dial |
| 2 Hydraulic oil temp gauge | 4 Engine rpm gauge | 6 Clinometer |

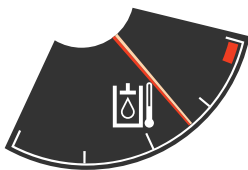
(2) Engine coolant temperature gauge



290F3CD53

- ① This gauge indicates the temperature of coolant.
 - Black range : General state
 - Red range : Engine overheated state
 - 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 even though the machine is in the normal condition range, check the electric device as this can be caused by poor connection of sensor or connector, and poor grounding of the instrument, etc.

(3) Hydraulic oil temperature gauge



290F3CD54

- 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 in the normal condition range, check the electric device as this can be caused by poor connection of sensor.

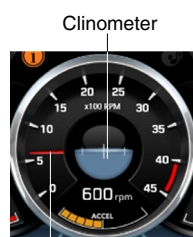
(4) Fuel level gauge



HX60A3CD55A

- ① This gauge indicates the amount of fuel in the fuel tank.
 - Black range : 9% or more
 - Red range : below 9%
- ② Fill the fuel when in 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 in the normal condition range, check the electric device as this can be caused by poor connection of sensor.

(5) Engine rpm gauge and clinometer



Engine rpm

HX60A3CD105K

- ① This displays the engine speed.
- ② This displays the tilt of machine.

(6) Accel dial gauge



290F3CD59

- ① This gauge indicates the level of accel dial from 0 to 10 step.

3) COMMUNICATION ERROR AND LOW VOLTAGE WARNING POP-UP

(1) Communication error pop-up



HX60A3CD107A

- 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



HX60A3CD108

- 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



HW65AH3CD109C

※ 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 up when the buzzer stop switch is pushed or the pop-up is touched. And the buzzer stops. Refer to page 4-19 for the switch.

(1) Engine coolant temperature warning lamp



290F3CD61

- ① The warning light is turned ON and buzzer is sounded when the engine coolant temperature is overheated.
- ② The engine speed is also decreased unless the coolant temperature is reduced again. Here, do not turn OFF the engine. When the engine is turned OFF, the coolant temperature is overheated even more to cause engine rattle due to the surge.

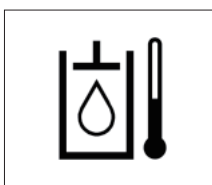
※ Check the temperature gauge of the engine coolant. The coolant is overheated when the gauge in the red range. Here, the coolant temperature warning lamp is turned ON, and the engine speed is decreased automatically.

The engine performs “low-speed idle” run until the gauge is returned to the black range. Even when the gauge returns to the black range, do not turn OFF the engine, and perform idle run additionally for 3~5 min. Ignoring this may cause surge from the heat to result in damage to the engine.

The reason for idle run of the engine is to disperse the overheated heat slowly to reduce the temperature.

After proper measures are finished check the coolant level again, and inspect whether the fan belt is loose, and whether there are any foreign substances around the radiator. When the coolant temperature returns to normal temperature, the engine speed is restored to normal speed again.

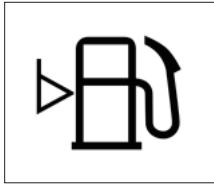
(2) Hydraulic oil temperature warning lamp



290F3CD62

- ① This warning 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



290F3CD63

- ① This warning lamp lights up and the buzzer sounds when the level of fuel is below 9%.
- ② Fill the fuel immediately when the lamp is ON.

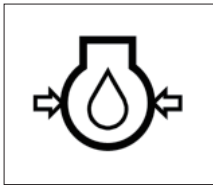
(4) Emergency warning lamp



290F3CD64

- ① This warning lamp pops up and the buzzer sounds when each of the below warnings occurs.
 - 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 will stop.**
This is same as following warning lamps.
- ② When this warning lamp lights up, machine must be checked and serviced immediately.

(5) Engine oil pressure warning lamp



290F3CD65

- ① This warning lamp lights up when the engine oil pressure is low.
- ② If the lamp lights up, shut off the engine immediately. Check oil level.
- ※ **Serious damage can be caused to the engine when the engine is operated continuously while the warning lamp is turned ON.**

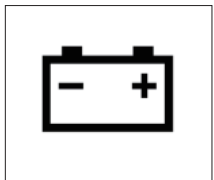
(6) Check engine warning lamp



290F3CD66

- ① Warning lamp is turned ON when the engine must be checked.
- ※ **When the warning lamp is turned ON, stop the machine and find the cause for repair.**

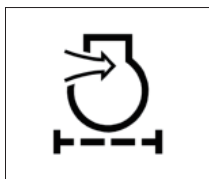
(7) Battery charging warning lamp



290F3CD67

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

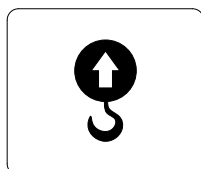
(8) Air cleaner warning lamp



290F3CD68

- ① This warning lamp lights up when the air cleaner is clogged.
- ② Check, clean or replace the filter.

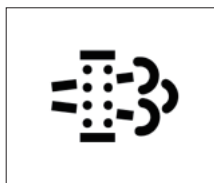
(9) Overload warning lamp (opt)



21093CD36

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

(10) DPF (Diesel Particulate Filter) Warning Lamp



290F3CD70

- ① This lamp is turned ON or OFF to inform that regeneration is required.
- ② For details, please refer to the after-treatment system below.

※ After-treatment System

The after-treatment system uses DOG and DPF to satisfy the exhaust regulations.

The oxidation catalyst of DOG reduces the emission of hydrocarbon and carbon monoxide through the catalyst, and the particle materials (PM) discharged from the engine are collected.

DPF regeneration is composed of “forced regeneration” during driving and “manual regeneration” performed by the driver.

When the regeneration is not performed successfully according to the procedure, warning lamp relevant to the each operating condition is turned ON.

When the warning lamp is turned ON, park the machine on a safe place, and perform the regeneration process manually according to the following procedure.

The warning lamp is turned OFF when the regeneration process is performed successfully.

DPF regeneration mode is classified into the following stages according to the soot accumulation level on the DPF.

- Soot level of 80% or less : Normal operating condition
- Soot level of 80~100% : AUTO regeneration during driving
- Soot level of 100~120% : Regeneration initiated by the driver (Manual Regeneration)
- Soot level of 120% or more : Inquiry to the Service Center or agent required

(DPF warning lamp turned OFF, check engine warning lamp turned ON, engine power reduced)

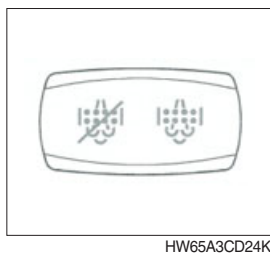
⚠ Engine power can be reduced when the regeneration process is not performed manually after the warning lamp is turned ON.

※ DPF Regeneration Procedure

Procedure	Soot Amount	DPF Warning Lamp 	Check engine warning lamp 	Decrease in Torque	Remark
1	Less than 99%	-	-	-	No action (Manual regeneration according to the equipment)
2	100~105%	-	-	-	Regeneration is started. Performed in high temperature (560~640°C)
3	106~110%	Blinking slowly	-	-	Forced regeneration induced (Alarm)
4	111~120%	Blinking slowly	Turned ON	Torque reduced weakly	Forced regeneration induced (Decrease in Torque)
5	121% or more	Blinking quickly	Blinking	Torque reduced severely	Regeneration is inactivated. Inquire to the service center or to the agent to start the service regeneration to solve the decrease in torque

- DPF warning lamp is turned ON when the DPF soot exceeds 100%.
- DPF warning lamp is blinked when the DPF soot level exceeds 105%.
- When the DPF soot level exceeds 111%, the DPF warning lamp blinks slowly, and the check engine warning lamp is turned ON to reduce the engine power.
- When the DPF soot level exceeds 121%, the DPF warning lamp blinks slowly, and the check engine warning lamp is turned ON to reduce the engine power.
- DPF regeneration is composed of the active regeneration occurred during driving and forced regeneration activated manually by the driver.
- When the DPF soot level is less than 105%, active regeneration is activated automatically during driving.
However, the system informs the driver to perform forced regeneration manually when the level is 105% or more.
The check engine warning lamp is turned ON when the level is 120% or more, and engine power is reduced to 50%. The driver must inquire to the service center or to the agent.
- DPF soot level of 105% or less : Active regeneration
- DPF soot level of 105~120% : Forced regeneration + Engine power reduced
- DPF soot level of 105~120% : Driver is informed that forced regeneration is required.
- DPF soot level of 120% or more : Regeneration not possible, and inquiry required to the service center or to the agent

※ Manual (Forced) DPF regeneration method



DPF regeneration procedure is activated manually by the driver when the driver selects to initiate the regeneration procedure.

Because the operating condition is inappropriate for the hot engine exhaust temperature (Ex.: Work near the inflammable materials), manual regeneration may be required if the driver prohibited the active regeneration procedure for long period.

① Manual regeneration condition

- Coolant (Engine oil) temperature : 40 °C or more
- Engine RPM: Low-speed idle run
- Parking brake must be applied (Only relevant to the wheel-type machine)
- When the soot concentration is accumulated to 20% or more

② Manual (Forced) regeneration procedure

Park the machine on a well-ventilated area, and keep away from inflammable materials to set the machine as shown below.

- Operate the machine until the engine coolant and oil temperature becomes 40°C or more.
- Engine speed is set to low speed.
- Put the gear lever on neutral, and apply the parking brake. (Only relevant to wheel-type machine)
- Safety lever is placed on the locking position.
- When the regeneration mode is in "Prohibit", DPF switch is pressed to the manual regeneration position.

③ Regeneration switch is activated to initiate the regeneration procedure.

※ DPF warning lamp is lighted on the monitor.

While the engine speed is in low speed, the speed is increased gradually to 2000 RPM, and the regeneration procedure is initiated.

Manual regeneration can be continued for maximum of 30 min. or more according to the soot accumulation amount.

HEST lamp is lighted during the regeneration, and HEST lamp is turned OFF when regeneration is stopped.

※ The driver can stop the manual regeneration by lifting the safety lever to the "Release Lock" position, or by pressing the DPF switch to the "Prohibit" position.

(11) Stop engine warning lamp



290F3CD252

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

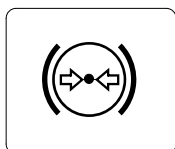
(12) Water in fuel warning lamp



HX60A3CD110

- ① This warning lamp lights up when the water separator is full of water or malfunctioning.
- ② When this lamp lights up, stop the machine and drain water from the water separator.

(13) Brake oil pressure warning lamp



55I3CD95A

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

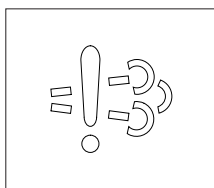
(14) Seat belt reminder warning lamp



300A3CD25

- ① When operator does not fasten the operator's seat belt, the seat belt reminder warning lamp pops up and the buzzer sounds.
- ② Fasten the seat belt.

(15) Exhaust System Failure Warning Lamp



HW60A3CD53A

- ① This warning lamp is turned ON in 3 cases such as when the quantitative distribution is stopped, poor reagent quality and monitoring malfunction, etc.
- ② Please refer to the exhaust gas control system below.

※ Exhaust Gas Control System

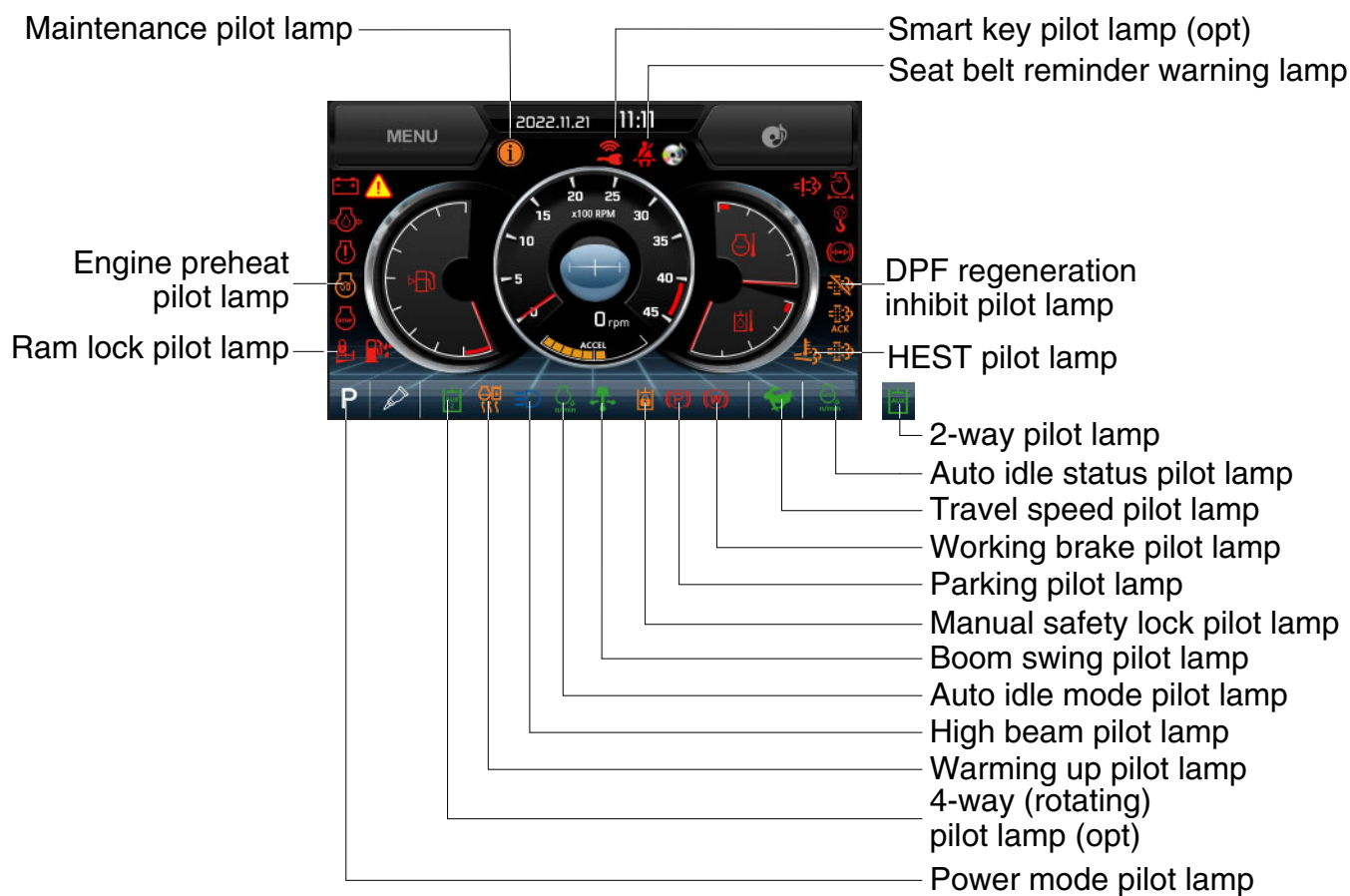
This machine is equipped with the engine exhaust gas emission control system that satisfies the exhaust gas emission regulations. The owner/driver has the responsibility of proper operation and maintenance on the exhaust control system provided in the guaranteed provisions related to emission.

The engine exhaust system is mounted on the DPF. DPF is a emission reduction device that reduces the diesel particulate matter or soot from the exhaust gas of the diesel engine. DPF is stored until the particulate matter is combusted. The process of combustion and elimination of the stored particulate matter is referred to as "Regeneration". After the regeneration process is completed, residue is remaining, and it must be removed from the DPF regularly.

▲ The temperature of the exhaust gas and components of the exhaust system are in very high temperature during regeneration. There are risks of fire or burn, and it can also result in death, severe injury or property loss. Inflammable materials and explosive gas must be kept far away from the exhaust system during regeneration.

Item	Stage	Reducing Agent Level/Time	Notification Method	Decrease in Torque	Symbol
EGR Valve Problem	Warning	Immediately	Always	-	
	Level 1	+36 hours	Blinking slowly	Torque Limit : ~25%	
	Serious	+64 hours (100 hours)	Blinking quickly + Buzzer	Torque Limit : ~50% Speed Limit : 60%	

5) PILOT LAMPS



HW65AH3CD112E

(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 mode
			Auto idle status

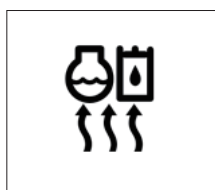
(2) Preheat pilot lamp



290F3CD79

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

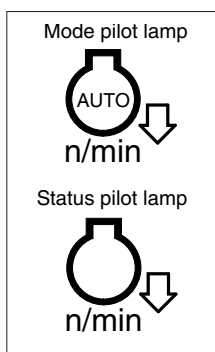
(3) Warming up pilot lamp



290F3CD80

- ① This lamp lights up 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 (86°F), or when 10 minutes have passed since starting the engine.

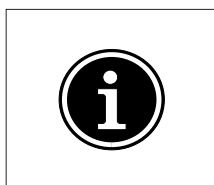
(4) Auto idle status/ mode pilot lamp



85A3CD106

- ① The auto idle mode pilot lamp will light up when the idle mode is selected.
- ② The auto idle status pilot lamp will be ON when all levers and pedals are in the neutral position, and the auto idle mode is selected.
- ③ One of the lever or pedal is operated, the status lamp will go OFF and the engine speed returns to the previous conditions.

(5) Maintenance pilot lamp

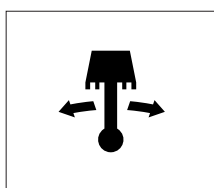


HX60A3CD116

- ① This lamp lights up when consumable parts are in need of replacement. It means that the change or replacement interval of parts is 30 hours from the required change interval.
- ② Check the message in maintenance information of main menu. Also, this lamp lights up for 3 minutes when the start switch is switched to the ON position.

※ Refer to page 4-24.

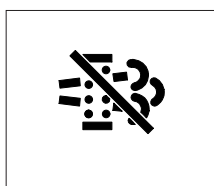
(6) Boom swing pilot lamp



HX603CD82

- ① This lamp lights up when the boom offset switch is pressed.

(7) DPF regeneration inhibit warning lamp

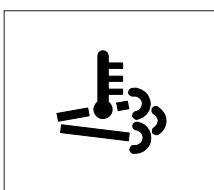


85A3CD107

- ① This warning lamp indicates, the DPF switch is pushed to the inhibit position, therefore automatic and manual regeneration can not occur.

※ Refer to page 4-41 for the DPF switch.

(8) HEST (High exhaust system temperature) warning lamp



85A3CD109

- ① This warning lamp indicates, when illuminated, that exhaust temperatures are high due to regeneration of the DPF.
- ② The lamp will also illuminate during a manual regeneration.
- ③ When this lamp is illuminated, be sure the exhaust pipe outlet is not directed at any surface or material that can melt, burn, or explode.

▲ When this lamp is illuminated, the exhaust gas temperature could reach 600°C [1112°F], which is hot enough to ignite or melt common materials, and to burn people.

※ The lamp does not signify the need for any kind of equipment or engine service; It merely alerts the equipment operator to high exhaust temperatures. It is common for the lamp to illuminate on and off during normal equipment operation as the engine completes regeneration cycles.

(9) Parking pilot lamp



210WF3CD05

- ① This lamp lights up when the the parking switch is set to the parking position.

※ Refer to the page 4-41.

(10) Working brake pilot lamp



210WF3CD07

- ① This lamp lights up when the working brake switch is set to working position.

※ Refer to page 4-41

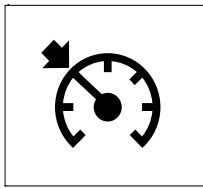
(11) Ram lock pilot lamp



210WF3CD04

- ① This lamp lights up when the ram lock switch is set to the LOCK position.
- ② Also, this lamp lights up when the select switch is set to the parking position or the brake pedal is applied in the traveling.

(12) Cruise pilot lamp

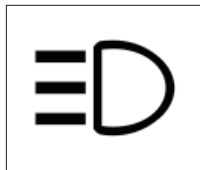


HW60A3CD46

① This lamp lights up when the auto-cruise of panel switch is pressed.

※ Refer to the page 4-40.

(13) High beam pilot lamp

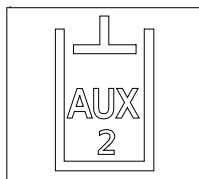


210WF3CD06

① The lamp lights up when the head lamp switch is set to the high beam position or passing conditions.

② When passing other machines ahead, this lamp must be used for a few seconds to give other machines warning for a few seconds.

(14) 4-way (rotating) pilot lamp (opt)

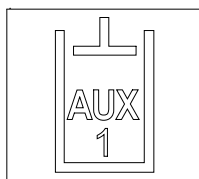


HW60A3CD48A

① This lamp lights up when the boom swing selection switch is set to the rotator (not used boom swing) and the 4-way operation switch on the LH control lever is pressed.

※ Refer to the page 4-43.

(15) 2-way pilot lamp



HW65A3CD49

① This lamp lights up when the option flow control function is activated in the cluster.

※ Refer to the page 4-24.

(16) Manual safety lock pilot lamp



140WA3CD37

① This lamp lights up when the safety knob is set to the LOCK position.

※ Refer to the operator's manual page 3-47 for the safety knob.

(17) Smart key pilot lamp (opt)



300A3CD36A

① This lamp lights up when the engine is started by the start button.

② This lamp is red when the authentication fails, it will be green when the authentication is successful.

※ Refer to the page 4-28.

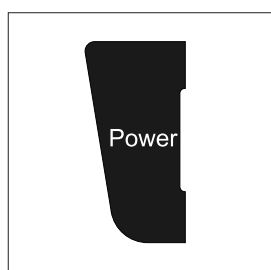
6) SWITCHES



HW65AH3CD117D

※ When the switches are selected, the pilot lamps are displayed on the LCD. Refer to the page 3-12 for details.

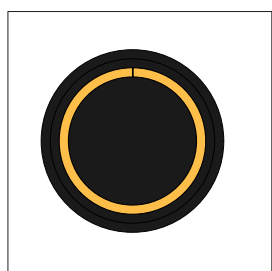
(1) Power mode switch



HX60A3CD118

- ① This switch is to select the machine power mode and when pressed, the power mode pilot lamp will be displayed on the section of the monitor.
 - P : Heavy duty power work.
 - S : Standard power work.
- ② The pilot lamp changes S → P → S in this order.

(2) Select switch



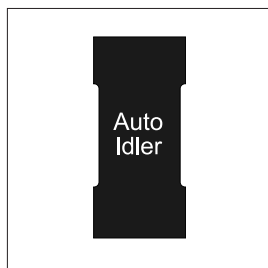
HX60A3CD119

- ① This switch is used to select or change the menu or input value.
- ② Knob push
 - 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 switch



HX60A3CD120

① This switch is used to activate or cancel the auto idle function.

※ Refer to the page 4-13 for details.

(4) Buzzer stop switch

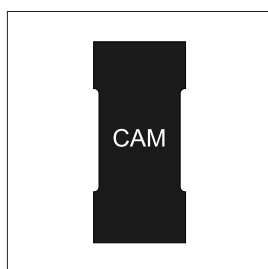


HX60A3CD121

① The buzzer sounds when the machine has a problem.

In this case, push this switch and buzzer stops, but the warning lamp lights up until the problem is cleared.

(5) Camera switch

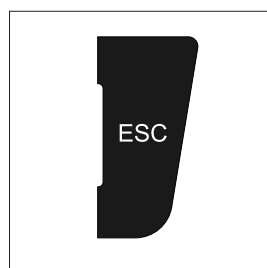


HX60A3CD122

① In the operation screen, pushing this switch will display the view of the camera on the machine (if equipped).

※ Please refer to page 4-35 for the camera.

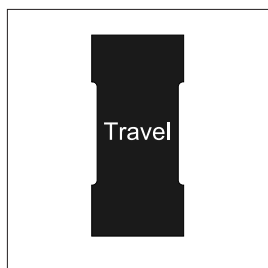
(6) Escape switch



HX60A3CD123

① This switch is used to return to the previous menu or parent menu.

(7) Travel speed control switch



HX60A3CD104

① This switch is used to select the travel speed alternatively.

-  : Low speed
-  : High speed

※ Do not change the setting of the travel speed switch while machine is moving. Machine stability may be adversely affected.

⚠ Serious injury or death can result from sudden changes in machine stability.

7) MAIN MENU

Main menu screen



HX60A3CD124A



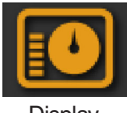
Sub menu screen



HW60AH3CD125A

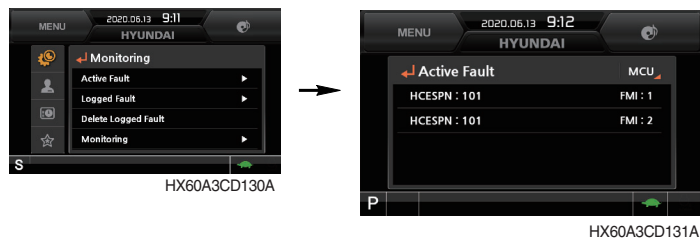
- ※ Please refer to the select switch, page 4-18 for selection and change of menus and input values.
- ※ In the operation screen, tap MENU or press the select switch to access the sub-menu screen.

(1) Structure

No	Main menu	Sub menu	Description
1	 Monitoring 55I3CD51A	Active fault - Machine Active fault - Engine Logged fault - Machine/engine Delete logged fault Monitoring - Machine Monitoring - Switch Monitoring - Output	MCU ECU MCU, ECU MCU, ECU Engine rpm, oil temp, voltage and pressure etc. Digital switch status Digital output status
2	 Management 55I3CD51B	Maintenance information Option flow control ESL mode setting Change password Machine information A/S phone number Cluster update CAN update Service menu	Elapsed time, Change interval, Replacement etc. Opt atch set, Proportional flow control set, Confirmation ESL mode setting Password change Cluster, MCU, Engine, Machine A/S phone number, A/S phone number change Application, System Program download, Update Power shift, Operating hour, Gauge type, Rpm, AVCU set, Language update etc
3	 Display 55I3CD51C	Clock Brightness Unit Language	Current time set Manual, Auto Temperature, Pressure, Flow, Distance, Volumn 22 kinds
4	 Utilities 55I3CD51D	Entertainment Camera setting Clinometer setting Manual Emergency mode Quick cooling mode	Video/music file playing Setup of number of active cameras, display sequences, and camera numbers Initializing slope sensor Display cluster manual Back-up switch for failed cluster switch and accel dial To maximize engine cooling performance

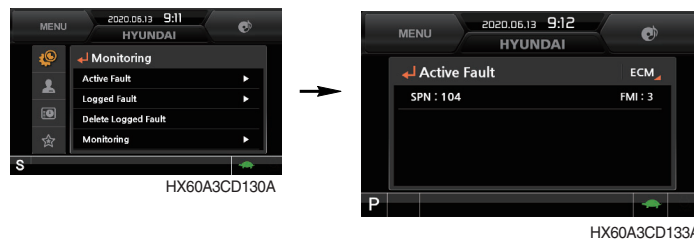
(2) Monitoring

① Active fault - Machine



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

② Active fault - Engine



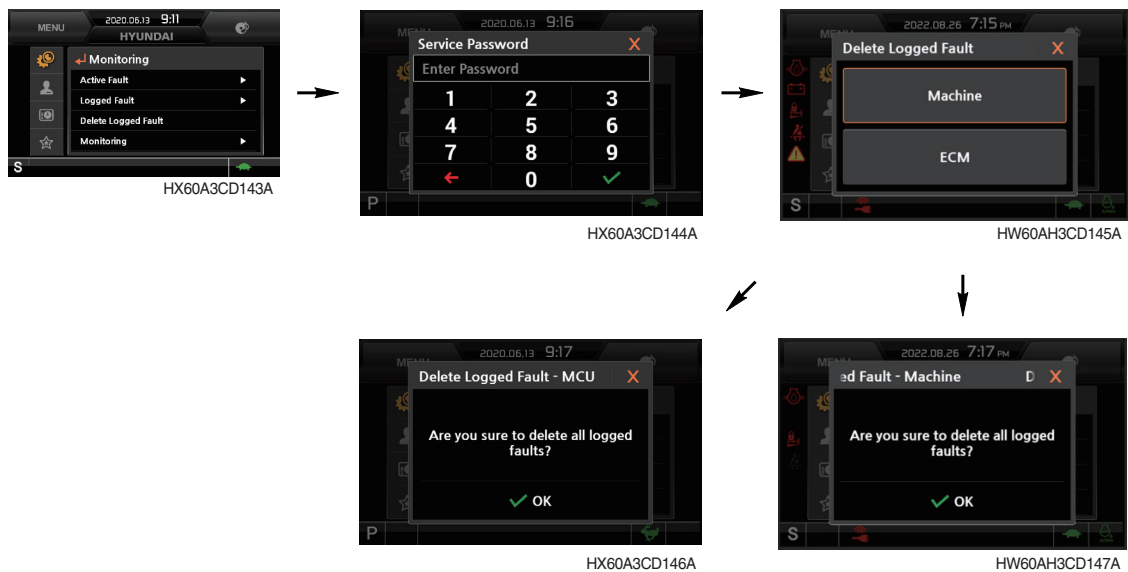
- The active faults of the engine ECU can be checked by this menu.

③ Logged fault - Machine/ Engine



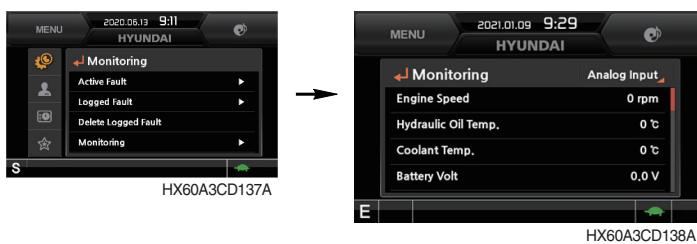
- The logged faults of the machine MCU or engine ECU can be checked by this menu.
- This menu can be used only HCE service man.

④ Delete logged fault



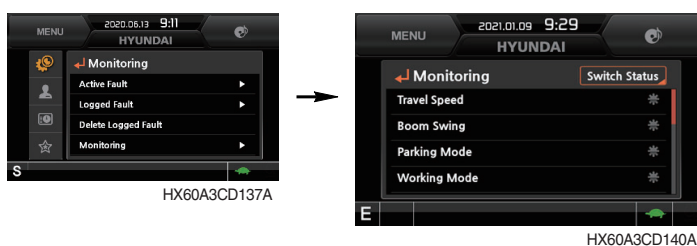
- The logged faults of the MCU, engine ECU can be deleted by this menu.
(It is possible under the engine stop conditions)

⑤ Monitoring (machine status)



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

⑥ Monitoring (switch status)



- The digital switch status of the machine can be checked by this menu.
- The activated switch will display in blue color.

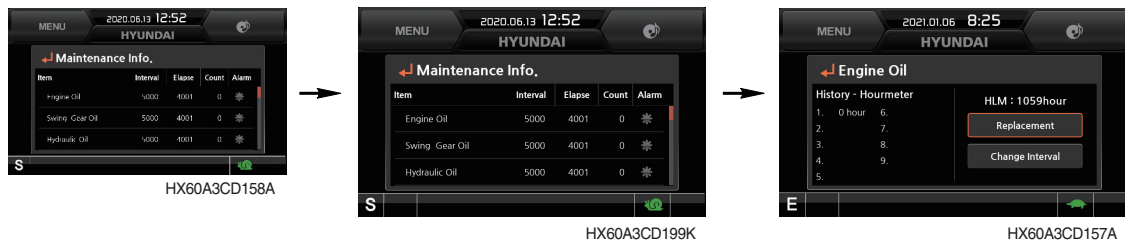
⑦ Monitoring (output status)



- The digital output status of the machine can be checked by this menu.
- The digital output status will display in blue color.

(3) Management

① Maintenance information



- Elapsed time : Display the elapsed time after the maintenance.
- Change interval : The change intervals can be changed in hour increments of 50.
- Change history : Display the change history for the maintenance.
- Replacement : The elapsed time will be reset to zero (0).
- Change or replace interval

※ Refer to the operator's manual page 6-16.

② Option flow control

a. Option attach selection



- Three kinds of option attachment can be selected by this menu.

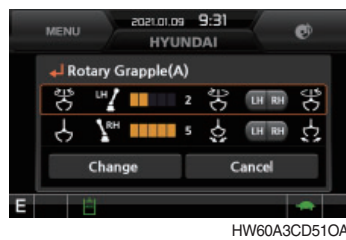
- Rotary grapple (4-way)
- Grapple (2-way)
- Auger (2-way)

※ There are two user modes (type A or B) in each option attachment.

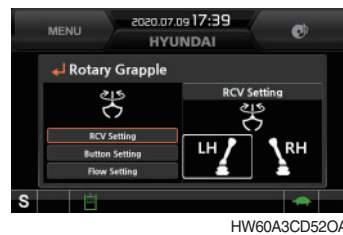
b. Proportional flow control setting

The preferable value of each option attachment can be set by this menu.

a) Rotary setting



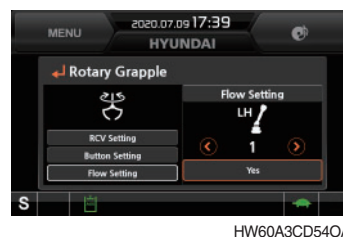
- Select rotary RCV, button and flow can be set by this menu



- RCV setting
 - Enable set LH or RH RCV for rotary operation.
 - Select LH for rotary → RH set for grapple automatically



- Button setting (CW rotation)
 - Select LH for CW rotation → RH set for CCW rotation automatically



- Flux setting
 - Enable set from level 1 to level 5.

b) Grapple setting



- Select grapple
RCV, button and flow can be set by this menu

- RCV setting
 - Enable set LH or RH RCV for grapple operation.
 - Select LH for grapple → RH set for rotary automatically

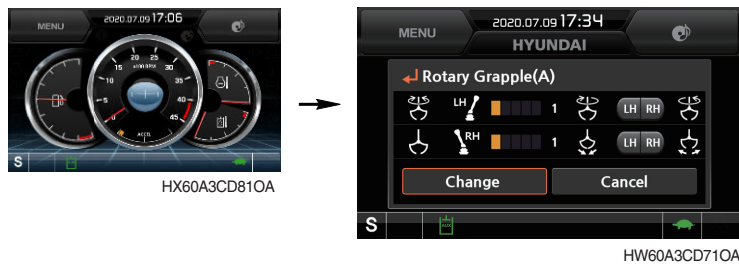
- Button setting (Close)
 - Select RH for Close → LH set for open automatically

- Flow setting
 - Enable set from level 1 to level 5.

- Flow setting value can be saved by pressing change button.

- ※ Setting value saved once, it memorized in each icon and the last setting value is activated.
- ※ Saved setting can be used by pressing Icon button only.
- ※ There are two kinds (A and B) in each option attach setting and six kinds of option attach setting can be saved totally (2 of 4-way, 4 of 2-way).

c) Confirmation



※ Symbol () is activated on the low side of main screen when option attach function is used.

※ Previous setting value can be checked by following procedure.

– Menu > Management > option attach

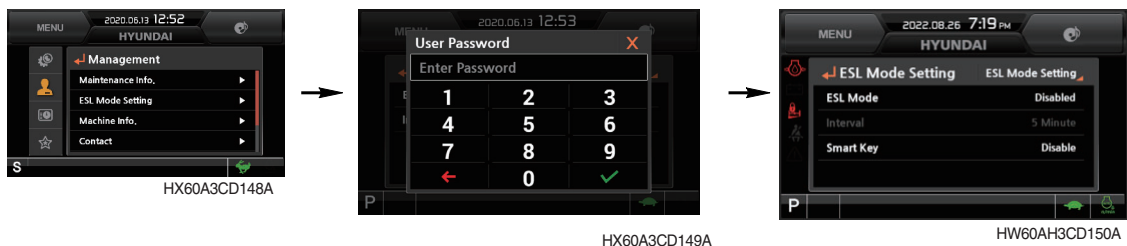
a) Rotary setting

- Rotary RCV : LH
- Rotary flow level : 3
- CW rotation : LH
- CCW rotation : RH

b) Grapple setting

- Grapple RCV : RH
- Grapple flow level : 3
- Open : LH
- Close : RH

③ 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.

– When you Enable the ESL mode, the password will be required when the starting switch is turned to the on position.

– Disable : ESL function is disabled and password is not required to start engine.

Enable (always) : The password is required whenever the operator starts engine.

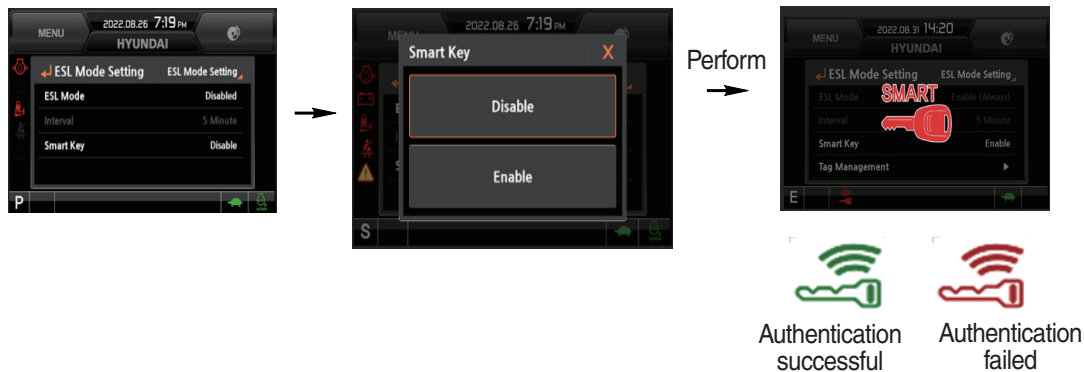
Interval : The password is required when the operator starts engine first. But the operator can restart the engine within the interval time without inputting the password.

※ The interval time can be set to a maximum 4 hours.

※ Default password : 00000

Password length : 5~10 digits

Start Limit - Smart Key Setting (When smart key is installed)



- Smart Key Exclusive

When the Smart key option (optional) is installed, Smart key menu is shown, and performance or non-performance of Smart key authentication can be set through the Smart key menu.

When the Smart key is not in the cabin, the approval procedure is rejected, and password must be entered.

Start Limit - Tag Management

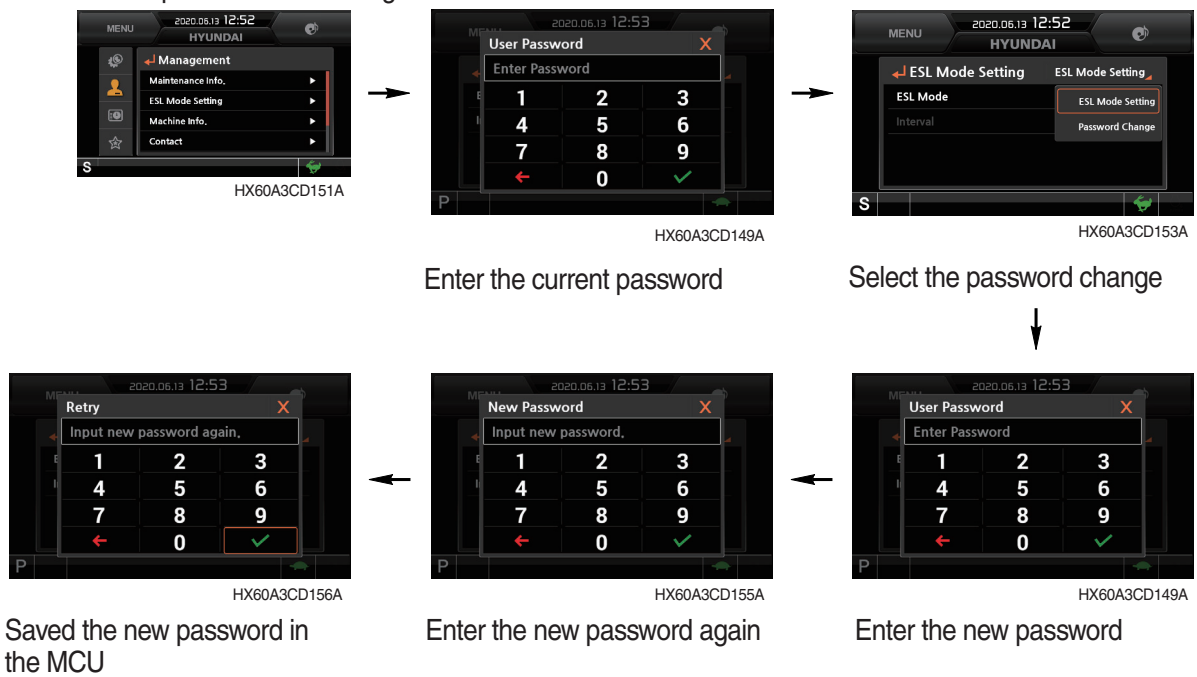


- The tag management menu is activated only when the Smart key menu is set through performance. Tag can be registered or deleted.
 - When registering the tag : Locate only the tag preferred for registration inside the cabin.
 - When deleting the tag : All registered tags are deleted.

Engine Starting Condition

Case	ESL Mode	Smart Key	Condition
1	Disable	Disable	- With registered tag : Engine can be started without password input. - Without registered tag : Engine can be started without password input.
2	Disable	Enable	If Smart Key is enabled, ESL Mode is automatically enabled. This Case 2 work the same as the Case 4.
3	Enable	Disable	- With registered tag : Engine can be started with password input. - Without registered tag : Engine can be started with password input.
4	Enable	Enable	- With registered tag : Engine can be started without password input. - Without registered tag : Engine can be started with password input.

④ Password change
– The password is 5~10 digits.

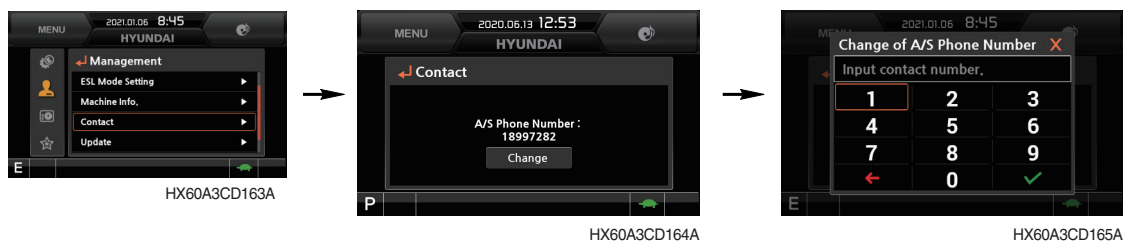


⑤ Machine information



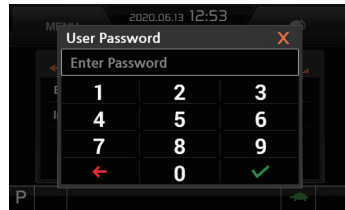
- The information of the cluster, machine MCU and engine and machine checked by this menu.

⑥ A/S phone number



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

⑦ Cluster update



Enter the user password

Select the cluster update

- The cluster and CAN device can be updated by this menu.
- ※ Do not turn power off while updating.

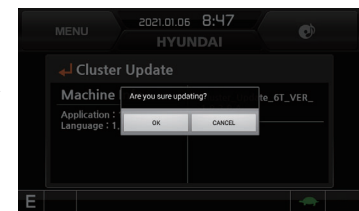
a. Application update



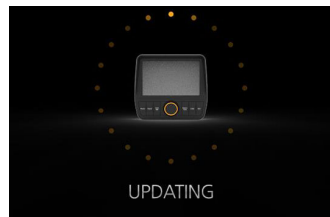
Select application item



Select file to update



Select OK

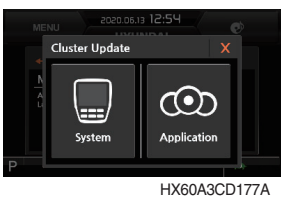


Completed

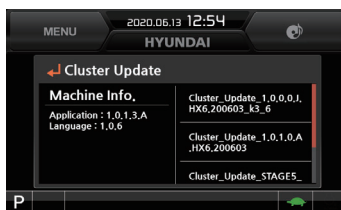


In process

b. System update



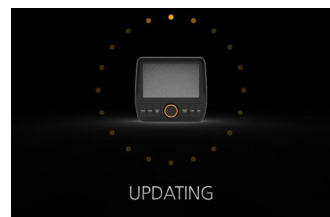
Select system item



Select file to update



Select OK

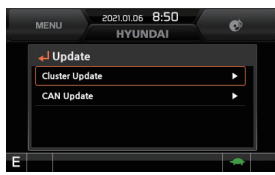


Completed

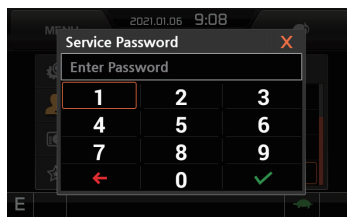


In process

⑧ CAN update

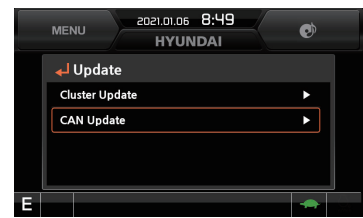


HX60A3CD169A



HX60A3CD149A

Enter the user password



HX60A3CD179A

Enter the CAN password again

· The application program can be downloaded and updated by this menu.

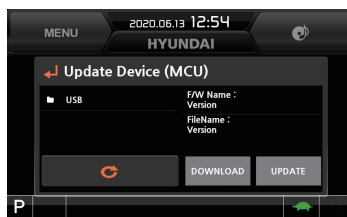
※ Do not turn power off while updating.

a. Download



HX60A3CD180A

Select update device



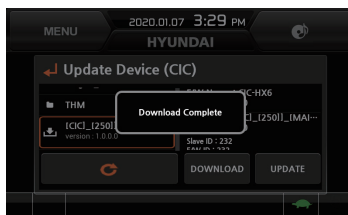
HX60A3CD181A

Select download

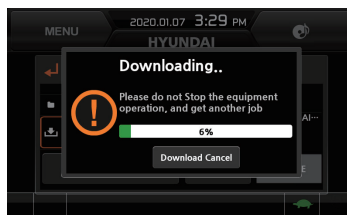


HX60A3CD182A

Select download after choose update file

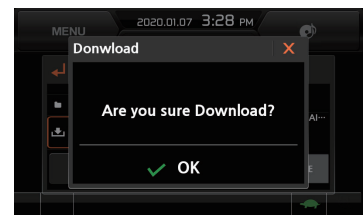


HX60A3CD185A



HX60A3CD184A

Stop download when select the cancel



HX60A3CD183A

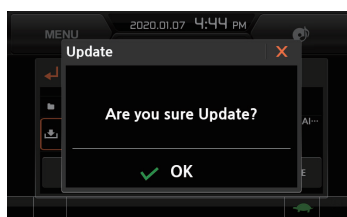
Confirm download

b. Update



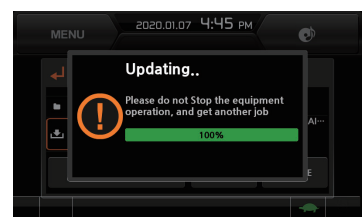
HX60A3CD186A

Select update after the download.



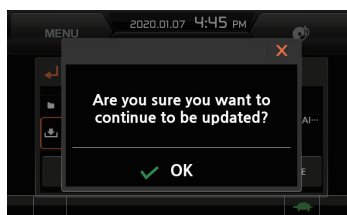
HX60A3CD187A

Confirm the update



HX60A3CD188A

In process update



HX60A3CD190A

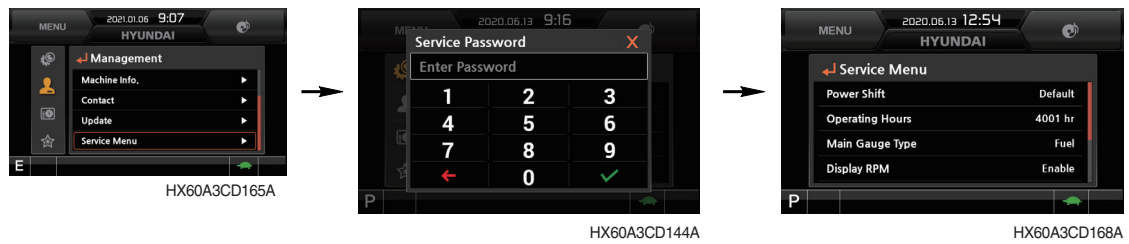
Select the OK to update another application program



HX60A3CD175A

Completed update

⑨ Service menu



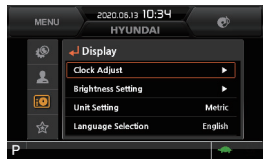
Enter the manager password

- Power shift : Power shift mode (default/option can be set by this menu.
- Operating hours : Operating hours in individual modes since the machine line out can be checked by this menu.
- Main gauge type : The engine rpm or fuel level gauge can be display on the main gauge of the main screen by this menu.
- Display RPM : Display the numeric value of engine rpm on the main gauge of the main screen can be set by this menu.
- AVCU setting : Standard, 2-Way or 4-Way dependent upon the machine options can be selected by this menu.
- Adding language : The language displayed on the cluster can be update by this menu when it is required to correct language.

※ This menu can be used only HCE service man. Do not attempt unauthorized adjustment.

(4) Display

① Clock adjust



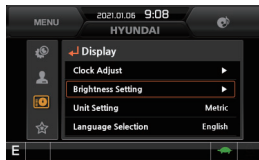
HX60A3CD191A



HX60A3CD192A

- The first row of boxes indicate Year/Month/Day.
- The second row shows the current time. (AM, PM/0:00~12:59)

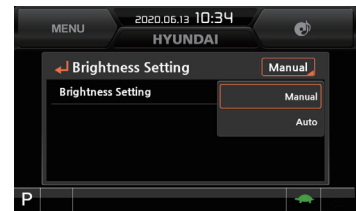
② Brightness



HX60A3CD193A

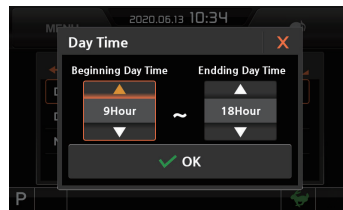


HX60A3CD194A



HX60A3CD195A

Manual (1st~10th step)



Auto (day/night)

HX60A3CD197A

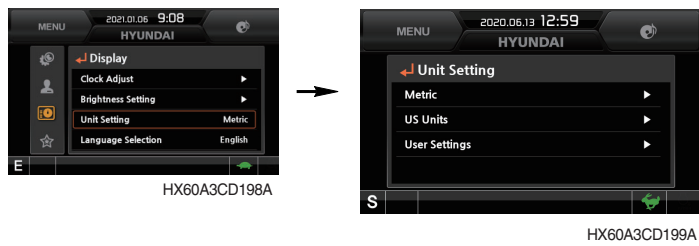


Auto (day time)

HX60A3CD196A

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

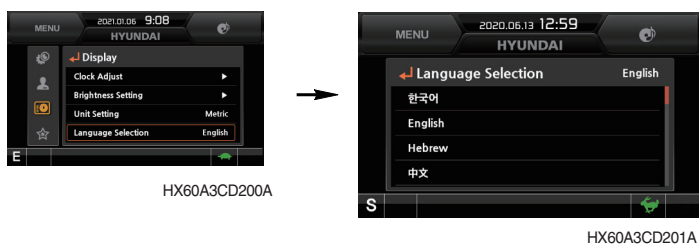
③ Unit set



- Metric units : Units change to metric units.
- US units : Units change to U.S. units
- User setting : Units change to user setting units

Item	Metric units	U.S. units	User setting
Temperature	°C	°F	°C, °F
Distance	km	mile	km, mile
Pressure	bar	Mpa	bar, Mpa, kgf/cm ² , psi
Flow	lpm	gpm	lpm, gpm
Volume	l	gal	l, gal

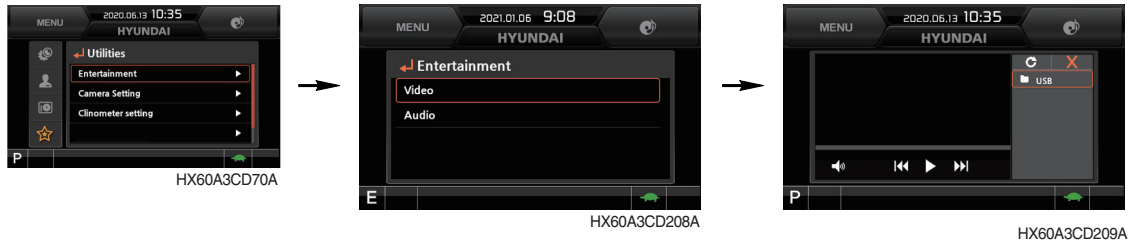
④ Language selection



- User can select preferable language (22 languages) and all displays are changed the selected language.

(5) Utilities

① Entertainment



- Play MP4 or codec file of external hard disk through USB port.
- The USB port is located left side of the cluster.
- Over 1100 engine rpm, the screen turns into the operation screen with MP4 or codec file playing for the safety. The video is played again when the engine revolution is 1100 rpm or less.

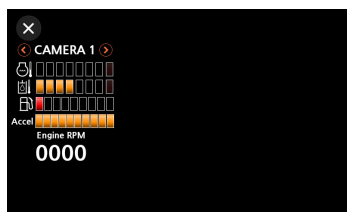
⚠ The video play is prohibited for the safety reason when the machine is operated.

② Camera setting



- Three cameras can be installed on the machine and display order can be set by this menu.
- If the camera is not equipped, this menu is not useful.
- 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, the camera channel can be changed by touching the screen.
- Display change to reduction size or display is not visible by pushing the select switch or touch the screen.

(display reduction size → hiding → display)



HX60A3CD204

- The camera display is terminated by pressing the ESC switch or touch the X icon on the screen.

■ Rear / RH view camera UI setting (Option)

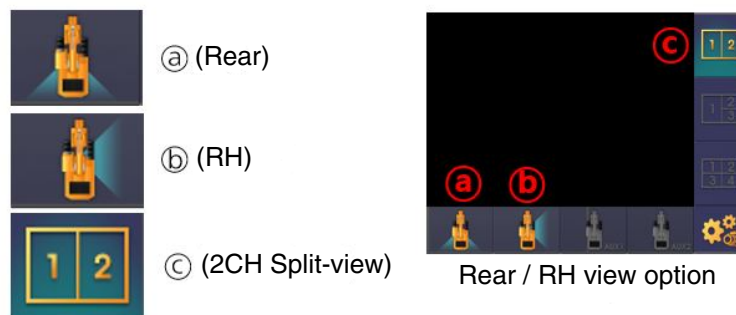
1) Camera control switch

- Select the CAM switch to activate Rear / RH view camera from the beginning screen.
- While in that mode, select the ESC switch to return to the home screen.



2) Cam image control (CIC) mode

- Touch ① (Rear), ② (RH) button on screen to set single-view camera mode.
- Touch ③ (2CH-split-view) button to set split-view camera mode.



3) Split-view Camera order setting

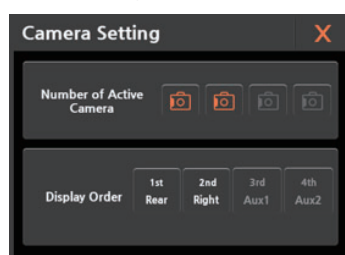
- Touch ④ (camera setting) button to set split-view camera order.



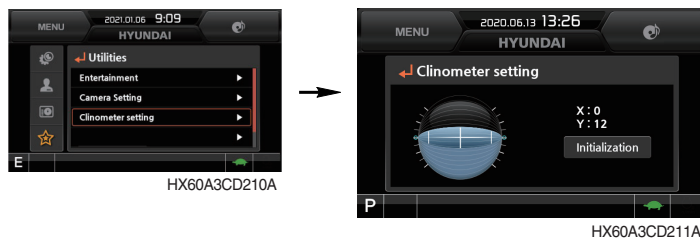
④(Camera Setting)



- You can change split-view camera order on display order menu.

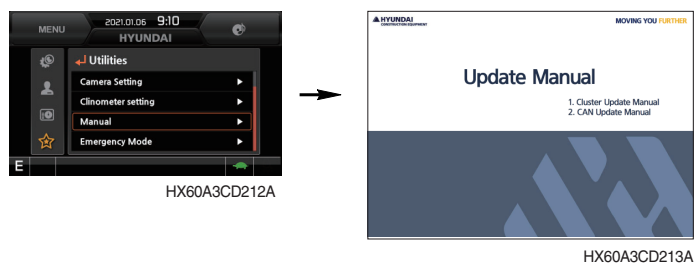


③ Clinometer setting



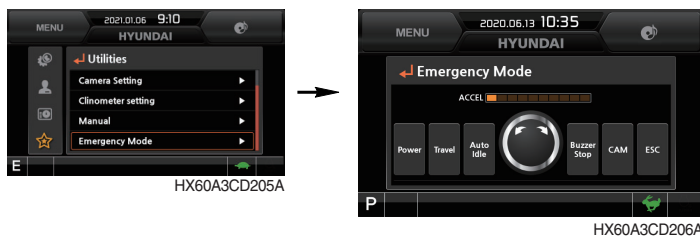
- When the machine is on the flatland, if you touch "initialization" on cluster, the values of X, Y will reset to "0".
- You can confirm tilt of machine in cluster's operating screen.

④ Manual



- Manual of the cluster can be read on the monitor.

⑤ Emergency mode



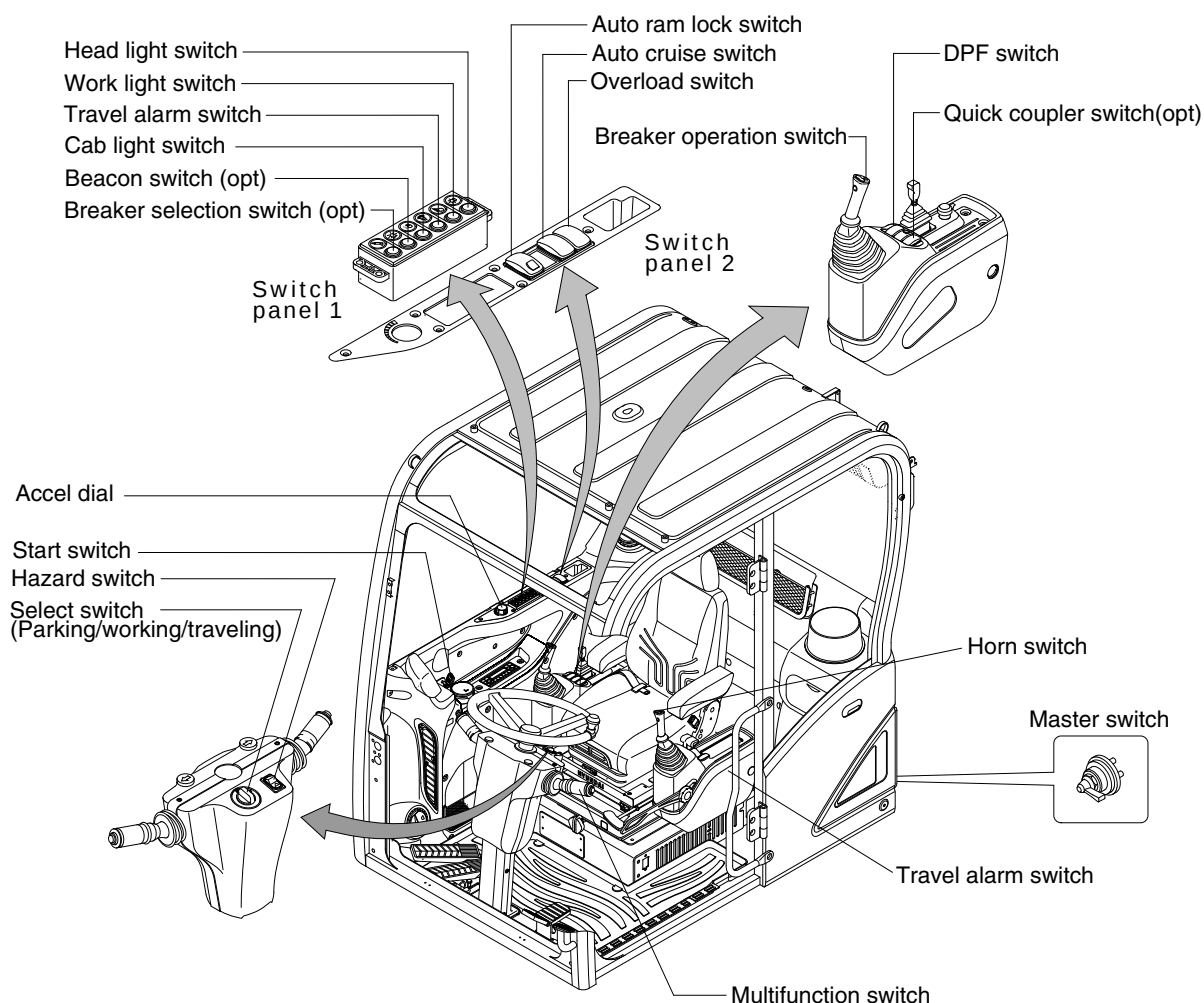
- When switches of the monitor and the accel dial fails, switches are displayed on LCD, and you are allowed to perform operation by touching the screen.
- Such operation is allowed only on this mode screen.

⑥ Quick Cooling Mode



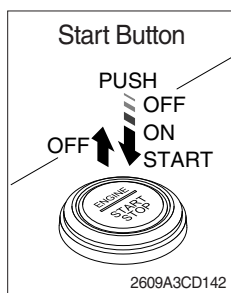
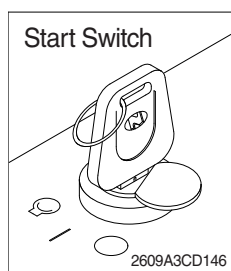
- While the machine is stopped and discontinued with operation, engine can be operated in maximum RPM for maximum rotation of the radiator fan. (Max. for 5 minutes)
 - Setting : When the machine is stopped, the safety lever is lowered to set the quick cooling mode in the locked state
 - Release : Released when the operating time exceeds 5 minutes, when the safety lever is cleared, and when the quick cooling mode release button is pressed

4. SWITCHES



HW65AH3CD02-2A

1) START SWITCH AND BUTTON (OPTIONAL)



Start button and Smart key tag (Optional)

(1) There are 3 switches of OFF, ON and START.

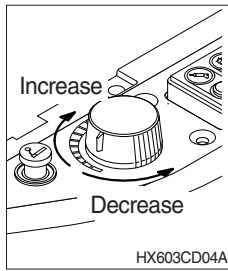
- ○ (OFF) : As the position possible for inserting and removing the key, engine is stopped when the key is in the OFF position while the engine is operating.
- | (ON) : The overall machine system is operated.
- ⦿ (START) : It is used to start the engine. Remove your hand after engine is started.

※ When the start switch is turned ON in the winter season, the coolant temperature is detected to operate the fuel heater automatically, and the fuel is heated.

When the start switch is turned ON, the engine is started in 1~2 minutes. More time may be required according to the outdoor temperature.

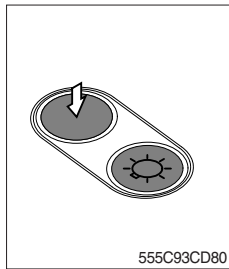
※ To maintain the electrical and hydraulic functions, and to prevent machine damage, the start switch is placed on the ON position when the engine is operating.

2) ACCEL DIAL



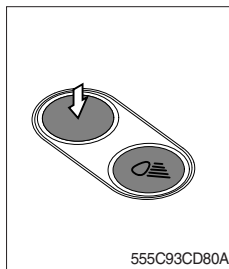
- (1) There are 10 dial setting.
- (2) Setting 1 is low idle and setting 10 is high idle.
 - By rotating the accel dial to right : Engine speed increased.
 - By rotating the accel dial to left : Engine speed decreased.

3) HEAD LIGHT SWITCH



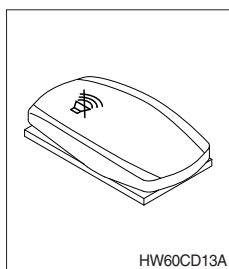
- (1) This switch is used to operate the head light.
 - Press the switch once, the head light comes ON and the pilot lamp ON.
 - Press the switch once more, the head light and pilot lamp turn off.

4) WORK LIGHT



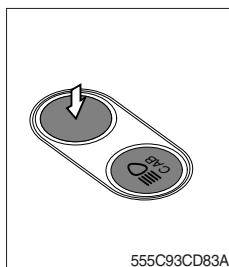
- (1) This switch is used to operate the work light.
 - Press the switch once, the work light comes ON and the pilot lamp ON.
 - Press the switch once more, the work light and pilot lamp turn off.

5) FORWARD TRAVEL ALARM SELECTION SWITCH



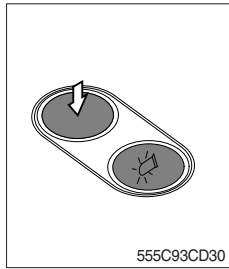
- (1) Warning sound on forward travel of the machine can be selected. (ON/OFF)
 - ※ **Alarm is not sounded during forward travel when the switch is pressed forward.**

6) CAB LIGHT SWITCH



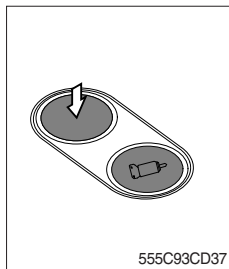
- (1) This switch turns on the cab light on the cab.

7) BEACON SWITCH (opt)



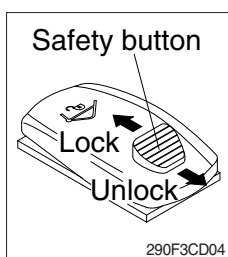
- (1) This switch turns ON the rotary light on the cab.
- (2) The below indicator lamp is turned ON when operating this switch.

8) BREAKER SELECTION SWITCH (opt)



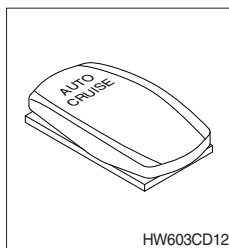
- (1) This switch is used to operate breaker.
- ※ **The breaker operates only when this switch is pressed.**

9) QUICK COUPLER SWITCH (opt)



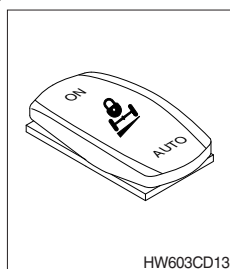
- (1) This switch is used to engage or disengage the moving hook on quick clamp.
- ※ **Refer to the operator's manual page 8-10 for details.**

10) AUTO-CRUISE SWITCH



- (1) When selected, this switch allows the user to drive at high speed with a constant pause at the speed selected by the user when selected.
- (2) This switch is released when the brake pedal is pressed.

11) AUTO RAM LOCK SWITCH

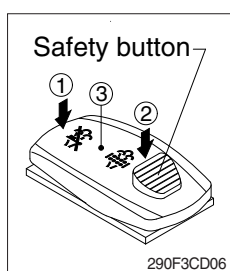


(1) This switch activate front axle oscillation cylinder to locking position for increase of stability.

- 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.

12) DPF (Diesel Particulate Filter) Switch



(1) This switch is used to select the regeneration function on DPF.

(2) Prohibit Switch (①)

- ① When set to the prohibit position, the AUTO or manual DPF regeneration is not allowed.
- ② It is used to prevent DPF regeneration when operating the machine in the environment that is dangerous in high temperature.
- ③ This position is recommended for operation limited to only when it becomes dangerous in high temperature.
- ④ Even when the DPF regeneration switch is in "Prohibit" position, initialization/forced regeneration can be requested according to the condition, and the warning lamp can be turned ON or OFF.



: The DPF regeneration indicating lamp can be blinking on the cluster.



: The DPF warning lamp may be turned ON or blinking.

(3) AUTO Position (③)

In this position, DPF regeneration is performed automatically.

(4) Manual Regeneration Position (②)

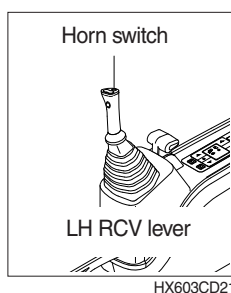
- ① In this position, the machine is not used while the engine is in low-speed idle run, and manual DPF regeneration is performed when the DPF soot level is in the sufficient level to permit regeneration.
- ② While the DPF regeneration is performed, the HEST lamp is turned ON.

※ For details, please refer to page 4-9.

※ The safety button must be pulled back to move to the manual position (②).

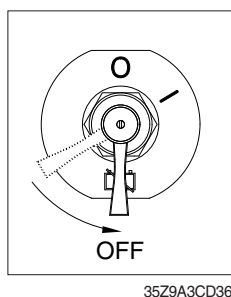
In addition, it is returned to AUTO position when released from the manual position (s

13) HORN SWITCH



- (1) This switch is at the top of left side control lever.
On pressing, the horn sounds.

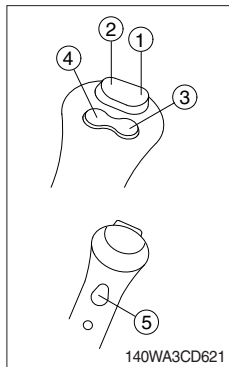
14) MASTER SWITCH



- (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.**

15) LH RCV LEVER SWITCH

(1) Proportional type

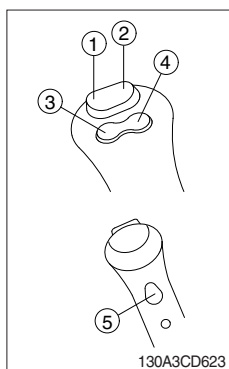


The switches on the LH RCV lever is function as below.

- ① CW rotating switch
When this switch is pressed, the boom swing or clockwise rotating
- ② will operate.
CCW rotating switch
When this switch is pressed, the boom swing or counterclockwise
- ③ rotating will operate.
Horn switch
- ④ When this switch is pressed, the horn will sound.
Ram lock switch
This switch activates only automatic mode.
When the control lever switch is pressed for 5 seconds, the front axle is locked.
- ⑤ The indicator lamp lights up when this switch is activated.
Boom swing/rotating switch (opt)
This switch is used to operate boom swing or rotation (if equipped rotating piping).
 - Switch and flow can be set on cluster.

16) RH RCV LEVER SWITCH

(1) Proportional type

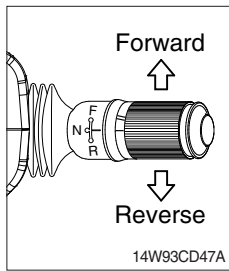


The switches on the RH RCV lever is function as below.

- ① **2-way clamp switch**
When this switch is pressed, the clamp will only operate when the crusher operation mode is selected.
- ② **2-way release switch**
When this switch is pressed, the release or breaker will operate when the crusher operation mode or breaker operation mode is selected.
- ③ **Proportional type ON/OFF switch**
The 4-way operation is activated only by turning on the proportional control ON/OFF switch located on the left control level.
- ④ **Breaker**
When this switch is pressed, the breaker will only operate when the breaker operation mode is selected.
- ⑤ **None**

17) 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

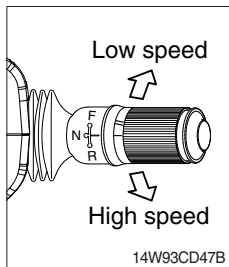
▲ Travel direction will be reversed if lower structure is positioned with dozer in front.

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



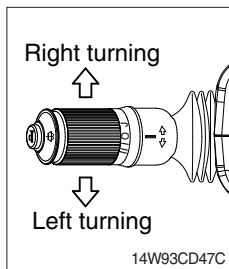
① This switch is for selecting travelling speed between high and low.

- 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.

18) LH MULTI FUNCTION SWITCH

(1) Direction indication lamp switch

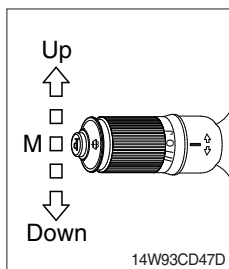


① This switch is used to warn or signal the turning direction of the machine to other machines or equipment.

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



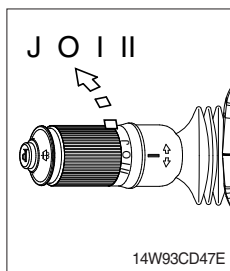
① This switch is used to turn the head lights direction.

② Switch positions.

- Up () : To flash for passing
- Middle () : Head lights low beam ON
- Down () : Head lights high beam ON

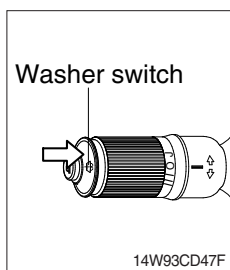
③ If you release the switch when it's in up position, the switch will return to middle.

(3) WIPER SWITCH



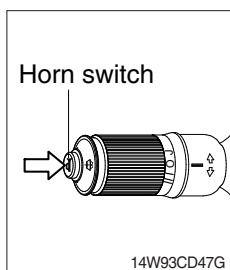
- ① When the switch is in J position, the wiper moves intermittently.
- ② When placed in I or II position, the wiper moves continuously.

(4) WASHER SWITCH



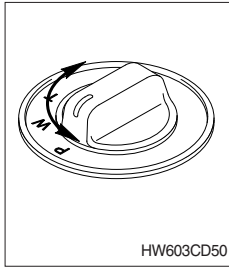
- ① If you push the grip of the lever, washer liquid will be sprayed and the wiper will be activated 2-3 times.
- ※ **Check the quantity of washer liquid in the tank. If the level of the washer liquid is LOW, add the washer liquid (in cold, winter days) or water. The capacity of tank is 1.5 liter.**

(5) HORN SWITCH



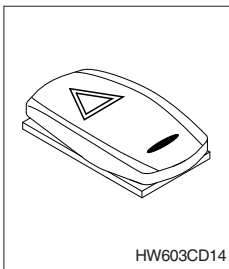
- ① This switch is at the end of left side multifunction switch. On pressing, the horn sounds.

19) 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.

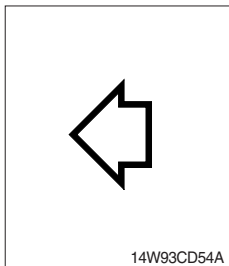
20) HAZARD SWITCH



- (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.

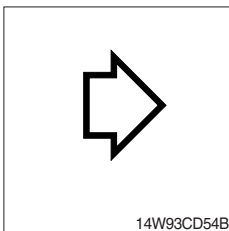
21) TURNING PILOT LAMP

(1) Left turning pilot lamp



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

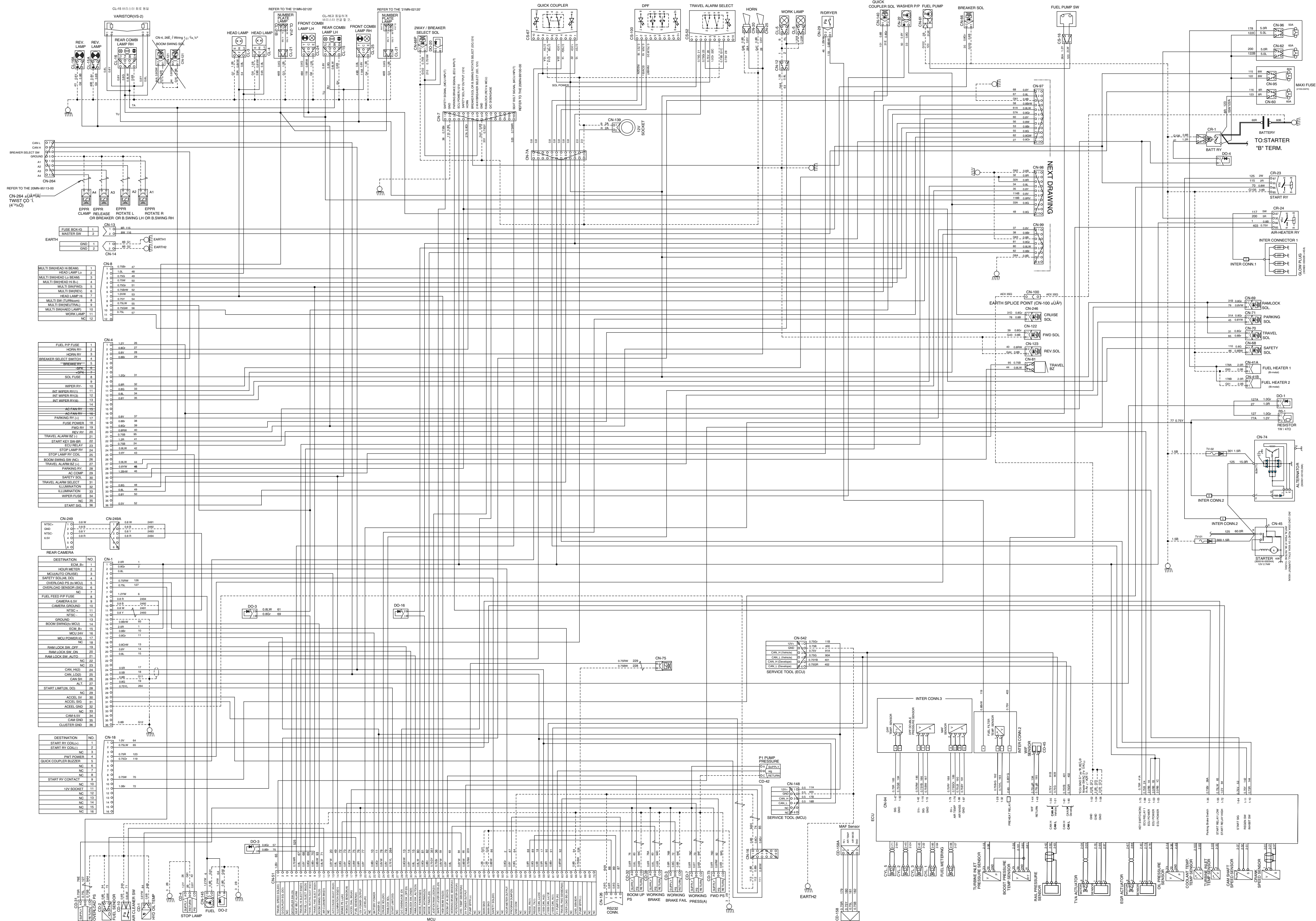
(2) Right turning pilot lamp



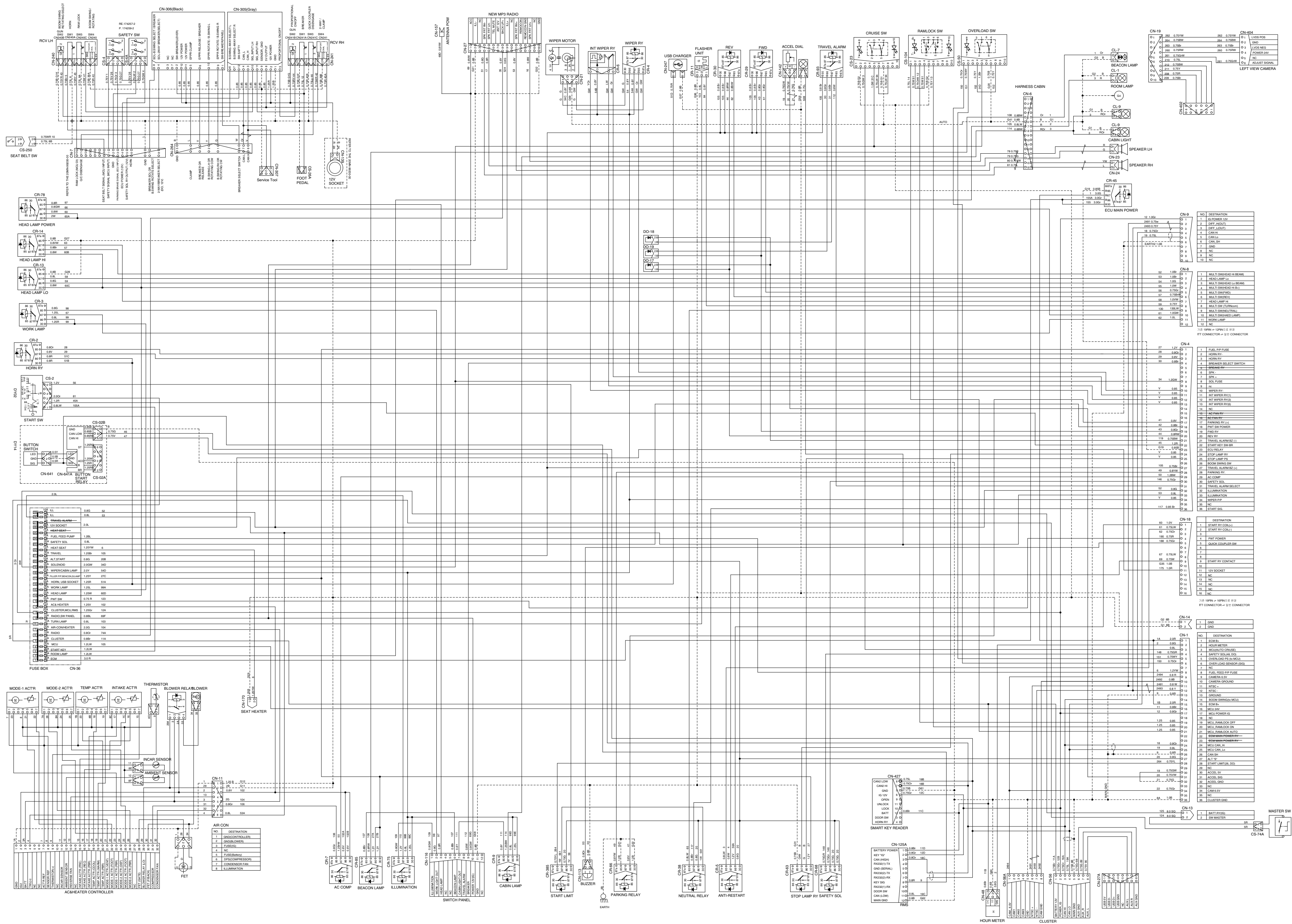
- ① This lamp flashes with sound when the LH multifunction switch is
- ② move to forward position.

GROUP 3 ELECTRICAL CIRCUIT

ELECTRICAL CIRCUIT (1/3)

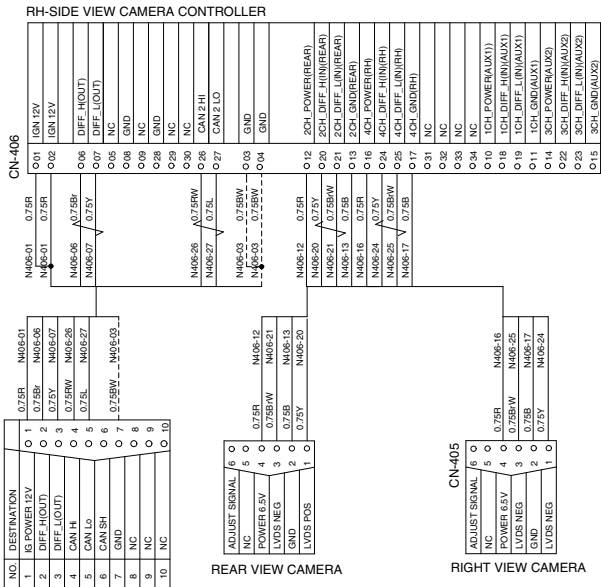


ELECTRICAL CIRCUIT (2/3)

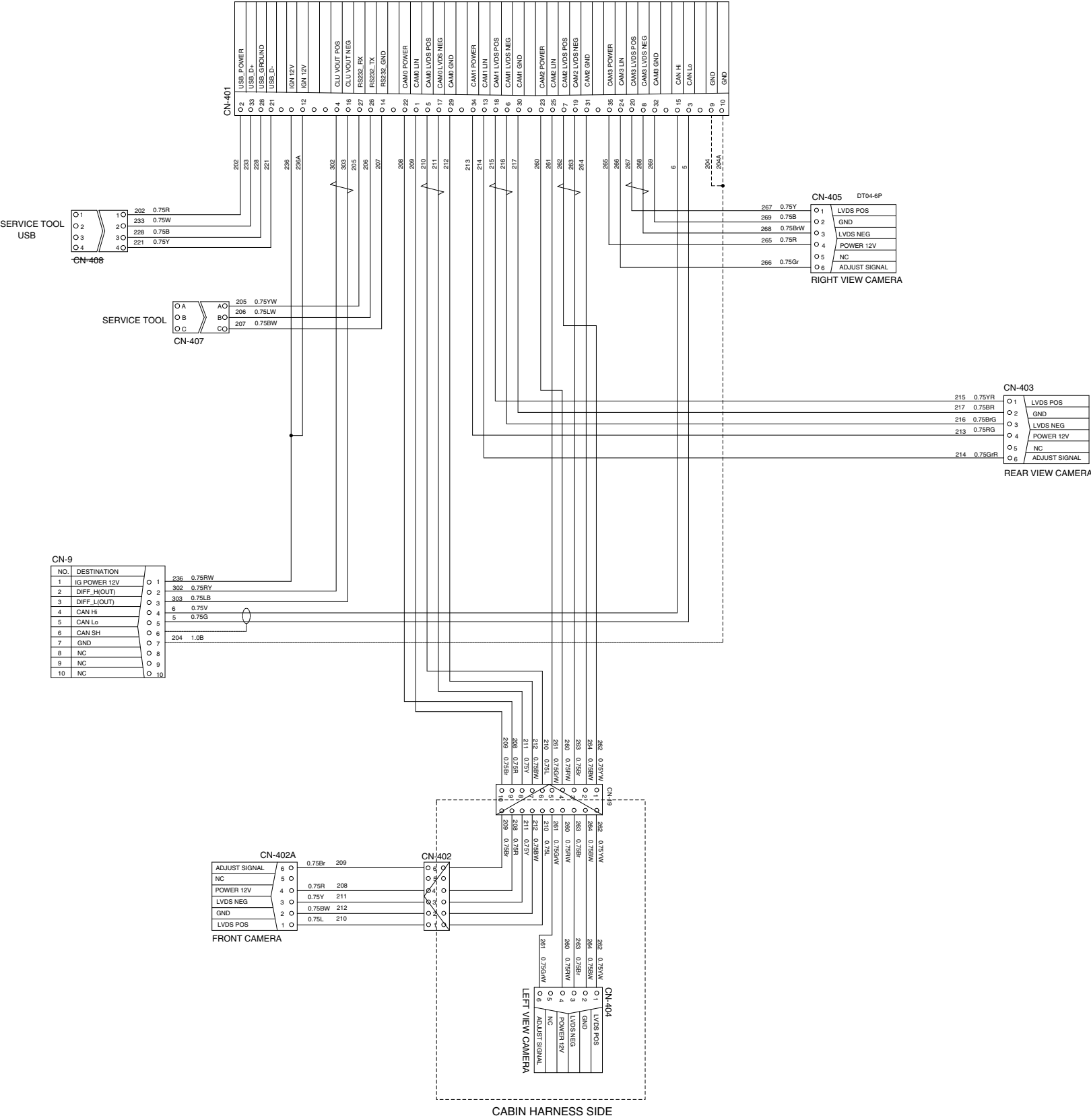


ELECTRICAL CIRCUIT (3/3)

RH MIRROR VIEW SYTEM(EI06)



AAVM CAMERA SYSTEM(EI02)



MEMORANDUM

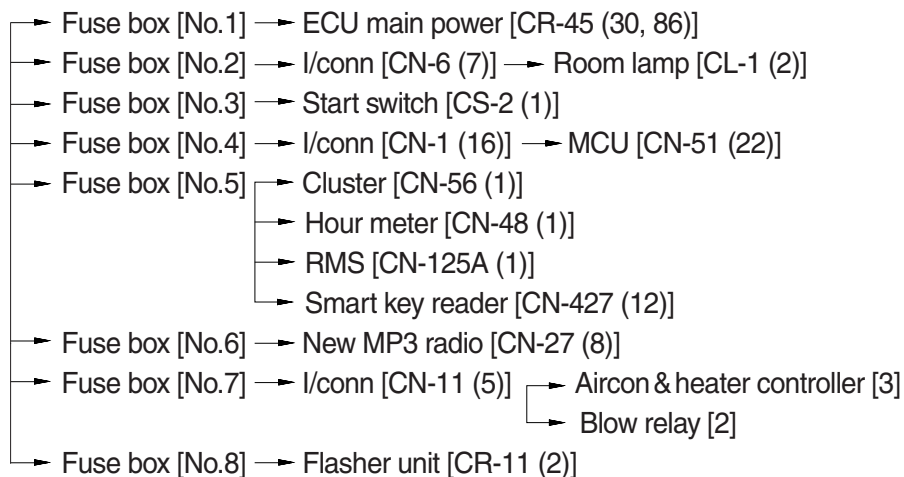
1. POWER CIRCUIT

The negative terminal of battery is grounded to the machine chassis.

When the start switch is in the OFF position, the current flows from the positive battery terminal as shown below.

1) OPERATING FLOW

Battery [B+] → Battery relay [CR-1] → Maxi fuse (CN-60) → I/conn [CN-13 (2)] → Master switch [CS-74A]



※ I/conn : Intermediate connector

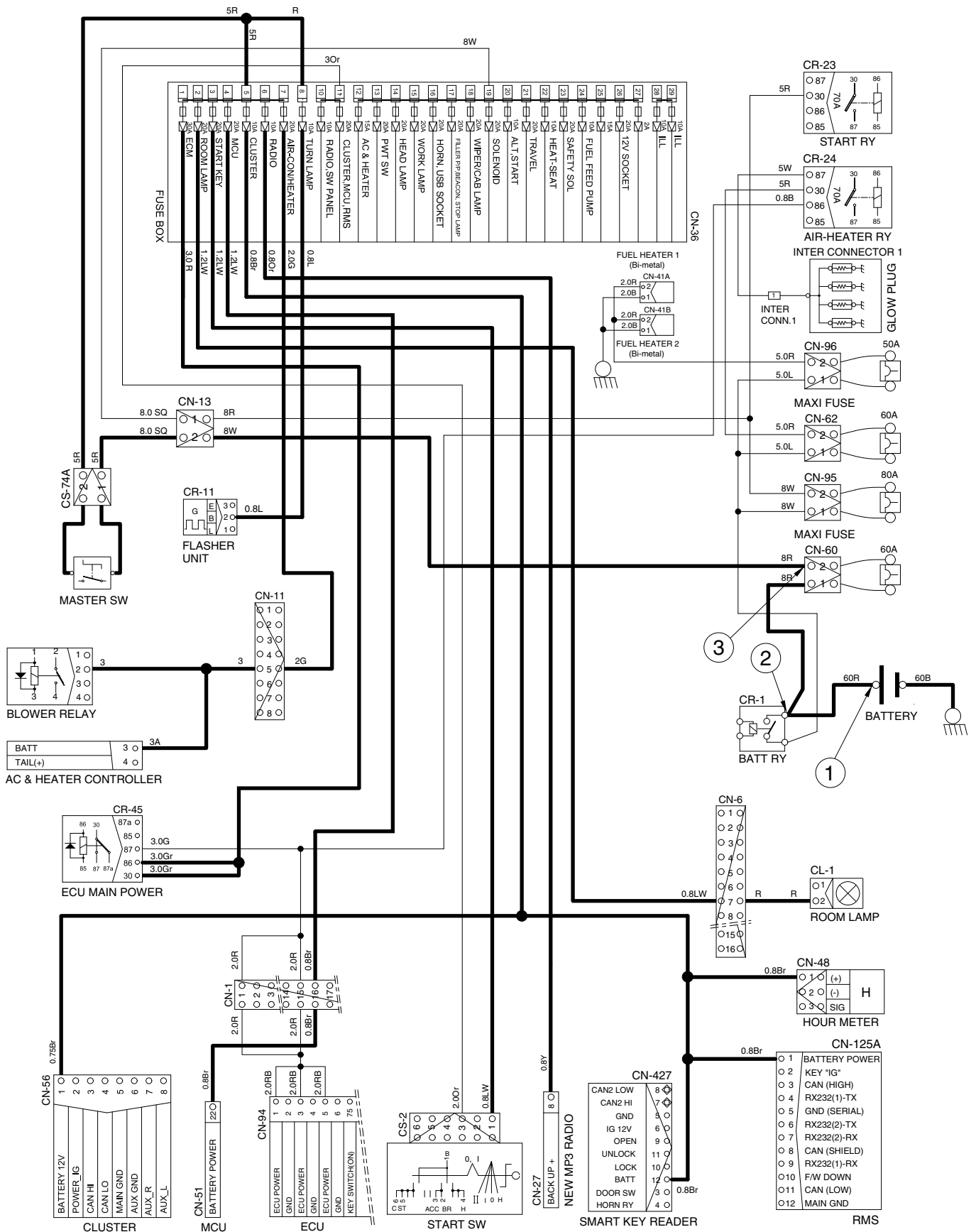
2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	OFF	① - GND (battery) ② - GND (relay) ③ - GND (maxi fuse)	10~12.5V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

POWER CIRCUIT



HW65AH4EL05

※ The circuit diagram may differ from the equipment, so please check before a repair.

2. STARTING CIRCUIT

1) OPERATING FLOW

Battery (+) terminal → Battery relay [CR-1] → Maxi fuse [CN-60]
 → I/conn [CN-13 (2)] → Master switch [CS-74A] → Fuse box No.3 → Start sw [CS-2 (1)]

(1) Start switch : ON

→ Start switch ON [CS-2 (2)] → I/conn [CN-4 (22)]
 → ECU [CN-94 (1-75)]
 → Battery relay [CR-1] : Battery relay operating (all power is supplied with the electric component)
 → Start switch ON [CS-2 (3)] → Fuse box No.11 → I/conn [CN-1 (7)] → MCU [CN-51 (23)]

(2) Start switch : START

Start switch START [CS-2 (6)] → Start limit relay [CR-385 (30→87)] → Neutral relay [CR-38 (30→87)]
 → ECU [CN-94 (1-84)→(1-72)] → I/conn [CN-18 (1)]
 → Anti-restart relay [CR-5 (86) → (87)] → I/conn [CN-18 (9)]
 → Start relay [CR-23 (85) → (87)] → Start motor operating

2) CHECK POINT

Engine	Start switch	Check point	Voltage
Operating	Start	① - GND (battery B ⁺) ② - GND (start switch) ③ - GND (battery relay M4) ④ - GND (starter B) ⑤ - GND (starter S) ⑥ - GND (start relay) ⑦ - GND (battery relay M8)	10~12.5V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

※ The circuit diagram may differ from the equipment, so please check before a repair.



HW65AH4EL06

3. CHARGING CIRCUIT

When the starter is activated and the engine is started, the operator releases the start switch to the ON position.

Charging current generated by operating the alternator flows into the battery through the battery relay (CR-1).

The current also flows from the alternator to each electrical component and controller through the fuse box.

1) OPERATING FLOW

(1) Warning flow

Alternator [CN-74 (L)] → MCU alternator level [CN-51 (20)]

→ Cluster charging warning lamp (via CAN interface)

(2) Charging flow

Alternator [CN-74 (B)] → Starter [CN-45 (B)] → Battery relay [CR-1]

→ Battery (+) terminal

→ Maxi fuse [CN-60] → I/conn [CN-13 (2)] → Master switch [CS-74A]

→ Fuse box [CN-36 No.1~8]

→ Maxi fuse [CN-95] → I/conn [CN-13 (1)] → Fuse box [CN-36 No. 12~27]

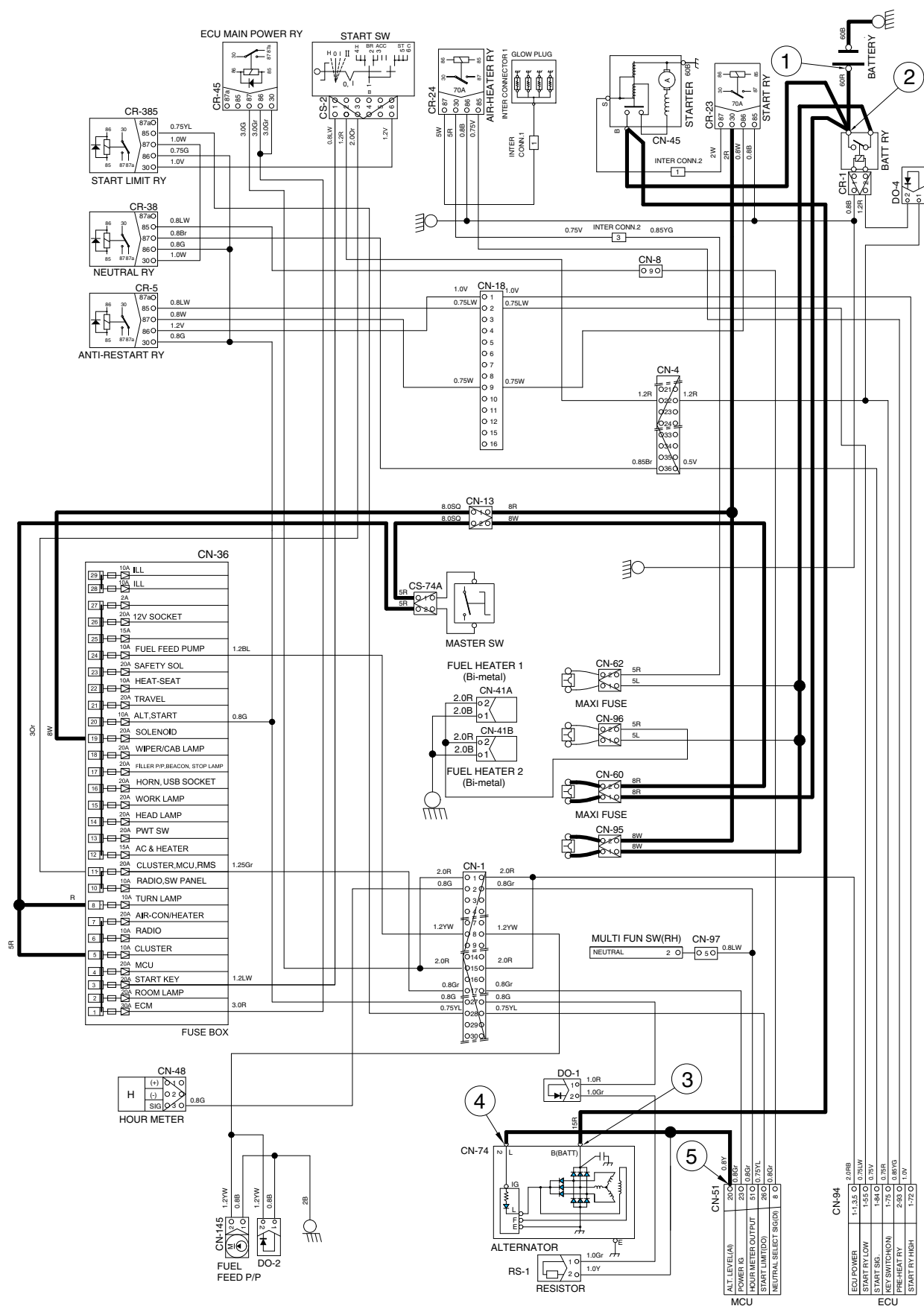
2) CHECK POINT

Engine	Start switch	Check point	Voltage
Operating	ON	① - GND (battery B ⁺) ② - GND (battery relay) ③ - GND (alternator B terminal) ④ - GND (alternator L terminal) ⑤ - GND (MCU)	10~12.5V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

CHARGING CIRCUIT



HW65AH4EL07

※ The circuit diagram may differ from the equipment, so please check before a repair.

4. HEAD LAMP AND WORK LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.14) → Head lamp Hi relay [CR-14 (30)]
 → Head lamp Low relay [CR-13 (30)]
 → Head lamp power relay [CR-78 (30)]
 → I/conn [CN-8 (4)] → I/conn [CN-97 (8)] → Multifunction sw left lever [(12)]

Fuse box (No.15) → Work lamp relay [CR-3 (30, 86)]

Fuse box (No.10) → Switch panel [CN-116 (10)]

(1) Head lamp switch ON : Mult function sw [LH, dimmer sw (Middle)]

Head lamp switch ON [CN-116 (3)] → Head lamp power relay [CR-78 (85)→(87)]
 → I/conn [CN-8 (11)] → I/conn [CN-97 (11)] → Multifunction sw left lever [(4)→(5)]
 → I/conn [CN-97 (10)] → I/conn [CN-8 (3)] → Head light low relay [CR-13 (86)→(87)]
 → I/conn [CN-8 (2)] → Head light ON [CL-3 (1), CL-4 (1)] : Head light ON

(2) Head lamp switch ON : Mult function sw [LH, dimmer sw (Down)]

Head lamp switch [CN-116 (3)] → Head lamp power relay [CR-78 (85)→(87)]
 → I/conn [CN-8 (11)] → I/conn [CN-97 (11)] → Multifunction sw left lever [(4)→(3)]
 → I/conn [CN-97 (9)] → I/conn [CN-8 (1)]
 → Head light high relay [CR-14 (86)→(87)] → I/conn [CN-8 (7)]
 → Head light ON [CL-3 (2), CL-4 (2)] : Head light high beam ON
 → MCU [CN-51 (37)] → Cluster high beam pilot lamp ON [Via CAN interface]

(3) Work lamp switch ON :

Work lamp switch ON [CS-116 (2)] → Work lamp relay [CR-3 (85)→(87)] → I/conn [CN-8 (11)]
 → I/conn [CN-12 (2)] → Work lamp ON [CL-5 (2)] : Work lamp ON

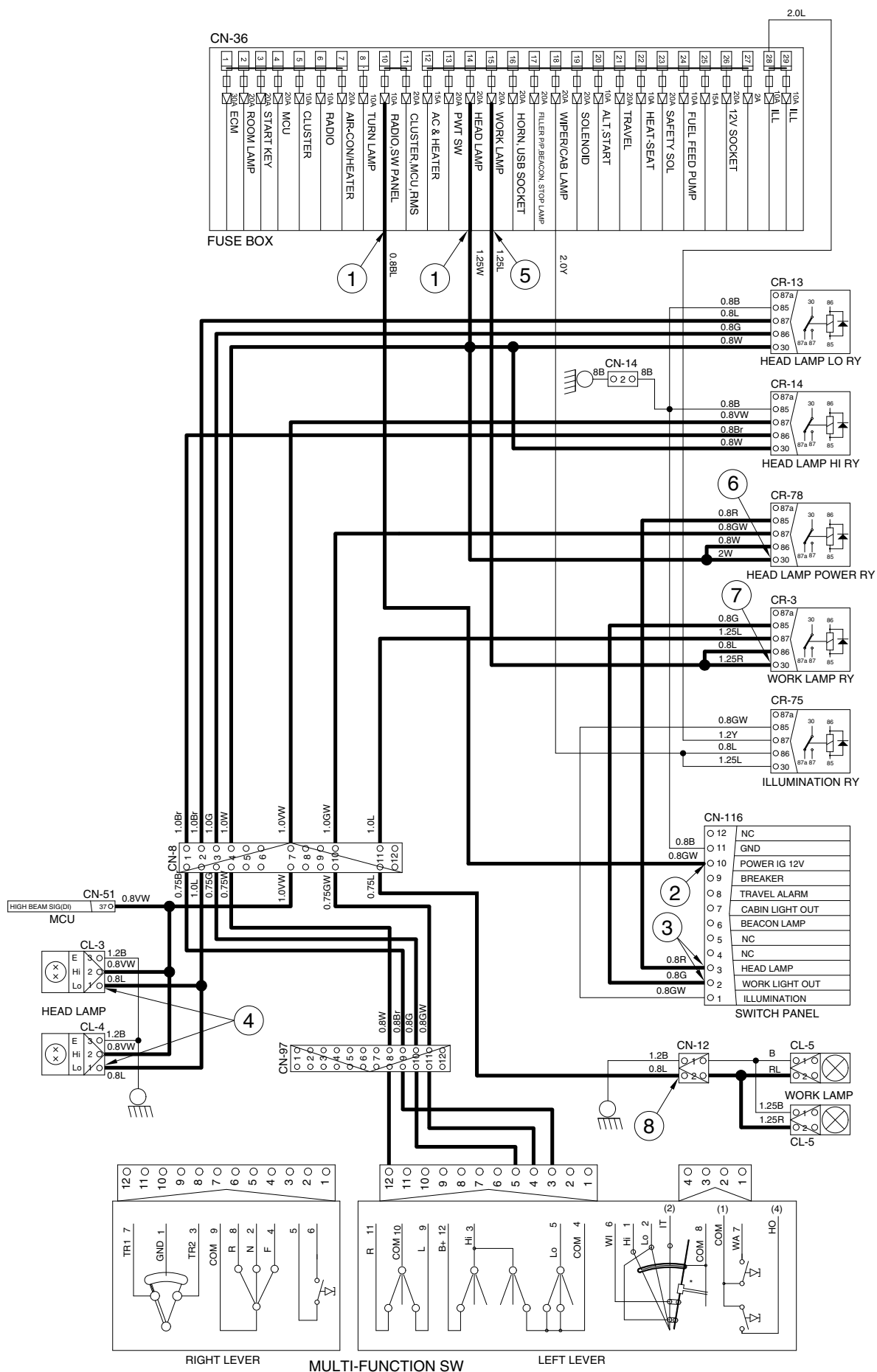
2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (switch power input) ③ - GND (switch power output) ④ - GND (head light) ⑤ - GND (fuse box) ⑥ - GND (head lamp power relay input) ⑦ - GND (work lamp relay input) ⑧ - GND (head lamp Lo/Hi relay input) ⑨ - GND (work light)	10~12.5V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

HEAD LAMP AND WORK LAMP CIRCUIT



※ The circuit diagram may differ from the equipment, so please check before a repair.

5. BEACON LAMP AND CAB LAMP CIRCUIT

1) OPERATING FLOW

Fuse box (No.17) → Beacon lamp relay [CR-85 (30, 86)]

Fuse box (No.18) → Cab lamp relay [CR-9 (30, 86)]

Fuse box (No.10) → Switch panel [CR-116 (10)]

(1) Beacon lamp switch ON

Switch panel [CN-116 (6)] → Beacon lamp relay [CR-85 (85)→(87)] → I/conn [CN-6 (5)]

→ Beacon lamp [CL-7]

(2) Cab lamp switch ON

Switch panel [CN-116 (7)] → Cab lamp relay [CR-9 (85)→(87)] → I/conn [CN-6 (8)]

→ Cab light [CL-9 (2)]

2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (switch power input) ③ - GND (switch power output) ④ - GND (beacon & cab lamp relay power input) ⑤ - GND (beacon lamp) ⑥ - GND (cab lamp)	10~12.5V

※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

※ The circuit diagram may differ from the equipment, so please check before a repair.

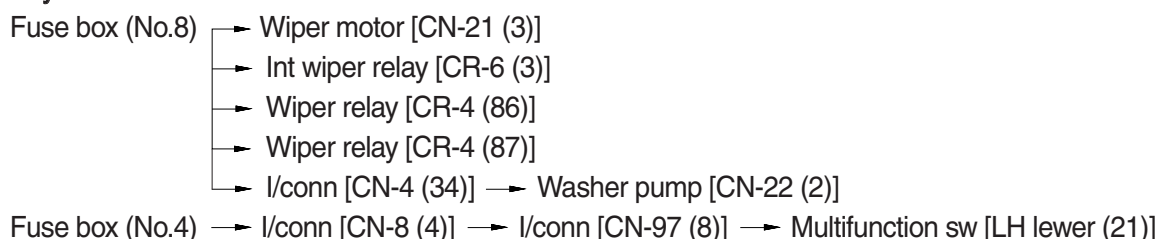


HW65AH4EL09

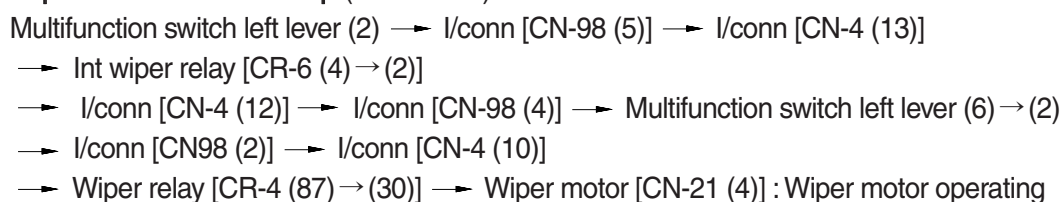
6. WIPER AND WASHER CIRCUIT

1) OPERATING FLOW

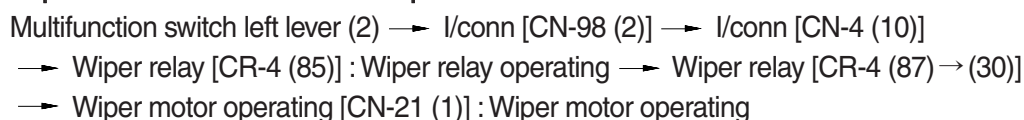
(1) Key switch ON



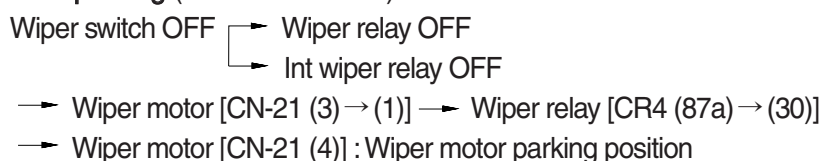
(2) Wiper switch ON : 1st step (intermittent)



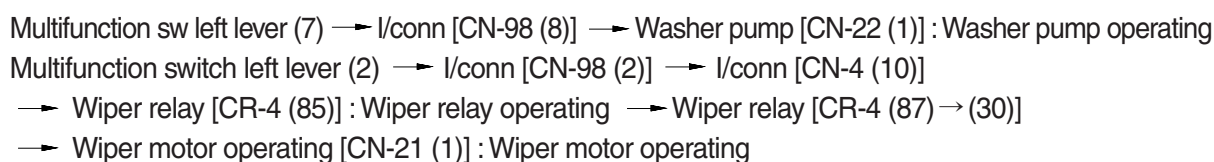
(3) Wiper switch ON : 2nd or 3rd step



(4) Auto parking (when switch OFF)



(5) Washer switch ON



2) CHECK POINT

Engine	Start switch	Check point	Voltage
STOP	ON	① - GND (fuse box) ② - GND (wiper motor) ③ - GND (switch power input) ④ - GND (switch power output)	10~12.5V

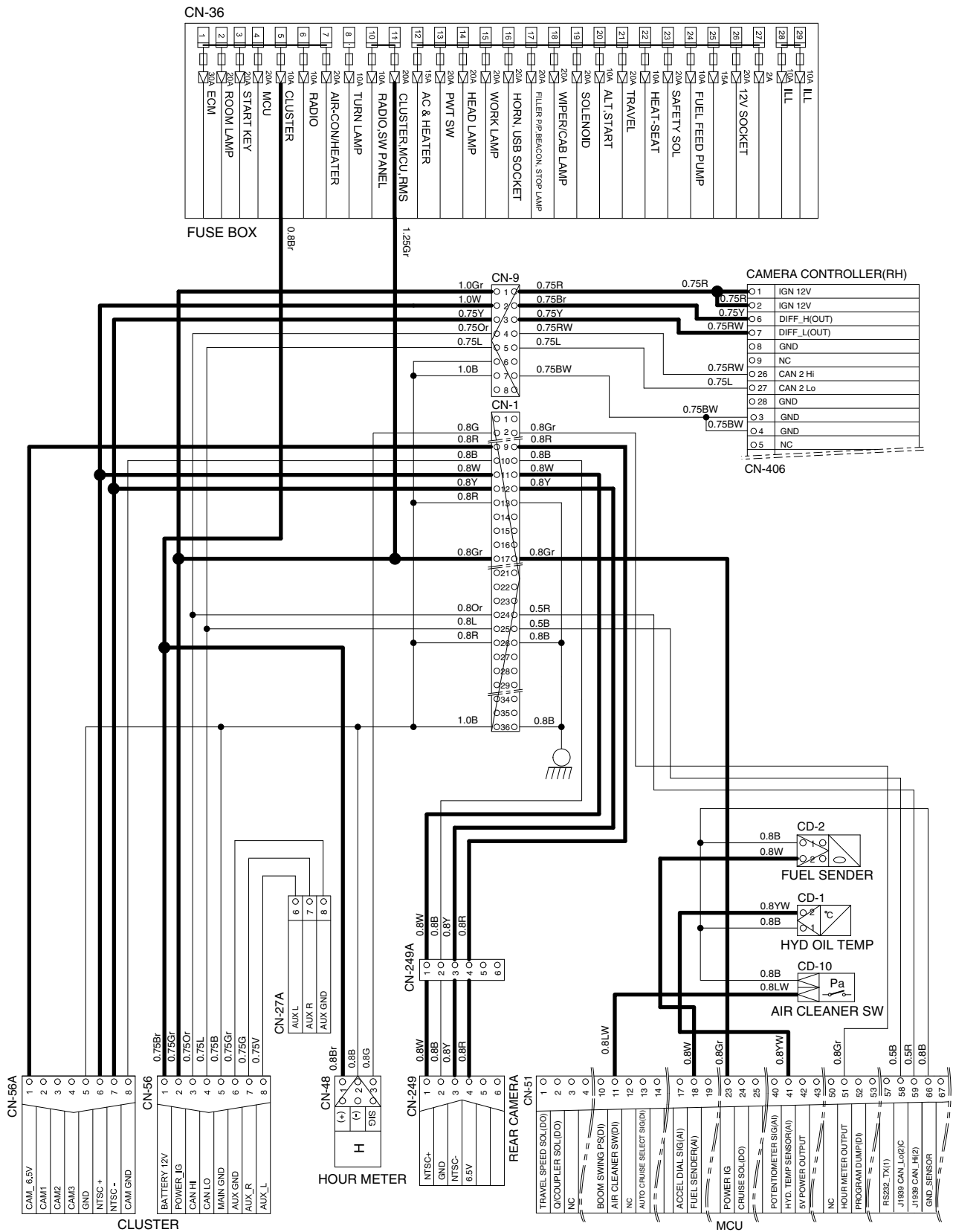
※ GND : Ground

※ The circuit diagram may differ from the equipment, so please check before a repair.

※ The circuit diagram may differ from the equipment, so please check before a repair.



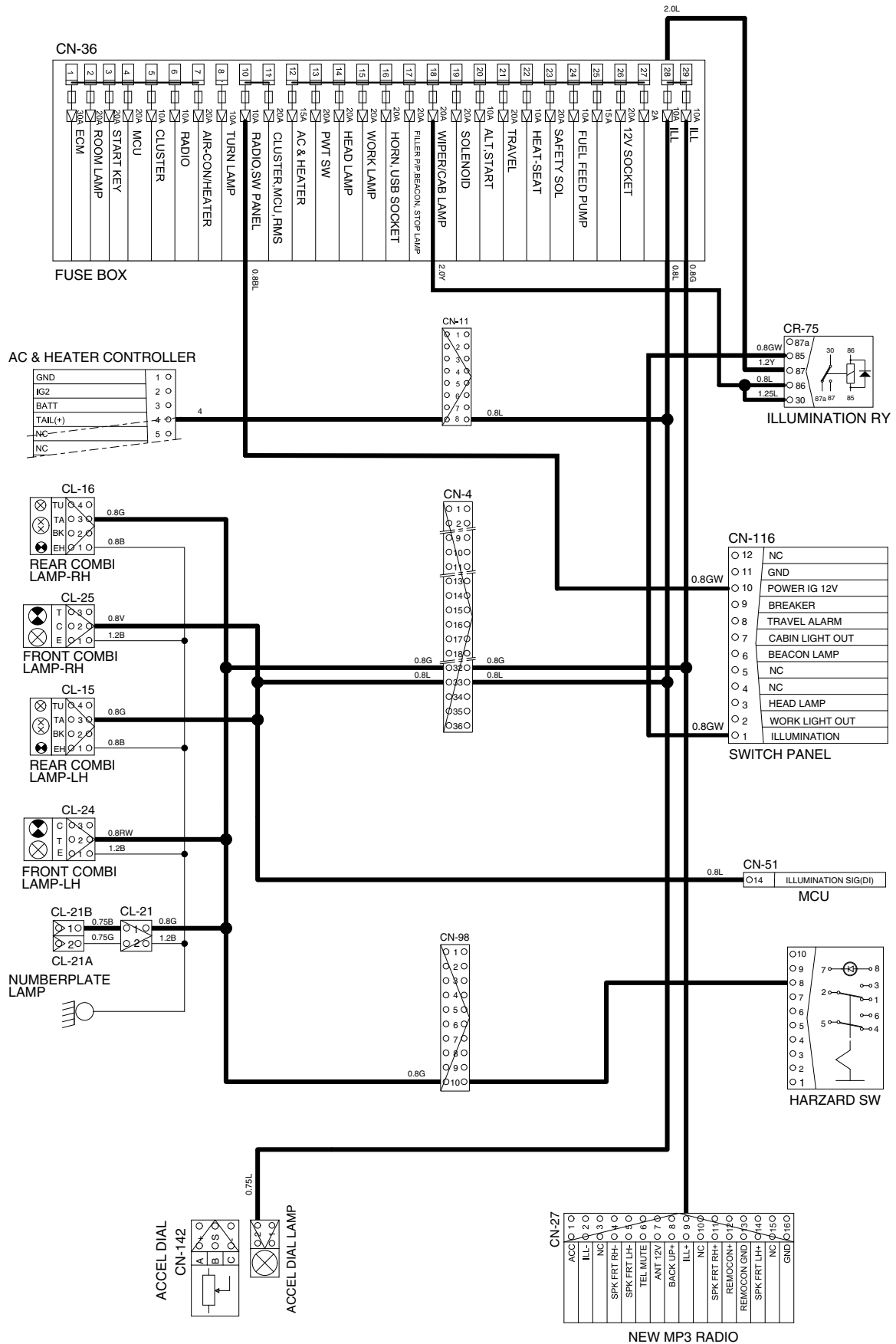
MONITORING CIRCUIT



HW65AH4EL11

※ The circuit diagram may differ from the equipment, so please check before a repair.

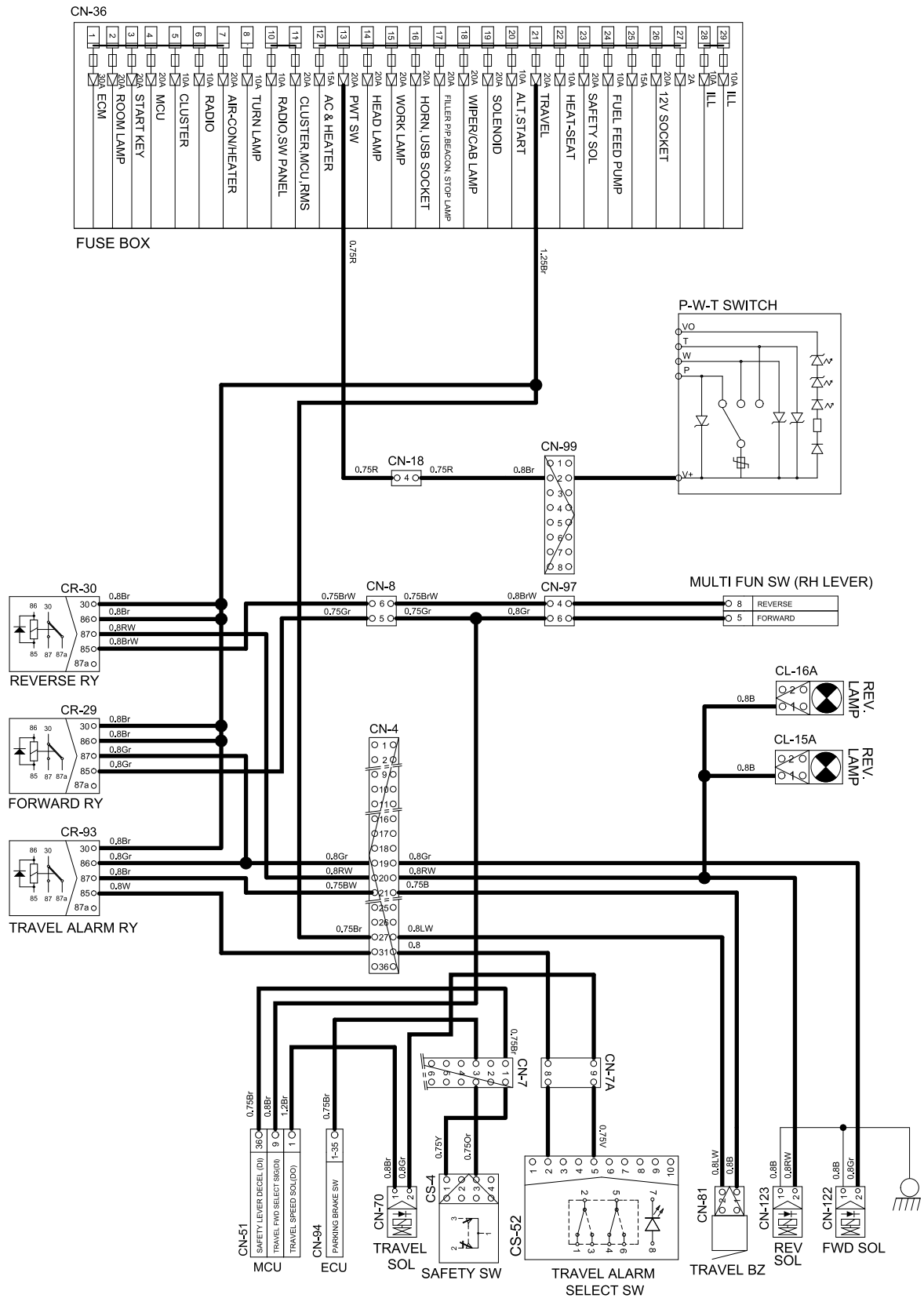
ILLUMINATION CIRCUIT



HW65AH4EL12

※ The circuit diagram may differ from the equipment, so please check before a repair.

COMBINATION LAMP CIRCUIT

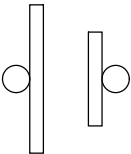
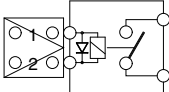
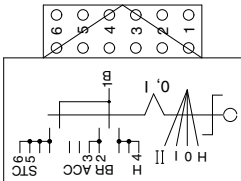
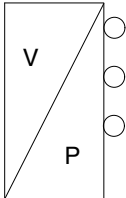
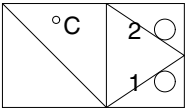
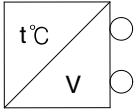


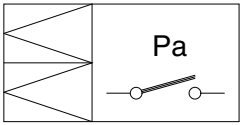
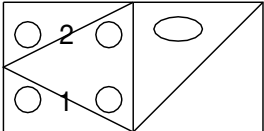
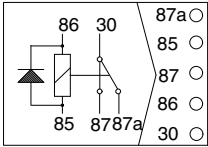
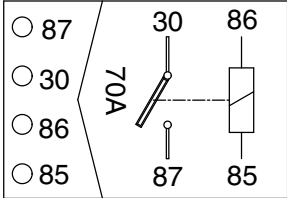
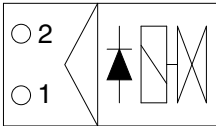
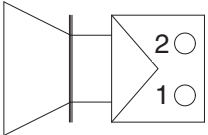
HW65AH4EL13

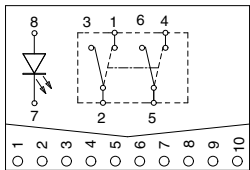
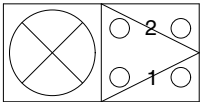
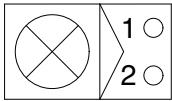
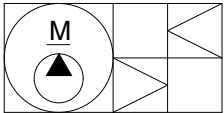
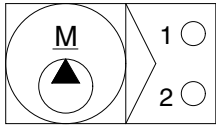
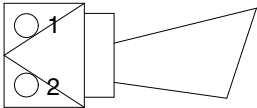
※ The circuit diagram may differ from the equipment, so please check before a repair.

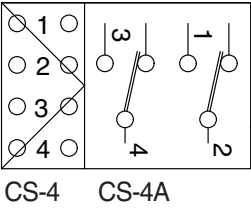
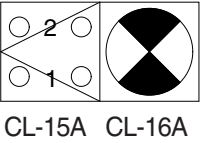
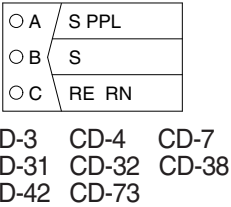
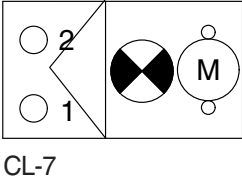
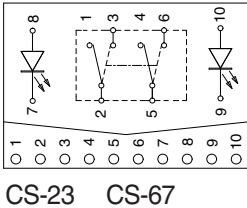
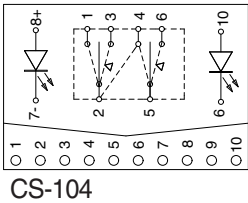
4-66

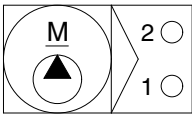
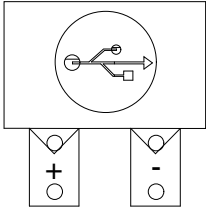
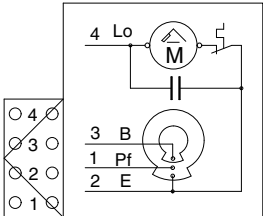
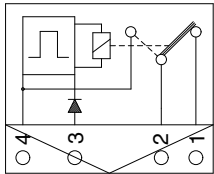
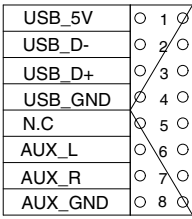
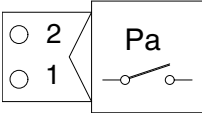
GROUP 4 ELECTRICAL COMPONENT SPECIFICATION

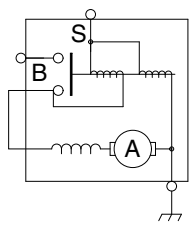
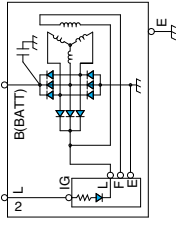
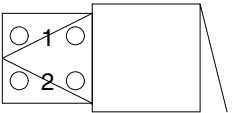
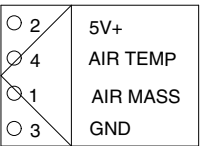
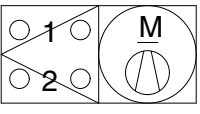
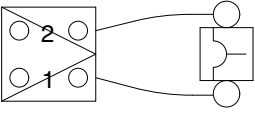
Part name	Symbol	Specification	Check
Battery		12V × 100Ah	※ Check specific gravity 1.280 over : Over charged 1.280 ~ 1.250 : Normal 1.250 below : Recharging
Battery relay	 CR-1	Rated load : 12V 100A (continuity) 1000A (30 second)	※ Check coil resistance Normal : about 12Ω ※ Check contact Normal : ∞Ω
Start switch	 CS-2	12V	※ Check contact OFF : ∞Ω (for each terminal) ON : 0Ω (for terminal 1-3 and 1-2) START : 0Ω (for terminal 1-6)
Pressure switch (for engine oil)		0.5 kgf/cm ² (N.C TYPE)	—
Hydraulic temperature sensor	 CD-1	-	※ Check resistance 50°C : 804Ω 80°C : 310Ω 100°C : 180Ω
Coolant temperature sensor			※ Check resistance 50°C : 804Ω 80°C : 310Ω 100°C : 180Ω

Part name	Symbol	Specification	Check
Air cleaner pressure switch	 CD-10	Pressure: 635mmH ₂ O (N.O TYPE)	※ Check contact Normal : $\infty \Omega$
Fuel sender	 CD-2	-	※ Check resistance Full : 100 Ω Low : 500 Ω Empty warning : 700 Ω
Relay	 CR-2 CR-3 CR-4 CR-5 CR-7 CR-9 CR-13 CR-14 CR-29 CR-30 CR-38 CR-45 CR-63 CR-66 CR-68 CR-75 CR-78 CR-85 CR-385	12V 20A	※ Check resistance Normal : About 200 Ω (for terminal 85-86) : 0 Ω (for terminal 30-87a)
Relay (start, air heater)	 CR-23 CR-24	12V 70A	※ Rated coil current $1.2 \pm 0.3A$
Solenoid valve	 CN-66 CN-66P CN-68 CN-69 CN-70 CN-71 CN-122 CN-123 CN-140 CN-246	12V 1A	※ Check resistance Normal : 15~25 Ω (for terminal 1-2)
Speaker	 CN-23(LH) CN-24(RH)	4 Ω 20W	※ Check resistance Normal : 4 Ω

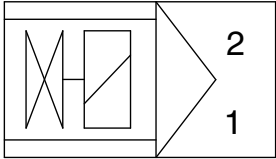
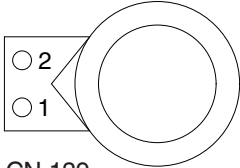
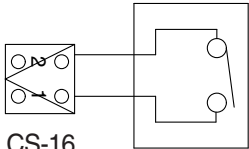
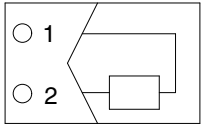
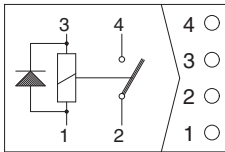
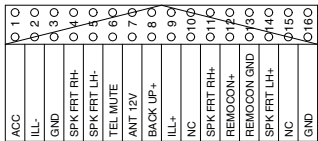
Part name	Symbol	Specification	Check
Travel alarm select switch	 CS-50 CS-52	12V 16A	※ Check contact Normal OFF - $\infty \Omega$ (for terminal 2-1, 5-4) - 0Ω (for terminal 2-3, 5-6)
Work lamp	 CL-5 CL-9	12V LED (ABL type)	※ Check disconnection Normal : A few Ω
Room lamp	 CL-1	12V 10W	※ Check disconnection Normal : A few Ω
Fuel filler pump	 CN-61	12V 35 ℓ /min	※ Check operation Supply power(for terminal 1) : 12V
Fuel feed pump	 CN-145	12V	-
Horn	 CN-20 CN-25	12V	$100 \pm 5\text{dB}$

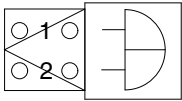
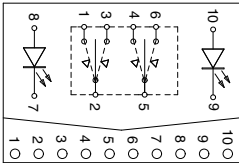
Part name	Symbol	Specification	Check
Safety switch	 CS-4 CS-4A	Micro	※ Check contact Normal : $\infty \Omega$ (for terminal 1-2, 3-4)
Reverse lamp	 CL-15A CL-16A	12V	※ Check disconnection. Normal : A few Ω
Pressure sensor	 CD-3 CD-4 CD-7 CD-31 CD-32 CD-38 CD-42 CD-73	8-30V	※ Check contact Normal : 0.1Ω
Beacon lamp	 CL-7	12V LED (17W) (Double flash)	※ Check disconnection Normal : A few Ω
Cruise switch	 CS-23 CS-67	12V 16A	※ Check contact Normal OFF - $\infty \Omega$ (for terminal 2-3, 5-6) - 0Ω (for terminal 2-1, 5-4)
Ram lock switch	 CS-104	12V 16A	※ Check contact Normal OFF - $\infty \Omega$ (for terminal 2-1, 2-3, 5-4, 5-6)

Part name	Symbol	Specification	Check
Washer pump	 CN-22	12V 3.8A	※ Check contact Normal : 3Ω (for terminal 1-2)
USB charger	 CN-247	12V 3.1A	※ Check coil resistance Normal : About 1MΩ ※ Check contact Normal : ∞Ω Operating time : 5~15sec
Wiper motor	 CN-21	12V 3A	※ Check contact Normal : 6Ω (for terminal 2-6)
Int wiper relay	 CR-6	12V 12A	—
Radio & USB player	 CN-27A	12V 3A	※ Check voltage 10 ~ 12.5V (for terminal 10-14,11-14)
Receiver dryer	 CN-29	12V	※ Check contact Normal : - OFF : ∞Ω (for terminal 1-2)

Part name	Symbol	Specification	Check
Starter		12V 2.5kW	※ Check contact Normal : 0.1Ω
Alternator	 CN-74	12V 100A	※ Check contact Normal : 0Ω (for terminal B-L) Normal : 10 ~ 12.5V
Travel buzzer		12V	-
MAP sensor	 CD-158A	5V	-
Air con blower		12V 8.5A	-
Maxi fuse	 CN-60 CN-62 CN-95 CN-96	12V, 50A (CN-96) 12V, 60A (CN-60, 62) 12V, 80A (CN-95)	-

Part name	Symbol	Specification	Check
Rear combination lamp-LH, RH	 CL-15 CL-16	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	 CL-24 CL-25	12V 21W 12V 5W	※ Normal : 4.8Ω (for terminal 1-2) Normal : 2.1Ω (for terminal 2-3)
Head lamp -LH, RH	 CL-3 CL-4	12V 60/55W	※ Normal : 1.0Ω (for terminal 1-3, 2-3) Normal : 1.5Ω (for terminal 1-2)
Master switch	 CS-74A	12V 1000A	-
Glow plug		-	-
Accel dial	 CN-142	-	※ Check resistance Normal : about 5kΩ (for terminal A-C) ※ Check voltage Normal : about 5V (for terminal A-C) : 2-4.5V (for terminal C-B)

Part name	Symbol	Specification	Check
EPPR vlave	 A1, A2, A3, A4	-	-
12V socket	 CN-139	12V 120W	-
Fuel pump switch	 CS-16	-	-
Resistor	 RS-1	1W 47 Ω	※ Check resistance A-B : 47 Ω
Relay (air con blower)		12V 20A	※ Check resistance Normal : About 200 Ω (for terminal 1-3) 0 Ω (for terminal 2-4)
New MP3 radio	 CN-27	12V 2A	※ Check voltage 10~16V (for terminal 1-3, 3-8)

Part name	Symbol	Specification	Check
Quick clamp buzzer	 CN-113	12V 60mA 65dB Min	-
DPF switch	 CS-100	12V 16A	※ Check resistance Normal OFF $\infty \Omega$ (for terminal 2-1, 2-3, 5-4, 5-6)

GROUP 5 CONNECTORS

1. CONNECTOR DESTINATION

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-1	AMP	36	I/conn (Main harness-Cab room harness)	1743059-2	1743062-2
CN-4	AMP	36	I/conn (Cab room harness-Main harness)	1743059-2	1743062-2
CN-6	AMP	16	I/conn (Frame harness-Cabin harness)	368047-1	368050
CN-7	AMP	16	I/conn (Main harness-Console harness)	368047-1	368050
CN-7A	AMP	12	I/conn (Main harness-Console harness)	174661-2	-
CN-8	AMP	12	I/conn (Cab room harness-Cab harness)	174661-2	S816-112002
CN-9	AMP	12	I/conn (Cab room harness-AAVM harness)	174655-2	174657-2
CN-11	DEUTSCH	8	I/conn (Cab room harness-Aircon harness)	DT06-8S-EP06	-
CN-12	AMP	2	I/conn (Main harness-Boom harness)	S816-002002	S816-102002
CN-13	KET	2	Master switch	S813-030201	MG620558-5
CN-14	KET	2	Earth	MG610557	MG620558
CN-16	AMP	6	Emergency engine start	S816-006002	S816-106002
CN-16A	AMP	6	Emergency engine start	S816-006002	-
CN-18	AMP	16	I/conn (Main harness-Cab room harness)	368047-1	368050-1
CN-19	AMP	10	Cabin lamp	174655-2	174657-2
CN-20	DEUTSCH	2	Horn	DT06-2S-EP06	-
CN-21	-	4	Wiper motor	180900-0	-
CN-22	KET	2	Washer tank	MG640605	-
CN-23	KET	2	Speaker LH	MG610070	-
CN-24	KET	2	Speaker RH	MG610070	-
CN-25	DEUTSCH	2	Horn	DT06-2S-EP06	-
CN-27	-	16	Radio/USB player	PK145-16017	-
CN-27A	-	8	Radio/USB player	-	S816-108002
CN-29	KET	2	Receiver dryer	MG640795	-
CN-36	-	-	Fuse box	21MN-55010	-
CN-41A	DELPHI	2	Fuse heater	15300027	-
CN-41B	DELPHI	2	Fuse heater	15300027	-
CN-45	MOLEX	RING TERM	Starter	MK238-10	-
CN-48	-	3	Hour meter	-	-
CN-51	AMP	70	MCU	1-968879-1	-
CN-56	AMP	8	Cluster	-	S816-106002
CN-56A	AMP	8	Cluster	174982-2	-
CN-60	MTA	2	Maxi fuse assy	21K6-03270	03.01060
CN-61	DEUTSCH	2	Fuel filler pump	DT06-2S-EP06	DT04-2P-E005
CN-62	MTA	2	Maxi fuse assy	21K6-03270	03.01060
CN-66	DEUTSCH	2	Breaker solenoid	DT06-2S-EP06	DT04-2P-E005
CN-66P	DEUTSCH	2	2-way/breaker select solenoid	DT06-2S-EP06	DT04-2P-E005
CN-68	DEUTSCH	2	Safety solenoid	DT06-2S-EP06	-

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-69	DEUTSCH	2	Ram lock solenoid	DT06-2S-EP06	-
CN-70	DEUTSCH	2	Travel solenoid	DT06-2S-EP06	-
CN-71	DEUTSCH	2	Parking solenoid	DT06-2S-EP06	-
CN-74	DONGA	RING TERM	Alternator	S820-408000	-
CN-75	DEUTSCH	2	Main pump EPPR	DT06-2S-EP06	DT04-2P-E005
CN-80	YAZAKI	1	Air heater	7323-3010	-
CN-81	DEUTSCH	2	Travel buzzer	DT06-2S-EP06	DT04-2P-E005
CN-94	BOSCH	91	ECU	1 928 405 452	-
CN-95	KET	2	Fusible link	21K6-03270	03.01050
CN-96	MTA	2	Maxi fuse assy	21K6-03270	03.01050
CN-97	AMP	12	Multifunction switch	S816-012002	S816-112002
CN-98	AMP	10	Multifunction switch	S816-010002	S816-110002
CN-99	AMP	8	Multifunction switch	S816-008002	S816-108002
CN-100	KET	1	ECU ground	MG640944-5	-
CN-113	-	2	Buzzer	S810-002202	-
CN-116	AMP	12	Switch panel	368542-1	-
CN-122	DEUTSCH	2	Forward solenoid	DT06-2S-EP06	-
CN-123	DEUTSCH	2	Reverse solenoid	DT06-2S-EP06	-
CN-125A	DEUTSCH	12	RMCU	DT06-126-P021	DT04-12PA-P021
CN-126	DEUTSCH	4	RS232	DT06-4S-EP06	DT06-4P
CN-139	AMP	2	12V socket	172434-2	-
CN-140	DEUTSCH	2	Quick clamp solenoid	DT06-2S-EP06	DT04-2P-E005
CN-142	DEUTSCH	3	Accel dial	DT06-3S-EP06	-
CN-142A	DEUTSCH	2	Accel dial indicator	174352-2	-
CN-145	DEUTSCH	2	Fuel feed pump	DT06-2S-EP06	-
CN-148	DEUTSCH	6	Service tool	DT06-6S-EP06	DT04-6P-E005
CN-157	-	1	Antena power	S822-014000	-
CN-170	PACKARD	2	Seat heat switch	12052641	-
CN-240	DEUTSCH	3	4-way/boom swing switch	DT06-3S-E006	-
CN-240A	DEUTSCH	2	Horn switch	-	DT04-2P-E005
CN-240B	DEUTSCH	2	Swing/rotating select switch	DT06-2S-E006	-
CN-240C	DEUTSCH	1	Ram lock switch	-	ST750036-3
CN-241	DEUTSCH	3	2-way/clamp switch	DT06-3S-EP06	-
CN-241A	DEUTSCH	2	2-way/clamp switch	-	DT04-2P-E005
CN-241B	DEUTSCH	2	2-way/clamp switch	DT06-2S-EP06	-
CN-241C	-	1	2-way/clamp switch	DT06-3S-EP06	-
CN-246	DEUTSCH	2	Cruise solenoid	-	ST750036-3
CN-247	AMP	1	USB charger	171809	-
CN-249A	AMP	6	Rear camera	DT06-6S-EP06	DT04-6P-E005
CN-264	DEUTSCH	8	I/conn (RH console harness-Main harness)	DT06-8S	DT04-8P-E004

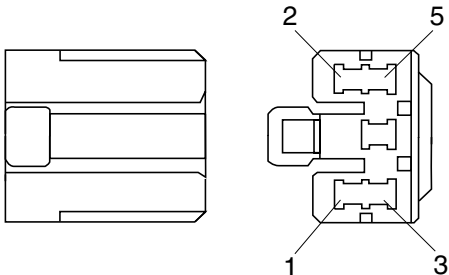
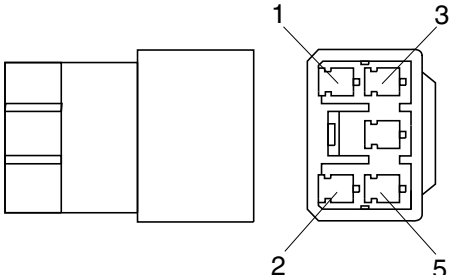
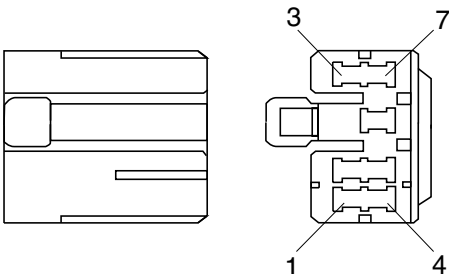
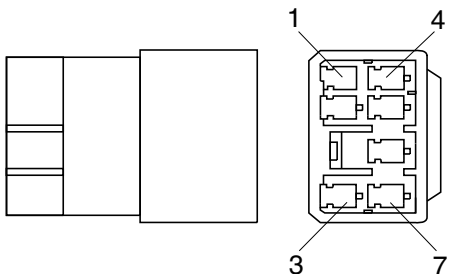
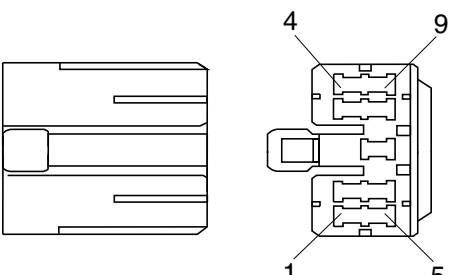
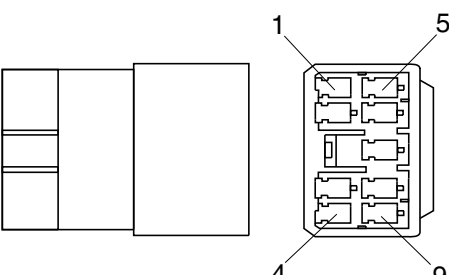
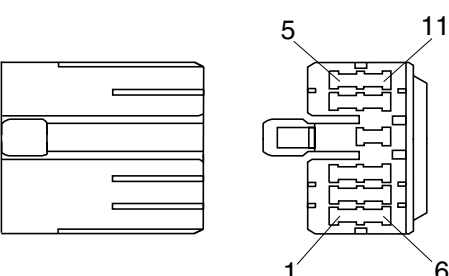
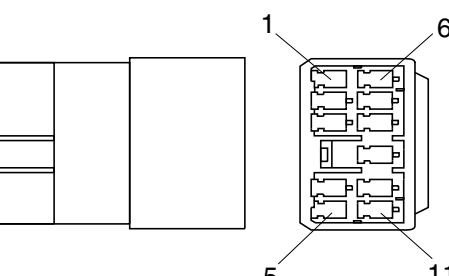
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CN-305	DEUTSCH	12	AVCU	DTM-06-12SA	-
CN-306	DEUTSCH	12	AVCU	DTM-06-12SB	-
CN-307	DEUTSCH	3	Service tool	DT06-3S-EP06	DT04-2P-E005
CN-403	DEUTSCH	6	Front camera	DT06-6S-EP06	DT04-6P-E005
CN-404	DEUTSCH	6	LH camera	DT06-6S-EP06	DT04-6P-E005
CN-427	-	12	Smart key reader	5559-12R	5559-12P
CN-542	DEUTSCH	6	Service tool (ECU)	DT06-6S-EP06	DT04-6P-E005
CN-641	KET	3	Button key	MG641035	-
CN-641B	KET	3	Button key-input	MG651032	-
CN-A1	DEUTSCH	2	EPPR- Rotate or boom swing RH	DT06-2S-EP06	-
CN-A2	DEUTSCH	2	EPPR- Rotate or boom swing LH	DT06-2S-EP06	-
CN-A3	DEUTSCH	2	EPPR- Release or breaker	DT06-2S-EP06	-
CN-A4	DEUTSCH	2	EPPR- Clamp	DT06-2S-EP06	-
CN-INTER 1	KET	1	Inter connection 1	-	MG643800
CN-INTER 2	KET	6	Inter connection 2	-	MG610513
CN-INTER 3	DEUTSCH	12	Inter connection 3	-	DT04-12P-E005
· LAMP					
CL-1	KET	2	Room lamp	MG610392	-
CL-2	AMP	3	Cigar lighter	S810-003201	-
CL-3	KET	3	Head lamp	S810-003702	-
CL-4	KET	3	Head lamp	S810-003702	-
CL-5	DEUTSCH	2	Work lamp	DT06-2S-EP06	-
CL-7	DEUTSCH	2	Beacon lamp	DT06-2S-EP06	DT04-2P-E005
CL-9	DEUTSCH	2	Cabin lamp	DT06-2S-EP06	DT04-2P-E005
CL-10	DEUTSCH	2	Cabin lamp	DT06-2S-EP06	DT04-2P-E005
CL-15	AMP	4	Rear combination lamp-LH	282088-1	-
CL-15A	AMP	2	Reverse lamp	282080-1	-
CL-16	AMP	4	Rear combination lamp-RH	282088-1	-
CL-16A	AMP	2	Reverse lamp	282080-1	-
CL-21	AMP	2	Number plate lamp	174463-1	174460-1
CL-21A	KET	1	Licence lamp	ST30057-2	-
CL-21B	KET	1	Licence lamp	ST30057-2	-
CL-24	KET	3	Front combination lamp-LH	S814-003001	-
CL-25	KET	3	Front combination lamp-RH	S814-003001	-
· RELAY					
CR-1	DONGA	RING TERM	Battery relay (IG)	S820-408000	-
CR-1	AMP	2	Battery relay	S816-002002	S816-102002
CR-1	DONGA	RING TERM	Battery relay (B+)	S820-408000	-
CR-2	HELLA	5	Horn relay	SJA003526-001	-
CR-3	HELLA	5	Work lamp relay	SJA003526-001	-

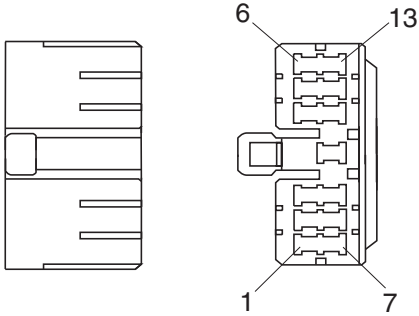
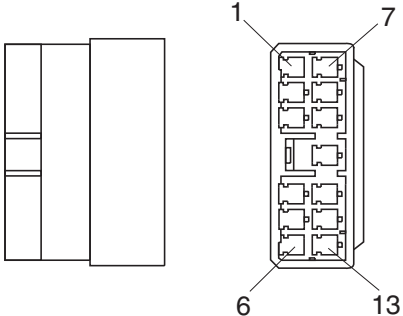
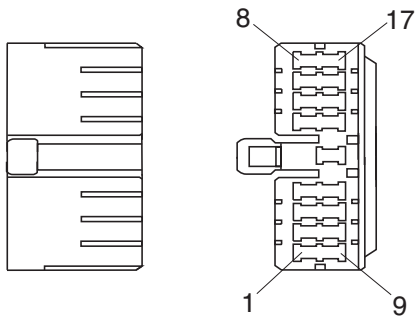
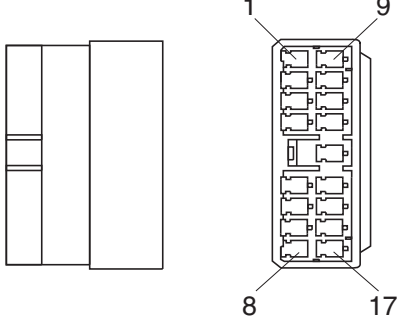
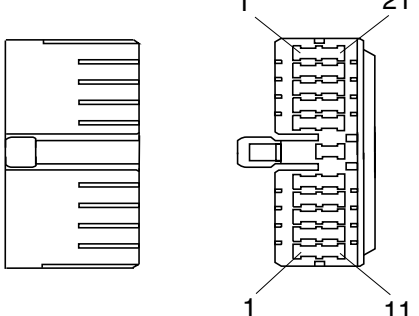
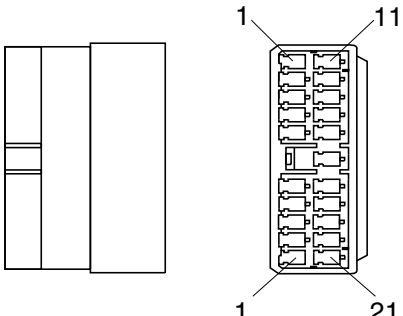
Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
CR-4	HELLA	5	Wiper relay	SJA003526-001	-
CR-5	HELLA	5	Anti-restart relay	SJA003526-001	-
CR-6	KET	4	Int wiper relay	MG652999	-
CR-7	HELLA	5	Aircon comp relay	SJA003526-001	-
CR-9	HELLA	5	Cabin lamp relay	SJA003526-001	-
CR-11	AMP	3	Flasher unit relay	180913	-
CR-13	HELLA	5	Head lamp low relay	SJA003526-001	-
CR-14	HELLA	5	Head lamp high relay	SJA003526-001	-
CR-23	KET	4	Start relay	MG612017-5	-
CR-24	KET	4	Air heater relay	MG612017-5	-
CR-29	HELLA	5	Forward relay	SJA003526-001	-
CR-30	HELLA	5	Reverse relay	SJA003526-001	-
CR-36A	HELLA	4	Pre-heater relay	SJA003526-001	-
CR-38	HELLA	5	Neutral relay	SJA003526-001	-
CR-45	HELLA	5	ECU power relay	SJA003526-001	-
CR-63	HELLA	5	Stop lamp relay	SJA003526-001	-
CR-66	HELLA	5	Parking relay	SJA003526-001	-
CR-67	CARLING	10	Quick coupler relay	VC2-01	-
CR-68	AMP	5	Safety solenoid relay	S816-002002	-
CR-75	HELLA	5	Illumination relay	SJA003526-001	-
CR-78	HELLA	5	Head lamp relay	SJA003526-001	-
CR-85	HELLA	5	Beacon lamp relay	SJA003526-001	-
CR-93	HELLA	5	Travel relay	SJA003526-001	-
CR-385	HELLA	5	Start limit relay	SJA003526-001	-
· SENDER					
CD-1	AMP	2	Hydraulic temp sender	85202-1	-
CD-2	AMP	2	Fuel sender	-	S816-102002
CD-3	DEUTSCH	3	Brake oil pressure switch	DT06-3S-EP06	-
CD-4	DEUTSCH	3	Stop lamp pressure switch	DT06-3S-EP06	-
CD-7	DEUTSCH	3	Working pressure switch	DT06-3S-EP06	-
CD-10	AMP	2	Air cleaner switch	85202-1	-
CD-31	DEUTSCH	3	Overload pressure switch	DT06-3S-EP06	DT04-3P-E005
CD-32	DEUTSCH	3	Boom up pressure switch	DT06-3S-EP06	-
CD-38	DEUTSCH	3	Working brake pressure switch	DT06-3S-EP06	-
CD-42	DEUTSCH	3	P1 pump pressure switch	DT06-3S-EP06	-
CD-45	DEUTSCH	2	WIF switch	DT06-2S-EP06	-
CD-73	DEUTSCH	3	Forward pressure switch	DT06-3S-EP06	-
CD-158A	AMP	4	MAF sensor	1-1718645-1	1-1564559-1

Connector number	Type	No. of pin	Destination	Connector part No.	
				Female	Male
· SWITCH					
CS-2	KET	6	Start key switch	S814-006000	-
CS-2B	DEUTSCH	3	BKCU (CAN)	DT06-3S-EP06	DT04-3P-E005
CS-4	AMP	3	Safety switch	174257-2	-
CS-4A	-	4	Safety switch	-	174259-2
CS-16	KET	2	Fuel pump switch	174352-2	174354-2
CS-23	CALING	10	Auto cruise switch	VC2-01	-
CS-26A	AMP	2	Foot pedal	174352-2	S816-103002
CS-50	CARLING	10	Overload switch	VC2-01	-
CS-52	CARLING	10	Travel alarm select switch	VC2-01	-
CS-67	CARLING	10	Quick clamp switch	VC2-01	-
CS-74	-	2	Master switch	MG620557	-
CS-100	CARLING	10	DPF switch	VC2-01	-
CS-104	CARLING	10	Ram lock switch	VC2-01	-
CS-250	DEUTSCH	2	Seat belt alarm	DT06-2S-EP06	DT04-2P-E005
· DIODE					
DO-1	AMP	2	Diode (alternator)	S816-002002	21EA-50550
DO-2	AMP	2	Diode (fuel feed pump)	S816-002002	21EA-50550
DO-3	AMP	2	Diode (neutral)	S816-002002	21EA-50550
DO-3	AMP	2	Diode (MCU)	S816-002002	21EA-50550
DO-3A	AMP	2	Diode (MCU)	S816-002002	21EA-50550
DO-4	AMP	2	Diode (battery relay)	S816-002002	21EA-50550
DO-17	AMP	2	Diode (travel)	174352-2	21EA-50570
DO-18	AMP	2	Diode (travel)	174352-2	21EA-50570
DO-19	AMP	2	Diode (travel)	174352-2	21EA-50570
DO-20	AMP	2	Diode (2way/breaker)	S816-002002	21EA-50550

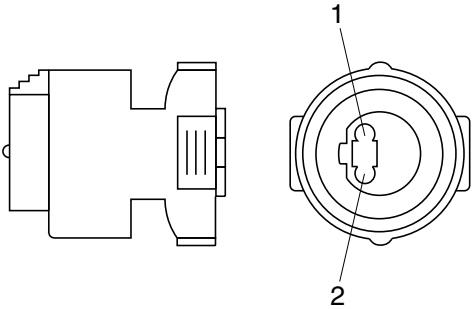
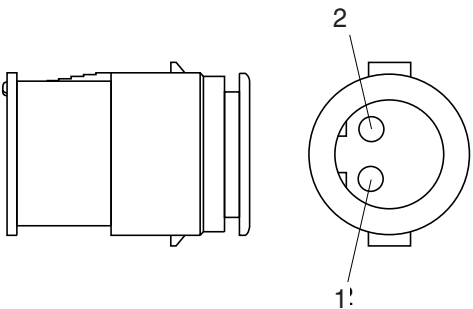
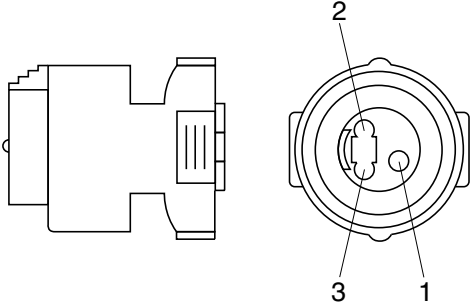
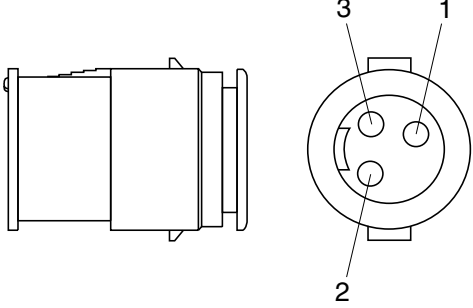
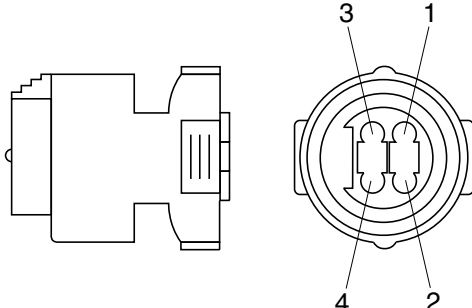
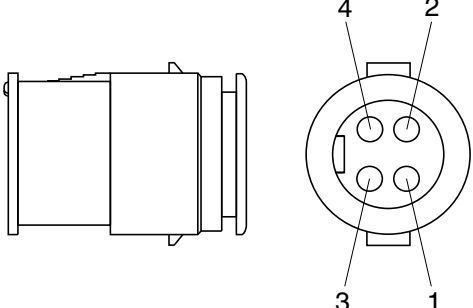
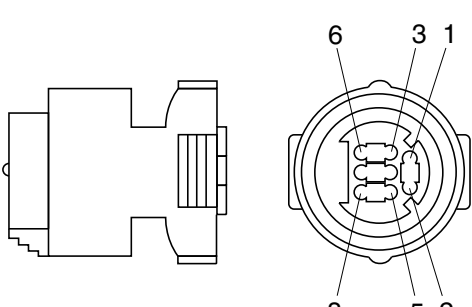
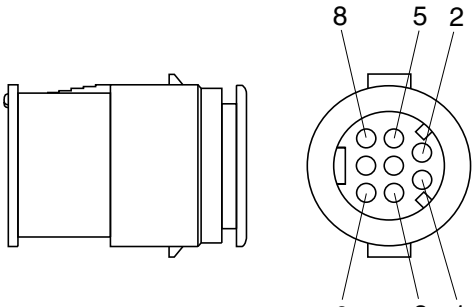
2. CONNECTION TABLE FOR CONNECTORS

1) PA TYPE CONNECTOR

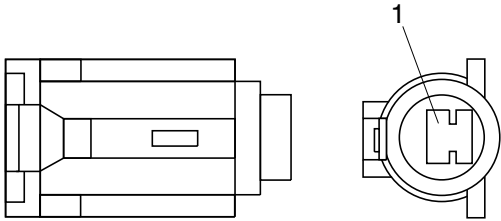
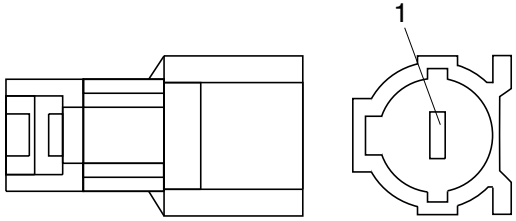
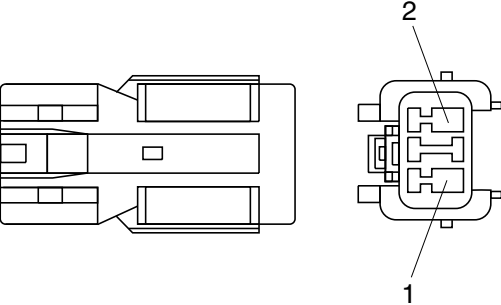
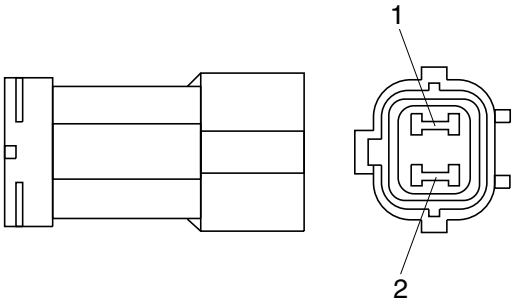
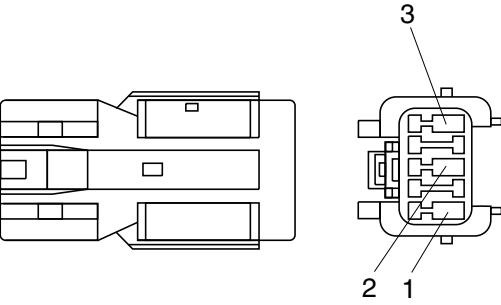
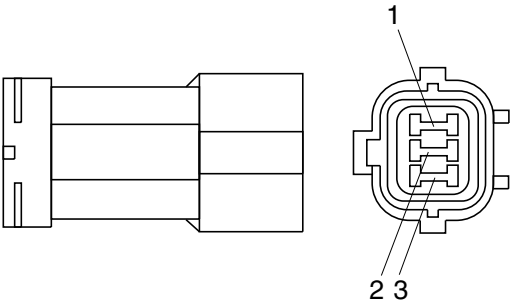
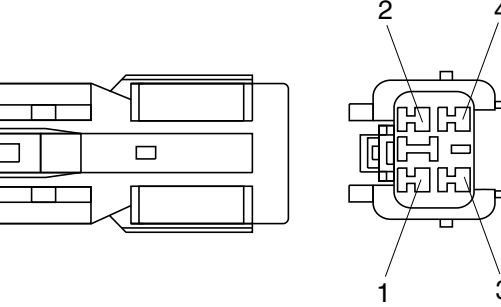
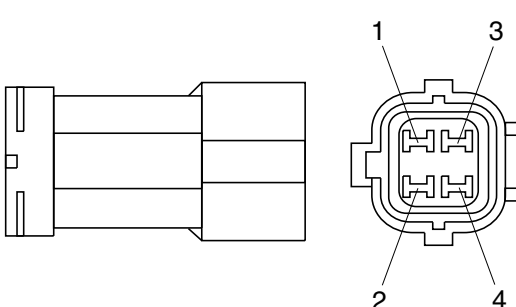
No. of pin	Connector (female)	Connector (male)
5	 S811-005002	 S811-105002
7	 S811-007002	 S811-107002
9	 S811-009002	 3S811-109002
11	 S811-011002	 S811-111002

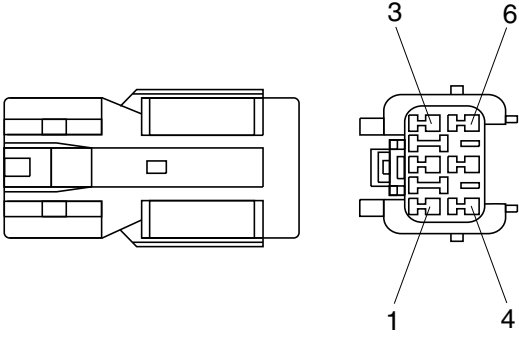
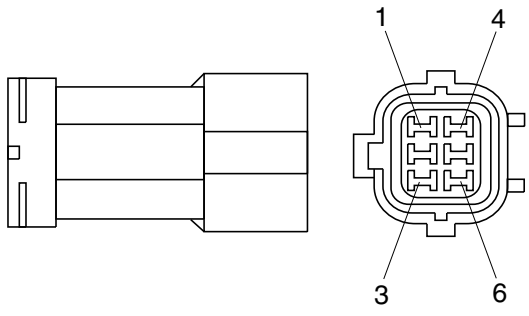
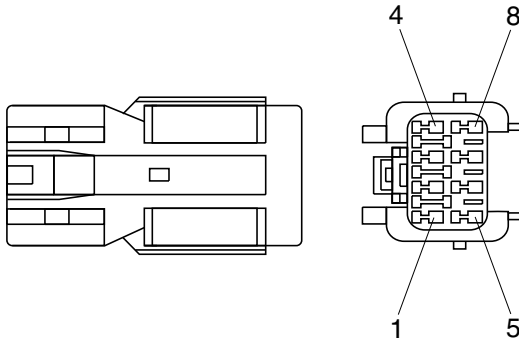
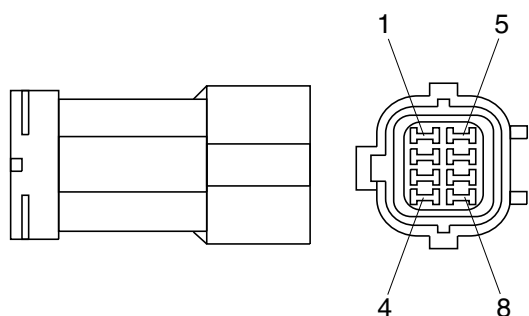
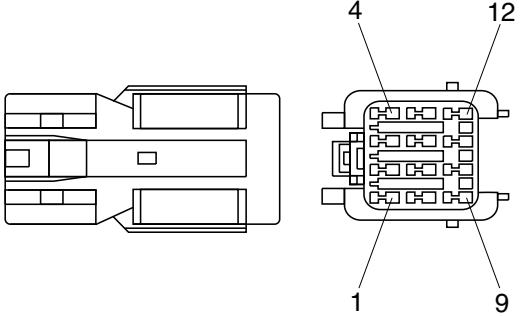
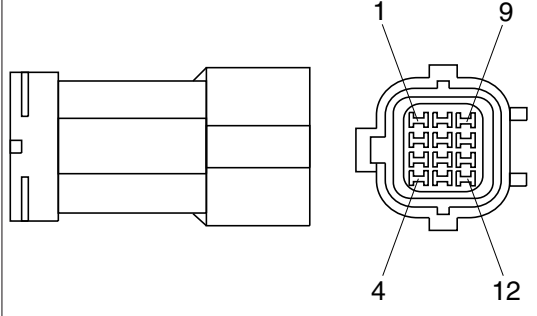
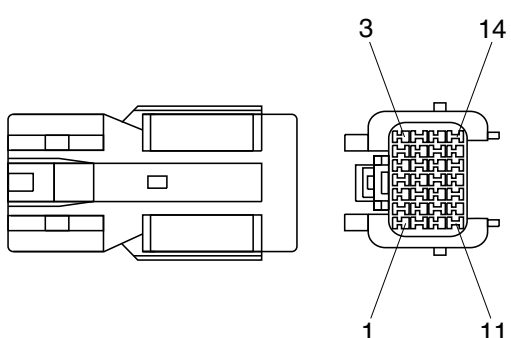
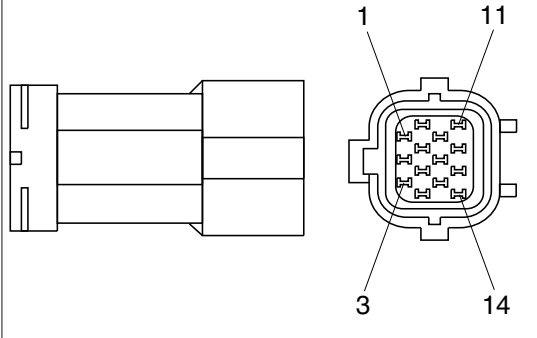
No. of pin	Connector (female)	Connector (male)
13	 S811-013002	 S811-113002
17	 S811-017002	 S811-117002
21	 S811-021002	 S811-121002

2) J TYPE CONNECTOR

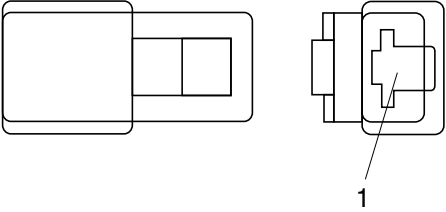
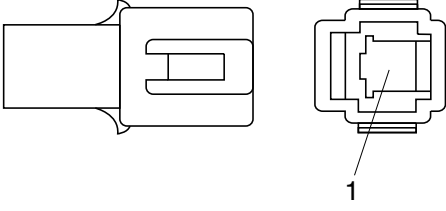
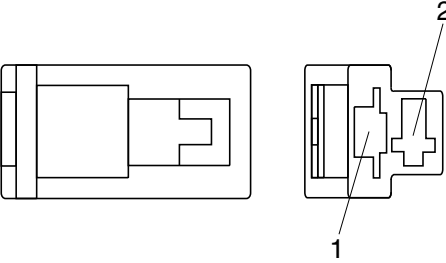
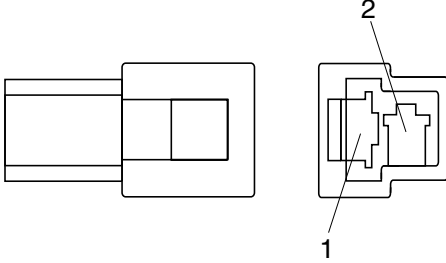
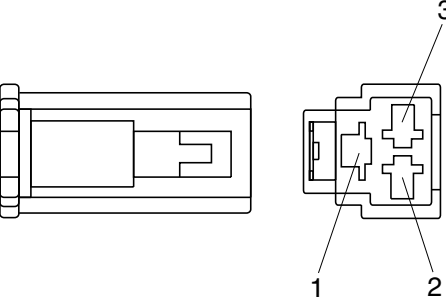
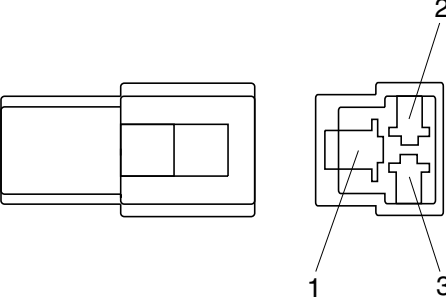
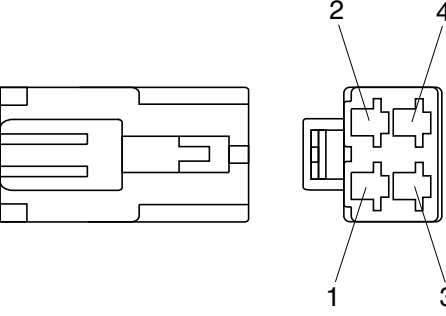
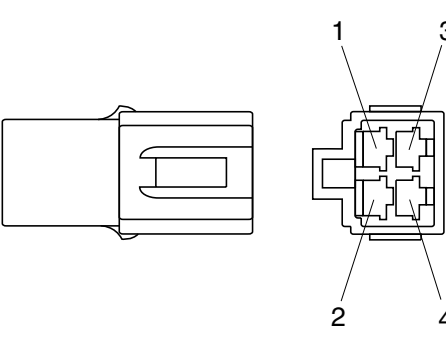
No. of pin	Connector (female)	Connector (male)
2	 S816-002001	 S816-102001
3	 S816-003001	 S816-103001
4	 S816-004001	 S816-104001
8	 S816-008001	 S816-108001

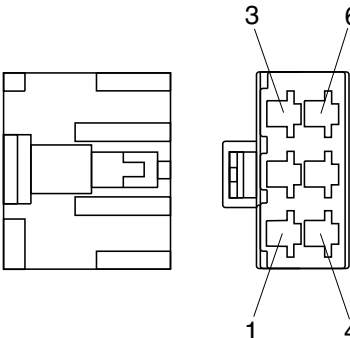
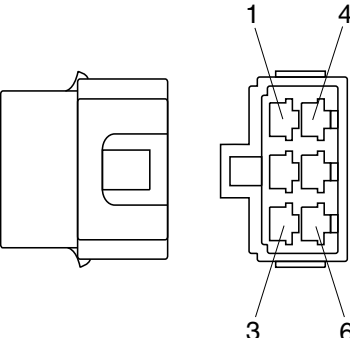
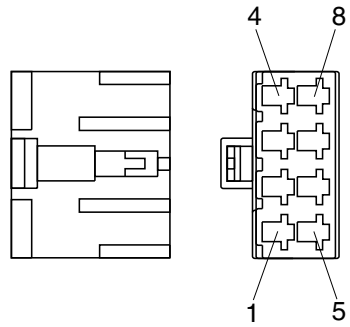
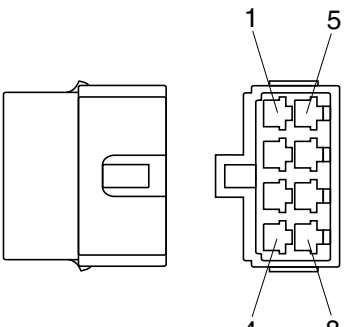
3) SWP TYPE CONNECTOR

No. of pin	Connector (female)	Connector (male)
1	 S814-001000	 S814-101000
2	 S814-002000	 S814-102000
3	 S814-003000	 S814-103000
4	 S814-004000	 S814-104000

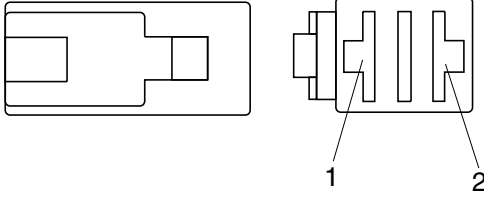
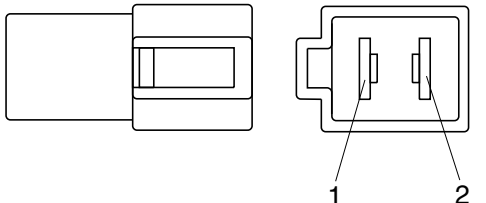
No. of pin	Connector (female)	Connector (male)
6	 S814-006000	 S814-106000
8	 S814-008000	 S814-108000
12	 S814-012000	 S814-112000
14	 S814-014000	 S814-114000

4) CN TYPE CONNECTOR

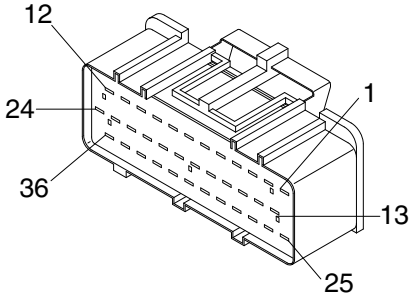
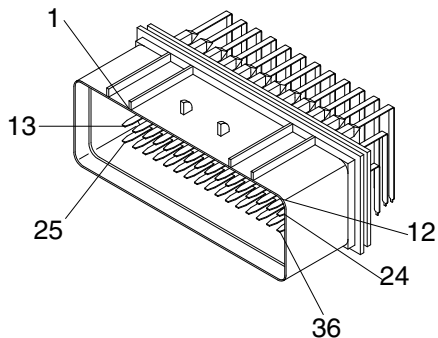
No. of pin	Connector (female)	Connector (male)
1	 S810-001202	 S810-101202
2	 S810-002202	 S810-102202
3	 S810-003202	 S810-103202
4	 S810-004202	 S810-104202

No. of pin	Connector (female)	Connector (male)
6	 S810-006202	 S810-106202
8	 S810-008202	 S810-108202

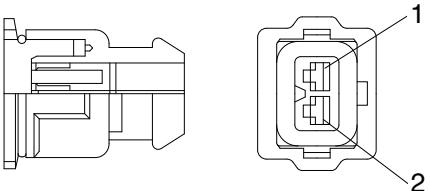
5) 375 FASTEN TYPE CONNECTOR

No. of pin	Connector (female)	Connector (male)
2	 S810-002402	 S810-102402

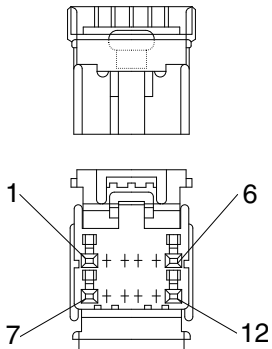
6) AMP ECONOSEAL CONNECTOR

No. of pin	Connector (female)	Connector (male)
36	 344111-1	 344108-1

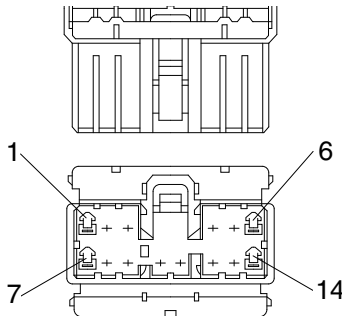
7) AMP TIMER CONNECTOR

No. of pin	Connector (female)	Connector (male)
2	 85202-1	

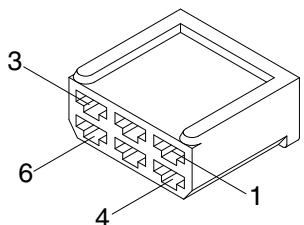
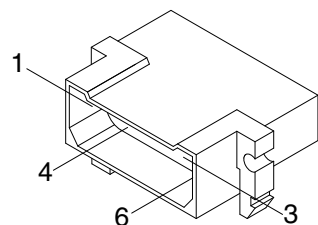
8) AMP 040 MULTILOCK CONNECTOR

No. of pin	Connector (female)	Connector (male)
12	 174045-2	

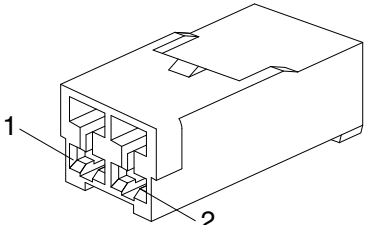
9) AMP 070 MULTILOCK CONNECTOR

No. of pin	Connector (female)	Connector (male)
14	 173852	

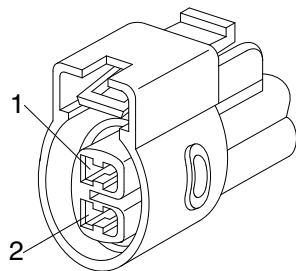
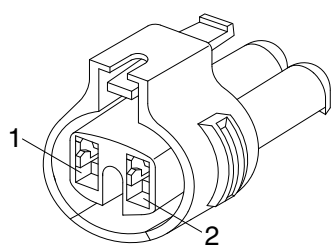
10) AMP FASTIN - FASTON CONNECTOR

No. of pin	Connector (female)	Connector (male)
6	 925276-0	 480003-9

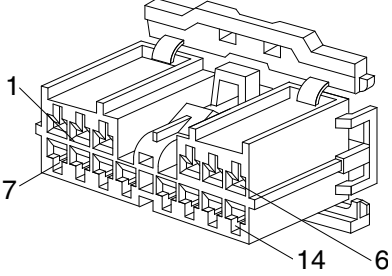
11) KET 090 CONNECTOR

No. of pin	Connector (female)	Connector (male)
2	 MG610070	

12) KET 090 WP CONNECTORS

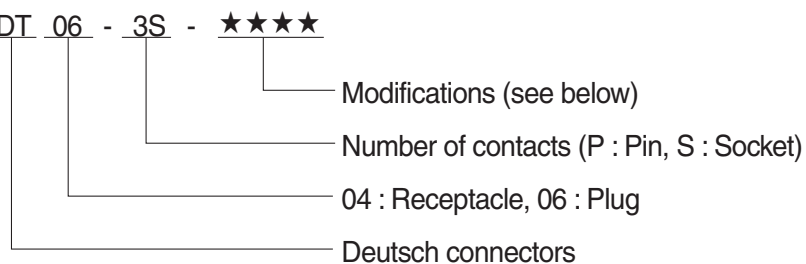
No. of pin	Connector (female)	Connector (male)
2	 MG640605	
2	 MG640795	

13) KET SDL CONNECTOR

No. of pin	Connector (female)	Connector (male)
14	 MG610406	

14) DEUTSCH DT CONNECTORS

DT 06 - 3S - ★★☆☆



※ Modification

E003 : Standard end cap - gray

E004 : Color of connector to be black

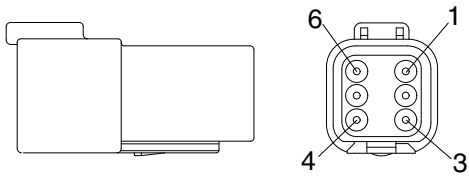
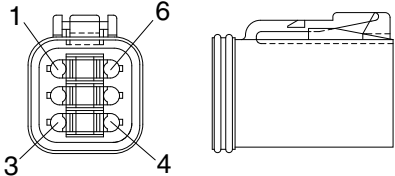
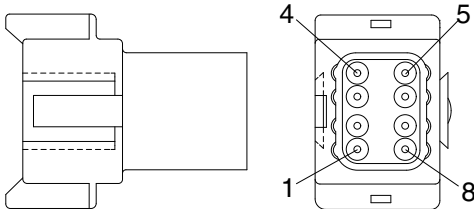
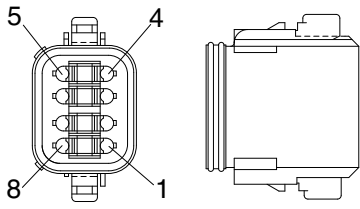
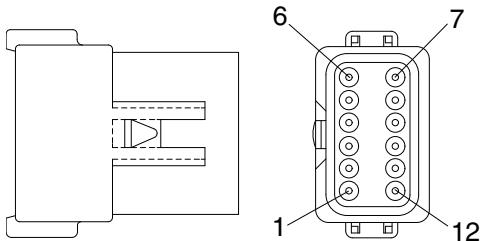
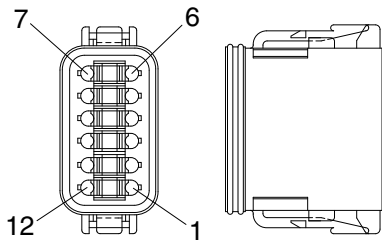
E005 : Combination - E004 & E003

EP04 : End cap

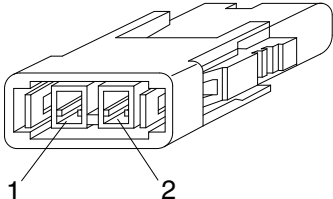
EP06 : Combination P012 & EP04

P012 : Front seal enhancement - connectors color to black for 2, 3, 4 & 6pin

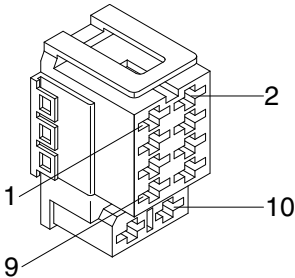
No. of pin	Connector (female)	Connector (male)
2	DT06-2S	DT06-2P
3	DT06-3S	DT06-3P
4	DT06-4S	DT06-4P

No. of pin	Connector (female)	Connector (male)
6	 DT06-6S	 DT06-6P
8	 DT06-8S	 DT06-8P
12	 DT06-12S	 DT06-12P

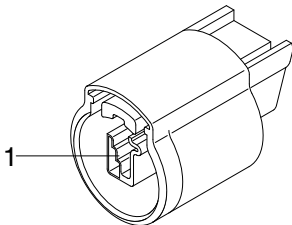
15) MOLEX 2CKTS CONNECTOR

No. of pin	Connector (female)	Connector (male)
2	 35215-0200	

16) ITT SWF CONNECTOR

No. of pin	Connector (female)	Connector (male)
10	 SWF593757	

17) MWP NMWP CONNECTOR

No. of pin	Connector (female)	Connector (male)
1	 NMWP01F-B	

GROUP 6 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
SPN	FMI	
0	19	Timeout Error of CAN-Receive-Frame TSC1VE (Engine speed & Torque demand)
27	0	EGR Position Open jammed fault
27	1	EGR Position Closed jammed fault
27	3	EGR Position Sensor High Fault
27	4	EGR Position Sensor Low Fault
27	20	EGR Close Position Learning Range Over Fault
27	22	EGR Close Position Learning Drift Fault for long time
27	23	EGR Close Position Learning Drift Fault for short time
29	3	Accel pedal position track2 sensor High fault
29	4	Accel pedal position track2 sensor Low fault
29	15	Hand pedal position track2 sensor High fault
29	17	Hand pedal position track2 sensor Low fault
51	0	Throttle valve Position Open jammed fault
51	1	Throttle valve Position Closed jammed fault
51	3	Throttle valve Position Sensor High Fault
51	4	Throttle valve Position Sensor Low Fault
51	22	Throttle valve Close Position Learning Drift Fault for long time
51	23	Throttle valve Close Position Learning Drift Fault for short time
51	30	Throttle valve Close Position Learning Range Over Fault
91	3	Accel pedal position track1 sensor High fault
91	4	Accel pedal position track1 sensor Low fault
91	11	Accel pedal position sensor plausibility fault (Not synchronism between track1 and track2)
91	12	Hand pedal position sensor plausibility fault (Not synchronism between track1 and track2)
91	15	Hand pedal position track1 sensor High fault
91	17	Hand pedal position track1 sensor Low fault
91	19	Timeout Error of CAN-Receive-Frame EEC2 (Pedal)
97	3	Water In Fuel Sensor signal range high fault
97	4	Water In Fuel Sensor signal range low fault
97	14	Water in fuel detected – Warning step
97	23	Water in fuel detected – Torque de-rate step (After 20min)
98	3	Oil combination (Level and temperature) signal output short circuit to battery error
98	4	Oil combination (Level and temperature) signal output short circuit to ground error
98	5	Oil combination (Level and temperature) sensor itself open or short circuit error
98	18	Engine oil level is too low (Low step3)
98	22	Oil combination (Level and temperature) sensor timeout fault
98	23	Oil combination (Level and temperature) sensor itself Voltage out of range error
98	24	Engine oil level is low (Low step2)

Fault code		Description
SPN	FMI	
100	1	Engine Oil Pressure Too Low Fault
100	3	Engine Oil Pressure Sensor High Fault
100	4	Engine Oil Pressure Sensor Low Fault
102	3	Intake Manifold Pressure Sensor High Fault
102	4	Intake Manifold Pressure Sensor Low Fault
105	3	Intake manifold temperature sensor High fault
105	4	Intake manifold temperature sensor Low fault
105	16	Intake manifold temperature High fault
108	3	Atmospheric Pressure Sensor High Fault
108	4	Atmospheric Pressure Sensor Low Fault
110	0	Coolant high temperature Fault
110	3	Coolant Temperature Sensor High Fault
110	4	Coolant Temperature Sensor Low Fault
110	10	Coolant Temperature Plausibility Fault
132	1	Intake manifold pressure low plausibility fault (Compressor out pressure too low)
132	3	Signal range check high error for Air mass flow sensor
132	4	Signal range check low error for Air mass flow sensor
132	5	Battery voltage error of Air mass flow sensor
132	19	Signal error of Air mass flow sensor
132	21	Sensitivity drift error low for Air mass flow sensor
157	10	Fuel Leakage is detected based on fuel quantity balance
157	11	Maximum positive deviation of rail pressure exceeded
157	26	Rail pressure too low fault
157	27	Maximum rail pressure exceeded
157	28	Pressure relief valve(PRV) failure
171	0	Environment Temperature Too High
171	3	Environment Temperature Sensor Signal High
171	4	Environment Temperature Sensor Signal Low
172	0	Inlet air temperature High fault
172	3	Inlet air temperature sensor High fault
172	4	Inlet air temperature sensor Low fault
173	1	DOC Exothermal Efficiency Fault
174	0	Fuel temperature high fault
174	3	Fuel Temperature Sensor High Fault
174	4	Fuel Temperature Sensor Low Fault
175	11	Oil combination (Level and temperature) sensor itself Oil temperature out of range error
177	15	Transmission oil temperature high fault (CAN)
177	16	Transmission oil temperature high fault (H/W Switch)
190	0	Engine over speed detection fault

Fault code		Description
SPN	FMI	
444	0	Battery Voltage High fault (Warning)
444	1	Battery Voltage Low fault (Warning)
444	2	Powerstage diagnosis could be disabled due to low Battery voltage
444	3	Battery Voltage Signal Range Max fault
444	4	Battery Voltage Signal Range Min fault
444	12	Powerstage diagnosis disabled due to high Battery voltage
626	12	Starter switch stuck fault (Cranking request is too long.)
636	2	Crank Signal disturbed fault
636	8	Cranks No signal error
637	2	Cam Signal disturbed fault
637	8	Cam Signal Lost fault
637	30	Cam Signal Drift Fault
639	2	CAN communication error
639	19	CAN bus off error
651	2	Injector Code(IQA) Program Missing Fault (Cylinder#1)
651	4	Injector Short circuit Fault (Cylinder #1)
651	5	Injector Open circuit Fault (Cylinder #1)
651	22	Injector High Low side Short circuit Fault (Cylinder #1)
652	2	Injector Code(IQA) Program Missing Fault (Cylinder#2)
652	4	Injector Short circuit Fault (Cylinder #2)
652	5	Injector Open circuit Fault (Cylinder #2)
652	22	Injector High Low side Short circuit Fault (Cylinder #2)
653	2	Injector Code(IQA) Program Missing Fault (Cylinder#3)
653	4	Injector Short circuit Fault (Cylinder #3)
653	5	Injector Open circuit Fault (Cylinder #3)
653	22	Injector High Low side Short circuit Fault (Cylinder #3)
654	2	Injector Code(IQA) Program Missing Fault (Cylinder#4)
654	4	Injector Short circuit Fault (Cylinder #4)
654	5	Injector Open circuit Fault (Cylinder #4)
654	22	Injector High Low side Short circuit Fault (Cylinder #4)
676	3	Glow plug Relay driver Short circuit to Battery Fault
676	4	Glow plug Relay driver Short circuit to Ground Fault
676	5	Glow plug Relay driver Open circuit Fault
970	12	Engine shut off request through CAN (EBC1)
970	22	Engine shut off request through hardwire
975	3	PWM FAN Output short to battery circuit fault
975	4	PWM FAN Output short to ground circuit fault
975	5	PWM FAN Output open circuit fault
987	3	CE(Check engine) Lamp Short to Battery

Fault code		Description
SPN	FMI	
987	4	CE(Check engine) Lamp Short to Ground
987	5	CE(Check engine) Lamp Open circuit
1076	3	Fuel Metering unit plausibility error in overrun mode
1076	4	Fuel Metering unit plausibility error in idle mode
1076	16	Maximum negative rail pressure deviation with metering unit on lower limit is exceeded
1076	20	Rail pressure too low for injection
1081	3	Glow plug Lamp Short to Battery
1081	4	Glow plug Lamp Short to Ground
1081	5	Glow plug Lamp Open circuit
1207	0	ECU temperature High fault
1207	3	ECU temperature sensor High fault (Short circuit to battery)
1207	4	ECU temperature sensor Low fault (Short circuit to ground)
1382	0	Fuel filter pressure high fault
1382	1	Fuel filter pressure low fault
1382	3	Fuel filter pressure sensor signal high fault
1382	4	Fuel filter pressure sensor signal low fault
1382	7	Fuel Filter Pressure low detection 1 - Warning
1382	13	Fuel Filter Pressure low detection 2 - Torque reduction
1485	7	ECU Main relay Stuck fault
1485	11	ECU Main relay Early opening fault
1568	3	Multi-torque switch signal too high fault
1568	4	Multi-torque switch signal too low fault
1612	3	Injector bank 1st Short circuit fault
1612	12	Injector bank 2nd Short circuit fault
1639	3	Fan speed too high fault
1639	4	Fan speed too low fault
1639	11	Fan speed signal long period fault path
1761	19	DEF Tank Level Signal error
1867	1	ECU over temperature for SCR Monitoring
1867	3	"ABE active" report due to overvoltage detection
1867	4	"ABE active" report due to undervoltage detection
1867	11	"WDA/ABE active" report due to unknown reason
1867	19	"WDA active" report due to errors in query-response communication
1867	22	ECU Software Reset 0 fault
2789	0	Turbine inlet temperature High fault
2789	3	Turbine inlet temperature sensor High fault
2789	4	Turbine inlet temperature sensor Low fault
2789	11	Turbine inlet temperature Plausibility Fault
2791	3	EGR H-Bridge Driver Short circuit to battery

Fault code		Description
SPN	FMI	
2791	4	EGR H-Bridge Driver Short circuit to ground
2791	5	EGR H-Bridge Driver Open Circuit Fault
3031	14	DEF Tank temperature overheated
3031	16	DEF Tank Temperature sensor High plausibility fault
3031	18	DEF Tank Temperature sensor Low plausibility fault
3216	4	NOx sensor signal low fault (Upstream NOx sensor)
3216	18	NOx sensor 1 (Upstream) concentration Low plausibility fault
3219	7	NOx sensor heating error (Upstream NOx sensor)
3224	5	NOx sensor Open circuit fault (Upstream NOx sensor)
3224	6	NOx sensor Short circuit fault (Upstream NOx sensor)
3226	4	NOx sensor signal low fault (Downstream NOx sensor)
3229	7	NOx sensor heating error (Downstream NOx sensor)
3234	5	NOx sensor Open circuit fault (Downstream NOx sensor)
3234	6	NOx sensor Short circuit fault (Downstream NOx sensor)
3236	0	EGR rate slow response positive error
3236	16	Maximum EGR rate governor deviation
3242	0	DPF(SCRf) inlet temperature High fault
3242	3	DPF(SCRf) inlet temperature sensor High fault
3242	4	DPF(SCRf) inlet temperature sensor Low fault
3242	11	DPF(SCRf) inlet temperature Plausibility Fault
3242	20	DPF(SCRf) inlet temperature Drift fault
3251	3	DPF differential pressure sensor High fault
3251	4	DPF differential pressure sensor Low fault
3251	13	DPF differential pressure drift fault
3251	18	DPF differential pressure too low fault
3360	14	DEF pressure line heater error (Perform afterrun)
3361	3	DEF dosing valve actuator Short circuit to battery Fault
3361	4	DEF dosing valve actuator Short circuit to ground Fault
3361	5	DEF dosing valve actuator Open Circuit Fault
3361	13	DEF dosing valve actuator Over temperature Fault
3361	14	Urea dosing valve plausibility fault
3361	22	DEF dosing valve actuator HS(High side) Short circuit to battery Fault
3361	23	DEF dosing valve actuator HS(High side) Short circuit to ground Fault
3361	27	DEF Dosing valve is blocked
3363	3	DEF Tank heating coolant valve output Short circuit to battery Fault
3363	4	DEF Tank heating coolant valve output Short circuit to ground Fault
3363	5	DEF Tank heating coolant valve output Open circuit Fault
3363	7	DEF Tank heating coolant valve output Over temperature Fault
3509	3	ECU Sensor supply1 Over voltage fault

Fault code		Description
SPN	FMI	
3509	4	ECU Sensor supply1 Under voltage fault
3509	5	ECU Sensor supply1 voltage fault
3509	6	ECU Sensor supply1 Short circuit to ground
3509	11	ECU Sensor supply Overvoltage monitoring error
3510	3	ECU Sensor supply2 Over voltage fault
3510	4	ECU Sensor supply2 Under voltage fault
3510	5	ECU Sensor supply2 voltage fault
3510	6	ECU Sensor supply2 Short circuit to ground
3510	11	ECU Sensor supply Undervoltage monitoring error
3511	3	ECU Sensor supply3 Over voltage fault
3511	4	ECU Sensor supply3 Under voltage fault
3511	5	ECU Sensor supply3 voltage fault
3511	6	ECU Sensor supply3 Short circuit to ground
3516	0	DEF Quality Too High fault
3516	1	DEF Quality Too Low fault
3517	18	DEF Tank level is empty
3520	3	DEF Quality Sensor Open circuit
3520	4	DEF Quality Sensor Short circuit
3532	3	DEF Level Sensor Open circuit
3532	4	DEF Level Sensor Short circuit
3695	3	DPF regeneration inhibit switch Stuck (Short to Battery) fault (Hardwire)
3696	3	DPF regeneration enable switch Stuck (Short to Battery) fault (Hardwire)
3696	11	DPF regeneration inhibit & enable switch plausibility fault (Hardwire)
3697	3	DPF lamp 1 (DPF regeneration switch enable lamp) Short to Battery
3697	4	DPF lamp 1 (DPF regeneration switch enable lamp) Short to Ground
3697	5	DPF lamp 1 (DPF regeneration switch enable lamp) Open circuit
3715	14	DPF regeneration failure (DPF regeneration is not performed well during machine operation mode)
3720	16	DPF Ash loading High fault (Ash cleaning is needed)
4082	3	Fuel metering unit Short circuit to Battery fault
4082	4	Fuel metering unit Short circuit to Ground fault
4082	5	Fuel metering unit Open circuit fault
4082	7	Fuel metering unit Over temperature fault
4335	0	DEF Overpressure error at METERINGCONTROL (DEF pump pressure is too high)
4335	1	DEF Underpressure error at METERINGCONTROL (DEF pump pressure is too low)
4335	2	DEF pressure build up error at PRESSUREBUILDUP (DEF pump pressure is too low)
4335	7	DEF Leakage detection at METERINGCONTROL
4335	12	DEF Overpressure error regardless of the state (DEF pump pressure is too high)

Fault code		Description
SPN	FMI	
4335	15	DEF Pressure reduction error at PRESSUREREDUCTION (Detected an insufficient pressure drop)
4335	16	DEF underpressure error at AFTERRUN_PRESSURECOMPENSATION
4344	2	DEF backflow Line plausibility error at DETECTIONMODE (Does not detect a pressure drop)
4354	5	DEF Pressure line heater circuit Open circuit Fault
4354	6	DEF Pressure line heater circuit Open circuit or Short circuit to ground Fault
4355	5	DEF Backflow line heater circuit Open circuit Fault
4355	6	DEF Backflow line heater circuit Open circuit or Short circuit to ground Fault
4356	5	DEF Suction line heater circuit Open circuit Fault
4356	6	DEF Suction line heater circuit Open circuit or Short circuit to ground Fault
4364	14	SCR Efficiency Too low fault
4365	3	DEF Temperature Sensor Open circuit
4365	4	DEF Temperature Sensor Short circuit
4365	14	DEF Tank temperature plausibility fault (Insufficient temperature increment)
4374	3	DEF Supply Pump Motor Signal output Short circuit to battery Fault
4374	4	DEF Supply Pump Motor Signal output Short circuit to ground Fault
4374	5	DEF Supply Pump Motor Signal output Open circuit Fault
4374	7	DEF Supply Pump Motor Signal output Over temperature Fault
4374	8	DEF Supply Pump Motor Speed Deviation Fault
4374	9	DEF Supply Pump Motor Speed Deviation Permanent Fault
4374	12	DEF Supply Pump Motor No activation Fault
4781	15	DPF Soot mass too high status (> 120%)
4781	16	DPF Soot mass high status (> 110%)
5067	3	PTO (Idle up) Lamp Short to Battery
5067	4	PTO (Idle up) Lamp Short to Ground
5067	5	PTO (Idle up) Lamp Open circuit
5099	3	Oil Pressure Warning Lamp Short to Battery
5099	4	Short circuit to ground error of oil pressure lamp
5099	5	Oil Pressure Warning Lamp Open circuit
5313	3	Rail pressure sensor High fault
5313	4	Rail pressure sensor Low fault
5419	3	Throttle valve H-Bridge Driver Short circuit to battery
5419	4	Throttle valve H-Bridge Driver Short circuit to ground
5419	5	Throttle valve H-Bridge Driver Open Circuit Fault
5435	10	DEF pressure stabilization error at DETECTIONMODE (DEF pump pressure is not stable)
5435	12	DEF pressure check error at DETECTIONMODE (Detected an insufficient pressure drop)
5436	3	DEF Reverting valve output Short circuit to battery Fault
5436	4	DEF Reverting valve output Short circuit to ground Fault

Fault code		Description
SPN	FMI	
5436	5	DEF Reverting valve output Open circuit Fault
5436	7	DEF Reverting valve output Over temperature Fault
5436	11	DEF Reverting valve Pressure drop plausibility fault
5436	14	DEF Reverting valve is blocked (Detected an insufficient pressure drop)
5491	3	DEF Pressure line heater relay output Short circuit to battery Fault
5491	4	DEF Pressure line heater relay output Short circuit to ground Fault
5491	5	DEF Pressure line heater relay output Open circuit Fault
5491	7	DEF Pressure line heater relay output Over temperature Fault
5491	12	DEF Pressure line heater feedback plausibility Fault
5571	22	Common rail pressure relief valve reached maximum allowed opening count
5571	23	Common rail pressure relief valve Forced to open status (Pressure increase)
5571	24	Common rail pressure relief valve Forced to open status (Pressure shock)
5571	25	Common rail pressure relief valve is open
5571	27	Averaged rail pressure is outside the expected tolerance range
5571	28	Common rail pressure relief valve reached maximum allowed open time
5629	14	DPF differential pressure too high fault
5629	15	DPF differential pressure high fault (Warning)
5706	5	DEF Supply module heater circuit Open circuit Fault
5706	6	DEF Supply module heater circuit Open circuit or Short circuit to ground Fault
5706	12	DEF Supply module heater temperature plausibility fault (Insufficient temperature increment)
5706	14	DEF Supply module heater temperature plausibility fault at cold start (Insufficient temperature increment)
5706	22	DEF Supply module heater plausibility fault (Insufficient temperature increment)
5746	3	DEF Main heater relay output Short circuit to battery Fault
5746	4	DEF Main heater relay output Short circuit to ground Fault
5746	5	DEF Main heater relay output Open circuit Fault
5746	6	DEF heater line circuit Short circuit to battery Fault
5746	7	DEF Main heater relay output Over temperature Fault
5965	3	SCR system Main relay short circuit to battery
5965	4	SCR system Main relay short circuit to ground
5965	5	SCR system Main relay open circuit
6323	3	Electric fuel feed pump Output short to battery circuit fault
6323	4	Electric fuel feed pump Output short to ground circuit fault
6323	5	Electric fuel feed pump Output open circuit fault
6323	13	Electric fuel feed pump performance fault
6385	19	Timeout Error of CAN-Receive-Frame EOI (Engine Starter Motor Relay Control)
6875	3	DEF Supply Pump pressure sensor High fault
6875	4	DEF Supply Pump pressure sensor Low fault

Fault code		Description
SPN	FMI	
6875	16	DEF Supply Pump pressure sensor High plausibility fault
6875	18	DEF Supply Pump pressure sensor Low plausibility fault
6915	3	DPF lamp 2 (DPF Regeneration Active Lamp) Short to Battery
6915	4	DPF lamp 2 (DPF Regeneration Active Lamp) Short to Ground
6915	5	DPF lamp 2 (DPF Regeneration Active Lamp) Open circuit
6916	3	DPF lamp 3 (DPF regeneration switch inhibit lamp) Short to Battery
6916	4	DPF lamp 3 (DPF regeneration switch inhibit lamp) Short to Ground
6916	5	DPF lamp 3 (DPF regeneration switch inhibit lamp) Open circuit
7069	3	DEF Backflow line heater relay output Short circuit to battery Fault
7069	4	DEF Backflow line heater relay output Short circuit to ground Fault
7069	5	DEF Backflow line heater relay output Open circuit Fault
7069	7	DEF Backflow line heater relay output Over temperature Fault
7069	12	DEF Backflow line heater feedback plausibility Fault
7107	12	DEF Supply module temperature plausibility fault (Insufficient temperature increment)
7107	14	DEF Supply module temperature plausibility fault at cold start (Insufficient temperature increment)
7416	3	DEF Supply module heater relay output Short circuit to battery Fault
7416	4	DEF Supply module heater relay output Short circuit to ground Fault
7416	5	DEF Supply module heater relay output Open circuit Fault
7416	7	DEF Supply module heater relay output Over temperature Fault
7416	12	DEF Supply module heater feedback plausibility Fault
7538	12	DEF Supply module temperature duty cycle in failure range
7538	13	Diagnostic Fault Check for Urea supply module duty cycle in the invalid range
7538	22	DEF Supply module heater temperature duty cycle in failure range
7538	23	DEF Supply module heater temperature duty cycle in invalid range
7538	24	DEF Supply module temperature measurement non-availability fault
7538	25	DEF Supply module time period outside specified range
7538	26	DEF Supply module PWM signal fault
7540	3	DEF Suction line heater relay output Short circuit to battery Fault
7540	4	DEF Suction line heater relay output Short circuit to ground Fault
7540	5	DEF Suction line heater relay output Open circuit Fault
7540	7	DEF Suction line heater relay output Over temperature Fault
7540	12	DEF Suction line heater feedback plausibility Fault
7748	3	Starter relay power stage output short circuit to battery
7748	4	Starter relay HS power stage output short circuit to ground
7748	5	Starter relay power stage output open circuit
8614	12	Injection cut off demand (ICO) for shut off coordinator
55296	12	ECU EEPROM Read Error
55552	12	ECU EEPROM Write Error

Fault code		Description
SPN	FMI	
57344	19	Timeout Error of CAN-Receive-Frame CM1 (Status of regeneration initiate and inhibit switches)
61441	19	Timeout Error of CAN-Receive-Frame EBC1 (Engine shut off request)
61454	19	Timeout Error of CAN-Receive-Frame AT1IG1 (NOx Upstream Concentration)
61455	19	Timeout Error of CAN-Receive-Frame AT1O1 (NOx Downstream Concentration)
64923	19	Timeout Error of CAN-Receive-Frame A1DEFI (DEF Tank)
65110	19	Timeout Error of CAN-Receive-Frame AT1T1I (Urea Level, Temperature over CAN)
65164	19	Timeout Error of CAN-Receive-Frame AAI (Hydraulic Oil Temperature)
65241	19	Timeout Error of CAN-Receive-Frame AUXIO1 (status of vehicle cut off [Safety bar])
65265	19	Timeout Error of CAN-Receive-Frame RxCCVS (PTO / Idle up)
65272	19	Timeout Error of CAN-Receive-Frame TRF1 (Transmission oil temperature)
65320	19	Timeout Error of CAN-Receive-Frame FanCtl (FAN Control)
65400	19	Timeout Error of CAN-Receive-Frame RxSMVCU (Pedal & Engine speed demand from VCU)
65400	22	Message Check Sum Error of CAN Receive Frame SMVCU (Pedal & Engine speed demand from VCU)
65400	23	Message Counter Error of CAN Receive Frame SMVCU (Pedal & Engine speed demand from VCU)
65401	19	Timeout Error of CAN-Receive-Frame DPM1 (Air Conditioning Switch Status / Oil life reset)
65402	19	Timeout Error of CAN-Receive-Frame DPM9 (Multiple torque Map select switch)
104332	9	NOx sensor Mounting Error (Upstream NOx sensor)
104385	9	NOx sensor Mounting Error (Downstream NOx sensor)
520601	12	CY327(Power control chipset) SPI Communication Error
520618	12	ECU ADC(Analog to Digital Convertor) NTP(Null Load Test Pulse) Monitoring fault
520641	12	ECU ROM Memory multiple error
520642	12	ECU MM(Monitoring Module) Synchronization Loss fault during Shut-off path test
520643	12	MoF(Monitoring of Function) Over Run error
520696	12	ECU ADC(Analog to Digital Convertor) Test error
520697	12	ECU ADC(Analog to Digital Convertor) Voltage ratio error
520698	12	ECU query response-communication error
520699	12	ECU SPI-communication error
520700	12	ECU Shut-off path test error
520701	12	ECU Wrong set response time error during shut off path test
520702	12	ECU Too many SPI errors during shut off path test
520703	12	ECU WDA working error during Shut-off path test
520704	12	ECU OS Timeout error during Shut-off path test
520705	12	ECU Positive test failure error during Shut-off path test
520706	12	ECU Shut-off path test timeout fault
520707	3	ECU Overvoltage error during Shut-off path test
520707	4	ECU Undervoltage error during Shut-off path test

Fault code		Description
SPN	FMI	
520723	12	NCD Inducement Fault Level1 (Group1 - EGR Block)
520724	12	NCD Inducement Fault Level2 (Group1 - EGR Block)
520725	12	NCD Inducement Fault Level3 Final inducement (Group1 - EGR Block)
520726	12	NCD Inducement Fault Warning (Group1 - EGR Block)
520727	12	NCD Inducement Fault Level1 (Group2 – Dosing Interrupt)
520728	12	NCD Inducement Fault Level2 (Group2 – Dosing Interrupt)
520729	12	NCD Inducement Fault Level3 Final inducement (Group2 – Dosing Interrupt)
520730	12	NCD Inducement Fault Warning (Group2 – Dosing Interrupt)
520736	12	NCD inducement Fault Level1 (Group4 – DEF Quality)
520737	12	NCD inducement Fault Level2 (Group4 – DEF Quality)
520738	12	NCD inducement Fault Level3 Final inducement (Group4 – DEF Quality)
520739	12	NCD inducement Fault Warning (Group4 – DEF Quality)
520740	12	NCD inducement Fault Level1 (Group5 – Tampering)
520741	12	NCD inducement Fault Level2 (Group5 – Tampering)
520742	12	NCD inducement Fault Level3 Final inducement (Group5 – Tampering)
520743	12	NCD inducement Fault Warning (Group5 – Tampering)
520790	12	NCD inducement Repeat offense Level1
520791	12	NCD inducement Repeat offense Level2
520792	12	NCD inducement Repeat offense Level3 Final inducement
520797	12	MoF(Monitoring of Function) Engine speed error